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ADJUSTING WHEAT ACREAGE IN THE NORTHERN GREAT PLAINS TO WARTIME DEMANDS

by

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Summary and Conclusions

The acreage planted to wheat in the Plains is affected by national and world demand for wheat and by the physical and economic conditions in each locality.

Large stocks of wheat have accumulated in the four principal wheat exporting countries. In the United States, production exceeded utilization from 1937 to 1941. During this period the acreage was reduced 31 percent to the lowest point since planted acre records were started in 1919. In 1942, utilization exceeded production for the first time in 5 years and the prospective need for wheat in 1943-44 is so great that surplus stocks will be greatly reduced.

The large stocks of wheat now on hand would disappear quickly if below average yields should occur on a small acreage. If large stocks of wheat are to be maintained for war and post-war needs, the acreage should be increased and the feeding of wheat to livestock probably should be curtailed unless large imports are received from Canada. The War Food Administration has set the 1944 goal at 13.5 million acres above the 1943 acreage. About 7.5 million acres of this increase is expected from the seven Northern Great Plains states.

The Plains is the principal wheat producing region of the United States with 55 percent of the acreage and 44 percent of the production in the past 14 years. Wheat is grown under widely varying conditions in the Plains, which on the average bring lower yields than for the United States as a whole

The feasibility of increasing the acreage of wheat in response to wartime demand depends on cropland resources, relation of wheat to other grain crops, average yield, risk from natural factors and the amount and location of idle cropland.

The amount of land used for the principal crops in the Plains decreased from 101 million acres in 1932 to 85 million in 1942, a reduction of 16 million acres. Of the 16 million acres of land formerly used for crop production, estimates indicate about half is held as idle cropland and the other half divided as restoration land, regrassed for grazing, purchased by the Federal government, or added to the amount in summerfallow.

Eighty percent of the wheat acreage of the region is concentrated in specialized wheat areas in which it occupies as much or more acreage than all other grain crops combined. Twenty percent of the wheat acreage is found in the more diversified areas where other grain crops predominate. Trends in wheat acreage show that greater shifts

occur in the diversified than in the specialized wheat areas. To a large extent, shifts in the diversified area were made by substituting wheat for other crops or vice versa. In the specialized wheat areas, although other crops were substituted for wheat to a limited extent, there was a strong tendency to grow wheat or let the land lie idle. About three-fourths of the idle cropland of the region in 1939 was in the specialized wheat areas and at least as high a proportion would be expected in these areas in 1942 and 1943.

The conditions in different parts of the Plains are reflected by the range in long-time average wheat yields from 5 bushels per acre in some counties to more than 20 in more favored counties. Low-yielding areas contain 9.5 million acres of wheat; medium-yielding areas, 16.5 million acres; and high-yielding areas, 11 million acres. Less fluctuation in acreage occurred in medium-yielding areas from 1931 to 1941 than in the other areas. A higher proportion of the cropland was retired or left idle in the low-yielding than in the other areas. The acreage of idle land, however, is greatest in the medium-yielding area. A large acreage in the low-yielding area is near the margin of cultivation and land use shifted from crop to idle or to grazing when the demand for wheat was low. Wheat is grown with greater success in the medium-yielding than in the low-yielding areas and with less competition from other crops than in many parts of the high-yielding areas.

Risk from natural hazards varies from 5 percent of the average yield of wheat for crop insurance premium to 35 percent. Low-risk areas correspond roughly with high-yield; medium-risk areas with medium-yield; and high-risk areas with low-yield.

By sub-dividing the specialized wheat areas according to yield, the possibilities and limitations of each subarea can be evaluated according to the wheat areage pattern, the long-time yield, variability of yield, risk and the approximate amount of idle cropland. The principal problem is to get the increased acreage in the areas where wheat can be produced advantageously, to avoid expansion in areas of exceptionally low yield and high risk, and to avoid undue substitution of wheat for other equally essential crops.

If the acreage is to be expanded in areas where experience indicates wheat has a comparative economic advantage over other crops, where a substantial amount of idle cropland is available, and where a minimum displacement of other essential crops will occur, the principal expansion must be made in the more specialized wheat areas. Within these areas, the amount of high-yielding land is limited and the production from the lowest-yielding land is erratic. In the medium-yielding parts of the wheat areas, production is less erratic than in the low-yielding parts, and more idle land is available than in the high-yielding parts. Although the wheat acreage is likely to be increased to some extent in all areas, the greatest increase should be encouraged in the medium-yielding portion of the specialized wheat areas.

Although large quantities of wheat have been produced in favorable years in the low-yielding areas, the risk is high and undue expansion of acreage is likely to bring severe post-war problems. No encouragement should be given for increasing wheat acreage on the lowest-yielding land until the need for wheat is very great, ample machinery and labor are available. Even then, provision should be made to regrass the land when conditions are such that this land will need to be retired from crop production.

Some counter measures, such as payments for regrassing the lowest-yielding idle land may be necessary to prevent expansion on land that can be profitably cultivated only when wheat prices are abnormally high.

Introduction

Since more than half of the wheat acreage of the United States is in the seven Northern Great Plains states and several million acres of land formerly in wheat are idle, the possibilities and limitations of increasing the acreage of wheat in this region are of national as well as regional significance. The objectives of this study are: (1) to analyze the wheat supply and demand situation and its relationship to the Plains; (2) to analyze experience in the use of land resources for wheat production in the Plains; and (3) to discuss, on the basis of these analyses, the possibilities and limitations of increasing the acreage of wheat.

The acreage planted to wheat in the Plains is influenced by forces which operate far beyond its boundaries. World supply and demand, transportation costs, national agricultural programs, world wheat agreements, and policies of international trade have an influence on the utilization of land resources. In addition to these external forces, the natural and economic forces which operate within the borders of the region are primary considerations in farmers' decisions on what portion of their land is to be used for growing wheat. The resulting pattern of wheat acreage and the changes which have occurred in recent years are indicators of the adaptability and comparative economic advantage of wheat as compared with other grain crops.

The significance of the analysis of this pattern of wheat acreage rests on two fundamental assumptions. The first of these assumptions is that a concentration of wheat acreage indicates that wheat has a comparative economic advantage over other grain crops in that area. It is recognized that farm management practices such as the spreading of labor and the rotating of crops are important factors influencing the acreage of wheat, particularly in diversified farming areas. The second assumption is that the physical productivity of the idle cropland varies in different parts of the region, that is, the average

physical productivity of the idle cropland in a medium-yielding wheat area is higher than in a low-yielding area.

To make an analysis of the situation in the Plains, data were classified in a small number of groups and detailed information was eliminated to avoid confusion. The geographical presentation is by large areas which correspond to the statistical groups. Although the difference between areas is significant, the difference between adjoining counties may be slight because changes are usually by gradual gradation. The viewpoint is regional and necessarily requires broad consideration of important tendencies in the use of land resources for wheat production. The data which are presented here in a small number of groups and covering large areas could be arranged in any desired number of groups and by smaller areas, if more detailed presentation were desired.

Wheat Supply and Demand Situation

The Northern Great Plains 1/ is largely dependent on outside demand for its wheat crop. Less than 25 percent of an average crop is normally used within the region for seed, feed, and food. The hard red winter and hard red spring wheat produced in this region are excellent bread wheats and move in the channels of the national and international trade. The demand for wheat in the United States and in the world, therefore, affects the returns that growers in the Plains will receive and, consequently, the acreage which they will plant.

World wheat situation.- The world wheat situation in 1943 was characterized by unprecedented supplies in some countries and severe shortage in other countries. The large stocks in exporting countries were the result of increased production and the limited export movement of wheat to continental Europe and the Orient. Another important factor in the situation is the effort of exporting countries to increase the domestic use of wheat, which may more than offset the curtailment of exports.

In the four major exporting countries -- Canada, United States, Argentina and Australia -- wheat production from 1938 to 1942 averaged 1,750 million bushels annually, domestic consumption was about 1,000 million bushels, and net exports about 430 million bushels, leaving an annual surplus of 320 million bushels. 2/ Wheat stocks were about

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1/ The Northern Great Plains for this study is a combination of seven states as follows: North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, and Colorado. For brevity it will be called the Plains in the remainder of this report.

2/ Food Research Institute, Wheat Studies, World Wheat Survey and Outlook, January, 1943.

1,750 million bushels on July 1, 1943, about 280 million bushels greater than the previous year and more than 2½ time the 1932-41 average. These large stocks resulted from exceptionally high yields since 1938 on a constantly decreasing acreage and from the war limitations on exports.

Although the stocks of wheat were 2½ times as high as the 1932-41 average, domestic utilization was above and acreage was below average. The acreage decreased from 134 million acres in the four major exporting countries for the period 1937-39 to 101 million acres in 1942. A low yield on this reduced acreage, coupled with the present high rate of utilization, would reduce the surplus drastically. Experience from 1934 to 1937 shows how quickly a large surplus can disappear when below average yields are produced. In addition to the possibility of below average yields before the war is over, a great deal of interest attaches to the question of how far domestic consumption will be expanded. The use of wheat for feed and alcohol has increased greatly in the United States and Canada, Argentina has authorized the use of 75 million bushels of wheat for fuel because fuel imports cannot be secured, and Australia has increased its use of wheat to some extent.

United States wheat situation.- The principal features of the United States wheat situation on the supply side are exceptionally large stocks of wheat in storage, an unbroken series of 6 years of above-average yields, and a sharp reduction in acreage. On the demand side, exports have been curtailed, but the use of wheat for feed and the manufacture of industrial alcohol has increased sharply to a point where current domestic utilization exceeds production.

Stocks of wheat on hand July 1 increased steadily from a low of 103 million bushels in 1937 to the record high of 632 million in 1942, then decreased to 618 million in 1943. Above-average yields caused the increase in stocks in spite of a 31 percent reduction in acreage from 1938 to 1942. In 1942, the second largest crop on record was produced on the smallest acreage since planted-acre records were started in 1919.

The annual utilization of wheat exceeded annual production from 1933 to 1936 and stocks were brought to the lowest level in recent years. From 1937 to 1941, utilization was less than production and large stocks accumulated. Although the production of 981 million bushels in 1942 was the second largest ever produced, utilization exceeded production for the first time since 1936.

Utilization of wheat from July 1, 1942 to June 30, 1943 was 1,023 million bushels, the largest on record. This compares with an average utilization of 677 million bushels, for the 10-year period 1932-41. The principal increase in use of wheat was for livestock feed. The Commodity Credit Corporation was authorized by Congress to sell 275 million bushels of wheat for feed at a price equal to 85 percent of

the parity price of corn, which was substantially lower than the prevailing market price of wheat. In addition to the large increase in the amount of wheat fed to livestock, its use in the manufacture of industrial alcohol was started and the amount used for food was 53 million bushels larger than the previous year. The per capita consumption of 4.03 bushels for the year is the highest since 1930.

For the year 1943-44, the utilization of wheat is expected to be about 1,155 million bushels, distributed as follows: food 535, feed 380, alcohol 110, seed 80, and exports 50. 3/ Although the 1943 wheat crop was large, the prospective consumption will exceed production by 318 million bushels and reduce the carry-over by the same amount. This would result in a carry-over of 300 million bushels on June 30, 1944, which would provide working stocks of 125 million, 125 million as a reserve against small yields, and 50 million to fulfill the commitment for post-war relief under the international wheat agreement.

The dwindling supply of wheat and the relatively small acreage seeded to wheat in 1943 requires consideration of what might be expected from an increase in wheat acreage in 1944 and following years. At long-time average yield of 12 bushels per acre, the 1943 acreage would produce only 650 million bushels, a little less than prewar disappearance, but far below the present rate of disappearance; the highest acreage on record, 80.3 million acres in 1937 would produce 970 million bushels; and the average for the past 14 years, 67.4 million acres would produce 809 million bushels. Even the highest acreage would fail to supply the present needs if large quantities are to be used for the feeding of livestock.

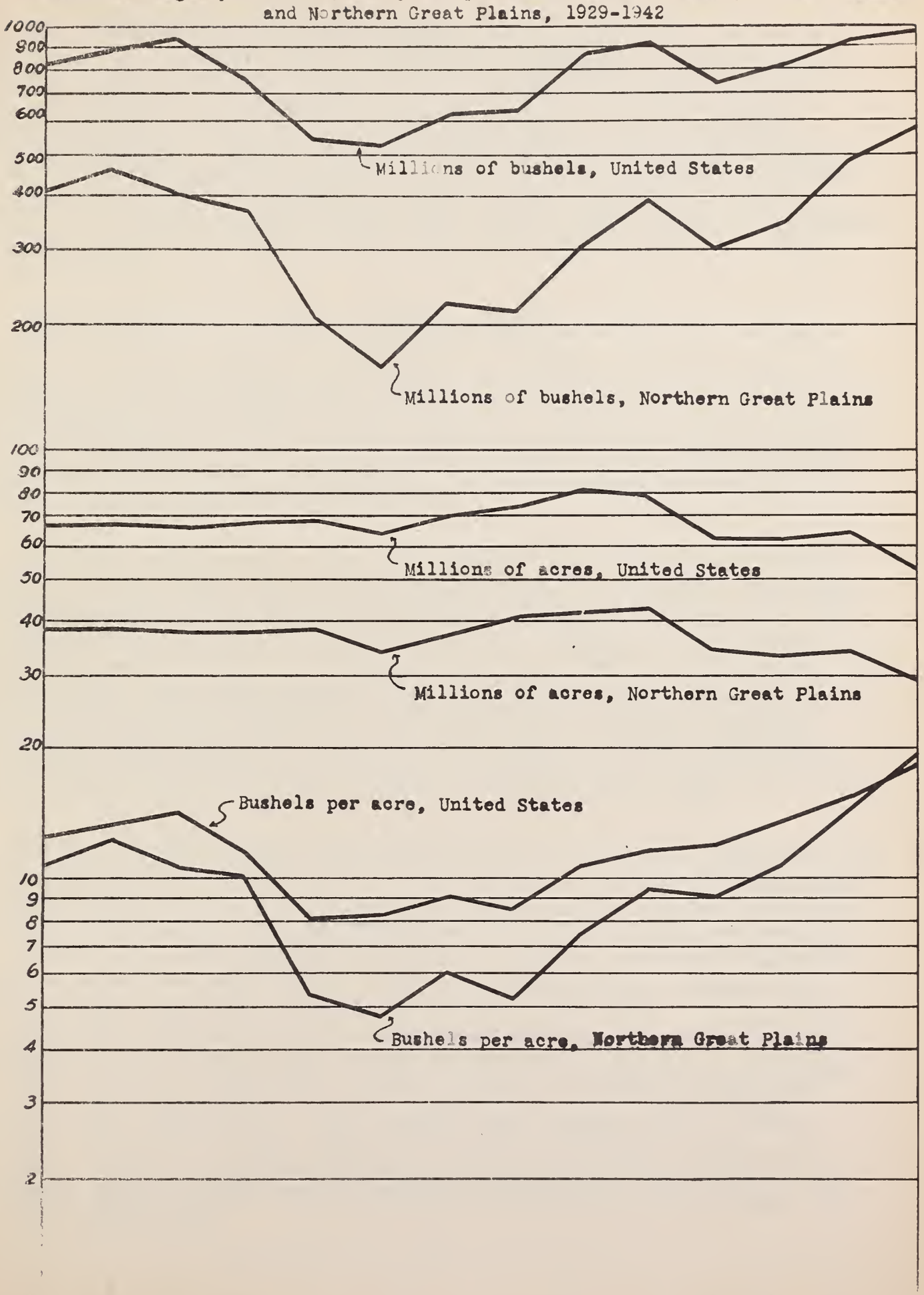
The demand for wheat leaves little doubt as to the need for a full utilization of available land resources in 1944 if supplies are to be available when the channels of world trade are opened. If large stocks of wheat are to be held as a food reserve, the feeding of wheat to livestock should be curtailed, at least until the 1944 production can be estimated. A possible alternative is the importation of large quantities of wheat from Canada and other exporting countries, if transportation facilities can be obtained. Imports for feed, July 1 to December 31, 1943, are about 45 million bushels.

Relation of the Plains to United States wheat supply.- The Plains is the principal wheat-producing region in the United States. During the 14-year period, 1929-42, 55 percent of the national acreage of wheat and 44 percent of the production were in the Plains. While the acreage planted to wheat fluctuated considerably during this period, the proportion of the total United States acreage that was planted in the Plains remained remarkably constant. The highest proportion was 58 percent in 1929 and the lowest was 52 percent in 1937 (figure 1).

3/ Bureau of Agricultural Economics, The Wheat Situation, Nov. - Dec., 1943.

Figure I.

Seeded acreage, production, and yield per seeded acre of wheat, United States and Northern Great Plains, 1929-1942



The all-time high was 80.8 million acres in 1937 for the United States and 42.3 million acres in 1938 for the Plains. The greatest shift in acreage for the entire period occurred from 1938 to 1939 when the acreage in the United States was reduced by 16.2 million acres or 20 percent in one year, and the Plains acreage was reduced 8.5 million acres, also 20 percent. The acreage then remained about the same for 3 years followed by another sharp reduction in 1942 bringing the lowest acreage since 1919, the earliest record of planted acreage, in the United States, and the lowest in 14 years of record in the Plains.

These concurrent changes in wheat acreage in the Plains and in the United States reflect the influence of changes in demand and the national and international policies and programs affecting acreage. The forces operating beyond the borders of the Plains are as important as the adaptation of wheat to the conditions within the Plains and may mean the difference between success and failure, particularly on the large areas where wheat is produced on a narrow margin of profit and on land which is near the extensive margin of cultivation.

In yield per acre and total production, the fluctuation is much greater in the Plains than in the United States as a whole. The average planted acre yield from 1929 to 1942 was 9.5 bushels per acre for the Plains and 11.7 for the United States as a whole. The yield in the Plains varied from 4.7 bushels per acre in 1934 to 19.8 bushels per acre in 1942, while the United States as a whole varied from 8.0 in 1933 to 18.7 in 1942 (figure 1). The yield in the Plains exceeded the national yield for the first time in 1942. In total production the Plains accounted for an average of 44 percent of the national total and varied from 30 percent in 1934 to 59 percent in 1942.

Wheat is grown nearer the critical point of moisture supply in the Plains than in most parts of the United States. Important wheat areas are found where annual precipitation is less than 20 inches, and some of the northern areas have an average of only 12 to 15 inches annually. Climate and other natural hazards are such as to cause wide variations in yield and production. There is considerable evidence to indicate that the widest extremes in natural conditions occurred during the period under discussion. The most widespread unfavorable conditions since the Plains were widely cultivated prevailed in 1934 and the most favorable conditions for the Plains as a whole brought the exceptionally high yield of 19.8 bushels per planted acre of wheat in 1942. Thus, the Plains, compared with the nation as a whole, is remarkably stable in maintaining about 55 percent of the acreage, but fluctuates greatly both above and below its average of 44 percent of the total production.

Land Resources Available for Wheat Production and Their Utilization in Recent Years

The need for a sharp increase in the acreage of wheat has been discussed in the light of the supply and demand situation in the United States and in the world. The War Food Administration has announced a national goal of 68 million acres of wheat for 1944, an increase from 1943 of 13.5 million acres. Approximately 7.5 million acres of this increase is expected from the seven Plains states. This need for an increased acreage of wheat raises questions regarding the availability of land resources for wheat and the conditions under which these resources can be effectively utilized.

The acreage which farmers plant to wheat in the Plains is affected by the physical and economic situation in each area as well as by the supply and demand situation which was discussed in the preceding section. The factors affecting the acreage of wheat are so numerous and interrelated as to make their separate evaluation extremely difficult, if not impossible. The action of these forces is reflected, however, in results which can be used as rough measures of the relative conditions under which wheat is grown in different areas. Thus, the present pattern of wheat acreage and the trends in different areas show the results of farmers' attempts to utilize their land in a manner which will bring the greatest net returns. The long-time average yields of wheat indicate the relative productivity of different areas and crop insurance premiums reflect the effect of natural hazards. An analysis of these factors is presented in the following pages as a basis for judgment regarding the possibilities and limitations of wartime increases in wheat acreage in the Plains.

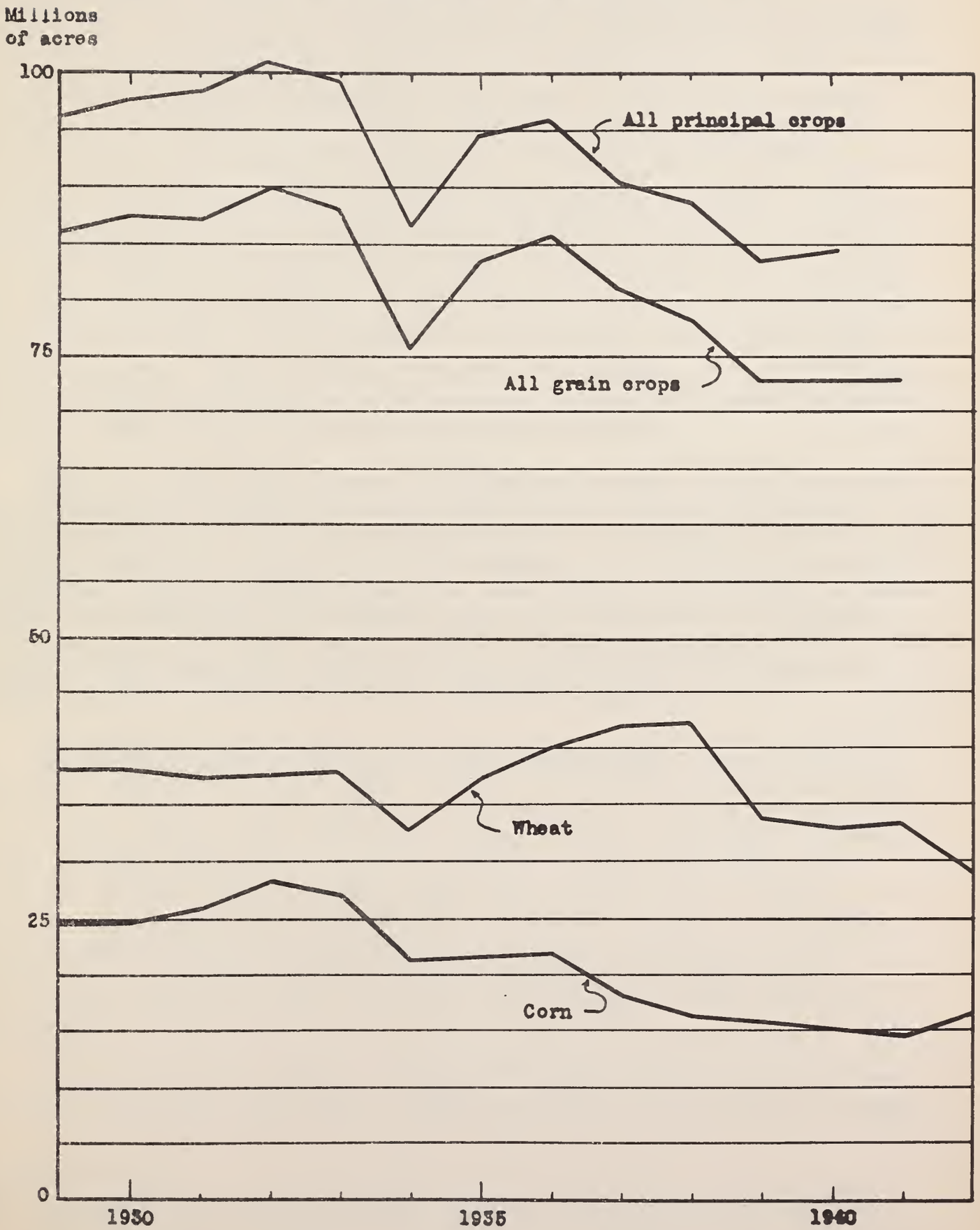
Trend in acreage of cropland, wheat, and other grain crops.- The acreage devoted to production of the principal crops in the Plains decreased 16 million acres from 101 million in 1932 to 85 million in 1942. 4/ This reduction came entirely from grain crops 5/ and their proportionate acreage was reduced from 89 percent of all crops in 1932 to 87 percent in 1942. Wheat and corn did not follow the same trend as the combined acreage of all grain crops. For example, the acreage of wheat was increasing from 1936 to 1938 while the acreage of corn and other grain crops was decreasing rapidly (fig. 2). From 1938 to 1942, the rate of decrease in wheat acreage was much greater than for other grain crops.

4/ Data from Crop Reporting Board, Bureau of Agricultural Economics, 1929-40 revised, 1941-42 preliminary.

5/ Grain crops are wheat, corn, oats, barley, rye, grain sorghum and flax; other crops are tame hay, forage sorghums, potatoes, and dry beans.

Figure 2

Acreage of all principal crops, grain crops, wheat, and corn
Northern Great Plains 1929-1942



The present use of the large acreage formerly planted to grain crops can be estimated for the region by using information from several sources. About 3 million acres were retired from crop use in the restoration program of the Agricultural Adjustment Administration. 6/ Rough estimates of regrassing of cropland run from 2 to 3 million acres, a portion of which is in the restoration program. Approximately 1 million acres of cropland were purchased by the Federal Government and returned to a grazing use. The acreage in summerfallow was increased substantially from 1932 to 1942 but the exact amount is not known. Based on the available data, it appears that about half of the 16 million acres formerly used for grain crop production has been retired, regrassed or added to the summerfallow acreage, and that the other half was idle cropland in 1942. Preliminary estimates indicate an increase of 3 million acres of land used for crops in 1943 as compared with 1942. These estimates of cropland and idle land are substantiated by data from the United States Census. From 1929 to 1939, the Census shows a reduction of 18 million acres in land used for crops and an increase of 14 million acres in idle and fallow cropland. When allowance is made for changes in land use from 1939 to 1942, the amount of idle cropland is about the same as previously estimated from other sources of information.

Wheat is more widely grown and probably is more flexible in its use of cropland resources than any other grain crop in the Plains. This flexibility in the use of land resources is shown by the location of wheat acreage in all parts of the region. In spite of its wide adaptation, however, wheat acreage is also highly concentrated in some areas. In competition with other crops, the proportion of cropland resources used for wheat varies greatly in different parts of the Plains. This pattern of wheat acreage, together with the trends in recent years, are discussed in the following sections.

Relation of wheat acreage to other grain crops.- More acres of land are planted to wheat than to any other crop in the Plains. The acreage of wheat is only a little less than the combined acreage of corn, oats, barley, rye, flax, and grain sorghum. From 1929 to 1942, wheat acreage varied from 43 to 52 percent of the grain crop acreage, and in 1941 was 46 percent, about the average for the whole period. Since the situation in 1941 was about average for the period, it was selected for analyzing the relation of wheat to other grain crops. Another factor in favor of 1941 is the importance of studying the most recent year for which adequate county data are available.

Areas of varying degrees of specialization in wheat were delineated by calculating the ratio of wheat acreage to the combined acreage

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6/ The purpose of the restoration program was to assist farmers in retiring land that was not suitable for cropping and in regrassing such land.

of all other principal grain crops in each county and arranging the counties into 6 statistical and geographical groups according to these ratios. Exceptions were made for a few isolated counties in order to join them with the nearest related group. The location of these areas is shown in figure 3.

In area I, wheat is grown almost to the exclusion of other grain crops, occupying 84 percent of the grain acreage (table 1). Barley with only 6 percent of the acreage is the nearest competitor to wheat. In Area II, wheat occupies 67 percent of the grain acreage, and barley is the nearest competitor but with only 9 percent of the acreage. In area III, wheat occupies about half of the grain acreage and corn is the nearest competitor. In area IV, wheat has 35 percent of the acreage and corn is a close competitor with 30 percent. In areas V and VI, corn is the leading crop and wheat occupies 29 and 12 percent respectively.

Table 1. Relation of wheat acreage to other grain crops by areas of varying degrees of specialization, Northern Great Plains, 1941

Areas	All grain crops 1/	Wheat		Corn	Oats	Barley	Other grain crops
	Thousand acres	Thousand acres	Percent	Percent	Percent	Percent	Percent
I	8,931	7,488	84	2	4	6	4
II	18,535	12,362	67	6	8	9	10
III	14,243	7,049	49	16	11	15	9
IV	6,714	2,360	35	30	18	8	9
V	8,618	2,521	29	34	14	11	12
VI	14,839	1,724	12	43	18	16	11

1/ Grain crops are wheat, corn, oats, barley, rye, flaxseed, and grain sorghums.

Data compiled from estimates of Federal-State Statisticians and production capacity studies, Bureau of Agricultural Economics.

Most of the wheat acreage of the region is concentrated in areas where it is not only the leading grain crop, but also where it equals or exceeds the acreage of all other grain crops combined. In 1941, 19.8 million acres of wheat or 59 percent of the regional total were in Areas I and II, the highly specialized wheat areas. Areas III and IV had 9.4 million acres or 28 percent of the regional total. Areas V and VI had 4.2 million acres or 13 percent of the regional total.

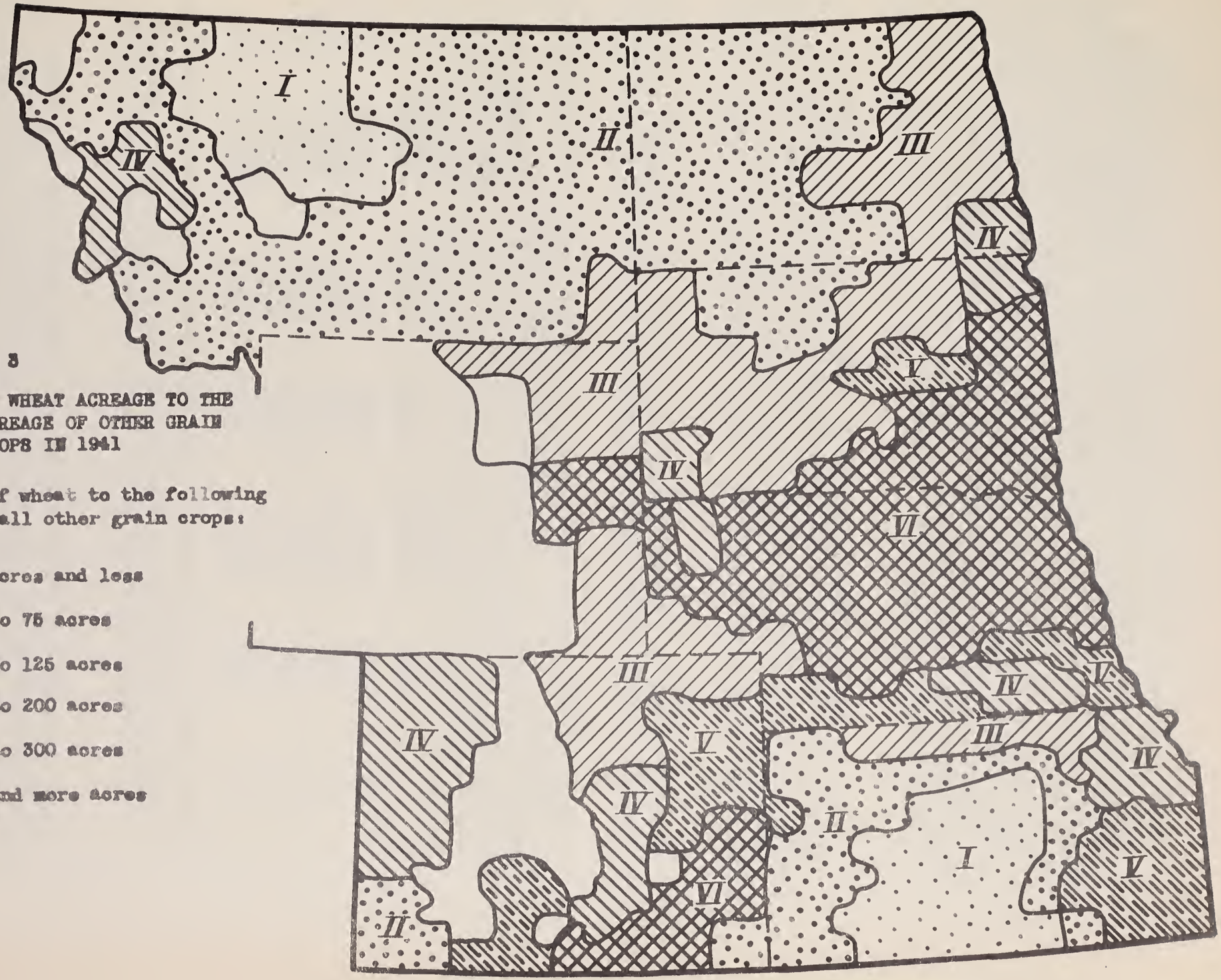

Figure 3

RELATION OF WHEAT ACREAGE TO THE COMBINED ACREAGE OF OTHER GRAIN CROPS IN 1941

100 acres of wheat to the following acres of all other grain crops:

- 25 acres and less
- 26 to 75 acres
- 76 to 125 acres
- 126 to 200 acres
- 201 to 300 acres
- 301 and more acres

The trends and fluctuations in the acreage of wheat from 1931 to 1941 were markedly different in the areas discussed above. The trend was definitely downward in the more specialized wheat areas (Areas I and II), about level for the less specialized areas (III and IV), and definitely upward for the diversified areas (V and VI) (Figure 4). Wheat acreage was not reduced in the diversified areas in 1934 in response to the Agricultural Adjustment Administration program, but was reduced sharply in the medium and specialized wheat areas. The acreage of wheat in the diversified areas increased more rapidly from 1934 to 1938 and decreased more rapidly from 1938 to 1940 than in the other areas.

A comparison of the highest and lowest wheat acreage in each area from 1931 to 1941 shows the widest fluctuations in acreage were in the more diversified areas where other grain crops are strong competitors of wheat. For example, the smallest acreage was 81 percent of the largest acreage in Area II and 51 percent in Area V (table 2).

Table 2.- Comparison of fluctuation in the acreage of wheat in areas of varying specialization in wheat, Northern Great Plains, 1931-41

Areas	Planted acres of wheat					Smallest as percentage of largest
	Average 1931-1941	Largest acreage		Smallest acreage		
	Thousand acres	Thousand acres	Year	Thousand acres	Year	
I	8,291	9,524	1938	7,464	1940	78
II	14,469	15,354	1937	12,362	1941	81
III	7,659	8,944	1938	6,716	1934	75
IV	2,396	3,345	1938	1,948	1934	58
V	2,555	3,661	1938	1,869	1933	51
VI	1,960	2,491	1938	1,653	1940	66

Compiled from published and unpublished data from Federal-State Agricultural Statisticians, Bureau of Agricultural Economics.

There are many impediments to change in the specialized areas where the whole farming economy is set to grow and market wheat for cash. The major use of the land, farm equipment, size of farm, storage, marketing facilities, and experience of the operator are all centered around wheat. Though barley may yield as many feed units per acre as wheat and the same farm equipment may be used for its production, the cash crop farmer would have difficulty in marketing

or feeding his barley. 7/ Wheat, priced as a food crop, usually brings greater returns than barley priced as a feed crop, unless barley outyields wheat by a substantial margin. An important cause of greater fluctuation in the diversified areas is that winter wheat is a more reliable crop than corn in times of drouth, while corn under the average price relationship will bring greater net returns than wheat when rainfall is ample. During a dry cycle, such as 1934 to 1939, wheat is likely to be substituted for corn. During a cycle when rainfall is ample, such as 1940 to 1942, corn is likely to displace wheat.

The annual average production of wheat from 1931 to 1941 was as follows: Area I, 79 million bushels; Area II, 102 million; Area III, 61 million; Area IV, 27 million; Area V, 26 million; and Area VI, 17 million. Yield per acre apparently had little effect on the degree of specialization in wheat since a wide range in county-average yields is found in each of these areas. Compared with the region as a whole, Areas II and III are below average yield and Areas I, IV, V and VI are above average.

It is evident that specialization in wheat in certain areas was not on the basis of the best natural adaptation of wheat to physical conditions as reflected in yield per acre. A wide range in yield is found in different parts of the specialized wheat areas. There is a tendency, however, for lower than average yield in specialized areas. Farmers tend to specialize in the crop that will bring a greater net return than other crops in the same area. The situation in the Plains is such that farmers have concentrated the wheat acreage in areas which have a wide variety of soil and climatic conditions.

Relation of wheat acreage to long-time average yield.- The long-time average yield of wheat for the Plains is about 10 bushels per planted acre, but there is wide variation between localities and from year to year. The difference in long-time average yields between areas and the relation of yield to the acreage pattern are shown in this section. The variation in yield from year to year is reserved for later analysis in connection with natural hazards to wheat production.

The long-time county-average yield of wheat varies in different

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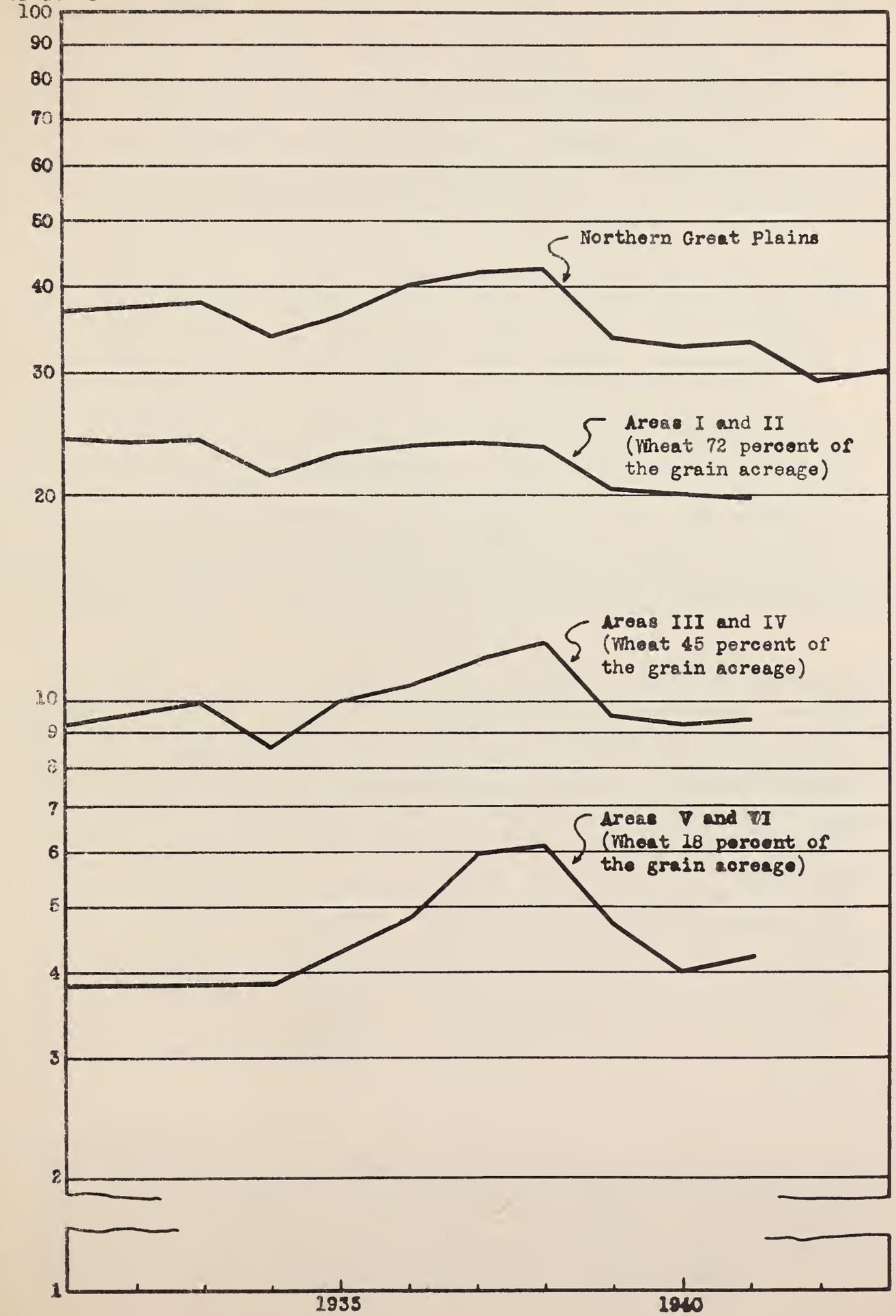
7/ While barley is not grown extensively in many of the wheat areas, some experimental evidence and farm yields indicate that barley might be expected to produce as many feed units per acre as spring wheat in parts of the Northern Plains.

Figure 4

Wheat acreage trends in areas of varying degrees of specialization in wheat, Northern Great Plains, 1931-1941



parts of the region from 5 to 29 bushels per acre. 8/ Most of the counties, however, average from 5 to 15 bushels per acre. For this analysis, three groupings were made as follows: counties with 5, 6, and 7 bushels per acre into a low-yielding group; counties with 8, 9, and 10 bushles per acre into a medium-yielding group; and counties with 11 bushels and more into a high-yielding group. A few isolated counties which did not conform with neighboring counties were arbitrarily attached to the nearest group. These cases were so few as to have little or no effect on the totals.

The low-yielding group of counties covers a large area in the north-central and the south-central parts of the region (figure 5). The medium-yielding area borders the low-yielding area and covers large portions of the central part of the region. High-yielding areas are along the eastern border and in the western half of Montana and Colorado. Although the difference between areas is highly significant, the difference between counties near one of the dividing lines is usually small. While the areas are characterized by low, medium, or high average yield, there are small localities which have long-time yields, above or below the average. The low-yielding areas, therefore, should not be designated as marginal, but they can be described as having a higher proportion of cropland which is near the margin of successful wheat production than do the medium or high-yielding areas.

In general, wheat occupies a more prominent position in comparison with other grain crops in the areas where its yield is lowest. In the low-yielding areas, wheat occupies 56 percent of the acreage of all grain crops and in the medium and high-yielding areas, it occupies 49 and 39 percent respectively (table 3). Barley acreage as a proportion of the total grain acreage follows wheat; that is, it occupies a more prominent position in the low-yielding than in the high-yielding areas. The proportion of the grain acreage used for corn and oats varies directly with the yielding capacity. In the areas of low-yield of wheat, corn occupies only 12 percent of the grain acreage, while in the high-yield area, it occupies 29 percent. The corresponding proportions for oats are 6 and 16 percent. The chief competitors of wheat in the low-yield areas are barley and sorghum, and in the medium and high-yield areas the leading competitors are corn and oats.

8/ The yield used is the adjusted average county yield established for the 1941 program of the Agricultural Adjustment Administration and the Federal Crop Insurance Corporation. The yields are based on all available information including "key" farm records from 1930 to 1940 and adjusted for a longer period.

Table 3.- Relation of wheat acreage to other grain crops in low, medium and high-yielding areas in the Northern Great Plains, 1941

Areas	All grain crops	Wheat		Corn	Oats	Barley	Other grain crops 1/
	Thousand acres	Acres	Percent	Percent	Percent	Percent	Percent
Low yield	13,985	7,883	56	12	6	13	13
Medium yield	28,991	14,257	49	17	10	12	12
High yield	28,904	11,364	39	29	16	10	6

1/ Rye, flax, grain sorghum.

Data compiled from reports of Federal-State Agricultural Statisticians and production capacity studies, Bureau of Agricultural Economics.

Wheat meets its keenest competition from other grain crops in areas where its yield is the highest. The high yields of wheat in eastern Nebraska and South Dakota show that wheat is well-adapted in these areas. But other crops such as corn and oats are also well-adapted. In the more arid areas farther west, both in the spring wheat area in North Dakota and Montana and in the winter wheat area of Kansas and southern Nebraska, the conditions are less favorable to the production of both corn and wheat, but the relative advantage shifts from corn to wheat. Thus, wheat appears to have its greatest economic advantage over other grain crops where conditions are such as to bring only medium and low yields. Wheat has occupied a large amount of land near the extensive margin of cultivation where yields become so low as to cast doubt on the advisability of cultivating the land at all. Moving toward the more humid areas, wheat meets more and more severe competition from other grain crops until the corn belt is reached and corn gets first choice on the use of crop land.

The trend in wheat acreage is significantly different in each of these yield groups for the 11-year period 1931-41. In the low-yielding area, the trend is distinctly downward; in the medium-yielding area, slightly downward; and in the high-yielding area definitely upward (figure 6). A higher proportion of the wheat acreage of the region was on high-yielding land in 1941 than in 1931. This is due in part to the reaction from over-expansion of wheat acreage on low-

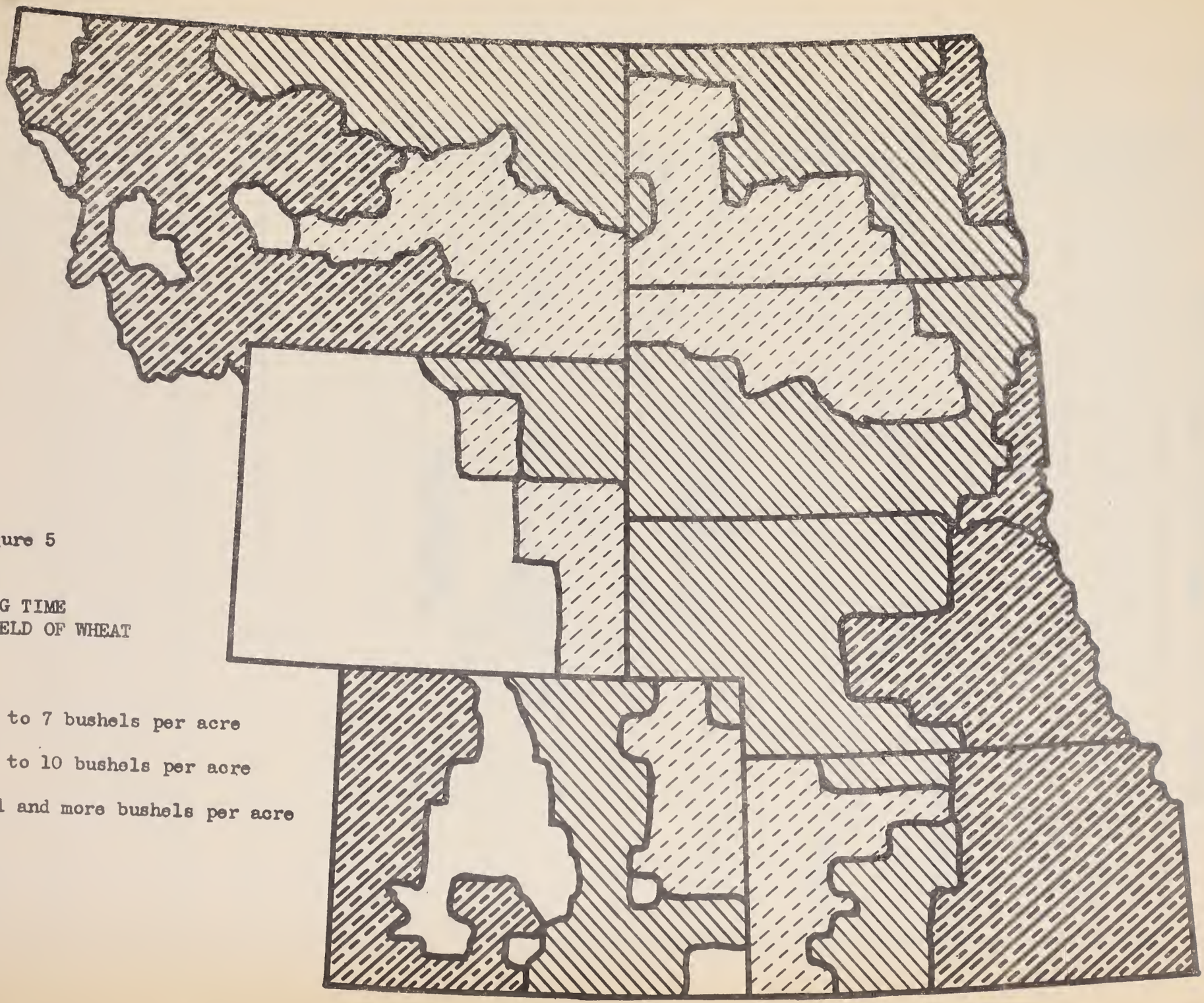


Figure 5

LONG TIME
AVERAGE YIELD OF WHEAT

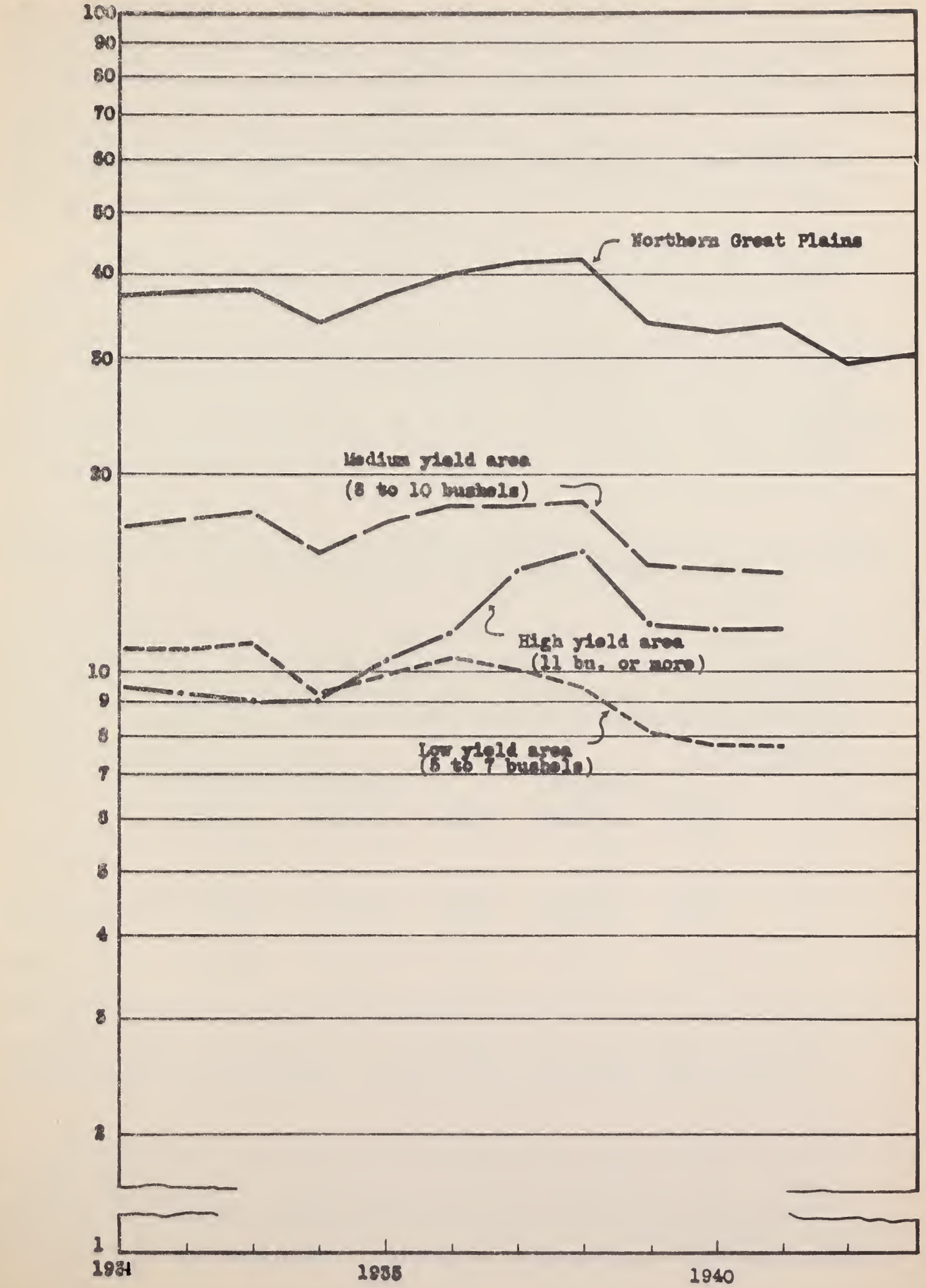
5 to 7 bushels per acre

8 to 10 bushels per acre

11 and more bushels per acre

Figure 6

WHEAT ACREAGE TRENDS IN AREAS OF LOW, MEDIUM, AND HIGH YIELD OF WHEAT, NORTHERN GREAT PLAINS, 1931-1941



yielding land which is near the margin of production. In this process of adjustment a substantial acreage of cropland has been retired and diverted to grazing or left idle awaiting a change in conditions which would justify cropping it again. There are few alternatives to wheat near the extensive margin of production. The problem there is whether to grow wheat or grass. The sharp increase in wheat acreage from 1934 to 1938 in the high-yielding area was due in part to the displacement of corn by wheat during the drouth. From 1938 to 1941, the acreage decreased rapidly in the high-yielding area but did not reach the former low point in 1933.

The rate of change in wheat acreage was more rapid and through a wider range in the high-yielding than in the other areas. The smallest acreage from 1931 to 1941 is 59 percent of the largest in the high, 79 percent in the medium and 69 percent in the low-yielding area (table 4). There was substantially less fluctuation in acreage in the medium-yielding than in either of the other two areas. Wheat is grown more successfully in the medium than in the low-yielding areas and with less competition from other grain crops than in many parts of the high-yielding area.

Table 4.- Fluctuation in the acreage of wheat in areas of low, medium and high yield, Northern Great Plains, 1931-41

Areas	Planted acres of wheat					Smallest acreage in percent of largest
	Average 1931-1941	Largest acreage		Smallest acreage		
	Thousand acres	Thousand acres	Year	Thousand acres	Year	
Low-yield	9,672	11,144	1933	7,743	1940	69
Medium-yield	16,461	18,069	1938	14,257	1941	79
High-yield	11,196	15,360	1938	9,096	1933	59

Compiled from published and unpublished data from Federal-State Agricultural Statisticians, Bureau of Agricultural Economics.

The decrease in acreage of land used for crops and the increase of idle and fallow were greatest in the low-yielding areas. Data compiled from Census reports shows that the decrease in land used for crops from 1929 to 1939 was 28 percent in the low-yielding areas, 20 percent in the medium and 10 percent in the high. Idle and fallow

land increased 388 percent, 276 percent and 162 percent for the low, medium and high-yielding areas, respectively. The retirement of cropland, as indicated by a reduction in the amount reported either as used or idle cropland, was 5 percent, 4 percent, and 2 percent for the low, medium and high-yielding areas, respectively.

Natural hazards to wheat production.- In addition to determining the availability of land resources for increasing wheat acreage, the pattern of past use, and average yields, the risk from natural hazards needs to be considered. This risk is indicated by insurance premiums of the Federal Crop Insurance Corporation which are based on the variability of yields from year to year.

The insurance program for wheat covers the loss from all natural hazards, the most important of which are drouth, insects, plant diseases, hail, and floods. Premiums are based on "loss cost" experience, that is, the amount which would have been required to pay actual losses over a period of years as determined by records of "key farms." The premiums, therefore, are measures of the variation of yields below the standard which was adopted. The proportion of the average yield which is required for the insurance premium in each county was calculated and termed the "risk factor." 9/ For example, the risk factor in a county with a 10 bushel average yield and 2 bushel premium rate would be 20 percent. If the premium rate were one bushel and the yield 10 bushels, the risk factor would be 10 percent.

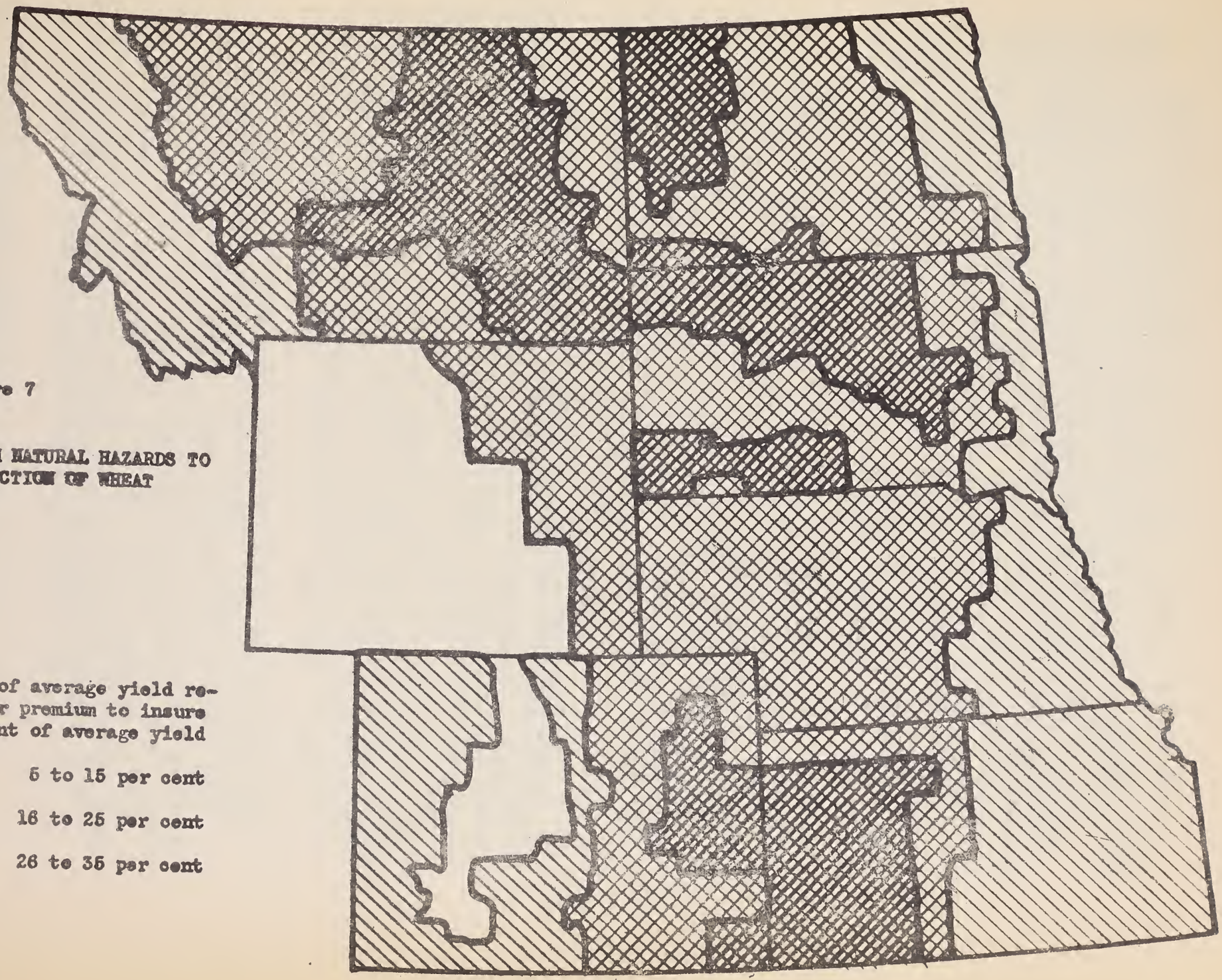
The risk factor varied from 5 to 35 percent in different counties of the region. Counties with risk factors of 5 to 15 were grouped together as a low-risk group; those with 16 to 25 percent, as a medium-risk group; and those with 26 to 35 percent, as a high risk group. The high-risk groups are in the north-central and south-central parts of the region (figure 7). Medium-risk groups extend around the high-risk and cover a large portion of the central part of the region and reach to the eastern boundary of South Dakota at one point. The low-risk groups are along the eastern side of the region where crop production is more dependable than it is in the central part, and in the mountainous and irrigated areas along the western side.

Since premiums are based on loss cost, which in turn is determined by the deviation of actual yields below 75 percent of the average, a high risk factor reflects high variability in yields of wheat. The deviation from average, therefore, is great in the high risk sections, and small in the low risk sections as compared with the average for the region. Here the risk is high, the probable yields extend from almost complete crop failure to 20 or even 30 bushels per acre.

9/ Data on county average yield of wheat and premium rates for "75 percent insurance" were obtained from state offices of the Federal Crop Insurance Corporation. The risk factor was calculated from these data, but it is not a part of the insurance program.

Figure 7

RISK FROM NATURAL HAZARDS TO THE PRODUCTION OF WHEAT



Average yield and risk show an inverse correlation. In general, high risk is associated with low yield and low risk with high yield. The average risk factor for areas of low yield is 28 as compared with 20 for areas of medium yield, and 9 for areas of high yield. In individual counties, there are exceptions to this general tendency. For example, Kidder County, North Dakota and Ziebach County, South Dakota both have average yields of 7 bushels per acre, but their risk factors are 24 and 34, respectively. In spite of some exceptions, the relation of average yield to the degree of risk from natural hazards is apparent both statistically and by geographic areas as shown in figures 5 and 7. The risk factor, although it is new and probably subject to some revision, supplies a valuable indicator of the relative variability in yields of wheat from year to year.

Since risk correlates closely with average yield, the analysis of acreage trends need not be repeated for the low, medium and high-risk groups. It is apparent without further analysis that areas which have a low average yield also have a high variability in yield from year to year because of natural hazards. Areas with high average yield generally have low variability in yield. A high proportion of the wheat acreage in the Plains is in areas of medium to high risk. A large amount of the wheat acreage of the world is in regions of high variability in yield. 10/

Approximate amount and location of land formerly planted to wheat.- The trend in recent years in the amount of cropland and the acreage of wheat for the region has been discussed and a substantial reduction in the acreage of both was shown. To determine the situation by areas is more difficult than for the region as a whole, and the acreage of idle cropland can only be estimated. Data from the Bureau of the Census, the only source with data for all counties for a period of years, shows the amount of land used for crops by counties. From this source, the decrease in the acreage of land used for crops from 1929 to 1939 was determined by areas and compared with the decrease in wheat acreage from the high point since 1931 to 1943.

This comparison shows that a high proportion of the idle cropland is in the more specialized wheat areas. Areas I, II and III, which contain 80 percent of the wheat acreage of the region, also had about three-fourths of the unused cropland acreage in 1939 (table 5). Areas IV, V and VI, which contain 20 percent of the wheat acreage of the region, had about one-fourth of the unused cropland in 1939. Since the wheat acreage was reduced from 1939 to 1942 and other crops were increased, it is probable that more than three-fourths of the idle cropland in 1942 was in the specialized wheat areas.

10/ V. P. Timoshenko, Variability in Wheat Yields and Outputs, Wheat Studies of the Food Research Institute.

Table 5.- Reduction in wheat acreage from highest acreage since 1931 to 1943 and the reduction in land used for all crops from 1929 to 1939 by areas in the Northern Great Plains

Areas	Largest acreage of wheat 1/		Decrease from largest wheat acreage to 1943 2/	Decrease in land used for crops 1929 to 1939 3/
	Year	Thousand acres	Thousand acres	Thousand acres
Area I			2,988	1,460
Medium yield	1937	4,782	1,596	900
High yield	1938	4,945	1,392	560
Area II			5,715	7,214
Low yield	1933	8,736	3,377	3,882
Medium yield	1936	5,505	1,669	2,871
High yield	1938	2,600	669	461
Area III			2,788	4,252
Low yield	1933	1,746	618	1,383
Medium yield	1938	5,188	1,488	2,788
High yield	1938	2,198	682	81
Area IV			1,252	909
Medium yield	1936	1,074	333	586
High yield	1938	2,302	919	323
Area V			1,449	1,490
Low yield	1937	800	215	1,006
Medium yield	1937	827	351	394
High yield	1938	2,091	883	90
Area VI			1,069	2,819
Low yield	1938	55	32	164
Medium yield	1936	1,341	448	1,523
High yield	1938	1,224	589	1,132
All Other Areas	1938	66	34	4/ 32
Regional Total			15,295	18,112

1/ Compiled from published and unpublished data from Federal-State Statisticians' offices, Bureau of Agricultural Economics, United States Department of Agriculture.

2/ 1943 wheat acreage in all areas is assumed to be 10 percent less than the 1941 acreage, the approximate difference between the 1941 and 1943 acreages for the region. This is only an approximation for the areas since some areas vary from the average for the region.

3/ Compiled from reports of Bureau of the Census. Wild hay not included.

4/ Increased.

The decrease in crop acreage from 1929 to 1939 was 18 million acres for the region according to the Census. Of the 13 million acres of this former cropland which was in Areas I, II and III in 1939, about 6 to 7 million acres were entered in the restoration program, regrassed, or added to the summerfallow acreage according to estimates. This would leave from 6 to 7 million acres as idle cropland in 1942. About the same amount of idle land is indicated by using Federal-State Statisticians crop acreage data. As previously discussed for the region, data compiled from that source showed 16 million acres less land in principal crops in 1942 than in 1932. About one-half or 8 million acres were estimated as idle cropland in 1942. Since at least three-fourths of the idle cropland of the region is in Areas I, II and III, at least 6 of the 8 million acre total would be in those areas.

A comparison of the largest wheat acreage since 1931 with the estimated acreage in 1943 shows a substantial reduction in every area in the region. If the former maximum wheat acreage were planted in all areas the same year, the amount would be 15 million acres greater than in 1943. 11/ Of this 15 million acre decrease, 11.5 million was in Areas I, II and III and 3.5 million was in Areas IV, V and VI.

Possibilities and Limitations of Increasing Wheat Acreage in the Plains

The conditions under which wheat is grown in the Plains vary greatly in different areas. The average yield from an acre of land is more than five times greater in some counties than in others and the risk is only one-seventh as great. In addition to these geographic differences, the changes in economic and physical conditions from year to year cause wide fluctuations in acreage, yield and production of wheat. A further complication is a large amount of land which is near the margin of crop production, the most profitable use of which changes with relatively small changes in price or cost of production. This situation is a wartime wheat production problem as well as a long-time land utilization problem, because wheat is the principal cash crop in the marginal areas. Since wheat is produced in large quantities on specialized wheat farms and in rotations on diversified farms, in areas where average yields are low and where they are high, on marginal land and on the best grades of cropland; all of these conditions should be considered in a program to secure the largest wartime production of wheat with the least disturbance to the production of other essential crops and the least detriment to land and human resources.

11/ The difference between the highest year and 1943 is greater when determined for each area and totaled for the region than is obtained by subtracting the 1943 acreage from the highest acreage for the region, because all areas did not have their highest acreage in the same year.

The possibilities and limitations of increasing wheat acreage, as considered in this study, are primarily from the viewpoint of the use of land resources. Since wheat can be grown successfully in practically all parts of the region, the ultimate acreage possibilities are limited only by the amount of cropland available. The practical possibilities of wartime increase in wheat acreage are limited, however, by the need for other crops and the probability that scarce manpower and equipment may be applied to land from which only small amounts of wheat can be expected.

The objective should be to encourage the maximum increase in wheat acreage in areas where wheat can be grown advantageously, where cropland resources are available and where a minimum substitution of wheat for other essential crops is likely to occur. The degree of need for wheat and the availability of manpower and equipment will eventually determine both the extensive and intensive margins of the utilization of land for wheat production. There is also the possibility that some counter measures such as governmental assistance in regrassing of land near the margin of cultivation may be desirable as a check on expansion of wheat acreage on land which will not remain in production except when conditions are favorable. A program to increase yields by the use of adapted varieties of seed and improved farm practices should accompany a program for increased acreage.

Major areas for an increase in wheat acreage.- In the following discussion, some guides on which to base priorities for increasing wheat acreage in various areas and under different circumstances are suggested. Since all restrictions on the planting of wheat have been removed, the acreage is likely to be increased to some extent in all parts of the region. But it may be desirable to encourage, by educational or other programs, a greater increase in some areas than in others or to discourage an undue expansion in certain areas. If the amount of wheat machinery is limited, some basis for allocating it to the areas of greatest increase in acreage will be needed.

Although Areas IV, V and VI show a sharp reduction in wheat acreage since 1938, the acreage of other crops, particularly corn, was increased. In spite of high yields, wheat occupies only 12 to 35 percent of the grain crop acreage. Since other essential crops are grown advantageously in these areas, special inducements to increase wheat acreage probably would result in a reduced acreage of other crops. The danger here is that wheat may partially replace feed grains which will produce more feed units per acre than wheat. As long as wheat is being used as feed for livestock, any increase in acreage in these areas beyond the needs of a suitable crop rotation system or to utilize the limited acreage of idle cropland is questionable.

Since most of the wheat acreage and most of the idle cropland in the region are in Areas I, II and III, the major portion of an increase

in wheat acreage would be expected there. If wheat acreage is to be increased where experience shows wheat to have a relative advantage over other crops and where a substantial acreage of idle cropland is available, the increase must come primarily from these three areas. Although these areas tend to specialize in wheat in comparison with other grain crops, wide variation in other conditions such as yield, risk, and availability of cropland exists. When these areas are subdivided according to yield groups, the decrease in wheat acreage from the high point to 1943 is 4 million in the low-yielding portion, 4.7 million in the medium and 2.7 million in the high (table 6). The reduction in the amount of land used for crops from 1929 to 1939 was 5.2 million acres in the low-yielding areas, 6.5 million in the medium and 1.1 in the high.

Table 6.- Comparison of the reduction in acreage of wheat, acreage of all crops, and the risk factor in the low, medium and high-yielding parts of the specialized wheat areas in the Northern Great Plains.

Areas	Decrease in wheat acreage from high point to 1943 1/	Decrease in land used for crops from 1929 to 1939 1/	Average wheat yield 2/	Risk factor 3/
	Thousand acres	Thousand acres	Bu. per acre	
Total I, II & III	11,491	12,926		
Low-yielding	3,995	5,265	5-7	28
Medium-yielding	4,753	6,559	8-10	20
High-yielding	2,743	1,102	11 +	9

1/ Data from table 5.

2/ Long-time average adjusted yield by counties from state offices, Agricultural Adjustment Administration.

3/ Percentage of the average yield required for crop insurance premiums.

High and medium-yielding parts of specialized wheat areas.- In areas I, II and III, wheat has demonstrated its comparative economic advantage over other grain crops by occupying 49 to 84 percent of the

grain crop acreage. 12/ The best portions of these specialized wheat areas are those with highest yields of wheat (figure 8). In addition to high yield, production is relatively dependable as shown by a risk factor of only 9 percent. An increase in wheat acreage in the high-yielding areas would bring large returns in wheat from the use of available cropland and should be given a high priority for the use of scarce machinery. The acreage of idle cropland, however, is small. Although the wheat acreage in 1943 was 2.7 million acres less than in 1938, the land used for all crops was 1.1 million acres less in 1939 than in 1929. Since the acreage used for all crops has been increased since 1939, the amount of unused cropland in 1942 and 1943 must be substantially less than the million acres which were available in 1939. Farmers probably will welcome the opportunity to substitute wheat for other grain crops which were planted when the acreage of wheat was restricted from 1938 to 1942. Thus, the acreage of wheat is likely to be increased in the high-yielding areas both by utilizing the limited amount of idle cropland and by some displacement of other grain crops.

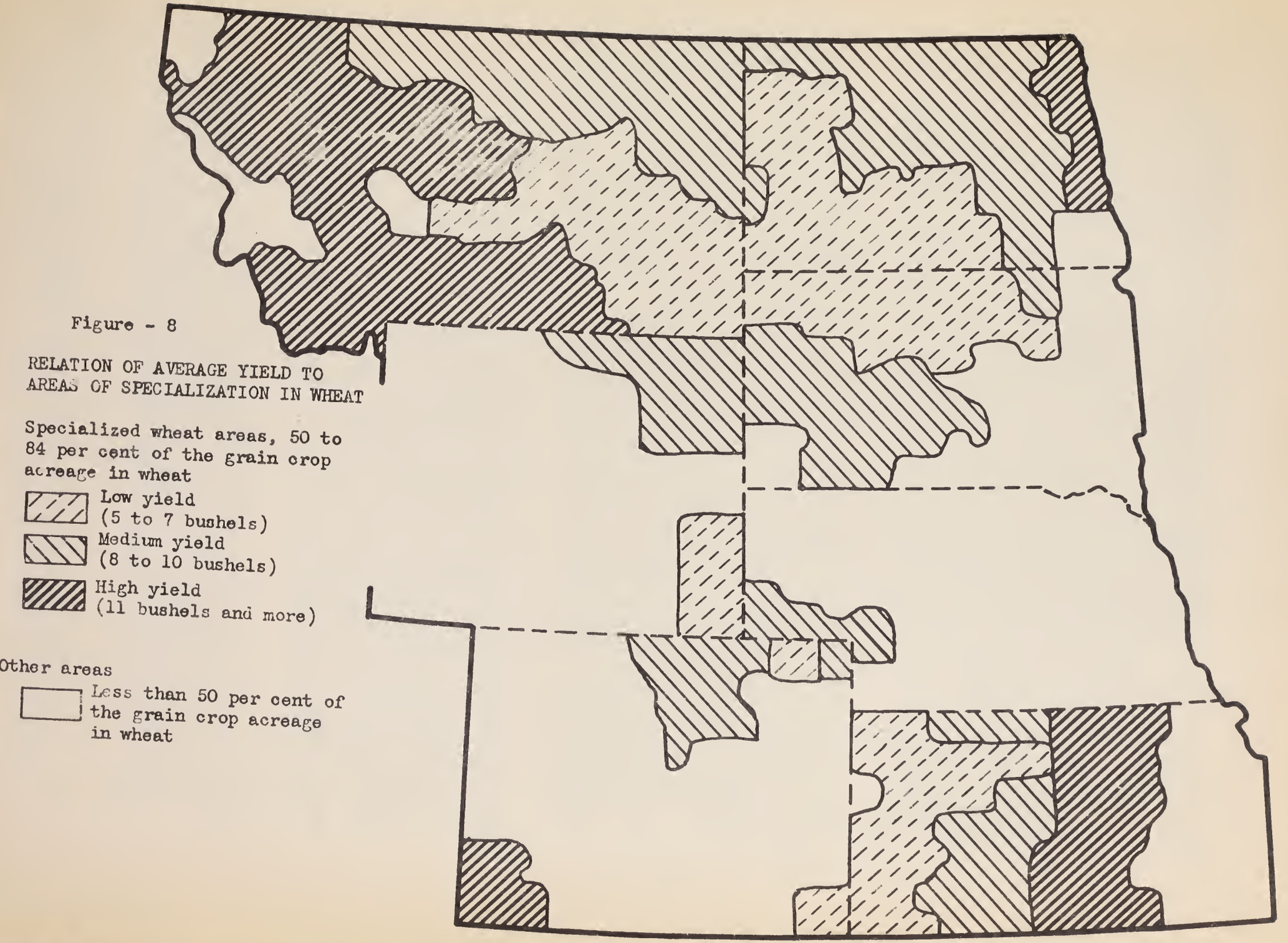
The medium-yielding portions of the Areas I, II and III had more acreage and produced more wheat than did either the high or low-yielding portions during the past decade. There was also less fluctuation in wheat acreage and less substituting of other crops as the wheat acreage was reduced. In contrast to the high-yielding areas, the reduction of 6.5 million acres of all crops was greater than the reduction of wheat acreage which was 4.7 million acres. Wheat acreage could be increased to approach its former high point in the medium-yielding areas with a minimum displacement of other crops or the use of cropland which has been regrassed.

Although the yield is less in the medium-yielding areas and the risk is 20 percent as compared with 9 percent for the high-yielding areas, a much larger acreage of idle cropland is available. Compared with averages for the region, both the yield and risk are medium. If special inducements are needed to get the desired wheat acreage, they should be applied vigorously in these medium-yielding portions of the specialized wheat areas. Encouragement for a maximum increase in the medium-yielding portions might help to avoid the substitution of wheat acreage for other essential crops in the high-yielding portions or excessive expansion in low-yielding portions. The expansion should not be extended to the point of disrupting the regrassing of the less productive cropland or to induce excessive plowing of native sod, at least until necessity dictates a greater increase than now appears necessary.

12/ Although the degree of specialization in wheat is higher in Area I than in Area II or Area III, wheat leads all other grain crops by such a large margin in all of these areas as to justify considering them together in the interest of simplicity in presentation.

Figure - 8

RELATION OF AVERAGE YIELD TO AREAS OF SPECIALIZATION IN WHEAT



Low-yielding parts of specialized wheat areas.- The low-yielding portions of Areas II and III 13/, have possibilities for a large expansion in acreage but also have severe limitations. The average yield is low and the risk is high. Average yield for these areas from 1931 to 1941 fluctuated from 2 to 13 bushels per acre. The effect of fluctuations is aggravated by what might be called cyles of yield. For example, yields were below average for 5 consecutive years from 1933 to 1937 and above average for the 5-year period from 1938 to 1942. When yields are above average for several years, wheat production is an attractive enterprise and acreage is likely to be increased, particularly when high prices coincide with the high yields. This situation may be followed by one in which yields are below average for several years. Below-average yields were accompanied by low prices in some of the years from 1933 to 1937.

In spite of their limitations, the low-yielding areas have importance as producers of wheat. Although the long-time county-average yield is low, some localities are better than average and there is wide variability from year to year in all localities. A distinction should be made between county-average, community-average, and farm-average yields. A county with low-average yield may contain a community with medium yield and individual farms with medium or even high-average yield. This situation also applies to counties with medium or high-average yield, but it is of special significance in low-yielding counties. Large quantities of wheat are produced in the years when weather conditions are most favorable. In favorable years, the low-yielding areas yield about as much per acre as the medium or high-yielding areas.

The acreage of wheat and the acreage used for all crops was much greater in the early 1930's than at present. About 6.5 million acres were planted to wheat in 1943, which is 4 million acres less than in 1933. The acreage of all crops was reduced 5.3 million acres from 1929 to 1939, indicating the availability of former cropland. A portion of this former cropland was retired and regrassed, probably 2 to 3 million acres. Since a large acreage of land near the margin of crop production is available, the amount of expansion in these areas will depend on the price of wheat, cost of production and the availability of equipment and manpower.

The consensus of opinion of both farmers and technicians is that the wheat acreage was over-expanded in the low-yielding areas in the early 1930's. A substantial increase in acreage in any except the best localities of these low-yielding areas is likely to require a downward adjustment in the acreage when the demand for wheat is less

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13/ No low-yielding counties are found in Area I. Practically all of the counties in the region with low average yield are in Areas II and III.

than during the war period. Unless the need for wheat becomes very great and an ample supply of machinery and labor are available, the increase in acreage in the low-yielding area should be confined to the best localities.

The extensive margin of land use varies greatly with changes in price of wheat and cost of production. When the price of wheat is high in relation to cost of production, the wheat acreage may be expanded in localities of low yield. When price is low in relation to cost, a large acreage becomes idle. The 5, 6 and 7 bushel portions of the specialized wheat areas have shown this tendency to a much greater degree than the 8, 9 and 10 bushel portions. A program to increase wheat acreage in the low-yielding areas would involve a determination of the marginal yield under existing cost-price relationship or provide incentive payments on the low-yielding land. Considered from the viewpoint of feed value, the total digestible nutrients from native grasses on an acre in the low-yielding wheat areas are about the same as found in 3 to 4 bushels of wheat.

If an "all out" program for wheat production should become necessary, great interest attaches to the possibilities of securing wheat from the low-yielding areas for an emergency period. These areas produced 103 million bushels of high-quality bread wheat in 1941, enough to supply 20 percent of the annual consumption as food in the United States. From 1931 to 1941, the smallest amount produced was 13 million bushels in 1934; the average 51 million; and the total for 11 years, 566 million. The amount of wheat which would be obtained in the next few years if the acreage were increased to the former high point is a matter of chance. Although the long-time average yield and risk are known, the probabilities of wheat yield for a year, or several years ahead, cover a wide range. The production possibilities on 10.5 million acres based on various yields is as follows: 95 million bushels from a yield equal to the 1938-41 average, 68 million from long-time average yield, 136 million from a yield equal to the highest from 1931 to 1941 14/, and 18 million from the lowest yield for the period.

A program designed to make the maximum use of the land resources in the low-yielding areas for wheat production should be classified as a war measure which is based on necessity, partially disregards costs, and provides for contraction or abandonment after the emergency is past. If a substantial increase in acreage of low-yielding wheat land should become necessary, adequate provision should be made for a downward adjustment of acreage when the price of wheat is likely to be lower than it is during the war.

14/ Production for the Plains in 1942 was the highest on record but has not been calculated for the areas which are discussed here.