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Accepted for the faculty of the College of Graduate Studies of
The University of Nebraska at Omaha, in partial fulfillment of the re-
quirements for the degree of Master of Arts.

G. B. Schily
Chairman Department

Graduate Committee E. J. Stale Economics
Name Department

Charles B. Henderson

David J. Petrusich

G. B. Schily

DELIMITATION OF THE OMAHA WHEAT
SOURCE SUPPLY REGION

A Thesis

Presented to the

Department of Geography

and the

Faculty of the College of Graduate Studies

University of Nebraska at Omaha

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

John T. Wilhelm

August 1968

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INTRODUCTION

The city, as a center of man's increased activity in past decades, has assumed a variety of shapes due primarily to both physical and economic factors. The relative size and importance of the city, however, is basically related to the external relationships which effectively bind it to the countryside. The recognition of this relationship by economic geographers has led to an increased awareness of the importance of analyzing a city's trade and market areas, which can be internally or externally oriented, depending upon the type of business being analyzed.

BACKGROUND. One of the earliest theories expressing the city-countryside relationship and the effect of transportation upon location was postulated in 1875 by Johann Heinrich Von Thunen. His idea was stated as follows:

Because of the effect of transport costs upon price, products would be grown near the city which were heavy in proportion to their value, because transportation costs on such articles would be so high as to prevent a distinct culture. Products that were easily spoiled and must be consumed fresh would also be grown near the city. Thus vegetables, milk, and timber would be produced close to town, but grain and cattle further away.

This theory would have proved more adaptable to present day usage had it not assumed a single city not in direct conflict with marketing areas of other cities. In a later method, Alfred Weber, who was concerned with

¹Stuart Daggett, Principles of Inland Transportation (New York: Harper and Brothers, 1955), p. 431.

the overlapping of market areas between cities, attempted to show where manufacturing would occur when the sources of material and the location of the market were assumed. However, neither Von Thunen nor Weber expounded upon the extent or probable shape of the areas which the established producers could command. The apparent lack of concern over the market area of a city continued since most economic geographers were more concerned with the areal distribution and production of material goods.¹

In the years following World War II, William Applebaum, in American Geography: Inventory and Prospect, wrote about marketing geography and its future significance to both the field of geography and to business. The basic idea was as follows:

In a commercial economy, as distinct from a subsistence economy, production represents only one side of economic geography. Goods not only must be transported from areas of production to those of consumption, but they must be transferred from the producers, by collection, and subsequent distribution, into the hands of the consumers. This is the function of marketing. It is a vital part of the capitalist system; it is a major factor in the differential growth of cities and in the changing aspects of rural areas.²

Applebaum continued to say that marketing geography should be concerned with the delimitation and measurements of markets and with the channels of

¹Richard Hartshorne, "A New Map of the Manufacturing Belt of North America," Economic Geography, XII (January, 1936), 45-53; Rex G. Henrickson, Trends in the Geographic Distribution of Some Basically Important Materials Used at the Buick Motor Division, Flint, Michigan (Ann Arbor: Michigan State University, 1951), p. 72; Clarence F. Jones, "Areal Distribution of Manufacturing in the U. S.," Economic Geography, XIV (July, 1938), pp. 217-222.

²William Applebaum, "Marketing Geography," American Geography: Inventory and Prospect (published for the Association of American Geographers by Syracuse University Press, 1954), pp. 245-251.

distribution through which the goods move from the producer to the consumer. It appears that, immediately following and preceding this book, marketing articles were published with greater frequency. Clarence Jones and John Alexander, writing prior to 1954, are representative of the limited concern with the delimitation of market areas and their related causal factors.¹ Jones, in analyzing the factors responsible for The Grain Trade of Montreal, mentioned location, storage facilities, cheap water rates and incoming freight rates as the cause of Montreal's importance as a grain shipping port. John Alexander, on the other hand, was concerned with freight rates as the determinant of a market area. From the study of freight rates of grain in Illinois, he determined that Illinois was receiving corn from two-thirds of the state; but more important was the fact that this area also enjoyed the favorable freight rates on grain.

Forthcoming from 1954 to present, numerous economic geography articles of importance to business establishments have been published. Business activity is concerned with markets because it is geared to meet present and potential demands of the customers. In studying the marketing business, geographers have developed two similar types of market analysis. The first deals with markets located in the city.² The second

¹Clarence F. Jones, "The Grain Trade of Montreal," Economic Geography, I (March, 1925), pp. 53-72. John W. Alexander, "Freight Rates as a Geographic Factor in Illinois," Economic Geography, XX (January, 1944), pp. 25-30.

²Homer Hoyt, "Residential and Retail Patterns of Leading Latin American Cities," Land Economics, XXXIX (November, 1963), pp. 449-454; Richard U. Ratcliff, The Madison Central Area. (Madison: Bureau of Business Research and Service, University of Wisconsin, 1953).; Bernard J. Kane Jr., A Systematic Guide to Supermarket Location Analysis. (New York: Fairchild Publications, 1966).

is based on the external supporting region of the city.

In looking at this external supporting area of the city, several progressive articles and books have been written in the last few years.¹ Robert E. Dickinson's book, City and Region, is an analysis of the city and its various regions; both internal and external. In studying these city-region relationships, he emphasized regional associations of a city. The first category, trade relations, was summed up under the heading of the trade area and defined as follows: "the concept of a composite that actually contains as many areas as there are individual trading activities."² Dickinson also inferred that an evaluation of both the city and its regions, however vaguely defined, should be carried out due to the constantly changing base of the city. Loyal Durand Jr., in "The Major Milksheds of the Northeast Quarter of the United States," mentioned several significant characteristics of the milkshed market areas. Durand stated:

The Milksheds of the major cities of the northeast portion of the United States, from the Atlantic to the plains border are competitive with one another. Milksheds of the major cities overlap. They also surround, impinge upon, and compete with the milksheds of small and medium size. The usual milkshed is highly irregular in shape. A few are oval rather than circular. Many contain outlying noncontiguous producing areas.³

¹Chauncy D. Harris. "Salt Lake City: A Regional Capital" (Doctoral Dissertation, University of Chicago Libraries, Chicago, 1941); Richard L. Merrill and William L. Garrison, "Projections of Interregional Patterns of Trade in Wheat and Flour," Economic Geography, XXXVI (April, 1960), pp. 116-126.

²Robert E. Dickinson, City and Region (London: Reutledge and Kegan Paul LTD, 1964), p. 228.

³Loyal Durand, Jr., "The Major Milksheds of the Northeastern Quarter of the United States," Economic Geography, XL (January, 1964), pp. 9-33.

In defining these milkshed market areas, Durand and others have set the precedent for increased analysis of all types of market area studies.

PROBLEM. The ensuing study is an attempt to analyze a specific grain-source market area of a major business in Omaha, Nebraska, the Omaha Grain Exchange. Not only is the study valuable as an addition to the literature, but it is also the first of its kind for Omaha. According to grain merchants, the study should represent a most complete analysis to date of a grain supply area for a primary grain market in the United States.

The selection of wheat as the grain to be analyzed was dependent upon several factors. Foremost was the large nine state drawing area from which wheat was shipped into Omaha. This production area, in comparison to the very small source areas of the other grains handled at the Exchange, offered a better opportunity to detect whether or not the market area was contracting or expanding. The importance and initial development of this topic was further enhanced by the disclosure that, although individual grain merchants might be aware of the location of their consignments, the overall and changing picture of the wheat supply area could not be statistically defined. Since wheat represents the second largest grain in volume to be handled at the Exchange, it has been speculated that increased international export of wheat has led to a diversion of some wheat from the Omaha market. Wheat is the country's leading cash crop, with production tending to concentrate in surplus areas. Accordingly the farm wheat price must be adjusted to bear all the charges necessary to move grain to the large consuming areas. It is not

uncommon for some wheat products to be carried across the country.¹ Therefore, since Omaha lies in such a surplus area, it is hoped that trends observed in the Omaha analysis will serve as a basis for decisions on the wheat movements of other primary wheat markets in the country. Such wheat movements, however, cannot be statistically detected until specific market supply areas for the primary grain markets are delimited. Hence, it was decided to study the years of wheat shipments from 1960 through 1965 to see if any fluctuations of the wheat region have occurred.

DATA PROBLEMS. The most important aspect of depicting the wheat supply area concerns the establishment of data for the boundary. What criteria are most effective in focusing on a grain center's source area? Once a source area has been defined, what might serve as the measureable causes for a source region fluctuation from year to year? As had proven a problem for Durand and others, the lack of data to measure the source area presented a formidable problem at the outset of this project. The general data finally utilized in this study was extracted from individual grain manifests of all railroads that indicated origins of shipments.² Further information on the topic was obtained from personal interviews of grain merchants, railroad officials and from published data. In the final delimitation, the wheat supply regions for the six year period were

¹James Schonberg, The Grain Trade: How It Works (New York: Exposition Press, 1956), p. 64.

²A grain manifest is a railroad document that indicates the following information on each incoming carload of grain to Omaha: point of origin, buyer, seller and contents.

constructed by a method derived by the author which, although not directly utilized by other writers, incorporated several features of regional construction methods.¹ Examination of the changing wheat supply regions shows a definite change in the wheat core and secondary areas through time. The causes of change will be determined from personal interviews of grain trade officials in Omaha.

¹Howard L. Green, "Hinterland Boundaries of New York City and Boston in Southern New England," Economic Geography, XXXI (March, 1955), pp. 283-300; Robert E. Dickinson, City and Region (London: Routledge and Kegan Paul LTD, 1964); Jean Gottman, Megalopolis: The Urbanized Northeastern Seaboard of the United States (New York: Twentieth Century Fund, 1961).

CHAPTER ONE

EVALUATION OF THE WHEAT STUDY AREA

LOCATION. The Omaha wheat supply area is located almost entirely in the Missouri River Basin -- with minor exceptions in central Kansas, eastern Colorado and western Iowa. The region consists of 322 counties located in the states of Nebraska, Iowa, Missouri, Kansas, Colorado, Wyoming, South Dakota, North Dakota and Montana (Figure 1). Its size is indicative of the fact that most of the counties included in Figure 1 represented wheat shipment counties during the 1960 through 1965 study period.

As noted in a later analysis, the primary and secondary wheat supply areas of Omaha are located in southern Nebraska, western Iowa and northwestern Kansas. This territory comprises the northern limits of the Great Plains Winter-Wheat belt in the United States; the Winter-Wheat belt consists of Oklahoma, Kansas, eastern Colorado, southern Nebraska and the Panhandle of Texas.¹ However, the area in northwestern Nebraska and southern South Dakota, which is part of the Spring Wheat belt is also of some significance to the wheat supply area of Omaha. The basic difference between these two areas is the time the crop is sown and harvested. Also, the relative hardness of the wheat in the Spring Wheat belt gives it a higher preference for millers in terms of its strength and flavor.

¹Clarence L. White, Paul F. Griffin, and Thomas L. Mcknight, World Economic Geography (Belmont: Wadsworth Publishing Company, Inc., 1964), p. 317.

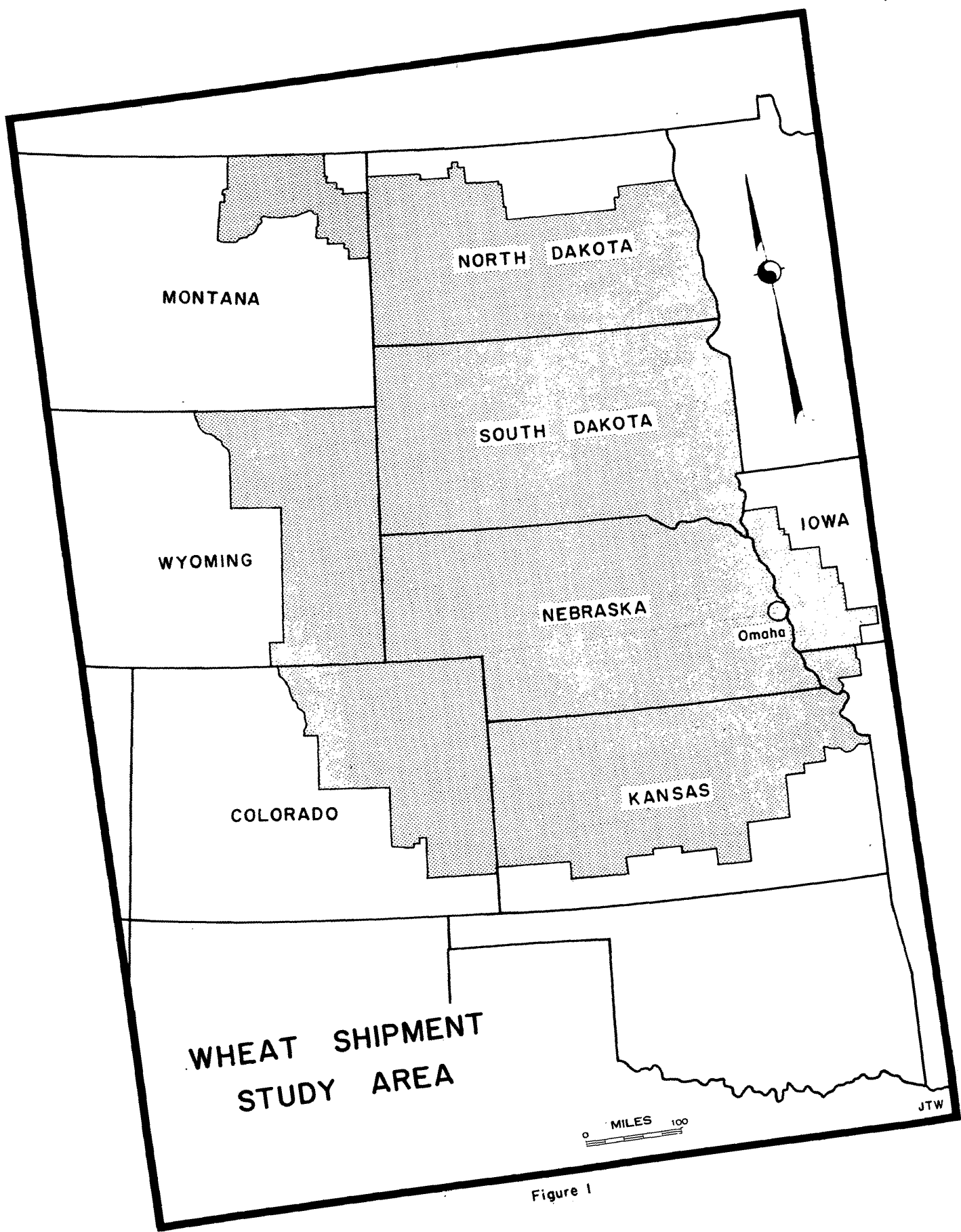


Figure 1

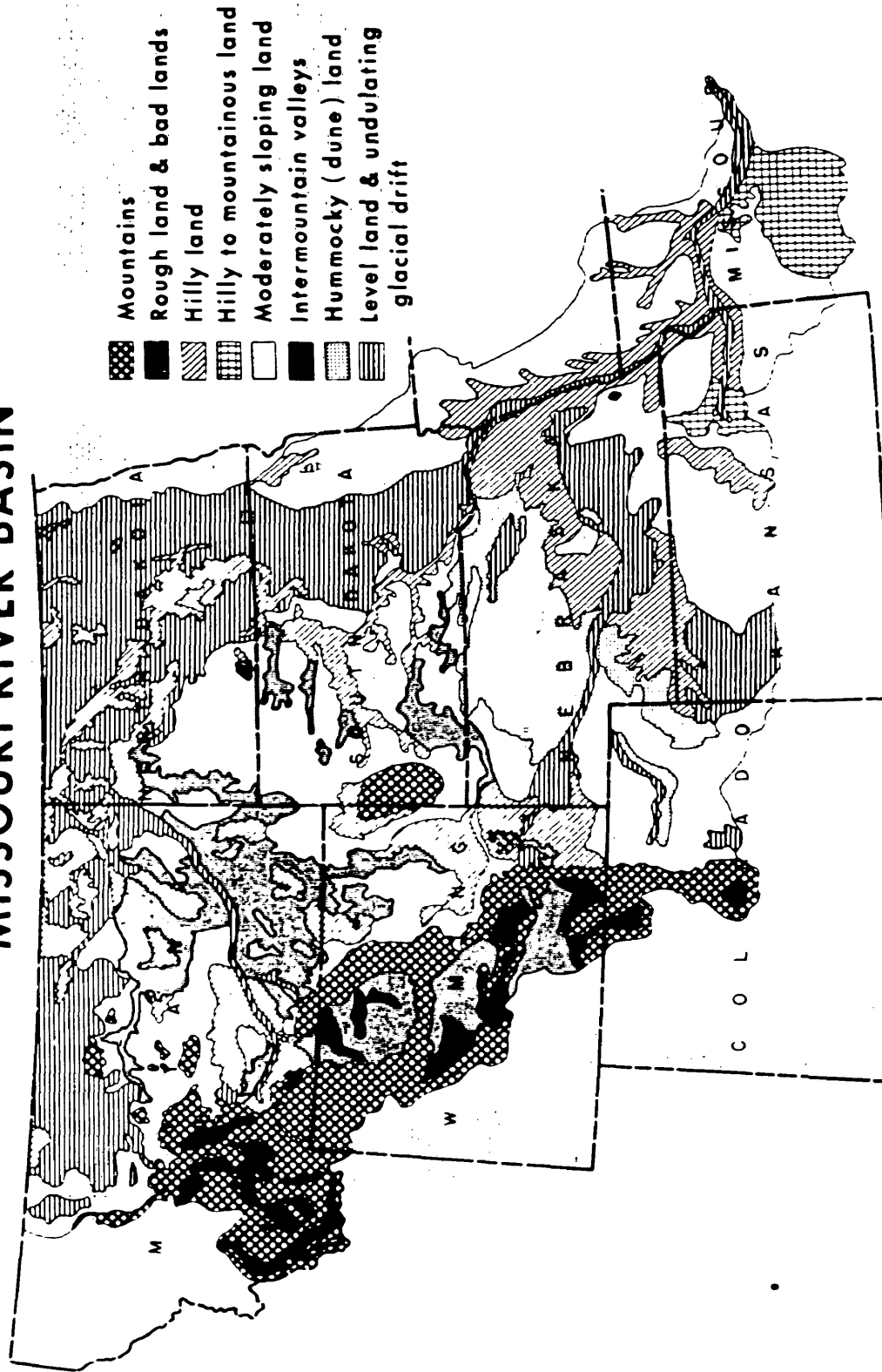
TOPOGRAPHY. Aside from the locations of both the Spring and Winter Wheat belts, the physical relationships of both regions exercise permanent and semi-permanent controls on the magnitude and location of Omaha's wheat source region. Physical characteristics are an important determinant of the northern wheat supply boundary (Figure 2). The large area of land in northern Nebraska, known as the Sand Hills, is a hummocky (dune) area composed of a thin soil overlying deep loose sand.¹ However, O. E. Baker and other writers have stated that wheat is not grown successfully on sandy or gravelly soils and that the dominant usage of the Sand Hills is for grazing.² To the east and immediately adjacent to the sand hills in Nebraska lie hilly loess areas which are not suitable for large scale wheat production due to the steepness of slopes. Consequently, these two land characteristics of sandy soils and sloping terrain serve to effectively impose a northern boundary for Omaha's wheat supply area. Not only do they inhibit the wheat supply area, but they also generally divide the two distinct wheat production regions -- the Spring-Wheat belt and the Winter-Wheat belt.

Directly south of this east-west barrier lies the northern limits of the Winter-Wheat belt. This edge roughly follows the Platte River Valley as it cuts across south-central Nebraska. With the exception of

¹Harry A. Steele, Facts About Agriculture in the Missouri River Basin, The University of Nebraska College of Agriculture Experiment Station, Bulletin 422 (Lincoln, University of Nebraska, 1953), p. 10.

²Oliver E. Baker, "The Potential Supply of Wheat," Economic Geography, I (January, 1925), p. 28.

PHYSICAL LAND CHARACTERISTICS OF THE MISSOURI RIVER BASIN



SOURCE: MISSOURI RIVER BASIN AGRICULTURAL PROGRAM, H. R. 373, 81ST CONGRESS, 1ST SESSION, FEB. 1949

U. S. DEPARTMENT OF AGRICULTURE

NEG. 49191-X BUREAU OF AGRICULTURAL ECONOMICS

Figure 2

a small area in south-west Nebraska that is sandy and hilly, this region ranges from moderately sloping land to level land and undulating glacial drift. Here the terrain is suitable to heavy wheat production and the chernozem soils are deep and extremely rich in plant nutrients.¹ This area, south of the non-wheat producing sand hills and sloping terrain, is Omaha's most important producing region.

CLIMATE. Another factor exercising considerable influence on the wheat-producing areas of the Great Plains is climate. The continental climate of the region is characterized by extremes and irregularity throughout the four seasons. Winters are relatively long and cold and farmers must contend with low humidity, much wind, intense local storms with hail and tornado damage, high evaporation in relation to rainfall, and the possibility of early frost. The importance of these climatic disturbances to the production of wheat in southern Nebraska, Kansas and Oklahoma has been documented by Leslie Hewes, Arthur Schnieding and O. E. Baker.

O. E. Baker, writing in 1925, was concerned over the potential supply of wheat in the Great Plains area. He indicated that wheat has a lower moisture limit of 15-17 inches and an upper limit of 50-52 inches of rainfall. Table I shows the average annual precipitation for selected stations throughout the Omaha wheat supply area. A noticeable trend here is that as one moves eastward, precipitation increases from about 16½

¹John Alexander elaborates on the causes of the fertility of the chernozem soils in Economic Geography (Englewood Cliffs: Prentice-Hall, Inc., 1963), pp. 173-174.

TABLE I
AVERAGE ANNUAL PRECIPITATION FOR SELECTED STATIONS
IN THE OMAHA WHEAT SUPPLY AREA

WESTERN STATIONS	<u>Inches</u>
Alliance, Nebraska	16.66
Kimball, Nebraska	16.51
Julesberg, Colorado	16.57
CENTRAL STATIONS	
North Platte, Nebraska	21.35
Bird City, Kansas	17.73
Holdrege, Nebraska	23.20
Hastings, Nebraska	24.61
EASTERN STATIONS	
Lincoln, Nebraska	27.94
Beatrice, Nebraska	31.28
Omaha, Nebraska	30.69

Source: Climatological Data for the United States, 1950.

inches in the west to over 30 inches in the eastern region.¹ Temperature, particularly growing season temperature, and the dates of occurrence of the spring and fall frosts are important to the growing and harvesting of the wheat crop.² The average minimum temperature of 57 degrees is a necessity during the three warmest months of June, July, and August. With the Great Plains having less than thirty inches average annual rainfall, plus hot summer temperatures, the production of wheat was climatologically and economically feasible. However, the slightest decrease in precipitation could cause wheat failure.

This topic of wheat failure due to climate was further documented in a series of articles by Leslie Hewes concerning wheat failure in western Nebraska and the central Great Plains. Since western Nebraska and northwest Kansas are of importance to the Omaha wheat supply area, the reasons for wheat failure have been noted briefly in an attempt to see whether these same causes have had some effect on the Omaha wheat area during the study years. In looking at the wheat areas from the Platte Valley southward, three chief causes of wheat failure were detected from 1939-1952. First, in southeast Nebraska winterkill was the basic cause of wheat failure. However, this region was the only clear-cut area of markedly low-failure primarily due to the adequate rainfall in comparison to the rest of Nebraska. South-central Nebraska and the northern tier of Kansas counties, however, suffered from drought.

¹ Baker, op. cit., pp. 22-28.

² Karl H. W. Klages in Ecological Crop Geography (New York: The Macmillan Company, 1949), pp. 343-347, describes the relationship of wheat to climatic effects very thoroughly.

Finally, western Nebraska and northeast Colorado suffered from severe hail damage throughout this period of study.¹

In summary, the total effect of all the physical factors, including topography, temperature, rainfall, hail and local storms are certainly determinants to be aware of in defining Omaha's wheat supply area. In trying to obtain a composite expression of these factors, it was resolved that total bushels produced per county would most adequately reflect the totality of the physical environment's influence upon wheat production. Consequently, such figures for selected counties were mapped for the six year study period. Also, the usage of several state agricultural statistics annuals provided yearly climatic summaries concerning the effects of the weather on the various crops. This further enhanced the author's ability to detect any large wheat failure for a particular year that might radically alter the wheat source area.

¹Leslie Hewes and Arthur C. Schmieding, "Risk in the Central Great Plains: Geographical Patterns of Wheat Failure in Nebraska," Geographical Review, XXXXVI (July, 1956), pp. 381-386.

CHAPTER TWO

DEVELOPMENT OF WHEAT SUPPLY REGION

CRITERIA SELECTION. At the outset of any market area analysis, it is most important for the investigator to select the proper criteria not only to best suit in the end, but also enable readers to recognize and interpret the results of the problem. With these objectives in mind, the data in both published and unpublished sources that could be utilized in the determination of Omaha's wheat supply region was found to be very limited. More wheat production figures by county were useless as the exact tonnage entering Omaha could not be ascertained. Consequently, the selection was restricted to the two modes of transport utilized to ship wheat to the Omaha market -- truck and rail.

Initially, it was felt that a combination of both truck and rail would provide adequate data from which the wheat source region could be delimited. However, after surveying the availability of data on trucked grain and interviewing several grain firms dependent upon trucked grain shipments, several aspects on wheat movements by truck eliminated this as a basic criteria. First, and perhaps most important, was the complete lack of available data concerning movements of wheat shipments. The underlying reason was that most of the trucked wheat entering Omaha was being transported by private owner-operated units. The importance of this private sector of truckers is that they are classified as exempt

carriers as defined in the Agricultural Market Act.¹ Exempt carriers are not controlled by the Interstate Commerce Commission regulations and they must not publish rates for the movements of agricultural products. More important, however, is that these carriers are in a highly competitive financial situation between other exempt carriers and the railroads. As a result, all attempts by the author to obtain information from truckers as well as from buyers utilizing trucks proved futile.

Certain basic facts on wheat trucked into Omaha were ascertained by the author which, in effect, attempt to explain the lack of truck data availability. As explained earlier, the Agricultural Marketing Act is a primary reason -- due to the lack of published tariffs. Secondly, intense competition further limits the dissemination of wheat movement data by truckers. Although rail and truck area-to-area differences seem large, it must be kept in mind that truck rates fluctuate with the competitive situation.² Of importance here is the trucking backhaul. In the case of Omaha, westward movements of corn by truck are sizeable. Consequently, truckers returning from eastern Colorado, eastern Wyoming and western Nebraska will lower their rates so that only operating costs and a small profit margin are made on the backhaul into Omaha.³ With

¹Charles A. Taff, in Commercial Motor Transportation (Homewood: Richard D. Irwin Inc., 1961), p. 121., comments on the importance of this exemption mentioning that these carriers are specifically exempt from economic regulation by the ICC, whereas common and contract carriers have published tariffs which are under government supervision.

²Richard Walsh, "The Transportation of Corn by Truck from Nebraska." (Unpublished M. A. Thesis, University of Nebraska, 1955), p. 51.

³Omaha Grain Exchange, Omaha, Nebraska, general consensus of grain merchants interviewed, September 1967 to June, 1968.

this type of cut-throat competition, the "gypsy" truckers, quite understandably, cannot afford to make public their source of pick-up loads.¹ Therefore, the usage of truck shipments as a basis for the determination of Omaha's wheat supply region was deemed impossible.

Railroads, representing the other mode of wheat movement, had valuable data available on a daily arrival basis for Omaha. The railroad document utilized for the study was a grain manifest that stated the point of origin of each car and its contents. Using the manifests for each day from 1960 through 1965, the author decided that a fairly accurate estimation of the wheat supply area could be derived. Although the complication of trucked wheat entered the picture, it is easily determined from Table II, that the railroads have steadily carried nearly seventy percent or more of the wheat shipments into Omaha. In addition to the large volume handled by the railroad, it was decided by the author and several grain and railroad officials that rail shipments would give a fairly accurate account of the wheat supply area. Also, accurate data of railroad manifests was available.

A large number of areas affected by truck competition were known to railroad officials so that in the final analysis of the wheat regions, it would be possible for the author to mention such cases. In developing a technique to map the source regions, the author has attempted to put enough flexibility into the boundary of the secondary region so that some of these trucking areas were included in the Omaha wheat source regions.

¹Gypsy is grain trade language referring to non-regulated truckers.

TABLE II

RECEIPTS OF WHEAT AT OMAHA BY TRUCK AND RAIL - 1960 THROUGH 1967

	1967	1966	1965	1964	1963	1962	1961	1960
Trucks	8,544	12,371	8,869	14,201	11,890	15,096	14,314	13,428
Bushels	5,553,600	8,041,150	5,764,850	9,230,650	7,728,500	9,812,400	9,304,100	8,728,200
Carloads	11,213	13,448	12,277	13,894	9,697	11,260	11,378	13,842
Bushels	23,908,122	25,551,200	23,326,300	26,398,600	18,424,300	21,394,000	21,618,200	26,299,800
Total								
Bushels	29,461,722	33,592,350	29,091,150	35,629,250	26,152,800	31,206,400	30,922,300	35,028,000

Source: Omaha Grain Exchange Annual Reports

MAPPING METHOD. After selecting the data to be utilized in depicting the Omaha wheat supply region, the tabulation of wheat shipments by points of origin, for each year from 1960 through 1965, was completed. In the end, approximately 1,150 shipment points were noted. For each station, the number of carloads of shipped wheat were recorded for the six years. In the final total for the six year period, 70,022 carloads of wheat were tabulated by points of origin in the states of Nebraska, Iowa, Missouri, Kansas, Colorado, Wyoming, Montana, North Dakota and South Dakota. Upon the completion of tabulating the basic statistical data needed for the representation of the wheat supply area, each shipping point, on a yearly basis, was mapped and the number of carloads shipped was placed adjacent to the station. The result was a series of maps indicating the actual wheat shipment territory of Omaha for the years 1960 through 1965 that indicated all shipment stations and the number of carloads of wheat that originated at each station.

After studying the six maps, it was apparent that a method of generalizing the wheat area had to be formulated so that a basis for determining boundary fluctuations could be established. Accordingly, then, after surveying boundary delimitations made by Durand, Green and others, the author derived a method based in part from the documented works and from personal observations on wheat movements to Omaha. At the outset it was felt that a primary and secondary wheat supply area should exist for each of the study years. The basic difference between the two classifications would be in their intensity of shipments to Omaha. Also, in conjunction with these two areas, individual shipment points outside of these two major areas were also considered important

because they seemed to serve as directional indicators of movement for the other two areas. With this basic philosophy, final details for the construction of the map were determined.

After consultation with the grain officials, plus the interpretation of the actual wheat supply areas and supporting statistical data, the author resolved that 65% of the total carload shipments for the primary area and 15% for the secondary area would adequately determine Omaha's wheat supply area. These two areas would then yield about 80% or more of the total wheat shipments entering Omaha -- a reasonable amount for the determination of the Omaha wheat supply area. In trying to obtain these percentages, different combinations of total carloads per point were attempted until the categories in Table III were ascertained. Using these three categories, a color code work map was produced for each year. By separately noting each color of the three classes a general locational pattern of the central, secondary and other shipping points could be envisioned. At this point, the actual boundary determination between the central, secondary and other points, was drawn.

The method utilized to separate the primary and secondary areas was relatively simple. First, two shipping points or more each having sent fifteen or more carloads of wheat to Omaha were located. Next, all the adjacent fifteen-plus shipment points were also included in this primary area. Any stations under fifteen carloads that were surrounded by the larger category were counted as part of the primary area. The actual boundary between a primary and secondary point was then placed by a proportional line directly related to the actual shipments of the two stations. For example, if station A shipped thirty loads and station B

TABLE III

DISTRIBUTION OF CARLOADS FOR STUDY YEARS

	1965	1964	1963	1962	1961	1960
	#	#	#	#	#	#
30 + loads	8,113	9,588	6,459	6,781	6,626	8,913
15-29 loads	1,974	1,797	1,638	1,834	2,357	2,129
Under 15 loads	2,265	1,909	1,240	2,291	1,846	2,254
Percentage total of 15 or more loads	81.5	85.6	86.6	79.0	83.0	83.0
Total loads	12,352	13,294	9,345	10,906	10,829	13,296

Source: Compiled From Railroad Grain Manifests.

shipped ten loads, the boundary line would be shifted 66% away from station A. This assumption was based on the theory that station A, shipping twenty more carloads, required more area to obtain its wheat supply than a station only shipping ten carloads. However, physical features such as the Sand Hills were also taken into account when determining the size of the primary and secondary areas. The same method of two stations, using the category of less than fourteen carloads, plus the proportional boundary between the two points, was utilized in determining the secondary area.

Also, separate primary areas were possible if at least two stations adjacent to each other shipped above fifteen carloads. Finally, several major shipment points not adjacent to other wheat stations, each sent over fifty carloads to Omaha. Their significance was designated by classifying them primary outlying areas. The last classification of "other points" was merely indicated by a dot on the finished maps which denoted their location. As mentioned earlier, these points were important indicators of primary and secondary movements or the need of merchants for specific types of wheat.

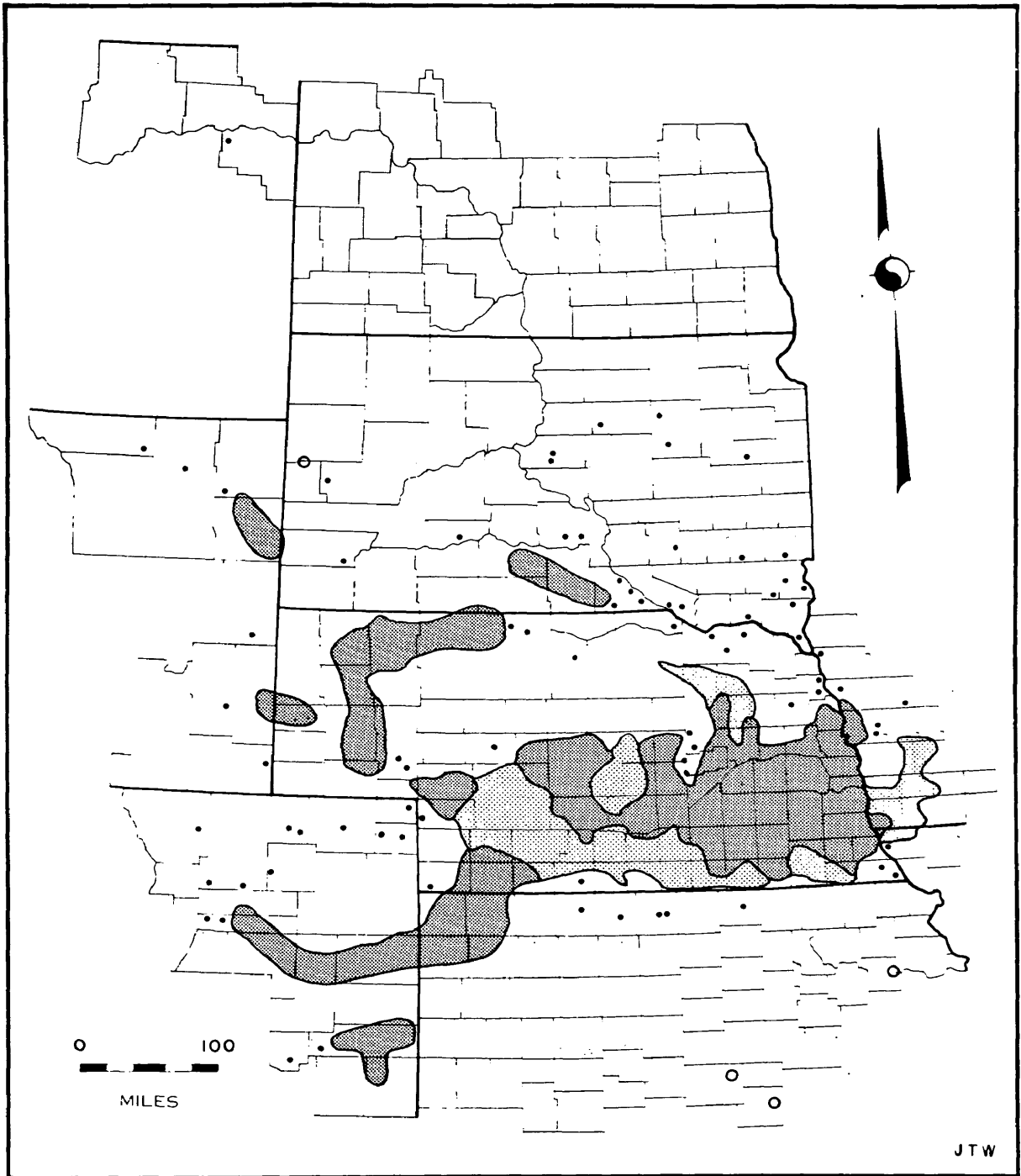
In conclusion, the results of the preceding methods were utilized by the author to construct the wheat supply maps analyzed in the following chapters. Numerous other techniques and choices of different percentages are open to discussion. Throughout the entire selection process, however, much has been dependent upon the recommendations of grain officials and the insight of the author. This involves subjective judgments, all of which cannot be fully explained unless one includes other complex problems related to transportation in the grain trade.

CHAPTER THREE

INTERPRETATION OF WHEAT SUPPLY REGION

After describing the wheat supply problem and methodology utilized in this market area analysis, the next step is to attempt to unravel those components that appear to be the underlying causes for the wheat supply region and its boundary fluctuations. Figures 3 through 8 inclusive, constructed by the method explained in chapter two, represent the wheat supply regions of Omaha for the years 1960 through 1965. From an initial examination of the map series, it is quite evident that the wheat supply region has undergone changes in some areas and has been stable in others. In the attempt to decipher the causes for such occurrences, it has been determined that three factors are predominantly responsible for the shape of Omaha's wheat supply region: wheat production, freight rates, and competing markets.

WHEAT PRODUCTION. Wheat production, controlled by physical limits, yield variability on a yearly basis, and government diverted wheat acreage programs is a definite indicator which exercises considerable control over the shape of the Omaha wheat supply area. In all six wheat supply area maps, the extent of the northern boundary of the primary and secondary wheat regions is limited physically by the Sand Hills and heavily sloping loess topography in north-central and northeastern Nebraska (Figures 3 through 8). The Sand Hills are not conducive to crop production. Also, the sloping loess topography is more economically suited for corn than wheat. Generally then, although minor



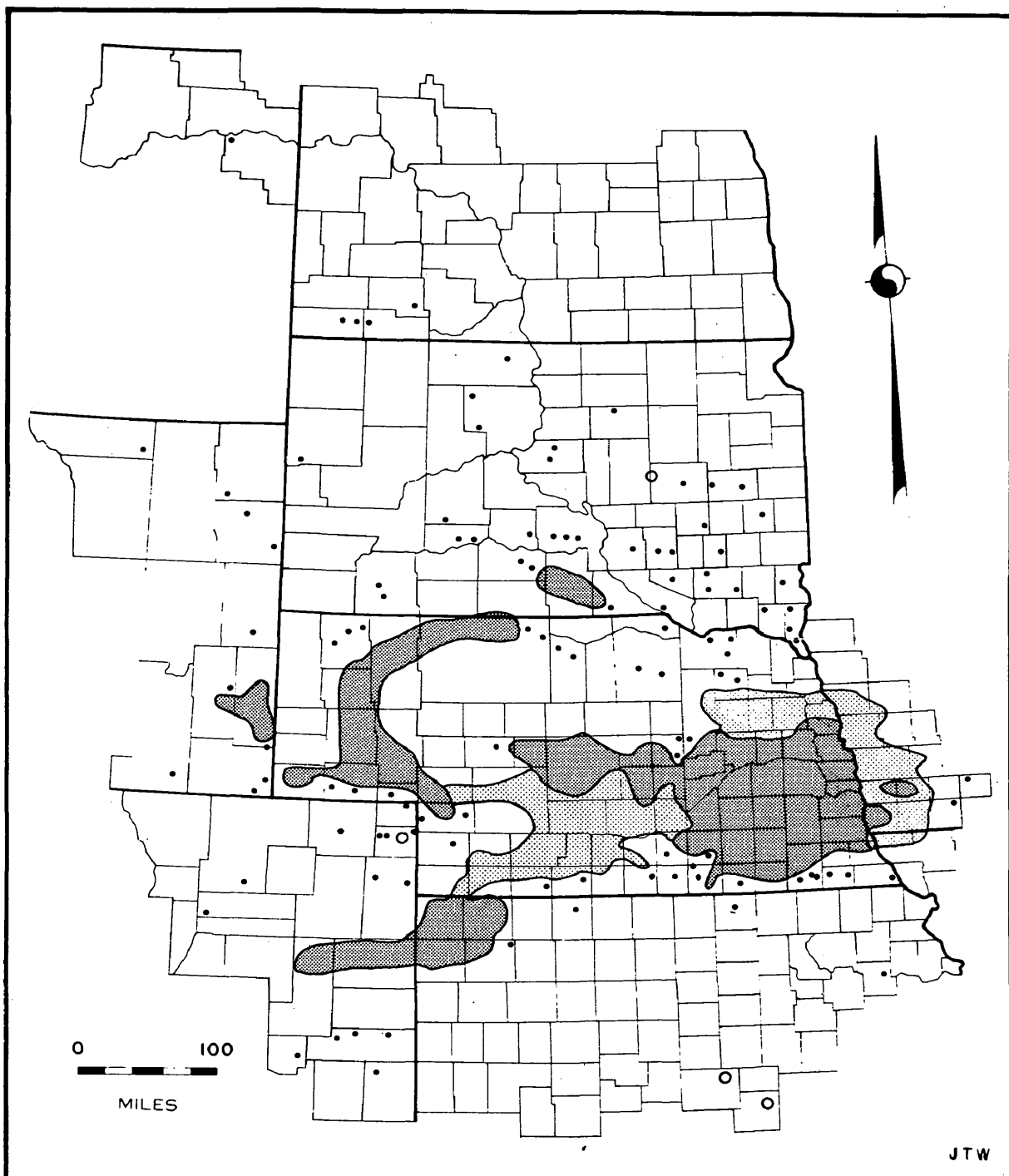
JTW

- PRIMARY
- CENTRAL
- OUTLYING
- SECONDARY
- OTHER



1960 WHEAT SUPPLY AREAS OF OMAHA

Figure 3



JTW

PRIMARY
CENTRAL
OUTLYING
SECONDARY
OTHER



1961 WHEAT SUPPLY AREAS OF OMAHA

Figure 4

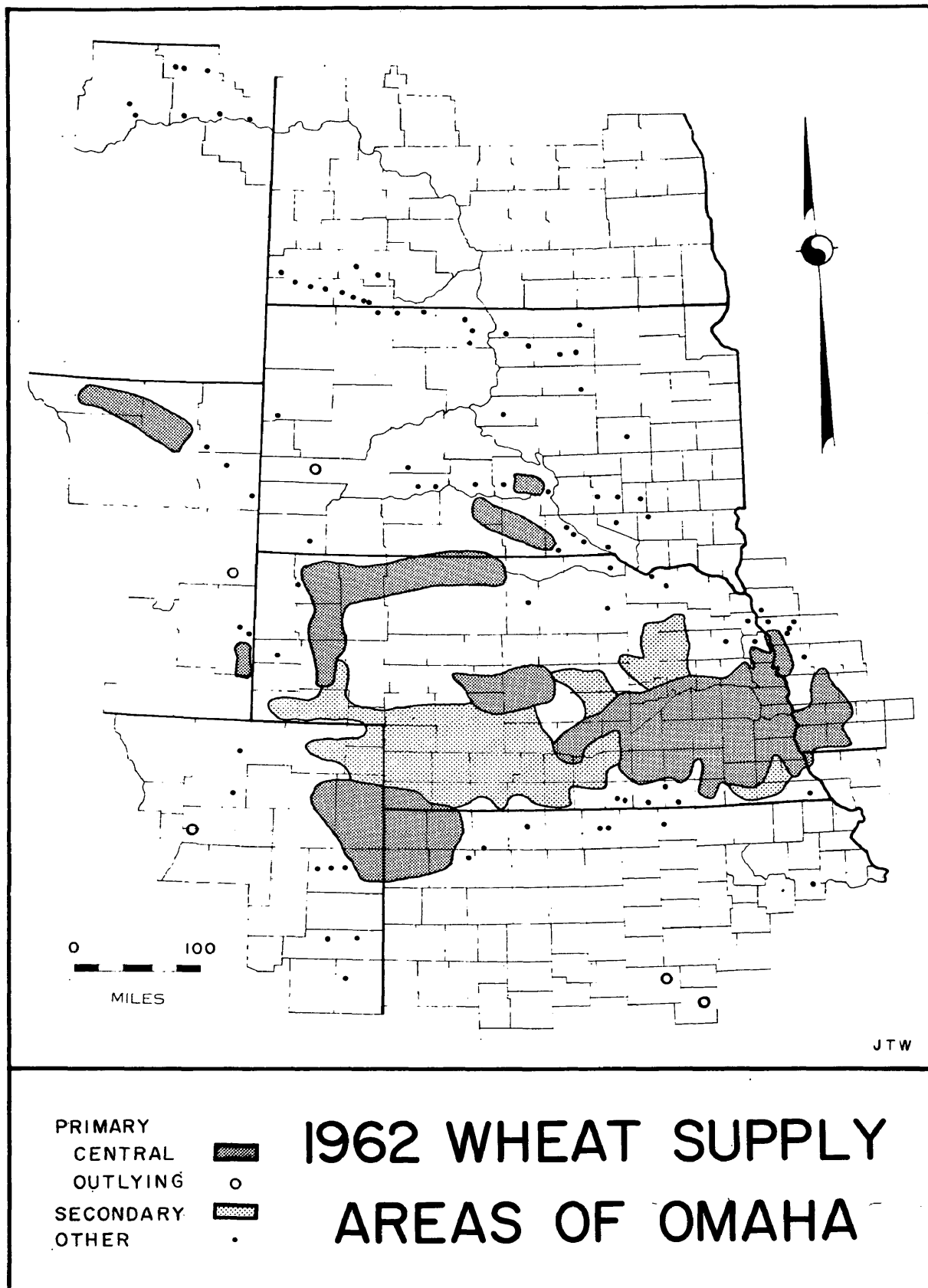
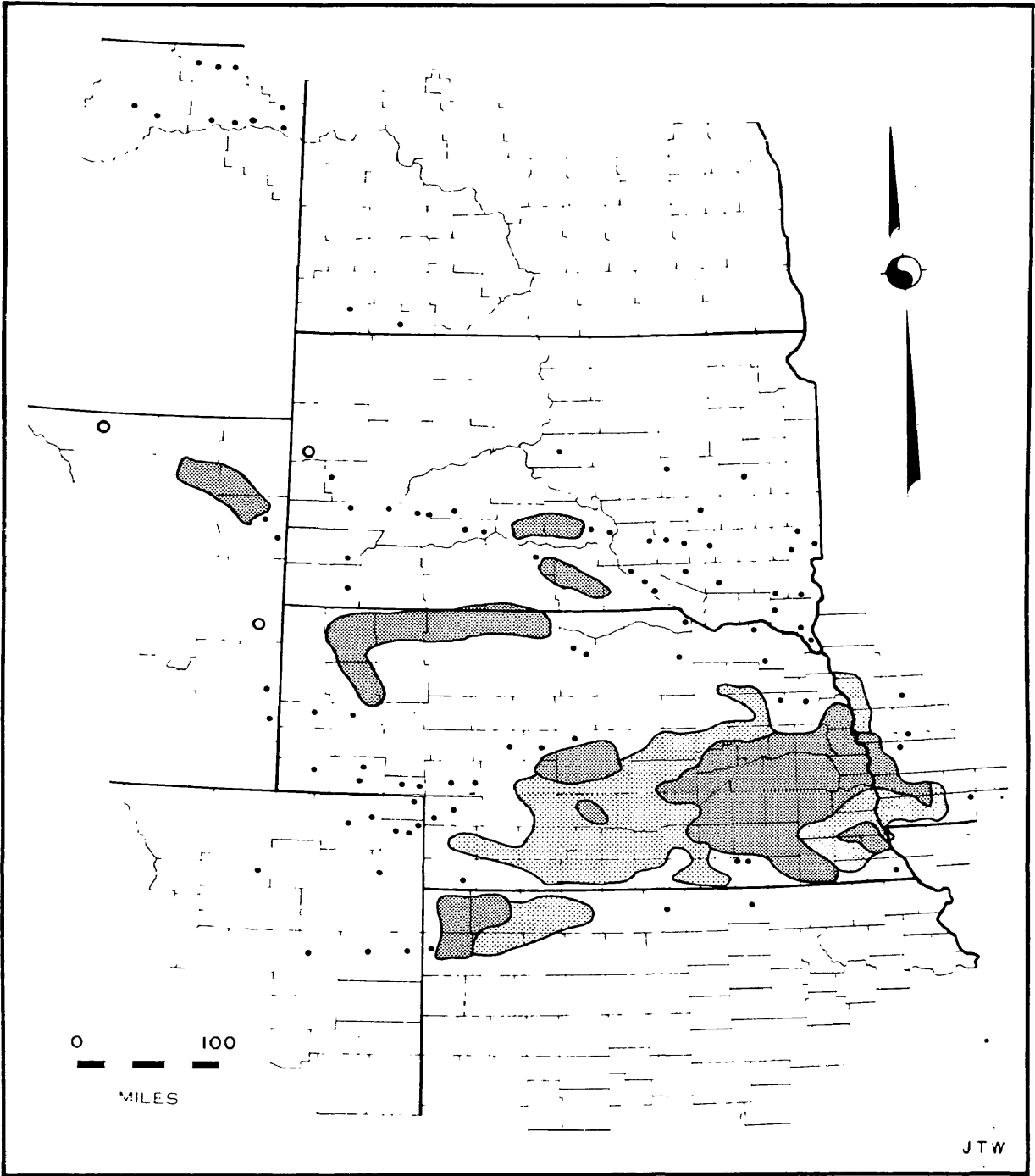


Figure 5



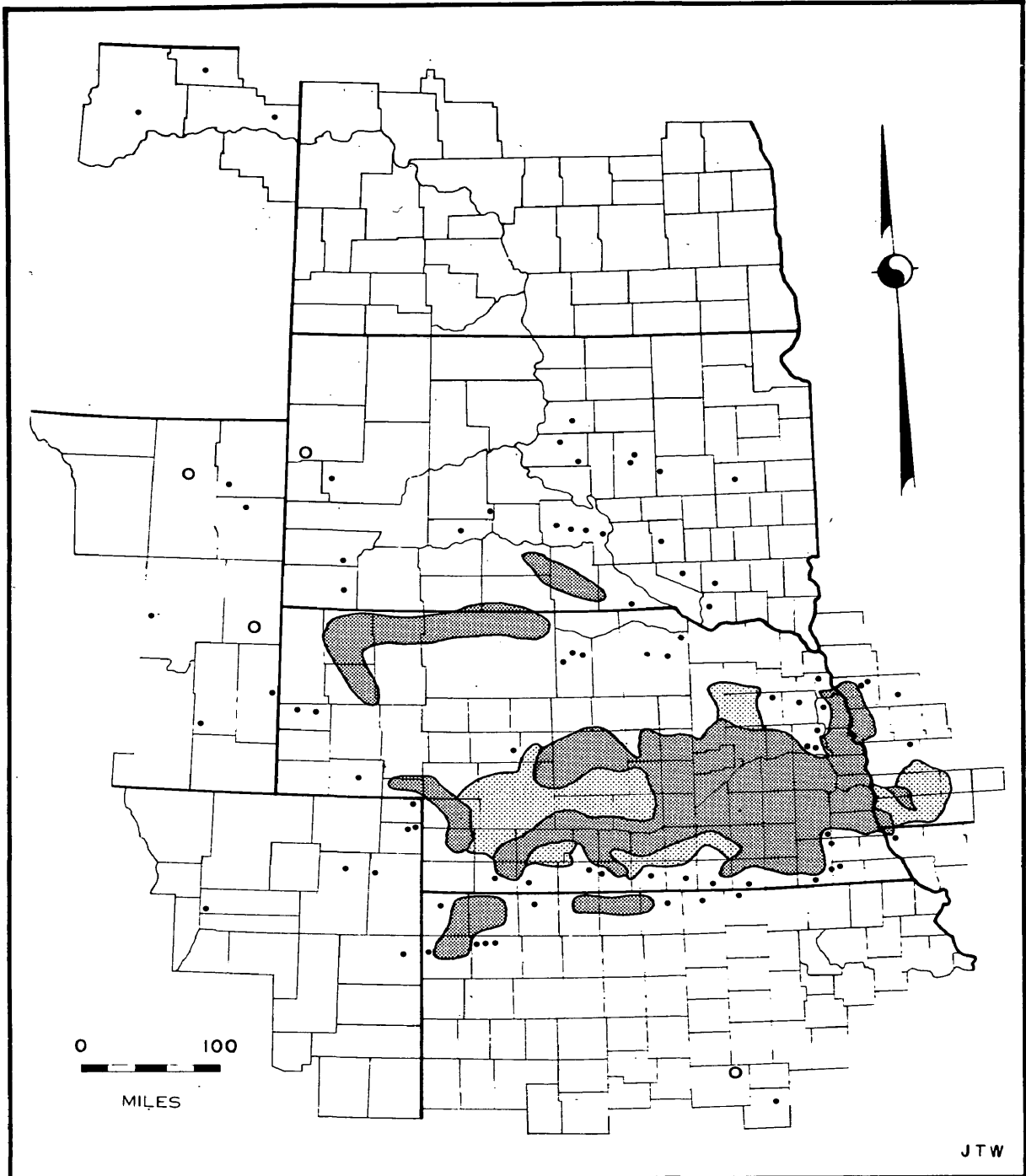
JTW

- PRIMARY
- CENTRAL
- OUTLYING
- SECONDARY
- OTHER



1963 WHEAT SUPPLY AREAS OF OMAHA

Figure 6

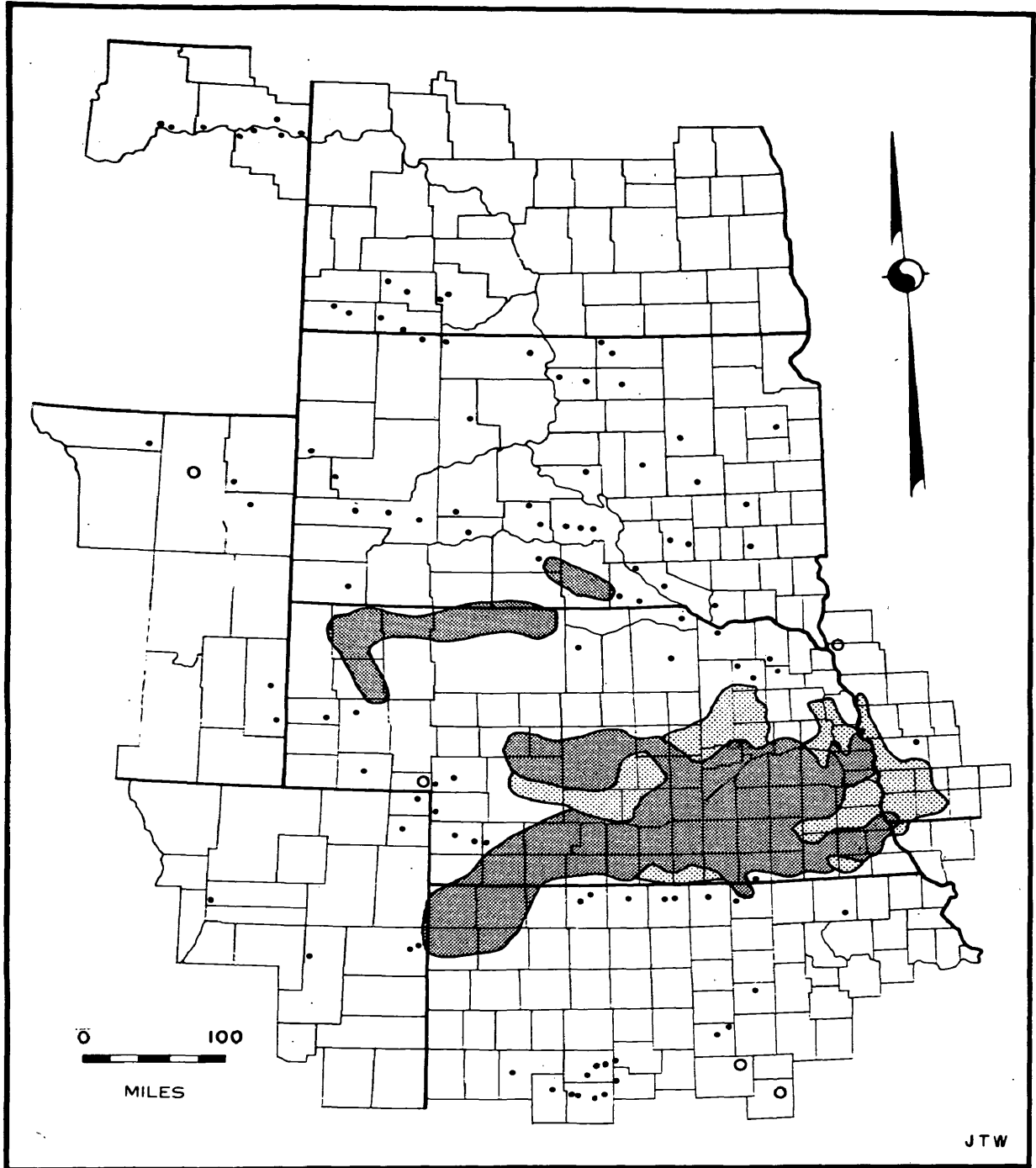


JTW

PRIMARY
CENTRAL
OUTLYING
SECONDARY
OTHER

1964 WHEAT SUPPLY AREAS OF OMAHA

Figure 7



JTW

PRIMARY		<h1>1965 WHEAT SUPPLY AREAS OF OMAHA</h1>
CENTRAL		
OUTLYING		
SECONDARY		
OTHER		

Figure 8

northward intrusions into this area have occurred sporadically, physical factors serve as a fairly distinctive northern boundary for Omaha's main wheat supply region.

The amount of wheat grown in the principal producing states from 1960 through 1965 is shown in Table IV. The main importance of Table IV is to illustrate changing wheat production in Nebraska, Kansas and the surrounding states. By comparing the wheat production statistics in Figures 9 through 14 with the mapped wheat supply areas of Omaha, Figures 3 through 8, a positive correlation between the two is apparent. In an analysis of this relationship on a yearly basis, the variable weather conditions affecting wheat production throughout Nebraska are quite evident on both of the map series.

In 1960 the largest winter wheat crop in Nebraska and Kansas, during the study years, was recorded. Wheat was thinned during the winter by dry conditions in the west and a severe winter in the east. Tillering, the sending forth of new roots, was unusually heavy in the spring and good growing weather prevailed during the early growth period. The yield per acre of 28.5 bushels was the second highest, being exceeded by the record high 33.0 bushels per acre of the 1958 crop.¹ Wheat production, as indicated in Figure 9, was excellent throughout the state in all known wheat growing areas. Figure 3 further illustrates the above in as much as the primary and secondary wheat producing areas cover more land

¹State-Federal Division of Agricultural Statistics. Nebraska Agricultural Statistics, Annual Report - 1960. Nebraska Department of Agriculture and Inspection in cooperation with the U. S. Department of Agriculture. Lincoln, Nebraska. 1961, p. 33.

TABLE IV

AMOUNT OF WHEAT GROWN IN PRINCIPAL PRODUCING STATES
(000 Bushels)

	1965	1964	1963	1962	1961	1960
Nebraska	56,100	73,825	63,490	53,820	78,807	87,712
Illinois	56,906	66,822	71,400	49,465	61,308	46,226
Iowa	779	2,612	2,832	2,223	3,008	2,985
Kansas	243,624	215,460	185,480	211,171	273,718	290,640
Minnesota	22,124	21,280	21,697	17,982	24,560	26,543
Missouri	32,615	46,442	28,708	26,352	43,096	37,648
North Dakota	179,706	150,842	124,862	158,500	68,438	127,500
South Dakota	36,624	37,563	29,368	29,824	32,545	46,156
Colorado	20,809	27,664	21,888	36,207	56,557	66,121
Total	649,287	642,510	559,725	585,544	642,037	729,531
U. S.	1,326,747	1,290,468	1,137,641	1,091,787	1,234,705	1,363,443

Source: Omaha Grain Exchange. Omaha, Nebraska. Annual Reports. 1960 through 1965.

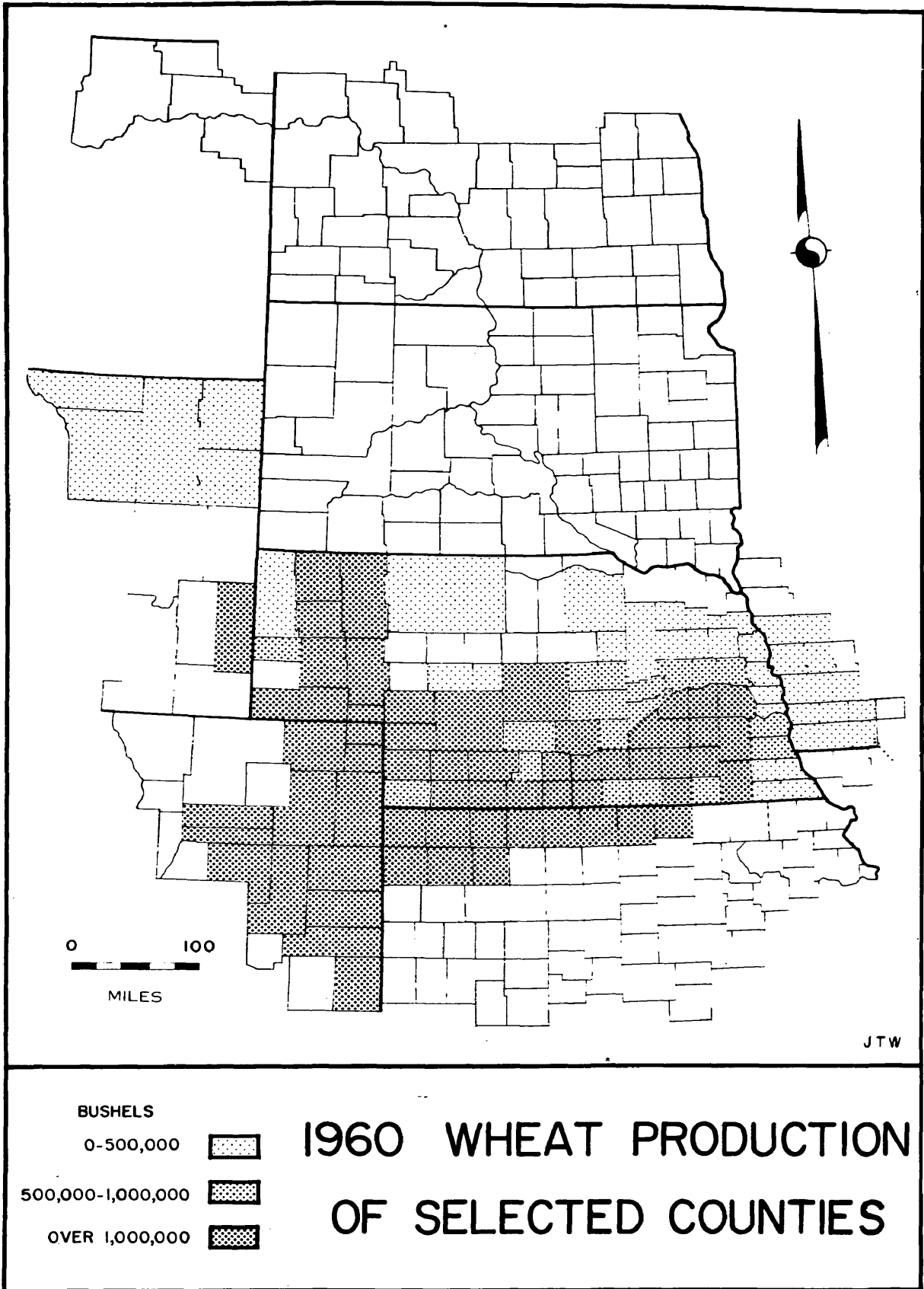


Figure 9

in Nebraska than in any other study year. The large secondary area in south-central Nebraska might be a reflection of the dry conditions that prevailed in the western part of the state.¹

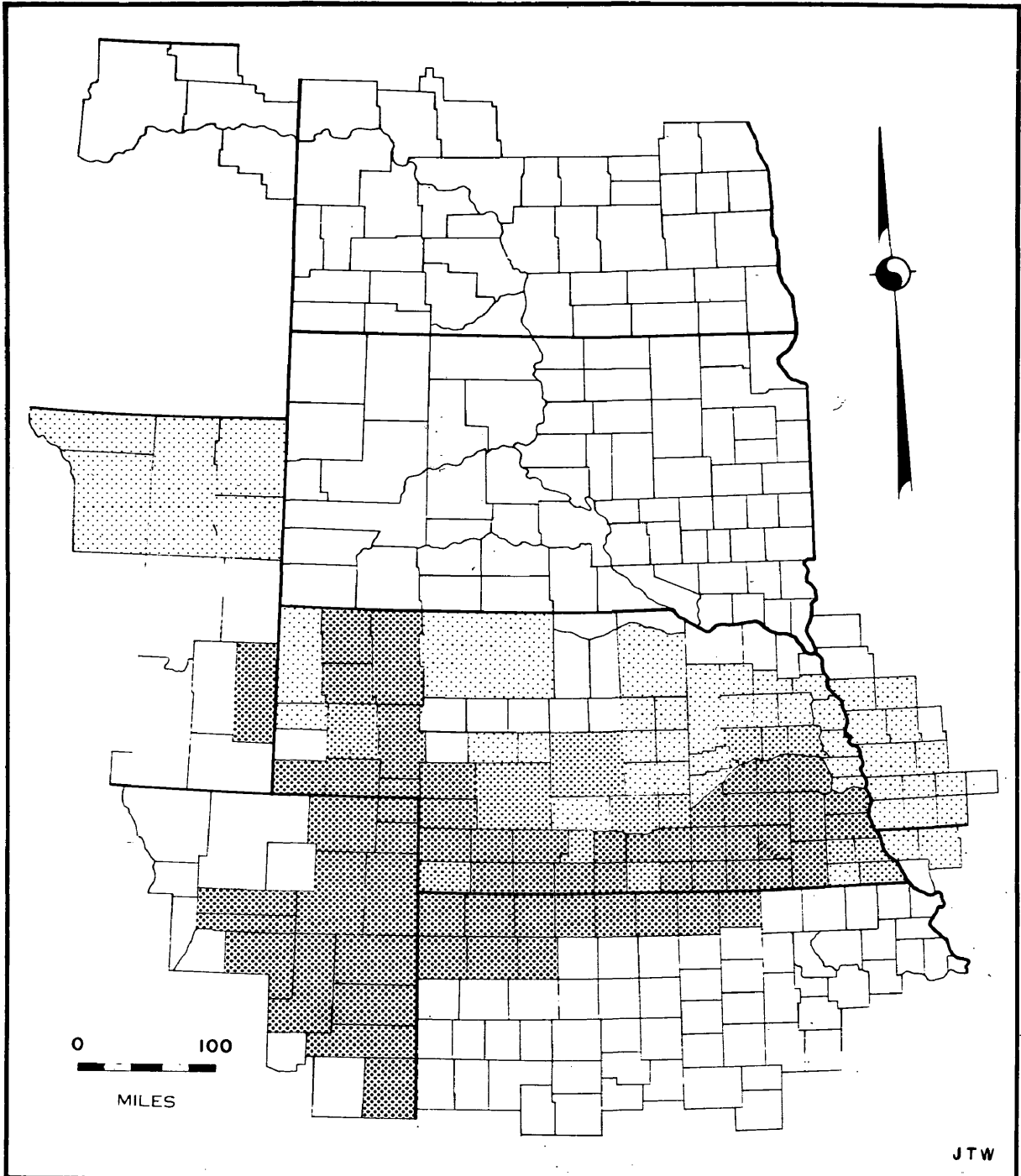
The wheat crop of 1961 was smaller than the record crop of 1960 (see Table IV). Dry surface soils in the western area caused uneven stands and plants lacked good root development before entering the winter dormant stage. The crop wintered well and tillered heavily in April and May. Heavy rains and high temperatures about two weeks ahead of the harvest caused some shriveling of kernels and promoted development of black stem rust spores that caused severe damage to the crop in south-central counties.² The yield per acre of 24.5 bushels was 4.0 bushels less than a year earlier.³

The black stem damage area in south-central Nebraska is noted very clearly in Figure 4. In comparing this damage area to the 1960 region (Figure 3), the secondary wheat region in this area has either been reduced in size or disappeared altogether. In comparing the 1960 and 1961 wheat production maps (Figures 9 and 10) for south-central Nebraska, a decrease in wheat production is apparent. This decrease in production seems to be related to the changing wheat supply regions as evidenced in south-central Nebraska (Figures 3 and 4). Also, the southern tier of Nebraska counties, in the 1961 wheat supply map, has been almost

¹Ibid.

²Ibid., 1962, p. 33.

³Ibid.



JTW




BUSHEL		
0-500,000		1961 WHEAT PRODUCTION OF SELECTED COUNTIES
500,000-1,000,000		
OVER 1,000,000		

Figure 10

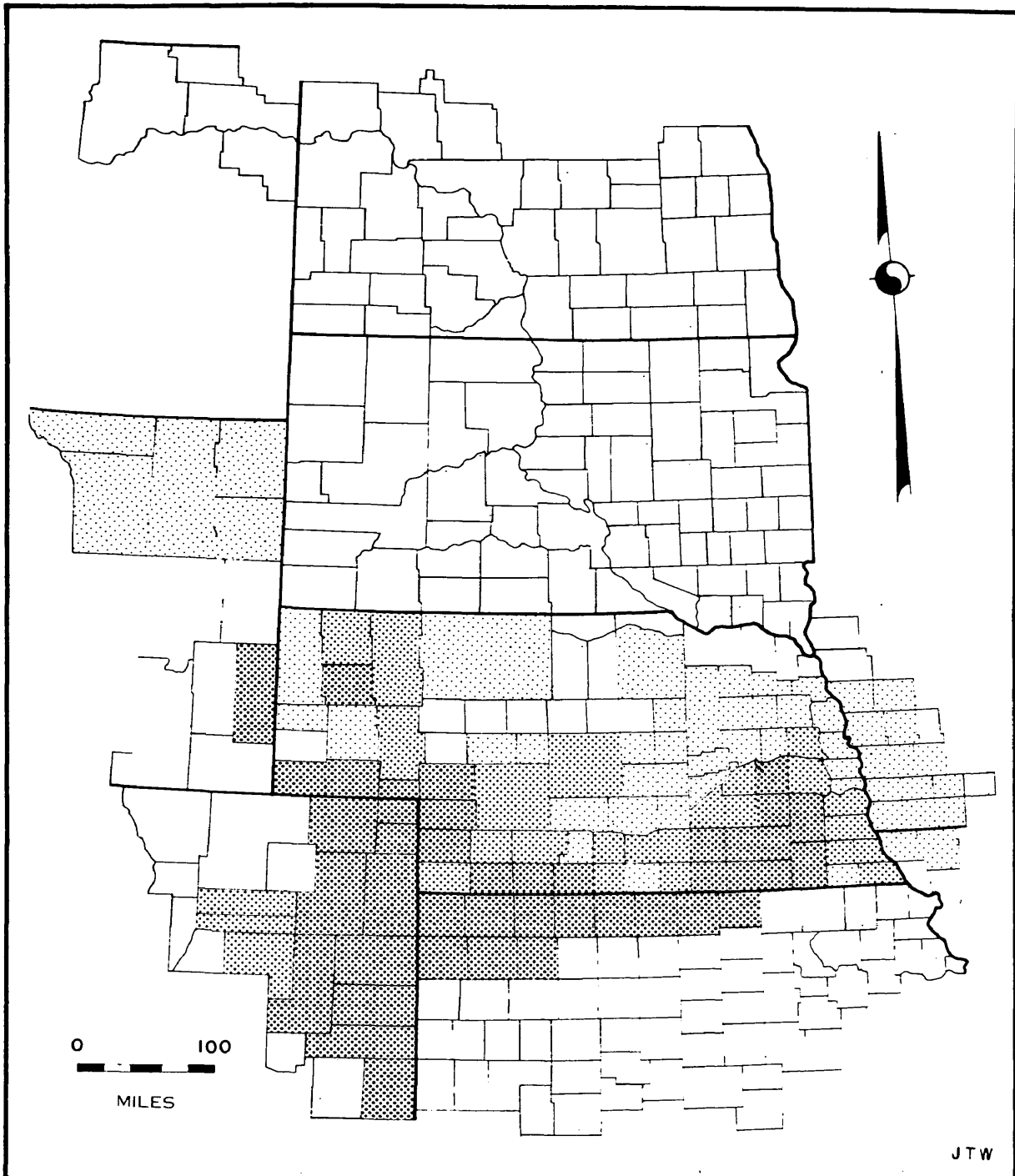
completely dropped from Omaha's supply region. In 1960, for the most part, these counties were in Omaha's wheat supply area. This represents an anomaly because a comparison of Figures 9 and 10 reveals increased production in this region. With the exception of these two areas, in 1961, Omaha's wheat supply area remained basically the same as it was in 1960.

Turning to the crop of 1962, several areas suffered from varying weather conditions. Yield per harvested acre of 19.5 bushels was 5.0 bushels below the yield of 1961 and the lowest since 1956.¹ There was a good supply of moisture that held the crop during the dry period in early spring, but plant development was forced and stunted. Wet weather in late May and June brought a heavy infection of black stem rust that again took a large toll in yield of late maturing varieties. Hail was extensive and caused considerable damage to the crop in the west.²

This western area is reflected in Figure 5 by the large secondary area in southwestern and in the southern Panhandle of Nebraska. The extension of the 1962 secondary area into the former western Nebraska primary wheat supply area of 1960 and 1961 appears to be an indication of decreased production in that area. Figure 11 only shows a decrease in four counties in western Nebraska over the 1961 (Figure 10) production map. The actual production figures for these western counties are lower for 1962 than the 1961 period. In looking at the south-east, the

¹Ibid., 1963, p. 33.

²Ibid.



JTW

BUSHEL	
0-500,000	
500,000-1,000,000	
OVER 1,000,000	

1962 WHEAT PRODUCTION OF SELECTED COUNTIES

Figure 11

earlier varieties yielded well. Here is a strong correlation between the heavy production in southeast Nebraska in 1962 (Figure 11) and the large primary marketing area in eastern Nebraska. As in the preceding two years, the boundaries of the southeastern primary core wheat region have remained fairly constant. In 1962, however, this core region is smaller in its western expanse due to the decreased yields in this area as evidenced in a comparison of the county production statistics in Figures 10 and 11.

Nebraska wheat production in 1963 was slightly better than the 1962 crop. Heavy growth before going into the winter dormant stage made the plants vulnerable to winterkill. There was considerable loss of acreage in the early spring months because of a lack of precipitation and the usual losses from hail. The freeze in late May damaged the crop in some areas and there was also some damage from black stem rust and other plant diseases.¹ Yields per acre at 21.5 bushels were 2 bushels better than the 1962 yield.² For 1963, as shown in Figure 6, both the primary and secondary wheat regions constricted from their previous limits of 1962.

In comparing the wheat production maps for 1962 and 1963 (Figures 11 and 12) with 1960 and 1961 (Figures 9 and 10), it is apparent that the 1962 and 1963 wheat crops were poor. Also, the 1963 crop was the second successive bad year of wheat production in Nebraska. County wheat production data in central and south-central Nebraska (Figure 12)

¹Ibid., 1964, p. 33.

²Ibid.

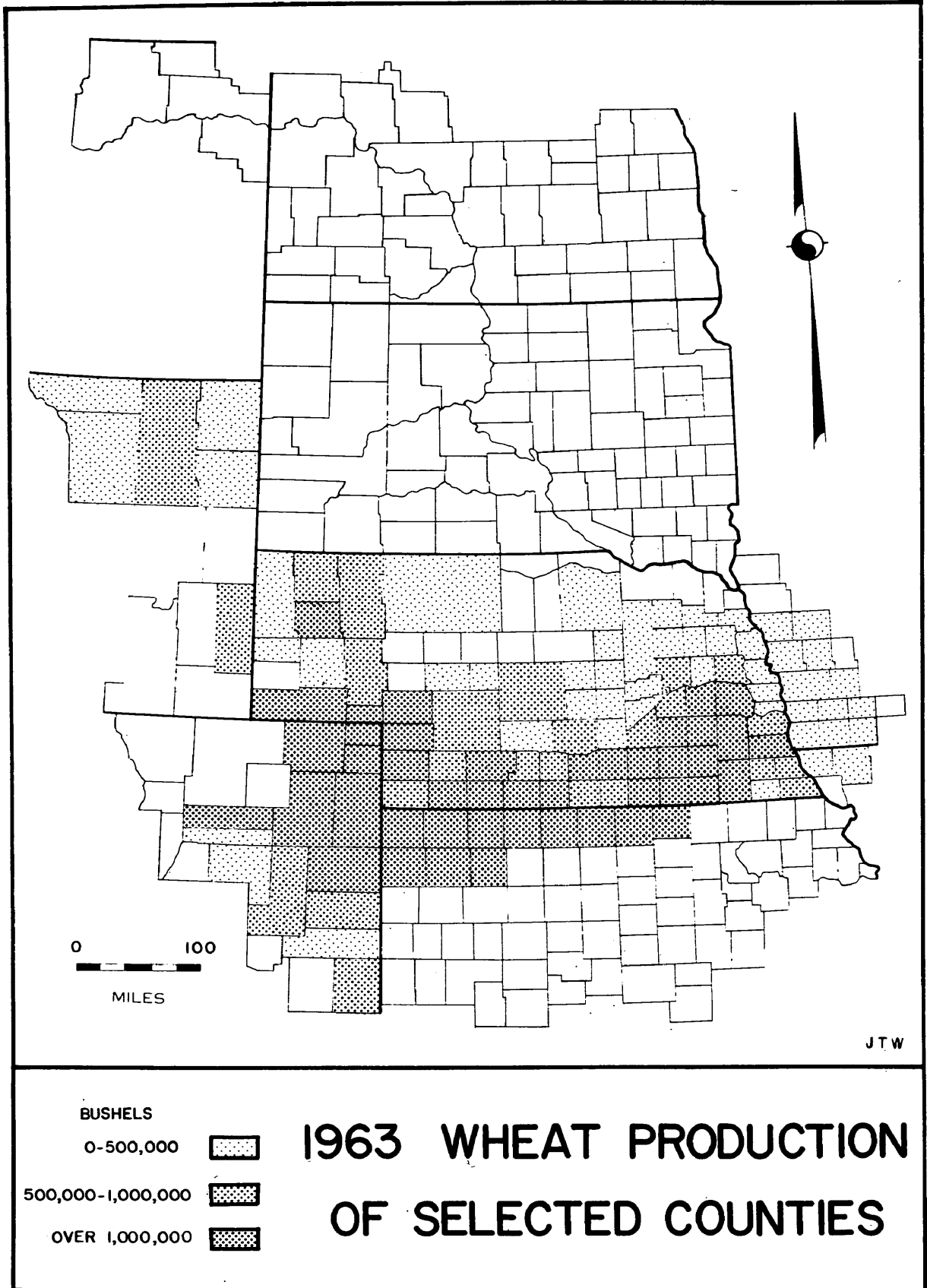


Figure 12

also indicates poor yields. This low yield, in turn, has seemingly had a negative effect on the total shipments coming from central Nebraska. The result is a further constriction of the primary and secondary wheat supply areas for 1963 (Figure 6) in comparison to 1962 (Figure 5).

At this point it is notable that although the Nebraska wheat crop was smaller in 1962 than in 1963, the wheat supply areas were larger than those of 1963. A possible explanation is that the wheat supply maps were constructed from wheat shipments and not production. Therefore, wheat that was stored in 1960 and 1961 was probably shipped out in 1962 when the wheat crop was poor. By 1963, however, the wheat reserves were probably low so that the shipments were less and the result was a smaller wheat supply area for 1963.

Another area adversely affected by decreased production in 1963 was the northwestern section of Kansas. As evidenced in the three previous yearly wheat supply maps (Figures 3, 4 and 5), this region was a constant primary wheat supply area for Omaha until 1963. In referring to Table IV, it can be observed that 1963 was the lowest wheat production year for the six year study period. In direct relation to the Kansas state figure are decreased county production statistics. Even though the decrease in wheat production for the counties in northwestern Kansas occurred, it was not enough to reflect a category change in the production map (Figure 12). The importance here is that although a slight decrease in production had occurred, it has been reflected in a reduced primary region and new secondary area, resulting in a separation from the contiguous wheat supply regions in Nebraska.

1964 yields were highly variable over Nebraska, but the average of 25.0 bushels per acre was just short of the 1958-62 average of 25.5 bushels and 3.5 bushels higher than the average yield in 1963.¹ Mild, open weather during the fall months and early winter permitted wheat plants to make good top growth and excellent development. Lack of moisture during the spring months slowed wheat development and drought conditions in the central and south-central counties caused some reduction of yields, forcing an early harvest in these two areas.²

In comparing the production maps for 1963 with 1964 (Figures 12 and 13) it is noticeable that production has increased in central and south-central Nebraska. This increase in production has been reflected on Figure 7, the 1964 wheat supply map, by the westward extension of the main primary wheat supply area and the constriction of the secondary area into three distinctive parts in south-central Nebraska. Also, although wheat production in Kansas had increased, the northwestern region of Kansas was not able to join again with the main area of Omaha's wheat supply region.

The wheat crop of 1965 suffered from winterkill, wind erosion and other factors that accounted for a 17% less in the total wheat crop. The average yield per acre was only 20.0 bushels, the lowest since 1962 when the yield was 19.5 bushels per acre.³ Heavy rains in May and June brought on conditions favorable for black stem rust. The crop escaped

¹Ibid., 1965, p. 37.

²Ibid.

³Ibid., 1966, p. 37.

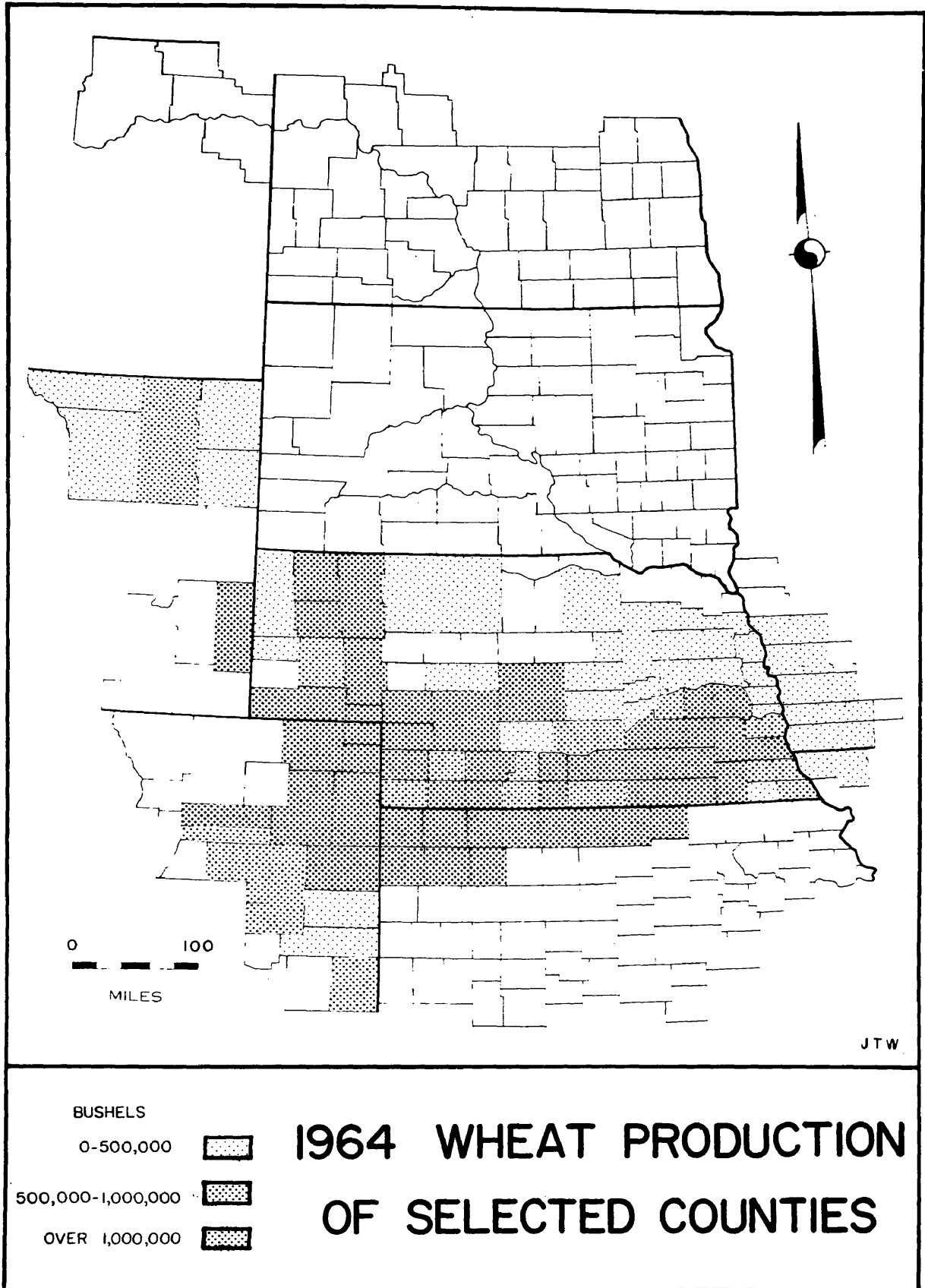


Figure 13

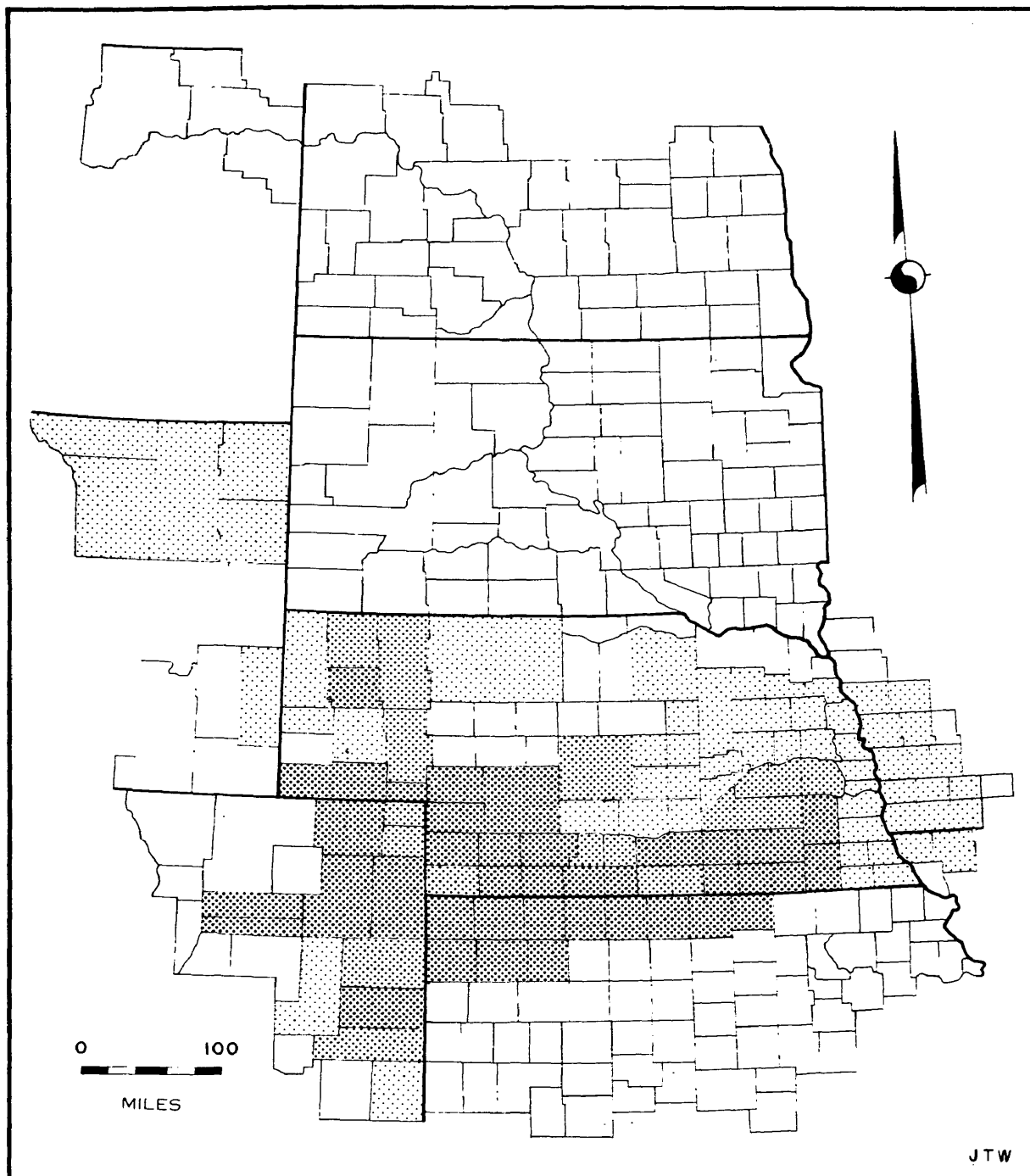
damage in the eastern area but was seriously hurt in the western counties.¹ The primary area in Figure 8, previously disconnected in 1963 and 1964, was extended continuously into northwestern Kansas where the 1965 wheat crop, as evidenced in Table IV, was above average.

A comparison of the wheat production maps for 1964 and 1965 (Figures 13 and 14) reveals that the south-central Nebraska area produced more wheat in 1965 than in 1964. This apparently accounts for the combining of the primary wheat region in north-western Kansas with the primary wheat region in central Nebraska as evidenced on the 1965 wheat supply map (Figure 8). A further analysis with the other study years indicates that the 1965 core region is the largest primary area for the six years studied.

In looking at the eastern limits of Omaha's wheat supply region, the lack of wheat production is prominent in Figures 9 through 14. None of the selected counties adjacent to Omaha's wheat area had produced over 500,000 bushels of wheat in a single year. This fact is understandable since eastern Nebraska and western Iowa lie in the western margins of the Corn Belt. Consequently, in looking at the series of wheat supply maps, Figures 3 through 8, the extension of either the primary or the secondary wheat areas into Iowa has been very limited.

FREIGHT RATES. A second factor responsible for the size and shape of Omaha's wheat supply area is freight rates. The fundamental basis of the effect of transportation costs rests upon the physical and

¹Ibid.



JTW

BUSHELS
0-500,000
500,000-1,000,000
OVER 1,000,000



1965 WHEAT PRODUCTION OF SELECTED COUNTIES

Figure 14

economic differences between markets. In the past there have been two underlying factors in establishing rates on grain:

First, an effort to adjust freight rates to enable producers to reach as many markets as possible, and second, establishment of freight rates from and through various markets to enable the markets and the various carriers to compete fairly with one another.¹

The railroad rate applications are constantly changing, hence the grain rate structure is quite complex and there are exceptions to general applications.

As evidenced in actual practice and mentioned in Schonberg,

Different interests apply for favorable rates, by petition, to the Interstate Commerce Commission, which is empowered by Congress and charged with the duty of regulating interstate rates. The broad application of the rate-break principle has been in effect for a number of years.²

This principle is concerned with gateway rates.

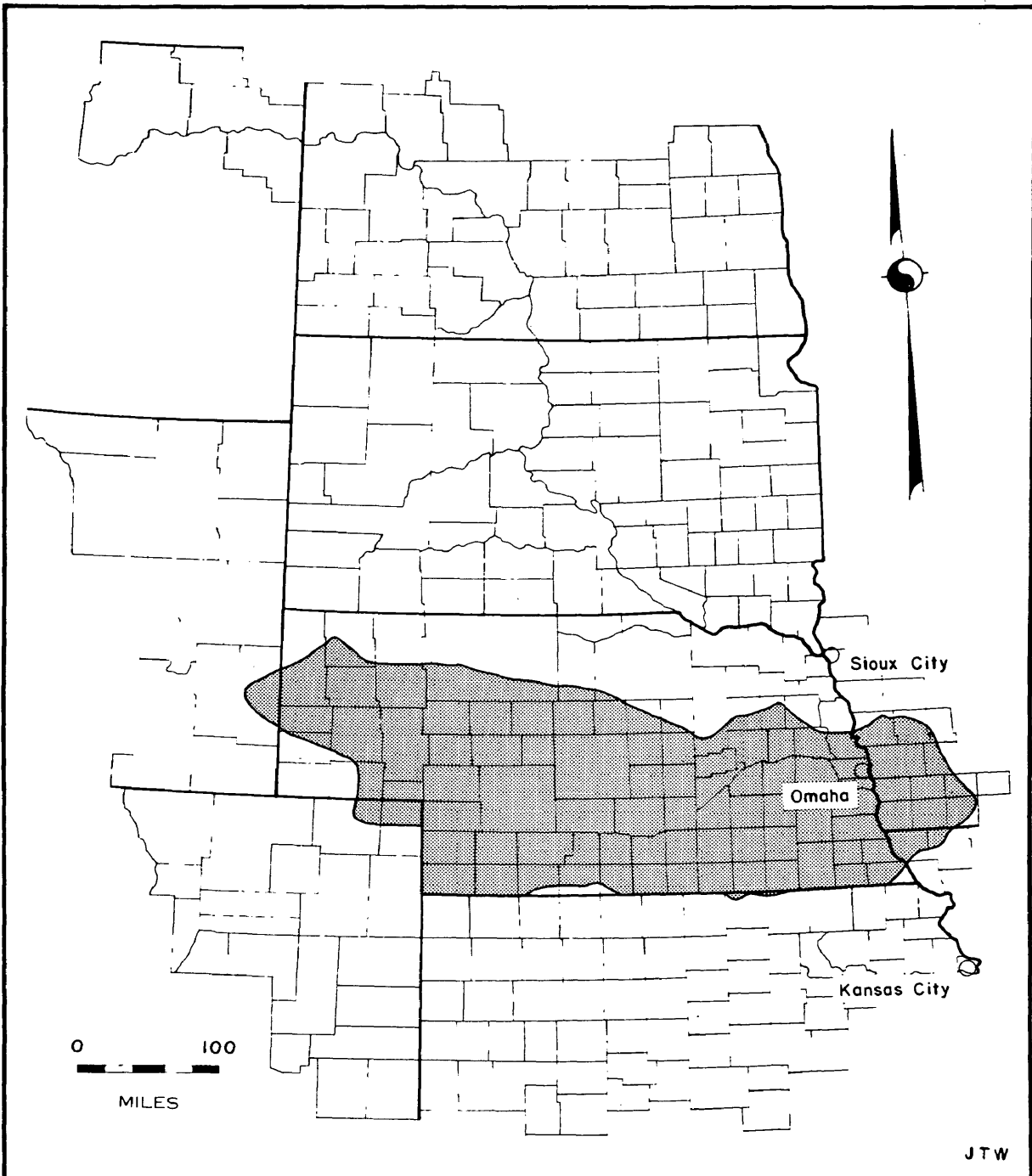
Grain moves through gateways - principal freight centers or junction points - at which freight is interchanged between various railroad lines. The principal movement of grain is from west to east and south. Some of the more important gateways are Chicago, Kansas City, Omaha, Sioux City and St. Louis. These gateways are rate-break points - by which is meant a point on which rates are made.³

From the brief overview of the freight rate structure, it seems apparent that some stations shipping wheat into Omaha would certainly be included in the favorable freight rate territory of Omaha. Figure 15, the favorable wheat freight rate area of Omaha, was constructed from

¹James S. Schonberg, The Grain Trade: How It Works (New York: Exposition Press Inc., 1956), p. 117.

²Ibid., p. 118.

³Ibid.



**FAVORABLE WHEAT FREIGHT
RATE AREA OF OMAHA**

Figure 15

interviews with railroad freight rate specialists. The map construction method was relatively simple. For each railroad line leaving Omaha, the rate to reach Omaha becomes less favorable as you proceed closer to another market. Therefore, each station was checked to see if the wheat rates to Omaha were lower in comparison to another market. Whenever the rates between Omaha and another market became equal, the boundary line was drawn between the last favorable Omaha rate station and the equal freight rate station. By the utilization of this method, all railroad shipment stations within the favorable freight rate area can transport wheat cheaper to Omaha than to its competitors, Sioux City and Kansas City. In comparing the favorable freight rate territory map with the series of maps on the wheat supply areas of Omaha (Figures 3 through 8), a good visual correlation is evident. With the exception of only four areas, three of which are explained later, the great majority of wheat entering Omaha has its origin in the favorable freight rate region.

Upon closer examination of the favorable freight rate area and the six wheat supply maps, it can be seen that a large area in southwestern Nebraska has not been included in Omaha's wheat supply region from 1963 through 1965. This area has favorable rates to Omaha and its production of wheat ranks high among other wheat areas of Nebraska. Southwestern Nebraska is well-known to railroad officials because truck and rail competition for the movement of wheat is very intense. As mentioned earlier, truck backhauls are often made at cost and this region is an important area for such truckers trying to get back to the Omaha area.

for loads of corn, fertilizer, and other agricultural commodities.¹ Although southwestern Nebraska might be considered part of Omaha's wheat supply region, it was not included from 1963 through 1965 because of the lack of available statistical evidence. It is probable that the region might merit inclusion if a field survey of storage facilities in this area were to be undertaken.

COMPETING MARKETS. The last factor considered to be prominent in determining the shape of Omaha's wheat supply area was the competing grain source areas of Sioux City and Kansas City. In both instances the favorable freight rate territories of these two rate-break markets served as limiting factors to the extension of Omaha's wheat supply area. Table V shows the receipts of wheat at the principal wheat markets near Omaha. Although Sioux City is a relatively minor market, it nevertheless serves to limit Omaha's supply region in South Dakota and northwestern Iowa. In turn, Kansas City, with its large volume of wheat receipts, effectively limits Omaha's southern wheat supply boundary. Even though the favorable wheat freight rate territory of Omaha is generally located along the Kansas-Nebraska state line, a glance at the wheat supply maps for the study years indicates that in four out of the six years studied, Kansas City drew wheat out of the southern tier of Nebraska counties in south-central and south-eastern Nebraska.

In approaching the competing wheat freight rate markets of Omaha, Sioux City and Kansas City from another viewpoint, it is interesting to

¹This was obtained in a private interview with several truckers who wish to remain anonymous.

TABLE V
RECEIPTS OF WHEAT AT THE PRINCIPAL MARKETS
(In Bushels)

	1965	1964	1963	1962	1961	1960
Omaha	29,091,150	35,629,250	26,152,800	31,206,400	30,922,300	35,028,000
Chicago	30,247,000	33,581,000	33,481,000	23,085,000	26,284,000	25,318,000
Duluth	91,877,000	84,043,000	85,038,000	75,416,000	105,043,000	78,538,000
Hutchinson	65,968,000	47,560,000	48,416,000	72,818,000	88,070,000	68,140,000
Kansas City	87,672,511	118,200,863	72,095,980	67,499,520	90,842,730	82,335,400
Milwaukee	590,828	1,687,495	1,518,650	947,836	812,033	578,287
Minneapolis	132,762,950	128,020,375	120,190,200	112,907,375	113,958,750	114,367,625
Sioux City	3,306,108	6,288,400	3,639,375	2,970,000	7,078,125	4,760,000
St. Joseph	8,428,000	8,125,200	7,744,000	11,191,000	12,762,310	11,553,230
St. Louis	32,518,897	41,042,890	35,822,775	28,199,593	34,580,331	31,795,509
Wichita	42,860,000	34,726,800	32,171,360	36,550,490	44,806,770	46,403,000
Total	535,322,444	538,905,273	466,270,140	462,791,214	555,170,349	498,837,051

Source: Omaha Grain Exchange. Omaha, Nebraska Annual Reports, 1960 through 1965.

note that several of Omaha's outlying areas, exclusive of the primary region immediately west of Omaha, lie in a freight rate regions that exhibit equal rates between two competing markets. The primary area in northwestern Kansas, appearing in all six wheat supply maps, is an equal freight rate territory between Kansas City and Omaha. While no definite reason could be uncovered for the inclusion of this region, the author felt that since the railroad lines of the Chicago, Burlington and Quincy and the Chicago Rock Island and Pacific railroads enter Nebraska from this region, the natural movement to Omaha seemed possible even though the freight rates to Kansas City and Omaha are equal. Similarly, the primary areas in northwestern Nebraska and south-central South Dakota are equal freight rate points for Omaha and Sioux City. In this case it is speculated that the movement to Omaha was spurned by a higher price for the wheat at the Omaha market caused by the limited demand of Omaha buyers for the high quality wheat which comes out of these two areas.

SUMMARY. In discussing the major determinants of Omaha's wheat supply region, it has been suggested that wheat production, freight rates and competing markets form the basis for the meaningful delimitation of Omaha's wheat supply region. In the first place, yearly wheat production provides the foundation for the wheat supply area and to a large extent is responsible for the yearly fluctuations of the primary and secondary wheat supply areas. Freight rates, as illustrated by the favorable wheat freight rate map of Omaha (Figure 15), appear to be important in effectively defining the limits of the natural movements of wheat into the Omaha market. Although not all areas in the favorable rate region of

Omaha ship to the Grain Exchange, nevertheless a determination of the favorable freight rate area of Omaha usually includes about 90% of Omaha's total wheat supply area. Finally, the importance of the competing grain market structure surrounding Omaha was discussed. Each market, with its separate favorable freight rate region, has undoubtedly restricted Omaha's supply regions in the north, south and west. Also, Omaha's ability to move wheat from equal rate points between two markets appears to be limited by insufficient demand and lower wheat prices. In conjunction with these three factors, the following chapter will enumerate other possible causes for Omaha's changing wheat supply areas.

CHAPTER FOUR

OTHER FACTORS RELATED TO SUPPLY

AREA BOUNDARY MOVEMENTS

Although three major factors related to the shape of Omaha's wheat supply region were discussed in the preceding chapter, other causes also existed during the study period. Hence, in order to present a more complete analysis of Omaha's wheat supply area, it was deemed necessary to discuss other possibilities or controls that might have affected the Omaha wheat supply regions during the study years. In the interpretation of these other variables, such as governmental role, price, and grain cooperatives, it must be understood that present data availability and methods for the measurement of each factor's effectiveness is relatively unavailable.

Each of the following topics could be independently developed into a specific paper which might prove beneficial to others in the grain trade. One of the other purposes in mentioning the above factors is to arouse the interest of future researchers. Also, because of the research possibilities that exist for each of these topics, it was deemed beyond the limits of this report to attempt to fully explain each additional factor. Although several questions concerning each topic have been left open to discussion, any instance where one of these factors appeared in the study the factor is mentioned.

GOVERNMENTAL ROLE. The first and perhaps most controversial factor is the affect the government has had on grain movements to the

markets. Government interference in wheat movements can be described under two categories -- the Commodity Credit Corporation and the diverted acreage allotment program.¹ It is an accepted fact among grain dealers that each of these programs affect wheat movements in the United States, but to document and examine their effect is another matter.

The fundamental operations of the Commodity Credit Corporation, commonly referred to as the CCC, are those related directly or indirectly to farm commodity price supports. It is through these price support activities that the Commodity Credit Corporation acquires surplus inventories.

All of the price support operations are either mandatory or authorized by the controlling legislature. In line with the basic policy of the administration and under the provisions of the CCC charter act itself, the Corporation makes every effort to carry out its operations through established channels and facilities of trade to the fullest extent possible. The CCC utilizes commercial storage before turning to emergency bin and ship space to supplement facilities. It ships abroad primarily through commercial exporters and is supposed to keep things in normal channels whenever it can. The great bulk of all wheat exported in recent years came from Commodity Credit Corporation stocks.²

Another program is the procurement of agricultural products to meet the needs of the United States government agencies (principally those administering relief programs abroad), cash-paying foreign governments, and international relief agencies.

¹A good background explanation of the Commodity Credit Corporation is presented in the U. S. Government Organization Manual 1956-57 (Washington: U. S. Government Printing Office, 1956).

²Chicago Board of Trade. Ninth Annual Symposium Proceedings, Commodity Markets and the Public Interest (Chicago: The Board of Trade of the City of Chicago, 1956), p. 111.

The Corporation is also authorized to exchange surplus agricultural commodities acquired by the CCC for strategic and critical materials produced abroad. It may also export or cause to be exported at competitive world prices any commodity or product that is not in short supply.¹

In delving into the CCC and its effect on the Omaha Grain Exchange, only limited information was obtained concerning the study years. Most grain officials commented that the increased buying and storing of grain by the CCC in past years has resulted in the by-passing of the Omaha market. This has gained significance as evidenced by the fact that several railroads have published favorable tariffs on direct wheat shipments to Gulf of Mexico ports for the export trade. The case of the Chicago, Rock Island, and Pacific Railroad (running north-south) in 1963, was an example of a railroad that published reduced tariffs for wheat movement to the south rather than eastward into Omaha. While most of the wheat moving south was owned by the CCC, it was also learned that a sufficient supply of elevator storage for CCC wheat was available along the southern route in such cities as Topeka, Kansas City, and Oklahoma City.² With reference to our wheat supply maps and supporting area data, it was impossible to determine both the origin and exact amount of wheat involved in the total diverted southward movement of wheat.

In summing up the literature, the general feeling among numerous grain and railroad officials and the Chicago Board of Trade, concerning

¹Ibid.

²Harold R. Irvin, private interview of Chicago, Rock Island and Pacific Railroad official held in Omaha, Nebraska, June, 1968.

the CCC, the following suppositions lie open to further discussion. The general opinion is that the CCC operations represent definite interferences with normal marketing and pricing functions. These basic areas of interference are:

The narrowing of the volume of grain on which free market prices are established; the by-passing of terminal markets in some governmental operations; the artificial increase of storage facilities following the build-up of surpluses; and established price support differentials may be outdated by developments of the current season; and replaces normal marketings.¹

Another government program that influences the supply area of a primary grain market is the acreage allotment plan. This plan has generally been initiated as a stop-gap measure against changing farm technology. As stated emphatically by Dunn:

Since supply is associated with production and other conditions of production are established by the state of technology, it will be no surprise that an increase in yield per acre, a decrease in cost per unit, or both, involve changes in technology that lowers the cost of production, the supply will increase because it is now economically feasible to extend the area of production beyond the previous limits. However, since the enlarged supply is inconsistent with effective demand at the original market price, the price must fall.²

Without a doubt the changing relationship between allotments per county per year and the changing yearly price support programs on wheat would further give the investigator supplemental information on the Omaha wheat supply region. In addition to this, the expected wheat movements

¹Chicago Board of Trade, Ninth Annual Symposium Proceedings, Commodity Markets and the Public Interest, p. 114.

²E. S. Dunn, The Location of Agricultural Production (Gainesville: University of Florida Press, 1954), pp. 75-76.

would also have to be taken into account as years of poor wheat yield could be an indicator of little wheat export and vice versa.

PRICE. A second indicator for a more refined analysis of a wheat supply region is price. In dealing with millions of bushels of wheat, the difference of 1/4 cent per bushel between two markets could alter the flow of wheat from one market to another, providing freight rates were equal. Although comparable individual prices per bushel per year for Omaha, Kansas City and Sioux City were not available, Table VI shows the Seasonal Wheat Average Price Per Bushel Received By States for the six year study period. In studying Table VI it is important to understand that these prices are only averages. Individual wheat prices in grain markets located in these states undoubtedly fluctuate throughout the year. Nevertheless, the low prices received by Nebraska wheat, in comparison to its chief competitors of Kansas and South Dakota, indicates that the marketing of wheat in states outside of Nebraska was more profitable. Consequently, it should be expected that locations in equal freight rate areas would ship to markets in Kansas or South Dakota because of a higher price for wheat. Price also appeared to be directly related to wheat quantities and qualities needed by millers and grain dealers. In observing the secondary and primary areas of the Omaha wheat supply maps, specific wheat source areas affected price appeared on all maps. Price also appeared to be directly related to wheat quantities and qualities needed by millers and grain dealers. Both statements are illustrated by the Omaha wheat supply region analysis in Chapter Three.

The primary wheat areas in south-central South Dakota, northwestern Nebraska, and northwestern Kansas (all areas present in each of

TABLE VI
SEASONAL WHEAT AVERAGE PRICE PER BUSHEL
RECEIVED BY STATES

	1960	1961	1962	1963	1964	1965
Nebraska	1.73	1.77	1.94	1.83	1.33	1.33
South Dakota	1.79	2.02	2.10	1.92	1.43	1.45
North Dakota	1.82	2.24	2.22	1.97	1.42	1.39
Kansas	1.74	1.79	2.06	1.86	1.37	1.35
Wyoming	1.65	1.74	1.85	1.75	1.27	1.23
Colorado	1.67	1.74	1.94	1.82	1.31	1.33
Iowa	1.77	1.81	1.96	1.85	1.38	1.35

Source: United States Department of Agriculture. Agricultural Statistics
(Washington, D. C.: Government Printing Office, 1966), p. 4.

the six study years) were located in an equal freight-rate territory between either Omaha and Sioux City or Omaha and Kansas City. Due to the high quality of wheat grown in these areas, it appears that the price paid for the wheat at the Omaha market was high enough for a certain length of time to allow these areas to be included in Omaha's primary wheat region. Similarly, in 1965 (Figure 8), with a poor wheat crop in Nebraska in terms of quality and quantity, it can be noted that wheat was obtained from central Kansas. This wheat was brought in by Nebraska Consolidated Mills on an unfavorable freight rate merely because the mill needed certain quantities of quality wheat.¹ Production and need was of importance, not price.

Utilizing the few examples just cited, the complexity of a wheat price analysis for the determination of a wheat supply region can be understood. Further study between wheat movements and price would be of invaluable importance, especially an analysis based on a weekly price -- weekly shipment basis. However, at present, the time requirement and availability of data would impose limitations on such an undertaking. Similarly, price comparisons per month between Omaha and competing markets correlated with receipts by location per month, would certainly indicate movements of wheat so that a definitive wheat supply map could be ascertained.

GRAIN COOPERATIVES. Grain cooperatives, the final factor discussed here, presented the most nebulous path for an analysis. However,

¹Nebraska Consolidated Mills, Omaha, Neb., interviews with several grain buyers and freight-rate supervisors, February, 1968.

with the price variations of wheat changing as much as 50 to 60 cents per bushel over a three year period at Kansas City, from 1962-1964, the holding practices of the grain cooperatives could prove important in obtaining a true picture of a market's wheat supply area.¹

Concerning the poor wheat production years of 1962 and 1963, it was previously mentioned that although 1963 production was heavier than 1962, the actual supply region for Omaha mapped for the 1962 period was larger than the 1963 period. Quite obviously holding practices involved in 1960 and 1961 might have affected the size and shape of Omaha's wheat supply region.

In relation to the problem of holding practices by the cooperatives, the author contacted the National Federation of Grain Cooperatives. In a letter from Roy Hendrickson, the holding situation of cooperatives was described as follows:

We have no data -- and I doubt if any exists -- on holding practices. Why human beings behave as they do, especially in matters that involve changes of price, is of great interest to me. Some state college economists may have some horseback observations of interest, but very little more.²

In conclusion, the seasonal and annual price variations undoubtedly exert an influence on cooperative holding practices, which, in turn, affects the size of the wheat supply areas. But, the extent of control over the wheat area is yet to be determined.

¹U. S. Department of Agriculture, Agricultural Statistics, 1965 (Washington, D. C.: Government Printing Office, 1966), p. 2.

²Letter from Roy F. Hendrickson, Executive Secretary of the National Federation of Grain Cooperatives, Washington, D. C., November 7, 1967.

CHAPTER FIVE

SUMMARY AND CONCLUSION

The analysis of the Omaha Grain Exchange wheat source supply regions, for the years 1960 through 1965, represents an initial attempt to statistically delimit and define a grain source region for a primary grain market. The relative importance of this study is that it represents the first known attempt to accurately define the wheat supply region for Omaha.

The use of railroad wheat shipments as the basis for determining Omaha's wheat supply areas was predicated upon the availability of accurate railroad statistics in comparison to limited trucking data. After utilizing railroad points of origin for wheat shipments as the basis for mapping and regionalizing wheat supply areas, then arbitrary percentages were used to derive primary and secondary areas. Accordingly then, a series of wheat supply maps for the years 1960 through 1965 were constructed.

The constant primary wheat sources for the six year study period were discovered to be in four areas. The foremost and largest primary region of wheat production throughout the entire study was located adjacent to Omaha. Although the western limits of this area constricted in 1962 and 1963, the westward expansion in 1964 and 1965 could be attributed to increased wheat production. The region was primarily limited in its northward extension by a non-wheat producing area and on the south by strong market competition of Kansas City. This area represents the solid core of the Omaha wheat supply area and has appeared to be least

susceptible to wheat crop damage throughout the study period.

Another constant primary wheat supply area was brought to light in northwestern Kansas. It appears that the transportation network of railroads moving into Nebraska from this region has been an important factor for the inclusion of this area in Omaha's wheat source region. With the exception of 1963 and 1964, when Kansas wheat production was low, this northwestern area has constantly been connected to the Omaha secondary or primary region in south-central Nebraska.

The last two primary areas uncovered, located in northwestern Nebraska and south-central South Dakota, have fluctuated the least in respect to the previously mentioned primary areas. In both regions production has remained uniform throughout the six years and apparently the demand for the high-quality wheat from the Omaha market has also remained constant. As was the case with the primary region in northwestern Kansas, both of these primary areas are in equal freight-rate territories between Omaha and Kansas City or Sioux City. Also, the transport configuration was again deemed significant since both regions had more direct railroad lines entering the Omaha market than any of its competitors.

The only secondary wheat supply area of major importance fluctuated between the primary areas of northwestern Kansas and the major primary region east of Omaha. The contraction and expansion of northwest Kansas or east of Omaha region appeared to be directly related to fluctuating yearly wheat yields. In 1960 and 1961 the area was small due to excellent wheat production. By 1962 and 1963, however, the secondary area expanded in direct response to the poor wheat crops of

those years. But in 1964 and 1965, with wheat yields increasing, this secondary area once again constricted.

In establishing determinants for the shape and size of Omaha's wheat supply regions, it was decided by the author that wheat production, freight rates and competing markets were of major significance.

Wheat production, a three-fold composite of physical limitations, variability of yield, and government wheat diverted programs, provided the basis for the wheat supply regions and to a large degree appeared to be a dominant factor in the yearly fluctuation of the primary and secondary wheat supply areas.

Freight rates, as illustrated by the map of The Favorable Wheat Freight Rate Area of Omaha, seemed to set the economic limits from which normal wheat movements to Omaha should be expected. One area of exception, located in southwestern Nebraska and the southern Panhandle of Nebraska, was not included in Omaha's wheat supply region. Trucking is very important in this area and the lack of statistical evidence on such movement accounted for the deletion of this region from Omaha's wheat supply area. While other minor areas in Omaha's favorable freight-rate region also did not ship to Omaha, nevertheless the favorable freight-rate area of Omaha accounted for almost 90% of Omaha's total wheat supply area.

The importance of Kansas City and Sioux City, as competing grain markets surrounding Omaha, was apparent in the limitation of Omaha's favorable freight-rate area to the north, south and west. Each market, having separate favorable freight-rate areas, also receives grain from the natural flow situation as described for Omaha. With Omaha's

proximity to Kansas City and Sioux City, the favorable freight-rate area of Omaha is limited on three sides quite effectively by these competing markets.

In analyzing Omaha's wheat supply area, it was obvious that other factors, besides wheat production, freight-rates and market competition, were affecting the Omaha wheat regions. The governmental role, exercised chiefly by the Commodity Credit Corporation, appeared to be the most controversial factor affecting the Omaha region. However, the lack of data to illustrate altered wheat flows discouraged further investigation. The only direct reference to any diverted wheat movements from Omaha was shown by the Chicago, Rock Island and Pacific railroad in 1963 when rates were lowered on direct wheat shipments to the Gulf of Mexico. In this situation, wheat from northwestern Kansas and possibly southwestern Nebraska was transported to the Gulf of Mexico ports for export.

Another government program affecting the size and shape of Omaha's wheat supply area is the diverted acreage allotment plan. Although a complete county analysis per year would provide additional data concerning Omaha's changing wheat supply regions, it was decided that such an undertaking was beyond the scope of this analysis. In utilizing wheat production as the sum total of the effects of climate and government programs on wheat yields, the author has taken into account such programs. Undoubtedly future researchers might analyze the components of wheat production used by the author in an effort to delimit Omaha's changing wheat supply regions more precisely.

Price, a rather important although changeable cause, was only discussed superficially because of limited data. Price appeared to be

directly related to wheat quantities and qualities needed by grain merchants. While the price for Nebraska wheat was generally a few cents lower than Kansas, Iowa or South Dakota wheat, the wheat supply maps showed that two of Omaha's outlying primary areas were located in equal freight-rate regions between Omaha and Kansas City or Sioux City. These areas in northwestern Nebraska and south-central South Dakota are known for their quality wheats. Although price information was not available on these areas, it seems probable that Omaha grain dealers paid more than the average Nebraska wheat prices so that wheat could be obtained from these areas. Similarly, high protein wheat shipped from central Kansas in 1965 for Nebraska Consolidated Mills represented a buying price above the normal Omaha market offering because this wheat was shipped from the Kansas favorable wheat freight-rate territory. This factor of price holds unlimited research possibilities for the future provided detailed data becomes available.

The last influential cause discussed was the holding practices of the grain cooperatives. After studying the wheat supply maps and accompanying data, the author concluded that such practices occurred in 1962 and 1963. As previously mentioned, although 1963 wheat production was heavier than the 1962 crop, the mapped Omaha supply regions for 1962 were larger than the 1963 period. In attempting to uncover what rules, if any, governed such holding practices of grain cooperatives, it was learned that none are known to exist at present.

The development of a wheat supply region for the Omaha Grain Exchange has emphasized that the location of agricultural shipments possesses a structural unity that is recognizable and subject to analysis.

At the same time it is futile to suggest that there is in all instances, a completely rational character to the changing wheat supply areas. Many anomalies in the analysis of the six wheat supply area maps indicate that the source regions by year are merely temporary, a result of complex causes in a constant state of flux. The distribution of primary and secondary areas represents only selected periods of time, not even a stable one, in a changing situation whose movements we do not completely comprehend. Some of the causes for the wheat area shapes are permanent, some no longer active, others are just beginning to function.

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