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United States and Canada

AN ECONOMIC GEOGRAPHY

United States and Canada

AN ECONOMIC GEOGRAPHY

ALFRED J. WRIGHT

The Ohio State University

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MANUFACTURED IN THE UNITED STATES OF AMERICA

TO

H. T. W.

PREFACE

The writing of this book was begun late in the period of depressed business conditions. In mimeographed form it appeared in the war period after the United States and Canada had reorganized their peacetime economy for war production. Over a period of three years a succession of classes gave the author an opportunity to test the educational usefulness of the textual material. The book in its present form comes from the press as the United States and Canada have assumed a rôle of leadership in the postwar world. The wartime evolution of the economy has left its imprint upon the life of both nations. The billions of dollars spent for new industrial and commercial equipment, resulting in a new combination of productive factors in the factory, on the farm, and in the mine changed the structure of the economy and altered the alignment of world trade routes.

The traditional regionalism of Anglo-America is discernable in the organization of this book, but regional differences are diminishing in importance as urbanization and industrialization of rural areas change the character of the cultural landscape. A succession of forces such as decentralization of some major production centers, the practice of subcontracting in industry, the reduction of cropped land in areas of marginal utility, and the extension of the arable domain by reclamation of lands, has reshaped the character of the country.

Within the broad framework of major geographic regions a functional treatment of the principal human activities reveals the character of the economic life of the United States and Canada. In the development of both countries a regionalism related to the physical conditions of the landscape persists as a fundamental feature of the national economy. But the works of man have tended to blur the boundaries which separate the re-

gions one from the other. Increasingly, as the years pass, these two English-speaking peoples, separated by an unguarded boundary of more than three thousand miles, have sought through legislation advantages which their natural development has denied them. Neither can legislate an increased or varied endowment of natural resources, but each can and does secure for itself the benefits of markets, carrying trade, processes and patents. Despite the tremendous flow of commerce across the border, they are two nations with distinct economies. The political frontier is a geographic boundary of major importance.

In the writing and the revision of the text the author has had access to voluminous literature—descriptive, statistical and interpretative. Every effort has been made to present recent and reliable data on the changes wrought during and since the war.

It is a pleasure to acknowledge the help of many people who, in one way or another, have aided the author in the preparation of the text and the selection of illustrative material. Most of the maps were prepared by E. Willard Miller, Pennsylvania State College. Many helpful suggestions from C. C. Huntington, Ohio State University, Julian J. Petty, University of South Carolina, David W. Lantis, University of Southern California, and W. Storrs Cole, Cornell University are gratefully acknowledged. Loyal Durand, Jr., University of Tennessee, read the entire manuscript and made many constructive criticisms of the text. A. K. Lobeck, Columbia University, generously permitted the use of a number of drawings in his Airways of America. The book reflects in its present form the critical reading of the entire manuscript by Guy-Harold Smith. His generous helpfulness at all stages is gratefully acknowledged. While acknowledging the contributions of these and many others in the preparation of this book, the author assumes all responsibility for any errors of fact or interpretative statement.

A. J. W.

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I

INTRODUCTION

The Point of View—This book treats the economic geography of that portion of North America occupied by English-speaking peoples. It proceeds from the viewpoint expressed in Dr. Isaiah Bowman's statement that economic geography is the study of "the timeless creative experiment." From this point of view Anglo-America is seen as a grouping or arrangement of general economic activities and regions allocated in such a way that both the individual economies and the pattern or the areal organization of the whole are subject to change. As new roles in the changing state of the arts are imposed upon the environmental conditions the economic regionalism of America is altered.

Economic Regions and Economic Change—The dynamic nature of economic geography is recognized by more people than ever before. The events of the past few decades have made us realize that even though political boundaries remain the same and the physical environment is essentially stable, the economy of the several regions and the use of natural resources are being modified continually. It is now generally recognized that our economy can never be static, that we cannot expect any single environmental factor or any particular activity to become a permanent basis of prosperity. Our attitude toward "abundance" and "isolation," manifested in the creation of barriers to the free exchange of raw materials, comes to be more widely questioned at a time when our industry is increasingly dependent upon materials not found within our borders, and when the accumulation of stock piles is advocated.

These changes are continuous, but they are greatly accelerated and, therefore, are more obvious during a time of war. Then new industries rise, others cease, resources are exploited and new centers arise. With these changes there come extensive rearrangements of trade relations, involving the development of new routes and means of transportation. Some of these changes are temporary, but many more have permanent effect. Consider some of the hitherto-nonindustrial members of the British Commonwealth of Nations such as Canada and Australia, which during the war and with the aid of the two long dominant industrial powers, namely, the United States and Great Britain, turned to manufacturing. In the postwar period these countries with newly established industrial centers,

with modern equipment, and a taste of self-sufficiency will be most reluctant to be dependent again.

The rapidity with which economic changes have taken place in North America, and the close relation that these developments have had to the physical environment make the study of our economic geography particularly interesting. As Dr. O. E. Baker states: "Perhaps nowhere else and at no other time has a great civilization been shaped so rapidly, so simply, and so directly out of the fat of the land." More than one section of our country has seemed to reach a geographical climax only to witness the beginning of another one.

Importance of Resources-Population Ratio—In reviewing the past half-century of historic-geographic developments in the United States, Professor C. O. Sauer of the University of California has said that the two most important events were (1) the passing of free farm lands, and, (2) the invention and mass production of Ford's Model T automobile. Lands which belonged to the public domain and were given away or sold at a nominal price were for over a century an important element in our economy. The existence of undeveloped lands for exploitation gave hope of an increased prosperity for the nation and an opportunity for self-advancement for the individual. The free lands offered outlet which prevented serious overpopulation of any one district. The abundance and the fertility of the land have, perhaps more than any other one environmental factor, differentiated the economy of the United States from that of Western Europe. Even the vast difference in wages for unskilled labor between the United States and Europe is primarily due, not to any difference in the virtues of the individual or of the government, but to the different ratios of resources to men. If the worker and his family did not like the wages or working conditions in Eastern United States, they could "go west" and take up some of the cheap land on the frontier.

Loss of Free-Land Frontier Compensated by New Vertical Frontier—The free lands were of great advantage to us in all but one respect: their existence tempted people to think of our land as inexhaustible and thus encouraged waste. As long as there were lands to be opened, we were inclined to squander the grass, trees, soil, minerals, and animals as areas were occupied.

Naturally the passing of this frontier has deeply affected the economic attitudes of the nation. We have had to develop more intensive methods of farming, learn to practice conservation, revise our view of the nation's future, and seek a new basis of national prosperity. For some people the intellectual adjustment has been painful or impossible. Since our expanding markets have been based on an expanding nation, those people can see no other possibility.

They believe that with the disappearance of the physical frontier the door to opportunity is closed. They have overlooked the fact that a new frontier, which has been aptly termed the "vertical frontier," has taken the place of the other; and that this does not require new territory, but merely increased ingenuity and perseverance in working toward a higher standard of living for a large proportion of the population.

Automotive Achievement Indicative of the New Frontiers—The Model T Ford mentioned by Sauer is a symbol of the opening of this new frontier. It stands for many aspects of the new economy: mass production and the concentration of industrial wage earners, cheap transportation, and powered machinery for all sorts of enterprises. Such changes have given rise to new problems which must be solved by generations yet unborn.

Field and Factors of Economic Geography—Since economic geography includes aspects of both economics and of geography, and has as its field the areal expression and consideration of all the productive factors, it must always recognize changes in the relative values of these factors

This can be illustrated by reference to a particular economic region, the Corn Belt. This table indicates the factors involved in the economy of this district:

TABLE 1

THE CORN BELT

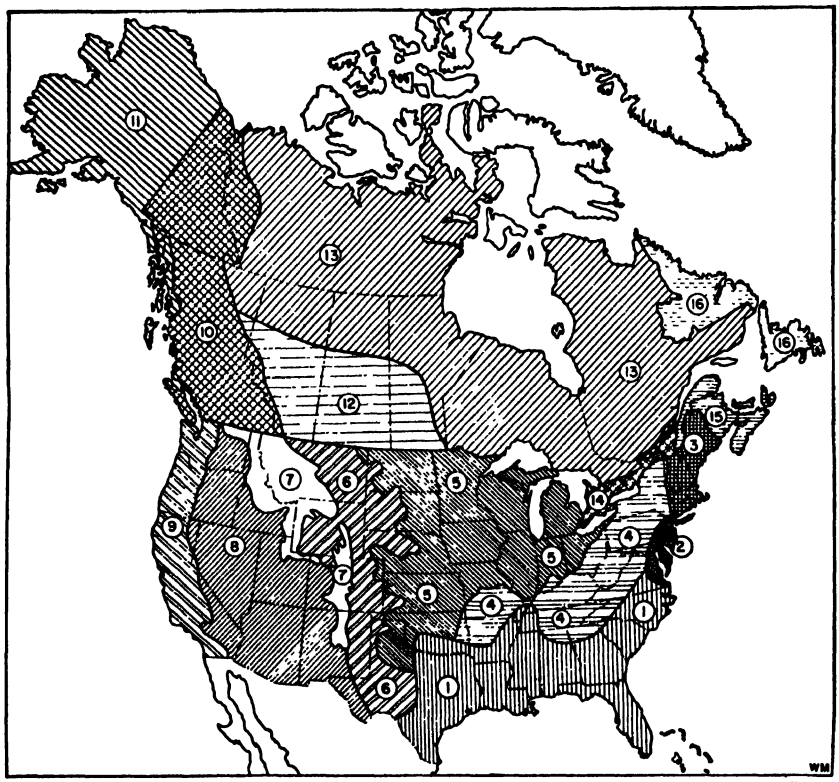
NATURAL FACTORS OF ENVIRONMENT	ECONOMIC FACTORS OF PRODUCTION
Situation	Labor
Climate	Capital
Relief	Entrepreneur
Soil	Government
Vegetation	
Minerals	

This list includes the factors of production. To these must be added the factors of exchange and consumption, which include transportation and markets.

The Corn Belt economy has been derived logically from its favorable situation, soil, terrain, climate, and natural vegetation. Corn dominated the region until new influences brought about a new equilibrium. Prominent among these influences were the rapid growth of urban centers and the movement of labor away from the farm. City markets gradually changed the nature of land use. The declining farm labor made mechanization of farm work necessary.

Economic geography, its phenomena so subject to change, can never be mere description of static conditions. It is necessarily a dynamic history

of forces in action, "the timeless creative experiment." In dividing English-speaking America into subdivisions convenient for study, the attempt is made here to keep the regionalism as simple as is consistent with an understanding of the diversity of activities which characterize these subdivisions.



Based on Goode "Base Map" No XXXX. By permission of the University of Chicago Press

FIG. 1.—GEOGRAPHIC REGIONS OF THE UNITED STATES AND CANADA

(1) The South, an agricultural province (2) Middle Atlantic Littoral, a commercial region (3) New England, a region of manufacturing and specialized agriculture (4) The Appalachian Highlands and Central Highlands, regions of subsistence and specialized agriculture, mining, and manufacturing (5) The Middle West, a balanced economy (6) Western Great Plains, a region of grazing and irrigated agriculture (7) Rocky Mountains (8) Intermontane Basins, a region of arid grazing, dry farming, and irrigation (9) Pacific Valleys and Ranges, a region of lumbering, specialized farming, and manufacturing (10) Pacific Mountains and Valleys (11) Alaska (12) Prairie Province, a region of grain farming (13) Laurentian Upland and the Arctic Plains, a region of logging, mining, and trapping (14) St. Lawrence Valley and the Ontario Lowland, a region of specialized farming and manufacturing (15) Maritime Provinces, a region of fishing, logging, and subsistence farming (16) Newfoundland and Labrador.

Foremost Economic Activities—Functionally, the economic geography of a country treats of the geographic aspects of the ways in which its population makes its living. Many of the factors which together give character to the economic activity are not inherent in the region. The next four chapters of this book take up the major industries of the United States and Canada as a whole, namely, agriculture, mining, manufacturing, and commerce. Following that, these and numerous other aspects of American economic life are considered more in detail by geographic regions.

Major Geographic Regions—There are several ways in which the United States and Canada may be divided into regions convenient for treatment. From the teacher's viewpoint, geographic regions become useful concepts only if the composite of factors and elements, both human and physical, are readily identified.

This type of region is one where availability of resources is roughly uniform throughout, permitting the development of a general socio-economic homogeneity. Several such regions have emerged and are generally recognized such as the Middle West and the South.

The sixteen regions into which the United States, Canada and Newfoundland have been divided have this regional quality. Within each of them are distinctive groupings of economic activities, a few of which lead to further regional subdivision. Experience with students is convincing: the geographical foundations of national well-being is a functional concept. In the chapters which follow, economic activities of the American people are first considered broadly; then, in Part II, they are treated as component elements of the sixteen geographic regions.

Despite the unfortified nature of the international boundary, the most significant environmental factor in the regions which it separates is this delineator of national markets. This fact becomes more obvious as depressions and times of neutrality or of war rock the fancied stability of economic regionalism. Canada and the United States are therefore treated separately, although at times and in places the role of the border is distinctly passive.

PART I

THE MAJOR INDUSTRIES

II

AGRICULTURE AND AGRICULTURAL REGIONS

Social Changes and Geographic Specialization

Westward Movement of Agricultural Frontier—Within the century and a half of agricultural conquest of North America, the frontier has moved from the Atlantic Coast to the Pacific. Man's attempt to put this continent under the plow constitutes a movement that may never occur again in all history. Across the eastern third of the continent the movement was slow because the population was numerically inadequate for the herculean task of clearing the forest, one of the largest and densest in the world. The Appalachian Highland interposed an obstacle to easy conquest. Midland America with its expansive plains and treeless prairies was brought under cultivation much more rapidly. By this time the increasing population of the eastern states was finding its relatively meager agricultural resources more and more inadequate. The high tide of European immigration provided a steady stream of settlers who sought out the fertile farm land along the frontier. Also, the government's policy of public land disposition had become increasingly favorable for settlement; so, too, was the policy of internal improvements.

Geographic Specialization—With each new physical province encountered by these pioneer farmers in their westward migration, they had to learn about the vagaries of climate and the characteristics of the soils which would affect crops. As a result of trial and error there was evolved in each region an agriculture suited more nearly to the physical environment and the economic conditions, than in any other important farming area of the world. Geographic specialization brought about changes in the economy more rapidly than is common in areas where a traditional and self-sufficing agriculture is well established. Within each of the great crop regions, man tended to adapt his crops to the limitations imposed by nature, and, so far as he knew how, tried to take advantage of the economic opportunities for farming in his particular environment.

Measured by the standard of living, the average farmer's success has been much greater in some regions than in others. The assumption that American farmers have made all of their money from farming was chal-

lenged by the veteran Corn Belt editor, William Allen White.[1] He believed that the returns have been primarily from the appreciation in land values brought about by the increasing domestic market. Lowered birthrate and the restriction of immigration have caused the domestic market to level off. However, comparative economic conditions, as well as varying physical factors, still differentiate the numerous districts.

Resultant Agricultural Regions—The amazing diversity of geographic specialization is a phenomenon found in no other part of the world, not even in Europe as a whole. It is based upon the extraordinary diversity of physical conditions and the uniformity of economic opportunity and of social conditions. Although not confined entirely within the boundaries of the United States, all of the following major crop-growing regions do exist within the country: cotton, corn, wheat, hay and dairy, truck and fruit, and grazing and irrigated crops.[2] Canada shares in the last four named.

It must be realized that these are essentially rural land-use regions, not necessarily economic regions. Some of them are highly urbanized and agriculture is far from being dominant in the economy. In others mining is the principal source of income. It is an oversimplification to term even the predominantly rural areas as "economic regions" because of the varying physical and economic conditions under which even one crop is produced. The concept is therefore of relatively large regions in which the crop specialty of rural land gives title to the whole. A more recent map by the Bureau of Agricultural Economics, *Types of Farming Areas in the United States*, embraces more than five hundred separate regions, based upon the way in which farmers make their living from agriculture.[3]

In this chapter only the major lineaments of the agricultural or crop-specialty regions are outlined. They are introduced early in the book, along with chapters on minerals, manufacturing, and commerce because the subsequent chapters dealing with broad geographic regions are treated from this functional point of view.

The specialization in rural land-use in the United States and Canada results in an agriculturally-balanced (but not self-sufficient) economy which is interdependent regionally. To a limited degree this applies to the United States—Canadian relationship as well.

Major Rural Land-Use Regions of the United States and Canada—The geographical and agricultural heart of the continent is the Corn Belt of the United States (Fig. 2). This is the only large area of the country

[1] William Allen White, *The Changing West*, New York, 1939.

[2] O. E. Baker, "Agricultural Regions of North America," published in *Economic Geography*, through 1926, 1927, and 1928.

[3] "Types of Farming Areas in the United States" (United States Department of Agriculture, Bureau of Agricultural Economics, Washington, 1939).

growing at least three thousand bushels of corn per square mile. However there are other areas where corn occupies almost as large a proportion of the cropped land as any other crop. Some of them lie in the southern states, east of the Mississippi River. Cropped land here constitutes a smaller proportion of the whole area in farms, than in the Corn Belt.

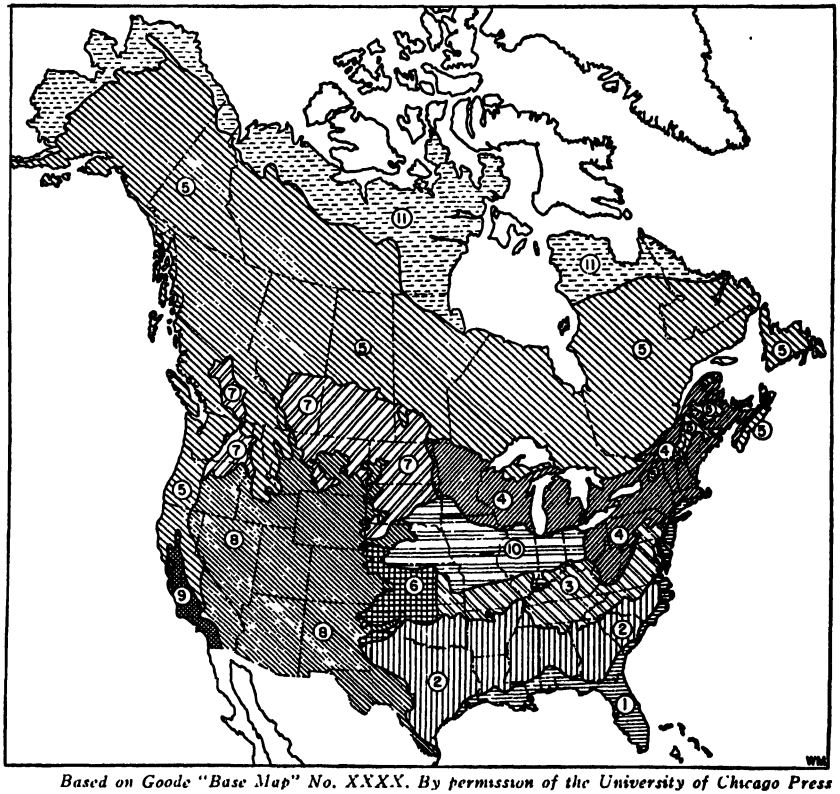


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FIG. 2.—RURAL LAND-USE REGIONS

(1) Humid subtropical crops region (2) Cotton belt (3) Corn and winter wheat belt (4) Hay and dairy region (5) Forest regions (6) Winter wheat region (7) Spring wheat region (8) Grazing and irrigated crops region (9) Dry subtropical crops region (10) Corn belt (11) Tundra.

Of the crop-specialty regions, the Corn Belt is one of the least deserving of its name. It is in reality a good general farming region with no more than half of its cropped land devoted to the growing of corn. The corn is fed to swine and to beef animals, with minor amounts to dairy cattle, sheep, and poultry. Illinois is the only state which sells an important part of its corn crop for other than feeding purposes.

Most farmers practice a regular rotation of the main crops such as: corn, wheat, or oats, and alfalfa or clover. Specialty crops are grown in many districts; tobacco, sweet corn, tomatoes, soybeans, and truck crops. Dairying and poultry are increasing in importance, especially in the more highly urbanized part of the Corn Belt east of the Mississippi River. In no part of the region is there anything like "industrialized corn growing" exclusively, the equivalent of developments found in cotton and wheat production.

Perhaps the outstanding quality of Corn Belt farming is its general prosperity. The broad gently-rolling-to-flat plains of western Ohio, Indiana, Illinois, Iowa, eastern Nebraska, and southern Minnesota support probably the most independent and prosperous farm population of similar extent in all the world. The prosperity of the rural population has given rise to active trading centers and to manufacturing.

The Corn Belt encompasses within its borders a large part of western Ohio, much of Indiana, Illinois, and Missouri, nearly all of Iowa, southeastern South Dakota, eastern Nebraska, and northeastern Kansas. To the north are the Great Lakes and on the south the Ohio River. Cutting across it from north to south is the Mississippi. These water routes have, in times past, served the Corn Belt as commercial outlets. Just east of this major agricultural region lie the major gateways across the Appalachians utilized by the great freight-carrying railroads which serve this area. Certainly one of the most important aspects of the Corn Belt is its accessibility to the northern and eastern port cities.

These are the conditions which have contributed to the emergence of commerce and manufacturing in the Corn Belt. Despite the fact that the level terrain, the climate, the fertility of soil, and the inclination of farmers combine to make this a highly successful corn-growing region, the dominant economy of many parts of the area tends to make the name, Corn Belt, inappropriate. Yet in many areas the type of industry such as the processing of corn and meat packing are functionly related to the raising of corn.

The Wheat Belts—Adjacent to the Corn Belt, mainly on the west and north, lie the Winter Wheat Belt of western Kansas and the Spring Wheat Belt of the Dakotas. These empires of wheat are separated by the unproductive sand hills of Nebraska. The western limit of wheat growing in both districts is set by increasing aridity. The eastern margin of the Winter Wheat and southeastern margin of the Spring Wheat belts are characterized by competition with corn. The southern margin of the Winter Wheat Belt is marked by competition with cotton.

The Canadian portion of the Spring Wheat Belt has low temperatures and poor soils as its northern and eastern limits, respectively. Although

the growing of Spring Wheat crosses the international boundary the resulting agricultural region is not an economic unit. Natural conditions are comparable on both sides of the border, but the role played by each wheat region in the economy of its own country is quite different. One, by law, has been able to protect its market; the other has not.

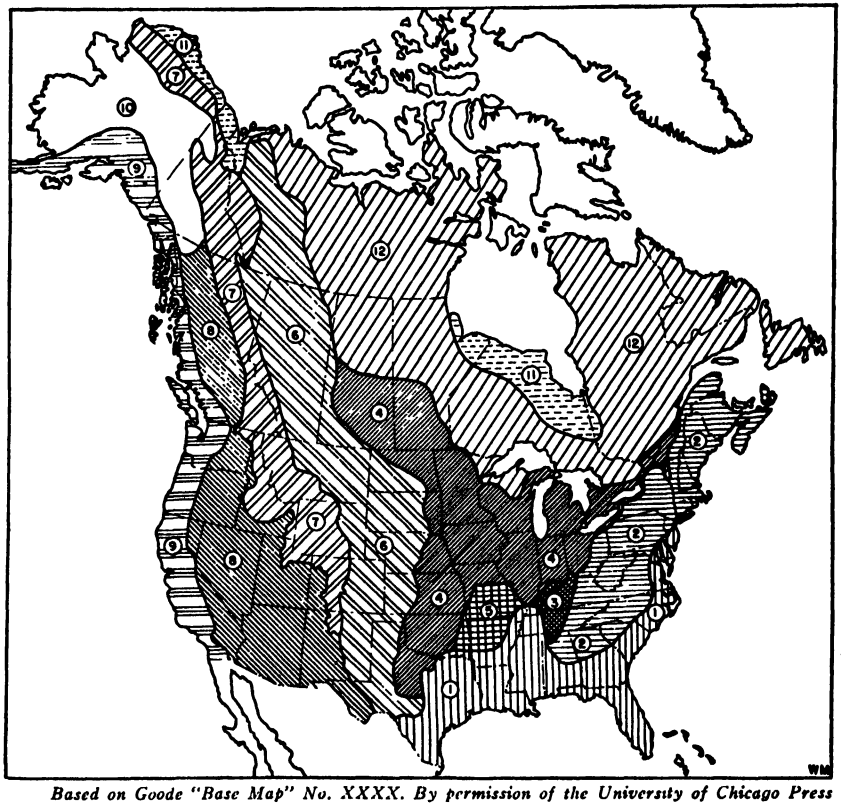

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FIG. 3.—THE PHYSIOGRAPHIC REGIONS OF THE UNITED STATES AND CANADA

(1) Atlantic and Gulf Coastal Plains (2) Appalachian Region (3) Interior Low Plateaus (4) Central Lowlands (5) Ozark-Ouachita Upland (6) Great Plains (7) Rocky Mountains (8) Intermontane Province (9) Pacific Coast Region (10) Yukon Basin (11) Arctic Plains and James Bay Clay Belt (12) Laurentian Upland.

No matter where wheat is grown in these two great wheat regions, its production has tended to become a specialized industry rather than a way of life as in the Corn Belt. Mechanization of all phases of wheat growing, land abandonment in the parts afflicted by wind erosion, and the gradual

diversification of farming practices in the eastern and southern districts characterize both wheat regions.

Corn and Winter Wheat Belt—Like the term Corn Belt, the name given this region does not do justice to the present-day type of rural land use. It is the only region thus far cited which has any considerable amount of hilly land. Lying immediately south of the Corn Belt of the Mississippi Valley, and south of the Hay and Dairy Belt of the Appalachian states, it partakes of the economy of both northern neighbors. The Corn and Winter Wheat Belt embraces the hill country of the Ozark Highland, the Interior Low Plateaus south of the Ohio River, the Appalachian Highlands, and extends eastward toward Chesapeake Bay. The critical natural environmental factor in the economy of this great region is unquestionably its rough topography. Wherever hills cease to be dominant in the landscape, some specialized land use interrupts the prevailing economy of the larger region, as for instance tobacco in Kentucky, Tennessee, and Pennsylvania, and fruit in Virginia, West Virginia, and Maryland.

As far as climate is concerned, all but the higher portions permit inclusion in the Corn Belt. Many of the lowland areas and broad valleys are important for corn. The most notable areas include the Kentucky Blue Grass, the Nashville Basin in Tennessee, the Shenandoah Valley, and the southeastern counties of Pennsylvania.

An economy best described as self-sufficing prevails over most of the large area. There is little commercial agriculture here; the population per square mile is relatively dense, and the living standards are low.

Hay and Dairy Belt—North of the Corn Belt, the Corn and Winter-Wheat Belt, and the Middle Atlantic Trucking Region, there is a large area of varied agricultural industries known as the Hay and Dairy Belt. The conditions under which these specialties are produced, differ locally; many parts of the area may be described as essentially self-sufficient.

The high proportion of urban population living within this rural land-use region (one-half of Canada's and one-fourth of the United States'), has been conducive to the development of dairying. The greater accessibility of the eastern half of this region to large fluid-milk markets has enabled dairymen to devote themselves primarily to supplying this demand. But the western half of the area must include less perishable products, such as butter, cheese, and condensed milk. The great influx of summer visitors to the Hay and Dairy Region makes the market for fresh milk very seasonable in some districts, and therefore encourages the manufacture of milk products at other times. The great permissive factor in the farm economy of the Hay and Dairy Belt is hay and pasture. Most of this region has a climate favorable to grass. Throughout New England, the Middle At-

lantic, and the Upper Lakes States, hay and natural pasture constitute the principal land use.

Cotton Belt—Nearly one-sixth of the area of the United States is embraced in the rural land-use region known as the Cotton Belt. Unlike the

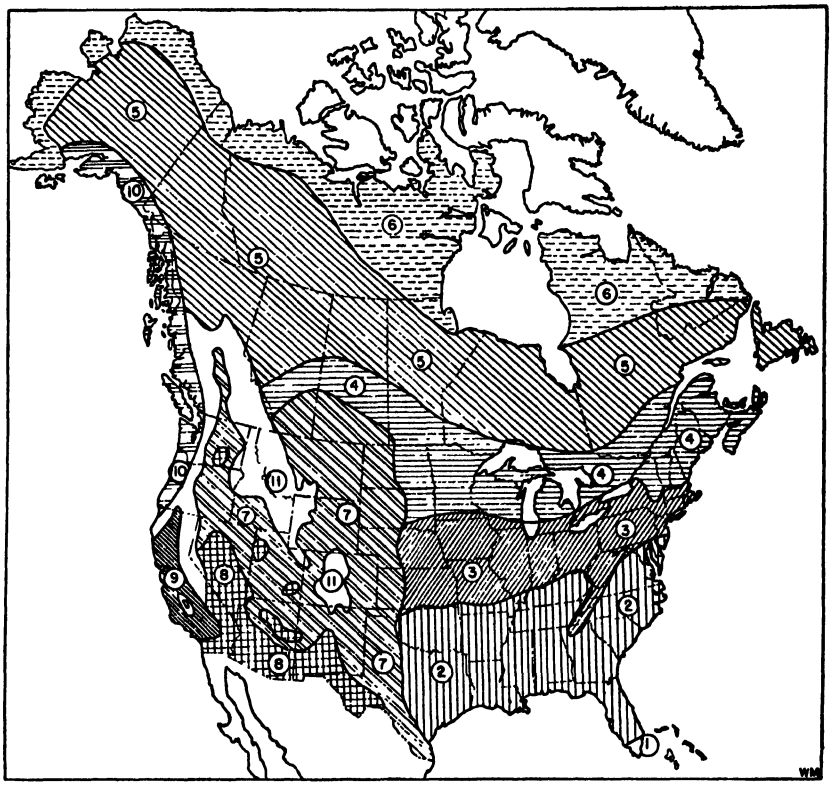

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FIG. 4.—CLIMATIC REGIONS OF THE UNITED STATES AND CANADA

(1) Tropical rain forest (2) Humid subtropical (3) Humid Continental (long summers) (4) Humid Continental (short summers) (5) Subarctic (6) Tundra (7) Middle latitude steppe (8) Middle latitude desert (9) Mediterranean or dry subtropical (10) Marine west coast (11) Highland.

Hay and Dairy, and the Wheat regions, the climate of the cotton-growing region permits the cultivation of a wide variety of crops. Few areas in the South have such a high proportion of the land devoted to the major crop as in the wheat areas or even in the western portion of the Corn Belt.

Historically, the boundaries of the cotton-growing South have been almost wholly defined by climate; but changes in cropping have been

taking place which have modified the location of the Cotton Belt. Generally the northern boundary follows the 77 degree average summer isotherm or 200 frost-free days. The western limit has been moving progressively westward and has now reached, without the benefit of irrigation, the 18-inch isohyet. The southern limit is approximately the 10-inch isohyet of

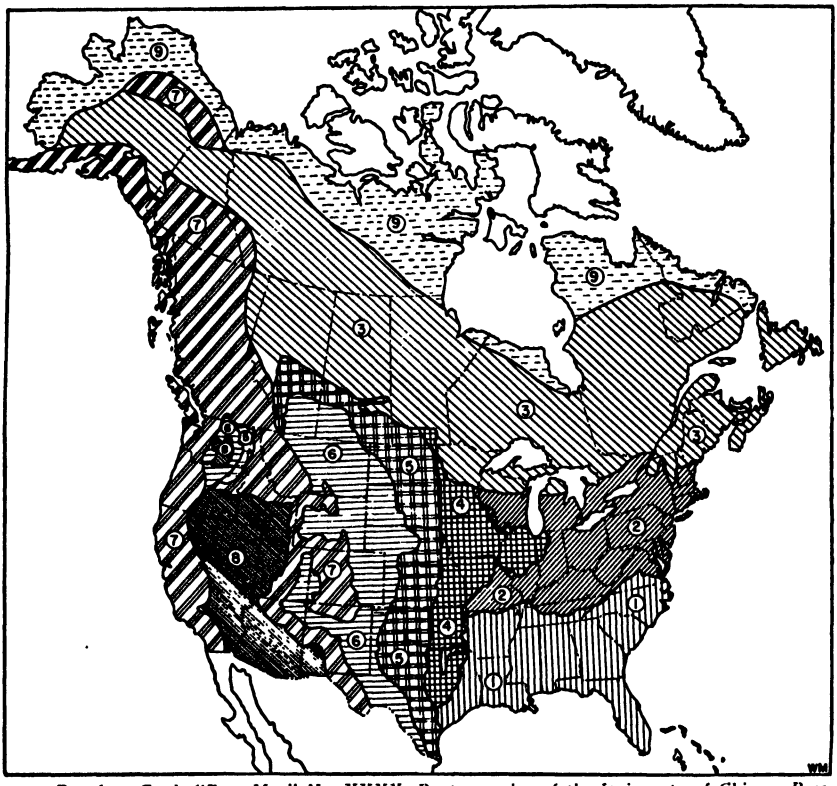

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FIG. 5.—SOILS OF THE UNITED STATES AND CANADA

(1) Subtropical red and yellow (2) Gray-brown forest (3) Podzols (4) Prairie (5) Chernozems (6) Brown steppe (7) Complex soils of mountains (8) Desert (9) Tundra.

autumn precipitation, generally some fifty miles inland from the Gulf coast. In the east poor drainage and inferior soils keep cotton from reaching the Atlantic. Within this large region there are many districts in which cotton does not dominate the farm landscape, particularly in the southeast.

After nearly a century and a half of cotton farming, the "system" under which it is grown has so dominated the farmers as to make them among

the least prosperous and independent of American farmers. Cotton growing is an exacting type of agriculture. It has a long work year, a maximum of hand labor and a dependence upon commercial credit. It has so modified the sources of credit and the outlets for distribution are so specialized as to make it very difficult for the small cotton farmer to break away from the cotton system.

Widespread ravages by the cotton boll weevil and the effects of the Second World War gave powerful impetus to crop changes in the cotton-growing South. Industrial payrolls at scores of new plants and shipyards, stoppage of imported vegetable oils into the United States, migration of both white and colored labor to northern factories, and the greatly increased purchasing power of most southern families, have been strong factors in bringing about a change in the nature of rural land-use in the former Cotton Belt. Relative independence was made possible for thousands of southern farm laborers; the Cotton Belt is less than ever before a one-industry region.

Gulf Subtropical Crop Area—More than three-fourths of a wide belt of Coastal Plain which fronts upon the Gulf of Mexico is forest, cut-over land, or swamp. In it are many "oases" of intensive agriculture where sugar cane, rice, citrus fruit, and early vegetables are produced for distant markets. The less desirable land, a very large part of the total area, is devoted to grazing livestock, or is unused. There is too much autumn rain for cotton.

This Gulf margin is further diversified by the rise of port towns and cities handling enormous tonnages of petroleum, cotton, naval stores, fruit and vegetables, salt, sulphur, and wood products. In recent years there has been a tendency for refining, smelting, and manufacturing plants to locate here. These industries have modified the agriculture of many districts along the subtropic coast.

Fishing has long been important to a relatively small proportion of the people. With the coming of winter tourists, game fishing has occupied a few of the seafarers.

Pacific Subtropical Crop Areas—Another subtropical area lies along the Pacific Coast south of San Francisco. It is not so restricted to the coast as that along the Gulf. It includes the valleys of the Coast Ranges, much of the Great Valley of California, and a portion of the arid interior of southern California. It is by no means uniformly utilized for agriculture, for while it contains larger arable regions than are found along the Gulf of Mexico, yet a smaller proportion of its total area can be used. It is prevailingly subhumid, whereas the Gulf margin has the heaviest rainfall of eastern United States. Both regions permit a wide range of crops.

Half or more of its area is mountainous. Its expensive irrigated lands

are much more densely populated than along the Gulf. It is twice as far from the luxury markets of the northeastern states. The Gulf south is surfeited with labor, while the Pacific southwest is deficient in labor and must rely on large numbers of transient workers each season.

Until recent years, the Pacific subtropical region was of very little industrial importance. It became the most rapidly-growing manufacturing area in the United States after Pearl Harbor. It will always be a Pacific subtropical region but the nature of its economy is in transition.

North Pacific Hay and Pasture Region—North of the subtropic Pacific coastal region there is a humid land of high mountains, relatively broad basins, and sparse population. It is composed of many small agricultural districts, most of them with specialized crop systems. The land had to be cleared of forests, much of it required draining, and all of it lacked the large local markets of southern California.

It is a temperate zone crops region. Apples, plums, hops, berries, flax, dairying and sheep raising are important aspects of its agriculture.

After Pearl Harbor, manufacturing and shipbuilding industries came to this Pacific Northwest; urban population rose rapidly. The increased activity in Alaska has contributed to the commercial importance of this part of the Northwest. Two of the largest dams in the country, the Bonneville and the Grand Coulee have been constructed on the Columbia River; what their ultimate effect will be upon industry of the Northwest, only the future can tell.

Grazing and Irrigated Crops—This immense region extends from the western margin of the Great Plains to the Sierra Nevada-Cascade mountain systems, and from Mexico to Canada. All of it is dry, and the population is sparse. Where water for irrigation is available, reclamation has taken place which supports an intensive agriculture and densely populated communities are found.

In general there are four great subdivisions of this province: the Rocky Mountains, the Columbia Plateau of eastern Washington and Oregon and southern Idaho which ranges widely in elevation, from less than 1,000 feet in the west to 4,000 feet in the east; the Colorado Plateau of western Colorado, southeastern Utah, and northern Arizona, with elevation generally above 4,000 feet; and the Basin and Range province of southeastern California, southern Arizona, and northern Mexico, with a wide range in elevation, from below sea level to 4,000 feet. The Great Basin, a northern subdivision of the Basin and Range province, lies chiefly in Nevada and western Utah, and averages 3,500 feet in elevation.

Mineral wealth brought many of the settlers to this vast region, and the fluctuating fortunes of mining camps have been reflected in the tide of population. Minerals are often made the football of politics, and the

present population of the physiographic divisions which make up this natural land-use area have not been exempt from the vagaries of a mineral economy.

Probably the best-known and the most important single oasis in all this region is the Salt Lake development of the Mormon Church. Since the

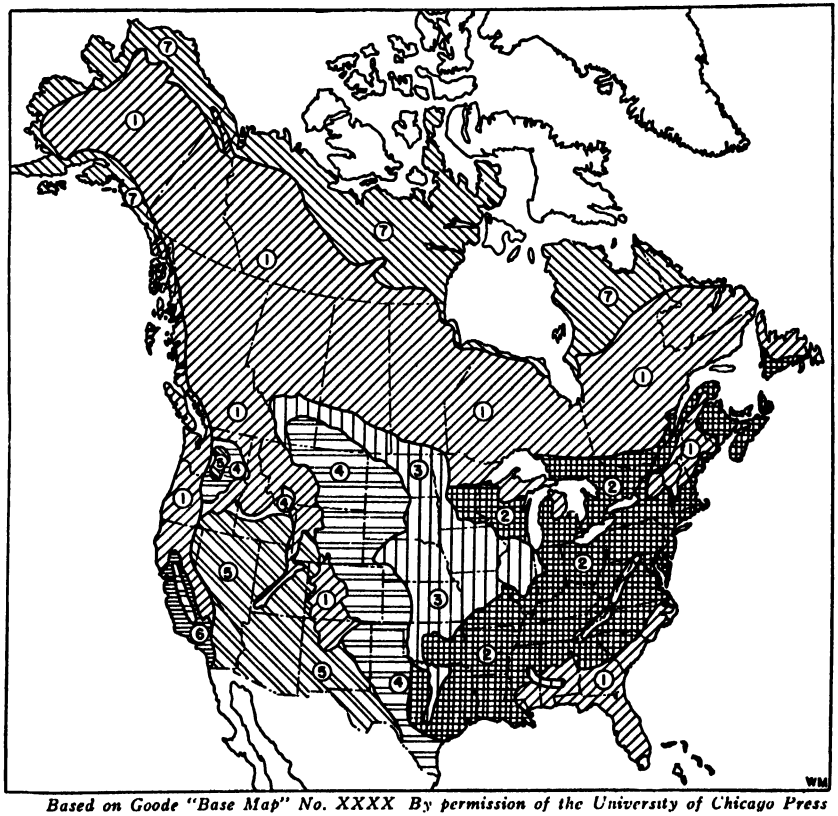

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FIG. 6.—VEGETATION REGIONS OF THE UNITED STATES AND CANADA

(1) Coniferous forest (2) Broadleaf and mixed broadleaf-coniferous forest (3) Prairie (4) Steppe (5) Desert shrub (6) Mediterranean scrub forest (7) Tundra.

middle of the nineteenth century, these agriculturists have pioneered a farm economy in the midst of an arid land.

Another important agricultural section of this inter-mountain area is the wheat-growing district of the Palouse country in eastern Washington; this is the only nonirrigated farming region of comparable size anywhere between the Great Plains and the Pacific mountain system.

The farmers on the irrigated delta plain of the lower Colorado River

in southeastern California take advantage of its lower elevation and lower latitude to produce long staple cotton, winter vegetables, subtropical fruits, and alfalfa. Similar crops are grown farther east in the Salt River Valley of Arizona.

Despite these locally important farming districts, the over-all importance of the mineral industries is evident in many ways. In Nevada for instance, about two-thirds of the area of the state is owned by the Federal Government and returns no taxes to the State treasury. Nevada's gold- and silver-mining districts in the western part of the state, and her copper, lead, and zinc districts in the southern and central parts have dominated the state's economy. Copper, iron and coal in central and southern Utah play a similar role there.

Northern Lands—North of the Hay and Dairying Belt and the Spring Wheat area lies a vast expanse of nonagricultural land. Encompassed within this great area is the major portion of the Laurentian Upland of Canada, the Mackenzie Basin, and the broad mountain system of western Canada and Alaska. Three major vegetation belts span the continent from the Pacific to the Atlantic. These belts from south to north are: forest and hay, northern forest and brush, and the tundra. All three belts are found in the same order in Alaska, with the forest and hay belt confined to the Yukon and Tanana valleys on the central upland of the Territory.

Characteristics and Recent Trends in American Agriculture

Yield per Man—In nearly all of the important crop regions of the United States and Canada, the agricultural goal has been the maximum yield per man engaged, rather than the maximum yield per acre as prevails in countries with a pressure of population upon resources of the land. In the gratification of human wants, this is wholly desirable. It has promoted the mechanization and the industrialization of American agriculture.

Mechanization—The substitution of powered machinery for human labor has been facilitated by the nature of crops which are grown and the nature of the terrain. The advent of the first farm tractor and the wheat combine made a permanent change in the agricultural practices of the wheat lands of the interior; eastern agriculture waited for lighter tractors and smaller combines. It got them. The cotton-growing parts of the South are still waiting for the widespread use of mechanical cotton pickers, thus far restricted to the plains of Texas where all bolls ripen at the same time. Even rice, potatoes, and sugar beets have a production method entirely different from that prevailing in the Old World.

Factories in the Field—In some parts of the United States and Canada the intensification of agriculture has earned the doubtful distinction of being described as "factories in the field." A large part of the laborers in these districts are aptly termed "adrift on the land." No large agricultural section of the United States is entirely free from this practice of considering field hands as completely dissociated from the farm as is factory labor, but the Pacific valleys are the principal centers where this distinction is made.

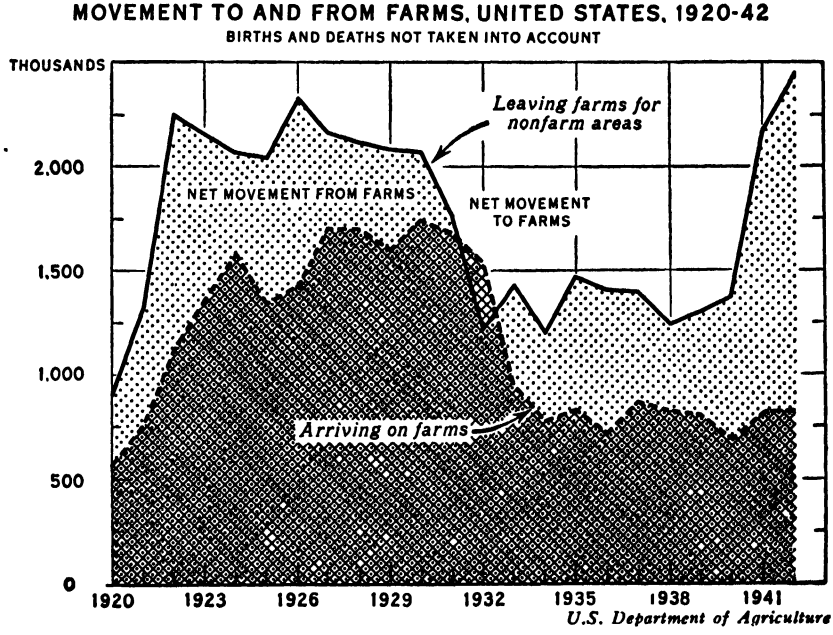


FIG. 7

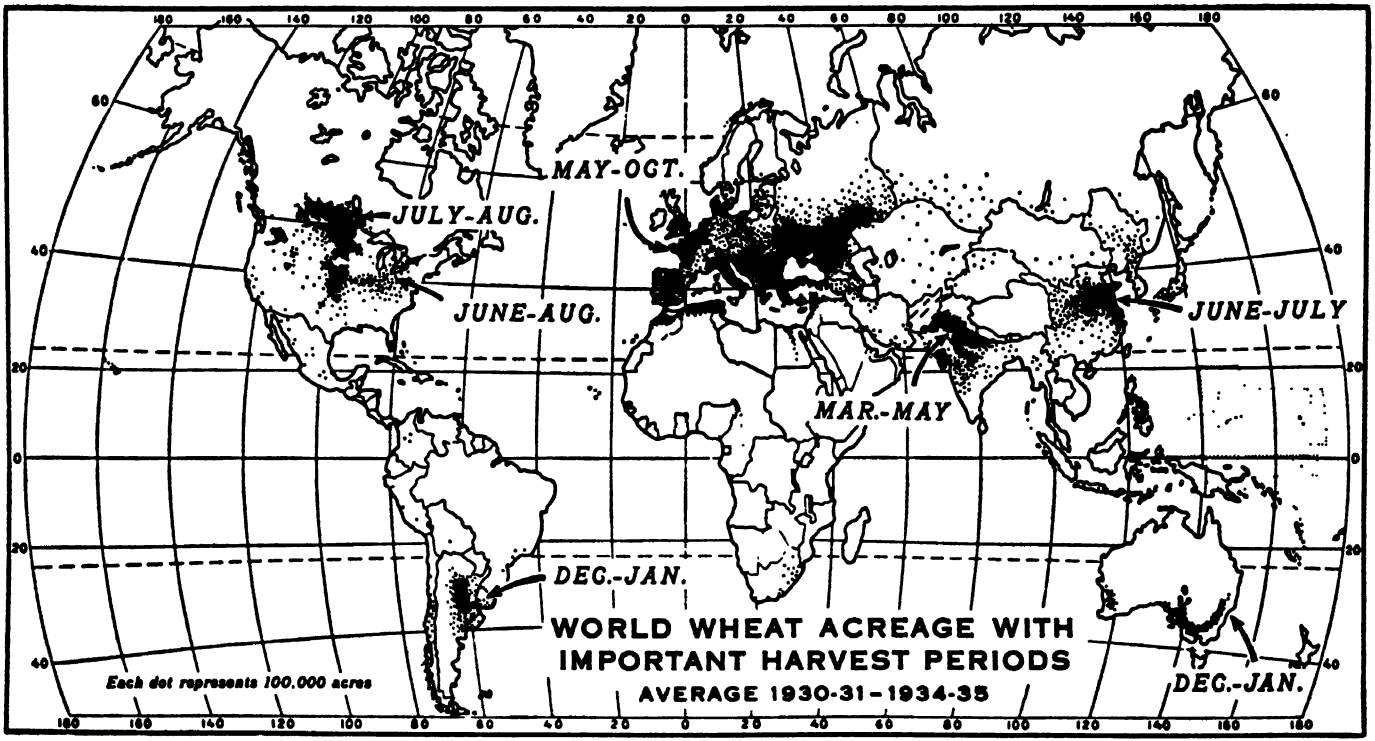
Agricultural-industrial Relationships—In America it has been generally true that farm labor could and would advance up the so-called "agricultural ladder," from farm hand and tenant, to owner-operator, and perhaps absentee owner. The declining rural farm population characteristic of most important agricultural sections manifests an interruption of this process. The rise of manufacturing (in varying degrees) in all but the arid interior of the United States has to a large extent depended upon the rural population for labor. The farms from which these laborers have come have been important consumers of factory goods. Probably no other nation can approach the extent of this farm market. There is a third

aspect of this farm-factory relationship, and that is the production of raw materials for factory consumption; this bond is strengthened as chemistry enables the nation to produce its own substitutes for some raw materials formerly imported.

Tenancy—The manufacturing plants which have been established in such agricultural districts as the Deep South, the Central Highlands, Salt Lake Oasis, and the Pacific Coast, as well as in the older manufacturing districts of the Middle West, have undoubtedly made a profound impression upon their agriculture. Land values have risen, factory employment has depleted the ranks of farm labor, and in some cases large tracts of the best land in the region have been converted to factory purposes. Tenancy increases with the price of land. The mechanization of farm work makes imperative a large investment in machinery. Financial advances by insurance companies and banks have ultimately brought important areas under their ownership. There is a small but increasing number of farmers who believe it is to their best interests not to become owners of the land they operate. Many farmers have accepted tenancy or employment on corporate-owned farms as a satisfying way of life.

Government—The government has become an active partner in agriculture, particularly through the Agricultural Adjustment Administration. This has affected the several agricultural sections of the United States in different ways, but in general the government has sought to retire submarginal cropland and to bring new soil-building crops into the farming system. Government has also, indirectly, tended to tempt a farmer to work more land than his own farm, so as to increase his production. It has raised farm wages and thus accelerated the changes in farm practices.

Impact of World War II—The Second World War converted the United States and Canada into an "arsenal" for the United Nations. Instead of "Food will win the War" as a slogan (World War I), the growth of factory production was phenomenal, even for the United States. Farmland changed hands without emotion during World War II, but the rise of new factories in hitherto-agricultural communities has disrupted the economy of hundreds of American communities. The attack on Pearl Harbor, with the subsequent demand for more food for the largest American army ever mustered, came at a time when AAA practices had somewhat reduced the food production of the farms. The wartime need for food and shortages in the immediate postwar period called for an expansion of agricultural production instead of restriction characteristic of the early thirties.



U.S. Department of Agriculture

FIG. 8.—DISTRIBUTION OF WORLD WHEAT ACREAGE

This is why wheat-growing nations have sought to establish quotas of export

III

MINERAL RESOURCES AND THE MINERAL INDUSTRIES

Resources and Characteristics of the Industry

Mineral Endowment—The United States has been for many years the world's principal producer and consumer of mineral raw materials. The experience of supplying needed minerals and their products during the five years of the Second World War brought to the attention of Congress and to laymen everywhere the question of adequacy of resources. It was not enough for United States interests to own mineral industries in foreign lands; the diversion of shipping space and of men during the emergency was critical.

No nation is self-sufficient in the minerals needed in today's industrial life. The United States and Canada together are superlatively well endowed with mineral resources, even with some of those most recently in demand because of the use of atomic energy. But as industrial nations they are forced to go to many parts of the world to obtain some thirty or more minerals needed in their industrial processes. Faced with the imminence of war, the United States began to accumulate stock piles of as many needed raw materials as could be purchased at the time. Several nations were bidding for these mineral stocks; some of these bidders were determined that the United States should be denied. As a result, the volume of purchases that was actually delivered was of little consequence in the war effort.

Sixty-five different minerals emanating from 53 countries were considered as vital to the war effort. Of these, 27 were obtainable only from abroad, including most of the essential minerals used in the newly developed field of electronics: quartz crystals, tantalite, high-grade mica, beryl, tin and diamonds. The remaining 38 minerals had to be imported because domestic production could not meet the demand. So great was this emergency that several minerals were flown to the United States, including mica from India, beryllium from Brazil, tantalite from the Belgian Congo, tin and tungsten from China.

From Surplus to Deficiency—Perhaps the most surprising aspect of the situation was the change from the status of surplus-producing to that

of deficiency. The resources of the United States and of Canada were strained to meet the demand for minerals they had considered as adequate for their use; manpower shortage, the added expense and time lag in raising the output of mining properties conspired to make them deficient for the emergency. As the greatest single user of many of these minerals, the steel industry reflects this situation in the table below.[1] Copper, for instance, fell from an export surplus to a 37 per cent deficiency; lead from a virtual adequacy to a 40 per cent deficiency; zinc from virtual adequacy to 36 per cent deficiency. Zinc, copper and lead alone accounted for more than half of the dollar value of the United States mineral imports during the war. Although serious in Canada, it was perhaps not so critical due to the fact that Canadian industry was related more closely to that in the United States, and the joint demand was attuned somewhat more closely to Canadian resources than was the case with the United States. It is probably true that Canadian manufacturing was more nearly in line with her resource endowment than it is in peacetime.

Now that the war is over, the experts differ as to the extent of our mineral reserves, even those charged with the policy-making for their conservation. Conflicting and sometimes alarming viewpoints have been expressed. It was enough to convince Congress of the necessity for accumulating stock piles of such mineral and other raw materials as are normally

[1] UNITED STATES' PROPORTIONAL SHARE OF WORLD'S PRODUCTION AND CONSUMPTION OF NONFERROUS METALS

METAL	UNITED STATES PER CENT OF PREWAR PRODUCTION (AVE.)	UNITED STATES PER CENT OF PREWAR CONSUMPTION (AVE.)	CHIEF SOURCES OF U.S. SUPPLY	UNITED STATES PER CENT OF WARTIME PRODUCTION (AVE.)	UNITED STATES PER CENT OF WARTIME CONSUMPTION (AVE.)	CHIEF SOURCES OF U.S. SUPPLY
Copper	40	35	U.S.	40	60	U.S., Chile
Lead	30	35	U.S.	27	50	U.S., Mexico, Peru, Australia, Canada
Tin	—	45	Br. Malaya, U.K., Neth. India	—	45	Bolivia, B. Congo
Zinc	35	35	U.S.	40	50	U.S., Mexico, Canada, Peru
Aluminum	30	40	U.S. Surinam	35	35	U.S., Surinam

(from: *Steel Facts*, March, 1947)

TABLE 2

Principal Ferro-Alloys Used by Steel Industry

Metal	Reason for Use	Typical Applications	Prewar Average			Wartime Average		
			Per cent of world production produced in U.S.	Per cent of world production consumed in U.S.	Chief sources of United States supply	Per cent of world production produced in U.S.	Per cent of world production consumed in U.S.	Chief sources of United States supply
Chromium	Small amounts improve hardening qualities, more than 10% prevents rust	Tools; machinery parts, stainless and heat- and acid-resisting steels	Insignificant	35	Africa, Cuba, Greece, New Caledonia, Oceania	5	50	Africa, Cuba, Greece, New Caledonia, Oceania
Cobalt	Holds cutting edge at high temperatures. Improves electrical qualities	High-speed cutting tools; permanent magnet steel	None	10	Canada, Belgian Africa, Australia	Insignificant	50	Canada, Belgian Africa, Fr. Morocco
Manganese	Small amounts remove gases from steel; 1 to 2% increases strength and toughness; 12% imparts great toughness and resistance to abrasion	Small amounts present in all steels; 1 to 2% used in rails; 12% or more for frogs and switches and dredge bucket teeth	Insignificant	20	Russia, Gold Coast, Brazil, India	5	30	Gold Coast, Brazil, India, Cuba
Molybdenum	Increases strength, ductility, and resistance to shock	Tools; machinery parts, tubing for air-plane fuselage	80	40	United States	90	75	United States
Nickel	Increases toughness, stiffness, strength, and ductility In large amounts resists heat and acids	Tools; machinery parts, stainless steels; heat- and acid-resisting steels	Insignificant	50	Canada, Norway, New Caledonia	Insignificant	75	Canada, Cuba, New Caledonia
Tungsten	Retains hardness and toughness at high temperature	High-speed cutting tools; magnets	10	20	China, British Malaya, United States	25	40	United States, Bolivia, China, Argentina, Brazil
Vanadium	Increases strength, ductility, and resiliency	Tools, springs; machinery parts	15	25	United States, Peru, Rhodesia	50	75	United States, Peru, South West Africa

(from: *Steel Facts*, March, 1947)

not produced or are inadequately produced in the United States; these stock piles are to be accumulated for emergency use only after the present needs of industry are met. In 1947 there was little beyond the needs of industry in these purchases. Whatever the success in stock-piling, it highlights the growing interdependence of industrial nations. The following table is believed to represent the adequacy of United States and Canadian mineral resources, based upon their peacetime use by the two nations.

TABLE 3

MINERAL RESOURCES OF THE UNITED STATES AND CANADA

MINERAL	ADEQUACY, U.S.A.	ADEQUACY, CANADA
Power minerals		
coal	adequate	deficient
petroleum	adequate	deficient
Iron and alloying minerals		
iron	adequate	adequate
vanadium	inadequate	deficient
molybdenum	adequate	deficient
tungsten	deficient	deficient
manganese	deficient	deficient
chromium	deficient	deficient
nickel	deficient	adequate
Nonferrous metals		
copper	adequate	adequate
lead	adequate	adequate
zinc	adequate	adequate
tin	deficient	deficient
Light metals		
aluminum	deficient	deficient
magnesium	adequate	deficient
Fertilizer minerals		
phosphates	adequate	adequate
potash	adequate	deficient
Precious metals		
gold	adequate	deficient
silver	adequate	deficient
platinum	deficient	deficient

Source: *Minerals Yearbook*

Basic Localization Factors—Two of the most abundant of domestic minerals are coal and iron, basic to industry and industrial location. Their presence has fixed the industrialized areas, both in the United States and in Canada. Practically all other minerals flow into these centers. Either coal will move to iron, the iron will move to coal, or both move to a point midway as determined by factors within the general coal-iron area itself, such as market, labor, and transportation facilities. The abundance and excellence of Appalachian coal made available, for industrial use, the refractory metalliferous ores of nature and released the metals.[2]

[2] W. H. Voskuil, *Minerals in Modern Industry*, New York, 1930, pp. 21–22.

Importance of Mining—Mining, quarrying, and their associated industries in the United States and Canada employ somewhat fewer wage earners and turn out a smaller value of products than either agriculture or manufacturing. Due to their geographical segregation minerals constitute a large part of the commerce of the United States and Canada. Exclusive of stone, sand, gravel, etc., coal accounts for approximately 95 per cent of all mineral tonnages, and iron about 90 per cent of our nation's metallic output. Indirectly, therefore, the mineral industry gives employment to many persons not listed as engaged in mining and quarrying.

Most domestic minerals are comparatively cheap. They require relatively little effort in extraction. In the sparsely populated western half of this country and in the Laurentian Upland of Canada, the mineral industry dominates the economy of many areas. In New England the mineral industry is of little consequence outside of one or two districts. Elsewhere, representatives of one or more of the mineral raw materials add diversity to the economy. Commerce in minerals is generally one-way and involves great distances over land or water routes.

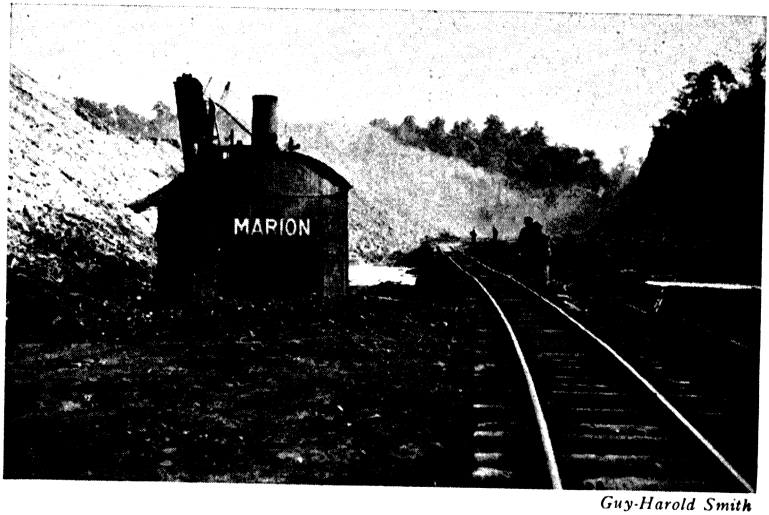
Characteristics of Mining—Mining in the United States and Canada exhibits some of the characteristics we have noted in agriculture and will find in manufacturing. The goal is the maximum output per man engaged in the industry. In terms of output per worker in England, Germany, and Japan the output for the United States is high. Another characteristic is strip mining, a response to the relatively low value of the surface land and the occurrence of the ore near the surface. Strip mining involves the removal of the overburden and mining with a power shovel.[3] In bituminous coal, copper, gold (placer), this type of mining is not uncommon. Another characteristic is the uncontrolled exploration method, noted particularly in petroleum. Neither government sanction nor adequate geological appraisal precedes this method of drilling.

Although not characteristic of mineral extraction alone, the dependence upon a great domestic market has been a most important factor in the development of American mineral industries.[4] In a land where relatively high wages have stimulated the introduction of labor-saving machinery, the per capita consumption of minerals has naturally been high.

[3] In eastern Ohio the rule-of-thumb in stripping coal is for each foot of overburden removed there must be at least one inch of minable coal. During the war and the subsequent coal strikes, the United States increasingly relied upon coal from strip mines. With about 15 per cent of the miners, these mines produced about 30 per cent of the coal during the most prolonged strike. In 1925 2.8 per cent of anthracite and 3.2 per cent of bituminous coal was mined by stripping; in 1945 the proportion was 18.3 per cent and 19 per cent, respectively. The average cost of stripping i 1945 was $2.30 per ton, mechanical shaft mining was $2.81, and by hand it was $3.31.

[4] For instance the tariff on copper is 4 cents, pig lead 1 cent, aluminum 3 cents, and magnesium 4 cents.

The abundance of high-grade ores led to the neglect of the inferior grades. The copper industry was the first to initiate the trend to use lower grades. Secondary recovery methods employed by the oil industry is another example of this trend. The shift from iron ores netting 50 per cent metal to 30 per cent ores in the Lake Superior region is not far off. In the less important aluminum industry, domestic ores are inferior to the grades upon which the industry was established.



Guy-Harold Smith

FIG. 9.—BITUMINOUS COAL STRIP MINE IN EASTERN ILLINOIS

As wages rise, the proportion of coal mined in this manner increases

Shifts in Mining—These changes in the character of the ores used have caused a shift in the mining centers of a number of important minerals. Other shifts have occurred because of discoveries; oil, copper, and magnesium have crossed the continent as new sources were discovered and developed. In some cases old workings were reopened. Deficiencies arising from a state of war frequently cause renewed activity in uneconomical mining properties.

The Mining of Iron Ore

Production and Reserves—As noted in the preceding section, coal and iron are basic minerals in the localization of industry. In the production or the consumption of iron ore, no other country equals the United States. In 1940 it produced 36 per cent of the world's output. As in the case of nearly all of the important minerals, the mining of iron takes place in

relatively limited areas. Of our national total, Minnesota mines 65 per cent, Michigan 17, Alabama 10, New York 4, Pennsylvania 2, and Wisconsin 1.6 per cent. In this country the production of iron ore and the manufacture of iron and steel bear a close relation. Canada on the other hand has found it economical to purchase iron from the United States rather than engage in extensive mining operations in Ontario just north of Lake Superior, or to get it from Newfoundland. World War II may have changed this practice to a degree.

Great Northern Railway

FIG. 10.—THE MAHONING IRON MINE, HIBBING, MINN.

Increased consumption during World War II gave warning of impending shortage of this high grade ore.

At the rate of consumption during World War II (96,000,000 tons annually), the ore of the Lake Superior district of 50 per cent iron content may be expected to be exhausted within another decade. Reserves of 30 per cent iron in the Superior region, in Pennsylvania, and in Alabama, and some in the Adirondacks of New York [5] may offer an additional fifty

[5] In the Adirondacks, mining by open-pit methods has increased since the War. While the ore body is large, it is low grade; the rock is very hard and more difficult to mine than Mesabi ore. Treatment of the black magnetic ore is complicated; the final product is a high-grade sinter comparable to fine Swedish ores.

years' supply at the same rate of consumption. During 1943 iron deposits in Canada's Steep Rock Lake district, 100 miles north of the Mesabi workings, looked so attractive as to cause the initiation of a large mining enterprise. It is expected that this source of high-grade ore will ease Canadian demands upon the United States. Farther east, along the Quebec-Labrador boundary, is probably the greatest potential ore district in Canada.

Iron Mining Districts—The distribution of the principal iron-mining districts has been indicated. The importance of the Great Lakes in the shipment of this ore is apparent in Fig. 21. The Lakes act as a great concentrating factor, gathering in ore and limestone for shipment to the furnaces and then serving as distributors of steel products to other Lake cities and for export. Railroads move only a small part of the iron ore from the western end of Lake Superior. With the recent increase in the ore-handling capacity of Escanaba, the initial rail haul has been somewhat increased. The establishment of ore stock piles at Lower Lake ports and at interior manufacturing cities has been based upon the economical ore boats. Iron mining has become so mechanized that man is virtually eliminated. The open-pit mines and the power shovels are the world's largest. The ore docks and the ore boats are on the same scale. The iron-mining districts near Birmingham, in the central Rockies, and in the Sierra Nevadas produce but a minor part of the nation's total.

The Ferroalloy Minerals—Before iron can be made into steel some one or more of the alloying minerals must be added. For instance, vanadium will give springiness, tungsten will give hardness, and molybdenum will give toughness to steel. Although the amount of these mineral raw materials added to each ton of steel is small, their uninterrupted supply is vital. New tools, new speeds, and new uses are being developed which are based upon the presence of these widely-distributed minerals. A modern steel-making nation is utterly dependent upon these alloying materials.

One of these strategic minerals is chromium. It is perhaps the most versatile of steel alloys. Chromium was mined in the United States during both world wars, only to subside before competition from Africa, Greece, and the Pacific. The largest chromium strike in the United States took place in 1942, in Montana's Beartooth Mountains. Resumption of trade routes through the Mediterranean compelled this new $15 million mine in Montana to close in 1944.

In the instance of manganese it is much the same story. When the war cut off Russian and African sources of this alloy, new mines, opened in the Butte, Montana district, old mines in Georgia and Arkansas, and increased imports from Cuba made the United States virtually self-sufficient. This does not entail a great tonnage since only fourteen pounds must be added

to each ton of steel manufactured. Resumption of world routes for manganese did not take place as promptly after World War II as in the instance of chromium, but the United States again imports this mineral from Russia and Africa.

Tungsten is the third of these vital alloy minerals. It is widely found; the district with the cheapest labor does the bulk of the mining. The Yellow Pine, Idaho, district declined from its wartime importance before competition from China and Malaya. Tungsten imparts a hardness to steel essential for the high-speed cutting tools now in use. The United States now produces about 10 per cent of the world's output, with Nevada supplying 60 per cent, California 16 per cent, Arizona, Colorado, and Washington 23 per cent in all.

Molybdenum gives strength and toughness to steel. It is the only one of the vital alloys in which the United States ranks high (93 per cent) as a world producer. Sixty per cent of the total supply comes from the Climax district high in the Colorado Rockies. This one district has 90 per cent of the known reserves of molybdenum. Copper mines in Arizona, New Mexico, and Utah supply most of the remainder of the domestic tonnage. The war gave no substitute to the deficient countries.

Vanadium is the second of the alloys in which the United States produces an important part (30 per cent) of the world's supply. Most of this comes from the copper-producing states of Arizona, New Mexico, Utah, Nevada, and Colorado. Nearly all of the remainder comes from United States' properties in Peru.

Nickel is almost an international monopoly in Canada, where about 85 per cent of the world's tonnage is produced. As with other alloying minerals, its principal use is in the heavy steel industry. Virtually the entire Canadian output comes from the Sudbury district in Ontario north of Georgian Bay.

Copper, Lead, and Zinc

Copper—Functionally, as the leading carrier of electrical energy, copper may be classed as a basic metal in modern industry, ranking next to iron in amount used. During the half-century or more of United States dominance in world copper production, the mining of copper has experienced great shifts in its major centers. During the middle of the nineteenth century, Michigan's Keweenaw Peninsula achieved world dominance. This district still ranks as the second greatest all-time producer of copper. The next important center was Butte, Montana, where in 1879 work began on the "richest hill on earth." Copper mining next shifted to its present

location, the greatest concentration of copper workings in the world, central and southern Arizona.[6]

Despite the high rank of the United States as a copper producer, World War II found domestic supplies about 25 per cent deficient. Higher wages and better working conditions had lured the miners to Pacific Coast war plants. In late 1943 the Army detailed 4,000 soldiers to mine copper in the Southwest.

Calumet and Hecla Copper Company

FIG. 11.—CALUMET AND HECLA COPPER MINE ON THE KEWEENAW PENINSULA

Copper is a rare metal, 5 as against 50 per cent metal content for iron and manganese. Hence enormous tonnages move out of the copper camps. Our copper deficiency called for greater imports from Chile. This was a burden because of the scarcity of shipping.

Copper scrap is an important item, and with a shortage in copper, the industry may use half as much scrap as the mines supply in a representative year.

Canada and Alaska—Canada's principal copper mines are at Sudbury (primarily nickel mines), Noranda, Rouyn districts in Quebec, and Flin Flon on the Manitoba-Saskatchewan border. Alaska has had one important copper mine at Kennicott. Until World War II the abundance of copper in the United States made Canadian mines marginal.

[6] Arizona produced 32 percent, Utah 27, Montana 14, Nevada 8, New Mexico 7, and Michigan 5 per cent of the nation's production. With approximately one-third of the world's total production, the United States is still the world's leading producer.

Lead and Zinc—Although the greatest concentration of lead and zinc mines in the world is in adjacent parts of Missouri, Oklahoma, and Kansas, the United States produces only about one-fourth of the world's output of lead and one-third of the zinc. In addition to this district, lead is produced in the Coeur d'Alene district in Idaho and the Bingham copper mines in Utah. Zinc is mined in northern New Jersey, Idaho, Kansas, and on the Tennessee-Virginia border. Canadian mines produce one-tenth of the world's lead and a similar proportion of zinc. The principal districts are the Kimberly, British Columbia, near Flin Flon, Manitoba, Noranda in Quebec, and Buchans in Newfoundland. There is only one mine, Treadwell-Yukon, in Alaska, just over the Canadian border at Keno.

Aluminum—Aluminum is one of the newer of the industrial metals. Since 1920 each decade has witnessed a great increase in the amount of aluminum used in the United States, and the use of steel, lead, zinc, and copper was somewhat less, proportionally. The Second World War necessitated a great increase in production; the capacity of new plants was much greater than the estimated need for the metal. From a total consumption in 1936 of 112,000 short tons, it successively mounted to 164,000 in 1939, to 309,000 in 1941, and to 920,000 tons in 1943. The first year after the war the total consumption by the United States was 500,000 tons. Most of the new plants had to close. The United States and Canada each produce more aluminum than Germany ever has.

The three basic operations of the aluminum industry are (1) mining and delivery to the processing plant of the ore or bauxite, (2) production of alumina from the bauxite, (3) the reduction of alumina to aluminum. This last step requires a great deal of electric power, and cheap power sites have played an important part in the location of the reduction plants.

Most of the ore comes from Surinam mines, with Arkansas supplying the major part of domestic tonnage. The principal aluminum plants operating after the war are at Massena and Niagara Falls, New York; Alcoa, Tennessee; Baden, North Carolina; Jones Mills, Arkansas; Troutdale, Oregon; and Spokane and Vancouver, Washington. The major alumina plants are at East St. Louis, Illinois; Lister Hill and Mobile, Alabama; Baton Rouge, Louisiana; and Hurricane Creek, Arkansas. Other large plants were built from Long Island to the Pacific Coast during the war; nearly all of these have closed.

Canada's aluminum industry is centered on the Saguenay River district in Quebec Province. The great Arvida plant is the world's largest, twice the size of any in the United States. Ore is brought by ship from company holdings in British Guiana to Quebec, requiring only a short haul to the Arvida plant. A substantial part of the aluminum is converted into semi-fabricated articles or consumers' goods within the Arvida mills. Currently

there is a 3 cents per pound tariff on crude aluminum entering the United States.

Magnesium—Prior to the Second World War there was but one producer of magnesium in the United States; this plant used brines pumped from beneath company holdings in central Michigan. During the war about a dozen plants were built, generally by the Government agencies; all of them were larger than the prewar plant. By 1947 there were three plants in operation, the original one and a companion one on the Gulf of Mexico using sea water; the other one was a war-built plant in southern California. Almost all magnesium is used with other metals to make alloys. The use of this light metal in peacetime is thus far very much less important than in war.

Metals and Nonmetals—The production of metals is more spectacular than that of nonmetals. Strikes and booms are phenomena of discoveries of gold, silver, and copper. But the value added by the extractive and refining processes is very much greater for the nonmetals. The number of uses to which nonmetals are put increases each year. We shall begin with coal, greatest of the nonmetal industries, employing about two-thirds of all wage earners in the mining industries.

Fuels

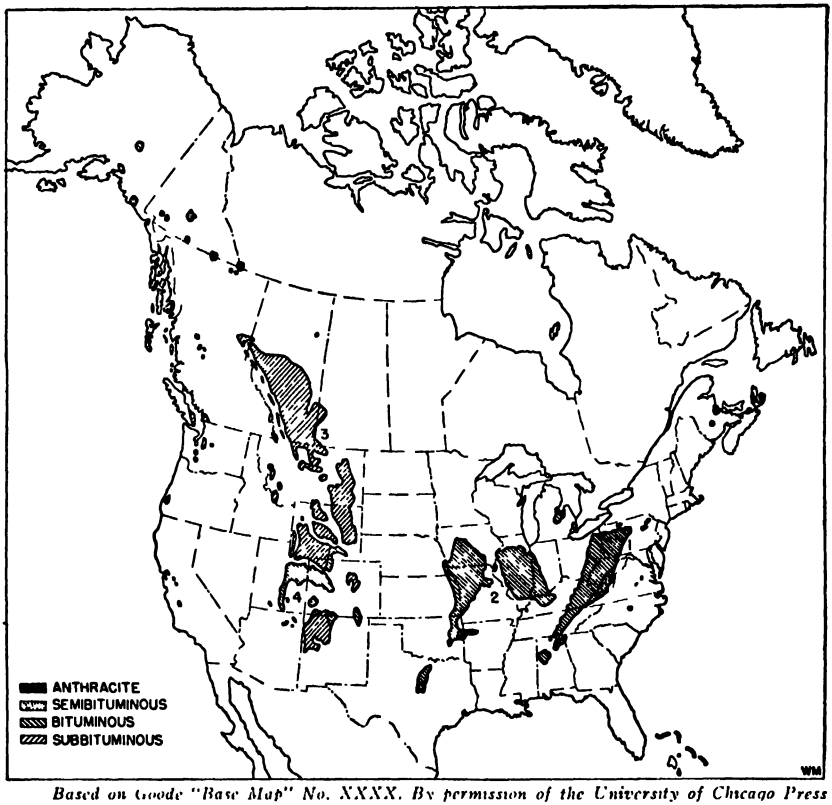
The fuels which have made it possible to extract ores from the rocks are especially important. From these fuels there have been extracted many new materials. Both in Canada and the United States the use of powered machinery in agriculture, commerce, the extractive industries and in manufacturing has been one of the most important national trends. Anthracite and bituminous coal, petroleum and gas have therefore an important role in the American economy.

Coal Reserves—Coal is mined in the United States at the rate of some half a billion tons per year, or about one quarter of the world's total. Coal resources of the United States are so great as to give the country first place among world reserves. Canada has found it economical to purchase her coal from the United States rather than to develop the important reserves known to exist at home, much of it probably of lower grade.

The Appalachian Coal Fields—The proximity of the great Appalachian fields to the industrial cities of the lower Great Lakes region, the Middle Atlantic, and the New England states, has made these fields produce about 70 per cent of the bituminous and nearly all of the anthracite coal for both countries. In spite of this, the commerce in coal within the United States is very great.

The principal coal fields of the Appalachian Highlands are based upon

the famous Pittsburgh coal seam of western Pennsylvania and eastern Ohio. It covers an area of 2,500 square miles and averages seven feet in thickness. A second important seam is the Pocahontas, embracing some 300 square miles in West Virginia which averages about the same thickness as the Pittsburgh seam. Both of these seams are persistent and lie at rela-



Based on Goode "Base Map" No. XXXX. By permission of the University of Chicago Press

FIG. 12.—COAL RESOURCES OF THE UNITED STATES AND CANADA

(1) Appalachian; (2) Interior; (3) Great Plains; (4) Rocky Mountain

tively shallow depths. Individual mining districts include the Connelsville coking coal, the Kanawha gas coal, and the Pocahontas smokeless steam coal. Most of the industrial coke is made from these coals.

Anthracite Coal—The only important anthracite or hard coal fields in this country are located in the eastern part of Pennsylvania. They lie in the northern end of the Ridge and Valley province of the Appalachian Highlands. The folding of the coal measures has made the coal unusually hard. Most of the moisture and volatile matter have been driven off.

Anthracite coal is highly desired as a domestic fuel because of its high heat value, little ash, and little smoke. This coal has not attracted a great deal of manufacturing to it. The mining district has had a long history of strikes and lockouts, due in large part to the high degree of organization among the miners and the small number of mining companies.

Interior Fields of the United States—The Eastern Interior field lies in southern Illinois and Indiana, and in northwestern Kentucky. Because of its location, it ranks after the Appalachian field in production, but its high ash and sulphur content makes it less desirable for coking purposes. It is satisfactory for steam and domestic purposes. The Western Interior field lies in southern Iowa, extending through Missouri into Arkansas. The seams are shallow and the coal is of lower rank than in the eastern fields. There are also fields in Michigan and in Oklahoma. The only other important fields appear along the front of the Rockies where central Colorado is the most active district, in western Wyoming, and in Utah.

Canadian Fields—Important coal measures are found near Sydney, Nova Scotia, the Western Plains province, and on Vancouver and Queen Charlotte Islands in the Pacific Southwest. The seams of good coking coal mined near Sydney extend under water for a distance of a mile or more. In Alberta and British Columbia and in the eastern Rockies there are several active fields. Among these are mines at Lethbridge, Frank, Bankhead, Canmore, and Crows Nest.

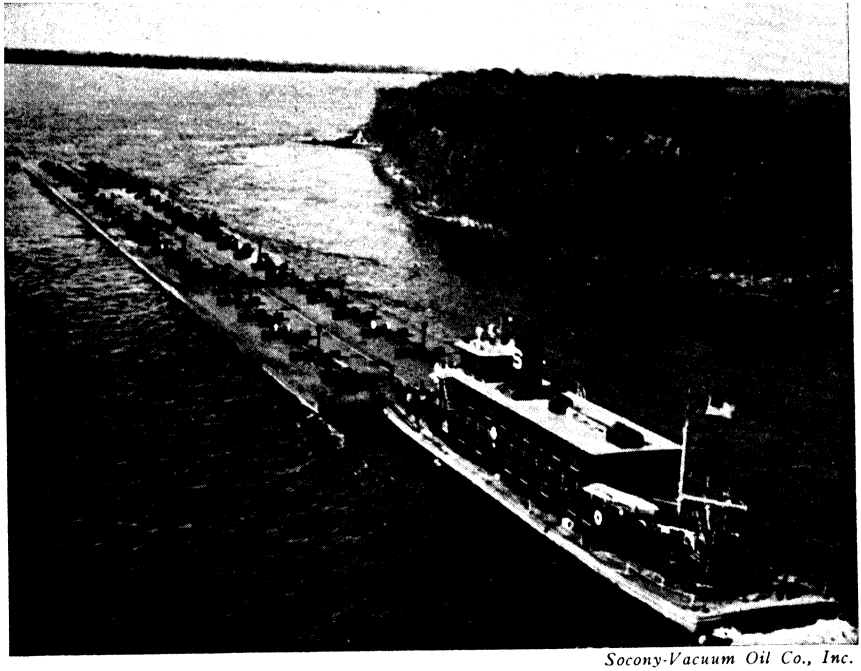
In general, propinquity to the good coals of the United States has retarded coal mining in Canada. The abundance of good hydroelectric power sites near the principal population centers has likewise retarded Canadian coal mining. Changes in the technology of iron and steel manufacture occurred early enough in Canadian history to prevent the localization of steel districts at the sources of coal.

The Petroleum Industry

Petroleum Districts—Next to coal the most important mineral fuel is oil. The United States produces 63 per cent of the world's oil. Its reserves are estimated the greatest in the world. Production is scattered widely over the country, but with the great bulk coming from the western states. Texas is by far the greatest producer with 37 per cent of the national output, followed by California with 16 per cent, Oklahoma 11 per cent, Illinois 10 per cent, and Louisiana 8 per cent. With such an oil supply close at hand, Canada has made little use of her known reserves in the Turner Valley and the Leduc fields, near Edmonton, in Alberta, and the Fort Norman district in the far Northwest.[7]

[7] In 1945, the U.S. Army wrote off as a loss the Canol project in the Mackenzie Valley of northern Canada.

Production Decline in Eastern United States—Although oil is still produced in the nation's first oil district in western Pennsylvania, it is but a fraction of its former yield. Eastern and northwestern Ohio, northern Indiana, central Michigan, and northern West Virginia have long since passed their peak of production. Secondary recovery methods are being



Socony-Vacuum Oil Co., Inc.

FIG. 13.—OIL TOW ON THE MISSISSIPPI RIVER

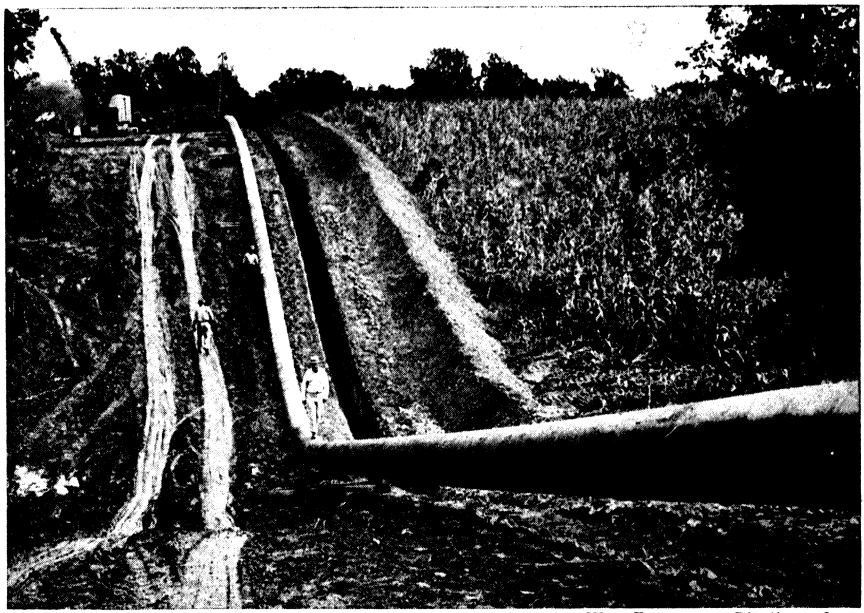
The dimensions of this tow are in contrast with its forerunner, a Mississippi River packet. The newest dam and locks on the Mississippi River will accommodate tows in excess of 1,500 feet in length.

employed in these oil districts with results that barely keep the industry active. The great depths to which some western wells have penetrated are unknown in these fields.[8] Southern Illinois experienced a revival in its oil production in the early 1940's. New fields have been opened in the swamplands of central Louisiana; oil rigs are floated to the scene of operation.

Commerce in Oil—Since oil production in the United States and Canada is generally so far from consuming centers, its commerce is very important. By ocean tanker, river barge, pipe line, and railroad tank car oil moves from the great interior production centers of Texas and Oklahoma

[8] Trend in drilling depth is: 1924, 7,319 feet; 1935, 12,785 feet; 1938, 15,004 feet.

to the cities of the Northeastern and Lower Lake states. Despite the importance of this trade route there was no through pipe line until World War II brought about the construction of "Big Inch," followed by Little Big Inch a few months later.[9]



War Emergency Pipelines, Inc.

FIG. 14.—BIG INCH IN NORTHERN MISSOURI

Precious Metals

Uses—Industry has little use for the precious metals, directly. Although silver has higher qualities of electrical conduction than copper, its price is prohibitive. Even diamonds have a greater utility than precious metals in our manufacturing industries.[10]

Gold—The annual gold production of the United States and its territories is 14 per cent of the world's output. Canada's production is slightly less than this. The chief gold-mining districts are near the western foothills of the Sierra Nevada Mountains in California; Fairbanks, and the Seward Peninsula in Alaska; Lead in South Dakota; Cripple Creek and

[9] Abandoned within a year after cessation of hostilities. The Big Inch pipe line is now used for the transmission of natural gas from Texas fields to northeastern cities.

[10] During the Second World War, a comparatively small Detroit plant made war goods under unusually heavy guard; the reason: $18 million in silver electric wiring was being used instead of copper, worth perhaps $700.

the San Juan mountains in Colorado. Canadian mines are in Ontario's Porcupine and Kirkland Lake districts.

Silver—The United States ranks second among the nations as a silver producer, accounting for slightly more than one-fourth of the world's total. Silver mines are seldom very large enterprises. Most of the silver is mined jointly with gold, copper, lead or zinc, with silver the more profitable commodity in the mining enterprise. The Sunshine Mine, Coeur d'Alene district in Idaho, is the principal silver producer in the United States.

Fertilizer Minerals—Less spectacular in their role, perhaps, are the mineral raw materials used in the manufacture of fertilizers and the chemical industries. Their extensive use has waited upon the development of agriculture to the point where mineral plant foods become imperative. Four of these mineral plant foods have been so depleted by continuous cropping and by leaching that they have become the basis for commercial fertilizers: phosphorus, potassium, nitrogen and calcium; sulphur is a somewhat less vital and scarce plant food. Prior to the 1930's, the United States was dependent upon imports from Germany for much of its potash. At that time there were discoveries made of abundant and high grade potash deposits in eastern New Mexico. The country is now supplied entirely by the domestic deposits; Searles Lake, California ranks next to the New Mexico region as a source of potash.

A second mineral plant food is phosphorus, a mineral long known to be very abundant in the United States. Peninsular Florida and the Highland Rim of Tennessee now supply the greater part of the domestic market and likewise exports. The greatest reserves of phosphorus are located in the middle Rocky Mountain province; distant though they are from the greater part of the domestic market, these deposits have been worked for the Intermontane agricultural districts.

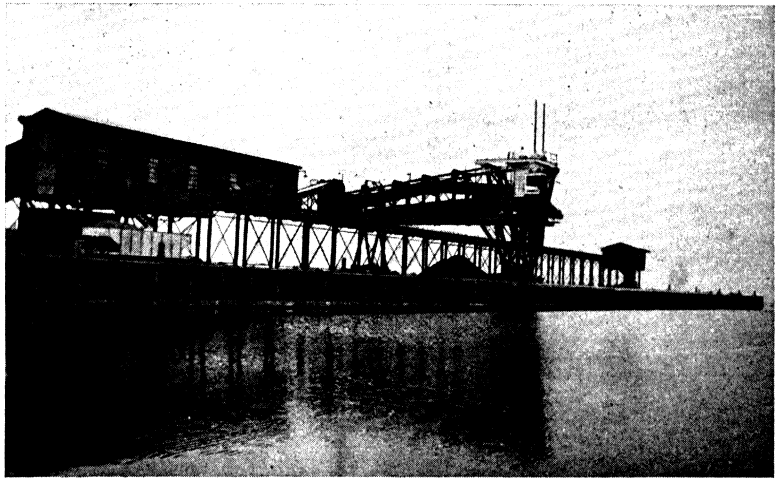
Nitrogen was long imported from the deposits in northern Chile for the American market. Advances made in its extraction from the atmosphere have progressed so far as to relegate Chilean sources to a minor position in the United States market. A number of power centers in eastern and southern states manufacture nitrogen for fertilizer.

Calcium is by far the most common in its occurrence; no concern is felt for future supplies of calcium carbonate from the local limestone deposits of many sections of the United States.

Sulphur probably has a greater variety of industrial uses than the three fertilizer minerals enumerated above. The United States is well supplied with sulphur deposits, producing more than three-fourths of the world's tonnage. The greatest producing districts are along the Gulf of Mexico in eastern Texas and some in western Louisiana. This sulphur is so pure

that it is extracted by dissolving it in steam forced down into the wells and the molten sulphur stored in great blocks above ground for shipment.

Salt—Salt is not an important fertilizer mineral, but its occurrence near the sulphur deposits may permit its introduction at this point. The three main sources of salt in the United States are brines pumped from deep in the earth, thick beds of rock salt as in the Lake Erie district, and the curious "islands" or salt domes extending westward from New Orleans over the coastal prairies. Other important districts are in California and Utah



Paul C. Morrison

FIG. 15.—LIMESTONE DOCK AND LOADING SHUTTLE NEAR ALPENA, MICHIGAN

where the waters of Great Salt Lake are evaporated. The increased activity in the chemical industries has been important in the extraction of salt brines especially from central Michigan south to West Virginia.

Sand and Gravel—The humble sand and gravel deposits found in so many parts of the country and under so many conditions constitute an important commercial mineral resource. One of the most densely populated sections of the United States, the upper Mississippi Valley and the Great Lakes Basin, has extensive deposits of sand and gravel of glacial origin. On many a farm the least productive field has become a source of gravel and sand for local highway construction. Outwash plains and moraines have yielded a vast amount of this commercial mineral.

The more spectacular aspect of sand as a resource is the use made of it in the manufacture of glass. Only the purest silica sand is used for the manufacture of clear glass. The location-value of the two factors in glass-making, fuel and pure sand, have varied during the history of the industry.

In Colonial days the relatively pure sands of the Atlantic Coastal Plain attracted an important glass industry, using charcoal from local wood as the fuel. As the industry was able to free itself from the hand labor involved in making glass by the invention of machines, the fuel factor rose in importance. The westward trek of the industry was largely due to the use of natural gas found in quantity in the upper Ohio Valley. The use of sandstones of desirable quality has become an important source of glass sand; it has enabled the industry to expand with the westward-moving market to the Mississippi Valley.

Clay—Perhaps the most common of the commercial minerals is clay. In certain places clay has assumed great importance, with the nature and extent of the market varying widely from place to place. The heart of the clay mining industry has been the middle Appalachian Plateau of western Pennsylvania, West Virginia and eastern Ohio. These buff-burning clays have enabled the manufacture of brick, tile, dinnerware and a great variety of ceramic specialties to assume national importance. Situated virtually in the center of the draintile market and not far from the nation's center of population, the bituminous coal and natural gas resources have complemented the clay resources of the Appalachian district.

The best dinnerware must be made from white china clay or kaolin; the principal deposits of this clay are in the Carolinas. Substantial quantities are even imported from England.

Stone, Cement, and Slate—Companion resources with clay in the nonmetallic construction materials are stone, cement, and slate. The least common of these three materials is slate; it is also the least varied in its uses. The common building stones found in important quantities in the United States and Canada are granite, limestone, sandstone, and marble. The principal granite-quarrying districts are near Barre, Vermont, the southern Appalachian Highland, and central Wisconsin.

Limestones are widely distributed and of many different qualities. The principal uses are for fertilizer, road construction, as a flux in ironmaking and for building construction. The principal quarries for limestone destined for ironmaking are in the Appalachian Highlands of Pennsylvania, northern and central Ohio, and the northern portion of the lower peninsula of Michigan. The traffic in this limestone is exceeded on no other routes in the world. The greatest center for the quarrying of fine building stone is in south central Indiana, near Bedford and Bloomington. This fine stone hardens after exposure to the air, has splendid coloring, and lends itself to decorative and artistic uses as well as building veneer. Many other districts quarry limestone for building purposes, but none has the fame of Indiana's product.

Sandstone is not so important commercially, but it has an extensive

market for grinding rolls and is used for much building construction. Northern and eastern Ohio have long quarried sandstone for grinding purposes. Some sandstones are prized for manufacturing glass.

Cement is manufactured from local limestone in most of the forty-eight states. The largest concentrations are near the greatest population centers; Pennsylvania, Ohio, Illinois, Michigan, and Missouri lead. Slate is quarried in the same district as cement in Pennsylvania's Lehigh Valley.

Summary—There is little to give continuity or regionalism to the inventory of mineral resources of the United States and Canada. The commerce in these minerals is tremendous; the Great Lakes trade is primarily minerals; several railroads derive the great bulk of their revenue from the transportation of mineral raw materials. A special type of transportation has been developed to a high degree to carry oil and gas. The distribution of certain minerals is such as to give rise to some of the longest sea routes known.

Everywhere the freeing of mineral wealth from the rock or foreign material has given rise to an important industry, which, as techniques change or ore bodies are found, tends to migrate. Industry has in general freed itself from the locational values of its mineral raw materials; the degree varies with the industry. On the whole, both the United States and Canada have been exceedingly fortunate in the abundance, variety and location of the mineral resources upon which has been predicated the economy of the past century and a half.

But minerals are wasting assets. Despite new discoveries and secondary recovery methods, nearly all of them will reach the end within foreseeable time. Conservation is difficult so long as the price of the mineral is relatively low. The unwelcome problems of a declining heritage have forced all sorts of control schemes upon the mineral hierarchy, by no means all of which tend to conserve the mineral in question. World War II has given impetus to yet another series of devices whereby the unequal distribution of mineral resources and industrial capacity may be reconciled.

IV

MANUFACTURING AND MANUFACTURING DISTRICTS

Connections Between Cities and Factories

Manufacturing as an Urbanizing Factor—Historically, commerce is a much older factor than manufacturing in the urbanization of Anglo-America. In both the United States and in Canada, the rise of cities began so late in the world's history that the period of commercial urbanization was relatively short in duration.

Even in the United States, manufacturing was once a home industry and therefore not a potent factor in urbanization. This period did not last long as the factory system was introduced in New England at the close of the eighteenth century. Home industries responded to the change in manufacturing procedure variously, depending upon the nature of the commodity. Cotton textiles and shoes were first to become factory enterprises. Thus began the concentration of factory workers and those whose livelihood depended upon the satisfaction of the wants of these workers—the complete economic city.

Growth of Cities—Not all cities in the United States have grown because of manufacturing activity, nor have the industrial cities grown at the same rate (Table 4). No one of the ten industrial districts as set up by the Census has failed to show some growth since 1930, but the population of two of these eastern and two mid-western cities declined.

Factors in the Localization of Industry

Industrial Location Factors—The study of urbanization in English-speaking America thus becomes intimately related to the factors of industrial location. This is true even though many industries may not have been rationally located, even for the period of their establishment.

Raw Materials—The centers of extraction of the raw materials needed by the manufacturing industries have not given rise to large urban groupings. Approximately one miner in ten lives in a city of 25,000 or over, while two out of three live on farms or in small towns of less than 2,500. The bituminous and anthracite coal mining areas, the iron and copper

mining districts, and the oil fields are the major mineral producing regions of the United States and Canada. Obviously the production of such factory raw materials as cotton, wool, sugar, flax, corn, and other farm products is a minor location factor.

TABLE 4

GROWTH OF THE 10 LARGEST CITIES IN THE UNITED STATES 1920–1940, AND THE POPULATION OF THE 10 LARGEST METROPOLITAN DISTRICTS IN 1940

CITY	1920	1930	1940	PERCENTAGE INCREASE 1930–1940	METROPOLITAN DISTRICTS, 1940
New York	5,620,048	6,930,446	7,454,995	7.6	11,690,520
Chicago	2,701,705	3,376,438	3,396,808	.6	4,499,126
Los Angeles	576,673	1,238,048	1,504,277	21.5	2,904,596
Philadelphia	1,823,779	1,950,961	1,931,334	—1.	2,898,614
Boston	748,060	781,188	770,816	—1.3	2,350,514
Detroit	993,678	1,568,662	1,623,452	3.5	2,295,867
Pittsburgh	588,343	669,817	671,659	.3	1,994,060
San Francisco	506,676	634,394	634,536	.0	1,428,525
St. Louis	772,897	821,960	816,048	—.7	1,367,977
Cleveland	796,841	900,429	878,336	—2.5	1,214,943

Data from United States Census

Of these ten cities, only Los Angeles and San Francisco are not a part of the so-called manufacturing "belt." The tendency for the suburban towns and cities to grow, even at the expense of the parent city is clearly demonstrated by a comparison of the population of the nuclear cities with that of the larger metropolitan districts.

Water Power—The use of direct water power was an urbanizing factor, but the period of its direct use was not long either in the United States or Canada. Water power sites as urbanizing forces were particularly important only in southern New England and along the Fall Line between the Piedmont Upland and the Coastal Plain. In only a few instances have these cities along the Fall Line remained vigorous.

Mobility of Raw Materials—In North America particularly, the goal has been to free industry from the localizing effect of sources of materials and power. This has been due to the fact that the sources of these materials are so widely distributed over the continent, to the development of the transportation facilities, and partly to the fact that labor has been relatively scarce and costly in America. As the mobility of raw material increases the localization of factories will reflect the increasing importance of other factors.

Size of United States—One is inclined to refer glibly to the resources and markets of the nations of Western Europe and of North America without taking into consideration the relative sizes of the nations involved. Germany is about the size of Texas, England about the size of Illinois, Japan

somewhat smaller than California. To a degree equaled by no other nation, the United States has developed into a number of widely dispersed specialized manufacturing districts. The permissive factors have been the low cost per ton mile of railroad freight transportation, cheap water-haul on the Great Lakes, and the mobility of industrial power and materials; the principal impelling factor has been market.

Location of Raw Materials—Natural resources and water power once tended to localize many industries, and still tend to locate some. With the increasing mobility of energy and materials, there has been much speculation concerning the theories of industrial location. Assuming the complete mobility of fuel and materials, Weber attempted to formulate principles of the location of manufacturing industries.[1] His principles were predicated upon the reduction of all the factors to weight and distance, taking into consideration the weight lost during the manufacturing process. From a single case like the milling of wheat, the problem becomes more complex as other raw materials are added and as the number of products increases. Few students of economic geography have been willing to state their theories with such mathematical precision.

Market as a Location Factor—As changes in manufacturing techniques free industry from the sources of raw materials and power, market becomes an increasingly important location factor. This is particularly apparent in those industries with a high value added by the manufacturing process. In this category fall such commodities as machine tools and many types of industrial machinery.

Labor Concentration—The attraction of certain types of industry by labor pools is another important location factor. Prominent in this group are the textile industries, seeking cheap labor. Of somewhat less attractive force are the bodies of skilled labor which aid in the orientation of such industries as automobiles, airplanes, and many kinds of precision machinery.

Interest in Decentralization—Since World War I, especially, the columns of trade journals and the public press have carried articles attempting to measure changes in industrial concentration. Under such beguiling titles as "Industry on the Move" and "War the great Decentralizer," they sought to discern a trend away from the industrial concentrations toward nonmanufacturing areas. The weakening ties of power sources and of raw materials were noted, likewise the growing importance of market and labor as location factors. It was common knowledge that since 1900 there had been a widespread closing of many local industries, particularly in the East North Central and Northeastern states. Among them

[1] Alfred Weber, *Theory of the Location of Industry*, C. T. Friedrich, Ed., Chicago, 1929.

were flour mills, cotton mills, creameries, saw mills, woolen mills, kilns, cabinet shops, tanyards, agricultural implement shops, and even automobile and tire factories. Other industries had deserted their original locations and moved to new regions. Perhaps the classic example is that where the Slater cotton mill, first factory of any kind in this country, moved from Rhode Island to Slaterville, South Carolina. Cotton textiles, glass, ceramics, wood products, and leather are examples of this type of movement.

Several attempts were made to measure the amount of industrial relocation during the interwar period.[2]

At the same time the information concerning industrial changes has become more complete and more readily available.[3] These data cover the phenomenal increase in industrial facilities up to September 1944 when plant facility allotments had virtually ceased. During the war period the usual plant location factors were not always the determining ones; war had imposed other location factors. New power centers in the south and west were for the first time appraised as location factors in manufacturing. Instead of constituting an unemployed group numbering perhaps ten million, wage earners came to be at a premium. In 1943 the United States was divided into regions on the basis of labor shortage; critical regions were awarded the minimum of war contracts.

Characteristics of American Manufacturing and Recent Changes

Some Unique Characteristics of Our Manufactures—The influence of far-flung and varied resources, relatively sparse and scattered population, and the relative absence of political restrictions, may be observed in the types of industry which have come to dominate the American scene. One characteristic is the three-fold relationship which manufacturing has with agriculture: (1) the American farmer is a consumer of factory products in the home and upon his farm to a degree surpassed nowhere; (2) he supplies the factories with many of their raw materials; and (3) an important part of the farm population is absorbed into the ranks of factory workers. This characteristic relationship between manufacturing and agriculture is a distinguishing feature of American industry.

A second characteristic of American industry is the complex division of labor. A third characteristic is the relatively high degree of value added

[2] D. B. Creamer, *Is Industry Decentralizing?* Philadelphia, 1936, G. McLaughlin, *Areal Growth in Manufacturing* (Univ. of Pittsburgh, Bureau of Business Research, 1934).

[3] Data from the War Production Board include: Defense Plant Corporation, War Department, Navy Department, Treasury Procurement, Maritime Commission, and the Foreign Purchasing Commissions.

by the manufacturing process. Our gross value of factory products for 1938 was about $70,000,000,000; after deducting purchased materials, the factory output or the net value was about $47,000,000,000.[4] This means little until comparison is made with other leading manufacturing nations. Great Britain and Germany together have an estimated 15 million wage earners; but the United States has only 10 million. Yet with 50 per cent greater number of industrial wage earners in Great Britain and Germany together, the amount which the manufacturing process adds to the value of the factory products of these two countries is little more than half that added by American wage earners. All three countries stress manufacturing, yet the manner in which the factors of production are combined for profit in manufacturing differs markedly.

A fourth characteristic naturally follows from the others: American manufacturing differs from that of other major manufacturing countries in that increased roundaboutness of processing gives rise to a more extensive consumption of power. In industrial location, therefore, materials and fuel have heretofore been more potent factors than labor in many types of industrial goods. Another distinguishing characteristic in a sense conditions others: American manufactures as a whole have been developed upon a domestic market. This is true of no other important industrial power.

Manufacturing as a Specialty—The United States has forged ahead of all other countries in manufactures, both relatively and absolutely. With roughly 7 per cent of the world's population and 6 per cent of its land area, the United States does 35 per cent of the world's manufacturing.[5]

Naturally there is some marked localization of these industries within the northeastern Manufacturing Belt, but no concentration in a few small areas such as is found in the Old World.[6]

The Areal Organization of Manufacturing in the United States

Areal Distribution of American Manufacturing—The position manufacturing now holds in the United States makes it imperative that this

[4] 1938 is taken as being representative of "pre-arsenal-for-Democracy days."

[5] In 1939 the United States' manufacturing industries consumed

72	per cent of the world's silk (com'l)	40	per cent of the world's chromium
66	rubber	40	aluminum
64	oil	39	coal
50	nickel	36	lead
46	tin	35	zinc
43	copper	26	cotton
43	pig iron	19	wool

[6] Since most countries do not take a census of manufacturing comparable to our own, direct comparisons are somewhat in the nature of estimates.

type of livelihood be accorded as careful an appraisal as agriculture. Figure 16 reveals the distribution of manufacturing activity on the basis of the value added by the manufacturing process.

The choice of this base for appraisal rests upon two advantages. In the first place there is no duplicated value, as would be the case if gross value of product were used, since from the value of output from each factory there has been subtracted costs of all materials, manufactured fuel, and containers purchased. In the second place, this base is weighted in proportion to the several factors of production since value added is not a factor of production but is the product (measured in dollars) resulting from production.

The "American Manufacturing Belt"—Although the bases used to show the distribution of manufacturing differ in the references cited in this chapter, the location of the socalled "belt" is essentially the same in all of them. Here it is sufficient to point out the major lineaments of the district: bounded on the north by the Great Lakes, on the south by the Ohio and Potomac rivers, on the west by the Mississippi and on the east by the Atlantic.

Outstanding Districts of Concentration—Although more than three quarters of the value created by manufacturing in the United States is accounted for within the above area, this is by no means uniformly distributed. The districts of major concentration are to be noted in Figure 16. What is not so easily seen, however, are the large areas of meager industrial equipment between the major districts.

Bases for Mapping Relative Manufacturing—No one factor will serve as an absolute measure for manufacturing. Various factors such as wages, wage earners, or power consumption may be used as a basis, depending on the purpose in mind. As an index to the employment of a region, the number of wage earners is of prime concern, but in our examination of manufacturing, as in agricultural industries, we are chiefly interested in areal associations. The productive district is our concern. Value added by manufacturing, or simply net value, measures productivity.

Unlike agriculture or forestry, manufacturing does not connote the same areal uniformity of land use. Neither is it as simple as the former industries; it does not consist simply in adding value to given raw materials within a single establishment. The manufacture of most products is divided among several plants, each specializing in one or more stages of production, the materials passing from one plant to another until the processing is finally completed.

War Increased Facilities—Whereas the First World War cast the United States in the role of food producer for the Allies, the adoption of Lend-Lease and the demands of participation in the Second World War made

this country a producer of factory products for the United Nations.[7]

To manufacture $175 billions in war goods the Federal Government spent approximately $33 billions for new plant facilities of all kinds. The actual increase in plant capacity was in this order: Ohio, Pennsylvania, Michigan, Illinois, New York, California, Texas and Indiana.

The principal part of plant facility increase was financed by public money; private funds accounted for but 22 per cent of the total increase in facilities. Most of these private funds went into nonmanufacturing enterprises such as power lines, mining properties, and various types of transportation facilities. Government financing was largely in the field of "war babies."[8]

Although most of the private money went into nonindustrial war industries, by no means the preponderate part of these industries were privately financed. Large power centers at Shasta, Calif., Bonneville and Grand Coulee, on the Columbia, Boulder on the Colorado, and the several dams in the Tennessee Valley were publicly financed. Scores of mining properties were similarly financed. The minerals most eagerly sought were tungsten, chromium, potash, magnesium, bauxite, and even iron and petroleum.

If we take the data released by the Census of 1940 and by the War Production Board at the end of September, 1944, we can get some idea of the amount and nature of changes in industrial concentration resulting from a major depression, a world war, and heavy Government financing of facilities. For each of the Census divisions of the United States it is proposed to show: (1) the changes in industrial concentration between 1919

[7] EXTENSION OF PLANT FACILITIES

WORLD WAR I		WORLD WAR II
$ 10 billions	net value of plants and extensions	—$50 billions
$600 millions—	Government financed	—$34 billions

[8] GOVERNMENT FINANCING

PER CENT OF THE INDUSTRY'S TOTAL FACILITIES	COMMODITY	PER CENT OF ALL GOVERNMENT FINANCING OF PLANT FACILITIES
95	aircraft, ship construction and repair	14
65	chemicals, oil and coal products	11
65	iron, steel and products	10
20	power lines, mining and transportation	8
48	machinery, electrical equipment and apparatus	3
80	combat and motor vehicles	3

Data from War Production Board, Nov. 5, 1944

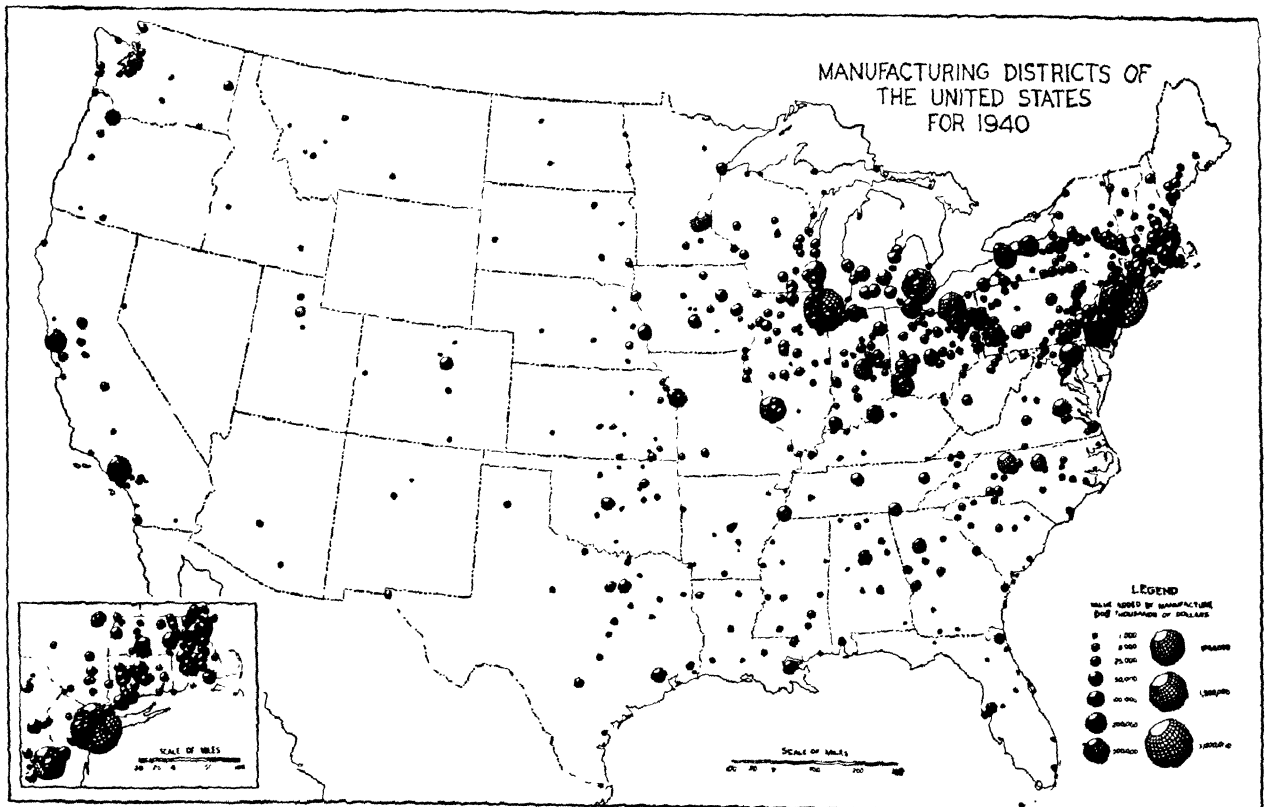
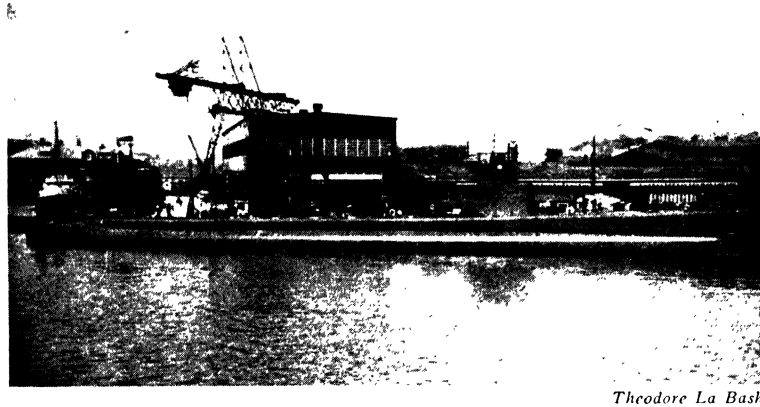


FIG. 16.—CONCENTRATION OF MANUFACTURING ACTIVITY

and 1939, and (2) the effects of expansion due to Lend-Lease and the war between 1939 and 1945.

New England—New England is the oldest of our manufacturing regions and it has always been one of the three most important. There is a great variety of commodities manufactured in these six states, although certain



Theodore La Bash

FIG. 17.—LAUNCHING A SUBMARINE ON THE GREAT LAKES

This was one of several war-time industries on the Lakes margin

types of industry have never been established there. In general it has been a region which imports its raw materials, fashions them, and exports its skill and labor. It has never been a self-contained industrial region. The first factories to start there were dependent upon imported raw materials. Even the market for these early factory products was outside of the northeastern states. New England's industrial history has been one of increasing competition from other parts of the United States and from foreign producers.

The New England Type—As a result of these factors, New England manufactures have tended to become something of a type. The "New England type" is a term used to describe factory goods with a relatively low bulk and high value added by the manufacturing process. It frequently involves a roundabout method of processing. New England probably was the first to practice subcontracting of parts in its manufactures; the New England type persists, although the product changes. There are mills on record in which the geographical markets have shifted with each change in the nature of product manufactured.

New England was first to lose an important industry to another region. Cotton is undoubtedly the best known of these industries which have migrated, but it is by no means the only one. Flour milling, iron making,

lumber and woodwork, worsted wool manufacture, and leather tanning also declined. In the manufacture of rubber tires and tubes, automobiles, glass, agricultural and construction machinery, several refining industries, and many food industries New England never attained an important position. A few industries became important elsewhere before New England took them up; among them are the manufacture of airplane engines, automobile parts, and steel ships.

Changes in Manufacturing, 1919–1939—The Census measures the amount of manufacturing activity on three bases: (1) value added by manufacturing, (2) wages paid, (3) and the number of wage earners employed. On these three bases, expressed as a proportion of the national total, New England declined in manufacturing during this twenty-year period. In Massachusetts, where two-thirds of the manufacturing took place, the decline was greatest. Connecticut declined least. In national standing, all six states declined.

During this twenty-year period New England gained in the manufacture of radio instruments, airplanes and engines, mechanical rubber goods, and electric motors, to mention the more important. The trend of shoe manufacturing seems to be away from this region.

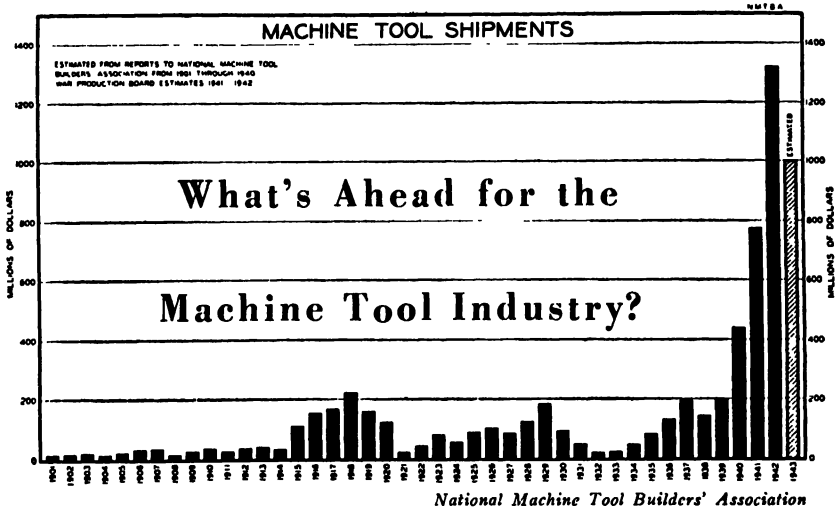
New Plants and Facilities, 1939–1945—War contracts and the construction of new plant facilities during Lend-Lease and World War II did not alter the general trend downward of New England's manufacturing. Compared with the 12 per cent of the Nation's value added which New England had in 1939, the 4½ per cent of total new facilities and 8 per cent of all war contracts are relatively low. No other Census division received so low a proportion of war facilities and contracts, expressed in terms of its value added in 1939.

The distribution of new plants was overwhelmingly in the three southern states; Massachusetts received nearly three-fifths and Connecticut most of the remainder. The War Production Board divided New England into 14 industrial districts; 12 of them received less than their proportional share of facilities. The new plants were for the manufacture of airplanes, engines, and parts (Connecticut receiving 90 per cent of this item for New England), ordnance (Connecticut getting 60 per cent), and shipyards (Massachusetts getting 70 per cent). Ten of these 14 districts received at least five times their proportional share of contracts.

In other words, New England did the bulk of its war contract manufacturing in lines which its factories were already fitted to produce, products which would be susceptible of subcontracting in many instances. In general these products are of the precision type needed in the manufacture of aircraft engines, directed projectiles, and the like. Where timing was a factor, New England was ready. The War made less change in

the type of New England manufacturing than in any other Census division.[9]

New England's manufacturing activity as a result of a depression, a world war, and Government spending for new facilities, has not changed essentially from the period between 1919–1939. The decline in manufacturing on the basis of number of wage earners, wages paid, and the value added by manufacturing was general throughout all six states.



National Machine Tool Builders' Association

FIG. 18.—THE VITAL STATISTICS OF AN IMPORTANT NEW ENGLAND INDUSTRY

Middle Atlantic—Although these states are primarily commercial in their economy, they are as well the nation's leading manufacturing region. They are far more abundantly endowed with resources than New England. Local anthracite and bituminous coal, iron ore, petroleum and gas, clay, stone, and zinc have been incorporated into the industry of these states.

	PERCENTAGE DISTRIBUTION OF INDUSTRIAL FACILITIES FINANCED BY THE GOVERNMENT	PERCENTAGE DISTRIBUTION VALUE-ADDED
New England	5	12
East North Central	30	28
Middle Atlantic	18	30
South Atlantic	7	3
West North Central	9	5
West South Central	11	2.5
East South Central	7	14
Pacific	8	5
Mountain	5	7

Changes Between 1919 and 1939—On the basis of the same three bases used in the appraisal of New England's manufacturing, the Middle Atlantic states of New York, Pennsylvania, New Jersey, and Delaware declined during this twenty-year period. New York and Pennsylvania declined the most although their leadership had been too great to have their ranking changed. New Jersey declined least in the group, dropping one place in number of wage earners but advancing one in value-added.

During this twenty-year period these states lost relative standing in the manufacture of iron and steel, machine tools, cotton textiles, rubber tires and tubes, and in ships. They gained in the manufacture of airplanes, engines, and parts, in automobile engines, and parts, chemicals and glass.

World War II—There was nothing in the effect of the war on industry in these states which materially altered the downward trend of the past twenty years. As with New England, the Middle Atlantic division received most of its war contracts in items which it was fitted to produce. The volume of these contracts was somewhat less than the share of the Nation's value added in 1939. New facilities built to manufacture these war goods amounted to a little more than half the share of value added. Again as in New England, the distribution of new plant facilities was concentrated in a few of the industrial districts.

Summary—The three southern New England states and the Middle Atlantic states make up the eastern half of the American "manufacturing belt." The trend in industrial activities, as measured by their share of the Nation's total of wages paid, number of wage earners, and the value added by manufacturing, has been downward for a quarter century. The war did nothing to alter this trend. For the most part, these states were called on to make products closely in line with their peacetime specialties. Reconversion of industrial plants will probably be less difficult for this division than for any part of the United States except New England.

East North Central—The five states comprising this division have long been characterized by a balanced economy. That is to say the number of wage earners engaged in agriculture, manufacturing, mining and quarrying, commerce, and the service industries are more or less in balance.

No other division rivals it in the close interrelationship between agriculture and manufacturing. In no other division has the urbanization of agricultural areas been carried so far. It was tardy in the development of its farms and factories, following by more than a century the settlement of the eastern seaboard states. In a little more than a century these states of the Northwest Territory have become the dominant half of the manufacturing belt.

Changes Between 1919 and 1939—Taken as a whole, the division showed no great changes in manufacturing activity during this twenty-year period.

Greatest gains were in Michigan and Illinois. These states experienced appreciable industrial movement, loosely termed decentralization. A marked regional shift took place in the manufacture of agricultural implements. The center of this important industry moved from Ohio to Wisconsin and Illinois. Another industry with important changes in its localization was the manufacture of automobiles. Originally it was a fairly well dispersed type of industry, with perhaps two score cities having one or more automobile plants. The number of makes greatly declined, and as a consequence automobile manufacture was sharply localized in the Detroit area. But parts-manufacture and sub-contracting have increased the volume of production and the geographical distribution of automotive wage-jobs.

Other important shifts within the division occurred in rubber tires and tubes, machine tools, in airplanes, engines, and parts, iron and steel manufacture, and in the manufacture of wool.

Greatest gains were experienced in iron and steel manufacture, ships, machine tools, railroad equipment, refrigeration and other electrical equipment, boots and shoes, chemicals, glass, and refining of oil, sugar, and magnesium.

Industries in which these states lost ground include flour milling, wool, ceramics, meat packing, and wood products.

Effects of the War—At first glance this division appears to have received somewhat more than its share of war contracts and new industrial facilities. It had 28 per cent of the total value added by manufacturing in 1929; it received 30 per cent of the nation's new plant facilities and 32 per cent of the war contracts. As compared with the New England and Middle Atlantic states this is a lion's share.

Conversion to War Work—In this connection it is worth while to recall how some of these midwestern plants were able to convert for war contracts. Outstanding was the automobile industry. For these manufacturers, conversion meant almost complete retooling, and considering the enormous size of some of their machine tools, this was a very important factor. An estimated 80 per cent of the machine tools used in the production of peacetime automobiles had to be set out in vacant lots under a coat of heavy grease for the duration of the war. In England the same industry was able to convert 80 per cent of their machine tools to war work. The tremendous difference is indicative of the degree to which this industry has become specialized in America.

This is also borne out in the Government's share in the financing of new facilities for the manufacture of combat and motor vehicles, most of which came from these states. With only 3 per cent of the total spent, this was the least important of nine categories receiving government financing,

yet private funds accounted for only 20 per cent of the new facilities. There are normally 986 plants engaged in the manufacture of automobiles, engines and parts; 617 of them are located within the East North Central division. Some of these facilities were quickly converted to the production of war materials.

The largest allotments for new facilities were for commodities not ordinarily produced in this region: (1) guns, ordnance, and explosives; (2) aircraft, engines, and parts; and (3) ship construction and repair.

Regional Readjustments—Certain shifts in manufacturing in this division, for the most part taking place since the First World War, explain in part the vigor in the growth of Michigan and Illinois and the lack of it in Indiana, Ohio and Wisconsin.

The transfer of a share of the manufacture of farm implements from Ohio to Illinois and Indiana; another but less important shift was in rubber tires and tubes, from Ohio to Michigan, Indiana, and Wisconsin and to the Gulf and Pacific coasts; the increased manufacture of steel in Michigan; clay manufacturing from Ohio to West Virginia; and in earth-moving machinery from Ohio to Illinois and California.

War gave this region the largest share of new plant facilities, but in proportion to the value added in 1939, these states were third from the bottom, being greater only than New England and the Middle Atlantic states.

West North Central—The West North Central states are not a part of the manufacturing belt. Only eight of the two hundred counties in which manufacturing is concentrated are within this division. The major industries have been those concerned with the processing of agricultural products and the manufacture of iron, steel, and machinery.

To those inclined toward the view of increasing emphasis upon market-orientation in industrial location, the West North Central states seemed to offer much promise. The per capita consumption of many kinds of machinery, of automobiles and of many types of creature comforts is exceeded by no other Census division.

Change Between 1919 and 1939—Missouri was the only state in the region which increased its share of manufacturing activity during this twenty-year period. Nebraska declined the most, with Kansas a close second. Iowa and the Dakotas were virtually unchanged. In national standing Missouri was the only one to advance one place.

This was the period during which marked changes in the localization of agricultural implements, automobiles and steel manufacture took place in the East North Central division. To a degree Missouri and Minnesota shared in this development. Steel manufacture came to Kansas City and St. Louis increased its share, but steel declined in Duluth. Flour milling

declined in Minnesota but not in Missouri and Kansas. The trend of shoe manufacture toward the Midwest was apparently reversed, or at least was checked. Early strides in airplane manufacture in this division were not maintained.

War Years—Every state in this division lost population between 1940 and 1943. In contrast with the East North Central states which showed only a slight change in population, these states west of the Mississippi River lost population at a rate much greater than any other Census division.

Although there was a slight decline in population in most of the states comprising the manufacturing belt (excepting Michigan, Maryland, Rhode Island, Connecticut and New Jersey), the West North Central decline was two to four times as great in proportion. The only exception to this rate of decline, was Missouri which lost only 1 per cent of its population.

This is an anomaly when viewed in the light of public funds spent for new facilities. Government financing in this division was proportionately greater than for any state or division to the east. With only 5 per cent of value added in 1939, they received 10 per cent of all facilities and 6 per cent of all war contracts. Of this increase and of these contracts Missouri alone got nearly half, with Minnesota and Kansas each receiving 20 per cent.

The war effort called for a wide range of productive effort in these states. Fifteen thousand miners worked in the iron, zinc, and lead districts. Northern forests produced 92 millon board feet of lumber. And 200 industrial plants (and 5 shipyards), 1,500 miles from salt water, made ocean-going tugs, barges, buoys, galley ranges, and ship's fittings. Despite these figures, there seems to be nothing in the changes induced by war to reverse the trend downward of manufacturing in the West North Central division.

South Atlantic and East South Central—These two Census divisions are considered jointly. This is in part due to the equality of their shares of value-added, of Government-financed plant facilities, and to the general practice of treating these states as a unit. In general this has not been an important industrial region; only Baltimore is a part of the manufacturing belt.

Farther south on the Piedmont is a second industrial area differing from any other region in the degree of its specialization. The War Production Board map of "WPB Regions and Industrial Areas," in 1943, shows only one district on the Piedmont south of Baltimore. The reason for the omission probably is the narrowly specialized nature of Piedmont manufacturing, namely, cotton textiles, wood products and tobacco. In these indus-

tries the WPB was not particularly interested. Although the South Atlantic states did some manufacturing as early as New England, the boom of commercial cotton growing caused industry to lapse for more than half a century. Other southeastern industrial districts developed at Louisville, Huntington, and Wheeling on the Ohio River; at Charleston on the Kanawha; Memphis on the Mississippi; Knoxville, Chattanooga and Birmingham in the Great Valley; and Nashville in the basin of that name. Relatively minor centers include Lexington and Ashland in Kentucky.

Changes Between 1919–1939—During this twenty-year period, with two exceptions, every state in these two divisions increased its share of the Nation's manufacturing. Mississippi and Florida were the exceptions. Lustiest growth was in the Carolinas and Tennessee.

The variety of new industries during this period was greater in the South Central states. The South Atlantic region greatly increased their share of cotton textiles, wood products including paper, and tobacco manufacturing. But the interior states gained substantially in knit goods, rubber tires, iron and steel, machinery, aluminum and chemical products.

World War II—Between 1939 and 1943 ten of these eleven states in the eastern South gained in population. Their proportional increase in population was greater than for any region in the United States except the Far West. The one southern state which failed to gain was Kentucky, which declined 4 per cent. Each of these two groups of states contributed about 3 per cent of the value added by manufacturing and each received just 7 per cent of all facilities financed by the Government for war work. This rate of public financing was comparable to the West North Central states, but the latter lost population almost as heavily as the eastern South gained. As a result of five years of war production, the eastern South finds itself ahead by a large pool of skilled and semiskilled labor, and many plants.

This net flow of labor to the South reversed the flow for the 1919–1939 period, although the northward flow of labor into the industrial cities of the Lower Lake states continued.

The wartime employment of these wage earners was in two principal groups of industry: (1) the old-established cotton textile, steel, aluminum refining, rubber and chemical industries, and (2) the new aluminum, ordnance and explosive plants, and the shipyards. Half of the money for new facilities in the eastern South was for shipyards. Whereas in 1940 there were 7,500 wage earners in Gulf Coast shipyards, in 1943 there were 200,000 in the same states. Of these 50,000 were in Mobile, 18,000 in New Orleans, 13,000 in Panama City, and 10,000 in Pascagoula. These are almost astronomical increases in wage earners for these places.

A new industry is the assembly of airplanes and the manufacture of certain parts. Most of the manufacturing for these planes was done by the

big automobile manufacturers in the Detroit district, but the parts were shipped to the South for assembly.

Vastly increased capacity for aluminum refining in Alabama and Tennessee was an achievement of this period. The manufacture of iron and steel at Birmingham increased by 15 per cent during these years.

For many years the South has complained about its discriminatory railroad rates. Originally they were set low so as to encourage the export of raw materials to northern mills; the South sought to get it back on manufactured items since there were a few for which the North was dependent upon Southern sources. In 1943 the Government-sponsored Tennessee Valley Authority issued a monograph on freight rates, both rail and motor truck, showing discrimination. In view of the TVA's attempt to find customers for electric power, and the South's taste of industrialization, will these thousands of transplanted wage earners return to their old frustrations on poor hill farms? Part of the answer was given in May, 1945, when the Interstate Commerce Commission lowered rail freight rates on certain types of freight in the South by 10 per cent.

West South Central—Between 1919 and 1939 Texas and Oklahoma increased their share of the Nation's manufacturing, but Louisiana and Arkansas declined. In 1939 the four states accounted for 2½ per cent of all value added by manufacturing. With the coming of the war, their share of new plant facilities financed by the Government was one of the highest, 11 per cent, with Texas and Louisiana getting three-fourths of the total.

1939–1945—Texas and Louisiana each increased their population by 8 per cent, but Oklahoma and Arkansas declined 7 per cent and 4 per cent, respectively. Increased facilities in these states include a steel plant at Houston, Texas, a tin smelter at Texas City, synthetic rubber plants at Port Neches, Lake Charles, Baytown, Texas, and Baton Rouge, La., aircraft at Tulsa and Oklahoma City, shipyards at New Orleans, and an increased oil refining capacity.

Mountain—The Mountain division here includes the Intermountain and western Great Plains states, a tremendous area yet it contributes only .7 per cent to the Nation's value added by manufacturing. Major districts are: Pueblo, Denver and the Salt Lake area.

1919–1939—During this period the share of the Nation's manufacturing contributed by these eight states declined in all but New Mexico, Arizona, and Utah; these three states showed almost no change.

Among the industries which increased during this period is the manufacture of iron and steel at Pueblo, Colorado and at Provo, Utah. Both districts use local raw materials and both ship a large part of their product to the West Coast cities for manufacture and for export.

Copper refining declined somewhat during this twenty-year period due

to the depressed business conditions, but the Government's policy of purchasing silver tended to keep copper production from the maximum slump, since the standard alloy for United States coins is nine parts silver and one part copper.

A large part of Mountain States' manufacturing is concerned with food processing (flour milling, sugar refining, canning, meat packing), industries which showed the minimum of depression slump, so the interwar period on the face of it is surprisingly good.

1939–1943—Between 1939 and 1943 every Mountain division state gained in population except Idaho and Montana, both of which lost population. In the other states the rate of gain was relatively high: in Arizona 40 per cent, Nevada 30 per cent, Utah 15 per cent, Wyoming 1.5, Colorado 3.5, and New Mexico .5 per cent. Mining rather than manufacturing was the cause of this increase. Utah with a population increase of 15 per cent had the greatest increase in manufacturing.

The proportion of Government financing of new facilities was high, 5 per cent, with the award of war contracts correspondingly high. Largest of these facilities is the Geneva steel plant near Provo, Utah, where three blast furnaces were built to produce 1,150,000 tons of pig iron, nine open hearth furnaces to pour 1,283,400 tons of steel ingots, and two rolling mills to produce 700,000 tons of plate and 200,000 tons of structural shapes yearly.

This plant depends for ore upon Iron Mountain, 260 miles distant, and upon the Mountain fields for coal 130 miles away. Production during the war was designed for the ship and aircraft industries of the West Coast.

Another new industry in this division is the production of magnesium at Las Vegas, Nevada. This basic magnesium plant is reported to be the largest in the United States. Pilot mills were operated at several places in these states for the processing of various ores in which the United States had been dependent upon imports. Postwar planning does not seem to include any of these plants.

Large ordnance and explosive plants were operated near Denver, Salt Lake City, and Idaho Falls during the war; Denver manufactured a variety of parts and fittings for ships.

Prospects—Few districts in the United States have aroused more discussion for the postwar period than the Geneva steel plant and the markets for its products on the West Coast. Important shifts in population have come to the western states; it continues in operation to produce the steel needed in peacetime. Lowered freight rates may help the region.

Pacific Coast—For many years the Pacific Coast cities were called warehouses for eastern manufacturers. Only the simplest type of manufacturing took place anywhere on the coast. Like the southeastern Cotton Belt

almost a century earlier, agriculture was dominant and a profitable dominance it was. It furnished one of the bases for manufacturing, and the processing of agricultural products has continued as an important industry.

Although Los Angeles brought in water from the near-by mountains early in the present century, industrial development was meager until World War I. The greatest single impetus to West Coast manufacturing was the great petroleum development. Lacking petroleum or an equivalent power resource, the Pacific Northwest did not undertake much manufacturing until a quarter of a century later.

1919–1939—This period witnessed an increase in the manufacturing activity of California and Oregon; Washington declined on all three bases.[10] The most vigorously growing cities in the United States, after the automobile boom days, were the California port cities. Bonneville and Grand Coulee dams have fundamentally changed the outlook for industrial development in the Northwest.

New industries in California during these years included the manufacture of rubber tires, automobile parts (seventh among the forty-eight states), earth-moving machinery, sugar and oil refining, rice milling, fruit and vegetable canning, aircraft, furniture and oil-well machinery.

In the Pacific Northwest industry remained relatively simple in type: wood products, seafood, fruit and vegetable processing, dairy products, wool, and a little iron and steel manufacturing. The airplane industry of World War I struggled through the lean years until rearmament in Europe gave it a new lease on life. California rose from tenth to ninth place in wages.

1939–1943—All three Pacific states gained substantially in population between 1939 and 1943. California experienced the greatest numerical increase in the nation, 1,559,135, and the fourth largest proportional gain, 22 per cent. Washington and Oregon gained 17 and 14 per cent, respectively. California's war contracts were exceeded only by Michigan and New York.

Eighty per cent of California's war contracts were for aircraft and ships; an even higher proportion was for these two items in Washington. Ninety per cent of Oregon's contracts were for ships. Diversification in manufactures was much greater in California than either of the other two Pacific states.

As for new industrial facilities financed by the Government, these states received 8 per cent, half again as great as their share of the nation's value added in 1939. Among the new industries in California thus financed were the following: magnesium reduction, using both dolomite and sea water;

[10] The division gained in value-added, both absolutely and relatively.

blast furnaces and rolling mills, 675,000 tons capacity, using ore from Sunnyside, California; and coal from western Utah; cement; shipyards; aircraft; machine shops and tool plants.

The industrial districts of Oregon are near enough to those of Washington to be treated here as one region. New facilities in these two states are about half those of California and were added principally for ships, aluminum, and aircraft manufacture. The shipyards are to Portland what the aircraft industry is to Seattle.

The Pacific Coast attracted labor from nearly every state in the country to man these tremendous increases in industrial capacity.[11] Most of the products were clearly for war purposes, but California especially, sees in this phenomenon an important step in the evolution of her economy.

The gains in her manufacturing efficiency may augur much for peacetime industry.[12] There is reported to be ample scrap iron and steel for the industry's anticipated need. Steel demands include the manufacture of tin plate for the food industry, some part of the new aircraft industry, earth-moving and oil-well machinery, pipe, possibly bodies for automobiles and refrigerators; and exports for the Oriental market appear to be important.

California has about one and one-half million more people than in 1939. This makes a big increase in the market for the necessities of life. Some part of this new population will probably remain on the West Coast, and become an increased market for all kinds of consumption goods. This is the sort of goods for which the West has depended upon the Northeastern states. Since the war, new industries have been established in California at a rate which California feels is highly promising.

[11] Sources of Labor:

West North Central	1,442,000
East South Central	940,000
West South Central	595,000
Mountain	560,000
Middle Atlantic	379,000
East South Central	170,000
South Atlantic	138,000
New England	134,000

[12] All West Coast aircraft plants in December, 1940 employed about 90,000 wage earners and built 2,600 planes; this is a ratio of 31 to 1. By December, 1941 this ratio was 22 to 1 In December, 1942 the ratio was 16 to 1. And in 1943 it was 11 to 1. Again, for every 100 wage earners needed to build a Douglas A-20 in 1940, it took but 9 in 1943. For a Consolidated B-24 it took 444 wage earners one year to build; in 1943 it took but 17. For a Lockheed P-38 it took 232 wage earners; in 1943 it took but 11.

V

COMMERCE AND COMMERCIAL ROUTES

Basis and Origin of American Commerce

The Meaning of Commerce—Commerce arises from the exchange of goods and services. The products of agriculture and manufacturing are not all consumed by the people who produced them, nor even by the people within the area where they were produced. Not all, but most, of these commodities are sold or exchanged, transported, and then used or consumed by other people.

The growth of these two industries is dependent upon commerce for they would not long produce more goods if they could not sell them. It is not only our large foreign trade, but also our vastly greater domestic trade that puts the United States at the top of the world's commercial nations.

Canada, though not equal to the United States in commerce or population, had, by the end of 1944, become the world's third-largest trading country. Even before the war, Canada was first in per capita exports. Its population, however, is only about one-twelfth of our own.

The United States has specialized geographically to a degree equaled by no other nation, or continent. In this geographical division of labor lies the basis of our great commerce. Just as geography deals with man and environment, so our regional specialization rests not only on variations in natural resources, but also on diverse stages of economic and social development in different districts. There is by no means a uniform population distribution and the commercial structure is likewise characterized by widely varying traffic density. But as nations go, none surpasses the United States in the uniformity of its commercial network.

In a country characterized by great distances, fronting on two oceans, and with a great diversity of climate, relief, soil, and resources, it is inevitable that such geographical specialization can be possible only if freight costs per ton mile are low.

Town and Country Contribute to Trade—The average American town or city involves a great deal of commerce because of the degree of specialization within its local economy. Towns and cities in the eastern half of

the Corn Belt, especially, are invariably engaged in some kind of manufacturing; in this respect there is no comparable area in the world. The Hay and Dairying Region as a whole has the highest proportion of urban population in the country, although the northern portion is sparsely populated. In these two agricultural regions, market towns have been transformed by industry. The Cotton Belt, the Trucking and Fruit Districts, the Grazing and Irrigated Crops Region, the Wheat Belts, the Subtropical Crops districts of the South and the Pacific, all contribute to this fundamental emphasis upon commerce.

Implying that the decentralization of crop specialization proceeded as far as practicable, the commerce in labor as an aspect of industrialized agriculture has been widely publicized in recent years. This type of migrant labor has long been associated with the Spring and Winter Wheat belts, with California vegetables and fruit, Great Lakes fruit districts, the North Atlantic trucking regions, most of the sugar beet districts in the West, the hops and fruit of the Northwest, and the Gulf Coast fruit and vegetable districts. In some areas it is comparatively new, for instance, the onion and beet sugar districts of Ohio, the tomato district of the eastern Cotton Belt, the citrus fruit district of the Rio Grande Valley, and even some of the cotton areas of Texas and of California.

Early self-sufficiency in agriculture resulted in local processing of farm products. This gave way before the increasing commercialism of specialized agriculture. Flour mills, slaughter houses, creameries, cheese factories, grain elevators, ropewalks, distilleries, and stock-loading pens have all retreated to the cities or larger towns. Out of these things, commerce is born.

Origin of Commerce—Specialization results in greater skill, efficiency, and output, consequently a large surplus for exchange. At the same time specialization means less self-sufficiency within the group or district. This naturally means a greater demand for the surplus products of another group or region, therefore more trade. Increased production due to specialized skill, makes possible because of the greater income, a rise in the standard of living. This results in greater and more diversified wants, and so a widening of the market. Thus a mutually beneficial commerce grows along with an expanding agriculture and the evolution of industry.

Factory System Speeds Up Commerce—The industrial revolution invaded manufacturing long before it did agriculture, and it has influenced commerce in factory products to a greater degree, even though our farms usually provide some 75 per cent of the industrial raw materials. In a sense, the highly specialized nature of industry has tended to make this economy rigid. Industries with a raw material orientation, or with power, labor or market orientation, have become established in their

respective centers, with the result that a maximum of commerce takes place within the region. Most cities have experienced somewhat the same sort of thing. Detroit is the home of mass production of automotive products, Akron of tires and tubes, Dayton of automatic and calculating machines, Youngstown of primary iron and steel products. Steel was once made from local materials but today the various types of steel draw upon many parts of the world for the ingredients. Coal is mined in increasingly remote fields; timber is cut at increasingly great distances from market. Commuting labor, common to many parts of the country, travels farther each year.

Railways and Traffic

Importance of Railroads—The volume of transportation in the United States and Canada is expressed in well-nigh astronomical figures; it is greater than that for all other nations combined. Two-thirds of it is carried by the railroads. There are two railroads in the United States each of which has a greater freight ton-mileage than any foreign country. American railroads carry about three times as much freight as the waterways, if the length of haul and local terminal traffic in the port cities are disregarded.

Railroad Network—The fact that there are 231,971 miles of railroads in the United States is misleading in that it gives no account of multiple tracks or of the density of freight traffic. Likewise a standard railroad map fails to distinguish between the main and the branch lines. It does, however, indicate the geographical pattern of the railway net. Generally speaking, the lines east of the Mississippi River and north of the Ohio-Potomac rivers have the greatest multiple trackage, and the density of freight and passenger traffic is likewise much greater in this division.

The density of passenger traffic for the Northeastern states is well shown on a map by Raisz.[1] If all United States traffic were thus apportioned on a map, railroads would appear as a series of east-west and north-east, south, and southwest lines increasing toward the Middle Atlantic Littoral. Of the eleven leading railroad states (mileage), seven are east of the Mississippi River.[2]

Character of Freight—In 1941 the products of mines and quarries accounted for 55.7 per cent of the total freight carried by the railroads; manufactured goods constituted 27.4 per cent; agricultural commodities 8.2 per cent; forests products 5.8 per cent; livestock and its products 1.4

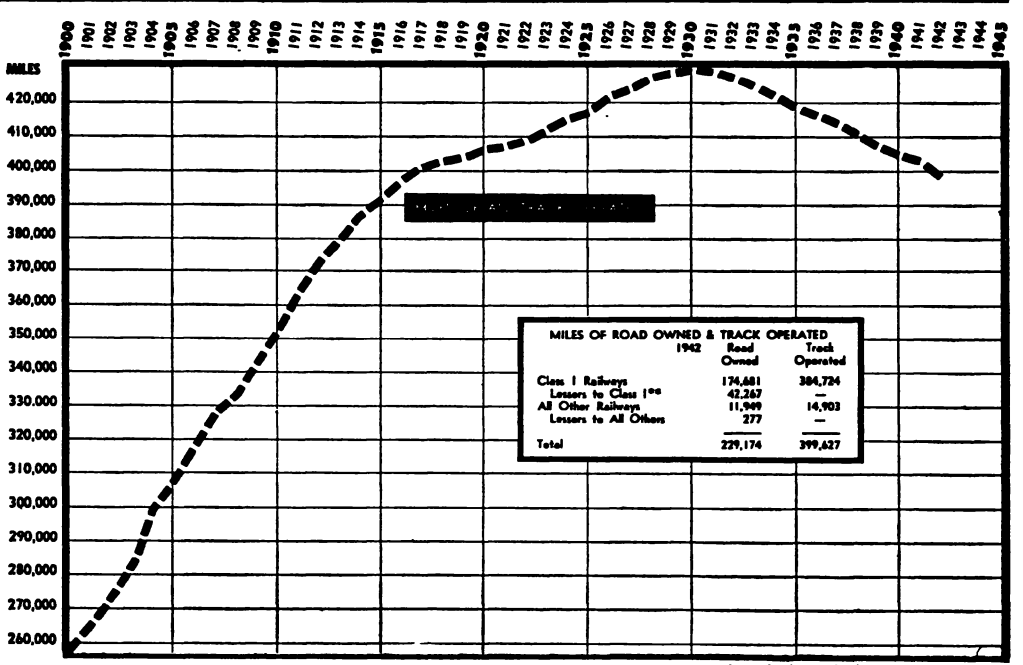
[1] Erwin Raisz, "Traffic Density for Eastern Railroads." (Geographical Institute, Harvard University, map series, 1941.)

[2] The mileage by states follows:
Texas, 16,221; Ill., 11,933; Pa., 10,275; Iowa, 8,949; Kansas, 8,567; Ohio, 8,162; Minn., 8,365; Mich., 7,256; Mo., 6,973; Ind., 6,888; and Wis., 6,617

MILES OF RAILWAY - ROAD OWNED AND TRACKS OPERATED

RAILWAYS OF CLASSES I, II AND III

YEAR (DEC. 31)	MILES OF ROAD OWNED	MILES OF ALL TRACK OPERATED *
1900	193,346	258,784
1901	197,237	265,353
1902	202,472	274,196
1903	207,977	283,722
1904	213,904	297,073
1905	218,101	306,797
1906	224,363	317,083
1907	229,951	327,975
1908	233,468	333,646
1909	236,834	342,352
1910	240,293	351,767
1911	243,979	362,825
1912	246,777	371,238
1913	249,777	379,508
1914	252,105	387,208
1915	253,789	391,141
1916	254,037	397,014
1917	253,626	400,353
1918	253,529	402,343
1919	253,152	403,892
1920	252,845	406,579
1921	251,176	407,531
1922	250,413	409,359
1923	250,222	412,993
1924	250,156	415,028
1925	249,398	417,954
1926	249,138	421,341
1927	249,131	424,737
1928	249,309	427,750
1929	249,433	429,064
1930	249,052	429,883
1931	248,829	429,823
1932	247,595	428,402



Association of American Railroads

FIG. 19

This is not a chart showing diminishing productivity of the railroads. It is in response to the shifting frontiers of American productivity

per cent of the total traffic. These are national averages and are representative of no single railroad. Instead, there is so much specialization by railroads in the character of freight hauled, as to give rise to such expressions as great (1) "coal road," (2) "wheat road," (3) "iron road," (4) "potato road," (5) "passenger road." [3]

Inland Waterways

Our Inland Waterways of Unequal Utility—The geographical pattern of the inland waters of the United States and Canada is such as to limit the usefulness of many parts of them. The low cost of railroad transportation has likewise discouraged inland water commerce.[4] Parts of the inland waterways, however, are of great value in the transportation system. These include the Great Lakes and their connecting waterways, the Mississippi system, the St. Lawrence and the Columbia rivers. During the days of river and canal trade, more streams were used than today, but the traffic burden of 1945 is immeasurably greater than in early days.

Renaissance of River Transportation—The rebirth of river transportation began in 1918 when Congress authorized the building of a small fleet of steel towboats and barges with which to start experimental services on the lower Mississippi and on the Warrior River of Alabama to determine whether such transportation had any public appeal and could be successfully maintained.

With the exception of the movement of coal to the furnaces on the upper Ohio and Monongahela rivers, transportation on the Mississippi system had been virtually dead for twenty years. The experimental fleet was designed to operate on the presumed nine-foot channel in the Mississippi from Cairo to the Gulf. High costs of operation resulted because the channel was not dependable. Except at flood stages barges could not go up the Ohio River above Cairo or above St. Louis on the Mississippi.

Today there is opportunity for year round nine-foot navigation be-

[3] (1) Chesapeake and Ohio
(2) Northern Pacific
(3) Bessemer and Lake Erie
(4) Bangor and Aroostook
(5) New York, New Haven and Hartford

VOLUME OF TRAFFIC, 1941

	MILES	MILLIONS OF TON MILES
Railroads	231,971	630,000
Highways	2,960,000	40,000
Inland Waters	29,038	66,746
Airways	35,592	10
Pipe lines (crude)	65,292	66,400

Statistical Abstract, 1942
Yearbook of Railroad Information, 1942

tween New Orleans and Pittsburgh, Chicago and Minneapolis, interrupted only in the Upper Mississippi by ice during the winter months as on the Great Lakes. There is fairly satisfactory six-foot navigation up the Missouri as far as Kansas City. The Gulf Intracoastal Canal is in active operation between Corpus Christi, Texas and Carrabelle, Florida. The Atlantic Waterway offers continuous inland navigation from Philadelphia to Miami. The proposed connecting barge channel across Florida and the completion of the Raritan Channel across New Jersey, will make continuous navigation possible between Boston and the Rio Grande.

Through traffic has built up rapidly as fast as added channels have been made available. Probably every river or canal is today carrying a traffic far in excess of the estimates of its projectors.

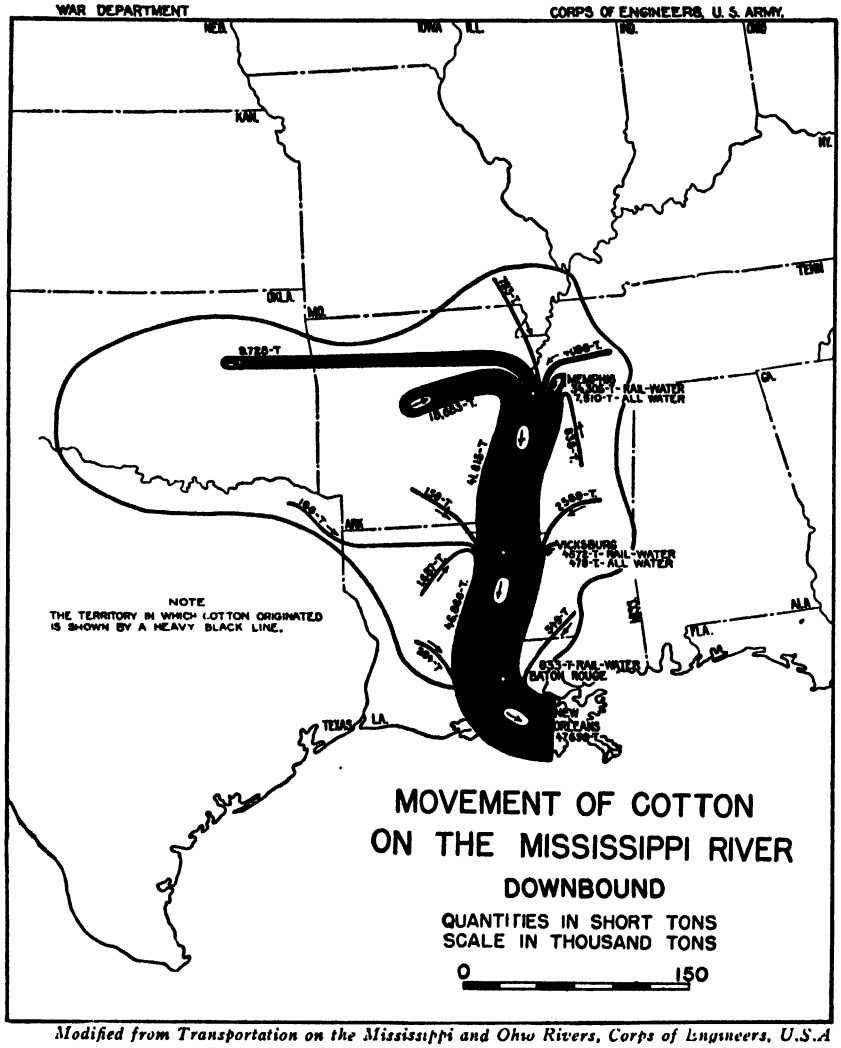
With the virtual completion of this system of some 9,000 miles of inland waterways, there has been a really astonishing development of traffic. In 1942 there were handled on the Mississippi River system about 92,000,000 tons of freight, an increase of 26 per cent over 1940. The Gulf Intracoastal Canal handled, in addition, over 21,000,000 tons, an increase of 82 per cent over 1940.

There are many significant movements involved, as for example, a large seasonal volume of furnace oil from New Orleans to the Twin Cities, gasoline, in bulk, from Texas to Pittsburgh, and intermediate Ohio River ports, from Kansas City to Minneapolis; from Wood River, Ill. to Chattanooga on the Tennessee, and from Port Arthur and Houston, to Port St. Joe and Carrabelle, Fla., where pipe lines take it to Atlanta and Jacksonville. Sulphur normally moves in bulk from Galveston and Port Sulphur to Pittsburgh and Chicago by way of Middle Atlantic ports. During the war it was transshipped from Chicago by lake to Cleveland. Canadian grain moves in bond from Chicago elevators to Galveston; grain in bulk from Kansas City to mills at Nashville on the Cumberland River; flour from Kansas City to St. Louis and Chicago. Illinois mines are moving a large amount of the fuel used by the public service corporations by the Illinois River to Chicago and on the Upper Mississippi to St. Paul. Molasses moves from New Orleans to Peoria for the production of alcohol.

There has been a marked increase in bargeload traffic, which the shipper loads and consignee unloads. While package freight has grown somewhat, it has not kept pace with the larger growth of bargeload traffic.

The future seems to hold better prospects for interchange between barges and trucks. One shipbuilder has the germ of an idea which may offer a remedy. It is the outgrowth of his experience in building thousands of landing barges for the Government during the war. He visualizes barges which will handle many loaded trucks. By this means, a truck carrying eight or ten tons can be loaded at the shipper's industry, pulled with inter-

changeable tractors to the river terminal, placed mechanically on several decks of a barge, taken by river to a designated interchange point, and



Modified from Transportation on the Mississippi and Ohio Rivers, Corps of Engineers, U.S.A

FIG. 20

there moved by waiting tractors for city delivery or direct to the plant of the consignee in the interior.

The Ohio River System—In many ways the Ohio River traffic differs from that on the Mississippi proper. It is fragmented, and a few very im-

portant segments of the Ohio system have great tonnage advantage over the larger river. The carriers on the Ohio are privately owned. Again, upstream traffic is of little consequence, and downstream traffic is diverted to a larger number of river cities than is the case with the Mississippi. As against a few hundred boats and barges on the Mississippi, there are about 1,700 on the Ohio and its tributaries.[5] Coal, iron and steel, sand and gravel, and timber constitute all but a small part of the total Ohio River tonnage. Cement and oil shipments have increased in recent years.

The hundred miles of navigable Monongahela above Pittsburgh carries the largest tonnage on the Ohio system, usually greater than the Mississippi River proper; in 1940 it was about twenty-nine million tons, mostly coal and coke, but with some sand, gravel, ores, and metals. Traffic on the Allegheny consists of less than four million tons a year of the same commodities, in a different proportion, plus petroleum. About two million tons are moved on the Kanawha, most of it coal headed for the industrial cities of Ohio and the Great Lakes.

Of the more narrowly specialized freight on the Ohio, 88 per cent is coal, gravel, iron and steel; the boats and equipment are more highly developed than was the case on the Mississippi before the government began operation.

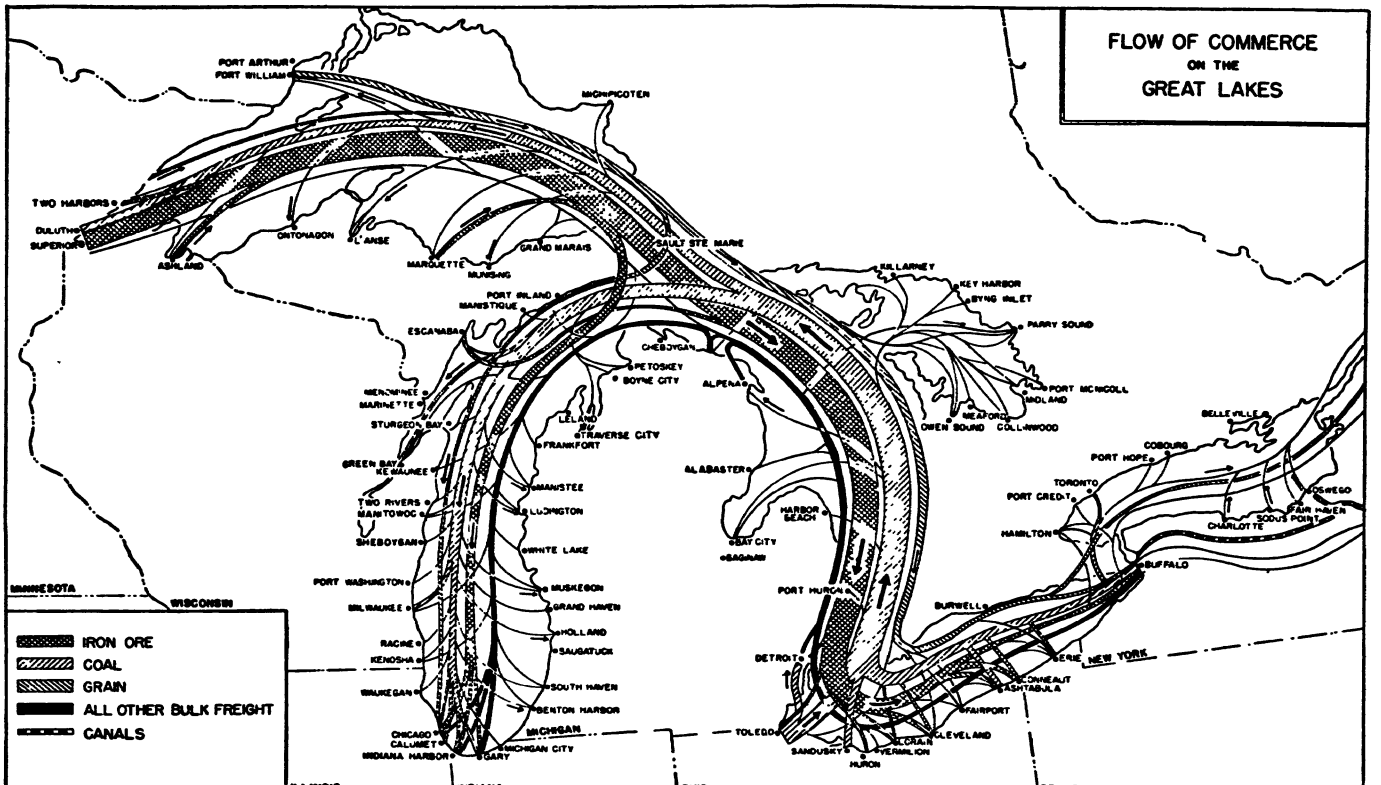
The huge sums expended upon the Mississippi system in its entirety may be regarded as having several objectives: (1) to increase navigability and integrate waterborne commerce with the railroad and pipeline systems, (2) prevent floods by the control of tributary streams (Great Miami, Tennessee, and Muskingum, projects are completed or nearly so), and (3) to aid in the conservation of water and land resources through water storage and erosion control, and the development of recreation facilities.

The Great Lakes—The Great Lakes waterway curves southeast a thousand miles from the greatest source of iron ore on the continent to the greatest steel-making centers. It lies between the greatest corn and wheat fields of North America and the richest consumer population on any seaboard area in the world.

Nearly 800 vessels ply the Great Lakes, all but a hundred of them being cargo carriers for the iron, coal, wheat, and limestone which constitute 90 per cent of the total tonnage of the Lakes.[6] (Fig. 21) Over 144 million

[5] One Pittsburgh steel company operates towboats and 201 barges, each holding about 1,000 tons or 14 freight cars. The barges are lashed firmly to the squared front end of the towboat so as to be steered as a unit.

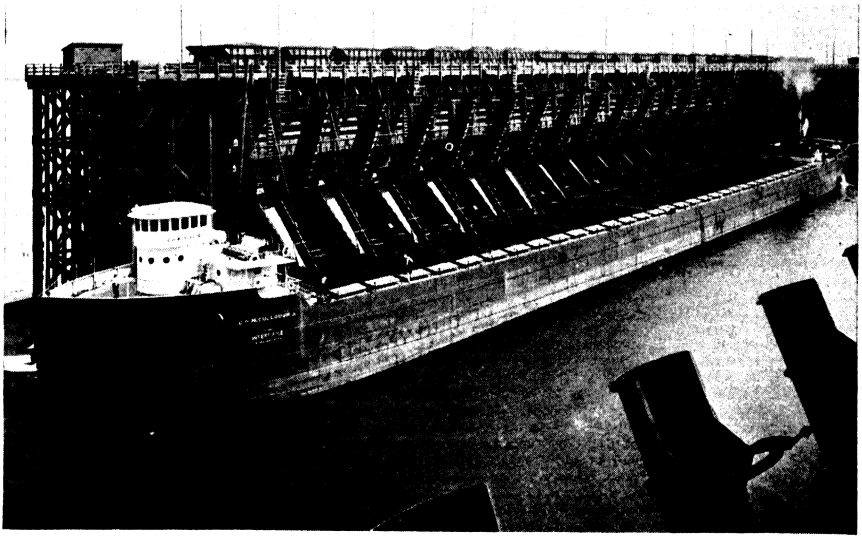
[6] Other commodities include vast quantities of sand, cement, lumber, newsprint, coke, petroleum, scrap iron and steel, dairy products, and miscellaneous metals and manufactured products including automobiles. The Lake Carriers Association publishes each year a complete report of freight carried.



Based on a chart drawn for FORTUNE by Boris Artzybasheff

FIG. 21

tons of cargo were carried by United States lake freighters from one United States port to another (1942) while sixteen million tons traveled from United States to Canadian ports and overseas. This total for the Great Lakes is somewhat greater than the combined tonnage of our Atlantic, Pacific, and Gulf ports for a year. The Canadian fleet of 300 vessels carried several million tons between Canadian ports. The rapid turn-around of these Lake freighters enables them to make about twenty round trips



Shell Oil Co., Inc.

FIG. 22.—ORE DOCKS AND FREIGHTER, DULUTH

The capacity of this boat is 14,000 tons or the tonnage of 300 ore cars. By gravity it is filled in three hours.

each season of eight months. Through the Detroit River this means an average of one passage every twelve minutes around the clock during the open season.

Although some eleven million people live in urban communities along the Great Lakes, most of them are on the United States side. Nevertheless, except for the four commodities named above, the use of the Lakes for commerce between these cities is limited. This is largely due to the fact that these interurban exports have high value or are of such perishable nature that the economical but slow boat passage does not attract them. It is also true that competition beween Lakes and rail has kept rates low on the land.

The commerce between the Great Lakes cities and those on the St. Lawrence River is unimportant except for wheat. Although the navigation hazards between lakes Erie and Ontario, and in the upper St. Lawrence itself, have been to a large degree overcome by canals, the river is closed to traffic even longer than the Lakes, and except for wheat, European ports are of interest to only a few Great Lakes exporters.

The Great Lakes Ports—There are approximately 400 harbors serving the Lake trade, but the five ports of Duluth-Superior, Toledo, Buffalo, Chicago, and Cleveland handle most of the tonnage. Most of the remainder is distributed among a hundred smaller ports.[7] Duluth-Superior, twin port cities at the western end of Lake Superior, are second only to the port of New York in tonnage. Of the sixty million tons handled in these ports, nearly half is iron ore from the mines some fifty to a hundred miles west and north of the lake. Most of the ore is shipped from Superior where the ore docks are the world's largest. (Fig. 22) The Great Northern Railway docks are capable of loading a standard freighter every hour around the clock. The experience of handling more than a billion tons of ore in the past half-century has resulted in the world's lowest handling costs.[8]

Coastwise Trade

Extent—In normal times the domestic trade of the United States accounts for about 90 per cent of the total trade. A large portion of the tonnage is classed as coastwise, a term which includes trade between the Atlantic and Pacific coasts, the mainland and the territories of Hawaii, Alaska, and Porto Rico, Canal Zone, and other minor areas.

Pacific-Atlantic Trade Via Panama Canal—Of the several trade routes which use the Panama Canal regularly, the one profiting most from the construction of the Canal has been the intercoastal trade between the Atlantic and Pacific ports. The novelty of the Canal has long since worn off; it is taken as a matter of environmental fact, and the proportion of our domestic trade which is water-borne by way of the Canal appears to

[7] There were 23 ports on the Atlantic seaboard handling gross traffic in excess of a million tons in 1937; 30 Lake ports exceed that figure.

[8] CARGO TRAFFIC ON PRINCIPAL CANALS

(Million short tons)

YEAR	SAULT	SUEZ	PANAMA	WELLAND
1915	71	15	6	3
1930	73	29	31	6
1937	88	36	32	12
1940	90		31	

Statistical Abstract 1941

be established. The peak year for this commerce was 1924 as no other year has approached this tonnage. At that time the Atlantic-bound tonnage was almost four times as great as the Pacific-bound, but the difference between the two movements has been narrowing for the last fifteen years. The effect of two world wars, the California oil boom, and the period of Japan's rearmament all stand out in the tonnage statistics of intercoastal trade.

The preponderance of Atlantic-bound traffic holds not only for the intercoastal but for the six other leading Panama Canal routes and railroads as well. In the intercoastal trade, shipments of oil and of lumber have been in first or second place for virtually all of the Canal period. In order of importance the first half dozen commodities include fish products, canned fruits and vegetables, copper, and furs. Pacific-bound products are mainly manufactured and semimanufactured goods.

Gulf-Atlantic Trade—This trade is likewise principally raw materials moving to Atlantic ports and includes phosphate, petroleum, copper, sulphur, lumber, cotton, naval stores, wheat, citrus fruit, and canned shrimp. To the Gulf ports from Middle Atlantic cities come steel and machinery for shipyards and oil fields, and a variety of commodities of lesser importance. Along with its great oil industry, the United States has built up a great oil transportation system. It has constructed a fleet of 450 tankers which make fifteen round trips each year between the Texas oil ports and the refining cities of the Middle Atlantic district. The importance of these tankers in supplying oil to the eastern states was dramatically highlighted in the first year of our participation in World War II.

Pipe-line Transportation—The use of pipe lines for the transportation of petroleum began shortly after the discovery of the commercial use of petroleum. Its main development occurred much later however. From tank wagon to railroad tank car to pipe line and to ocean tanker, petroleum successively cheapened its mode of transportation.

By 1940 there were approximately 120,000 miles of pipe lines of all kinds in the United States. This network was concentrated principally between the oil fields and the port cities and from Texas to the lower Lake region, thence east to the Middle Atlantic cities. These pipe lines moved most of the United States commerce in petroleum. The cheaper ocean tanker dominated the transportation of petroleum from Gulf ports to Middle Atlantic port cities.

World War II drastically reduced the proportion of petroleum moving by ocean tanker and increased the proportion by railroad, river barge, and by pipe line. The first transcontinental pipe lines from the Gulf to Middle Atlantic port cities were constructed during the War, Big Inch and Little Big Inch. By 1947 these lines were given over to the transport of natural

gas from Texas to the cities of the Manufacturing Belt. The economical ocean tanker again dominated the flow of oil from producer to refining and consuming centers on tidewater. Gasoline pipe lines have been constructed extensively; most of this mileage is between Ohio and the Middle Atlantic states.

For many years western cities have brought water many miles from dams built upon the rivers flowing down from the high mountainous heart of the United States. New York uses a great deal of this mode of transport to satisfy the enormous demands of several million people and industrial users of water. Smaller cities of the United States are extending municipal mains farther into the surrounding country each year in order to safeguard health, secure adequate quantities of water, and increase municipal revenues.

Traffic Between Atlantic Ports—The principal item of this trade between Atlantic port cities is coal from the ports of Chesapeake Bay to the New England and Middle Atlantic cities. Vessels bringing iron ore from Cuba and Chile return with cargoes of coal for the American naval bases in the Caribbean and for the Panama Canal. Steel from Baltimore moves both north and south to the shipyards of the Atlantic margin. Some fruit is likewise moved between Atlantic ports.

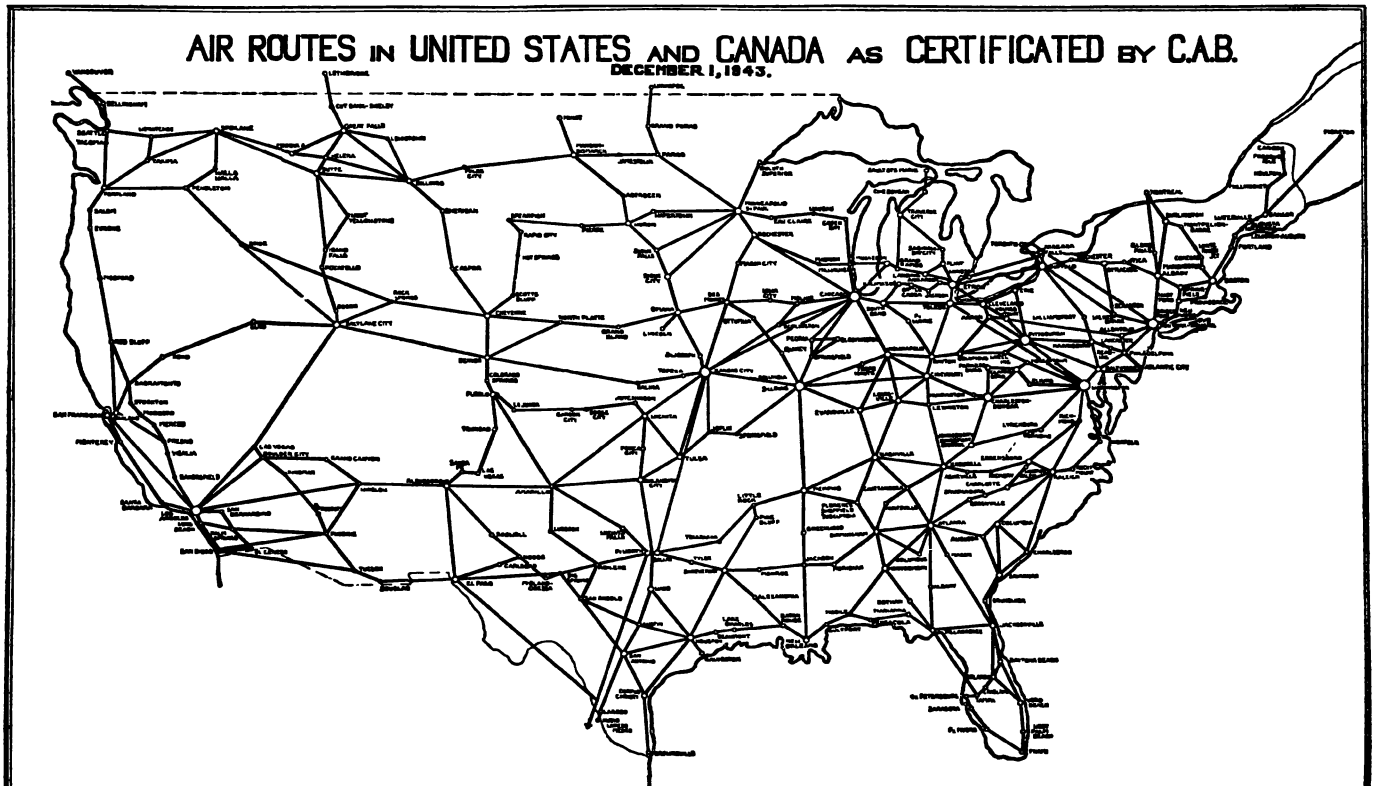
Air Commerce

Status—The secrecy of war kept the facts of air commerce development from the public during a period when its greatest strides were being taken. When World War II broke out the United States and Canada were well served by commercial airways as domestic and foreign airlines of the United States flew more air miles than all of the major European-owned lines put together. In Pan-American Airways this country had the most extensive international air service in the world, covering 98,582 route miles.[9]

Development—World War II caused the establishment of the Army's Air Transport Command; in 1942 this service was flying 60,000 miles of route; in 1943 the number of planes and the number of trips flown were increased several hundred per cent. Its flying routes literally encircled the globe. The Navy likewise operated a tremendous air transport system comparable in scope to the Army's. In the early postwar years, England, Holland, France and Mexico were operating airlines serving many of the same regions covered by United States lines.

This is a far cry from the experimental airway flown by the army in 1918, from New York to Washington, Chicago, and Cleveland. On this air-

[9] Its nearest competitor was the German Lufthausa with about 33,000 miles. (Newsweek, Editorial, March 5, 1943.)



Association of American Railroads

FIG. 23

way only mail was carried. A combination plane-train transcontinental airway was established in 1929, with only daytime flying in the first large multi-engined transport planes. A lighted transcontinental route soon followed. Dawn-to-dusk flights, sleeper planes, and stratosphere planes followed in that order.

Routes—Reference to the airways map (Fig. 23) reveals the pattern of domestic commercial airways. It reflects much the same continental pattern as the railroads. Both show the critical nature of relief and climate in trade. Although the rise in airways traffic, both passenger and express, has been impressive, it appears to be the intercontinental development that promises to alter significantly the structure of United States commerce.[10] Alaska is becoming almost solely dependent upon the airplane. The new mineral kingdom of Upper Canada is likewise predicated upon airplane transportation. Central and South American airlines have shown astounding increases in sustained air traffic.

America's Foreign Commerce

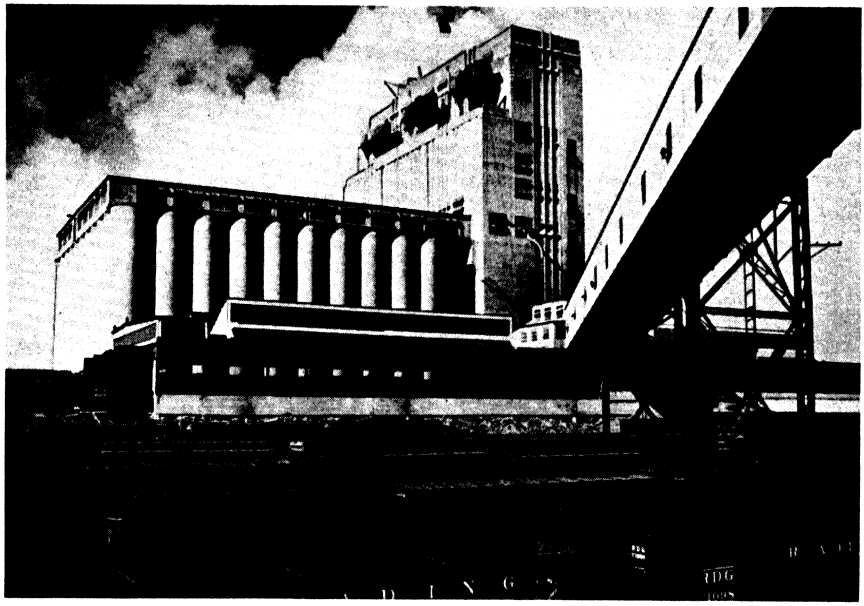
The United States Looks Abroad—Like other aspects of the economic geography of the United States, foreign trade reveals the fundamental character of the national economy. The United States has had the double advantage of being a new country with a surplus of raw materials and of food, and at the same time a mature country with its highly developed manufacturing industries. The economies of large-scale factory production have been possible because of the size and overwhelming dominance of domestic trade, which market has steadily expanded for more than a century. As a result of these economies, foreign markets have been opened to manufactures of the United States because of low price and high quality. The proportion of total trade classed as foreign has varied by commodities and with the years, but it remains generally less than 10 per cent. Yet by each one per cent of foreign trade perhaps a million persons

10 AIR COMMERCE

	1932	1940	1943
Miles of Airway Flown:			
Domestic	28,550	41,054	36,982
Territorial and International	19,980	53,025	—
Passengers Flown:			
Domestic	474,279	2,959,480	3,454,040
Territorial and International	23,281	225,758	—
Express and Freight: (Thousand pounds)			
Domestic	1,034	12,605	57,544
Territorial and International	6.39	1,682	—

Statistical Abstract, 1944–45

will be directly affected here in the United States.[11] Neither must it be forgotten that the goods imported are sold here, and such goods become a part of the domestic trade. Another fact that makes the above figure of 10 per cent misleading, is that where a considerable portion of the surplus special product of a city or region is exported, the money received may be spent for the goods of some other city or region, so again boosting the total of domestic trade.



Reading Company

FIG. 24.—GRAIN ELEVATOR, PORT RICHMOND, PENNSYLVANIA

Nature and Extent of Foreign Trade—The nature of the United States exports and imports reveals the double advantage the nation has in being an exporter of both raw materials and manufactured goods. Our foreign trade also reflects the three stages of industrialization existing here at the same time. Imports include raw materials for manufactured luxuries in foods and manufactured goods, and a number of items, both raw and manufactured, which compete with domestic production.[12]

[11] World War II taught most Americans that self-sufficiency is a myth, and that the widespread failure to recognize this slowed our war effort inexcusably.

[12] NATURE OF FOREIGN TRADE OF UNITED STATES

(In Millions of Dollars)

EXPORTS	1940	IMPORTS	1940
Machinery	670	Paper and wood pulp	192
Iron and steel	515	Crude rubber	317

(*Continued on page 80.*)

Geographical Distribution of Our Foreign Trade—The nations with which the bulk of this trade was carried on in 1940 were Canada, the United Kingdom, Japan, Germany, France, Cuba, Philippine Islands, and Malaya. Over a fifty-year period there has been a change in the types of goods the United States wanted to buy and to sell; these changes are reflected in the shifting centers of trade. As the following table reveals, in half a century the proportion of our foreign trade which is with Europe has about halved, while that with Asia has doubled. Although our trade with South America has increased, it has been in no such spectacular fashion.

The United States has come of age, and the present distribution of foreign trade reflects something of this maturity. The geographical shifts in trade are shown in the table below.

TABLE 5

PERCENTAGE DISTRIBUTION OF U.S. IMPORTS AND EXPORTS

IMPORTS—1900	COUNTRY	IMPORTS—1940
51.8%	Europe	14.9%
17.2	Asia	37.4
4.7	Canada	16.6
11.	South America	15.
10.6	Central America and Mexico	9.8
EXPORTS—1900		**EXPORTS—1940**
74.6%	Europe	40.9%
4.8	Asia	15.4
7.	Canada	18.
2.8	South America	10.8
6.5	Central America and Mexico	8.5

Statistical Abstract of the United States, 1941–45

(*Continued from page 79.*)

EXPORTS	1940	IMPORTS	1940
Petroleum and products	310	Vegetable oils	56
Automobiles	254	Cane sugar	113
Cotton	213	Coffee	126
Copper and its products	110	Raw silk	124
Coal and coke	87	Tin	130
Cotton mfgs	75	Wool and mohair	84
Packing house products	48	Furs	79
Rubber goods	44	Hides and skins	50
Tobacco, raw	44	Fruits and nuts	60
Chemicals	145	Feed grains	—
Fruits and nuts	35	Cotton mfgs.	30
Wheat and flour	32	Copper and products	73
Paper and products	—	Cocoa	—
Sawmill	36	Petroleum	70
Aircraft	—	Burlap	45

Statistical Abstract, 1944–45

A further breakdown of the trade by continents for 1940 shows that the United Kingdom and Canada dominate our foreign trade just as the commerce between them dominates their respective trade.[18] There exists a triangular pattern, with the trade between no two of the nations being predominantly one-way. This advantageous relationship which has developed over a long period was enlarged and strengthened by the exigencies of World War II. The tardy resumption of prewar trade patterns has carried the impetus of the war period well into the postwar years. In 1946 Congress provided for the accumulation of stock piles for mineral and other raw materials deemed essential for our continued well-being.

Canada is a progressive new country with a large foreign trade per capita. The production of wheat, cheese, butter, meat, wood pulp and paper, gold, asbestos, nickel, and fish gives rise to a large surplus with which Canada buys from the United States such commodities as automobiles, all kinds of machinery used in the extraction, transportation, and processing of her raw materials, agricultural implements, textiles, coal, iron, petroleum and its products, vegetables, and fruit.

Both Canada and the United States expect to increase their manufactured exports substantially during the years after World War II, but they plan this at a time when the United Kingdom is less able to make the

18 GEOGRAPHICAL DISTRIBUTION, U.S. FOREIGN TRADE, 1940

(In Thousands of Dollars)

EXPORTS		IMPORTS
$1,643,174	Europe	$387,188
1,010,829	United Kingdom	155,051
112,521	No. E. Europe	26,639
96,621	So. W. Europe	50,120
18,349	So. E. Europe	18,118
629,210	Asia	980,869
28,372	W. Asia	34,818
258,426	So. & So. E. Asia	689,384
322,412	East Asia	256,667
94,183	Australia & Oceania	34,673
435,583	South America	395,105
124,880	No. S. America	93,816
80,727	W. So. America	93,315
229,976	E. So. America	207,974
1,068,087	North America	696,081
759	Greenland	1,328
2,254	Iceland	2,673
713,248	Canada	423,541
10,481	Newfoundland & Labrador	12,174
200,016	Central America	117,129
141,205	Caribbean	139,177

Statistical Abstract, U.S., 1944–45

very large raw material purchases it formerly made. Occupied Germany and Japan have also had their purchasing ability sharply curtailed as a part of international policy. Purchases by these three nations enabled many other countries to buy on world markets; the attitude of the United States toward imports from abroad is undergoing some revision, of necessity.

PART II

MAJOR GEOGRAPHIC REGIONS OF CONTINENTAL UNITED STATES

VI

NEW ENGLAND
A REGION OF MANUFACTURING AND SPECIALIZED AGRICULTURE

Introduction

Manufacturing Persists—It is no overstatement to say that the New England states constitute a manufacturing region, if it is understood that the term does not imply regional uniformity. Manufacturing industries are by no means common to all parts of the large area, but in terms of livelihood no more descriptive term can be used.

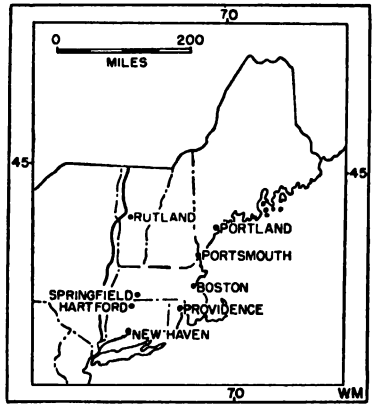


FIG. 25.—NEW ENGLAND

The amazing thing about New England has been the persistence of its industrial importance. It transcends all other aspects of the economy. Despite the many changes in transportation, in sources of industrial raw materials, shifting population, and changing markets, New England has remained one of the three most important industrial areas in the United States. Every phase of the American industrial evolution has been reflected in the series of occupance patterns. New England remains, after three centuries, a major industrial section of the United States.

A Land of Contradictions—Superficially, New England would appear to be a land of contradictions. It has often been termed a hard land; resistant geologically and hard economically, with both attributes merited in large measure. Over a long period of time, any region, no matter what its natural endowments may be, will have its resources appraised and reappraised, not only in terms of the physical abundance or niggardliness of nature; but also in terms of its human resources and its changing position with respect to national and international economic conditions.

In New England both agriculture and manufacturing are on the decline; but in the former the decline is measured in terms of specific places and crops; in the latter, in terms of particular concerns, though only in certain instances is it a considerable part of an entire industry. In many of the rural areas of the six New England states, the decline in population and in agricultural return has been at a decreasing rate for several decades. Even in the three northern states, life in the New England hills is staging a comeback, although manifestations of this revival are of a new order.

Small Landscapes—New England has been described as a region of small landscapes. This might well be the keynote of a discussion of the area, for it is true of both the physical and the economic landscapes. An inspection of a physiographic map will reveal much that has profoundly affected the nature as well as the course of New England's economic development.

Highlands, Lowlands, and Rivers

Lowlands—Significant in the life of this region have been the lowlands, which are here briefly sketched in their distribution and general characteristics. The coastal lowlands, which include the Boston Basin, the Narragansett Basin, the New Hampshire and Maine coastal lowlands, Cape Cod, and the Massachusetts islands, have become so associated with the life and times of New England as to require only a brief review here. Peripheral to the main block of the New England Upland, these lowlands have been attractive centers during the three centuries of white occupancy. Three-quarters of New England's population live on these narrow lowlands along the coast and in the Connecticut River Valley. The sandy flats of Cape Cod and the Massachusetts islands are of minor importance as population centers.

The attraction of these coastal lands has resulted not so much from extensive level and fertile areas, as from their situation adjacent to the mouths of the numerous rivers flowing generally southward from the plateau or upland, which makes up the major portion of New England.

Interior Lowlands—Except for the Connecticut River Valley in its broad lower reaches, the interior lowlands of New England are not so densely populated as are the lowlands along the coast. The Champlain and Berkshire lowlands, and the remote Aroostook Valley in northern Maine have localized population in about that order of importance. Situation with respect to two of the three principal gateways to New England has given these interior lowlands economic advantages. With the Canadian provinces on the north and the northeast, the Atlantic on the east, the Hudson River, the Berkshires, and Lake Champlain on the west, there are only three points at which New England can be served by direct rail connections with the rest of the United States. These rail entries are by way of three natural corridors: the northern end of Lake Champlain, the northern end of the Berkshires, and the north shore of Long Island Sound.

Mountainous Upland—The physical backbone of New England is an ancient mountainous upland stretching from the Canadian border of Maine to the Hudson River Highland. Though the northern and western sections are especially rugged, prolonged erosion by water and ice have reduced much of this former mountainous region into a subdued rolling hill country, above which rise the Green Mountains of Vermont, and White Mountains of New Hampshire, and such isolated hills as Monadnock, Greylock, and Katahdin.

Continental glaciation wrought notable changes in the terrain of New England. The highlands bore the brunt of glacial erosion; the lower areas to the south and east were mantled by the boulder-laden drift removed from the highlands to the north.

Among these forested hills are found literally thousands of lakes of all sizes and degrees of attractiveness. The ice removed the soil from the rocks in many places; in others it deposited so many boulders that cultivation is impossible. In the literature of the New England hill country we find frequent mention of "barrens": clearings in the woods where neither trees nor grass grew. Nearly everywhere the soil is thin and often poor, yet in many places the weathering of the glacial drift has yielded a soil which is suitable for agriculture.

Many Waterfalls—The derangement of New England's pre-glacial rivers by the ice made easy the development of water power during the first half of her industrial history. Waterfalls near the coast became the nuclei of early industrial centers, such as, Lowell, Lawrence, and Haverhill on the Merrimac River, and Pawtucket on the Blackstone. Although the streams of the northern New England upland have greater potential power, the accessibility of the lower courses of the Connecticut, the Housatonic, the Blackstone, and the Merrimac, all below the thousand-foot contour, have been more fully developed.

Little River Traffic—Navigation on New England rivers is largely historical, although some traffic now moves on the lower Connecticut to Hartford, on the Thames to Norwich, on the Charles to Cambridge, on the Merrimac to Haverhill, on the Penobscot to Bangor, and on the Kennebec to Augusta. Only bulky materials, such as stone, sand, coal, and wood are much in evidence today in this traffic.

As local trade routes the river valleys have lost little of their importance, for the modern, hard-surfaced roads have tended to follow them. The revived growth of rural population has been based in large part upon the increased accessibility of the New England rural dweller to the manufacturing cities and towns of the coastal lowlands, and this in turn has been made possible by cheap personal transportation by motor car. The key to the rejuvenation of life in New England's hills is the modern highway which makes it possible for the commuter to get to work quickly.

Climate

Temperature and Precipitation—Reference to the climatic regions map in Part I will serve to orient the reader in respect to the climate of New England. Rainfall is a permissive factor in the New England environment as its amount and distribution make possible the production of practically all farm crops common to regions with similar temperature distribution. The average annual precipitation varies from 45 inches at places in the southern tier of states to 30 inches in the extreme north; nearly two-thirds of it falls during the frost-free period.

Temperature is not so favorable to agriculture.[1] The growing season varies from something less than a hundred days in the three northern states to two hundred in the southern states. The effect of altitude is clearly seen in the zoning of crops in the hill lands between the Champlain Lowland and the Aroostook Valley, where the direction of the slope is a decisive factor in land use.

Hazards of Climate—The lack of sunshine at haying time and the destructive hailstorms in the tobacco-growing areas of the lower Connecticut Valley are unfavorable features of the climate of New England. Extended droughts of a killing nature are not experienced in New England.

Despite the seasonal uniformity in the distribution of rainfall and hundreds of natural reservoirs, floods which cause great damage and considerable loss of life occasionally occur in the spring. These floods are caused usually by the rapid melting of heavy snowfall at times of full streams. Snowfall of 100 inches has been known in the northern portions, although

[1] P. W. Church, "A Geographical Study of New England Temperatures," Geographical Review, April 1936, Vol. 26, No. 2, pp. 283–292.

along the southern periphery it is not so heavy, averaging about 30 inches in Connecticut.

Climatically, the three northern states lie north of the Corn Belt, thus where corn is grown it is for ensilage and not for grain. Although commercial apple crops are not regarded as profitable in this latitude, potatoes, hay, clover, oats, and barley do mature here.

The three southern states produce corn in most sections and tobacco in the lower Connecticut Valley. Relief determines the length of growing season just as it does in the northern states. The "small landscapes" are matched by the related "micro-climates" of New England.

Favorable Aspects—Not all the climatic conditions are unfavorable. For the favorable aspects of New England's climate, compare the climatic chart for Rutland with that for Kansas City, Chicago or St. Paul. The sale of New England's climate and scenery to tourists has been the most rapidly growing industry for several decades, and the comparison suggested will reveal one reason for this phase of her economy. Because of the amount of snowfall in winter months, New England has been able to exploit the public's growing interest in winter sports. To her already large summer-tourist trade has been added a growing number of winter-sports enthusiasts, not only those who participate, but also the greater number who come for "atmosphere" and relaxation. The snow trains, the ski trains, and the Dartmouth and Middlebury Winter Festivals have enjoyed growing popularity.

The even distribution of precipitation has been a boon to the users of water power in New England. The thousands of ponds and lakes which serve as natural reservoirs also tend to minimize the fluctuation of stream levels.

Natural Reforestation—The relation between the climate of New England and her extensive forests is a close one. Natural reforestation of the New England hills has gone on with the withdrawal of man from many of the marginal and submarginal farms of the upland. Trees with a diameter of ten inches or more may be seen growing in the middle of a former secondary road, in the center of a tumble-down farmhouse, or in a formerly productive field.

In traveling about the United States one hears comments from various localities, lauding the beauty of their autumn or their spring, as the case may be. The New Englander, perhaps not so articulate, thinks thus about all four seasons. More and more travelers share his enthusiasm and become transient guests of the province for winter sports, summer dwelling, or autumn coloring.

The hundreds of harbors of all sizes and degrees of importance are ice-free in winter. Shipment of goods through New England the year round

is ample evidence of the uninterrupted railroad service. Although highway maintenance is an expense not confined to these states, clearing the winter roads is a considerable task. If the owners of the many refurbished New England farmhouses were year-round dwellers rather than summer visitors, the demands for road service would be a still greater burden on the highway departments and taxpayers.

Soils

Their Reclamation—The soils of New England are well known. Writers perhaps have given more attention to these soils than to those of any other region in the United States. Their notoriety takes account of their reclamation from stones and boulders, of their thinness and hardness, of their passing from the hands of Yankees to foreign-born and sons of foreign-born. Surprisingly little is known of the economic characteristics of these soils, that is, their importance to the man who buys them and to the state hoping to plan their use for the ultimate advantage of society. Land that was valuable to one generation may be valueless to the next, with no decline of fertility; because new supply centers have risen, or changes in consumption habits have lowered the prices of commodities which they are best fitted to produce.

Intricate Soils Pattern—In judging the worth of the soils in New England, the physical and economic characteristics common to the major groups will suffice to outline their permissive role in the several stages which have marked New England agriculture for the past century and a half. Here again the concept of small landscapes will apply to the pattern of her soils, as well as to her relief. The complexity of soils arising from various bedrock types has been increased by glacial action.

The Effect of the Forest Cover—New England soils bear the expected relation to climate in a region where rainfall is relatively heavy and uniform throughout the year. The evaporation rate is low even in summer. The entire area originally supported a forest. Today, approximately two-thirds of the area remains in woodland, with small stone-littered fields scattered over most of the region, where some agriculture of a subsistence sort is possible.

A very large part of New England is covered with a thin, stony, light-textured soil which varies from a fine sandy loam to a silt loam. Nearly all soil groups are light in color and acid in reaction. In the northern forested section, the terrain in Maine is less mountainous than that of the other two states, and contains large areas of swamps. Conditions over much of New England have favored the development of the ashen, podzolic

soils characteristic of the coniferous forest of the cold micro-thermal climates.

Interior Lowland Soils—On the lower altitudes of the eastern and southern margins of the upland, there are loams, varying in texture from a gravelly or sandy loam to a silt loam. In some places such soils are especially favorable for plant growth because of the presence of a particular mineral in the parent rock: lime in the western lowlands of Vermont, Massachusetts, and Connecticut; phosphatic material in the Aroostook Valley of northern Maine. Some of these are suitable for vegetables, hay, and even corn in all but the northern portion. The greater part of these soils is in good pasture.

Soils of the Coastal Margin—One of the densely populated soil provinces is the narrow strip of low sandy plain in southeastern Massachusetts. It is dotted with marshes and peat bogs, some of which are well adapted to cranberry culture. This is one of the two leading cranberry centers in the United States. Elsewhere, asparagus and strawberries are grown on sandy soil. The lower Connecticut Valley has been so extensively enriched by alluvium and marine silts that it has become the principal agricultural district in all New England.

Mountain and Hill Soils—In the mountainous and hilly regions the soil is quite generally thin and bare rock is exposed in great patches, both on slopes and in the valleys. However, even today many of these slopes support an irregular pattern of fields from which fairly good crops were once harvested. The fertility has been exhausted generally and at present the yield is low. Many areas have been allowed to grow up in pasture or brush. The dairy industry has encouraged forage cropping of land in such regions.

Population

Historical Changes—The contradictions mentioned as being characteristic of certain phases of New England's development are nowhere better exemplified than in her population. Far from being a new England, today it has the largest proportion of foreign-born of any part of the United States. Numerically it has more foreign-born residents than any but the Middle Atlantic and East North Central divisions.[2] Long hailed as the home of the Yankee and Puritan, it is neither today. Although literature gives us a picture of the New England farmer as the typical inhabitant, he is in the minority as four-fifths of all the people are urban dwellers. New

[2] *The U.S. Census Bureau* groups the states into these nine "Geographical Divisions": New England, Middle Atlantic, South Atlantic, East North Central, West North Central East South Central, West South Central, Mountain and Pacific States

Englanders took a leading part in the peopling of the Middle and Far West; her men and women went to the eastern cities. Abandonment of her farmland has been going on since 1850; yet today, her population is one of the densest in the nation: 132 persons per square mile, as against 44 for the United States as a whole.

Foreign-born—Not only does New England have a large proportion of foreign-born, but the percentage of New England foreign-born who are Canadians is six times that of the country as a whole. One out of every four of her foreign-born is Canadian, and half of these are French. Next in number are the Irish who are almost as numerous as the Canadians. The Italians are next, numbering only slightly less than the Irish. There are other stocks comprising the minor groups but they are neither so numerous nor so widely distributed as the six named.[3]

It is not enough to say that the proportion of foreign-born in the three southern states of New England is twice that of the three northern states. In the large cities of the former states they are found in very great numbers; for instance in 1910 they made up nearly 30 per cent of the population of the following cities: Fall River, Holyoke, New Bedford, New Britain, Woonsocket, Cambridge, Lowell, Bridgeport, Waterbury, Stamford, Pawtucket, Nashua, and Lewiston.

The New Englander of the time of John G. Whittier and Sarah Orne Jewett is seldom encountered today because the foreign-born have found their way into even the remote areas of rural New England. Only about an eighth of all the people of foreign stock in New England live in the three northern states; and nearly half the foreign-born farm population is in the north. The French in northern Maine, Vermont, and New Hampshire settled at the time of the Revolution. The small numbers found on farms in the southern states came down before the present century, usually to work in the textile mills. Italians are especially numerous on the farms of the lower Connecticut Valley and on the periphery of every city.

Distribution of Population—Within New England there are pronounced contrasts in the distribution of population.[4] The contrast between the three northern and the three southern states is greater than between New England as a whole and the rest of the United States. The character of her population is dominated by the three southern states which, with but one-fifth of the area, have four-fifths of the population. Population density in the northern group is only 33 inhabitants per square

[3] Eugene Van Cleef, "Finns on Cape Cod and the Problem of Adjustment to Natural Environment" (Annals of Association of American Geographers, March 1933, Vol. 23, No. 1), p. 54 (Summary).

[4] S. D. Dodge, "A Study of Population Regions in New England on a New Basis" (Annals of Association of American Geographers, December 1935, Vol. XXV, No. 4), pp. 197–210.

mile, whereas for the southern group it is 419. In the nation, Rhode Island and Massachusetts rank first and second, respectively, and Connecticut ranks fourth. All but four of the twenty-two New England cities with a population in excess of 50,000, are in the three southern states. These intra-New England contrasts in population are reflected in the regional character of her agriculture, manufacturing, fishing, and commerce.

Population Movements—A review of the movement of population within New England and to points outside, unaccompanied by an explanation of the economic circumstances which attended them, tends to make the phenomenon seem bloodless and dispassionate. However, it seems wise to sketch the major aspects of the redistribution of New England's people before examining her agricultural and industrial economies.

The first population movement was caused by the ambition of the people to occupy as much of their respective states as environmental conditions permitted and economic conditions warranted. The better lands of southern New England were more quickly occupied than the frontier areas to the north. The settling of the Connecticut Western Reserve in Ohio and the equally attractive portions of the upper Mississippi Valley began to make drains upon the population of these six states as early as 1830, but the abandonment of farmland in New England was not widespread before 1880. After 1880, New England, both north and south, had economic repercussions from these former citizens. As middle western farmers they contributed to the production and export of an agricultural surplus which drove down prices, thus putting the northern New England farmer in a predicament from which he could extricate himself only by specialization or by migrating. The decline slowed appreciably after 1900; only in specific districts did these hill lands show an increase in population.[5]

The three northern states did not reach their maximum rural population until the period from 1850 to 1870. By 1880, 80 per cent of the towns in Vermont and 65 per cent of those in New Hampshire were declining in population; after 1900 the decline was at a decreasing rate. By 1930 only 6.4 per cent of the towns in Vermont were declining in population and only 49 per cent in New Hampshire. In the three southern states between 1840 and 1870 wage earners in agriculture decreased 40 per cent, while in industry the number increased 288 per cent.[6]

[5] For a discussion of local changes in population see:

J. L. Hypes, "The Future of the Sparsely-Settled Towns of Connecticut" (Geographical Review, April, 1936, Vol. 26, No. 2), pp. 293–301.

J. W. Goldthwait, "The Town That Has Gone Downhill" (Geographical Review, October, 1927, Vol. 17, No. 4), pp. 527–552.

H. F. Wilson, "The Road of Windsor" (Geographical Review, July 1931, Vol. 21, No. 3), pp. 379–397.

[6] For the full treatment from which this was drawn, see *New England Prospect* published by the American Geographical Society, New York, 1932.

Industrial Life the Product of the Land and the People—The population of New England with all of its contradictions, its changes, its migrations, and its inequalities of distribution has been characterized by the qualities of thrift, energy and vitality, of persistence, and force of character. These characteristics, along with ingenuity and adaptability, have enabled these people to take the ups and down of their land in their stride, to discount the hazards of their climate while capitalizing on its advantages, and to utilize the advantages of their situation while weathering the competition of more favored areas. Thus the land and the people together have influenced the evolution of industry and the development of a way of life which make New England an outstanding geographic region, and an example and a symbol of American enterprise.

Forests in New England Economy

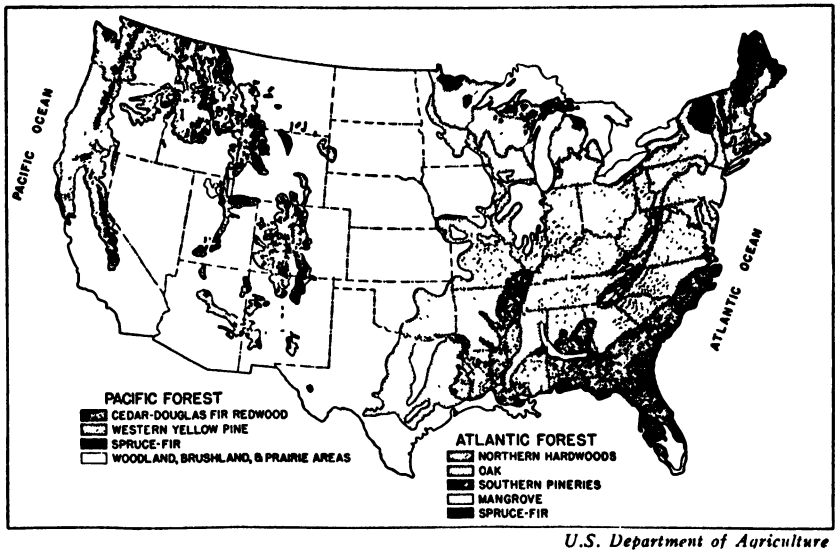
Forests Have Been a Mainstay—Along with water power, forests have always been one of the mainstays of New England's economy. Both have been stabilizing forces in her industry and along with other environmental factors, each has left its impress on at least one period in the economic life of these states. In nearly every section of these six New England states, income from trees has enabled farmers to pursue their subsistence agriculture, and has constituted the major source of cash for scores of small towns and villages. Indirectly, the forest wealth of New England has been the leading force in freeing so much of her area from the blight of isolation.

Maritime Influences—With the rise of the fishing industry and the temptation of New England men to take to the sea rather than struggle with their boulder-strewn fields, wood assumed a predominant position. Fishing led to an even greater use of her wood in commercial shipping and shipbuilding. These ventures were profitable not only because of the abundant harbors, the excellent timber available, the near-by fishing grounds, but also because of the subsistence nature of her agriculture and the large but uncertain profits of the carrying trade. So far as this trade was concerned, the Napoleonic wars in Europe were very propitious. Commerce, logically and rather promptly, stimulated manufacturing, and New England's workshops supplied the local market and provided many of the products required by the emigrants who soon were to become a part of the westward migration. A foreign market hungry for timber and fish could also use the fabricated products of New England.

Farmland Reverts to Woodland—Reversion of farmland to woodland started about the time of the Civil War. About half of the privately owned woodland in New England is in natural or improved wood lots and cut over land with young growth. The Forest Service estimates that there

is 15 per cent more forest land now than in 1860. It is a commentary on the woodland situation to note that, although New England has about 6 per cent of the total forest land in the United States, the area has a scant 2 per cent of the nation's stand of saw-timber. Seven-eighths of the original stand is gone.

Nearly 70 per cent of the area of New England is classed as forest land. The bulk of this is in the three northern states; but the three southern



U.S. Department of Agriculture

FIG. 26.—ATLANTIC AND PACIFIC FORESTS

states have about 45 per cent of their area in forest, despite the concentration of urban population, the extent of agriculture, and the areas devoted to manufacture. Figures alone, however, will not express the relative value of the forest land of these two regions. In addition to quantity, the quality, accessibility, character of ownership, and the forests' potential uses for purposes other than industrial raw material, determine their value. The northern uplands contain by far the greater proportion of merchantable timber, probably 75 per cent, while the southern uplands have forests and agriculture and industry rather generally intermingled in the economy.

The Northern Forests—The northern forests produce the greater part of the pulpwood credited to New England. They support many large industrial establishments using wood, some of which own and systematically cut their renewing resource of timber. These forests are primarily in the belt of spruce, balsam fir, and northern hardwoods. Most of these north-

ern forests, which were at all accessible, were cut over in the early days for the pine and spruce, leaving the bulk of the hardwoods standing. White pine cut reached its peak in 1840, and the stand was nearly exhausted by 1870. Re-establishment of the forest took place quickly. A great deal of this was similarly cut over again and again, each cutting leaving smaller and smaller trees until the most recent cutting for pulpwood has reduced the softwood to only the smallest size. The cuttings have not been uniform, but the greater part of the northern forest has substantially undergone this exploitation. Hardwoods have been left standing, especially in Maine, constituting an excellent forest cover predominantly deciduous in character.[7]

The Southern Forests of New England—In the southern tier of states the pattern of distribution is checkered with farms and villages. Most of the timber is owned by the small land holders. Hardwoods predominate and forests generally occupy the poorer soils and steeper slopes which, found unfit for cropping, have been allowed to revert to woodland. Because of their greater accessibility, the forests have long supplied the smaller industries with wood, and the farmers themselves have cut some for use on the farm or for sale. For the most part, the forests have not been cut with a view toward forest maintenance, so today the trees are generally inferior and progressively deteriorating. It is in the southern states, however, that the recreation industry is most actively promoting the conservation of the remaining timber.

Effect of Forest Depletion on Industry—At the present time a great deal of timber enters New England from the virgin forests of the South and the Pacific Northwest, at prices within the permissive range of the great wood-using industries. This increasing dependence upon imported wood is due partly to the ease with which the industries have been able to turn to other regions, whose forests were in the stage of exploitation as in New England a hundred years before. However, the continued existence of the numerous but small industries depending directly upon near-by lumbering operations is out of the question. New England's lumbering industry is virtually gone from the land. The Census reports that since 1910 all lumber production decreased 65 per cent; that the number of wage earners decreased by 56 per cent; and that the total value of products declined 44 per cent. These figures pertain only to the lumber industry and the industries directly connected with the further fabrication of the products of the sawmill, but there are other aspects of timberland as a resource which require attention.

Pulp Industry—Cutting spruce and other softwood for pulpwood be-

[7] For an interesting account of the northern lumbering industry, see *Kennebec*, by R. P. T. Coffin, New York, 1932.

gan about 1890 and reached its peak just before World War I. In recent years it has fallen off, until now it is estimated that not more than half of the consumption of New England mills is from local sources. With the rise of a pulp industry in the South and West, New England has just about held her own.

Other Wood Industries—The various industries which depend on wood for their raw material originally had the advantage of situation with respect to forests. Because of the large capital investment and other factors these industries are now reluctant to move elsewhere, yet their permanent retention depends upon a continued supply of wood. Many of these plants constitute the only source of income for their respective communities, especially in the three northern states. When a plant closes, the men who work on the railroad are laid off; the wage earners in the factory pass the recession on to the banks and stores; even the farms feel the loss.

On many of the northern upland farms a substantial part (20 per cent or more) of the income is from the sale of wood in some form, perhaps as logs for the sawmill, highway guard rails and bridge timbers, or is derived from maple sugar and syrup. Possibly the farmer can make some money in off seasons by renting his teams for use in the lumbering operation. This income makes it possible to carry on low-profit farming operations which could not be carried on otherwise. Where these farms can share in the rapidly growing tourist trade or where their location is such as to enable some of the members of the family to commute to work in a near-by town, their economic horizon is much wider than for the rank and file of these upland farmers of the three northern states. The term "residence farms" has been aptly used in describing this type of occupance.[8]

New Englanders have learned by experience what this nominal asset of forest land is really worth. New England forests were profitable during the exploitive stage. However, in contrast to the situation in the Upper Great Lakes district and the Pacific Northwest, the forests were cut off to permit agriculture. Both the agriculture and the lumbering prospered so long as the exploitation of first-rate timber could continue; but both languished when, rather than take the second-best or reforest, New England industries saw fit to buy timber from other virgin areas in the South and West. It appears, therefore, that the rate at which New England farmers reforest their sub-marginal crop land and waste land is dependent, not so much upon the quantity or quality of her own forested land, as upon the early depletion of competing virgin forests elsewhere in the United States. Until that time, waste elimination will be deterred by the

[8] See Kenneth MacLeish and Kimball Young, "Culture of a Contemporary Rural Community,—Landoaff, New Hampshire" (Rural Life Studies No. 3, April 1942, U.S. Department of Agriculture, Bureau of Agricultural Economics).

chief problem, the hazard of "waiting for the timber to mature that must run the gauntlet of taxes, fire, and finally markets." [9]

The resultant poverty of the area has created a serious problem for the various minor civil subdivisions which are dependent on taxes in order to provide schools and to continue fighting fires, building and maintaining roads, and caring for the defectives, delinquents, and dependents.

Forests and the Tourist Business—Meanwhile, attempts to incorporate the forest into the profit economy of the New England farms by way of the tourist trade gives much promise. This may be the ultimate forest-use for much of New England. Aided by federal, state, and town purchases of forest preserves, the New England farmer allows more and more of his fields to grow into woodland.

A metropolitan Sunday supplement carries photographs of youthful men and women sliding down hills on skis in Tuckerman Ravine on the southeastern slope of Mt. Washington. This is the heart of a 700,000 acre national forest area, which the Federal Government is gradually developing for the growing army of winter sport enthusiasts. This great snow-bowl, which owes its shape to glacial sculpture, holds a perfect surface of "corn" snow, ideal for skiing, until late in May. This is but one of the meccas for which many thousands entrain from the principal New England and Middle Atlantic cities every winter. Be they participants or onlookers, the economic result is the same upon the railroads, the filling stations, and those who cater to their wants at the scene of their sport. It is a revival in the very parts of the upland most in need of it. Directly and indirectly these New England forest lands now may, and in many instances do, support more people better than was possible when lumbering was in its heyday.

But wintertime recreation by no means dominates the New England tourist industry. The practice of taking "paying guests" during the summer months is most important. Whereas the winter sports are localized at favored districts, the ubiquitous summer tourist knows no metes or bounds, save accessibility by highway. Forests, lakes, and the seacoast have served to make this source of revenue greatest of all in New England.

Contrast with Southern New England—It is important to note the variation from this type of revival as practiced in the three southern states. Here commuting from the farm home to urban employment is common. It differs from the residence-farm of the northern tier of states in that the latter landlords are, for the most part, summer occupants only. They make no demands upon the school resources, road clearing program, or mail delivery in winter.

Cheap personal transportation, proximity to cities, and the tourist

[9] *New England Prospect* (American Geographical Society, New York, 1933).

trade have conspired to give New England year-round use of surfaced highways. Thus, whether the New England farm is a forest-farm, a recreation farm, or a residence farm, the increasing economic value of the woodlot is obvious.

North Atlantic Fisheries

Banks—On the broad continental shelf along the eastern margin of North America the water is relatively shallow and cold. Upon this shelf there are a number of elevations known to the fishing industry as "banks." [10] The depth of water over the banks varies widely, but generally is from 35 to 200 feet. In these waters are two main types of fish. Commercial varieties as mackerel and herring come to these waters to spawn. Cod, haddock, halibut, sole, and flounder remain all year and make up the bulk of the catch in the North Atlantic.

Factors Favoring Fisheries—Conditions which contribute to the importance of this industry are both physical and economic. The cold waters of the Labrador current appear to increase the amount of minute plankton upon which the fish feed when young. The hundreds of natural harbors along this coast, the location of the banks with respect to the coast of the United States and Canada is such as to encourage their exploitation by the relatively dense population of maritime New England. The climate and the surface conditions of New England make agriculture a difficult pursuit, thus rendering the resources of the near-by Atlantic all the more attractive.

The fishing industry, the carrying trade, and the relatively dense population which these industries supported were largely responsible for the manufacturing of New England. About half of the New England catch is consumed by the local markets.

Leading Ports—The most important New England fishing port today is Boston, taking nearly half the fish brought into the northeastern ports of the United States. Farther north along the coast, Gloucester and Halifax are the most important of a group of ports which includes St. Johns, Lunenburg, Digby, Sydney, Yarmouth and Portland. Activity varies from season to season and from year to year with the abundance and the nature of the catch. Larger steam trawlers, powered machinery, and improved methods of icing and freezing have resulted in longer trips, fewer men employed, and fewer ports required. The drying frames for cod are still important features of the landscape in many fishing villages and towns, but this method is relatively less important than other methods of processing.

[10] The Banks include some large and many small ones; among them are Grand, St. Pierre, Banquereau, Sable Island, Le Have, Brown's, Georges', and a number of smaller ones in the Gulf of St. Lawrence, the Gulf of Maine, and off the Labrador coast.

Oysters, Clams, Lobsters—New England oyster production has declined markedly. Most of the inshore catch in these waters consists of lobsters and clams. Farther south, particularly in Chesapeake Bay, the hundreds of small bays offer spawning grounds for oysters. Most of the 18,000,000 bushel catch is from Chesapeake and Delaware Bays, and Long Island Sound.[11]

Agriculture: General Aspects

New England Agriculture is Self-Contained—Although overshadowed by the manufacturing industries, agriculture in New England merits careful examination if for no other reason than that it is essentially self-contained. The relationship between the farms and the twenty million people within a hundred miles of Connecticut is not the same as that prevailing in the Lower Lakes region and the Ohio Valley. New England farms do not supply any considerable part of the raw materials consumed by her factories, nor do they consume much of their output.

Decreasing Proportion of Cropped Land—Less than a quarter of the total land surface of these states is now in farms, and only a little over a third of this portion is classified as improved land used for crops and plowable pasture. Although the peak of land abandonment has long passed, Vermont, with the largest proportion of crop land in the northern group, reports decreases in her number of farms as follows: in comparison with each preceding census period, the state had one per cent fewer farms in 1910, 11 per cent in 1920, and 27 per cent in 1930. Despite these data, agriculture is experiencing a revival.

Revival—The revival of agriculture is dependent upon two things: first, finding a phase of agriculture that will fit the land; and second, integrating

[11] FISHERY PRODUCTS, QUANTITY, BY STATES, 1902–1942

YEAR	MAINE	NEW HAMPSHIRE	MASSACHUSETTS	RHODE ISLAND	CONNECTICUT
			(1,000 lbs.)		
1902	242,390	1,593	230,616	21,614	37,832
1919	117,956	529	246,951	18,251	23,653
1935	112,219	351	503,117	24,524	14,916
1942	168,392	2,529	509,099	12,889	13,053

Statistical Abstract of the United States, 1941–15

FISHERIES OF THE UNITED STATES, BY SECTIONS, 1942

SECTION	FISHERMEN	VESSELS	BOATS	PRODUCTS (1,000 LBS)
N. England	15,011	658	6,726	705,962
M. Atlantic	6,517	366	3,699	319,193
Chesapeake Bay States	10,679	291	6,912	202,240
So. Atlantic & Gulf States	27,941	1,145	15,019	575,533
Pacific Coast	21,047	1,586	6,903	1,374,688
Lake States	5,142	499	1,785	75,246

rural living with industrial employment. Both aspects tend to foster in agriculture the "small landscapes" referred to under the section on Relief. Both tend to restrict the farm market to New England, which is in direct contrast with the selective development of her manufacturing. Finally, both have contributed another aspect to the appraisal of marginal and submarginal land. Widespread evidence of each tendency is to be observed in both the northern and the southern states.

After a review of the general characteristics of farm land use in New England, a somewhat different view of her farms and farmers is gained by examining the combination of income-producing activities that constitute the economic basis of support of the families living on the land.

Agriculture: Northeastern Uplands

A Fine Balance Required in Agriculture—The altitude and interior location give to the Northeastern Uplands a shorter growing season than that in eastern and southern New England. Snowfall is heavier than along the coast or even on the Laurentian Upland northwest of the St. Lawrence River. Parts of the region have never made any attempt at commercial agriculture, such as one-third of northern Maine, which is virtually unoccupied. Subsistence farming together with the proceeds from the sale of wood products support a sparse population on these extensive hilly areas. There has been no attempt at what might be called a self-contained mountain economy, although the fine balance required of the people who try to make a living here is suggestive of mountains. Maple sugar and syrup have given this region a reputation, but little income.

Vermont Agriculture Better—Although the commercial timber of these upland hills is depleted, pulp mills are supported in all three states by systematic cutting from planned reforestation areas. These mills have made possible the same sort of part-time subsistence farming that existed when the virgin timber was being cut. These conditions exist in all three states, but not to the same extent. Vermont agriculture has long fared better than has that of New Hampshire or Maine. A greater degree of accessibility is the main difference, but a somewhat better soil and superior pasture have been contributing factors. Corn and oats are grown for the silo, but root crops and hay are likewise used for dairy feed during the indoor winter feeding. City markets are accessible by truck and rail, so the intensification and the fitting of the crops to the soil and climate have been possible because of income from dairy products. This opportunity is denied most of the farmers in the two eastern states of this upland.

Purely Agricultural Areas—Maine—The future of agriculture in these northern states seems to be foreshadowed by what has already taken place.

There are two districts that may be termed purely agricultural. The potato industry of Aroostook County in northern Maine extends from Houlton to Fort Kent, with its center at Presque Isle and Caribou. It lies in the rolling hill country of the Aroostook, Allegash, and St. John river valleys. While the ordinary farm raises from thirty to fifty acres of potatoes, it is not uncommon to find farms operating a thousand acres of land of which nearly half will be in potatoes. There is a tendency for several of the small

Maine Development Commission

FIG. 27.—POTATO BARN, AROOSTOOK COUNTY, MAINE

farms to be operated under a single management. Although not all years are profitable for the potato growers, the acreage is being increased each year, more machinery is used, and clover is entering the cropping system along with oats. The yield of potatoes from this area has reached nearly 50 million bushels annually.[12]

In addition to the general and dairy farming of the upland there are types of specialized and localized farming which merit more detailed examination. Blueberry farming in Maine is localized along the coast from Penobscot Bay to Eastport. Such holdings vary from a few acres owned by a fisherman, shopkeeper, or general farmer, to relatively large tracts. The berries are picked by men, women, and children who specialize in

[12] During World War II Maine potatoes were picked up by Negroes from the British West Indies, men, women, and children from hill counties of Kentucky, and Boy Scouts from greater New York. The normal labor pool was exhausted by factory demands of World War II.

the work year after year. Blueberry farming in Maine, however, is not so much a type of farming as an annual exploitation of a wild crop.

Champlain Lowland—The other purely agricultural district is the western lowland of Vermont.[13] The Champlain lowland is an extension of the St. Lawrence lowland, and in common with it, is generally covered with clay loam or clay soils of dark color. North of Burlington the soil is underlain with limestone and grows hay and clover abundantly. The tempering effect of the lake makes possible the growing of corn for ensilage, and a silo is almost as common as a barn in the farm landscape. The major advantages of this lowland are the absence of stones and boulders, and low relief which permits fields and farms of ample size. Accessibility to fresh milk markets enables the farmers to take advantage of the natural factors favoring dairying. The cooperative creameries and milk plants of Vermont, however, have been hard pressed since 1928 to retain their market for cream, in the face of competition with Lower Lake states.

Elsewhere the salvation of farming appears to rest in the degree of success attained in combining part-time farming with supplying the pulp mills, with boarding and entertaining tourists, and with selling wood products in some form. A final possibility is an increase in the number of residence-farms occupied by wage earners in near-by industries.

Agriculture: Southern New England

Contrasts to the Northern Uplands—Southern New England, on the other hand, contrasts in most respects with this northern upland, with perhaps the minimum of tangible physical differences to account for the difference. There is little abandoned farm land in these states, yet marginal and submarginal land forms no inconsiderable part of the landscape. This is the New England with which most of us are reasonably familiar.

Like the northern upland, the southern portion is also largely a dairying region, but with marked differences in its other farm activities. Perhaps the major difference is the importance of part-time farming in the southern region. Tobacco, sweet corn, apples, potatoes, eggs and chickens, and miscellaneous fruits and vegetables all lend themselves to part-time farming interests. The proximity of much of the southern upland to industrial centers promotes residence-farming and recreation-farming.

Cranberries—The cranberry culture of southeastern Massachusetts is interspersed among the barren soils of Plymouth and Barnstable Counties, and on the islands of Martha's Vineyard and Nantucket. There are two centers of concentration: one about the communities of Wareham and

[13] S. A. Anderson, and F. M. Woodward, "Agriculture in Vermont" (*Economic Geography*, Jan. 1932, Vol. 8, No. 1), pp. 12–42.

Carver in Plymouth County, the other at Harwich and Brewster on Cape Cod. There are many large plantings as well as numerous small bogs of only a few acres. Cultivation of the cranberry requires intensive preparation of the soil, including sanding of the bogs and handling of the water to permit flooding at critical frost periods. The most important labor requirement is for harvesting, for which experienced labor is used.

Tobacco—In the Connecticut Valley, on the east side of the river north of East Hartford, and on the west side north of Windsor is an area devoted to tobacco. In the outlying townships tobacco is combined with dairying and general farming, with tobacco dominant until recently. Northward into Massachusetts, general farming, together with onions and tobacco characterizes the agriculture. On the east side of the river in Connecticut, broadleaf tobacco is the main variety; on the west side, Havana leaf. Much of the wrapper leaf tobacco is grown under a covering of cheese cloth. An average of ten acres of tobacco on a twenty-acre farm once was sufficient to afford a satisfactory family income, and few farms exceeded this acreage, but with the fall in price of tobacco after the World War I and the loss of foreign markets just before and during World War II, these tobacco farmers were forced to retrench sharply. Today the principal trends are for larger farming units and, on the smaller farms, the introduction of dairying and general crops.

Vegetable Growing—The geography of vegetable growing is rapidly changing. As with other commodities on New England farms, cooperative organizations have been formed to standardize the grades and aid in marketing the vegetables. The cooperative movement has achieved success among the asparagus growers about Concord, the market gardeners at Dighton, and the strawberry growers on Cape Cod.

Small areas of specialized production are springing up in many places where good roads and the motor truck open up markets, and the market garden of the horse and buggy days is being eased out of the picture by an intensified vegetable industry organized to serve the growing urban markets. The typical vegetable farm is not the specialized producer, but rather a small farm growing a variety of vegetables from the earliest to the latest, and employing besides the members of the family, one or more men the year round and a dozen or more during the rush months. Most of the itinerant workers speak English, many do not. Their quarters are generally little more than shelters. Just how much specialization within this industry can take place in New England is dependent upon many factors, over some of which New England has little or no control.

Unchanging New England Farmer—Thus the "unchanging" New England farmer is involved in agricultural changes as great as those in any other region in the United States. Minor changes are always going on in

the enterprises that constitute farming. Under the impact of such potent changes in her manufacturing and in outside agriculture as have been in progress for a generation, some types of farming will be altered or may disappear in a comparatively short time.

VII

NEW ENGLAND MANUFACTURING

Antecedents of Manufacturing in New England

Sequence of Economies—From the preceding chapter it is obvious that New England's manufacturing did not develop as a means of livelihood apart and distinct from her agriculture. On the surface, agriculture-industry relations appear to be weak indeed. If manufacturing is to develop beyond the subsistence level, there must be an accumulation of capital. But New England's agriculture was not the type which permitted the accumulation of capital. From the earliest times to the present, agriculture has manifested few if any of the characteristics which invite manufacturing. Agriculture has never yielded a surplus sufficient to encourage manufacturing. Indeed, New England has long been the consumer of imported farm products. At no stage in her agricultural history has New England been able to employ much farm machinery. Equally uninviting has been the situation in respect to mineral raw materials: neither coal nor metal, only stone and water. And yet from this environment New England has risen to a commanding position in the nation's manufacturing, a phenomenon which suggests an intriguing study in economic geography.

Handicapped in farming by unfavorable land and climatic environment, New England next turned to the sea. The Grand Banks off Nova Scotia offered a fishing region, approximately as large as Pennsylvania, and accessible from the scores of good harbors along the New England coast. The embayed coastline with many safe harbors, a gently sloping ocean floor, a broad continental shelf averaging less than sixty fathoms deep on which are a score of offshore fishing banks, and inland a wealth of lakes and streams suited to fish—all promoted fishing as a livelihood. Without these advantages there would have been no profits in the carrying trade. These widely traveled men of the sea found markets and materials for New England's manufactured goods.

This was the sequence: fishing, foreign shipping, and then the manufacturing of cotton and wool products at a time when commerce dominated New England's economy.

Dependence Upon Trade—Today the industrial structure of New England, having outgrown and supplanted the shipping and trading activities

of earlier years, is yet dependent upon, and conditioned by, foreign trade, as is no other industrial area in the United States. No longer the center of New England's economic life, foreign trade nevertheless is one of the fundamental supports of manufacturing, and its importance in this regard appears to be increasing.

Imported Raw Materials—In the first place, industrial New England is largely dependent upon outside materials. This is so, partly because the local resources are exceedingly limited; partly because so many of the industries, originally founded on imports, still depend upon them; partly because any highly industrialized region, such as this one, must draw upon a widening circle of imports to meet the complex and exacting needs of modern manufacturing.

With manufacturing so largely based on the use of imported raw materials, imports have come to acquire an industrial character. For some of New England's manufacturing, this trade association has become of paramount locational significance.

Stabilizing Factors versus Unsettling Influences

Industrial Advantages—Interdependence of Community and the Factory—Out of the early start, in which commerce played so great a part, there arose certain advantages which have had a potent effect upon the subsequent development of the manufacturing industries. At least two of them have been cumulative in their influence. The first is the establishment of manufacturing centers and the trade routes which serve them, in which the manufacturer himself, his labor, the railways or waterways which move his materials in and his products out, and the stores, banks, and even the good will of the community all set to work to make greater the advantages of this particular location. The interdependence of the community and the plant are recognized by the several groups of people concerned, and each group in its own way tries to make this manufacturing plant a permanent thing, thereby establishing to a considerable degree its own economic conditions. There are cases on record of New England communities actively sacrificing in various ways for the purpose of continuing a plant in operation. This condition has certain dynamic aspects, too, since association of quality of products with the name of the company and its place of manufacture is well recognized. It is commonly known as functional prestige.

Skilled Labor Pool—A second cumulative advantage has been the development of skilled labor. A supply of skilled labor is one of the critical factors in the location of many of the industries for which New England has become famous. Community attachments for skilled laborers are in-

variably more substantial than for the unskilled; they buy property, and in other ways become a part of the community. Although most industrial plants are said to have been located by chance, the fortuitous factor has a way of becoming rational.

For a long time the *softness of New England water supply* has been regarded as an attractive feature for all textile concerns which scour or dye raw stock, or which wash, full, bleach, or dye their products. Water for processing purposes has always been available without treatment, other than filtering, at most New England power sites.[1] The importance of this has been reduced, however, by modern processes for treating hard water.

Uprooting Forces—In its development, New England has been subject to influences which tend to uproot industry as well as those which tend to hold it. Some of these factors continue to operate; thus there has been a continuing give-and-take, which has modified her industrial landscape. Some of the major attractive forces of location have been considered; there remains an accounting of the uprooting forces. One of these is the invention of machines and the perfection of processes by which the proportion of labor in a given industry declines. Occasionally, however, the perfection of a machine which has decreased the need for labor will absorb an equal amount in its own manufacture. Another is the problem of labor organizations, a front of conflict where there may be as many different degrees of violence as there are communities involved. Still another is the rise of new producing centers with no special advantage over the older ones except that a recentralized market permits recentralization in manufacture.

Manufacturing Centers

Massachusetts Dominates—Reference to the map of Manufacturing Districts on page 51 will orient the New England states within the manufacturing "belt" of the United States. About 85 per cent of New England's manufacturing takes place in the three southern states, slightly more than half of it in Massachusetts alone. This distribution corresponds closely to that of population, but the proportional distribution of wage earners differs markedly in the various states. Only in Vermont is there any semblance of balance between agriculture and industry in terms of wage earners.

The localized areas of maximum manufacturing activity are readily identifiable: Merrimack Valley, Boston Basin, Narragansett Basin, Blackstone Valley, Connecticut Valley, and the Naugatuck Valley. Minor areas include the Champlain Lowland, the eastern plain of Massachusetts, and the southeastern coast of Maine.

[1] U.S.G.S. "Water Supply and Irrigation" (#79, Washington, Government Printing Office, 1903), p. 56.

TABLE 6

NEW ENGLAND: EMPLOYMENT IN MANUFACTURING AND AGRICULTURE

(From Census of Manufacturing, 1939)

WAGE EARNERS IN MANUFACTURING			PER CENT OF TOTAL POPULATION ENGAGED IN:	
Area	Number	Per Cent	Manufacturing and Mechanical Industries	Agriculture
N. England	1,100,043	100.0	19.2	2.6
Maine	69,593	6.3	12.8	6.4
N. Hampshire	65,119	5.9	19.0	4.8
Vermont	27,582	2.5	11.0	10.8
Massachusetts	559,143	50.9	19.7	1.3
Rhode Island	124,838	11.3	23.7	1.3
Connecticut	253,468	23.0	20.9	2.3

Changing Sources of Power—Water—Falling water gave the New Englanders an industrial head start when they turned from maritime trading to manufacturing. New England's water power resources were developed earlier and to a greater extent than those of any other section of the country, but their importance in localizing manufacturing has changed with the times. Primitive water wheels were improved and streams were made to do more work by the use of canals or hydraulics. Later steam engines outmoded water wheels. At present these prime movers, supplemented or displaced by the steam turbine and internal combustion engine, are turning generators of electricity, and electricity is gradually superseding a large part of both mechanical power and human labor in New England mills.

Imported Coal—New England today depends upon imported coal and domestic water power, with the former taking care of about 85 per cent of the power requirements. The southern states have done most in the development of water power. The lower Connecticut, the Housatonic, Blackstone, Taunton, Charles, Merrimack, and the smaller Kennebec, Saco, Androscoggin, and Penobscot rivers, supply nearly all of New England's water power. The early industrial centers were along these streams, and despite the power "revolution," her manufacturing is still thus localized. A riparian location is still important for some industries because of the need for water in the manufacture of steam power.

An estimated 30 million tons of coal are consumed in New England every year, of which two-thirds are bituminous. Anthracite coal is used almost entirely for domestic heating purposes. By far the greater part of the coal is consumed in the three southern states, principally Massachusetts. To secure this coal, New England has developed two major trade routes: the rail route from Pennsylvania, northern West Virginia, and

western Maryland; and the combination rail-water routes from southern coal producers of western Virginia and eastern Kentucky. The tonnage from these two areas is about equally divided. Coal from the northern fields enters New England by way of four "gates" from New York: Maybrook, Albany, Troy, Mechanicville, and through the junction-point at the Harlem River. The southern fields export through Norfolk and Baltimore, and then by sea to the New England industrial ports for rail delivery to interior points. Foreign coal, irregularly imported and amounting at most to half a million tons a year, is largely Welsh anthracite.

The St. Lawrence Plan—The industrial centers of southern New England are within a radius of 250 miles of the International Section of the St. Lawrence River between Ogdensburg and Montreal. Power development here is a disputed point before some Provincial legislatures and the United States Congress. Whatever decision is finally made may have an important effect on industry in New England.

The Labor Element in the Cost of Production

Human Factor—Manufacturing everywhere is dependent upon the people for management, labor, and market. Manufactured products embody a great deal of labor, the amount varying with the type of commodity. The highly processed nature of New England's manufactures and the dependence upon human labor are indicated by an appraisal of the several aspects of the manufacturing function. For instance, with but 6.9 per cent of the nation's population, New England has 13.2 per cent of the total wage earners in industry in the United States; while wages paid in manufacturing in New England are 12.3 per cent of the total; and the value added by the manufacturing process is 10.8 per cent of that for the United States as a whole. On the other hand, the cost of the materials for mills is but 8.7 per cent of the national total. To a greater extent than any other large manufacturing district, New England's exports represent a high proportion of human services.

Combination of Factors of Production—It has been suggested that these characteristics are indices for the evaluation of the maturity of her manufacturing. The advantage accruing to another section from the physical presence of mineral raw materials may be, and in New England sometimes is, offset by a relatively greater advantage in the human factor. It is the relative cost of productive factors in *combination* which determines the place of least cost. So New England, without mineral fuels and without mineral raw materials for manufacture, may still find its factor-combination cost as low as that of any other district in the United States. This industrial selection has been going on for two centuries and the present manufacturing

landscape, both as to type and pattern, manifests one sign of maturity, an increasing value added by the manufacturing process.

Cotton Textiles in New England Manufacturing

Diversity of Products—It is, perhaps, understandable that the average person thinks of New England's manufacturing as textiles, primarily. Doubtless more columns of copy in the big eastern newspapers have been concerned with the problems of the textile industries than with any or all of the other industries found there. As a matter of fact, the number of wage earners directly dependent upon textiles, or their closely related industries, is greater than for any other group of industries in New England. However, the value added by, and the total income from, the manufacturing process is greater for items fashioned from metals than from all textiles. Metals, textiles, leather, and rubber constitute nearly three-fourths of all New England's industry.

"New England Type"—So generally are these facts known to us that for a long time we have used the expression "New England type" of manufactured product for a commodity characterized by relatively low cost of raw materials, low bulk, low power cost, highly elaborative processing, and high value added by processing.

Distribution of Cotton Mills—Even though cotton textiles, indeed all textiles, do not rank first in value added by the manufacturing process, they merit first consideration historically. For with this industry, factory processing began in New England. The reluctant transference of capital investment from shipping to manufacturing first took place in cotton. The venerableness of cotton manufacture, in this section, has made it peculiarly susceptible to the changes brought about by the industrial revolution in the United States.

Although the textile industry is important in every state in New England except Vermont, the major centers are Rhode Island, eastern Massachusetts and southeastern New Hampshire. Approximately 75 per cent of the wage earners and 90 per cent of the establishments are in Rhode Island and Massachusetts. In view of the distribution of cotton mills elsewhere, the New England situation is unique: Bristol County, Massachusetts, and Providence County, Rhode Island, two highly specialized cotton districts, have half the total active cotton spindles in all New England. Here are located Fall River, New Bedford, Pawtucket, Taunton, and Woonsocket, all-time important names in United States cotton manufacturing. A third of the spindles are farther north in the lower Merrimack Valley, where Lowell, Lawrence, Manchester, and Nashua have been dominant cotton cities.

Plant Site and Form—A map showing the present location of New England cotton mills would reveal two facts: first, most of the large mills are at sites on fresh-water streams of considerable size, and second, those not having this source of power are close to tidewater. During the years which saw establishment of this, the first factory industry in the country, the textile machinery which was being developed, antedated the application of steam to factory uses. Consequently the expansion of the industry occurred where water was adequate to power the machines then in use. The mills, generally of brick and from two to four stories in height, were located immediately at the power site. It is in such mills that the greater number of idle spindles are to be found. For more modern machines and greater possibilities for expansion one must go to the steam mills of a later day, located for the most part on or near tidewater.

The Pioneers—Samuel Slater and a Providence financier began the manfacture of cotton at Pawtucket, Rhode Island, in 1790.[2] The first complete cotton spinning and weaving mill in America was put in operation in 1813 at a waterfall on the Charles River near Waltham, Massachusetts. A decade later the power needs of more modern machines made this site inadequate, with the result that the more abundant power at the site of Lowell on the Merrimack superseded it. Shortly afterwards, Lawrence, Manchester, and Nashua manufactured cotton at sites along the Merrimack. Within a few years Saco, Biddeford, and Lewiston in Maine began manufacturing cotton. The Hadley Falls dam on the Connecticut River brought about the development of Holyoke, founded as a cotton town, but now better known for the manufacture of paper.

Mills Turn to Steam—Up to 1850 water power was so abundant and cheap that steam played virtually no part in the manufacture of cotton in New England. By 1870, a third of New England's spindles were powered by steam; and mills were being developed at points along the coast, where bituminous coal was imported from Middle Appalachian fields. The new coastal centers included Newburyport, Salem, and Portsmouth in the north, and Newport, Bristol, and Warren in the south.

From the first venture of seventy-two spindles in 1790, the industry expanded during the ensuing century and a half to 1,600 establishments with more than thirty-four million active spindles. So far as New England is concerned, the location of cotton manufacture has changed but little, despite the changed source of power and the improvement in techniques.

Industrially as well as geographically these two cotton manufacturing districts have remained distinct. The northern cities have larger mills and make standardized fabrics; while the southern group, centering in the

[2] In 1944, this company was moved to Slaterville, South Carolina.

Blackstone Valley and in smaller and more numerous units, make somewhat higher grade textiles.

Cotton Manufacture Extends to Other Regions—New England cotton manufacturing felt the effect of many changes and adjustments incidental to the extension of this local industry to other sections of the country in the 1880's. The extent to which an industry is geographically bound to the sources of its raw materials depends largely upon the loss of weight

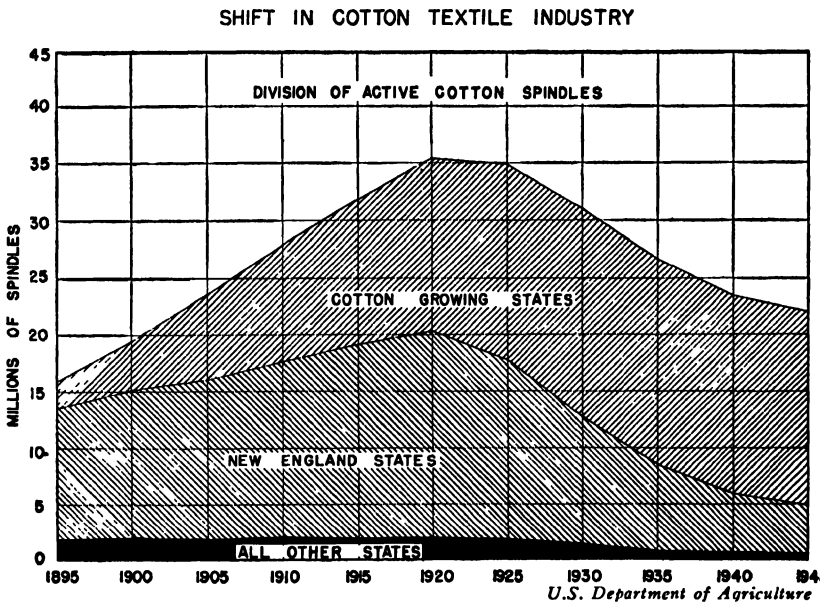


FIG. 28

experienced in the process of manufacture. The loss of weight in ginning raw cotton averages but 10 per cent, and compression to a high density does not materially damage it. Hence the manufacture of this fibre is relatively free from raw-material orientation. Prominent among these major changes was the *rise of southern competition,* which by 1904 had reached the point where the two cotton manufacturing districts were about equally balanced as to number of spindles. No other region has risen to challenge the supremacy of the half dozen counties in New England and the much more widely scattered industry of the Piedmont.

Between 1904 and the outbreak of World War I, the Piedmont mills of the South were increasing their capacity at the expense of the older New England mills. The flood of orders incidental to Allied purchases and our own wartime demands served to bring about a plant expansion in both

the North and the South. The postwar deflation could not be weathered by mills living on "borrowed time," so many failed.

The loss of the Oriental and South American markets principally to Japan and Brazil, seriously curtailed American exports of cotton textiles. New England mills felt this loss more keenly than the Piedmont mills which had never enjoyed an important share of the export trade, due largely to their late start.

Political Factors—The plight in which the American cotton grower found himself in the 1930's, indirectly led to further limitations upon New England mills. In order to finance the crop, control measures designed to aid the grower of cotton, a processing tax was levied on the manufacturer. This of course applied to northern and southern mills alike, but the former were in many instances unable to take this added cost in their stride and in consequence some of the largest mills in New England closed.

Even before the tax on manufacturers was levied, Massachusetts had limited the working week to 48 hours, and improved the conditions of work for women and children. In the Piedmont mills such labor restrictions were not in effect.[3] The New England cotton mills could not make a concession to counterbalance these two developments, and were put at a disadvantage in the production of the cheap, coarser grades of cloth which constitute about 75 per cent of all cotton fabrics made.

Foreign Competition in Cotton Fibre—During the years from 1930–1945 the price of raw cotton was pegged (in effect) at about nine cents per pound in the United States and the old coffee-growing lands of southeastern Brazil were able to inaugurate a cotton-growing program of considerable importance. World War II aided in this venture. What the ultimate effect of this will be upon the New England cotton factories remains to be seen. Thus far it has enabled Brazil to cut into the South American market.

Lend-Lease and World War II have had much the same effect upon the cotton industry as World War I. The net result appears again to favor the southern mills.

Woolen and Worsted Manufacturing

Persistence of Wool—Half of all the wool manufacturing establishments in the United States are in New England, although this industry ranks after both cotton and metals. At least 90 per cent of the wool processed in New England is used for the woolen and worsted types of goods.

[3] During the winter of 1940–41 many Georgia roadside billboards carried large posters exhorting voters not to approve minimum wages on penalty of losing the cotton textile industry.

The proportion of the woolen to the worsted [4] mills varies considerably by individual states within New England. Only Rhode Island has more worsted than woolen mills. Approximately half of the woolen establishments are in eastern Massachusetts, with about half of the remainder shared by Maine and Rhode Island. Over a long period of time the worsted industry has shown a slow but steady increase in the number of establishments. Woolen mills on the other hand have shown a slow decline. There has been no change in the type or size of the mill to compensate for the decline in number.

Early Development—Wool manufacturing in New England has had a very different history from cotton. Cotton manufacturing began in a factory, but wool processing began in the home. The manufacture of cotton goods has always been centered in a few localities, but wool was at one time spun and woven in almost every household. The preparation of cotton for spinning is for the most part a single process, but wool differs so much in this respect that the mills have developed apart and under different conditions. In cotton functional specialization occurs, but woolens and worsteds may be described as different industries in their locational aspects.

Woolens—The early development of wool manufacture in New England was primarily the making of woolen goods. When yarn was prepared for weaving in the home the practice had been to card it. The transition of this yarn manufacture to a mill was by way of the powered machinery of the fulling mill, developed in most communities to do the heavy work involved in finishing the home-woven fabric for tailoring into garments. By 1810 there were twenty-four small woolen mills in the United States, virtually all of them in the northeastern states, the largest employing 150 persons. But after the War of 1812, woolen mills appeared in many parts of the United States east of the Mississippi River.

The number of woolen mills in New England and elsewhere declined and their size increased about the time of the Civil War, when reciprocity with Canada enabled us to secure long staple wool for combing, and at a time when a power wool-combing machine was introduced from England. The dwindling supply of raw cotton from the seceding states made some cotton manufacturers turn to wool for "the duration." The heavy demands during the war for worsted uniform cloth gave some of the mills a specialty they followed thereafter. When the reciprocal trade agreement with Can-

[4] The operations required for the manufacture of woolen and worsted fabrics are similar, the essential difference being the greater density of the worsted yarn, its longer fibres, and the inability to use reclaimed fibre. A commentary upon the relation of this industry to the trade of New England is the fact that while manufacturing more than half the nation's wool, only 5 per cent of the commodities made from it are fabricated in New England.

ada ceased after 1868, Canadian manufacturing was hard hit and New England worsted mills would have suffered severely but for the perfection of wool-combing machinery which enabled them to use wool from Argentina and other countries.

Worsteds—Worsteds did not become commercially important until after the invention in 1860 of power machinery for combing the wool. The proportion of worsted mills in New England has reflected the changes which have taken place in these two major divisions of the industry since that time. First one and then the other would be stimulated by some style or some price change caused by a war or by depressed business conditions. However, worsteds were the established leader by the turn of the century and have remained so. From the beginning, worsted mills have been larger establishments, have employed more people, and have made more standardized items than the more numerous but smaller woolen mills. Worsted mills are more localized than either cotton or woolens.

Worsted mills resemble cotton mills in the completeness of processing within one mill, but the former employ men primarily, the latter employ women. At first the worsted industry was at a disadvantage because of the requirement of relatively more men than women in the manufacturing processes. Like cotton mills, worsted mills have installed a greater proportion of labor-saving devices than have the woolen mills.

Sources of Wool—New England now has in wool manufactures, another industry, similar to cotton, which depends upon imported raw materials, and a national market. Unlike cotton, wool continues to have its major processing region in New England. Only in the Middle Atlantic states has the manufacture of woolens and worsteds developed into regional significance. Although it was founded originally on local supplies of wool, the New England industry today buys wool not only from other regions of the United States, but also from most of the other great wool-growing nations of the world.[5]

Until 1813 wool rags were used only for fertilizers. Then an Englishman conceived the idea that worn wool cloth had further manufacturing value. The economic importance of reclaimed wool (shoddy and mungo) is now great. It amounted to at least a fifth of all wool processed, and thus provides cheap and warm clothing which helps to keep the price of virgin wool down. The American shoddy fibre has never reached the proportions

[5] Although the United States is the second largest producer of wool, it is not self-sufficient. Relatively mild climate makes the United States' wool fine-fibred, usable for apparel, draperies, and upholstery. Yet in the apparel class alone, the United States produces only 70 per cent of her consumption; Australia and New Zealand send to this country 50 million pounds annually. The United States has been dependent upon Argentina and China, principally, for carpet wool. War cut off supplies from China, and the United States turned to Uruguay and increased imports from Argentina.

of the British industry. This is in part due to the fact that it is not readily adaptable to worsted manufacturing, and in part to the ability of most Americans to purchase clothing materials relatively free from shoddy.

Metals Manufacture

Leading Varieties—The goal of all manufacturing districts similar to New England is the export of manufactured commodities in which there is the maximum of skilled labor. The metals industry best fits this regional objective. Machine tools, electrical equipment, a wide variety of textile and other machinery, machine shops and foundries are the phases of metals manufacture which dominate the New England scene. The wages paid in this group are somewhat higher than the average for New England, although within the group there is wide variation.

Early Development—For obvious reasons, New England made iron only from local materials in the seventeenth century. The distance from Great Britain gave the colonial iron masters the equivalent of an estimated 25 per cent protective tariff. Within the colonies the difficulties in transportation kept iron manufacturing a local industry. Local need for iron products was not then great, but the shipping industry of Massachusetts provided a considerable outlet for iron goods. A farmer in his home and about his farm could get along with little in the way of iron products, but in shipbuilding and subsequent operation of the vessel, iron was a vital necessity. Up to the middle of the eighteenth century Massachusetts led the colonies in iron making, with the greatest works about the Narragansett Basin and the Boston Lowland. Local bog iron, oyster shells for flux, and charcoal sufficed for this infant industry. Increasingly the industry came to depend upon ore imported from the colonies of the Middle Atlantic and bar iron from Europe.

Every step toward the subjugation of the physical environment tended to enhance the importance of iron manufacture. The westward movement of colonists from the seaboard of the Middle Atlantic and New England into the near-by interior valleys, created new markets for the manufactured necessities of pioneer life. Two of the early forges or furnaces, common in the interior valleys, rose to importance as commercial centers of iron manufacture: Lancaster, Pennsylvania, and Salisbury, Connecticut. The functional decentralization which characterizes the iron and steel business, the separation of ore reduction and the fabrication of iron products was having its beginning. After the turn of the nineteenth century virtually all of New England's iron was imported from the interior furnaces.

For a brief time during the World War II New England supplied a small

part of her pig iron from a modern plant on tidewater in Massachusetts. Ore was imported from Cuba, Newfoundland, and the Adirondacks. Since then, most of the iron has come in as pig from Birmingham, Bethlehem, and Buffalo. Just now the Buffalo-Lackawanna district is gaining on the others in competition for the New England market.

Textile Machinery—Most of this type of machinery made in the United States comes from the New England states; four-fifths comes from Massachusetts and Rhode Island alone. As would be expected, the location and fortunes of firms engaged in this manufacture are dependent upon the cotton and woolen textile mills. For an industry whose prime function is to make and repair cotton textile machines, the size of the unit varies from six or eight men to a thousand, as measured by the number of wage earners.

Electrical Equipment—Although this industry is important in the region, New England's share of the manufacture of electrical equipment is much less than in the case of textile machinery. For the most part, this phase of metals manufacture is carried on in large units centered primarily in cities along the north shore of Long Island Sound—Bridgeport, New Haven, and the cities of the Narragansett-Blackstone lowland. Products include equipment for the generation, transmission, and utilization of hydroelectric power. The long-time importance of these cities in the manufacture of copper and brass is antecedent to this modern industrial specialty.

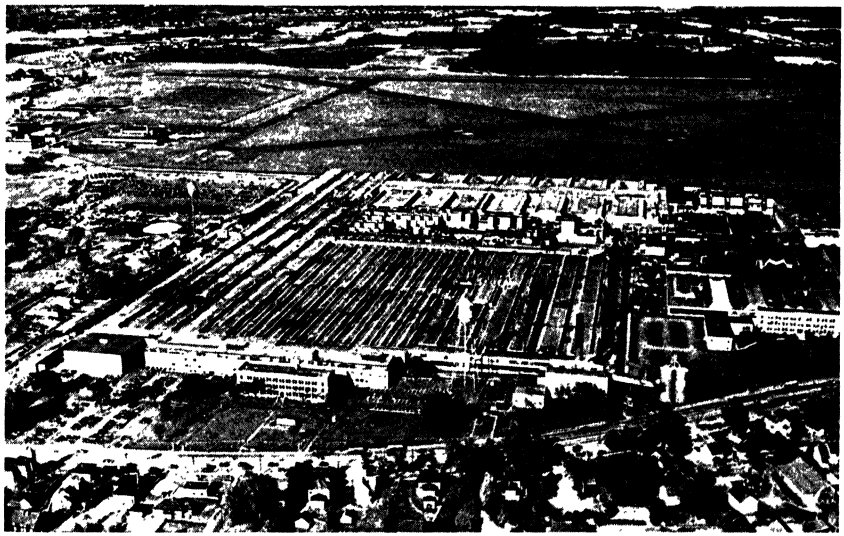
Machine Tools—Perhaps in the machine tool industry more than in any other, one sees the so-called "New England" type of products. Wages are the highest of any industry, and the value added by manufacture is greatest, sometimes amounting to fifty times that of the average for other industries. This is sometimes referred to as the parent of all manufacturing since the basic machines of industry drill, bore, mill, grind, and broach metal parts which, when assembled, become the machines which make the machines of industry. They are precision-made and their builder is an artist among metal workers. New England manufactures about one-fourth of the nation's total of this type of product although there were perhaps not more than sixty machine tool plants, prior to World War II.[6]

The building of machine tools did not emerge as a distinct industry until after the Civil War, although every blacksmith in a limited way partook of this function. The distribution of the factories today is as widespread as the market centers. The "feast or famine" nature of machine-tool building as an industry tends to keep the capacity at peace-time level. (Fig. 18) The emergency of 1941–45 enormously increased the market; so-

[6] New plants and much subcontracting marked New England's tool industry during the 1940–45 emergency.

called "bottlenecks" developed. A representative small tool works in New England at Springfield, Vermont (population 5,000), where the hill farms came right down to the shop, was one of the pioneers in "farming out" processes in the precise job of making machine tools.

Foundry and Machine Shops—The apparent wide distribution of foundry and machine shops is due largely to the indefinite classification. In the three southern states of New England the shops are found in nearly



Pratt and Whitney Aircraft

FIG. 29.—A LARGE AIRCRAFT MANUFACTURING PLANT IN CONNECTICUT

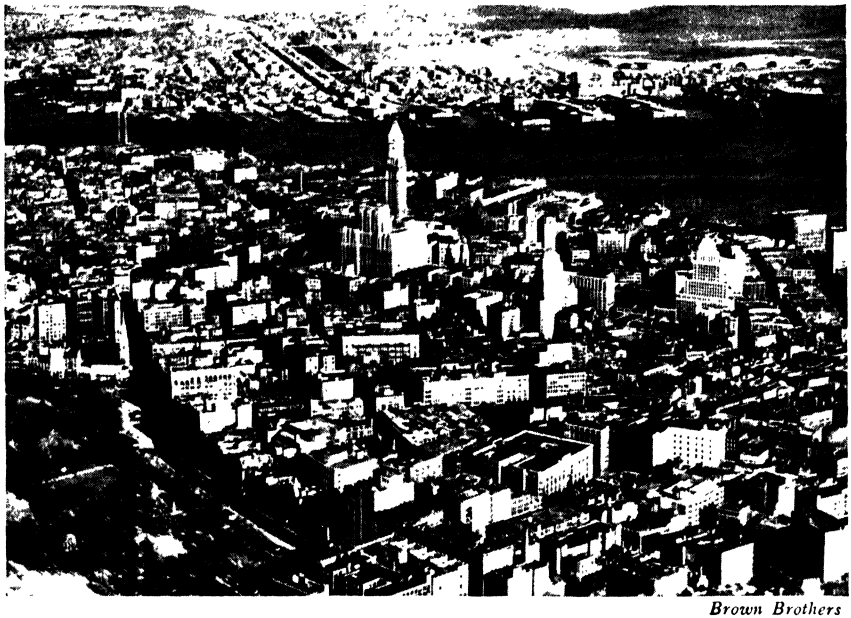
every town of industrial importance. The northern states have the shops localized for the most part in southeastern Maine, southern New Hampshire, and the Vermont lowland. Wherever machinery is made or repaired, the machine shop will be found.

Shipbuilding

Shipbuilding, historically one of New England's important industries, is today carried on principally at Bath and South Portland, Maine, Portsmouth, New Hampshire, Boston and Quincy, Massachusetts, and Groton, Connecticut. New England never has regained the shipbuilding importance achieved in the days of wooden ships. Although during World War II wooden ships were built in the same shipyards, it was indicative of no permanent change.

Leather Manufactures

The Tanning Industry—Historically, the leather industry and the manufacture of boots and shoes are basic in New England's economy. Functionally, the former is basic to the latter. Both have continued significant in the region. Massachusetts had about one-fifth of the 600 tanneries in thirty-two states in 1930. Despite the tendency toward larger units, New



Brown Brothers

FIG. 30.—PORT OF BOSTON

England tanning is still relatively small-scale and scattered. The relative simplicity of the tanning process has encouraged small scale operation, with the result that there are more tanneries than are necessary to meet market demands. The size of the establishment increased when chemical tanning replaced tanbark. Although New England tanneries represent both the old and the new types, they are generally smaller than elsewhere in the nation.

Since tanbark and hides were seldom found in sufficient quantities in the same locality, one or the other has to move to the point of leather manufacture. Transportation costs have determined that hides would travel to or toward the forest. The large markets for leather among the New England shoe manufacturers made tanneries most numerous in that

region. Waning supplies of bark there caused the industry to develop farther south and west in the Appalachian states with their oak and chestnut forests. The United States has been unable to supply hides in quantity sufficient for its needs, so accessibility to imported hides proved a greater localizing factor than the domestic supply. The rise of the great packing centers of the Lower Lake cities about the time of the Civil War exerted a new pull on the location of tanneries.

Early Rise of Shoe Manufacture Stimulated by Trade—From the days when the shoemaker was limited to his own locality for raw materials, labor, and market, to the rise of the large modern shoe factories, this industry has been intimately related not only to other industries but also to New England's crafts. The shoe industry in New England has had little to do with water-power sites. The more accessible power sites had been occupied by the textile industries before the wide-spread application of power-driven machines to shoe manufacture.

It has been stated that the shoe industry was given its first great stimulus by the export of shoes to the laboring classes of our South, of Mexico, and of the West Indian Islands. The rapidly-growing carrying trade of New England offered not only this outlet for shoes, but also brought in hides from pastoral countries.

Production Centers—Lynn, next door to Boston, dominated all other towns in the early days of shoe manufacturing. Here was inaugurated the subdivision of labor in the homes of fishermen in Gloucester, Beverly, Salem, and Marblehead. By 1800 these early shoe centers were turning out 300,000 pairs annually.

Because of the long continuance of shoemaking in the home and the small workshop, the larger shoe factories which did develop were found for the most part, in towns where textile manufacturing had not absorbed all of the available labor. Shoe manufacturing south of Boston amounted to little prior to the Civil War. At first no town south of Boston dominated the shoe business; it was important in a dozen. It is interesting to note that the shoe stores of Brockton and south shore towns have always specialized in men's shoes, but that those of Lynn have confined their line to women's shoes.

Other shoe centers have risen in New England, principally on the periphery of Boston, and there are centers in southern New Hampshire at Nashua and Manchester and in southern Maine at Auburn. The dominance of the Boston center has nevertheless persisted for 150 years. Outside of New England the manufacturing of shoes has progressed very rapidly in relatively recent times, particularly in the North Central states. Shoe manufacturing is one of the most mobile of industries, largely because of its labor orientation. Other contributing factors have been the

average small size of the individual establishment, the leasing system which provides the machinery, and the fact that properties are often rented.

Paper

Distribution—The manufacture of paper is carried on in three principal districts in New England: the Thames Valley; the Connecticut Valley, both in southern New England; and Maine, New Hampshire, and Vermont. The region's greatest concentration of wood-pulp mills is in the north, at Millinnocket, Orono, Old Town, and Brewer in Maine, and Berlin in New Hampshire. The second ranking district is centered about Holyoke in the Connecticut Valley. This is the greatest rag paper center of all. Nearby is the paper district of the Thames Valley.

The big factors in the location of paper mills in New England have been: (a) supply of raw materials; (b) abundant power; and (c) large quantities of water suitable for processing the pulp. The size and the varied nature of New England's market for paper products have, in large measure, determined the distribution and the nature of the primary paper manufacturing there. The need for paper boxes and containers of many sorts has profoundly influenced the type of output of the Connecticut mills particularly.

Depletion of Materials—Depletion of local sources of pulpwood has promoted imports from Canada. Some of the large paper companies have transferred a considerable portion of their activities to the Canadian forests. Approximately half of the pulpwood consumed by New England mills is now imported from Canada and northern Europe.

The northern mills are dependent upon local supplies of pulpwood, but the southern mills depend upon imported pulp and upon rags. Besides these primary districts there are scores of other mills making paper products of some sort, nearly always from purchased pulp or other papermaking materials.

New England's Prospect in Manufacturing

Future—New England faces increasing competition in most aspects of her agricultural and manufacturing future. The leveling off of the domestic market and the rise of new industrial nations bodes no easy path for these northeastern states. The recent ruling by the Interstate Commerce Commission which lowered rail freight rates in the west and south while raising them in the northeast will undoubtedly render uneconomic certain of New England's industries. Yet the fundamental structure of the

economy of New England has elements of permanence. Skilled labor will remain relatively important as a cost factor; power and raw material will continue to decline slightly as factors of production. Industrial maturity will characterize manufacturing in New England.

VIII

MIDDLE ATLANTIC LITTORAL
A COMMERCIAL REGION

It is something of a paradox that where man-made landscapes are the most conspicuous, the nature of land use is often difficult to discern. The largest cities generally offer the maximum in geographical specialization, yet the regionalism of an urban landscape is not widely known. Reference points, intra- and inter-regional relationships, and the most densely utilized local trade routes are relatively unknown to outlanders. Many of the observable features in the economic complex of a great city are foreign even to its residents. Vertical growth of cities contributes to this inchoate quality.

To some New Yorkers, the East River has personality, and the North River merits its name. The satellite cities assume a meaningful pattern and there is regionalism to the circulatory system of urban routes. The Middle Atlantic Littoral is a comparatively small area containing three of the nation's largest cities; there is no other area of the continent with a comparable third dimension. The overwhelming superiority of the dominant cities in the Littoral has fostered an intercity bond equaled, probably, by no other region of North America. In the Middle Atlantic Littoral the term "satellite" or "sister city" has a connotation not often encountered in the urban geography of North American cities.

New York, Philadelphia, and Baltimore, together with their associated urban clusters are therefore less susceptible of regional description than most other sections of the United States or Canada. The urban dominance gives rise to a sort of concentrated economic geography.

Port Cities and Associated Plains—The Middle Atlantic Littoral embraces more or less equal portions of the estuarine Coastal Plain and the adjacent Piedmont, extending from Long Island to the Virginia capes and westward to the Blue Ridge and the Ridge and Valley provinces. (Fig. 31.) About each of these port cities are other cities which extend the urban domination toward the interior.

All three cities are located on the Atlantic margin of the old (geologically) land of the Piedmont. Aside from this province, they have had little direct relation with the bulk of the Appalachian Highlands which encompass them on the north and west.

Situation—After the initial impetus of agriculture on these relatively inviting plains and the coastwise commerce of an early day, all three port cities became the focus of transappalachian routes to the interior of the continent. Their trade with the Middle Western Plains has always greatly exceeded that with the near-by Appalachian counties. Like Dutch Governor Wouter van Twiller of New Amsterdam whose plump cheeks seemed to have taken toll of all that entered his mouth, these cities have

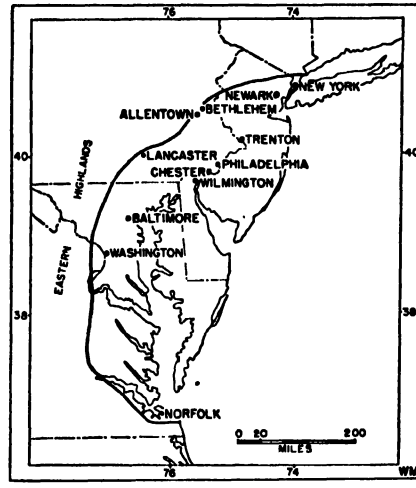


FIG. 31.—MIDDLE ATLANTIC LITTORAL

literally taken toll of the heavy flow of commodities and people which has crossed the Appalachians during the century and a half of settlement.

New York has the corridor afforded by the Lake Plain and the Mohawk and Hudson valleys. It has shared with Philadelphia the corridor through central Pennsylvania, the middle Susquehanna and Juniata valleys which ultimately lead to the Upper Ohio Valley. Philadelphia also shares with New York the Delaware River and the Upper Susquehanna gaps. Baltimore has been served by the Potomac and Roanoke gaps. South of the Roanoke there are no important transappalachian corridors.

Completing all of these transappalachian routes are valleys of north-flowing streams leading to the Ohio. This fact of northern Appalachian drainage is outstanding in the development of all three port cities and their urban clusters.

Identity—The Middle Atlantic Littoral has retained its regional identity throughout the development of the United States. As the keystone of the colonies, these plains took character from their situation. Local trade

was circumscribed by the Blue Ridge and by the Ridge and Valley province. Maritime trade with New England, the eastern South, and the West Indies laid the foundations for the far-flung commerce of the nineteenth century, the China trade, trade with the Pacific Coast and with western Europe.

The opening of the Erie Canal in 1825, the advent of the railroads, and the westward movement of people modified the pattern and the nature of domestic trade for these port cities. As more remote hinterlands were made accessible the relative importance of these port cities was altered. Railroads made possible the export of middle western agricultural raw materials. With the settlement of the Canadian prairie plains, central Canada exported through the Middle Atlantic ports. After the Panama Canal was opened in 1914, the trade territory of the port cities extended farther inland. This zone of indifference as to exports for the Pacific varies by commodities and by sections, but in general it may be defined as just east of the Mississippi River. Based upon commerce, these cities have become important manufacturing districts. They dominate the agriculture on the plains of the Middle Atlantic Littoral. Their daytime population has long been partly drained off by the countryside, the extent and pattern of this commuting being determined by several factors, one of them being distance. In the main, commuting has been between the cities and the Piedmont, rather than the Coastal Plain.

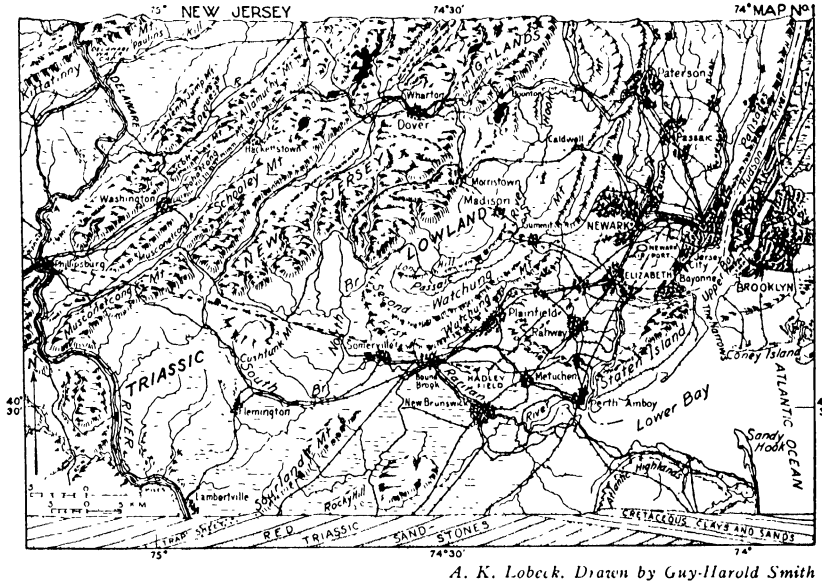
New York City—Site—Three islands, Manhattan, Long, and Staten, together with the adjacent portions of the North Atlantic Coastal Plain and the Piedmont have localized the 9,000,000 people comprising the city group known as Greater New York. (Fig. 32.) The area embraced is 309 square miles with a population approximately that of the continent of Australia. On the west of Manhattan Island is the Hudson or North River, to the west of which lie Hoboken, Jersey City, and Bayonne. On the east of Manhattan is the East River and beyond that is Brooklyn, the first spillover of the Island's dense population. On the north and northeast is the Harlem River which separates the Bronx from Manhattan. Beyond Jersey City on the west are Paterson, Passaic, East Orange, Newark, Elizabeth, and Perth Amboy.[1] The Port of New York, unlike any other on the continent, has not less than six distinct harbors: Lower and Upper Bays, Newark Bay, Jamaica Bay, Flushing Bay, and Raritan Bay. Each one is a large harbor. All are connected by a series of sheltered waterways totaling 900 miles of shore line.

Swampland and shallow waters have always restricted the uniformity of urban growth and have been expensively overcome by the construction

[1] The following cities of the district lost population between 1930–1940: Bayonne, Elizabeth, Hoboken, Jersey City, Kearney, Montclair, Newark, Passaic, Perth Amboy.

of 56 vehicular and 9 railroad bridges, 42 tunnels under the Harlem, East and North rivers, and by 24 ferry routes over these streams. The Island of Manhattan, as the most accessible by water, has the major share of port functions; competition from the cities across the bay came after Manhattan was well established.

Congestion—Within the corporate limits of New York there are 7,380,259 people, resulting in the greatest congestion of any American



A. K. Lobeck. Drawn by Guy-Harold Smith

FIG. 32.—THE NEW YORK AREA

city. It has increased the costs of movement of people and commodities. The traffic speed during the working day is slow. The core of the urban landscape has developed vertically; an estimated 12 million passengers are moved by elevator each day. Because bodies of water impinge upon Manhattan, many industrial concerns dependent upon immediate rail facilities have located in the north Jersey cities adjacent to New York harbor. This has necessitated the transshipment of goods and people on a very large scale. Here too are industries requiring extensive ground space. These cities, although economic spillovers from Manhattan Island, have become major cities in their own right and as such have had markets large enough to attract manufacturing industries. To a great extent the past vigor of greater New York's growth has stemmed from these satellite cities.

Where congestion is so great, it operates as a centrifugal force to dispel industry. Those remaining must absorb high ground costs, varied handling costs, and in some cases, a labor shortage. Over a period of years, this has narrowed the gross types of manufacturing in Manhattan.

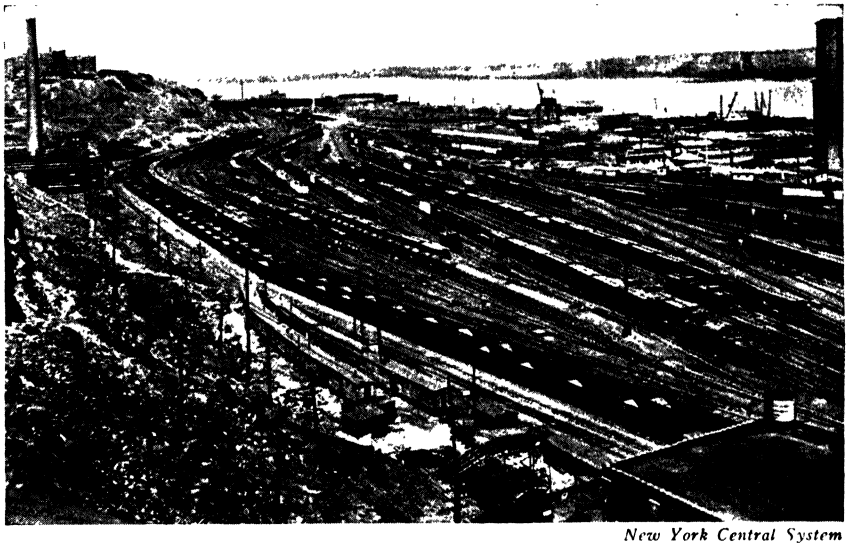
A Commercial Center—Despite the disadvantages of site, New York has become the continent's greatest port city. Ten thousand vessels clear its 600 piers every year, carrying $5,000,000,000 of cargo. New York's produce exchanges deal in commodities from the whole world. One hundred and sixty billion dollars in checks from all parts of the world cleared New York banks in 1939. An estimated 700,000 persons make their living in some branch of foreign trade.

There was a time when New York was neither the largest city nor the greatest port in the United States. During the early decades of the nation, New York was smaller than either Boston or Philadelphia. It was just a large town lying between New England and the Middle Atlantic states. Sea-borne commerce gave to Philadelphia and Boston a vital headstart. When canals and railroads opened up the transappalachian country during the first half of the nineteenth century, the position of New York was enhanced.

Access to Interior—The Middle Atlantic Littoral and New England had one hundred and fifty years of growth before white settlement began in the transappalachian country. Recognition of the significance of the new west to the seaboard communities was implicit in the construction of the Erie Canal, opened in 1825. In effect, therefore, the Middle Western Plains soon became an important factor in the development of Middle Atlantic port cities. The effect of the Erie Canal upon the peopling of the Northwest Territory was likewise important; Ohio grew slowly between 1789 and 1825, but by 1835 it had two million people.

The Erie Canal and the railroads which followed it, caused New York to outstrip Philadelphia and Boston in population. The New York Central Railroad follows the gap of the Hudson and Mohawk valleys westward to the lake plain. This corridor soon became the prime trade route of the country. A little later the Pennsylvania Railroad was constructed, following in part the Susquehanna, Juniata, and upper Ohio valleys. The Baltimore and Ohio follows the Potomac gap through the Blue Ridge. The Chesapeake and Ohio follows the James, New, and Kanawha valleys through the Appalachians. The Norfolk and Western follows the Roanoke and Big Sandy gaps through the same barrier. All of these railroads focused upon the Middle Atlantic port cities; all but the last named had a New York terminal. Without this kind of accessibility, no Atlantic port city has grown to major proportions, as Charleston and Savannah bear witness.

The period of raw material export from the Middle West was a potent factor in enabling New York to lead all other Middle Atlantic cities by a wide margin. In recent decades this superiority has not been maintained; the port of New York has declined relatively since 1880; its share of total United States imports dropped from 68 per cent in that year to 49 per cent in 1939; exports declined from 47 per cent to 36 per cent. These figures are for "visible" imports and exports only; "invisible" items have increased, particularly since World War I. Because of the extraordinary



New York Central System

FIG. 33.—TERMINAL FACILITIES, NEW YORK CENTRAL R.R., WEST SHORE OF THE HUDSON RIVER, NEW YORK AREA

growth of Chicago since 1830, and the decline noted above, some people have doubted the continued dominance of New York. A slight increase in the proportion of its imports took place during the period between the two World Wars. The Asiatic trade doubled during the past forty years and New York's situation on the Middle Atlantic coast may ultimately prove to be less desirable than San Francisco's on the Pacific coast. This will be particularly significant if the trade with European countries continues the relative decline of the past forty years. On the other hand, trade with Canada has also doubled, and the amount of coastwise trade has increased. There is no evidence that New York's supremacy is yet seriously threatened.

Nature of Commerce—New York is primarily a financial and commercial city. The import functions are greater than export; a considerable part

of the exports are termed invisible, that is to say they are the services of men, money, and ships. The two major exports of the United States which have suffered most in recent decades by the dislocation of foreign markets, are wheat and cotton; for neither commodity was New York the principal exporter. Foods, particularly meats, have kept their high rank as exports; in this line New York has long been pre-eminent. As the proportion of manufactured goods in export trade slowly increased, New York, as the chief port for the American manufacturing belt, has secured the lion's share. The recently opened markets for American machinery of many kinds in Australia, India, East Indies, China and Japan may continue to advance the proportional share of the Pacific ports.[2] This seems likely in view of the establishment of manufacturing industries in the West Coast cities, particularly since World War II.

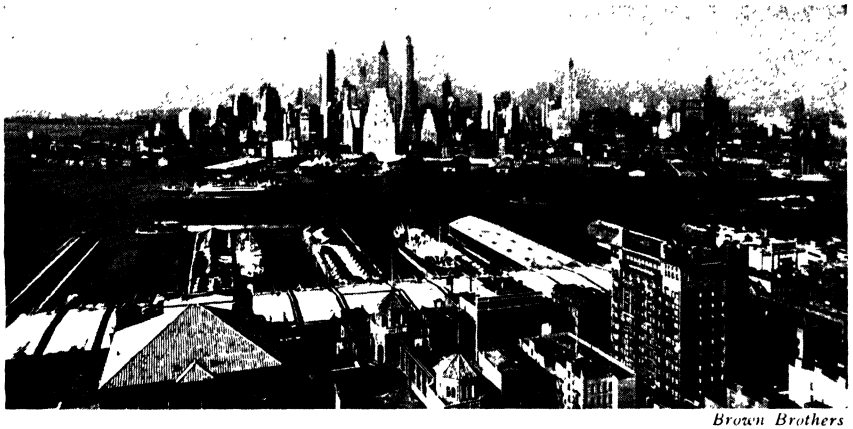
New York's Free Port—In 1934 Congress permitted port cities in the United States to establish free zones where goods may temporarily come to rest without the payment of duties. In 1937 New York created a free zone on municipally owned, waterfront properties at Stapleton on Staten Island. These facilities were originally constructed for World War I and include about 90 acres of land, four large, double-decked piers, and something in excess of a million square feet of storage space. Most cargoes come to this zone by ship, but it is served by three bridges, several highways and trucking lines, and eight railroads.

Re-export has never attained an important status in the foreign trade of this country; in 1941 an estimated 2.5 per cent of our exports were re-exports, with the United Kingdom, Canada and Mexico taking about three-fourths of it. There are numerous reasons for a free zone to be used. Commodities which have a tendency to shrink considerably may ad-

[2] WORLD MERCHANT FLEET
(Millions of Gross Tons)

	1939	1946
United States	8.7	40.2
British Empire	18.2	13.3
Norway	4.5	2.7
Netherlands	2.7	1.7
Sweden	1.4	1.4
France	2.7	1.2
Russia	1.1	1.2
Greece	1.7	.6
Japan	5.2	.7
Italy	3.2	.3
Germany	4.	—
Others	6.2	5.2
	60,600,000 tons	68,500,000 tons

vantageously be stored here by the importer. When commodities come in under a quota system, it often helps to store some part of them until the next period. Processing and packaging frequently are reasons for storage in free zones. It often happens that the exporting countries have no facilities for processing certain of their exported commodities. World War II added at least one advantage to this free zone when the disruption of normal trade in Sumatra leaf tobacco gave this zone an opportunity to become a leading Frascati or Sumatra leaf tobacco market. Among commodities which have become important in the use of the New York free zone are:



Brown Brothers

FIG. 31.—NEW YORK HARBOR

Argentine beef, Brazilian nuts and coffee, Indian spices, Scottish woolens, Chinese tungsten, Chilean copper, Canadian asbestos, Chinese and Peruvian peas, Bolivian antimony, Spanish olive oil, and Swiss watch movements.

Although re-exports in the past have not been a major part of United States foreign trade, this free zone accounted for approximately 5 per cent of the New York customs district merchandise imports in 1941. As a source of employment for United States wage earners, it has not been a major item but it is closely related to our expanded merchant marine, the changed routes for some commodities in world trade, and the increased pressure put upon this country to import. It calls for a variety of skills and types of labor; New York's zone has given employment to perhaps 700 persons. New Orleans has instituted a similar zone, and several other port cities have planned to establish such a service.[3]

[3] A. L. Lomax, "The Foreign Trade Zone" (*Bur. of Bus. Res.*, Univ. of Oregon, Eugene, Oregon, March, 1947).

TABLE 7

CHANGES IN ORIGIN OF U.S. IMPORTS, 1937–1946

(Millions of Dollars)

COUNTRY	1937	1946
Canada	398	752
Brazil	121	372
Cuba	148	288
India		276
Mexico		232
Argentina	139	164
Union of So. Africa		156
Colombia		148
Great Britain	203	132
Russia		121
Br. Malaya	243	
Japan	201	
Philippines	126	
Netherlands India	118	
China	104	

In 1937 ten countries provided about 60 per cent of the imports into the United States. In 1946 ten countries were likewise responsible for about the same proportion, but they were in a different order.

Absent from the list for 1946 are raw silk, tin, grains, vegetable oils, due largely to world shortages. Silk may never again rank high on the list. Tin will be restored with stable political conditions in the Far East. Increased values are due largely to price increases not to greater amounts; the order was not changed.

TABLE 8

CHANGES IN DESTINATION, U.S. EXPORTS, 1937–1946

(Millions of Dollars)

COUNTRY	1937	1946
Canada	509	1,060
Great Britain	536	908
France	165	436
Mexico	109	404
Brazil		320
Philippines		316
Cuba		240
China		204
Germany	126	
Belgium	95	
Argentina	94	

TABLE 9

CHANGES IN CHARACTER, U.S. IMPORTS, 1937–1946

(Millions of Dollars)

COMMODITY	1937	1946
Coffee	151	432
Wool	96	336
Rubber	251	248
Furs	87	240
Precious stones		216
Sugar	166	200
Paper & mfgs.	137	196
Paper pulp	118	152
Petroleum		144
Fruits & nuts		132
Tobacco		116
Jute & mfgs		116
Silk	109	
Tin	104	
Grains		
Vegetable oils	84	

Coastwise Commerce—The economy of water-borne shipments has tended to increase the importance of coastwise trade through all of the Middle Atlantic ports.[4] On certain commodities it pays to ship by rail from as far west as Illinois to these ports for transshipment by water to the Pacific Coast markets. In view of the large merchant marine now flying the United States flag, and the chaotic nature of world shipping at the conclusion of the world conflict, it may be that the United States in the future will maintain a large merchant marine. In 1948, the prospect for United States dominance is not bright.

Raw Materials—With such a large proportion of the population of the United States within a short distance of New York harbor, it is not strange that this port is the largest importer of cane sugar, copper, and petroleum, and important quantities of rubber, vegetable oils, coal, chemical raw materials, hides, skins, bricks, tile, sand, gravel, fresh and canned fruit, seafood, cotton, tobacco, paper, and lumber. The list is long and the tonnage impressive, because New York is primarily an import port.

Manufactures—Market-Oriented—New York is a commercial and a banking city, but it is also the greatest single manufacturing district in the United States. Approximately a third of the city's total annual income is

[4] In 1939 it cost 13 cents to ship a hundred pounds of wheat from New York to Liverpool (2,500 miles), while from Kansas City to New York it cost 33 cents. A 240 pound bale of rubber from Singapore to New York cost $1.56, while from New York to Akron it cost $1.03.

from manufacturing industries. Its manufactures embrace a very wide range of commodities; in some of them the value added by the manufacturing process is high, while in others it is low. As the continent's largest city, New York is obliged to develop a wide range of service industries. Prominent among these are: utilities, banking, slaughtering, roasting, curing, and canning food products; pharmaceuticals; publishing and printing; clothing; paper products, toys; brick and tile; and machine shops. Many of these industries are inconspicuously housed in floors of large buildings which bear little resemblance to factories. Others are perforce located on tidewater or railroad or where horizontal expansion is not prohibited by land costs. Most of these industries contribute but a low value by the manufacturing process. As congestion became so great that the population overflowed into neighboring cities, many of these service industries established branch plants to care for the recentralized market. Some of these service industries have achieved a national market; among them are toys and novelties, printing and publishing, beverages and spices, pharmaceuticals, and clothing.

World War II has given an illustration of the extreme specialization in metals manufacture in New York and adjacent cities. An Army Ordnance Survey lists 8,000 concerns in the greater New York area as apparently able to make Army ordnance items of one sort or another. In 1943 only 1,800 of them were operating under Government contract; many were idle. Of these 1,800 concerns active in war work, 1,500 were subcontractors. Thus 6,000 metals manufacturers in the New York Ordnance District were not participating in the war effort because they were too highly specialized to change the nature of their product even under emergency conditions. An interesting commentary upon this subject is to be noted in Detroit, another large manufacturing district specializing in metals manufacture.

Port Type—Other manufacturing industries have been established in New York because of its pre-eminence as a port. In this category are oil refining on an enormous scale, cane sugar refining, copper refining, ship building, arsenal and certain types of ordnance manufactures, chemicals, preparing and packing food products for re-export, vegetable oil processing, including soap, fur and leather preparation, drugs, and warehousing functions involving simple manufacturing. The value added by manufacture in these commodities is generally low. Obviously this type of industry is based upon import trade rather than export; but oil refining and ship building are important exceptions to this generalization.

Prestige—Some industries have tended to concentrate in New York because of the prestige which certain products have built up locally. Outstanding in this category are silk manufactures, women's clothing, novel-

ties of many sorts, products based upon imported linens and laces, and publishing and printing. Mere volume in the construction industry has likewise tended to give low costs and superior quality to many items essential to the building trades; this includes a wide assortment of manufactured items.

Satellite Cities—The cities comprising the New York urban group are much more specialized in their manufactures, such as Passaic, plastics and wool; Paterson, aeronautical products, machinery, and silk; Kearney, copper refining; Bayonne, petroleum refining; and Garden City, publishing.

Many of the manufactures of New York are intimately related to the diverse conglomeration of races and tongues, since 73 per cent of its population are foreign-born or sons of foreign-born. Two hundred foreign-language newspapers are published for these minority groups. First to come were the Irish, then the Germans, Russians and Italians, to list only the largest groups. From our own southern states came nearly half a million Negroes. Half of the Jews in the United States and an eighth of all Jews in the world live in New York, the largest proportion being in Brooklyn. The foreign elements are not being assimilated readily and the prospect for future assimilation is not bright.

Manhattan reached the peak of its population in 1920 with a total of 3,000,000; Brooklyn appears to have reached a stationary figure. New York's most rapid growth followed the opening of the Erie Canal and the influx of foreigners, 75 per cent of whom landed in New York and many of them remained there. Greater New York has grown somewhat faster than the population of the United States as a whole.[5] The foreign-born peoples turn variously to the many trades: tailoring, furs, foods of the homeland, confectioneries, and restaurants, as well as low-priced labor for the scores of large industrial employers.

Philadelphia—Site—Like New York, Philadelphia is a port city, but its commercial importance is but one-fourth that of its northern neighbor.[6] The site of Philadelphia is more favorable for urban growth. It is located at the margin of the Piedmont and Coastal Plain at the confluence of the Schuylkill with the Delaware River. The swamps and marshes which characterized the New York site are not present in the Philadelphia area.

Situation—In some respects Philadelphia's situation is similar to that of New York; it lies at the eastern terminus of an important corridor through

[5] In 1840 New York had 2.29 per cent of the total population; in 1890 the proportion was 3.98 per cent, and in 1930 it was 5.64 per cent.

[6]

CITY	1890	1900	1910	1920	1930	1940
New York	2,507	3,437	4,776	5,620	6,930	7,380
Philadelphia	1,046	1,293	1,549	1,823	1,950	1,935
Baltimore	434	508	558	733	804	854

(population in 1000)

the Appalachian Highland, the route followed by the Pennsylvania Railroad through portions of the Susquehanna and Juniata valleys to the headwaters of the Ohio River near Pittsburgh. The railroads connect Philadelphia with the anthracite and bituminous coal fields of Pennsylvania. The Baltimore and Ohio extends on north from Baltimore to Philadelphia and New York. These roads and others connect Philadelphia with New York, constituting one of the densest freight traffic routes in the United States.

Philadelphia profited from the transappalachian routes several years before New York. So long as the immediate hinterland largely determined the size of the cities, Philadelphia was the dominant city of the Middle Atlantic Littoral. Its adjacent farmlands are more extensive and are superior to those of New York. The Schuylkill River was canalized at an early date in order to bring anthracite coal (first industrial fuel) to Philadelphia's factories and homes. The short-lived Pennsylvania Canal across the Ridge and Valley province was of no commercial importance except in the sense that it blazed a route and was the forerunner of a railroad. Because of a more prosperous farming environment, and a conservative Quaker element dominant during the early days of the Commonwealth, Philadelphia seems to have lost commercial supremacy partly by inaction.

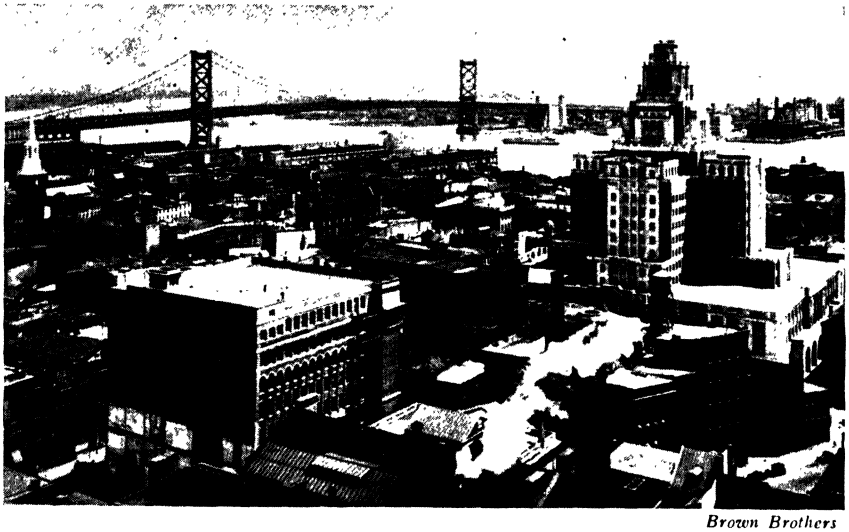
The port of Philadelphia has a 35-foot channel maintained for the approximately 88 miles to the Atlantic. With about 40 miles of waterfront in the port-area, railroads now serve about half of the 200 piers and wharves. Virtually no lighterage is required to serve the normal peacetime needs of the port. During Lend-Lease and war days the relatively rapid turnaround of freight vessels made the port attractive for high-priority commodities.

By Philadelphians this has sometimes been called the Port of Pennsylvania. An examination of its commerce leads one to conclude that the appellation is warranted. The Director of Wharves, Ferries, and Docks states that relatively more "ready-made" cargoes originate in the Philadelphia area than in any other Atlantic port city. The War Production Board described Philadelphia's industrial region as the "most concentrated" in the United States. The port is intimately related to the economy of the densely populated and industrialized counties of southeastern Pennsylvania and New Jersey.

Commerce—To an even greater degree than New York, Philadelphia is an importing port. Most of its tonnage however is coastwise domestic trade. Prominent among the imports are petroleum, copper, coal, manufactured iron, sugar, hides and skins, lumber, chemical raw materials, vegetable oils, wool, cotton, and some iron ore for transshipment. Exports through the port include locomotives, rolling stock, machine tools, refined

petroleum, scrap iron and steel, wheat, and chemicals. Rail commerce is of greater relative importance to Philadelphia than it is to New York. Few transatlantic lines serve this port directly.

Population—Philadelphia is another of the major cities of the Middle Atlantic Littoral to have lost population since 1930. Its loss was not compensated by a corresponding increase in the population of suburban cities



Brown Brothers

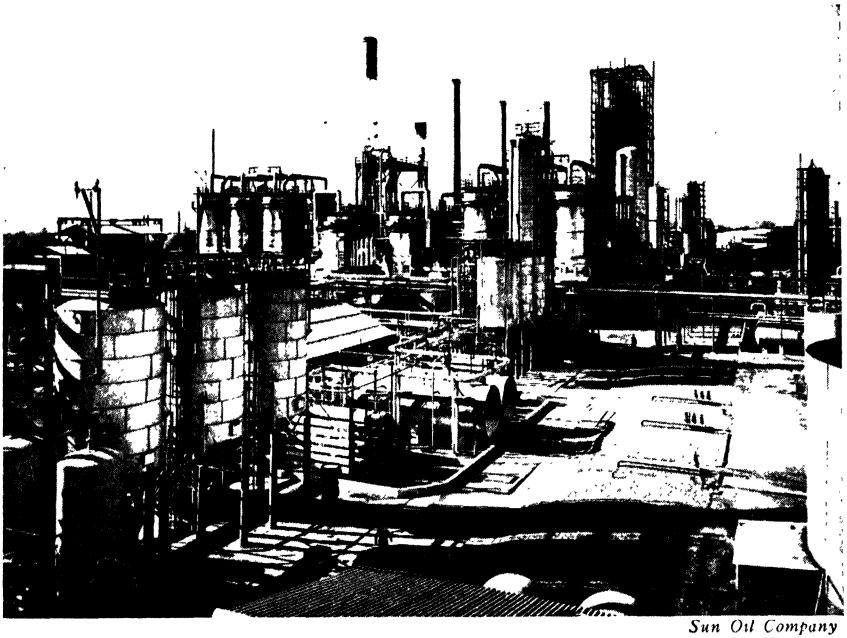
FIG. 35.—PORT OF PHILADELPHIA

This center dominates the port cities of the lower Delaware River

in the Delaware Valley. Unlike New York's satellite cities about the harbor, the cities peripheral to Philadelphia are situated along the lower valley of the Delaware River and on the plain west of the city. Camden, immediately across from Philadelphia, is a functional appendage of the larger city, and is the scene of industries seeking cheaper ground sites and of homes for relatively low-paid Philadelphia wage earners. The city in its own right is the commercial center of the famed Camden trucking district.

Down river are Chester and Wilmington both of which are important industrial cities. Likewise down stream and on the west side is Marcus Hook, an important petroleum-refining center. West and north of Philadelphia are the residential cities of Swarthmore, Villa Nova, Bryn Mawr, Haverford, Wayne, and Norristown. The only industrial city on the west is Coatesville; Lancaster and York are cities on the lowland southeast of Harrisburg. Up river from Philadelphia are Bristol and Trenton.

Many nationalities are represented in the Philadelphia area, although the proportion of foreign-born is lower than for New York. Such a small proportion of the immigrants landed at this port that it lacked the principal incentive for the formation of large foreign groups. Many foreign-born, particularly Italians, have come to work in the factories and on the fruit and vegetable farms across the Delaware River. Swedes and Germans



Sun Oil Company

FIG. 36

This great oil refinery at Marcus Hook is representative of the heavy industries which have come to the industrialized lower Delaware River.

were early arrivals and formed important groups south and north of the city.

For many years after the formation of the Commonwealth, the Quaker influence was strong in political and economic fields; their conservative principles are said to have encouraged the foundation of insurance companies, and to have discouraged the establishment of certain industries, particularly those based upon the employment of cheap imported labor; intoxicants also came in this category of suppression.

The Quaker influence has declined, proportionally, in these fields, but colleges and schools inaugurated under the auspices of this Society have remained and prospered in the Philadelphia region.

Manufactures—Philadelphia, like New York, has no representative of basic iron and steel manufacture. Steel from the Bethlehem steel district on the north, Coatesville on the west, and Baltimore on the south is fabricated into machine tools, ordnance, ships, planes, locomotives, lightweight steel trains, industrial machinery of many kinds, auto bodies, street cars, oil and sugar-refining machinery. The resulting abundance of scrap steel has been exported, mostly to Italy and Japan.

The harbor-side location has been instrumental in localizing the manufacture of cork products, linoleum, petroleum, cane sugar, copper, chocolate, soap, wool carpets, leather and chemicals. Near-by fruit and truck farms have markets in the soup and preserving industries. Tobacco from Lancaster County on the west has stimulated the making of cigars.

The first paper mill in America was built on a small creek near Philadelphia by early German settlers bringing the skill from Europe. In the series of changes in the technique of making paper, this industry has spread to other regions; there remains today an important high grade magazine and book paper industry. The great magazine and book publishing concerns in Philadelphia keep the name a household word over most of the United States.

West of Philadelphia, east and south of Harrisburg, are Lancaster and York, manufacturers of linoleum, watches and industrial machinery, and of refrigeration machinery, respectively.

Philadelphia, as well as the near-by cities, are so much smaller than New York and its satellites, that the industrial forces which have developed within the latter region are for the most part less important in accounting for changes in the nature or location of Philadelphia's manufacturing. The loss in population and the less vigorous growth in manufacturing and in commerce may cause one to speculate upon the recent spectacular increases in population and manufacturing in other parts of the country.

Baltimore—The port of Baltimore lies on the margin of the Coastal Plain and the Piedmont, about 150 miles from the Capes which mark the entrance to Chesapeake Bay. Like New York and Philadelphia, Baltimore is situated east of an important transappalachian corridor, the gap made by the Potomac River. It has no cluster of satellite cities about it; it stands alone with no urbanized railroad route between it and the cities of the lower Delaware Valley. There are two other cities on Chesapeake Bay; Norfolk is a coal-exporting port, and Newport News is a naval station; neither is closely related to Baltimore. South of these cities there is no easy access to the interior of the United States.

As with its two neighboring ports to the north, Baltimore is primarily an import port, but the preponderance of imports is even more marked in

Baltimore, being five times greater than exports. In 1940 Baltimore ranked third in total water-born commerce and second in foreign-trade tonnage. Imported raw materials constitute an impressive list and include iron ore from Chile and Cuba, copper from the Southwest and from Chile, sugar from Cuba, cork from Spain, petroleum from the Gulf Coast and Venezuela, lumber from the Pacific Northwest, nitrates from Chile, phosphates from Florida, and wheat from the interior wheat belts of the United States.

As in the instance of Philadelphia, Baltimore rose to importance before New York. It was at the eastern terminal of the Wilderness Road over

Baltimore and Ohio Railroad

FIG. 37.—PORTION OF BALTIMORE'S WATERFRONT

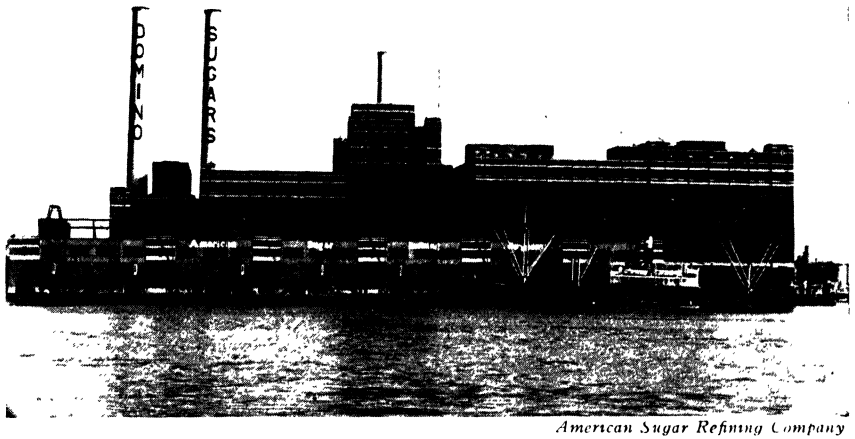
which swine and beef animals were walked from the Ohio Country to Baltimore as late as 1860. This port city is somewhat closer to the farmlands of the upper Mississippi valley than either of its rivals farther north; Baltimore has continued to handle an important commerce originating in this region. The increase in the tonnage of this port in recent decades is due in no small measure to the acquisition of large iron, steel and machinery manufacturing industries, but recent port development at New Orleans is of concern to Baltimore.

Manufactures—Despite the age and accessibility of Baltimore, its manufacturing industries are neither as diversified nor as important as those of Philadelphia. The dominant industry in Baltimore is iron and steel manufacture. It is relatively a newcomer, developed as one of the specialized units of the Bethlehem Steel Company which has markets in the ports of New York Bay, Delaware Bay, Chesapeake Bay, the Gulf Coast, and even the Pacific Coast.[7] The mills located on suburban Sparrows Point are well situated to receive half their ore from the Tofo iron mines in Chile,

[7] Company-owned shipyards at Quincy, Mass., Staten Island, N.Y., Baltimore, San Pedro (Los Angeles' port), San Francisco, and Seattle. Other shipyards, Government and private, are Portsmouth, N.H., Philadelphia, Chester, Wilmington, New Orleans, Houston, Pascagoula, Hampton Roads, Norfolk, Portland, and Tacoma.

and the minor Cuban fields; in 1939 ore imports amounted to approximately 2,000,000 tons.[8] During World War II, due to the shortage of ore boats, the company turned again to old iron workings in the Adirondack section of New York to supplement South American ores.

One of Sparrows Point's chief products is railroad rails. Railroad shops for the Chesapeake and Ohio, Baltimore and Ohio, and the Norfolk and Western are located at Baltimore and Norfolk. The enormous Martin



American Sugar Refining Company

FIG. 38.—A LARGE SUGAR REFINING PLANT, BALTIMORE

airplane plant was the largest single employer in the city during World War II. Machine shops and machine tool plants in keeping with the varied metals manufactures listed have been established there. The revival of interest in an American merchant marine may well presage a marked increase in Baltimore's steel industry and in its port activity.[9]

Foods—Most numerous of Baltimore's plants are those engaged in the preparation of food products, including flour (although most of the wheat shipped in is for export), shellfish and other sea food, vegetables and fruit, jams, jelly, marmalade, and tobacco. The embayed character of the Coastal Plain, distance from markets for fresh produce, sandy soils fit for few crops except vegetables, and abundance of cheap labor combine to make this a great fruit- and vegetable-canning district.

[8] Chilean ores may last for fifteen years. The Company has ore properties 175 miles up the Orinoco River which are reportedly to be opened in 1948.

[9] About one in five deep draft vessels arriving in Baltimore now use the Chesapeake and Delaware canal.

As with all large cities, Baltimore has important service industries. Of these the manufacture of clothing and of pharmaceuticals have become of more than local importance. The fact that Baltimore is one of two cities

Baltimore and Ohio Railroad

FIG. 39.—COAL UNLOADER, NORFOLK

in all the southern states with a population of half a million has meant that it developed into the commercial and distributing center for most of the eastern south.

Agriculture

Reference to the Rural Land-use Regions map reveals that parts of three major regions fall within this division: North Atlantic Trucking Region, Hay and Dairy Belt, and the Corn and Winter Wheat Belt. Climatically the area is favorable for all of the crops which thrive in the humid continental type of climate. For certain crops, the embayed character of the Littoral is especially favorable because of its marine influence; in the northern portion especially, embayment has increased the extent to which this moderation takes place. The sandy soils warm up earlier in the spring than the heavier clay soils on the Piedmont. Rainfall is adequate for plant growth at all seasons, with a slight summer maximum. The attenuated nature of this region has resulted in a whole sequence in growing seasons, beginning with the southern end and progressing northward at a rate of perhaps 15 miles a day. This results in a series of exporting centers, each depending upon its earlier harvest for good prices in the markets of the large cities farther north.

Soils—The region is practically coextensive with the northern Coastal Plain province. The soils are therefore varied; one quality they have in common is their poverty. Farmers are obliged to be lavish with commercial fertilizers if a profitable yield is to be obtained; only in the Cotton Belt farther south is there a similar dependence upon commercial fertilizer. The soils are generally sandy to sandy loam, but many areas have drainage too poor for crops. It has been stated that these soils contribute the mechanical but not the physiological functions of soil; that is to say, they hold the plants and supply the medium for artificial plant feeding. They are poor pasture soils; a mere 3 per cent of the area is in pasture. Livestock is not an integral part of the farm economy and there is a resultant loss in soil enrichment.

Although soils are for the most part poor to fair, certain districts have some of the most fertile soil to be found in the entire Middle Atlantic states. One of the good soil districts is the limestone region of southeastern Pennsylvania, another is the clay marl belt extending northeast-southwest across central New Jersey. The high rank of the agriculture in this region is due in large part to the more favorable soil condition.

Agricultural Districts

Southeastern Pennsylvania—Diversity characterizes the relief and the soils of southeastern Pennsylvania. The small landscapes pertain as well to the agricultural scene. Despite this diversity, the southeastern counties

have better soil for the most part, and more gentle slopes than any other section of the Middle Atlantic states. Perhaps the most significant environmental factor is the accessibility of the area; a network of railroads and highways focuses upon the port of Philadelphia from all parts of eastern Pennsylvania and gives to these rolling lands urban markets rivaled by no other area.

Careful farming practices are associated with this district; the Chester Valley has long been a region of good farming and, for many years, of dominant Quaker influence. In York and Lancaster valleys the so-called "Pennsylvania Dutch" have likewise a reputation for scrupulous attention to their farms.[10] With the possible exception of Chester Valley, these southeastern counties must be regarded as diversified agriculture: hay, corn, wheat, oats and an accompanying livestock economy. Tobacco fits into the agricultural economy, particularly in Lancaster County. Wherever there are hills, there probably will be apples. Potatoes and nursery products are prominent in the York Valley. Half or more of the nation's mushrooms are produced in the Chester Valley. Many nurseries have become national concerns. The chief cash product of the region is milk; virtually all of it is marketed as fluid milk.

For all of this dairying region, whether on good or on poor land, there is a stability born of the tendency to form the so-called milk "sheds." These fresh milk producing districts become fixed by the laws of their city market and by the limitations upon the economical shipments of fresh milk. Although some of these milk sheds overlap (that is to say, neighboring farmers may ship to different markets regularly) it appears that the fortunes of individual dairy farmers are determined by the conditions of employment and purchasing power in their particular city market. The nearness to other cities, so common to most of the industrial Northeastern states, infrequently serves to prevent depressions. Probably in no other farm product has this provincial character of supply been so marked, although in fresh vegetables, flowers and some fruits the same type of localization may be noted. By and large the dairy farmers have, by organization, so stabilized their market as to set them apart from the farmers producing farm

[10] Since 1720 a quarter of Pennsylvania's ten thousand Amish farmers have lived in and near Lancaster county, in such communities as Bird-in-Hand, Smoketown, and Blue Ball. Their farms are characterized by the dominance of diversity of crops, and by large barns and other farm buildings indicative of livestock. The Amish farmer has built up in two hundred years an impregnable farm economy based on the simplest formula: feed the family, feed the stock, and sell the rest. The effect of such a program is evidenced both in the people and the land. In 1939 two hundred acres of this land sold for $59,000. Amish farms are seldom for sale at any price. A large part of this prosperous "Dutch" farming country borders the rolling land of the Piedmont on the north and west. It is a more gently rolling and more fertile lowland known as the Triassic Lowland.

crops exclusively. Although they are common to most parts of the United States, these Middle Atlantic milk sheds are most complex in the areas tributary to New York, Philadelphia, Baltimore, and Washington.

The investment represented in the large herds and in the buildings and machinery essential to their maintenance, the more exacting demands in handling, bottling, and transportation, and the year-round duties involved make these dairy specialists men of business. These farmers and the landscapes they have built up are in sharp contrast with many of the specialized truck districts on the North Atlantic Coastal Plain to the east; although where poultry has become a specialty, certain of these qualities are attained. Probably the greatest contrast is in the nature of the wage earners employed to do the work. The truck regions have an economy largely dependent upon the availability of migratory labor.

Middle Atlantic Trucking Region—Immediately east of the southeastern Pennsylvania section is the smallest of all major agricultural regions in the eastern United States. More or less continuously from the Connecticut Valley to the Carolinas, this trucking region follows its attenuated way; nowhere is it more than fifty miles in width, and in the deeply embayed northern portion, it is quite narrow. The name is almost a misnomer, since more than half of the region is still in scrub forest or brush, about 40 per cent is in farms, and perhaps 15 per cent in crops of all kinds. Despite the inclusion of districts which are very highly specialized, the cropped region as a whole is best described as mixed farming, about one-fifth the cropped acreage and half the value of all crops consisting of vegetables including potatoes, and fruit. In no other major agricultural region of Eastern United States does the same high proportion of truck and fruit obtain; in only three other major regions is there as small a proportion of cultivated fields to total land.

Camden District—Lying on the narrow Inner Lowland of central New Jersey, across the Delaware River from the Piedmont dairy region, is the famed Camden Region, largest truck grower of the North Atlantic Coastal Plain. For a distance of fifty miles, this narrow clay marl lowland is given over to the production of vegetables and small fruit. It is more uniformly cropped than similar districts to the south in Delaware and in eastern Maryland. The smooth expanse of the Coastal Plain north and south from Camden is as intensively farmed as any in the nation. Fertilizer, hand labor, and advanced marketing practices are lavished on these farm products. General farming and dairying preceded truck growing as specialties on this clay marl belt; but of the two former types of farming there are relatively few remnants left today. The rise of population centers suburban to Philadelphia has also enabled truck specialization to displace dairying as the principal source of income. The moderately hilly lands of the northern

Piedmont with their heavier soils have become the dairy districts. Canning plants have been established in Camden and other south-central Jersey towns to care for the surplus vegetables and fruit from these specialists.

East of the intensively farmed acres is the pine belt of waste land, twice cut over and today of slight value except where cranberry bogs have made islands of profitable greenness among the pine trees. In the cranberry and in the truck and fruit farms, the proportion of foreign-born laborers is particularly high.

Tri-State District—Delaware, eastern Maryland and Virginia share the Coastal Plain farther south and share also the fruit and vegetable industry. The so-called Eastern Shore counties have not been able to dispose of such a large proportion of their crops to urban markets as their northern neighbors; more must be canned. Baltimore canning plants rank first in the nation for this type of food product. To a greater extent than in the Inner Lowland of New Jersey, sweet potatoes and white potatoes are grown. Until recently the Washington market was smaller than that of Baltimore; now it is somewhat larger. The embayed character of the Eastern Shore country has kept boat transportation dominant. Several counties here have no railroad. Many of the customs of the inhabitants are indicative of the isolation which is due to the embayed character of shore line and the many interior swamps.

The Future—The larger part of the Coastal Plain is not cropped. Similar soils and climate have accommodated the dairy industry of the Low Countries in Europe. However, before such a transformation is possible on the Middle Atlantic Coastal Plain, the pressure of population upon the land resources of this extensive region must be much greater than is now believed likely.

The trends in agriculture in this country since World War I appear to be especially significant to the future of agriculture in the North Atlantic plain. Under Federal guidance the national production of vegetables for canning has increased 30 per cent, the number of milch cows 25 per cent, peanuts have increased 300 per cent, surpassing the acreage of rye. Soybeans have increased from 169,000 acres in 1918 to 14,241,000 acres in 1942. On the other hand corn and wheat acreage has declined 14 per cent, and cotton has declined 39 per cent since 1926.

Summary—The Middle Atlantic Littoral is a commercial region par excellence. Even in a country where geographic specialization has been carried farther than in any other nation, the commercial dominance of the New York–Philadelphia–Baltimore region is unique. It supports an important local agriculture, but the cities did not develop as economic centers of an agricultural area. Some of its important industries are engaged in processing an agricultural surplus, but much of the farm produce

comes in from other regions. Wasteland and noncommercial agriculture exist within a few miles of the most highly commercial farmlands in the nation, within sight of railroads bringing from midcontinent farms the raw materials for these great urban markets. The densest rural population in the United States may be found in the southeastern counties of Pennsylvania, yet the term "factories in the field" is aply used to denote dependence upon non-resident farm labor in the Camden district just across the river.

No section in America outranks the Middle Atlantic Littoral in industrial importance, yet only one of the largest cities has gained in population within the past quarter century. Few industrial centers move their necessary raw materials such great distances. Perhaps nowhere else has industry become so highly specialized while at the same time, offering such a comprehensive variety of factory products. The experience of World War II showed a curious inability on the part of these factories to convert for war production, owing largely to specialization.

The nation's major commercial region remains the greatest industrial region as well. The assurance of this prime position in commerce is greater than in manufacturing, however. Events of the period between two world wars, the five-year plan for industry during the Second World War, and thus far in the postwar period indicate that the increase in manufacturing activity in the Middle Atlantic Littoral is at a decreasing rate.

IX

APPALACHIAN HIGHLANDS

Appalachian Highlands—Situation—The Appalachian Highlands form the major part of a great hill-and-mountain province extending southwestward from the St. Lawrence Valley to Alabama and westward from the Atlantic Littoral to the Interior Lowland. For more than a century this

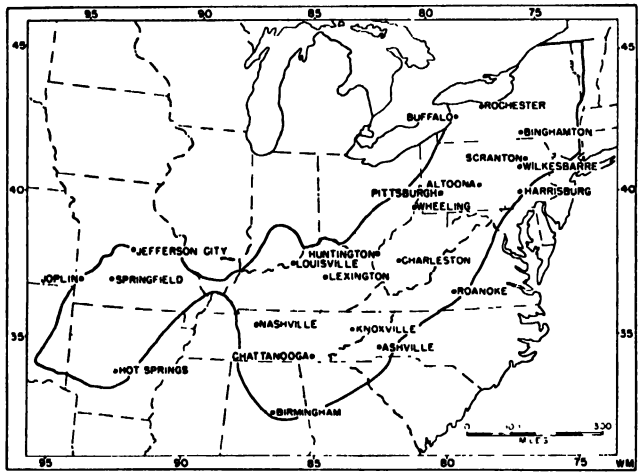


FIG. 40.—THE APPALACHIAN HIGHLANDS AND THE CENTRAL HIGHLANDS

highland province held back the settlement of the interior of the continent. When settlers finally moved into the Middle Western Plains, the passes through the barrier profoundly influenced the pattern of settlement.

Geologically the Appalachian Highlands include the uplands of New England, which have been discussed elsewhere, and the highlands of maritime Canada, which will be treated later. The Adirondacks, considered by some to be an outpost of the Laurentian Upland are included here as a subdivision of the Appalachian System. Farther southward the Appalachians consist of two major divisions commonly referred to as the Older and the Newer Appalachians. The Older Appalachians consist of the Pied-

mont and the Blue Ridge. The Piedmont Upland because of its economic relationship to the South Atlantic Coastal Plain is reserved for later treatment. The Newer Appalachians consist of the Ridge and Valley province and the Appalachian Plateaus. These several sections, each with a high degree of uniformity in the character of the land features, collectively make up the Appalachian System or the Eastern Highlands of Anglo-America.

Adirondacks—The Adirondack province is a highland of from 1,000 to 2,000 feet in elevation, with a mountainous eastern front where individual peaks reach 5,000 feet. The descent to the Champlain-Hudson lowland on the east is abrupt; but toward the St. Lawrence Lowland on the northwest and the Mohawk Lowland on the south the decline is more gentle.

Many lakes and the remnants of lakes dot the hilly surface of this glaciated upland. Population is sparse, perhaps five persons per square mile. The fact that this "island" of rugged terrain and many lakes is accessible to large urban centers has made it possible for the cut-over timberland to experience a seasonal rejuvenation in carrying power by the sale of its climate and scenery to the tourists.

Blue Ridge—The Blue Ridge province is a mountain belt lying between the Ridge and Valley and the Piedmont. Beginning with the Carlisle Prong in southeastern Pennsylvania, the Blue Ridge is approximately twenty miles in width; in central Virginia where the gap of the Roanoke River separates it from the main block of the province, it is 70 miles wide. North of the Roanoke, the term Blue Ridge is very suggestive of its physical appearance, but south of the river only the eastern portion of the province bears the name and appearance of Blue Ridge. Immediately west lie the higher and more rugged mountain groups: the Great Smokies and the Unakas. The mountains terminate in northern Georgia, beyond which the Piedmont borders the Ridge and Valley province for a distance of two hundred miles. In eastern Pennsylvania the Reading Prong, an extension of the New England Upland, fails to meet the northern end of the Blue Ridge and thus leaves open a wide gateway to the Ridge and Valley province.

Ridge and Valley—Immediately west of the Blue Ridge, and extending from the Hudson Valley to central Alabama, is the Ridge and Valley province. It is not one great physiographic region in the sense that all parts of it are essentially uniform. It was developed upon sedimentary rocks which were folded against the western flanks of the Older Appalachians. Through a long period of erosion of these folded strata the present series of parallel ridges and valleys was developed, hence the name, Ridge and Valley province. Although elevations are nowhere great, the steep slopes common to most ridges render this section a barrier to commerce.

There is enough differentiation in the ridges and valleys throughout this very attenuated province to warrant subdivision into northern, middle and southern sections. The north or Champlain-Hudson section differs from the others in its minor extent and paucity of ridges. It has no streams to give it accessibility to the east. The Mohawk Lowland, the most northerly of the major transappalachian routes, is one of the major gateways to the west.

The middle or Pennsylvania section has fairly uniform cigar-shaped ridges and valleys, with a much larger valley along the eastern margin. There is a hiatus in the eastern mountain wall of this valley in Pennsylvania where it is breached by a nearly level plain between Reading and Harrisburg. This section has much greater accessibility to the Atlantic seaboard than the portions to the north and to the south. Appalachian drainage focuses upon this portion of the Ridge and Valley province virtually all of the commerce between the Middle Atlantic port cities and the Middle Western Plains.

The southern and largest subdivision of this province has smaller valleys, a larger proportion of the surface in ridges, and the large eastern valley is interrupted with numerous ridges. It is less accessible from the east and west than the other two sections.

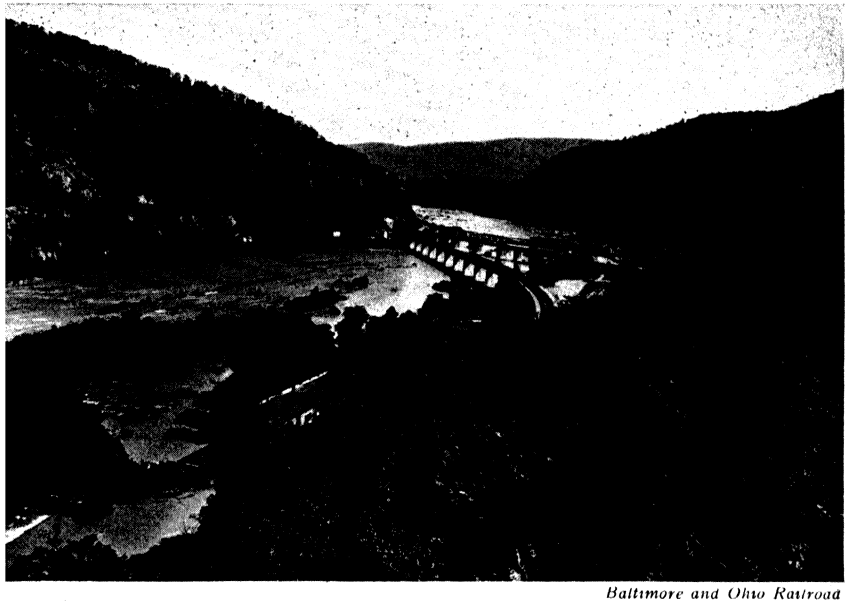
The eastern portion of this province, from the Hudson Valley to central Alabama, is a series of connected valleys, from ten to twenty miles wide and over a thousand miles in length, known collectively as the Great Appalachian Valley. It was long the principal corridor between the northeastern and southeastern states. Thousands of people came into Kentucky and Tennessee by way of the Valley and the Cumberland Gap near the Kentucky-Tennessee border. There are no other important gaps through the western Appalachians between this gap and Wills Creek in Maryland; there is none south of it. Many portions of the Great Valley are best known by names taken from streams which follow the valley for part of their courses, such as the Shenandoah, the Roanoke, the Coosa and others.

Appalachian Plateaus—West of the Ridge and Valley province lie the extensive Appalachian Plateaus. Bounded on the north by the Mohawk Lowland and the Ontario Lake Plain, on the west by the Middle Western Plains and the Central Highland, this great region offers much diversity within its expanse of hill country. The northern portion was glaciated, and as a consequence the hills and valleys are more broadly sweeping than they are farther south. Isolation here is not so general as farther south; the rather sparse rural population maintains a fairly prosperous agriculture.

The central and southern portions were not glaciated. Streams have

carved an intricate pattern of narrow, steep-sided valleys in the Plateau. On these slope lands and the limited areas of flat land an agriculture has been developed that is little above the subsistence level. No part of the Eastern Highland is more isolated than sections of the Cumberland Plateau.

Major Drainage Features—The rivers of the northern Appalachians rise in the Adirondacks and the Appalachian Plateau and flow across the Ridge and Valley province to the Middle Atlantic. In the central section



Baltimore and Ohio Railroad

FIG. 41.—HARPER'S FERRY AT THE POTOMAC GAP

of the highlands the streams rise at or near the Allegheny Front, the eastern margin of the Appalachian Plateau. South of the Roanoke the major stream is the Tennessee which has its source in the Blue Ridge and flows westward across the Ridge and Valley province and the Cumberland Plateau and eventually discharges into the Ohio. This arrangement of the major drainage lines in relation to the physiographic provinces was at the time of settlement a very important factor in facilitating the movement of the pioneers along the water courses and the fertile valleys. The transappalachian migration was in its early stages a movement southwestward along the Great Valley and across the western ridges and the Cumberland Plateau to the fertile lowlands of Tennessee and Kentucky. Along

the main routes of travel isolation was largely dispelled, but the more inaccessible sections of the highland have become the repository of cultural and economic customs dating from an early day.

Forest Industries

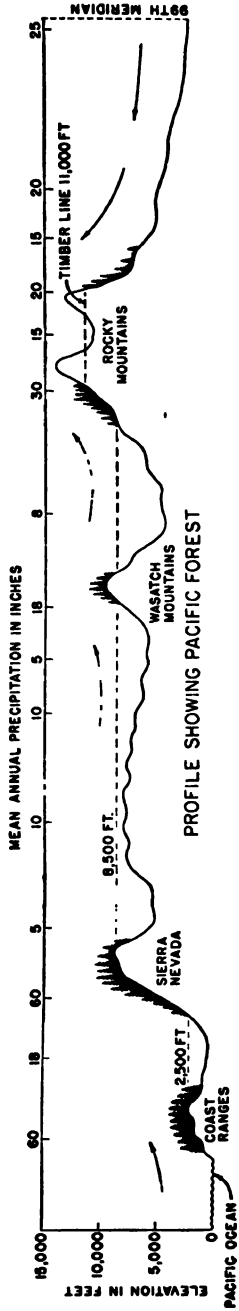
The Northern Forest—The Adirondacks have been intimately related to the forest industries of the northeastern part of the United States. They shared with New England the spruce, balsam, fir, and white pine forest. The division between northern and southern types of Appalachian forest is in Pennsylvania; north of this boundary grew birch, beech, maple, and hemlock, generally on the medium elevations and better-drained soils. Although the forest economy of the Adirondacks and northern Appalachian Plateau is a thing of the past, about half of the land is classed as woodland. The proportion is slowly increasing at the expense of submarginal farm land.

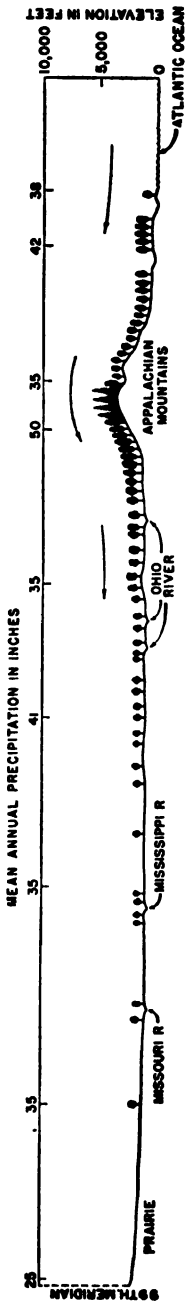
The only considerable forest area is in northern Pennsylvania where state forests occupy about half of the most rugged of all parts of the northern Appalachian Plateau. Extensions of this large forest area cross the Ridge and Valley province into Maryland. There is virtually no permanent occupancy of these woodlands. Fishing in the spring and summer, and hunting in the autumn have enticed many tourists into the area; Pennsylvania issues as many hunting licenses as any other state. Isolation precludes the possibility of developing the profitable part-time agriculture characteristic of the New England woodlands.

Commercial Lumbering—Although commercial lumbering in the Adirondacks and the northern Appalachians closely followed that of New England, the character of the industry and the role it played in the development of the region are in contrast. Large-scale commercial lumbering began just before the middle of the nineteenth century, but instead of the industry following the excellent stand of trees southward along the Appalachians, it moved from Pennsylvania to the Lake States. The advent of the railroad meant that transportation costs, not distances alone, determined the priority of lumbering regions in the United States. The lumberman followed the rails and the center of population rather than the continuous stand of good saw timber. However, by the end of the century, the southward advance along the Appalachians had begun.

The first clearings were for agriculture in eastern Pennsylvania and central and southern New York. Last to go were the forests of the Adirondacks, Catskills, and less accessible slopes of western Pennsylvania.

Although lumbering was generally a prelude to farming in the Eastern Highlands, there were exceptions. In some places farming was impossible. In early times charcoal for iron furnaces drew heavily on local wood,





U.S. Department of Agriculture

FIG. 42.—FOREST PROFILE IN THE UNITED STATES

particularly in eastern Pennsylvania. Later, timbers for the expanding coal-mining industry made demands upon these forests. By 1870 the commercial cutting of white pine in New York and Pennsylvania was at its height; a little later spruce reached its peak. Last to go was the pulpwood industry of the Adirondacks. Abandoned lumber towns, abandoned power sites with their mills, and an atmosphere of desolation characterize many districts of the western Adirondacks and the plateau to the west.

Nevertheless, in some districts the wood-products industry remains the important source of livelihood. Charcoal burning, cutting of timbers for coal mines, and for the State Highway department, and the manufacture of containers and of toys are forms of the industry in the upper Susquehanna Valley and the Adirondacks.

Southern Forest—This mountainous belt is in effect a peninsula of northeastern climate and hardwood forest extending deep into the south. Because of its nearness to large cities, parts of it have become recreation lands. Agricultural communities have developed in small mountain valleys of the southern section of the Blue Ridge province. These valleys or "coves" are more or less self-sufficing farming communities, with small wood-working industries in a number of places.

In nearly all parts of the Appalachian Highlands, except the industrialized valleys of western Pennsylvania and eastern Ohio, and the numerous arable valleys throughout the Ridge and Valley and Plateau provinces, the proportion of cash income from forest products has always been important to these hill farmers. In the less accessible sections there still remains an important stand of hardwood, but in the main, reliance must be increasingly upon the areas under public control. In every state sharing the Appalachians, there are thousands of acres of state or national forestland. More is being added every year.

The programs for public recreation, flood control and soil erosion have contributed to this end. Largest of these programs to halt despoliation is the Tennessee Valley Authority; newest of the larger projects is the Muskingum Watershed Conservancy Project in eastern Ohio. The effect of the war and of strikes in the soft coal industry has been to increase the proportion of strip mining. Public concern over this method has aroused some local interest in reforestation. It is conceivable that reforestation may receive further impetus from this practice.

Mineral Industries

Coal Mining—The Appalachian Highlands are the greatest storehouse of high-grade coal in the United States; they contain probably 85 per cent of the good coal in the nation. The Appalachians embrace the anthracite

fields of northeastern Pennsylvania and the bituminous fields extending along the Plateaus from northern Pennsylvania to central Alabama. Coal mining is not one of the industrial "first families" of the United States; there was no commercial mining of coal during colonial times. It was not until after the turn of the nineteenth century that domestic and industrial needs gave rise to coal mining of even local importance. Today the coal problem is intimately associated with hundreds of bituminous and dozens of anthracite mines of the Appalachian Highlands.

Two main factors retarded the early development of coal mining in eastern United States: the coal mining districts everywhere lie two hundred miles or more from tidewater, and the terrain is such as to make the mining and export of the coal expensive. Again, Eastern United States offered a great stand of timber and an abundance of water power sites. Together, these substitutes for coal served to retard commercial coal mining. The physical presence of coal did not then, and does not now, determine its usefulness to man in that vicinity. In its subsequent development as an industry, the delivered price of coal determined which of the mining districts got the business.

Labor has never been cheap in the United States. Every economic activity therefore has been scrutinized to the end that a machine or a method may be devised to lower the cost of production, whether in the field or in the factory. The use of machines in bringing the American continent into production has promoted coal as the chief fuel for the manufacture of labor-saving machines and subsequently as the principal source of power for their motivation.

The development of the coal mining industry in the Appalachian Highlands has had three main periods: (1) the rise and partial decline of the anthracite fields; (2) the rise of the northern bituminous field, and (3) the rise of the southern bituminous fields. With each of these three periods some part of the Appalachian Highland has been directly concerned. In the United States, anthracite was the first major industrial fuel. This was primarily due to the location of the anthracite fields in northeastern Pennsylvania, near the center of the iron industry. Despite its limited mining area, anthracite was the dominant industrial fuel until after the Civil War. Since then its use in manufacturing has declined. Since 1924 the use of anthracite has declined generally.[1]

[1] In 1917 there were 99,611,811 net tons mined; in 1940, 51,484,640 tons, including shaft, strip mines, and river dredging; does not include bootleg coal.

New England imported 11,679,000 tons in 1917; in 1940, 4,802,000 tons.

In 1914 there were 179,679 anthracite miners; in 1940, 91,313.

Annual supply of energy from mineral fuels and water: bituminous coal 11,875, oil and gas 11,239, water 2,620, anthracite coal 1,361 (in trillions of B.t.u.). Source: *Minerals Yearbook*, 1940.

Anthracite Coal Mining Districts—Anthracite deposits are worked from four major coal fields in Lackawanna, Luzerne, Carbon, Schuylkill, and Northumberland counties in northeastern Pennsylvania's Ridge and Valley province. If all four coal mining districts were brought together the combined area would be about twenty by twenty-four miles square, as against thousands of square miles of bituminous deposits farther west. But it is not from areal extent alone that the importance of this mining industry is derived. These are the only important anthracite fields in the United States. They are situated close to the millions of homes in large eastern cities where the smokeless, sootless and slow-burning qualities of anthracite have made it the ideal domestic fuel. For a long time the owners have enjoyed what they believed to be a virtual monopoly, protected in many cities by legislation against excessive smoke.

The mining industries which have developed in this coal region are very different from those in the bituminous areas. Anthracite deposits average much deeper underground than bituminous, and the preparation of the coal for market is infinitely more exacting and expensive. The greater amount of capital needed to bring these deposits under production has always curtailed widespread ownership; probably 75 per cent of the coal rests in the hands of not more than ten companies.

The restricted deposits of anthracite coal were conducive to the unionization of the miners, with the result that, for nearly forty years, the buying public has been critical of the interrupted supply and inferior quality of the coal. Today there is the anomaly of the anthracite regions lying inactive in many parts, in spite of the high favor this coal has always enjoyed. Because of its being closely held, anthracite has not manifested one of the characteristics of a declining market: prices have not declined materially.

From what has been said, it will not appear strange that, although the bituminous tonnage is five times that of anthracite, the consumption of the former by industrial plants is perhaps twenty times that of the anthracite. Only in the industrial periphery of the mining districts and along certain of the anthracite railroads are the industrial consumers of this coal still found.[2]

In spite of its century of activity and the estimated second century of productivity ahead of it, the anthracite mining districts appear to have only a fairly bright future. This is due in part to the diminishing returns from mining. The other is a consequence of the nature of the geologic setting of the industry.

The depth of mining operations has greatly increased; less accessible

[2] According to the United States Coal Commission Report, the distribution of total anthracite domestic sales in 1927 was as follows: Middle Atlantic states, 60.44 per cent; New England, 17.90 per cent; Central states, 8.64 per cent; all others, 13.3 per cent.

coal has been worked. Coal pillars of the mine have been robbed. The use of ventilating, pumping, lifting and mining machinery has been necessary; the output per miner has declined, despite these mechanical aids.[3] The increase in the number of apartment dwellers and of central heating plants, the electrification of industry and the railroads, and the vigorous strides made by competing fuels have aroused anxiety in the anthracite industry. Expressions of this may be noted in several closed mines, stagnation of many of the anthracite towns and prostration of a few of them, and diminished railroad traffic with its attendant unemployment.

Anthracite Landscape—But what of the anthracite landscape itself? What changes are apparent in the folded mountain country in which the anthracite is mined? It has been described as an abandoned countryside by one student of the conditions there.

> Years ago someone with imagination surveyed the wild and gloomy region of Pennsylvania's anthracite district and said that if one stood on the crest of the Alleghenies and looked eastward, he might not see hills and valleys, but long rolling breakers of stony surf, petrified waves a thousand feet high. In the trough of one of these waves lies the coal-mining town of Shenandoah—a town that reflects the rise, power, and decline of a great industry.
>
> The traveler looking down from Bear Ridge can see a large hummock thrown up on the valley floor; Shenandoah is on the hummock. The houses are huddled and crowded together, the roofs close, sloping gradually to a rounded peak at the top of the hummock, with only the Latin crosses and the bulbous Greek domes rising above the town.
>
> A blackened colliery can be seen, shut down. On the right is another great colliery, also closed down, with a thousand window lights smashed, the dark mountains of culm behind it; it is a wild ruin. There isn't a light or puff of smoke. The great stacks are rusted, the engine room is shut up. On the railroad spur which runs to the breaker are empty cars, the rails are rusted.
>
> From the north end of the town, where the mountain rises abruptly once more, the picture is complete. There is the town on its hummock; away overhead is the road which climbs Bear Ridge and winds through the little coal towns, over the hills, to the county seat, Pottsville. Below on every hand are the collieries and toward the southeast, the huge new St. Nicholas breaker. In and out, crisscross, all over the valley, thread the railroad tracks—Lehigh Valley, Pennsylvania, and the Reading.
>
> Aside from some packing plants and a shirt factory or two, established when factory labor laws drove the business away from New York, there is no industry here except coal. It is coal that makes this town live and breathe. Stand in any street and look down upon it, the sole prospect is coal.

[3] Average output per man per day worked (Short tons)

YEAR	ANTHRACITE	BITUMINOUS
1895	2.07	2.90
1905	2.18	3.24
1915	2.19	3.91 (From U.S. Bureau of
1924	2.00	4.56 Mines, Department of
1928	2.17	4.73 Commerce)

Who were the miners? They were all native-born Americans in the beginning, but the demand for skilled men became so intense that English and Welsh miners came over in great numbers. On their heels after the potato famine of '47 came the Irish, young, hardy, truculent. And so Shenandoah lived in the taut atmosphere of Deadwood or Virginia City during the gold rush, as these intensely individualistic miners came together after working hours. The first strike in coal occurred near Shenandoah in 1842. The Slavs came from the early '80's on, and absorbed all that they found. But the racial bitterness did not make organized labor impossible in 1900. To look at Shenandoah now is like looking at a great stratified cliff, with layer upon layer of races and bloods laid down by successive waves of immigration. Viewed chronologically, this cliff shows at the bottom a layer of English, Welsh, and German stocks. Next above comes a broad belt of Irish; and on the top a huge stratum of Russians, Poles, Lithuanians and their descendants, the bulk of the town. Sprinkled upon this sedimentary formation are a few Spanish and Portuguese, the last arrivals of all.

The miners are now beset by the greatest problem of all—decline in the anthracite coal industry. Mechanization and strip mining have added to the number of jobless miners. From a production of 90 million tons in 1925, it fell to 73 million tons in four years. By 1935 it had fallen to 51 million tons, about where it stood in 1890. Where there were 175,000 miners in 1920, in 1935 there were but 100,000. There has never been at any time steady work in these mines; often a miner could work but half the days in a year, and of recent years, this average has fallen considerably. Shenandoah has lost 3,000 of its 24,000 population since 1920.

It is this state of affairs which accounts for the thousands of crude shafts and miniature coal mines of the anthracite bootleggers which have dotted the hillsides of Schuylkill County in the past five years. A half-dozen men or less, with jerry-built equipment, mine these little holes for coal on company land. Truckers carry it away to the cities for sale.[4]

Bituminous Coal Mining—The anthracite coal industry is unique to the ridges and valleys of eastern Pennsylvania. It is a resource shared only to a minor degree by Colorado. But bituminous coal mining is carried on under varying circumstances in many states. As an industry it is fully five times as important as the anthracite industry. Unlike anthracite, bituminous coal is an important raw material for industrial uses; the products made from coal number in the hundreds. Bituminous coal is mined in the Appalachian Plateaus from northern Pennsylvania to central Alabama. It is mined under every conceivable condition: large mines and small mines, mechanized and manual, private and corporation-owned, union and non-union.

The flat-lying strata of the Plateaus have been deeply and intricately dissected by streams over a very long period of time. No part of the upland is undrained. While erosion has carried away great quantities of coal, it has at the same time rendered the coal seams more accessible to the miner. Railroads follow the more important of these winding valleys

[4] Reprinted by permission of the publisher from *Five Cities* by George Leighton, New York, Harper & Brothers.

through the Plateaus; it will be recalled that the mountains lie athwart the principal east-west trade routes between the Atlantic coastal cities and heart of the continent.

Unlike the coal mining landscapes of the anthracite districts, the coal economy of the Pennsylvanian field is not everywhere apparent. Frequently the mines are tucked away in the numerous valleys, where access to the coal and its subsequent transportation are facilitated.

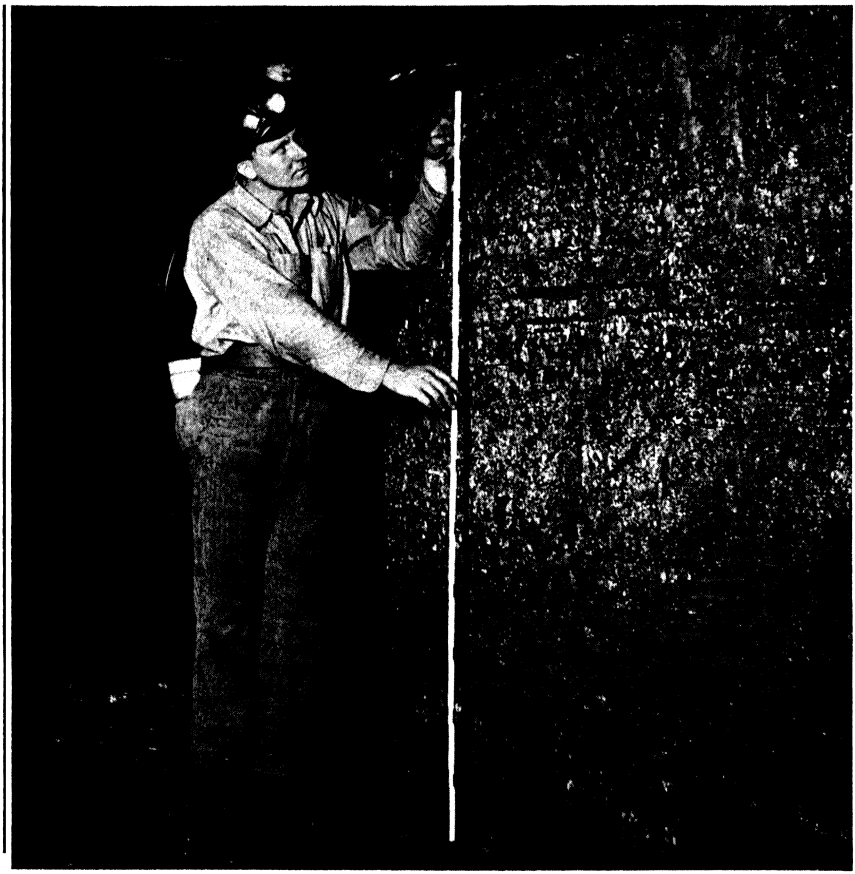
Allegheny Coal Field—The most important coal mining district is the Allegheny field of western Pennsylvania, eastern Ohio, and northern West Virginia. Seams average seven feet of mineable coal and are generally thicker in the east and south. In this portion of the Allegheny Plateau rivers have dissected the upland so completely as to make these coal seams accessible to the miner and to facilitate export to other regions. The quantity, quality, and accessibility of this bituminous coal have had incalculable effect upon the economic development of the United States. The Ohio River with its north-flowing tributaries, Monongahela, Youghiogheny, and Kanawha afforded economical transportation of coal from western Pennsylvania and northern West Virginia, toward the Lower Lake cities. South of Pittsburgh in the vicinity of Connellsville, the coking quality of a particular seam gave it more than local importance during the days of bee-hive ovens for coke making. The export of this coal to neighboring coal-mining states testified to its continuing desirability, long after the by-product method of coke manufacture supplanted the oven.[5]

The outstanding development of the Allegheny coal field has been its industrialization. Manufacturing cities are strung along the railroads which cross the Plateau. Between Lake Erie and Pittsburgh, the manufacture of steel has become especially important. Industrial landscapes which have developed here are overwhelmingly those of heavy industry. Prominent among these industries based upon heat and power are primary iron and steel, clay, glass, oil refining, aluminum manufacture, and industrial chemicals. The great number of urban centers have promoted the manufacture of many kinds of commodities which are attracted by markets or cheap labor. Heat and power industries invariably attract other industries which utilize their by-products and process their semimanufactures.

West Virginia Field—About 150 miles south of the Allegheny field lies the second important bituminous coal mining area of the Appalachian Plateau, the West Virginia field. On the eastern side of this coal mining area lie the New River and Pocahontas fields, famous for smokeless coals of high heating value. To the west lie the Kanawha, Tug, and Logan fields,

[5] During World War II these old bee-hive ovens were reopened as fast as they could be reconditioned. In some instances this involved evicting families who had taken up their abode in them.

likewise of high quality. Since there is no industrial development in this region comparable to that in the Pittsburgh area, most of the coal mined here is exported to other states. The great coal routes from this field cross



Baltimore and Ohio Railroad

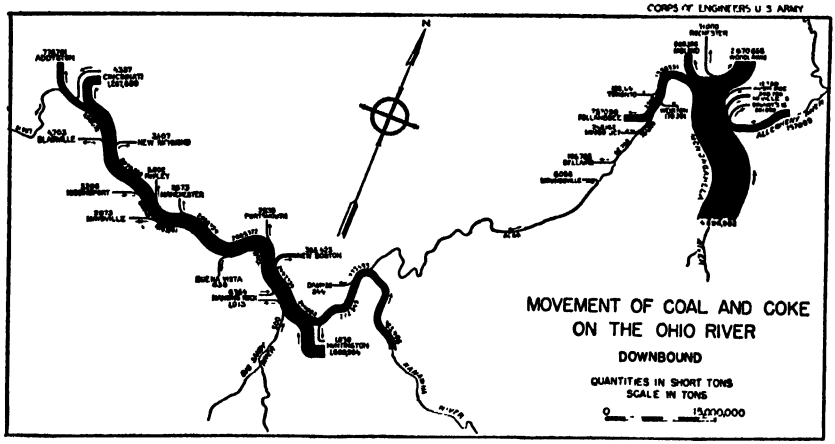
FIG. 43. [illegible]

Ohio to Lower Lake cities and from there the coal is widely distributed by water to the east, north, and west.[6]

[6] BITUMINOUS COAL SHIPMENTS BY PORTS FROM LAKE ERIE

	1944 (NET TONS)
Buffalo	869,454
Erie	1,718,292
Conneaut	2,190,443
Ashtabula	5,152,376
Fairport	1,793,962
Cleveland	1,315,624

Shifts in Mining—Important shifts in mining have occurred in these two fields. In the Pennsylvania field during recent decades there has been an increase in the amount of coal mined in the Allegheny Valley, and a decline in the Monongahela Valley to the south. A more important change has centered around the production of coal for export to the cities of the Great Lakes region. This has involved about 30 million tons of coal each year, shipped north to Michigan, Wisconsin, Minnesota, and the Dakotas.



Modified from Transportation on the Mississippi and Ohio Rivers, Corps of Engineers, U.S.A

FIG. 11

Lower mining costs and a freight differential have caused this coal to come from mines south of the industrialized northern Appalachian region.

Landscapes—Settlement throughout most of the Appalachian fields is on a very different pattern from that in the anthracite country with its parallel valleys and ridges. The bituminous mines are generally smaller and very much more numerous. The coal is much more accessible to the miner and to markets outside, due in part to the stream dissection of the plateau and in part to the absence of folding and of faulting so common

BITUMINOUS COAL SHIPMENTS (*Continued*)

Lorain	2,748,217
Huron	512,392
Sandusky	14,246,565
Toledo	23,134,006

DESTINATION OF LAKE ERIE COAL SHIPMENTS, 1944

Canadian ports	22.6 per cent
Lake Superior ports	20.2 "
Lake Michigan ports	28. "
Lower river ports	17. "
Other Lake Erie ports	6.8 "

Source: *Lake Carriers' Association*, 1945

to the anthracite region. A bituminous mining community presents a minimum of structures above ground, since there is so much less processing of the coal necessary before marketing. Bootleg mines are obviously out of the question in an industry where there are so many thousands of different properties.

Problem—The problems of the bituminous coal mining industry have received much publicity in recent years. In an earlier section reference was made to the anthracite-mining problem: an industry with a declining market. The bituminous problem is quite the reverse. What then is the trouble with the bituminous coal mining industry?

> I doubt if any other question about industry can be put in this country to which the reply will come back so readily, so tersely, and so unvaryingly. Issuing alike from legislative halls, public platforms, editorial rooms, and the chummy conclaves of Pullman smokers, reiteration has made the verdict unanimous. The diagnosis has already been made by acclamation: "Too many mines and too many miners."
>
> Each doctor to the dilemma, of course, states the case according to his own therapeutics. "One way traffic and too many coal cars," complain the railroads. "Too many coals and too many salesmen," growls the buyer. "Too many wage cuts and too many idle days," pleads the miner. "Too many expenses and too many price cutters," moans the management. "Too many competitors and too many losses," decides the banker. "Too many strikes and too many alibis," says the public.
>
> In brief, everything about coal is too much or too many. The root of all the evils is the excessive capacity for coal production.[7] So says George J. Anderson, in "How Much Coal is Enough?"

Petroleum and Gas—The Appalachian Plateaus have a long and honorable history in the oil and gas industry. Beginning with the Drake discovery in northwestern Pennsylvania, this region has produced a very high grade oil and in quantities great enough to have given to "Pennsylvania grade" the equivalent of "sterling" to silver. Twenty years ago the oil industry of western Pennsylvania, eastern Ohio, and northern West Virginia was thought to be on its way out. Over most of the fields this has proved to be the case, although many of the fields still are in production; they will run from one-fourth barrel to forty-five barrels per day. The greatest revival in production recently has been in the Bradford district, north of Pittsburgh in the Allegheny Valley. Operating under a pressure system, pure water floods the wells; production has increased about 50 per cent in these wells.

Adirondacks Iron Mining—The same district in the Adirondacks which supplied iron for the cannon of the United States fleet in its first war with

[7] George J. Anderson, "How Much Coal is Enough?" *Atlantic Monthly*, Vol. 142, pp. 823–833. Reprinted with permission of *Atlantic Monthly*.

England is still producing iron ore. For lack of transportation these great, rich deposits of iron, so hopefully pioneered in the early 1800's, failed to develop into a flourishing industry. Pioneer iron masters repeatedly staked fortunes on this ore, and lost to bad roads, no railroads, subzero weather, deep snows and rugged mountains.

In 1946, between three and four thousand miners living in the small communities of Lyon Mountain, Port Henry, Clifton, Benson and Tahawus produced about four million tons. Although the rejuvenation of the mines is recent, it was not a part of the Second World War's revival of marginal mining communities. After the rock is blasted from deep quarries, it is crushed and mixed with powdered anthracite coal, then fused into sinter resembling black, metallic clinkers. The sintered ore is then sent to Bethlehem, Pittsburgh and Cleveland blast furnaces. A cut-over forested region, after a long period of hardscrabble farming, experienced rejuvenation. It is another instance of the steel industry forming attachments in eastern United States.

Agriculture

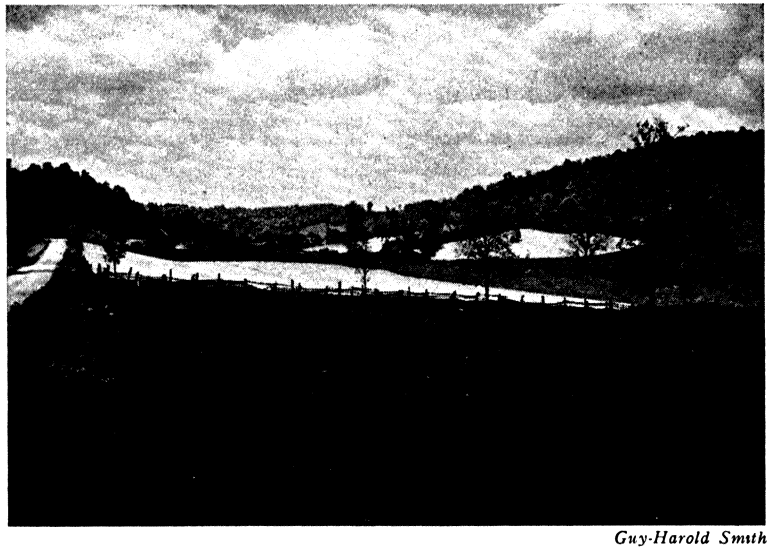
The agriculture of the Appalachian Highlands is not susceptible of regionalization to the extent that great plains areas are. The variety of landscapes is too great to permit the development of broad zones of agricultural similarity. Yet in a general way there are three regions discernible: the northern Appalachian portion of the Hay and Dairying Region, a central Appalachian zone where urbanization has intensified the agriculture, and, finally, an extensive, rugged region of the southern Appalachians where farming is apt to be self-sufficing in nature.

Northern Appalachian Highlands—There are two physiographic provinces represented in this great region: the Appalachian Plateau and the Ridge and Valley province. The former is the more extensive but the latter contains most of the superior farm lands. The several sections of the northern Appalachian Plateau of New York, Pennsylvania and Ohio are all a part of the Hay and Dairying Region. Large parts of the Adirondack Mountain area, the Catskills, and the Pocono portions of the Plateau are largely forested or classed as woodland. Where dairying has developed, it has been with mixed farming in an attempt to utilize the poor thin soils left after the lumbering exploitation. Tourists, both summer and winter, have fostered the development of dairying.

Over the larger part of southern New York dairying has developed upon rather poor mixed farming. Much of the land is fit for pasture but unfitted for plow crops. Accessibility to eastern markets has enabled most of the region to dispose of fluid milk. Although grain farming is relatively unimportant, buckwheat is grown for its grain and during the blossoming

period the bees reap a harvest of nectar which they convert into buckwheat honey. The cool climate favors the growing of oats. Corn is grown for ensilage and supplies during the winter a very suitable feed for the dairy cattle.

Where the farms are not readily served by transportation to city markets, the manufacture of butter and cheese has persisted. Farther south in the northern tier of counties in Pennsylvania, the slopes are steeper



Guy-Harold Smith

FIG. 45.—A PLEASANT VALLEY IN EASTERN OHIO'S APPALACHIAN PLATEAU

and the land less productive. Milk condensing plants have come in to replace cheese plants and creameries. Without minerals or other factors to increase the carrying power of this land, these portions of the northern Appalachian Plateau have little prospect for a change in livelihood.

In the Catskill Mountains, the Poconos, and the Finger Lakes districts, tourists are of growing importance as a source of income. In certain of the northern Pennsylvania counties just west of the Susquehanna River, the income from hunting and fishing licenses is the most important source of income, in an area which is primarily agricultural.

Fruit Districts—Although not a part of the Eastern Highlands, the fruit districts between the Appalachian Plateau and Lake Ontario and Lake Erie are included here. They are an important exception to the prevailing dairy economy of the Plateau. On this lake plain of western New York is the nation's second greatest apple-growing area, and one of the major

grape districts. This narrow fruit belt continues along the Ohio shore of Lake Erie. The principal advantage rests in the moderating effect of the lake breezes, not only preventing early opening of the buds and forestalling early frosts, but also somewhat lengthening the growing season. The Cleveland district, for instance, has on the average a growing season twelve days longer than the district a hundred miles south.

The lake silt soils likewise promote the growing of vegetables for market. They mark the location of a former glacial lake or swamp; when drained and cleared many areas became suitable for such crops as celery, onions, potatoes, tomatoes, and cabbage. The near-by large cities of the Lower Lakes have stimulated this type of farming not only because of markets but also because of the abundance of cheap hand labor, much of it foreign-born, so necessary in market gardening. The same factors have promoted the erection of large areas of greenhouse, particularly along the Lake Erie Plain.

Immediately south and east of the Plateau counties lie the ridges and valleys of the Folded or Newer Appalachians. Dairying is important, but chiefly in the northern tiers of counties only. The soils are best in the limestone valleys, but even in the largest valleys there are rock outcrops which make numerous ridges in an otherwise good agricultural valley. These interruptions are particularly conspicuous in eastern Tennessee and southern Virginia. Soils on the ridges are invariably thin and poor, supporting an agriculture which is in sharp contrast with that of the generally prosperous lands of the valleys.

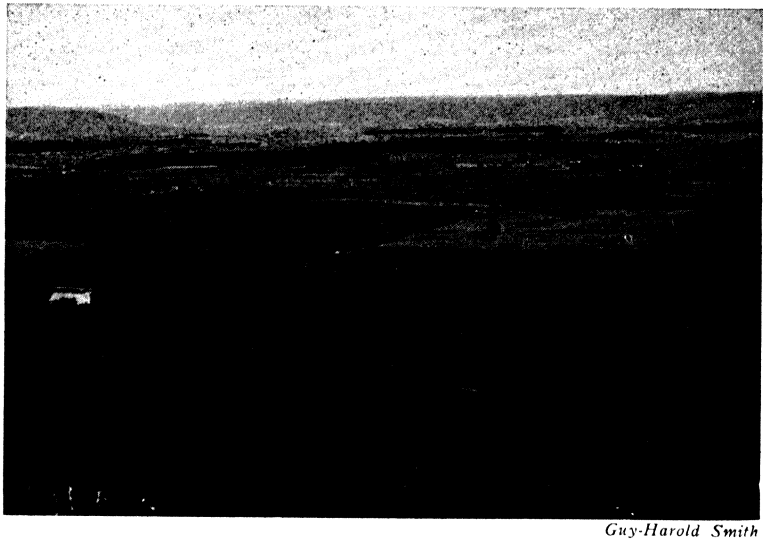
Even where the valley floors have fertile soils, the inaccessibility of the district often makes the agriculture self-sufficing rather than commercial in nature. From the Hudson River to central Alabama, the agriculture of the Ridge and Valley province is exceedingly diversified, due largely to the effect of terrain on soils and to accessibility. The account here must be an over-all view.

In nearly all of the Pennsylvania valleys there is evident the careful farming practices noted in the famed Lancaster and Chester counties of the Piedmont. Dairying, small grains, and stock-feeding are common to nearly all. But the substantial homes, big barns, silos, and ordered appearance are common only to the more accessible valleys of the northern Ridge and Valley province.

Central Appalachians—The broad stretches of the Plateau in western Pennsylvania, eastern Ohio and northern West Virginia are included in the Corn and Winter Wheat Region. Greater urbanization has modified the agriculture from that of the northern counties. Livestock feeding is an important industry. Sheep raising in the hilly lands has long been a leading animal industry. Coal mining, manufacturing and a network of

railroad lines have intensified the agriculture in these hill counties.

Farther east in the Ridge and Valley region the numerous good valleys exhibit the same careful farming practices noted farther north. In eastern West Virginia and Virginia the ridges are given over to apple orchards, but throughout the entire region the farming system is based on corn and livestock. There are many departures from this system where markets enable the farmers to specialize in some crop or crops. Thus in Pennsylvania the corridors through the Ridge and Valley province enable farm-



Guy-Harold Smith

FIG. 46.—A PROSPEROUS AGRICULTURAL VALLEY IN CENTRAL PENNSYLVANIA

ers to engage in dairying for the great urban markets of the Middle Atlantic port cities. There are small-scale representatives of this dairy landscape in such interior limestone valleys as Bedford, Nittany, and Kishacoquillas in central Pennsylvania, and Greenbrier in central West Virginia.

Southern Appalachians—Agriculture in the southern Appalachian Plateaus is in marked contrast with the north, despite the apparent similarity in topography and soils. The principal factor in accounting for this contrast is isolation. Where dissection has penetrated to the underlying limestone, the valleys may be wider and more productive than farther north, yet isolation remains. The over-all cropping system is classed as Corn and Winter Wheat, but the regional variations are so great as to make this almost a misnomer.

Everywhere south of central West Virginia similar conditions prevail. Here agriculture is made self-sufficing only by lowering the standard of

living. The valley people have not been exclusively agricultural, however. Until recent years coal mining has been important. Except for certain areas and certain periods, these hills have always been "The Land of Do Without." Timber exploitation went first, then the chaos of large sections of the mining industry has accentuated the poverty of the region.[8] Yet it is in this part of the Eastern Highlands that rural population increase is the highest in the United States. In some counties the birth rate is so high

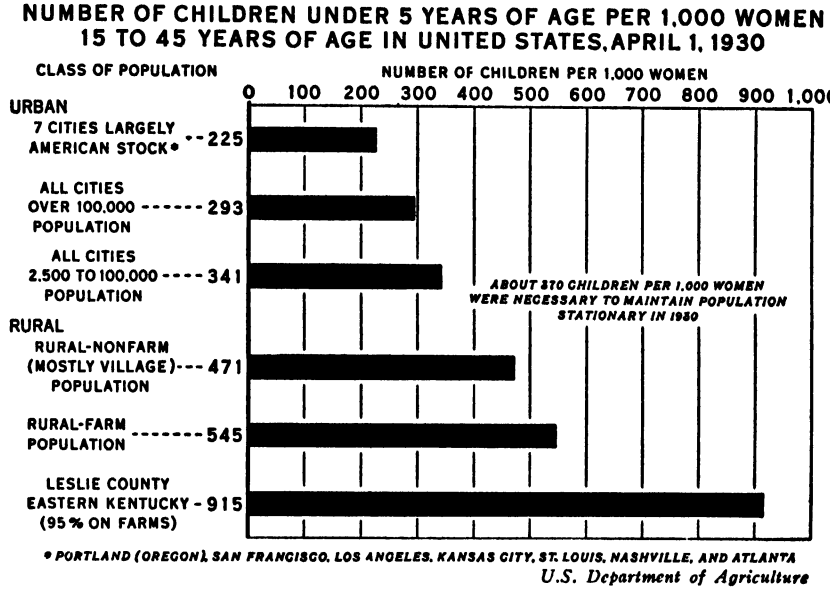


FIG. 47

that population would be doubled in thirty years were it not for emigration. Population density reaches one hundred per square mile on some of the bottom lands, while ridge tops are sparsely populated.

Population, a Resource or a Handicap—The Southern Appalachians constitute the greatest labor pool in the United States. They supply the industrial north with white labor, in some years 40 per cent of the city-ward shift. These southern counties must export labor or clear more slopes

[8] Statistics compiled from a questionnaire sent to the parents of the 400 pupils in the High School in Berea, Kentucky, indicate that: 82 per cent live in the country, with an average distance of 10 miles from town; 76 per cent get no daily, 63 per cent get no weekly paper; 68 per cent are farmers, yet 53 per cent do not own a team of horses or mules; 83 per cent own no automobile; 65 per cent of the houses have never been painted; the average distance of the water supply from the house is 172 feet; the average number of children is six. (From Annual Report, President of Berea College, 1934.)

or move people on as tenants to other poor land.[9] The economy of the region has to all intents and purposes left man out. The cultural and physical endowments of today's population in many of these counties are relatively inferior to those of their forbears in the same regions. Mining of the land continues unabated; so does mining of the people. Odum has suggested that nothing short of a complete reconstruction of the agriculture, together with adequate support of the tools and institutions of science and learning, will solve the economic problems of this large region.

J. R. Randall

FIG. 48.—A CABIN IN THE GREAT SMOKY MOUNTAINS

Yet some improvements are being made. The County Agent of Berea, Kentucky, writes:

> In September 1914, I rode horseback for six days and found only ½ acre of red top grass to be cut for hay. Today (1934) we have thousands of acres of Korean lespediza, cowpeas, and alfalfa. We also have better pastures made up of from one to five grasses. . . . Forty per cent of the farm income is from poultry.
>
> Again, of the 714 living graduates of Berea College, 78 per cent come from the 200 hill-and-mountain counties of the southern Appalachians, 200 were from the "outside"; of the former, 63 per cent are back working in these counties, and 19 per cent of the outsiders are likewise working there.
>
> (Quoted from the 1939 Annual Report, President of Berea College.)

During World War II certain Ohio colleges and universities with departments of agriculture undertook to train groups of white labor from the hill counties of the Southern Appalachians. These farmers were trained to do the mechanized work on Ohio and Indiana farms during the wartime shortage of farm labor.

[9] See the penetrating study: F. J. Marschner, *Rural Population Density in the Southern Appalachians.* (U.S. Dept. of Agriculture, Miscellaneous Publication No. 367, March 1940.)

Such instances of self-help are being multiplied as isolation is yielding slowly to improved roads, northern employment, and education. Despite hills, poor soils, and poor people, the Southern Appalachians may yet reconstruct their whole economy to the end that man will not be left out of the crop improvement.

Manufacturing Industries

Iron and Steel—During World War II steel manufacture in the United States for the first time was a nation-wide industry, with great producing centers at Baltimore, Youngstown, Birmingham, Provo, and Fontana (Los Angeles), and from Duluth to Houston.

Steel's greatest world province lies across twelve states, with the Great Lakes as its private ocean. Here the iron moves a thousand miles to meet the coal of Appalachia.[10]

Early Centers—In the Ridge and Valley province, between New York and central Alabama, beds of hematite iron ore occur. These deposits are relatively low-grade ores but have the advantage of being nearly self-fluxing; iron has been made here for many years.

The iron-master was in many instances the blacksmith, the mine was simply a local ore bank, and fuel was charcoal from the neighboring forest. With relatively widespread raw materials, the industry spread with advancing population to many parts of the Appalachian Highlands, but especially it was centered in the parts which, by virtue of accessibility, were most densely settled. The advent of the railroad marked the period of greatest growth of these early furnaces which reached their peak by the late nineteenth century.

[10] 1940 World Steel Production Capacity (U.S. Tariff Commission Report):

United States	80	million tons *	
Russia	22	"	
Continental Europe	42	"	(exclusive of USSR)
Great Britain	15	"	
Japan	7	"	
Canada	1.7	"	
All others	4.0	"	

Pig Iron—U.S. Production by States (in 1,000 tons):

	1913	1937
Pennsylvania	12,955	11,371
Ohio	7,129	7,904
Indiana-Michigan	1,776	4,722
Illinois	2,928	3,436
Massachusetts–New York	2,200	2,843
Alabama	2,058	2,581

* In March 1943, the steel making capacity of the United States was 88 million tons. Over a period of a century, the rate of increase in steel manufacture is twice that of the population increase.

The first coal field developed for the iron industry was the anthracite field of the upper Schuylkill Valley, and it was in this and neighboring valleys of eastern Pennsylvania that the rising iron industry received its initial impetus.[11] The anthracite iron industry surpassed the charcoal iron industry rather promptly, and when the railroad had opened up the coking coal of the lower Pittsburgh district, coke-made iron, by 1875, had surpassed the tonnage of anthracite-made iron. But still the ores of Pennsylvania, Ohio, and West Virginia were adequate for the manufacture of iron and steel. When in 1884 the iron ores of the Upper Lakes began to supplant the ores of the Appalachians, the iron-and-steel-making centers were able to take in their stride the changed source of ore. Thus early movements of iron manufacture were due to fuel changes and shifts in the market rather than iron ore changes.

Shifts—Iron manufacturing has not remained concentrated in these states, but their importance has continued. Local ores of the Cornwall district near Harrisburg, northern New Jersey, and the Adirondacks still supply part of Bethlehem's requirements. The contribution of these iron and steel regions to the freight of American railroads is almost beyond belief. Single cities along the Lake Erie shore handle a greater tonnage for these heavy materials than the total tonnage of the United States wheat crop for a year.

In 1899 there were in the United States a total of 575 furnaces for the production of pig iron and ferroalloys. Although by 1938 the number of furnaces had decreased to 236, their total capacity was about 51 million tons, or four times as great. Fifty years ago, when accessibility to iron ore and fuel supplies was the primary factor in locating a blast furnace, furnaces were located in 162 counties in 24 states. In 1938 they were found in but 56 counties in 17 states. This shift has increased the tonnage of the

[11] Mount Joy, better known as Valley Forge, was one of dozens of "iron plantations" known to have existed in the valleys of the Schuylkill, Susquehanna, and Juniata rivers in Pennsylvania during the eighteenth and early nineteenth centuries. Others were Pine Forge in Berks County, Windsor Forge, Martec Forge, Hopewell Village, and Elizabeth Furnace in Lancaster County. Some of these plantations covered ten thousand acres; clustered about the "mansion house" were houses for the thousand workers as well as the necessary work buildings, vegetable gardens and orchards essential to their self-sufficiency.

Instead of vast fields of cotton, the iron plantation had virgin forests of oak, hickory, ash, chestnut, and pine. From these trees was made the charcoal used in smelting the local iron; on a plantation of this size, 15,000 cords of wood were made each year into charcoal; woodcutters and charcoal burners greatly outnumbered the miners.

At about the same period charcoal iron was made in the hills of the western margin of the Plateau in Ohio, West Virginia, and Kentucky by methods essentially the same as those just described. In the Ohio Valley, however, there was no known plantation system; instead, the economic and perhaps social life of the people working in the woods, iron pits, and furnaces crystallized into villages, some of them persisting today, many with the suffix "furnace" to the town name.

(Data from Dr. Wilbur Stout, Ohio Geological Survey, and the Iron and Steel Institute.)

Lower Lake states, partly at the expense of the Middle Atlantic group. Ohio, Indiana, Illinois, and Michigan produce about one-half of the nation's output.

These changes in location were made possible by a series of important changes in the method of manufacture. Just after the Civil War, a new process in steel-making, known as the basic open-hearth, was introduced in the United States. This eventually proved to be one of the principal factors contributing to the leadership of the United States in steel production, since it made possible mass production, of high-grade steel from relatively impure raw materials at reduced cost. It also permitted the use of scrap iron and scrap steel. Nine-tenths of the steel today is made by this basic open-hearth process. The electric furnace process was not used here extensively until after World War I. Although increasingly used, it is on a quality rather than a tonnage basis. Within the past ten years there has been the wide-spread adoption of the continuous strip mill.

Market—A significant feature of the iron and steel industry of the United States is the fact that it has developed upon a domestic market. Whereas western European countries have depended upon iron and steel exports for about half of their volume, the domestic market of the United States normally absorbs 95 per cent of output.

Not only has the steel industry developed upon domestic markets, it relies upon domestic raw materials for 99 per cent of its tonnage needs—a significant fact in modern world minerals and world politics. The materials which must be purchased abroad, however, are essential in steel operations and no completely adequate substitutes or sources have yet been developed. Included in the raw materials which must be imported are manganese, tin, palm oil, certain heat-resisting materials, and some metals used in alloy steels.

Iron and Steel Districts—Although steel manufacturing is not the only industry in the Appalachian Highlands, nor is it uniformly distributed here, it will serve as a basis for an account of manufacturing.

There are four main centers in the northern Appalachians; Allegheny County in western Pennsylvania is the principal center. Also included in this area are the adjacent counties along the Ohio River to the northwest, south along the Monongahela River, and the more remote Johnstown district farther east.

In the valleys of the Folded Mountains in northeastern Pennsylvania are manufacturing cities with iron and steel dominant in their economy: Allentown and Bethlehem, twin cities astride the Lehigh River, and Easton and Phillipsburg a few miles to the east at the confluence of the Lehigh and Delaware rivers. These cities with local iron, limestone and anthracite mark the birthplace of the modern steel industry. Reading has

outgrown its steel dominance and is better known as a silk- and rayon-knitting city. The two types of industry are about equal in employment. To these cities, steel means basic iron and steel products. Raw materials and power are lavished; it is a heat and power landscape, despite its textiles.

Coal Towns—Farther north in the Ridge and Valley province are several smaller cities, primarily anthracite coal mining centers: Scranton, Wilkes-Barre, Carbondale, Pittston, and Nanticoke. Scranton with a population of 140,000 is by far the largest city in this or adjacent coal fields. A few industries have come to Scranton, all of them seeking cheap labor: shoes, work clothing and silk. None of these cities is an important manufacturing center. So long as there is a good export of hard coal, the railroads offer a great deal of employment. World War II brought some new industries to this district. Most of them were attracted to Scranton. What is to become of them with the decline of coal mining? Thus far there has been an exodus of nearly a third of these miners to soft coal districts in the western part of the state, already oversupplied with miners. World War II took many of these miners to factories in tidewater cities. Similar though smaller cities are situated in the middle and southern anthracite fields: Pottsville, Hazleton, Mauch Chunk, and Shamokin.

Southern Appalachians—Birmingham (400,000) is the only major iron and steel producer in the Southern Appalachians. It is unique among great steel manufacturers in that all of the raw materials of steel are found within a radius of ten miles of the city. In Red Mountain on the eastern slope of Jones Valley, where ore and limestone lie one above the other, are the Wenonah, Muscoda, and Isbkooda mines. From the Warrior coal field in the Cumberland Plateau on the west, come the vast tonnages of fuel needed in the manufacture of iron and steel.

Suburban Bessemer, Ensley and Fairfield make the steel which is fabricated in Birmingham's mills. Chief products have been pipe, ship plates, and recently armor plate and other war goods. Birmingham manufacturing dates from the Reconstruction period, although pioneer furnaces operated there as early as 1815. Birmingham maintained Bessemer furnaces long after their decline elsewhere; World War II spurred the making of Bessemer steel again.

As a "have" region, Birmingham lacked only a market. World War II gave rise to a score or more of new shipyards along the Gulf and South Atlantic coast. These in turn called for ship plates, armor plate, and a wide range of fittings which brought new capacity to these Alabama mills.

The intolerable slowness with which the South's market has developed was due not only to the low rate of urbanization and of industrialization, but was due also to the man-made restrictions by means of which estab-

lished steel centers sought to perpetuate their period of profit. Even after the abolition of the Pittsburgh basing point system of determining steel prices, Birmingham mills have been limited to pipe, sheet and bar iron and rails until the exigencies of World War II widened the range, at least for the emergency.

Chattanooga (200,000) and Knoxville (150,000) are the largest cities between Harrisburg and Birmingham. Cement, brick, woodworking, knit goods, and iron working are the principal industries. Alcoa is a small city with a large aluminum refining industry, utilizing hydroelectric power from tributaries of the Tennessee River. Ducktown has the only copper smelter in the southeastern part of the United States.

Central Region—Population of the larger cities and towns in this central region has declined in recent years; smaller places have increased somewhat.[12] Population is largely native American with some second-generation Italians and Swedes. Industries attracted to this district by the abundance of oil and gas have declined; the most important one was glass manufacture. Lumbering persists as an industry, and more people are being employed in this and associated industries than any other. The presence of many small wood chemical plants making acetate, wood alcohol, charcoal, and tanning extracts testify to the attractive powers of local wood.

Natural gas was quickly exhausted in western Pennsylvania, but West Virginia has supplied the industrial regions north of the Ohio River for many years without exhaustion being apparent. Buff-burning clays are found in great quantities in eastern Ohio and northern West Virginia, particularly. A great ceramic industry has been developed upon the clay and the natural gas of Pennsylvania and West Virginia. Brick, hollow tile, drain tile, white wear and some art pottery have all become important industries in this tristate region; historically the capital of this ceramic industry has been East Liverpool on the Ohio River, but Wheeling, Pittsburgh, and several other smaller places have likewise been important ceramic manufacturing centers.

Western Pennsylvania Valleys—Pittsburgh—The industrialized valleys of western Pennsylvania may be thought of as the center of a larger industrial area embracing eastern Ohio and northern West Virginia. In this hilly Plateau, the lower Allegheny, Monongahela, and the upper Ohio rivers have so localized industry as to make these larger valleys, focusing upon Pittsburgh, the economic heart of the region. The most conspicuous

[12] Population Changes in Bradford County:

	1940	1930
Bradford	17,691	19,306
Kane	6,133	6,232
County total	56,673	55,167

Data from Dr. E. W. Miller, Pennsylvania State College.

feature of the landscape is the steep hills, 400 to 500 feet above the river plain. From these valleys and hills, the city of Pittsburgh takes its attenuated shape and its series of occupied levels. Literally a score of suburban agglomerations constitute the Pittsburgh industrial region.[13]

The continued importance of Pittsburgh as a manufacturer of primary iron and steel products is probably its best-known characteristic. Although the fabrication of products from these primary commodities has become a more important industry in recent decades, it is a less conspicuous part of the landscape. It is in the former role that the Pittsburgh region gives rise to such an unbelievably large tonnage by water and by rail. It is a heat-and-power landscape made possible by transportation. When Pittsburgh used iron from central Pennsylvania, coke from Connellsville, and local limestone, the industry could prosper solely due to the accessibility to materials and markets of the Midwest. With the decline of the raw anthracite furnaces in eastern Pennsylvania and the use of Lake Superior iron ores, basic iron and steel manufacturing in western Pennsylvania steadily increased until in 1937 more than 80 per cent came from this region in Pennsylvania and Ohio.

The site of heavy industry within the Pittsburgh area could change only with difficulty. Topography dictated a riparian location for the railroads. The rivers supplied water for the mills and much of the coal came down the Monongahela by barge. Congestion and land values have kept all but one of these mills outside the city limits. Meanwhile the Ohio and upper Mississippi valleys had become densely populated, and the first great market for farm machinery had developed. The many-sided economy of the Lower Lakes states is reflected in new primary iron and steel centers rising in eastern Ohio and on the lake margins of Ohio, Indiana, and Illinois. The plant capacity became greater than the market. Competition favored the new midwestern steel centers. Today, Ohio, and Pennsylvania have about equal rank in primary iron and steel manufacturing. The Pittsburgh region has lost ground, but the change in rank has been primarily due to increased tonnage in the Lower Lakes region.

Finished Metals—Undoubtedly, one of the major reasons for modernization of the primary iron and steel plants in the Pittsburgh region has been

[13] Pittsburgh	669,877	Swissvale	16,029
McKeesport	54,632	Clairton	15,291
Duquesne	21,396	Dormont	13,190
Ambridge	20,277	Munhall	12,995
Homestead	20,141	Carnegie	12,497
Braddock	19,329	Corpolis	10,724
McKees Rocks	18,116	Turtle Creek	10,690
North Braddock	16,789	Arnold	10,575
New Kensington	16,762	Aliquippa	30,000

See R. E. Murphy, *Geography of Pennsylvania*, Harrisburg, 1932.

the rise of another type of manufacturing to surpass the primary industry. The manufacture of finished metal products employs a greater number of persons and is less bound by a riparian location. With these two types of manufacturing, all other Pittsburgh industries are relegated to a more or less minor position.

Railroad equipment, mining machinery, electrical machinery and aluminum manufacturing are important phases of these secondary metal products. Such industries create a higher factory value than the primary products. As Pittsburgh matures, the part played by her accessibility to raw materials and to fuel will be relatively less important than the location and extent of the market and the skill of her labor pool. In the ascendancy of finished metal products may be read the industrial maturing of the Pittsburgh region.[14]

Glass—Another industry of the heat and power region is glass manufacture. In this industry Allegheny County leads, yet glass ranks far behind metals in this county. Glass sand attracted the industry at the turn of the nineteenth century. This was subsequently stimulated when coal replaced charcoal as fuel, and again when natural gas replaced coal. Part of the glass sand is still produced near Allegheny County, but sandstones for good glass are quarried near the central part of the state. Other than the Plateau counties there is but one important glass center in Pennsylvania, and that is at Philadelphia.

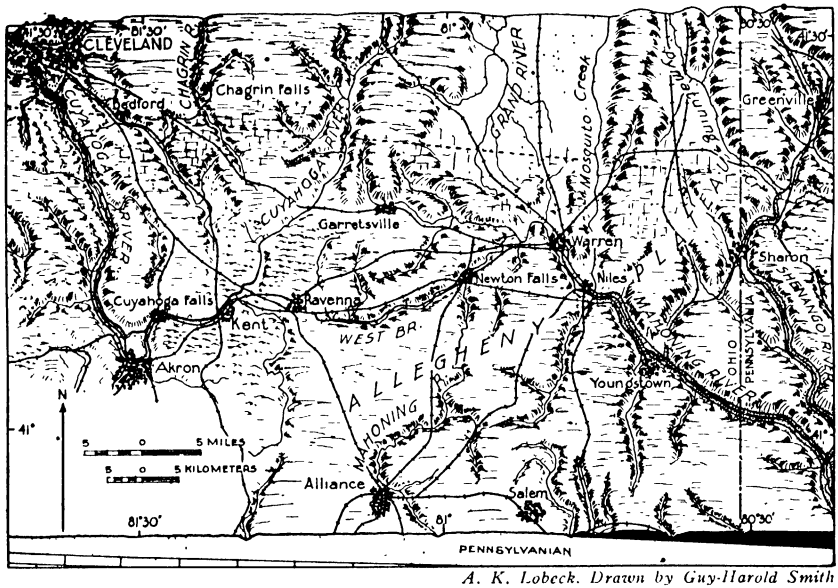
What has been said about the Pittsburgh region will apply with almost the same emphasis to the score of smaller cities and towns in the valleys of western Pennsylvania. They are for the most part less highly developed than Pittsburgh but are influenced by it. Where coal has not been the major source of livelihood, we find manufacturing making a belated appearance, as for instance in the agricultural southwestern counties of the state where glass and tin plate have more recently come in.

Monongahela Valley—In the Monongahela Valley blast furnaces, rolling mills, tin plate and glass manufacturing carry out the Pittsburgh landscape. A zinc smelter for the wire mills disposes of its by-product, sulphuric acid, to the steel mills. Connellsville and coking coal are almost synonomous terms. Behive coke ovens were located near the coal mines; this valley did not attract much industry, but rather became a coke supplier for the Pittsburgh area. About 1910 the Connellsville coke industry

[14] The Wall Street Journal for May 2, 1946 carries a speech made by the president of the Carnegie–Illinois Steel Corporation at the University of Pittsburgh. He contends that "We must logically expect when it is necessary for some of the present steel manufacturing facilities in Pittsburgh to be replaced, it will be at a location closer to the concentrated market for steel and there will be some reduction in the total ingot capacity of the Pittsburgh area. . . . We must look to a greater diversification of industry to offset this."

reached its all-time high. By World War I, this wasteful method of making coke gave way to by-product coke, not to be revived until World War II. By this latter process, coke making could and did disperse widely, since many bituminous coals were satisfactory.

East of Pittsburgh on the Conemaugh River is Johnstown, a small-scale Pittsburgh. Although it is in an active coal-mining region, half of the wage



A. K. Lobeck. Drawn by Guy-Harold Smith

FIG. 49.—THE CLEVELAND-YOUNGSTOWN AREA OF THE ALLEGHENY PLATEAU

earners in manufacturing work for the Bethlehem Steel Company. On the Plateau between Pittsburgh and Johnstown are several large towns with economies based on coal, iron, glass, clay, and gas.

West of Pittsburgh, in the upper Ohio Valley, is the first section of a great commercial and industrial route to the cities of the Middle Western Plains. (Fig. 49.) Although not so highly industrialized as the immediate Pittsburgh region, manufacturing cities follow the Beaver, Mahoning and Shenango valleys. This natural corridor for trade has long served to move Upper Lakes iron ore to the Pittsburgh furnaces, and coal to the lakeshore cities. In the direction of Youngstown and Cleveland, this corridor is more industrial. The manufacture of iron and steel products predominates in the cities of the Beaver-Shenango valleys, but clay, glass, and cement manufacturing, in that order, are also characteristic of the area.

Western Margin of the Plateau—The Ohio River has localized the following Plateau cities: Wheeling, Weirton, Parkersburg, Huntington and Ashland, with Charleston on the Kanawha River. These cities are dominated by heavy industry: iron, steel, nickel, clay, industrial chemicals, glass, explosives, and oil refining. Although similar to the economy of the Pittsburgh district, Wheeling is not a spill-over from Pittsburgh; it has been and is an independent steel center. A combination of physical resources and market have functioned to make these cities part of the nation's greatest clay products center. The region has abundant and excellent buff-burning clay and natural gas. The farmland of the Middle Western Plains offer the greatest market for drain tile, the midwestern steel industry needs refractory materials, and the rise of cities constituted a market for the brick and hollow tile. On both sides of the Ohio River, clay products and steel dominate the industrial landscape.

Associated with steel and clay manufacturing are other representatives of the heat and power industries. Most important are the manufacture of glass, industrial chemicals, explosives, and oil refining. Accessibility by rail to both eastern and midwestern consumers, cheap labor, abundant bituminous coal and gas, have brought these industries to Ashland, Huntington, Charleston, Wheeling, and Moundsville.

The southernmost of the industrialized valleys of the Appalachian Plateau is that of the Kanawha River in north central West Virginia. Charleston (135,000), with its industrial suburbs, Nitro, Institute, and South Charleston, comprise a relatively new industrial district. It is served by the Chesapeake and Ohio, and New York Central railroads and by the navigable Kanawha River.

The manufactures include glass, naval ordnance, industrial alkalis, petroleum products, and synthetic rubber. These heavy industries are based in part on local coal, petroleum, gas, brine, and alcohol from Kentucky's distilleries. The farm vote urged the support of this type of synthetic rubber as against the rubber made from petroleum products.

The Kanawha Valley is representative of a number of valleys along the western flank of the Appalachian Highland which have developed chemical industries since the First World War.

The Mohawk Lowland—Between the Adirondacks, the Tug Hill Plateau, and Lake Ontario on the north and the northern escarpment edge of the Appalachian Plateau, lies an east-west corridor which breaches the Eastern Highlands. Although the Mohawk Lowland and Lake Plain are not parts of the Appalachian Highlands, they are included in this section due to proximity and economic ties. Here the New York State Barge Canal joins Lake Erie and the Hudson River. The New York Central Railroad follows this water-level route to the Middle West. This highly industrial-

ized lowland has developed a variety of manufactures characteristic of the maturing economy of many of the older industrial districts.

In the seventy or more cities in the lowland, nearly every conceivable commodity is manufactured; certain specialties are well known: collars and shirts, knit goods, gloves, copper and brass goods, and electrical equipment. They have two things in common: raw materials are imported, and their market is nationwide. Farther south, in the valleys of the Susquehanna River and its tributaries there are a few minor industrial centers, chief among them being Binghamton with its great shoe plants, Elmira with tools and machinery, and Corning with its immense glass works.

Buffalo, at the eastern end of Lake Erie enjoys a strategic commercial position. Traffic for eastern cities leaves the Lakes at this point, because of Niagara Falls and because of the pattern of the Lakes themselves. Buffalo also lies at the western end of a natural corridor through central New York through which virtually all of the trade must pass that is destined for the great Atlantic ports of Boston and New York. It also lies at the northwestern end of the principal passes through the northern Appalachian Plateau. A narrow plain borders Lake Erie and provides an easy detour around the Appalachian Plateau of Pennsylvania and New York; Buffalo lies on this plain.

From the point of view of situation, Buffalo would appear destined to be one of the nation's largest cities. The same factors which gave it early importance still do so. That it numbers only 750,000 persons appears to be due to two factors: one is the presence of Rochester (400,000), and Syracuse (250,000), near enough to share many of the advantages of Buffalo's situation; the other is that manufacturing has developed somewhat slowly in the Buffalo district.

The leading industry is iron and steel. Suburban Lackawanna assembles iron ore, coal, and limestone nearly as cheaply as Detroit, cheapest of Great Lakes steel districts today. Lackawanna coal is 90 cents less than the $3.24 rate to Gary, yet its ore costs no more. By barge to New York City, steel costs less than from any other steel mill. As one of the largest plants of the nation's number two steel maker, Lackawanna steel products supply the Northeastern states market, the automobile factories of Detroit, Toledo, and Cleveland, and the eastern railroads. The Buffalo steel district complements rather than competes with other Bethlehem plants at Baltimore and at Bethlehem. Growth in Buffalo's steel industry waited therefore upon a more or less specialized market, much of which was remote from her plants.

The manufacture of flour has likewise waited upon the decline of small flour mills in the interior of the country, cheaper costs of lake-borne wheat, and the large market of the Northeastern states. Today Buffalo ranks second

to Kansas City but ahead of the long-time leader in milling, Minneapolis.

Buffalo's second-ranking industry is chemicals. The development of hydroelectric power at Niagara Falls has been the most important single factor in the rise of electrochemical and electrometallurgical industries, partly because of early start and low cost of power, and partly because of the very large market for these items used in further manufacture.

Rochester is another of the large group of American cities which began as trader and manufacturer for an important farming region on the Lake Plain of western New York. The falls of the Genesee River provided power for an important milling industry. Subsequently the rise of the enormous precision metals manufacture has transformed Rochester. Photographic, optical, and electrical industries now dominate the city's economy. The manufacture of men's clothing ranks it among the four leading centers in the nation.

Syracuse is another of the cities located in the corridor traversed by the New York State Barge Canal. Its industries are of a heavier type than Rochester, foundries, clay and salt products, shoes, and steel for the automobile industry.

Another major industrial group lies near the mouth of the Mohawk River; Schenectady, Troy, and Albany. Their manufactures, like other central New York cities, are specialized by city and as a region embracing a very wide range of metal, textile, and chemical products.

X

CENTRAL HIGHLANDS

In the commonly accepted ways of delineating a region, the Central Highlands hardly deserve regional identity. Two major provinces comprise the Highlands, the Interior Low Plateaus east of the Mississippi River and south of the Ohio River, and the Ozark-Ouachita Uplands west of the Mississippi and south of the Missouri River. (See Fig. 40.) As was noted in an earlier chapter, the Appalachian Highlands have a degree of unity due to their great extent and to the over-all uniformity of each of the major provinces comprising them; no such unity obtains in the Central Highlands.

Nowhere in these Highlands are elevations so great as in the Appalachians; nearly all of the summit areas of the Interior Plateaus are less than 1,000 feet in elevation; nearly all of the Ozark-Ouachita Uplands rise above 1,000 feet. It is predominantly hill country, but the nature of the hills varies greatly. Throughout most of the Interior Plateaus the hills are relatively low and broad; the Ouachitas consist of parallel ridges similar to the Appalachian Ridge and Valley province. Within each of the two major areas there are likewise important differences in relief.

Transition Zone—There is one bond which most of the Central Highlands have in common, the transitional nature of the climate, the terrain, and the economy. The north and the south seem to share in the character of these Highlands. Here southern people are raising northern crops under conditions which partake of both north and south. If the hills were not so dominant, northern aspects of the economy would probably be uppermost. To northern industrialists, the abundance of satisfactory labor in these hills has long been recognized and utilized. Newspaper comment in the Deep or Gulf South has more than once pointed out that the Upper South looks to the Middle West and the Middle Atlantic areas for its industrial and commercial ties. Certain types of manufactures have been moving into some of these hill areas in recent years. Two world wars have forged these bonds even more closely.

In a political sense, too, the Central Highlands have looked upon issues being debated on the floors of Congress more as northern than southern states. The routes followed by the westward-moving settlers brought eastern people into Tennessee and Kentucky. Most of southern Ohio

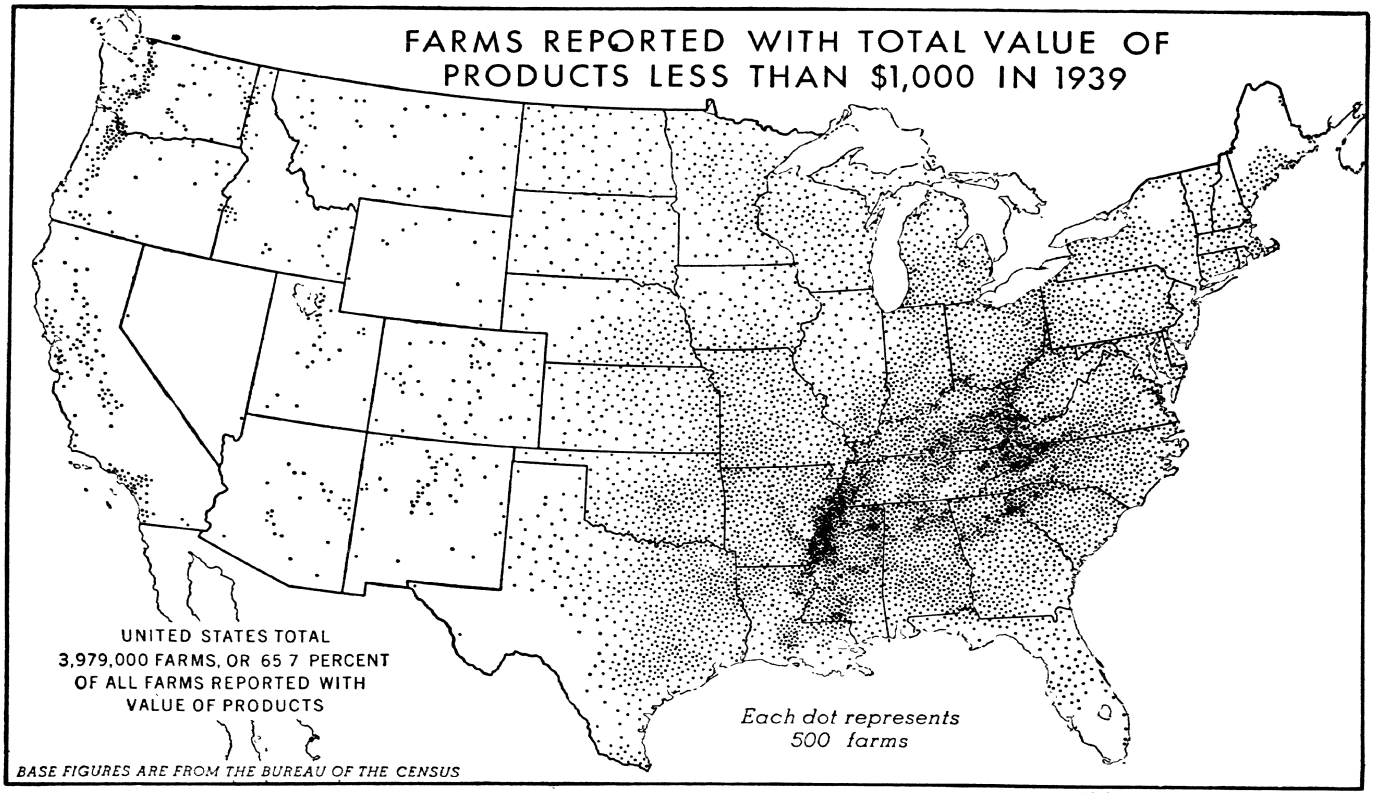
and Indiana were settled by the same stock. The westward movement in the Deep South was an entirely different phenomenon; it was essentially southern in scope.

Interior Low Plateaus—The Interior Low Plateaus display this transitional character more conspicuously than the Ozark-Ouachita area west of the Mississippi River. By some, this eastern region is known as the Lower Ohio Valley; most of its streams flow toward the Ohio. Others have classed it as part of the interior plains of agricultural fame. Its boundaries are roughly set by the Ohio River on the north, the Tennessee River on the west and south, and the Cumberland Plateau on the east. In southern Indiana and southern Illinois, this province crosses the Ohio into the area treated in this book as a part of the Middle West.

The surface of this province has hill rather than plateau characteristics. The most rugged portions are near some of the stream courses. Within the hill country are two famed basins of rolling land and fertile soil derived from the underlying limestone, the Blue Grass of Kentucky and the Nashville Basin of central Tennessee. No part of the province has experienced the smoothing effect of the ice sheet. The best soils are found in the two limestone basins noted and along certain parts of the Ohio, Cumberland, Green and Tennessee rivers. On the whole, soils are more like those of the Middle West than those of the Deep South. The characteristic red and yellow soils of the Gulf states have given way to brown and gray soils.

Despite these gross similarities to the Middle Western Plains, the Low Plateaus are distinct from them in their physical and economic characteristics. Rainfall and steep slopes of the region have promoted serious erosion. The long-continued attempt on the part of the relatively dense population to make a living from the soil has hastened the depletion of the soils of entire townships. Although most of the same crops appear in this region as in the Middle West, neither their areal distribution nor the conditions under which they are produced and marketed are quite similar to the northern neighbor. Arable land is much less extensive and self-sufficiency in agriculture is widespread. (Fig. 50.)

Self-sufficing and Specialty Farming in the Low Plateaus—This is a province of marked contrasts in agriculture. Poor, self-sufficing farming prevails over most of the area, yet there are many districts where crop specialties have resulted in a prosperous countryside. These more prosperous regions are the fertile basins and valleys nestled in the hills which comprise most of the province: Blue Grass, Nashville Basin, and parts of the alluvial plains of western Kentucky and Tennessee. Parkins calls it a region of "corn, winter wheat, tobacco, and forage." Although it is predominantly hill country, elevations are not great enough to affect the



U.S. Department of Agriculture

FIG. 50.—This is by no means the result of just one set of circumstances. An intriguing study in economic geography

climate of the province, except to retard the northward advance of spring. The slope of the land does lead men to do strange things with a mule and a plow, however.

Self-sufficiency in agriculture has lowered living standards to a point

U.S. Army Air Forces

FIG. 51.—LAND USE ALONG THE OHIO RIVER NEAR PORTSMOUTH, OHIO

grown. Corn occupies by far the largest proportion of cropped land; its production is localized in no one region. Although the yield per acre is nearly twice that of the Coastal Plains the yield per acre and per farm is low in comparison with the Corn Belt.[1]

Very little of the corn leaves the farm on which it is grown, either as grain or livestock. Practically every condition under which this corn is grown offers a contrast with the Corn Belt on the north.[2] The field pattern of these hill farms is such as to make impossible the economic use of labor-saving machinery. (Fig. 51.) The methods employed in many districts are more those of mining the soil than farming it. Although local self-sufficiency has passed with intolerable slowness from some counties of this province, and in others it is still dominant, wheat has been declining in acreage since the middle of the nineteenth century. Open winters with their freezing and thawing are hard on young wheat plants. The Department of Agriculture classes every state in the Central Highlands as "wheat deficient."

The increasing volume of "store" bread purchased in rural districts weakened the attachment to local flour made from soft wheat. The old-school millers have died, there were no others to take up their work. This, quite as much as unfavorable climate and terrain, doomed wheat in this part of the corn and winter wheat belt.

Tobacco is strongly entrenched, both physically and economically. Climate and soils favor it. Its heavy and exacting labor demands fit in well with this labor—surfeited hill country, but its depletion of soils is serious. At every stage of its growth, from seedbed to cutting, curing, and packing, tobacco calls for much hand labor. Women and children may do a great deal of it. Little or no machinery is needed. Tobacco sells readily for cash, it may be stored awaiting higher price, and a relatively few acres will keep a family.

The kinds of tobacco grown and the methods of harvesting and curing vary with the locality. Paralleling the Ohio River from West Virginia to western Tennessee is the largest tobacco acreage in the southern states. Most of it is either Burley air-cured or dark air-cured. The western portion of this belt has dark fire-cured tobacco; the heavy soils of these counties give darker, more aromatic, small leaf tobacco. This is more like the tobacco grown across the Ohio River in southwestern Ohio. This tobacco

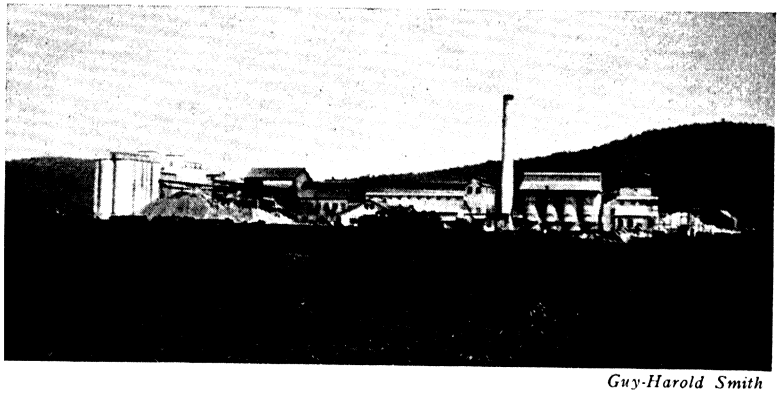
[1] Yield per farm in Illinois is 1,450 bushels, in Tennessee it is 284 bushels, and in Alabama it is 176 bushels.

[2] For instance, the average weight of cattle and swine when slaughtered is:

CATTLE	STATE	SWINE	CATTLE	STATE	SWINE
932	Iowa	237	850	Kentucky	190
547	Louisiana	170	690	Carolina	200
437	Florida	131	450	Georgia	150
815	Tennessee	186			

is used for cigar and chewing purposes. Tobacco barns likewise vary, from the large, two-storied structures with alternate strips of siding hinged to permit opening for air-curing to the decrepit structures used in fire-curing.

Kentucky Blue Grass—The bedrock of the surrounding plateau and of the basin of the Blue Grass is predominantly limestone, yet differs as to age and composition. The basin limestone is generally free from impurities; lime and cement are manufactured from it at several places. Entering the Lexington Plain, heart of the Blue Grass, from the hills of the outer



Guy-Harold Smith

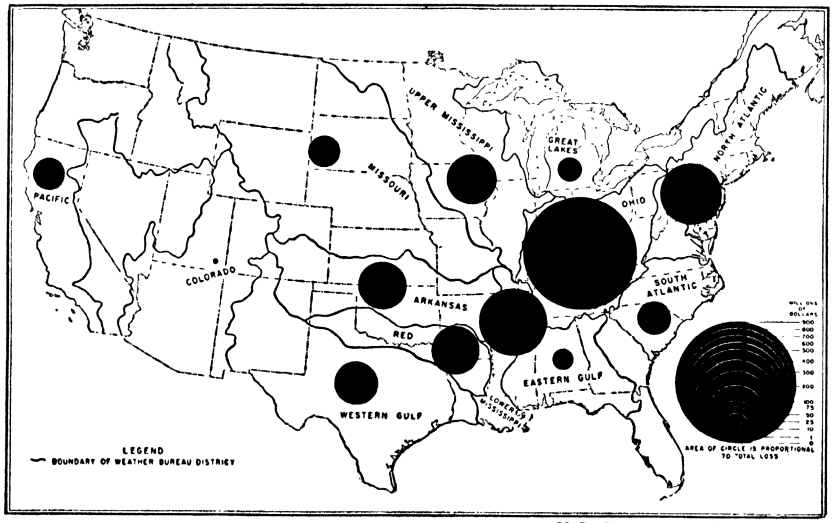
FIG. 52.—A CEMENT PLANT ON THE HIGHLAND RIM OF TENNESSEE

basin and the surrounding plateau is an experience not soon forgotten. The change in land use and general prosperity of the countryside is unmistakable. The outer Blue Grass on the north and northwest grows tobacco as a specialty; [8] for the outer Blue Grass as a whole, general farming prevails with emphasis upon livestock. The total number of cattle in these two basins will not exceed that of two counties in the Iowa corn belt. The cities of Kentucky are in and along the northern margin of the basin; dairying is increasingly important, but the best known, and in the Lexington Plain the most important, phase of livestock is blooded horses. The University of Kentucky at Lexington and Berea College in the Highland Rim a few miles south have long undertaken the task of rehabilitating the agriculture of Kentucky's hills.

The Nashville Basin in central Tennessee is similar to the Blue Grass

[8] Although tobacco is known as a crop fitted for hilly areas, there are within this tobacco region differences between the hill lands and basins which are important examples of the economic costs of relief. For instance, the tobacco yield of the Blue Grass and Nashville Basin is 30 per cent greater than that of the surrounding hill counties. Even with tobacco, the costs of farming small scattered fields is greater, to say nothing of the losses due to greater runoff and erosion.

in the proportion of its land in hay and in the excellence of its general farming. Blue grass is not so well adapted to the Nashville Basin and the emphasis upon blooded horses does not obtain. Like its northern counterpart, however, it is the agricultural heart of Tennessee. Although there are no other districts of similar agricultural excellence and advanced living conditions in all the South, there are many limestone valleys in the Highland Rim of Kentucky and Tennessee which support a prosperous agriculture.[4] For the greater majority of the rural districts, farming is dis-



U.S. Department of Agriculture

FIG. 53.—FLOOD DAMAGE

tinctly noncommercial, and in that fact there is not a little security for the hill farmers. Standards of living have reached the level necessary to support such a relatively dense rural population as in these hills.

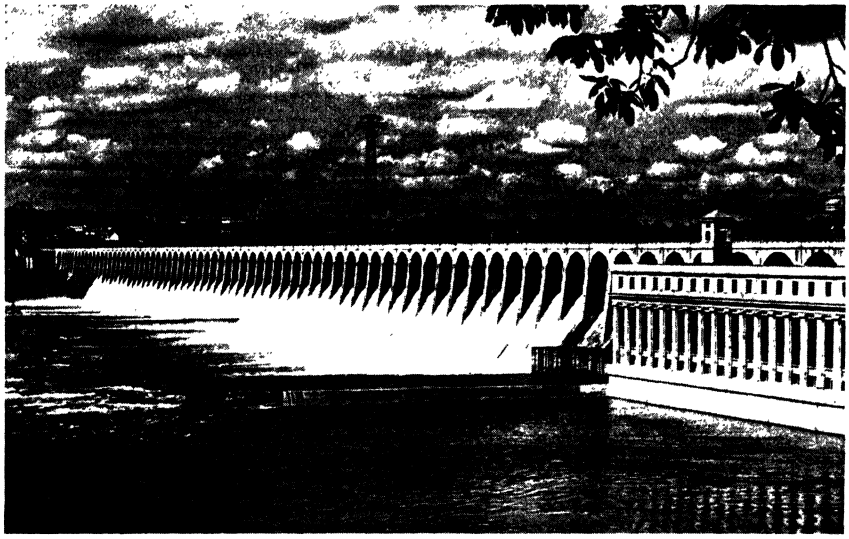
Urban markets have made possible the commercial production of strawberries, apples, and other fruit, poultry, dairying, and truck crops. Locally, agricultural specialties have invaded areas traditionally devoted to corn, wheat, and forage crops.

TVA—The program of the Tennessee Valley Authority is not confined to the Central Highlands, in fact most of the dams have been built in the Southern Appalachians. But since the Tennessee River bounds the Low Plateaus on the west and south, and the benefits from this major undertaking in reclamation accrue in large measure to the people of the Low

[4] Phosphate in the limestone soil is an important mineral plant food. Phosphate rock is quarried commercially at places in the Highland Rim.

Plateaus, a brief résumé of this venture in regional planning is included in this chapter. (Fig. 53.)

This improvement in the Ohio's southern tributary, the Tennessee, is a major environmental fact of the Low Plateaus. The area involved is about the size of Ohio, with a population approximately one-third that of Ohio's seven million. The Authority envisages more than the development of power and the attraction of industry to these power sites. Soil erosion, flood control, navigation, reforestation of cut-over hill country,



Tennessee Valley Authority

FIG. 54.—WILSON DAM ON THE TENNESSEE RIVER

Near this dam there is a Government-owned nitrate plant and a super-phosphate plant. The Second World War removed the last vestige of doubt as to the utility of the Tennessee Valley program.

and the improvement of farming in the Valley are all embraced in the program. Something new has been added to the promotion of TVA in the form of industrial relocation and plant expansion in the interior of the country. A few industrial plants were established within the area during the recent war, for security reasons.

World War II saw the project well along in construction but by no means complete. Twenty-seven dams had been built. During lend-lease days and the period of the war itself, the acute shortage of power won many converts to the Government's plan for developing hydroelectric energy.

Power from TVA has been transported as far as Cincinnati, St. Louis,

the Piedmont cities, and to some of the Gulf coastal cities. Within this large area there are few large cities and little in the way of a market for this power. World War II brought some increase in manufacturing. Aluminum expanded in the Tennessee Valley of northern Alabama and in Tennessee. Chemicals and steel increased somewhat, but in general there has been no striking increase in the industrial power requirements. The manufacture of nitrates was one of the original objectives when the Wilson Dam was built at Muscle Shoals, Alabama. Improvements in this original process have kept the industry alive here. Whether the coal, oil, gas, iron, bauxite, clay, limestone, and phosphate known to exist within the region will become the basis for important industries, remains to be seen. The fact remains that the Tennessee Valley had been going downhill for a long time when TVA took over.

Manufacturing—The Interior Low Plateaus are not part of the American Manufacturing Belt. The area north of the Ohio River has witnessed a rapid urbanization and industrialization; south of the Ohio these processes have developed with intolerable slowness. But a certain degree of industrialization has taken place; very much more industry and many more cities are in the Low Plateaus than in the western part of the Central Highlands west of the Mississippi River.

Several of the cities such as Louisville, Ashland, Paducah and Covington are located on the Ohio River. Louisville, with nearly half a million population, manufactures wood products, beverages, shoes, tobacco products, flour, brick and leather. The War put some large Government-built plants in the city for the manufacture of aluminum, chemicals and plane parts. The only important iron and steel center in Kentucky is Ashland. In this plant the American Rolling Mill Company established the first continuous strip rolling mill in 1923, an improvement that has since swept the industry. Covington shares a few of Cincinnati's industries.

Nashville, in its fertile limestone basin, manufactures shoes, furniture, assembles planes, makes fertilizer, hardwood flooring and clay products. Chemical industries were established in and near Nashville before the War. The manufacture of atomic products continues at Oak Ridge, near Knoxville.

Important railroads cross this Plateau region from east to west along the northern portion, and from north to south through the heart of it. The Ohio River carries about 30 million tons of freight past its northern margin, and the Tennessee River has a new nine-foot channel from Knoxville to Paducah, but it affects the economic life of the region but slightly. Of greater importance undoubtedly will be the chemical plants which are beginning to dot the central portion. Wood products plants are found in many of the towns and cities.

Ozark-Ouachita Uplands—West of the alluvial plains of the Mississippi Valley, the Central Highlands continue as the Ozark-Ouachita Uplands. There are three main subdivisions of this Upland, the northern or Ozark Plateau including the associated Boston Mountains, the southern or Ouachita Mountains, and the intervening lowlands of the Arkansas Valley. Despite the variety of landscapes within this Upland, the boundaries are everywhere more distinct than in the Interior Low Plateaus farther east. This is likewise true of the minor subdivisions.

The Ozark Plateau is for the most part a region of broad rolling hills with a much more rugged portion in the northeast, St. Francis Mountains, and another and larger section in the south, the Boston Mountains. The proportion of cleared land in the Ozarks is much greater than in the narrow valleys and ridge-like mountains of the Ouachita Mountain province in the south. In general the Ouachita Mountains are similar to the Newer or Folded Appalachians farther east.

Settlement in both parts of the Upland preceded that in the Middle Western Plains on the north and west. This is not strange in view of the attraction these forests of hardwood and the secluded fertile valleys must have had for the pioneers. The temperate climate must have encouraged them to linger. Many parts of the Upland remain secluded and pleasant today. Elsewhere the seclusion has become isolation, an isolation so complete that it has not yet been dispelled from many parts of the Upland.

Agriculture—As with the Interior Low Plateaus farther east, the Ozark-Ouachita Upland exhibits the same regional transition between the northern Corn Belt and the southern Cotton Belt. Within the Upland there are marked contrasts among its principal subdivisions. Two areas stand out in their agricultural excellence, the Springfield-Salem portion of the northern Ozark Plateau, and the alluvial plains of the Arkansas Valley. Elsewhere the agriculture is more or less of the self-sufficing type common to many parts of the Low Plateaus.

The larger of the two areas of commercial farming is in the northern Ozarks. It resembles the Corn Belt north of the Missouri River. Erosion has removed most of the limestone from the eastern part of this area; its farms and farmers are not so prosperous. The rolling uplands generally support a balanced agriculture which contributes to a pleasing countryside. Dairying has slowly advanced into the districts easily accessible to the cities to the northeast and northwest. Fruit has become of major importance in some districts; grapes, apples and strawberries have developed as rapidly as the midwestern markets have permitted. As in many districts of the eastern Corn Belt, tomatoes have become increasingly important.

Baker classes the Upland as part of the Corn and Winter Wheat Belt; this classification is probably more descriptive of its agriculture than is the

case with the Low Plateaus of Kentucky and Tennessee. There are fewer districts of specialization in the Ozark-Ouachita Upland.

The Arkansas Valley is to all intents and purposes a part of the Cotton Belt. Its fertile soils have supported cotton farms with their attending problems for a long time. Tenancy, resettlement projects, and an ostensibly profitable but uneconomic cotton system have prevailed here as in the Cotton Belt. Corn occupies an important acreage, but in common with the other three alluvial basins of the Mississippi, cotton continues to be the chief source of farm income.

J. R. Randall

FIG. 55.—A SORGHUM PRESS IN THE OZARK HIGHLANDS

Elsewhere the rugged terrain has fostered self-sufficiency in agriculture. The proportion of cleared land is perhaps half that of the Low Plateaus and much less than in the Springfield-Salem Upland farther north. In some of the most rugged portions of the area, mineral springs, higher elevations, and dense forests have accounted for the location of well-known resorts. In summer the Upland rises as an island of more equable temperatures above the hot plains which surround them on all sides. Although the area is a conspicuous blank space on railroad maps, many parts of the Upland have succumbed to the automobile. The proximity of large urban centers within a day's drive appears to augur an increase in the recreational carrying power of the Upland.

Minerals—Lead and zinc have been mined in the Ozark Plateau for many decades, and their respective districts are among the most important on the continent. The older district, some 60 miles south of St. Louis, has been producing lead for more than a century. It has no superior in the United States. The mines are deep shafts and the surface is dotted with

waste brought up from the cavernous workings. The only industry attracted to this district is the ore-processing before shipping to the lead refineries. The second important mineral district is also a lead producer, although its principal ore is zinc. It is known as the Tri-State District and embraces adjacent parts of Missouri, Kansas and Oklahoma. It is the most important zinc producer in the United States, accounting for half or more of the domestic supply. The landscape is even more like a strip-mining operation than in the lead district; 600 square miles are pocked with small shafts and their waste accompaniments.

The only other important mineral industry in the Upland is bauxite mining on the border of the Ozarks in central Arkansas. Nearly half of the domestic supply comes from this district, about equally divided between open-pit and shaft mines. Ore processing takes place locally as well as shipments to the large reduction center at East St. Louis. There are minor deposits of manganese near Batesville, Arkansas, barite in the St. Francis Mountains, and glass sand in the northeastern Ozarks. World War II spurred activity in the mining of these and other minor mineral resources but the activity lapsed even before the cessation of hostilities.

Manufactures—As has been indicated, the mineral economy of the Ozark-Ouachita Upland is colonial in its nature. Little of the processing required of these minerals takes place in the production district. Most of the lumber cut is likewise for export; Fort Smith (36,000) is the principal processor of wood. Joplin is the most important smelting center for lead and zinc ores mined in the Tri-State area. Although large cities lie upon its northern and western flanks, the Upland has no city larger than Springfield, 75,000 in 1940.

Agriculture remains the most important pursuit of the Upland; specialized commercial agriculture is confined to a few districts in the Ozark Upland. Increasingly the forested areas are being established as state and national forests. The prospect appears to offer no departure from this type of economy.

XI

THE SOUTH, AN AGRICULTURAL PROVINCE

No other section of the United States has the cultural unity of the South. Here under the humid subtropical climate so favorable to the cultivation of cotton has evolved an economic and political region unlike any other part of America. In spite of diversity which is earthly, the climate has been a unifying factor. Economy and political unity born of national disunity during the Civil War have given to the South a traditional separatism, now largely healed by perils which threatened the whole country. A transformation of the South is in progress and the older agrarian economy is gradually yielding to the industrialism which is destined to change the fundamental character of the region.

The South is largely a plains province or at least a land of low relief. The Coastal Plain and the Piedmont Upland together constitute this distinctive geographical area. The boundary between the South and the provinces to the north are sharply drawn on the map but actually the South and the Appalachian Highland become inextricably intermingled along the Ridge and Valley province of eastern Tennessee, in the Nashville Basin of central Tennessee, and along the Arkansas River Valley in central Arkansas. Here as elsewhere geographical boundaries are in effect zones of transition.

This great region stretches from Chesapeake Bay to the Rio Grande River, and from the mouth of the Ohio to the Florida Everglades. Owing to its great extent there are a number of important differences in its physical character. It is, however, a world apart from the hill-and-mountain country which borders it on the north and west.

The vast region is overwhelmingly rural. For a long time it has been a problem area. The spirit of its hillier portions may be expressed by the dogtrot house, porch chair, and yard swept clean each Saturday. Elsewhere the cotton fields stop at the cabin doorstep. Although the creature comforts of more than half the white and nearly all of the Negro farmers are governed entirely by the price of cotton, this crop does not dominate the use of land for agriculture. Probably half of the cropped land is in corn, varying of course with the district. In 1941 the commodity sales in all

southern states for cotton and cottonseed products totaled a little more than $598 million.

Physical isolation and the cotton economy have yielded slowly to the changes in cropping which result from urbanism and industrialization. Not only in the South, but for the Nation, cotton has ranked first as an export for more than a century. World War II made great changes in the southern economy, both rural and urban.

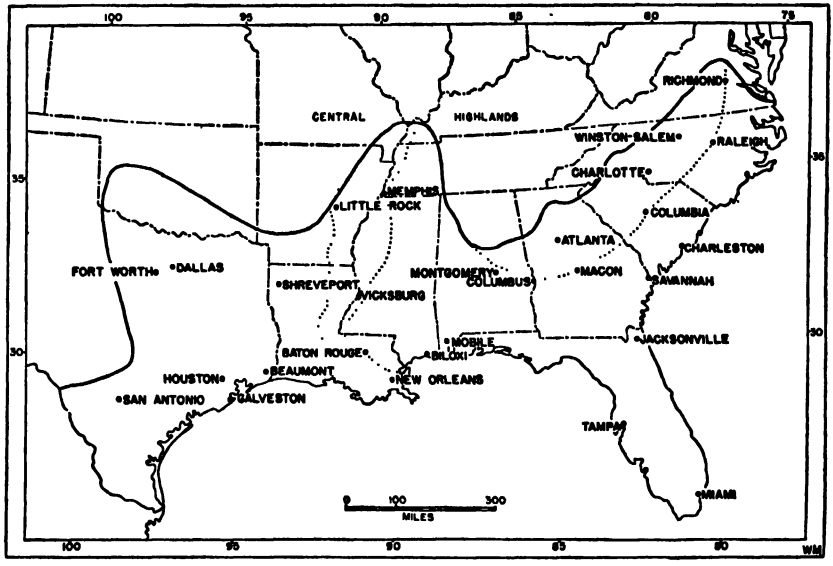


FIG. 56.—THE SOUTH

Most of the South, as stated above, consists of the Coastal Plain; much of the remainder is the Piedmont Upland, the easternmost division of the Appalachian Highland. There are in general three main subdivisions of the Coastal Plain: the South Atlantic from Florida to Virginia, the Gulf from the Rio Grande to Florida, and Florida itself. In Texas there is a fourth plains area, the southern extremity of the Central Lowlands. (Fig. 56.)

South Atlantic Coastal Plain—The South Atlantic Coastal Plain was once the bed of the ocean; it is therefore a relatively featureless plain. An occasional cuesta or inland-facing escarpment is its most conspicuous feature. On the basis of elevation, soils and drainage this plain may be subdivided into three sections, all paralleling the coast. The outermost or flatwoods section is level to undulating, interspersed with numerous swamps, bays, low sand ridges, and indented by many estuaries. The greater part of the area is poorly drained, the highest portion being under

sixty feet above sea level. The original vegetation was longleaf and shortleaf pine, oak, hickory, holly and sweet gum on the better-drained portions, with gums, cyprus and some hardwoods prevailing in the swamps. Soils are generally light colored except for the alluvial plains. Most of this outer province is unused for agriculture, although truck crops, peanuts, some cotton, tobacco and corn are produced in the oases of arable land which dot the margin.

J. R. Randall

FIG. 57.—A PORTION OF THE FLORIDA FLATWOODS

Bordering the flatwoods on the west is a broader and higher belt of undulating to gently rolling sandy plains. Soils here were formed under much the same type of forest as on the eastern flatwoods section. Neither the sandy character of the soil nor the pine-forest cover have favored the accumulation of organic matter, so the prevailing color is light or yellowish gray. Soil differences rather than relief give rise to regional differences.

Although these soils are deficient in plant foods, their productivity has been relatively high with the application of commercial fertilizers. Cotton, tobacco and peanuts are the principal money crops, with fairly important acreage in truck crops and fruit. This is the most important belt of the South Atlantic Coastal Plain.

Just west of it is a well-known but agriculturally unimportant sand-hill strip which lies along the front of the Piedmont Upland from North Carolina to Alabama. Most of this belt is covered with scattering longleaf pine and several varieties of scrub oak forest which have grown up since the original heavy longleaf forest was lumbered. These sand hills make up a narrow strip of country which is somewhat higher than the Coastal Plain to the east or the Piedmont to the west.

Piedmont Upland—Although not a part of the South Atlantic Coastal

Plain province, the broad belt of red clay hills which characterize the southern Piedmont completes this geographic region of the eastern South. In contrast with the Coastal Plain to the east, the Piedmont has been seriously eroded by the many streams which cross it. Its soils were formed under an original forest of longleaf pine, oaks, and some walnut, hickory and gum in the southern portion; in the northern part the vegetation was dominantly hardwood: oaks, hickory, poplar, dogwood and shortleaf pine. Soils too are diversified but in general are gray sandy or red clay loams.

As the scene of the eastern South's principal agricultural economy, the crops grown on these naturally productive soils have seriously depleted their fertility. In the north tobacco has been the main cash crop; with corn, wheat, clover and timothy hay as the supporting crops. Livestock has been of minor importance. Farther south cotton is the dominant cash crop, with sweet potatoes, melons, truck and peanuts as specialties.

In some counties of the southern Piedmont erosion has been dramatic in its destruction and the wasted acres are beyond the redemption of individual farmers. Soil exhaustion is critical in most counties and farming has impoverished man when soil mining returns no livelihood.

The margin of the Piedmont and the inner Coastal Plain is known as the Fall Line or Fall Zone. Here the rivers leave the hard rocks of the Piedmont for the less resistant sands and silts of the Coastal Plain. Falls have invited the growth of cities all along this Fall Line; the oldest and best-known of the southeastern cities are located at the coastal margin or on the Fall Line.

Gulf Coastal Plain—The Gulf Coastal Plain is much larger than the South Atlantic. It extends from the Gulf to the mouth of the Ohio River and from the Rio Grande to Florida. The belted characteristics are much more pronounced than in the case of its Atlantic neighbor. Its alluvial plains are more numerous and of very much greater extent.

The same sequence of terrain, forest and soil mark the nearly concentric belts inland from the Gulf coastal margin that were noted along the South Atlantic, although the individual belts differ. The Gulf margin of the Mississippi delta and westward toward Texas is a coastal marshland of considerable extent. Drainage conditions are somewhat inferior to the South Atlantic margin and a smaller proportion of the new land is used for farming purposes. Parts of the Louisiana section of these coastal prairies are locally known as prairie tremblant. It is a strange country of land and water.

The Mississippi Basins—The St. Francis, Yazoo, Tensas, and Atchafalaya basins of the Mississippi River flood plain comprise the greatest single

diversity in the surface of the Gulf Coastal Plain. From the mouth of the Ohio River to the Gulf these flood plains of tributary rivers comprise a great province of fertile soils and flat terrain extending for more than 600 miles along both sides of the Mississippi. The peculiarities of drainage and the hazard of flood have combined to keep this great region from being all usable. The principal cities are located on the bluffs where the Mississippi flows toward the eastern margin of its flood plain. On the west side the cities are well back from the active flood plain on principal tributaries. Smaller towns are scattered over most parts of the plain.

The alluvial soils which have been deposited by the Mississippi and its tributaries once supported a river bottom forest of cypress, tupelo, and red gum. The principal farm income is from cotton, with rice, sugar cane, and truck crops as important specialties. On the newest land south of New Orleans where dry land is at a premium, the slightly higher lands which slope away from the bayous toward the interstream areas have localized most of the people and some unusual means of making a living.

Texas-Louisiana Coastal Plain—West of the Mississippi alluvial plain and north of the coastal prairies are the yellowish sandy loams of the Central Coastal Plain. The longleaf, loblolly and slash pine forest of southeastern Texas and northwestern Louisiana is the counterpart of the broad middle belt of the South Atlantic Coastal Plain. The belted characteristics of the Texas plain are much more pronounced than in any eastern state except Alabama. Rivers have made more extensive alluvial plains than are found east of the Mississippi. West of Louisiana the coastal margin is embayed like that of the eastern Gulf and South Atlantic.

Florida—Peninsular Florida differs from the Gulf and the South Atlantic coastal plains chiefly because of its 400-mile extension into the Atlantic and its lake-dotted central limestone plain. The northern or mainland section of Florida is similar to its eastern and western neighbors, but the peninsula has poorer drainage, poorer soils for the most part, and originally was less densely forested.

Rivers of the Southeastern Plains—More than any other part of the United States, the southeastern plains abound in rivers. There are many kinds; their characteristics are known far beyond their locality. Dominating the entire region is the Mississippi, the system with the greatest length and the greatest volume on the continent. But its enormity is not its only unusual feature. Throughout the ages its waters have built up a delta from the mouth of the Ohio to a point well out into the Gulf. Upon this alluvial plain the river follows a tortuous course southward, cutting off portions of its course by straightening, and building new land along its main distributaries in the Gulf. Through the years the level of the river bed has been raised; tributary streams have difficulty in gaining access to the main

stream. For seventy miles south of New Orleans the usual drainage pattern is reversed: the best-drained land is the river bank; interstream areas are first to be flooded.

Floods—High up on the bluffs south of Vicksburg, at the confluence of the Yazoo with the Mississippi, the United States Waterways Experiment Station has duplicated in small scale a model of the lower Mississippi River system, complete to the last cut-off. Here for ten years engineering experiments have been conducted which later will save time, money, property, and lives on the southeastern plains.[1] This station symbolizes the most important feature in the landscape of the Mississippi alluvial plains, the river itself. The problems connected with the control of the river during flood times have occupied the attention of Government engineers ever since the territory has been a part of the United States. The great volume of water carried, the meandering course of the stream, and the economic importance of the lands periodically inundated and left covered with the silt, combine to make Mississippi floods a national disaster. The system of levees, spillways, and overflow basins has left its mark on the countryside of the lower Mississippi.

Fundamentally, the floods of the lower Mississippi are related to the rivers of western Pennsylvania's Appalachian Plateau, the till plains of the Lower Lakes states, the Interior Highlands of Kentucky, Tennessee, Arkansas, and Missouri, and the melting snow of the Rockies and the Great Plains. Water control along the tributaries in the head-stream area must precede flood control on the lower Mississippi. But such work is very expensive; thus far only the Miami Conservancy District (1918), Tennessee Valley Authority (1935), Muskingum Watershed Conservancy District (1946) have been established and begun to function. This leaves the greater number of the offending streams without adequate control measures. So long as agricultural interests were the ones mainly affected by floods, the minimum was done. When urban and industrial destruction become great, control measures will be adopted.

World War II focused attention upon water-borne commerce and upon the shortage of industrial power; the conservation of productive lands and the causes of floods in the Mississippi system are receiving more attention. The most important agricultural lands of the lower Mississippi Valley states are included in these alluvial plains, parts of which are periodically flooded. Included also are urban centers and the major part of the commercial activity of these states. Less obvious, and therefore more insidious, is the destruction by runoff before the water reaches the permanent stream courses.

[1] During World War II the U.S. Army had tests made here which later were helpful in crossing the Rhine River.

Rivers of Texas—West of the lower Mississippi are a number of rivers which rise in the Southern Rockies and the Great Plains and flow across the dry plains of western Texas and Oklahoma. The longest flow to the Mississippi, but west of the Red River they empty into the Gulf of Mexico. Their principal use thus far has been as a source of water for irrigation. The principal streams are the Rio Grande, Brazos, Colorado, Trinity, and Sabine. The use of these streams for irrigation decreases toward the east. A few have installations for power development but industrial demands are not yet great enough to warrant further increase of facilities. Their flow is irregular which necessitates reservoirs both for irrigation and for power.

Along the coast subsidence has produced estuarine embayments giving great irregularity to the inner coastal margin. Seaward a series of long narrow islands, tied to the mainland at a number of places, gives to the Gulf Coast a high degree of regularity in contrast to the inner coastal margin. The lagoons between the off-shore beaches and the mainland are irregular and discontinuous. The Intracoastal Canal, recently built, connects the estuarine and river ports of the coastal area with the Mississippi. Deep-water ports have been created at Orange, Sabine, Port Neches, Port Arthur and Beaumont, all on a 32-foot canal. Galveston, Houston, Texas City and Port Bolivar are grouped on Galveston Bay and adjacent bayous. Freeport, Port Isabel and Brownsville are also deep water harbors. All of these Texas port cities will ultimately be served by the Intracoastal waterway.

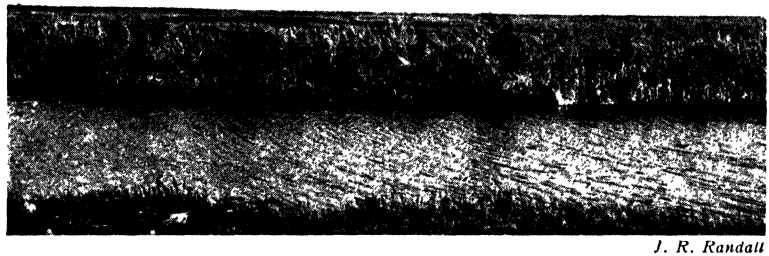
A number of the streams of Louisiana are in fact bayous, which in times past were, and in times of high water may still be, distributaries of the Mississippi and the Red rivers. These quiet streams have localized most of the villages and the individual homes in the Deep Delta country. Among the larger and more populous bayous are Teche, LeFourche and Barataria west and south of New Orleans. These bayous are often congested with the dense growth of water hyacinth which renders navigation difficult for the boats which ply these streams.

The rivers of peninsular Florida are unlike those of the rest of the Coastal Plain. Solution of underlying limestone has given rise to underground drainage and to a series of sinkholes extending through central Florida. The proposed Florida ship canal was to divert the headwaters of the St. Johns River westward to the Gulf of Mexico.

Water Power—Nearly all of the water power developments in the South are located on the southern Piedmont, where the number and character of the streams which flow from the interior are generally favorable for power development. The mountains receive from 50 to 70 inches of rainfall, fairly uniformly distributed, but with a minimum in late summer.

Before the Federal program began in the Tennessee Valley, many or most of these power sites were already developed. The Catawba, Saluda, and the Tallulah-Tugaloo are important power developments. The sites on the Catawba River system in the Carolinas have been almost completely developed. At the southern extremity of the Piedmont, the Coosa and Alabama rivers have important installations. These power developments are possible because of the relatively high head rather than the large size of the streams.

The proximity of the southern plains to the important power developments on the Tennessee system and the smaller projects in the Ozark Highlands has served to compensate for the dearth of power sites in the greater portion of the province itself.



J. R. Randall

FIG. 58.—A PORTION OF THE EVERGLADES IN FLORIDA, NOW A NATIONAL PARK

Wet Lands—All three divisions of the Coastal Plain in the south and east have great areas in need of drainage. Many of these districts are known to be productive when drained. But the reclamation of wet lands has progressed farther in the Great Lake states than in the South. While irrigation projects of enormous concept are being constructed in the western half of the United States, these southern wet lands are reclaimed at intervals and on a small scale. This is an important part of the remaining "horizontal" frontier.

Climate

Humid Subtropical—One of the world's agriculturally most productive climates is the humid subtropical. This type of climate supports a large part of the world's rural population. Summers are long and hot; winters are short and cold or cool, depending upon the latitude. Despite its south-

erly latitude and its situation well below the prevailing paths of cyclonic and anticyclonic storms, the climate of the South is characterized by occasional severe "cold waves," with temperatures near zero persisting for a few days. Many winters have freezing temperatures as far south as middle peninsular Florida. It is definitely a continental type climate, although modified by its southerly latitude. While rainfall is heavy, Parkins, a close student of the South for many years, has said that in his opinion "dry spells (mostly less than 30 days duration) are the most wide-spread and destructive of all weather phenomena to agricultural operators in the South." [2] Despite this, the cost of creature comforts necessary to support life in this climate is probably less than for any other region in the United States. When these extremes in temperature and in precipitation are anticipated in establishing farming practices, little damage results. But where they are infrequently experienced and no precautions taken, the damage is serious, as in Florida and along the Gulf coastal margin.

Not an Optimum Climate—Climatic conditions are more appropriately regarded as permissive rather than optimum for cotton and corn, two of the principal crops.

Daytime temperatures on the Gulf Coastal Plain are too high for too long a period to make a good corn crop. Autumn rains gradually make cotton unprofitable along the Gulf Coast; crops are damaged and harvesting is difficult. The eastern South is so humid that cotton bolls do not ripen so quickly as in the drier plains of Texas. Humidity also is conducive to insect pests of cotton and other crops.

Visher estimates that the Deep South receives more than one-third of its annual 55 inches of rainfall as downpours, many of which are very heavy. No other section of the United States has so many thunderstorms; no other has them at all seasons; no other has such a high average precipitation for thunderstorms.[3] Along the south Atlantic Coast and to a lesser extent along the Gulf Coast the tropical hurricanes of late summer and early autumn increase the total precipitation and may produce a seasonal maximum at this time of year. The growing season varies from 180 days along the southern border of the hill country of the Central Highlands to 220 days along the Gulf margin. Only along the Pacific continental margin is the dependability of a frost-free season greater than here.

West of the Mississippi River the direction of climatic change is east-west as well as north-south. This is true both for the amount of precipitation and the seasonal variability.

[2] A. E. Parkins, The South, New York, 1938, pp. 44–45.

[3] S. S. Visher, "Torrential Rains in the South," Geographical Review, Vol. XXXI, 1941, pp. 44–52; see also "Regionalization of the United States on a Precipitation Basis," *Annals of the Association of American Geographers*, vol. XXXII, 1942, pp. 355–370.

Lee Coast—Because the southeastern plains are on the lee coast of the continent, the region enjoys certain relative climatic advantages. No other coast has a steeper thermal gradient than eastern United States. This puts the southeastern plains with their subtropical climate within easy reach of the great urban markets of the Middle Atlantic Littoral. Spring advances toward the northeast, thus enabling the production of early fruits and vegetables to move northeastward in profitable stages.

Resorts—Northern urban centers are but a two-days' ride from the winter resorts of the south Atlantic and the Gulf coasts. This is a permanent natural resource, one that increases in importance as the Northeastern and the Middle Western states increase in population and purchasing power. Its enjoyment is by no means confined to the moneyed classes; many well-paid northern factory workers live in trailer camps and in tourist cottages during the slack season for their particular industry. The carrying power of the South is materially enhanced by this relative climatic advantage.

Where once summer climate was popularly supposed to militate against factory work, the trend during the past generation has not supported this contention. During World War II the rise of new manufacturing industries in the South was a striking feature of the growth in plant capacity. Air conditioning units were installed in the gigantic synthetic rubber plants of Texas and Louisiana. Government spending made these plants possible, but the experience gained will be important in postwar industry.

Forests and Lumbering

From eastern Texas to the Atlantic and north to Maryland, the natural plant life on the Coastal Plain has been mainly longleaf, shortleaf, and loblolly pine. Bordering this belt on the north is a transition belt in which deciduous trees occupy the better soils and the slopes. As in the northern states, the ground must be cleared in order to make way for the essential agriculture. By ax and fire the Coastal Plain was settled from the yellow pine of the south Atlantic coast to the scrub pine of central Texas. In one important respect the clearing of these plains differed from the north; natural reforestation took place much more readily and effectively on the southern plains.

Nature and Distribution of Forests—The longleaf, shortleaf, and loblolly pine of the Coastal Plain was not a uniform forest cover. Prairie vegetation was found on the so-called "black belts" of Texas, Alabama, parts of Louisiana, and the coastal borderlands of the Gulf and of the Atlantic. In areas of extensive swamplands the vegetation was predominantly cypress. Many of the poorer sand flats of the inner Coastal Plain

supported blackjack pine and other less useful trees. Oak was the principal tree found along the inner transition zone with the hills of the Appalachian and Central Highlands.

Mainland Florida was predominantly pine, but the peninsula had little forest vegetation in the southern third of the region. Even today in northern Florida forests dominate the landscape; only about 15 per cent of the area is in agricultural use, while in the southern part it is only 8 per cent in cultivation or in pasture. Coastal margins on the southwest have a mangrove stand which masks the contact of land and water. Here on the Coastal Plain of the mainland, there are stretches of coastal prairie land.

J. R. Randall

FIG. 59.—A TURPENTINE ORCHARD IN SOUTHERN GEORGIA

Lumbering—The history of commercial lumbering in the South reflects something of the same type of migration noted in the north, yet there were several distinguishing features. First, the movement was slower, there was no frenzied period in the lumbering industry. Lacking the phenomenal increase in rural and urban population of the north, southern commercial lumbering was dependent upon exports to lumber-deficient districts as they developed in the north. Second, destruction was not so complete in the wake of the westward-moving southern lumber industry. Third, forest reproduction was more rapid in the South than elsewhere in the United States. Not only do pines grow more rapidly in the South, a stand maturing in forty years, but they grow on a greater number of soil types than do hardwoods in the North. And, finally, land abandonment began very early in the South's history, it was more widespread, and progressed more rapidly than in the North. With these facts aiding in the natural reforestation of the South, commercial lumbering played a more persistent role than in the North.

The only states producing more than a billion board feet a year each are the Gulf coastal states, and with the exception of Arkansas, the lumbering is mostly in the pine forests. Mississippi, Louisiana, and Alabama have consistently led in southern lumbering. Less than half as important have been Texas, Arkansas, Georgia, the Carolinas, and Florida. The remaining states, all in the hilly Upper South, have never been important. Essentially the same relative grouping is preserved with respect to the area of their forest reserves.

J. R. Randall

FIG. 60.—TURPENTINE STILL IN SOUTHERN GEORGIA

Although most of the southern lumber cut is pine, the hardwoods once were its equal. Today the hardwoods are the basis for an important wood-products industry only in the Upper South. Seventy per cent of the Nation's pulpwood is now produced south of the Mason-Dixon Line.

Naval Stores Industry—A second important phase of the wood industry is the production of naval stores: pitch, tar, turpentine, and rosin. This industry began in North Carolina, moved into South Carolina, Georgia, and Florida as the older areas declined. Driving along the highways of southern Georgia and northern Florida one sees mile after mile of the tall trunks of loblolly pines with small earthen cups fastened at their most recent (lowest) scar. Occasionally the traveler sees an open-roofed building in a clearing in which the sap is distilled to secure turpentine and rosin. (Fig. 60.)

The size of the individual company's orcharding operation may reach 50,000 acres of pine forest, involving approximately 8,000,000 cups. Such a unit will keep in operation a still large enough to ship tank cars of turpentine and flat cars of rosin barrels to Jacksonville and Savannah for

export. Although termed naval stores, modern uses include rosin for linoleum, varnish, paper-sizing, and laundry soap. Even old pine stumps are pulled out and utilized in the production of naval stores and insulating board.

Tung—A commercial newcomer in the southern plains is the tung "nut" tree from which oil is extracted. For twelve years this crop has been supplying a high grade tung oil in competition with Chinese sources, commanding a somewhat higher price. Thus far there is no substitute for the qualities imparted by tung oil; paints, ink, linoleum, and particularly the growing line of plastics find this oil essential to their manufacture. The principal producing district today is in central Florida, south of Gainesville where in the neighborhood of 10,000 acres of tung trees are in production with some sixty trees to an acre. Another district borders the Gulf, west of Pensacola.[4] The by-product oil cake is sold as a stock food.

Wood Pulp—The ability to produce pulpwood in 25 years instead of the 60 or more in the northern forest areas, has acted as a stimulant for southern pulp manufacturers. Building board, insulation, kraft and newsprint paper are manufactured from materials formerly burned as waste. This recovery of wood product has become a major industry in the forested areas in the South. The extent and variety of these new wood products is increasing, but the net effect upon the southern lumber industry is not far-reaching as yet.

Colonial Character—Despite these uses, the lumber industry of the South still has many of the characteristics of a colonial industry. Approximately three-fourths of the lumber cut is exported as lumber; only one-fourth becomes raw material for southern wood mills. The role of wood in the economy of farmers is an important one. The ubiquitous woodpile is a necessary part of every farm home and cabin. Charcoal is

[4] Tung nut production:

	U.S.A.		FLORIDA	
1939	1,160 tons	$ 49,000	550 tons	$ 22,000
1940	11,000	660,000	4,700	282,000
1941	8,750	773,000	2,250	202,000
1942	16,350	1,501,000	3,700	333,000
1943	6,200	897,000	700	65,000
1944	30,400	3,044,000	7,000	665,000

Imports of tung oil, in pounds:

1925	101,554,000	1933	118,000,000
1926	83,000,000	1934	110,000,000
1927	89,000,000	1935	120,000,000
1928	109,000,000	1936	134,000,000
1929	119,000,000	1937	174,000,000
1930	126,000,000	1938	107,000,000
1931	79,000,000	1939	78,000,000
1932	75,000,000	1940	97,000,000

From Bur. Ec. & Bus. Research, Col. Bus. Admr., U. of Fla., Gainesville, Feb. 1945.

an urban necessity for the Negroes. No other source of fuel is available to many of them, even with bituminous coal so near. As has been observed, an estimated two-thirds of the nation's farm population lives on land classed as "fair" and "poor," much of it being in the South.[5] With them, the commercial forests, the turpentine orchards, getting out raw logs from small wood lots, clearing the cut-over lands and swamplands, cutting mine and highway-construction timber, and even burning charcoal, combine to make wood one of the main crops in many districts on the southeastern plains.

Mineral Industries

Mineral Resources—Although the mineral resources of the South are varied, petroleum has single-handedly raised this province to a position of national importance in the mineral industries. The other mineral resources of commercial importance include sulphur, phosphate, salt, and kaolin. Water power may be included with this group of natural resources of the South. These are not the kind of minerals which exert a strong pull on industrial location. An exception is the attraction of certain industries to the sources of hydroelectric power, natural gas, and the by-products of refining industries. Only two of these minerals, bauxite and sulphur, are confined to the South alone; in all others the South must compete with northern and western sources.

Petroleum Districts—There is one major oil-producing district in the South, the Gulf Coast field. It shares in one other field, the Mid-Continent. In 1939 Texas alone produced 500 million barrels or about 72 per cent of the Mid-Continent total for that year. Texas, Louisiana, and Alabama together produced in that year about 40 per cent of the world's oil.[6] In late 1943 oil was struck in southern Florida, the first

[5] All arable land is classified as of four grades:

grade 1	—	"excellent"	—	101,000,000 acres
" 2	—	"good"	—	211,000,000 "
" 3	—	"fair"	—	346,000,000 "
" 4	—	"poor"	—	363,000,000 "

(Estimates of the National Resources Board, A Report on National Planning and Public Works in Relation to Natural Resources and Including Land use and Water Resources with Finding and Recommendations, Part II, Report of the Land Planning Com., Washington, 1934, pp. 126–217.)

[6] United States Production of Crude Oil (in millions of barrels of 42 U.S. gallons).

YEAR	U.S.	REST OF WORLD
1937	1,279	762
1938	1,214	753
1939	1,264	811
1940	1,353	823
1941	1,405	809

Production of crude oil in the western hemisphere is 1,762,000,000 barrels; the refined capacity is 1,990,000,000; this is about 65 per cent of the world figure for each category.

on the Atlantic Coast; thus far its importance is not definitely known.

These southern oil and gas fields have been more spectacular in their development than the older Appalachian fields. This is in part due to the timing of their exploitation, and in part to the vastly increased use of powered machines. No other factor has accounted for such spectacular changes in southern economy since the rise of cotton. No other section has witnessed such an increase in exports, most of this development occurring within the past twenty years.

The yellow flame burning the waste gas off the oil blazes day and night from the oil fields of west Texas where dull gray derricks push up through the hard, brown earth of the cattleman's vast ranch lands. It burns in the swampland oil fields of the coastal prairies and the Mississippi swamps above and below New Orleans. It burns in the wheat-country oil fields of northwestern Texas and in the corn-and-cotton country oil fields of central and eastern Texas. It may burn in Florida. This is the dark picture. The bright side shows natural gas piped to the largest southern and some northern cities. There is also an increasing use made of the products from gas, such as lampblack made in Louisiana.

Chronic overproduction has characterized the oil industry ever since the east Texas field opened in 1926. Delirious heights in land speculation, dislocation of land-use over considerable areas, the rise of skyscrapers in the oil cities, and the vastly increased population consequent to the increased carrying power of the land, all of these, some believe, are ephemeral features of the regional economy.[7]

Oil has given rise to three related types of areal phenomena: (1) it has fostered rapid urban growth in and near the fields themselves: Fort Worth, Dallas, Amarillo, Shreveport, San Antonio, and Baton Rouge. (2) Even more startling has been the rise of commercial cities through which the oil and its products move to market: Beaumont, Houston, Galveston, Port Arthur, and New Orleans. Until World War II nine-tenths of the Mid-Continent field's oil went to Atlantic seaboard market and refining centers by boat. (3) The third type of phenomenon is the refining center, of which there are 83 in Texas, 45 in Oklahoma, 14 in Louisiana, and 10 in Arkansas (1940). Enormous affairs even by modern standards, these refining units are still expanding in the South.

Characteristics—The oil industry has four characteristics not common to other mineral industries, and from these characteristics a great deal of the frenzied nature of the Mid-Continent and Gulf Coast economy appears to stem. These four are: (1) the source of oil is unknown; (2) the

[7] One of every six Texans depended upon oil for livelihood in 1939. One-fourth of Louisiana's state income is from oil.

extent of the supply is unknown, (3) the supply is migratory in the sense that gas and oil do not necessarily remain fixed, and (4) the industry has its own transportation system.

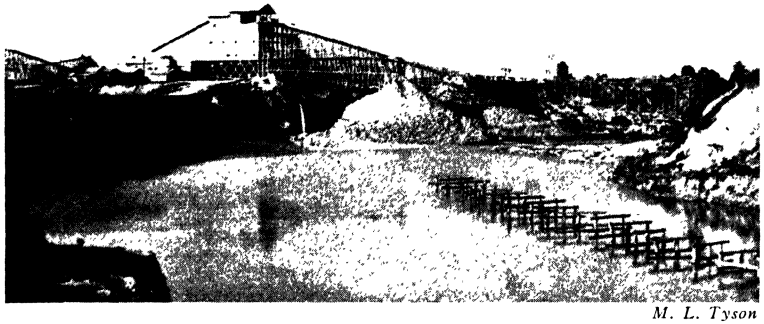
It will be recalled that anthracite coal presented a seeming anomaly in that its price remained fixed despite a diminishing market; the effect of this on the landscape of the anthracite country was described as abandonment. Oil presents another seeming anomaly in that low prices have but slight effect upon the number of wells and the volume of production. Unless the price of crude oil drops to a few cents a barrel, the owner of a gusher very likely will produce at a profit and is therefore uninterested in limiting his volume for the sake of conservation. Again, the market for oil and its products has been increasing. The effect upon the land use of the region embraced by these southern oil fields is apparent. Petroleum in the South, particularly in the Mid-Continent and Gulf Coast fields, has been an impelling factor in population movement and in industrial and commercial growth. Will the factors which determine the carrying power of this land for farming purposes, the commerce of port cities, and the relatively few industries which have come to oil and gas for fuel or raw material, alter the trend of growth?

To get most of this oil to market, the industry has built a system of pipe lines connecting the several producing districts with the Lower Lake cities. The first pipe line directly from Texas to New York, "Big Inch," was opened in 1943; it is now used for natural gas transport. Pipe lines also run to the Gulf ports which ship crude and refined oil to the Atlantic states (half the domestic market), and abroad. A great oil tonnage moves by the economical ocean tanker. The vulnerability of the tanker system of transport was demonstrated during World War II when the diversion of tankers plus the destruction by German submarines off the south Atlantic Coast caused an oil and gasoline shortage in the Northeastern states. The completion of the Intracoastal Canal in 1942 enabled barge-tows of oil to creep from Corpus Christi and Houston to the Mississippi, thence up stream to the Ohio, Cumberland, Monongahela, and Allegheny to head-stream terminals, thence by tank cars to the eastern cities. The principal limit to this type of oil commerce was the availability of barges and tugs.

Phosphate—Phosphate rock from the Tampa district in Florida comprises about four-fifths of the country's total consumed; also Tampa exports to foreign countries. A hundred-mile stretch of peninsular Florida is being rendered desolate by the strip-mining methods in use there. (Fig. 61.)

Sulphur—Seventy per cent of the world's and 99 per cent of Amer-

ica's sulphur is from coastal Texas near the Louisiana border.[8] Huge quantities (2,000,000 tons annually) are heaped upon the flat coastal prairie to solidify after extraction in molten form. Hot water (300°F.) is forced down a large pipe to melt the sulphur which is then drawn up through another pipe. For forty years Louisiana and Texas have enabled the United States to supply domestic needs. Galveston and Freeport now export more sulphur than the entire world consumed just prior to World War I.



M. L. Tyson

FIG. 61.—A PHOSPHATE MINE NEAR TAMPA

Salt—West and south of New Orleans there are five or six curious domes which rise a hundred feet above the flat coastal prairie, some are a mile in length. They have long been called islands; one of them, Jefferson Island, produces most of the salt exported from the southeastern plains. Yearly production is about one-fourth that of the state of Michigan.

Clay and Stone—The mining of white china clay in the North Carolina Piedmont has been the principal domestic source of this mineral used mainly in coating paper. The quarrying of marble and granite in Georgia's Piedmont has been an important industry with most of it exported.

Sand and Gravel—Today when the construction of roads, foundations, retaining walls, and many other structures require concrete, local sources of sand and gravel are very important. Widely distributed throughout the Coastal Plain are sand and gravel suitable for the making of concrete.

Fishing Industry

Role in the Economy—The fishing industry of the South has never occupied such an important role in the economy as in New England or the

[8] The only Louisiana town to produce sulphur now is Grand Ecaille, 425,000 tons annually.

Middle Atlantic Littoral. A smaller proportion of people have had to turn to the sea in order to eke out a livelihood. There are fewer good harbors; there has been no local carrying trade to open up markets for the seafood. Most of the important food fish of the northern Atlantic and Pacific coasts are lacking in these warm waters. But there is a fishing industry of some importance, largely inshore.

Florida—Out of an estimated 18,000 commercial fishermen utilizing perhaps 1,000 fishing boats, Florida has 5,000 men engaged in this industry. In commercial and recreational fishing Florida ranks next after Massachusetts. The most important fish is the shrimp which is used both fresh

J. R. Randall

FIG. 62.—SPONGE FISHING FLEET, TARPON SPRINGS, FLORIDA

and canned on a large scale. This state accounts for about half of the nation's catch of shrimp, with the industry operating out of St. Augustine, principally.

Florida has almost a monopoly in sponge fishing now concentrated near Tarpon Springs; financial control of this industry is largely in the control of the Greek Orthodox Church. Sponges grow in shallow water (6 to 15 feet) offshore as far south as Key West. Very long hooks are used to bring them to the surface. Where the water is deeper, divers go to the bottom for them. Processing sponges for markets consists largely of cleaning away the animal matter and drying them.

Gulf Coast—A quarter of the nation's oysters are caught along the Gulf Coast from Apalachicola westward to New Orleans. A large part of the oyster catch is canned before marketing. Neither the oyster nor the shrimp canneries are so large as those for other seafood in the Northeastern states.

Shrimpers' cabins and the drying platforms are rather common sights along the Gulf Coast from western Louisiana to Florida. They are espe-

cially numerous but less pretentious along the streams of the lower delta country south of New Orleans. The long stretches of quiet water between the offshore bars and the mainland attract many hundreds of fishermen operating in small boats. The Intracoastal Canal provides easy access to salt water from scores of coastal communities.

J. R. Randall

FIG. 63.—SPONGE WAREHOUSES, TARPON SPRINGS, FLORIDA

The largest part of the deep sea catch is menhaden, a fish sought for manufacture into fertilizer. Mullet, blue fish, grouper, and a few other edible fish are caught off the Gulf Coast. Promotional activity for the sea food of southern waters is less vigorous than in the Northeastern states.

Furs—The trapping of fur along the Gulf Coast is an important industry, particularly for the people who dwell along the marginal lands of Louisiana. For those who live on the long narrow strips of land which border the bayous and distributaries of the Mississippi River, the seasonal trek to the leased muskrat-trapping grounds is a diversion and often the source of the major part of the year's cash income. The value of Louisiana's annual fur catch is somewhat greater than for the Dominion of Canada.

Many nationalities are found in this half water, half land territory, but the French stock is most numerous. Most of the people are descendents of Acadians who managed to find this land of many flags; the isolation of the region has aided them in preserving many of the customs of their forbears.

Agriculture

An Agricultural Province—From Maryland to Florida, and from Florida west to Texas, the Coastal Plain and the Piedmont have long been an

agricultural province. Except for a few "islands" of industrial activity, this extensive plains region is still committed single-mindedly to agriculture. Within this large area there have been important regional differences in the nature of the crops grown. Today it is in the throes of fundamental changes in its cropping system. These changes are occurring on the Piedmont Upland, the Atlantic and Gulf Coastal Plains, and in Florida.

While the rest of the nation's farms have been mechanized, more than 60 per cent of the southland's acres are still plowed by mules and horses. Although little wheat is grown in the Deep South, some is still cradled. After the drought of 1933–36 thousands of western cattle came to the South. Hogs have also increased. The South always raised some hogs for local consumption; under Corn Belt feeding-methods these southern hog growers may produce for export. In Texas, particularly, the number of farms has declined and the size per farm has increased. World War II may have given the South an opportunity to establish a well-planned crop diversity and to end its long and disastrous yearly speculation in cotton and tobacco.

Nature of Agriculture—For the South as a whole, animals and their products have an annual value almost as great as cotton and its products. Virtually all of the Corn Belt crops are grown here, but corn is the only one of importance, although its importance is by no means uniform. Only east of the Mississippi River does the proportion of cropped land in corn rise above 30 per cent; Texas gives 13 per cent to corn; Georgia 39 per cent. In some counties of southern Georgia 60 per cent of the cropped land is in corn; yet cotton is still the source of 44 per cent of the cash income from crops (1941).[9]

Actually the diversity of crops grown in the South is exceeded only by those in California. Although the variety grown is large, the bulk of the acreage is devoted to only a few products. These agricultural lands have most of the United States' acreage for cotton, sugar cane, rice, tobacco, grapefruit, and peanuts. In hay, corn, wheat, fruits, and vegetables, the region is variously ranked, but in none as a leader. Some of these crops are of importance in the South principally because of their early appearance on northern markets, for instance tomatoes, melons, cabbage, onions, celery, and small fruits. Low prices of cotton and tobacco anticipate the day when these southern plains farmers will milk their own cows and work their self-sustaining gardens. There may be some money left for house paint.

The United States has a larger area than any other country of cultivable land with the optimum climate for cotton production. Under one set

[9] Peanuts, to replace cocoanut oil from the Far East, occupied (1943) 5,000,000 acres, —an increase of 155 per cent over 1941.

of conditions or another, cotton is grown from the Atlantic to the High Plains of Texas, indeed if the irrigated districts of the Rio Grande, Imperial Valley, and California be considered, it is grown from coast to coast. For so long a time so many people of the South have been dependent upon the cultivation and harvesting of cotton that this region generally is known as the Cotton Belt. It has come to depend upon foreign markets for half of its annual sales. These are the characteristics of a "colonial" system of agriculture; it is "export or die," and foreign markets are not to be had for the taking.

Cotton in National Development—The part played in American history by the exports of raw cotton to western Europe has been important. The purchasing power it created for the struggling Republic was so timed as to enable the economic structure to withstand the strain of the Westward Movement and the rise of manufacturing. This cotton was the raw material which gave British manufacturing its first important factory industry. For the South itself, it enabled the purchase of the staples and luxuries of life which a society of that type demanded.

Long before World War II the planters felt the pangs of the rise of nationalism in Europe, the Orient, and South America. The British Empire Cotton-growers Association was a symbol of the Empire's desire to foster the production of cotton in India, Egypt, Nigeria, and a few other districts. Brazil has increased its cotton acreage on old coffee lands. Japan was encouraging the growing of more cotton on Mindanao and in China.[10] Partial liquidation of the Empire may retard this program.

The United States has in effect cooperated with these other cotton growers in the sense that the Hawley-Smoot Tariff and the Agricultural Adjustment Administration have kept the price of cotton high enough to allow higher-cost growing districts to get started and perhaps ultimately achieve the low costs of quantity producers. Foreign sales restrictions have had similar effects. "Export or die" does not sound attractive for the future of the southern cotton economy. It has been asserted that mechanization of cotton growing will make 5 cent cotton profitable in the South. That price will make it more difficult for foreign cotton growers, but the dislocation of labor in the eastern cotton belt will be tremendous.

The Cotton Environment—The climate of the cotton belt in the United States has the 77 degree isotherm (summer) as the northern border. Along

[10] In 1939 the six major regions of cotton production were: United States, 11,817,000 bales; India, 4,136,000; U.S.S.R., 4,000,000; Brazil, 1,996,000; China, 1,900,000; and Egypt, 1,801,000.

Acre yields in the United States for several years have increased due to improved seed and methods of cultivation. In 1940 it was 253 pounds per acre, with yields running nearly twice that in some of the irrigated valleys of the southwest.

this margin the average date of the last killing frosts in the spring is April 10 and the first frosts of autumn come about October 25, so the frost-free season is approximately 200 days. Along the western margin the elevation of the Great Plains shortens this period to 180 days. Most of the cotton-growing region has from 30 to 50 inches of rainfall, most of it falling during the summer and less of it during the autumn than any other season. Improvements in cotton seed have pushed it into dry, not wet, regions.

Cotton is grown on practically all well-drained types of soil in the Cotton Belt. Generally the maturing is more rapid on the sandy loams of the southeast than on the more heavy clay soils. Early planting and rapidly growing varieties have been important in restricting boll-weevil damage. The Sea Island (long fiber) cotton is coming back on the lands of eastern Georgia as a result of the weevil controls. Within the past twenty years cotton has moved into the hot valleys of southern California, Arizona and New Mexico.

Eastern Cotton Belt—Within this large area three major cotton-growing districts may be noted: an eastern, a middle, and a western. In all three regions the absence of grass pastures has made a fundamental difference between the districts in which Corn Belt crops have been introduced and the Corn Belt itself. The role of livestock does not easily become a profitable part of the farm economy. Yet continued cropping is possible in most of this large area only with liberal applications of commercial fertilizers; approximately one-fourth of the gross income is spent for fertilizer; no other section of the United States approaches this figure. Cash outlay for seed, fertilizer, and the necessities of life have given rise to a system in which a very large proportion of the farmers are tenants of one sort or another, many of them on plantations, and many of them Negroes.

The ready credit accorded cotton farmers has been their undoing. Cotton has a ready cash value. It can be stored. It provides an acceptable basis for a bank or store loan, a factor which is often the deciding element in the situation. A century and a half of this sort of farming environment has made it very difficult for the farmer to change his farming practice. Every community agency and way of life has been patterned after the crop requirements of cotton. Even the ravages of the boll weevil could not entirely uproot it.[11]

[11] In the past, a country town and the adjacent farms could in effect become the monopoly of one enterprising family. For instance in Pelham, Mitchel County, on the inner coastal plain of Georgia, these conditions obtained in 1910. The Hand Trading Company bought all of the cotton in the surrounding countryside; the Hand Gin cleaned and baled it; the Hand mill crushed the seed. Another Hand mill spun the fiber. In October when the picking season opened, the Hand Trading Company began to pay off; the Pelham Bank was swamped with deposits; by February it was all gone.

As an example of how persistent such farming practices have become, 2,500 representative farms studied in 1930 revealed the following significant statistics: 89 per cent raised no swine, 48 per cent had no milch cows, 20 per cent raised no chickens, 60 per cent grew no vegetables, and on many farms no corn was grown. The soil on these farms was from fair to poor.

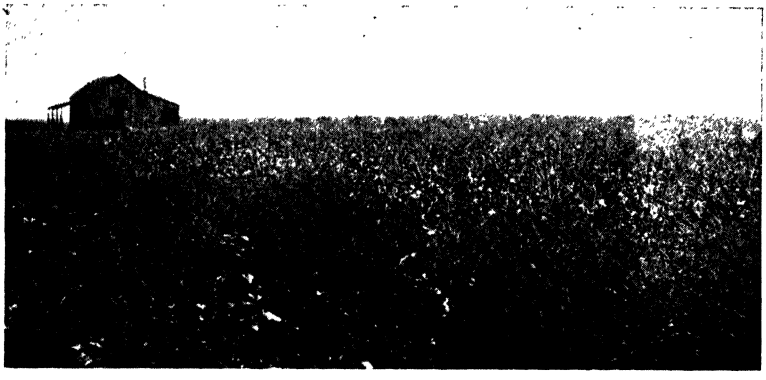


FIG. 64.—CABIN IN THE COTTON

Inner Coastal Plain—There are, however, instances where the dominance of cotton has been broken. *Life Magazine* (1940) reports that a bright red tomato (metal), not an iron general on a prancing horse, decorates the railroad station at the same Pelham, Georgia noted above. The Wingate farm in this community in 1940, with 600 acres of fair land, was devoted to the following crops: 200 acres in corn, 100 in Kudzu vine or other legume, 75 in pasture, 45 in tomatoes, 1 in sugar cane, and the remainder in wood swampland. Exclusive of government benefit checks, the income from the Wingate farm was 25 per cent greater in 1940 than ten years earlier when the principal crop was cotton. The 40-bushel average yield of corn for this farm was three times the average for the same county.[12]

Alabama Black Belt—Cotton was once king here, too, and as elsewhere, cotton's imperious demands on top of poor farming methods, wore out the soil. Today a regeneration has given wealth to the Black Belt, wealth based on cattle, milk and sweet potatoes. Local beef has been improved, marketed as feeder calves. The marbled steaks of hard fat that make top-quality beef call for corn-fattening. Corn does not do well in the state,

[12] The last cotton compress in Savannah, whose street traffic was once jammed with mule-drawn wagons as millions of bales were receipted in cotton warehouses each year, is now being dismantled for removal on Aug. 1, (1947). The cotton farmer has been succeeded by the tree farmer in a large section of the eastern South.

so after grazing a year, the calves are sold to feeders in the north or packers of veal or baby beef. Cotton still grows here but it no longer dominates.

Southern Piedmont—In the eastern cotton belt corn has a brighter future, perhaps, than any other field crop, but it is definitely no panacea for all agricultural ills. In many southern Piedmont counties of the eastern Cotton Belt, corn has become an important crop, particularly in Georgia where nearly 40 per cent of the Piedmont's cropped land is in corn. In some counties 60 per cent is in corn. Neither the soil nor the temperature and rainfall are optimum; the yield per acre is low, 14 bushels in Georgia (Illinois yields an average of 40 bushels); the cost of producing a bushel is much higher than in the Corn Belt; and the yield per acre and per farm is lower than in any section except New England and the Far West. Despite the higher price per bushel of corn in the Georgia Piedmont, the Department of Agriculture estimates a loss of from $1 to $3 per acre. How else can these farmers get a return for their labor? The answer may be the practice on the 315 acre farm of W. B. Hammett, near Inman, Spartanburg County on the South Carolina Piedmont, who fed the following in 1940: 6 head of horses and mules, 4 dairy cows, 2 young cattle, 150 chickens, 15 hogs. Fifty-five acres were in cotton; 35 in corn; 25 in lespedeza; 8 in oats; 8 in cowpeas; and 21 in fallow.

Middle Cotton Belt—The middle cotton belt includes all or parts of the alluvial plains of the major tributaries of the Mississippi River: St. Francis, Yazoo, Tensas, Red, Arkansas, Ouachita and Atchafalaya. Here the physical appearance of the cotton growing region differs sharply from the eastern area. It is predominantly flat land, larger fields, and nearly all in cotton. More than 60 per cent of the rural population is Negro, and the ratio of tenant farming (90 per cent) is higher than for any other district in the United States. Although the soil is fertile and the climate at the optimum, the yield of cotton is not a great deal higher than in the poorer eastern fertilized section. In the use of hand labor and the minor importance of livestock, these bottom lands are similar to the older eastern area.[18]

A representative cotton farm in the middle cotton belt will be 26 acres in size, raise a few sweet potatoes, a bit of sorghum, half a dozen chickens, two hogs, and one horse or mule. Farms will not average one milk cow.

[18] *It's the System.* 246 typical plantations studied by WPA in 1934 and in 1937, a "better" year.

	1934	1937
Average Size	1,000 A.	
Average Number of Cropper families	15	
Average Plantation Income	$2,528	$3,590
Average Cropper Income	$ 363	$ 400
Average Planter Investment	$31,378	$37,504

Allowing 6 per cent for investment, the difference for the planter is $645 in 1934 and $1,339 in 1937.

There is a higher rate of tenancy and a more industrialized organization by the planters. One planter from this region was articulate. Mr. W. A. Percy, a northern-educated man, in his *Lanterns on the Levee* suggests that sharecropping as a system of employment is the best solution for the type of labor in the cotton economy in many parts of the eastern and central South.[14]

Western Cotton Belt—The western or Texas cotton belt is the newest of the large cotton-growing regions in the South. Negroes never have constituted an important part of the population. The plantation system never obtained the widespread dominance it once did in the eastern and middle South. These relatively level black prairies have good soils and a climate that permits cotton and discourages the boll weevil. Farms are larger, tenancy is lower (60 per cent), and more of the farm work is mechanized. In Texas the size of the farm is not determined by the ability of a man with a mule to plow and cultivate, and with some help to pick 25 to 30 acres of cotton. On these relatively level western lands the introduction of machinery has resulted in larger farms. For nearly twenty years the cotton stripper has been used to pick cotton on the subhumid plains of Oklahoma and Texas. With this implement a Texas farmer can pick as much as eight hand pickers. With the Rust cotton picker four men can pick an acre an hour; the work of a hundred men picking by hand. Prospects for the Rust machine are bright in the sense that the field of its operation is not confined to the west margin of the cotton belt. On the other hand the introduction of such a machine in the more densely populated middle and eastern cotton-growing regions must inevitably have as an accompaniment widespread disemployment of cotton hands.[15]

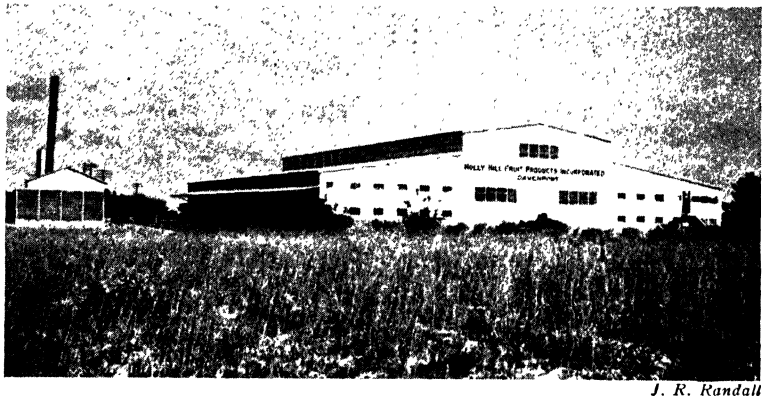
Tobacco does not appear in any of the farm-crop combinations of the western Cotton Belt. The improvements in the cotton plant and the methods of production have enabled cotton to cross the Texas prairies and on to the High Plains. Lower rainfall has destroyed fewer of the mineral plant foods in the soil. There has been no long history of continuous cropping of cotton and tobacco to deplete the soil.

When the eastern, middle and Texas cotton-growing areas are considered as one, effects of the vagaries of climate, particularly rainfall, upon cotton yield are perhaps obscured by other contrasting physical conditions. In wet years the higher and better drained lands give the best yields, while in dry years the alluvial and the clay lands have the highest yields. In "normal" years the most productive cotton lands are the alluvial basins and the black prairie lands of west central Texas.

[14] W. A. Percy, *Lanterns on the Levee*, Alfred A. Knopf, New York, 1934.

[15] During World War II Professor J. J. Petty of the University of South Carolina reported that much cotton was not picked for lack of labor.

Agriculture Along the Subtropic Coast—The largest part of this "left-over" region of the South is put to no productive purpose. A name frequently given to much of this region is "flatwoods." In this term we may see the vast stretches of sandy outer coastal plain, most of it in forest with clearings intricately dispersed, many of them occupied by bodies of water, some by cropped land, some by both. The drainage is poor, the soils generally very poor, and the autumn rainfall too heavy for inclusion in the Cotton Belt. West of the Mississippi delta country the flatwoods become coastal prairies with few trees. The growing season is longer than for any



J. R. Randall

FIG. 65.—A GRAPEFRUIT PACKING PLANT IN CENTRAL FLORIDA

other part of the United States—2 to 10 days longer over all parts of it. Where man has reclaimed parts of this coastal margin for agricultural purposes, the land use has become highly specialized in keeping with the climate, soils, and distance from large markets.

Citrus Fruit—The largest of these arable "islands" along the Gulf margin is the citrus-growing district of central Florida. The peninsula reaches nearly 400 miles into the warm waters of the Gulf of Mexico and the Atlantic. Although by reason of origin and excessive leaching, the soils are among the nation's poorest and all citrus trees are under partial irrigation, the situation with respect to northern markets and the subtropical climate have made citrus fruit the best known of Florida's crops.[16]

Districts—There are three principal producing districts on the peninsula: The central belt of limestone sinks and low hills which parallels the coast, the district around Tampa Bay on the west, and the attenuated coastal strip on the east coast bounded by Indian River. Both oranges

[16] Of the national total of 129,762,000 boxes produced in 1939, the southern states produced 48,000,000; and of this Florida grew about 32,000,000 boxes. Grapefruit presents a different picture: Florida produced 46 per cent of the nation's and 54 per cent of the South's total. (Univ. of Florida, Bur. of Bus. Res., February 1944.)

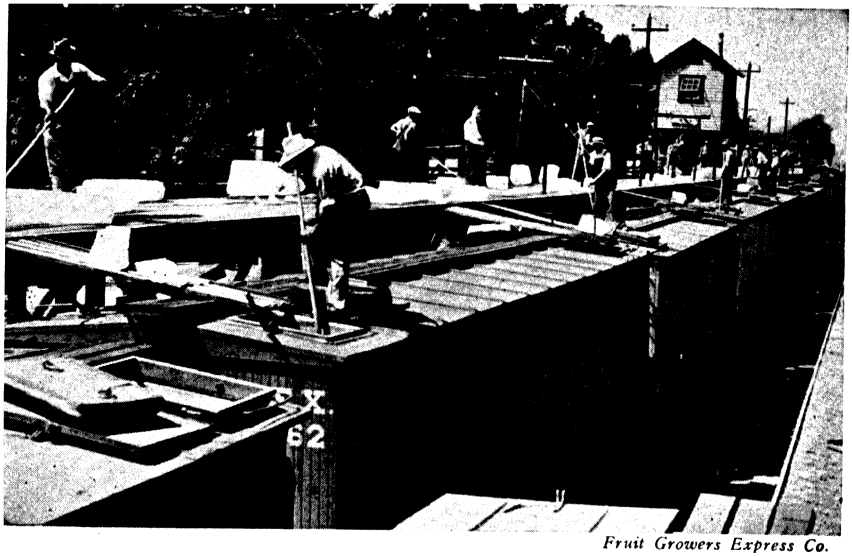
and grapefruit appear to do best in the central district where the low hills and many lakes offer some protection from frosts. Orange and grapefruit trees are grown in similar numbers; most orchards grow both. Limes are found only in the far south, below Miami and on some of the rocky keys. Lemons are so sensitive to winter temperatures that their production is of slight importance.

There are several score varieties of oranges grown in the state; many of them never attain the characteristic orange color, or they lose it after ripening on the tree. Many have a rusty appearance. To gain the necessary salesprovoking color, about half the orange crop is stamped "color added" after exposure to ethylene gas. Such a procedure is not peculiar to Florida oranges alone.

Marketing—The ease of reaching Florida citrus centers by truck from the north has led to marketing procedures not common to California or Texas citrus districts. In Florida citrus-growing constitutes a way of life. There is less "industrialization" and the holdings are smaller than the other two areas. Florida had to secure markets after California had become well established as a producer and shipper. Although cooperatives are known in Florida, they are by no means so large and powerful as in California. As late as 1935 Florida officially undertook to reduce the number of varieties, to make more rigid the enforcement of standards of the fruit, and to control the marketing and shipping aspects of citrus production. Since the imposition of strict regulations, a certain amount of "bootlegging" of fruit has taken place by free-lance truck drivers anxious to take back a full load. The largest producing and shipping center is Orlando, Orange County. The production of grapefruit has taken place faster than the market for fresh fruit warranted. As a consequence about one-seventh of the grapefruit crop is canned locally. Very little of the orange crop is canned. Florida's leadership in citrus fruit (6 million orange and 4 million grapefruit trees) is being challenged by younger orchards in the Rio Grande Valley of Texas, with 4 million grapefruit and 2 million orange trees.

Vegetables and Small Fruit—Even in the heart of the orange and grapefruit country of central Florida, the production of vegetables and small fruits for northern markets is generally an accompaniment of agriculture. Capitalizing upon the situation of this subtropical region with respect to large luxury urban markets of the north, hundreds of communities grow the staple vegetables. Deland, Volusia County, may be taken as a representative general farming district of the peninsula. It is located east and north of the principal citrus areas, although oranges are grown. Grapes, strawberries, celery, string beans, tomatoes, cabbage, carrots, beets, potatoes, white and sweet, eggplant, peppers, okra, cucumbers, and water-

melon are grown for export. Corn is the only field crop; commonly the melons are grown with the corn. Recent specialties have been Easter lilies and ferns. Dairying and poultry are making some headway in Florida agriculture, but the state still imports three-fourths of all poultry consumed, and 450,000 dozens of eggs. By alternating the vegetables with the root crops, the farmers spread their risk over a three-crop season.



Fruit Growers Express Co.

FIG. 66.—ICING STATION FOR LETTUCE IN CENTRAL GEORGIA

Sanford, Seminole County, ships 2,000,000 crates of celery grown on the 5,000 acres devoted to this crop. (Fig. 67.) Subirrigation is practiced. As in all other parts of Florida except the south, fertilizer is an important factor in production. By staggering the planting for several weeks after July first, transplanting in September, cutting proceeds after the New Year over a period of seven months. Another specialized region is the Hastings potato district, near Palatka.

One of the newer vegetable-growing districts is around the shores of Lake Okeechobee in the south. In 1940 Clewiston and six smaller towns shipped 6,000 carloads and 2,500 truck loads of vegetables to northern markets. In this reclaimed portion of the fresh-water Lake Okeechobee, 40,000 acres of black muck soil are worked by Negro labor living under conditions which at best leave much to be desired. Green beans are the most important crop; seven-eighths of all this type of bean is grown in Florida and half of the state's production comes from the Everglades section. Tomatoes, peas, lima beans, celery, cabbage, peppers, potatoes, or-

anges, and avocados are also grown. This is one of the few districts in Florida which have something of the "factories in the field" atmosphere to be noted in the agriculture of several districts in California.

Another specialty is the cane sugar grown on land reclaimed from the Everglades. Fourteen hundred acres of cane are grown at costs reputedly lower than any other part of the United States. There is no refining done here; the raw sugar is shipped to Savannah for refining.

Rio Grande Valley—Another island of productivity in the prevailing wasteland of the coastal prairies is the irrigated valley of the lower Rio Grande. On the Texas side of the river lies an agricultural community extending about sixty miles upstream from Brownsville. Nine thousand

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FIG. 67.—CELERY FIELD, SANFORD, FLORIDA

citrus growers and a few hundred vegetable growers hustle three million boxes of oranges and nearly six million boxes of grapefruit and lemons to local canneries, to cars for mid-western markets, and to boats for New England cities and for export to England. Out of a United States total of 75 million boxes these figures may seem small, but most of Texas' trees are not yet of full bearing age.

In 1904 the railroad came to this cattle and cotton country. When in 1912 the lurid land promotion began, the Brownsville area had very little land for sale. Speculation moved upstream for sixty miles; today the modern small cities of Laredo, Harlingen, San Benito, and McAllen are centers of the irrigated citrus districts of the lower Rio Grande. Today land changes hands normally and without emotion.

It is the economic rather than the physical conditions under which grapefruit and some oranges are grown here which are unique. Of the nine thousand growers of fruit and vegetables, not more than a third are year-round residents of the Valley. The state sets a date when all grapefruit

must be off the trees, because of a fruit fly infestation. The packing company which buys the fruit does all of the picking. Local canneries take most of the grapefruit; one-third of the Valley's crop is canned as juice. In 1938 nearly five million boxes of grapefruit were canned, of which only 200,000 were meat. The citrus "deal" (harvesting and selling) begins in October and lasts all winter. In selling it is every man for himself, so prices

De Vilbiss Company

FIG. 68.—THE TRACTOR HAS ENTERED THE LOUISIANA SUGAR CANE FIELDS

are cut by the small producer. He may get $4 per ton for grapefruit, while in Cleveland, Ohio, it brings $200. All of these citrus districts face the frost problem and the competition from California's more highly organized and controlled citrus association.[17]

The irrigated land is all in the valley of the Rio Grande, pumps being necessary in order to lift the water to each of the levels on which agriculture takes place. There are perhaps thirty different irrigation districts along the lower Rio Grande supporting an agricultural economy based on cotton, corn, sorghum, sugar cane, vegetables, and citrus fruit. Due to its southerly latitude, winter vegetables are produced on many of the farms:

[17] California burns oil to prevent fruit loss by frost. Florida has recourse to wood, little stacks of which are found in some Florida citrus orchards.

root crops, peas, beans, onions, and broccoli. Livestock is as yet only a minor source of farm income, although poultry and dairying are increasing.

Sugar Cane Parishes—Another district of specialized agriculture in this subtropic coastal region is the cane sugar-growing parishes of southern and central Louisiana. Despite the populous and apparently prosperous landscape, they constitute an exotic and uneconomic feature in southern agriculture.[18] There is no rotation of crops and there are few if any sup-

J. R. Randall

FIG. 69.—A CANE LOADER, BAYOU TECHE, LOUISIANA

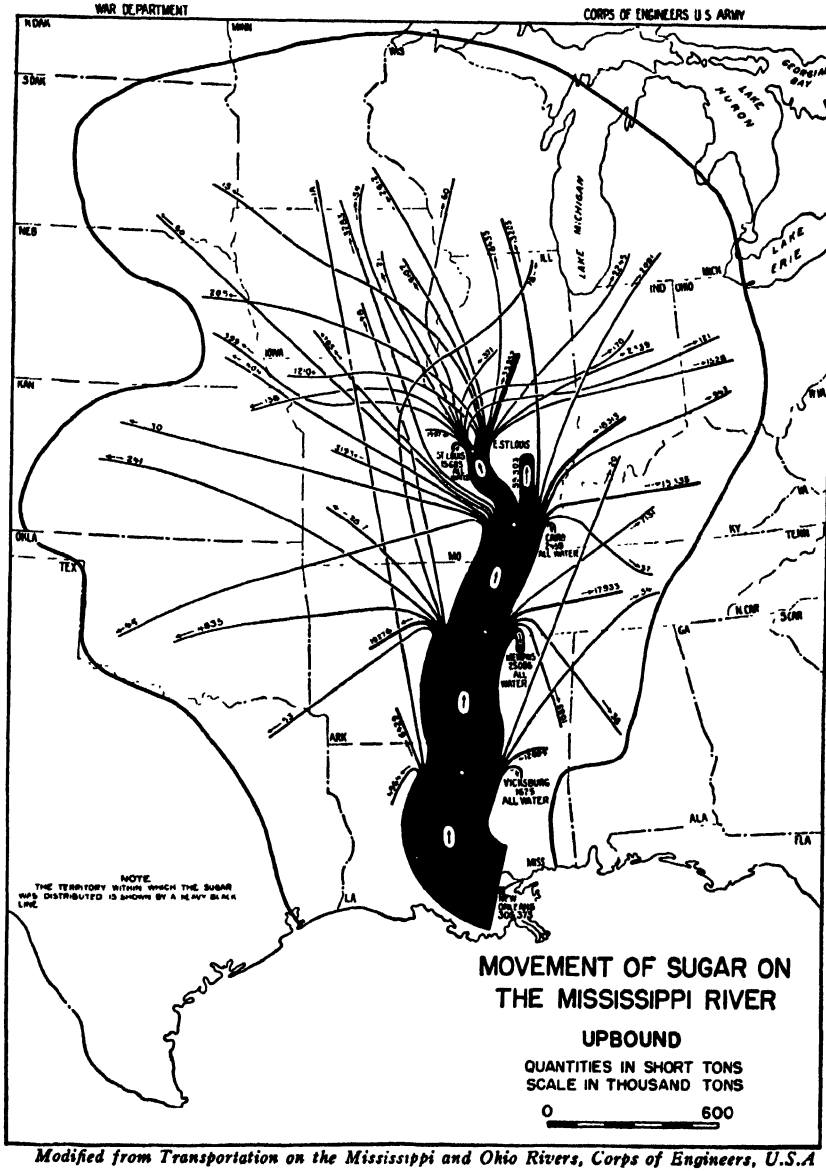
porting crops grown in these cane lands. Like the other specialized farming districts of the Gulf, these are arable islands in a region predominantly forested.

Cane sugar as produced here calls for heavy capital investment in drainage, transportation, and mill equipment, heavy labor costs, and annual planting due to its northern latitude. Production is maintained by a tariff, at the behest of this cane region and the more widespread northern and western sugar beet growers. Near-by Cuba, one of the world's most economical and the only unprotected sugar producer, has had to accept quotas of import imposed by the principal buying nations.

Much of the land in the sugar parishes is too poorly drained for cropping purposes, but cane fields occupy most of the cropped land west and northwest from New Orleans. The river bottom soils have no more profitable crop than sugar cane.

[18] Approximately 5 per cent of our sugar consumption comes from these Louisiana sugar parishes. The bulk of it (40 per cent) comes from American possessions, chiefly Hawaii; Cuba supplies 30 per cent and the remainder (about 25 per cent) is from domestic beet sources.

Bayous La Fourche and Teche have localized a great deal of this cane acreage. It is an unusual landscape for the United States: the flat fields on either side of the Bayou are large but irregular in pattern; dominating



Modified from Transportation on the Mississippi and Ohio Rivers, Corps of Engineers, U.S.A

FIG. 70

the landscape are the huge gray refineries, each surrounded by the iron-roofed cottages of the Negro and French-speaking canefield and refinery employees. In the fields are the ubiquitous loading devices and the narrow-gauge tracks. Associated with some of the refineries, is the by-product, bagasse or dry stalks, manufactured into wall board.

Rice—Another exotic landscape is found farther west in Louisiana and in Texas, where are located the major rice-growing districts of the flat coastal grassland. This coastal prairie has two sources of agricultural income: rice and beef cattle. Low dikes surround the rich fields. Except for flooding, the methods of cultivation and harvest are similar to those of the wheat-growing areas of the northern plains. As in the instance of cane, the cultivation of rice calls for large capital investment. Unlike cane, its existence is not due to tariff protection; mechanization has enabled these rice growers to meet the world price set by cheap labor areas of the orient. The Texas-Louisiana rice production is about half of the nation's total, and approximately 1 per cent of the world's figure.

Livestock—The earliest use of Texas and Florida lands was for grazing of cattle and hogs, generally of a poor type. It remained for the automobile to increase markets for livestock products and for the eradication of cattle tick before an efficient feeding animal came to dominate the outer portion of the South. The resort industry of peninsular Florida was primarily responsible for trebling the amount of milk from its dairy cows while increasing the number only 13 per cent between 1910 and 1940. The seasonal aspect of the tourist industry makes it difficult to establish a permanent dairy industry large enough for peak satisfaction.

There is no uniformity to the type of livestock industry; generally dairying is dominant near the cities, and where cropped land is rare the grazing of beef animals is often important. Corn is nowhere an important crop along the Gulf margin, so the swine industry utilizes skim milk and garbage; there are still hogs grazing in the cutover lands which look strikingly like the old razorback of pioneer days. The last area where stock raising dominates the farm economy in Florida is far south on the peninsula in the vicinity of Lake Okeechobee, where a savanna-like sandy plain was the last stand of the pioneer-type of open range grazing.

Farther west along the Gulf plains the effect of introducing the big hump-backed cattle from India and Africa is evident. These cattle are apparently immune to the parasites and the effects of the subtropical climate. The next large center of dairying is in Louisiana where the New Orleans market of half a million people has stimulated the production of dairy products. There are about three times as many dairy cattle in Louisiana as in Florida. The industry varies widely in the size of its units from the large herds in the vicinity north and west from New Orleans to

the prairie tremblant south of the city where the luxury of a few yards of dry ground means a few head of cattle. It is alleged that cows swim from one dry ridge to another in search of pasture.[19]

In the urbanized region around Birmingham, Alabama, dairying has increased in proportion. Between the southern Appalachians and the Louisiana delta is the only major development of condenseries, cheese plants, and meat packing. It is the only district where silos are common to farmsteads. North and west of New Orleans nearly a million head of beef cattle graze in the valleys of the Red and Ouachita rivers. About that many swine are produced on the delta and rice areas west of the city.

The rise of Texas cities on the black lands of the interior and the growth of the port cities in the south have largely accounted for the development of a very large dairy industry; the volume of milk is about ten times that of Florida. The state as a whole ranks fourth in the United States in milk production. Poultry is important near the cities in Florida, Louisiana, and Texas. The raising of turkeys is a specialty of one south Texas community; in 1939 it exported 1,300 car loads of turkeys to northern markets.

Sheep are grazed on the pine cutover lands of northern Louisiana and in southwestern Texas particularly. Also in this part of Texas, centered about Kerrville and Rock Springs, is the greatest center for goats; three million goats produced three-fourths of the nation's mohair in 1939.

Manufacturing Industries

Antecedents—Despite an early start, manufacturing in the South did not for a long time successfully compete with agriculture as a likelihood. Parkins speaks of an 84-spindle cotton mill in eastern South Carolina in 1790; paper, glass, flax, hemp and gunpowder were classed by the census of 1870 as "firmly established" in the Southeast.[20] But these were isolated instances and did not indicate a general industrialization of the South.

The markets for raw cotton made its cultivation very attractive to southern people. The northeastern states were denied this choice of alternative opportunity. During the long-time dominance of agriculture, changes in manufacturing were taking place in the Northeast. It mined the coal, copper, and iron. It built the farm machinery and railroads which enabled the westward-moving people to occupy the heart of the continent. It built

[19] On some of these chenieres there are automobiles for only a mile or two of road. They are remote from tax collectors; when a man bought a new car he did not bother about a new license plate for it. A visitor to one of these island-like ridges found six cars with plates bearing six different years, 1933 to 1939. (Reported by Kane, *Deep Delta Country*, New York, 1944.)

[20] Quoted from A. E. Parkins, The South, New York, 1938.

the Navy and Merchant Marine. While the presence of good cheap farm land and an increasing population gave a steadily expanding domestic market, the North more or less monopolized the manufacturing.

The South seriously began its manufacturing late in the nineteenth century, a generation before the domestic market leveled off as a result of the end of cheap farmlands, imposition of immigration restrictions, and a de-

Farm Credit Administration, U S. Department of Agriculture

FIG. 71.—THE MULE IS MISSING IN THIS PICTURE

clining birth rate. The railroads had been built, skyscrapers and houses constructed and farms equipped. Southern markets had to be secured in competition with northern manufacturers.

Characteristics—Today manufactures of the South are much less free from northern competition than are farmers. There are very few industries found only in the South. Only in such items as tin smelting, naval stores, cotton seed products, Celotex, kraft paper, and oils from the tung, peanut and cotton seed has the South anything resembling a monopoly. Her most important industries are those with northern competition: refining of oil, sugar, sulphur, and aluminum, cotton spinning and weaving, ship building, the processing of tobacco and leather, and the manufacture of furniture and flooring.

The overwhelming proportion of the manufacturing of the South may be termed simple manufacturing. The value added by the manufacturing process is low; interplant dependence and the development of diversified industrial landscapes are rare. The South is still essentially an agricultural region. The proportion of her people engaged in manufacturing varies from 29 per cent in North Carolina to 8 per cent in Mississippi.[21]

Manufacturing Districts: Piedmont—No such term as manufacturing "belt" may be used to describe the localization of manufacturing in the South. The term industrial "crescent" has been used to describe the distribution of industrial centers on the inner Piedmont, southward from Virginia to central Georgia. Even here there are no cities of half a million population. Most of them have but one or two large industries; and functional relationships among the plants, so characteristic of the north is of minor importance.

This inner Piedmont crescent of industry is predominantly cotton textile manufacturing; in North Carolina tobacco and furniture are important. One is seldom out of sight of a cotton mill while driving through the inner Piedmont of the Carolinas.[22] These mills and the homes of their employees are so uniform in appearance throughout the Piedmont as to constitute a type. Whereas the New England cotton mills are of brick, multiple-storied, and invariably on a stream in some city, Piedmont mills are two stories at most, and set apart from congested urban areas. More often than not, it will be the only industrial payroll in the town. Although power development preceded industrialization in the Piedmont, there are many mills located near power sites, "just in case," as one observer put it.

Cotton Textiles—The southern Appalachians' most important manufacturing industry is based upon the South's most important crop, cotton. Yet for a century this was predominantly a New England industry. Its trek to the Piedmont constitutes the most spectacular industrial migrations in all United States industry. (Fig. 28.) It is the only nationally dominant manufacturing industry in the South. The Carolinas and Georgia have most of the mills.

The impelling factor in the migration was cheaper labor in the Piedmont, although power and fiber costs and low taxes were contributing factors. It was not a sudden shift, its acceleration being most rapid since 1880.

[21] Others are: Louisiana 11, Alabama 15, Georgia 17, Florida 10 (despite its 55 per cent urban dwellers), Virginia 18, and South Carolina 20.

[22] Of South Carolina's manufactures, 67 per cent is cotton textiles. North Carolina has cotton 39 and tobacco 38 per cent.

TABLE 10

ACTIVE SPINDLES

YEAR	SOUTH	NEW ENGLAND
1840	181,000	1,597,000
1860	324,000	3,859,000
1880	561,000	8,632,000
1900	4,369,000	13,171,000
1930	17,000,000	11,350,000
1937	18,000,000	7,000,000
	ACTIVE LOOMS	
1860	7,000	118,000
1880	12,000	212,000
1930	344,000	268,000

Whereas cotton mills in New England have been localized in a few cities in three relatively small districts, southern cotton mills are widely scattered. Every southern state manufactures cotton to some extent. In recent years Texas has experienced the most rapid rate of increase; in 1936 there were 21 mills in the northeastern part of the state, with a total of about 250,000 spindles. As these Texas mills increase their cotton manufacturing, New England as the principal buyer of Texas cotton, is at a disadvantage.

Mills in the Piedmont generally consume approximately the quantity of cotton grown in these states.[23] Many Piedmont mills supply yarn to New England mills for weaving; it is in spinning that southern mills have their greatest advantage. Knitting is increasing in central Georgia and central Alabama. Finishing and dyeing call for labor more skilled than the spinning and weaving mills, hence large quantities of southern textiles are sent to the New England and Middle Atlantic states for finishing.

Labor—Nearly all of the labor is from the hilly counties of the southern Appalachians and Interior plateaus. It is predominantly Anglo-Saxon; few Negro laborers are employed in the mills. Although this labor is somewhat cheaper than its northern counterpart, there is now no great disparity in wages; in 1936 labor was from 30 to 68 cents an hour in Piedmont mills; in New England mills it was 33 to 68 cents an hour. In 1930, 36 per cent of Piedmont cotton mill workers were women and about 5 per cent were children; not greatly different from the New England mills.

Markets—New England's cotton industry in the past has practically monopolized the exports of American cotton cloth. The loss of these markets to Japan and Brazil was therefore more serious to the northern

[23] In Georgia mills only a small part of the cotton was from that state; it was not of high enough quality.

mills. Although labor costs, modern machines, power and fiber costs have combined to give the southern mills a price advantage on standard grades of cloth of from 10 to 18 per cent, the differential has narrowed in recent years.

The southern manufacturers of cotton have turned increasingly to the motor truck for less-than-carlot shipments. Several states of the Upper South took advantage of this by taxing in one way or another the trucks and gasoline of this new service. Specifications as to load limit, length of the truck and trailer, hours of work and the like were all determined and rigidly enforced. This practice has for several years been the object of much inquiry and some legislation, some of it retaliatory in nature. During World War II it became a "bottleneck" in the production of uniform cloth and military equipment, first for Lend-Lease and later for prosecution of our war effort. Before Government intervention, the states cooperated in removing or rendering innocuous these barriers to interstate commerce.

By-Products—Cotton by-products include cottonseed oil, cake meal, and linters. Southern mills manufacture 97 per cent of all cottonseed oil made in the United States.[24] The middle and western cotton-growing sections localize by far the largest number of mills. More common than grain elevators in the North, are cotton gins and compressors in the South; they are usually small affairs employing but a few men; taken as a group they constitute an important industry of the Gulf section of the South. (Fig. 71.) The season of activity is short, generally from October to the first of the year.

Tobacco—Sharing in the industrial landscape of the Piedmont, and dominating it in North Carolina, is the manufacture of tobacco.[25] Nearly all of the large tobacco factories are in the cities of the North Carolina Piedmont: Winston-Salem, Durham, and Reidsville, all within a radius of 75 miles. These large modern mills concentrate on cigarette manufacture. In North Carolina the value of tobacco grown is five times that of cotton or corn, and its manufacture is about twice the value of cotton and its products, the second-ranking industry. Furniture, knit goods, and fertilizer, the state's next most important industries, are together less than half as important as tobacco, on the basis of value added by the manufacturing process. Localization of the factories in North Carolina illustrates the influence of market as well as raw material; although the Upper South raises most of the tobacco manufactured in the North, North Carolina is by far the principal southern grower and manufacturer.

[24] George F. Deasy, "Geography of the U.S. Cottonseed Oil Industry," *Economic Geography*, Vol. 17, 1941, pp. 345–352.

[25] See Ben F. Lemert, The Tobacco Industry of the Northern Piedmont, Durham, 1939.

Wood Products—Furniture—The third important member of the industrial triumvirate on the Piedmont is the manufacture of furniture from near-by Appalachian hardwoods. The principal center of its manufacture is High Point, North Carolina. Despite its local importance, the value of Carolina furniture is less than half that of Michigan. Wages are low in these mills, partly in response to the employment of wives in the local cotton textile plants.

Sawmills—Much more common to the South generally are the sawmills, most of them small, scattered throughout the pine belt of the Coastal Plain. Flooring mills are found at many places, although dependence upon hardwood has localized most of them in the Central Highlands of the Upper South. Memphis is the principal flooring manufacturer in the South.

Wood Pulp and Paper—Wood pulp and paper are manufactured at many places in the southern pine belt. The manufacture of kraft paper for bagging and wrapping purposes has taken place in the South for forty years. Insulation and building board have recently become important in the use of wood waste and bagasse or pressed sugar cane stalks. With the recent perfection of processes begun by the late Dr. Charles Herty, it is possible to make newsprint paper from ordinary slash pine.

The manufacture of this type of paper appears to have a bright future in the South. With the decline of available pulpwood in the North, the difficulties involved in importing it from Europe, and current dominance of Canadian pulp, the recent successes in the use of southern woods border on the spectacular. Estimated reserves of wood, the rate of reproduction and growth, and their accessibility, place the South in the front rank of potential newsprint makers.[26] The heavy power requirements are likewise readily met in the southern Piedmont.

The actual rise of the industry however, is conditioned by a number of factors not within the power of the South to control. For one, the price of Canadian pulpwood can well be lowered, which would reduce the apparent advantage of the South. Again, most of the paper plants are in the Lake states and the interior of the Middle Atlantic states, thus placing southern pulp mills at a disadvantage. So far, most of the southern pine used has been in the manufacture of kraft paper, a tough brown wrapping paper.[27]

[26] For instance, near Savannah two paper mills employ 7,000 people, have a reforestation program on a million acres of land owned, or on long lease in Ga., Fla., and So. Car. (N.Y. *Times* 6–28–47)

[27] One recent paper specialty is the manufacture of cigarette paper from flax near Asheville, North Carolina, by a recent *émigré* from France. His substitution of flax for the linen rag base in cigarette paper will create a market for 100,000 acres of Minnesota, North Dakota, and California flax, according to the company. This concern elected to be near its market rather than the source of its raw material.

Wood Specialties—One of the important wood product specialties in the southeastern plains is manufactured at Laurel, Mississippi where the Masonite Corporation turns out several types of board made of wood fibers. In the manufacture the fibers of small pine trees are torn apart and recombined under heat and pressure. Approximately 2,000 persons are employed in this mill, largest in the state.

Another specialty is the extraction of naval stores from dead pine stumps and top wood in a large plant near Pensacola, Florida. Southern methods of logging have left many thousands of these pine stumps; trucks from the distillery range for miles around bringing in these very slowly decaying obstacles to cultivation of the cleared land.

Oil Refining—Texas, Louisiana, and Oklahoma dominate the refining of oil in the entire South. The larger plants are located at Baytown, Port Arthur, Port Neches, West Dallas, San Antonio, Houston, Amarillo, and El Paso in Texas, Tulsa and Oklahoma City in Oklahoma, and Baton Rouge in Louisiana. There are many others of smaller size in the same states. Thousands of miles of pipe line connect these refineries with the fields of Texas, Oklahoma, Louisiana, and Arkansas and the ports. In all, 40 per cent of the nation's refined oil is produced in this part of the South.

A Refining District—On the outskirts of Baton Rouge is an enormous refinery, reputedly one of the three largest in the world, covering approximately 500 acres of land. The landscape is that of a vast forest of tubes, pipes, tanks, and towers. From this enormous and complex plant comes part of the commerce in oil products. Baton Rouge is served by pipe line and ocean tanker.

By-Products—From such refining centers come carbon black (from natural gas), and synthetic rubber (Buna S). Three-fourths of the nation's carbon black comes from these Deep South refineries. From the youthful but very large (30 acres) copolymer plant nestled in the hundreds of acres of the oil refinery at Baton Rouge, comes a large part of the Buna S rubber from petroleum production. (In 1943 more than half of Buna S rubber came from alcohol; this type of rubber plant is located farther north in West Virginia, near the source of alcohol). At Baton Rouge, Buna S rubber is made from butadiene (a product of the oil refinery), and styrene (a product of coal tar and of petroleum refining). The butadiene is piped directly from the Baton Rouge oil refinery; the styrene comes in tank cars from Texas City.

Butyl—There is another kind of synthetic rubber made at Baton Rouge. It is butyl rubber and its present manufacture is a unit in the midst of the great oil-refining center itself. Its constituents, butylene (a refinery gas) and isoprene (from turpentine) are of local origin.

The enormous capital outlay for such types of rubber plants is appar-

ent from the physical appearance of the structures: Steel towers rising 170 feet, enormous globular tanks, and miles of pipes of various colors.

Role in Southern Manufacturing—The importance of the manufacture of synthetic rubbers in the economy of the South may be appraised, in part, by the number and size of the participating centers of production. So far as number of factories is concerned, there were nine cities and towns in Texas, and three in Louisiana engaged in making the rubber or some of its constituents.[28] Both of the principal types of synthetic rubber are southern-made, Buna S and Butyl. The ingredients for both types are local. The Buna S plant at Baton Rouge is a "standard design" plant, that is, it is being duplicated exactly at other centers in Texas. During and for a period after the War all rubber made in the United States was manufactured by this process. All of these Buna S plants are owned by the Federal Government, but operated by a northern rubber concern or by a chemical concern, depending upon the nature of the plant in question. The Butyl process is thus far the creature of petroleum chemists.

These new rubber plants employ relatively few persons; they rely upon skilled personnel. But it is a completely new source of employment in a region which seeks industrial payrolls. What is their future when crude rubber from the western Pacific is available in greater quantities?

Iron and Steel—Although there were charcoal iron furnaces in Alabama and Georgia by 1810, and in Texas by 1840, the manufacture of iron and steel in the South may be regarded as a new industry brought there by the demands of World War II. New plants have been constructed at Houston, Fort Worth, and Galveston. The principal market for their product is the hundred-odd new shipways that were built along the Gulf margin after the lend-lease program started.

Prior to the recent war, the most widespread of southern iron and steel markets were the small foundry and machine shops found in every state but Mississippi. Birmingham supplied pipe and much of the iron and steel for southern manufacture. The ultimate role of shipyards in the industrial economy of the South will largely depend upon the attitude taken toward the maintenance of a merchant marine. The repair of ships has long been an important industry here, but ship construction was unknown until the United States began manufacturing for Lend-Lease.

Airplanes—Dallas, Houston, Fort Worth and Tulsa were wartime centers for the assembly of airplanes from parts produced principally by northern auto and plane parts manufacturers. Rarely are the parts or subassemblies of southern manufacture. The future of these Government-built plants still appears uncertain. Some may survive the postwar period of readjust-

[28] Houston, Borger, Ingleside, Corpus Christi, Texas City, Baytown, Port Neches, Eldorado, and Uslaco in Texas, and Shreveport, Lake Charles, and Baton Rouge in Louisiana.

ment and become a part of the permanent industrial structure of the South.[29]

The only tin smelter in North America is located at Texas City, Texas. The fuel is natural gas, ores are from Bolivia. The diversion of Bolivian ores to the United States appears certain to continue in the postwar world. Magnesium is extracted from sea water at Freeport, Texas. Helium is extracted from natural gas in the vicinity of Fort Worth and Amarillo.

Louisiana refines about 1 per cent of the cane sugar refined in the United States. It is important only in the sugar-growing parishes in the delta of south central Louisiana. At Chalmette one refinery produces 10,000 barrels daily. With this industry is associated the manufacture of cane syrup and a wall board; the latter is made from the pressed cane stalks at or near the refinery. Thirty rice mills handle 20 million bushels of this grain from western Louisiana.

Phosphate rock from central Florida, potash from eastern New Mexico, and synthetic nitrates are manufactured into commercial fertilizer at several places in Georgia and minor centers elsewhere in the Gulf South.

The canning industry is especially important along the Gulf Coast and in Florida, for shrimp, oysters, citrus fruit, turpentine, and cane syrup. Florida and the lower Rio Grande Valley can citrus fruit. There are two centers for the manufacture of tin cans, New Orleans and Houston, Texas. Meat packing is widely distributed over the South, with central Texas and Oklahoma leading by a wide margin; Tennessee and Alabama follow. Dairy products have not developed rapidly in the southeastern plains, due to lack of pastures, the low purchasing power, inability to keep milk in the warm months, and the predominantly rural character of the population. For years, the ease of importing northern dairy products discouraged southern competition. Butter is the leading product and is made principally in central Texas, Oklahoma, and Tennessee.

Cities of the South—All of the cities in the South do some manufacturing, but in many cases it is little beyond their immediate needs, service industries. Nearly all of these urban centers are predominantly commercial in function. Among the cities which are definitely commercial are Montgomery, Meridian, Selma, Jackson, Vicksburg, Monroe, Shreveport, Dallas, Austin, Tulsa, Oklahoma City, and Fort Worth. Located approximately one hundred fifty miles from the Gulf Coast, most of these cities appear to have as their prime reason for existence serving as midway distributing points between the interior cities and the port cities of the Gulf. The little manufacturing that is done includes cotton, lumber

[29] Although the largest item in Southern war contracts was for textiles, prefabricated houses, furniture, steel, and magnesium were major items in the list for which the South had substantial peacetime development.

and wood products, and cotton seed products. Dallas is the largest of these cities and does somewhat more manufacturing than any other city in this middle section of the South. In some ways, Dallas is the Atlanta of the western cotton belt; it is on the fertile Black Prairie; it is a focus of railroad transportation, and the jobbing center for many concerns. Dallas is a vigorously growing city, largely due perhaps to the prosperous stage of its cotton agriculture and the importance of the oil industry a short distance to the west. Although Fort Worth is only 30 miles distant, it is more of an oil center and a livestock city than its rival Dallas. Oil refining is an important industry. In most other respects Fort Worth and Dallas are similar in the vigor of their growth and their commercial interests.

Another group of cities is found along the Gulf and south Atlantic margin where embayed rivers have offered attractive harbors, some of which have developed into important port cities. Houston, Mobile, Galveston, Biloxi, Pensacola, Tampa, Miami, Savannah, Jacksonville, Charleston, and Wilmington are the larger cities in this class.

The Gulf port cities differ from the cities of the south Atlantic in one important regard: the former draw upon hinterlands which have greater extent and a greater variety of exportable surplus. It is also true that the commodities moving through the ports of the respective regions differ in the degree to which they are susceptible of local manufacture.

Mobile is one of two alumina concentration centers in the U.S. The other is East St. Louis.

The Gulf ports, particularly those of the western portion, are relative newcomers to our coastwise trade. A common sight along the flat coastal prairie margin west of New Orleans is the oil tanker. Intercoastal tankers carried (1941) more than 90 per cent of all the oil consumed on the Atlantic seaboard (about half the nation's total). Three hundred and fifty of these tankers carry about 1,200,000 barrels of oil daily from the western Gulf ports, and some 200,000 barrels daily from Latin American ports. The cost by tanker (1941) was 21¢ per barrel; by pipe line (100,000 barrels daily) it was 60¢ per barrel, and by rail (used mostly for refined products) it was $1.80 per barrel.

A specialized type of Gulf port is represented by the twin agglomerations of Beaumont and Port Arthur. They single-mindedly devote their energies to the commerce in petroleum and, more recently, its refined products. Unbelievable tonnages of oil from the East Texas fields clear through these ports each year. With Baton Rouge, these ports rank as having the largest refining units in the world.

Houston, largest of southern cities, has displayed more vigorous growth than any other Texas city. Its development was delayed; fifty years

ago it was the same size as Galveston, today it is sixteen times as large. It is primarily as a railroad city that it has grown, although it has become the great port for half a dozen Texas cities farther inland and handles a tonnage that ranked it fourth among United States ports in 1936. Houston has had a series of specialties in its economy: first it was cattle, with the coming of the railroads, then it was cotton and pine, finally oil and gas.

Houston Chamber of Commerce

FIG. 72.—PART OF THE HOUSTON SHIP CHANNEL

The Houston ship channel has been no idle invitation to industry. Between two world wars and during the early post-war period, Houston has grown more rapidly than any southern city.

In 1914 the ship channel was built which enabled Houston to attract commerce from older established ports. For the wheat country of Kansas and Oklahoma, and the salt and sulphur districts of the coast, Houston has become the major port; it is a raw material exporter par excellence; exports have ten times the tonnage of imports.

Because of its size and access to the raw materials mentioned above, Houston began to forge ahead in manufacturing. Industry has developed beyond the refining, milling, and packing stage of the earlier days. Lend-Lease and the Second World War were responsible for the establishment at Houston of an airplane assembly-manufacturing plant, a new iron and

steel plant, new shipyards, and nearby, a tin plate factory. Older factories make machinery for the oil industry, cotton seed products, and refined oil products, rice mills, foundries and machine shops.

Galveston has diminished in relative importance as a commercial port and has failed to gain the manufacturing activity of its near neighbor on the mainland. The Houston ship canal attracted much of insular Galveston's trade to the inland city; this is especially true of exports from the common hinterland. Galveston has lost less of its import trade in bananas, oil, and sugar.

Tampa, Jacksonville, Savannah, Charleston, and Wilmington are south Atlantic cities (save Tampa on the Gulf) which combine commerce with fishing and the resort industry for a livelihood. Tampa exports enormous tonnage of phosphate rock and great quantities of citrus products. Jacksonville struggles with Savannah for first place in the export of naval stores, but does not rival her in wood exports.

New Orleans—Although the site of New Orleans is not a prepossessing one, the situation has enabled it to become the first city in all the South with a population of half a million. New Orleans is located in the swampland of the lower Mississippi plain. The river meanders over this low plain at an elevation somewhat higher than the city streets. Periodic floods have contributed to the general inaccessibility of New Orleans, yet the facts of situation have been enough to overcome the disadvantages of the immediate site. Nine railroads, seventy steamship lines, and a Federal barge line using the nine foot channel to Pittsburgh, Chicago, and St. Paul serve New Orleans and delineate the pattern of its hinterland. Here at New Orleans, for five miles on both sides of the Mississippi, are modern docks, warehouses, loading and unloading devices of a great seaport. The docks are classified by type of commodity, including facilities for handling bananas, bauxite, sulphur, coffee, oil, refined sugar, cotton and lumber. New Orleans is primarily an exporter. During World War II her imports increased somewhat as Middle Atlantic ports had some of their trade diverted to the Gulf Coast. Cuban sugar, South American oil and bauxite were important items in this diversion. A "free zone" was established in 1946.

New Orleans' manufactures are specialized and factory employment is secondary to commerce. The industrial sites are along the river, extending in an open pattern as far as Baton Rouge, nearly 80 miles upstream. Except for the city's margin, there is very little manufacturing to the south. The most important factory products include refined sugar and sugar products, oil and aluminum refining, synthetic rubber, ship building, lumber, cotton textiles, foods, and clothing. In view of the rise of Houston

particularly, of Dallas and Fort Worth, and of the recent growth of Mobile's industry, the future of New Orleans as a manufacturer does not appear to be rosy. Service industries will continue to employ the greater part of industrial wage earners.

The vacation industry of New Orleans and other Deep South cities and towns is an important source of income, not only in winter but summer as well. The plantation "open houses," the food, the French Quarter, Mardi-Gras, and more recently its military camps have combined to make New Orleans the principal magnet west of Florida and the best known of southern cities.

The port of Mobile stands out among cities of the South because of its proximity to the Birmingham steel mills, the Warrior coal fields, and the eastern Cotton Belt. Mobile has large shipyards, an aluminum ore reduction plant, fertilizer plants, paper mills, and canning factories. Its most important imports are bananas, bauxite, phosphate, nitrate, and potash. It exports cotton, lumber, iron, steel, and tung oil.

Memphis, with a population of 253,000 is the principal city between New Orleans and St. Louis. Memphis is less of a river city and more of a distributing center and branch assembly-manufacturer in its modern development. Wood products, fertilizer, tin cans, agricultural machinery, cotton and its products are its most important manufactures.

Prospects—It may be prophetic that in the industrial emergency of World War II, the South with about one-fourth of the nation's population received less than one-fifth of the Government contracts. Even that proportion is somewhat higher than the South's share of industrial plant capacity. To handle these contracts, private concerns expanded and plants were built with public funds. Engineering construction more than doubled between 1939 and 1941. With the return of peace, most of these "war babies" had to stop production.

In general, as an "export or die" region, the southern mills cannot fail to be concerned over the loss of foreign markets due to the rise of nationalism and changes in Europe as a result of the War. Perhaps the most heartening note will come from the probable increase in purchasing power of the people in the South; retail sales per capita in the eastern cotton-growing states have been the lowest in the United States, but purchasing power is being poured into the South through employment in the new factories, military posts, shipyards, conservation and power programs, and higher wages in all livelihoods. Having sampled the fruits of manufacturing it is unlikely that they will be surrendered without a struggle.

One of their causes for concern has been the structure of freight rates. Southern leaders have felt that in many cases they have been discrimina-

tory and this has had an effect upon the rise of manufacturing in the South.[30] The Interstate Commerce Commission in May, 1945, ordered a 10 per cent reduction in rates for the southern and western states, pending a permanent adjustment by the commission after further study. Just how much difference a lower rate will make in the long run remains to be seen.

[30] Freight rates in 1944 on pottery from Gordon, Ga. to Cincinnati, 584 miles, were 68 cents per hundred pounds. From East Liverpool, Ohio, to St. Louis, 588 miles, it was only 42 cents. Hence Georgia exported the clay to be manufactured in the North. And this is a state with more railroad mileage than any southern state except Texas and Oklahoma.

XII

THE MIDDLE WEST: A REGION OF BALANCED ECONOMY

Introduction

The Middle West, indefinitely defined though it is, evolved into one of the greatest economic regions in America. Originally the open prairies, dense forests, and fertile soils presented a challenge to the homeseeker who had to wrest the land from the aborigines and transform the wilderness into a fertile farm land unsurpassed as an agricultural area.

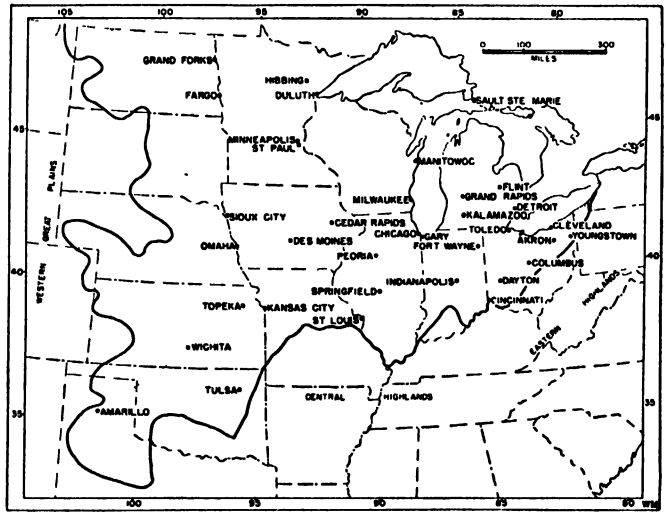


FIG. 73.—THE MIDDLE WEST

In a century this rich agricultural region has slowly changed from a frontier to an industrial area of major importance in the national economy. This rich economic area has achieved a regional character which transcends the economy and involves the cultural and political attitude of the people. Midland America has become a dominant area in the nation.

The Identity of the Middle West—The Middle West as shown on the accompanying map (Fig. 73) embraces the Central Lowlands, a small

portion of the Interior Low Plateaus (Indiana), the Superior Upland, the eastern or low Great Plains, and a small portion of the glaciated Allegheny Plateau in northeastern Ohio. It is essentially the East and West North Central states of the Bureau of the Census.[1] Within this major frame of reference certain specialty regions are commonly distinguished: Corn Belt, Wheat Belts, and the Hay and Dairy Region and the western half of the manufacturing belt. The boundaries of the several regions fade into each other to a greater degree than elsewhere in the United States.

Varied Economic Characteristics—Despite its agricultural excellence, this section is no longer predominantly an agricultural area. Its fertile lands are crossed by an intricate pattern of railroads and freight highways, also by pipe lines and air lines. Upon its northern border is a great waterway upon which plies freight tonnage greater than that of our merchant fleet of the high seas. Through its center and along its southern border an almost equal tonnage is borne by the successor to the river packet boat: the enormous barge tows that silently traverse the nine-foot channel from the Lakes to the Gulf, and from Pittsburgh to Kansas City. The shape of the Middle West has changed as each improvement in transportation has dispelled the isolation of some of its parts.

Not Self-Contained—The economy of the Middle West has been termed "self-contained"; quite the reverse is true, as it exists today in all of its ramified commercial relations. In fact it is the most commercial of all great sections in the United States; yet if separated from the rest of the nation, it could, by a fundamental realignment of its trade, be as nearly self-contained as any section in America and probably in the world. There is no other farming region like it. The farmers are the most commercial and at the same time the most independent in the world. Its mineral wealth is both varied and abundant. The nation's center of population, of manufacturing, and of agriculture have all moved to the Lower Lake states.

During a century and a quarter, the Middle West has developed some specialized economic regions, but the boundaries are nowhere definite and are everywhere overlapping, retreating or advancing with the change in market price of a dominant commodity in the farm economy.

Situation

Accessibility—Aside from the general excellence of its natural environment, the principal physical fact about the Middle West is its accessibility, as among its several subdivisions and with respect to the great port cities of the Middle Atlantic Littoral, the Gulf Coast, and Canada's most populous areas.

[1] East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota. West North Central: Iowa, the Dakotas, Nebraska, Kansas and Missouri.

The Middle West may be said to lie within a great funnel through which flows the greater portion of our domestic commerce. The northern margin of the funnel is the rock-and-water surface of the Laurentian Upland, a barrier that has forced the westward movement of people to pass to the south. The southern margin of the funnel is the hill-and-mountain country of the Appalachians and the Interior Highlands, stretching from the Atlantic to the Great Lakes and from Maritime Canada to central Alabama.

Position with Reference to the Great Lakes—The Great Lakes dip deeply into this directed stream of people and commodities passing between the relatively low and flat plains of the Central Lowland, heart of the continent and its Old World margin on the Atlantic. The Middle West occupies a very large part of the Great Lakes basin, and also the watershed areas between the two great river systems, St. Lawrence and Mississippi.

Mississippi Valley—The importance of the Mississippi River has varied with the times. The early relative importance of the Mississippi and its tributaries declined after the coming of the railroad. In recent decades the relative importance of this great central river system has materially increased.

Relief and Soils

Favorable Topography—This region presents a remarkably favorable terrain for the agriculture which has developed there. It is for the most part the great low plains province of the Central Lowlands. The repeated advances of the continental ice sheet left the surface smoother than it found it. This gently undulating till plain extends from central Ohio to the Great Plains border, and from the Great Lakes almost to the Ohio-Missouri rivers. When the earlier Great Lakes and the north-flowing streams were blocked by ice, numerous lakes were formed; when the waters receded, resultant lake plains were ultimately drained and became for the most part good farm land.

Hills—Not all of the province is as uniformly attractive as the heart of the till plain just described. An extensive hilly belt borders the Ohio and the Missouri River valleys, where the more recent ice advances failed to reach or to mask the eroded surface of an earlier till plain. Another hilly section marks the northern limits of the Middle West; westward across the Upper Lakes region the low hills and rock-and-water surface of the Superior Upland of northern Minnesota and Wisconsin, and the moderately hilly plains of the Wisconsin Driftless Area complete the rough periphery of the Middle West.

Other exceptions to the prevailing uniformity of the till plain include the sandy plains of the northern portion of Michigan's lower peninsula, the swamps of northern Illinois and Indiana, southern Minnesota, Wisconsin, and Michigan. Less conspicuous are the moraines which festoon the till plain in great loops from the north.

Great Plains—Another physiographic province represented in the Middle West is the low eastern Great Plains. The least defined portion of the eastern Great Plains border lies within these Middle Western states. A small portion of the glaciated Appalachian Plateau in eastern Ohio, and a small portion of the Interior Low Plateaus in southern Indiana are likewise included within the Middle Western Plains as here outlined.

Soils—There are three main soil groups found within the Middle West. Across the Upper Lakes region from western Minnesota to New England are the light-textured surface soils low in fertility and with a thin mat of partially decomposed, vegetable matter. There are many areas of sandy loams whose porous nature has allowed the minerals to be leached from them into the subsoil. These soils were produced under forest cover and are, therefore, low in humus. Such farming as is found here is generally the subsistence type. Tax delinquency and poor soils loom so large in state affairs that the Michigan Land Economic Survey was established more than twenty years ago to classify, map, and plan for ultimate use the soils of that state. The current program of reforestation in so many sections of the state is indicative of the low carrying capacity of the soils. A similar organization is trying to develop the most economic use of these soils in Wisconsin.

The second important soil group includes the gray-brown podzolic area of western Ohio, central Indiana, southern Michigan, and southern Wisconsin. These soils are transitional between the northern podzols and the old grassland soils of Illinois and Iowa. They are moderately fertile but some very productive but poorly drained lands are interspersed among them. Their texture is heavier than the northern podzols and they are less subject to leaching. In the Wisconsin and Michigan portions of this division extensive sandy areas and some stony areas are rather common.

The third important soil group consists of the prairie soils of Illinois, Iowa, southern Minnesota, and northern Missouri. Formed under grass, these silty soils are dark colored and highly productive; their gently rolling landscapes are not only pleasing to the eye, but evince prosperity as well. No better agricultural lands are to be found. The principal disadvantage of the prairie and gray-brown podzolic soil groups is the necessity for drainage. Of all the agricultural divisions of the United States, these two soil groups are the most widely tile-drained. Represented else-

where in these states are many soils of lesser extent and economic importance.

Climate

Major Divisions—The climate of most of this region is of the humid continental type with long summers; the Upper Lakes area has the short summer phase. All of the qualities of a continental climate are here. Hot summers and cold winters, wet years and dry, destructive winds, hail, and snow, occasional serious floods—and yet good crop weather. The cold winters help prevent soil leaching and erosion, aid in soil making, and destroy many of the plant pests. Critical droughts are rare. The heart of the Middle West is the Corn Belt, and this climate is famous.[2] Thunderstorms on hot days bring quick rains when growing crops need them. Hot nights are essential to the growth of corn particularly. Professor Huntington has characterized the changeable nature of this type of climate as best for producing energetic and provident men.

Critical Climatic Elements—Floods and inundation have been both a curse and a blessing to limited parts of the Middle West at one time or another. Where repeated inundations have left a coating of fertile silt over many years, continuous cropping of corn has resulted in no diminution in crop yield. In some sections where a large part of a farm is low enough to have benefited from inundation, the farmer may be locally known as a "bottom" farmer, not without a note of contempt. Minor and major floods have occurred so often that they are an accepted part of the environment for farmers of the flood plain portions of the Mississippi, Illinois, Wabash, Miami, Scioto, and Muskingum valleys, as well as along the hundreds of smaller tributaries to these rivers. Fortunately, the extent of such districts is small compared with the total farm area of the Middle West.

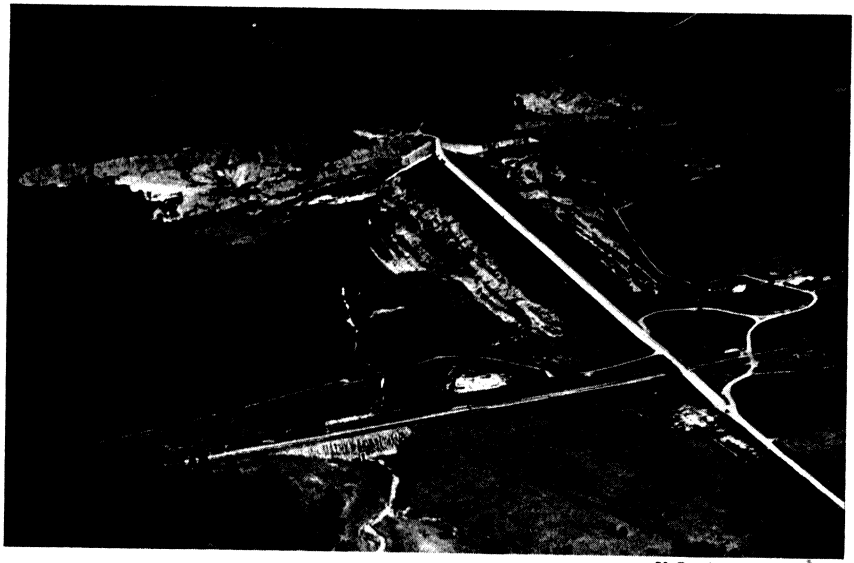
On the land subject to flooding, the type and pattern of fences, choice of crop, and the location and material of farm buildings make proper allowance for the spring inundation. Occasionally a severe flood becomes a major disaster, as, for instance, the 1913 flood of the Great Miami River in southwestern Ohio, where heavy spring rains on the frozen ground caused damage to the middle and lower Miami Valley well over $100,000,000.[3] In 1937 heavy winter rains along the Ohio caused enormous

[2] J. K. Rose, "Corn Yield and Climate in the Corn Belt," *Geographical Review*, Vol. 26 (1936), pp. 88–102; also S. S. Visher, "Weather Influences on Crop Yields," *Economic Geography*, Vol. 16 (1940), pp. 437–443.

[3] Such a catastrophe is not likely to occur again, because effective methods of flood control have since been established. Before the immediate rehabilitation of Dayton,

property damage as the flood waters reached record heights and spread widely across the bottom lands.

The Upper Lakes Region—This section has fewer floods. The rivers are much shorter and many of their drainage basins have great numbers of lakes and ponds to serve as reservoirs. The winters are somewhat longer



U.S. Army Air Forces

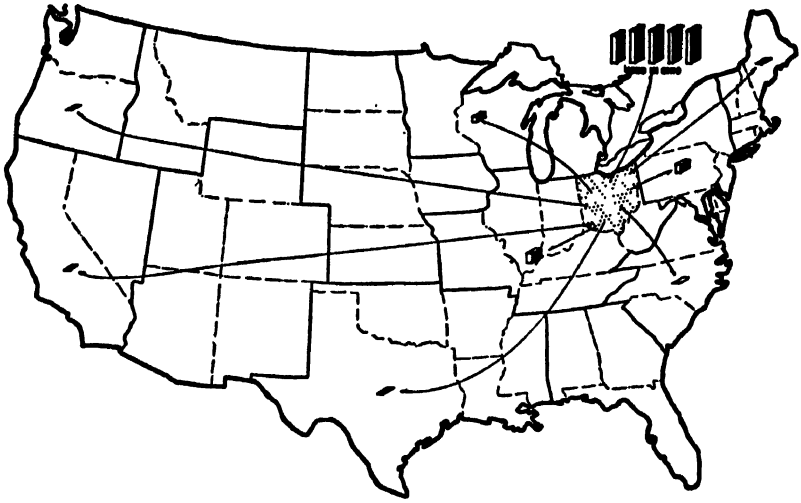
FIG. 74.—A DAM OF THE MIAMI CONSERVANCY DISTRICT, NEAR DAYTON

Water is impounded only during times of high water. The white ribbon is a state highway which crosses the dam.

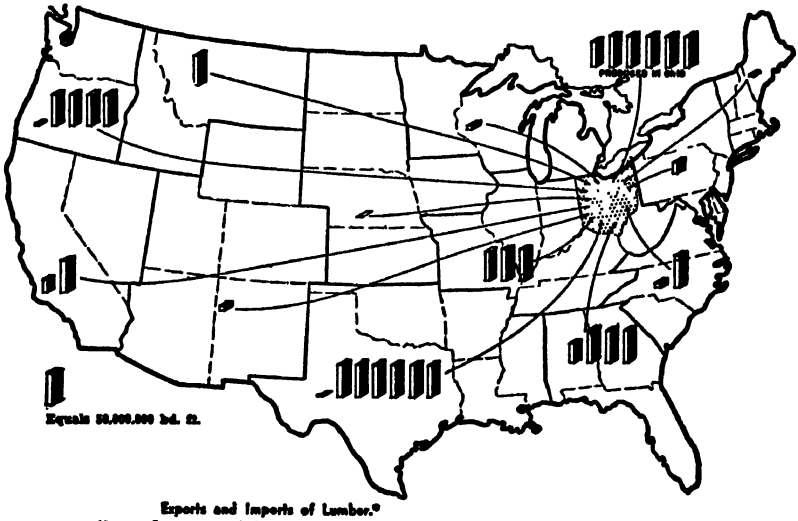
and colder. The summers are generally cooler. The influence of the Great Lakes is of economic importance to the people of these states, either as a lure for tourists in summer or as a stabilizer of temperature for fruit grow-

Hamilton, and other cities farther south was well under way, a Miami Conservancy District was authorized by the State of Ohio, and plans were laid for a major reorientation of riparian occupancy, based upon the construction of five earthen dams impounding water only at times of high water in the tributaries of the Great Miami River. The District took title to all of the land likely to be inundated when the dams functioned. After the layout of the farms was redesigned, they were sold again with a flood-easement clause in the deed. Virtually every acre of this land has been sold to farmers. Changes in riparian occupance in Dayton, Hamilton, and Middletown, particularly, were far-reaching. The Muskingum River was likewise put under a plan for flood prevention nearly twenty years later. The dams here are designed to impound some water all of the time for water conservation, but to have additional capacity for flood control. Another tributary of the Ohio, the Tennessee, has likewise been brought under control. The principal trouble makers have had no control: Pennsylvania's Allegheny, Monongahela, Conemaugh, and Youghiogheny rivers.

EXPORTS FROM OHIO BY FOREST REGIONS, 1942



IMPORTS INTO OHIO BY FOREST REGIONS, 1941



Exports and Imports of Lumber.*
Upper—Destination of shipments of lumber produced in Ohio.
Lower—Source of shipments of lumber consumed in Ohio.
*Taken from unpublished data, U. S. Forest Service.

Ohio Division of Forests

FIG. 75

ers on the lee sides of Lakes Michigan and Erie. Smaller areas are likewise affected, for instance Wisconsin's Door Peninsula. Thousands of smaller lakes have served to make this a vacation land. Pastures are not apt to burn out during the summer, hence it is a grass land, favoring the dairy industry which has developed there. In recent years the consistent cold of winter and the considerable snowfall of the Upper Lakes states have been turned to advantage by the winter sports festivals which have been established in Michigan, Wisconsin, and Minnesota.

Forests and Lumbering

Original Vegetation—Reference to Fig. 6 reveals the extent to which the Middle West was forested. Hardwood forests closed upon the prairie peninsula which extended eastward across the Mississippi into central Illinois. West of the Mississippi the prairie grasses spread smoothly westward to the eastern Great Plains, northwestward into a similar province in west central Canada, and southwestward along the Central Lowlands to the High Plains of Texas. No finer hardwoods could be found than those of the upper Ohio Valley; no finer white pine than that of the Upper Lakes states.

Logging and Lumbering—The natural contrasts between the Upper and Lower Lakes regions persisted as well in their forest economy. Although the Ohio Valley was the first to cut timber, it was never characterized as commercial lumbering. Here trees were cut in order to clear the land for farming; in the Upper Lakes the land was a by-product of the lumbering operation and lumbering was the chief commercial enterprise.

In the hardwood forest the farm wood lot became a characteristic feature of the farmstead, supplying firewood, fence posts and, on occasion, sawable logs. Repeatedly these wood lots have yielded products of value on the farms of the Middle West. Unfortunately many of the wood lots were heavily pastured and as a consequence depreciated in usefulness. But an enlightened tax plan has encouraged farmers to maintain and improve their wood lots.

The timing of the Westward Movement and lumbering in the Upper Lakes area was such as to fuse them into one experience. The migratory nature of lumbering is discernible in the Lakes states as well as in the Northeastern division. After 1820 Michigan shared with Maine in the white pine cut. Several decades before the supremacy of Michigan, lumber camps were dotting the rivers of that state; by 1850 inroads were being made in Wisconsin, and in 1875 the Lakes states surpassed the Northeastern division in lumber cut. By 1890 Minnesota was a leader. For nearly a century, lumbering dominated all other industries in the Upper

Lakes; an area as large as France constituting one immense pine forest. The fifty-year period immediately following the Civil War was one of "frenzied lumbering"; for the first time machinery entered the forest. By the end of the nineteenth century, from Maine to Minnesota, the first exploitation was over. During this time the domination of the Upper Lakes region by the lumber industry was almost complete. With its decline, the absence of alternative employment left in its wake ghost mill towns, quiet rivers, and new farms. Because the forest economy there ran its course in such a short time, it is sometimes said that the frontier passed more rapidly in the Upper Lakes region than in any comparable area in the country.

The rapid harvest of the vast lumber resources of the Upper Lakes was related to the settlement of the prairies of the Upper Mississippi Valley. Fortunately the Mississippi and the Wisconsin reached deeply into this great pine forest. In the spring great rafts of logs and lumber, cut and sawed during the winter, moved out of the head-stream areas with the melting snow. Downstream in the treeless prairie great quantities of lumber were needed to build the homes, the factories, and the other structures so necessary in a rapidly expanding area.

So long as the northern lumber was used for building homes for the rapidly growing upper Mississippi and Ohio valleys, lumber meant white pine, clear, straight, and easily worked. But with railroad construction, fenced fields, and the rise of wood-using industries, cedar, tamarack, and hardwoods were called for. Old lands were cut over again; little was left this time. The lumbermen and the forest fires [4] which followed have made much of the Upper Lakes region a virtual desert of bare rocks and sandy soil.[5]

Passing of Timber—Before railroad days, rivers were of paramount importance in marketing the timber. The large towns were therefore on the rivers in Michigan, Wisconsin, and Minnesota. The population pattern of the Upper Lakes was set by this industry which dwarfed all others, but the passing of timber withdrew support from even the larger population centers, from the trade routes which bound them, and from the countryside which nourished them. During the half-century that followed, the lumberman in many cases took up agricultural pioneering on the cut-over lands. This has proved unprofitable in the majority of instances.

[4] In *Burning an Empire* (Macmillan, 1943), Holbrook writes a very sobering history of American forest fires. In 1942 for instance there were reported by the Forest Service 208,000 forest fires, of which 26,000 were "incendiary" or deliberate. No part of the United States escaped, north, south, east or west.

[5] The Prospectus of State Parks by the Michigan Conservation Department says, "Hartwick State Park contains the only remaining virgin stand of timber in all Michigan—90 acres on the banks of the Ausable River." Grayling, Gaylord, Roscommon, Nemadji, and St. Croix are just names from a colorful past.

In many areas the state government has become the principal owner of land. Ten cents per acre was paid by the state to the counties for this land, some of it good enough for agriculture but not extensive enough to support communities.

Guy-Harold Smith

FIG. 76.—A FARMSTEAD IN THE SUPERIOR UPLAND OF WISCONSIN

Guy-Harold Smith

FIG. 77.—ANOTHER PART OF THE FARM SHOWN IN THE PRECEDING PHOTOGRAPH

Fisheries

Waters of Middle West Provide Important Fisheries—Although commercial fishing is very much less important in the Middle West than in the North Atlantic, the North Pacific, or the Gulf regions, recreational and commercial fishing merit some attention. Six species of fish constitutes the bulk of the catch in the Great Lakes: herring, trout, whitefish, pike, sturgeon, and blue pike. The fishing takes place near the larger centers of population on Lakes Michigan, Erie, and Huron. In winter there is some fishing through the ice, particularly on the southern shore of Lake Erie. The catch is marketed fresh to eastern and midwestern cities. This represents an income to the fishermen averaging over $5,000,000 a year, not including this district's share of the smaller catch from the Mississippi River and its tributaries.

Recreational fishing takes place not only in the Great Lakes but in the thousands of smaller lakes in the Great Lakes basin as well. River fishing is a minor part of the fresh water fishing industry. Recreational fishing is inextricably a part of the total recreation industry of these states. In the Upper Lakes states particularly the recreation industry brings in a greater revenue than the original forest industry. Water pollution, reforestation, and the delinquent tax lands play a related and an important part in the economy of Michigan, Wisconsin, and Minnesota.

TABLE 11

FISHING INDUSTRY, MIDDLE WEST, 1942

(1,000 lbs.)

	LAKE SUPERIOR	LAKE MICHIGAN	LAKE HURON	LAKE ERIE	TOTAL
	19,228	21,404	8,465	21,131	75,246

(Lake Ontario, Lake St. Clair, Lake of the Woods, and the St. Clair and the Detroit rivers are of relatively minor importance and are given in the total figure only.)

(Statistical Abstract of the U.S., 1944-45)

Mineral Resources of Upper Lakes Region

Early Importance of Copper—Michigan's Keweenaw Peninsula has had one of the most spectacular careers of any mining section of the United States. For a century the Copper Range, major axis of the Peninsula, gave rise to the copper-mining industry which for sustained employment and profit is probably equaled by no other mining district in the world.

The Copper Range—This fabulous mining district became a part of Michigan because Ohio and Indiana had secured the valuable Erie

and Michigan lake frontage at the expense of what was then the Territory of Michigan. These Laurentian rocks contain the only large deposits of pure copper metal known. Earliest mines were based on great blocks of copper metal. Later, copper in the conglomerate became the main source of the red metal. The mines were scattered along the 150-mile range and varied in size from the thousands of pre-historic shallow pits to the 6,000-foot Red Jacket shaft. The largest mines were in the vicinity of the twin cities, Houghton and Hancock. Silver is frequently found in the copper mines, but only one was developed as a silver mine.

The People—Welsh and Cornishmen were the first to come into the copper country from outside. They were followed by Scandinavians, Finns, and Croats. Seventy-five thousand people were dependent upon mining for employment. The absence of noxious fumes from the copper smelters has meant that the desolate landscapes of western copper districts have been entirely lacking in northern Michigan. Paternalism on the part of the copper companies gave neat towns and comfortable homes, good schools and modern hospitals.

The Industry—From 1832 to 1935 the copper industry gave employment and paid dividends, with few lulls and but one major strike. Nearly 10 billion pounds of copper were shipped from the lake ports of the Upper Peninsula. Few mines, no matter what their product, have provided a century of employment for so many people. Calumet-Hecla paid $168,000,000 in dividends within a 58-year period.

So long as native copper was mined, no stamping mills and smelters were needed. Lake vessels carried barrels of copper down the lakes to Middle Atlantic refiners and manufacturers. When conglomerate rock was mined, stamping mills and smelters were constructed on the Peninsula. For a number of years the new mines prospered.

As the telephone, streetcar, automobile and electrical machinery came into use, Lake copper exports increased greatly. It was 1905 before Lake copper interests were aware of competition with the new mines of the southwest. As Keweenaw mines went deeper, costs went higher. To lift the rock one mile to the surface cost so much in the face of falling copper prices, that after World War I the Keweenaw mines never resumed their former status. In their time they had broken the hold of the Welsh copper refining, but in the course of time the copper country of upper Michigan began to feel the competitive pinch of the new copper producing areas in Montana, Utah, and Arizona.

World War II—The price of copper at 12 cents per pound plus a bonus of 5 cents per pound could not restore the industry of the Keweenaw country at a time when the United States was deficient in this metal. Most of the mines are filled with water. A few miners have migrated with the industry

to the west. The Peninsula today is just "making out" with reduced mining, tourist trade, and other economic activities.

Iron—A cartographical mistake has played an important part in the Upper Lakes' greatest resource—iron ore. On the famed Dr. John Mitchell map of the "Minnesota Arrowhead," the Pigeon River, rather than the St. Louis River some ninety miles farther south, was taken as the northern boundary. Nearly forty years before Michigan surrendered the premier position in copper, iron was discovered in this arrowhead of Minnesota. As with copper, this led to national dominance, but not until after the Civil War.

Unlike copper, the extraction, processing and shipping of iron ore gave rise to a dozen cities and towns. Duluth (100,000 population) and Superior (40,000) handle most of the tonnage, with minor ports in Two Harbors, Minnesota, Ashland, Wisconsin (12,000), and Marquette (15,000) and Escanaba, Michigan (18,000). Mining towns in and around the Mesabi (world's greatest producer), Gogebic, Vermillion, Cayuna, Menominee, and Marquette ranges have localized most of the interior population of the Upper Lakes region.

The extraction of ore, its handling, and its transportation are marvels of mechanical efficiency. Manpower is relatively a minor factor in this economy. These population centers are but points of transfer, the creatures of iron ore, whose work year is shortened by winter's closing of the lakes for five months. Their relations to the surrounding countryside and with the more distant cities of Minneapolis and Winnipeg are of little importance. From these iron districts some fifty to sixty million tons of ore are exported each year. Many of the usual sordid accompaniments of mining are lacking here. The stumps left by the lumberman taught the state to tax the iron ore while it could. The result has been that the iron districts display every evidence of community wealth but very little of individual prosperity.

Hibbing, a perennial boom town in the Mesabi Range, has been moved two miles from its early site in order to make way for the huge electric shovels of the open-pit Hull Rust mine. Its schools and public buildings have been elaborately reconstructed and richly furnished. A four million dollar school educates the second generation Finns, Norwegians, Cornishmen, Poles, and Slovenes, whose parents came in after the Civil War. With 17,000 population, Hibbing spends about as much as Duluth's 100,000 to carry on city services and government. In 1924 Hibbing levied taxes on mineral wealth of an estimated 94 million dollars; today it has shrunk to 60 million. From a yield of 25 million tons in 1945, this mine in 1947 yielded only 14 million. The land cannot carry this sort of cultural landscape after iron goes.

Iron Ranges—For scores of miles the iron ranges are pock-marked with open pits, active only during the seven warm months. Less frequent are the shaft mines, which are able to operate throughout the year.[6] In 1940 more than 80 per cent of our total iron shipments came from this Lake Superior district.[7] More than half came from the Mesabi Range alone, which yields more than any other district in the world.[7a] In this range is the world's largest open-pit mine, the Hull-Rust Mine at Hibbing: 350 feet deep, 2½ miles in length, and producing 15 million tons in one season. (Germany's prewar yearly total has averaged 10 millions.) In its half-century of operation, Mesabi has accounted for more than 1½ billion tons, two-thirds of our total ore production. A like amount of high grade ore remains, and vast unknown quantities of lower grades are untouched.[8]

Lake Trade—Iron—The spectacular nature of the Great Lakes' iron industry stems not only from ore mining but as well from its loading, transportation, and unloading at Lower Lake ports. In less than eight months of the year, a total in excess of ninety million tons (1942) is moved a thousand miles by 300-odd ore boats averaging some 14,000 gross tons. Un-

[6] A little over half is mined by the open-pit method on the Mesabi Range where the ore lies near the surface. The remainder is mined by the shaft method; this is the most common method in all districts except Mesabi. This range is virtually the sole producer of this easily mined ore, and the only high-grade field which can yield large tonnages on short notice.—*Steel Facts*, June, 1943.

[7] Next in importance was the Alabama district with 11 per cent of the total. Three per cent came from Pennsylvania, and the remaining 3 per cent was made up of small amounts from eleven other states.

[7a] IRON ORE SHIPMENTS, BY RANGES, 1854–1915

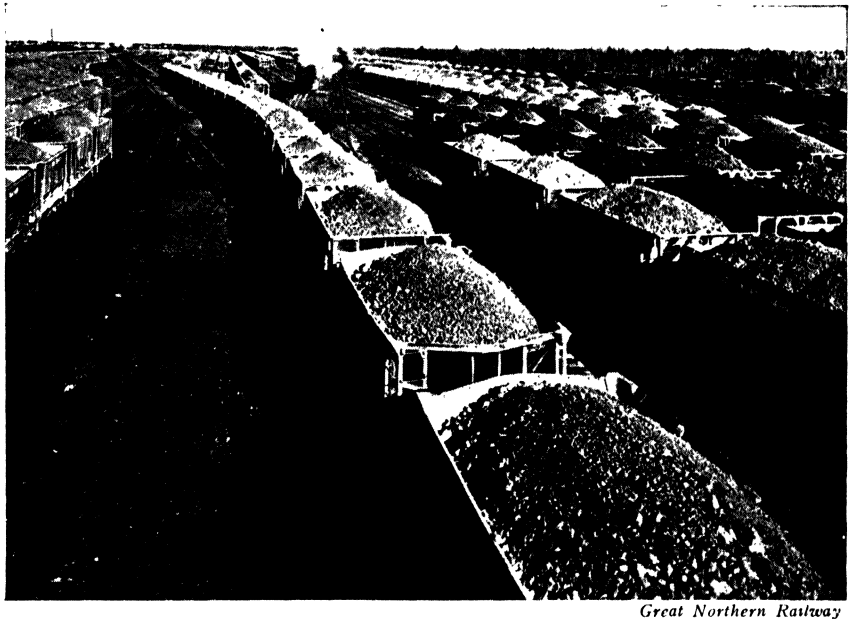
RANGE	YEAR OPENED	TOTAL PRODUCTION (GROSS TONS) 1,000
Marquette	1854	237,710
Menominee	1877	212,328
Gogebic	1877	249,191
Vermillion	1884	77,198
Mesabi	1892	1,436,330
Mayville	1892	2,379
Baraboo	1894	643
Cuyuna	1911	55,579
Fillmore	1942	279
Canadian (old)	1904	3,935
Canadian, Michipicoten	1939	2,868
Canadian, Steep Rock Lake	1944	521

(Lake Carriers' Association, Cleveland, 1946)

[8] During 1942, on a twenty-four hour basis, mining in the Mesabi district turned out 92 million tons; in gondola cars of 60 tons each, this ore was hauled downhill to the 25 ore boats which left each day for the Lower Lake receiving ports. At this rate most of the 50 per cent ore will be gone in eight or ten years; there is no reason for alarm but good reason for planning to utilize the estimated 40 billion tons of 30 per cent ore which remains.

loading ports see the freighters about nine hours on an average; loading ports only about five hours. The integration of ore properties, lake vessels, ore-carrying railroads, and iron and steel manufacture has established the world's greatest iron and steel industry.

It may be said that the efficiency of the steel industry begins at the source of the ore. From the time the iron ore is dug from the mines it scarcely stops moving until it reaches the blast furnaces in Gary or Youngstown.



Great Northern Railway

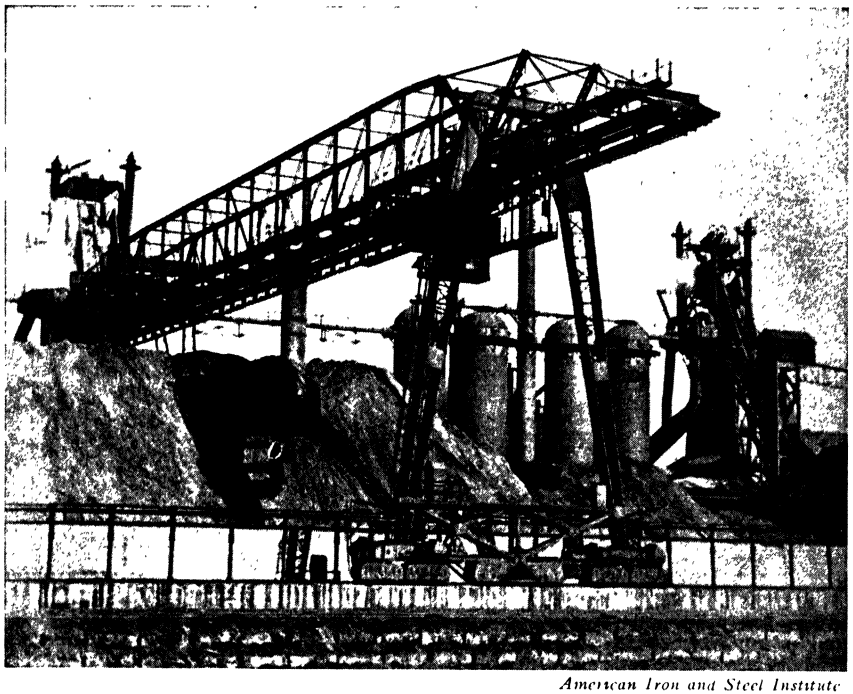
FIG. 78.—IRON ORE CLASSIFICATION YARDS, ALLOUEZ DOCKS, SUPERIOR, WIS.

Along the spurs of nine railroads, cars from the ore pits and the stock piles start their downhill run to the lake ports and roll on high trestles to the loading docks which are perhaps half a mile long. Each car is dumped into hoppers from which the waiting ore boats are filled. Loadings are unbelievably rapid; the record time for loading a standard 12,000-ton ship is under seventeen minutes. Nor is this saving of labor confined to iron ore; coal is handled on the Chesapeake and Ohio docks in Toledo, the Pennsylvania docks in Cleveland and Sandusky, and the Nickel Plate at Loraine, in a manner as mechanized and as economical as is iron ore.

Stone—Among all products of mines and quarries of the United States, limestone is normally exceeded in tonnage only by bituminous coal, and in some years by sand and gravel. Its value is relatively much less. In its

production Michigan is second only to Pennsylvania, followed by Ohio, Illinois, and Indiana. The uses for this limestone are exceedingly varied; something less than half of the limestone quarried in the Middle West is used as a flux in the manufacture of iron and steel.

Michigan's limestone consists of large, thinly covered deposits of very pure, high calcium stone in the northern part of the state, some of it con-



American Iron and Steel Institute

FIG. 79.—ORE STOCK PILES, SOUTH SHORE OF LAKE ERIE

veniently located on or near shores of the Great Lakes, within sight of the great ore boats plying from Upper Lakes mines to Lower Lakes mills. Stone ranks third in the tonnage of the Great Lakes, three-fourths of which is consumed outside of the state of origin. The principal exporting ports are Calcite, Port Inland, Alpena, and Rockport.[9]

In south central Indiana at Bedford and Bloomington are the most famous of dimensional limestone quarries. Bedford quarries limestone used in buildings all over the eastern and middle western United States. Sandstone quarried in northeastern and southeastern Ohio has been vari-

[9] See Paul C. Morrison, "The Michigan Limestone Industry," *Economic Geography*, Vol. 18 (1938), pp. 259–274.

ously used for grindstones, pulp rolls, and building purposes. Thus it is seen that stone is important in both the Upper and Lower Lakes regions.

Lower Lakes Minerals

Two-Way Traffic—From the resource point of view, the Upper and Lower Lakes regions are complementary; between the two regions flows the greatest domestic tonnage on the continent. Lake ore ports frequently

Guy-Harold Smith

FIG. 80.—LIMESTONE QUARRIES, BEDFORD, IND.

exceed in tonnage the port of New York. The lake trade is not all one-way; the Lower Lakes export coal, oil, and package freight to the Upper Lakes.

Coal—The coal in the lake trade comes mainly from West Virginia and Kentucky mines over the Chesapeake and Ohio, the Norfolk and Western, and the Pennsylvania lines to Toledo, Sandusky, and Cleveland respectively. Whereas Pennsylvania and Ohio mines once dominated this lake trade, lower freight rates, and for several years before World War II, lower mining costs, have shifted it from the northern to middle and southern Appalachian fields. (In the winter of 1941, the southern Appalachian mines struck for a wage-scale equal to their northern fellow miners!)

Leading Coal Ports—Toledo is the nation's greatest coal-shipping port; on the same south shore of Erie are Sandusky and Cleveland, ranking next after Toledo in coal exports. From these cities coal moves to Detroit, the Province of Ontario, the cities of western and southern Lake Michigan, and the Upper Lakes.[10] The economy in cargo handling due to mechanization, already noted for iron ore, is likewise true of coal shipments. In view of the relatively great number of ports served by the lake freighters, many of the larger vessels are self-unloaders. The coal tonnage is about equally divided between the Upper and Lower Lakes destinations.

The Ships—The huge freighters which carry the ores, coal, grain, and other commodities of great bulk reflect the physical conditions under which they operate and the nature of the cargo carried. (Fig. 22.) They are built very long (600 feet or more), and rather shallow (20 feet), and with much of the deck surface given over to hatches. These dimensions are imposed by the relatively shallow canals and rivers which provide connection between the Great Lakes, and by the depth of the harbors; the hatches enable these vessels to be loaded and unloaded mechanically in the shortest possible time. Since some of the harbors are without unloading devices on a scale commensurate with the vessels serving them, some of the large freighters are self-unloaders. Ore, coal and wheat cargoes are seldom destined for any but the larger and well-equipped ports.

Ohio Coal—The Ohio coal fields lie within the Appalachian Plateau hill country. For the most part coal-mining here is a large-scale industry, but in many counties it is run on a small scale, frequently supplementing the self-sufficing type of farming induced by poor soils of an area characterized by low, rounded hills. Although the coal-mining communities are sordid enough, there is less of the isolation common in many sections of the southern Appalachian fields and in some parts of Pennsylvania.

Situated as this field is between the markets of the Eastern States and the Upper Mississippi Basin, most of the great east-west railroads pass through it.[11] However, southeastern Ohio does have fewer cities than any other part of the State. The coal moves out of the area to the industrial communities on the near-by plains. However, important quantities of Ohio coal are consumed in a number of river towns such as Wheeling, Huntington, Ironton, and Portsmouth.

Illinois Coal—The Illinois-Indiana coal fields, also in hilly country north of the Ohio River, rank ahead of the Ohio fields. Conditions there

[10] It would at first appear that here is a case of carrying coals to Newcastle, in view of the important coal-mining districts of southern Illinois and southwestern Indiana. Delivered price is the important consideration.

[11] W. H. Voskuil, Coal in the Commerce of the Great Lakes, *Geographical Review*, Vol. 32 (1942), pp. 117–127.

are more rural than in eastern Ohio, largely because of their location well south of the principal East-West railroads. The coal mines here are found for the most part in good farming country, thus rendering the many small coal-mining communities somewhat less helpless than those in the hilly areas of southeastern Ohio. Along the lower Ohio as well as along the upper reaches of the river the industrial communities are important coal markets. The chief centers include Cincinnati, Covington, Evansville, and Louisville.

Strip mining began in Illinois, but state rank in 1945 was in this order: Pennsylvania, Illinois, West Virginia, Ohio, Indiana, Kentucky, Missouri and Kansas.

Oil—Oil fields have been in production at many places in Ohio, Indiana, Illinois, and Michigan for half a century. Production has declined in all but the newer fields of Michigan, southwestern Indiana, and southern Illinois. Crossing the hill counties of eastern Ohio is the great Appalachian oil district extending from southwestern New York to eastern Kentucky. Here the oil industry appears to have dotted the landscape continuously. Derricks rise above the low, pastured hills, and less frequently in the tilled valleys. Nowhere is there the congestion in drilling apparent in the Pacific and Mid-continent fields. Activity throughout this area has never been uniform; western Pennsylvania has long dominated as an active producing area. The Ohio section of the Appalachian field is generally in decline. There have never been oil boom-towns in much of the Appalachian field except in northwestern Pennsylvania when oil was first discovered. Only from the point of view of cash income can oil be said to have dominated the local economy.

One of the older fields is that lying between western Lake Erie and Richmond, Indiana. Most of this area is a plain of gentle relief. Here the oil industry is superimposed upon a superior general-farming economy. This field, like the northern portion of the Appalachian field, lies athwart the oil pipe lines from the Mid-Continent field to the Lower Lake cities. Conspicuous in this oil field are the huge metal storage tanks for through traffic as well as for local storage. Inconspicuous pumps are operated from a small central power house. In most parts of this field the ephemeral use of land by the oil industry is apparent. Agriculture everywhere encroaches upon the once-active oil industry.

Smaller fields with modern equipment are found in the Vincennes region of the southern Indiana-Illinois borderland, in southwestern Illinois, and in northwestern Illinois below Rock Island.

Throughout the Lower Lake states, the major continental pipe lines parallel the rail and highway trade-routes. There is no greater network of pipe lines anywhere, yet the emergency of 1941, with its reduction in

the number of oil tankers, placed the seaboard states on gasoline and oil rations.

Gas—Although natural gas is frequently an accompaniment of oil in wells, in the Middle West there are only four minor gas producers: Ohio, West Virginia, Indiana, and Illinois. In contrast with the oil pipe lines, gas lines are apt to be in direct connection with the consuming center; they are very much less extensive.

Clay—The Lower Lakes region is well endowed with earthy and stone mineral products. One of the world's outstanding clay belts is that of the Appalachian Plateau of eastern Ohio. The nation's center for the manufacture of hollow tile, drain tile, and whiteware is located in eastern Ohio; East Liverpool, Dresden, Zanesville, Lancaster, and Logan are the main producing centers. The abundant natural gas and the imperative need for drain tiles on the farms of the Lake states have fostered this industry. The landscape of the ceramic centers is a drab one: smoking kilns, enormous stacks of brick and tile, and even vitreous homes for the workmen. Recently there has been some decline in the Ohio clay industry; more tractable labor, lower taxes, and equally cheap fuel gas across the river in West Virginia have brought about considerable migration.

Sand and Gravel—The humble sand and gravel of glacial origin have been one of the prime mineral resources of the Middle West. Moraines lie like great festoons upon the plains of these states. On many farms, the least productive field has become a valuable gravel or sand pit, when a gate is put in the fence, and a loader installed for the trucks serving some county, state, or federal road project.

Middle West Agricultural Regions

Middle West a Multiple-Use Region—Although this section of the United States is famous for its agriculture and for the institutions which have grown from it, the Middle West does not consist of one great agricultural region. Not only does the Upper and Lower Lakes contrast, noted earlier, continue over into the field of agriculture, but within each of these two regions important distinctions in farming practices are apparent.

Inspection of the map, Fig. 2, reveals that the Corn Belt, the Spring Wheat, the Winter Wheat, Minnesota-Wisconsin Dairying, and the Corn and Winter Wheat regions all lie partly or wholly within the Middle West.

Importance of Corn—The United States is by far the greatest producer of corn in the world. Nearly all of the corn in this country is grown in an area between the Dakotas and the Great Lakes on the north and the Gulf of Mexico on the south. More than three-fourths of the farmers of this

great region grow corn for grain. Despite the widespread distribution of corn in America, more than half of the nation's crop is produced in eight states known as the Corn Belt.

The Corn Belt

Basis of Delineation of Region—Corn was everywhere a minor crop in the northeastern states; in much of New England it does not even appear in the farming system. Only in southeastern Pennsylvania is it an important crop. In the Middle West, however, there are few places where corn is not a major crop.

In delineating a Corn Belt, three thousand bushels per square mile may be taken as the minimum limit; in much of the Corn Belt, production reaches five thousand bushels.[12] Throughout most of the southern states, from the Carolinas to Texas, and north to the Dakotas, the yield of corn per acre is much lower than in the Corn Belt. For instance, North Carolina averages only fourteen bushels per acre to Illinois' forty; this is due chiefly to hills, poorer soils, and protracted high temperatures.

North Boundary—The Corn Belt lies far to the north and somewhat to the west of the center of the corn-growing states of the United States. The northern boundary is somewhat abrupt. In the west it is a temperature limit, but for the eastern two-thirds it is soil, rather than temperature, which determines the boundary. In northern Illinois, eastern Iowa, and southern Minnesota, corn follows the northern limit of the prairie soils which characterize so much of the Corn Belt; in northern Indiana and Ohio the poorer-drained soils of the till plain and of the lake plain, respectively, have subordinated corn to a relatively minor crop in some places. Soils therefore largely account for the northwest-southeast trend of the Corn Belt's northern margin.

The history of agriculture in the Middle West shows a persistent movement of Corn Belt crops and livestock into the former Spring Wheat region of Minnesota and the Dakotas. This encroachment has been going on for nearly fifty years. Farther east, a different type of land use has been modifying the Corn Belt's northern limit. From Minnesota, through southern Wisconsin and southern Michigan more corn is cut for silage than elsewhere in the nation. The Hay and Dairy district's demand for succulent winter cattle feed has increased the corn acreage beyond its temperature and soil optimum for grain. Furthermore, the growth of the large cities on the southern margin of the Great Lakes has stimulated a somewhat different specialization of agriculture on the lake silts and

[12] O. E. Baker, "Agricultural Regions of North America," "The Corn Belt," *Economic Geography*, October 1927, Vol. 3, No. 4, pp. 447–467.

mucks of this plain. Pasture, sugar beets, vegetables, and fruit vie with corn in northern Illinois, Indiana, and Ohio.

The tempering effect of Lake Erie has made peaches and grapes the main crops in a large portion of its south shore, in a more or less continuous belt from one to ten miles in width, stretching from Toledo to Buffalo.[13] Along Lake Michigan's eastern shore, peaches and cherries have likewise brought about specialization in land use.

West Boundary—In the northwest the corn-and-dairy combination has been encroaching on the wheat areas. Corn has moved west from the prairie soils onto the chernozems of wheat fame. Except for the sand hills of western Nebraska, the isohyet of eight inches summer rainfall marks the western limit of the Corn Belt. In the southwest, winter wheat and corn compete for the land where the rainfall is adequate. Both the Spring and Winter Wheat regions increased in acreage when the price of wheat rose during both world wars.

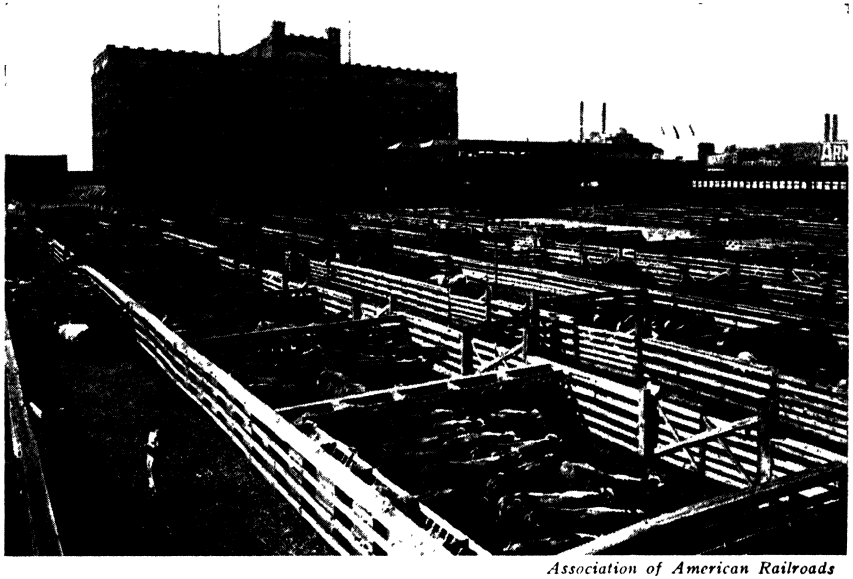
East and South—The eastern boundary is more transitional than either the north or west. The hill and mountain country between central Ohio and the Atlantic reduces corn to relatively a minor crop, grown for the most part on the bottom lands.

In the south as in the east, hilly topography is the immediately limiting factor in corn acreage and yield. Relief and some poorly drained soils of moderate fertility so reduce the yield of corn as to keep the isopleth of three thousand bushels per square mile everywhere north of the Ohio Valley hills. This transition zone is a part of the Corn and Winter Wheat Belt. Further treatment is given this section in the chapter on the Central Highlands.

Divisions—There are three main subdivisions of the Corn Belt. In each of them corn is the dominant crop and averages well above three thousand bushels per square mile, yet the varying circumstances under which corn is grown and marketed merit this subdivision. The first subdivision may be termed the heart of the Corn Belt. It lies in Illinois, Iowa, eastern Kansas, eastern Nebraska, and southern Minnesota. Here the natural conditions for corn are optimum. Corn shares dominant position with no other crop. Oats are second in importance. The corn-hog combination holds throughout the district, although more cattle are fattened here than elsewhere in the Corn Belt. In Illinois more corn is grown for sale than in any other portion of the Corn Belt. The only place where corn does not dominate the landscape is along the hilly lands of the Mississippi and its tributary valleys, where sheep production has become of ranking importance because these lands are best fitted for pasture.

[13] Paul C. Morrison, "Viticulture in Ohio," *Economic Geography*, Vol. 12 (1936), pp. 71–85.

The second subdivision of the Corn Belt is sometimes known as the Little Corn Belt. It lies in western Ohio and central Indiana. Soils here are not so consistently fertile as in the district just described, yet corn does well and the region appears to be as prosperous as in the heart of the Corn Belt. While corn is the dominant crop and hogs are the chief element in the livestock economy, the agriculture in the Little Corn Belt is quite diversified; and further diversification is possible when and where economic conditions warrant. Wheat, oats, and hay crops are important; tobacco is grown



Association of American Railroads

FIG. 81.—A PORTION OF UNION STOCK YARDS, CHICAGO

on farms in the middle and lower Miami Valley and in central-western Ohio adjoining Indiana. Beef and dairy cattle are widely distributed.

The third subdivision is the wheat-corn transition zone along the entire western limits of the Corn Belt. Although corn predominates nearly everywhere, the livestock phase of corn belt economy is of secondary importance. Cash grain is more important here than in any other portion of the corn belt except Illinois. In the northwest a corn and dairy combination has been encroaching on wheat acreage while in the southwest, winter wheat and sorghums rank along with corn. Despite occasional failures due to low rainfall, corn has become established.

Farming Practices in the Corn Belt—The farm landscape from central Ohio westward to central Kansas is essentially the same. Crop rotation is a practice of long standing. Despite certain changes in crops grown during

the past century, it has remained essentially the same type of farming region. Supporting crops are grown with an eye to the labor calendar and quick cash, as well as maintenance of soil fertility. Winter wheat, sown after corn is cut, grows a few inches before winter and is harvested by midsummer. This is followed by a legume, then by corn again. On many bottom land fields, where stream overflow restores fertility, corn is grown year after year with no diminution in yield.

The use of machinery has enabled the rural population to decline somewhat in numbers without the accompaniment of abandoned land. Ma-

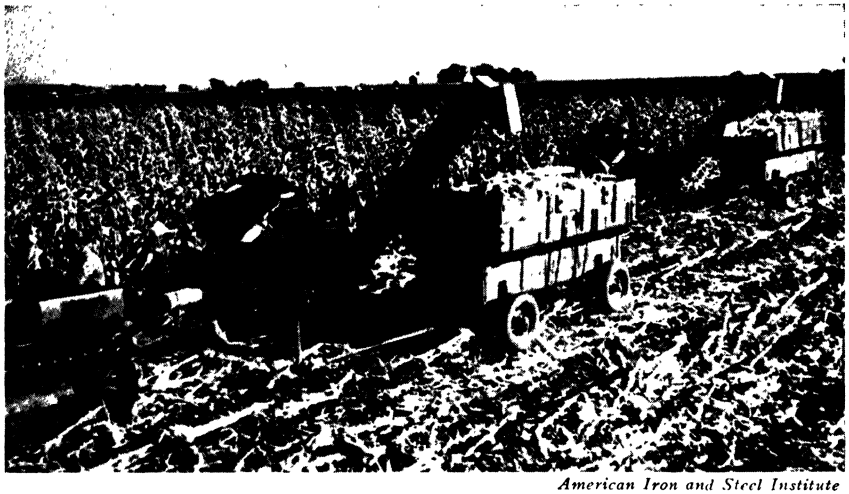


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FIG. 82.—A CORN PICKER AT WORK IN THE CENTRAL CORN BELT

chines have enabled the average farmer to work his 160 acres without more than one man the year round.

A high proportion of urban population in the region has been recruited largely from the farms; many who left the farm for the city have been employed in the manufacture of farm implements, destined for use on these same farms. The Corn Belt farmer uses more factory products on his fields and in his home and barns, than any other farmer in the world.

Changes in Farming—Two fundamental types of changes in farming practice have occurred in the Corn Belt. One type is the result of increased accessibility by railroad and highway; the other derives from a situation unique in world agriculture: a large and superior farming region has become the scene of a major part of the manufacturing activity in the United States. The first type of change marked the passing of local self-sufficiency, and brought about changes in the cropping system and

TABLE 12

Labor Calendar on a Northwestern Ohio Corn Belt Farm

JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.	NOV.	DEC.
Corn husked and cribbed from shock		Plow for Corn Oats planted Plow for Soy-beans	Plow for Corn Fitting for Corn Plow for Soy-beans Fitting for Soy-beans Disk and drill for Oats	Plow for Corn Corn planted Rotary hoe used Plow for Soy-beans Plant Soy-beans	Cut and shock Wheat Plant Soy-beans Rotary hoe Soy-beans Corn culti-vated Cut Alfalfa	Cut, shock and thresh Wheat Corn culti-vated Oats, cut, shocked and threshed Cut Alfalfa	Thresh Wheat Make Soybean Hay Oats threshed Cut Alfalfa	Corn cut by binder and shocked Fill silo Ground disked Disk and drill for Wheat Cut Alfalfa Make Soybean Hay Soybeans cut and shocked for seed	Corn husked and cribbed Disk and drill for Wheat Soybeans cut and shocked for seed and threshed or combined	Corn husked and cribbed	Corn husked and cribbed

the method of disposing of crops. Flax and hemp have passed from the Corn Belt. Sorghum, timothy, and wheat have declined in acreage. Local woolen mills, grist mills, distilleries, slaughtering, and tanyards have passed. Sheep have retreated to the hillier eastern and southwestern portions of the Corn Belt. Beef and swine have not been driven overland to the markets of the Middle Atlantic Seaboard since just before the Civil War.

The second type of change was due to the development of manufacturing in the Corn Belt and along the Lower Lake margin. This, also, has caused the introduction of new crops and new methods. The cities, relatively uniform in their distribution, have drawn upon the youth of the Corn Belt for employment needs. Dairying has become widespread, especially important near the northern margin of the Corn Belt. In northwestern Ohio and southern Michigan the sugar beet (grown under refinery contract) has made a start. A million pounds of sugar were grown and refined in Ohio in 1942. Tomatoes, cabbage, onions, celery, and other vegetables are important products. These crops have made it necessary to import cheap labor from the hill counties south of the Ohio River and from Cleveland, Toledo and Detroit and even a few from Mexico.

Canning Crops—The role of vegetable canning in the Middle West is important, not only from the point of view of local economy but from that of the industry as well.

The leading vegetable for canning in Indiana, Illinois, and Ohio is the tomato. No monument has been raised to the tomato in these states, as was done in Georgia, but the crop has steadily increased for twenty years. The major producing areas are in central Indiana and Illinois, and in northern Ohio. More than half of the tomato plants are imported from Georgia, Louisiana, Arkansas, and Mississippi.

On the silt and muck soils of northern Ohio, Indiana, and Michigan onions and celery are important. Much sweet corn also is grown, particularly in the valleys of southern Ohio and Indiana.

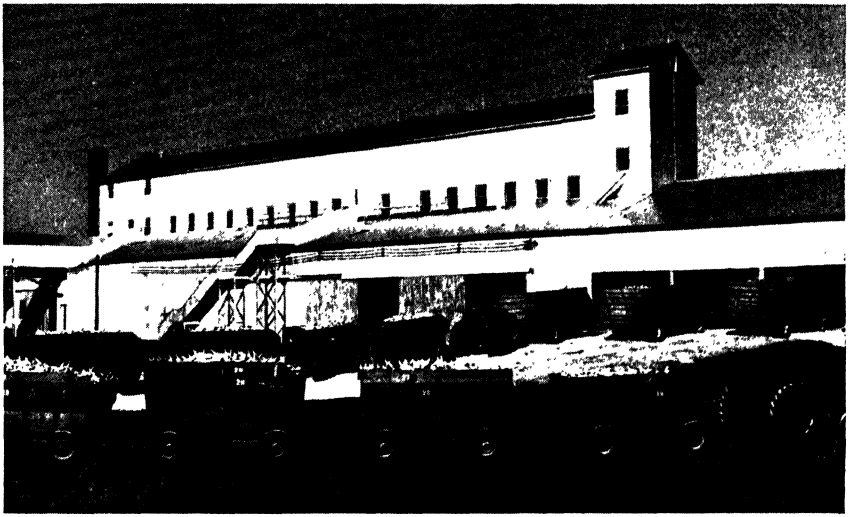
Changes Since the AAA—Throughout the Middle West significant and far-reaching changes have occurred possibly as a result of the Soil Conservation Act of 1935; it is not agreed to what extent the government program has been responsible for these changes. Many responsible farmers assert that they had already begun before the Triple A, and will continue regardless of Federal aid.

Agricultural Adjustment Administration reduction in corn acreage hastened the development of hybrid corn. The farmers found that, since they were compelled to reduce acreage, they could raise more bushels per acre. As early as 1933 there were 24,000,000 acres of hybrid corn; this was about 40 per cent of all the corn land in these states. In some counties

the proportion was as high as 90 per cent. The growing and selling of hybrid seed corn has become an important business. (Fig. 83.)

The soybean acreage increased from three and one half to nine million since 1933. Grain sorghums, fed from the shock and as silage, are grown from Indiana to eastern Nebraska. Grass silage is likewise coming into wide use, principally with sweet clover, alfalfa and occasionally red clover.

Corn belt farms have been getting larger; Ohio State University agri-



American Iron and Steel Institute

FIG. 83.—A LARGE WAREHOUSE IN ILLINOIS

The production and storage of hybrid corn seed has become an important industry in the Corn Belt.

cultural economists reveal that in 1916 the average size was 210 acres; in 1925, 232 acres; in 1934, 254 acres; in 1938, 266 acres. Various reasons are given for this. One is the fact that the need for more land to fit the increased capacity of farm machinery more or less coincided with the first and second government programs to pay farmers to grow less corn, wheat, and oats. With labor difficult or impossible to get at seasons when it was most needed, many Corn Belt farmers simply quit looking for it and turned to machines. This frequently meant that a farmer could collect his government payments for reduced grain acreage on the farms he owned and parts of one or two more which he rented for the purpose of using his equipment more efficiently. Actually he may have tended but a few more acres in plow crops, but the payments covered the retired grain acreage on his increased farm holdings. Such cases were frequent in Ohio

and Indiana, and were especially numerous in Iowa, Nebraska, and Illinois.

The growth of hybrid corn with its 20 per cent greater yield, in effect confused the government program, particularly in Iowa where 75 per cent of the corn is hybrid. It also caused a dislocation in farm labor. One farm owner said:

> Altogether I have taken twelve small, run-down farms or parts of farms, operated by eight men, and have turned them into three units with a total of 830 acres. I operate these with the aid of four men. I shift tools from farm to farm. The manure spreader runs every day in the year. Miles of fences have been torn out to make larger fields. I work a three-year rotation and am making money. With or without government aid, this trend will continue.[14]

Land Values—The late William Allen White of Emporia, Kansas, wrote a little book suggesting that most of the money made in United States farming has really been from rural land speculation. The knowledge of an ever-increasing market in the United States has stimulated sales of farm land. When this market fails to increase, fundamental readjustments must be made. Rural nonfarm living helps but little. Purchase of farms by city men is more important. These investors have bought farm properties for several reasons: one is the government payments, obviously another is that the money spent in building up the land can be deducted from income taxes; and, finally, the fear of inflation. Such a type of ownership is also promoting the larger farming units. Men from the drought-stricken Great Plains have in some cases sought to return to Corn Belt farms. Not all of these factors are ephemeral; they figure prominently in Mr. White's conclusions.

Urbanization—The nearness of railroads and factory towns has had a profound effect upon Corn Belt people of all ages. Nowhere in the United States is there a comparable farming region so intimately associated with manufacturing of similar importance. The value of farm land has been determined not only by its fertility, but in many instances by its location value for the encroaching railroad and factory. Abandoned crop land has not been the accompaniment of the rise of so many factories employing labor from the farms; instead, mechanization took place.

With high land values, a high degree of mechanization of farm work, and the profit accruing from farming and the sale of farm land throughout the Corn Belt to attract the city-farm buyers, the number of tenant-operated farms has steadily risen until Ohio has 40 per cent; Illinois 30 per cent, and Iowa 25 per cent tenancy. Although many farmers work on the shares, they are not sharecroppers. The relative stability of Corn Belt farming has enabled many owners past middle age to escape the rigors

[14] Information from Professor H. R. O'Brien, The Ohio State University.

of winter by going to California and to Florida. Many more are content to escape the lonely life on the farm, after the children are grown, by renting the farm and moving to a near-by town, still keeping an observant eye on the home place.

Corn and Winter Wheat Belt

Need of a Better Name—The principal discussion of the large land use region known as the Corn and Winter Wheat Belt appeared in the chapter on Central Highlands. Its treatment here is confined to its border lying north of the Ohio River.

This is the oldest of the agricultural regions of the old Northwest Territory; it is also, perhaps, the least widely known. The region should carry in its name more of its character; it might well be termed the subsistence and specialized crops region. This places the emphasis less upon crops than upon the conditions under which they are produced.

Topography—The critical factor in the environment is hills. Were it not for the thousands of low hills, much of the Ohio Valley might well be included within the Corn Belt. Corn is still the dominant crop here, and bottom-land fields occasionally produce crops comparable with the best anywhere. The terrain, however, precludes cropping of more than one-third of the area, and thus prevents production of the three thousand bushels or more per square mile which characterizes the Corn Belt.

The Ohio River Valley—The soils of the Ohio Valley in many places are too acid for alfalfa, although timothy, clover, and natural pasture occupy an increasing proportion of the area each year. The last great advance of the ice sheet did not reach far into the Ohio Valley, and the smoothing effects of an earlier ice advance have been erased by erosion. The landscape presents a much more dissected appearance than the Corn Belt on the north.

Livestock and Crops—The pastured hills support many flocks of sheep; the upper Ohio Valley ranks second in wool clip to the western range lands. Since corn is less abundant, swine are not so numerous as either sheep or cattle. Relative inaccessibility of rural areas to urban markets for fresh milk has kept down the amount of dairying. With the motor truck and hard-surfaced roads has come increased specialization in tobacco, fruit, tomatoes, sweet corn, poultry, and dairying for which parts of southern Ohio, Indiana and Illinois have long been noted.[15]

Part-Time Farming—Throughout the Ohio Valley the effects of fluctuating prices for wheat and oats are more apt to be observed in the use of

[15] I. E. Robertson, "The Ozark Orchard Center of Southern Illinois," *Economic Geography*, Vol. 4, 1928, pp. 253–266.

farm land than is the case in the Corn Belt. Part-time farming is increasingly common, especially in southern Ohio and Indiana, where Cincinnati and some small industrial cities have given employment to rural folk.

The vestiges of the original hardwood forests which once covered the hills now give rise to another type of part-time farming, in which the working up of small timber cut into sizes for highway and coal mine use locally constitutes the principal source of farm income. About the larger cities there is an increasing number of farm-estates, occupied by professional men or business executives from the city. The beauty of the countryside and the low price of farmsteads have conspired to bring about this development.

Towns, River Traffic, and Floods—A few of the towns and small cities of the Ohio Valley may be characterized as declining. The tonnage shipped on the Ohio is greater than ever before, but the slight extent to which the Ohio River towns dip into this traffic or contribute to it, does not support many workers. Coal mining has spurred some communities in southeastern Ohio, southwestern Indiana, and southern Illinois, but for the most part the huge steel, coal, sand, gravel, and wood tows on the Ohio mean little or nothing to the river towns of today. In fact, the construction of great roller dams to improve navigation of the Ohio has inundated considerable tracts of the Valley's best farm land.

On the other hand, the annual floods which have beset the river counties have responded to the flood control devices of the Ohio and its major tributaries, the Muskingum and the Great Miami. The effects of the TVA and other controls on the southern tributaries have been discussed under the appropriate chapter on the South.

Characteristics of the Economy—In summary, the impression one gets of a representative farm in the Corn and Winter Wheat Belt is its amazing diversity. While livestock remains important, the effects of hills, poorer soils, and inaccessibility to large urban centers have combined to make it self-sufficing rather than commercial. Farmwork is not mechanized, and rotation is practiced only on part of the cropped land. The population distribution is surprisingly dense, as dense over most of the area as in the Corn Belt. Land values are approximately only half those of its northern neighbor. Tenancy is likewise low. Soil qualities throughout the region vary greatly, although virtually none of it ranks with the heart of the Corn Belt.

The Cincinnati market has intensified the agriculture in the lower Miami Valley and adjacent parts of Kentucky.

Tobacco, peaches, apples, tomatoes, melons, sweet corn, and sheep are important in a number of districts.

The Hay and Dairy Region

Location of Portion in Middle West—The Hay and Dairy Region is the largest of the agricultural regions within the Lake states.[16] In both the eastern and western Lake plains it lies just north of the Corn Belt. In many places the Corn Belt margin is one of vague definition, but in general it approximates the industrialized Lower Lakes margin, the southern limit of sandy soils in Michigan, the Driftless Area of southwestern Wisconsin and the adjacent states, and the sandy or stony soils in central Minnesota.

Surface features range from nearly level plains to morainic ridges and bare rock knobs. Many glacial bogs and lakes dot the landscape. A great deal of the western Lake region and much of the eastern Lake region may be characterized as cut-over land, communities of small farms, or abandoned crop land. Thus far the description might be that of the northern tier of New England states or northern New York, but even with the added bond of dairying, these Upper Lakes states are set apart from the Northeastern states in their economy.

General Farming Precarious—As was noted in the section on Forests, the Upper Lakes agricultural area is mainly the by-product of lumbering. It was not settled at the same time the Lower Lakes area was; westward-moving agricultural pioneers passed it by and went on to the rich prairie lands of the Missouri Valley. The economy of this large area bears little resemblance to the Corn Belt south of it. Where soils are not too stony or shallow, large areas have been cleared and used for the cultivation of clover, alfalfa, small grains, and corn for ensilage. Due to the high cost of clearing the mediocre land, the short growing season, and the relative inaccessibility of the producing areas almost everywhere the nature of the agriculture betrays the imminence of abandonment.

The United States Bureau of Agricultural Economics has suggested that persons having little capital can obtain the largest value of products in return for their labor and capital by investing it in poor cheap lands like those of much of the Upper Lakes states.

Increased Role of Dairying—Wherever proximity to markets allows it, dairying is the principal source of farm income. Dairying alone, or together with potatoes and small grains or even livestock, tends to set apart the several tiers of counties bordering the Corn Belt.[17]

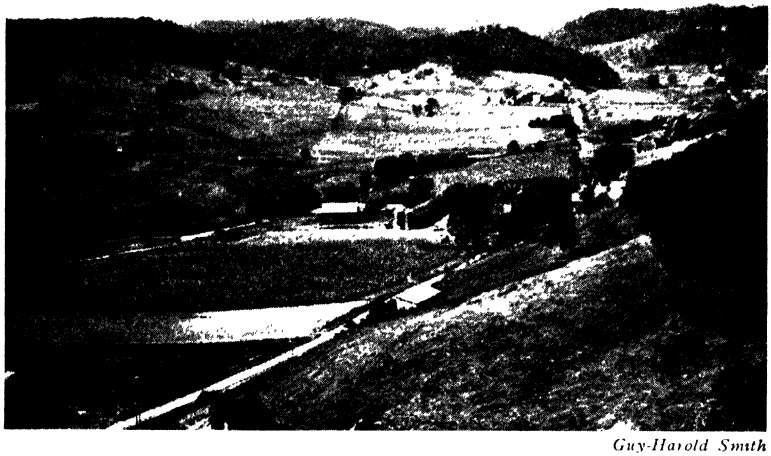
From the southern end of Lake Michigan northwestward to the Spring

[16] O. E. Baker, "Agricultural Regions of North America," "The Hay and Dairy Regions," *Economic Geography*, Vol. 4, 1928, pp. 44–73.

[17] A. Fause and G. S. Carfield, "Potato Industry in Minnesota," *Economic Geography*, Vol. 13, 1937, pp. 393–401.

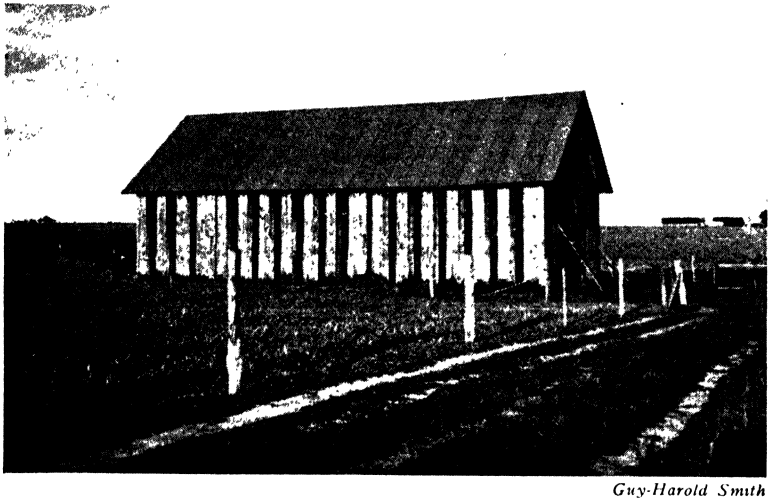
Wheat district of the Dakotas, dairying steadily increases at the expense of corn and wheat.

It must be remembered that only since the beginning of the present century has the United States become an important consumer of dairy products. The change in land utilization, therefore, dates from the rise



Guy-Harold Smith

FIG. 84.—A PROSPEROUS VALLEY IN THE DRIFTLESS AREA OF SOUTHWESTERN WISCONSIN



Guy-Harold Smith

FIG. 85.—TOBACCO CURING BARN IN THE DRIFTLESS AREA

of this new market for fluid milk, and several types of cheese. The growth of the market for fluid milk was contemporary with the rise of the automobile manufacturing industry. (Detroit's population in 1900 was 285,000, while in 1940 it was 1,750,000.)

Supporting Power Increased by Proximity to Lake Cities—Whereas Edward Tiffin, then Surveyor-General of the United States, stated of this region in 1815 that "not one acre in 10,000 will support human life," the carrying power of Michigan's lower peninsula, the southern half of Wisconsin, and Minnesota, has steadily risen and now the population of the southern Lakes margin has approached the ten million mark.

The urban population has modified the farm economy of the Upper Lakes region to an important degree. Except for New England and New York, no other part of the United States has so many farms with at least half of the income derived from boarders, lodgers, and campers. Another feature which the Lakes states' farms share with New England and much of the Appalachian upland is the forest-products farm, where at least half the farm income is from the sale of forest products.

Despite these New England characteristics, this region supports an agricultural economy in which a much smaller proportion of farmers are able to supplement their income by working in near-by cities than is the case in New England. The concentration of manufacturing to the south of the area accounts for that. Poultry, crop specialties, and animal specialties, aside from dairying, are rarely encountered in the Upper Lakes region.

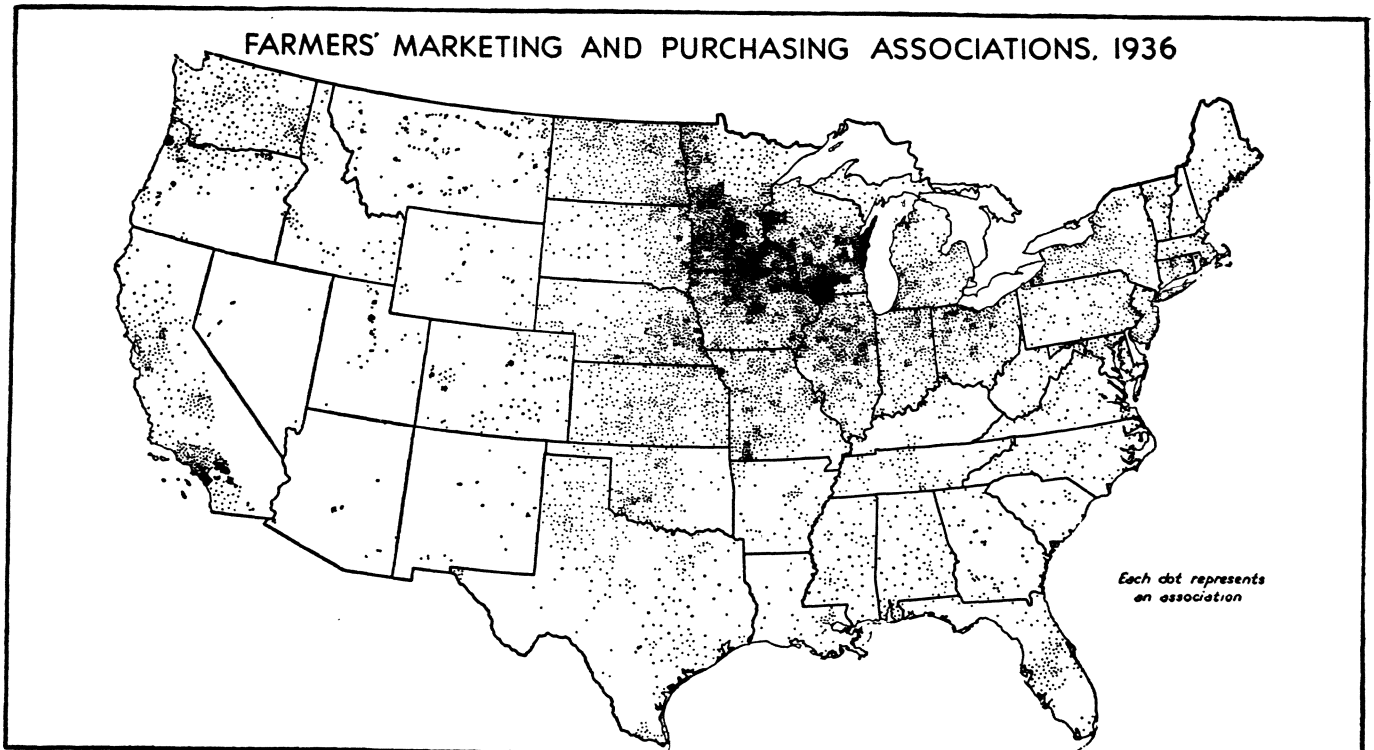
Both the Upper Lakes and the Ohio Valley are exporters of labor to more favored areas. Increasingly the children of the future will come from these less favored areas which have higher birth rates.

Some Areas of Crop Specialization—There are areas, however, in which crop agriculture stands out distinctly. Among these districts must be included the peach and cherry orchards of Lake Michigan's east shore and the Door Peninsula of eastern Wisconsin; the potato district of east central Wisconsin and southeastern Michigan, the sugar beet district of eastern and southeastern Michigan, the celery districts in southwestern Michigan, and on the Kalamazoo silt plains. Where such specialized centers have developed, there is a degree of permanency unknown to most of the Hay and Dairy region.[18]

Impelling though Lower Lakes markets are, the fact remains that soils are generally poor and the growing season is short; the interiors of these states have nearly three weeks' shorter growing season than the shore areas.

Recreation Facilities, Assets of the Future—The carrying power of the

[18] Southwestern Michigan's tulip industry is a $4,000,000 industry. About half of all U.S. bulbs are grown here. Holland, Kalamazoo, Galesburg, Benton Harbor, Marshall and Plainwell share in it. Half a million people visit their Tulip Festival each year.



Farm Credit Administration, U.S. Department of Agriculture

FIG. 86.—ORGANIZATION IS AN ACCEPTED PART OF THE AMERICAN FARM ECONOMY

Compare this map with Fig. 2

land may become relatively great, only if the dense population of the Corn Belt and the Lower Lake cities turns increasingly to this northern summer vacationland. Tourists reach areas too remote for any significant development of commercial dairying. For twenty years the Michigan Land Economic Survey has been appraising and mapping the potentialities of these cutover areas to the end that speculation may be stopped and proper use made of the land. Reforestation, stocking of streams and lakes, and the protection of wild life appear to be the most colorful, but in the long run the least important phases of their program.[19] Equally sterile lands in New England support many times more people per square mile, but proximity to industrial centers largely accounts for this contrast.

In the Upper Lakes the cost of administering local governmental units and services is nearly everywhere greater than the tax returns. The multiplicity of these service organizations in effect reduces the carrying power of the land.

The Spring Wheat Region

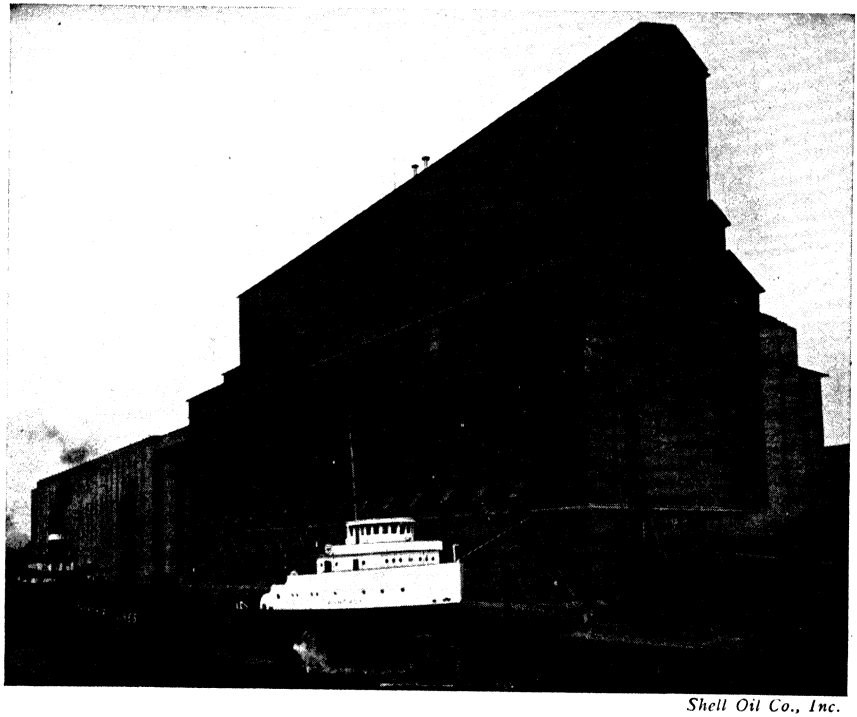
The Name Continues but the Economy Changes—In the northwestern portion of the Middle Western Plains the production of spring-sown wheat has been so general and so persistent as to give its name to that region. In the main it is a transition zone between the row-crops of the upper Mississippi basin and the grazing lands of the Western Great Plains. However, in spite of the persistent emphasis upon wheat, there have been changes in the economy of the area, and the end is not yet in sight. The southeastern border has changed as the relative prices of wheat and of corn have mutually affected the production areas of these crops. Two world wars and an intervening depression have profoundly affected the economy of the erstwhile spring wheat specialist.

This is one of the great agricultural regions in the United States which have been designated by the name of one commodity. Attention has been given to the changes in cropping which have made almost misnomers of such terms as Cotton Belt, Corn Belt, and now Spring Wheat Region. Whereas World War I caused a great demand for wheat, with an increased price and extended acreage in consequence, World War II placed emphasis upon factory goods primarily, although the largest army ever mustered in the United States called for more wheat than our wheat lands had been producing for a quarter century. Despite the war, the Spring Wheat Region has become a region of wheat, barley, oats, sugar beets, potatoes, dairy farming, and stock raising.

Red River Valley—The Red River Valley, the heart of the former wheat-

[19] Michigan trappers caught 995,443 muskrats and 37,801 mink in 1943.

specialist area, is the most important agricultural district west of the upper Great Lakes. Changes in its agriculture over a period of fifty years are representative of those taking place in the rest of the wheat-growing northern plains. A situation on the old Agassiz lake plain of northern Minnesota and North Dakota places it in the short summer phase of the humid continental interior type of climate. The growing season is limited, vary-



Shell Oil Co., Inc.

FIG. 87.—GRAIN ELEVATOR AT DULUTH

Representative of the handling and storage facilities in the commerce of the Great Lakes.

ing from 103 to 139 frost-free days. Killing frosts may occur as late as June and as early as September. Corn is knee-high in Georgia when the frost line retreats to the plains of Canada, and the farmers of the Red River Valley move out on the flat fields of this old lake plain to prepare the soil for wheat. Although the period of frost-free days is not long, the percentage of possible sunshine is high and the period of sunlight is long each day.

About half of the total yearly precipitation of from 17 to 22 inches falls during the summer months when crops most need it. The certainty of cold winters has precluded the possibility of crop changes which require a more

temperate climate. Many of the settlers who moved to the Matanuska Valley in Alaska were from these wheat-growing counties.

Soils of the eastern Great Plains nearly everywhere north of the Arkansas River are of the northern chernozem type. Red River Valley soils are deep, heavy, finely divided clay loams with rather poor natural drainage. As with most of the Great Plains soils, they are productive if adequately watered.

An Agricultural Oasis—A strip of these soils some forty miles wide and the breadth of North Dakota constitutes the only level terrain of similar extent between the northern Rockies and Lake Superior. It has been the basis for the development of an agricultural oasis in which 80 per cent of the district is in farms and 90 per cent of the land is cultivated. Field crops have returned by far the largest part of the farm income for fifty years, but their nature is changing. The area used to specialize in wheat, which reached its climax about 1880. In the past quarter century wheat acreage has declined by nearly 40 per cent; corn and oats have increased their proportion of the total cropped land. Potatoes, barley, flax (a quarter of the nation's crop), sugar beets, and alfalfa have all become important crops as the market for dairy products has enabled the farmers to turn to this phase of the livestock industry. Since World War I dairy products have increased in value 400 per cent; the cream sold as butterfat has increased from 7 million to 52 million pounds.

Red River farms in recent years have faced a labor shortage; in some alfalfa fields there will be a hydraulic lift, sweep rake and stacker which replaces the labor of three men and three machines. Some farmers do not stack their wheat but allow it to dry on the ground; later a big rake picks it up for threshing. It is the Red River Valley chiefly which sends the northern Great Plains far ahead of the southern portion in the proportion of farm income which comes from the sale of livestock and its products. Poultry has increased 300 per cent since World War I.[20]

Changes in Economy—A representative farm in the Red River Valley which has departed from an all-wheat specialty to a grains-livestock feeding economy is that of Mr. O. J. Haas of Houston, Minn. Although this farm does not quite live up to the ratio of crops income, 60 per cent, and livestock income 40 per cent, of the total farm income obtaining for a Red River Valley county, it is typical of the transition. His farm of 320 acres is about average size; 77 acres are cultivated wheat, oats, and barley; 17 acres are in permanent hay, 27 acres in pasture, 91 in woods-pasture, and 3 are idle. In 1938 he was feeding 2 horses, 19 dairy cows, 16 head of young stock, 18 hogs, and 60 chickens.

[20] See "Farming Hazards in the Drought Area," Works Progress Administration, Div of Social Research, Mono. XVI, Washington, 1938.

The AAA encouraged the reduction of cash grain farming and the increase in livestock and the crops associated with livestock. The rise of dairying has brought 150 creameries to the Red River Valley. A sugar beet refinery, a score of small flour mills, and the usual service industries for a total urban population of 90-odd thousand, more or less equally divided among Fargo, Grand Forks, and Moorehead, have been established thus to modify the nature of the local market.

Union Pacific Railroad

FIG. 88.—AN EASTERN KANSAS WHEAT FIELD

Which has not yet succumbed to the combine

The financial difficulties which hit the farmers of the Spring Wheat Region between the two world wars did not overlook the Red River Valley. Crop failures due to drought were less than for any other part of the wheat-growing plains, but hastened the establishment of a crop-diversity program and the end of a long and disastrous annual speculation in the price of wheat.

The Winter Wheat Region

What and Where?—So much wheat is sown in the autumn in central and western Kansas, Oklahoma, and northern Texas that it has come to be known as the Winter Wheat Region. The region does not have the

optimum conditions for growing winter wheat. The yield is low because of the uncertainty of the weather and the destruction of the crop by disease and by pests. The western boundary of this wheat area is set by aridity, where the farmer has lost so many crops of wheat that a large proportion of his ranch is in pasture. On the south, higher temperatures enable the farmer to grow cotton more profitably. The northern limit is a combination of poor Nebraska soils, and winter-killing of the wheat plant. The eastern margin is economic in nature; corn is more profitable than wheat, and where rainfall permits, corn is the dominant crop. As in the case of the Spring Wheat district, the relative price of corn and of wheat plays an important role along the eastern periphery.

Regional Characteristics—For half a century the farmers on these broad plains have put about three-fourths of their plowed land in wheat, with results that show in the following table.

TABLE 13

COMPARISON OF YIELDS OF WHEAT AND CORN

WHEAT, BUSHELS PER ACRE			CORN, BUSHELS PER ACRE	
KANSAS	ILLINOIS	YEAR	KANSAS	ILLINOIS
12	17.4	1937	12	48
9.3	14.5	1935	9	38.5
9.1	16.4	1933	11.5	27
18.5	23.3	1931	18	37
12.4	14.7	1929	18	35.5
11.2	13.9	1927	27	32
9.2	16	1925	17.6	41
10	18	1923	23	37.5

During World War I the price of wheat never fell below $2.00 per bushel; between the two world wars it did not rise above $1.63; the average was about $1.00. With such price fluctuations it is not strange that the fluctuations in wheat acreage were likewise marked. Conditions such as these have contributed to an ephemeral element in the rural population in the winter wheat growing region. Under such titles as "Adrift on the Land," their migrations over the Great Plains and to the Pacific Coast have been told many times. The percentage of farmers who have succumbed to the urge to start all over again is much higher in this southern wheat growing region than in the northern wheat region.

The Government has released the story of one farmer who stayed through low prices and drought to face the future with changed farming practices. His experience is typical of the majority of wheat farmers who have intelligently tried to adapt their farming methods to the physical and the economic conditions obtaining in the winter wheat area. This

representative farm is on the southern Great Plains in the eastern part of the Texas panhandle. The present owner-occupant broke this farm from Great Plains sod in 1910. For the next eight years he raised wheat and beef cattle exclusively. World War I, with $2.00 wheat, led him to turn 300 acres more into wheat. In 1920, when the price of wheat dropped, he lost his farm, remaining on the farm as a tenant. In 1926 the yield and the price of wheat were good; with the proceeds of this crop he was able to rebuy the farm. In 1929 water erosion was serious; in 1935 he first noticed some of his soil was being eroded by wind, but his location on the eastern margin of what came to be known as the "dust bowl" did not seriously impede his farming operations. In 1940 he had 950 acres of wheat, grain sorghum, and fallow in rotation, with 297 acres in pasture, 31 in houses and roads, and 9 in windbreaks. He was feeding at this time 2 dairy cows, 31 young beef animals, 12 horses, and 50 chickens. His share of farm income from livestock and its products was higher than the average for the southern part of the eastern Great Plains.

XIII

MANUFACTURING IN THE MIDDLE WEST

In the Middle West the land which was to become one of the most important agricultural and industrial regions of the world had to be possessed. The aborigines were dispossessed and the pioneers sought the fertile lands along the moving frontier. Of necessity self-sufficiency became a way of life. While the pioneer families largely devoted their energies to establishing a farm, there was in every family or at least in every community the rudiments of an industrial economy. Many of the household industries in due time became major regional industries. With the establishment of the lines of commerce and a full development of the natural resources the Middle West emerged as the industrial heart of America.

Factors Influencing Settlement

Late Settlement—White settlement of the old Northwest Territory did not begin until the turn of the nineteenth century. Reasons for the tardy settlement are to be found in the relative inaccessibility of the region at that time, in the reluctance of both France and England to permit white settlement during the Colonial Period, and in the tardy formulation of a land policy for the disposition of these lands by the Federal Government. Once started, however, no other section of the United States increased in population so rapidly as the Middle Western states.

River and Canal Period—The rural communities were of necessity self-sufficing; such surplus as existed had to be processed for shipment by water to the eastern south. Flour was milled, whiskey was distilled from corn, brandy was made from fruit, and flax and wool textiles were made in the home for shipment by river boat to the South. The seasonal use of the rivers, the length of the journey, and the uncertainty of profits discouraged any great river export trade. Prices for farm products were very low. New York's experience with the Erie Canal led some communities in Ohio, Indiana, and Illinois to plead for canal construction as a means of ending the agricultural depression. Year-round transportation is held to be the first stage in the industrial evolution of the Middle West.

The direction of trade had been north-south, so the major canals

planned were to connect the Great Lakes and the Ohio River. Those actually completed and used were the Ohio and Erie and the Miami and Erie canals following routes across Ohio which have continued important in trade. In Indiana there was the Wabash Canal with its feeders. These canals with their respective feeders prolonged the generation of river economy and fixed the pattern of urban population which has persisted until the present. Although canals languished and ceased operation about the time of the Civil War, the best years were those immediately after the building of the railroads which, for the most part, paralleled the canals. The influence of canals and the belief in the desirability of Great Lakes–Ohio River accessibility is manifest in the persistent advocacy of canal construction in these Lower Lakes states. Most recent projects have been as parts of the water conservation program. There is today a canal completing the nine-foot channel from Chicago to the Gulf.

The canals tended to raise the prices of farm products wherever the producers were within hauling distance of the canal or river; they thus contributed to the denser settlement of their respective corridors. They tended also to promote the conversion type of industry: woolen factories, ropewalks, flour mills, distilleries, sawmills, tanyards, and the ubiquitous blacksmith shop. Upon trade their effect was a continuation of the north-south commerce utilizing the Ohio and Mississippi rivers.

Railroad Influences—After the railroads came to the Middle Western states, the ill-drained plains of the Great Lakes basin finally were settled. The railroad oriented the urban groups in these areas, as rivers and canals had done a generation earlier in the Ohio Valley.[1] Although railroads curtailed the importance of steamboating on the rivers, they by no means put an end to the trade with the eastern cotton belt. Cincinnati built a railroad from that city to Chattanooga shortly after the Civil War; this has been under profitable lease to a southern company ever since. Another railroad which testifies to the continued vitality of these gateways to the south is the Louisville and Nashville, likewise a profitable investment for an Ohio River city which, like Cincinnati, nearly bankrupted itself to pay for the project. But the new trade horizons of these states was to be east-west after the railroad came; southern trade has been of secondary importance.

Rapid Growth in Lake Section—For the older population centers on the Ohio River, the railroad was to mean growth, but at a declining rate; while for the plains of the Lower Lakes margin it was to mean a phe-

[1] See: Guy-Harold Smith, "The Populating of Wisconsin," *Geographical Review*, Vol. 18, 1928, pp. 407–421; also "Population Redistribution in Ohio, 1880–1930," in "Major Land-use Problem Areas and Land Utilization in Ohio, 1935," by J. H. Sitterly, R. H. Baker, and J. T. Falconer, Bulletin No. 79, Department of Rural Economics, Ohio State University, Columbus, and Ohio Agricultural Experiment Station.

nomenally rapid growth in urban population. Wheeling, Cincinnati, and Louisville were to witness the much more rapid growth of Cleveland, Detroit and Chicago. Likewise the railroad enabled scores of interior towns to grow up; from Pittsburgh westward to Chicago and St. Louis the railroad gave rise to many new urban centers.

The Appalachian gaps on the east, the Great Lakes as carriers (and deflectors of overland trade) on the north, the Ohio River on the south, and the Mississippi on the west have jointly determined the commercially-active portions of the twelve states of the Middle West. It remained for the railroad not only to fix the detailed pattern of manufacturing centers, but strongly to influence the types of manufacturing as well.

Factory Beginnings Unlike Those of East—The antecedents of manufacturing in the Middle West differed greatly from those of the Northeastern states. The latter group had a century and more of industrial experience before the Northwest Territory was established. The rise of factory industry in the east found large cities acting as magnets for the new manufacturing establishments. These cities were sources of capital and of markets. The poor farms supplied the necessary labor. Although industrial raw materials were meager in the east, the New England merchant marine tended to offset this disadvantage. In several instances quantity production was made possible in New England factories solely because of the foreign markets reached by the Yankee ships.

In the Middle West, on the other hand, when the restrained westward movement of settlers finally did burst over the Appalachians to the plains of the Upper Mississippi Valley, they were for two generations numerically inadequate to the task of establishing an agricultural and industrial economy in this great land. Because of labor shortage, every common task was scrutinized with a view toward mechanization. The level terrain, a soil free from stones, and the susceptibility of the crops to machine production early led to the invention and manufacture of farm implements. There were no large cities to stimulate manufacturing. Capital was scarce; there was no New England trade to bring it in, nor to carry the products out. Fortunately the factors which tended to retard manufacturing were temporary in nature. Industrial expansion came when the retarding factors had given way to the conditions which favored manufacturing.

Even during the pre-railroad period, the later importance of iron in the manufacturing economy of these states was presaged by the rise of charcoal iron furnaces on both sides of the Ohio River, and farther north particularly in the Mahoning River Valley of eastern Ohio. These small furnaces began operation during the canal days, but with the advent of the railroad their development became important. By the time of the

Civil War, several hundred thousand tons of charcoal iron were produced each year by the furnaces of the upper Ohio Valley. The last of the charcoal iron furnaces closed just after World War I. There were no iron "plantations" in this transappalachian country but the several furnace settlements were somewhat like them. A phrase used to describe the size of one Ohio furnace was "fifty yoke of oxen and a hundred men"; this suggests the method of uncovering the ore and the size of the furnace organization including charcoal burners.

Major Industrial Types

Iron and Steel—The major industrial types in the Middle West during the first quarter of the nineteenth century are still among the half dozen most important industries in these states. Following is a brief review of these factory industries in the Middle West.

Three of the nation's six major steel districts are in the Middle West: Cleveland-Youngstown, Chicago, and Detroit. There are also numerous minor steel districts: Middletown, Hamilton, Massilon, Canton, Portsmouth, Zanesville, Kansas City, and Columbus; the tonnage for the Middle West is materially increased by their combined output.

The Pittsburgh-Cleveland district now leads the United States in iron and steel manufacturing, as Pittsburgh led for more than a generation. As the table below indicates, Pennsylvania has watched the steel industry establish new centers in the Middle West until today Ohio ranks near Pennsylvania, and the Middle West produces about half of the nation's iron and steel. The permissive factors in this recentralization have been: (1) the ore from the iron ranges of Lake Superior, (2) the coal mined in the Lower Lakes states and the Appalachian Plateau, (3) limestone on the lake margin of Ohio, Michigan and Indiana, and (4) railroad accessibility to eastern and western markets. The impelling factor has been market. The principal use for steel is to make machinery. The cardinal location factor for machinery manufacture is nearness to market, and the market center has steadily moved to the machinery-using Middle Western states. Scrap iron and scrap steel are often used as charges in steel furnaces. The automobile industry is one of the principal sources of this scrap metal. The Lower Lakes margin is therefore a principal source of this material for steel making.

The iron and steel region which shows most vigorous growth in the 1940's is the heavy industry center of the country. Although thousands of tons of pig iron and steel ingots are exported from the Pittsburgh-Cleveland districts, a far greater tonnage is consumed in the local manufacture of wire, sheet and tube, structural steel, mining machinery, auto-

mobile parts, ships and others in the long list of heavy machinery and machine tools. Despite the diversity of manufacturing industries in the Middle West, the proportion of wage earners engaged in metal manufacturing exceeds that of Pennsylvania, the ranking steel state.

TABLE 14

IRON AND STEEL PRODUCTS ROLLED IN THE UNITED STATES

1875		1901	1938
(1,688,000 tons)		(12,319,000 tons)	(36,766,000 tons)
Pennsylvania	39%	56%	30%
New England, New York and New Jersey	20	4	6
Ohio Illinois	13	15	23
Indiana	13	15	20
Southern States	10	7	13

Data from Iron and Steel Institute

It must not be supposed that iron and steel are industries of similar magnitude. The manufacture of steel employs nearly twenty times as many men as does the manufacture of iron. Their separate identity has been weakened by the modern tendency to eliminate as many of the heatings as possible; a mill today converts the iron into a molten state but once during the entire process of converting iron ore into a fabricated steel form. Rather than two industries, iron and steel have tended to become one.

TABLE 15

PROPORTION OF WAGE EARNERS IN METALS MANUFACTURE PER THOUSAND POPULATION, 1938

Michigan	105
Connecticut	70
Ohio	55
Indiana	46
Illinois	38
Pennsylvania	37
Wisconsin	31
Massachusetts	29
New York	17

Iron and Steel Institute

Machinery—The manufacture of machinery in the Middle West is the most spectacular aspect of the metals industry. This quality is due to the varied types of machinery made here, to the precision nature of so much of the machinery, and finally to the emphasis upon the manufacture of

machine tools. This kind of manufacturing creates a relatively high value; machine tools, for instance, have about four times as much value added by manufacturing as metal manufactures in general. The average machine tool plant takes $1,111 in materials and fuel per wage earner, and adds $2,887 or 250 per cent to it, in contrast with a 67 per cent increase by the average metals manufacturer.[2]

It is axiomatic that machine-using regions will become machine-making regions. The machine shop is the market for the machine tool, and the shop will be located where the machinery is to be replaced or repaired. In this manner, several of the early manufacturing districts of the Middle West began with the satisfaction of a large and growing market for agricultural machinery. This has been largely responsible for the attraction of skilled mechanics, and in turn for the coming of new concerns dependent upon skilled workmen. The average Corn Belt farm boy is something of a mechanic; upon him many kinds of city factories depend for labor. Today the position of the Middle West is well known in the manufacture of machine tools, automatic and calculating machines, automobiles, airplanes, refrigeration machines, power shovels, watches, agricultural implements, turbines, electric motors, Diesel engines, coal mining and construction machinery, tire and tube making machines, washing machines, ordnance, marine engines, and locomotives.[3]

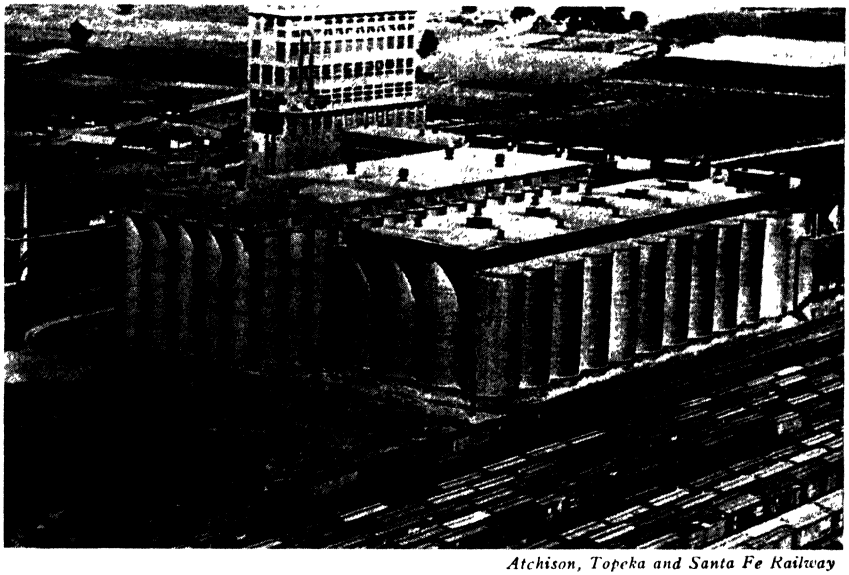
Flour Milling—In the days of self-sufficing communities every wheat-growing district had its flour mills, generally small units. Commercial bakeries were limited to the larger cities. Power and labor requirements were easily met in all but the smallest communities; the prevalence of home baking enabled many a small flour mill to operate long after its milling costs became disproportionately high. Flours ground from local wheat were not uniform in their baking qualities, and the peculiarities of their baking requirements constituted a strong tie for the small mill.

During World War I the government took over these flour mills. The change in the baking habits of the rural areas of the nation was accelerated by the wartime restrictions, so that by 1942 probably 60 per cent of the flour mills of the United States had closed. Wheat blending, improved milling machinery, the automobile and better roads, and the development of commercial bakeries serving rural routes all contributed to the decline of the small independent flour mills. For three-quarters of a century there has been a gradual reduction in the acreage of wheat in the Corn Belt states as land values rose; this and the rural-urban shift in population have further promoted the change in milling centers.

[2] Data, Machine Tool Builders Association, E. F. DuBrul, Secretary, Cleveland.

[3] Comparative newcomers are the shipyards on the Great Lakes: Cleveland, Chicago, Detroit, Manitowoc, Lorain, Ashtabula, Bay City, Superior and Duluth.

Minneapolis led the nation during the middle period of American flour milling. Lacking local markets, the Spring Wheat Belt exported its wheat to this old sawmill town on the Mississippi River at the Falls of St. Anthony. During the half century of Minneapolis supremacy, the milling industry underwent revolutionary changes in technique and in consumer demand. By World War II Kansas City led the industry; Buffalo, Minneapolis, and the cities of the Corn Belt milled the bulk of the remainder.



Atchison, Topeka and Santa Fe Railway

FIG. 89.—GRAIN ELEVATORS AT KANSAS CITY
Serving the hard winter wheat region

Isolated centers on the Colorado Piedmont, the Salt Lake oasis, the Columbia Plateau, and the Pacific Coast continue the pattern of milling originally established in relation to the wheat-growing areas and to the markets.

The milling of rye, oats, buckwheat, corn, and barley is much less important than wheat. Corn is milled in many places; it is especially important south of the Ohio River. The largest cereal mills to convert oats are at Cedar Rapids, Iowa, and at Akron, Ohio. Buckwheat is milled in New York and Pennsylvania.

Meat Packing—The slaughtering industry did not involve meat packing until the middle of 1800's, when Cincinnati became the largest center for pork products. Local butchers, many of them operating rural delivery routes, had furnished fresh beef and cured meats for most communities,

large and small. Beef was not susceptible to packing methods until the development of the refrigerator car in 1875. Prior to that, beef was from locally slaughtered animals sent in from the Middle West. Chicago's packing industry, founded on pork during the second half of the nineteenth century, singlehandedly developed beef packing and still retains its supremacy. Mass production methods were employed and local slaughtering declined in all areas served by rail from Chicago. In 1942 the packing industries for beef, pork, and lambs are localized primarily in Chicago, with Kansas City, East St. Louis, Omaha, Sioux City, Milwaukee, St. Joseph, and St. Paul as the minor centers. Largely because of certain religious mandates, only the slaughtering of lambs and sheep has continued in the eastern cities.

Changes are taking place which modify the nature of the livestock industry; vegetable oils have driven the lard-type hog from its former premier position; and the demand for so-called baby beef (18 months) has fostered cattle bred in the corn-growing states at the expense of the range states. The AAA feeding program has likewise affected the livestock industry in that it has aimed at a general reduction of animals. For Illinois farmers a compensatory development has been the rise of industries in and near Chicago in which corn is a raw material for the manufacture of starch, alcohol, plastics, cereals and syrup.

Industrial Districts

Urbanization—By referring to the map on page 51, it will be noted that the Middle West is a land of many cities, but the urban distribution is by no means uniform. The Lower Lakes states are much more densely populated than the Upper Lakes region; industrialization is the principal reason for this. Major contrasts in the urban population are also observed between the states east and west of the Mississippi River, with the former much more densely populated. Within each of these major divisions there are differences in the distribution of cities: in the region adjacent to the Ohio and Missouri rivers there are few cities; the largest cities are along the Lower Lakes margin, with most of the smaller cities on the plain between the Lakes and the Ohio-Missouri rivers.

Districts—In Fig. 16 where the symbols are drawn so large, one does not gain the impression of a uniform urbanization even within each of the major industrial districts. The gross pattern includes the city groups about Cleveland-Youngstown, Detroit-Toledo, Chicago-Milwaukee, Miami Valley, Indianapolis–Fort Wayne, St. Louis, Kansas City, Minneapolis–St. Paul, and the scattered groups of smaller cities on the plain between the Lakes and the Ohio-Missouri rivers. If one were to think of these cities as

points along the railroad net of the Middle West, the proper areal perspective will be gained.

City Groups Constituting Manufacturing Districts—Mere propinquity of these urban districts is not enough to suggest an economy common to the cities comprising the group. The appearance and the growth of these cities varied with the regional economy in which each is rooted. All cities are or were commercial; most of them achieve manufacturing importance later. The functions of these cities in the Middle West vary widely, more so, probably, than the cities of any other large division of the United States. The cities of the eastern Corn Belt, for instance, engage in much more manufacturing than those of the western Corn Belt; cities in the Upper Lakes region are characterized as lumbering or mining, or commercial, or just recreation centers. Those of the Lower Lake margin are commercial and manufacturing. Those of the Ohio River are commercial and manufacturing; generally the former predominates.

Cleveland-Youngstown—Between the Ohio and the Lake Erie cities there is, in effect, a natural corridor of river valleys. (See Fig. 49.) The neck of this funnel may be thought of as the upper Ohio and Beaver valleys; it widens in the Mahoning Valley and the railroads branch out to the principal ore-importing ports on Lake Erie: Ashtabula, Lorain, Fairport, Conneaut, Cleveland. Into this commercial funnel pour the iron ore from the Lake Superior mines, and the limestone of Michigan and Lake Erie's south shore, destined for the iron furnaces of Pittsburgh and the cities of this industrialized corridor. As the manufacture of steel expanded beyond the limits of Pittsburgh and the adjacent valleys of western Pennsylvania, the railroad towns of these eastern Ohio valleys shared in the growth of iron and steel manufacture. Like many other populous pioneer areas, the Mahoning Valley had a few charcoal-iron furnaces in operation long before the spill-over from Pittsburgh gave Youngstown the foundations of its present high rank as a steel manufacturer. Youngstown, Niles, and Warren in Ohio, and Sharon, Farrel, and New Castle in Pennsylvania are all steel towns; they constitute a specialized industrial landscape of heat and power.

Cleveland—The only city of more than a million people in the entire region between Pittsburgh and Lake Erie is Cleveland. By virtue of its situation on the narrow Lake plain at the mouth of the Cuyahoga River, Cleveland is directly in the path of two important trade routes: (1) the western extension of the Hudson-Mohawk Valley route from the Middle Atlantic seaboard to the Central Lowlands, and (2) the water-rail route for iron and coal between the Great Lakes and the bituminous fields of the Appalachian Plateaus.

Role in Upper Lakes Economy—The commercial and financial func-

tions of Cleveland have gone far beyond the mere handling of these raw materials. Cleveland interests have dominated the iron mining and iron transportation industries; likewise the copper mining of Michigan's Upper Peninsula, and the limestone industry of northern Ohio and Lower Michigan. It has been Cleveland rather than Buffalo, Detroit, or Chicago which has had the dominant role in the development of the Upper Lakes mineral empire.

Commercial Functions—Despite the Ohio and Erie Canal, for the first half of Ohio's history it was Cincinnati rather than Cleveland which dominated the state's economy. The Miami Valley, rather than any section of the lake shore, was the principal manufacturing district in Ohio. With the coming of the railroad and with the changed source of iron ore which occurred in the 1870's, Cleveland began growing at a rate which has steadily increased its population over that of Cincinnati. Cleveland is more closely related to the commerce of the Great Lakes than any other large city on their margin. Although there has been no decline in the major industry, steel, to compensate for the ultimate loss of high grade iron ore, Cleveland interests are promoting new Canadian developments of 50 per cent ore a hundred miles north of present Mesabi workings. They also are experimenting with the great quantities of 30 per cent ore in the old Mesabi district. The manufacture of aluminum and magnesium have also been established. The Cuyahoga River is undergoing an expensive straightening process with the object of attracting a larger proportion of Lake traffic and also of berthing a larger part of the Lake fleet during the winter.[4] The recently promulgated trade agreement with Canada which provides for a greater degree of international specialization in manufacturing than has obtained previously, may augur well for Cleveland and other Lake cities.[5]

Manufacturing—Cleveland's manufactures, although rooted in the basic iron and steel district to the southeast, have never been characterized by blast furnaces and rolling mills. It is a heavy industry center specializing in steel products, particularly machinery for the excavating, loading, transporting, and unloading of the raw materials in Lake trade: iron, limestone, copper, oil, coal, clay, and aluminum.

The machinery-making Lower Lake cities provide a market for Cleveland's machine tools, electric machinery, stampings for furnaces, refrigerators, and bodies. The lakes trade absorbs the ships, Diesel and other marine engines, hoists, and ship fittings. The manufacture of chemicals is a major industry: acids and alkalis for the manufacture of steel, clay

[4] C. Langdon White, "Cleveland and Its Cuyahoga River Problem," *Annals of the Association of American Geographers*, Vol. 26, 1936, p. 88.

[5] Announcement, Department of State, December 18, 1942.

products, paper, paints and varnish, printing and publishing, oil refining, copper, magnesium, and plastic products. Electrical machinery and illumination equipment have increased with the automobile and especially with airplane manufacturing.

Youngstown—The steel centers of Youngstown (170,000), Niles, and Warren form a group of cities in which the manufacture of basic iron and steel products dominates the economy to a degree surpassed by no other major steel district in the United States. With nearly 90 per cent of its wage earners engaged in steel, Youngstown's specialization is considerably greater than Pittsburgh's. There is no other industrial landscape in North America quite like the industrialized valleys of eastern Ohio's and western Pennsylvania's Appalachian Plateau. The flow of coal northward to the Lake ports, the flow of iron ore to the interior furnaces of western Pennsylvania and eastern Ohio steel cities, and the flow of clay and steel products, from this heavy industry region give rise to an enormous tonnage on the railroads which serve this corridor. With the manufacture of coke and of clay products as the only breaks in the steel economy, these cities are particularly vulnerable to the fluctuations in the steel industry.

Canal Agitation—The demand for a canal connecting Lake Erie and the Ohio River by way of Youngstown has been persistent for many years. For a time after a continuous strip mill was erected in Youngstown during the early 1930's, the canal was not mentioned; but the erection of huge new steel plants in other midwestern steel centers, in the South, and on the Pacific Coast has again brought the desirability of an ore-bearing canal to the fore in Youngstown circles.

Not far to the west are smaller steel centers, Massillon and Canton (226,990), specializing in stainless steel, roller bearings, electric sweepers, springs, and stampings. This is sometimes known as the Central Alloy District. In view of the large increase in steel-making capacity as a result of the wartime needs, the future of several of these smaller steel cities of eastern Ohio, western Pennsylvania and northern West Virginia seems anything but promising.

Akron, a Rubber Center—Akron (244,905), has progressed far enough in its development as the world's largest producer of rubber tires and tubes to have experienced important changes in its economy.[6] These changes reflect the concentrating and the uprooting forces operating in a specialized manufacturing city. These changes appear to be consistent with those affecting the manufacture of steel, which dominates the economy of all cities of the district except Akron. Its growth as a rubber manu-

[6] National Youth Administration in Ohio, "The Rubber Industry in Ohio," Columbus, 1937.

facturing center at the turn of the century was largely due to a discovery in rubber treatment, together with its accessibility to the automobile factories of Ohio, Indiana, Illinois, and Michigan. The import of rubber by way of the major Atlantic port cities offered no great obstacle; in early days Akron had a dozen competitors in cities of the Middle West and the Northeast. Developments within the industry favored the large Akron plants at the expense of the others; the major exceptions were plants at Detroit, Indianapolis, Dayton, and Chicopee, Massachusetts.

In 1917–18 employment in the rubber plants of Akron and neighboring Barberton reached 70,000 wage earners, an all-time high. No United States city had surpassed Akron in the degree of its specialization at this period. Wages were high (comparable to those of the auto industry), and a certain amount of diversification in the rubber line was taking place.

Recentralization—The disadvantages of concentration in tire and tube manufacturing reached a climax in 1937, with labor troubles becoming the impelling force in the establishment of new centers. Mostly by plant purchase, partly by new construction, the recentralization by Akron companies extended to perhaps a dozen small cities in the Lakes states, the Eastern states, and the Pacific Coast. No new industries came to Akron to occupy the idle floor space or employ the idle rubber workers until the emergency of World War II. By 1941, employment in Akron's rubber plants had climbed back to 40,000 but the movement away from the parent plants appears to be permanent.

Even before the orders of Lend-Lease, Akron rubber companies had begun to manufacture metal products. This became much more important with the entrance of the United States into World War II. The manufacture of ordnance of many sorts, airplane parts, and other military equipment is to be followed by peace-time metal commodities. The manufacture of synthetic rubber by the big tire companies is already taking place in Akron. A shift in rubber sources should affect Akron but little.

Detroit Industrial District

Industrial Revolution—The dynamic nature of economic regionalism is well illustrated in the automobile district which radiates from Detroit (1,800,000) to include most of the cities in southeastern Michigan. Detroit, together with the score of towns and cities integrated with the economy of Detroit, has undergone an industrial revolution since the beginning of the twentieth century. More than any other Lakes city, Detroit is a manufacturing city. Unlike Chicago, Cleveland, or Buffalo, Detroit has never been a dominantly commercial city, and unlike any other large

Lakes city its manufactures have been overwhelmingly specialized. The events of the war years have added another chapter to the narrative of the home of mass production. Despite the highly specialized nature of its industry, Lend-Lease and America's entry into World War II brought about a great change in Detroit's manufacturing; to mass production of automobiles must be added subcontracting and the conversion of craft airplane manufacture to mass production. All three techniques have affected dozens of other manufacturing districts.

Site and Situation—A glance at a map will reveal Detroit as the gateway to the United States for much of the relatively densely populated Ontario peninsula of Canada. It is on the principal east-west corridor between the St. Lawrence Valley–Ontario lowland and the continental heartland immediately south of the western Great Lakes. Detroit once was thought too far north to share in the tremendous through-commerce of the Lower Lakes margin, although it is served alike by railroads passing north and south of Lake Erie.

Industrial Detroit is the water front. The heavy industries associated with the manufacture of automobiles have been the nucleus for the growth of other heavy industries: steel, glass, oil refining, rubber, industrial chemicals, machinery, shipyards, sulphur, aluminum, brass, paper and wood pulp, and gypsum. At the wharves of the Detroit and Rouge rivers are vessels from many parts of the world bringing raw materials to the home of mass production and carrying its products to far corners of the globe. Thus far the Canadian side of the Detroit River is marked by no important factories. From the center of old French Detroit southward along the Detroit River to Zug Island at the confluence of River Rouge, through Ecorse and Wyandotte to Monroe, and as far west as Dearborn, the heavy industry section of Detroit spreads its grimy plants.

Stages of Growth—First Period—Two main periods may be observed in the industrial development of Detroit. In present-day Detroit one must search to see evidence of the industrial economy of preautomobile days. As the economic capital of a state in which the copper and the lumber industries were waning, and where agriculture was restricted to the southern half of the state, Detroit was a medium-sized city. Stoves, farm implements, tools for the lumbering industry (machines entered lumbering for the first time as the frenzied industry was sweeping across Michigan), and a few boats for the lake trade occupied most of its wage earners. Detroit was little influenced by the prosperous Corn Belt on the south or the commercial cities of Chicago and Cleveland.

The second period has spread its work over all of the city and dates from the centripetal forces set in motion by Ford's perfection of the assembly

line method of production. There is a third period, less spectacular than the second, in which some centrifugal movement is discernible in the manufacture of automobiles.

Of the score or more auto makers once in Detroit, only a few remain: Ford continues his line and that of the Lincoln Company; Chalmers, Maxwell, and Dodge are now a part of the Chrysler Corporation; General Motors (born of Cadillac) has absorbed Buick, Chevrolet, Oldsmobile, and Pontiac. Hudson continues as an independent manufacturer. Steam and electric cars have passed from the scene. Of the four hundred names of cars in the United States at one time or another, fewer than twenty-five remain, most of them in the Detroit district. Yet there has been little real geographical change in the manufacture of the automobile; the change has been primarily in the assembly of the finished car. Subcontracting of parts was first practiced on a large scale by the Detroit auto-makers. The areal extent of the redistribution of automobile manufacture merits an examination. In peacetime, seven of a total of seventeen makes of passenger cars and four of a total of fifty trucks and buses were assembled within the limits of greater Detroit, including Dearborn, Hamtramck, and Highland Park. The automotive industry in peacetime has consisted of 986 plants, large and small, scattered through thirty-one of the forty-eight states.[7] The great bulk of the industry is in the Lakes states. These plants involve virtually every type of subcontracting. But there is another type of redistribution of automobile manufacture which has developed from the Ford plant and which is true decentralization.

Decentralization—These plants manufacturing auto parts are all within a radius of fifty miles of the parent plant at River Rouge, suburban Detroit. They are located on small rivers: Rouge, Raisin, Saline, and Huron, from which most of the plants derive at least some of their power requirements, through hydroelectric installations rather than direct water power. Several of them occupy sites of former mills operated when local self-sufficiency was imperative. Situated in towns having no factory section, their attractive buildings, absence of noise, odor, and refuse make the factories desirable additions to these Michigan towns.

Since none of the plants was an emergency undertaking, the labor relations were carefully worked out. River Rouge wages are in effect, and

Michigan	279	California	35
Ohio	145	New Jersey	31
Illinois	100	Missouri	25
New York	92	Connecticut	24
Indiana	75	Massachusetts	18
Pennsylvania	53	Minnesota	8
Wisconsin	48	Texas	5

Washington, Oregon, Colorado, Nebraska, Virginia, Rhode Island, North Carolina, Georgia and Maryland each 3.

have been since their establishment. Men and women from the town in question, or from adjacent farms, were trained in the Rouge plant in preparation for the establishment of the decentralized unit. There are 3,000 wage earners in all fifteen plants, ranging from twenty-five to four hundred per plant. One plant employs women entirely; virtually all of the remaining plants employ men.

In view of the costs involved and the socio-economic relationships with the towns and with such other industry as may be in the town, careful studies of these decentralized units have been made. "There have been fewer layoffs, job for job, than in the parent plant. Greater interest by the wage earner is reflected in improvements in procedure initiated by them." [8]

The cost of congestion in the parent plant was the force which caused this decentralization, yet the mass production of the car is still in the parent plant. Behind the establishment of these decentralized units are such permissive conditions as less-than-carload lots for daily delivery to the parent plant, and a relatively high value added by the manufacturing process.

World War II Expansion—At no time since the rise of the automobile industry has there been a stimulus for increased production comparable to World War II. The invention of mass production in Detroit was an accident; its subsequent pattern of redistribution resulting from forty years of industrial selection was no accident. It is instructive to observe the effects of Lend-Lease and of the entry of the United States into the Second World War upon the birthplace of mass production.

Detroit and the Lower Lakes region generally were profoundly affected by the flood of orders for machinery of all kinds, ordnance, chemicals, ships, textiles, all sorts of food products, and refining of many crude materials. Greatest of all was the demand for automotive equipment for use on the land, and sea,[9] and in the air. Three major trends are discernible: (1) failure of large orders to revive many declining industrial centers; (2) failure of industry to go voluntarily to non-industrial districts; (3) the enormous increase in the capacity of the automobile plants in and near Detroit and in Chicago. This increase took the form of conversion of established plants, subcontracting, and building of very large new plants.

These auto-makers found they could not convert an important part of their machine tools to airplane or tank-building purposes. Unlike English auto-makers, these huge plants were in effect gigantic single-purpose machine tools designed for the single purpose of producing their special product; this was true of individual machine tools, plant layout, organization,

[8] W. J. Cameron, Ford Motor Company, Detroit, Letter, Feb. 16, 1941.

[9] Frigates, tankers, submarines, landing craft and marine equipment were built 1,500 miles from the Gulf.

and labor skills. Most of the United States planes and tanks for the war effort have come from factories built and equipped for the purpose. This includes completely new plants and redesigned and retooled established plants.[10] Detroit, the oldest and largest industrial subcontractor, was unable to handle as large a proportion of the industry's war work as it did of peacetime work, due to the relative inelasticity of workers available in the area. Thus many of the new plants were erected elsewhere; three of the largest were in Indiana; three others were in the Chicago area; Detroit had three, and Wisconsin, New York, and Ohio had one each of this size. Detroit auto-makers furnished parts for large government-built airplane assembly plants at Nashville, Fort Worth, Dallas, Houston, Tulsa, Omaha, and Kansas City.

In a sense this industrial revolution in Detroit brought the return of a native to the Lower Lakes states, for the only large-scale production of airplanes during World War I was in Ohio, and until 1934 Ford made multi-engined metal transport planes.

Chiefly due to the large amount of automobile manufacturing within its boundaries, Detroit has become an important steel district, using the large amounts of scrap from the auto factories and selling a large proportion of their product to these plants. Steel imports from Buffalo, Cleveland, and certain interior districts are necessary for the satisfaction of automobile engine and body demand. Under similar auspices the manufacture of machine tools, glass, air conditioning equipment, refrigeration, stokers, and electrical machinery have developed. Rubber tires and rubber body mountings are manufactured by the Detroit member of the Big Three tire companies. Ford until recently was a large tire maker; Russian Lend-Lease took the entire plant. The manufacture of trailers, buses, bodies, tractors, accessories, and stainless steel railroad cars have stemmed from the manufacture of automobiles. Pharmaceuticals, chemicals, paper, ships, calculating machines, stoves and furnaces, farm implements, and toys are important industries which nearly complete the picture.

Toledo—Another city specialist of the Lower Lakes margin is Toledo (340,000) at the western end of Lake Erie. From Toledo to Buffalo the curving shore of Lake Erie is interrupted by long docks running out from

[10] Ford, Studebaker, Allison, Packard, Chevrolet, and Buick all built new plants for the manufacture of Pratt and Whitney, of Wright, and of British engines. Chrysler built a new tank arsenal. Ford built a complete bomber plant, Willow Run, which may be as famous in U.S. history as Bull Run. Beside meandering little Willow Run, forty miles west of Detroit, Ford built the world's largest building: four million square feet of floor space, twenty-eight miles of crane tracks, and a straight assembly line over half a mile in length. Forests of machine tools, special purpose tools, covered its wood block floor. The Ford Company and the Government announced in May 1945, that they planned to close Willow Run; its purpose had been served. By early 1946 a new automobile company began the manufacture of Kaiser and Frazer cars in this huge plant.

the iron ports and steel cities: Sandusky, Lorain, Cleveland, Ashtabula, Conneaut, Erie, and Buffalo. There is no iron ore, coal, wheat, or oil produced along this shore or its immediate hinterland, yet mile for mile there is more activity in these commodities than anywhere else on the Great Lakes. To these port cities come the greater part of the iron ore, and most of the coal that moves over the Lakes. The featureless lake plain is strung with railroads, and the docks are black with the gigantic specialized loading and unloading machines by which these cities have achieved their low handling costs. Toledo has become one of the four principal railroad centers in the nation. Upon this city, at the west end of Lake Erie, converge railroads from every direction.

Toledo has not had the industrial and commercial history of Detroit, but it has shared the automobile industry. Aside from automobiles, the important industries are: glass, calculating and electrical machinery, machine tools, industrial wood flooring, and chemicals.

The manufacture of glass first came to Toledo when natural gas was exploited in northwestern Ohio about 1900. Sandstone for glass manufacture is quarried in northern Ohio not far from Toledo. With the rise of the automobile industry, Toledo has greatly expanded its glass industry.

Midland—Another of the urban specialists is Midland a small city in east central Michigan where a great number of industrial chemicals are manufactured from the millions of gallons of brine pumped from the wells near by. In this brine the magnesium chloride is so concentrated that electrolytic treatment gives chlorine and pure molten magnesium. The same company extracts it from the more dilute sea-water on the Texas Gulf Coast. The difficulty encountered in finding a market for magnesium metal caused the brine-processing company to fashion metal parts in order to create a market for the new lightweight metal. World War II and the aluminum shortage hurried the acceptance period for magnesium.

Other cities of lesser importance in the southern Michigan industrial district include Grand Rapids (furniture), South Bend (farm machinery and automobiles), Fort Wayne (gasoline pumps, machinery), Kalamazoo (paper, drugs, stoves), and Monroe (paper, auto parts). Battle Creek (foods), Holland (furnaces), Mishawaka (machinery), and Elkhart (band instruments).

Chicago

Tardy Settlement—The location of towns and cities, particularly large cities, on the level expanse of the Central Lowlands, was governed by factors some of which did not pertain to the hilly eastern states. Situation rather than site values governed the choice of location. The economic

geography of the western portion of the Manufacturing Belt is continental in its frame of reference, more so probably than any other section of the United States or Canada. Chicago (3,400,000) is commonly referred to as the product of the Winter and Spring Wheat Belts, the Corn Belt, and the Great Plains. One railroad magnate saw Chicago's future strongly influenced by the ports of the Pacific Northwest.

With reference to continental settlement, the cities of the central plains are likewise related to major epochs; two hundred years after New England's settlement, the culmination of grassland settlement was reflected in the rise of Chicago. Although settlement of this region was tardy, after it began it proceeded at a rate exceeded in no other section of the country. These factors have left their impress upon the distribution of urban population and upon the extent and nature of industrial development in the Lakes states, particularly the eastern portion.

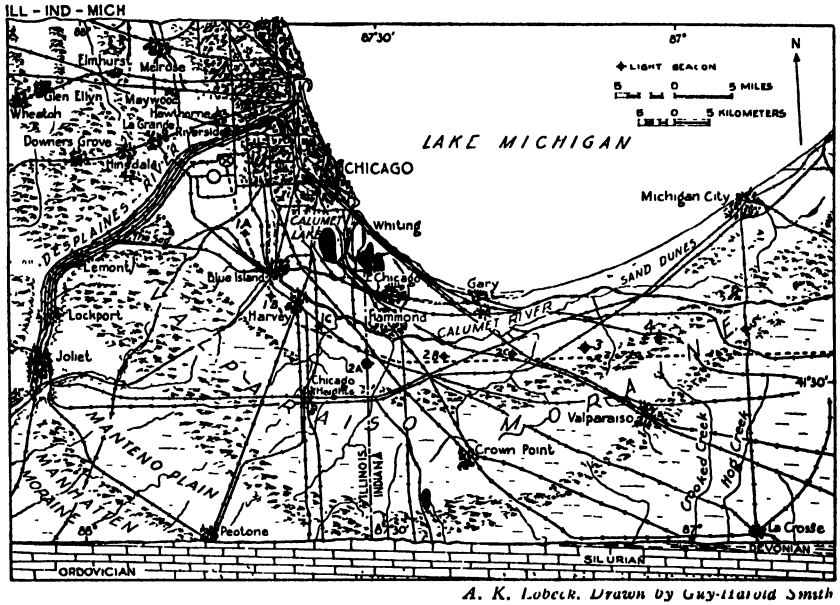
The facts of situation which accounted for Chicago's growth from a village in 1830 to a city of nearly four million in a hundred years, have also kept other urban centers from rivaling it on the western Lake plains. Milwaukee (587,000), Gary (111,000), Peoria (105,000), and South Bend (101,000) are the only cities in Indiana, Illinois, and Wisconsin within a hundred miles of Chicago which approach large size.

Satellites—Only in the instance of Chicago are there important satellite cities. A zone of rural countryside separates Chicago from the industrial landscapes which reappear at Waukegan (34,000), Kenosha (48,000), Racine (67,000), and Milwaukee. Southeast of Chicago are Hammond (70,000) and East Chicago (55,000). West of the lake margin cities are Elgin (38,000), Aurora (47,000), Joliet (42,000), and Chicago Heights (22,000). Still another belt of cities lies farther to the northwest: Janesville (23,000), Beloit (25,000), and Rockford (84,000). A single large city, Peoria (105,000) stands alone on the plain south of Chicago.

Illinois ranks third among the forty-eight states in manufacturing in spite of the fact that only one of its cities, aside from Chicago, has much over a hundred thousand population. Industrial development of this great region has resulted in marked centralization of manufacturing, but a decentralization of wage earners employed. The long finger of Lake Michigan which penetrates 300 miles into the Central Lowlands has localized commerce along its southwest shore so effectively for more than a hundred years that no other important converging point has developed.

Commercial Function—Historically, Chicago has been commercial in function. The pattern of land use in the city bears witness to this. Aside from its suburban cities, Chicago's role in the commerce of the Great Lakes is comparatively minor; its commercial character derives mainly from the railroads. If the traffic of greater Chicago (from the Wisconsin-Illinois

state-line to Gary, Indiana) be considered as a unit, Chicago ranks approximately fourth among Great Lakes cities. As one of the major receiving cities for western grain, Chicago transships by rail the greater portion of its receipts. In East Chicago, Hammond, Whiting, Indiana Harbor, and Gary the iron and steel plants import enormous quantities of iron ore and bituminous coal by lake freighter. In this same district, the oil refineries



A. K. Lobeck. Drawn by Guy-Harold Smith

FIG. 90.—THE CHICAGO AREA

pumped about twenty million barrels of gasoline (1938) into tankers in the Indiana Harbor ship canal. The canal system which links Chicago with the Mississippi River moves large quantities of oil, grain, sulphur, and mixed freight north-bound, and chemicals and coal south-bound.

Its marketing supremacy in livestock, wheat, corn, and other grains gave an impetus for growth in merchandizing and financing, which enabled it to attain second ranking position in North America. A large amount of manufacturing resulted from the processing of this agricultural surplus. With a population of nearly four million people, and another million or so tributary to it, Chicago has become the second ranking manufacturing district in the United States. There is scarcely any limit to the variety of Chicago's manufactures, but the dominant items are: iron and steel, machinery, chemicals, food products, and leather. Their manufacture is so closely related to converging rail- and lake-borne raw materials that Chi-

cago and adjacent satellites are perforce the region of greatest concentration. The principal exception to the localization is the manufacture of machinery, which is common to virtually every industrial city of the western half of the manufacturing belt.

Chicago differs from other Lakes cities in several respects. Neither Detroit nor Cleveland has a comparable agricultural hinterland upon which to draw and to which to sell. Detroit is primarily a manufacturing city, and Cleveland's commerce is based largely upon coal shipments and ore receipts. Looking to the future of these three cities, Chicago alone appears to have access to a large hinterland as well as more remote trade territories in the Pacific Northwest and the southern states.[11]

Iron and Steel—For the first half of Chicago's growth, there was no important local manufacture of iron and steel. Lacking local iron ore and coal, Chicago had to wait until midwestern markets made imperative further recentralization of iron and steel manufacture. Finally, the changes took place within the steel industry which permitted its recentralization along the shores of the Great Lakes, provided markets were large enough to make such a move desirable. These markets and the open hearth furnace, by-product coke, and the discovery of iron ore in the Lake Superior district nearly a generation earlier conspired to give Gary, Indiana, its first great steel mill in 1906. Thus, the beginning of the twentieth century marked, for Chicago, the opening of a new phase in its industrial history. Since that time, the manufacture of primary iron and steel and the products fabricated from them has become the biggest industry in the Chicago district.

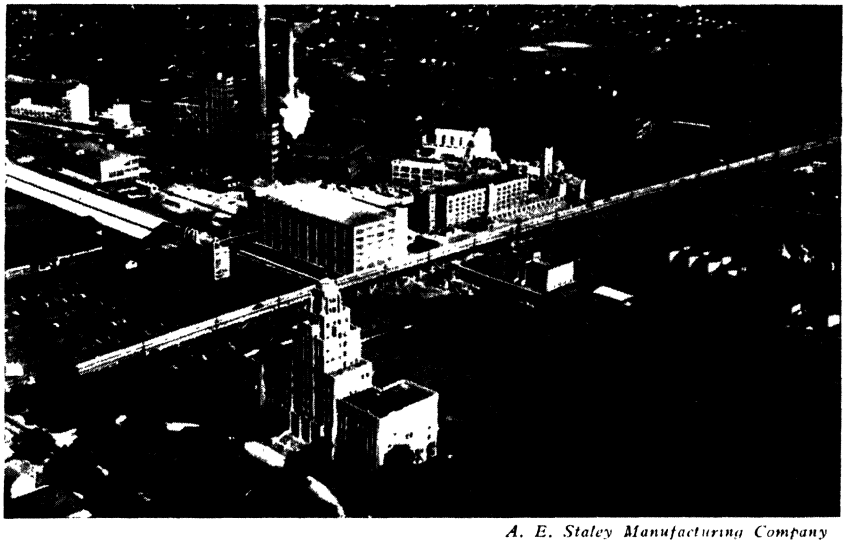
Iron ore moves a thousand miles by water, and coal comes from as far as West Virginia, to make iron and steel in this district. Water transportation is cheap, but this is not the only factor in accounting for the low assembly cost of this steel district. Many furnaces today are oil or gas fired, and Chicago has access to the Mid-continent oil fields. Scrap iron and scrap steel play an increasingly important role in both iron and steel manufacture; Chicago and its suburban cities make so much machinery that the district is an important source of scrap. And finally, the dense population abruptly ceases at the dry boundary for humid agriculture which lies

[11] The flow of the South Branch of the Chicago River has been reversed and it now drains into the Mississippi Basin, forming part of the Lakes-to-Gulf Waterway. This river, the Des Plaines River, the Chicago Ship and Sanitary Canal, and the Illinois-Michigan Canal provide outlets for Chicago's water-borne freight and sewage by way of the Illinois River.

Chicago favors the Great Lakes–St. Lawrence Improvement Project for several reasons. One is the hoped-for reduction in freight charges on grain exported through this port to foreign countries. Another is the direct importation by water of foreign goods consumed in the Middle Western Plains region. World War II gave impetus to still another belief in its efficacy; the ship building industry of the nation could come to the source of steel.

four hundred miles west of Chicago. This means that the westward-moving market for steel in all its forms has come to a halt, the westward-moving center of steel manufacture likewise stops.

Another factor in growth has been the westward movement of some types of industry. The Chicago district has established certain steel-using manufacturing industries which were for a long time centralized in the eastern cities. In the emergency of World War II, despite an expressed in-



A. E. Staley Manufacturing Company

FIG. 91.—CORN PRODUCTS MANUFACTURING PLANT IN CENTRAL ILLINOIS

A modern development of the Corn Belt

tention on the part of the Government to make the distribution of manufacturing more uniform throughout the manufacturing belt, the Chicago district got a lion's share, like other primary concentrations of industry. Chicago never had so important a share of labor-oriented industry as New England.[12] It is this type which has shown the greatest tendency to re-centralize in the United States.

But Chicago's industry is not all steel and a great variety of machinery. Oil refining in South Chicago and Whiting is exceeded only by the New York district. Aside from the packing of meat and flour milling, Chicago has developed the manufacture of foods far beyond the demands of the six million people in metropolitan Chicago. It is the most important corn

[12] W. N. Mitchell, and M. J. Jucius, "Industrial Districts of the Chicago Region and Their Influence on Plant Location," *Journal of Business*, University of Chicago, Vol. 6 (1933). pp. 139–156

products manufacturer in the nation. Cheese and dairy products, beverages, canned soups, vegetables, preserves, and spices are all important.

Impact of War—As a machine-making district, Chicago's industry was profoundly affected by Lend-Lease and America's entry into the war. They began the major development of recentralized units of Detroit's industry. General Motors and Chrysler built plants near Chicago larger even than Ford's Willow Run.

As the eastern Corn Belt has become more and more of a manufacturing region, the Lower Lakes margin cities, particularly Chicago, have practiced subcontracting on an increasingly large scale. There is likewise a larger proportion of producers' goods being manufactured in Chicago. The dominance of the wholesaling function by Chicago has slowly weakened with the advent of motor freight lines which tend to break up the rigidity of distribution channels set by the railroads. Two of the Big Four wholesalers in Chicago have passed into the hands of St. Louis concerns. This movement was under way long before World War II, but the drastic priorities on many of the materials handled have accelerated the rate of change.

It has been estimated that 40 per cent of the wage earners in industry of Iowa, Illinois, Wisconsin, and Indiana are employed in the Chicago industrial region—hub of their industrial areas. The nature of their wartime employment is indicative of the transformation which has taken place in this erstwhile agricultural-conversion type of industrial region. Of $10 billion in war contracts, $2.7 billion were in the manufacture of cargo planes, fighters, bombers, engines, and parts; $1.6 billion in ammunition; $1.2 billion in machinery and electrical equipment; $1 billion in combat motor vehicles; ships, ordnance, and explosives followed in order, but no one item exceeded $8 million. The impact of World War II on the Chicago industrial region is more than the erection of enormous new plants, it is an acceleration of a trend toward the type of metals manufacture long associated with cities of the eastern portion of the American manufacturing belt.

Peacetime Reconversion—By late 1947 the reconversion of industrial plants built by the Government was proceeding slowly, with the greatest proportion returned to peacetime manufacture located in the Middle Atlantic and the East North Central states. Those built for metals manufacture have thus far had the highest rate of reconversion. Since the great bulk of machine tool and machinery plants were built in these two Census divisions, the relationship is to be expected.

Minneapolis–St. Paul

Situation—In all the rather sparsely populated northern plains west from the Great Lakes to the Northern Rockies, there is but one urban center of half a million population, Minneapolis (493,000), and St. Paul (288,000), so-called Twin Cities on the Upper Mississippi River. The erection of Fort Snelling at the little fur trading post at the Falls of St. Anthony singled out the one settlement destined to grow. It is the dominant trading center for the more densely populated farming area southward into Iowa. As Middle Western cities go, the Twin Cities are relatively youthful, and their economy shows this characteristic. With the combination of furs, water power, and a crossing of trade routes, the early start afforded by the Army post was enough to out-distance rival towns.

Economies—During the frenzied lumbering period of the Upper Lakes which reached Minnesota about 1880, they became important sawmill towns, two of the very few that survived and have grown from this half-century of exploitation.

Eventually they became the main commercial and financial centers for the livestock industry of the northern Great Plains. With the decline of Minnesota lumbering, the peak of the Spring Wheat's production was reached in the years immediately following World War I. The market for Minneapolis and St. Paul was not to be had for the asking however; freight rates were not conducive to the easy marketing of this surplus. Cooperative organizations for consumers and for producers grew rapidly in numbers and in bargaining power, especially in the many small Scandinavian towns. The markets for Twin City products expanded throughout the western Lake Plains and the northern Great Plains. The Twin Cities milled an increasing proportion of Great Plains wheat. By the first decade of the present century Minneapolis had become the greatest wheat milling center on the continent. Milling gave the dominant character to their skyline and to their economy. Although Minneapolis recently has had to rank after Kansas City and Buffalo, it still remains a major milling center.[18]

Manufactures—With the vigorous growth of the Lower Lakes cities, the dairy industry expanded into southern Minnesota, and the Twin Cities achieved high distinction in the manufacture of butter. Aside from the service industries to be associated with a population of three-quarters of a million people, there has been some export-types of manufacturing established. Prominent among these are agricultural implements, electrical machinery, and glass. Minneapolis and St. Paul have become dominant

[18] V. G. Pickett and R. S. Vaile, "Decline in Northwestern Milling," University of Minnesota Studies in Economics and Business, No. 5, 1933.

in the commercial activities of the western Lakes region, but the character of their hinterland is such as to warrant little prospect of greatly increased manufacturing.

East and north of these cities there is a wide belt of cutover land in which there is the minimum of productive activity. This derelict zone has effectively isolated the Twin Cities from the vastly different economy of the iron mines at the west end of Lake Superior. Cleveland, not Minneapolis or St. Paul, took the job of financing the mineral industries there. Neither of the latter cities had a fortunate invention for aggressive business men to promote, as was the case in Detroit. There was not even the specialization in manufacturing logically expected in two cities so closely located. As the northern Great Plains were occupied and reoccupied, the violent fluctuations in their economy left their mark on the wholesale and banking institutions of these cities. The nature of their manufacturing indicates youth, but the closely knit cooperatives, the very large state university and other colleges, and the smart shops and modern hotels reflect maturity.

The hundreds of lakes within a short distance of the Twin Cities have fostered an important recreation industry. The entire Upper Lakes region has embarked upon a reforestation and recreation program designed to increase the carrying power of the cutover lands.

St. Louis

As a trading post on the middle Mississippi between the mouths of its two greatest tributaries, the Missouri and the Ohio, as the greatest river town north of New Orleans, an outfitting and forwarding center for the westward-moving settlers before and after the Civil War, and as the second greatest railroad center in the Middle West, St. Louis has had a varied history. It is still a river port, although its commerce now rests primarily upon the railroads. It is still a commercial city, but manufacturing has become important.

Site and Situation—The site of St. Louis is on the high west bank of the Mississippi River a short distance below the mouth of the Missouri. As an early river town the site was particularly advantageous. As a modern railroad city its situation has proved to be one of the really superior centers in the Middle West. Were it farther south, near the mouth of the Ohio River, it would have been surrounded on three sides by the hill country of the Ohio Valley and the Ozark Highlands. (Cairo, Illinois, 12,000, occupies such a situation.)

Commerce—St. Louis marks the northern extension of the Ozarks and is far enough north to be on the trade routes which skirt the northern

margin of the hills of the Ohio Valley. These hills and the Great Lakes constitute the two sides of a great "funnel" through which the raw materials of the western Plains must pass on their way to eastern consuming centers; Chicago dominates the northern and St. Louis the southern sides. Whereas Chicago dips into the stream of commerce from the northern Great Plains, St. Louis dips into that from the southern Great Plains and the western Gulf region, both great raw material exporting regions. The vitality of large cities is dependent upon commerce and in this respect St. Louis is exceptionally favored.

Although the upper Mississippi and the Missouri are not so commercially active as the Ohio River, St. Louis has remained an important river port. Since the improved Mississippi-Ohio system was inaugurated in the early 1930's, the tonnage on all parts of the system has come to exceed a hundred million tons annually. The nine-foot channel from Chicago to the Gulf, and on the Ohio and Missouri rivers may conceivably bring about an increase over the present volume of trade on the upper Mississippi. World War II developments gave some indication of the increased use of the Mississippi system in the future.

Except for the important difference of Lake trade, St. Louis is similar to Chicago in its functions. Each lies at the Corn Belt margin of a large physical barrier to rail commerce. St. Louis commands the only water route and one of the three land approaches to the upper South. Professor Goode wrote years ago that the north-south trade of the Mississippi basin may eventually be as great as the east-west trade, and then Chicago and St. Louis will realize in full the advantages of their respective situations.

Manufactures—Census figures for St. Louis make it a city of 800,000; but geographically St. Louis has a population of approximately a million. Immediately across the river are four satellites, Alton, Belleville, Granite City, and East St. Louis. The urban group may be generally characterized as of the heavy industry class, with no particular specialty. Iron and steel are the leading industries, using Upper Lakes ore, and coal from southern Illinois and from Oklahoma fields. One of the largest alumina processors in the country is located here. Oil refining, chemicals, meat packing, flour milling, airplanes, rolling stock, farm implements, leather and shoes, machine tools, and a variety of industrial machines are other important manufactures. Since the oil boom in southern Illinois, oil drilling and processing equipment manufacture was established here.

The recent rise of new steel centers at Kansas City, Detroit, and in the Gulf South, and increased capacity in Middle Western steel centers has not brightened the hopes of St. Louis steel-makers. The trek of shoe manufacturing to St. Louis has recently shown some indication of a retreat to the east. Glass manufacture has not gained greatly in importance since its

establishment here early in the 1900's. Flour milling reached its peak just before the First World War. But the prospects are not all equally depressing. Lead, zinc, coal and oil extracting and handling machinery manufacture has increased. Airplane manufacture is new. Machine tools and chemicals have increased. The South is becoming industrialized in a few districts, and purchasing power in the Gulf South is increasing. St. Louis trade reflects this unmistakably.

Miami Valley

Accessibility—Mention has been made of a few cities situated between the Great Lakes and the Ohio-Missouri rivers; there are scores of others, large and small, scattered throughout the Lower Lakes states, most of them east of the Mississippi. To omit them from the discussion of Middle Western manufacturing simply because they are not part of larger districts, is to ignore the industrial transformation that has occurred since the last years of the nineteenth century, when forces operated to cause the establishment of manufactures in many interior cities.

The cheap personal transportation symbolized by the Ford assembly line gave mobility to labor and vastly widened the location-choice of manufacturers. Larger industrial centers grew at the expense of smaller ones. This fact seems to have caused the first recognition of the skilled labor pools which have been slowly built up in some of the interior cities, particularly in Michigan, Ohio and Illinois. The motor car made the transition from farm work to factory easier, because it involved no change in rural living.

Creameries, sawmills, flour mills, woolen mills, clay plants, harness shops, cabinet and body shops, ropewalks, small foundries, and machine shops gave way to larger establishments in cities in whose trade territories these towns now were. The economy of large-scale production enabled rural and town buyers to secure an improved product at a lower price. This is the transformation wrought by low-cost transportation. The extent to which this modified the economy of the Middle West appears to be somewhat greater than for any other comparable division of the country.

The largest agglomeration of these industrial cities of the interior is in the Miami Valley: Cincinnati (455,610), Norwood (40,000), Hamilton (50,592), Middletown (31,000), Dayton (210,718), and Springfield (65,000). In this fertile valley every large city manufactures iron, steel, or their fabricated products, predominantly of the precision type. Interplant dependence or linkage is characteristic of industries in the valley.

There is no city marking the crossing of the Miami River by the old

National Road, although Springfield, in Mad River Valley to the east, was located on this important early highway. To a marked degree, the growth of the cities in the Miami Valley was essentially a local matter. The list of their inventions resulting in manufacturing is a long one.

Taking the Valley as a whole, there are three periods of industrial evolution: First, the early river and canal days when flour, wool, meat, whiskey, leather, and some manufactured iron were exported to the South. Second, the railroad period in which industry assumed marked interregional importance. During this period farm implements, tobacco, paper, soap, wool textiles, and machinery became important. The third brought in the big industries: iron and steel, machine tools, machinery, automatic and calculating machines, scales, watches, airplanes, radios, auto parts, rubber, printing, and publishing.

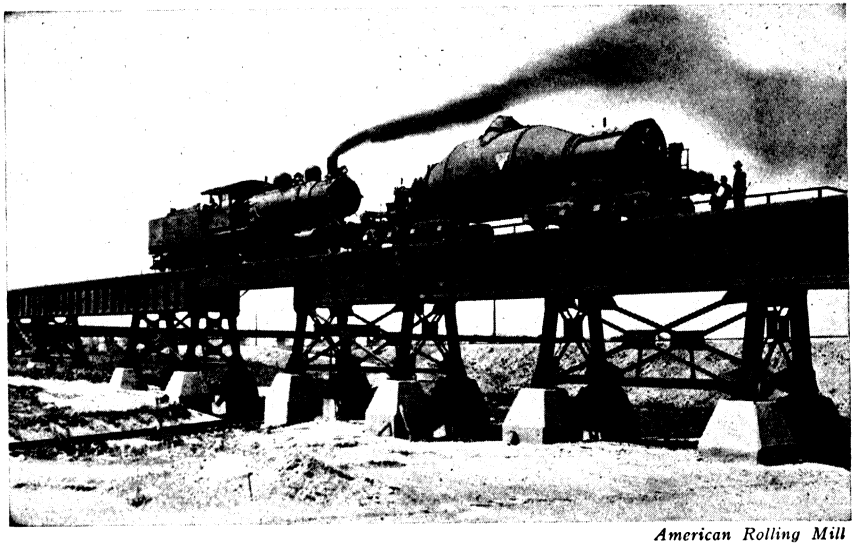
Cincinnati—Cincinnati, second oldest settlement in the Northwest Territory, began as United States Fort Washington on the Ohio River, midway between the mouths of the Great and the Little Miamis. The situation of the Northwest Territory with respect to transappalachian drainage resulted in the extensive use of rivers and river valleys in the settlement of this first of the Nation's public lands. Quakers and other Middle Atlantic stock were its first settlers. Shortly after the Miami and Erie Canal was opened in 1829, many Germans came into this settlement.

Steamboat commerce on the Ohio and the lower Mississippi made Cincinnati the dominant city in the extensive trade with the South. Other Miami Valley cities became forwarding points on the canal as it was gradually pushed northward to Lake Erie.[14] The railroad came fifteen years after the canal. It paralleled the river and canal at first. Later east-west lines were constructed which opened up markets in states farther west, then in process of settlement. After the Civil War, Cincinnati grew slowly, but the other Miami Valley cities had their most rapid growth. Cincinnati's manufacturers began with the usual range of simple items needed by the frontier communities. Southern trade boosted its exports of beverages, flour, meat, and some iron articles. After the railroad reached Cincinnati, the charcoal iron furnaces of southeastern Ohio supplied the Miami Valley cities with quantities of iron. Meat packing became important after 1856; the manufacture of soap first developed as a by-product of the packing industry. Agricultural implements, machinery, machine tools, watches, and paper became important by the turn of the century.

Industrial selection has left Cincinnati with machine tools, radio, airplane engines, motor trucks, watches, industrial machinery, meat packing, soap, printing and publishing as the major industries. Reference is some-

[14] C. C. Huntington and C. P. McClelland, "Ohio Canals," *Ohio Archaeological and Historical Society*, Special Publication, 1905, Columbus, Ohio.

times made to the "decadent river towns" along the Ohio, Missouri, and upper Mississippi. Unquestionably some of them are decadent but the Miami Valley representative on the Ohio River has become as firmly wedded to the railroad as it was to the Ohio River. Cincinnati's municipally owned railroad to Chattanooga has long been under very profitable lease to a southern railroad. This link with the South is as vital as any in the heyday of the steamboat.



American Rolling Mill

FIG. 92

The American Rolling Mill Company moves molten iron in ladle cars from its blast furnaces at Hamilton to its rolling mills at Middletown, Ohio, 12 miles distant. Integration of the iron and steel industries in the U.S. is virtually complete.

Dayton—Dayton was the trading center for a very fertile and prosperous agricultural region, with the usual utilities and service industries. Its role in canal days was much more important than any other city north of Cincinnati. Steel manufactures made their start with farm implements, sewing machines, streetcars, automobiles, bicycles, cash registers, fare registers, scales, paper, tobacco, and pumps.

After 1900, there were several inventions and improvements which gave Dayton the airplane, electric self-starter, ignition system, home-lighting units and electric refrigeration. Although Dayton was founded in 1801 and grew to be the second-largest city in the Miami Valley, it has been within the lifetime of people now resident there that it has become a great

manufacturing city, specializing in precision goods, with a national and international market.[15]

The skilled labor pool which attracted General Motors, Chrysler Corporation, and other large concerns, was built upon the manufacture of the machinery noted above. Dayton lost the automobile and airplane industries, as complete units; but more people are now employed in the parts

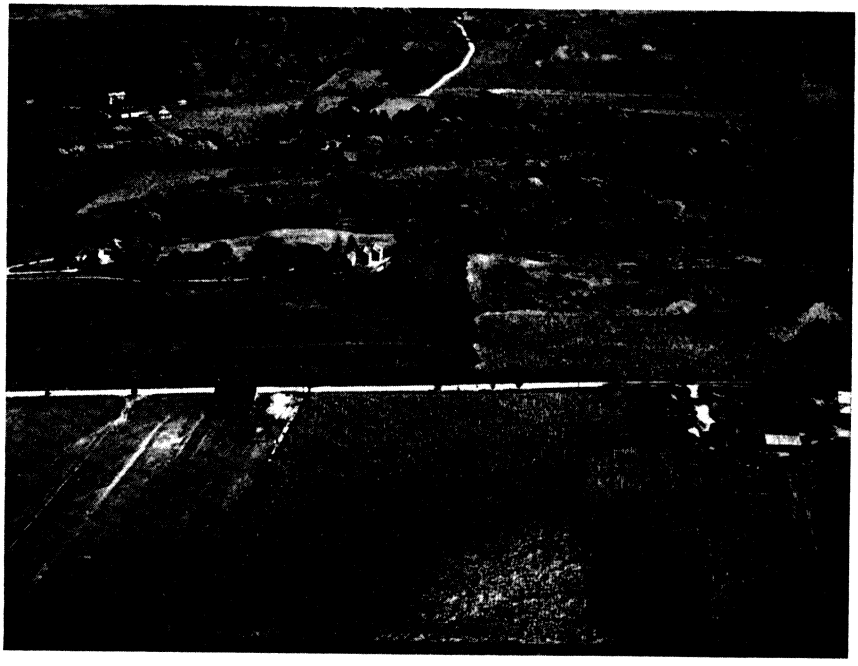


FIG. 93.—A PORTION OF THE TILL PLAIN IN WESTERN OHIO

The increasing range of commuting has revitalized many parts of the eastern Corn Belt.

for planes and cars than were ever employed in the finished product. Farm implements have gone, likewise streetcars, sewing machines, and bicycles. But machine tools have greatly increased. The manufacture of refrigeration machinery is exceeded by no other city. Air conditioning, radio, aeronautical research, and water systems have all developed as important industries. World War II forced Dayton industries to depend upon the unskilled white labor pool south of the Ohio River to care for the large increases in factory employment.

Dayton illustrates very well the way that manufacturing has tended to

[15] The largest employer in Dayton, National Cash Register, exports 55 per cent of its production.

rationalize its location by throwing out roots of ingenuity, skill, and specialization which enable the industry more firmly to establish itself in a given location. Its manufactures are proportionately of the high-value-added-by-manufacturing type. Its markets have been largely rooted in the Middle Western makers of machinery; specialization has secured a national and international market in several instances. When postal zoning was established, Dayton and Springfield were able to undertake a tremendous increase in printing and publishing. With Springfield it was a substitute for an early eminence in farm implement manufacture.

Cities on the Plain—Among the other industrial cities of the Middle West two stand out, Indianapolis and Columbus. Neither is identified with any river route of a former day. Both are major railroad centers. Of the two, Indianapolis is the more important for manufacturing industries, with automobile and aircraft engines and parts, agricultural implements, tires, rolling stock, machine tools, pharmaceuticals and industrial machinery among the important lines.

Although similar in some respects, Columbus remains more commercial. Its industries include coal mining machinery, construction machinery, machine tools, rolling stock, bearings and aircraft. World War II gave both cities important industrial expansion, a large proportion of which remains active today.

There are scores of smaller cities strung along the railroad net of northern Ohio, Indiana and Illinois, aside from those already discussed in connection with the largest urban centers. Few of them are larger than 100,000 population, but their total contribution to the nation's manufacturing is an important one. There are in general two characteristics which distinguish them, first, their economy does not stem from the river-and-canal period, and second, there appears to be much less functional interrelation than was noted in the major industrial centers of the Middle West.

These small cities are somewhat more numerous in Ohio than in the states to the west. They achieved manufactural importance after the farm implement industry had begun its shift to Illinois. Many of them had no part in the near-revolution of the automobile industry. Several have attained importance only since the First World War. There is something of a detached quality about their products; there is little to relate them either to the immediate region or to each other.[16] They are some of the benefici-

[16] Mansfield: refrigerators, tires, tin plate, brass, stoves
Bucyrus: cranes, hoists, power shovels, road building machinery
Marion: power shovels, tractors, threshers, auto parts
Elyria: heavy machinery, toys, tubing, cycles, chemicals
Wooster: aluminum utensils, toys, china, brushes
Ashland: pumps, windmills, rubber products
Galion: electrical and road machinery, power shovels
Salem: pumps, motor products, steel
Newark: glass, tires, implements

aries of the recent postwar movement of new plants by major industrial corporations to small communities in states already heavily industrialized. They are near the center of the nation's market.

Northern Illinois approaches the number and diversity of northern Ohio cities. Because of their geographical location, most of them have been treated in connection with other industrial areas. The oldest are on the Mississippi River, but the greatest number are on the plain. In all of them the importance of agricultural implement manufacture is much greater than in Ohio.[17] Northern Indiana has fewer cities but they are essentially of the same type.[18]

[17] Dubuque, Clinton, and Muscatine: wood-working industries, implements
Davenport, Rock Island: farm implements, ordnance
La Salle: brass, clocks, cement, zinc
Peru, Decatur, Ottawa: implements

[18] Marion, Kokomo, Elwood, Lafayette, Logansport, Nappanee, and Frankfort

XIV

THE WESTERN GREAT PLAINS

A Region of Grazing and Irrigated Agriculture

It has become traditional to regard the land to the west of the 20 inch isohyet and the 100th meridian as distinctly western. The High Plains, a region of scant rainfall, is a land of grass. Under aboriginal conditions the nomadic Indians and the great herds of buffalo represented a type of land use which contained the elements of a wise economy. Over-anxious settlers have learned to their sorrow that most of this great grassland is not plowland.

A Problem Area—The western Great Plains is a region of pioneer experimentation, actual or potential. This is likewise true of the eastern Great Plains which have been considered as a portion of the Middle Western Plains. Within one hundred years the Great Plains have been appropriated and settled, have reached a peak of production, and have begun to decline. Man appraised the carrying power of this grassland in a manner now held to have been unwise both for the individual settler and for the nation. As a result it has become a plundered province, and as a consequence many of the people have been caught in a serious economic situation. Most of the problems which now beset the people of this region are directly or indirectly the consequences of failure on the part of the heterogeneous population, which flocked to the Great Plains after the Civil War, to adjust their humid farming practices to the conditions of this interior plains region.[1]

Situation—The Western Great Plains (Fig. 94) region is approximately the short grass portion of the Great Plains physiographic province. The northern, western, and southern boundaries of the Western Great Plains as a geographic unit are clear enough, but the eastern boundary is not susceptible of the same precise delineation. In a manner of speaking, the Western Great Plains is a way of life and does not depend upon rigid delimitation for treatment.

The eastern boundary is a transition zone; it is related to a combination of critical rainfall, soil type, and grass cover. In the chapters on the Middle West, the portions of the eastern Great Plains given over to the

[1] See C. Warren Thornthwaite, "The Great Plains," in "Migration and Economic Opportunity," by Carter Goodrich and others, Philadelphia, 1936.

production of spring and winter wheat and to cotton are treated as a part of that geographic region. In the present chapter there remains for consideration the higher western portion of the Great Plains where grazing occupies a larger part of the farm acreage than in the eastern transition zone.[2] This boundary recedes toward the west so far in northeastern Colorado as to nearly pinch off the northern portion.

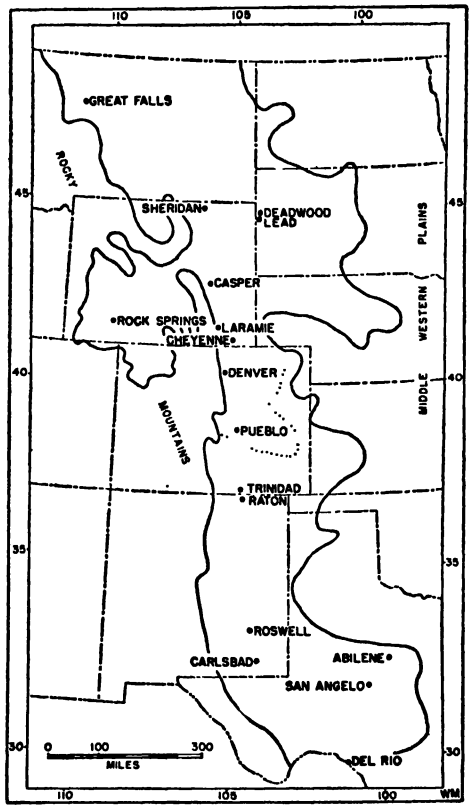


FIG. 94.—THE WESTERN GREAT PLAINS

The southern margins of the Edwards and Stockton Plateaus of Texas give a definite limit to this geographic region in the south. In Wyoming, the western margin of the Great Plains swings west to include the geologically different but physiographically similar Wyoming Basin as a part of this geographical region. The Canadian border is taken as the northern boundary of this attenuated region.

2 "The Future of the Great Plains," H. R. Doc. 144, Government Printing Office, Washington, 1937, Fig. 2, opp. p. 23.

Relief—For about 1,300 miles the higher Western Great Plains stretch along the front of the Rockies from Canada almost to Mexico. The general concept of the flatness of these Plains is for the most part valid. In many places however, the generally level character of the region is broken by "badlands," mesas, and volcanic intrusions. Eastward-flowing streams which rise in the Rockies have cut valleys through the water-borne mantle of the Western Great Plains. At several places along the front of the Rockies a lowland has been eroded, the most important part of this low land is in northeastern Colorado, the Colorado Piedmont.

Guy-Harold Smith

FIG. 95.—GREAT PLAINS WEST OF DODGE CITY

This Piedmont lowland situated at the narrow middle portion of the Plains, serves to divide the Western Great Plains into northern and southern portions. The northern plains are dominated by the drainage of the Missouri River. The surface is somewhat lower and more rolling than in the southern portion. This was the only section of the Great Plains which was invaded by the continental ice sheet, the southern limit of glaciation approximating the present course of the Missouri River. The northern portion is characterized by numerous mountain outliers east of the Rockies. Farther to the east is the more extensive "badland" topography of the Plains. (Fig. 96.) These badlands are the result of the very extensive erosion of relatively nonresistant sediments containing layers of more resistant sandstones and shales.

The principal difference in the terrain of the northern and southern Plains is a broad belt of High Plains along the front of the southern Rockies, a remnant of an older and higher surface formed by deposits of

old streams from the Rockies. To the east where this older surface has been removed are the Low Plains. In north central Nebraska there is a sand-hill area where the sand was deposited as dunes, and south of the Arkansas River in eastern Colorado is an area of mesas which are in contrast to the monotonously flat Staked Plains of northern Texas.

Soils—The Western Great Plains are covered for the most part with a fairly deep and fertile soil. The soil-making materials were deposited during a very long period of erosion from the Rockies. This thick mantle of sediments has since been uplifted and the rivers have again eroded into the plains, giving rise to broad terraces. North of Nebraska nearly all of the sediments which distinguish the High Plains, have been removed.

J. R. Randall

FIG. 96.—BAD LANDS IN SOUTH DAKOTA

Dark brown soils characterize much of the broad eastern zone of the Plains from Canada to Mexico. Lighter soils appear along the drier west. Within very small areas soil texture is extremely variable, ranging from clay soils to sandy loam. Soil diversity for the individual farmer is further complicated by the very large size of the individual holdings.

The soils are for the most part suitable in texture and fitted for crop agriculture when watered. Their ability to absorb and hold water varies widely and is, perhaps, their most critical quality, from the viewpoint of agriculture. Soils with fine textured surface materials generally hold water well but do not absorb it readily. Sandy soils can absorb water quickly but do not hold it well. Hence prolonged drought may affect crops on the heavy soils more seriously than those on lighter soils.

Of the four principal types of soil on the Western Great Plains, those of eastern Colorado are the most productive. They hold water fairly well under irrigation and produce a greater variety of crops, including sugar

beets, alfalfa, and small grains. Under dry farming they produce corn, wheat, barley, oats, and beans. Dairying and the feeding of sheep and cattle are important.

Farther north from this Piedmont region, the greater part of the land is used as livestock range, with alfalfa, potatoes and sugar beets grown on irrigated areas.

South from the Piedmont a smaller proportion of the land is plowed, but 80 per cent of the cropland is in wheat. The southernmost soil region has the least cropland of any; nearly all of it is used for livestock grazing, being either in very large ranches or public ranges. Its more permeable soils are better for cotton, sorghum, and corn where water is available.

There are numerous districts of sandy soil which preclude any profitable use. The largest by far is that of western and northern Nebraska, but there are smaller areas in the Colorado Piedmont and farther south in the valley of the Arkansas River. Wind erosion has damaged many parts of the Western Plains, but damage appears to be greatest in the northern and the southern ends of the region, where the sandy nature makes it difficult for the soil particles to group themselves into units large enough to prevent erosion.

Climate—The rainfall fluctuates so widely around a critical point for crop production that even a slight reduction in moisture affects crop yields seriously. The irregular but persistent recurrence of severe drought, wide fluctuation in temperature and in winds, and the general failure of settlers to adjust the farming practices of the humid east to these hazardous conditions are chiefly responsible for the problems which now beset them. Market variations occur not only from year to year, but also from place to place; they also occur in irregular periods of several years and in major periods of many years' duration.

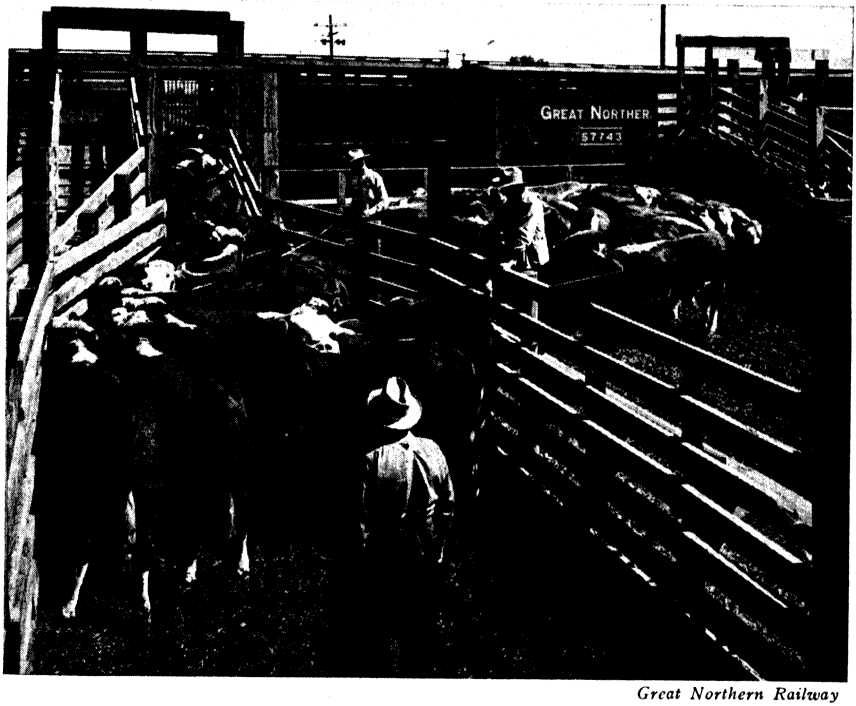
Temperature—The annual range of temperature is frequently over 100° F. even in the Texas portion of the Great Plains. More harmful than thermal variation, however, are the sustained high temperatures, sometimes continuing for three consecutive weeks. Livestock, dependent upon surface streams for water, suffer miserably. Under such temperature conditions wheat and corn are seriously damaged.

Wind—In no other part of the interior United States are wind velocities so high as in the Great Plains. The high rate of air movement increases evaporation and promotes dust-blowing on fields which are, or have been cultivated.

The long-time effects of low rainfall, extreme variability in seasonal distribution, low relative humidity, high winds, and the extremes of temperature have been to render less useful the apparent water resources of the Great Plains. Water from drilled wells may be obtained in much of the

southern plains, but costs are prohibitive over much of the northern plains under present conditions of stock raising. Irrigation is beginning to account for an appreciable part of Great Plains agriculture. Wherever a river crosses the Plains, there can be a segment of an irrigated ribbon of farmland.

Grass—In the long history of the settlement of eastern United States, grass was a quiet factor in the environment, but with the migration to



Great Northern Railway

FIG. 97.—STOCKLOADING PENS, CASCADE, MONT.

the Central Lowlands and the Great Plains, grass was dramatized. Hunters and trappers came first, then the cattle men, but the sod was broken by the farmers, who followed them closely. It was a very old sod; centuries of buffalo and Indian occupancy had failed to deplete it. The grasses of the Plains were native to the land, differing in this respect from most eastern grasses.

The tall grasses of the eastern plains country crossed over the High Plains in northwestern North Dakota, western Nebraska, and western Oklahoma. Now the original grass has been replaced by more or less unpalatable weeds and shrubs in all but the sand plains of western Nebraska.

Elsewhere the short grass turf dominated, and in some areas still does: Buffalo grass in Wyoming, Nebraska, Kansas, Colorado, and New Mexico, Mexico and Arizona; Grama grasses in Colorado and New Mexico; the Galleta grasses farther south and west, which made a sod that was able to support moderate grazing and hold the light-textured soils of the area with their fibrous roots. With overgrazing these grasses gave way to less nutritious yellow snakeweed, flowering baillcya, and yellowish pingue. The range is thereby poorer but still can stand some grazing and will withstand wind. Eventually, overgrazing results in further deterioration of cover, the encroachment of plants such as Russian thistle, blueweed, and lambs quarters,—and wind erosion. The old sod which greeted the settlers had no superior in any part of the world. Its present forage capacity is from 30 to 50 per cent of its original value. It is lowest in the northern plains and in the Dust Bowl areas such as southeastern Colorado and the Texas Panhandle.

Settlement—The great movements of settlers on to the Great Plains and the subsequent expansions of grazing and cropping lands have occurred in times of abnormally high rainfall and high prices for beef and wheat. The Civil War had produced a shortage of cattle in the North, although Texas had great numbers to spare. An estimated five million head were driven from Texas northward over the plains to the railroads for shipment to the populous northeastern states.

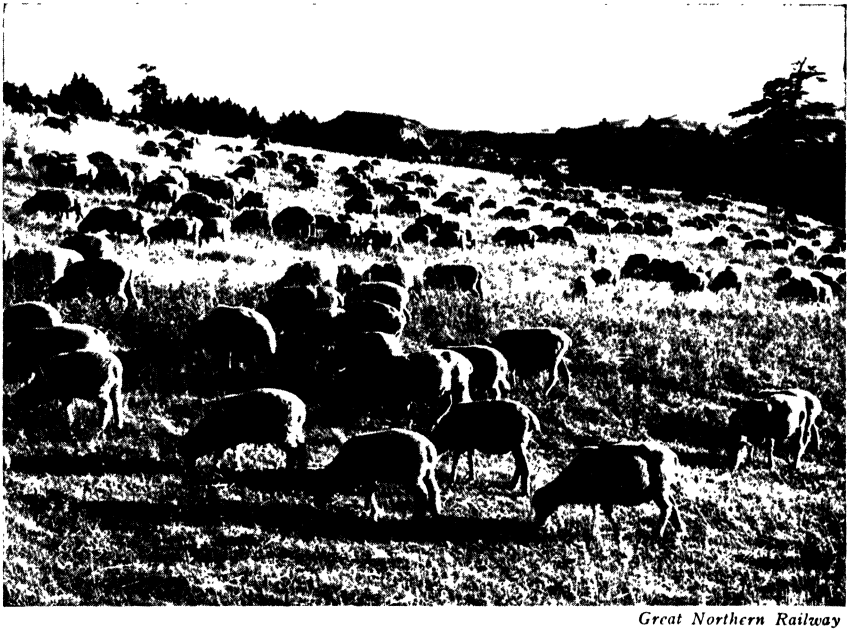
For twenty years after the Civil War there was a relatively humid period on the Great Plains. There was also an eager westward movement of people; money was to be had for the raising of stock. During this time the northern Plains were filled with their first domestic cattle. By 1867 the first of the cow towns had been established at Abilene, Kansas on the Kansas Pacific Railway, now the Union Pacific. The price of range steers rose from $7 in 1879, to $9.50 in 1880, and to $12 in 1881. The world boom in Great Plains beef was on.[3]

Settlement followed the lines of railroads, which were built at that time in the central and northern portions of the Plains. This encouraged the driving of cattle from Texas northward to Kansas shipping points. Later, herds were pushed into Nebraska, the Dakotas, and Montana, first to provide meat for military garrisons and Indian reservations, then to furnish a supply for eastern markets. Real and anticipated profits from cattle raising led to a phenomenal extension of ranching in the Great Plains. But changes in the Plains economy came fast.[4]

[3] In 1881 Gen. James S. Brisbin published a book entitled "The Beef Bonanza: How to Get Rich on the Plains."

[4] In no other section of the United States has legislation been of such importance in determining the place and character of settlement. The Homestead Act of 1862 replaced

From the end of the Civil War until 1886 large herds of cattle grazed the Plains as one great pasture from Montana to Texas. With the drought years which began in '86 and with the enclosure of lands with barbed wire fence by homesteaders, the range became insufficient and cattle barons declined in importance. There was only slight increase in the number of cattle after 1890. In the range portion of the Plains states there were 12 million head in 1920 and 10 million in 1935. Yet because of continued



Great Northern Railway

FIG. 98.—SHEEP ON THE MONTANA FOOTHILLS

and serious deterioration of the range, encroachment by homesteaders, and the drought of 1934 the Plains were estimated to have been nearly 100 per cent overstocked in 1935.

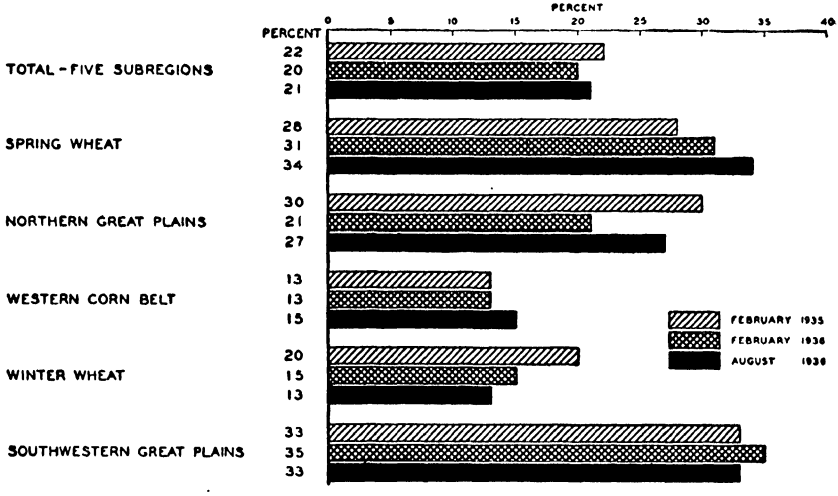
Today most of the cattle are owned by farmers who raise forage crops; the day of the vast cattle ranch with its famed brands is nearly over.[5] Herefords and Shorthorns are efficient consumers of the corn and other forage

the eastern-creditor land policy of Hamilton with the western-debtor land policy of Lincoln. From 1862 on, a man could have 160 acres of land from the public domain for the settling, although it is now known that in drier western parts of the Great Plains a farm of that size is far too small to support a family. He was required to put it under cultivation regardless of fitness. Not until 1909 was the size increased to 320 acres; in 1916 grants of 640 acres were made with the provision that they be grazed.

[5] There were many English and Scotch interests in control of large herds of Plains cattle and sheep during the days of "barons."

crops grown, and the pulp and molasses which are by-products of the beet sugar refining industry. Even with the number of horses reduced 50 per cent, nine-tenths of the cropland is in forage crops and wheat.

Sheep are still very important on the Western Great Plains, but the greater number are grazed on the Western Slope of Colorado and in the valleys and mountain pastures of the Rockies. As farm land is abandoned



PERCENT OF TOTAL RURAL FAMILIES IN MAJOR SUBREGIONS OF THE GREAT PLAINS, RECEIVING PUBLIC ASSISTANCE IN FEBRUARY 1935[A], 1936[B] AND AUGUST 1936[B]

A EMERGENCY RELIEF
B ALL RELIEF FINANCED BY FEDERAL, STATE OR LOCAL PUBLIC FUNDS, INCLUDING WORKS PROGRAM EMPLOYMENT AND RESETTLEMENT GRANT CLIENTS.

U.S. Department of Agriculture

FIG. 99

for one reason or another, the number of sheep increases on the Plains. The greatest concentrations are in southern Montana and in the Texas Panhandle. Transhumance is practiced widely in order to relate the summer pastures in National Forest preserves with the alfalfa and other forage crops grown in the lowlands.

Wheat on the Plains—No plow crop could be important on the Western Great Plains until after the railroad had provided access to eastern markets. Unlike eastern farms, it was not uncommon for farm land to be mortgaged as part of its first sale to the pioneers. There was too much emotion in the land sales which accompanied the movement of eastern people on the High Plains; farming alone could not always be made to show a profit. The crops and the methods of growing them were those of

the humid east. Stock feeding was the basis of the farm economy; wheat did not at first play an important role. As a result of a series of dry seasons, a new type of wheat, the development of farm machinery, and the rise in the price of wheat, the commercial grain farming of the more humid eastern portion of the Plains spread westward to the Rockies.

Prior to World War I many farming communities had given up trying to make a living and had abandoned the land. Then the high prices for wheat of the First World War, together with a series of abnormally humid years brought a great increase in wheat farming. Cornland and abandoned land went into wheat, rangeland was plowed for wheat. The price of wheat dropped just after the war, but the humid years continued for a time. Large scale wheat farming kept on too. The cost of machinery had been so great that farmers felt that they had to keep on producing large crops in order to meet their obligations. This partly accounted for the continued large acreage in wheat despite the drop in price after the First World War. At this time the "suitcase" farmer entered wheat production.

These were nonresident farmers who had purchased large areas of land and hired farmers in the vicinity to plow and seed them to wheat. The term has also been applied to business men of the eastern Great Plains who leased or bought land on the High Plains for the same purpose. It was not unusual for a single farmer to put 3,000 to 5,000 or more acres in wheat; with a good crop once in five years he would break even or a little better; two crops and he would make money, providing the price of wheat was not down. This sort of wheat growing was condemned as speculation, and praised as furnishing paid employment for local farmers during bad years.

A Farm Landscape—It is wheat that has determined the size of most farms and it is this economy that has created much of the atmosphere of "temporariness" on the Western Plains. It is in part due to the sparse population, and the widely spaced urban groups. The single-track railroad has likewise contributed to the effect. Certainly one factor must be the meager capital investment represented by the farmstead itself. Many of the homes are of poor construction and unpainted. In an effort to escape the high winds and the extremes of temperature, some are partly underground. On the northern High Plains an occasional sod house may yet be found.

The relative absence of farm buildings adds to this atmosphere of temporariness. The large storage barns, silos,[6] corn cribs, poultry houses, and hog lots of the humid eastern plains have no place here. It is an entirely

[6] Generally the silo is of the horizontal type; a trench dug deep enough and long enough to hold a winter's supply of ensilage. This, covered with earth, serves adequately in this region of high winds, light snowfall, and no wood.

different type of livestock economy. The ubiquitous windmill may well represent an investment nearly half that of the combined farm buildings.

Farmers on the Plains live a more isolated life during the winter months

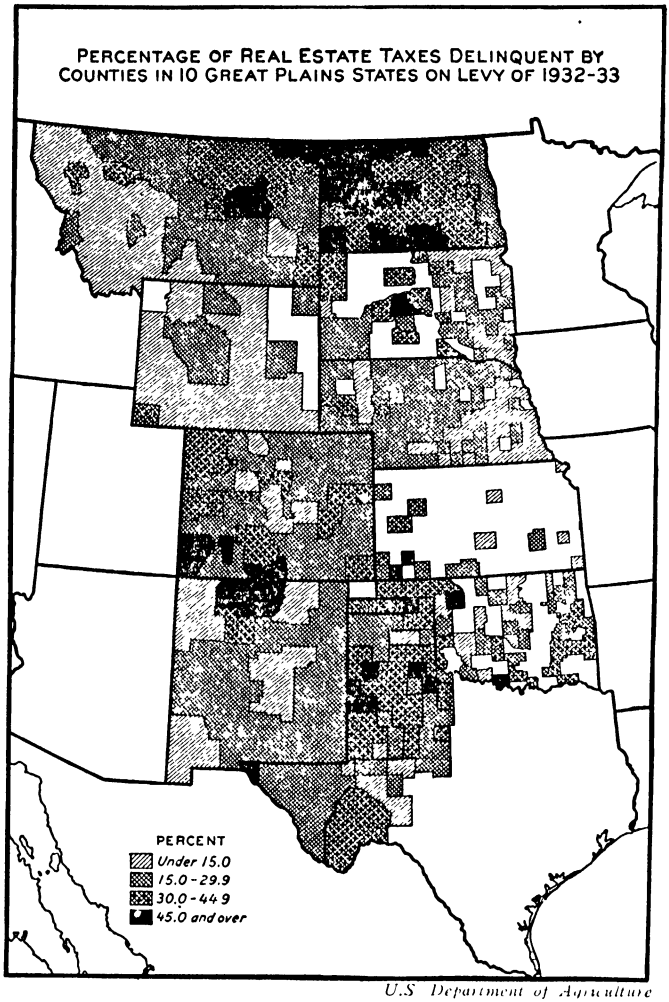


FIG. 100.—THE ORIGIN OF MANY WHO ARE ADRIFT ON THE LAND

than the folk who live in the valleys of the Rocky Mountain province where the Chinook or "snow eater" wind melts the snow and breaks the long cessation of social life.

Sugar Beets—We have noted the increase of sugar beet farming on the

eastern Great Plains. Although this crop is grown on only about 10 per cent of the cropped land in the eighteen counties where its production is largely concentrated, it accounts for 40 per cent of the farm income from all irrigated crops. The principal beet areas on the Western Great Plains are along the valleys of the South Platte 150,000 A., the North Platte 90,000 A., the Arkansas and the Yellowstone 50,000 A. Everywhere it is an irrigated crop and grown under contract with the refinery. Due to the scarcity of labor on the High Plains and the labor requirements of beet growing, foreign-born workers have been imported for the season.[7] In the sugar-growing counties the small tar-paper shack which houses the beet worker is a common sight.[8]

Colorado Piedmont—The Colorado Piedmont of northeastern Colorado supports the largest concentration of cropland and the densest population on the Plains. This old erosion surface presents a broadly rolling terrain of from 5,000 to 7,000 feet in elevation, sloping to the east. The southern boundary is less regular than the others, grading into the Raton Mesa and the Park Plateau. Wind action has created a minor wasteland of dunes some twenty miles northeast of Pueblo. Otherwise the Colorado Piedmont is comprised of arable land within the limitations of a semiarid climate.

Although the Piedmont, as the rest of the Western Great Plains, has steppe climate, the rainfall varies from 13 inches in the eastern portion to 20 inches farther west where elevations are two thousand feet greater. Extensive park lands and even some forest land are to be found in the western portion. Waters of the North and South Platte and the Arkansas rivers enable several parts of these valleys to be irrigated.

Agriculture—The agriculture of the Colorado Piedmont exhibits the characteristics of the three distinct types of Great Plains agriculture: irrigated crops, dry farming, and grazing lands. Approximately one million acres are irrigated, eight million acres are dry farmed, and nine million acres are grazed.

Taken as a whole, the farming is mixed in type, with the acreage of hay, wheat, and corn ranking in that order on the cropped land. Barley and sugar beets are roughly a third as important in acreage as any one of the three chief crops. Vegetables and fruit are important only in the irrigated districts in the three river valleys that cross the Piedmont. This region is the most important dairying section in Colorado or the Western Great Plains; it is also one of the least important producers of range sheep. As sugar beet refineries have been established, the pulp has become a companion feed with alfalfa for a growing lamb-feeding and beef-fattening in-

[7] First German-Russians, then Japanese, recently Spanish Americans. Mechanization got a good start during World War II.

[8] Minimum wages for beet labor established in 1940 for Colorado were $21.60 an acre for an average yield of 12 tons.

dustry. As specialization in wheat has declined, the increase in forage crops has paralleled the increase in lambs and beef cattle.

Irrigated areas rarely present a picture of compact and uniformly cropped land; the farms of the Colorado Piedmont are no exception. Despite the apparent flatness of the region, the minor variations in terrain

Union Pacific Railroad

FIG. 101.—PICKING POTATOES ON THE COLORADO PIEDMONT

are enough to cause breaks in the uniformity of cropped land. It is essentially a region of small landscapes, all irrigated, with broad expanses of wheat, barley or range land intervening. Despite the fact that yields are probably three times as great in the irrigated as in the nonirrigated fields, the distance to market has served to restrain the exuberance of irrigation enthusiasts.

To a greater extent than elsewhere on the Western Great Plains, the Piedmont experienced an increase in land values during World War II. Airfields, depots, ordnance plants, and a steel industry made important

changes in the trade horizons of the irrigated farms of the Piedmont. Population shifts appear to be a net gain.

Other Irrigation Communities—The Yellowstone Valley is the most important irrigated district in Montana's plains region. It is centered around Billings and under conditions similar to the Colorado Piedmont produces potatoes, sugar beets, alfalfa, wheat, garden peas, and corn. Berries are the only fruit that have commercial importance in the Yellowstone Valley. The alfalfa is fed to the cattle, dairy cows, and sheep which make the Billings area one of the two most important stock regions in Montana.

The Shoshone River district, Belle Fourche, Jackson Hole, and the Laramie Basin, are important irrigated districts.

Another irrigated region is the Arkansas Valley of southeastern Colorado. Agriculture here is similar to the other districts mentioned, with the addition of Rocky Ford cantaloupes and winter watermelons, peaches, pears, and more small grains and truck crops than are grown farther north. Pascal celery and berries are grown west and north of Denver. The value of all truck crops is about a sixth of the value of beet sugar.

Although mountain rivers are snow-fed, irrigated farming is yet a minor part of the cropped acreage on the Western Great Plains. Even in irrigated areas there are seasons when water is inadequate for the established systems of water diversion. In most parts of the High Plains no irrigation is possible except under the "flood" or "spot" type, either because no water is available or the land is not suitable. The numerous small dams built under this system are gaining in favor among the farmers. It is relatively expensive and for some farmers it is impossible even with the concessions made by the Federal Government since the prolonged drought of the middle 1930's.[9]

Among the larger irrigation projects under way are two which undertake to divert water from the western slope of the Rockies and by means of tunnels bring it to dry lands on the eastern side. One, a private venture, is the Twin Lakes Reservoir and Canal Company which diverts water from Roaring Fork on the western slope of Colorado to Crowley County farm lands on the east side. The largest, Government-built, is the Colorado–Big Thompson project which diverts Pacific water from above Hot Sulphur Springs on the western slope and by a 13-mile tunnel leads it to already-established irrigation lands on the east side of the Rockies.

Most recent and very comprehensive in scope is the project known as the Missouri Valley Plan. This envisages the conservation and use of the greatest river system of the Great Plains. The enormous Fort Peck dam

[9] In 1945 there was no provision by any High Plains state for the creation of a water conservation district whereby the benefits and the cost may be shared by a large community

on the upper Missouri is the first large unit under the proposed plan; 18 dams are planned for the Missouri River System.

All irrigated communities have problems and expenses not common to humid areas. After irrigation has been practiced for fifteen or twenty years it not infrequently happens that over-alkalinity develops due to excessive evaporation. There is always the expense of securing surface water and the maintenance of the canals. In the largest valley of the southern Plains, the Pecos, still another problem is confronted. Near Roswell, New Mexico, in the middle Pecos Valley, irrigation is by means of artesian wells. These wells have had an extraordinary flow of water and largely account for the 75,000 acres or so under cultivation to cotton, alfalfa, and vegetables.

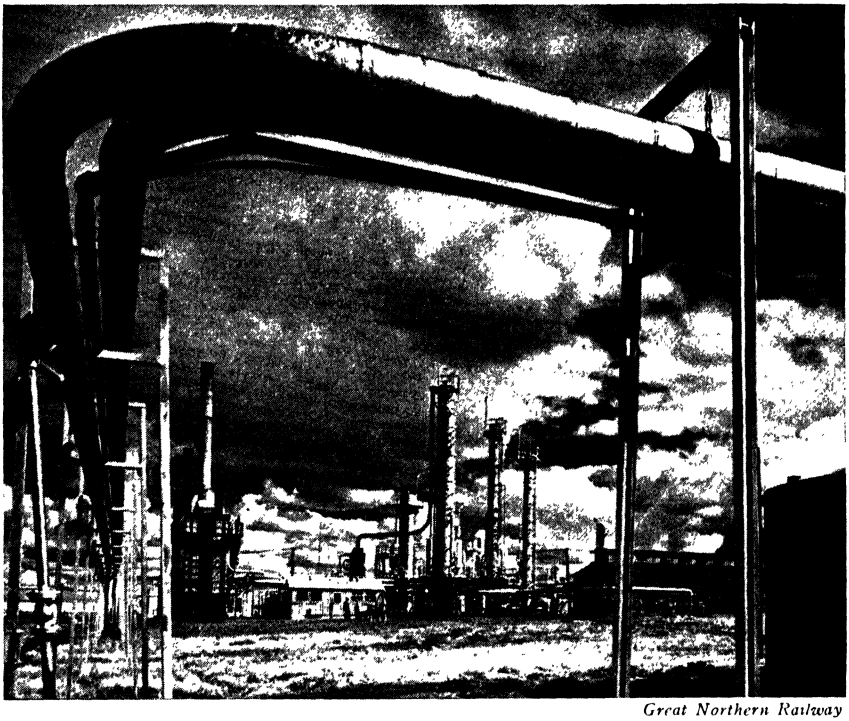
The southern portion of the Western Great Plains, including the Edwards Plateau, the Staked Plains and the smaller associated semiarid plains of New Mexico and Texas are primarily a livestock grazing area, with dependence placed upon the irrigated districts with their forage crops to carry the stock through the winters and protracted droughts. In all of this southern region, the use of wells for irrigation is greater than elsewhere on the Great Plains.

Arid grazing—Grazing is found everywhere on the Plains, but particularly on the higher, drier, southern portion. The Wyoming Basin is likewise a grazing region and is included in this geographic province because of this fact; geologically the basin would be treated as part of the Rocky Mountain province. Grazing in the nearest upland pasture at two dollars a head, and winter feeding on the Piedmont or other Plains farms has led to an important transhumance. Covered wagons for sheep herders are a common sight from Montana to Mexico. Grazing is intimately related to the production of forage crops now, as it never was during the days of warfare among the stockmen. Although sheep have become very important on the range, there is still an order of distinction to the farming: wheat ranks first, beef second, and sheep third.

Minerals—The Western Great Plains have the sort of minerals most of which contribute little to urbanization and less to manufacturing. Historically, the mineral center of the Plains has been the Black Hills with gold, silver and lead mines. Although stimulated by the high prices of the early 1940's, they are no longer the colorful communities of years past. Lead and Deadwood are the major centers.

Petroleum discoveries have been worked at several places on the Western Great Plains, from western Texas to Wyoming, and Casper, Hobbs, Artesia, and Roswell have grown because of it. Two World Wars have highlighted the importance of the enormous potash deposits on both sides of the New Mexico–Texas boundary. In quantity, quality and accessibility

these potash deposits rank with those near Stassfurt, Germany. The Second World War interrupted the normal flow of potash for five years, long enough to give these New Mexican deposits an important impetus. Carlsbad is the only important mining center.



Great Northern Railway

FIG. 102.—REFINERY AT CUT BANK, MONT.

From coast to coast and from Canada to Mexico the oil industry presents its unique landscape

Another resource of importance is helium, a virtual monopoly of the United States. The gas wells from which the rare gas is extracted are near Amarillo, Texas. Gypsum deposits are found over a wide area from western Kansas south into the Pecos River Valley.

The most widespread mining industry is bituminous coal, although there are operations at only a few places, Trinidad, Colorado and Evanston, Wyoming for coking coal, and Canon City, Colorado for heating coal; minor centers extend north into Montana and across the border in Alberta. Salt Lake City and the new steel center at Provo depend upon Wyoming coal for a part of their supply.

Cities and Manufacturing—The principal group of Plains cities are those on the Colorado Piedmont and adjacent areas to the north. They mark an important crossing of the Plains province as well as superior agricultural possibilities. Pueblo (50,000) Denver (290,000), Colorado Springs (33,000), Greely (12,000) and, just over the Wyoming border, Cheyenne (17,000) are the larger urban centers. Every city and town is rooted in the agriculture of the Plains. Beet sugar refining, flour milling, meat packing, butter, cheese and condensed milk are industries found in a representative town. Pueblo has an iron and steel industry based upon near-by coal and iron ore from eastern Wyoming.

Denver is the center of an important mining industry which has enabled the city to manufacture mining machinery. It also makes tires and tubes, refines petroleum and processes the minerals produced on a relatively small scale in the central Rockies. Exploration during World War II increased the number of these mineral raw materials, but the postwar years witnessed their collapse. The impact of the War Production Board's "Five-year Plan" seems to have made little permanent difference to the industries of these Plains cities. The large chemical plants, parts and accessories for merchant ships, modification of heavy bombers for their theaters of operation, and explosives plants have closed. Denver's commercial and financial hinterland includes not only the central Rockies, but a large portion of the Great Plains as well.

Denver, Colorado Springs, and the towns which border the Rockies have an important tourist industry.

XV

THE ROCKY MOUNTAINS

The Great Plains province is bordered on the west by the Rocky Mountains. In many places the mountain front is marked by narrow ridges or hogbacks which have been carved out of sedimentary rocks turned up against the mountain mass. In other areas, particularly in Montana, the approach to the mountains is indicated by outposts of smaller mountain areas such as the Little Rocky Mountains, Beaver Mountains, and the

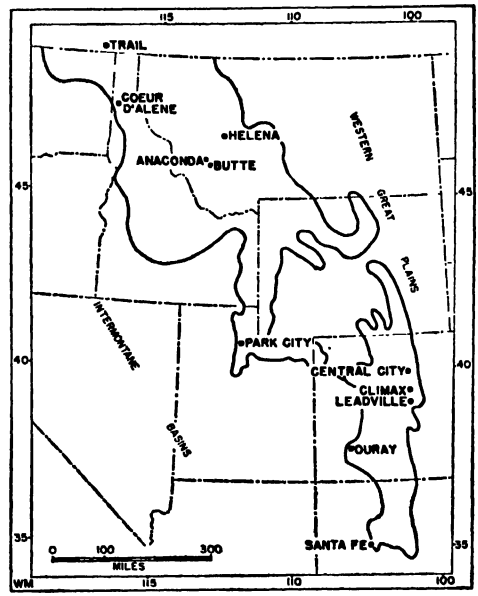


FIG. 103.—ROCKY MOUNTAINS

Big Snowy Mountains. In spite of these marginal features which mark the western border of the Great Plains, few physiographic provinces are as distinctly separated as the Great Plains and the Rocky Mountains. Certain plains areas invade the mountains and in a similar manner grazing, a typical industry of the plains, is well-developed in the mountain area.

Situation—The Rocky Mountain province may be resolved into the Northern and Southern Rockies, being almost entirely separated by the

Wyoming Basin (Fig. 103.) Except for the Wasatch and the Uintas which serve to connect the two areas, separation would be complete. These two mountain areas are generally in contrast both physically and economically. The Rockies have not functioned as a barrier in the development of the United States. Upon occasion they have attracted settlement by their mineral wealth and by the agricultural possibilities of some of the valleys. World War II again cast them in the role of mineral producer, with the usual consequences in ephemeral settlement.

Trending as they do from northwest to southeast from Canada almost to Mexico, the Rockies have exerted a strong influence upon the pattern of settlement and upon the routes of commerce between the humid east and the drier west. Due to the higher elevation of the mountainous terrain, water is available for the communities on the north, south, east, and west, as well as to the several intermontane valleys. They are so near the center of the great continental land mass that they have not increased appreciably the extent of the arid land in interior America. Their elevation not only enables them to supply water to many agricultural communities, but also to support extensive areas of timberland on their favorable slopes. Their height and grandeur have attracted to the area one of the nation's greatest tourist industries.

Northern Rockies—These mountains differ from the Southern Rockies chiefly in the lower elevations and the smaller proportion of mountains which are linear in arrangement. In Idaho they are more closely spaced and there are no large intervening valleys. Near the Canadian border they appear to be just a mass of mountains with several well-defined glaciated valleys or trenches which provide easy accessibility only from the north and south. The over-all appearance of the Idaho and Montana Rockies is that of a high maturely dissected plateau with a few high peaks and massive ranges. Prominent among these narrow valleys are the Okanogan, Colville, Bitter Root, Pend d'Oreille, Purcell, Kootenai, and Rocky Mountain trenches. These have localized most of the people, both urban and rural. The best soils are here, the growing season is longer and the accessibility is easier, since all roads and railroads follow devious courses through these mountain valleys.

The southeastern portion of the Northern Rockies embraces a plateau-like district in which is located Yellowstone National Park, ranging from 7,500 to 8,500 feet in elevation, with a few high peaks, the Grand Tetons, Mount Evans and Mount Washburn, all over 10,000 feet. Hot springs, geysers, Yellowstone Canyon, lakes and snowy peaks make this one of the most popular of our parks.

An attenuated portion directly south is the Wasatch Range which lies just east of Great Salt Lake and its desert. The Uinta Range nearly bridges

the gap between the Northern and Southern Rockies and is the only large east-west mountain range in the United States.

Minerals—The mineral wealth of the Northern Rockies is outstanding. Phosphates, chromium, manganese, tungsten, gold, silver, copper, zinc, lead, mercury, arsenic, and bismuth have all contributed to the fabulous wealth derived from the mining industry. Newest of these minerals is chrome, the tough, heat-resisting alloying metal for steel furnace linings, armor plate, and highspeed machine tools.[1] Another critical wartime alloy mineral mined in the Northern Rockies is manganese; the principal domestic source, Silver Bow County, produced about 5 per cent of the world's total during World War II.[2]

Copper—But it is not from the strategic and vital alloying minerals that the Northern Rockies have gained their wealth; copper has been the principal mineral. The Butte district has been, during its period of activity since 1882, the greatest producer of copper in the world, having yielded in half a century more than two billion dollars in copper, silver, gold, and zinc.

Rocky Mountain copper mines no longer dominate the national copper scene, but Montana has long been one of the top three producers.[3] Most important of these copper districts has been Butte, in western Montana. Butte (40,000) is probably the world's greatest copper mining district. Unlike many of the mines in other copper fields, these are deep, from 2,000 to 4,000 feet. The one big copper company concerned with this district ships the lowgrade ore to their smelter at Anaconda (12,000) some twenty-six miles distant; the blister copper is then sent to Great Falls (29,000) for refining by means of the hydroelectric power generated on the Missouri River.

Butte began its mineral career in 1865 with the discovery of silver, and for ten years after 1875, silver was the leading mineral of the Northern

[1] A $15 million investment in chrome is at Monat, high in the Bear Tooth Mountains of Montana. In 1941 Monat was a sparsely wooded mountainside, its population was miner Monat and wife. The Japanese had choked off chrome from the Philippines; the Germans had blocked the Mediterranean route from Turkey's chrome mines; submarines imperiled shipping from South Africa. The Metals Reserve Corporation cleared away the mountainside at Monat, sank six levels of tunnels, and built a 12-story mill in the canyon. Production began in June to supply two-thirds of domestic needs.

A thousand workers moved in the new town. By late 1943, allied victories in North Africa enabled chrome to be shipped more cheaply than Monat could mine and mill it. The mill closed and the men went back to copper companies and other employers, and lower wages. Uncle Sam owns the largest ghost towns in the Rockies.

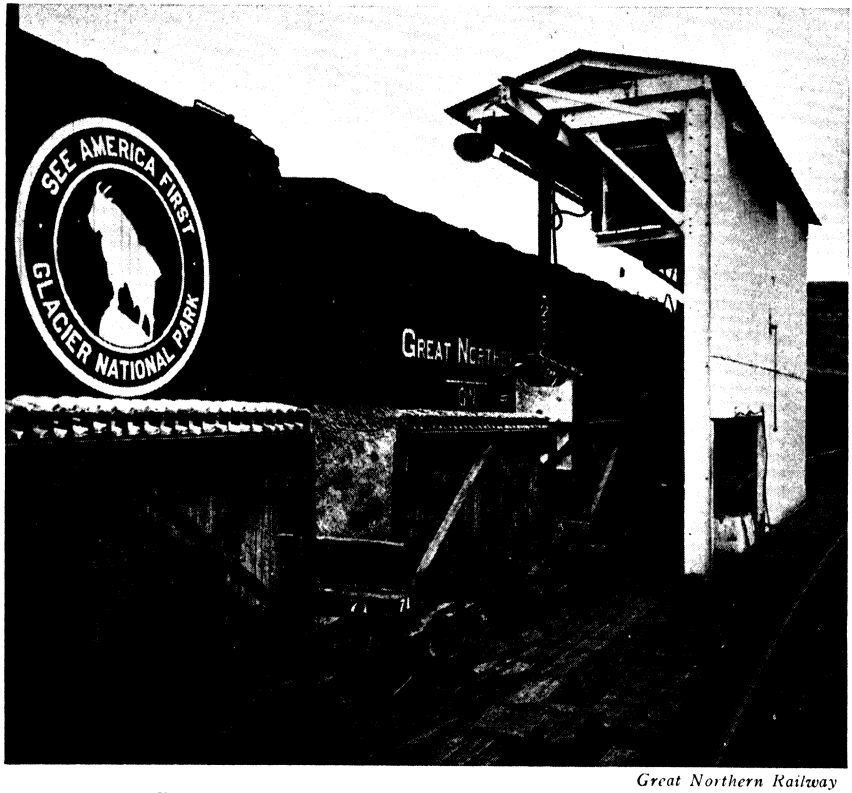
[2] Other mineral raw materials with increased production during the War include:

chromium, about	5	per cent	of	world	production		
tungsten	" 25	"	"	"	"	"	
vanadium	" 50	"	"	"	"	"	

Quoted from *Steel Facts*, February, 1947.

[3] 1938: Arizona 420, Utah 230, and Montana 156 (million pounds smelter output).

Rockies. Butte remained the major silver producer in the state, although rich deposits were worked in five other mountain counties in Montana. During the early 1880's copper mining in the Butte district became so important that it surpassed silver. At first the ore was shipped to Swansea in



Great Northern Railway

FIG. 104.—COPPER SHIPMENTS IN THE ROCKIES

Anodes containing 99.4 per cent pure copper come to the Great Falls, Mont., plant from Anaconda, Mont. The copper is refined and rolled into rod and drawn into wire.

Wales for smelting, and the costs of transportation were so high none but the richest ores could be taken. Even after the first copper concentrator was built in Butte, the matte was still sent to Swansea for refining.

The first fully equipped reduction plant was built at Anaconda in 1892; at the same time an electrolytic copper refinery was built at Great Falls on the Missouri River. During World War I a large wire and cable mill was built at Great Falls and since that time no step in copper has had to take place outside of the state. The rise of this great mineral industry

in the development of the nation was like so many of the American resources, very fortunate in its timing.

The problems of Montana's copper industry are not solely the result of circumstances in the immediate region. In an attempt to stabilize the copper market, the Copper Institute was formed by the leading American copper producers. The result has not been altogether satisfying either to domestic or to foreign purchasers of copper. Price could be stabilized, but the quantities of copper thrown on the market by new producers in central Africa could not. The copper surplus of the United States available for export has declined from a high of 36 per cent at the start of World War I to 8 per cent in 1930, and to a deficiency in 1941. On the other hand, domestic refiners have long imported about 27 per cent of the copper consumption. At the start of the depression, 61 per cent was from domestic areas, and 12 per cent was from domestic scrap. Although United States copper exports have usually exceeded copper imports, the rise of Belgian and British interests in African copper threatens the export market for American copper in Europe. With a refining capacity greater than the production of domestic ore and scrap, the copper industry in the United States appears to have reached its peak of mining operation. World War II created such a demand that domestic copper mines were unable to meet the emergency.

Lead and Zinc—Lead, silver and zinc have long been by-products from copper mining as well as mined in their own right. The Coeur d'Alene district in northern Idaho produces more lead than any other western district; it is surpassed only by Missouri. Some 35 per cent of the nation's lead is mined in the Northern Rockies. Coeur d'Alene district also has the largest silver mine in the United States, producing slightly over a fourth of the national total. Park City, Utah, has an important silver and lead mine. Lead and zinc are closely associated, and their development was forced to wait upon improvements in recovery. Most of the lead is smelted at Bradley, Idaho or at East Helena, Montana. Zinc is refined chiefly in plants at Kellogg, Idaho and at Great Falls and Anaconda. By-products of smelting include sulphuric acid and arsenic.

Cement, plaster, gypsum, phosphate, granite, sand and gravel, and sapphires are produced in important quantities in the Northern Rockies.

Coal of several degrees of excellence is mined in the Rockies and in the Western Great Plains near by; comparatively little is used for industrial purposes because cheap gas and hydroelectricity are available.

Forests—In general the forests of the Northern Rockies are like those of the Intermontane area. Except in parts of the province, there has been no commercial lumbering beyond that of local demand for mine timbers, road construction, and housing. The limit of aridity below, and of temperature above, has kept tree growth restricted to a middle zone. Much of the region

is isolated, the stands are thin, and the local market insufficient to warrant the development of important lumbering operations. The largest remaining stand of white pine in the United States is in Idaho; it constitutes more than two-thirds of the total Rocky Mountain timber cut. Inaccessibility makes difficult the prevention of fires which have long been destroying

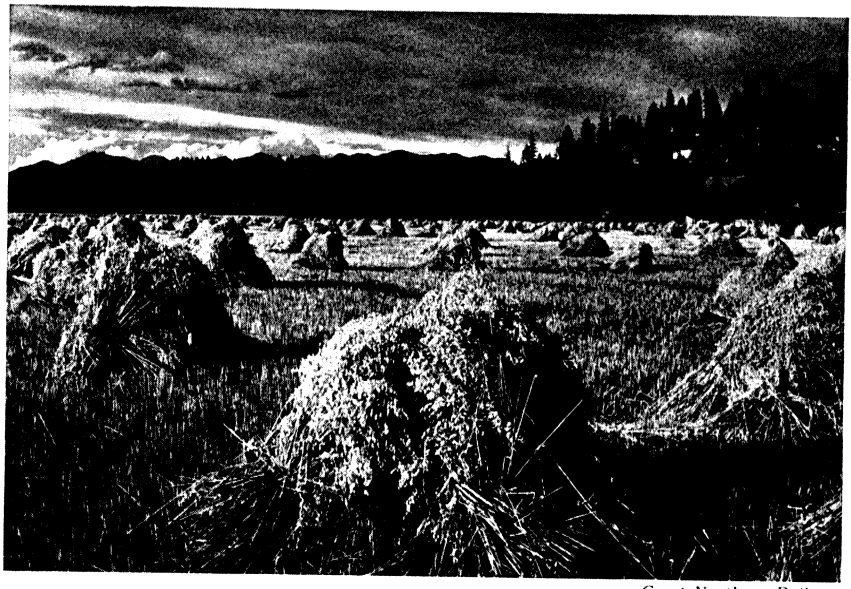
U.S. Forest Service

FIG. 105.—SMALL SAWMILL OPERATING IN EMIGRATION CANYON, CACHE NATIONAL FOREST, IDAHO

these forests. Where government supervision exists, the loss by fire is low but unfortunately most of the forests of the Rockies are not thus adequately cared for.

Floating logs out in flumes and the use of modern machines has enabled some of the difficult stands to be cut, but in many areas the chief source of income is from the tourist industry, and related activities. With this in mind, the Forest Service is planting trees at the rate of a few thousand acres each year, scarcely a drop in the bucket considering the vast extent of land in every mountain county fit only for trees.

Agriculture—Taking the Northern Rockies as a whole, grazing is the



Great Northern Railway

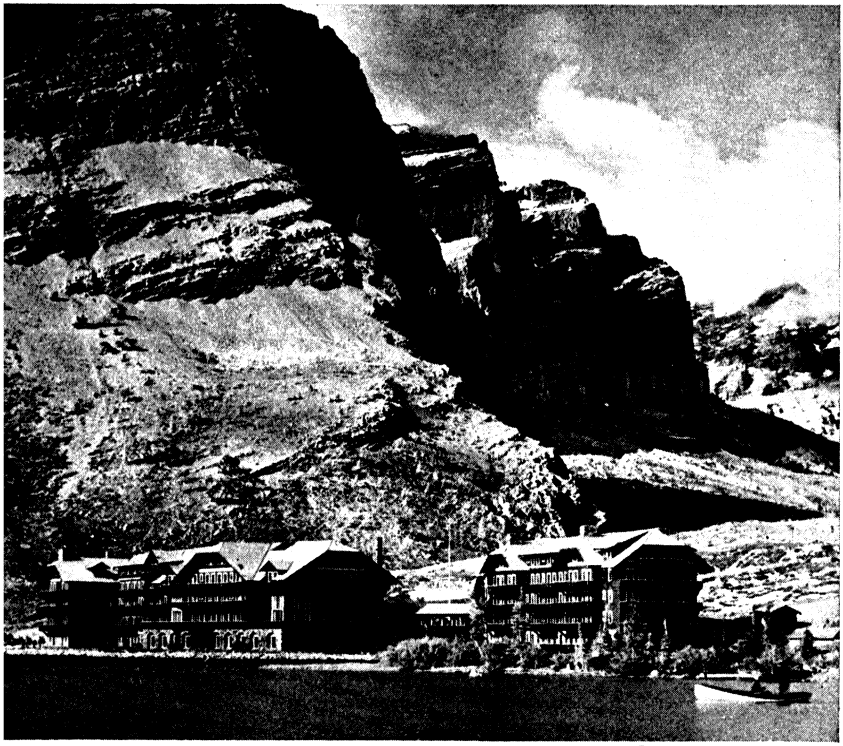
FIG. 106.—OAT FIELD IN THE FLATHEAD VALLEY, NORTHERN ROCKIES

Great Northern Railway

FIG. 107.—HEREFORD CATTLE GRAZING IN THE MONTANA ROCKIES

major aspect of agriculture. Cattle and sheep divide the time between the mountain pastures and the winter feeding lots and alfalfa stacks of the valleys. Cattle and sheep are about equal in importance in the Northern Rockies, with Idaho the principal sheep herder.

As soon as mining passed from the prospecting stage, crop agriculture



Great Northern Railway

FIG. 108.—MANY GLACIER HOTEL IN GLACIER NATIONAL PARK

began; the high prices for farm products which prevailed there stimulated it. Today the Northern Rockies rely upon three main crop regions outside of the main mountain block: Boise, Coeur d'Alene, and Anaconda-Helena districts. The Boise, Payette, and Weiser farming district is primarily hay, wheat, sugar beets, potatoes, and some apples, dairying, and livestock. The district farther north near Coeur d'Alene is much the same but with the addition of poultry, thus contributing to a more self-sufficing economy. On the Montana side of the mountains, there is a compound farming region composed of the Anaconda, Helena and Butte districts where agriculture is similar to that of western Idaho, but with greater emphasis upon

hay and livestock. There is also greater emphasis upon dairying and the manufacture of butter, cheese, and canned milk.

There are a few mountain valleys with dry farming and some with irrigated crops not included in these localized farming districts. Kalispell–Flathead Lake district is one of these; another is the well-known Bitter Root Valley. Both of these are similar to the peripheral areas just described.

Union Pacific Railroad

FIG. 109.—SUN VALLEY, IDAHO ROCKIES

Another way to increase the carrying power of the Rockies

Manufacturing and Commerce—Although the Northern Rockies have perhaps a million and a half people the region is not a land of manufacturing. However, its mineral industry gives rise to a vast amount of railroad traffic. Most of the urban centers were originally mining districts and still function as such. They have become in turn trading centers for their respective farming districts. Virtually all are located on one of the main natural corridors through the mountain block. In this respect they are generally in contrast with the towns of the Southern Rocky Mountain province.

Aside from the mineral reduction referred to earlier in this chapter, a little oil refining, and fertilizer manufacture from the by-product of copper refining, there is little in the way of manufacturing. A foundry at Anaconda

makes about 20 million pounds of iron castings and 200,000 pounds of brass casting a year. The refining of beet sugar is the principal industry based on the farm products of the Rockies. One large mill at Billings produces 100 million pounds of sugar a year. Other refining centers are at Missoula, Butte, Anaconda, Helena, and at nearby Great Falls. Sawmills and pulp mills are mostly in the far northwestern part of the Rockies.

Southern Rockies—For the purpose of this chapter, we are dividing the Rocky Mountain province at the Wyoming Basin, geologically a part of the Rockies but geographically treated as a part of the Western Great Plains region. This makes the Southern Rocky Mountain section a much smaller region than the Northern. The general pattern of mountains and valleys is similar to a letter H, with three old lake plains nested along the center of the north-south axis; North, Middle and South Parks, and farther south the San Luis Valley, all of them lying between the Front Ranges and the Park and Sawatch. Even within the Rockies themselves there are numerous extensive areas of undulating land capable of supporting a grazing industry out of all proportion to the general concept of a Rocky Mountain landscape. (Fig. 107.) Transportation routes follow the few deep gorges which mark drainage to the east and south. The Royal Gorge of the Arkansas River is perhaps the most spectacular of these valleys. The extreme southern portion of the Rockies consists of two narrow elongated ranges which lose themselves on the western margin of the plateaus of New Mexico.

Minerals—Mineral exploitation in the Southern Rockies may have been more spectacular than in the Northern section, but the importance of the mineral industries is currently far below its northern neighbor. Within the Southern Rockies minerals are less important than agriculture. Most of the "ghost" towns enumerated in surveys by the Government are in this section. Precious metals made the district around Central City the most flamboyant of all gold or silver districts.

Scores of workings which have been abandoned pock the slopes of the ranges west of Denver. The desolate landscape is occasionally enlivened by silver mines reopening when prices of silver or copper warrant. The discovery and operation of the mines near Leadville may be cited. The gold boom began there in 1860; in 1863 it was deflated. In 1875 silver and lead were the basis for its next boom; in 1893 silver was derelict. In 1895 gold came back again, quietly.

From these mining properties have come such names as Leadville, one of the greatest silver camps in the world; Black Hawk, Central City, and Cripple Creek (gold); Ouray, Silverton, Telluride, and Creede (silver).

Meantime coal mines were opened in both northern and southern Colorado. For many years these coal mines in the southern mountains and

along the entire Piedmont have been first among the minerals of Colorado. The coal ranges in quality from subbituminous to anthracite; reserves are believed ample to supply the nation for five centuries. Although there is known to be a great deal of iron ore in the Colorado Rockies, ore for the iron furnaces at Pueblo is hauled from Sunrise, Wyoming; Colorado ore is expensively mined.

Although not so important as the Northern Rockies, the Colorado section has been a producer of lead, zinc, and copper. Molybdenum is mined at Climax near Leadville; the output of this one property constitutes about 80 per cent of the world's supply. Wolframite ore from Boulder County yields most of the tungsten produced in this country. Nearly 90 per cent of the nation's vanadium is also mined in this part of the Rockies. With the manufacture of automobiles, airplanes, high-speed machine tools, the radio and electronic equipment these uncommon minerals assumed new values. Fluorspar, a calcium fluorine compound, used in the manufacture of some steels and in the ceramic and chemical industries is yet another important export from the Colorado Rockies, ranking fourth in the nation. Although some petroleum is produced in north central Colorado, most of the state's requirements is piped in from Texas.

Both Northern and Southern Rocky Mountain mining communities are sensitive to the Federal Government's policy toward gold and silver in the monetary system. Two world wars with the heavy demands for special steel and electrical equipment, and the closing of routes by which the United States secured certain minerals have caused the mining industries of the Rockies to fluctuate violently. It seems likely that the best days for the mineral industry in the Southern Rockies are yet ahead.

Agriculture—Grazing is the dominant phase of agriculture in the Southern Rockies. Transhumance is regularly practiced to take advantage of the vertical zoning of the vegetation; all of the plant zones are brought into use: sage brush and grass at the lower elevations, above that prairie grasses to about 8,000 feet, above this the open forest of pine, Douglas fir, larch, and lodgepole pine, and finally stunted vegetation above 10,000 feet. In all of the plant zones there is some vegetation suitable for sheep grazing at one time or another. Although there is no agricultural equivalent for the trenchlike valleys of the Northern Rockies, the Colorado section has four extensive mountain "parks," which support many head of livestock, despite their aridity, elevation, and difficult approach. In North, Middle, and South Park, in the parklike San Luis, in the upper Arkansas, and lesser valleys, great numbers of Herefords and Shorthorns are grazed.

The range for cattle grazing is not so great as for sheep. The summer pastures for most of the cattle are on the foothills and lower slopes and the grassy parks. The dominant type of farm in all parks but the San Luis is

forage-grazing, and will average from fifteen hundred to two thousand acres in extent. As National Forest preserves were established in the surrounding mountains, the carrying power of the ranges was limited to safeguard the forest. Since World War I sheep grazing and the production of hay for shipment to other feeding areas have increased, while the number of cattle has decreased.

Farm Security Administration

FIG. 110

Loading lambs on narrow gauge railway in the Colorado Rockies for shipment to Denver market.

San Luis Valley—The fourth of the park lands of the Southern Rockies is the San Luis Valley, a broad bolson plain surrounded by high mountains except on the south, where the Rio Grande is cutting a gorge just south of the Colorado–New Mexico line. Agriculturally this valley is more important than either of its northern neighbors.

The economy of the San Luis Valley is based upon irrigated agriculture and the raising of livestock. The nature of the land-use varies with the availability of water and the racial background of the farmers. One county of 3,000 square miles occupies the northern half of the valley; except for irrigated sections along the mountain foothills on the west, it is given over to livestock ranching on a large scale.

The most populous irrigated sections are situated upon the alluvial fans made by the Rio Grande and its principal tributaries along the

western side of the San Luis Valley. Iceberg lettuce is grown in the vicinity of Del Norte and along the flood plain of the Rio Grande canyon; the 8,000 foot elevation seems to aid in the development of crisp heads. The agricultural heart of the valley is the Monte Vista-Center-Sargent region where alfalfa, potatoes, field peas, oats, hogs, cattle, and sheep constitute the farm economy. Pleasant farmsteads, adobe root cellars and the ubiquitous irrigation ditch set this region apart from the ranch-type of occupance farther

David W. Lantis

FIG. 111.—HARVESTING POTATOES IN THE SAN LUIS VALLEY

north. Formerly hogs and now lambs are fed upon field peas and bring top prices on Denver markets.

The southern counties have many Mexican farmers. More attention is given to such crops as broccoli, cabbage, cauliflower, garden peas, and some potatoes. Adobe farm houses are common in this section. In these southern counties the summer pasturing of sheep on mountain grasslands has become an important phase of the farm economy. The flocks are wintered on alfalfa grown on the irrigated valley floor.

Agricultural development of the San Luis Valley has been limited by the amount of water for irrigation. A certain flow must be maintained in the Rio Grande across the New Mexico border by international agreement.

Storage dams have been built on the Rio Grande and tributary streams in the mountains; artesian wells supplement the water supply from mountain streams. Irrigation methods are generally simple; each year the ditches are plowed over and new ones built in the spring. Subirrigation is generally used with water seeping into the water table from the ditches. As in all irrigated regions, increasing alkalinity becomes an important problem.

There are no large cities in the San Luis Valley. The market center of the valley, and the second largest city in the Colorado Rockies, is Alamosa (5600). Originally a narrow-gauge railroad town, it has become the dominant market town of the valley; the railroad payroll has declined in importance since about the time of World War I. The chief industries are dairying, flour milling, meat packing, and oil refining.

In general, the agriculture of all parts of the Rocky Mountain province suffers from the great distance to its market. Freezing of vegetables is an industry which has grown tremendously within the past ten years; it has just begun to help these distant producers. But the greatest factor in the agricultural prospect for all western food producers is the phenomenal increase in population and in industrial payrolls in Pacific Coast urban centers. So far as farm products are concerned, these are competitive districts, but the growth of manufacturing in favored Pacific districts may give rise to food imports from the Southern Rocky Mountain oases.

XVI

WESTERN INTERMONTANE AREA

The physiographic provinces comprising the Intermontane area, for all their apparent similarity, exhibit a variety of small economic landscapes. In the present character of their occupance and in the history of their development, the great Intermontane areas have manifested many fundamental contrasts. This is accounted for in part by the complexity of relief,

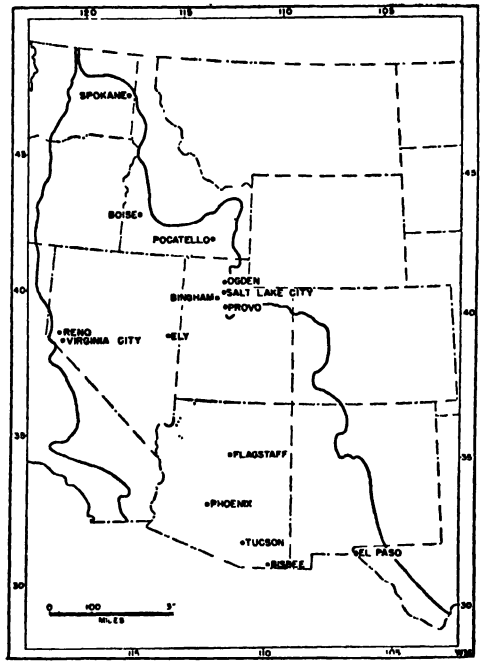


FIG. 112.—WESTERN INTERMONTANE AREA

and in part by the distribution of water resources in this generally arid region. Although newspapers in Salt Lake City refer to this area as the Intermountain Empire, its representatives in Congress do not always vote as regional associates; they sometimes vote with their mountain neighbors. Yet there is ample reason for the treatment of these areas as a single geographic region.

These dry plateaus and basins consist of the Columbia-Snake River Plateaus, the Basin and Range Province, and the Colorado Plateau. Development of the area was based first upon the mineral resources, and later upon irrigated farms; it is in this latter phase of their economy that present-day developments border on the spectacular.

Distant Factors of Influence—These plateau communities bear striking manifestation of the influence of remote environmental factors in regional development. Primarily, the increased irrigation facilities are not in response to local needs, nor are they the natural culmination of the agricultural occupancy of the area. To a very large degree the irrigation projects have stemmed from centripetal movements in regions remote from the Intermontane basins. The Mormon settlements in Utah, New Mexico, and Idaho are examples. So are the more recent and stupendous government irrigation projects on the Columbia, Snake, and Colorado rivers. These projects have been initiated because of the plundering of the Great Plains and its people, an anticipated shortage of power, the desire for navigation and flood control, and the need for a municipal water supply for Pacific Coast cities. The future of these and subsequent projects will be closely related to the role of the United States in world trade after World War II.

Even greater than the contrast among the several parts of these basins is the contrast with agricultural communities of the Great Plains. Most of the area is fit only for arid grazing; large parts are unfit for any useful purpose. But where water and accessibility permit, a self-sufficing economy based on livestock has developed, and the utilities and creature comforts are on a high plane. There is little of the temporariness so noticeable on the Great Plains.

Climate—The climate of these basins and plateaus is perhaps their principal bond, and in a very real sense, climate is the creature of relief. Surrounded by mountains, all of the province is dry. It is classed as steppe for the most part, with desert conditions obtaining southward from the middle portions of the Great Basin. There has never been any doubt about its aridity; no cycles of humid climate attracted settlers unwisely as in the Great Plains. Yet there are indications of the arid climate being an asset rather than a liability, in certain districts at least.

These basins do not have so much rainfall as the Plains, nor is its distribution the same, except in New Mexico and Arizona, where a summer maximum exists that is even more marked than on the Great Plains. All of the northern half of the province has a slight winter maximum. Precipitation is not uniform year after year, but there is none of the same pronounced cycles which characterize Great Plains climate. The northern portion receives from 10 to 18 inches, the amount decreasing toward the south. The relatively high altitude and latitude reduce evaporation.

Prof. H. Bowman Hawkes of the University of Utah reports that these summer rains are unusual for the Intermontane area. They have recently been studied by Government meteorologists who report that they occur mostly as showers during the months of July, August and September. The moisture necessary for their development is brought in by a deep anticyclonic flow of air from the Gulf of Mexico. Any vertical displacement of this unstable air will generally result in a vigorous thunder shower. These warm moist winds, instead of moving into the northern portion of the Intermontane province will continue their anticyclonic circulation and flow eastward. The northern part of this large province has a winter maximum. The precipitation, generally in the form of snow or drizzling rain, is associated with the cyclonic storms along the Pacific polar front which pushes equatorward during the winter season. The polar front and its accompanying storms will move occasionally into the New Mexico–Arizona region.

The Cascades cast a rain shadow of considerable extent along their western margin in the Columbia Basin; its effect is greater because of the low elevation of the Columbia Plain above the junction of the Snake and Columbia; rainfall here is only 6 inches. Most of the Columbia Basin receives about 10 inches. Another district that is drier because of its location is the plain of the Snake River in southern Idaho; annual precipitation here is from 10 to 13 inches.

The southern half of the Intermontane province is generally classed as desert, due to the low rainfall and the generally high evaporation associated with its latitude. In southeastern California desert conditions obtain over an area extending as far east as the Arizona Highlands and south into Mexico.

Temperatures reflect the altitude and the mountain periphery, particularly on the northern portion. The growing season is longest in the Columbia Plain and the Channeled Scablands, where it is from 130 to 210 days, depending upon the altitude. Just west of this low center of the Columbia Basin, in the folded ridges and valleys of the Yakima, east of it in the Palouse Hills, and southwest of it in the Deschutes Plateau, the growing season is from 80 to 200 days. Farther south in the Basin and Range province, where elevations are greater, the growing season is from 80 to 150 days.

The extremes in elevation, from below sea-level in southern California to 7,000 feet above, and the very great variety of land forms and of soils, greatly affect the usefulness of rainfall. Night temperatures are lowered, and the growing season is shortened by the relatively high altitudes. Winds are noticeably less severe throughout this province than on the Great Plains. Dust storms are rare, although wind erosion in the northern Columbia Plateau is a problem.

Columbia-Snake River Basins and Plateaus—Westward from the Northern Rockies toward the Cascades, stretch 200,000 square miles of lava-covered country. This large area exhibits a great variety of land forms and

soils. Continuing until recent times, geologically, fluid lavas have at a dozen or more intervals, risen to the surface through fissures and covered the then existing surface. In the Snake River Plateau the flows are especially recent, for instance in Craters of the Moon National Park.

The Columbia River Plateau is the older and more spectacular of the two main divisions. At the point where the Snake River enters the Columbia, the altitude is somewhat under 400 feet; from this point the plateau rises to 6,000 feet on the west and to 3,500 feet on the north and northeast. The lowland center of this Columbia Basin is known as the Central Plains. West of it are the Yakima ridges and valleys; on the north are the Channeled Scablands; on the east are the Palouse Hills; and on the south the Columbia Plateau and the Blue Mountains. Between the last-named province and the plains of the Snake River in southern Idaho is a hilly dissected plateau known as the Payette section, an area of almost no use.

Basin and Range Province—The second of the Intermontane provinces is the Basin and Range country. It may be subdivided into three sections: the Great Basin, the Gila or Sonoran Desert, and the Arizona Highlands. The Great Basin embraces all of Nevada and most of western Utah, and a portion of southern Oregon. This province is characterized by hundreds of roughly parallel mountain ranges trending north-south. These structurally-tilted blocks of the earth's crust rise from 3,000 to 5,000 feet above the valleys which are partially filled with sediments carried from the mountains. Rapid runoff promotes this extensive sedimentation.

Drainage of the Great Basin is interior. A major stream, the Humboldt River, seeps into the ground before reaching a body of water. Ephemeral lakes are formed at many places in the Basin each year. If fresh water, as few of them are, they are called playa lakes; if salt, they are called salinas. In ancient times two very large lakes occupied the northern portion of the Basin, Lahontan in the west and Bonneville in the Great Salt Lake area. Lake Winemucca, Pyramid Lake, and Walker Lake are remnants of the former. Great Salt Lake, Utah Lake and Sevier Lake cover only a small part of the area once occupied by Lake Bonneville. Their basins and those of the short-lived ephemeral lakes are for the most part alkaline.

In the far southwest of the Great Basin is Death Valley, a depression only partially filled by sediments from the adjacent ranges. It is known chiefly for its altitude (270 feet below sea-level) and for its inactive borax workings.

Gila Desert—The Gila Desert portion of the Basin and Range province is similar to the Great Basin, although erosion has more completely dissected its ranges and thus widened its valleys. It is drained by the Colorado and its tributary the Gila, and although it is more arid than its northern

neighbor, these surface streams permit some irrigated agriculture. The international boundary divides the large Colorado delta into approximately equal parts. Until the recent completion of the United States canal diverting water from the river for irrigation into near-by Imperial Valley, water was brought in by way of the Mexican portion of the delta.

The Colorado has been dammed near Boulder Canyon (Las Vegas, Nevada) and until sediment has diminished its usefulness, it will irrigate and prevent floods in the lower reaches of the river, supply Los Angeles with water, and generate electricity.

Arizona Highlands—The final subdivision of the Basin and Range province is the Arizona Highlands lying south of the Colorado Plateau and the Southern Rockies. In the main it resembles the other parts of the Basin and Range province, but it is more rugged, and the valleys are more extensive, and more eroded. The name bolson has been given to some of these valleys with interior drainage.

Colorado Plateau—The third and final province between the Rockies and the Cascade–Sierra Nevada systems is the Colorado Plateau. This plateau may be resolved into two main divisions: the northern canyon country and less dissected southern plateau. Because of altitude some parts of the plateau receive enough rainfall to permit tree growth. These forested plateau fragments are mostly in the north; arid grazing predominates on the southern section except along the western margin.

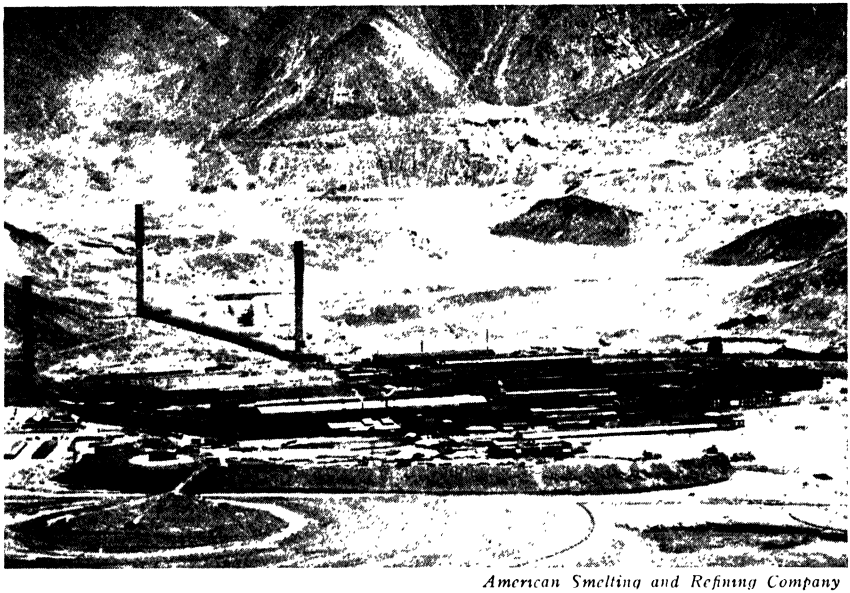
Mineral Industries of the Intermontane Area—A very great variety and, in some instances, a very great abundance of minerals are found in these areas. While gold and silver brought many people into these interior basins in early times, most of the mining districts have suffered decline or abandonment. There are more "ghost" towns as a result of mineral industries than of all other causes combined.

Nearly 80 per cent of the copper now mined in the United States comes from this province. Yet copper mining, like much of the agriculture here, has been the result of forces far removed from the region itself. The mining districts had to wait for improved mining methods and processes for recovery of the copper before they could become active. And now that they have become the major producers, artificial controls have kept them far below maximum production. This is the situation:

The United States produces 30 per cent of the world total.
" " " consumes 35 " " " " " " "
" " " controls 66 " " " " " " "
" " " refines 55 " " more copper than it mines.

There is, therefore, in copper camps something of the same "industrial" feeling that is observed in many of the larger agricultural districts of the

Intermontane province. A contributing factor is the low grade of the western ores. Of the four main classes of copper deposits, (1) high-grade deep deposits, (2) surface ores of very low grade, (3) small bodies of rich ore, and (4) scattered small deposits; the major part in Arizona, New Mexico and Utah belongs to the second category. Montana has mainly the first type. Flotation has enabled the low-grade ores to compete with Montana's and Michigan's deep veins of much higher copper content.



American Smelting and Refining Company

FIG. 113.—COPPER SMELTER, GARFIELD, UTAH

The leading state, Arizona, has widely separated copper districts: Bisbee, Jerome, Morenci, Metcalf, and Globe, all are situated in the arid Arizona Highlands, where every item for community life has to be imported. Every activity of these towns is related to the mining and processing of copper. At Bingham, Utah, forty miles south of Salt Lake City, the world's largest open pit copper mine produced recently 150,000 tons of copper from 8 million tons of ore mined. At such a mine three of the four stages in the preparation of the ore for manufacture take place. Salt Lake County is the world's largest nonferrous smelting center. At least half of Utah's population lives on its great extractive industries.

Not all of the ores from the Intermontane basins are smelted at the interior points. Tacoma smelts and refines large quantities of these ores and some from Alaska and British Columbia as well. Most of this nearly

pure copper is sent to the great refiners adjacent to the large port cities of the Middle Atlantic Littoral.

Lead and Zinc—Lead and zinc now constitute a fairly important mineral export from this province, although the bulk comes from Coeur d'Alene farther to the east; large smelting and refining plants are at nearby Kellogg. Lead, zinc, gold, and silver are recovered in profitable quantities during the processing of copper. Approximately half the nation's silver is produced in the copper, silver, and lead mines of these states. One-fifth of the nation's gold comes from the Intermontane province, with perhaps half of it mined jointly with copper.

Forest Industries—Strictly speaking, there has been no important commercial lumbering in this province. There is as much land classed as forest land as in Washington and Oregon west of the Cascades, but the Forest Service estimates less than a third as saw timber stand, with a much larger proportion of it in government hands.

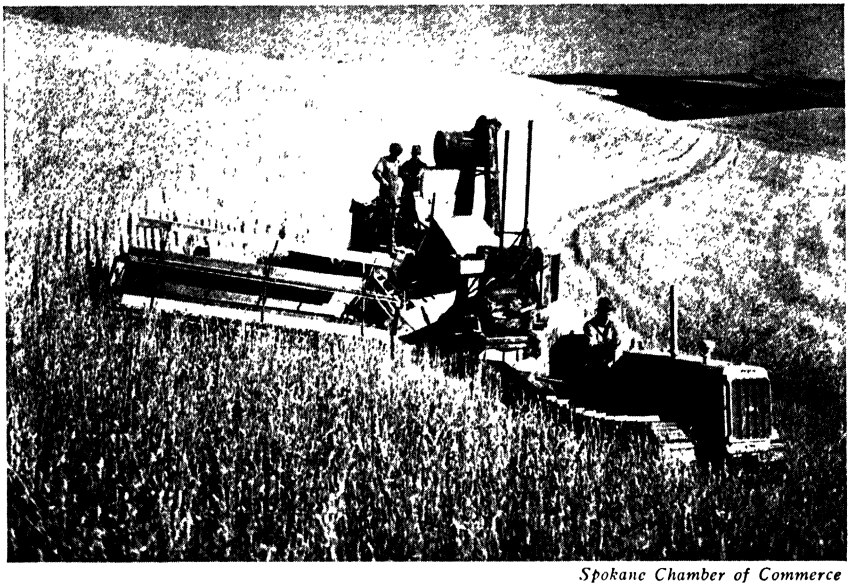
The forests here contrast with those of the West Coast in that they have a preponderance of pine instead of Douglas fir. Smaller, lighter logs, thinner stands, and relatively favorable terrain made the use of machines in the lumbering operation much less necessary. The white, ponderosa, and sugar pines of the Intermontane province have been widely advertised as successors to the Great Lakes and the New England white pine. White pine from Idaho is a valuable wood. It is used for high-grade finish lumber, sash and doors, and all kinds of millwork. WPA researchers listed dozens of "ghost" lumbering towns in Idaho; this gives a clue to the small size of most of the earlier lumbering operations in this region.

In the New Mexican and Arizona portions of the Colorado Plateau there are stands of pine which are the basis of a minor lumbering industry. The forests themselves are among the largest continuous stands in the United States.

Agriculture—Except for the Columbia wheat area, the Intermontane agriculture is based on irrigation. The region was settled late in our history; the first major settlement was under the auspices of the Mormon Church. Their organized reclamation was based on irrigation and was by no means confined to the Salt Lake oases. From New Mexico northward to Idaho, the Mormon pioneers founded and have maintained an irrigated agricultural economy.

The Wheat Growing Section—There are three major wheat-growing areas: Palouse Hills, the Big Bend country, and the Snake River Plain. The Palouse area is a steeply-rolling upland of loess soils which has been the center of winter and spring wheat production in the Northwest. In this subhumid region, there are definite limits to the cropping system. Diminish-

ing yields and erosion have forced some such rotation as the following on these 500-acre farms: sweet clover for the first and second years, winter wheat the third year, spring wheat the fourth year, fallow the fifth year, and winter wheat the sixth year. In the Palouse area wheat yields an average much higher than the national average, 25 to 50 bushels as compared to 12 to 15 bushels. Professor Garland believes that the present wheat economy of the Palouse Hills has reached the "geographical climax." [1]



Spokane Chamber of Commerce

FIG. 114.—A PALOUSE WHEATFIELD

There has been an Eastward Movement, too. The tractor and combine have come out of the West and, in smaller size, crossed the continent.

The Big Bend wheat district is north of the Palouse region and is in contrast chiefly because of its level to gently rolling terrain, its much larger farm units (1,600 acres), and the smaller proportion of cropped land. Mechanization of wheat farming took place earlier here than on the hilly Palouse. Crop failure is more frequent, fluctuation in cropped land much greater, and wheat farming is more of an industry in the Big Bend country of the Columbia than in the more important wheat region to the south. On the western margin, some wheat is being grown by irrigation. The yields (30 to 70 bushels per acre) in irrigated areas are generally higher than in

[1] John H. Garland, "The Columbia Plateau Region of Commercial Grain Farming," *Geographical Review*, Vol. XXIV (1931), pp. 371–379.

the dry farming sections. Irrigated wheat constitutes 5 per cent of all northwestern wheat.

The third wheat-growing district in the Intermontane province is the Snake River Plain in southern Idaho. Some of the wheat grown in this valley is under irrigation. The proportion of land in fallow is therefore lower than elsewhere in the Northwest wheat region. Farms are much smaller

Union Pacific Railroad

FIG. 115.—MT. HOOD AND APPLE ORCHARDS

(100–175 acres), the cropping is more varied; and livestock is more important than elsewhere in the wheat regions. But wheat farmers and wheat industrialists have one thing in common: their means of livelihood is particularly vulnerable to the impact of world market and world supply. Alternative opportunities are exceedingly limited in these dry uplands. Their isolation from large markets would seem to make advisable a self-sufficing agricultural economy: feed themselves, feed the stock, and sell the rest. Some diversification has taken place, particularly in the upper Snake River

Valley where hay crops, sugar beets, poultry, fruit, and sheep are now produced.

Orchard Districts—Unlike the great wheat acreage, orchards appear in rather widely separated valleys scattered throughout the northern third of the Intermontane province. Like the wheat growers of this province, these specialists have their problems of marketing a product so many thousand miles from its ultimate consumer. Fallow land in the orchard districts is not a sign of the cropping system as it is in wheat; rather it is evidence of reduction in fruit average and a temporary abandonment of farm land. Irrigation is practiced in virtually all of these orchard districts.

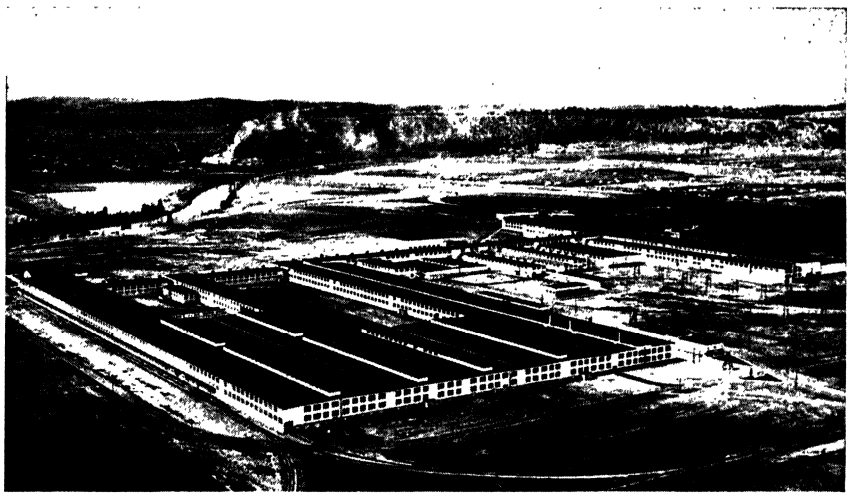
Yakima—Across the ridges of the western margin of the Columbia Plateau the Yakima brings water from the crests of the high Cascades to irrigate orchards of apple trees—two million of them. North of the Yakima Valley is another apple-growing district, the Wenatchee-Okanogan valleys of Washington and southern British Columbia. South of the Yakima, across the Columbia, is yet another, the Hood River Valley. These four districts also grow pears, potatoes, and vegetables, with diversification greatest in the Yakima Valley. Three smaller districts in Washington also specialize in apples: Spokane Valley, Touchet Valley, and the White Salmon–Stevenson Valley on the east slope of the Cascades. Varieties of apples differ from district to district, but in general Winesap, Delicious, McIntosh, Yellow Newtons, and Spitzenbergs are the more numerous. Except for pears and apricots, the fruit is sold fresh.

Although high color, perfect fruit, and large size guaranteed by the cooperatives have made the job of the copy writer easy, these fruit growers have their troubles. Two world wars have cut off a large part of the export markets. Eastern fruit districts, in an effort to better their position, have adopted many of the measures employed by Northwestern fruit growers, with the result that their fruit has raised its competitive value. The cost of pipe, irrigation control of insect pests, and scarcity of labor have all raised costs in these western valleys.

Snake River Valley—A third district important for its agriculture is the irrigated Snake River Valley in southern Idaho. The eastern portion raises alfalfa, potatoes, wheat, sugar beets, and some fruit. Idaho Falls, Twin Falls, and American Falls are the agricultural centers which mark the falls of the Snake River. Farther west, near the Oregon boundary, there is less diversification; alfalfa still leads, but apples are second. In both areas the root or apple cellar is a conspicuous feature of every community. The Idaho baking potato is probably as well known as the Washington apple. Potato production is about two-thirds that of Maine. This is the only one of the Columbia Plateau farming districts to have an important livestock industry. In these districts, as throughout most of the Intermontane country,

sheep are more important than cattle. Transhumance is practiced, with summer grazing on the high ranges and winter feeding on irrigated alfalfa.

Columbia Basin Project—The present Grand Coulee undertaking was made possible during the Pleistocene Period when a gigantic ice sheet obstructed the course of the Columbia River, forcing the river to cut a new channel at a point in the present state of Washington about 150 miles from the Canadian border. When the ice receded, the river resumed its former channel, leaving its emergency outlet as an arid canyon some fifty miles in length. This abandoned channel is the Grand Coulee.



Spokane Chamber of Commerce

FIG. 116.—GOVERNMENT-BUILT ALUMINUM ROLLING MILL, SPOKANE

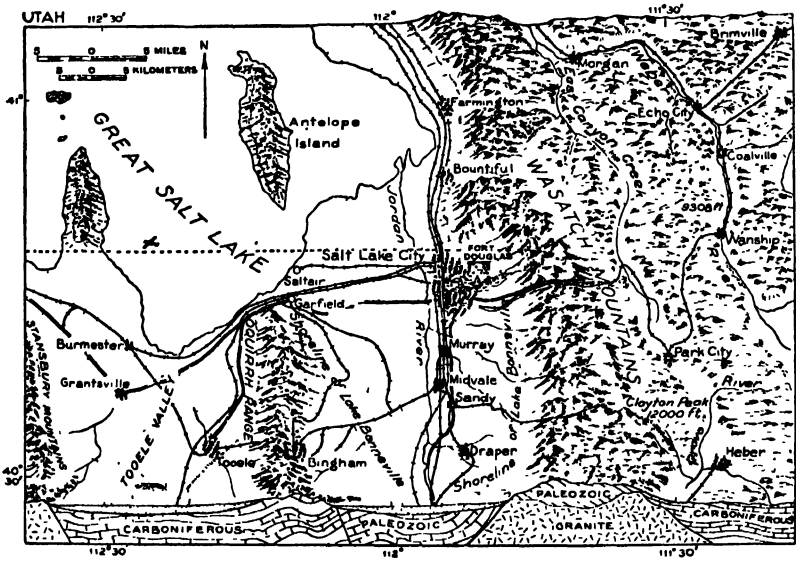
The future of this and other large war plants in the West is still uncertain

PWA Project No. 9 is therefore a substitute for the glacier; the block of masonry is considerably longer than Boulder Dam but it is not so high. Power is being developed, irrigation made possible, and flood control furthered by this immense project. A steady flow of water down the Columbia will improve navigation and increase power output at Bonneville Dam, located where the Columbia breaches the Cascade Mountains.

The main objective of the Grand Coulee plan is irrigation; all other benefits derived are supplementary. For this purpose water is pumped from the lake behind the dam, a lake which reaches to the Canadian border 150 miles away. This is the balancing reservoir whence the water will be canalled to the irrigable portion of the Columbia Basin to the south, an area estimated at 1,200,000 acres of excellent land, now used only for grazing and marginal wheat growing. The by-product of power

from this and the Bonneville Dam creating our largest power pool, has raised the Northwest's proportion of the nation's developed water power nearly 20 per cent.

The Bonneville Dam is not properly a part of the Intermontane province, but its development with the Grand Coulee project seems to make appropriate its treatment here. It is (1) to increase transportation between the Columbia Basin and the Pacific Coast by enabling the largest ocean vessels to go ultimately as far as the Dalles of the Columbia River; and (2) to



A. K. Lobeck Drawn by Guy-Harold Smith

FIG. 117.—THE SALT LAKE AREA

develop power. Power from this dam is the basis for such industries as the new aluminum refining plants at Vancouver, Washington, and the manufacture of calcium carbide, pig iron, and pulp. A number of public utilities also secure power from this source.

Salt Lake Oasis—The Salt Lake oasis is the largest irrigated farming district in the Intermontane area; other oases are Reno-Carson, parts of the Humboldt and San Juan basins, and Mesilla, Coachella, and Yuma valleys. Salt Lake cities and towns extend for three hundred miles along the front of the Wasatch Mountains in eastern Utah. Virtually all of the water for irrigation comes from melting snow and the heavier rainfall of the lofty Wasatch. Salt Lake City (150,000), Ogden (40,000), Provo (20,000), Logan (15,000), Brigham (6,000), and Springvale (5,000) are the largest cities.

After a 500-mile drive over the semiarid plateaus on the east, to drop down the west slope of the mountains into the man-made green of Salt Lake City is indeed an experience. Wide streets, modern shops, and some high buildings bear testimony to the profits from commerce which had its beginning with Mormon outfitting in 1847. Although Salt Lake is the largest city, the location of Ogden, farther north and closer to the canyon through which the railroad comes from the east, has made this the railroad center of the oasis.[2] For such industries as slaughtering, flour milling, meat packing, and freight classification yards, the Ogden location is superior to all other cities on the oasis. Ogden stockyards handle sheep and cattle on a scale that makes it comparable with St. Louis.

The agricultural economy of this oasis sets it apart from all other irrigated districts of the Intermontane province, not so much in the nature of the crops grown as the conditions under which they are produced and marketed. Cooperation stems from the early and continued efforts of the Mormon Church to arouse an enthusiasm for cooperative organization. Physical insularity, strong cooperatives, and a population of a quarter of a million people have given to the oasis a self-sufficiency conspicuously lacking in all but the Mormon-irrigated communities.[3] Here it amounts to a way of life. As in other irrigated communities, alfalfa and livestock constitute the principal emphasis of the agricultural economy; sheep, cattle, and hogs, in that order. Wheat, oats, barley, sugar beets, peaches, apples, apricots, vegetables and dairying products are produced.

To bring about an agricultural occupance such as obtains here, great capital investment has been required. The Mormon Church initiated most of the projects, but has retained control of only a few.[4] The cooperatives have been strong enough to carry on the management of the diversified economy. The ruin of many irrigated communities throughout the west has been due to the general unfamiliarity with this type of farming and to overproduction. These pitfalls the Mormon pioneer irrigationists have largely avoided. During the period of inflated markets incidental to World War I, the oasis farmers did overspecialize. Since then, diversification of crops, re-emphasis upon craft industries of many kinds, and general belt-tightening have partially restored self-sufficiency in the Salt Lake oasis.

Manufacturing—This largest urban grouping within the Intermontane province has developed some manufacturing beyond the needs of the immediate population. The processing of farm products has been the most important aspect of its industry. Flour milling, beet sugar refining, fruit

[2] World War II brought it large military and naval installations. The War gave Provo an enormous ($180,000,000) steel plant which has been converted to peacetime use.

[3] Yet during the depressed 1930's Japanese, Italians and Austrians came into this oasis as landowners.

[4] Information from Prof. H. Bowman Hawkes, Univ. of Utah.

canning, meat packing, wool and some cotton textile manufacturing and an infant starch industry using culls from Idaho's important potato production have long been of more than local importance.[5]

American Forestry Association

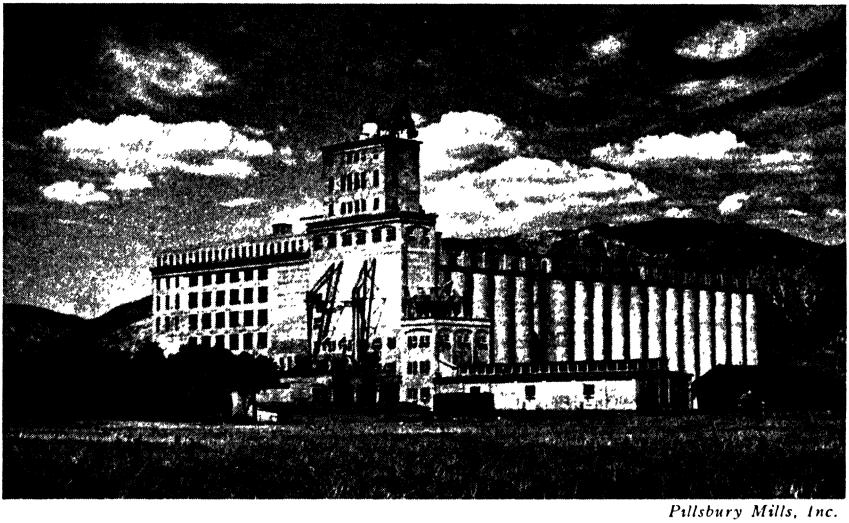
FIG. 118.—AN IRRIGATED COMMUNITY AT THE FOOT OF THE WASATCH MOUNTAINS IN UTAH

This view of the mountain front near Centerville was taken in 1930 just after a flood swept out of Parish Canyon (left center) destroying some valuable farm lands and buildings. Centerville Canyon to the right did not flood because its watershed lands had been protected by town planting.

The small steel industry at Provo has undergone a revolutionary change. The Geneva plant was built by the War Production Board to supply ship steel for the yards on the Pacific Coast, primarily. At the conclusion of World War II this very large, modern steel plant was purchased by its

[5] Excellent cotton is regularly grown in Utah's "Dixie," near the Arizona boundary.

wartime operating company and altered somewhat to manufacture products for a peacetime market. The effect of this tremendous payroll upon the small city of Provo (18,000 in 1939) may be imagined, or upon the entire Salt Lake oasis, for that matter. With the other large steel plants at Fontana (Los Angeles) and San Francisco, the prospect for Pacific Coast manufacturing is undergoing a profound change. The part to be played by the Salt Lake district in this industrialization of the Far West is not entirely clear, but the vitality of its *situation* in the postwar period seems abundantly clear.



Pillsbury Mills, Inc.

FIG. 119.—A MODERN FLOUR MILL NEAR OGDEN IN THE SALT LAKE OASIS

Imperial Valley—Another irrigation project of major importance is the Imperial Valley in southern California. In reality no valley, this portion of the Colorado River delta plain is irrigated with water from the river. Two major improvements have recently been made: construction of Hoover Dam near Las Vegas, Nevada, and diversion of Colorado water by way of an all-American canal which supersedes a former canal which took an easier grade across part of the Mexican portion of the delta. The Imperial Valley has been a spectacular project, first because of its size (450,000 acres), and second because of its remarkably steady growth. This is the more to be wondered at since it has desert climate with very high temperatures and an altitude of 200 feet below sea level. Lettuce and cantaloupes are the leading exports, with cotton ranking second, then citrus fruit, and finally dairy products. Remote as the region is, it appears to have a firm hold on

eastern markets because of its ability to market its foods as early as December.

Dairying, in a region where there is no natural pasture, must, of course, be a late and artificial development. The vigorous growth of Los Angeles, San Diego, and other Southern California cities gave rise to an expanding market for fluid milk and creamery products. Land values in this urban area were very high, so an important part of their dairying has been done in the Imperial Valley. Recent spectacular increases in factory employment in these California cities have stimulated dairy sales.

Salt River—Not far away in the Salt River Valley of central Arizona is another irrigated district of more than average success. Construction of the Roosevelt Dam in 1910, some seventy miles above Phoenix, enabled the extension of irrigated acreage (500,000 A.) with water from the Salt River. The specialties of this district are similar to those of the Imperial Valley; long staple cotton is more important and dairying is much less important than in other irrigated communities throughout the Intermontane province.

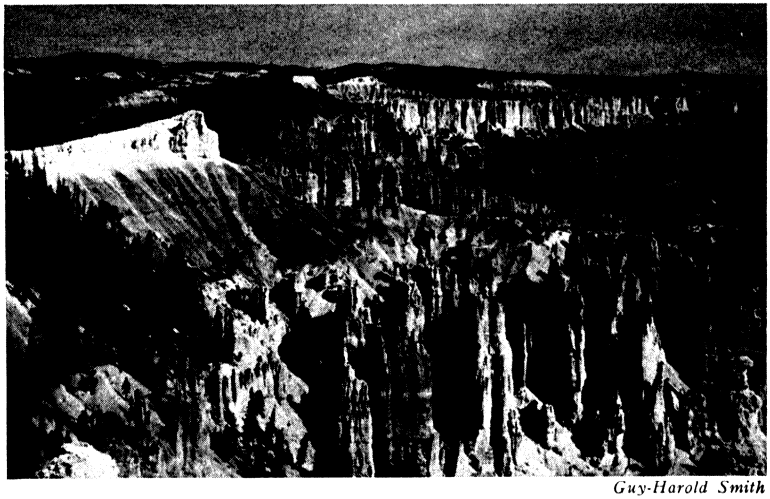
Western Slope—One of the most important agricultural areas of these Intermontane basins are the valleys of Colorado's Western Slope. This northeastern section of the Colorado Plateau embraces the drainage basins of two principal streams, the Grand and Gunnison rivers. Although settlement began during the 1880's, the relative isolation of these valleys has retarded their development.

Grand Junction, a city of 14,000 population at the junction of these two rivers, has come to dominate the economy of the entire Western Slope. These river plains, at elevations of some 4,600 feet (comparable to the Salt Lake Oasis), produce large crops of sugar beets, hay, melons, grains, vegetables, and many kinds of fruit—apples, peaches, cherries, grapes, apricots, and strawberries. An impressive tonnage of these products is moved out over the scenic route of the Denver, Rio Grande and Western Railroad to Denver and Salt Lake City.

Another of these specialized valleys is the Uncompahgre, irrigated with water diverted from the Gunnison River by means of the six-mile Gunnison Tunnel. Along the upper reaches of the valleys both sheep and cattle are grazed, and the Western Slope remains the most important sheep range in Colorado.

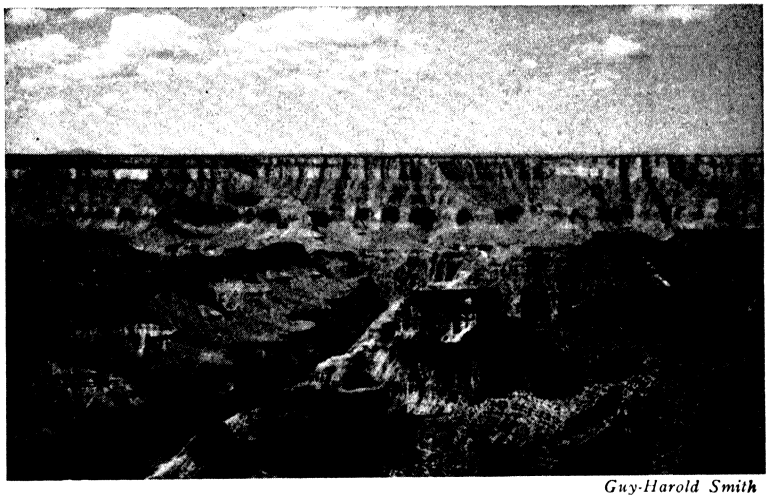
Recent construction and successful use of a plant to refine oil shale at Rifle promises to diversify the specialized economy of these isolated valleys.

Middle Rio Grande Valley—The physiographic diversity of the Rio Grande Valley seems to typify the transitional nature of the Intermontane basins as a whole. For the first hundred miles, the Rio Grande flows east as a Rocky Mountain stream, until it enters the San Luis Valley, an extensive



Guy-Harold Smith

FIG. 120.—BRYCE CANYON NATIONAL PARK



Guy-Harold Smith

FIG. 121.—SOUTH RIM OF GRAND CANYON

As viewed from the north looking down Bright Angel Trail

flat area of 7,500 feet elevation. As a Basin and Range stream it flows for 300 miles through a series of basins to El Paso at 3,800 feet.[6] The growing season ranges from 95 days in the northern San Luis Valley to 120 days at

[6] Elephant Butte Dam, some 70 miles above El Paso, stores water to irrigate a long strip of floodplain to the south.

the Colorado–New Mexican boundary, and to 200 days in southern New Mexico. Clear sunny days are the rule throughout the entire valley. Rainfall averages ten inches, with a slight summer maximum.

The southward extension of the Rio Grande depression, unlike the San Luis Valley farther north, is a deeply dissected surface with little to commend it for agriculture. Just below the New Mexico boundary this section is known as the Taos Plateau. Isolated Indian pueblos characterize its population pattern. Agriculture generally is of the subsistence type and is confined to the irrigated portions of the Rio Grande floodplain.

W. Storrs Cole

FIG. 122.—MANCOS CANYON

As seen from Mesa Verde

Still farther south in the valley, for perhaps 90 miles north and south of Albuquerque, is the Middle Rio Grande Conservation District, successor to the many small irrigation systems which were scattered along this portion of the valley. Cotton and alfalfa have become the leading crops in most of the area, with the former now dominant. The hay has long been the basis for feeding sheep and cattle pastured in the dry hills. A dairy industry is being built on the alfalfa as markets permit. Vegetables and fruit are grown for local consumption primarily; only melons and tomatoes have secured much of an outside market.

Indian Country—South of the very deeply dissected canyon country of Utah and Colorado, the Plateau is somewhat less formidable. The Indian country may be said to lie between the San Juan and Little Colorado rivers on the Plateau of northern New Mexico and Arizona. Its inaccessibility,

both local and regional, has undoubtedly contributed to the great age of its Indian and sparse white occupance.

Down from the highest Plateau elevations with a mountain-like climate and ponderosa pine forests, through the middle elevations with piñon-juniper woodland type of forest, through scanty grasslands of the lower elevations, and to the arid flats or washes is the vertical setting for four centuries of human occupance.

For many, the moderate temperatures, fifteen inches of rainfall, and piñon-juniper woodland of the middle elevations offered the more inviting and accessible home. For the 40,000 Indians, Navajos and Hopi, the scanty grassland and the dry washes with infrequent water sources constituted the basis of an economy and a home. Periodic trips to the timbered elevations for wood and nuts were important aspects of an agricultural or pastoral life.

The highest elevations of the Plateau, with great sawtimber stands of ponderosa pine, became the basis for the development of lumbering. Nearly all of the southwest's timber cut comes from these forests. Inaccessibility has delayed the cutting of these trees until recent times.

The Navajos have long been dependent upon grazing of sheep and goats for their livelihood. This form of transhumance has been hovering near the subsistence level. Overgrazing has more than once imperiled the very existence of these nomadic herdsmen.

Tourist Industry—The recent interest in desert resorts adds another aspect to the tourist industry of the Intermontane basins. With such desert resorts as Palm Springs and Death Valley, the carrying power of arid lands is being appreciably increased in a score of places.

An earlier tourist attraction is the National Park or Monument, of which Grand, Bryce, Zion, and Boulder canyons are examples. Commercial centers in these dry lands, Salt Lake City, Tucson, Phoenix, and Las Vegas, likewise have established important tourist interest. The Indian communities, in a few instances, have also become tourist attractions.

XVII

PACIFIC VALLEYS AND RANGES

Although white settlement began on the Pacific about a century after that on the Atlantic Coast, it was only one hundred years ago that the Pacific Coast experienced the first of a series of fundamental changes which have made the rest of the nation acutely aware of the Pacific realm. Upon a

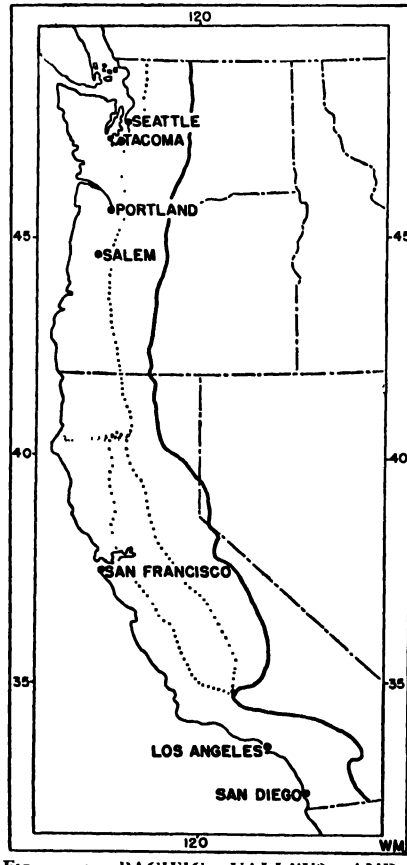


FIG. 123.—PACIFIC VALLEYS AND RANGES

nation whose economic characteristics largely reflected the resources of the humid eastern half, came the successive impacts of Pacific resources, gold, fish, timber, and petroleum; a Pacific agricultural system fashioned on a dry subtropical climate, cheap Oriental labor, and cooperatives; and more recently the transformation of manufacture which resulted from new sources of hydroelectric energy, combined with the stimulation provided by Lend-Lease and World War II.

The Pacific Valleys and Ranges province with great empty spaces, is still a land of extractive industries, with a colonial-type agriculture. The many specialized districts in which the transformation has been epochal remain as exceptions to the prevailing economy.

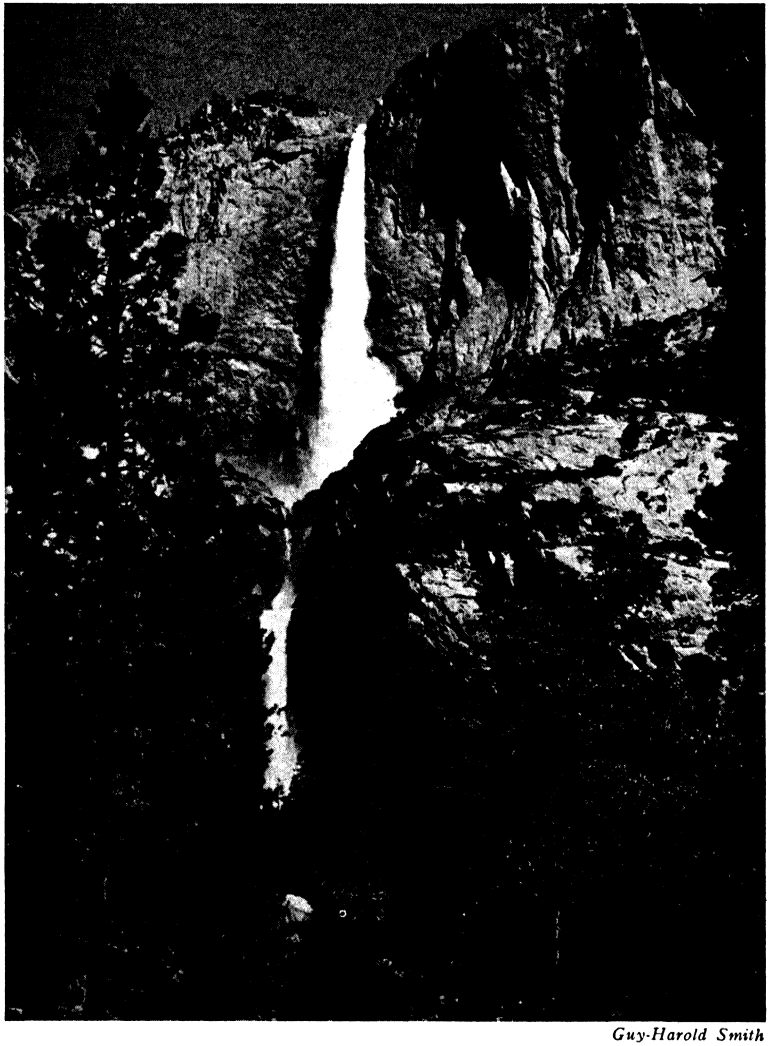
Lying west of the Intermontane area, this province extends for nearly 1,400 miles along the Pacific margin of the continent. It is a complex land of high mountains and broad valleys. The major features are three mountain-bordered lowlands: California's Great Valley, the Los Angeles Basin, and the Puget Sound—Willamette Valley. (Fig. 123.) Treatment of this immense area is divided into the Pacific Southwest and the Pacific Northwest, regions whose physical attributes and economic development are for the most part in contrast.

Relief in the Southwest—The Pacific Southwest comprises three great physical regions: Sierra Nevada Mountains, Central California Valley, and the Coast Ranges. The Sierra Nevadas constitute a great tilted mountain block approximately 400 miles long by 125 miles wide. The short abrupt slope is toward the Great Basin on the east, and the long gentle slope is on the west. The high Sierras on the east provide a natural reservoir for the dry valleys to the west. In the foothill section on the long western slope, the upland has been dissected so thoroughly as to leave no extensive flat lands. The availability of water for irrigation has enabled the hill lands to support a fairly dense farming population, specializing mainly in fruit. Many districts of unused land are interspersed among the farms.

Central California Valley—Central Valley is in reality a great trough extending some 400 miles between the Coast Ranges and the Sierras. Two streams flow toward the middle of this lowland, the San Joaquin from the south and the Sacramento from the north, to unite east of the San Francisco lowland. Tributaries enter these streams from the east only. Both valley plains are essentially flat with rolling lands bordering them on the east and west. East of San Francisco Bay the valley floor is at sea level. The meandering rivers have built up natural levees on the swampy land. Reclamation has enabled large areas of this convenient but ill-drained lowland to support a rather dense farm population.

Periodic floods have deposited a series of large alluvial fans at the base of the Sierras, extending almost across the valley above the headwaters of

the San Joaquin River. These alluvial fans constitute the choice farm land of the San Joaquin Valley. The southern portion of this valley is a region of interior drainage and is known as the Tulare Basin.



Guy-Harold Smith

FIG. 121.—FALLS OF THE YOSEMITE

An air view of the Great Valley reveals a great deal of wasteland, due in part to the swamps mentioned above and in part to deposition of gravel by the streams which have built up the alluvial fans. Over the entire region the limitations imposed by a subhumid type of climate add to the wasteland

character of the Great Valley, especially in the valley of the San Joaquin. The Central Valley Project is especially concerned with this section.

South of the Sierras which also form the southern margin of the Great Valley, there is a large section of the Basin and Range province. This section is low, part of it below sea level, and the ranges are much less conspicuous than in the Nevada portion. This southern end of the Basin and Range province was referred to in the preceding chapter. Nestled within the Coast Ranges is the Los Angeles Basin, third and last of these Pacific Coast lowlands.

Climate—Although California has a Pacific location, its climates are in part continental in character. (Fig. 4.) The marine west coast type of climate prevails on the northern Coast Ranges and the lower elevations of the Sierra Nevadas. The Coast Ranges shut out the rainbearing winds from the Pacific Ocean. The same type of climate borders the Mediterranean climate of the Great Valley on the west, north, and east. The Coast Ranges of California are lower than in the Northwest, thus reducing the amount of rainfall, and the more southerly latitude gives higher temperatures. Most of the Great Valley has a subhumid climate, with 15 to 20 inches of rainfall which comes almost entirely during the winter season. The valley of the San Joaquin has steppe climate throughout most of its area: in the far southwest in the rainshadow of the Coast Range, desert conditions obtain. The Coast Ranges have the Mediterranean climate except for the middle Salinas Valley and the Carrizo Plain which are steppe. South of the Great Valley, the mountains have Mediterranean, and the lowlands of the interior have desert climate.

In many of the lowlands agriculture would be impossible were it not for irrigation. Clear, mild winters and clear hot summers, modified at many places by Pacific breezes, have attracted the motion-picture industry and the tourist. The climate became a permissive factor in the manufacture of airplanes during World War II when San Diego performed some of the plane-making operations out-of-doors.

Soils and Vegetation—The soils of the alluvial fans which comprise most of the eastern half of the San Joaquin Valley are very productive when watered. Soils in the Sacramento Valley farther north are much less uniform and have large areas of sand and gravel deposited by the torrential flood waters of the Sacramento River. In the Los Angeles Basin the alluvial fans are similar to those of the San Joaquin Valley. There are limited mature soils in the Southwest Pacific region; alluvial fans are the foundation of its agricultural prosperity. In the extreme southern end of the Great Valley there are extensive areas of lacustrine plain which are often inundated by flood waters. In the Tulare Lake Plain, several thousand acres have been reclaimed by an elaborate system of pumps and

drainage ditches which impound the flood waters for irrigation during the dry season.

The vegetation on a few of the moister ranges is Mediterranean scrub forest. Elsewhere the low rainfall has limited the vegetation to chaparral on some ranges and bunch grass and creosote bush on the dry lowlands of the interior.

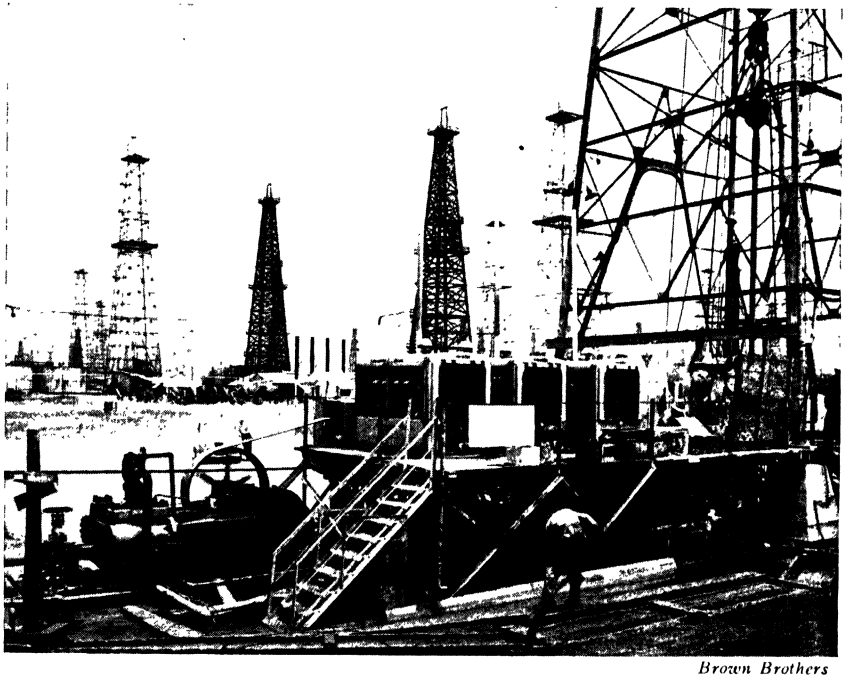
Lumbering—California ranks just after Washington and Oregon in commercial lumbering, but by no means does the forest dominate the economy of California; its agricultural products are about fifteen times as important as forest products. Although California exports lumber, two-thirds of the lumber consumed there is imported from the Pacific Northwest. Commercial lumbering is confined to the rainy northern half of the state: redwood in the Coast Ranges north of San Francisco, and ponderosa and sugar pine from the Sierra Nevada and Klamath Mountains. Moisture-bearing winds from the Pacific cannot reach the Great Valley where tree growth even in the most favorable places is Mediterranean scrub forest. Labor shortage in California over a period of many years, relatively inaccessible mountain forests, and a northern neighbor specializing in lumber have combined to keep California commercial lumbering in a third-rate position. So long as the timber remains on the western slopes of the Sierras, water storage is made easier. Timbered slopes also are conducive to the tourist industry upon which the state has come to depend so much. Conservation of timber supply has progressed farther than in Washington and Oregon.

California Fisheries—The Pacific Southwest has a larger fishing industry than the Northwest, but the varieties, methods of fishing, and the disposition of the catch differ.[1] There are few good harbors along the California coast, so fishing is centered about the four large ones: San Francisco, Monterey, Los Angeles, and San Diego. Most of the catch has been taken by Japanese, Chinese, Italians, and Portuguese, fishing in small craft within fifty miles of the cannery. Depletion of the fishing grounds caused the boats to venture farther out; whereas in 1910 Californians fished an area roughly 250 miles by 25 miles, in 1940 they covered waters approximately 3,000 by 200 miles in extent. As the fishing went seaward, boats became larger, the equipment and refrigeration more elaborate and expensive. Such changes in size and equipment were not characteristic of the Northwest fishing fleet as a whole; employment is greater in the northern industry.

Although salmon have been caught in large quantities in California waters, by World War I the tuna catch exceeded salmon. As white-meated

[1] See C. M. Zierer, "The Los Angeles Harbor Fishing Industry," *Economic Geography*, Vol. 10, 1934, pp. 402–18.

tuna became more difficult to catch, operations extended farther south, and other varieties of tuna were caught. About the time of World War I Japanese competition with frozen white-meated tuna began. This competition then came to include canned white tuna, solely a Japanese product. Exports of frozen white tuna declined with the export of canned tuna. This caught the United States tuna industry both going and coming.



Brown Brothers

FIG. 125.—AN OIL LANDSCAPE AT SANTA FÉ SPRINGS, CALIFORNIA

By comparison with the present century's experience with oil, the gold rush no longer appears spectacular.

Labor was so much cheaper in Japan's fishing fleet and in her canneries that its white tuna was delivered in New York at a somewhat lower price than less desirable grades from United States Pacific canneries.

After World War I and partly because of it, sardines were caught, canned, and exported from California and Maine plants. Unrest in western European countries has served to stimulate the United States industry. Nevertheless, the sardine fishing and canning industry in California has fluctuated violently. The most recent addition to California's fishing is the mackerel. By 1930 Pacific mackerel had surpassed the older Atlantic catch.

Mineral Industries—Two minerals have accomplished spectacular things for California: gold in the second half of the nineteenth century, and oil in the twentieth century. Minerals brought thousands of people to California, where timber and farm lands brought hundreds to the Northwest. By comparison with the present century's experience with oil in California, the gold rush during the past century no longer appears spectacular. In 1899 Los Angeles began its hectic career as an oil producer, although abortive attempts had been made earlier. All other land uses were ephemeral if oil was suspected; orchards, lawns, public property, and even the floor of the Pacific coastal waters surrendered to the oil derrick without a struggle. Production jumped from four million barrels in 1905 to two hundred fifty million barrels in 1940; for a quarter-century California has been one of the three leading mineral states.

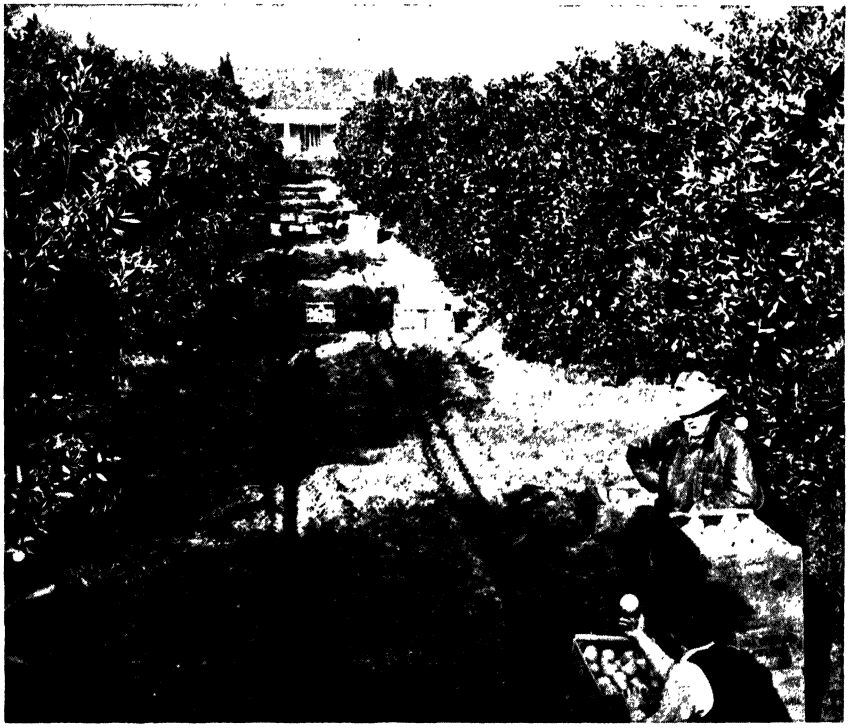
There are two main oil-producing districts: the coastal lowlands adjacent to Los Angeles, and in the southern part of the Great Valley near Bakersfield, production is almost equally divided between them. In 1944 Los Angeles, a city in the desert of Southern California, had a population of 3,357,000. So many things have been spectacular in California: gold output, oil production, and population growth. A steadily expanding agriculture needed an expanding market; almost single-handedly oil turned the trick. In 1945 manufacturing in this district was developing almost as spectacularly, based upon such minerals as iron and aluminum.

California Agriculture—The oldest agriculture of the Pacific Valleys and Ranges is in California.[2] California's agriculture began with the transplanting of Mediterranean crops and methods from the Old World by missions. Now California's agriculture has become a giant industry, long since outgrowing local or even national markets. The fact that California has been one of the three leading agricultural states in the nation for the past forty years, is due to a number of circumstances, among them the climate and the soils of this large state, the rapid growth and the nature of the population, and the agencies developed by man to offset natural and economic disadvantages. It is a common error to think of California as having a simple agricultural economy based on an abundance of certain factors peculiar to that region alone; actually there are few if any agricultural districts in the United States which have experienced such revolutionary changes in crops and in marketing procedures in an attempt to continue in production.

Labor is Critical—California agriculture has been termed Oriental, because of the large numbers of Orientals engaged in the production of the crops for which California has attained its greatest fame. The native white

[2] See O. E. Baker, "Agricultural Regions of North America: The Pacific Subtropical Crops Region," *Economic Geography*, Vol. 6, 1930, pp. 166–191, 278–309.

farmers who once operated large ranches and wheat farms gave way before the production of fruit in the irrigated districts of Southern California and in some areas of the Great Valley. The Chinese from railroad gangs, together with thousands of others imported for the purpose, pushed out the native white labor in the fruit districts. A few Hindus and some Japanese



Brown Brothers

FIG. 126.—AN ORANGE GROVE IN CALIFORNIA

Citrus growing is a way of life as well as a means of livelihood

came in at this time. California's distance from eastern markets had to be offset by cheap labor; her crops are not susceptible of mechanized production.

But the solution of the cheap labor problem brought others in its stead. In 1882 Chinese were excluded by law. With the passage of the Dingley tariff in 1897, sugar beets were given strong impetus everywhere in the United States, but particularly in California, where beets took over old orchard and wheatland. Forty times as much labor is required on a beet sugar plantation as on a wheat ranch. This time it was Japanese labor upon

which the new crop was based. The Japanese did not long confine themselves to laboring on sugar beet plantations. They spread from the beet fields to take up land for themselves in districts regarded as submarginal by the whites. One such district is the reclaimed alkaline flood plain of the Sacramento River south of Sacramento, where the Japanese grow one of their native varieties of rice for which there is no demand in the United States, except among the Japanese themselves. No land that could be watered was regarded as being hopeless by the Japanese. They made strawberries an important crop in California agriculture. It fitted into the labor requirements of the sugar beet.

When, in the 1920–1930 period, farmers in the San Joaquin Valley began to raise long staple cotton, Mexicans and, later, colored hands came in to work the fields.[3] Declining prices for local farm products tended to stimulate the growing of cotton; superior quality and heavier yields caused an increase in the total cotton land from 1,500 acres in 1920 to 600,000 acres in 1937. California cotton yielded 350 pounds per acre as against Georgia's average of 117 pounds. Fifty thousand workers came in to pick the 1937 cotton crop. Local labor worked in the cotton harvest between the grape harvest in September and the early thinning of sugar beets after the New Year.

Agriculture has embraced still another influx of outside labor. White labor has come in from the drought-stricken Great Plains of Texas and Oklahoma. This is in addition to the annual influx of migrant white workers who have long motored to the West Coast orchards to harvest fruit. With conditions arising from this last influx of outlanders, such contributions to literature as "Grapes of Wrath" and "Ill Fares the Land" have been concerned.

The essence of the agricultural problem of California is the consequences from the attraction of outlanders to work for wages low enough to enable California to compete with eastern producers for eastern markets. There are said to be more than two hundred crops which can be successfully grown in California. Not all can be profitably grown, however. The crops in which California has seen fit to specialize are those in which some modification of the plantation system of production can be employed to keep costs down. This has meant that other races were brought in still further to reduce the labor cost. One observer has said that California has "factories in the field." [4] He refers to the fact that the laborers do not regularly live on the land they work; there is a predominance of the large-scale units of production, a thousand acres or more; complete dissociation of the manage-

[3] See S. M. Dicken, "Dry Farming in the San Joaquin Valley," *Economic Geography*, Vol. 8, 1932, pp. 94–99.

[4] Carey McWilliams, *Factories in the Field*, Boston, 1938.

ment function from labor; seasonal employment; organization of growers, packers, and to a degree, of labor. There is an absence of such common rural sights as school houses, churches, burial grounds, farmsteads, and villages of retired farmers. Every change of crop emphasis in California's agriculture during the past 100 years is represented by vestiges of the formerly dominant economies in the landscape prevailing today.

Approximately two-thirds of the state's farm land is in large units of 1,000 acres or more: grazing, wheat, and cotton usually, but occasionally fruit and sugar beets. Two-thirds of the state's farmers are found on the remaining third of the land, their farms ranging in size from five to 150 acres. Some parts of the state have never had the large farms or ranches, notably the Los Angeles lowland; in the Great Valley about three-fourths of the farms are 160 acres or less.

Of California's 9 million acres of farmland, 4 million are irrigated. In the Great Valley nearly all of the irrigation is a part of the Central Valley Reclamation Project of California. The largest dam is Shasta on the Sacramento River, planned to

> (1) irrigate one million acres of rich lands; (2) improve the navigation of two rivers; (3) reduce flood damage to highly-developed lands; (4) generate power; (5) provide a safe fresh-water supply for cities; (6) the regulation of flow of rivers for the protection of water supply and of 400,000 acres of delta lands threatened with ruin by infiltration of salt water from the Pacific.[5]

Sacramento Valley—Although this northern portion of California's Great Valley is irrigated, in common with the rest of the interior lowland, many circumstances under which agriculture is carried on here are in contrast with the north-flowing San Joaquin. The Sacramento River has a larger volume of water than the San Joaquin, while the latter valley has much greater need for water; so great is this need that a plan for reversing the flow of the San Joaquin by diverting the Sacramento has been considered. The Sacramento Valley has more rainfall, but summers are dry and the temperatures are high; pastures regularly burn out during the summer months.

The soils here are somewhat poorer than in the San Joaquin; extensive areas are unused. In the northern portion of the Sacramento Valley a livestock economy prevails; the ranch type of holding results in widely spaced farm homes. Hops are of increasing importance. Proceeding southward, orchards are increasingly important, mainly pear, peach, and prune.[6] On the reclaimed alkaline river plains north of Sacramento the Japanese grow a variety of rice for their own consumption and for export to Oriental

[5] Reclamation Handbook, Bureau of Reclamation, Dept. of the Interior, 1942, p. 3.

[6] Peveril Meigs, "Current Trends in California Orchards and Vineyards," *Economic Geography*, Vol. 17, 1941, pp. 270–278.

markets. This crop has rapidly increased to 150,000 acres, yielding about 70 bushels per acre.

The proximity to large urban markets of Sacramento, Stockton, Almeda, Oakland, and San Francisco has induced an important truck and fruit farming concentration on the rich delta plains about San Francisco Bay. This vegetable-growing section has far outgrown its immediate market and is the nation's greatest exporter of fresh and canned asparagus, beans and peas. Dairy products and poultry have become important accompaniments to vegetables and fruit.

The importance of Oriental labor to this farm economy has long been recognized locally, but the mass evacuation of these farming districts by the Japanese during World War II brought it forceably to the attention of eastern consumers of these erstwhile export commodities. This is the principal district where the system of proportioning land, labor, and capital to intensive farming has given rise to the expression "factories in the field."

San Joaquin Valley—Three times as much farm land is under irrigation in the San Joaquin Valley as in the Sacramento. Its distribution is also more continuous from north to south. It is localized for the most part by the alluvial fans which spread fan-wise from the Sierra Nevada Mountains of the east side of the valley. In the southern portion of the valley, above the headwaters of the river, these great fans almost cross the entire valley plain. The winter rain is less abundant, but the soils are better than in the Sacramento Valley. The principal limiting factor to agriculture is the extent of water resources from the San Joaquin and the tributaries from the east.

Already completed in the upper San Joaquin Valley are the Friant and the Pine Flat dams; the former is much the larger. They will irrigate fertile land lying between the King and the San Joaquin rivers centering around the city of Fresno. If the flow of the San Joaquin is reversed as planned, still greater increases in cropped land will result.

Vineyards, citrus fruit, sugar beets, and cotton occupy a large part of the cropped land. Figs, apricots, peaches, and plums are important specialties. Fresno raisins have world-wide fame. From this region comes word of a great change in the method of growing sugar beets. In 1944 more than half the beet acreage was planted with new "single" seeds, the estimated saving in labor in thinning was 3 million man-hours. If this proceeds as anticipated, the sugar beet may be grown without tariff protection and without "coolie" labor. Such labor will still be needed for the other crops, however.

In driving through this valley one is never allowed to forget that it has been reclaimed; interspersed among the green oases of intensive farming are brown remnants of winter pasture where soil or water conditions

limit the extension of irrigated cropland. The heavy snowfall in the Sierra Nevada Mountains is the principal source of water.

Los Angeles—There are a number of coastal lowlands and valleys which support agriculture. The most important of these lowlands is that of the Los Angeles Basin. This southernmost of California's agricultural districts is critically deficient in water, yet produces nearly one-third of the state's total farm products. Where water is available, virtually all of the land is in some kind of crop.

Much use of the lower Colorado River has been made to irrigate the farm lands of the Los Angeles Basin and of the Imperial Valley farther south. About 150 miles below Hoover Dam the Parker Dam has been recently completed. This dam created a reservoir known as Lake Havasu, designed to provide storage for pumping into the Colorado River Aqueduct of the Metropolitan Water District which comprises Los Angeles and twelve other cities in southern California with a population of between three and four million.

One of the outstanding diversion dams from the standpoint of services rendered is the Imperial Dam across the Colorado River about 100 miles below the Parker Dam. It diverts the water of the Colorado to the Gila Project Canal feeding southern Arizona and to the All-American Canal supplying water to Southern California.

Nearly all of the nation's lemon crop is grown here, mostly on the alluvial fans at the base of the San Bernardino and San Gabriel Mountains.[7] No orange district in the country surpasses the Los Angeles area. Peaches, wine grapes, apples, walnuts, celery, tomatoes, lima beans, dairy products and poultry are produced for the large local and the eastern markets.

The farms which average ten acres or less, command the highest prices in the United States, in part due to their excellence when watered, and in part to their high development as homes. No other farming district exhibits such an urbanized countryside. This fact is implied in the current saying that Los Angeles is the largest city of its size in the world.

But even this pleasant and prosperous countryside has its problems. The mountain streams are of little consequence. Wells are dug increasingly deeper as each farm home is erected. Distances increase as the cities reach out to remote supplies of water. The irrigation ditches common to the Salt Lake oasis are lacking in this region; nearly all of the irrigation water is pumped from underground. In order best to adapt the crops to local water and temperature conditions, there is vertical zoning within each valley. Lemons are the least hardy and therefore occupy the slopes midway be-

[7] C. M. Zierer, "The Citrus Fruit Industry of the Los Angeles Basin," *Economic Geography*, Vol. 10, 1934, pp. 53–73.

tween the valley floor and the height limit of irrigation. Walnuts and sugar beets occupy the valley floors, where cool air settles and deep-rooted crops will not tolerate the underground water. But these local problems are not the only ones which restrict the agriculture of Southern California. It is three thousand miles from eastern markets. Rival districts which specialize in subtropic fruits and vegetables have developed in the Rio Grande Valley, along the Gulf Coast, and in Florida. The vogue for frozen fruits and vegetables has been a boon to the central California growers.

Coastal Valleys—There are many other smaller though important agricultural districts in California; many of them are in the valleys of the Coast Ranges. Some of these smaller districts have almost enough rain for their crops, while others have to rely wholly upon irrigation. The four most important of these mountain valleys are just north and south of San Francisco. The more important are the Santa Clara and the Salinas valleys east and south from Monterey. The former occupies the southern portion of a long lowland extending southward from San Francisco Bay.

The Santa Clara Valley, with San Jose as its chief city, is one of the world's fruit capitals. Under pump irrigation, prunes, apricots, pears, grapes, white cherries, peaches, and English walnuts are grown for national and international markets. Although these crops dominate the valley, others are grown; plums, olives, citrus fruit, and figs have a place in the highly developed agricultural economy of the Santa Clara Valley. No wonder labor is scarce. Artificial drying of the fruit has begun to supplant natural sun drying; the major part of the crops are canned, however.[8]

Another important valley south of San Francisco is the Salinas. This longer and drier valley parallels the Santa Clara, opening directly into Monterey Bay. Like so many other districts in California it has had a great variety of nationalities living there: Spanish, Mexican, Peruvians, Basques, English, Danes, Swiss and Portuguese. They have successively sought to make a living from cattle grazing, sugar beets, head lettuce, pecans, dairying, and rubber.

From 68 cars of head lettuce in 1921 it has now become 20,000 cars with three harvests a year, huge icing plants near the fields, and a new hardy strain of lettuce. Lettuce grew at the expense of sugar beets. Evaporated milk still is produced. But the Guayule Rubber Emergency Project of Salinas, with its increase in rubber from 400 pounds to 2,200 pounds per acre within nine years, its experiment station, and the approval by Major Dwight Eisenhower in 1930 is gone.

Farther south along the coast, between Santa Barbara and Los Angeles,

[8] See J. O. M. Broek, *Santa Clara Valley*, Utrecht, 1932, and E. N. Torbert, "The Specialized Commercial Agriculture of the Northern Santa Clara Valley," *Geographical Review*, Vol. 26 (1936), pp. 247–263.

are the Oxnard Plains and the nation's center of lima bean production. Other irrigated crops include sugar beets, English walnuts, oranges and lemons. Nearby most of the United States-grown flower seeds are produced.

North of San Francisco the Russian River Valley is the principal oasis among the dry Coast Ranges. Its principal specialization is fruit. Petaluma goes in for poultry, and the Napa Valley for grapes. Most other districts are too dry to use.

Marketing—The farm products of the Pacific lowlands have two prime prerequisites for successful cooperative control of marketing: perishability and more or less of a climatic monopoly. This latter quality derives partly from the very mild winters and partly from the practice of multicropping. Most California farm products have long been marketed under the direction of cooperative organizations. Cooperative controls have extended to picking, grading, packing, and merchandising. Production controls have likewise been practiced successfully. In this manner California growers have been able to offset the great distance from their market.

Manufacturing on the Pacific Coast—For most of its history the cities of the Pacific Coast have been warehouses for eastern manufactures. With a population of about 5 per cent of the United States, it is not strange that the Coast cities stood little chance of developing manufacturing in competition with eastern manufacturers. The usual 10 per cent increase in price for factory goods sold west of the Rockies was not enough to offset the lack of iron, coal, and water of California, and the coal and iron of the Northwest. The plants which were established were narrowly specialized, many of them associated with the packing and processing of agricultural products.

Since the 1930's, however, there have been important changes made in the Pacific Coast area. Bonneville and Grand Coulee dams on the Columbia River have fundamentally changed the outlook for industry in the Northwest. Boulder and Shasta dams have had something of the same effect upon the Pacific Southwest. Newest of these is on the Sacramento River where Shasta Dam backs up water on the Sacramento, Pit, and McCloud rivers to irrigate an estimated million acres of California Valley land. Larger than Hoover, this dam ranks second only to Grand Coulee. Hoover Dam serves lower California. The dams all have direct agricultural value; Bonneville and Hoover have direct industrial value. The carrying power of the Pacific Coast region has been materially increased by this conservation measure. The wartime Pacific manufactures trained a vast army of workers; postwar Pacific Valleys and Ranges now have two new environmental conditions: abundant power facilities and a body of trained metal workers.[9]

California Manufactures—Among the well-established California in-

[9] United States population, 1900–1940, increased 73%; California increased 365%.

dustries are those based upon agriculture, fishery, and forest products: canned, frozen, preserved, and dried fruit, vegetables and nuts; canned and frozen seafood; containers of wood and paper for packing and shipment. From Hawaii comes cane sugar and from California beet sugar for large refineries. California oil fields have given rise to large refineries for the satisfaction of West Coast and Intermontane markets, and for export. When California cities could guarantee adequate industrial water supply, tire and tube manufacturing plants were erected by large Ohio and Michigan rubber companies. Doubtless partly introduced by the gigantic earth-moving jobs undertaken to occupy the hills of urban centers and to build dams, one of the nation's largest makers of earth-moving machines is a California concern. The manufacture of California cotton for tires, bags, clothing, and certain industrial uses has become an important industry. Many types of small metal manufactures have become established, particularly in the San Francisco district.

Large orders under Lend-Lease and Government orders after the United States entered World War II gave rise to enormous increase in Southern California airplane manufacture. In 1941 one concern succeeded in converting a craft manufacturing industry into a mass-production type. As a craft industry, the manufacture of a plane represents thousands of hours of painstaking labor; power consumption is low; and the value added by manufacturing is high. Tool-makers and skilled metal workers have been rare on the West Coast; opportunity for training them was exceedingly limited. War appears to have done for West Coast plane manufacture what decades of normal peacetime growth did not do.

Unlike the new Government-built plane assembly plants in the Middle West and South, the West Coast plane manufacturers have increased their manufacturing, although they are still dependent upon eastern-made motors. The 1941 value added by manufacturing in the Pacific states was 8 per cent of the nation's total; in 1944 it was 13 per cent.

Government money has expanded shipyards in California to an even greater extent than in the Northwest. Two hundred thousand wage earners were employed in Pacific shipyards, with California employing about three times as many as the Northwest. Iron and steel came from Baltimore, Birmingham, and the new Fontana and Geneva steel plants. With the perfection of prefabricated ship construction, hundreds of interior plants participated in the ship building industry; for Denver, Provo, and Pueblo this was a new development.

Airplane manufacture calls for a great deal of subcontracting; to a fairly large degree ships do likewise; these industries persist as large concerns which in turn will promote the establishment of small metals manufactures.

The degree to which the Pacific Coast will become a balanced manu-

facturing region remains to be seen. Certain it is that there will be no equilibrium among agriculture, commerce, mining, and manufacturing such as now obtains in the Middle West. At the rate that population and industrial wage jobs are increasing in these states today, it may well be that this region, and California especially, will soon end its role as a warehouse for eastern manufacturers.

Industrial Districts—The industrial population of the Pacific Coast increased by leaps and bounds during World War II. Factory wage earners moved into these districts at the rate of 65,000 a month in 1942. Concentration of industry is very much more marked than in the eastern states: three-fourths of all wage earners in manufacturing are in the five principal cities. San Francisco has a population of 800,000; Los Angeles has 2,000,000; Seattle 500,000; San Diego has 415,000; Portland 350,000; and Tacoma 150,000.

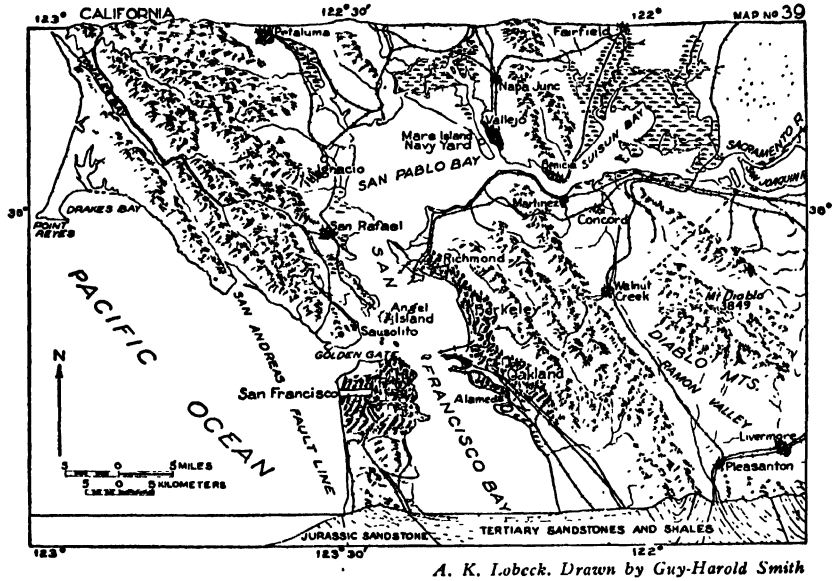
The immediate hinterlands of the Pacific port cities are relatively small, and access to the high dry plateau country of the interior is difficult. The Pacific overseas markets served by these ports have increased in importance during the past forty years; in fact, only Canada shows the same doubling of trade with the United States. Recently the trade with India and Australia has increased greatly, while Japanese and Chinese trade waned. It seems likely that the trade with the eastern Pacific will increase in the future, with the realignment of commercial ties in that area.

San Francisco—San Francisco has been the long-time industrial city of the Pacific Coast. The disadvantages of the immediate site have been compensated by the advantages of its situation with respect to harbor, the rest of the Pacific Coast, and the Orient. Commercial gateways are rare on this coast and their combined importance is much less than that of the Atlantic and the Gulf port cities. San Francisco, in common with Seattle and Los Angeles, is a terminal for a number of transcontinental railroads and a terminus for transpacific steamship lines.

Located at the northern tip of a long, hilly, peninsula the city is accessible by rail only from the south. The splendid protected deep-water harbor separates San Francisco from the mainland; this bay is so large that it was not bridged until 1937. A great deal of handling and transshipping characterizes the trade of this port city. As one of two excellent harbors on the Pacific Coast, San Francisco has had an important commercial career.

San Francisco exports a limited range of products from the Great California Valley, her immediate hinterland. Leading exports are sugar, canned sea food, dried fruit, fresh fruit and vegetables, rice, cotton, wheat, animal products, lumber, oil, and salts. Imports include Hawaiian sugar, pineapples, sea food, and a wide range of eastern manufactured products. With

the impetus of gold and oil discoveries, San Francisco became a manufacturer of narrowly specialized lines. Ships, refining industries, food preparation, wood products have become important, but no textiles, machinery, glass, agricultural implements, automobiles, or chemicals are produced. More recently the shipyard expansion has brought about the establishment of machine shops and small ship's outfitters.[10]



A. K. Lobeck. Drawn by Guy-Harold Smith

FIG. 127.—THE SAN FRANCISCO AREA

Los Angeles—With nearly 3½ million people in the Los Angeles district, this city in Southern California is one of America's major industrial districts today. Its aircraft employment during World War II exceeded Detroit's automobile manufacturing employment. The county assembles more automobiles than any other county in the United States except Wayne (Detroit). It makes almost as many rubber tires as the home of the industry, Akron. It is third in food processing. It is fourth in clothing manufacture. It made almost half of the steel it fabricated. Oil refining, and the manufacture of countless small items are important. One of the largest manufactures of earth-moving machinery is located here.

The war brought about great increases in most lines and introduced such new ones as magnesium, aluminum, and steel manufacture. A poll of the new arrivals to California showed nearly half of them planned to stay

[10] San Francisco is losing commerce to Oakland and Richmond across the Bay. This group handles about one-fifth of all West Coast tonnage.

there after the war was over. There is hope that the manufacture of steel sheets for refrigerator, stove and automobile body makers will provide a new backbone for West Coast markets for factory goods. Its days as a warehouse for eastern manufacturers may be nearing an end.

Pacific Northwest-Relief—As with the Pacific Southwest, the Pacific Northwest lies between the interior dry basins and the Pacific Ocean. Although variously defined by those who write of the Northwest, the Cas-

Brown Brothers

FIG. 128.—A LOS ANGELES INDUSTRIAL PLANT

Factories are supplanting warehouses for eastern manufactures on the Pacific Coast

cade Mountains form the logical eastern boundary for a region whose physical qualities and human use combine to make it a geographic region.[11] Fig. 123 shows two large lowlands more or less inclosed by the Coast Range and the Cascade Mountains. The Olympic Mountains at the northern end of the Coast Range are set apart by their generally higher elevations and individual mountain character. These ranges are bordered on the west by a very narrow coastal plain, at most three or four miles wide except in central western Washington where it widens to thirty miles. The ranges are breached by few streams, the more important are the Columbia, Chehalis, Rogue, Umpqua, and Klamath.

[11] Otis W. Freeman and Howard H. Martin, *The Pacific Northwest*, New York, 1942, has been drawn upon freely

South of the Oregon Coast Range, and connecting them with the Cascades, are the Calapooya Mountains of Oregon; immediately south of them are the Klamath Mountains of northern California. The Cascades of Washington and Oregon are high mountains but have a fairly uniform plateau surface interrupted by volcanic cones. They rise in a rather gentle slope from the Puget Sound-Willamette lowlands. The northern portion of this lowland is drowned by Puget Sound. The middle and the southern parts of the lowland are better land, with rare occurrences of the glacial

Guy-Harold Smith

FIG. 129.—INDIANS FISHING ALONG THE COAST OF NORTHERN CALIFORNIA

gravels which render many parts of the northern portion unfit for agriculture. Throughout the lowland there are numerous areas of undrained land, giving an over-all impression of a pioneer fringe.

There are few good harbors on the narrow Pacific coastal plain; streams which cross it are able neither to open up a considerable hinterland nor to offer promising harbors. Unlike the north Atlantic coastal plains, this attenuated plain has but one important drowned river, the Columbia. Less important bays are found at Gray's Harbor, Washington, Tillamook and Coos in Oregon.

Climate—Due to the break in the Coast Range which permits marine influence to penetrate much of the interior lowland, a large part of the Pacific Northwest has a marine west coast type of climate. For about nine months of the year, the marine influence gives rise to overcast skies and moisture-laden winds. In summer these winds are heated by the land, thus giving relatively dry summers and winter rainfall. This sequence is com-

mon to the coastal lowlands as well as to the interior valleys. On the higher elevations along the Coast and the Olympic ranges rainfall varies from 50 to 180 inches a year, while on the lowlands of Oregon it averages from 17 to 35 inches. On the highest eastern mountains much of the precipitation is in the form of snow; in many places it remains on the ground throughout most of the summer.

Throughout the Pacific Northwest, differences in elevation and in distance from the Pacific cause important variations in climate. The difference between the windward and the leeward sides of mountains profoundly affects the climate. Differences in latitude along the Pacific margin have the minimum effect upon climate. Temperatures west of the Cascades, except in high altitudes, are moderate. Freezing weather regularly occurs, however, and occasional summer temperatures of 95 degrees are recorded. In the Puget Sound-Willamette lowland the growing season averages seven months; along the coastal lowland it is even longer. The presence of warm and cool air masses gives rise to cloudy days in winter and to regular and heavy fogs along the coast. For ocean shipping and airways over many of the lowlands, the fogs are an important hazard.

Forest Industries—The effect of the mountain and valley terrain upon climate has been noted; its effect upon vegetation is obvious in Fig. 42. Because the effect of these environmental conditions upon vegetation is greater from east to west than from north to south, vegetation zones are similarly oriented. On the whole, natural conditions have favored forest growth in the Pacific Northwest above all other regions of the United States. Three-fifths of the total area of Washington and Oregon west of the high Cascades is classed as forest land, only one-tenth of which is noncommercial in character. The settlement and subsequent history of these states bear testimony to the dominance of forests in their economy. With more than half of the old-growth saw timber remaining in the United States, these two states probably receive more national attention than any previous timber storehouse.

Westward Migration of Lumbering—One hundred years after New England white pine initiated the commercial lumbering industry on this continent, the lumberjack reached the Pacific slopes. During this frenzied hundred years many important changes had come to the business of felling trees and moving them to the sawmill. Had it not been for these changes in the industry, Pacific forests could not have become available at the time. Forests of the Northwest were mostly in mountainous country; the trees were enormous, both as to height and bulk, and in much of the forested region there was no snow and ice to simplify moving out the logs. There was only a small local market for the timber and no alternative use possible for the land. The eastern lumberjack from Minnesota who worked

the Pacific forests found his day relatively short because machines designed to save labor at every stage in the lumbering process were soon on the scene. The part-time worker was no more; living conditions were entirely different; the camps took on the appearance of permanent towns, with women, children and schools; instead of horses and their French Canadian drivers, there were tractors and trucks. In the Pacific Northwest, lumbering became a large scale industry.

U.S. Forest Service

FIG. 130.—PONDEROSA PINE STAND, DESCHUTES NATIONAL FOREST, OREGON

Lumbering in the Northwest—In Washington, the forests consist largely of Douglas fir, ponderosa pine, and on the higher levels, spruce and fir. Oregon has the same trees, and in addition Port Orford cedar, sugar pine, and redwood in the southern portion of the state. No finer timber exists on the continent. It is the last great forest. It contains such notable specimens as the world's tallest trees and oldest living thing known (three thousand years).

Lumbering began in Washington because a great deal of the best timber there was within fifty miles of tidewater, and accessibility to ocean ports was necessary, inasmuch as most of the lumber was cut for export.

The Puget Sound Lowland was the first important center, with half a dozen towns springing up on the good deep-water harbors which mark its central portion. At the same time this timber was being cut, the older South Atlantic and Gulf states were still cutting great quantities of yellow pine. At no time in its history has the Pacific Northwest been the only major logging region in the United States.

Oregon developed more slowly than Washington. The need was less pressing and the timber for the most part was less accessible to tide-water ports. In both states the mills were close to the timber supply. Most of the area of both states is east of the Cascades, but the timber and the population have been localized on the west side. Washington has remained the forest industry state; two-thirds of the wage earners are in this industry.

So far as Oregon's industrial and commercial economy is concerned, forest products dominate in all parts except the grasslands and high plateaus of the southeastern section of the state. So important is timber and its products that there is scarcely a community, in western Oregon at least, whose prosperity does not depend upon it.[12]

The lumber industry plays the role of principal stimulant for Oregon's manufacturing. Equipment used in cutting, transporting, processing and shipping forest products constitute a large part of the state's relatively unimportant manufacturing.

Oregon's commerce is also largely concerned with wood; the leading exports are in order: lumber, flour, wheat, paper, and canned goods (including fish); with logs, pulpwood, and plywood in the next category of exports.[13] Of all wood cut in Washington and Oregon, 88 per cent is for lumber, 7 per cent for pulp and paper, and 5 per cent for plywood. Coos Bay now leads in lumber export.

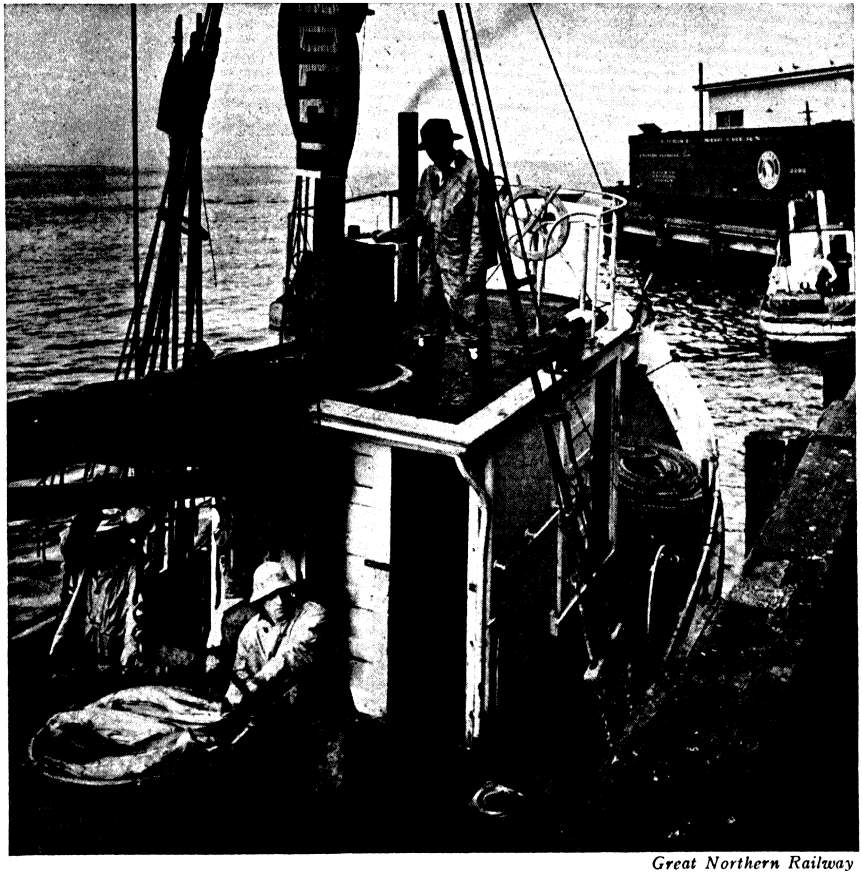
Minerals—The Pacific Northwest is not one of the important mineral centers of the United States, nor is it likely to be. A good grade of bituminous coal is mined on the Puget Lowland at Bellingham and at several minor centers in the interior. Semianthracite is mined in small quantities on the west side of the Cascades. Oregon has bituminous coal mined at the Coos Bay field in the southwestern part of the state.

Magnesium bearing minerals have been mined in increasing quantities near Chewelah, Washington; these deposits are believed to be the world's largest. World War II has given impetus to the use of magnesium in metals manufactures. Local water power and the very large deposits of the ore promise future industry.

[12] Oregon's income (1940) from forest products, $117 million
agricultural products 50 "
minerals 4½ "
fish 3 "

[13] "Oregon," American Guide Series, 1940, p. 63.

Steel mills at Seattle and Vancouver, Washington, use local iron ore; the latter is a war-built plant. Chromium in the Klamath Mountains gives promise. Manganese is found in southern Oregon. Tungsten is mined in Stevens County, Washington. Gold and silver are mined in



Great Northern Railway

FIG. 131.—UNLOADING BLACK COD AT SEATTLE

both Washington and Oregon, but the production is not great. Copper is mined in southern Oregon and northern Washington in relatively small amounts.

Fishing Industry—Although fishing and the canning of fish products constitute an important industry in the Northwest, it no longer dominates the industry of the Pacific Coast. In 1945 Alaskan and British Columbian waters and canneries surpassed those of Washington and Oregon. The importance of fishing along this Northwest coast began long ago with the sal-

mon industry. Nearly every harbor on the Northwest coast has a fishing fleet, but Seattle, halibut center of the world, has more fishing craft than any other port, and the bulk of the fishery products ultimately clear through this port. Fishing craft, of many kinds, repair establishments, and huge warehouses for storage are concentrated about Salmon Bay terminals. Canneries, icing plants, warehouses, and reduction works constitute the landscape of an important fishing port. Fifteen thousand fishermen and 1,300 cannery employees are reported to be engaged in this industry in Washington and Oregon alone.

Salmon have been overwhelmingly the major part of the catch.[14] In recent years the catch has been somewhat more varied; halibut and oysters are relatively minor, though increasingly important. The spawning habits of the salmon make them easy to catch in prime condition on their way to the fresh-water spawning grounds. Each spring and summer salmon move up the many streams emptying into the north Pacific Ocean for their only spawning, in the lake or river in which they were born four to nine years before, depending upon the variety of salmon. The start of this tremendous migration varies with the distance the fish have to go. The parents soon die after the final act of reproduction. The length of stay in fresh water varies from a few months to two years or more; likewise the period of life in the Pacific varies from two to six years depending upon the kind of salmon. In size and color the salmon will vary; the red-meated salmon has been the best seller, but pink and white meated varieties have surpassed the more expensive red within the past twenty years.

The construction of Bonneville and Grand Coulee dams cut off 800 miles of Columbia River and 100,000 square miles of watershed as spawning grounds for these famed salmon. Proposed additional dams on the Snake River: Dry Gulch, Rice Bar, Steamboat Bend; and on the Columbia or its tributaries: Umatilla Rapids, Dalles, Priest Rapids, Rock Island, Rocky Beach, Chelan, and Foster Creek, would seriously reduce the spawning grounds remaining.

The only streams left are those on the east side of the Cascades, the Snake, and the coastal rivers. Salmon ladders have been at least partially successful at Bonneville Dam; they are impossible at Grand Coulee. This dam has raised the temperature of the water so high that salmon cannot live in it.[15]

[14] O. W. Freeman, "Salmon Industry of the Pacific Coast," *Economic Geography*, Vol. 11 (1935), pp. 109–29.

[15] Bonneville Power Administration released the following data:

YEAR	CHINOOK	BLUEBACK	SILVER	STEELHEAD TROUT
1938	271,799	75,000	15,185	107,003
1939	286,216	73,382	14,381	121,922
1940	391,595	148,808	18,822	185,174

Recent Developments—World War II interrupted Japanese encroachments upon salmon fishing in the Pacific Northwest and in Alaska, tuna fishing off California and Mexican waters, and the canning industry based upon these and other sea food. Japanese success in these ventures was apparent to any observer of the grocer's shelves in the United States. With increased interest in Pacific waters and the memory of the unemployment in the United States during the 1930's, it is not unthinkable that some measures will be taken to end the sometimes legal but unethical practices calculated to scuttle the United States Pacific fisheries. Although fishing in Oregon is not so important as in Washington, at several places it is a major industry. On the Columbia River fishing is important at Astoria, Warrenton, and The Dalles. On the Pacific Coast the principal fishing ports are Tillamook, Newport, Reedsport, and the towns on Coos Bay. Salmon is the leading catch, with halibut, pilchards, steelhead trout, shad and oysters important in that order. Pilchards are processed for oil and fertilizer; it is the most recent of developments in Oregon fishing.

The halibut industry reached its peak catch in Pacific waters in 1915, but it has far outdistanced its north Atlantic competitor. It employs one-tenth as many wage earners as the salmon industry, markets half of its catch as fresh fish and freezes the rest, ranges hundreds of miles from port for fishing, and uses the modern equivalent of a single line instead of the quantity methods of the salmon industry. Seattle is the principal halibut port, despite the northward migration of the major catch. In recent years albacore (tuna) fishing has grown rapidly off the Washington-Oregon Coast, reaching 11,000,000 pounds in 1940.

Agricultural Industries—Only the northwestern states on the Pacific Coast developed as a climax to the westward movement of people across the continent. Settlement in the Pacific Southwest began on the coast and moved eastward. The conditions under which agriculture was established in the Northwest were not greatly different from those of the Old Northwest Territory a century earlier, from which many of them had migrated. For their respective times, both were tardily settled, although unlike the Ohio Country, the Oregon Country did not attain a population of two million within the first generation of its occupancy. After nearly a century it now barely approaches that figure. Settlement spread from Portland southward to the Willamette Valley; later it went north to the Cowlitz Valley and on to the Puget Sound Lowland, but it has remained primarily

YEAR	CHINOOK	BLUEBACK	SILVER	STEELHEAD TROUT
1941	461,713	65,741	17,011	118,087
1942	403,938	55,464	12,041	151,346
1943	303,123	39,845	2,517	92,131
1944	238,191	15,071	4,073	93,047

Quoted by R. L. Neuberger, *Harper's*, February 1945, pp. 229–36.

an agricultural country. Today 80 per cent of the farmers live on these three lowland areas.

Four years after the discovery of gold in California, Seattle was established. During the early years of the export of farm products from the Northwest to California, they brought collector's prices in the markets of dry California. The Northwest, after a time, caught up with this California demand for the staples of life; lumber soon supplanted food products as the prime export from the Puget Lowland. California's agriculture became more nearly self-sufficient after this boom period of imports.

Agricultural Districts—Most of Washington's farm land lies east of the Cascades in the great rolling wheat lands of the Palouse Country, but two-thirds of the farms are in the lowland bordering Puget Sound. Only about one-seventh of all farm land in Washington and Oregon is irrigated. The region appears to have more cut-over land than plowland; a great deal of the area is unused; swamps, tidal flats, cutover land with the stumps remaining, and large sections of obviously poor soil are prominent in the landscape of the northern portion of the Puget Sound Lowland.

White River Valley—The heart of western Washington is the White River Valley, part of a J-shaped system of valleys, with Seattle at the end of the vertical completed by the Duwamish Valley, Sumner at the turn, and Tacoma at the end of the hook which is made by the fertile valley of the Puyallup. The floor of the White River Valley is a plain of black, alluvial soil relatively free from the gravel common to much of the lowland of western Washington. The hills on either side are abrupt, have poor soil, and are partly timbered.

The White River Valley and adjacent lowlands have localized the urban population of western Washington.[16] City markets and canning plants have enabled the farmers of these lowlands to develop an agriculture based on dairying, poultry, vegetables, cranberries, and plums; small fruits and berries ripen all summer. In midsummer, when work in the cropped land slackens, the sour cherry belt along the hills of the valley sides brings in migratory labor from as far east as the Lakes states and as far south as California. Local authorities assert that there are no "grapes of wrath" harvested in Washington's migratory labor camps. Seventy years ago the lowland was a series of pioneer clearings.

Puyallup Valley—One of the problems of the White and Puyallup Valley farmers has been the role of the Japanese in land ownership and plant management; 10 per cent of the population controlled 90 per cent of the farms. The nature of the urban market has accounted for the type of

[16] Seattle 500,000, Tacoma 150,000, Everett 40,000, Bellingham 40,000, and Olympia 15,000.

crops grown; the need for a great deal of cheap hand labor is obvious. The removal of the Japanese from Pacific valleys during World War II put this and other fruit and vegetable districts in the position of being so shorthanded that crops were not all harvested. Crops here are similar to the White River district.

Willamette Valley—The Willamette Valley is the best of the three districts making up the lowlands of the Pacific Northwest. This valley contains about 55 per cent of the farms in the entire state of Oregon. Agriculture here is highly diversified, with general farming predominant,

Guy-Harold Smith

FIG. 132.—HOP FIELD NEAR CORVALLIS, IN THE WILLAMETTE VALLEY, OREGON

usually centering around dairying or farm sheep, with a good deal of cash grain and legume-seed production. Many specialized fruit farms produce prunes, cherries, pears, and apples. Truck farms are primarily concerned with onions, celery, peas, beans, and tomatoes; this is one of the heaviest producers of strawberries in the United States.

The Willamette Valley's farming calls for thousands of transient harvest hands each summer.[17] Near Athena, 22,000 acres of green peas need thousands of pickers; Salem's sweet cherries need 10,000 extra hands; the harvest of the entire nation's filbert crop, walnuts by the thousands of tons, four million bushels of pears near Medford in the Rogue Valley, sugar

[17] See O. W. Freeman, "Hop Industry of the Pacific Coast States," *Economic Geography*, Vol. 12 (1936), pp. 155–63.

beets at Nysea, and hops centering about Independence use 25,000 extra pickers. The voluntary cooperative labor of the Corn Belt would be no solution for the labor shortage of the Pacific Coast. The increase in manufacturing industries since World War II has aggravated this shortage.

Other Districts—Lying between Puget Sound Lowland and the Willamette Valley is some hilly country bordering the Columbia and Cowlitz rivers. Although it is not a good agricultural region, the Portland market has induced some dairying, poultry, and vegetable gardens. Most of the Portland market is supplied by farms farther south in the Willamette Valley.

Just south of the Columbia there is a country of rolling hills which lies between the Cascades and the Blue Mountains. It is situated in the great Columbia lava flow. The climate is hot and dry in summer, moderately cold in winter. Dry farming (wheat) predominates, with a few irrigated districts. The uncultivated sections support large herds of sheep and cattle.

In the region west of the Coast Range there are districts in which specialized dairy farming for cheese production and those in which poultry farming for eggs are increasingly important. Farther south in Oregon, in the valleys of the Umpqua and the Rogue rivers, specialized fruit and vegetable farming is carried on with general farming. In the Umpqua area: prunes, peas, cherries, apples and small fruit; in the Rogue pears are most important.

The Northwest's Major Industries—In 1945 the number of industrial wage earners exceeded that of any other livelihood except retailing. In both states the processing of wood, petroleum, fruit, vegetables, sugar, cotton, and sea food gives rise to a low value added by the manufacturing process. Prior to World War II, in the Northwest, 60 per cent of the value added was from simple processing of local raw materials, almost half of it forest products; only 40 per cent of the value added was by manufactures of the more complicated types.

Wood—The manufacture of pulp and paper is an important phase of the wood products industry of the Northwest, especially in Washington. Only bleached sulphite pulp is exported in quantity to eastern seaboard cities; some of this has been exported to Japan. Furniture manufacture is increasing; the two principal centers are Portland and Tacoma. Sawmills are widely scattered in the Puget-Willamette Lowland; one important specialized product being wooden packing cases for the wide variety of canned foods exported from this area.

Refining—Another important manufacturing industry is the refining

of aluminum in a group of new plants established at Vancouver, in the Puget-Willamette district in order to utilize the newly created resource of electric power.

In 1940 not a pound of aluminum was made west of the Mississippi River. By 1944 about half of the nation's output (two and a half million pounds) was made in the Pacific Northwest. Alumina, six days out of East St. Louis mills (bauxite ore is from enormous deposits in Dutch Guiana), is sucked out of cars by vacuum tubes and given an electrolized bath in

Boeing Aircraft Co.

FIG. 139. BOEING AIRCRAFT, SEATTLE

The aircraft industry was one of three which contributed most to the amazing industrial development of the West Coast

cryolite from Greenland. Spokane, Tacoma and Vancouver, Washington, and Portland have enormous new mills.[18] The vast power requirements of these new mills are met by turbines at Bonneville Dam and at Grand Coulee Dam. Despite some 1,600 miles of new transmission lines, this is reported to be the cheapest current in the United States.

In process of development is a new method of making aluminum from the large local (Castle Rock) alunite clays, only fifteen miles from the new aluminum plant at Longview, Washington. The same relationship occurs at Spokane's new plant. Despite early criticism, these giant dams have outlived their early characterization as "dams of doubt," even if the war-born refining industries do not progress beyond the present experimental stage. Not many types of industry are attracted by cheap power alone; minerals

[18] Between 1940 and 1945, Portland-Vancouver population increased from 501,300 to 660,600 or 32 per cent.

and wood products are the only two thus far to come to the Pacific Northwest.

Airplanes—Seattle began the manufacture of airplanes during World War I. Boeing made them in his native city, near the supply of suitable spruce for the frames; engines were imported from eastern manufacturers. He specialized in transports and bombing planes, and was forced to depend upon exports to countries of western Europe for his market. Despite exports, this company had to give up plane manufacture at one period and turn temporarily to furniture. World War II gave this industry a tremendous boost. Twelve thousand workers were employed in this one plant. Two wars have given the airplane industry the stimulus which has made it a major industry.

Ships—Another war industry is shipbuilding. Both World Wars have caused a boom in the shipyards of Portland, Seattle, Vancouver, Bremerton, and Tacoma. Shipyards, airplane capacity, and aluminum refining are responsible for a great proportion of the government funds spent in Washington and Oregon in the prosecution of the War effort. This was the biggest market for steel plate from the new mills at Provo, Utah.

Other Industries—Salem manufactures flax fiber into twine, combining Belgian imported fiber with local flax to raise the quality of the product. Seattle, Portland, and Eugene manufacture wool into blankets, knit goods, and suitings.[19] Sugar beets are refined at Nysea. Each of the cities' mills make flour from eastern Washington-Oregon wheat; Seattle, Portland, and Tacoma are the leading centers.

Cities—Most of the cities of the Pacific Northwest are situated on Puget Sound; the principal exception is Portland on the Columbia River. Seattle, Tacoma, Port Angeles, Bellingham, and Everett are commercial cities through which moves a heavy tonnage; Portland has all to itself the trade of the Columbia River basin; the other eight ports are small and specialized.

TABLE 16

TONNAGE OF PACIFIC NORTHWEST PORTS, 1937
(Cargo Tons of 2,240 Pounds)

CITY	IMPORTS	EXPORTS
Tacoma	324,605	280,326
Seattle	326,387	278,025
Portland	137,529	428,526
Port Angeles	19,128	210,291
Bellingham	12,795	65,211
Everett	9,670	86,188
Total	1,088,434	1,844,164

[19] Oregon boasts of leading every state west of the Atlantic seaboard in the manufacture of woolen worsted textiles and wool, worsted and linen yarn. Her western valleys support goats yielding half of all U.S. mohair wool.

Domestic trade is by far the larger part of the commerce of these port cities. As a group, they are primarily export in their function. The greatest export is wood in some form; Japan has been the largest importer of wood products. Shingles, wood pulp, and newsprint from Canada has been the most important import through these cities. Historically, raw silk from Japan has been second ranking item (value); diversion of this trade to New York after World War I together with its cessation just before World War II has long since curtailed Seattle's imports; postwar developments have not restored this trade item to major importance.

Other leading exports include flour and wheat, fish and fish products, fruits and vegetables, refined copper, refined aluminum, airplanes, ships, and some machinery.[20] During the period of Japan's rearmament, the exports of scrap iron, machinery, and stock-piling rose rapidly. Lend-Lease export and World War II kept several of these items in the fore by shipments to Australia, India, and China as well as to American military forces in several parts of the Pacific.

Seattle has always dominated the trade with Alaska. In recent years the establishment of the Matanuska colony and the construction of military bases at several places have occasioned a boom in Alaskan commerce. Japan has long been the principal importer through these cities, ranging from a third to a fourth of all exports. Canada and Great Britain virtually tied for second position; Russia has recently been fourth, and China and the Philippines tied for fifth. These port cities of the Northwest are two or three days nearer the Orient than other American ports; it is not likely that the upward trend of commerce with the Pacific borderlands will be permanently disrupted. Reconstruction of these countries, economic alignment with the United States as the dominant world power and the imperative need for the United States to export with the expanded merchant marine, promise increasing trade through cities of the Pacific Coast.

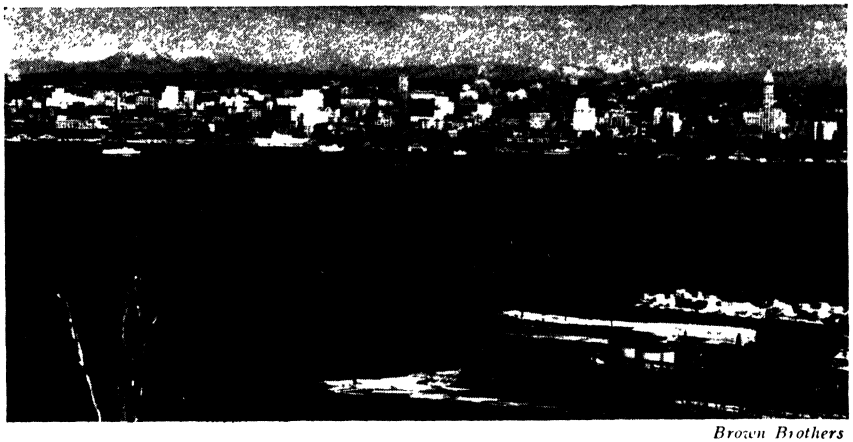
As a port city, Seattle could develop no faster than its hinterland. The Puget Sound Lowland has developed as a forest, fishing, and mixed farming section, with lumber and fish as important exports. Farther north, the Fraser River Valley is likewise a lumbering region. East of the Cascades, the interior plateaus, the Northern Rockies, and the northern Great Plains are all exporters of a few specialties, principally wheat, copper, and livestock. When the irrigable land in eastern Washington supports a denser farm population, the variety and extent of Seattle's commerce should increase.

The industrial district of Seattle lies along the Duwamish flats south of

[20] Oddly enough flour is an important export from Seattle. The reason for this lies in the fact that Pacific liners carry it to the Oriental markets; most of this wheat never enters the great grain trade of the Atlantic.

the city, around Lake Union, and at Ballard, a suburb on Salmon Bay. Above these industrial and commercial lowlands the city rises on its hills in a series of more or less discontinuous districts. Embayment and hills have given Seattle something of the appearance of San Francisco. Residents assert that Seattle has leveled more hills than any other United States city. Elevations vary from 12 to 500 feet.

The nature of manufacturing is not such as to bring about much interplant dependence. There is little primary metal production and the integration which frequently comes from metals manufacture. Wood, fish,



Brown Brothers

FIG. 131.—SEATTLE HARBOR

One of the few good harbors the United States has on the active Pacific Coast

and refining industries are not conducive to this type of industrial development. What hydroelectricity will do to increase the city's industries remains to be seen. Airplane manufacture was the largest employer in the city, with shipbuilding next in importance.

Portland, a hundred miles from the Pacific, is connected by a channel of sufficient depth to accommodate ocean shipping. Its hinterland is of far greater agricultural importance than that of Seattle or any of the Puget Sound cities. On the other hand the fishing industry is primarily related to the northern ports.

Portland's location on the Columbia at the point where the Willamette River enters, gives it the best corridor to the mineral and farming districts in the Northern Rockies. The Union Pacific Railroad has made this corridor a busy one.

The sources of electric energy have been utilized by new industries during the Second World War; the largest employers were shipyards at Port-

land and at Vancouver across the river. The chief factory products are flour and cereals, lumber and millwork, canned preserved fruits and vegetables, woolen goods, meats, butter and cheese, and foundry products.

What the future holds for these cities of the Pacific Northwest must be conjecture. Until World War II the prospects were primarily colonial type commerce, but a great deal of it. No other region in the United States has had so much public money put into the development of water resources. Whether the industries attracted to this cheap power will remain in production will depend upon several factors, some of which are national issues. One of them is the future status of the United States merchant fleet. Another is the position of this country in the economic structure of the Pacific nations. Another is the attitude taken toward the rise of manufacturing on the Pacific Coast by large eastern concerns and by the Government.

As a market-generating region, the Northwest does not compare with the Southwest, but as a site for power-hungry industries it may be in a class by itself. Moderately fertile soils, a few resources of very great extent, mild but rainy winters, one of the two most accessible situations on the entire Pacific Coast of the continent, these factors in the hands of the relatively sparse population of Washington and Oregon have produced handsomely. With a relatively great share of manufacturing activity brought about by the war, the Northwest may well be facing greater industrial payrolls in the postwar years.

PART III

MAJOR GEOGRAPHIC REGIONS OF CANADA, ALASKA, HAWAII, NEWFOUNDLAND, AND GREENLAND

XVIII

CANADA

The Approach is National—The most important factor in the development of the Dominion of Canada is the desire and intention of becoming a nation; the approach to the economic geography of Canada is therefore national. Within this major frame of reference the economic subdivisions are used to the extent that the national economy permits. It is sometimes asserted that Canadians are endeavoring to establish a nation in defiance of the geographic circumstances in which they live. Boundary-makers have been accused of plying their trade without concern for the solvency of the sections they create.

The intent of the respective nations is paramount in all instances where the international boundary cuts across a region of similar natural endowments. The impact of this friendly boundary between the United States and Canada has been and remains a fundamental factor. Canada's most valuable timber, most convenient waterways, and warm and fertile soils are near this border. The major concentration of economic life in the United States is likewise near the border. But everywhere this border marks a fundamental difference between its two sides. Even in the spring wheat region the boundary is responsible for the greatest of all differences, a market for wheat. Similarity of physical conditions are permissive in their influence; the compelling factor is the intention of the people occupying the land.

Canada is Continental—North of the United States lies a great land stretching from the Atlantic to the Pacific, and from the Arctic to the latitude of Chicago. Canada is continental. It embraces the qualities we associate with continentality: great distances, varied topography, varied climates and resources. But Canada is also twelve million people imbued with the desire to erect a nation. Everything Canada has done has been done under the conditions imposed by a population numerically inadequate for the task of appropriating and developing such a large and varied area. The great contrasts with the United States in the degree of land utilization are attributable largely to the sparse population and to a niggardly agricultural endowment. In neither a physical nor an economic sense can the Canadian–United States boundary be said to divide the continent into symmetrical halves. The attempts to establish Canada as economically self-contained as its southern neighbor have met with some frustration, both physical and economic.

Its Situation—Although Canada lies in much the same latitude as Europe, its situation with respect to the Atlantic and Pacific oceans is one of frustration. Its Atlantic margin trends at right angles to that of the United States and the Great Circle route to Europe. North-flowing rivers debouch into the Arctic and North Atlantic, thus limiting their usefulness at any season. Along the eastern periphery flows the cold Labrador Current, which appreciably impairs the usefulness of Maritime Canada. Along the Pacific margin the Alaskan boundary reaches a long finger southward, thus halving the Canadian contact with the Pacific. The location of this continental margin with respect to the lands bordering the Pacific Ocean is one of increasing and absorbing interest. A direct route from California port cities to Tokyo parallels the Pacific Coast to the Aleutian Islands of Alaska.

Complements United States Regions—Instead of accessibility of the warm Gulf of Mexico and the Mississippi River, Canada has the inhospitable Hudson Bay and the Mackenzie River. With respect to the Great Lakes, Canada is less fortunately situated than her southern neighbor. A glance at the map will reveal the Great Lakes dipping deeply into the prevailing paths of inland commerce of the United States, but the attenuated portion of Canada's commercial net which hugs the northern margin of the Great Lakes is relatively minor. As local trade routes, the Lakes have become predominantly the creature of the country south of the border; as links in a system of interregional trade routes, they have readily become incorporated into the domestic commerce of both nations. The eastern and western plains of Canada are connected by major railway lines which span the rock and water barrier of the Laurentian Upland. A degree of national unity is achieved in spite of this broad barrier.

The great landform provinces of the United States are in most instances common to Canada, although in a different pattern. The great bulk of the Appalachian Highlands lies south of the border; the Canadian section has neither the general accessibility nor the well-defined subdivisions. The St. Lawrence River permits ocean vessels to pass through to the interior, but this is the only corridor through the barrier. The two nations jointly share in the great Central Lowlands, the heart of a continent. But whereas the drainage of the Appalachian Highlands and the embayments of the Atlantic Coast focus trade routes upon the Central Lowlands in the United States, in Canada the great Laurentian Upland thrusts its rock and water surface to and across the international boundary. Settlements on the lowland of the St. Lawrence River and the peninsular southern portion of Ontario were thus effectively separated from the plains of the interior. The Laurentian Upland pinches the western plains to a relatively narrow corridor bordering on the Arctic Ocean. The wide expanse of

Rocky Mountain, Intermontane basins, Cascade, and Coast Ranges are compressed in Canada into a relatively compact province of high mountains and intervening valleys, with no easy corridor through the barrier and very few passes of any kind.

Canada's Agriculture

To the extent that Canada shares the principal crop-growing regions of the United States, the conditions under which these crops are grown are similar; natural factors governing the production of farm crops do not change at the international border. The economic and political factors under which crops are produced do change abruptly at this border. There is therefore a continuity in the major Rural Land-Use Regions, but the Geographic Regions reflect the nationalism of the international border.

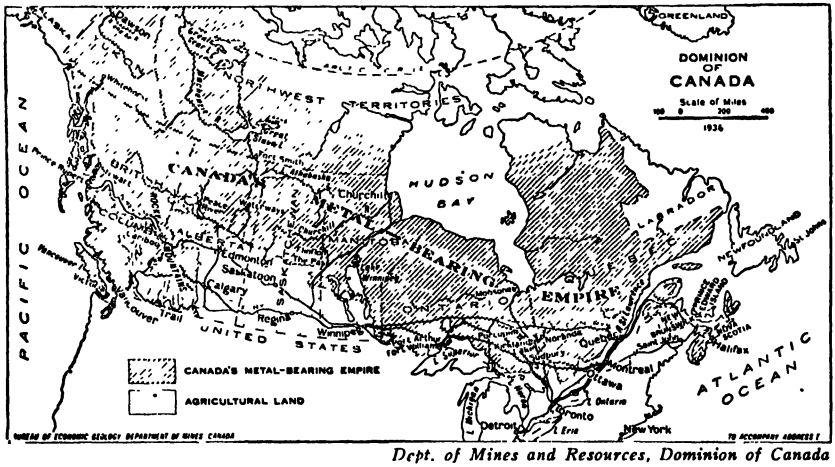
For the most part, the agricultural regionalism of Canada is in contrast with that of the United States, so far as the over-all pattern is concerned. Whereas the great Central Lowlands of the United States support a variety of crop-specialty regions, there is no counterpart in Canada. The differences in climate within Canada are not permitted to be reflected in the agriculture, chiefly because the optimum climatic conditions for crops are so seldom encountered. Then too the rock and water surface of the Laurentian Upland is a most effective limiting factor in the development of any kind of agriculture throughout much of the heart of the Dominion.

In Chapter II there was some discussion of the Canadian portion of Natural Land Use Regions shared by the two nations. It remains for us now to indicate the conditions under which Canadian agriculture has developed its characteristic pattern. Canada too had a westward movement, but it took place much later than in the United States. Only when the railroad came, shortly after the formation of the Dominion in 1870, was there the impact of the agricultural frontier so important in the rise of the Canadian nation. Wheat did for Canada in the economic structure of world trade what cotton did for the United States eighty years earlier. That difference in timing has made a very great deal of difference in the subsequent history of the respective nations.

Agricultural-Industrial Relationships—Despite the limiting factors of climate, soil and terrain, agriculture leads in employment in all provinces except British Columbia; the highest proportion is in the Prairie Provinces. Little of this agricultural production gives rise to manufacturing. Cotton, corn, wheat, sugar, both cane and beet, tobacco and the subtropical fruits have attracted various types of transformation-type industries in the United States. In Canada even wheat and tobacco are for the most part

sold for other nationals to process. Dairying in both countries has attracted important milk-processing plants. Canada retains somewhat the colonial-type of agriculture.

The two major factors in accounting for high wages and mechanization of farm work among United States farmers have been the phenomenal rise and widespread distribution of urbanism; the other has been the relatively inadequate population for the Herculean task of occupying the country. Canada lacks the former, conspicuously; the second has been relatively less important. The factor of high wages has therefore contributed less to the mechanization of Canada's farms. Although the governments of the



Dept. of Mines and Resources, Dominion of Canada

FIG. 135.—CANADA'S METAL-BEARING EMPIRE

Dominion and of the several provinces have become active partners in agriculture, there has been the minimum of regulation designed to increase manufacturing of farm products. Severe winter weather operates as a deterrent for both farm products and minerals.

Minerals and Mineral Industries—An inventory of Canadian minerals was given in Chapter III; it remains for us to review the conditions under which the mineral economy of Canada has developed. Nearly all minerals have to be extracted from the ground and from various foreign materials; this makes imperative the use of great quantities of heat and power. Canada is inadequately supplied with high-grade coal. Granted the great variety and extent of Canada's mineral endowment, the factors of market, inadequate coal, and nearness to the sources of many minerals mined in the United States have conspired to give the Dominion anything but a well-rounded mineral development.

The use of water power has softened the austerity of the mineral econ-

omy, but it has by no means unlocked the major part of her proven mineral stocks. In a sense, Canada's credit has been too good to bring about a well-rounded exploitation of her resources. Another factor has been the dissimilar interests among Canada's natural economic regions. In general there has been lacking the community of interest to offset the natural isolation of these regions, one from the other. Sectionalism like this has not been absent in the economic development of the United States, but in Canada its passing has been arrested.

Manufacturing—The conditions under which Canadian manufacturing takes place differ in several respects from those of the United States. The limits imposed by the character of her mineral resources is partially offset by hydroelectric energy sources and by proximity to lake-borne coal from the United States. Canada's membership in the British Commonwealth of Nations is only partial compensation for the relatively meager population of the Dominion itself. Reciprocal trading agreements have lowered slightly the wall of the United States tariff. A final condition is the lack of a homogeneous domestic market adequate for the establishment of a general manufacturing economy.

There is no manufacturing belt in Canada in the sense that the United States has one. There is regionalism in the Canadian economy, but it has not assumed the character of urbanized regions of increasing industrial importance. In some instances there appears to be a trend away from Canada. In steel, for instance, the industry has developed new techniques in the United States which have tied it more closely with mass-produced ore, coal and limestone. The industry is likewise related to the source of scrap metal. New fuels have been successfully used in steel-making, but they have not altered the trend toward market centers. Canadian subsidy has thus far failed to change this balance.

World War II accelerated the development of new sources for iron ore in Canada. The famed Lake Superior iron ranges have been mined to the point where the steel companies are looking for other important sources to supplement the easily-mined and high-grade ores of the Mesabi and neighboring ranges. Steep Rock Lake and Labrador have been the object of steelmakers' interest. If all of these ore properties become important sources for iron, they will contribute much to the continued vitality of the Great Lakes steel manufacturing region on both sides of the border. Labrador ore is so far from any waterway that millions must be spent to make it available for development. Both are known to contain high-grade ores.

Up to the present, iron mining has been a relatively simple matter of extracting the ore and hauling it away by water and rail to the iron centers on the Lower Lakes margin. In order to use the taconite deposits of the same ranges, they must be processed; costs of this processing have thus far

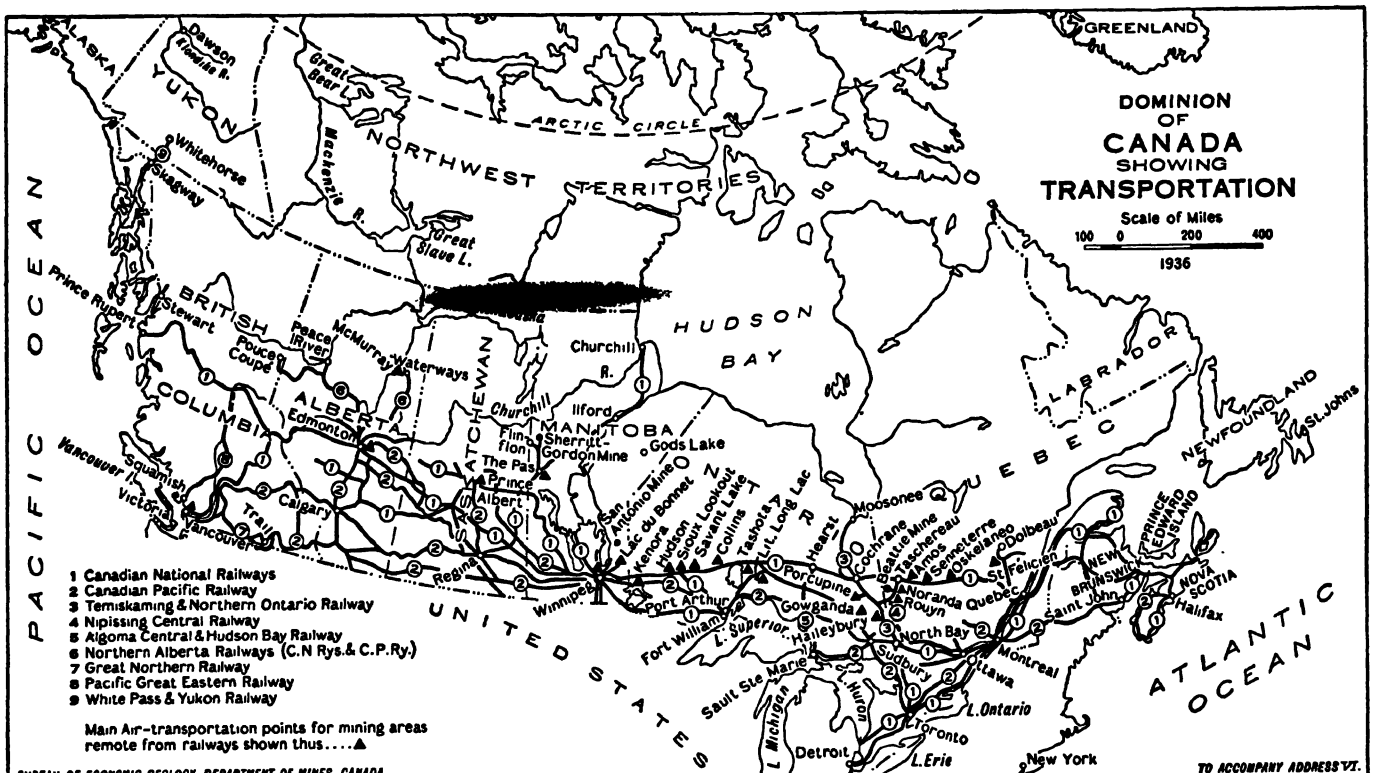


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FIG. 136.—TRANSPORTATION IN CANADA

been high. It is out of the question for Great Lakes steel mills, as presently constituted to bring ore from more distant sources. New sources of high-grade iron ore must be found economically accessible to the Lakes steel district or there will be a shift in steelmaking toward tidewater. This largely explains the interest being displayed by Canada and the United States in the ore properties now being explored in Canada.

Empire Content—An industry in the United States may establish a Canadian branch manufacturing plant and mark its product as "Made in Canada" if it meets the Dominion requirement of "Empire Content." This device enables the manufacturer to have access to the protected market of the British Empire and Commonwealth. Canada gains a pay roll and taxable property; the United States concern gains an increased market for its product, much of it the work of United States labor.

Main Phases in Canada's Development—There have been three main phases in Canada's development as an economic power. The first has been the development of specialties for world trade, fostered by Great Britain until World War I when it became apparent that Britain was unable to continue indefinitely with this market support; this situation was officially recognized at the Imperial Conference in Ottawa in 1932. A second phase for Canada has been a trend toward self-sufficiency made possible through the erection of tariffs and the payment of bounties of one sort or another to stimulate Canadian industries. A third phase has been an unplanned but increasing dependence upon the United States for deficiencies in raw materials and market. In effect, the first two have served to supplement the third. The impact of World War II increased Canadian production tremendously through the development of specialties required by the United States.

Export duties have been levied only on such commodities as will move anyhow. As a result of legislative attempts to gain prosperity and of the slowly increasing population, there has been a trend toward self-sufficiency throughout the populous parts of the Dominion. This is despite the emphasis upon furs, softwood, wheat, pulpwood, dairying, and minerals. These successive export specialties clearly reflect the role of the British Commonwealth of Nations in the domestic economy of Canada.[1]

Dependence upon United States—The net result of Britain's attitude however has been increased dependence upon the United States markets, manufactured goods, and even raw materials for Canadian factories, in spite of the fact that most raw materials are to be found in Canada as well.

This type of joint development minimizes the penalties to be paid for the contrasting economies of the two Anglo-Saxon nations occupying the continent. That such economic dependence presages political dependence

[1] Legally provided for in the Statute of Westminster, 1931.

appears entirely unlikely. Economic domination by the one nation over the other is by no means in the 12:1 ratio of their respective populations, nor does it exist in all forms of economic endeavor; each nation has absolute advantages as to resources. Prior to World War II, reciprocal trade agreements were agreed upon between Canada and the United States. Lend-Lease furthered this policy during and immediately after the war. Early in 1944 the two governments agreed upon the general policy of postwar reciprocal trade agreements, similar to that of prewar days. The one factor that looms over the reciprocal development is that Canada numbers but twelve million people. Students of political geography may well observe this important example of economic and political harmony in the development of a continental heartland, crosscurrents to the contrary not withstanding.

Canada's Trade

Relative Standing—Canada ranks fifth among the nations in the value of its total foreign trade, yet it ranks thirty-fifth in population. In 1939 the value of Canadian–United States trade was approximately $900 million, a figure surpassed by the trade between no other two nations. In the value of its exports, Canada was surpassed only by the United States, Great Britain, and Germany.

Exports—Taking 41 per cent of all Canadian exports ($380 million) and supplying 30 per cent of the imports, the United States is Canada's most important trading nation. Of the rather narrowly-specialized group of exports, the United States takes 80 per cent of the newsprint, which with wood and wood products constitutes her leading export group ($166 million). The second-ranking export group is agriculture and its products, ($79 million). This figure does not take into account the fact that a large part of the wheat is exported through the United States, not *to* it. Approximately half of this agricultural group is animal products: live cattle, fish (lobster, whitefish, smelts, salmon, and halibut) furs, and hides comprise most of the $44 million. The third-ranking export group is minerals; 90 per cent of Canada's mineral production is exported. Of the total mineral export of $50 million, nickel ($28 million) silver ($8 million) and copper ($8 million) dominate; gold, lead, zinc, and aluminum comprise less than $2 million each.

Tourism—More important than these visible items of export is the estimated $200-odd million spent in Canada by the 18 million United States tourists visiting there in 1939. This resource is not expendible; tourism appeal is virtually an inexhaustible resource.

Imports—Canadian imports from the United States embrace a very wide

range of commodities, three thousand or more, which in 1939 totale nearly $500 million. Some of the more important items are listed in Tab 17.

TABLE 17

IMPORTS FROM U.S.A.

Machinery	$37 million	Petroleum products	12 millic
Coal	33 "	Electric motors	11 "
Crude oil	32 "	Silk and its products	7 "
Auto parts	25 "	Stone and its products	6 "
Rolling mill products	23 "	Paper and its products	6 "
Farm implements	20 "	Vegetables	5 "
Fruits	16 "	Engines and boilers	5 "
Automobiles	15 "	Rubber and its products	4 "
Raw cotton	15 "	Glass and its products	4 "
Books and printed material	12 "	Clay and its products	3 "

In the foregoing analysis of Canada's trade the fact stands out that tl great bulk of her production is for export. To that extent therefore C nadian economy is sensitive to the conditions of world trade. An econom depression in the United States and the weakening of Britain's trade dom nance are acutely felt in Canada. Canada has been short of capital; Wor War I ended Canada's dependence upon Britain for capital. Since th time, the United States has had a larger share of Canada's trade.

Impact of World War II—The Second World War made Canada an ir portant member of the American Arsenal for the Democracies; : June 1943 an estimated 28 per cent had been added to Canada's indu trial productive capacity. Metal-working capacity in Canadian factori had risen by an estimated 40 per cent. Thousands of Canadian plan worked metal in some manner and to a degree of complexity which thr years before World War II was regarded as impossible. Some idea of tl significance of this to the Canadian economy is to be noted in the fa that 35 per cent of all Canadian imports in 1939 were classed as "produce materials" and 25 per cent as "producers equipment."

World War I led to the expansion of wheat acreage on the weste plains. Subsequent events proved this addition was unassimilable by C nadian's foreign commerce. The specialized nature of the plains agric tural economy had to be broadened, a change now in process. World W. II also broadened the benefits accruing from reciprocal trade agreemen with the United States.

World War II marked the opening of iron-mining operations at Ste Rock Lake, Ontario, the manufacture of airplanes under United States cense, the building of smaller naval vessels for the United States, the man facture of synthetic rubber and of tires and tubes. Shipyards were doubl

in number and more than that in capacity; about half of them were for new construction. A skilled labor pool was created and the economies of large scale production achieved—and this in a nation of scarcely 12 million people. Another indication of Canada's coming of age was the outright gift of a billion dollars to Britain in late 1942.

XIX

REGIONS IN CANADA

Natural Regions Have Some Economic Homogeneity—Canada may be resolved into six great regions, each distinguished by a degree of homogeneity in economic life. These regions are the St. Lawrence Lowland, Peninsular Ontario, Maritime Provinces, Laurentian Upland, Prairie Plains Province, and Pacific Mountains and Valleys. Each region borders the United States at some point, and it is along a narrow zone near the border that the principal Canadian centers of population are found. The economies which have developed within each of these major regions vary widely and their relation to the trade of Canada is significant especially when the creation of a homogeneous nation is the goal. Increased trade with the United States does not impair the integrity of their economic subdivisions.

St. Lawrence Lowland

Situation—The major part of Canada's population, agriculture, manufacturing, and commerce has been concentrated on two lowland areas which border southern Canada, the St. Lawrence and peninsular Ontario lowlands. It is this part that has drawn the fire of those who assert Canada is trying to create a nation in defiance of geographic circumstances. These two populous lowlands are separated by a southern extension of the Laurentian Upland which reaches the St. Lawrence River at the international section.

The St. Lawrence Valley is an attenuated low-lying plain stretching on both sides of the river from the city of Quebec to the Thousand Islands. This plain averages about seventy miles in width, and has an area slightly smaller than the State of Ohio. From the Ottawa Valley to Quebec, the southern margin of the Laurentian Upland marks the limits of the St. Lawrence Lowland on the north. On the south the Appalachian Highlands present a higher and more rugged boundary to the Lowland. Most of the St. Lawrence Valley is a series of nearly level plains thickly covered with glacial deposits. The soils are among the best in Canada, with the upper (western) portion of the valley more favored than the lower portion. Old lake plains are numerous in the upper valley and peninsular

Ontario. Although rather more of the lowland lies south of the river, the major part of the rural and nearly all of the urban population are on the north side.

Climate—The climate of the St. Lawrence lowland is typically east coast continental.[1] The growing season averages 130 days, with rainfall uniformly distributed throughout the twelve months. The summers are dry enough to permit the maturing of small grains, but not corn. Winters are long and cold; the river is frozen nearly six months of the year somewhere

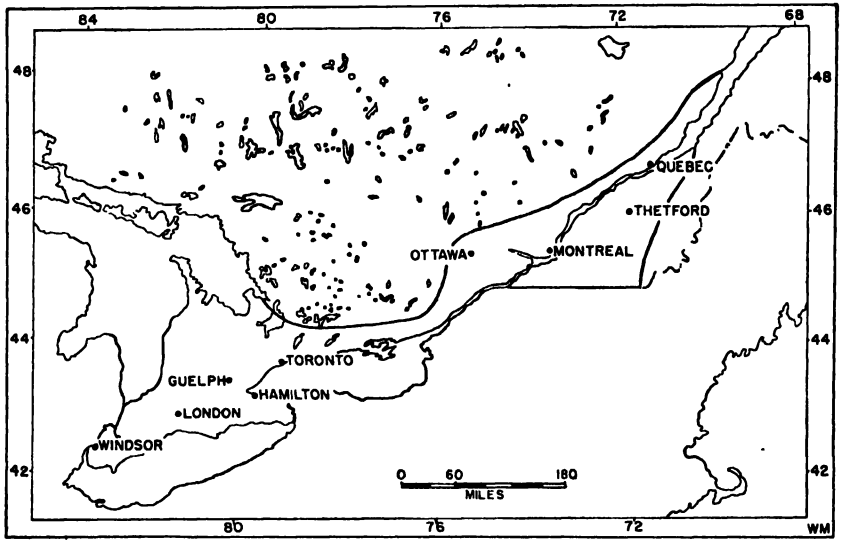


FIG. 137.—ST. LAWRENCE VALLEY AND ONTARIO LOWLAND

along its length of 350 miles. The lower Valley below Quebec city has a maritime influence similar to southern Labrador.

Isolation—Climate and situation have combined to make the lower St. Lawrence Valley an isolated region. It places a high appraisal on the St. Lawrence, a wide and very deep river. It orients the roads, the farms, and the villages. The so-called "long lot" farm has developed as a response to the desirability of river frontage. From the river, these rural settlements appear to be a more or less continuous village. The St. Lawrence Valley has a rather prosperous appearance, partly the result of the closely spaced substantial farmsteads, but due more to the general absence of the usual characteristics of the north, forests and wasteland.

[1] D. F. Putnam, and L. J. Chapman, "The Climate of Southern Ontario," Scientific Agriculture, 1938, Vol. 18, pp. 401–446; and Roderick Peattie, "Climate in the Lower St. Lawrence Valley," Geographical Society of Philadelphia, Jan. 1923, Vol. 21, No. 1, pp. 31–36.

The isolation has promoted the hold of the church upon the habitant and upon the economy which he has single-mindedly maintained. From a nucleus of 6,000 Frenchmen there have developed in the neighborhood of four million French Canadians, three-fourths of whom live in southern Quebec and Ontario; another million live in New England. Although something more than half of them are urban dwellers, the rural French Canadian is perpetuating the language, traditions and mental attitudes of a former France. These qualities, together with the Norman architecture of the older houses give to the rural districts an Old-World atmosphere.

Geographical Review, published by the American Geographical Society of New York

FIG. 138.—A LONG-LOT FARM IN THE ST. LAWRENCE VALLEY

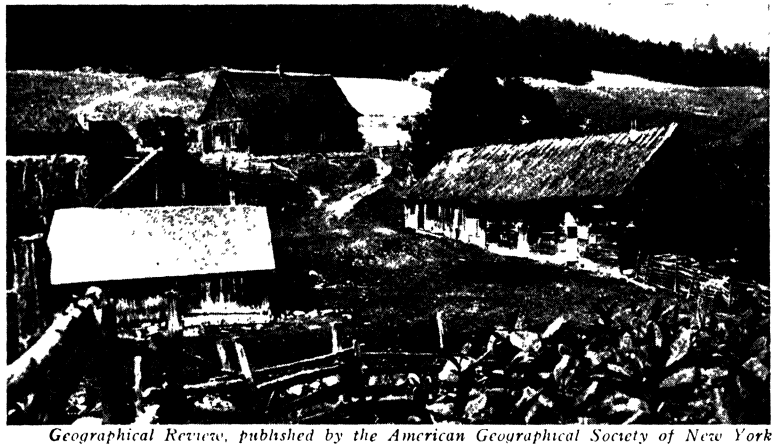
Peattie attributes the fact that the original 6,000 French settlers did not remain a wreck of an old people lost in the flood of an Anglo-Saxon nation to their isolation and to the Catholic church.[2]

Agriculture—These French farmers have made dairying their principal source of income. Where urban markets permit, they sell fluid milk, otherwise it is cheese or butter. Exports of these two commodities to western Europe rather than the United States has been the result of tariff restrictions principally. In an attempt at self-sufficiency, they raise tobacco, potatoes, oats, wheat, hay, buckwheat, rye, barley, flax, beans, peas, and strawberries. It is not the mere variety of the crops, but rather the conditions under which they are grown and disposed of, which makes this valley distinctive in North American agriculture.

Although as nearly self-sufficient as climate and soil permit, these farmers have always specialized in something. They produced all of Canada's wheat until the railroad opened up the prairies for settlement and wheat. Since

[2] Roderick Peattie, "Isolation of the Lower St. Lawrence Valley"; *Geographical Review*, Vol. VIII (1918), pp. 102–118 has been freely drawn upon in this section.

then they have specialized in dairying, despite the difficulties in developing an export market. A high tariff kept butter and cheese from the United States. In England, Canadian dairy products met competition from the dairy nations of western Europe. Finally, however, Canada's cooperative effort secured about one-fourth of the English market. In 1935 and again in 1943 duties were lowered and quotas established for entry into the United States, with the result that Canadian exports of cheese to the United States are now about 10 per cent of her total cheese exports. Although butter has been less spectacular in its development, it is nearly twice as important as cheese. Its market has been assured from the start. Less de-



Geographical Review, published by the American Geographical Society of New York

FIG. 139.—A FARMSTEAD OF A ST. LAWRENCE VALLEY HABITANT

pendence was placed upon exports, and in England butter met with less competition from the Continent. The emphasis upon butter and cheese has proved desirable in that the maximum of labor is exported, a goal devoutly to be desired in the St. Lawrence Valley.

Mineral Industries—There is but one mineral in the Valley. Half of the world's asbestos is mined midway between the Vermont border and Quebec, at Asbestos and Thetford Mines. To furnish the heat and power necessary for the Valley's homes and factories, coal is imported from the Appalachian fields in the United States and much smaller amounts from the Maritime Provinces and from England. Eighty-five per cent of Canada's coal is some 2,000 miles away in British Columbia and Alberta, or in Nova Scotia about 1,000 miles distant. Despite preferential rates for British coal, imports from the United States are ten times the tonnage from abroad. An important supplementary source of power is hydroelectricity generated at the scores of excellent sites immediately north of the St. Lawrence Valley.

Modern electric generation and transmission have brought the vast power resources of the Laurentian Upland to the cities of the St. Lawrence Lowland. The Province of Ontario has built power plants and distributed the power to private consumers for many years at a rate about one-third of that charged in the United States' portion of the Valley. Within recent months manganese of 53 per cent content has been discovered on Grindstone Island, in the Magdalen group in the Gulf of St. Lawrence.

St. Lawrence Project—On the St. Lawrence itself there has long been serious consideration of the development of hydroelectric power. Before the governments of both nations several proposals have been submitted by the International Joint Commission. Each of them involves some minor change in the International Boundary to secure the maximum benefits from the generation of power. Few rivers have the uniform flow, the volume of water, and the convenient location of power sites as the St. Lawrence.

The generation of power is linked with the navigation of the Great Lakes and with the international control over the uses to which the waters of the Great Lakes–St. Lawrence water may be put. There is of course such a waterway at present, limited to vessels drawing less than fourteen feet; this waterway accommodates some 30 per cent of American ocean-going vessels. In 1938 it handled in excess of nine million tons of freight. In that year an important section of the waterway, the Welland Canal (Canadian) moved nearly thirteen million tons of cargo. Large as these tonnages appear to be, they represent approximately 4 per cent of the tonnage moved on the Great Lakes.

For years there have been discussions on both sides of the border as to the feasibility of constructing a continuously-navigable Great Lakes–St. Lawrence waterway, 27 feet deep and 2,339 miles in length, from the Straits of Belle Isle, to Duluth, nearly halfway across North America. The depths of the St. Marys, St. Clair, and Detroit rivers, the Soo, Welland, and St. Lawrence canals all differ. The harbors on the five Great Lakes likewise vary in depth. Such a seaway as is proposed will involve every port on the Great Lakes and the St. Lawrence River.

Sectional feeling has run moderately high in both countries. The international wheat belts have favored it; the eastern and maritime sections have opposed it. With the broadening of the agricultural base in the Canadian wheat-growing plains, it seems fair to assume that the wheat specialists' advocacy of a deeper seaway may be somewhat dissipated.

Manufacturing—Nearly all of the manufacturing in the Dominion takes place in the St. Lawrence Valley and peninsular Ontario. The extent and nature of manufacturing have been mainly determined by two conditions: a population of a scant twelve millions, and propinquity to

the manufacturing districts of the United States. Not only is the concentration of manufacturing in northeastern United States, but the principal sources for iron ore, coal, and limestone are likewise found just south of the border. A degree of frustration to Canadian manufacturing inevitably results.

Types—These circumstances have been largely responsible for the series of investments by Canada designed to promote manufacturing employment in the Dominion. Bounties are paid for mining coal and iron ore. An "Empire content" has been devised as a prerequisite to marking factory products "Made in Canada." A protective tariff has been in effect since the days of the American Civil War. In 1944 a renewal of a reciprocal trading agreement was announced between the two nations as a step toward the benefits of international specialization.

Three classes of manufacturing are particularly dependent upon tariff protection: textiles, steel, and branch plants of United States' concerns which want not only the Dominion but an Empire market as well. These branches account for one-fourth of all Canadian manufacturing; they produce 82 per cent of the automobiles and trucks, 68 per cent of the electrical machinery, 50 per cent of the nonferrous metals, 14 per cent of the nonmetallic minerals, 42 per cent of all industrial, agricultural and household machinery, 40 per cent of all chemicals, and 40 per cent of the miscellaneous manufactures. World War II caused a number of companies to manufacture in Canada under license from United States concerns. Examples included airplanes, ordnance, plastics, and wider steel sheets.

Under somewhat similar arrangements, small naval vessels, rubber tires, tanks, and a variety of metal products were made in Canada during the emergency of World War II.

Wood Pulp and Newsprint—One absolute advantage Canada has over the United States is in the materials and power requirements for the manufacture of wood pulp and newsprint. These products are the most important items in the wood group which ranks first in Canadian exports. Paper and pulp alone are second in value only to wheat, and in some years their positions are reversed. Most of the great paper and pulp plants are located along the St. Lawrence and the tributaries from the north. Although this industry is youthful, it has indeed few of the characteristics of a young industry. The mills represent enormous investments of Canadian, United States, and British capital. Scientific forestry is preventing the waste and destruction which marked the same industry in the United States. Unless recent attempts in the Gulf states to make pulp from slash pine are immediately more successful than is apparent now, Canada has several more years of dependence upon the United States. The large invest-

ments of United States capital in Canadian mills is an important factor in estimating the longevity of the industry.

Montreal—One thousand miles from the Atlantic at the head of deep-water navigation (La Chine Rapids) on the St. Lawrence, is Montreal, largest Canadian city and one of the few great ports in North America. It has a situation which commands not only the St. Lawrence but the Ot-

Canada Wide Feature Service, Ltd.

FIG. 140.—MONTREAL HARBOR

At the crossing of the Ottawa-Champlain lowlands with the vital St. Lawrence Valley

tawa and the Champlain lowlands as well. Its site is on the southeast side of Montreal Island, some thirty miles in length by seven or eight in width. About three-fourths of its 900,000 population are of French extraction, but the remaining one-fourth of the people control about three-fourths of the industry and commerce. The combination of beautiful location at the foot of Mount Royal, French population, and English perspicacity in encouraging tourists from south of the border have brought to Montreal and the St. Lawrence Valley one of their greatest sources of income.

A Trade Center—Montreal has always been a trade center. Since early French voyageurs roamed the forests for furs, Montreal has been a great

export city. First it was furs, then softwood, wheat, pulp and paper, dairy products, and minerals. It may be that the export of power from the contemplated hydroelectric developments above Montreal will be next. In many ways Montreal resembles the export cities of the Upper Lakes. Immense grain elevators, long docks, acres of warehouses, and large ocean freighters are common along Montreal's miles of water front. Despite the fog and ice of the Gulf of St. Lawrence, Montreal and Quebec are favorites for Europe-bound passengers from both sides of the border. The great handicap has been the fact that the St. Lawrence is frozen about four months of the year.

Wheat is Montreal's big export by water, although upon occasion wood pulp and paper have surpassed it. Even so, an estimated one-fifth of Canadian wheat is exported by way of United States' Atlantic ports, the winter ports for Canada. Grain shipments by way of Hudson Bay have not affected Montreal; Vancouver's grain exports have greatly increased, although not all at Montreal's expense. The changed position of Britain in the world's wheat market has accounted for some decline in the volume through Montreal.

An important part of Canadian legislation concerning industry has attempted to balance the economic functions of Montreal. Montreal would like to emulate the industrial sequence of many of the cities in the western half of the manufacturing belt of the United States. World War II appears to have given Montreal something of a boost in this direction.

Service Industries—As the largest city in Canada and with Quebec (130,000) not far distant, Montreal's manufactures include many so-called service industries: meat packing, boots and shoes, paper, clothing, flour, cement and wood products. As a rail center and port, the manufacture of railroad cars and locomotives, ships, and structural iron and steel have developed as important industries. The tariff has promoted the steel group, particularly electrical, industrial and farm machinery. None of the important branches of United States automobile manufacturers has been established in Montreal, or for that matter, the St. Lawrence Valley. World War II stimulated the manufacture of airplanes, plastics, ordnance (all under license), ships, rubber tires, and wool textiles. This foretaste of self-sufficiency in manufacturing will appeal strongly to the city and valley in the postwar period.

Ontario Peninsula, Situation—This is an extension of the Central Lowlands province of the United States and is known as the Ontario peninsula, because of its obvious relation to the Great Lakes basin and the Laurentian Upland. It is in reality a compound peninsula, with its several parts invested with the significance of an individual bridge area.[3]

[3] J. R. Whitaker, "Peninsular Ontario: A Primary Regional Division of Canada," *Scottish Geographical Magazine*, Vol. 54, 1938, pp. 263–284.

It dips deeply into the traffic flow between eastern and western Canada; likewise between the northeastern states and the middlewestern plains south of the border. The new Welland Canal, the canalized St. Clair waterway, and the Detroit River mark the present active utilization of these peninsular waterways. An all-Canadian waterway from Georgian Bay to the middle St. Lawrence River has been advocated. One major line of a United States railroad from Buffalo to Detroit utilizes this direct passage.[4] Unlike the St. Lawrence River the accessibility of this peninsula is not confined to the summer months, despite the cessation of lake traffic about the year's end.

Terrain—In some respects it is similar to the St. Lawrence Valley. It is covered with a thick mantle of glacial deposits and is relatively free from lakes and swamps. Along the north shore of Lake Erie the old lake plain with its poor drainage is most extensive; narrow belts of ill-drained land likewise border Lakes Huron and Ontario.

Population Density—Its location has been the principal reason for the high proportion of urban dwellers (68 per cent). The two main urban clusters are along the southern margin: Toronto 633,000, Hamilton 155,000, Windsor 64,000, Kingston 23,000, Peterborough 20,000, and London 71,000.

Climate—Since the region is located near the path of prevailing cyclonic activity, the weather varies greatly throughout the year. Despite its latitude, the peninsula has been prominently identified with fruit production. Late spring budding and late autumn frosts are characteristic, particularly near the shores of the Great Lakes. A frost-free period of 170 days obtains along the shores of the Great Lakes whereas along the Laurentian margin it is 115 days. In this portion of the humid continental (short summer) climate, the rainfall (32 inches) is evenly distributed throughout the year. An important vacation industry has been developed upon this cool summer climate. The ten million Americans concentrated in cities along the southern margins of the Great Lakes find peninsular Ontario an easily accessible vacation land.

Forests—The peninsula is part of the northern margin of the Lakes hardwood forest belt, with the stamp of the north evidenced in the abundance of conifers. As in the St. Lawrence Valley, there is surprisingly little of forest land and wasteland on the peninsula. The Laurentian forest plays a less important part in the work year of the English-speaking farmer of the peninsula than in that of the habitant of the St. Lawrence Valley. This difference is due in part to the greater urbanization of the Great Lakes section and in part to the habitant's frugality in the farm economy of self-sufficiency.

[4] During World War II the Province of Ontario granted permission for motor freight lines to move freely across this peninsula on the Buffalo-Detroit-Chicago run.

Agriculture—The over-all pattern of agriculture is that of a uniformly farmed landscape. There is little wasteland. Although the peninsula is generally classed as general farming in character, many districts are or have been specialized. Fruit has been important along the Erie shore and some distance back from the Lake. As dairying increased in importance due to urbanism, fruit growing has declined. Despite this intensification, the representative farmstead of Ontario's peninsula appears somewhat less prosperous than similar types of farms in Michigan's lower peninsula.

Manufacturing and Commerce, Iron and Steel—Although there are more industrial wage earners in the St. Lawrence Valley, the Ontario peninsula is more like the United States type of industrial region. Most of the Dominion's manufacture of iron and steel is carried on here. Canada has ten iron furnaces with a total capacity of 1.6 million tons annually, a steel-making capacity of 2 million tons, and 1.6 million tons of finished hot-rolled steel products (1938). The plants are at Sault Ste. Marie, Hamilton, and Port Colburn, Ontario, and at Sydney, Nova Scotia. All of the Ontario plants are dependent upon near-by United States iron ore and coal. Development of electric furnaces has enabled nearly 60 per cent of the Ontario capacity to use Ontario hydroelectric power. World War II made such heavy demands upon Minnesota ores that Canadian mines were reopened in the Steep Rock Lake district, about 100 miles north of the older and highly developed Mesabi ranges.

International Specialization—Dependence upon England and the United States for steel products has changed through the years, as duties and preferences have been modified in an attempt to strengthen the commerce with Great Britain. More recently the reciprocal trading agreement with the United States has likewise affected this commerce, but the trend has been toward England, except in certain lines where the United States leads by a wide margin. So far as manufacturing iron and steel products is concerned, few districts are better equipped by nature to make electric alloy steels and the nonferrous alloys which the industry needs. This has invited the present international specialization in steel products manufacture among Canada, England and the United States. Many branch plants of United States' concerns, particularly automobiles, have been established in Ontario. Scrap iron and steel have become important sources of metal; the continuous strip mill has reduced the amount of labor needed. The net result has been to make the market a more important factor of location than it was. Canada's twelve million people can do but little in the way of attracting steel manufacture.

Pulp and Paper—The manufacture of pulp and paper is much less widely distributed in the Ontario peninsula than in the St. Lawrence Valley. The mills are located about the shore of Lake Ontario, near the

source of timber and hydroelectric power. In general the manufactures of the peninsula are light and varied in their character.

Toronto—Toronto is the home port for the major part of Canada's lake fleet of between 300 and 400 vessels. Although not comparable to the largest United States lake ports, Toronto handles about four million tons of freight through its modern and well-equipped harbor. The principal commodity is wheat, most of it destined for transshipment. Due to the situation of Toronto on the peninsula, railroad and truck competition has tended to keep lake shipments lower.

Toronto manufactures machinery, ships, leather, wood products, wool clothing and automobiles, in addition to the varied list of service industries for a population of 633,000.

Hamilton, with Niagara power, manufactures steel, cotton goods, farm implements, wool textiles, electrical machinery, stoves, furnaces, and furniture. An important part of Hamilton's commerce grows out of the important fruit-growing district adjacent to it.

Maritime Provinces

Situation—In the development of the North American continent, the Maritime Provinces have become the back door of Canada.[5] They have been passed by in the Dominion's development because shipping has sought the inland ports rather than those closest to Europe. The most economical port to use is generally the one requiring the shortest land haul. There is little in the environment of New England which has contributed to its high degree of urbanism except its situation with respect to the productive lowlands of the Great Lakes and the breaches in the Appalachian Highland. Canada's Maritime Provinces have no such location. If the trend toward development of the continental heartland continues to accelerate after World War II, these eastern provinces may profit more from their relation to northeastern United States than from their relation to the interior of Canada. During the anxious periods of the economic depression of the 1930's and the subsequent war, Canadian newspaper editorial comment displayed increasingly the feeling that the Dominion's future lay in continental development. These editorial comments were by no means confined to the most "worldly" of Canadian provinces, the Prairies.

Relief and Soils—Viewed on a relief map, the Maritime Provinces appear as a northern extension of the Appalachian Highlands, set apart from the main bulk of the Highlands only by the caprice of boundary-makers. These uplands, together with the associated peninsulas and islands which make

[5] See W. F. Ganong, "Origins of Settlements in the Province of New Brunswick," Transactions of the Royal Society of Canada (1904), Sec. 11, pp. 3–185.

up the eastern hump of North America, have a situation with respect to the Dominion which in nearly every way contrasts with that of New England to the interior of the United States. The Canadian portion does not preserve the well-defined subdivisions of the Appalachian system, which characterize the area south of New York State. In eastern Canada the Appalachian system is represented only by the moderate highland areas of eastern Quebec and northern New Brunswick. The Green Mountains of Vermont continue toward the Gaspé Peninsula as the Notre Dame Mountains. Elevations generally are from 1,000 to 1,500 feet, with some peaks rising to 2,500 feet.

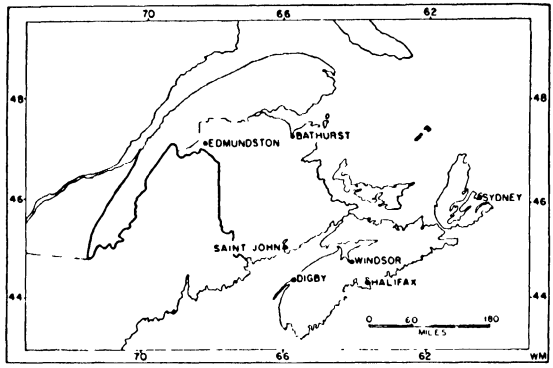


FIG. 141.—THE MARITIME PROVINCES

Although this region is essentially a rugged and inaccessible area, it has some reasonably fertile districts; among these cultivated valleys are the St. John's of New Brunswick, the Annapolis and Cornwallis of Nova Scotia, and smaller valleys in eastern Quebec. Generally, the Canadian portion of the Appalachians is forested, has swift streams, and numerous lakes; it is scarcely an inviting land for agriculture. Glaciation scraped off the higher places and filled the valleys; the net result generally was disastrous for both. There is no continuation of the coastal plain characteristic of the southern three-fourths of the Atlantic coastal margin.

Climate—The location of the Maritime Provinces on the eastern "hump" of North America gives them two main types of climate: the marine climate of southern Nova Scotia mildest of all parts of the Maritimes, and the continental type of most of the remainder. Differences in elevation (100–2,700 feet) in the continental portion are great enough to warrant subdivision.[6] For the farm crops grown in this area, the British Meteorological Service has adopted 42 F. as the critical temperature limit.

[6] D. F. Putnam, "The Climate of the Maritime Provinces," *Canadian Geographical Journal*, Vol. 21 (1940), pp. 135–147.

The growing season thus defined varies from less than 150 days in northern New Brunswick to 190 days in southern Nova Scotia. Most of the 35"–50" rainfall occurs in the winter six months.

Forests and Lumbering—There is greater uniformity of forest in the Maritime Provinces than in the district just to the west between the Great Lakes and Hudson Bay. The Dominion Forest Service classes the bulk of Maritime forests as of the Acadian type as far north as the Gulf of St. Lawrence; beyond that lie the eastern extremes of the Northern and the Subarctic forest belts.[7] Most of these Maritime coniferous forests resemble those of the New England states: some are red spruce, some white spruce, balsam, the mixed hardwood and softwood type in which white pine and hemlock occur, and some the black spruce and cedar types which occur on poorly drained land. Aspen, white birch, and jack pine grow on burned-over areas, but these trees are of short life. Many hardwoods of the so-called intolerant type are found in the eastern portion of the Northern forest belt, where fires have been especially widespread. A large part of the interior plateau consists of barrens with heath or bog vegetation.

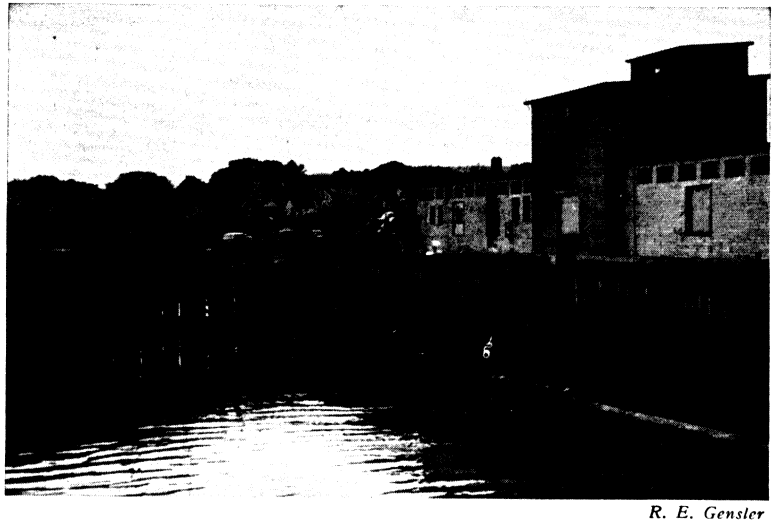
Prince Edward Island, New Brunswick, and Nova Scotia have no more than one-fifth of the timbered land supporting merchantable timber. In Cape Breton and Newfoundland the proportion runs somewhat higher. Despite the minor position of Maritime forests in the Dominion's forest industry, they play an important role in the life of the local farmers. Winter employment and the sale of wood from their own wood lots are frequently the principal sources of income. In these Provinces the pulp and paper industry is important in New Brunswick and Nova Scotia only, and even there it is small in comparison with Quebec and Ontario.

Agriculture in Nova Scotia—One of the most important of the agricultural areas of the Maritime Provinces is Nova Scotia. At one time Nova Scotia was the front door of Canada. In 1800 Nova Scotia, or New Scotland, appeared to have a future as promising as Massachusetts, which is not much more than half as large. Its location on the Gulf of St. Lawrence places it nearer England; its harbors are never frozen; it is nearer the Grand Banks fishing grounds. Massachusetts has no agricultural area so large as the combined Annapolis-Cornwallis valleys. The mineral wealth of the Canadian province is more varied and more abundant than Massachusetts. At the conclusion of the American Revolution, New England loyalists flocked into Nova Scotia to give it the same type of stock which dominated in Massachusetts during its early years. In spite of all these favorable circumstances, Nova Scotia supports only half a million people, engaged in fishing, agriculture, lumbering and a little manufacturing. It

[7] W. E. D. Halliday, "A Forest Classification for Canada," Canada Dept. of Mines and Resources, Forest Service Bulletin 89, 1937, pp. 1–50.

has been passed by in the Dominion's development because the ports of northeastern United States shipped more Canadian products than the Maritime ports.

The famed lowland of the Annapolis-Cornwallis valleys in western Nova Scotia is the largest area of good farm land in all the Maritime Provinces.[8] It stands as an arable island in the glacially-scraped rock surface of Nova Scotia, most of which is a cut-over forest. The valleys parallel the western coast, separated from the Bay of Fundy by a narrow ridge known



R. E. Gensler

FIG. 142.—A DIGBY WHARF

as North Mountain, rising from 400–600 feet above the valley floor. The combined valleys are nearly one hundred miles in length, varying in width from three to ten miles, and open at each end to the Bay waters. The reddish sandstone soils are in contrast with the lava and granites of the bordering ridges. The growing season averages 199 days, from April 22 to November 3, with a frost-free period of 145 days. Although it is the first part of the Maritimes to warm up in the spring, the Bay of Fundy gives these valleys the same advantages that the Great Lakes give their lee shores: late spring budding and late autumn frosts which make possible the successful apple orcharding which is the most important source of farm income. Approximately half of the apple crop of all Canada comes from these valleys. Obviously such a specialty is possible only because of a highly-developed export market in western Europe, particularly in Great Britain which takes most of the two million barrel production.

[8] C. C. Colby, "The Apple Industry of the Annapolis–Cornwallis Valley," *Economic Geography*, Vol. 1 (1925), pp. 173–197 and pp. 337–355.

Despite the emphasis upon apples, the farmers are as nearly self-sufficient as possible. Small grains, hay, and root crops for the stock, and vegetables for the table have made these valley farmers perhaps as prosperous and contented as those described in Longfellow's poem on the Acadians. At the open ends of the valley, where the world's highest tides flood the narrow flats, the farmers have built dikes to reclaim the rich alluvial soils for pasturing the hogs, whose products constitute another export.

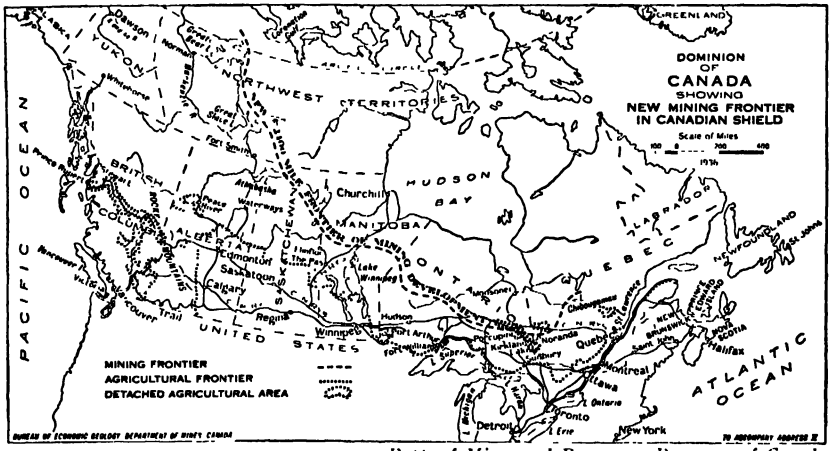
In the export of the services of men, Nova Scotia has had marked success for many generations. In a Dominion where racial congregation has been a conspicuous characteristic, the origin of educational, political, and economic leadership is of interest. The Scots' descendants who have gone out from Nova Scotia to important posts in the Dominion and the United States constitute a contribution to Anglo-American institutions but a drain upon the Province.

Commerce in Minerals—Nova Scotia produces two-thirds of the coal mined in Canada, from seams located on and near tidewater. The Sydney field on Cape Breton Island which occupies 200 square miles, is bounded on three sides by the sea. On the east side of Nova Scotia, in Pictou County, the seams exceed twenty feet in thickness. Tidewater coal and iron from the Belle Isle ore beds in Newfoundland meet at the furnaces of Sydney, where the manufacture of iron has been relatively a major industry. That it has remained small is largely due to the propinquity of the United States. Furthermore, the St. Lawrence is frozen too much of the year to carry steady traffic, and the construction of a rather meandering national railroad to connect the province with the interior has not overcome its isolation. World War II did what another war did for this province: created a shipping and a steel-making boom for the duration. Halifax, Amherst, and Truro manufacture the items associated with service industries and export some chocolate, petroleum products, and sugar. Postwar developments in trade among Canada, England, and the United States may make important changes in the development of this outpost.

Laurentian Upland

Its Role in the Development of Canada—In a manner of speaking, the Laurentian Upland has been the most important province in the development of the Dominion. Its importance lies not in the warmth of its welcome to agricultural, forestry or mining pioneers, but rather in its effectiveness as a barrier to the development of the central plains of Canada. The Laurentian Upland constitutes about five-sixths of the provinces of Ontario and Quebec, but the population is about one-sixth that of the southern lowlands of these provinces. The period of its settlement ex-

tended over the early part of the twentieth century when immigration ceased entirely and two world wars left a profound imprint upon the mining industry. The Upland embraces an area larger than all of the Lakes states south of the border. Spreading in all directions from Hudson Bay, the Upland is bounded on the east by the Atlantic, on the south by the St. Lawrence and Ontario lowlands, and on the west by the Prairie Province. In northern Minnesota, Wisconsin, and Michigan it extends across the border to form the Superior Upland.



Dept. of Mines and Resources, Dominion of Canada

FIG. 143.—NEW MINING FRONTIER

Our study of the United States has revealed that a subdivision does not develop apart from other subdivisions; its character is determined by the remote as well as the immediate environment. Witness the impetus furnished the early economic development of the Northeastern states by the highly commercial products of the Southeastern states. As agricultural occupance of the Northeastern forested region took place, the Southeastern states achieved the first climax in United States agriculture. The momentary hesitation at the eastern margin of the grassland was in the face of even greater opportunities. In the United States the frontier passed rapidly; in Canada it could not. While the St. Lawrence Valley was attempting to develop an export agriculture based on wheat, westward-moving pioneer farmers emerged from the forests to encounter not the prairie grasslands of the Lakes states, but the rock-and-water surface of the Laurentian Upland, and the international boundary. Canada therefore had no equivalent for the highly developed commercial agriculture of the Cotton Belt to "spark" the self-sufficing agriculture of the St. Lawrence Valley

and the Ontario peninsula. The prairie grasslands had to wait until the railroad made settlement possible.

When, at the turn of the twentieth century, the prairies became a great wheat exporter, Canada was supplied for the first time with the vital trade "spark." It is hardly possible to exaggerate the importance to Canada's economic development of the rise of the prairie wheat country; it marked the beginning of an epoch in which this province did for Canada what the cotton belt and the upper Mississippi Valley did in larger measure

David W. Lantis

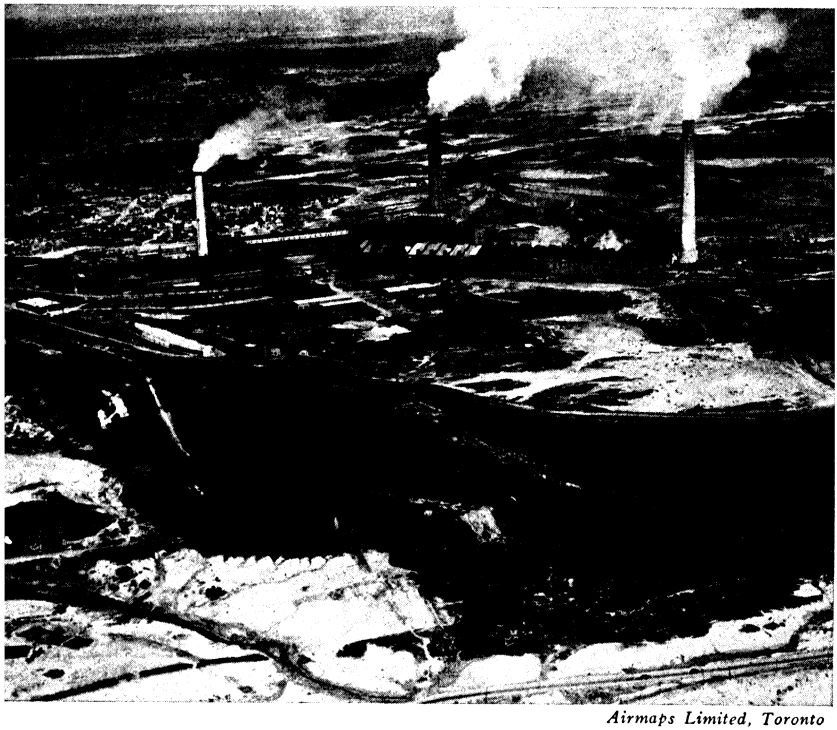
FIG. 144.—REINDEER GRAZING ON THE TUNDRA IN YUKON TERRITORY

for the United States. The principal factor in the vital difference in "timing" was the Laurentian Upland.[9]

Terrain—This largest of Canadian physical divisions is a great rock-and-water-plain, for the most part below 1,500 feet in elevation. In eastern Quebec and in Labrador it rises to 4,000 feet. The ancient rocks of the Laurentian Upland have been glacially scraped, leaving many low hills of bare granite in the north, and deposits of assorted materials farther south. The ice also deranged the surface drainage, leaving thousands of lakes and old lake plains scattered over the surface. Only the remnants

[9] For a full treatment see W. A. Mackintosh, "The Laurentian Plateau in Canadian Economic Development," Economic Geography, Vol. 2, No. 1 (1926), pp. 537–545.

of the former very large glacial lakes are visible today, but the surface of the Upland is perhaps one-fourth water. The outer margin of the Upland is marked by several of these large lakes: Great Bear, Great Slave, Athabasca, Winnipeg, and the upper Great Lakes along the international border. Large areas of muskeg country and ill-drained lacustrine plain still further reduce the amount of arable land. Where such land is found it generally is an old lake plain with fertile but light soil.



Airmaps Limited, Toronto

FIG. 145.—COPPER CLIFFS COPPER SMELTER

Climate—The climate of the Laurentian Upland varies widely from the humid continental with short summers in the neighborhood of the Great Lakes, through the Subarctic to Tundra.

Minerals—Before 1900 the Canadian Pacific was the only railroad across the rock and water surface. Within the next fifteen years another east-west line and a few short connecting lines were built to ports on Lake Superior, Lake Huron, and Georgian Bay; in 1932 the line from Cochrane was extended to a new port of Moosonee on James Bay. Railroads enabled settlement to proceed, although in a somewhat tentative manner. Conceived as agricultural railroads, their construction led to the development of some

of the vast mineral resources of the Laurentian Upland. Important mining settlements have developed in eastern Ontario at Cobalt, Timmins, Kirkland, and Larder Lake; in the west, at Geraldton, Long Lac, and Red Lake—gold and silver mining districts all. Just north of Georgian Bay is Sudbury, the largest copper producer in Canada and the world's greatest source of nickel. Important among the newcomers are Rouyn and Porcupine, gold camps just south of James Bay.

A recent mining operation is the reopening and extension of the mines in the rich hematite iron ores at Steep Rock Lake, about a hundred miles north of the Mesabi range in Minnesota. The presence of hydroelectric power and the nearness of several alloy minerals augur much for this new iron district. The United States drew heavily on Mesabi ores in its role of an arsenal for the United Nations. The future of Canadian iron mines is brighter than at any time.[10] There is a possibility that lignite, known to be accessible to the railroad to James Bay, may ultimately provide the first profitable freight traffic for this extension.

Water-Power Resources—It has been fortunate for Canada that the bulk of her water-power resources are localized in Ontario and Quebec, the provinces of greatest need. Neither province has commercial coal fields; the power-consuming pulp industry is here; and the major part of Canada's population is along their southern margin. No other Canadian water-power districts are so near the large United States markets. The international section of the St. Lawrence River is one of the greatest water-power districts in the world. On the north shore of the broad estuary of the St. Lawrence a northern tributary, the Saguenay, has tremendous power resources. Smaller but important power sites are located on the following Laurentian rivers: Thunder Bay on Nipigon River transmits power to Fort William and Port Arthur, Abitibi Canyon on Abitibi River transmits to Sudbury 250 miles farther south, Far Falls on English River, Pat Rapids on Albany River; and smaller installations are located on Mattagami, Spanish, St. Marys, Montreal, Kaministiquia, Seine and Winnipeg rivers.

Water power plays a very important role in Canadian exports; wood pulp and paper are jointly Canada's greatest export; these products consume a tremendous amount of electric power. Another high-ranking export group is minerals, with an equally great demand for electric power. Nickel, copper, lead, zinc, aluminum, and iron all are localized on the Laurentian Upland or immediately below it. Seventy per cent of Canadian steel is the product of electric furnaces.

Forests—The forest industry of the Laurentian Upland has experienced two phases: the early commercial lumbering of saw logs, and the more

[10] In 1946, another important iron ore deposit, the third in recent years, was opened at Blind River on the north shore of Georgian Bay between Sudbury and Sault Ste. Marie. In recently acquired Labrador is the greatest iron ore discovery in Canada.

recent wood pulp industry. The cutting of saw timber has moved west to the forests of British Columbia, but the Laurentian forests have become of great economic importance as a source of paper-making material. For twenty years Canadian wood pulp has surpassed in importance that of the United States. Today the United States imports most of the pulp it consumes, chiefly from Canada. The Laurentian forests supply virtually all of this Canadian export. Jack pine, poplar, spruce, and balsam predominate, and upon these woods the pulp industry has been built. With more than adequate water-power resources for this giant consumer of cheap power, ample timber, the world's largest consumer of pulp and paper just across the border, and the absence of alternative opportunity for employment, Ontario and Quebec may be expected to look to the perpetuation of this industry so vitally affecting Canada's position in the economic structure of world trade.

Agriculture—Despite the impetus given agriculture by the early period of commercial lumbering, by the construction of railroads, by the rise of important mining districts, and by a paternalistic provincial government, agriculture on the Laurentian Upland has generally been fragmentary and transitory. A combination of agriculture and lumbering spread from the lowlands of the St. Lawrence River and Ontario peninsula. In such a region as the Upland arable land is limited, and then restricted to small tracts, generally inaccessible. Settlement was a consequence to lumbering, and such agriculture as developed was in response to these lumbering communities. With the passing of lumbering in the lower portions of Ontario and Quebec, farming waned and settlements generally declined. The soils in some districts were rich enough, but so light that a few seasons' rainfall carried them away. The long and very severe winters, the short and moderately warm summers (July is the only month in which freezing temperatures have not been recorded in the James Bay clay belt), and the general inaccessibility of the Upland conspire to make farming very hazardous. As highways are constructed, the tourist industry spreads farther into the Upland; mineral districts are being opened in many places; where new varieties of staple crops have been developed, yields have generally been higher than in the southern lowlands, but the future of agriculture is limited at best.

James Bay Clay Belt—The best agricultural prospects are in the extensive clay belt bordering James Bay on the south and west. Eight hundred miles of this stretch westward toward the prairie plains of Manitoba. Most of it is believed to be fertile and capable of supporting the crops necessary for a self-contained mixed farming economy. Lack of a market makes imperative the self-contained character. Potatoes, garden peas, malt-

ing barley, flax, and some fruits have done well, especially those developed for northern latitudes.

> Occupance here has been an attempt to develop agriculturally part of a much larger region which, through repeated effort and failure has proved itself generally unfitted to farming. When it was first exploited it was believed that the ever-increasing population of the world demanded the farming of all potentially productive land. Today the district is considered distinctly marginal.[11]

Randall estimates that not more than 5 per cent of the Clay Belt is being used, and there are but 80,000 people living in a region roughly the size of Ohio. Subsistence farming prevails, with oats, barley, wheat, hay and garden crops. Some dairy cattle are cared for to supply the local needs and for the mining districts which border the Clay Belt on the south. Beef animals are not raised in sufficient quantity for local slaughter. As with nearly every farming district in Canada, the close relationship between lumbering and farming has generally redounded to the detriment of the latter. As a source of income, it has enabled the marginal type of farming to persist in altogether too many instances.

A few districts on the Upland have become known for certain specialties: New Liskeard for potatoes, clover and grass seeds; Sudbury for dairying and seed potatoes; Port Arthur for poultry, barley and potatoes; Rainy River for flax, seed grains, honey, and sheep; Manitoulin Island for turkeys, beef, and recreation. Some of these agricultural communities have established successful cooperative creameries, canneries and potato products plants.[12] The future of immigration to Canada will have a profound influence upon the agricultural prospect for the Clay Belt and other relatively favored spots on the Laurentian Upland.

Lake St. John Lowland—About one hundred miles north of the city of Quebec and a like distance west of the mouth of the Saguenay River lives an isolated agricultural community on the Lake St. John Lowland. Fifty thousand French Canadians carry on a self-sufficing agriculture similar in its major aspects to that on the James Bay Clay Belt.[13] The pressure of rural population upon farm land in the St. John Lowland has led the church to foster colonists moving north into the James Bay region to establish new communities. The venture into this pioneer fringe is made at no small per-

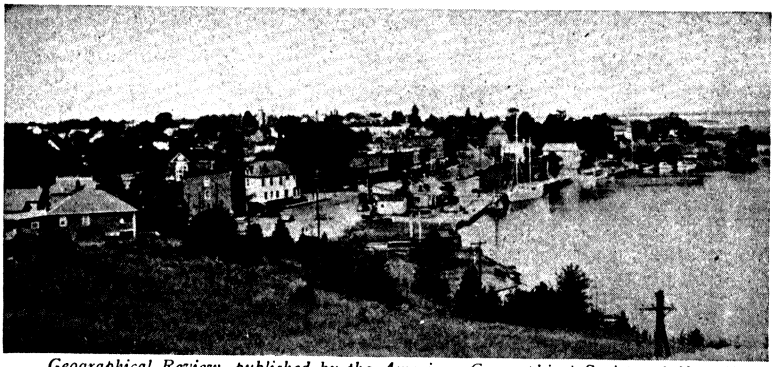
[11] See John R. Randall, "Settlement of the Great Clay Belt of Northern Ontario and Quebec," *Bulletin of the Geographical Society of Philadelphia*, Vol. XXXV (1937), pp. 53–66.

[12] See D. F. Putnam, *Manitoulin Island, Geographical Review*, Vol. 37 (1947), pp. 649–662.

[13] R. M. Glendinning, "Lake St. John Lowland," Papers of the Michigan Academy of Science, Vol. 24, April 1934, pp. 232–237.

sonal sacrifice. Many emigrants have sought new opportunities in New England.

Manufacturing and Commerce—In the Upland there is little in the way of manufacturing. Most widespread is the manufacture of pulp and paper. With the world's greatest market for these commodities south of the border, the stands of pulpwood and abundance of water for power and transportation assure the Upland of this industry for a long time to come. The individual mills are large and the over-all scale of the industry is very large indeed.



Geographical Review, published by the American Geographical Society of New York

FIG. 146.—LITTLE CURRENT, MANITOULIN ISLAND

The Northland capitalizes upon its inexhaustible resources of climate and scenery. Each summer the waterfront of Little Current is lined with luxurious cruisers from all parts of the Great Lakes.

Mineral industries account for a few important districts. Sudbury has been Canada's largest copper concentrating center; today it is the greatest nickel processor in the world. Arvida, on the Saguenay River, manufactures both alumina and aluminum, one of the very few plants in the world to do both. Beyond the processing of minerals for shipment to refining centers, little in the way of manufacturing is in prospect as new mineral discoveries are made.

In the more important agricultural areas, as in the James Bay Clay Belt and the Lake St. John districts, the manufacture of butter is of local importance. In a few places the preparation of certain vegetable seeds for export has become of local importance.

Fort William and Port Arthur—These two port cities are the Canadian twins on the north shore of Lake Superior. They are outlets for wheat from the Canadian prairie province and distributing points for the vast territory of northwestern Ontario where recent mineral developments have bordered on the spectacular. These cities are primarily wheat ex-

porters; lake-front elevators store nearly a 100 million bushels, and wheat exports to the St. Lawrence are at the rate of 200 million bushels a year. The exports from large fur farms and from the northern forest complete the exports of Fort William and Port Arthur. The nature of the imports indicate something of the frontier character of these port cities: mining machinery and supplies, agricultural implements, barbed wire, canned goods, and the thousand and one items needed in an enormous hinterland now in the developmental stage. Iron ore from Steep Rock Lake was first exported here.

Arctic Plains

Lying north of the provinces which border the United States, there is a vast empty land of plain, tundra, and some scrub forest. This northern Laurentian Upland is a landscape of lakes and lake plains of every size. The tree line swings southeastward from the upper Mackenzie delta to a point on Hudson Bay near Churchill. Some trees have been found in sheltered places, even on some of the Arctic islands. In the so-called Barrens there are known to be at least five hundred varieties of flowering plants and ferns. On the whole however, the Arctic Plains constitute a region of doubtful carrying-power, despite the fact that one student of the North, Stefansson, contends that it is a "friendly Arctic." (See Fig. 143.)

Climate—Although temperatures in summer reach 90 degrees Fahrenheit occasionally, the winter of long nights and sub-zero temperatures may last for eight months. Its winter weather received the attention of the American press below the border during the construction of the Alaskan Highway during the winter and summer of 1941–42. This same winter temperature however is the factor which enables the highway to be used in its present state. There are reported to be short stretches of the highway which are unfit for use unless the ground is frozen. Early summer floods tear out many of the bridges and ground thaws render the gravel surface unfit for wheeled vehicles. Despite this the road can be maintained as an all-season highway.

Winter temperatures average −55 to −60 degrees Fahrenheit in the lower Mackenzie Valley and −30 to −50 in Baffin Land. Second in size to the Mississippi River, the Mackenzie flows in a meandering course toward the Arctic Ocean. It is usual for the upper portion of the river to thaw long before its lower portion; severe floods are common in the early summer.

Animal Life—Over the Arctic Plains as a whole, the animal life is surprisingly varied. It includes buffalo, moose, bear, wolves, fox, musk ox, rabbits, lynx, mink, fisher and marten. The grazing is good enough to support these wild animals together with growing herds of caribou and

reindeer. Several varieties of ducks, geese, and other northern fowl are likewise found there. Along the border of the Arctic Ocean the Eskimo has managed to live on the whale and seal which flourished a quarter-century or more ago. The inhabitants of these Arctic Plains have long relied upon trapping for their subsistence. The development of fur farms in the southern provinces is reported to offer serious competition to the trapping of wild animals farther north; the pelts of fur farms are superior to those caught on trap lines. The reindeer herds established by the Government just after World War I have become well established, a move intended to change the emphasis from exports to an earlier economy of self-sufficiency. The isolation of the region, lack of refrigeration, and the inconsequential local market, appear to make this trend altogether desirable.

Minerals—Half of the white people now resident in this great area are engaged in some form of mining. Gold, silver, pitchblende, and even some petroleum are the minerals being exploited at present. Most of these mining communities are only ten or fifteen years old; their future may be as violently fluctuating as similar districts have been elsewhere. The mineral wealth of the Arctic Plains had to wait upon airplane transportation for exploration and development. The day of the cargo plane may well increase the mineral activity of such areas as the Arctic Plains. In 1945 airline companies spoke confidently of a rate of 2 cents a mile in the future.

The People—In 1941 there were approximately 10,000 people living on the Arctic Plains; half of them were Eskimos living for the most part along the Arctic Ocean between the Mackenzie River and Hudson Bay. They make their living by fishing and by hunting. Whaling and sealing declined early in the present century. Both whales and seals are still caught in numbers sufficient to maintain the present Eskimo population. Nearly all of the 4,000 Indians live below the tree line in the Mackenzie Valley. There are perhaps 2,600 white people living in the region, with at least half of them engaged in mining gold, pitchblende, and silver at Great Slave Lake and near Great Bear Lake. The latter camp discovered silver in 1930 and pitchblende a short time after. Gold production began in 1938 at Yellowknife on Great Slave Lake. Between 1920 and 1925 oil was extracted at Fort Norman on the Mackenzie River; prospects for its resumption were not good until World War II. In 1943 a pipe line was constructed to White Horse, Yukon Territory, 400 miles distant from the Fort Norman field. In 1945 this project of the U.S. Army, Canol, was abandoned. Tractor trains bring supplies and take out minerals during the long winters; in summer the airplane is employed.

The Future—The dawn of a Pacific consciousness, World War II, the development of the airplane in passenger and cargo freight, and the construction of the Alaskan Highway have combined to make the Arctic Plains

of greater moment to the Dominion Government than ever before. The Alaskan Highway will undoubtedly make its contribution to the settlement of Canada's western and northwestern plains. Precious metals likewise have an appeal that will bring action from any government. It is unlikely that the white population of the plains will increase greatly, but the standard of living as measured in creature comforts assuredly will rise for the people living here. What the air age will do for such a sparsely settled area remains to be seen.

Prairie Province

Situation—Canada's Prairie Province lies between the Laurentian Upland and the Rocky Mountains. This great plains area is somewhat higher than the Laurentian Upland, with elevations decreasing toward the east

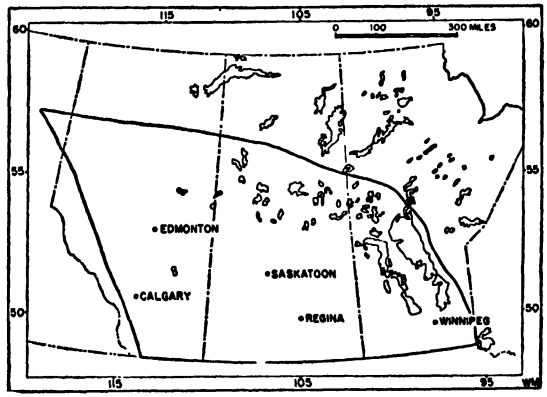


FIG. 147.—THE PRAIRIE PROVINCE

and north. In general these plains are of two divisions: (1) the Prairie Plains of southern Manitoba, Saskatchewan, and Alberta, and (2) the Arctic Plains which were discussed in connection with the Laurentian Upland.

The eastern portion of the Prairie Province includes many old lake beds left by the retreating ice. The largest is known as Lake Agassiz, which was as large as the present basin of the five Great Lakes. The elongated southern portion is a lacustrine plain and is now drained by the Red River of North Dakota and Manitoba. Manitoba, Winnipegosis, and Lake of the Woods are the more important existing remnants of Agassiz. The plain is characterized by the fine materials deposited on the bottom and in the deltas of the erstwhile tributary streams; in the main good soil has developed on these deposits.

The western boundary of these lacustrine plains is a series of distinct

uplands and escarpments known as Riding Mountain, Touchwood Hills, and finally the Missouri Coteau. Beyond, the plains rise in higher steps to 4,000 feet at the base of the Rocky Mountains. Most of the surface has been covered with glacial deposits in which the few swift streams have eroded deep valleys.

Five hundred miles north of the international boundary, the prairie vegetation gives way to small, sparse tree growth. The stand increases somewhat in density and variety toward the north. Before Hudson Bay is reached barrens become increasingly extensive. These treeless wastelands are related to the outwash plains formed by the retreating ice sheet. Drainage is progressively worse toward the north.

Climate—These plains lie within the region of cold steppe climate. The characteristics of continental interior are very much in evidence. Most of the rainfall (9–15 inches) occurs in summer. Winter and summer temperatures average lower and higher, respectively, than in eastern Canada; sensible temperatures however reflect the dryness of the region.

Although elevation increases to the west, distance from the cold Hudson Bay is likewise greater. In Alberta the influence of the warming chinook blowing through gaps in the western mountain barrier is frequently experienced. This wind melts the snow and raises the temperature in a remarkably short time, so that winter snows seldom lie long on the ground. Eastward from Alberta, the temperatures are somewhat lower in winter and the chinook influence is not so pronounced. It has been said that spring advances from the Peace River district (56 North) toward the southeast, and that winter begins in Manitoba and advances north-westward.

The Wheat-Growing Prairies—By all odds the best known and most important section of these western Canadian plains is the Spring Wheat-growing Prairies west from Lake Winnipegosis, to the Peace River and southward to the drier plains country of southern Alberta.[14]

When the Dominion of Canada took over the government of the Northwest Territories from the Hudson Bay Company in 1870, there were only a few thousand acres of improved farm land in the entire area of the three provinces, nearly all of it being in southern Manitoba. Seventy years later the improved farm land totaled 60,849,957 acres (1936) and the population numbered 2,414,891. Despite these impressive figures, the prairies experienced a number of agricultural crises unprecedented in their severity and scope; the most severe was that between 1929–1938, a period when depressed world economic conditions coincided with drought in the prairie wheat lands.

[14] See Henry M. Leppard, "The Settlement of the Peace River Country." *Geographical Review*, Vol. 25 (1935), pp. 62–78; C. A. Dawson, and R. W. Murchie, The Settlement of the Peace River Country, Toronto, 1934.

Palliser Triangle—When the Canadian and Provincial Governments were speculating upon the possibility of prairie settlement, a report from the hand of a Government appraiser, Captain John Palliser, characterized most of the southern portion of Alberta and Saskatchewan as unfit for agricultural settlement because of its aridity. Bounded roughly by Calgary, Saskatoon and Morden, this triangle has become known in Canada as the Palliser Triangle.

Brown Brothers

FIG. 148.—A WHEAT HARVEST IN ALBERTA

Canada waited for wheat to "spark" the economy of the Dominion

Appraisal of the carrying power of this territory has varied with the rainfall cycles in which the appraisals were made. In good years, and most years have been favorable for wheat growth, these wheat farmers have repeatedly cropped this land with sustained yields. Before the soil was exhausted, enough capital was accumulated to build and stock many a permanent farmstead for a mixed type of farming.

Railroads and the Wheat Climax—After the first transcontinental railroad was built in 1885, extensive advertising and high prices brought thousands of settlers to the prairie plains. Of the 60,850,000 acres in improved land in 1937, wheat and other small grains occupied 38,000,000 acres, while an additional 18,000,000 acres were in fallow, an essential feature of dry-farming practice.

Enough capital has been accumulated to provide for a feeding industry

of about 4 million head of cattle, 1¼ million sheep, and nearly 2 million horses on the 30,000 farms of the Prairie Plains.[15] The wheat climax was perhaps reached in 1928.

As dry cycles succeeded humid, the farmers became aware of the limitations mentioned in the Palliser report. Black stem rust repeatedly damaged the wheat; in 1935 it virtually halved the crop. A prolonged drought, 1929–1938 caused widespread and very serious crop failure. In 1937 the average yield of wheat in Saskatoon was 2.6 bu. per acre, as compared with an average yield of 15 bu.[16] This drought period coincided with the world-wide depression; many prairie farmers gave up the struggle and abandoned their farms. To make the disaster complete, the loss of a large portion of wheat export to Great Britain was made known. After World War I, it was increasingly apparent that Britain was unable longer to maintain single-handedly the economic structure of the world trade of the nineteenth and early twentieth centuries. Canada's wheat specialists on the prairie plains had to begin all over. When King George and his Queen visited the provinces in 1938, they, in effect marked the end of the economic period upon which the Canadian wheat empire was founded.

Hudson Bay Wheat Route—The dream of the wheat farmers was a railroad connecting them with Hudson Bay and offering a cheaper route to western European markets. The Canadian Government built this railroad from Saskatoon to Churchill. That neither the railroad nor the port facilities at Churchill realized even a substantial part of the success hoped for, may be seen in the following account of the port's services.[17]

TABLE 18

SHIPPING AT PORT CHURCHILL, 1931–1938

1931	2	ships	called,	carried	away	545,000	bu. grain no import
1932	10	"	"	"	"	2,737,017	bu. grain no import
						987	tons of flour
							general cargo
1933	10	"	"	"	"	2,707,889	bu. grain
						1,187	tons steam coal
						200	head of cattle
						150,134	bd. ft. lumber
						1,441	tons general cargo
						65	tons of honey
1934	15	"	"	"	"	4,049,877	bu. grain
						2,412,055	bd. ft. lumber

[15] E. S. Archibald, "Prairie Farm Rehabilitation," *Canadian Geographical Journal*, Vol. 21 (1940), pp. 158–171.

[16] J. K. Rose, "Weather and Wheat Yield in Western Canada," *Geographical Review*, Vol. 27 (1937), pp. 140–142.

[17] From an unpublished thesis on the Port at Churchill by R. S. McClure, Univ. of Washington, 1941.

SHIPPING AT PORT CHURCHILL, 1931–1938 (*Continued*)

						1,510	tons steam coal
						580	head cattle
						4,253	tons flour
1935	9	ships	called,	carried	away	2,407,000	bu. grain
						1,651	tons general cargo
1936	14	"	"	"	"	4,292,900	bu. grain
						1,680	tons general cargo
1937	2	"	"	"	"	603,982	bu. grain
						1,675	tons general cargo
1938	3	"	"	"	"	916,913	bu. grain
						1,400	tons general cargo

The fact that shipping grain from Churchill is two cents per bushel cheaper than from Montreal and 3½ cents cheaper than from Vancouver is not enough to divert grain from established channels. During 1937–38 these provinces exported 111 million bushels of wheat, oats, barley and flax seed through Port Arthur and Fort William. Through Vancouver the same year went 11 million bushels of grain.

Realignment of Prairie Economy—Attempts to solve the problem of the Prairies have been made, some locally, others in the Provincial capitals and in Ottawa. The Imperial Conference held in Ottawa in 1932 did little for the wheat farmers beyond telling them that England was no longer able to buy the great bulk of Canada's surplus wheat. When England adopted a protective tariff, Canada did receive as a benefit the imposition of six cents per bushel duty on non-Empire wheat entering Great Britain. This proved of little aid to Canada's wheat lands; consequently when in 1938 reciprocal trade agreements with the United States removed this duty, the Prairies did not protest.

The Agricultural Future—In order to put some limit on production a land classification board has been classifying wheat lands since 1922; such areas as are designated "public land" may not be sold for farming purposes without Provincial permission. Another form of alleviation has been the changes in the agricultural economy in some parts of the wheat country. Dairying is making some headway in the more densely-settled sections. The silo, often in economical subterranean form, enables the Spring Wheat farmers to make ensilage of oats, peas, clover, and occasionally the sunflower plant. Probably the Prairies must for years to come remain behind Ontario and Quebec in dairying, but in a 15-year period, Saskatchewan raised butter production from 9 million pounds in 1922 to 23 million in 1937. Alberta in the latter year produced 26 million pounds, and Manitoba 24 million pounds—about one third of Quebec's total. But the Prairies apparently have not skipped the meat-producing period which commonly succeeds pioneer grain farming.

VAL MARIE, Sask. (Canadian Press)—

In this southwestern Saskatchewan area the old West breathes again, more vigorously than ever. It's the west of cowboys, jingling spurs and round-ups.

Years of bitter trial and error ended and the short-grass acres are being restored to the service they can best perform—the feeding of cattle.

The restoration work is being done under the federal Prairie Farm Rehabilitation Act with the cooperation of the Provincial Government and municipal councils.

At Val Marie are two PFRA projects. One is quickly appreciated because of the gem of green fields lying between the sombre buttes about this town. The fields result from an irrigation project started in 1936 and which, with two major dams, eventually will serve some 10,000 acres of irrigable land in the valley. The second is the community pasture covering more than 160,000 acres among the gray hills and coulees.

When the rancher and the farmer both had failed the PFRA took over and has brought the land back to useful service in the pastures.

When a pasture is established farmers within its area are moved to other land where they will have more prospects of success, their moving expenses being paid by the Government and their acreage of submarginal land exchanged for a corresponding acreage in the new locality. There is nothing compulsory. If they want to remain they can do so and the pasture fences will circle their property, but most of them go readily. In this region, where farm cattle herds averaged, perhaps, five head, they now run to thirty-five or forty. For a small fee the farmers are able to leave their cattle on the pasture throughout the summer, and during these months beef cattle will put on from 300 to 500 pounds of weight and thus have their value increased by $30 to $50.

Therefore when wheat fails the farmer no longer suffers complete disaster. He has his fat cattle to sell in the fall when he takes them from the community pasture and has a market on which prices are upheld by Dominion Government purchases for overseas. Community pastures are under the care of experts in cattle management, water supplies have been developed and the grazing is so allocated that there is a sufficiency of feed even in dry years. Thus the farmer is able to depend on returns from cattle he sends to the care of the PFRA pasture managers and riders.

This has meant that the old arts of the cowboy are held in new esteem in Saskatchewan, which once concentrated on wheat to the near exclusion of everything else.

(*The New York Times*, Dec. 10, 1944)

Mineral Industries—Potential mineral wealth in this province is based upon petroleum and bituminous coal. The geographic center of Canada's oil fields lies in Alberta, near Edmonton, and Calgary. Oldest is Turner Valley, southwest of Calgary; newest are the Leduc-Woodbend fields, near Edmonton. The future looks bright for Canadian petroleum, but the distance from the Great Lakes and market makes necessary great capital outlay for transportation facilities. Government encouragement is not unlikely, due to disturbed world relations.

Three-fourths of Canada's bituminous coal lies within the Province of

Alberta, nearly 2,000 miles from the eastern Canadian market. The coal is reported to be of good quality, accessible for mining, and abundant.

Pacific Mountains and Valleys

Situation—West of the Canadian plains is a great province of high mountains and intervening valleys. It does not everywhere border the

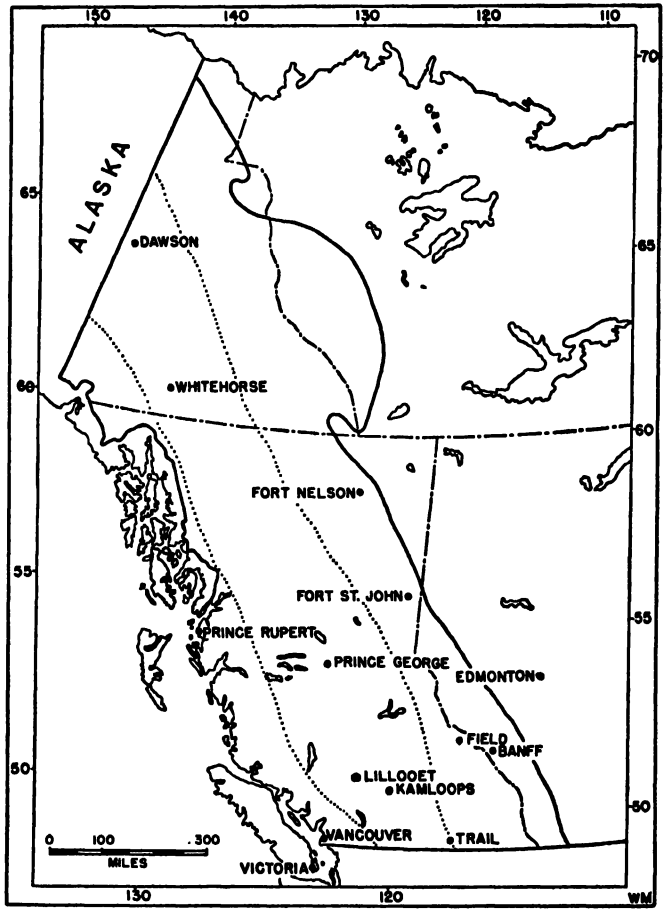


FIG. 149.—PACIFIC MOUNTAINS AND VALLEYS

Pacific Ocean; the northern half of the Pacific Littoral lies within the Territory of Alaska. The combination of high mountains and international boundary has given the Dominion a minimum of Pacific accessibility. Just north of the United States border there is a series of mountain passes which

give a corridor to the port cities of British Columbia. The other transmontane corridor is just south of the Alaska border at Prince Rupert. For the remainder of the Mountain and Valley province there is no railroad and no highway which offers direct connection between the interior plains of Canada and the Pacific Littoral.

While the general character of the Pacific Mountain province of the continent is somewhat the same, the five subdivisions of the Canadian Pacific province differ in many ways from those of the United States. Alaska, Canada and Washington have in the Coastal Ranges similar glaciated mountain valleys, deep fiords and altitudes well above 5,000 feet. For most of the Pacific margin there is the characteristic dense tree growth, almost a temperate jungle.

The Interior Basins lying immediately to the east of the coastal Ranges are not common to the United States or Alaska. For the most part they are deeply incised basins about 3,500 feet in elevation. Pinching this province off at the south are the Selkirk Ranges in which the most distinctive features are the great north-south glaciated trenches. The Rocky Mountain Trench on the east borders the Rockies for nearly a thousand miles. West of it are shorter valleys known as Purcell, Selkirk, and Okanogan trenches. In them are many of the small agricultural districts found in the southern part of this province. The Selkirks are more heavily forested than the Rockies.

East of the Interior Uplands are the Canadian Rockies, ranging in elevation from 13,000 feet in the south to 7,000 feet in the north. These mountains are more compactly grouped in the United States and more lofty and rugged than those in the Alaska section of the Rockies. Passes through the several mountain systems are relatively low, considering the elevations of the ranges in which they are found. Kicking Horse Pass in the Rockies is 5,339 feet; Crowsnest Pass farther south is 4,461 feet; Yellowhead Pass farther north is 3,711 feet; and Allison Pass in the Selkirks is 4,486 feet. Drainage is not entirely toward the Pacific; several streams cut through the Rockies to flow toward the Arctic.

East of the mountain province there is a very large area of rolling plains generally below 3,000 feet in elevation. This was treated under the Arctic Plains and part of it in western Alberta in the chapter on Prairie Provinces.

Climate—The climate of the Canadian Pacific province is amazingly diverse even for a mountain province. The marine west coast or temperate marine includes all of the Pacific Littoral where elevations do not make the temperature range greater than 43 degrees F. The larger part of the mountain block and the interior uplands may be termed moderate continental, with temperature ranges no greater than 50 degrees F. Severe continental includes the highest elevations and the plains lying east of the Rockies.

The July isotherm of 57.2 degrees F. is in Canada often taken as the northern limit for crops, which would therefore permit crop growth in most of the plains east of the Rockies and in most of the mountain valleys in the southern half of the province. The limiting factor is rainfall rather than temperature, with so many of the valleys lying on the leeside of mountains high enough to make them dry. Aridity is thus common to the valleys between the higher southern mountains, while humid conditions prevail in most of the valleys farther north.

Minerals—Only minerals with a present market could bring population to most of the valleys of so mountainous a province. Although there are active mines, mining has done little either to increase the population or to change its localization in valleys. Sullivan, one of the world's largest lead and zinc mines, is located at Kimberley on the eastern margin of the Purcell Range, in the Kootenay Valley of the Rocky Mountain Trench. This mine exports concentrates to its huge smelters and chemical works at Trail. Some of the sulphide is turned into fertilizer for Canadian markets.

Near Nelson there are many inactive silver, gold, lead, zinc, and copper mines. Bituminous coal is mined at Fernie in the southeast. Gold is still washed in the riffles of the Fraser River near Canyon Creek. None of these minerals centers, active or inactive, attracted any considerable number of people.

Agriculture—There are five general districts in this province where agriculture is carried on. The most important by far is the Fraser delta and the southeastern portion of Vancouver Island. This district is devoted mainly to peaches and apples, hops, dairying, and vegetable growing. These two areas together supply many of the needs of the near-by cities and towns such as Vancouver, Victoria, and New Westminster.

A second district lies about Lake Okanogan in the Kettle River Valley where fruit is the specialty. A third is the semiarid East Kootenay district where cattle ranching is the principal industry. A fourth is the Middle Fraser Valley where again cattle raising is the principal occupation; in the eastern part of this valley sheep are more important than cattle. The fifth agricultural district is an attenuated area from Prince Rupert to McBride where pioneer farming embraces wheat, poultry, cattle, and a great deal of hay.

Cities—The distribution of population in this province is almost entirely determined by the distribution of arable valleys. Even where mining is important, the pattern is not materially changed. Three-fourths of the entire population live in the southern third of the province.

Vancouver is Pacific Canada's largest city. It is located on a peninsula projecting into a large arm of the Pacific. The city was planned as a western terminus of the Canadian Pacific Railway in 1880, and in sixty years has

reached a population of 300,000. Across the Strait of Georgia lies Vancouver Island, largest of the thousands of islands which fringe Canada's Pacific margin. Victoria (39,000) on the island and Vancouver on the mainland have commercial access to the Pacific realm. The opening of the Panama Canal gave them a world market for Canadian products passing through these western outlets.

Brown Brothers

FIG. 150.—VICTORIA HARBOR

Through these splendid waterways Canadian commerce circulates in the Pacific

The island's rich deposits of iron and copper ores and of bituminous coal have become the principal centers of development along the entire Canadian coast. Cheap hydroelectrical power from near-by mountain streams has enabled Vancouver to become an important paper and pulp manufacturer. As a large port city the building of ships, refining of sugar, salmon canning, meat and fruit packing have become major industries.

Through its port go great quantities of wheat, wood and minerals from western Canada, and a great variety of manufactured goods enter Vancouver destined for all of the towns and cities of western Canada.

Another city of the Pacific province is New Westminster (21,700)

primarily engaged in lumbering and fishing. Prince Rupert (7,000) is a town planned to be a rail terminus utilizing the only reasonable pass through the central and northern Canadian mountain system. It has failed to live up to expectations as a wheat exporting port. Only the nucleus of the town's plan has been built. Normally its economy is based upon salmon and halibut fishing. During the Second World War the military and naval activities in Alaska made it a boom town for trade.[18]

Ashcroft packs tomatoes with labor recruited from an assortment of races and nationalities. Prince George operates two large creameries. Kamloops is the trading center for an irrigated farming district.

Fishing Industry—Canada's share of the Pacific Coast fishing industry is second only to Alaska in the catch of salmon and halibut together. Not all parts of the British Columbia Coast are engaged in the same type of fishing. Not all years are equally important in the total catch.[19]

Salmon—Salmon is the principal fish caught in the Canadian Pacific fisheries. The most desirable kind of salmon caught, the Chinook, is the least important in the annual pack. The Chinook or king salmon is the largest of the four varieties canned for food. It averages some twenty pounds. There may be more than one run or harvest of this fish. At least one river, the Columbia, has three runs. These fish spawn in fresh water at four years, then die. No true salmon lives to spawn a second time. The Chinook commands the highest price fresh, frozen, or canned. The runs of Chinook salmon have long passed their peak. The largest Canadian pack is from the waters of Puget Sound and the Fraser River.

The second most esteemed type is the sockeye or red salmon. This type is caught all along the British Columbian coast with the principal runs just north of Puget Sound. This fish is much more abundant than the Chinook, ranking second only to the pink salmon. Sockeye runs reach a maximum every four years.

The largest pack is of the third most desirable type of salmon for most purposes, the pink or humpbacked salmon. This type spawns in their second year and averages about five pounds in weight. The district of greatest catch is southeastern Alaska and British Columbia.[20]

[18] See L. Stevens, "Rise of the Port of Vancouver, B.C.," *Economic Geography*, Vol. 12 (1936), pp. 61–70; "The Grain Trade of the Port of Vancouver, B.C.," *Economic Geography*, Vol. 12 (1936), pp. 185–195; S. B. Jones, "Mining and Tourist Farms in the Canadian Rockies," *Economic Geography*, Vol. 9 (1933), pp. 368–378.

[19] J. Q. Adams, "The Pacific Coast Halibut Fisheries," *Economic Geography*, Vol. 11 (1935), pp. 247–257.

[20] Salmon pack for 1934:

4,261,262	cases	of	pink salmon
3,354,933	"	"	sockeye "
596,951	"	"	silver "
352,552	"	"	Chinook "

The chum or dog salmon ranks next to pink salmon in annual pack. Its yellowish color when canned has been one reason for its unpopularity as a food. Natives of Alaska dry this fish for winter dog food. The silver salmon is between chum and Chinook in point of pack, but somewhat inferior as a food fish, mainly due to color. There are no especially important districts for this type along the coast of British Columbia. Although Alaska dominates the salmon pack of the Pacific Coast with from five to seven million cases (48 one-pound cans), British Columbia ranks second with an average pack of 1½ million cases. The annual catch by types and by districts will change, but the over-all pack does not greatly fluctuate. The catch of sockeye salmon in the Fraser River—Puget Sound district, reached a peak in 1913 with more than a million cases, its prewar pack was about 15 per cent of this all-time high. The salmon fishing districts of the United States have generally declined, with the Puget Sound and Columbia River districts holding up best. The industry is seasonal and fluctuating; life in the tiny hamlets perched on piles near the canneries is likewise seasonal. Although mechanization has reached a high point in the canning industry, many migrant white and Indian workers move into company houses or private shacks during the canning season.[21]

Marketing—Although the bulk of the salmon catch is canned, a large part is frozen. Important quantities are sold fresh, salted, mild-cured, or smoked. The proportion of each variety marketed in this manner varies. Usually the finest and freshest Chinook and silver are selected for freezing; the sockeye is too oily. Although many canneries also freeze some fish, the largest refrigerators are at Seattle and Ketchikan, with Prince Rupert and Vancouver following in that order. British Columbia has about one-third as many canneries and a fifth as many refrigerating plants as the United States and Alaska. European markets regard smoked salmon as a delicacy; there is no other important market for this product.

Halibut Fisheries—The only other important fishing industry of the British Columbian Coast is the halibut industry. As a Pacific industry it is only about one-fourth as important as salmon. Since most of the halibut catch is sold frozen, there are no canneries dotting the British Columbian Coast. Unlike salmon, the halibut industry is dependent upon large urban markets in eastern United States. Modern refrigerated transportation by boat and train, together with the good keeping qualities of halibut, make it possible for this fishing industry to take place across the continent from its market.

Larger vessels, fewer fishing ports, no canneries, and two thousand miles of coastal fishing ground characterize this industry. The industry devel-

[21] See Otis W. Freeman, "Salmon Industry of the Pacific Coast," *Economic Geography*, Vol. 11 (1935), pp. 109–129.

oped at the close of the nineteenth century, and serious depletion of the fishing grounds plus Japanese competition make a not altogether promising future. Of the total halibut catch, British Columbia accounts for a little over 40 per cent.

When the Grand Trunk Pacific Railway came to Prince Rupert just before World War I, halibut fishing could move farther north into Alaskan waters. The Diesel engine, Alaskan refrigeration plants, and a declining halibut catch to the south, combined to move the centers of the halibut industry.

This large fish (40–50 pounds) with its white meat and good keeping quality has encountered considerable competition with Atlantic haddock, caught much nearer the market and generally marketed as fillets. Conservation measures are being introduced in the Pacific halibut industry; there appears to be no ultimate extinction such as met salmon in south Pacific waters.

Tourists—The national parks of the western Canadian mountains embrace but a fraction of the spectacular scenery. The Waterton-Glacier International Peace Park, the Banff National Park, with its Lake Louise, and Jasper National Park are the major large parks in this province. All are most easily accessible by rail; the principal exception is the Waterton-Glacier Park which has the newly opened Going-to-the-Sun Highway across the continental divide at Logan Pass, and a good road connecting with Glacier Park south of the border. The relative inaccessibility of western Canadian parks to the average summer tourist has kept down patronage. All depend upon tourists from the United States for the bulk of their income. Pacific Canada's recreation industry stands to gain from the spectacular increase in urban population in western Washington, Oregon and California. As with Alaskan industries, this is an absentee-owned and operated industry, operating only for a short season.

XX

ALASKA

Situation

Resources versus Location—Prior to World War II the fisheries and the minerals played a dominant role in the economic development of Alaska. It may well be that the most important circumstances in its future development will be its situation. The United States and Canada have been slow to appreciate that Alaska's position has been subject to change, and that this has thrust upon them, almost overnight, the unwelcome problems of its economic and military security. Only with intolerable slowness have both nations become aware of changes in the Pacific realm. Thus in 1942 Alaska had no railroad or highway connection with the United States or Canada, although for a thousand miles Alaska is Canada's western frontier, and

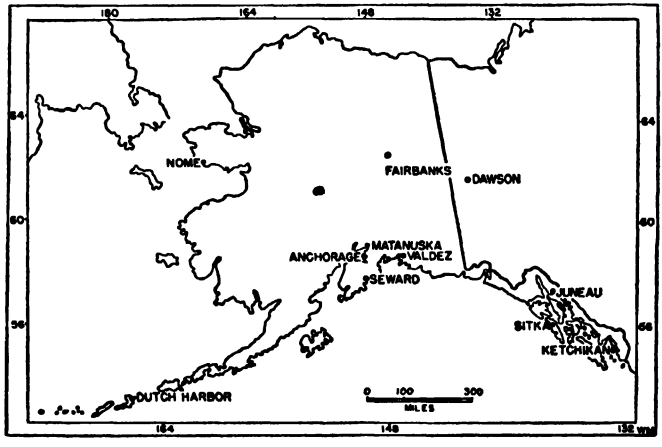


FIG. 151.—ALASKA

Seattle is but five hundred miles distant from southern Alaska. By early 1943 the United States Army had completed the Alaskan Highway from Fairbanks to the northern terminal of a provincial highway in Alberta.[1]

[1] Edmonton to Grand Prairie, Fort St. John, Fort Nelson, White Horse, and Fairbanks. This was selected after the rejection of an explored and approved route which followed a trough between the Coast Range and the Rockies north to White Horse, head of navigation on the Yukon River.

Pacific Relationships—With a globe and a piece of string one may see the Aleutian Islands in their true perspective with reference to the Pacific borderlands, more specifically the United States, continental Alaska, Australia, and the Orient. Three miles of seaway separates United States and Russian territory. On the globe one may observe that the Aleutians extend in a great arc westward from Alaska toward the mainland of Asia. Pearl Harbor is not on the shortest steamer route from San Francisco to Tokyo; rather such a route follows the Pacific Coast of Canada, Alaska, and the Aleutians. Dutch Harbor is some 5,000 miles from San Francisco, but only 2,500 miles from Tokyo. Names not on American lips since the days of the Alaskan gold rush were in common usage during the war. United States military and naval bases at Fairbanks, Sitka, and Anchorage in Alaska, and at Unalaska and Kodiak, probably the best sites in the Aleutians, were being feverishly completed in 1942.[2] Before American pilots and naval personnel can become as familiar with conditions in the north Pacific as the Japanese naval officers who have long "fished" these waters and explored the hundreds of snug harbors, much time will have elapsed and a great deal of money will be spent on bases and their lines of supply.

Paid Its Own Way—Furthermore Alaska is no part of the "white man's burden" as have been some units in the American empire. It has paid its own way, and handsomely. Already in Alaska fisheries and fur trapping have produced a billion dollars' worth of products and Alaska mines another three-quarters of a billion, all at a relatively small cost to the Nation and a handsome return on the original $7,200,000 investment.[3] Alaska differs from other parts of the empire in that the Federal Government owns almost all of the vast territory, and its problems and its opportunities are of concern to all the people of the United States. There seems to be evidence of a developing recognition of this relationship in and out of Government circles. Perhaps we have Japan to thank for this.

Relief

Major Features—Alaska's shape is such that although it embraces a longitudinal and latitudinal expanse comparable to that of the United

[2] The occupation of Alaska by the military forces of the United States created a bigger "boom" than the gold rush.

[3] IMPORTS AND EXPORTS OF ALASKA, 1922–42

YEAR	IMPORTS MERCHANDISE FROM U.S.A.	IMPORTS FROM OTHER COUNTRIES	EXPORTS MERCHANDISE TO U.S.	EXPORTS TO OTHERS	GOLD SHIPMENTS TO U.S.
1922	$26,777,806	$870,929	$51,082,995	$1,371,490	$6,640,978
1930	31,303,291	1,709,636	48,996,962	347,191	7,631,737
1940	48,039,410	119,833	40,973,952	411,315	20,926,967
1942	89,497,621	2,026,655	58,199,935	818,327	12,104,445

Statistical Abstract of the United States, 1944–45

States, its area is only about one-fifth that of the United States. The great central plateau of the Territory has a gently-rolling surface extending in a great arc from the Bering Sea to Canada's Yukon Territory. It is drained by two large rivers, the Yukon and its tributary, the Tanana. This is the only interior part of Alaska which permits agriculture to an appreciable degree.

Pacific Mountain System—Fronting on the Gulf of Alaska is the Pacific Mountain System consisting of three successive mountain groups. The Pacific borderland groups consist of the Chugach and the Kenai Mountains which extend westward as far as the Kodiak Islands. The Chugach include many peaks of more than 10,000 feet elevation. Some of the large glaciers reach the sea, making an impressive sight; of more than local fame are the Bering Glacier and the Columbia Glacier near Valdez.

Back of this coastal mountain group is a lowland drained on the east by the Copper River system. Immediately on the west is the Matanuska Valley. The second great mountain group comprises the Wrangell Mountains and the Aleutian Range in the Alaska Peninsula. The third and last mountain group between the Pacific Ocean and the central upland is the Alaska Range, a nearly continuous mountain barrier. It is breached by the headwaters of the Tanana River, producing a pass used by the Alaska Railroad.

One peak in this range is of especial interest, Mount McKinley, highest in North America (20,300 feet), rising higher above its plain than any peak in the world. Southwestern Alaska has both active and extinct volcanoes; most spectacular has been Mt. Katmai which in 1912 blew away its summit area during a three-day period of violence. An adjacent forested valley has since been known as The Valley of Ten Thousand Smokes.

Central Upland—North of the Pacific Ranges, interior Alaska consists of an extensive upland sloping westward to Bering Sea. This area is drained by the Yukon and Kuskokwim rivers.

Northern Margin—Marking the northern margin of the central upland is the Brooks Range. Extending southward along the Bering Sea and bordering the Brooks Range on the north is a relatively flat coastal plain. Neither the Brooks Range nor the peripheral lowland has appreciable economic value for the white man unless the petroleum in the coastal area proves to be a valuable resource. Only a few Eskimo villages are found along this bleak Arctic plain.[4]

Southern Alaska—From the state of Washington north to Alaska's main south boundary, the Pacific Coast is steep and broken. Glaciation and submergence of the coastal margin have given it curious indentations known as fiords. The fiords (locally known as canals) vary in length from 100 to

[4] Alfred H. Brooks, "The Physiographic Provinces of Alaska," *Journal of the Washington Academy of Sciences*, May 4, 1916, pp. 252–253.

200 miles, and in depth from a few hundred to two thousand or more feet. For a thousand miles this type of coastline affords an inland passage to Alaska. From a steamer one has spread immediately before him the Alpine landscape of lofty snow and ice fields, breaking fronts of glaciers, and waterfalls. Level land is so rare that agriculture, even grazing, is out of the question; even the few towns have had to blast their sites from the mountain slopes or are supported on piling above the Pacific. Accessibility to the interior of Alaska or to British Columbia is limited to a very few places and under anything but favorable circumstances. Perched upon these precipitous slopes, the few towns must draw upon the resources of the Pacific and upon certain minerals of the coast ranges for their livelihood.

The panhandle of Alaska has none of the advantages that accrue from trade through a region. The relief, the shape, and the climatic conditions of Alaska contribute toward its insularity. Varying appraisals of its elements of strength and of weakness from a military point of view are the cause of common concern throughout Anglo-America as this book is being written. In our increasing awareness of the physical and economic geography of the United States and Canada, the Pacific margin looms as an important area.

Climate

The Birthplace of Storms—Alaska has been termed the "weather factory" of North America. In 1941 the United States began seriously to observe the weather conditions of Alaska and distribute the data as a basis for the safe and intelligent development of airways. Among the phenomena studied are the curious Alaskan gales or "williwaws." The knowledge of Pacific weather conditions are to the United States and Canada what those of the Atlantic are to the countries of western Europe.

Lying north of the Pacific Ocean with a vast expanse of land to the east and separated only by Bering Strait from the still much larger land mass of Siberia, the main portion of Alaska is covered during the winter by relatively high atmospheric pressure. Just to the south there usually exists a trough of low pressure, the Aleutian Low. Through this "pressure valley" pass a great many of the cyclonic disturbances of North America in their west-to-east movement. The high Canadian mountains frequently cause a stagnation of air in the Gulf of Alaska which may last for weeks. The United States Army Air Corps in attempting to locate and blast the occupying Japanese forces on three Aleutian islands in 1942 encountered some of this stagnation.

Central Plateau—The Central Plateau, ranging in height from 2,000 to 4,000 feet has an extreme range of temperature during the year: from −76

degrees F. to 100 degrees F. is not uncommon. Rainfall is very low, ranging from 10 to 18 inches, much of it occurring during the summer months. The growing season varies from 75 to 100 frost-free days. At Fairbanks, about one hundred miles from the Arctic Circle, there is an average of 120 days of zero weather, and 234 days when the temperature drops to freezing at night. The total number (theoretical) of hours of sunlight is as great as in the Dakotas and plant development is rapid.[5] Snowfall is light and is needed to supplement the low summer rainfall.

Arctic Lowlands—The lowlands along the Arctic and the Bering coasts have even less precipitation than the interior upland, generally from 6 to 8 inches. Temperatures are less severe than in the interior, both in winter and in summer; they are however much colder than the Pacific margin. North of the Arctic Circle the long days of summer and the long nights of winter are experienced, but neither is the night so bright nor the day so dark as is commonly believed.

Southern Alaska—One of the smaller Alaskan climatic provinces, but by all odds the most important to the 30,000 whites living in Alaska, is the narrow strip of marine west coast climate paralleling the Pacific margin. Here the harbors are never frozen; the summers (50°–55° F.) and even the winters (20°–25° F.) are not greatly different from Washington's coastal section in the United States. Rainfall is heavy, from 50 to 200 inches annually, depending upon the location. Fogs and general visibility make this continental margin hazardous for airmen and for navigation of the Inside Passage. Although winter temperatures are relatively mild, the northerly latitude shortens the period of daylight to Arctic proportions. The other Alaskan climates supplement this coastal strip, but it is in this type that the United States has its principal economic and military stake.

Matanuska—In the Matanuska Valley summers are cooler than in the Dakotas, despite the longer day. Several weeks of growing temperatures prevail before the seeds sprout, due to the cold ground. Springs are therefore not the beginning of life in the Matanuska Valley. The usual summer day maximum is perhaps 70 degrees, and the summer night minimum is generally between 45 and 60 degrees. The dependable growing season even for hardy crops is usually ended by September.

For hardy crops there are 123 days of growing season; for tender crops there are only 105 days. Rainfall occurs all through the year, with the maximum in July and August. Thunderstorms are rare. In winter, which

[5] At the winter solstice, sunrise and sunset officially occur at about 9:03 A. M. and 2:54 P. M., respectively. At the summer solstice, they are, respectively, 2:09 A. M. and 9:54 P. M. Length of the period of sunlight does not mean that many hours of sunshine however. Very few sunshine data are available, but for Juneau, with a possible 17 hours of sunshine during the long summer days, there are actually fewer per year than at Boston. Boston's yearly total of sunshine is more than twice that of Juneau. These conditions of course vary with the several agricultural districts of Alaska.

may begin in October, the sun is so low that much of the sunlight is cut off by the Chugach Mountains bordering the southern margin of the Matanuska Valley. Snowfall is light, from 20 to 40 inches; its depth on the ground is modified materially by the occurrence of the periodic Knik or Chinook wind.

Population of Alaska

Ratio of Whites to Natives—About 80,000 people live in Alaska, somewhat fewer than fifteen or even thirty years ago. They are about equally divided between whites and natives of several types, including 1,200 Indians. No part of Alaska is densely populated, but there are more towns and villages in the Pacific Littoral than in any other province of the Territory. These towns are localized about two centers: the Inside Passage of the south, and the Cook Inlet and Prince William Sound districts. Ketchikan, (4,695), Juneau (5,729), Sitka (1,987), and Petersburg (1,323) are all in the panhandle and account for about one-third of the entire population. Indians live only in this and the Gulf of Alaska sections of the Territory.

Juneau—Juneau is the only modern city of the group; its start was gold mining and today it is the site of the Territorial Capital. Sitka, the old Russian capital, makes its living from the sea. Ketchikan, southernmost of Alaskan towns, is headquarters of the halibut fishing fleet which accounts for three-fourths of the 45 million pounds of halibut caught each year on the Pacific Coast. The salmon fishing fleet supplies the nine canneries with some half-million cases of 48 cans each. Millions of pounds of halibut, salmon, and cod for food, and herring for bait are frozen in Ketchikan each year.[6]

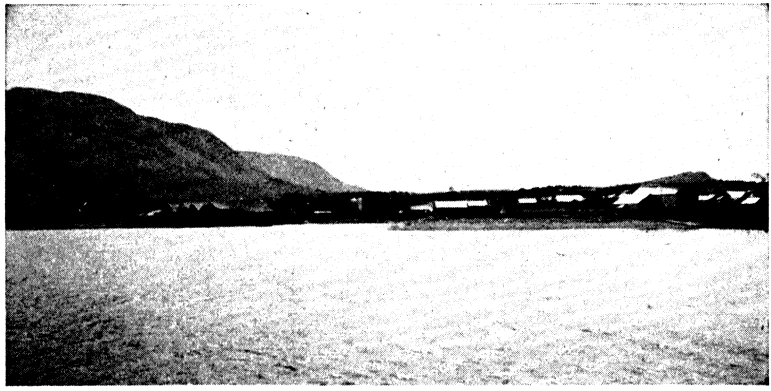
Wrangell (900), Skagway (500), Petersburg (1,300), and Douglas (600) are the other panhandle towns of some importance locally.[7] All engage in fishing in season and cut-wood. At Petersburg there is a large fish freezing warehouse. Douglas has one of the very few iron casting plants in Alaska.

Alaska Railroad Towns—The towns of the Cook Inlet district are more or less intimately connected with the Alaska Railroad and the Matanuska

[6] Fifteen miles south of Ketchikan, on Annette Island, live perhaps 500 Indians, originally from British Columbia, who own and operate the largest Indian cooperative in North America. The Metlakatla sawmill, salmon cannery, hydroelectric plant, water system, boat yards, and model town are all wholly the product of cooperative labor, aided by exclusive fishing rights within 3,000 feet of their island, given by the United States Government. For nearly thirty years these Indians have been adding to their original venture which consisted of a sawmill and a few fishing boats. In 1936, their share of the profits from the cannery was $117,000. In addition they received approximately $75,000 as wages for working in the cannery and from the sale of fish to the cannery.

[7] E. J. Foscue, "The Development and Decline of Skagway, Alaska," *Economic Geography*, Vol. 10 (1934), pp. 419–428.

Valley rehabilitation colony established in 1935.[8] Anchorage (3,495) at the head of the Inlet, has the shops and offices for the Alaska Railroad, although its terminus is at Seward farther south. This town was Government-owned and planned. Placer gold mining, coal mining, and the ubiquitous fish cannery have since been developed. This town experienced the throes of a second rush to Alaska, when the "occupation" of parts of Alaska by military and naval forces was a necessary part of the war strategy.



David W. Lantis

FIG. 152.—ANNETTE ISLAND AND METLAKAHTLA INDIAN SETTLEMENT

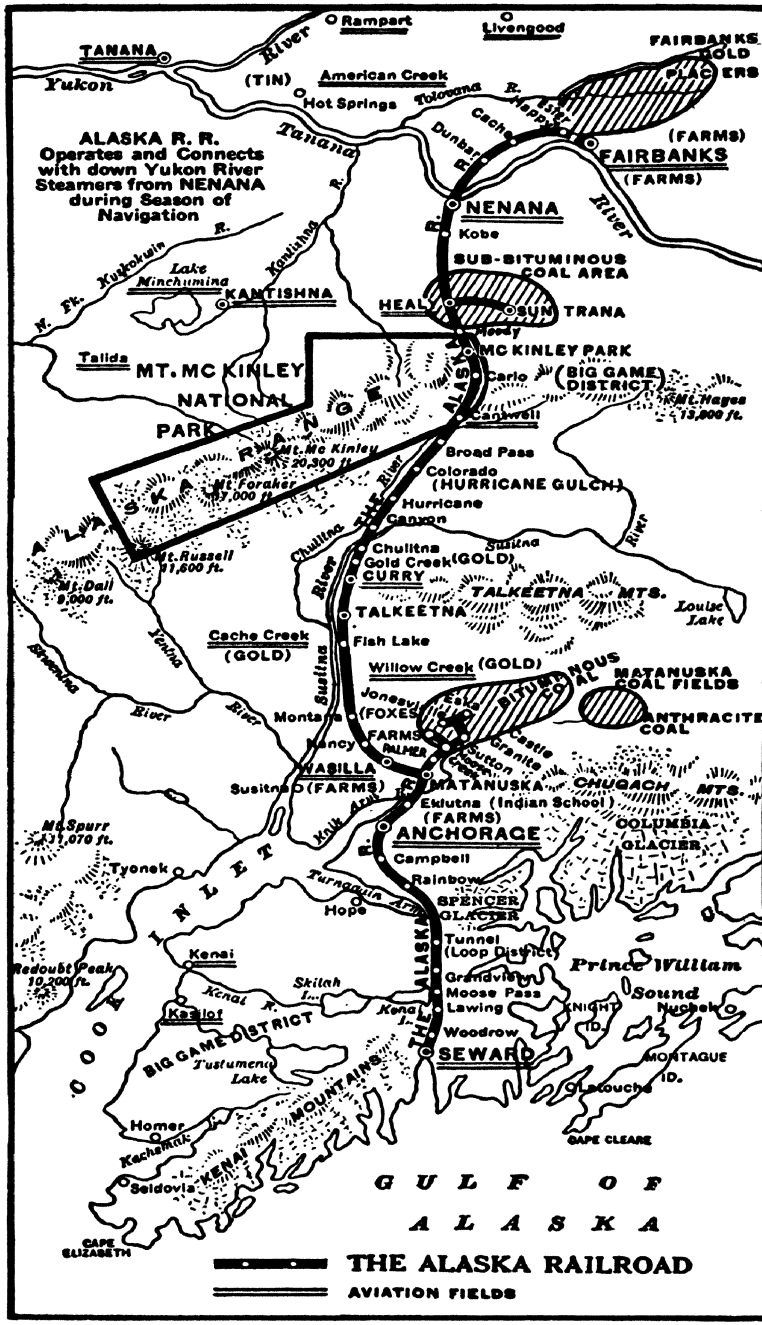
Seward (900) is the terminus of the railroad. It is unique among Alaska towns in that it is primarily a commercial center and lacks the usual mining, fishing, and fur interests. Palmer (1,000) is the administrative center for the new Matanuska Valley colony. Features of Palmer are consonant with its rail location and the Government-sponsored rehabilitation corporation of Matanuska: hospital, multi-storied municipal buildings, creameries, canning plant for vegetables, and freight warehouses.

Valdez, (600) on Prince William Sound, has an excellent harbor and is at the terminus of the Richardson Highway to Fairbanks. Blue fox, land otter, mink, and marten are regularly exported. Commerce and the tourist trade are increasing.

The only other town on this sound is Cordova (1,000). As the terminus of the privately owned Copper River and Northwestern Railway before it closed, Cordova was the distributing center for the rich copper-mining

[8] THE ALASKA RAILROAD, 1914

Miles operated	500.8
Revenue passengers carried	84,300
Tons of revenue	
freight, coal	229,961
miscellaneous	397,886

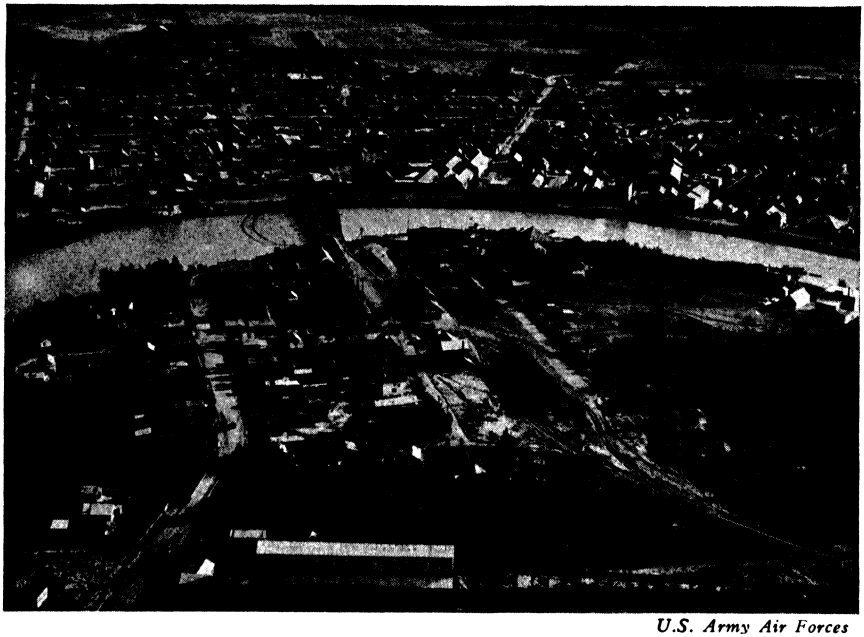


U.S. Department of the Interior

FIG. 158.—REGION SERVED BY THE ALASKA RAILROAD

area around Kennicott, the copper and gold workings in the Wrangell Mountains, the former Katella oil field, and the Sound fishing region, numbering perhaps 3,500 people. Recently it has depended upon lumbering, salmon and crab canning, and clam digging.

The remainder of the Pacific province of Alaska is very thinly populated. This embraces the borderlands of Bristol Bay and the Aleutian Islands. Fur farming, salmon fishing, tin, platinum, and gold mining, and the



U.S. Army Air Forces

FIG. 154.—FAIRBANKS

Note the length of shadows, particularly of the bridge

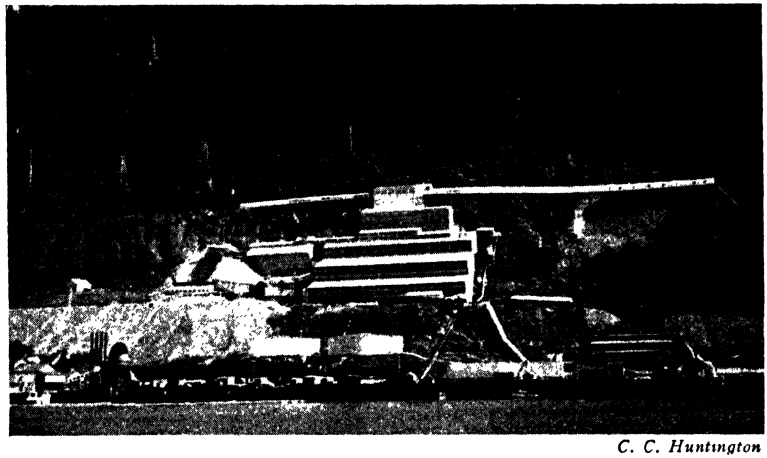
policing of these industries have engaged the inhabitants. This became one of the active military bases of the Territory during the War. Far to the west, on the remote Seward Peninsula, is Nome (1,559). Access to this outpost of the United States is by boat and plane and the former in summer only; there is no harbor here to facilitate off-shore commerce.

Fairbanks—Fairbanks (3,455) in the interior on the Tanana River, is the terminus of the Territory's only railroad and the principal highway. This town lives intensely during the short summer in order to survive the long cold winter. It began as a gold camp and has continued gold extraction as a sober industry in which nothing is left to chance. Upon the completion of the Alaska Railroad in 1923, the evolution of Fairbanks from a gold camp to a modern city began; if a second factor was responsible for

the transformation it has been the extensive use of the airplane for freight and passengers. Forty planes operate continuously out of Fairbanks on every conceivable kind of errand, from moving supplies and even lumber to isolated communities to rescuing round-the-world flyers. The military constructed an immense base for the Army Air Corps, accommodating perhaps 2,000 planes and two or three times as many men. A short distance from the city is College, the seat of the University of Alaska, one of the sixty-nine land grant universities of the United States. Among its students are men and women from most states in the Union.

Mineral Industries

Gold—Seventy years have elapsed since the first gold prospectors stormed Alaska. In 1880 Wrangell was the center of a migration headed for the gold of Canada's Cassia district. The same year Juneau had its first gold



C. C. Huntington

FIG. 155.—STAMPING MILL OF THE JUNEAU GOLD MINING COMPANY

The mine is just beyond the mountain settlement.

mining in the Silver Bow Basin.[9] Juneau again boomed in 1896 when gold production on Klondike Creek in the Yukon country of Canada began its phenomenal rise. Skagway came into being and within a year had 15,000 population. The first stampede in Alaska itself was along Anvil Creek near Nome, in the summer of 1898, reaching its climax in 1900. Fairbanks had its first gold rush in 1902, and thousands of prospectors came in from the Klondike, from Nome, and up the trail that today is

[9] "Alaska Juneau: Gold Mine," *Fortune*, Vol. 5 (1932), pp. 30–33, 120–121.

the Richardson Highway. Less spectacular gold fields became known at intervals up to World War I.

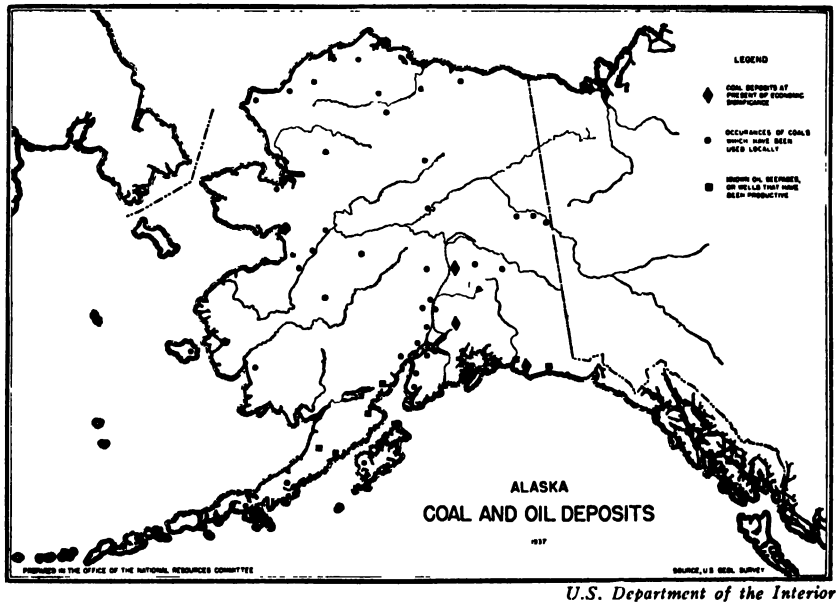
The picks, shovels, and pans of the early prospector soon gave way to the sluice box and later to hydraulic placer mining. This type of mining dominated until World War I; since then the proportion has been about 60 per cent placer mining and 40 per cent lode mining. Placer mining has been brought to a high degree of refinement in Alaska, despite the handicap of frozen ground and dry summers. This type of operation is used in most parts of Alaska, the principal exception being the southeastern part of the Territory. Lode mines are to be found for the most part in southeastern Alaska and the Willow Creek district near Anchorage.

Placer mining can take place only during the short summer, and even then the ground may be frozen as much as two hundred feet under the insulating cover of muck and other materials. Literally scores of miles of pipe are used to thaw out the ground and to bring water from great distances for the mining operation. Huge dredging machines wash and recover the gold from about nine million cubic yards of gravel per day. Wages must be high to attract men to these isolated places; the capital investment in equipment is high; obviously the whole process necessitates large scale treatment of gravels if there is to be any profit. Similar methods are employed in California gold operations, but at half the cost. The individual operator still works the smaller, rich placer deposits, however, and will in all probability continue to do so.

Copper—Less spectacular in its development, and thus far only half as important in its total return, copper mining has nevertheless become an important Alaskan industry, ranking next to gold. Present prospects are that copper will continue as an important industry after gold is gone. The feast or famine characteristic of copper mining in the United States is not lacking in the Alaska industry. When copper prices are high, copper surpasses gold mining in importance, the period of the First World War was a case in point, and so was the second. More than a billion pounds of copper have come from the Kennicott mines in the Copper River region, from the Ketchikan, and from the Prince William Sound copper districts. The most productive of Alaskan copper mines closed in 1938, following the exhaustion of paying ore at current prices. In all of these districts it has been necessary to invest a great deal of capital in the mining, extraction, and transportation of copper to tidewater. The Kennicott interests included a privately built railroad costing 23 million dollars.

Silver—Silver is of relatively little consequence among Alaska's minerals. Nearly three-quarters of all the silver produced is a joint product of copper mines. Silver, tin, lead, platinum, aluminum, and coal combined amount

to only 5 per cent of the Territory's mineral output. Tin has been mined on the Seward Peninsula for a long time, but the total value of the output is about that of copper for 1938. Platinum is mined in the Goodnews Bay district, in the lower Kuskokwim region. Lead is mined at several places in southeastern Alaska; its price is so low that the industry is of minor importance. Although petroleum has been produced for several years on the coast east of the mouth of the Copper River, production ceased altogether



U.S. Department of the Interior

FIG. 156.—COAL AND OIL DEPOSITS

in 1934. The oil prospects are believed to be good along the Arctic Plain and elsewhere in Alaska, but low prices obtaining in the fields farther south in California prevent the development of new fields in the Territory.[10]

Coal—Although Alaska has the only good coal on the Pacific borderland, very little is mined there. The quality of some of its bituminous coal is up to United States Navy standards; a good grade of anthracite is also found. The construction of the military bases and the increased economic

[10] ALASKAN MINERAL PRODUCTION

	1920	1930	1940	1943
Copper	66,094	36,380	128	62 (1,000 lbs.)
Gold		107	757	110 (1,000 fine oz.)
Silver		392	173	46 (" " ")

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activities during the War stimulated coal mining. The Healy coal field in the central upland, supplies the city of Fairbanks and the large placer mining companies with quantities of coal. The Matanuska field supplies the Alaska Railroad, the town of Palmer, and the growing demand in the Matanuska Valley.

The potential petroleum resources of Alaska are not known nor are they predictable on the basis of facts now available.

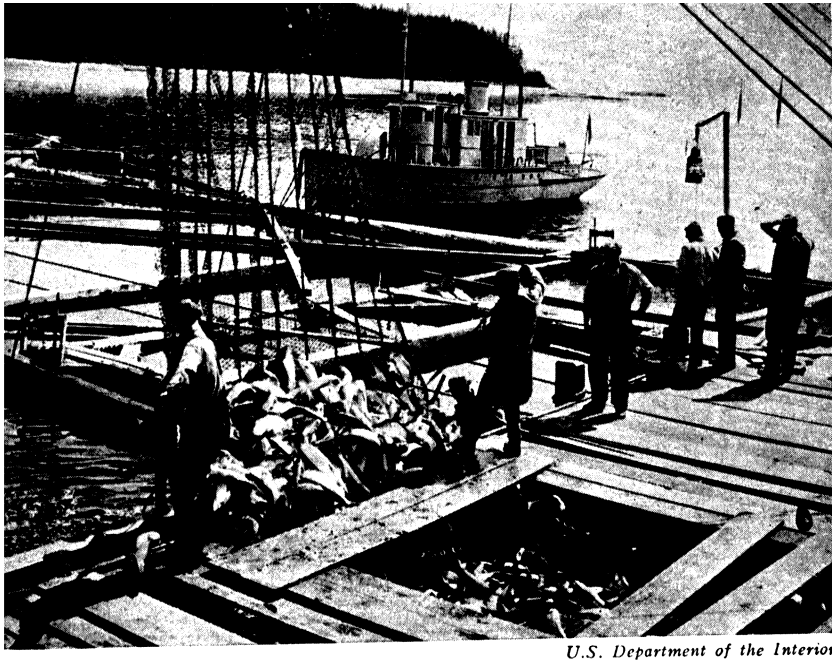

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FIG. 157.—BRAILING SALMON OFF THE ALASKAN COAST

Fishing

Share in Pacific Fisheries—The Alaskan fishing industry has developed along the same continental lines as that of the United States and British Columbia. It started off California, moved northward through the Pacific waters of Oregon, Washington, and southern Alaska to its present center off central Alaska. With many harbors, many fish, and open winters, Alaska has become the most important of the world's salmon fisheries. Relief and climate have kept Alaska's population concentrated upon the Pacific margin; absence of alternative opportunities has forced many of these people to turn to the ocean for a livelihood. The Japan current with its wealth of sea vegetation and animal organisms upon which millions

of fish feed, made Alaskan economy maritime. Fish in these Pacific waters are many times as important as off the Atlantic Coast, and the fishing industry is 50 per cent greater in value than all minerals combined.[11]

Alaska made its bid for commercial fishing in 1878, and by 1890 it had surpassed the salmon catch of the Columbia River. Although the salmon catch has declined somewhat since 1936, there are still no other salmon fisheries in the world equal to Alaska's, and the pack is three times that of British Columbia salmon. The international nature of salmon fishing has made conservation difficult, not only between the United States and Canada, but between Japan and the United States as well. The Anglo-American agreement has been put into effect, but Japan violated the spirit if not the letter of an earlier agreement by catching the salmon in the open sea as they head for inland spawning grounds. Floating canneries complete the job of pelagic destruction.

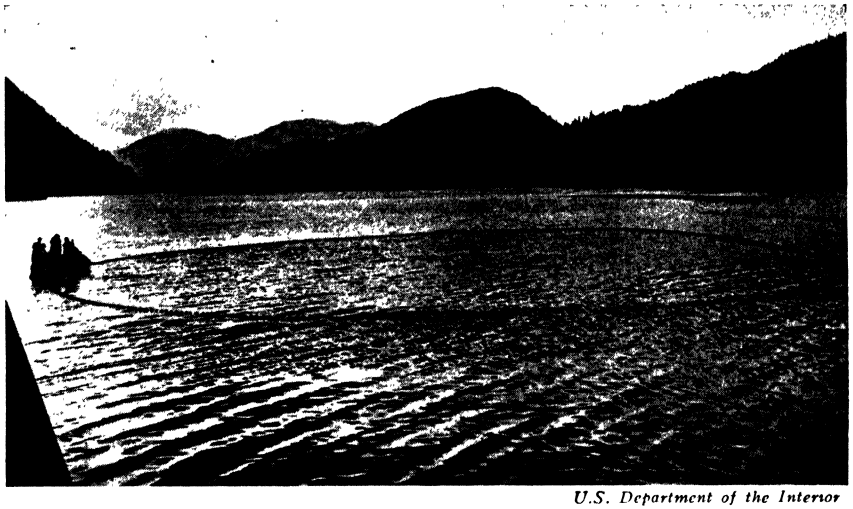

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FIG. 158.—PURSE SEINING OFF THE ALASKAN COAST

Commercial Species—Five species of salmon are caught in Alaskan waters; in order of importance as a food export they are: sockeye, Chinook,

11 FISHING INDUSTRY, U.S. AND ALASKA, 1942

SECTION	FISHERMEN	VESSELS	PRODUCTS	
			QUANTITY	VALUE
			(1,000 lbs.)	($1,000)
Alaska	8,564	4,161	522,179	17,933.6
Pacific Coast States	21,047	8,489	1,374,688	49,244.1
New England States	15,044	7,384	705,962	36,293.6
Gulf and So. Atlantic States	27,941	16,194	575,533	14,644.9

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humpback, coho, and dog salmon. The finest and freshest salmon may be frozen and stored for export in large modern refrigerator depots at: Ketchikan, Juneau, Sitka, and Petersburg. Sockeye and Chinook salmon are canned for export. Some coho salmon are mild-cured for the makers of smoked salmon, particularly in western European countries. The dog salmon is dried for dog food.

The salmon feed a few miles offshore for three years preceding the one and only spawning in the headwaters of rivers. They are caught as they ascend the streams.

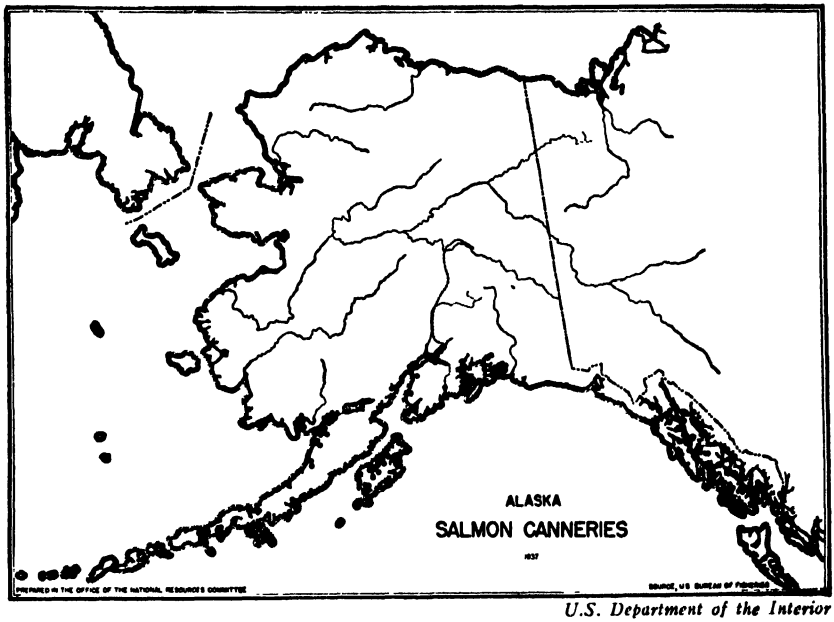
Guy-Harold Smith

FIG. 159.—SALMON CANNERY, CORDOVA, ON THE ALASKAN COAST

In order to ensure an adequate spawning season, the fishing season has been restricted by the United States Government. Alaskan canneries are perforce located on the steep-sided coastal margin. The Chicago packing plant technique has been applied to every step in the preparation of salmon for the market. An "iron Chink" has largely supplanted the Oriental upon whom the industry once depended; it has not entirely supplanted him however, for a large number of laborers have to be imported for the canning season, as estimated 18,000 out of the total of 30,000 wage earners in the industry. The peak year, 1936, witnessed a pack in excess of eight million cases of 48 one-pound cans each. In 1940 the pack was 5,069, and in 1943 it was 5,428 thousand cases of 48 one-pound cans each.

Most of the North American halibut are caught in the Pacific between Puget Sound and Dutch Harbor in the Aleutians. They are exported frozen and fresh; virtually none is canned. Halibut are caught with long

lines in the deep waters farther offshore. The yield, time, and place of catch vary from year to year. Generally the season closes early in September, although in some areas it continues into October. This lack of uniformity has tended to drive the small operators out of business.



U.S. Department of the Interior

FIG. 160.—ALASKAN SALMON CANNERIES

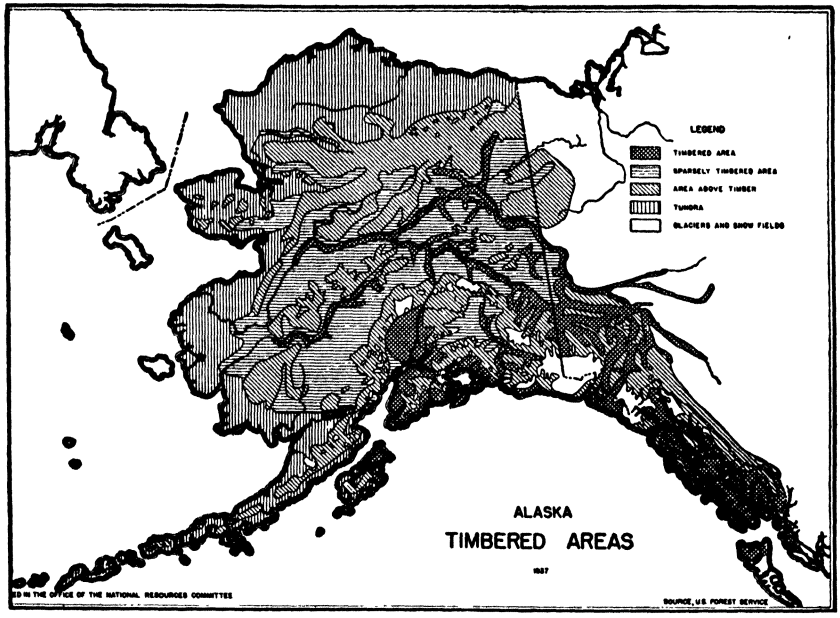
Furs

Fur Seal—The two main Pribilof Islands (St. George and St. Paul) some 200 miles northwest of Unalaska, localize the major part of the Alaskan fur industry, both seals and foxes. After a reckless exploitation of the fur seal, an agreement was reached in 1912 among the United States (90 per cent of the seals), Russia, England, and Japan whereby the killing was to be done under strict Government supervision. As a result, the seal population has increased to over three million from a low of perhaps 200,000 when the agreement was reached. This is a far cry from the five million believed to have once visited these barren shores. The habits of the seal have made its destruction an easy matter when the herds return to these islands to bear their young.

Foxes—Some of the same islands have so-called blue foxes both running wild and cared for on farms. The moist, cool wind-swept islands seem

to make the fur finer, thicker, and longer than most fox fur; in addition it has a blue undercoat that is peculiar to foxes in a very few parts of the world. These islands are so youthful that their volcanic soil supports only a luxuriant grass, no tree growth.

Most of the fox herds are privately owned, but the United States Government has one herd that produces about 1,500 skins annually. On one of the islands there is the only known herd of sea otters remaining; their skin is priced perhaps even higher than that of the blue fox or seal.



U.S. Department of the Interior

FIG. 161.—ALASKAN TIMBERED AREAS

Fur Markets—Virtually all of the 50,000 skins of the three-year-old male seals taken annually are sent to St. Louis for preparation and sale at fur auctions. This largest primary fur market in the world not only receives most of the seal and all of the blue fox pelts taken on the Pribilof Islands, but a large proportion of other herds of the same animals from other parts of the world. New York City then takes nearly all of the skins for tailoring into garments.

Forests and Lumbering

Lumbering One of Three Major Industries—One of the three major industries of Alaska is based upon the forest resources of the Pacific moun-

tain province.[12] The lower slopes of the mountains up to 2,500 feet are covered with a dense stand of timber, a large proportion of which is classed as merchantable. Heavy rainfall rather than extremes of temperature have prevented much diversity in this forest. Hemlock and spruce predominate; broadleaf deciduous trees cannot thrive in this coniferous forest. Sitka spruce is the most valuable tree, with hemlock offering possibilities as pulp. Estimates of Alaska timber indicate it is the equivalent of two years' consumption by the United States.

Complements United States Resources—The United States is seriously deficient in pulpwood, and the future appears to suggest that Alaskan forests can be made to produce revenue over a long period of years only if pulpwood is their principal export. What the prospects are for southern slash pine, remains to be demonstrated, but the future is by no means assured for this Alaskan industry. Virtually all of the Territory's merchantable timber is confined to the coastal mountains and valleys. Elsewhere it is too dry or the seasonal extremes of temperature militate against tree growth. Sitka spruce is exported to China, Japan, Australia, and the United States; some is used for the prosaic packing case for canned salmon. If and when a market is developed for pulpwood, Alaska is abundantly endowed with water power for the generation of electricity to process the wood. Mountain streams on the Pacific margin offer year-round power sites, with melting snow to augment the low summer rainfall. No other part of the entire Pacific borderland appears to offer such an opportunity for pulp manufacture.

Agriculture

Alaska's Great Size Reflected in Its Agricultural Backwardness—In 1938 Alaska imported about $5,000,000 worth of food that could have been produced in Alaska, so far as soil, climate, and crops are concerned. Yet the complaint most often heard from the Matanuska Valley colony concerned the lack of market for their agricultural produce.[13] These two seemingly incompatible statements may be entirely true. Circumstances which have contributed to this arise largely from the following: Alaska's area of about 600,000 square miles supports but two fairly large areas of crop agriculture, the Matanuska Valley in the Pacific margin, and the Tanana Valley in the interior; most of the Territory's population lives in the southern panhandle and the region adjacent to the mouths of the

[12] L. A. Wolfanger, "Economic Regions of Alaska," *Economic Geography*, Vol. 2 (1926), pp. 508–536; A. L. Seeman, "Regions and Resources of Alaska," *Economic Geography*, Vol. 13 (1937), pp. 334–346.

[13] The 15,000 permanent residents within distributing distances of the four farming districts of Alaska, annually import from Seattle farm produce valued at about $1,000,000.

Copper and the Matanuska rivers. Many of these people are closer to the farms of Washington than to Alaska's. The utter lack of transportation except by water, and for a few places by air, inevitably places on the Alaskan grocery shelves foods from the United States.

Ample Purchasing Power—Again, there are few if any poor whites in the Territory; only the Indians and natives are poor. The exports of furs, fish, minerals, and wood give ample purchasing power to white Alaskans, despite the fact that ownership of most of these industries is in the hands of absentee interests. Finally, there is a sort of temporariness about white Alaskan occupancy; there is a desire to remain dependent for food upon the United States, to which they will eventually return.

Such an agricultural principle as "Feed the family, feed the stock, and sell the rest" does not fit the crops, the role of the livestock, or the wishes of most of the poor Alaskan farmers. The farmers are in the minority; relatively high wages prevailing in all industries, as well as the inhospitable farming environment, conspire to make a self-sufficient type of agriculture physically and economically out of the question. The development of agricultural specialties is consistent with the fact enumerated above. If and when the freight-carrying airplane becomes an economical means of transport in Alaska, a new agricultural regime may dawn for Alaska's farmers. So long as every major industry has to import labor from "outside" every summer, farming is not apt to attract many recruits.

Agricultural Areas—There are two relatively important and two much less important farming districts in Alaska: Matanuska Valley, Tanana Valley, Kenai Peninsula between Cook Inlet and the Kenai Mountains, and parts of the Kuskokwim and Yukon valleys. For grazing purposes there are many different kinds of pasture lands, totaling perhaps 40,000 square miles or about the size of Ohio.[14]

Matanuska Valley—The Matanuska Valley center of the Alaska Rehabilitation Corporation embraces an area about the size of Rhode Island. It is divided into 250 farming units varying in size from 40 to a hundred acres, for the 190 families living there in 1944. The Corporation cleared the rather dense forest of cottonwood, alder, birch, spruce, and willow, generally under 18 inches. By 1944 there were some 7,000 acres cleared for farming purposes. In May 1935, lots were drawn for the new farming locations by approximately 200 colonists from the Upper Lakes region in the United States. All necessary purchases were financed by the Federal Government. Clearing the land, constructing communications, and organization of cooperatives were all aided by the Government. Nine years after this initial venture, the Matanuska Valley presents a rural landscape which

[14] A. L. Seeman, "Development of Reindeer Activities in Alaska," *Economic Geography*, Vol. 9 (1933), pp. 292–302.

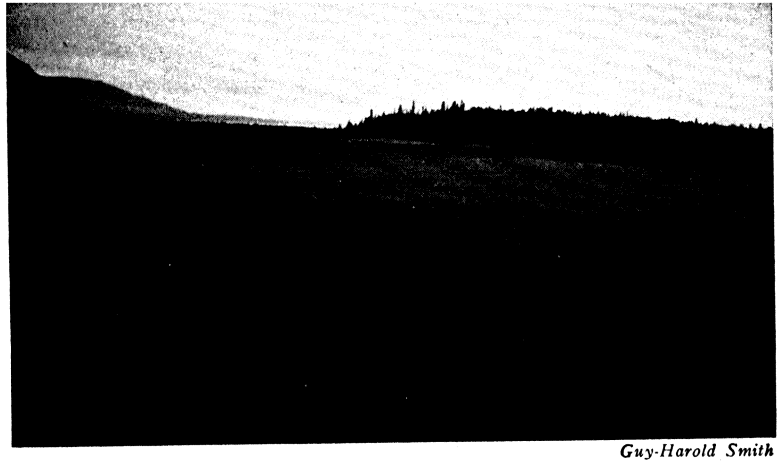
David W. Lantis

FIG. 162.—MATANUSKA VALLEY FARMSTEADS AND THE CHUGACH MOUNTAINS

Guy-Harold Smith

FIG. 163.—A PIONEER'S HOME IN THE MATANUSKA VALLEY

may be a preview of what many Alaskan farm communities will be like in the future. A tent community has become a settlement of 180 well-built log houses of from six to eight rooms. Each home has a substantial red-painted barn. Berries, white potatoes, cabbages, oats, peas, hay, poultry and dairy products are produced in quantities great enough for export to the towns along the railway. In 1943 the greatest increase in farming had taken place in dairying; there were 700 dairy cows, mostly Holstein and Guernsey. Milk was selling at $6.20 per hundred pounds. The hay used to feed these herds and about an equal number of swine (there are very



Guy-Harold Smith

FIG. 164.—OAT FIELD IN THE MATANUSKA VALLEY

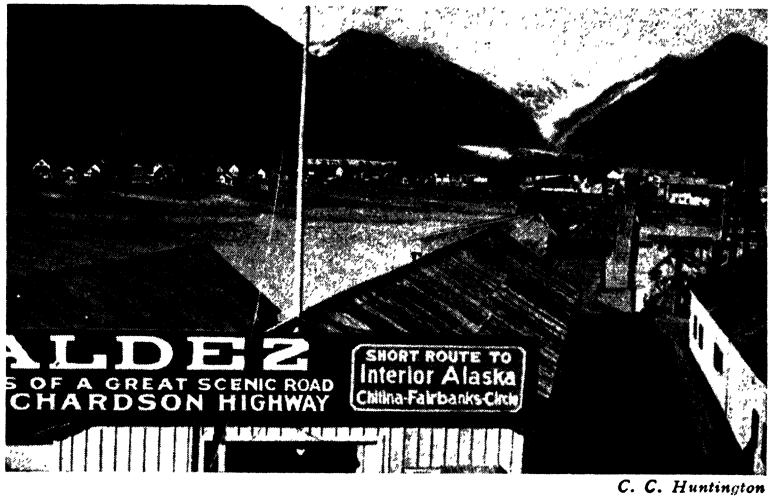
few beef animals) was usually a mixture of oats and pea vines or of vetch and oats, yields averaging about 3 tons of dry hay per acre. Due to its low price, barley is often used for corn in poultry (27,000) and stock feeding. Legumes and soybeans will not do well in the Valley.

Among the small grains, oats yield about 45 bushels, barley 23 bushels, spring wheat 22 bushels per acre. White potatoes yield well; in 1943, 3,000 tons were grown. Nearly all of the buying and selling are done through the Matanuska Valley Farmers Cooperating Association; this organization paid back to the members in 1941 $105,000, a sum half again as great as in 1940.

To process some of these products, the Association has established a vegetable canning plant, a cold storage plant, and a creamery. These together with the hospital, power plant, warehouses, school, trading post, and the offices and residences of the administrative officers constitute a landscape very much in contrast with other Alaskan and many United States rural areas. No other agricultural community has had such Federal

backing, not excepting the Federal Resettlement projects in the United States. The colony is not solely the creature of the Alaskan environment, even though fundamental changes have taken place there.

Prospects—The impact of World War II and the post-War readjustments may bring the shortcomings of this venture into the limelight. The year 1942 saw 5,000 acres of cleared land lying idle as the farmers secured remunerative employment on government projects of several kinds related to the war effort. There is a strong feeling that the present 40-acre holding is too small to support the homesteader under the present econ-



C. C. Huntington

FIG. 165.—VALDEZ

omy. Settlers complain that there has been no long-time marketing program established. These settlers also feel handicapped in that they are not able to participate in mining, boat transportation, or an agency for some concern in the States. In other parts of Alaska, most of the whites have been able to engage in at least two of these means of earning a livelihood. The prospect of continued large government pay rolls in this and other Alaskan districts promises a modest return for Matanuskans. No one seems to feel that there will be the striking population increase experienced in the Soviet Arctic.

Tanana Valley—By no means so important as the Matanuska in its present development, but embracing a greater area, is the Tanana Valley, 250 miles north of Matanuska. In its physical characteristics it is largely in contrast with the southern colony. Winters are colder, summers are hotter, and both are drier than in Matanuska. Oats and barley grown for grain, potatoes, raspberries, currants, blueberries, and dairying are the

principal sources of income for the few farmers (2,000) supplying the market of Fairbanks.

Commerce and Manufacturing

Passing of Insularity—Except in a limited military sense the insularity of Alaska did not pass with the completion of the new highway through Canada. Perhaps the freight-carrying airplane will accomplish for Alaskan

Pan American Airways System

FIG. 166.—ALLUVIAL PLAIN AND HARBOR MUD FLATS OF SKAGWAY, 1937

communities what the railroad can never do. A start has been made in this direction by the light planes now carrying all kinds of goods among many of the towns. Pan-American Airways, Alaska Division, follows the coast, while a Canadian line runs north from Vancouver and Edmonton to Fort St. John and White Horse, where it joins the Pan-American line. By this latter route Chicago is 4,000 miles closer to Shanghai than by way of the steamer routes.

In 1941, 30 Alaskan airlines flew 7,900,000 miles, carried 4,900,000 pounds of freight, 41,703 passengers, and utilized 130 landing fields. The most important link is between Juneau and Fairbanks and over this line green vegetables, eggs, fruits, and other perishable foodstuffs have been regularly flown. New bases and greatly increased garrisons are now multi-

plying the burden of these airlines. Speed is imperative. The payroll is regular and continues throughout the year. As in the case of minerals, fishing and canning, and lumber industries, and Matanuska Valley agriculture, these new communications will be developed at Federal expense.

TABLE 19

ALASKAN AIRWAYS

FISCAL YEAR ENDING JUNE 30	NO. OF PLANES IN SERVICE	PLANE MILES	PASSENGERS CARRIED	MAIL, EXPRESS	FREIGHT
1930	24	338,122	3,654	17,690 lbs.	103,043 lbs.
1931	26	381,234	7,947		161,718 #
1932	31	742,854	6,637		496,680 #
1933	42	1,059,155	7,743	151,570	634,016 #
1934	56	1,126,610	10,194	124,972	869,398
1935	73	1,685,654	13,318	225,840	1,496,917
1936	79	2,130,929	16,982	279,720	2,138,886
1937	101	2,209,206	20,958	487,630	2,940,757
1940			25,000	500,000	3,500,000
1945			53,800		3,000,000

(# includes mail)

Source: *Regional Planning*, Part VII—Alaska, December 1937, p. 175; Dept. of Interior, release 1946.

Manufactures—As has been noted, the manufactures of Alaska are primarily the conversion or the packing of fish, minerals and forest products. A few simple subsidiary industries have been established, but the future appears to cast Alaska as a market for factory goods made in the United States.

The Alaskan Problem—Although comparisons with the countries of Europe invariably disparage Alaskan development, their respective situations are so different that comparisons are not fair. As the Governor of Alaska has stated, "Alaskan economy rests none too securely on two industries, both seasonal, both absentee-owned, and both dependent upon migrant labor." Estimates as to the carrying power of Alaska vary widely, partly because too little is known of Alaska, and partly because its carrying power is a correlative of that of the United States.[15] Perhaps ten million people will ultimately live there; before they do, such frontier phenomena must pass as highway tolls of $9.27 per ton of freight, and 52 Federal agencies exercising jurisdiction there. The degree to which the United States absorbs into its economy Alaska, the Great Plains, and the dry basins west of the Rockies may well be a measure of our national well-being.

[15] V. Stefansson reports in the Yearbook of Agriculture, 1941, p. 215, "During the past ten years, Soviet Arctic shipping has increased many thousand per cent. The population of several Arctic towns and cities has greatly increased, for instance Archangel in 1926 had 76,774 population; in 1939 it had 281,091."

XXI

NEWFOUNDLAND, LABRADOR, GREENLAND [1]

Although not a part of Canada, Newfoundland is included in this book not only because of its location but also because of intimate economic relations with Canada. Situated on the eastern "hump" of the continent, Newfoundland has played an important part in the affairs of the United States and of Canada in time of war. Since the Second World War these two countries have had a number of large bases established in Newfoundland and in Labrador. In war and in peace Canada has had important economic relations with her large eastern neighbor.

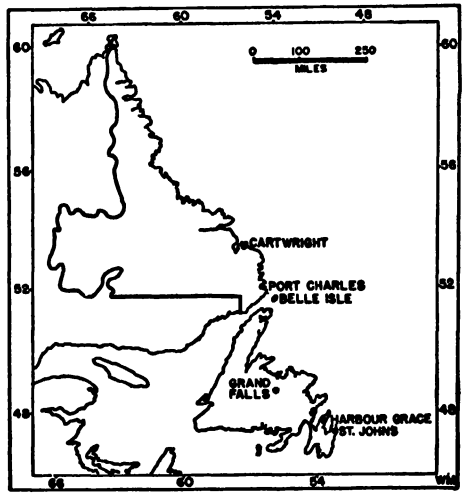


FIG. 167.—NEWFOUNDLAND AND LABRADOR

The Land—Newfoundland is an island about the size of the state of Ohio, separated at its northern tip from the mainland by the narrow Straits of Belle Isle. The entire coastline of this nearly-equilateral triangle of land is forbidding and exceedingly irregular due to glaciation and submergence of an ancient mountainous upland. The surface of Newfoundland is a rolling plateau, sloping from a maximum elevation of 2,000 feet on the west to about 700 feet on the east. Parts of the southern margin

[1] Incorporation of Newfoundland and Labrador into the Dominion of Canada has taken place since this chapter was written.

are lower. Long Range, the one mountain range in Newfoundland, parallels the west coast. Resistant rocks and glacial scouring have combined to give the island poor thin soils and poor drainage. There are no major streams to offer access to the interior of the island.

Climate—Not a part of the island but very definitely a part of its environment is its situation upon the lee coast of the continent at a place where the cold Labrador Current flows along the eastern and southern shores. Ice or ice water is therefore a part of the environment throughout the year. Although no harbor is frozen in winter, there is much floating ice. Winds from the south bring warmer air in from the vicinity of the Gulf Stream, thus causing fogs which abound along these coasts throughout most of the year. In winter the cold air masses from the mainland bring continental conditions to insular Newfoundland. There is extreme variability to weather conditions due to the prevalence of cyclonic and anticyclonic phenomena. Although winters are long and cold, the extremes of temperature are not comparable to the interior of North America.

At the more favored places, the growing season is seldom over one hundred days. Although there is very much less fog in the interior of the island than along the coastal waters, there is too little sunshine for most temperate zone crops. Nearly all of the population lives along the eastern and southern coasts where cloudy weather and frequent rains are the rule.

The effect of this climate upon tree growth has been to prevent its reaching commercial size along the east coast and elsewhere to attain heights generally under fifty feet and a diameter of twelve inches. Fairly dense forests of black spruce, balsam fir, and a few other varieties of fir, pine and juniper occupy much of the interior of the island. Glacial scouring has resulted in extensive areas of no tree growth, locally known as "barrens." Virtually no timber is exported, but pulpwood and newsprint have become established at two places, Corner Brook and Grand Falls.

Agriculture—There are few districts of good soil, and they are all located in the western part of the island. Nearly all of the people live along the eastern and southeastern shores where they are accessible to fishing grounds. The agriculture of Newfoundland is therefore in the nature of a residuum; fishing has always dominated the economy of Newfoundlanders. Newfoundland has reacted as have so many parts of the world where Nature has given a mineral, climate or soil adequate for sustenance: specialized in the one favored livelihood and bought the necessities.

An estimated 100,000 acres of the island support some sort of agriculture today; this is about two-fifths of 1 per cent of the total area. Most of this cropped land is as widely scattered as the fishing villages which dot the indented eastern and southeastern coasts. The principal crops are hay,

cabbage, potatoes and turnips. A total population of about 300,000 is reported to have only 88,000 sheep, 24,000 cattle, 15,000 goats and 8,000 hogs.

The city of St. Johns (40,000) is a market for dairy products most of which are produced on the Avalon Peninsula in the southeastern portion of the island. There are no other cities of comparable population. The growth of the dairying industry, as with any other kind of specialty, has been retarded by the relative inaccessibility of the island's scores of small population centers which fringe the eastern and southern coasts.

In the present serious state of the island's economy, the question naturally arises: why does agriculture play such an unimportant part in the welfare of Newfoundland when in such northern and barren countries as Norway, Sweden and Finland it has a much greater role? The historical attraction of fishing undoubtedly is the principal reason. Another is the remote location on the western side of the island of the soils believed to be most productive. Still another is the relative weakness of the Government of Newfoundland; in its present form it has given up its independence and has a position somewhere between a dominion and a colony of Great Britain.[1] Finally, the fiorded coastline has made intervillage communication very difficult even during the summer months. The single narrow-gauge railroad between Port au Basque and St. Johns does little to promote a market for the farm products of the island. It crosses the almost sterile interior to serve the needs of the larger fishing ports on the east and west coasts. The commission set up by the British Government to find a solution to Newfoundland's problem is reported to be working toward the improvement of agriculture. They have stated that the Humber, Codray and Gander valleys have areas of good soil capable of supporting important agricultural communities.

Furs—The fur trade has been important to Newfoundland, but never remotely approaching the fishing industry. As an exploitive industry, the catch has declined markedly during the past seventy years. Beaver, mink, and fox furs were once two or three times as important as they are today. Little or nothing has been undertaken by way of increasing these depleted resources.

Fishing Industry—The dominant industry in Newfoundland is fishing. Three times as many men (40,000) are engaged in fishing as in all other occupations combined. They catch each year approximately 140,000,000 pounds of fish, four-fifths of which are exported. The chief markets have been the Mediterranean region of southern Europe, West Indies, Brazil, Cuba and the United States. Nearly every fiord along the 3,000 miles of bleak coastline has its fishing village. Most of the catch comes from the

[1] Newfoundland returned to this status in 1934 at her own request.

waters off the Newfoundland coast, with about 25 per cent from the coastal waters of Labrador and 10 per cent from the Grand Banks a hundred miles to the southeast. Before the large steam trawler came into use, an estimated 90 per cent of the island's population depended upon fishing for a living; today it is nearer 50 per cent.

Historically it has been the cod which constituted the bulk of the catch and the principal item in the Newfoundlander's diet. Salt cod has declined in popularity and the difficulty of catching cod has increased as near-by resources have become depleted. Shellfish have never been an important part of the catch; lobster, and scallop fishing employ perhaps 500 men. Halibut and smelt fishing have become relatively more important in recent years. Each spring for a period of only a few weeks salmon are caught frozen in brine and exported to Great Britain. The demand for salt cod has declined in all quarters of the Newfoundland market. They are less able to place fresh fish on world markets even with refrigeration, owing largely to distance.

Hair seals have been a fairly important adjunct to cod fishing; the present catch is about a third of that during the peak years late in the nineteenth century. During the spring, before cod fishing begins, several hundred sealers go north to kill seals on the ice floes northeast of Newfoundland. The oil from the fat is used for soap making, and the skin is used for leather.

Not only has the Newfoundland fisherman worked under the most dangerous and trying conditions that Nature can provide, but he has been wholly dependent upon the price of fish to make both ends meet. Economic conditions have been bad for so long that the British commission seeking to stabilize the economy, has apparently given up the idea of bolstering the fishing industry as the principal remedial measure. Newfoundland's market is beyond the powers of the commission. Agriculture, mining and the processing of ores, and the timber resources of the island are to be integrated in a long-range program to reduce the dependence upon "store credit" made necessary by the very low net earnings of these fishermen, in 1938 reported as $86.

Unfortunately this is not all accounted for by the rise of new sources of employment. In every village there is a group of families permanently on relief.

Minerals—There are three minerals of commercial importance today, including iron ore, lead and zinc, and bituminous coal. The most important by far is iron; it is reported to be one of the greatest reserves in the British Empire. The Wabana ores on Bell Island in Conception Bay, east of Newfoundland, are high grade, abundant, and, in addition, accessible. The ore bed extends out under the waters of the Bay for a

considerable distance. These British-owned mines support about 4,000 persons on Bell Island, men, women and children. Prior to the recent war, these ores were shipped to Germany (50 per cent), Canada (35 per cent), and the remainder to Great Britain and the United States. Most of the smelting for Canada is done at Sydney, Nova Scotia. Attempts to smelt on the island are said to be under consideration.

Zinc and lead ores are mostly American properties and constitute but an infant industry thus far. The extraction center is near Red Indian Lake in the interior of the island. Interest in copper, silver, nickel, chromium and vanadium was temporarily raised during the period of mineral prospecting in World War II; nothing of a commercial nature has been reported to date.

Bituminous coal is known to exist in the remote St. George's Bay area on the west coast. Although reportedly abundant, there is very little market for this coal on the island. Domestic heating is with wood, and there is virtually no industry. Cape Breton Island ships coal to St. Johns more cheaply than Newfoundland can.

Commerce and Manufacturing—The situation of Newfoundland is such that the great North Atlantic steamship routes have done nothing to relieve its isolation. Steamships ply these waters when the weather conditions permit, but only the larger ports are served. The coming of air transportation has relieved this situation somewhat. In 1939 the activities of the enemy submarines in waters near Newfoundland caused the United States and Canada to arrange, through the British commission governing Newfoundland, for the lease of land and the construction of large air bases in Newfoundland and in Labrador. Prior to this time, Newfoundland had been the refueling point for many of the transatlantic airways, but war brought immense expenditure of money in the creation of enormous airfields at Goose Bay (Labrador), Gander Lake, St. Johns, and Botwood. Local labor welcomed the opportunity for employment, but these self-sufficient "colonies" of outlanders have provided no sustained increase in Newfoundland's pay rolls, no market for local producers of food products. What the future holds for the island may only be guessed, so far as air commerce is concerned. There is almost no revenue derived from this type of commerce; the leased bases pay no taxes. Except for the money spent by the visitors, there appears to be little gain in Newfoundland's income.

The principal industrial pay roll is that of pulp and paper mills; Corner Brook (7,000 pop.) sells mostly to the American market; Grand Falls (5,000 pop.) ships to England. There is no prospect of an increase in this industry. The export of lead and zinc concentrates, iron ore, oil from cod and seal, canned lobster and canned salmon appear to be stabilized at their present level. The commission apparently believes that such diversi-

fication as Newfoundland may reasonably hope to achieve will be in the expansion of agriculture to the end that some degree of self-sufficiency will be attained. Two centuries of a fishing economy will be difficult to alter, even though poverty of individual and government is acute, and probably no more than half the population is currently employed in the fishing industry.

Labrador—Labrador, a political dependency of Newfoundland, lies along the northeastern margin of the continent northwest of Newfoundland. Since 1927 its area has been about three times that of its protector. Its one thousand families have but one source of livelihood, fishing in the shallow waters of the North Atlantic Coast. They are joined each season by thousands of fishermen from Newfoundland. Straitened as are the circumstances of the average Newfoundlander, these people along the Labrador coast are even worse. The isolation induced by distance, cold, and lack of resources has kept the Labradorean in a perpetual state of want.

Perhaps a third of the area is forested with timber large enough to cut. Black spruce along Hamilton River and the shores of Lake Melville have been slightly developed.

Newfoundland has been in no position to develop the bleak region so much like the interior of their own island, and the commission which drew the new boundary for Labrador decided that it should remain for ultimate development by a rejuvenated Newfoundland.

Within recent years there has been much interest in the high-grade iron deposits far in the interior of Labrador. In view of the partial exhaustion of high-grade ores in the Lake Superior region, these in distant Labrador have taken on new interest. There is no means of transportation now available; it would mean building at least 300 miles of railroad to bring the ore within shipping distance of the Great Lakes iron and steel industry on both sides of the border.

The impact of World War II upon Labrador has not been significant. The principal effect thus far has been the loss of market for fish in western Europe. Political and economic turmoil in these Mediterranean countries has curtailed their ability to purchase fish. Governmental failure and widespread economic distress on the part of Newfoundland have added to Labradorean concern. Canada and the United States constructed and maintain a very large air base at Goose Bay, but the economy of Labrador has benefited only by the construction employment the base afforded. Commission rule of Newfoundland has increased somewhat the ship service available to the larger villages of Labrador, but the prospect is anything but bright for the five thousand Labradoreans utterly dependent upon a fishing economy. Newfoundland may hope for some increase in agricultural activity, but the only diversity Labrador may look forward to

is iron mining in the far interior. Even the Grand Banks fishing grounds are shared by Canada, France, Spain, Portugal, England and the United States.

Greenland—During the Second World War, the United States occupied the Danish colony of Greenland for strategic reasons, principally climatological. Denmark was unable to carry on normal trade relations with her largest possession, the world's largest island. With the end of the War, occupation ended, and the peacetime life of the great ice-covered plateau was resumed. The phenomenal increase in aluminum manufacture in the United States and Canada gave rise to unparalleled activity in quarrying Greenland's only commercial mineral, cryolite, at Ivigtut in the far south. This Danish monopoly bids fair to become a more important source of revenue as light metals secure a more important place in our industrial economy. This clear, ice-like mineral is shipped to every country in which aluminum is manufactured; its movement is perforce confined to the summer months.

Sixteen hundred miles in length and seven hundred miles wide, nearly all of it is covered by an ice cap perhaps a mile in thickness near its center. Greenland is certainly the least attractive to settlement of any large area in or near North America. Along its southwestern coastal margin there is a number of small settlements, all engaged in the Danish-aided fishing industry. Cod, halibut, salmon, haddock, and shark are caught and canned at Holstenborg, Godthaab, Frederickshaab and Julianehaab settlements. There appears to be less misery than in Labrador; the Danish supervision seems aggressive and farsighted. Greenland's prospects remain as before the War, a sparsely settled series of fishing communities living under the most meager conditions.

XXII

TERRITORY OF HAWAII

North Americans are increasingly aware of the situation of a large archipelago some two thousand miles west of Los Angeles.[1] The seven principal islands comprising the Hawaiian Islands are not large, embracing an area of some 7,000 square miles. But their situation has steadily appreciated in importance during the period of United States' occupancy of the Islands. Americans do not need to be told of their military significance with respect

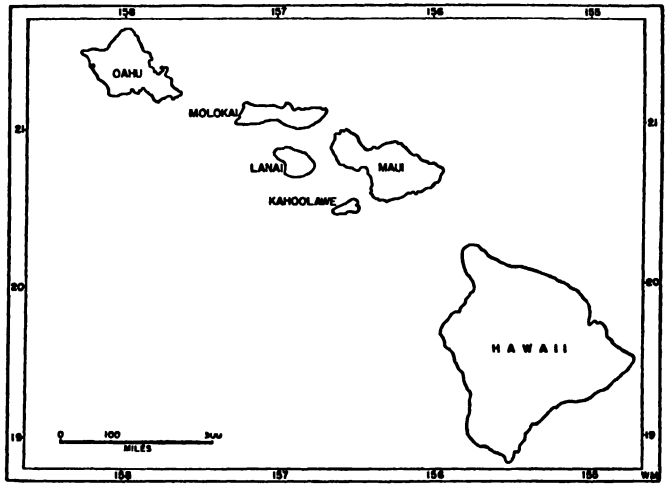


FIG. 168.—HAWAIIAN ISLANDS

to the Panama Canal, Alaska, and the United States, since the fateful December 7, 1941. What is not so generally known however, is the role of the Hawaiian Islands in the vigorously developing commerce with Pacific borderlands which has marked the period since their acquisition by the United States in 1898. Another aspect of their importance is their part in the domestic economy of the United States, a viewpoint which has increas-

[1] In the preparation of this section, much use was made of John Wesley Coulter, "The Territory of Hawaii," in The American Empire, W. A. Haas, Editor, University of Chicago Press, 1940.

ingly occupied the attention of thoughtful men and women on the Islands and on the mainland especially since the depressed 1930's and the economic chaos of World War II.

Situation—The six principal islands of the Hawaiian group lie at the southeastern extremity of a much more extensive group of smaller islands some two thousand miles west of California and about 1,400 miles north of the equator. (Fig. 168.) They are on the steamer lanes to Australia and the southwest Pacific, rather than those to Japan and China, as popularly supposed; their main strategic importance lies in their association with the Aleutian Islands on the north and the Panama Canal on the southeast. Since the development of the land-based airplane as an adjunct to sea power, the Hawaiian Islands have become much more than stepping stones on the transpacific routes. In like manner other islands in the Leeward, Caroline, and Marshall groups have become vital points for the United States in the Pacific Ocean. Statements anent U.S. bases in the Pacific after the War point to still greater interest in the future.

Climate—The climate of these islands is primarily a consequence of their location between 18 and 22 degrees north latitude, on the poleward margin of the belt of northeast trades. The marine influence and their low latitude give to all except the higher latitudes a uniformly warm climate with generally dry summers and moist winters. This type of climate has attracted Chinese and Japanese nationals in large numbers from the extremes of their home climates. Hawaiian climates are similar to those of Central America, providing the basis for economic relationships in agriculture which are not always complementary. The rugged relief of the Islands makes directional as well as altitudinal differences in local climate. Areas on the leeward side of the mountains are similar to San Diego, California climate; windward sides have heavier and more evenly distributed rainfall, depending upon the elevation. Lee coasts particularly have a variable rainfall from year to year; these differences may be as great as 100 per cent. Much of the winter rainfall on lee slopes is the result of storms known as "kona".

With variable rainfall, semiarid slopes, and permeable soil, most Hawaiian agriculture is perforce irrigated. Furthermore, the principal crops are heavy consumers of water, particularly sugar cane. Yet this same climate is the principal source of income for the Islands, through tourists and agriculture.

Relief—Although their total area is not great, the Hawaiian Islands have a wide diversity of landscape features because of their volcanic origin. The island of Hawaii, nearly twice the size of the remaining islands, has two volcanoes of approximately 13,000 feet. Most of the area is unfit for

agriculture because of the rugged terrain. Plain-like areas are found at various altitudes, but many of the lava slopes are barren wastes. Extensive coastal plains are rare; the only large one is on the south shore of Oahu. In addition to the rugged features due to volcanic deposition, erosion has created districts of very rough topography. On the whole the terrain of much of the Hawaiian Islands can scarcely be termed inviting.

Agriculture—The economy of the Hawaiian Islands is largely agricultural, even though a scant 9 per cent (350,000 acres) is classed as arable. At the higher elevations subtropic crops are grown, while on the lowlands they are tropical in nature. So far as land use is concerned, grazing is the principal form of agriculture, but on the basis of value created and the number of people employed, the production of sugar cane is by far the dominant phase of the Islands' agriculture. Two-thirds of the cropland and two-thirds of the wage earners are engaged in this industry.[2]

Cane—Sugar cane is a lowland crop grown under the plantation system; there are sixteen of these sugar plantations on Hawaii, ten on Mauai, seven on Oahu, and five on Laui. Plantations vary in size from 1,000 to 15,000 acres, with the planting staggered so that about 10 per cent of the area is planted each year. Cane is grown from sections of the stalk cut from the tops of ripe cane. From this one planting there will be five ratoon crops, six harvests in all. The permeable soil, the extremely heavy water requirements of the plant, and the scanty rainfall combine to make irrigation imperative on more than half of the total cane acreage. Topographic conditions make irrigation costs high; on a representative plantation the annual costs for irrigation may be as high as $300,000.

Despite mechanization of much of the work on a sugar plantation, the labor requirements are still very great. A major problem is to secure adequate labor on these isolated plantations. As a result the management is very paternalistic; many housing and recreational devices have been used to attract a body of dependable labor. Most of the foremen have been Filipinos and Japanese. The exchange of labor between cane sugar and pineapple plantations has been possible; the pineapple growers have used some of the idle labor during the slack summer cane season.

[2] LAND IN HARVESTED CROPS
1940

Sugar cane	235,110 acres
Pineapples	48,598
Coffee	4,136
Corn	1,862
Taro	622
Rice	509
White potatoes	487

Statistical Abstract, 1946, p. 685.

Not Optimum Conditions—Hawaii's one million tons' production is about 14 per cent of the annual consumption by the United States.[3] Conditions under which cane is produced in Hawaii are by no means ideal. The winters are too cool, water is scarce, rotation is not practiced and fertilizer must be applied regularly, and there is a shortage of labor. To offset these conditions, more than half the sugar crop (acreage), is irrigated,

Brown Brothers

FIG. 169.—CANE SUGAR FIELD IN HAWAII

Specialization has been the breath of life for the Hawaiian Islands

resulting in yields almost twice that of unirrigated cane. Scientific methods of fertilization and propagation have been practiced over a long period of years; the yield has been increased 80 per cent since 1921 with an increase in acreage of only 15 per cent. Two-thirds of the labor in cane fields is foreign-born, Filipinos and Japanese. The principal aid is political; as a territory of the United States the Hawaiian Islands have been able to profit by the tariff on cane sugar; this one factor is the main reason for

[3] PER CENT DISTRIBUTION OF SUGAR CONSUMPTION IN UNITED STATES, BY SOURCE, 1941

Domestic sources	32.8 per cent
Non-contiguous territory	28.1
All foreign countries	39.

Statistical Abstract, 1946, p. 688.

the existence of the relatively high-cost industry. Government control extends to the commerce in sugar as well; it must all be carried to the mainland in United States' merchant vessels.

Pineapples—Although pineapples are the second ranking crop of the Hawaiian Islands, their aggregate acreage is less than one-fourth that of sugar cane. They are a luxury rather than a staple food; they have no tariff protection, yet these islands produce more than three-fourths of the world's

Brown Brothers

FIG. 170.—HARVESTING PINEAPPLES IN HAWAII

Unlike cane sugar, these pineapples are destined for many parts of the world

crop. As with cane, this crop needs a great deal of manual labor; the same types of imported labor are used to care for it. The tolerance of pineapples with respect to soils and climate is much greater than cane; as a consequence production has spread to many parts of the archipelago. Improvements have been made in the plant and in the methods of growing and canning it. National advertising on the mainland has succeeded in taking pineapples out of the purely luxury class. Despite these facts, the Hawaiian pineapple industry has violently fluctuated with the changes in purchasing power in the United States.

As with cane production, paternalistic methods have been in vogue; the same groups are imported for labor; indeed the same companies exercising control over cane production have control over more than half of all pine-

apple acreage. Pineapples are canned on the plantation or in Honolulu. Due to seasonal differences in labor requirements, cane labor is used on pineapple plantations during June–September, offseason in cane, with Portuguese doing most of the mechanical work.

The principal producing districts are Maui, Molokai, and Lanai. Here under varying conditions of rainfall and temperature, the slips of pineapple plants are set in the ground in early autumn. By inserting them through holes in heavy moisture-proofed paper several feet wide, weeds are kept down and moisture conserved. After a period of approximately twenty months (June to September) the fruit is harvested. A second ratoon crop is harvested one year after the first; neither ratoon crop is as abundant as the plant crop. Labor during the harvest is nearly all manual; at this time extra hands are recruited from the idle cane plantations.

Unlike the sugar crop, pineapples are destined for many parts of the world; the ten million cases packed in 1943 constituted 80 per cent of the world output.[4] Thus the two chief crops of the Hawaiian Islands are dependent upon a protected market on the mainland, imported labor, and outside capital for the very extensive investments in these two types of production.

Oahu—Oahu with an area of 604 square miles, is second in size to Hawaii, but its population density of 378 per square mile places it far ahead of any other island in the archipelago. The mountain topography of Oahu embraces the same type of varied landscape common to the other islands. The mountain slopes are forested to their tops. There is less barren land. On the southern margin there is a broad coastal plain, the largest of its kind on all of the islands. The indented shoreline forms a number of excellent harbors, among them is Pearl Harbor, a few miles from the city of Honolulu. Rainfall varies from 27 inches at Honolulu to 139 inches yearly on the windward east coast. The largest forest reservations are on Oahu. The soils of Oahu, as are those of the other islands, are composed of weathered lava and coral lime; they are naturally fertile but in use require liberal fertilization.

With approximately one-fourth of its area in crops, Oahu has the largest proportion of arable land of the group. Seventy per cent of this cropland is devoted to sugar cane, 22 per cent to pineapples, with the remainder used for truck, and other minor crops. Although the Kaneohe district raises tomatoes, potatoes, peas, cabbages, and some tropical vegetables not grown on the mainland, more than half of the fresh vegetables and fruit consumed by the large Honolulu market is imported from California. Despite the apparently optimum conditions of climate and soil for many

[4] Statistical Abstract, 1946, p. 697. This figure includes a small quantity from Puerto Rico.

of these crops, the heavy rains on the gardened slopes cause destructive erosion. The colonial type of agriculture has a strong appeal for so many subtropical and tropical people who are great food importers.

Honolulu—The largest city in the Islands is Honolulu with a population of 155,000. Within thirty miles are the naval base at Pearl Harbor, and Schofield Barracks, some twenty miles from Honolulu. With this large population, the Oahu market is by far the largest in the archipelago. Although other islands market fresh fruits and vegetables here, Oahu has the greatest acreage of vegetables and fruit, and most of the milch cows in the Islands.[5] Nevertheless, Honolulu imports from California more than half of the vegetables and fruit consumed there. Rice is grown on the island, but a great deal is imported, some from the Japanese producers in central California.

Honolulu is by far the greatest fishing port in the Islands; the largest fish cannery is likewise here. Years ago this was an important base for the whaling fleet. About a thousand small boats fish the near-by coastal waters today; most of these are Japanese-owned and operated. The industry does not suffice for the Hawaiian domestic market; 10 per cent of the fish are imported from the United States and from Japan. Most of the catch is a variety of tuna, averaging about 11,000,000 pounds annually. The fishing industry operates under three basic restrictions, the shortage of labor on the Islands, the great depth of the waters a very few miles offshore, and the rocky character of the shore line. The latter two factors make the use of hook and line imperative and the scale of operation small.

The Hawaiian Islands act in the capacity of a large warehouse for manufactured goods imported from the mainland. There is little to encourage the establishment of manufacturing on the Islands beyond the processing of the raw materials for export. Some iron and some cotton textiles are manufactured in Honolulu for local consumption.

Hawaii—This large island is about twice the area of all others in the Hawaiian group. Its two large volcanoes Mauna Loa and Mauna Kea make it a conspicuous island. Although mountainous, its shore line is more regular than any of the large islands. Of its 4,000 square miles only 4.8 per cent is cropped land. Population density is less than one-eighteenth as great as on Oahu. Hilo is the principal port and ranks next after Honolulu in fishing and the canning industry.

Hereford cattle, horses, mules, sheep, goats, and a few swine and poultry make Hawaii the most important livestock area in the Islands. The requirements of the plantations in the way of draft animals and meat are largely met by this island. On the eastern coastal plain of Hawaii are large

[5] On the Islands, in 1940, there were: 10,000 milk cows, 129,000 beef cattle, 31,000 swine, and 26,000 sheep.

sugar cane plantations. The only coffee grown in the Islands is produced in the central and western (Kona) part of the island of Hawaii at altitudes of from 1,500 to 2,500 feet. The industry is largely in the hands of the Japanese who operate farm units of from 5 to 15 acres. Most of the 10,000,000 pounds of this coffee is exported to the mainland for blending purposes. As in all other intensive farming operations in the Islands, there is a shortage of labor during the harvest season; these coffee farms import labor from the pineapple growers during the slack season.

At one time rice was an important crop on Hawaii; today the rice crop is some 5,000,000 pounds; the Islands import 85,000,000 pounds from the mainland, mainly for the Oriental population. Like coffee and cotton, rice is largely in Japanese hands. Cotton is grown on a small scale, less than 500 acres.

Other Islands—Kauai and Maui have some diversified agriculture, but are small. Grazing is the only form of agriculture on dry Niihau and Kahoolawe; there is virtually no cropped land on Molokai.

The future of these islands has undergone a new appraisal since December of 1941. It marked the end of a period in which the United States maintained a sort of colonial interest in the Hawaiian Islands. To the extent that the military establishments on these islands and other islands make for trade with the mainland, there is likelihood that this will increase for a time in the postwar period. The increased trade with Asia which has characterized the commerce of the United States during the past forty years will probably continue as one of the two vigorous phases of our external trade; the trade with Japan probably will remain at a somewhat lower level, and that with Australia, the East Indies, China and India will continue to increase.

TABLE 20

COMMERCE OF THE HAWAIIAN ISLANDS, 1941

	IMPORTS FROM	EXPORTS TO
Continental United States	$186,662,139	$122,640,189
Foreign Countries	6,193,318	11,012,877

Statistical Abstract, 1946, p. 931.

The United States in the Pacific—Americans particularly are hearing a great deal about the United States in the Pacific. Reference is made to such terms as the American Empire. In this chapter the attempt has been made to set forth the economic geography of these lands which have territorial status in the United States. The Philippine Islands were freed, in 1946. Guam, Midway, Wake, American Samoa, Baker and Howland are all small islands. The combined area of all United States' possessions in the Pacific

adds but a scant 20 per cent to the area and 10 per cent to the population of the mainland; exclusive of the Philippines, the proportion drops to a tiny figure, both for population and area.

Aside from the products, the principal concern to the United States has been for their use as bases for commercial and military aircraft, and because of their interest to Japan.

The composition of the population of these Pacific possessions complicates the question of absorption and of economic tranquility within the structure of the domestic economy. Although two-thirds of Hawaii's population are of first and second generation Oriental stock, three-fourths of them are citizens of the United States. The racial issue in Alaska, our other great territory, is of no concern so far as national security is concerned.

As has been noted earlier, United States' trade with Asiatic countries has shown the greatest increase of any continent over a period of nearly half a century. Although it is common to hear references made to the self-sufficiency of the United States, the fact is that we are second only to Great Britain as an importing nation. Prior to and during the Second World War, the press carried frequent references to the so-called strategic raw materials and the effort of our Government to accumulate stock piles of them. Of the seventeen vital and scarce raw materials upon which the continuance of our present economy is dependent, fourteen are found wholly or principally in the borderlands of the South China Sea.[6] Wartime substitutes for some of these raw materials have been developed, with the price of no consideration.

The United States has become a lending nation, a nation which must export an increasingly large proportion of manufactured goods. To these Pacific borderlands went nearly one-fifth of our exports in 1937; during the years of Japanese preparation for her war with the United States, this proportion was even higher. Two-ocean consciousness on the part of the United States is economic as well as for defense; it may never again become passive.

As the United States assumes a role of economic and political leadership in the Pacific realm the Hawaiian Islands take on new importance. They are in effect the keystone of a system of island defenses which spans the Pacific Ocean.

[6] Rubber, vegetable oils, tin, quinine, chromium, tungsten, spices, silk, tea, kapok, tung, rice, and coffee.

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