A LAND USE PLAN FOR JACKSON COUNTY, MICHIGAN

Thesis for the Degree of M. S.

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Henry Wilford Fairchild

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This is to certify that the

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A Land Use Plan for Jackson County, Michigan

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A LAND USE PLAN FOR JACKSON COUNTY, MICHIGAN

By

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CHAPTER I

THE PROBLEM

Introduction

Twenty to fifty thousand years before man settled Michigan, the glaciers had formed the complexity of landforms that early explorers and settlers saw as wooded hills and valleys, swamps and lakes. When man settled the region in the early eighteen hundreds, his pattern of settlement had already been given in the land acts of 1784, 1785 and 1787 (8) which provided that the North West Territory, of which Michigan was a part, be surveyed into ranges, townships and sections. This determined the grid pattern of development for both the city and county, resulting in the straight roads, the square and rectangular fields and the square block arrangement of the cities that is seen today. These two factors, glacial formation and grid land division, determined to a great measure the land use patterns that evolved.

Subsistence agriculture was the first land use to develop after settlements were established in southern Michigan. This pattern soon changed into a general agriculture pattern which was subsequently modified by the development of manufacturing industries and large urban centers.

Before the day of the automobile, the city was the city and the country was the country; no one had difficulty in determining the boundary between. The location of the railroad and the trolley, and the speed of the horse controlled the city limits. Since the advent of the automobile, the city has permeated the country to the extent that it is difficult to know where the city stops and the country begins. Rural electrification has made the country a more desirable place to live, in some respects, than the city and has caused intense competition to develop for the land lying within driving distance of the cities.

Electricity, the automobile and the tractor have changed agriculture from a pioneer subsistence type into two new farm types, the commercial farm which produces most of the farm products, and the part time farm which provides homes for workers from town and for people interested in living on farms but not interested in commercial farming.

The new patterns of urban and agricultural land use evolved with such a rapidity after 1910, that in 1947, nineteenth century public administration methods were still being applied to twentieth century problems.

Purpose and Scope of Study

The plan of this study was to select a sample area from the dairy-general farming region of Southern Michigan where the pattern of industrial and commercial land use had

been superimposed on the agricultural use pattern, to delineate the land use problems characteristic of the region and to provide, if possible, logical solutions for the problems.

To attain the objective stated, it was necessary to obtain basic information about the land, people, and the use of the land by the people; to determine the trends of past land use and project them into the future; and to evaluate the land use trends and recommend changes that appeared desirable.

More specifically, it was planned to:

1. Outline the physical features of the area selected for study.
2. Make studies of land use for agricultural, forestry, recreational, and urban development.
3. Delineate the social-economic land use areas.
4. Outline areas having land use problems.
5. Make recommendations for changes in land use.
6. Make statistical studies of population, land values, and other items necessary to the completion of the study.

Jackson County, Michigan was selected as the locale of the study.

Location and Size of the County

Jackson County is located in the second tier of counties from the southern boundary of Michigan, in the central part of the state from east to west. Jackson,

the largest city, and county seat, is situated in the center of the county seventy-two miles west of Detroit, thirty-five miles west of Ann Arbor, thirty-nine miles south of Lansing, and forty-two miles east of Battle Creek. Fig. (1) shows the location and size of the county on a Michigan map.

The county consists of nineteen townships, made up of 717 square miles, of which 705 are in land area and the remaining twelve square miles in water area (26). Jackson city in 1940 was the 201st largest city in the United States with a population of almost fifty thousand people, and a land area of ten and two tenths square miles. (30).

History

The earliest record of a permanent settlement in the county was given by DeLand (5) as the summer of 1829 when Horace Blackman settled the west bank of Grand River at the junction of several Indian trails. The account relates that he settled there because it was the most likely place for the county seat to be located. Prescott (20), stated that a more forbidding site could not have been selected in the whole state of Michigan for a village or city. Shortly after Blackman made his settlement, other settlers came over the trail from Ann Arbor to locate farms and build homes. The county of Jackson was founded on October twenty-ninth, 1829, and was attached to Washtenaw for judicial purposes. The next year

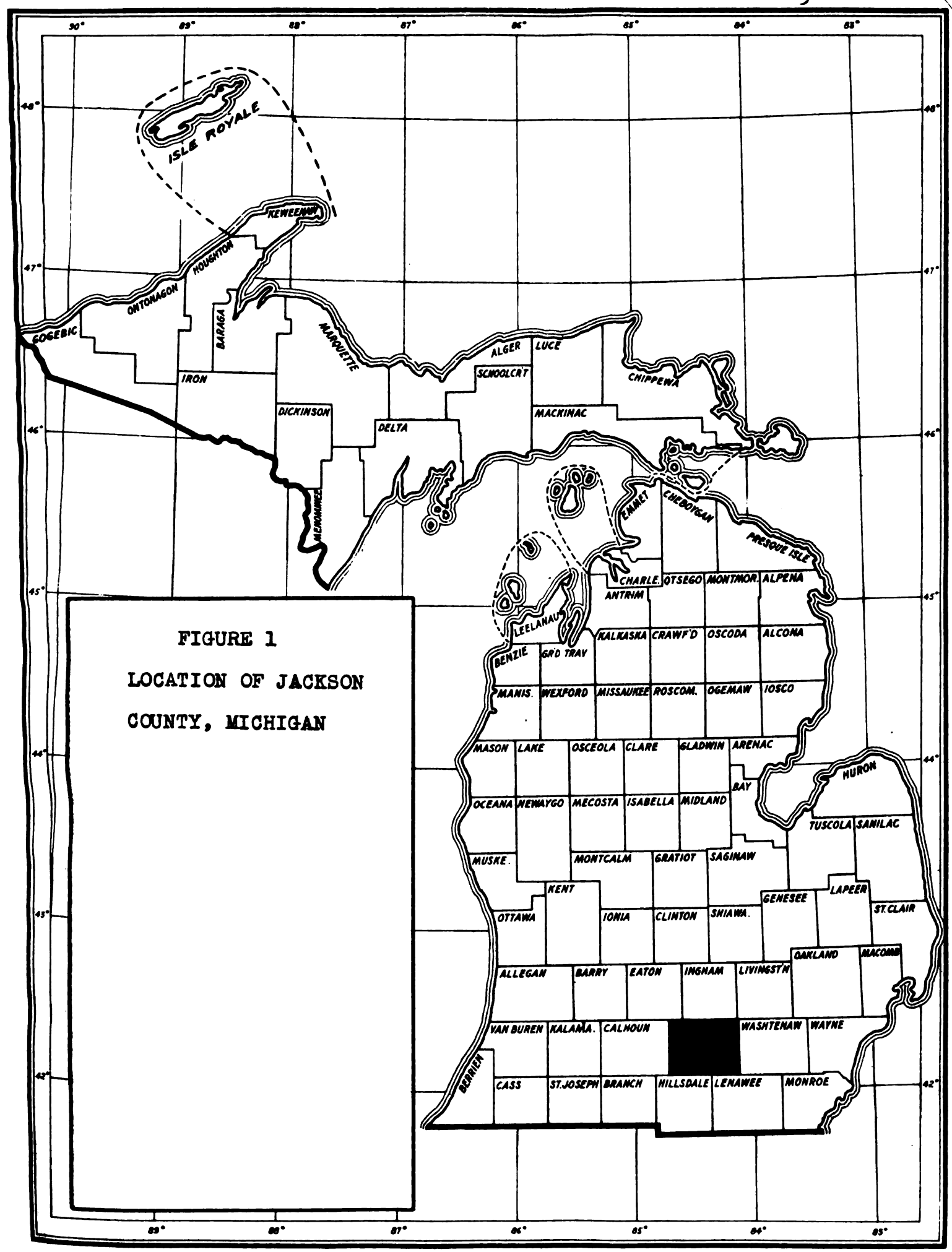


FIGURE 1

LOCATION OF JACKSON COUNTY, MICHIGAN

Kalamazoo road was built and through the efforts of Blackman was directed through Grass Lake, Jackson, and Concord. In 1832 Jackson became a separate county. From 1829 to 1834 the population grew to eighteen hundred and sixty five people, in 1837 it numbered seven hundred and in 1840 thirteen thousand, one hundred and thirty people (23).

Blois (2) stated that the natural landscape of the county was made up of about one-quarter swamp plains and the rest largely oak openings. McGee (18) further stated that, "the oak openings were largely burr oak (a misnomer) and that there were no grubs or small timber and no brush... the only obstacles in the way (of travel) were the marshes and rivers." McGee went on to describe the natural vegetation, saying that besides the timber, there were "brakes", a kind of fern, which grew to two and one half to three feet high, wild strawberries and many kinds of wild flowers which grew in great profusion.

Rapid growth of population came in the eighteen-thirties. The Pottawatomee Indians were numerous but offered no serious resistance to the settlement of the land. Life was rugged in the new county for the settlers from the east, food was scarce during the first few winters but there was no lack of work. Farming soon became the chief occupation of the settlers, with wheat, hay and cattle the main farm products. In 1843 the first railroad was built connecting Chicago with

Ann Arbor, By that time also the road transportation system of the county was well established; thus with the railroad for long hauls to distant large cities, and the oxen and horses for short hauls to the railroads, commercial agriculture began in earnest. By the time of the civil war, the county was producing thousands of bushels of wheat and hundreds of cattle.

The city of Jackson, early in the history, became the center of culture and entertainment in south central Michigan. It was known as the best "show" town in Michigan with all the large eastern Theatre circuits making regular appearances there. The first Grange in Michigan was founded at Grass Lake, and it was "under the oaks" at Jackson on July six, 1854 that a group of Michigan citizens gathered and formed the first political party to be called the Republican party, in the United States. The party founded there on that day was later combined with the party formed at Ripon, Wisconsin to form the present Republican party (7).

CHAPTER II

PHYSICAL FEATURES OF THE COUNTY

Topography

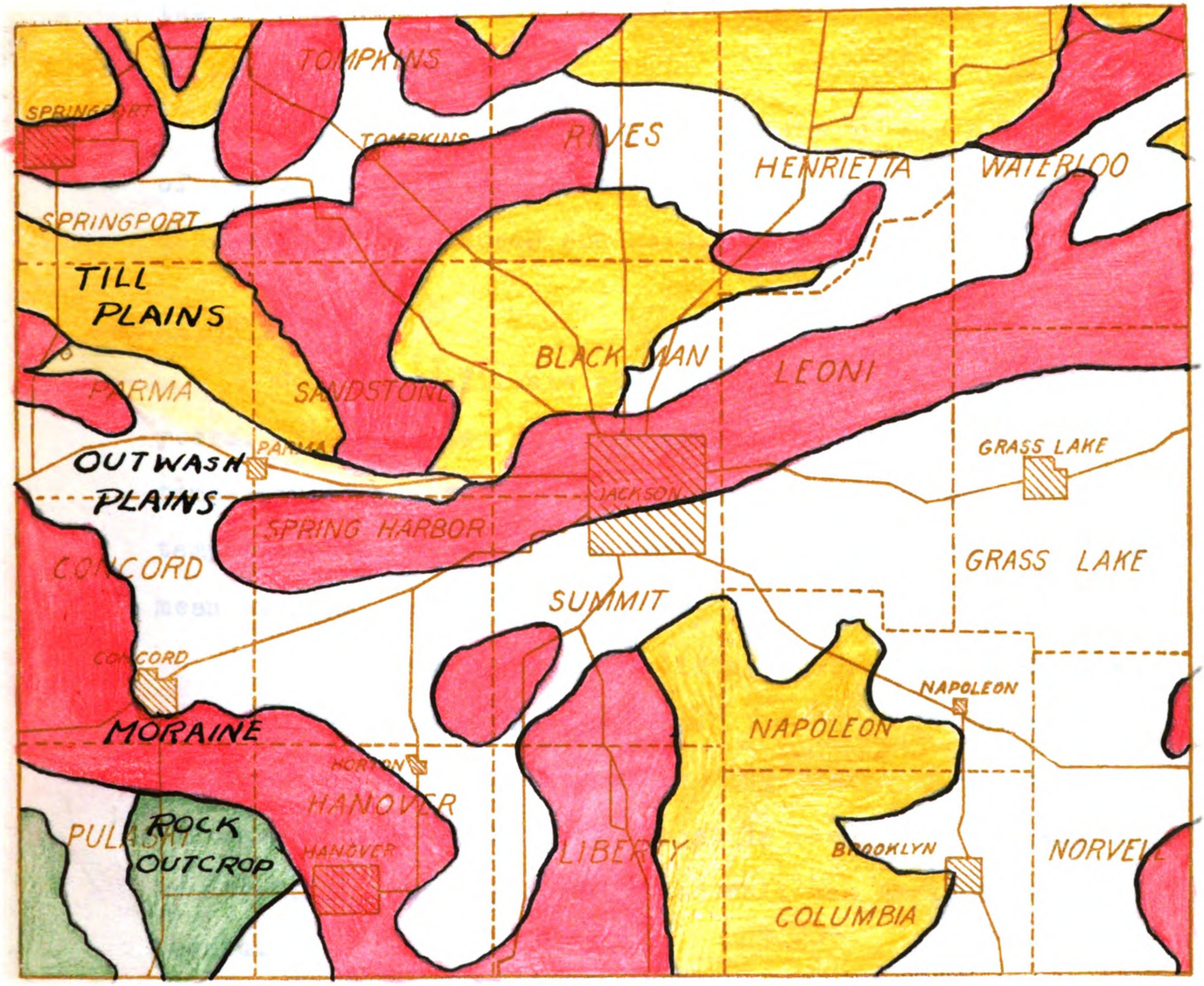
The topography of the county is level to hilly with the greatest differences in elevation being about one hundred and fifty feet. Fig. (2) shows the surface features of glacial origin as mapped by Leverett (10). The county can be separated roughly into several topographic components. A moraine runs east and west through the center of the county, another runs north and south through Sandstone and Tompkins Townships, and still another through Concord and Liberty Townships. The north-east part of the county consists largely of swampy plains through which are distributed sand islands. The south-east quarter of the county consists mainly of a level pitted plain; deeply pitted in the north, with many potholes, swamps and lakes and less deeply pitted in the south. The west half of the county consists of, besides moraines, undulating sandy plains through which are formed broad valleys of swampland along the drainage ways.

Topographic maps of the U.S. Geological Survey have been completed for the north half of the county and the townships of Summit, Liberty, Leoni and the western part of Columbia and Napoleon Townships (15).

FIGURE 2

SURFACE GEOLOGY

After Leverett



JACKSON COUNTY

The greatest part of the county lies between 950 and 1050 feet above mean sea level, the highest point in the county thus far mapped being 1168 feet at Prospect Hill in Liberty Township.

Four rivers have their headwaters in the south end of the county, the Kalamazoo and the Grand flowing north and west, and the Huron and Raisin flowing east.

Climate

Continuous climate records are available for forty years. The climate is characterized by moderate summer temperatures and fairly cold winters, the mean average July temperature as recorded was 73.4 degrees Fahrenheit and the mean average January temperature 24.7 degrees.

The average dates for killing frosts have been: the last in the spring, May sixth, and the first in the fall, October eighth; or an average growing season of 155 days. The latest date recorded for frost in the spring was May twenty-fifth, and earliest in the fall was September nineteenth.

The rainfall is fairly well distributed throughout the growing season, with an average of 15.91 inches out of 39.97 inches of annual precipitation falling between the first of May and the first of October. An average of 39.4 inches of snow fall occurred in the county, most of it in

December, January and February. Precipitation of more than one-tenth of an inch occurred on an average of 119 days a year. The wind is moderate with an average velocity of about ten miles per hour and blows from a south-westerly direction throughout all the year except the months of February and March when it blows from the northwest. The maximum wind velocity had never exceeded forty five miles per hour at the time of the study (3,4).

Natural Vegetation

The natural vegetation of the county in its original state varied with soil and topography, but in general the well drained mineral soils supported a growth of oak and hickory on the more sandy soils, and beech, elm, hard and soft maple and basswood on the heavier soils. The poorly drained mineral soils supported elm, ash, soft maple, basswood, swamp white oak, cherry and butternut. Tree and growth on the organic soils consisted of elm, ash, soft maple, tamarack, aspen, red osier dogwood. Other vegetation included elderberry, sedges, bluejoint, dwarf birch, common winterberry, kalmia, chokecherry and sphagnun and other mosses (34).

Soils

Veatch, Trull and Porter (34), and Trull (25) have described the soils of the county in great detail. It is sufficient for this study to quote Veatch:

"The soils of Jackson County differ widely in texture, structure, chemical composition, fertility, and moisture--natural factors which bear a relation to plant growth and consequently to agricultural use. They also exhibit a lack of uniformity within very short horizontal distances, a condition common to the State as a whole.

The surface soils range from loose, incoherent, nearly pure sand to moderately heavy silt loam and clay loam. Most of the soils, however, are light sandy loams. The sands comprise less than 5 per cent of the total area, and soils which have a clay or clay loam texture in the plow soil are of almost negligible total acreage. Probably 65 per cent of the land is loamy or free working under all conditions, about 10 per cent is moderately heavy, and about 5 per cent is refractory or difficult to manage because of a high content of clay, extreme stoniness, susceptibility to blowing, or other unfavorable tilth conditions. About 20 per cent consists of muck and peat, which has its own tilth characteristics.

It is estimated by local standards that 20 per cent of the soil is comparatively poor in organic matter in the plow layer, containing 2 per cent or less by weight; and that about 25 per cent, including muck and peat, has a high organic matter content. The houmous (humus) layer in virgin well-drained soils does not exceed 3 inches in thickness, and consequently in the cultivated there is very little tint or coloring from organic matter below the depth of 6 or 7 inches. The soils are deep, however, from the point of view of penetrability, as the parent soil material is unconsolidated glacial drift to a depth of several feet.

About 90 per cent of the soils are acid in reaction in the natural surface horizons and in the plow soil. It is estimated that about 60 per cent of the mineral soils are acid to a depth of 36 or more inches, that 30 or 35 per cent contain sufficient calcium and magnesium carbonates or other bases at and below a depth ranging from 24 to 36 inches to give an alkaline reaction, and that 5 per cent either are nonacid or limy throughout under natural conditions. The organic soils comprising about 20 per cent of the area of the county are mostly neutral or moderately acid, less than 5 per cent being the extremely acid peat.

> In the greater part of the county drainage is naturally fairly good, as the water table is not high and the slope is sufficient to provide free run off. It is estimated that 25 per cent of the soils are characterized either by a high water table or by permanently swampy conditions and are therefore unsuitable for agricultural use unless they are ditched or tiled.
>
> The fertility and productivity of the soils, according to standards for the southern part of Michigan, are generally medium. Analyses of the predominant types of mineral soil represented here do not show any evidence of abnormally high or of unusually small contents of the mineral constituents ordinarily determined. Probably 10 per cent of the soil, including the sands, is poor because of low content of plant nutrients and deficiency of moisture, and a rather large proportion, including some of the mucks or peats, is poor because of low content of mineral food in combination with either an excess or deficiency of water."

Bedrock

The northern half of the county is underlaid with Parma sandstone, a part of the Saginaw formation. The remainder of the county is underlaid in bands running from east to west with Bayport limestone, Michigan shale, lower Marshall limestone, Coldwater shale and Napoleon sandstone (13). Leverett (11) stated that in the north end of Hillsdale and the southern end of Jackson counties, the bedrock lay at a about 1100 feet above mean sea level, sloping downward to about 900 feet at Jackson. This slope of the bedrock breaks to form a divide in the Irish Hills between Hillsdale and Jackson counties, causing all the rivers in the area to flow in all directions except south.

The minerals of the county are few and for the most part unimportant. Gravel, a little coal and building stone are the only minerals of any importance.

From a soil point of view, the soils of the south end of the county are thin glacial drift with many projections of the bed rock. As one travels north through the county, the drift becomes thicker and fewer outcrops of rock are seen.

Natural Land Types

Fig. (3) shows the natural land types as mapped by the author. A different approach to natural land type mapping was used in this case than was employed by Veatch (33), or Schoenmann (22). A separate land type was used for the naturally wet lands. This was done to point out the swamp land patterns that were associated with the other natural land types. From Fig. (3), it can readily be seen that with each of the other natural land divisions there was a definite associated patern of swampland that in part determined the land use of that natural land type.

The natural land types as delineated on Fig. (3) were as accurate as could be made from the soil map, the topographic maps and limited personal reconnaissance of the area. It was felt that the south west quarter of the county was not mapped very accurately because of a lack of topo-

FIGURE 3

SPRINGPORT TYPE

PARMA TYPE

CONCORD TYPE

WATERLOO TYPE

NAPOLEON TYPE

LEONI TYPE

graphic data. For the purposes of this study, it was felt that the natural land types as mapped were sufficiently accurate.

Waterloo Type

The waterloo land is easily recognized by the high percentage of intricately formed short steep slopes which gives the landscape the appearance of waves on a sea; field crops when viewed from above, look like a choppy sea due to the micro-irregularities of the landforms. Slopes are steep, many steeper than 15 per cent. The length of slope varies from six feet to perhaps 200 feet. Slope covers considerable more than half of the land area of the land type.

Relief varies from fifty to 150 feet, rising out of narrow swampy valleys or of numerous lakes and small ponds of the area. It is on this land type that the highest point in the county is found.

Soils of this land division are sandier and more drouthy than on any of the remaining land divisions. Greater evidemces of sheet and gully erosion are also present. Woodlots are commonly found covering both the hills and valleys, something quite distinct from other land of the county. Natural forest types are oak and hickory.

Bellefountaine sandy loam soil makes up more than 95 per cent of this land type with Coloma sand and Hillsdale sandy loam making up the remaining 5 per cent (34).

Springport Type

The Springport natural land division consists of undulating to hilly fertile loam soils of the Miami and Hillsdale soil types. Relief differences are never greater than seventy feet. Slopes are gentle, but locally may be as steep as 8 to 15 per cent. Hills are smooth with rounded crests and valleys. A high proportion of the Munith land type is associated with the Springport in broad valleys of irregular pattern.. The woods that are found on this land are in the form of small pastured woodlots and are located on the crests of the undulating hills.

Munith Type

All naturally wet lands consisting of either mineral or organic soils are included in this group. This land assumes two patterns in the county: broad valleys of swamp following the course of the youthful streams and rivers and irregular shaped patches connected by streams and narrow swamps. Munith type is commonly found bordering most of the lakes of the county, making them of little value for home construction or recreational purposes. Pasco (19)

found that forest and brush was most commonly associated with the soils of this land division.

The soil components of this land consists of about 80 per cent organic soil and the remainder wet mineral soil. The organic soil includes such types as Rifle peat, Carlisle muck, Houghton muck and Greenwood peat. The mineral soils are Brookston loam, and clay loam. Brady sandy loam, Newton loamy sand, Conover loam, Griffin loam and Genesee sandy loam. Rifle peat makes up about half of the area of the Munith type with Houghton muck and Brookston loam comprising practically all the remainder.

Concord Type

Concord land division is composed of fertile, friable sandy loam soils underlaid by clay, making them moisture retentive. Slopes are smooth, ending in rounded crests and valleys. Slopes vary from 8 to 15 per cent and the relief differences are not greater than 100 feet.

This land division rises out of the Parma land type and could be considered as a steeper phase of that type. Broad valleys of the Munith land division cuts across this land in broad valleys. This type is freer of swampland than other types because of its position in the landscape. Woodlots are found on the crests of the many hills; the

sidehills are cleared and erosion has become the problem. Hillsdale sandy loam soil comprises practically all the soil of this land.

Parma Type

The Parma land type consists of level to gently undulating fertile sandy loam soil, mostly of the Hillsdale soil series. Relief differences from the valleys to the crests of the low hills are not greater than fifty feet. Broad valleys of the Kunith land type are interspersed in a haphazard pattern through the area.

The original vegetation of the Parma and Concord land was oak and hickory. By the time of the study all but a few hill tops had been cleared for agriculture. Slopes on the area vary from 0 to 8 per cent with a few as steep as 15 per cent.

Napoleon Type

The presence of numerous pits, lakes and depressions, the sandy and acid character of the soil, and the flat nature of the topography, characterize this land type. It is thought that the plains were formed by the outwash from melting glaciers and the pits in the plains were formed by chunks of ice sloughed off the glacier and left to later melt and form holes in the land surface.

The soils consists of Fox sandy loam and loam. All are fair to good in fertility and are especially adapted to the production of alfalfa when properly limed. Woodlots on this land are larger than for the average of the county. Usually they are found at the edge of many swamps that meander through the area and at the edges of the many depressions.

Leoni Type

The statements made for the Napoleon land type are equally true in this land division with the exception that this land differs in relief from Napoleon. In the latter case the land is smooth with many depressions. In this case the land takes on the appearance of a peneplain, with many flat topped hills of the same elevation with deep pits between.

CHAPTER III

SOCIAL AND ECONOMIC FEATURES OF THE COUNTY

Population

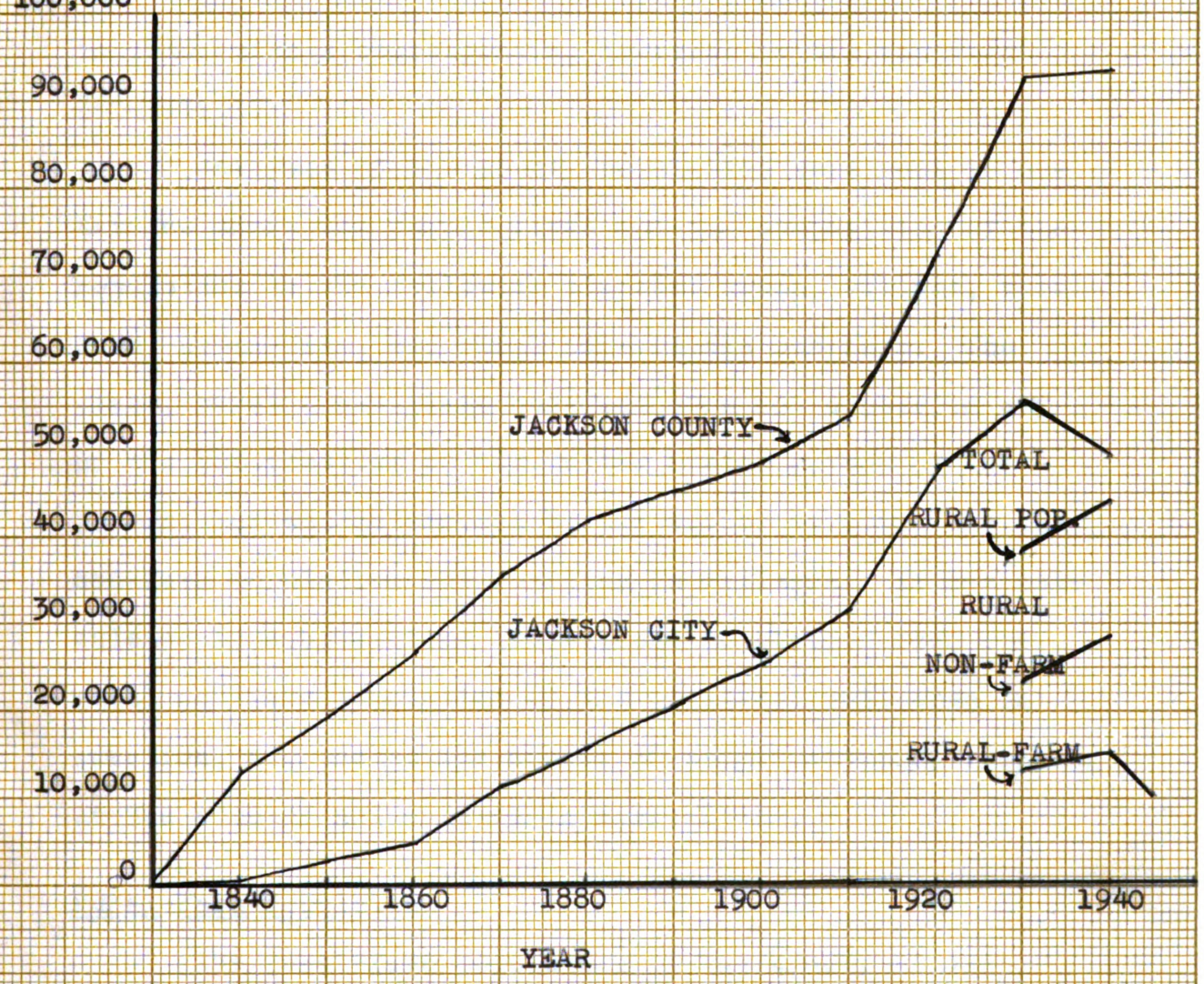
According to the United States census of 1940, Jackson County had a total of 93,108 people, or 132.1 persons per square mile of land area. Most of these people, except for the population within Jackson City, were of old American stock that had migrated from the east to Jackson and surrounding counties in the middle eighteen hundreds (30).

Jackson County has been steadily increasing in population since its earliest white settler, Horace Blackman, arrived in 1829. Figure (4) shows the increase in population since 1840 for the entire county, and for the city of Jackson since 1850. As the figure indicates, the population has increased at a decreasing rate since 1910; increasing 35.8 per cent from nineteen ten to nineteen twenty, 27.2 per cent from nineteen twenty to nineteen thirty and only 14.7 per cent from nineteen thirty to nineteen forty. This represents the levelling off of the population in Jackson county much as was occurring throughout the entire nation (31).

FIGURE 4

POPULATION TRENDS IN JACKSON COUNTY

1840 TO 1940



Closer examination of Figure (4) shows that despite the total increase in population for the county, the city of Jackson lost about 6,000 population from 1930 to 1940, with a corresponding increase in the non-farm population.

Analyses of the county population were made to determine where the people lived and the composition of the population by the following classes: urban, village, rural-farm, urban-farm, and rural non-village non-farm. The class, rural non-village non-farm does not appear in any of the publications of the United States Bureau of the Census, but was determined by the author to point out the non-farm population not residing in villages. It was calculated by subtracting the village population from the rural non-farm population of the political unit area in question, and showed the number of people actually residing in the country not engaged in agriculture.

Rural-Farm Population

The rural-farm population of the county is distributed according to the amount of class I and II land available for agricultural use. Thaden (23), has shown that rural-farm population was based in 1930 upon the prediction line: for each per cent variation in class I land, there

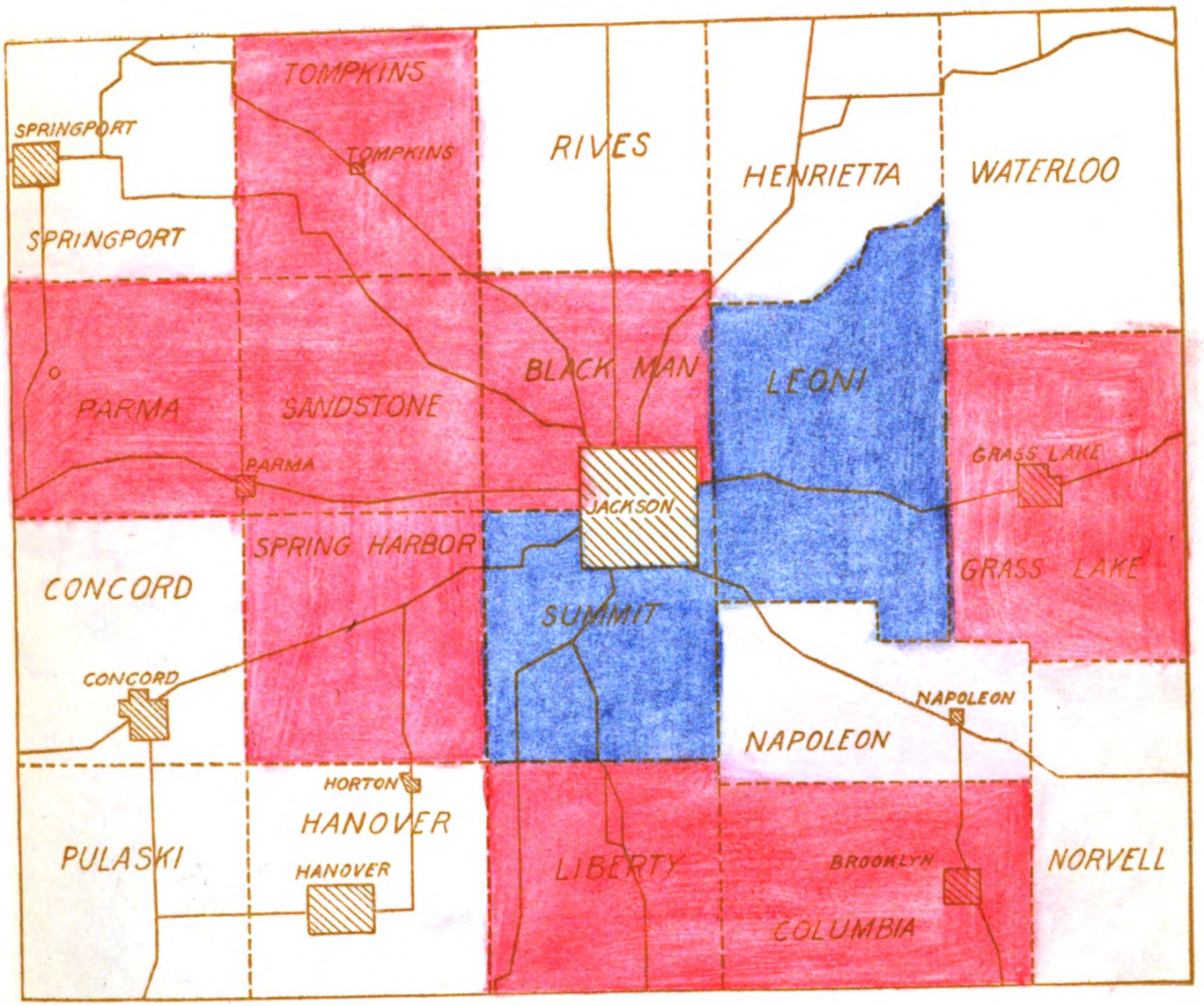
was a variation of .31a plus 5.6 in rural-farm population. Applying this equation to Jackson county, for 1930, showed that there should have been 16.8 rural-farm people per square mile; actually there were 18.3. When the prediction line is applied to any individual township for the 1930 census, the results are of no value, showing that something besides the amount of Class I land influenced the rural-farm population. Thaden(24), in a study of the Lansing community, showed that the rural-farm population decreased directly with the distance from the city. Rank coefficients of correlation were calculated between the distances of the townships from Jackson and their rural-farm populations for 1930, 1940, and 1945. The coefficients of correlation for these years respectively are: +.34, +.72, and +.11. The coefficient for 1940 is the only one with high significance, indicating that either there is a different relationship in the Jackson community than was true for the Lansing community, or else the sample of the Jackson community is not large enough to show the true relationship between distance from Jackson and the rural-farm population. The latter is probably true since a large share of the Jackson community falling in other counties is not included in this study.

The distribution of rural-farm population assumes a

FIGURE 5

PER CENT LOSS OF RURAL-FARM POPULATION

FROM 1940 TO 1945



JACKSON COUNTY

WHITE--LESS THAN 25 PER CENT LOSS

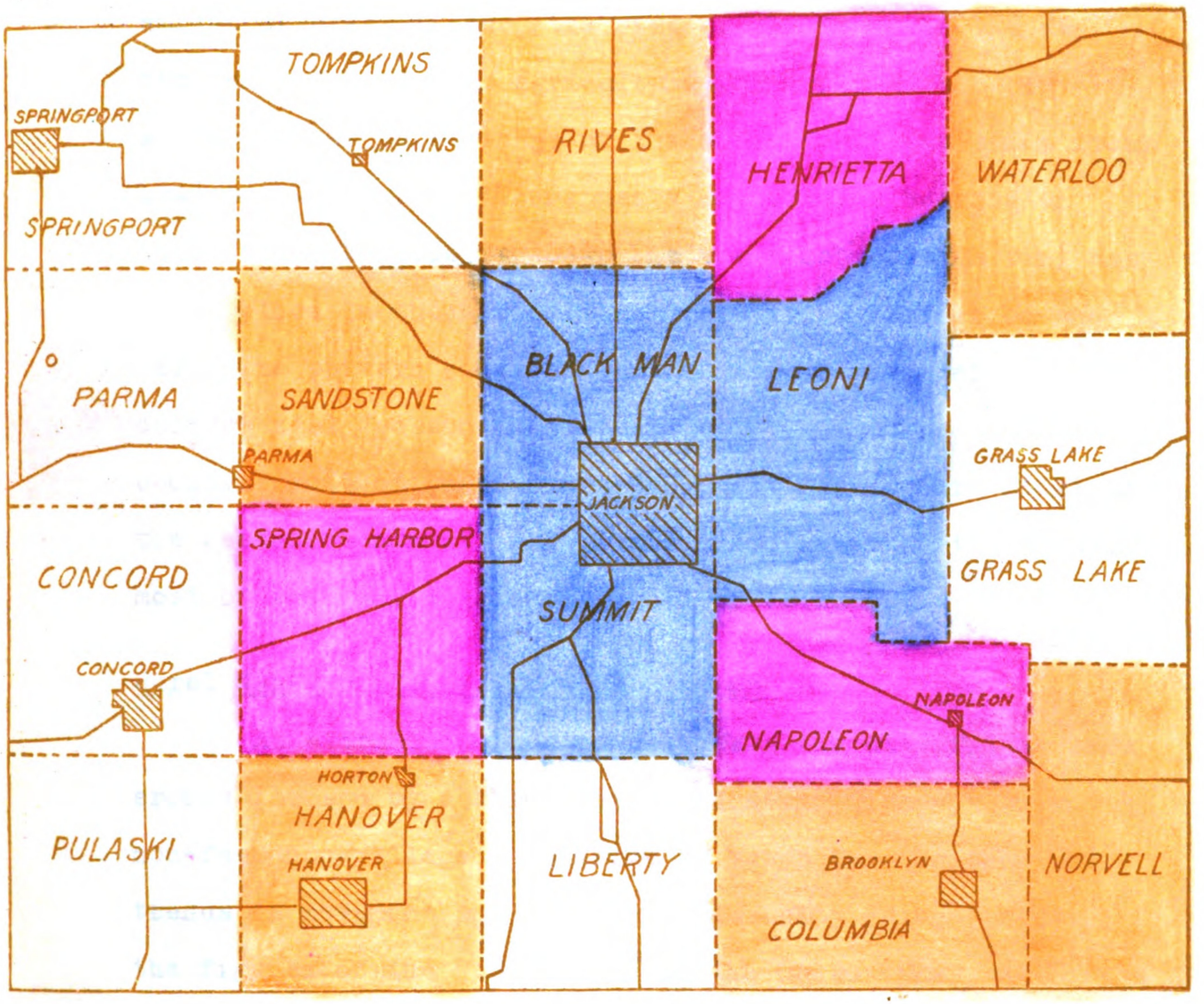
RED--FROM 25 TO 49 PER CENT LOSS

BLUE--MORE THAN 50 PER CENT LOSS

FIGURE 6

RURAL NON-FARM NON-VILLAGE POPULATION

PER SQUARE MILE IN 1940



JACKSON COUNTY

BLUE--MORE THAN NINETY PERSONS PER SQUARE MILE

PINK--FROM FIFTEEN TO FORTY PERSONS PER SQUARE MILE

ORANGE--FROM FIVE TO FOURTEEN PERSONS PER SQUARE MILE

WHITE-- LESS THAN FIVE PERSONS PER SQUARE MILE

haphazard pattern, Figure (5), but in every township the pattern is easily explained on the basis of either the amount of class I land, the size of the farm, or the retirement of land from agriculture for other uses. Fig. (6) shows the per cent change of the rural-farm population from 1940 to 1945. This Figure has a significant bearing on this study, because it shows the tremendous change that has taken place in the agricultural population because of the war. The pattern shows that more farmers have left agriculture near Jackson than in the outer townships of the county. Most of the farmers that quit farming are still in the Jackson community as will be shown later in the study, most of them working in the shops of Jackson.

Rural Non-Farm Non-Village Population

An attempt is made to delineate the city fringe area around Jackson by determining the distribution of the rural non-farm non-village population by township. To show the trends in movement and density of the city fringe population, the figures of the U.S. Bureau of the Census are used. Distribution of the rural non-farm non-village population was determined for 1920, 1930 and 1940 (20). Figure (7) shows the distribution of this class of population for 1940. The distributions for 1920 and 1930 have the same pattern, the

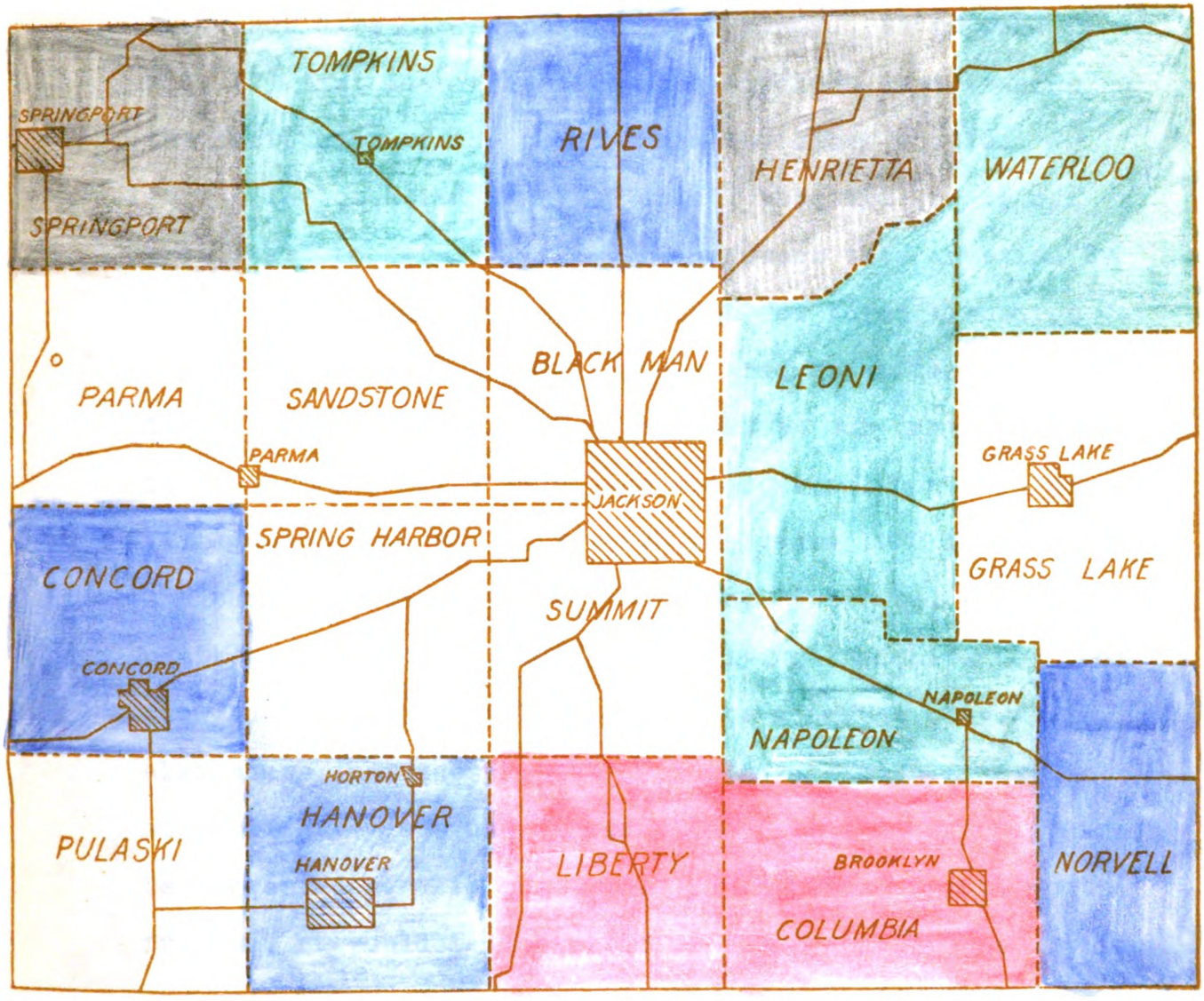
only difference being in the density of population. Fig. (7) proves conclusively that there is a zone of population concentration of rural non-farm non-village population around Jackson, and that it covers considerable area. In order to point out more vividly this zone of concentration of population, a field study was made. An actual count was taken of new houses built since the Michigan State Highway planning survey was taken in 1940 (17). On twelve miles of highway 27, north of Jackson, sixty two new houses had been built, thirty five of them within two miles of the city limits. Counts along other highways leading out of Jackson gave similar results, showing better than census data the tendency for non-farm homes to be built near a city.

To further show the growth of the rural non-farm non-village population, Fig. (7) was drawn, showing the per cent of change in school census from June first, 1940 to June first, 1947. A greater per cent increase in school census was shown in the second tier of townships from Jackson than in the townships bordering the city (21). This plus the data obtained from Fig. (6), the per cent loss of rural-farm population from 1940 to 1945, showed the trend towards the extension of the fringe area out from the city.

FIGURE 7

PER CENT CHANGE IN SCHOOL CENSUS

FROM 1940 TO 1947



JACKSON COUNTY

RED--0 TO 10 PER CENT LOSS

BLUE--0 TO 10 PER CENT INCREASE

WHITE--11 TO 20 PER CENT INCREASE

GREEN--21 TO 30 PER CENT INCREASE

BLACK--OVER 30 PER CENT INCREASE

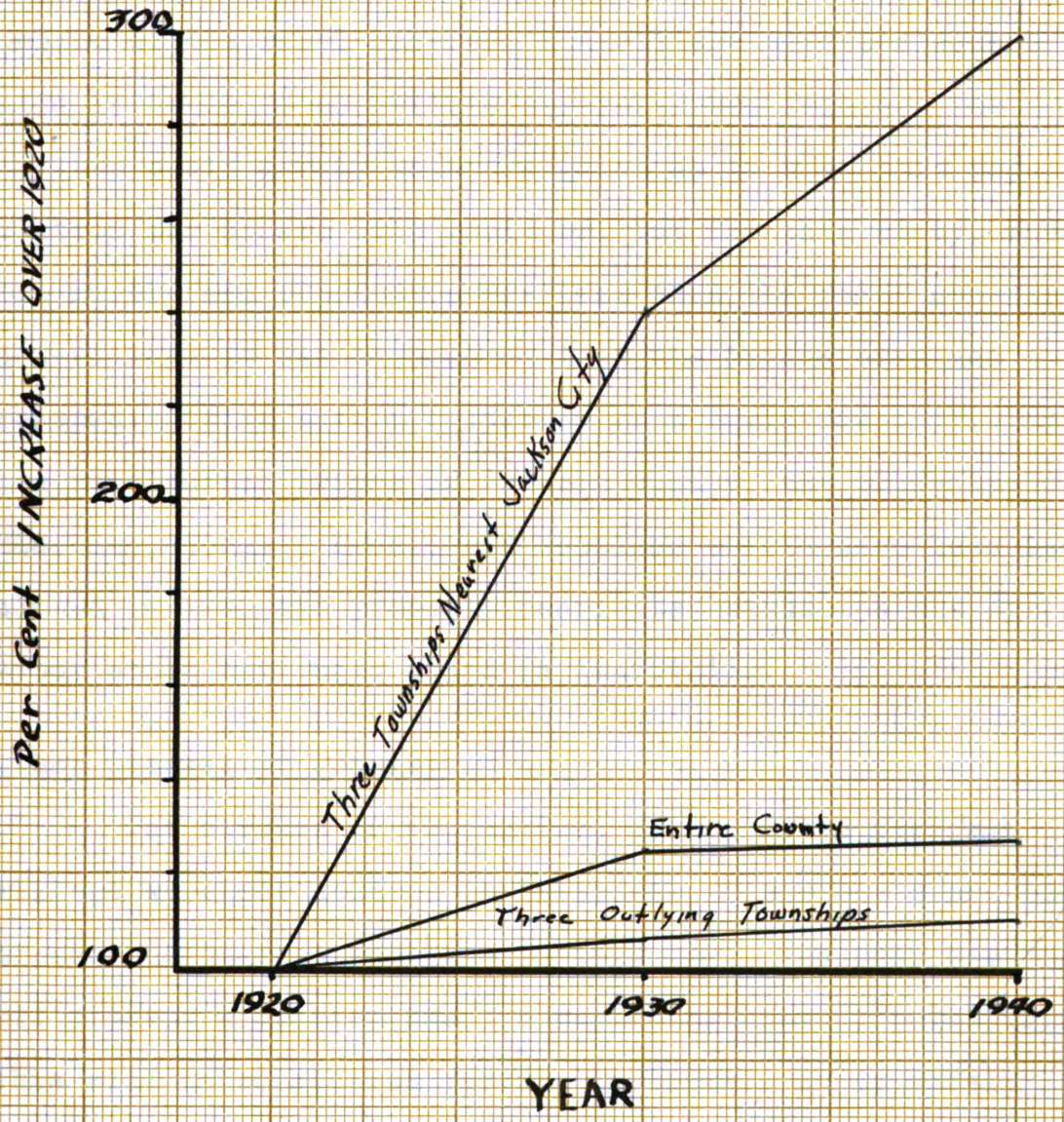
The figures for Springport township in Fig. (7) were incorrect because of a school reorganization program, so they should be disregarded in this study. It is seen in Fig. (7) that the fringe area has expanded more towards the north east of the county than any other section.

The question might be asked; when did the fringe area start to develop? Fig. (8) answers this question by showing the total population growth for three townships nearest Jackson, the total county, and three townships on the border of the county. The greatest per cent increase in population, which is of the class, rural non-farm non-village population, was between the years 1920 to 1930 for the three townships nearest Jackson. The total county population and that for the three outlying townships does not show the sharp rise of the townships near the city. Fig. (8) also shows that the problem of the rural-urban fringe is about twenty years old at the time of this study. It might be suggested at this point that for studies of rural-urban fringes, it would be desirable if rural non-farm population now used by the U.S. Bureau of the Census be broken down into village population and rural non-farm non-village population when future censuses are taken.

Fig. (9) shows the city-rural fringe of Jackson that for all practical purposes might be considered merely an ex-

FIGURE 8

PER CENT INCREASE OF RURAL NON-FARM, NON-VILLAGE POPULATION SINCE 1920



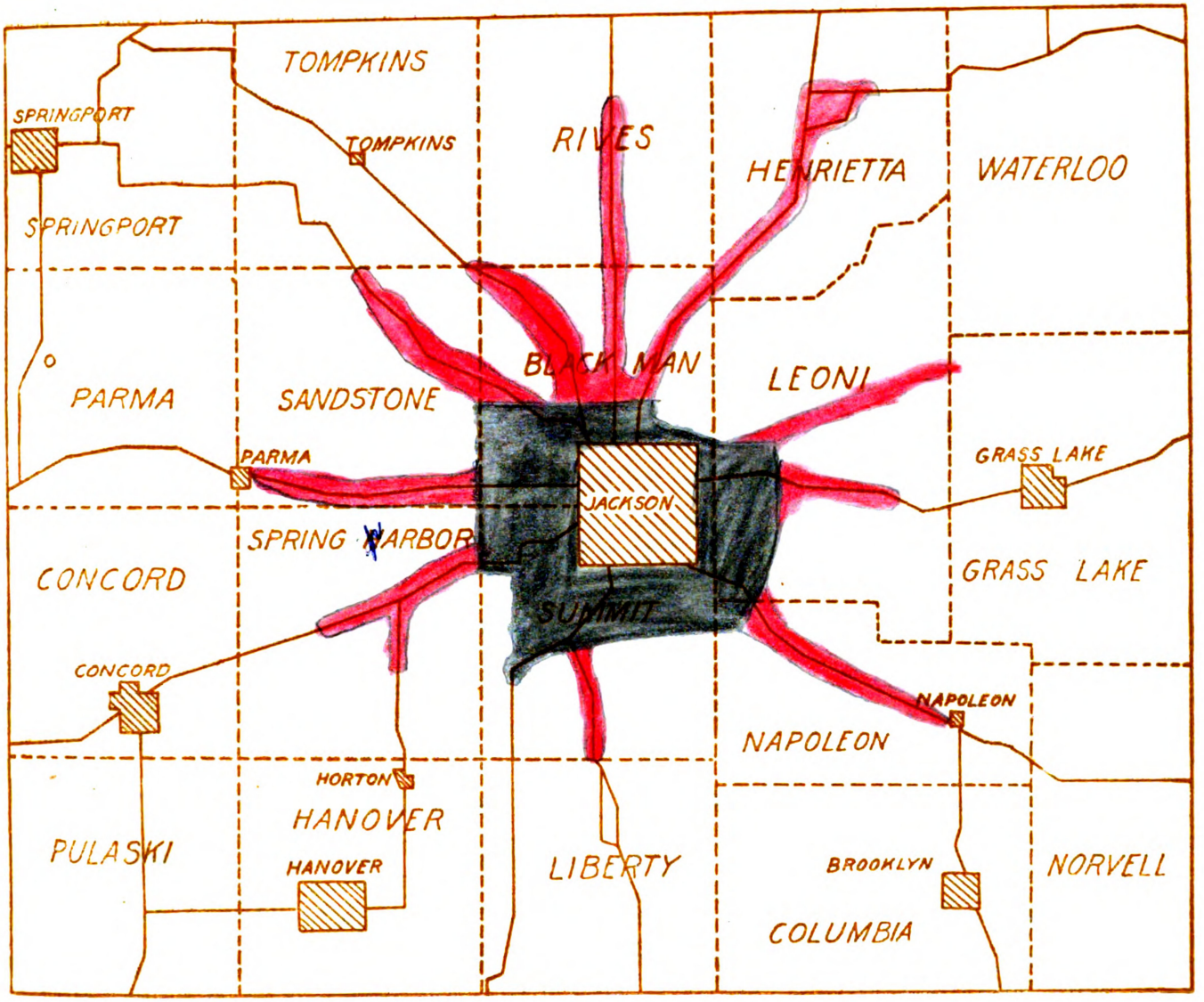
tension of the city beyond the city limits. The boundary drawn was purely an arbitrary affair since population declines in more or less of a linear curve. To delineate a fringe area, one has to answer the question of how many people of the rural non-farm non-village type per square mile it takes to constitute a rural-urban fringe. The writer could merely hazard a guess as to what this population per square mile would be, but for this study, when the rural-farm population was less than the rural non-farm non-village it was considered that the fringe area was reached. Using such a criterion as a basis for outlining the rural-urban fringe of Jackson county, the townships of Blackman, Summit, Leoni, and Napoleon should have been included in 1940 and probably Henrietta, Sandstone and Spring Arbor could have been added in 1947.(31).

Other Classes of Population

The classes of population, urban, urban farm and village were not studied in detail in this study since they presented no great problems in land use. The only one that did present a problem was the declining urban population. This will be considered farther on in this study under, "Problems In Land Use."

FIGURE 9

THE CITY FRINGE AREA OF JACKSON CITY, MICHIGAN



JACKSON COUNTY

RED--HIGHWAY STRIP DEVELOPMENT

BLACK--URBAN DEVELOPMENT

II. SOCIAL ECONOMIC USE AREAS

The county was divided into five areas, based on the distribution of the population and the use of land. Fig. (10) shows the five areas as: urban; rural-urban fringe; general agricultural; general agricultural government land and recreation; and general agriculture and recreation.

Urban Area

The urban area consists of all land devoted to intense industrial, commercial or residential use. It covers only one area in the county, the city of Jackson.

Rural-Urban Fringe Area

This area includes all land devoted to rural nonfarm residence use, mixed commercial and industrial use, part time farms, large commercial farms, and other uses. Population density and not use determines the boundary of this area. About 2,000 people per square mile is the boundary between the urban and the rural-urban fringe areas, and about 175 people per square mile is the population used to determine the boundary between the rural-urban fringe area and the agricultural areas (27, 28, 29, 31).

General Farming Area

The general farming area represents all the parts of

the county devoted solely to agriculture or to servicing the agricultural population. This includes the small villages of the area. Other uses of the land are represented but are of minor importance.

General Farming, Government Land and Recreation Area

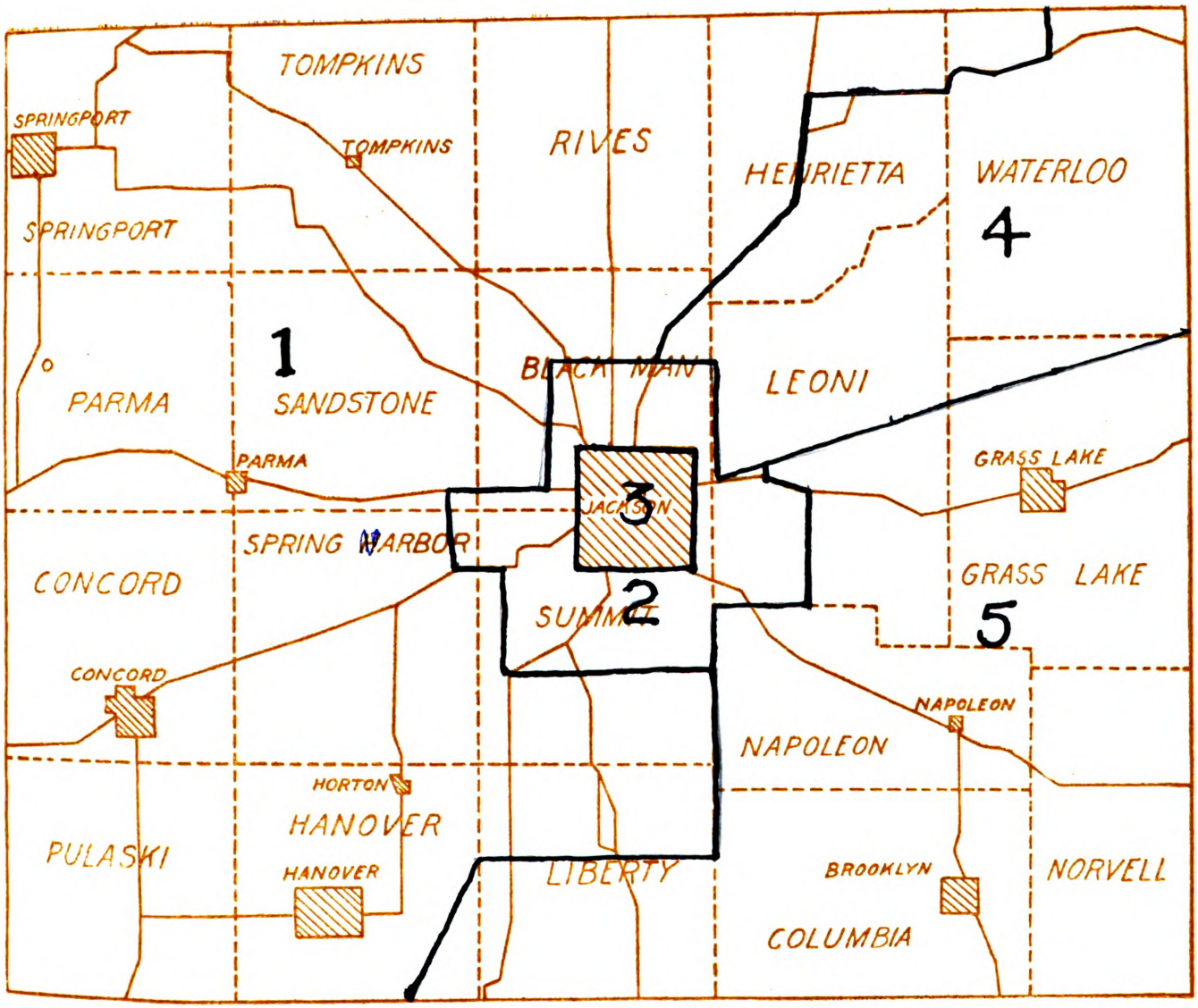
This area represents land uses for private recreation, public and general agriculture uses. This area occurs in the north east quarter of the county and has several land types represented. On the more fertile land types, the main use is for agriculture both private and for the prison farms. The government recreation area, part of the Waterloo recreation area occurs in Waterloo, Grass Lake and Leoni townships, on Munith and Waterloo land types. Private recreation is found on the borders of the sandy shored lakes where cottages may be built. Pleasant Lake, Big and Little Portage lakes, Batteese Lake and Clear Lake are examples of such lakes (9).

General Farming and Recreation Area

This area covers most of the south east quarter of the county. The difference between this area and the general farming area of the western half of the county is the presence of numerous lakes that provides a place for recreational land. Clark's Lake, Vandercook's Lake, Vineyard Lake, Round

FIGURE 10

SOCIAL-ECONOMIC USE AREAS



JACKSON COUNTY

1. GENERAL FARMING AREA
2. RURAL-URBAN FRINGE AREA
3. URBAN AREA
4. MIXED GENERAL FARMING, GOVERNMENT, AND RECREATION AREA
5. MIXED GENERAL FARMING AND RECREATION AREA

Lake and Hampler's Lake, provides the best recreational opportunities in the county. Hundreds of people have summer homes in the area, which provides a ready market for the products produced by the farmes. Farming covers all the land except that adjacent to the sandy shored lakes (9).

III. LAND VALUES

In 1946, according to the figures of the Michigan State Tax Commission, (18) the real equalized land values in Jackson county varied from a high in Blackman township of $145,498.05 per square mile or $226.70 per acre, to a low in Waterloo township of $19,337.97 per square mile or $30.97 per acre. These values were for all real property in the townships.

The U.S. Bureau of the Census (27) gave the value of real farm property in Summit, the highest value township, as $58,384.80 per square mile or $91.07 per acre, to Waterloo township, the lowest value township, with a value of $23,776.00 per square mile or $37.15 per acre.

It is of interest to note that real land values were higher for non-farm land near Jackson than for farmland, and that they decreased with the distance from the city. There is a high positive correlation between the distance from Jackson and total equalized real property value. The

correlation is+.68 which is highly significant.

Farm land values differ from total real property values, in that they apparently are based on two factors; the amount of class I land available for agricultural use and the distance from Jackson. Figures (11) and (12) show the total equalized real property valuation per square mile for all land, and the total property value per square mile for farmland respectively. The valuations represented in the figures do not represent the selling value of land, but rather the values two different government agencies placed on the land.

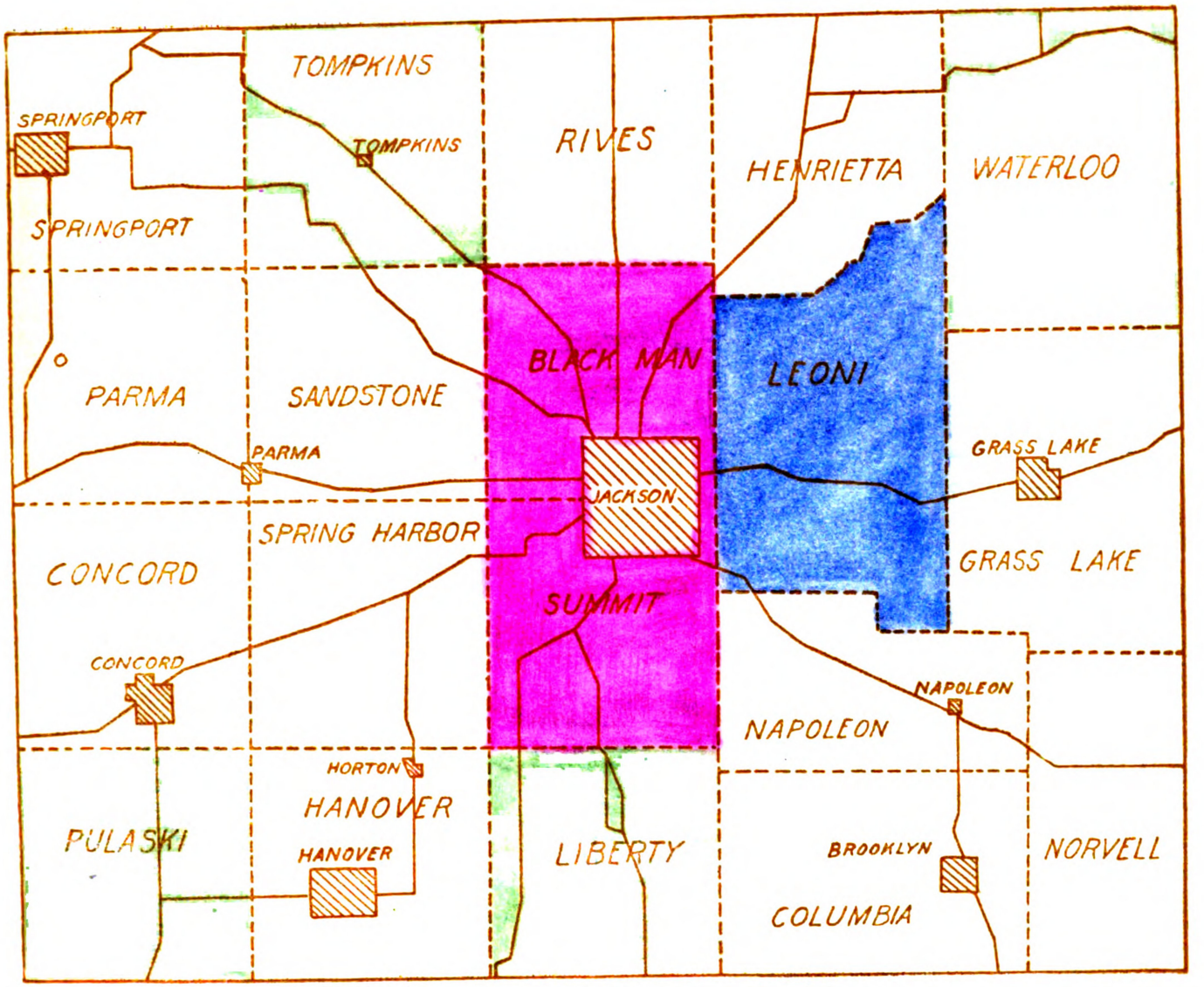
Values for farmland have reached a point in certain of the townships of the county, where they have forced large farms to be broken into smaller holdings, as in Sandstone and Napoleon townships; or into combinations of small farms and large commercial farms as in Summit and Leoni townships.

Property taxes paid in the county, based on the fifteen mill limitation, vary from a high on farmland of $1.06 per acre per year to a low in Waterloo township of $.55 an acre per year. This represents a capitalized value at 5 per cent of $21.20 per acre in Summit township to $11.00 per acre in Waterloo township. In other words it requires twice as much return on investment to pay the taxes in Summit township as in Waterloo township on the same kind of land (18).

FIGURE 11

TOTAL PROPERTY VALUATION PER SQUARE MILE

IN 1945



JACKSON COUNTY

PINK--OVER 200,000 DOLLARS VALUATION PER SQUARE MILE

BLUE--100,000 TO 200,000 DOLLARS VALUATION

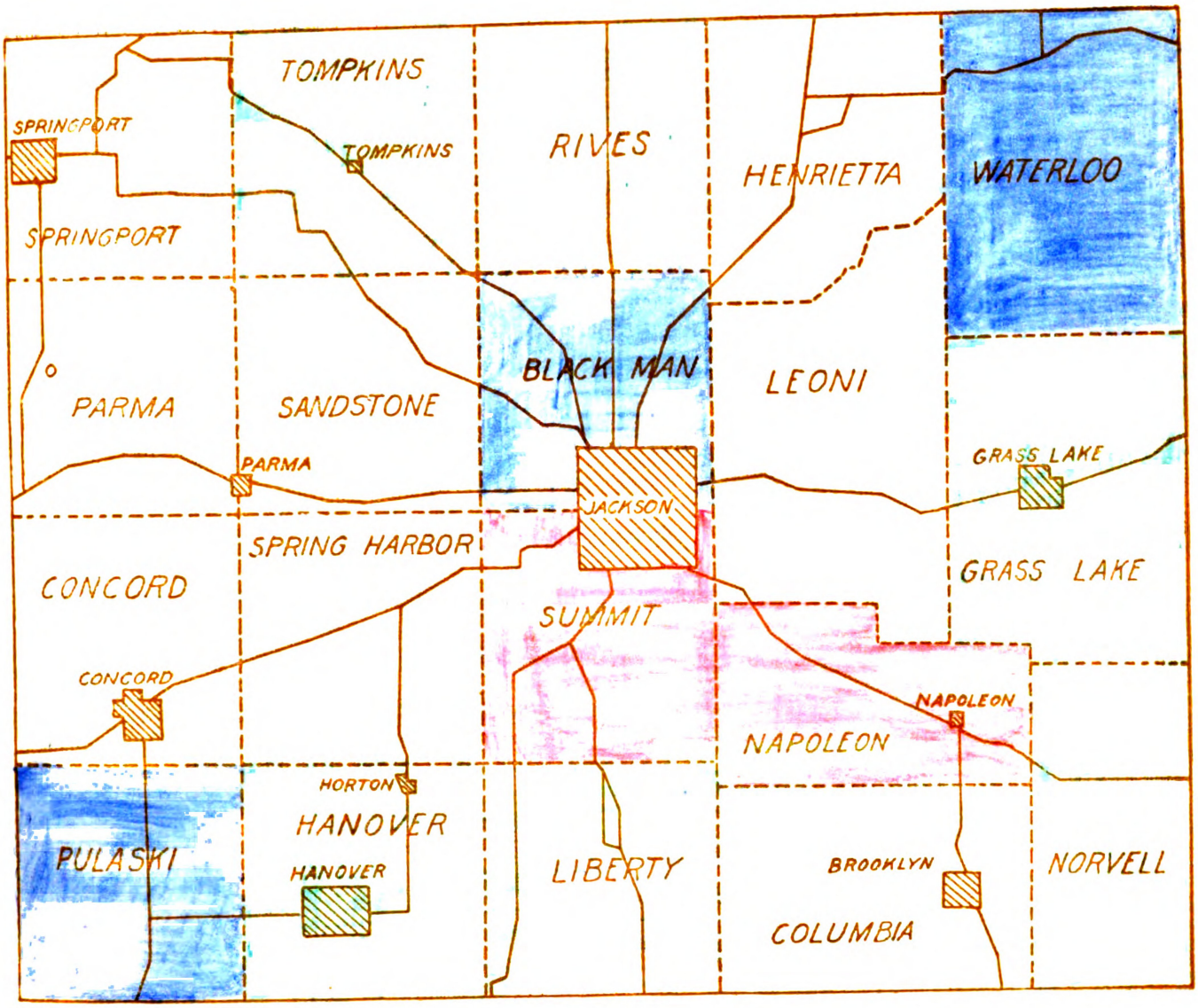
WHITE--40,000 TO 100,000 DOLLARS VALUATION

GREEN--LESS THAN 40,000 DOLLARS VALUATION

FIGURE 12

TOTAL FARMLAND VALUE PER SQUARE MILE

IN 1945



JACKSON COUNTY

RED--OVER 45,000 DOLLARS VALUATION PER SQUARE MILE

WHITE--FROM 35,000 TO 44,000 DOLLARS PER SQUARE MILE

GREEN--FROM 30,000 TO 34,000 DOLLARS PER SQUARE MILE

BLUE--BELOW 30,000 DOLLARS VALUATION PER SQUARE MILE

CHAPTER IV

LAND USE IN JACKSON COUNTY

I. AGRICULTURAL LAND USE

Summary of General Features Of Agricultural Land Use

In 1944 the county had four hundred and fifty one thousand, two hundred acres of total land area. Of this, 81.7 per cent was in farms and 36.1 per cent was in harvested cropland. Of the land in crops, corn took up 28.5 per cent; Alfalfa, 18.8 per cent; oats, 15.2 per cent; wheat, 11.9 per cent; and clover, 11.6 per cent. Of the total farmland in the county; woodland, both pastured and unpastured, made up 10.7 per cent. There was 9 per cent of the farm land idle; the remainder was in harvested cropland, pasture land, fallow cropland, crop failure land, roughland, swampy and wasteland, roads, fences, ditches, feedlots and homesteads (27).

The figures above are for the county as a whole and show nothing of the internal structure of agricultural land use within the county. In order to do this, it was necessary to make a census study of the townships. It would have been more desirable to make the study on the basis of the natural land types, but since it would have been necessary to make a new census of agriculture by natural land types, it was not attempted.

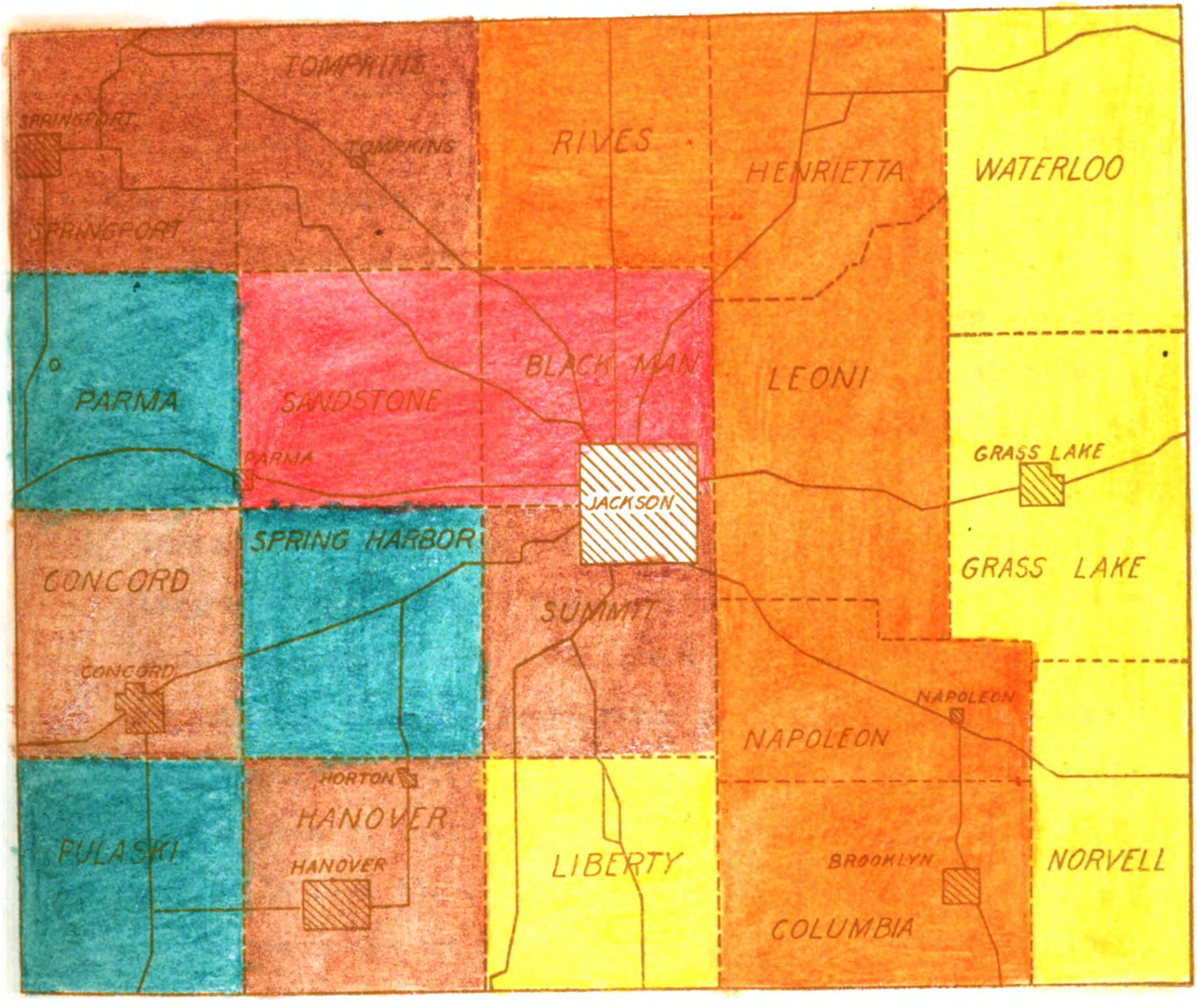
Size of Farm

The average size of farm in the county in 1944 was 134.6 acres, a rise of 22.6 acres per farm since 1939, 26.6 acres since 1934, and 10.1 acres since 1930. Figure (15) shows the distribution by township of the size of farm in 1944 (27).

Thaden (24) has stated that the size of farm is a function of distance from a metropolitan center. The writer, in an attempt to find if this were true for the county, ranked the townships according to their average distances from Jackson and correlated these distances with the size of farm. The results were not significant. It is not known whether or not a large enough sample of the Jackson community was included in the study to compare directly these figures with those of Thaden. In a general way although no linear pattern existed, farms do appear to grow larger as distance increases from the city. In this connection, it is noted that the trend in rural-urban development influences the average size of farm. There appears to be stages in the change in size of farm near a city. First there is a change toward smaller land units as the rural-urban growth starts; this trend continues until the size of land unit became smaller than three acres and is no longer considered a farm

FIGURE 13

AVERAGE SIZE OF FARM IN 1945



JACKSON COUNTY

RED--BELOW 100 ACRES

ORANGE--101 to 120 ACRES

GREEN--121 to 140 ACRES

BROWN--141 to 160 ACRES

YELLOW--OVER 160 ACRES

for census purposes. The retirement of land from agriculture raises the average size of the remaining farms. Apparently this trend runs in cycles, with the average size of farm changing between censuses to a greater degree than would seem logical. In Jackson county, Summit township was in a stage where the smaller land holdings had retired from agricultural use by 1944. Sandstone township, on the other hand, was in the first stage of rural-urban fringe development with many small land holdings, bringing the average size of farm down. On the basis of past census figures, it can be predicted that Henrietta and Leoni townships will go through the small farm stage, and will eventually have a larger average size of farm. This is important to know when planning agricultural extension work in any township. If it is known that the small farms will disappear and a non-farm population will replace the farmers, then a realistic program can be initiated that will plan for such a happening.

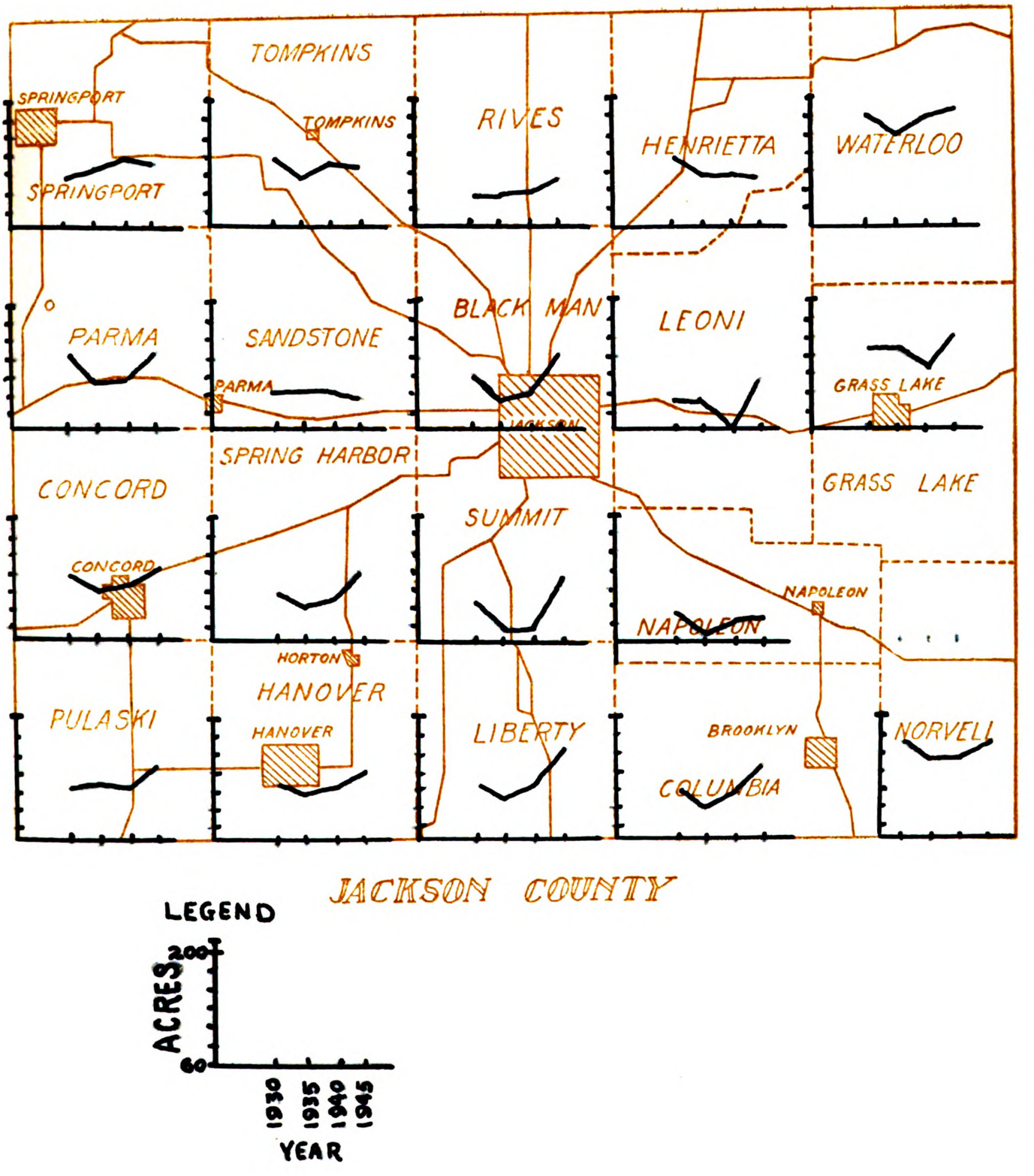
In 1944 the average size of farm varied from ninety-six acres in Sandstone township, to 184 in Waterloo township. Figure (14) shows the change in size of farm from 1930 to 1945. The trend towards larger farms is noted in all but several townships affected by "rurban" influences. (27).

Tenancy

Tenancy varied from 0 per cent in Blackman township,

FIGURE 14

CHANGE IN SIZE OF FARM FROM 1930 TO 1945



to 28.5 per cent in Grass Lake Township in 1944. Thaden (23), has shown that the per cent of farm tenancy increases directly with distance from a metropolitan community center. A rank coefficient of correlation was made by township between distance from Jackson and the per cent of tenancy; a coefficient of +.61 was found, indicating that the Jackson community is like the Lansing community in this respect.

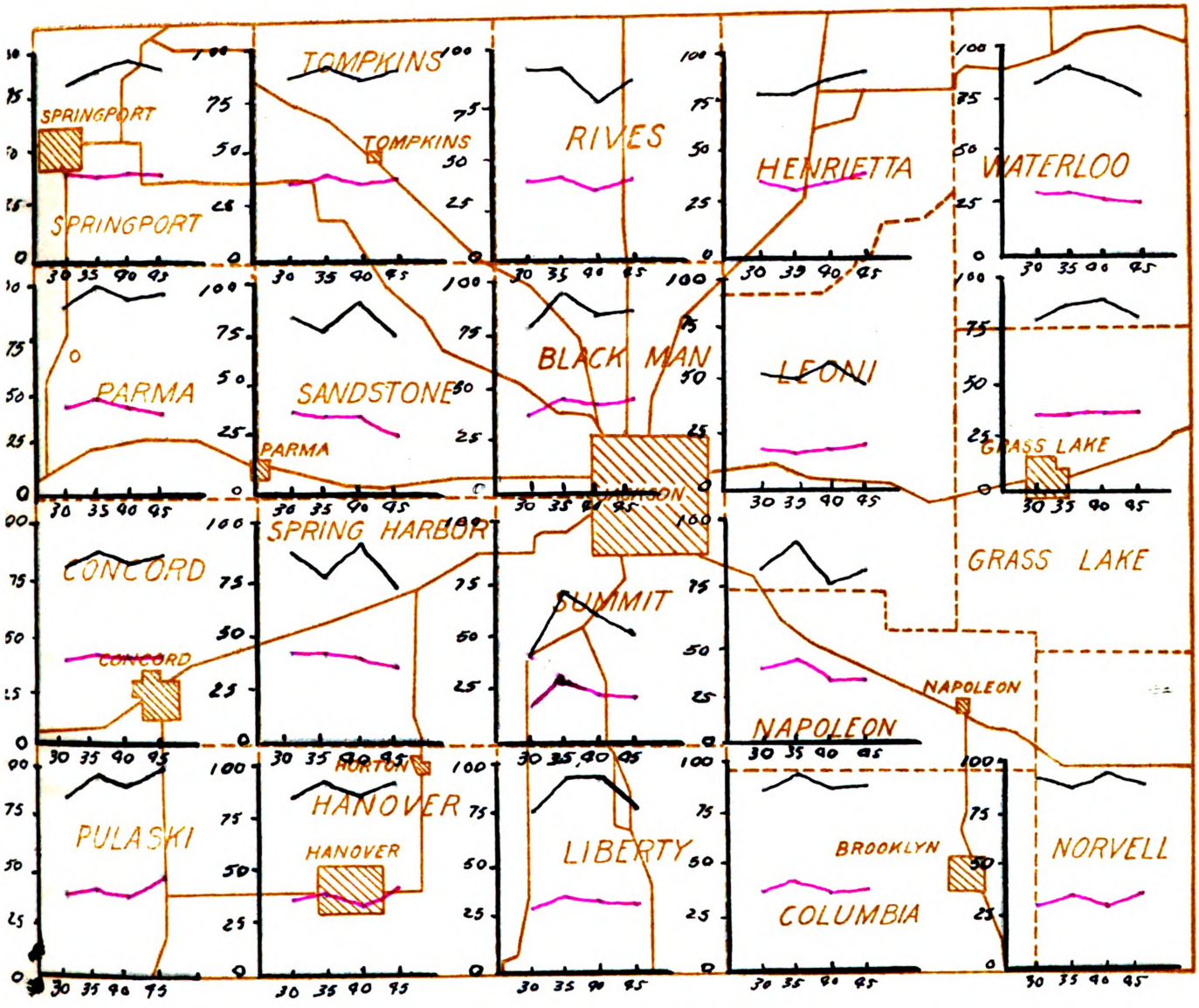
Cropping Program

As shown before, 81.7 per cent of the land of the county was in farms in 1944, and 36.1 per cent of the land was in harvested cropland. Fig. (15) shows the analysis by township of the per cent of land in farms and the per cent of cropland harvested. It would appear from this figure that the per cent of land in farms is a combined function of the natural land type and the distance from an urban center. For example, Grass Lake and Waterloo townships have a small per cent of land in farms because of the presence of a great amount of the Waterloo Land type. On the other hand Sandstone, Spring Arbor and Summit townships had a smaller amount of land in farms than the county average because of the "rurban" influence which removed land from agriculture. It appears that the per cent of land in farms is a better criterion than

FIGURE 15

TRENDS IN LAND UTILIZATION

1930 TO 1945



JACKSON COUNTY

PER CENT TOTAL LAND IN FARMS

PER CENT TOTAL LAND IN HARVESTED CROPS

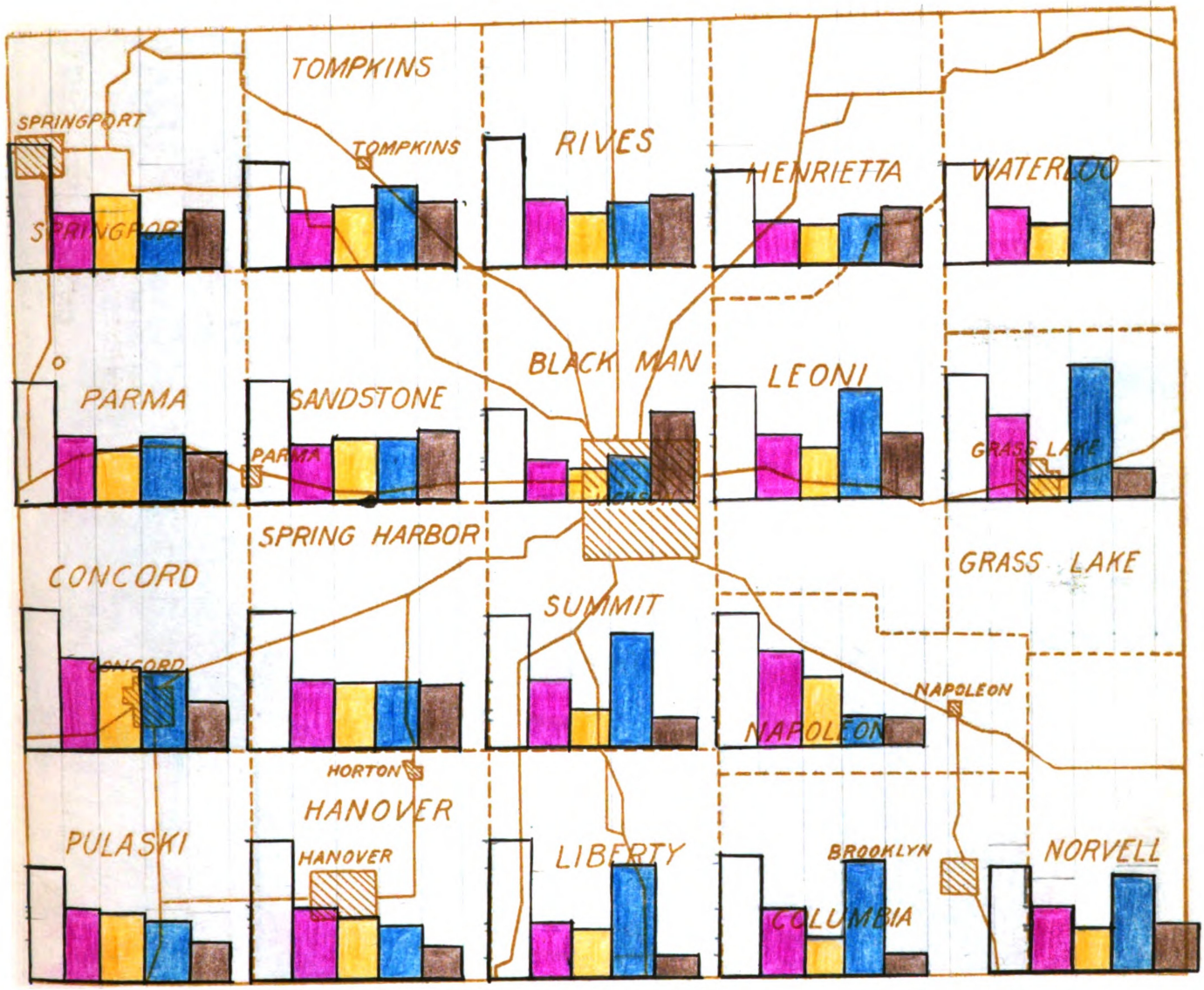
the size of farm for determining the stage of "rurban" development of a township, if the total amount of land originally available for agriculture is known.

A further examination of the cropland harvested shows considerable difference between townships in the crops grown. Fig. (16) shows the comparison by township of the five leading crops: corn, oats, wheat, alfalfa and clover. It is of interest to note that the county has no outstanding cash crop, the five crops mentioned making up, in most townships, over 90 per cent of the cropland harvested. Further analysis, Figs. (17)to (21) show that in general corn is grown more in the southwest half of the county, if the county were split by a diagonal from northwest to southeast. Oats generally occupy greater importance in the south half of the county. Wheat is grown more in the western two tiers of townships. Alfalfa largely occupies the southeast half of the county and appears to occupy more the Napoleon land type than any other land type. Clover on the other hand is of most importance in the north central section and north west quarter of the county (27, 28, 29).

The above analysis indicates the per cent of total land used by the various agricultural crop enterprises for 1944, but the question could be asked: did all farmers grow all crops? To answer this question, an analysis was made to

FIGURE 16

CROPPING PROGRAM FOR 1945



JACKSON COUNTY

PER CENT HARVESTED CROPLAND IN CORN

PER CENT HARVESTED CROPLAND IN OATS

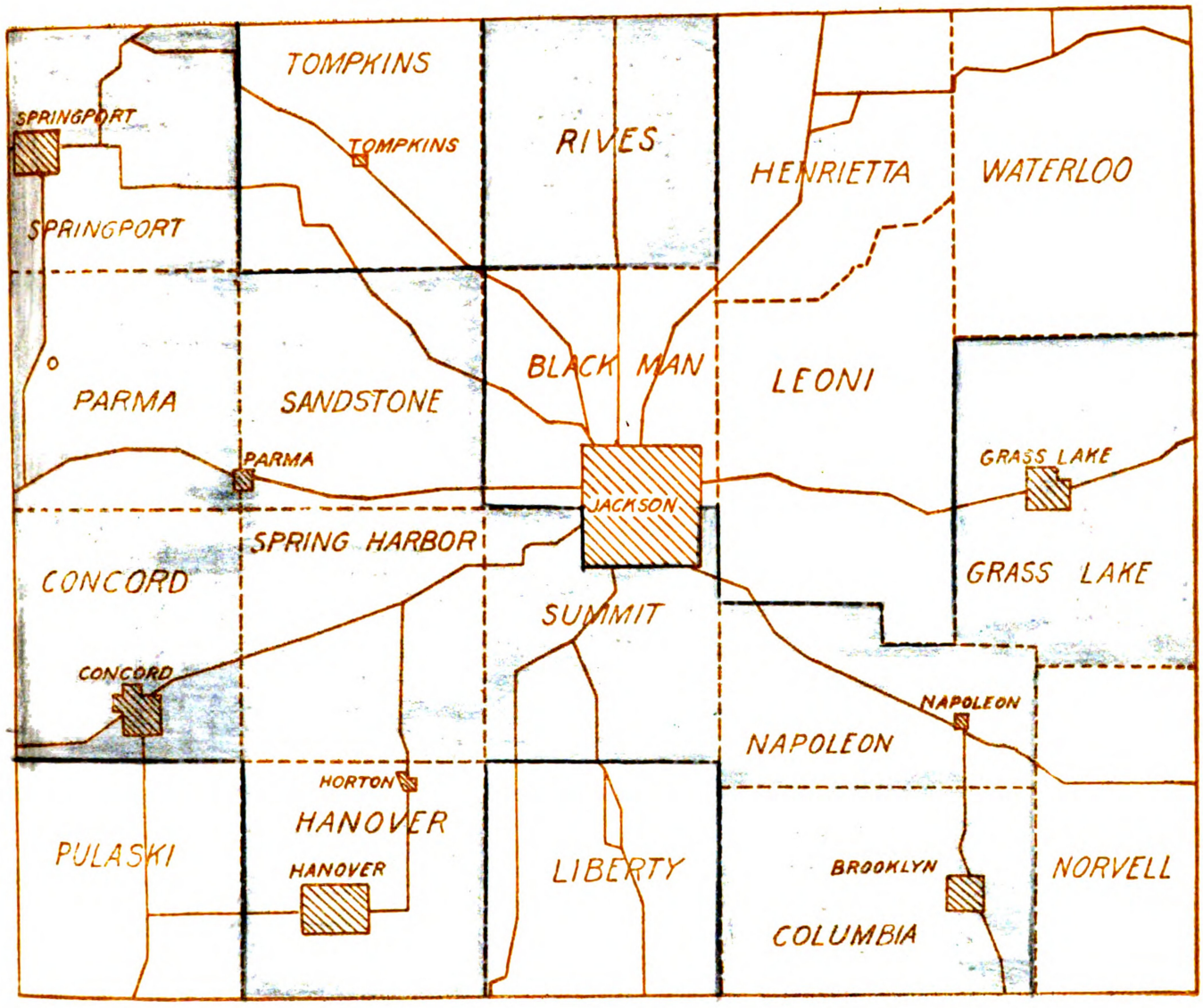
PER CENT HARVESTED CROPLAND IN WHEAT

PER CENT HARVESTED CROPLAND IN ALFALFA

PER CENT HARVESTED CROPLAND IN CLOVER

FIGURE 17

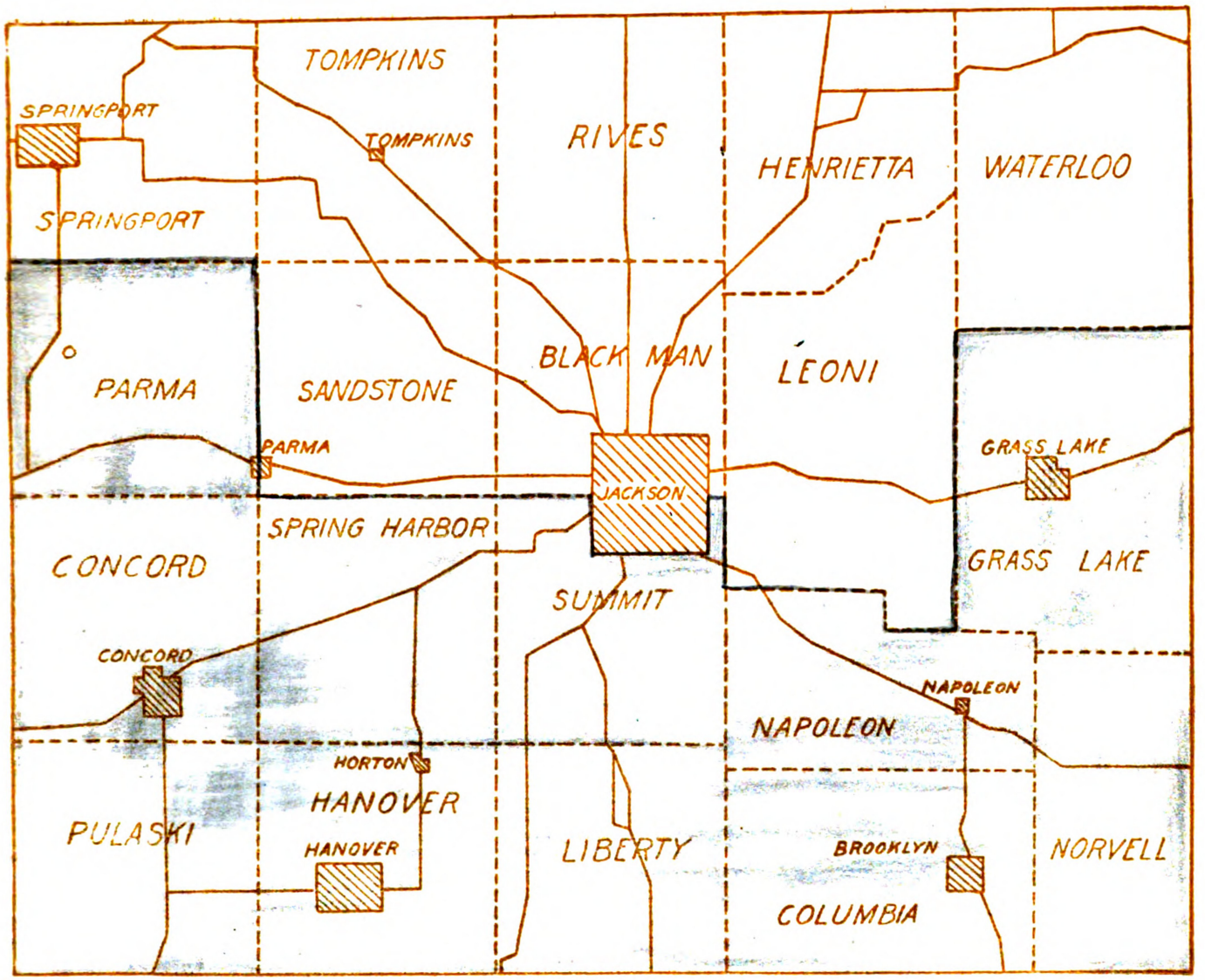
MAP SHOWING TOWNSHIPS HAVING HIGHER PER CENT
THAN COUNTY AVERAGE OF FARMS REPORTING ALL CORN IN 1945



JACKSON COUNTY

FIGURE 18

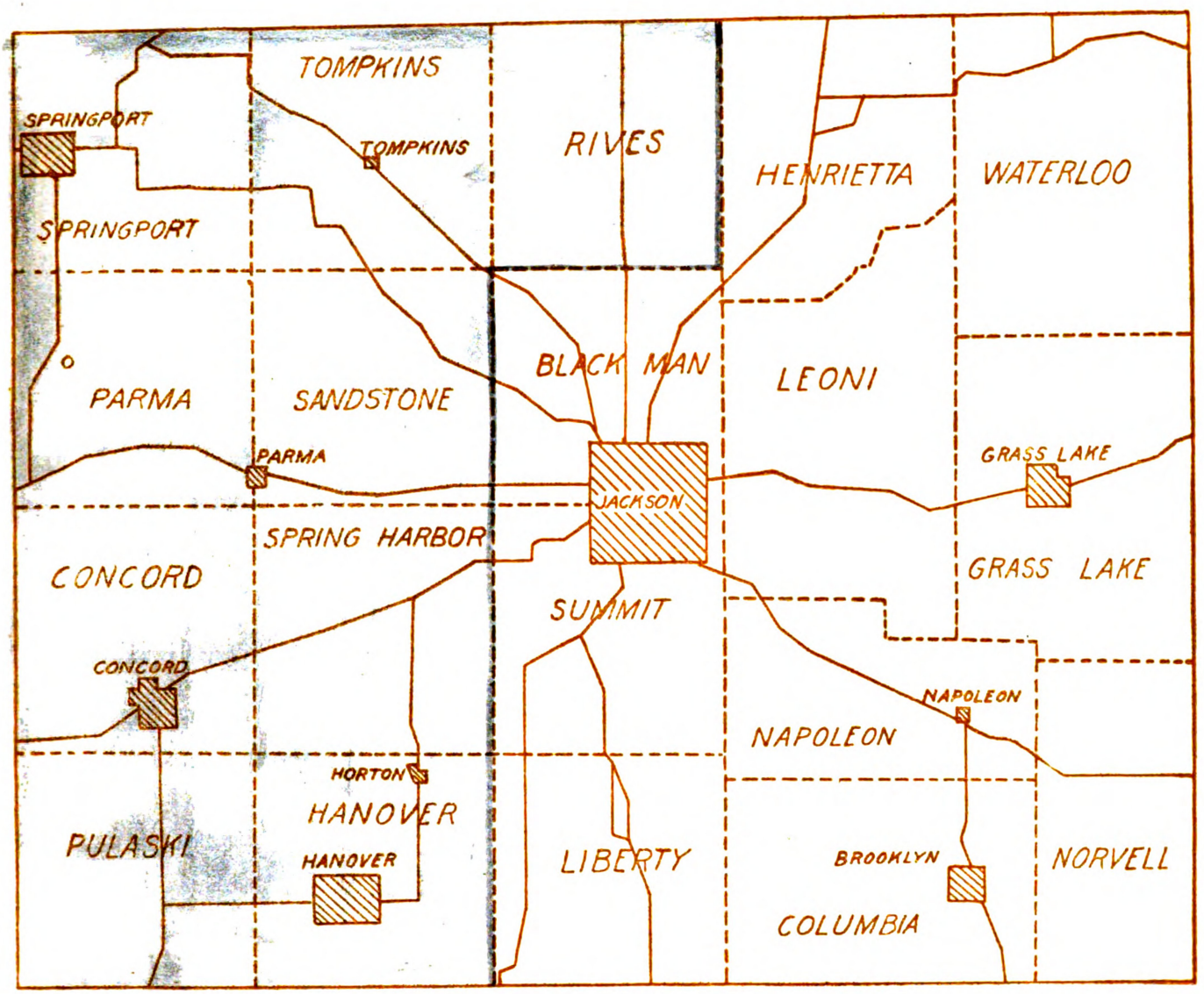
MAP SHOWING TOWNSHIPS HAVING HIGHER PER CENT
THAN COUNTY AVERAGE OF FARMS REPORTING ALL OATS IN 1945



JACKSON COUNTY

FIGURE 19

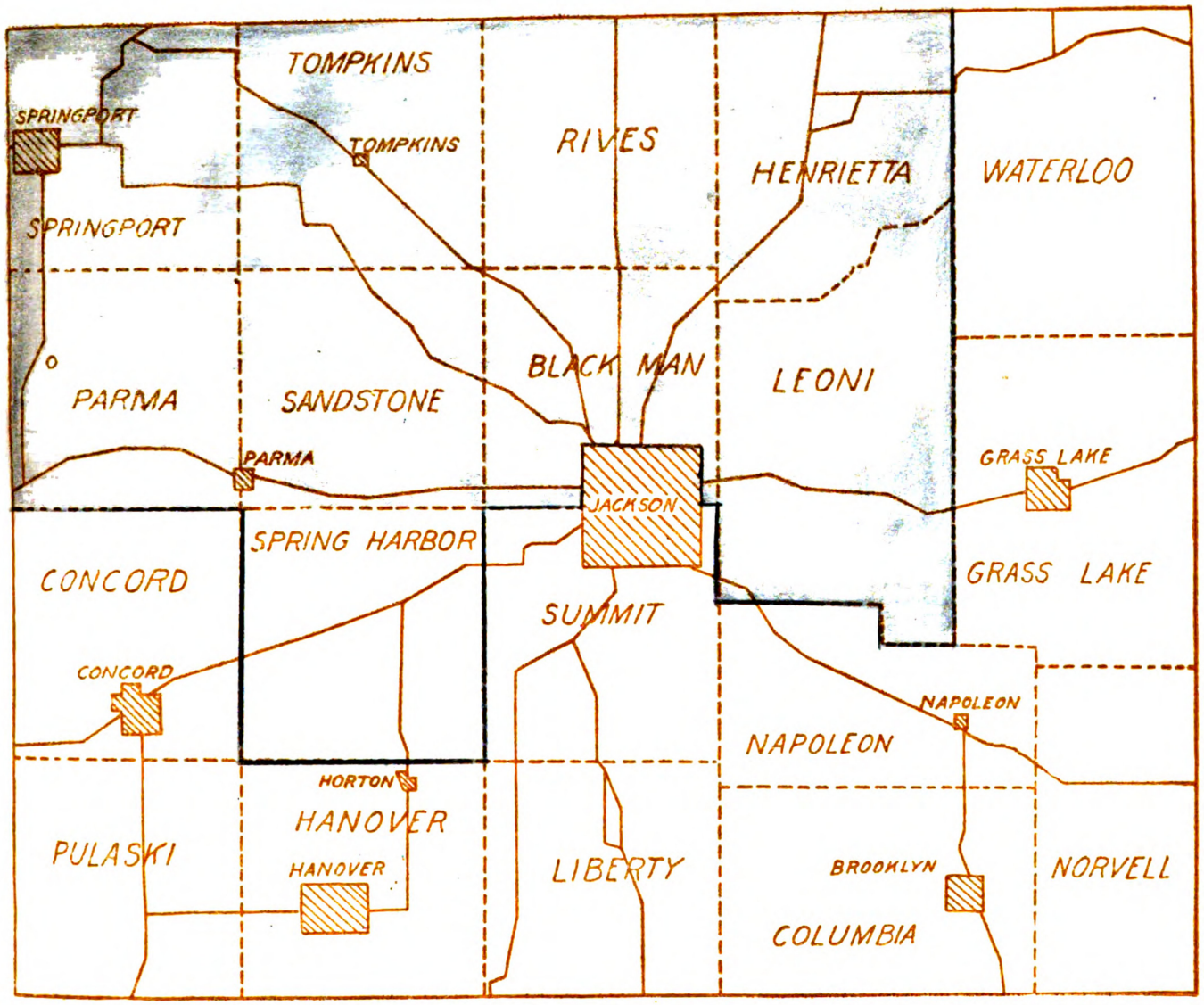
MAP SHOWING TOWNSHIPS HAVING HIGHER PER CENT
THAN COUNTY AVERAGE OF FARMS REPORTING WHEAT IN 1945



JACKSON COUNTY

FIGURE 20

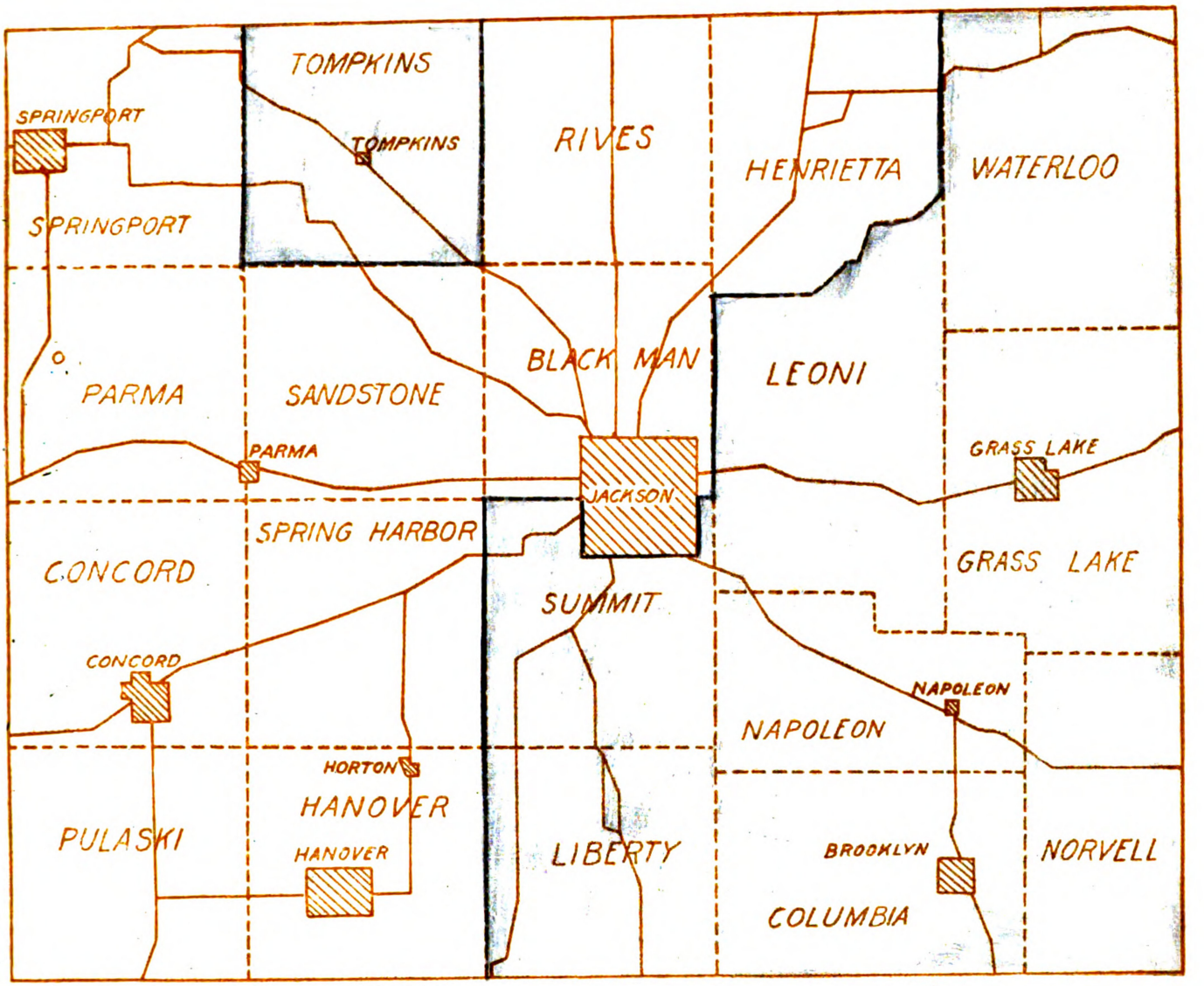
MAP SHOWING TOWNSHIPS HAVING HIGHER PER CENT
THAN COUNTY AVERAGE OF FARMS REPORTING ALFALFA IN 1945



JACKSON COUNTY

FIGURE 21

MAP SHOWING TOWNSHIPS HAVING HIGHER PER CENT
THAN COUNTY AVERAGE OF FARMS REPORTING CLOVER IN 1945



JACKSON COUNTY

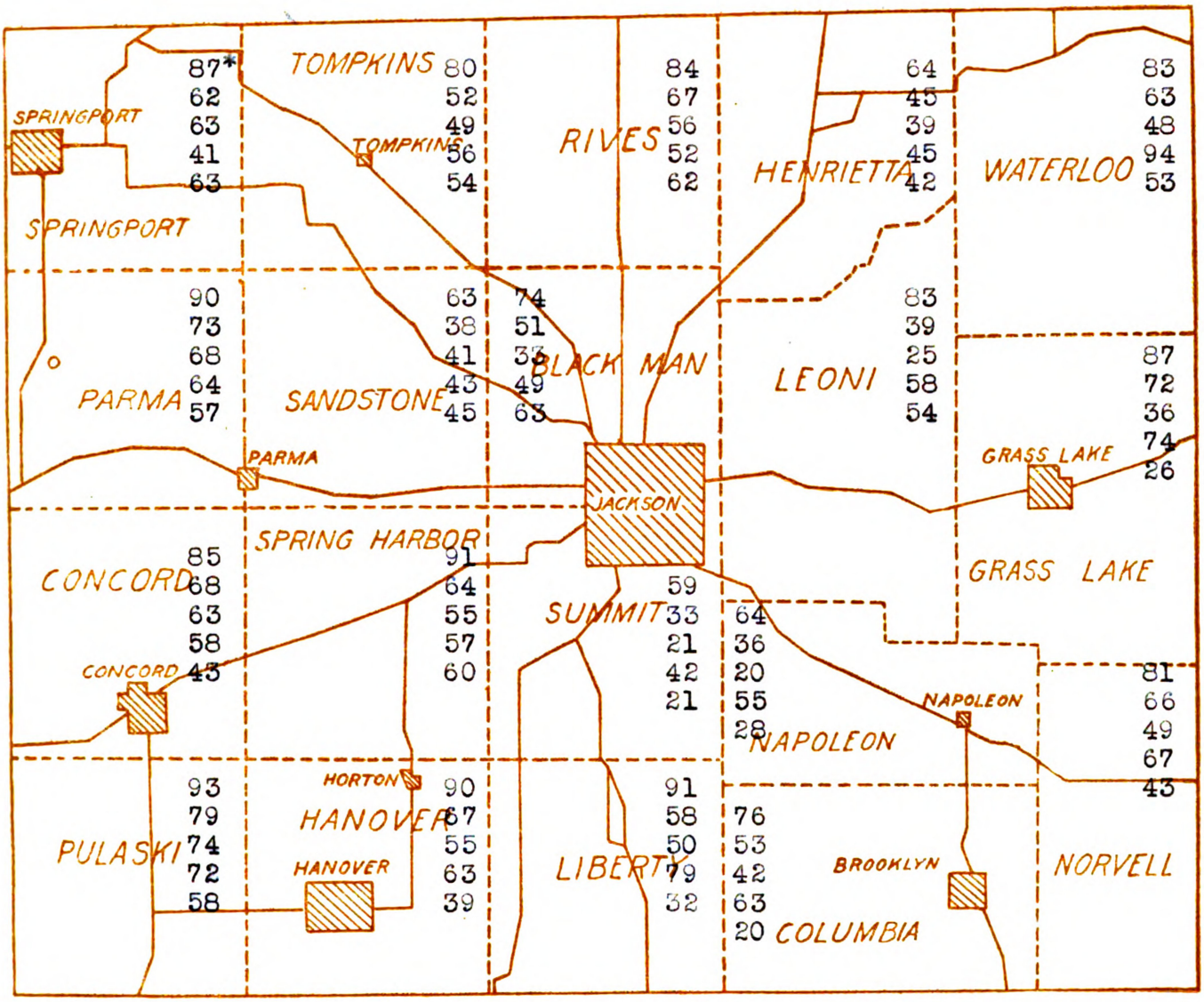
find the percentages of farmers reporting various crops to see if this would help in outlining agricultural land use areas. Fig. (22) shows the distribution of farms reporting various crops. For example, corn was reported by 92.9 per cent of the farmers of Pulaski township and only by 34.7 per cent of Summit township farmers. By following through these figures, definite use areas appear (27).

To understand further the cropping pattern of the county, the writer decided to correlate various items to determine the patterns of cropping by a statistical method. Fig. (23) shows the rank coefficient of correlation between several of the major crops. The correlations show that townships having a high per cent of farms reporting corn also tend to have a high per cent of farms reporting oats, wheat and alfalfa, but have no relation to the farms reporting clover. It is of interest to note the slight negative correlation between the per cent of farms reporting alfalfa and of those reporting clover.

On the basis of these correlations it would appear that rotations seem to be about the same throughout the county; corn, oats, wheat and alfalfa being the main rotation. The significant differences between townships lies in the per cent of farms reporting this type of rotation in each township.

FIGURE 22

PER CENT OF FARMS REPORTING CORN, OATS, WHEAT, ALFALFA AND CLOVER-TIMOTHY IN 1945.



JACKSON COUNTY

* Numbers read from top to bottom: per cent farms reporting corn, oats, wheat, alfalfa and clover-timothy respectively.

FIGURE 23

RANK COEFFICIENTS OF CORRELATION BETWEEN COMBINATIONS OF THE FIVE LEADING CROPS

Corn and oats	plus .81**
Corn and wheat	plus .72**
Corn and clover	plus .29 n.s.
Corn and alfalfa	plus .59 *
Oats and wheat	plus .79**
Oats and clover	plus .25 n.s.
Oats and alfalfa	plus .57*
Wheat and clover	plus .52 n.s.
Wheat and alfalfa	plus .39 n.s.
Clover and alfalfa	minus .12 n.s.

** - Highly significant correlation

* - Significant correlation

n.s.- Non-significant correlation

In one case, as in Pulaski township, there is a high percentage of farms reporting this rotation, whereas in Summit township a little over half as many report the rotation, indicating a different type of farm organization in Summit township. The correlations between grain crops and clover are non-significant which allowed a rotation of corn, oats, wheat and clover, but indicates that there is no definite pattern to this relationship, clover apparently being grown independently of other crops or in combination with crops other than corn, oats, wheat, or alfalfa.

Other crops reported by over 20 per cent of the farms of at least one township are field beans, red clover seed, potatoes and fruit. The acreages of these crops are not important in more than one or two cases.

The Livestock Program

To differentiate types of farming areas, it was necessary to make a fairly complete analysis of the livestock program, since livestock of some kind was found on practically every farm in the county. Cattle is the most important form of livestock with 81.1 per cent of all farms in the county reporting this form. Of all cattle, dairy cattle are of much greater importance than beef as dairy cattle are reported by 77.5 per cent of all farms. No

figures were given in the 1945 census of agriculture for beef cattle but by elimination it was seen that beef cattle assume no great importance in the total cattle program. The animal next in importance to cattle is poultry, being reported on 76.6 per cent of the farms. Horses and colts are next with 58.4 per cent; hogs follow with 47.5 per cent and sheep are last with only 20.4 per cent of all farms reporting this form of livestock (27).

It was found that the sheep area of the county confines itself to the southern tier of townships and the townships of Henrietta and Waterloo in the northeast part of the county. Hogs roughly follow the section of the county in which corn is grown, namely, the southwest half below a diagonal between the northwest corner of the southeast corner of the county. Cattle follow the grains and hays; Grass Lake township in the east is the best dairy cattle township, followed closely by Rives in the north and Columbia and Liberty in the south. Closely following these townships are the entire two west tiers of townships in the wheat and corn region. Poultry tends to follow the corn and small grain regions and the smaller farms. Thus it is found that the western half of the county plus the townships of Henrietta and Leoni report the bulk of the chickens.

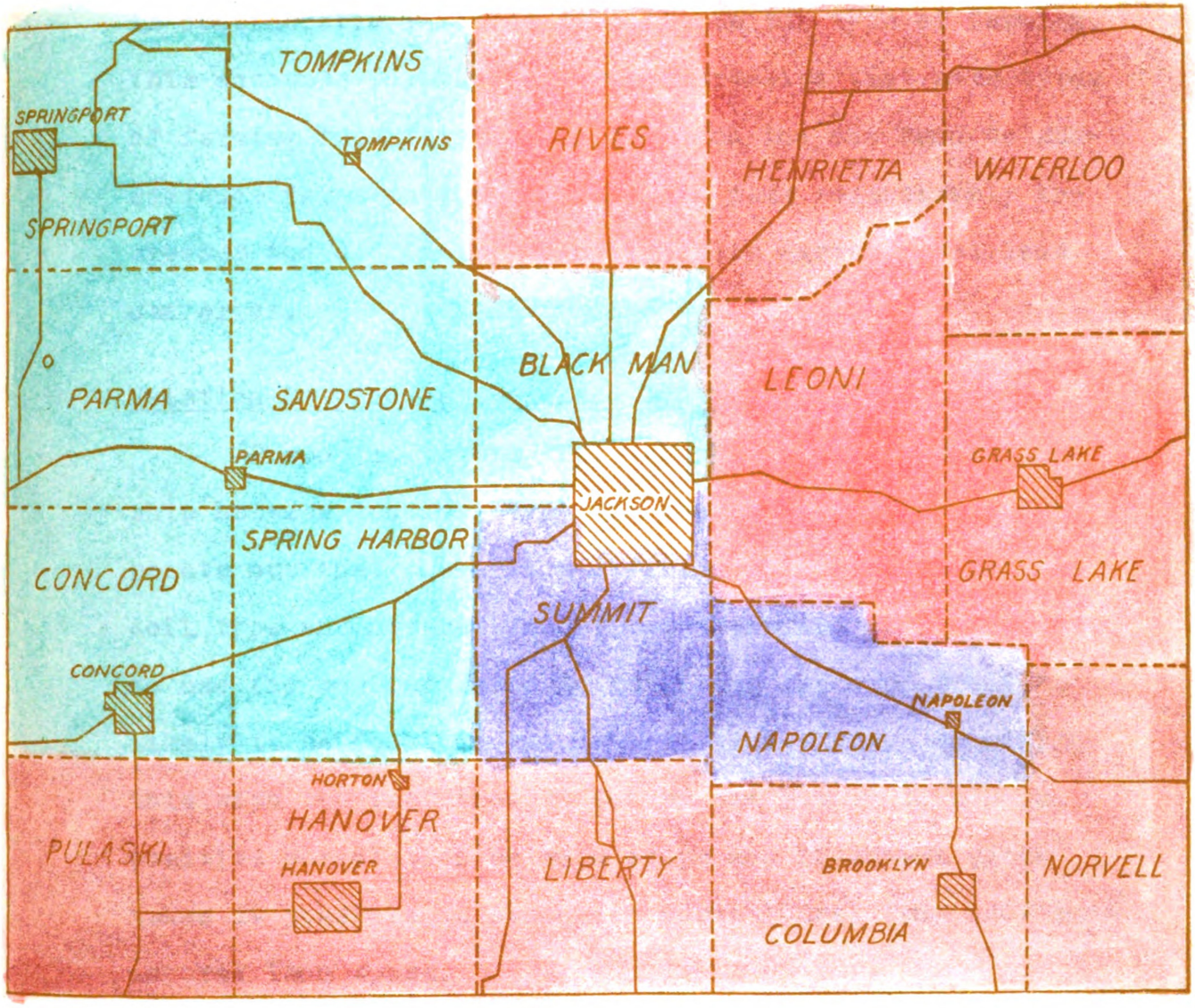
Agricultural Use Areas

Using the crops, livestock and other data collected, the author attempted to group townships into homogeneous agricultural use areas. No attempt was made to correlate agricultural land use with land type at this stage of the study. Fig. (24) is the result of such a breakdown and shows the rather arbitrary use areas, each of which shows definite tendencies toward a certain type of farming. To justify such a grouping, townships were ranked according to per cent of farms reporting corn, oats, wheat and alfalfa; an average was taken of these ranks and correlated with the average ranks of townships reporting all livestock, cattle, hogs, sheep and poultry. A high positive correlation of .81 was found. In simpler terms this means that townships having a high per cent of farms reporting the crops, corn, oats, wheat, and alfalfa also have a high percentage of farms reporting the various livestock. This merely bears out in a statistical way the common observation that the type of livestock is determined by the type of crop.

Commercial crop farms were found following two patterns in the county; small truck farms were found near the city while the large commercial truck farms were found on the drained organic soils.

FIGURE 24

TYPES OF FARMING BY TOWNSHIP IN JACKSON COUNTY



JACKSON COUNTY

GREEN--DAIRY, POULTRY AND HOGS

BROWN--DAIRY, POULTRY, HOGS AND SHEEP

RED--DAIRY AND POULTRY

BLUE--PART TIME FARMING

One of the important factors in this study is that, like all parts of the Gray Brown Forest soils region, there is considerable latitude possible in the type of farming. This accounts for the writers observation that note types of farming from fox and fur farms on the one hand to subsistence farms on the other. This fact considerably increases the difficulty of delineating agricultural land use areas.

Relation Between Natural Land Type and Type of Farming

Pasco (19) shows that there is a direct relationship between the soil type and the crops grown. Veatch (33) points out that there is a definite relationship between soil type and natural land type, therefore it is possible to use the work of Pasco to point out the crop programs likely to be found on the natural land types. Combining this with the fact brought out by the author of a high positive correlation between crops and livestock grown makes it possible to associate agricultural land uses with natural land types.

Munith Type

Munith type is made up of over 80 per cent organic soils (34). Using Pasco's data, predictions were made as to the use of land in this land type. Pasco found the

organic soils, Rifle peat and Carlisle muck high in brush, pasture and hay, with a small per cent of the type in cultivated crops. Looking at the natural land division map, Fig. (3) one sees that in the western half of the county the swampland occurs mainly in small bodies incorporated in other land types. In this area the Munith type is utilized differently than in the northeast quarter of the county where it occurs as huge swales and swamps. In the west part of the county Munith land type tends to augment a livestock program by offering a place to produce hay and pasture. In the northeast part of the county some of this land is utilized as rented pasture or is cut for wild hay, but it offers a more difficult problem in utilization because there is not enough of other land types present on which to grow grains and tame hay to support a heavy livestock population. The livestock grown consists of sheep and cattle. Hogs and poultry are not adapted to this land type, other than in a few small areas that have been drained and which support grain crops. This land is not adapted to dairy cattle other than for summer pasturage (19).

Parma Type

Parma type is made up almost exclusively of the more level portions of Hillsdale sandy loam, therefore any state-

ments made about this soil type are equally true for the land type. Pasco (19) found Hillsdale sandy loam to be associated with high acreages of clover, wheat, corn and oats. Orchard fruit was reported and alfalfa was important but assumed a lesser role than clover.

The crops grown indicate that this is a livestock land type and since the topography is relatively level the livestock is restricted to cattle, hogs and poultry with very few sheep.

Concord Type

The soil of Concord land type is made up of the more hilly phases of Hillsdale sandy loam with small inclusions of Bellefontaine sandy loam and Fox loam. The crop adaptations for this land type are the same as for the Parma type, the only difference being in amount of the crops grown. From observations made by the writer more of this land type is in timber and pasture than is true of the Parma type. The livestock grown, includes all the major types, with particular emphasis on sheep on the rougher hills.

Springport Type

The soil consists of Miami and Hillsdale loams, of both the undulating and hilly phases. In general the land is not hilly enough at any point to affect the type of farm-

ing. Pasco found the soil types included in this natural land type grow corn, oats, wheat, alfalfa, and clover. Lesser amounts of barley and beans are also grown. All the major livestock types except sheep are raised.

Waterloo Type

The soil consists of Bellefontaine sandy loam, with minor inclusions of Coloma sand and Fox types. According to the work of Pasco, Bellefontaine sandy loam most often supports crops of rye, alfalfa, oats, orchards. A very high per cent of idle land is reported.

The sandy nature of the soils in this natural land type, combined with the rough topography, makes it the poorest actual or potential natural land type for agriculture. The Munith could be drained and made into fair agricultural land, but not so with this land. The livestock program on this land type is of low intensity due to the poor inherent fertility of the soil. Dairy cattle and sheep are the two most important forms of livestock.

In general, this land does not support a very thrifty agriculture, the buildings are run down and unpainted. Many of the fields and farms of the area are idle.

Napoleon And Leoni Land Types

Fox loam and Fox sandy loam with minor inclusions of

of the Plainfield types, make up these natural land types. The major crops reported by Pasco are corn, oats, alfalfa and truck crops. The crops of lesser importance are wheat, clover and rye. Dairy cattle is the main form of livestock, with hogs, poultry and sheep of minor importance.

Review of Agricultural Land Use

A review was made to check the findings of Pasco in regard to crops grown on the various soil types as applied to the natural land types of the county, with the findings of the 1945 Census of Agriculture (27). Corn, according to Pasco (19), was found in greatest frequency on the soil types making up all the natural land types, except those of the Waterloo and Munith types. Census figures, when plotted on a map, indicate a similar pattern to that drawn from Pasco's data. Similarly, the patterns drawn from census data and from Pasco check closely for all other crops of the county. Corn is found to be grown most extensively in the south west portion of the county, diminishing in amount as one goes northeast; wheat production is confined to the west two tiers of townships, oats follow the pattern of corn, alfalfa is found in greatest acreage in the south east quarter of the county and on the clay land of Rives township in the north. Clover is found

mainly in the western half of the county. Idle land is found in greatest amount in Leoni, Waterloo and Liberty townships; and forest land is well distributed through out the county, with the highest intensity in the south east and north east portions.

Since it is possible to determine type of farming areas with fair accuracy from census data, it is felt that census data could play a more important part in planning if care is exercised in selecting the townships for study. If townships are selected on the basis of their natural land type and distance from town, data can be obtained for natural land types for the past as well as the present. Much time and effort in making field studies could be saved in this way.

II. RECREATIONAL LAND USE

There were in 1947, fourteen county parks, three city parks, one state park and one state recreational area in the county. Fig. (25) shows the locations of the parks, recreational area, and all lakes having seasonal dwellings in 1947 (9, 16, 17).

A part of the Waterloo recreation area, found in Grass Lake, Waterloo and Leoni townships, constitutes the largest body of recreational land. A state park is operated

in connection with the recreation area. At the time of the study, the area was in the process of development and much of the land had little or no improvements made upon it. Most of the land in the recreation area is of the Munith or Waterloo land types, making it of little recreational value for the most part except for some hunting, camping or hiking. At the edge of the lakes however, there are a few good sites for group recreation. Portage Lake, for example, offers camping, swimming and a picnic ground. Good fishing is to be had in many of the lakes of the area.

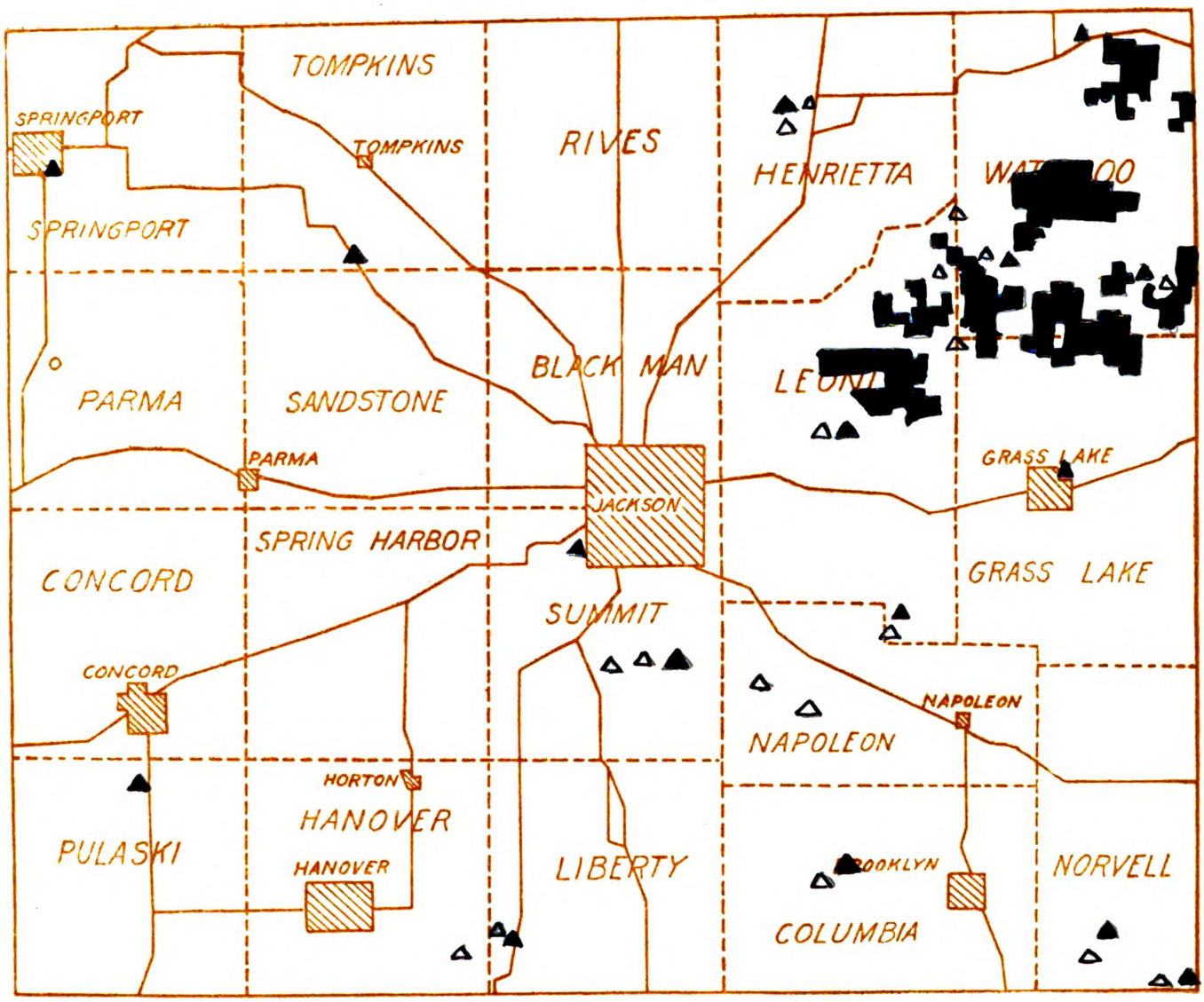
Hampler's Lake state park, 671 acres of woods and natural scenery, located between Hampler's Lake and Round Lake, offers the best beach and group facilities including a campground and trailer park, in the county (16).

County parks are operated at Clark's Lake, Clear Lake, Gillett's Lake, Grass Lake, Little Wolf Lake, Minard Hills, Round Lake, Sparks, Springport, Swains Lake, Vandercook Lake, and Vineyard Lake. Three city parks are operated; Sharp, Loomis and Northlawn. All the parks offer picnicking and playground facilities, and some of them, swimming and camping (19).

Some of the chief recreational assets of the county are the sandy-shored lakes scattered throughout the southern and eastern parts of the county. Wherever a sandy-shored

FIGURE 25

RECREATIONAL LAND USE



JACKSON COUNTY

GOVERNMENT RECREATION LAND

COUNTY OR STATE PARK

LAKE HAVING SEASONAL RESIDENCES

lake is found, cottages are also found. Most of the desirable cottage lakes had been developed or overdeveloped at the time of the study.

There are many lakes in the county with little recreational value. These lakes are surrounded with swampland and have beaches of organic soil, making them of no use for building or swimming purposes. They are of value for trapping, fishing and hunting, however. There are several of these lakes that could be changed into excellent swimming and cottage development lakes by the addition of small dams at the outlets of the lakes. As an example, Drill Lake could be improved by such a dam, resulting in a sandy-shored lake of high recreational value.

III. FORESTRY LAND USE

There are no accurate figures relating to the extensiveness of forest land in Jackson county, but probably such land did not exceed 10 per cent of the total land of the county. Fig. (26) shows the location of the woodlots in 1936, no more recent data being obtainable. It can be seen that most of the woodlands of the county are of the farm woodlot type, and they tend to follow the courses of hilltops, rivers and swamps. For this reason, the north eastern and the southern parts of the county have the most

woodlands (1). According to the census (27), a little over half of the farm woodlands are pastured. The remainder are in second growth unpastured timber found mainly along the rivers of the county. There is a considerable amount of marketable timber in the county particularly in the eastern half. Much of the timber is in danger of extinction because of pasturing and failure to have sufficient reproduction stock.

IV. GOVERNMENT LAND USE

There are two main areas of government land in the county, the portion of the Waterloo recreation area lying in the county and the Southern Michigan Prison farms. The Waterloo recreation land was discussed under recreational land use so need not be discussed here. The land belonging to the Southern Michigan Prison is for the most part devoted to agriculture. There are slightly over six thousand acres in the farms of the prison (14). All the government land is concentrated in the northeast part of the county.

WOODLOT MAP

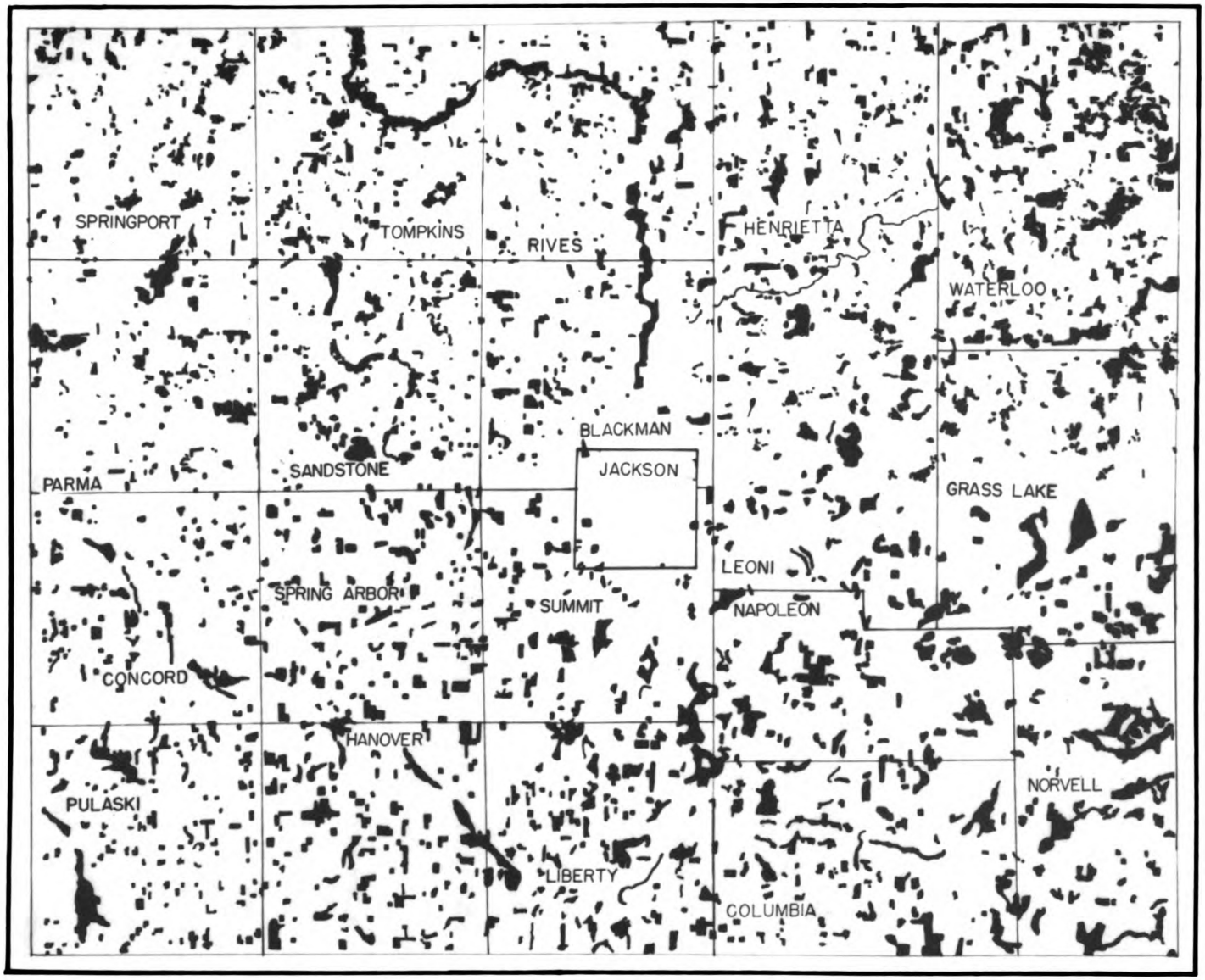


FIGURE 26

CHAPTER V

LAND USE PROBLEMS OF THE COUNTY WITH PROPOSED SOLUTIONS

Introduction

The problems of Jackson county are many, diverse and so interrelated that it is impossible to discuss the solution of one problem without considering others.

For the purpose of discussion, the problems in the county are separated into two categories; problems affecting other areas in the state besides Jackson county, requiring State aid to solve, and problems that are the obligation of the county, township, city or local community. The proposed solutions are given for each problem as it is presented. The writer feels the proposed solutions are the same solutions that would be presented by any group of civic minded people studying the same problem with the same evidence at hand. Since there is a great deal of difference between likely action by politicans, and logical planning, certain proposals are presented that could be carried out, and at the same time others are offered as an ideal in planning at which to aim. No attempt is made to evaluate the cost of the proposals put forth, the political expediency or the likelihood of adoption.

Since so many of the questions of land use are debatable, no attempt is made to offer "only" solutions. Neither are all the possible land use questions covered; only those pertinent at the time of the study or likely to become important in the near future are included.

The Swampland Problem

About 25 per cent of the total land in the county is in the Munith land type (34). This land, in the virgin state, served as a natural water control system, storing water during the flood period in the spring and releasing the water during the dry summer months.

At an early period, it was decided that the swamps and marshes should be drained for agricultural purposes. Drainage projects were started, huge ditches were dug and much of the swampland was drained long in advance of the need of the land for agriculture. This drainage had an immediate effect of increasing the spring flood flow of the rivers flowing through the swamps and decreasing the summer flow. When downriver population increased to the point that pollution problems developed, the drainage of the swamplands had detrimental effects not only from the floods produced in the spring, but also from the lowered water levels in the summer. It is well known, that to care for the sewage of a

city the size of Grand Rapids, a good flow of water is needed throughout all the year in the rivers to keep dangerous contamination from assuming a strong enough concentration to endanger public health and the growth of fish. Drainage of the swamplands of the upriver counties, of which Jackson is one, has contributed a great deal to the pollution problems of the rest of the state.

Agriculture has added another problem to the initial one of drainage of the swamplands. Modern agricultural methods are such that they tend to increase both the flood and the pollution problems caused by drainage. It is considered good practice to control the water level on the muck farms of the Munith natural land type. This is done by means of large pumps that pump the water off the fields in the spring thus adding water to the already swollen rivers, and by pumping water onto the fields in the summer months using water badly needed for pollution control downstream. Since little of the land in Jackson county was under cultivation at the time of the investigation, this was not a serious problem. In the future if the trend to cultivate this type of land continues, a serious problem will certainly arise.

Another problem to take into account when considering

drainage of the swamplands in the problem of controlling lake levels within Jackson county. Although this problem was of no great importance at the time of the study, it is almost certain to arise if the clearing of swampland for use by agriculture is continued. Many of the lakes border on swamps. In this way their water levels depend directly on the water levels in the swamps. The lowering of lake levels will have the immediate effect of ruining bathing beaches and home sites along the shores. Portage Lake, Brill Lake and Goose Lake are examples of lakes that will be ruined by the drainage of the swamps at their edges (15).

The solution to this problem of public water control is no simple matter. A solution will be given here, but what will eventually happen depends on the court of public opinion. At the time of the investigation there were several agencies working on both sides of the question. Some desired water control by the use of law. At the same time others were giving directions for the more efficient drainage of the swamps.

It is the writers belief that a study group should be appointed by the governor of Michigan to make a survey of Michigan rivers affected by flood and pollution control problems, and to make recommendations as to the proper solution in each case. The writer feels that the wise

thing to do would be for the state to enlarge the Waterloo recreation area in Jackson county to take in the remaining large areas of swampland in the north east quarter of the county. The remaining areas of the county are smaller and less likely to be efficiently drained. It is thought that to leave these in private hands will not add greatly to the flood and pollution control problems.

Frontage Development

Another problem that probably only the state can solve, is that of overcrowding the state and federal highways with all manner of homes, commercial establishments and businesses that require entrance to the highways. Along U.S. highway 127 north of Jackson, there were, on July 15, 1947, over one hundred and eighty entrances to the highway. This is an average of over fifteen entrances per mile. This fact did not point out the problem as vividly as it existed because over half of all these driveways were found less than two miles from the city limits. Over forty driveways per mile were found in this area. On highway 112 running east and west the situation was even worse. As any motorist knows, driving along a highway with a driveway to a home, factory or store every few rods, does not provide ideal driving conditions. Not only does travel become un-

safe, but it is slowed down 50 per cent or more. With the state spending between $75,000 and $200,000 per mile to build highways, it hardly seems logical that such a system should be allowed to continue; public safety and economy of public funds both demand the end of this practice.

The writer proposes that the State highways be zoned against future invasions by residences and commercial places. Such zoning would allow public entrance to the State highways every half mile, and would state that the county be given a number of years to provide other roads for the people now living on the highways, down to a minimum of perhaps five entrances per mile in farming territory where it would be impractical to provide other roads.

Under such a system the State highways could become real highways and not residential and commercial streets. Average speed could be increased resulting in less need for additional highways and the accident rate certainly would decrease.

Such a plan is not likely to be accepted immediately by the public even if the cold facts of possible dollars saved were presented. If, however, such a plan were adopted, in a few years, residential and commercial developments would center along the county highways, and the State and Federal highways would be left unmolested by local traffic.

Such a plan would require approximately 100 miles of county roads to be provided for the people now living along State and Federal highways. The expenditure for 100 miles of county road undoubtedly would be less than that of rebuilding or rewidening the fifty miles of State highways. Such action will have to be taken if building is allowed to continue along the highways.

Airports

A minor problem existed at the time of the study which may become a major problem in a few years: that of providing adequate air facilities for the Jackson city community. When the study was made, Reynolds airport covered one and one half square miles, one and one-half miles long by one mile wide. This was adequate in 1947, but there is a question as to whether it will be in 1957.

The writer recommends that the county take immediate steps to get an option on all of sections 29 and 30 and the north half of sections 31 and 32 of Blackman township for a future airport. Present use could be continued on this land until needed but this would save many headaches and thousands of dollars in a few years.

Excess Roads

In certain rural sections of the county there are

too many roads. Looking on any map one can see examples of roads a few rods from each other running parallel. On many such roads no residences exist; therefore such roads could well be eliminated. This would be political suicide for a road commissioner to attempt but common sense dictates such action from the point of view of saving in road costs. Probably twenty miles or more of such roads exist.

V. RURAL-URBAN FRINGE

One of the major problems facing Jackson county is the future direction and control of the population. For several miles in every direction from the city of Jackson, there have sprung up all kinds of homes, businesses, and industries. This type of development has become known to the sociologist as the "city fringe". As Wolfanger (36) puts it:

> "The struggle for land reaches its highest intensity in the unincorporated urban-rural fringe which surrounds both our small and large cities. This fringe develops a great variety of land uses that presently become all entangled without apparent order or plan; truck, fruit, and poultry farms; string-along-the-road homes; areas of city dwellings of big and little houses. . . The crowding and struggle for land is creating serious problems in many fields--good water, proper sewage disposal, fire protection, police protection, enough light, air and space. . . a long and growing list."

When this study was made in July of 1947, the fringe area of the county included almost all the townships of Leoni, Summit and Blackman; and was rapidly expanding into Sandstone, Spring Arbor, Rives and Henrietta; and there was evidence of further expansion in the remaining townships.

The problem of the city fringe is one with which the people of the county have had no previous experience on which to base intelligent future action. It is for this reason that such development was allowed to arise in the first place.

If the problem of the city fringe is to be efficiently handled in the future, the development of the fringe area must be understood. Firey (6) has given a picture of the development of the fringe area of Flint, Michigan. He states that the population of that area is made up of several kinds of people: workers seeking cheap land with low taxes, business men seeking a place in the country where "gentleman farming" can be carried on, part-time farmers and drifters. Firey goes on to characterize the features of a city fringe as having a high rate of population turnover, a high rate of home ownership, a high proportion of young adults having many children, a heavy dependence upon industrial shop work in the city, inadequate social life and

organizational facilities for the people, and part-time farming or gardening on the part of most farms. He further states that the fringe area is a problem area because it removes land from agriculture, encourages uncoordinated, unguided settlement, increases taxes beyond the tax-carrying capacity of farmers and shop workers in the area, boosts land values to a point where agriculture can no longer be profitably continued, allows a mixture of land uses to become started, and develops homogeneous small communities that make attractive communities on one hand and shack towns on the other.

What is true in the case of Flint is also true for the city fringe of Jackson. No detailed study such as Firey carried on for Flint was attempted, but from observing the area the same type of development had apparently taken place. The studies that were made regarding the population bore this out.

Declining Urban Population

Not only has increasing population become a problem, but also decreasing population. Jackson city population declined by several thousand between the years of 1930 to 1940. This has caused serious city finance problems to arise. A fifteen mill limitation on taxes was in force

through voters' franchise; therefore, with the exodus of several thousand taxpayers, the only method of raising enough taxes to operate the city was to increase real and personal property valuation. This started a vicious circle: rising valuations caused more people to move, which in turn raised valuations. Naturally this cycle could not continue indefinitely; therefore property tax increases were discontinued and the services offered throughout the city suffered. To complicate matters further, the people living outside the incorporated limits of Jackson city asked for more services in the forms of such items as better streets and more parking facilities in the downtown section.

Jackson faces the problem of either increasing tax revenue by expanding the city limits to include suburban communities, receiving aid from state or county sources, or continuing to reduce still further the services and facilities necessary for smooth functioning of an industrial city community.

Proposed Solution to the Rural-Urban Fringe and Declining Urban Population Problem

To offer a solution for the rural-urban fringe problem, a total land use plan for the county is given. The plan is laid particularly around the solution to the

rural-urban fringe problem but also includes problems of agriculture, recreation and other activities.

The writer proposes that the following be done:

1. Increase the size of the city of Jackson to include its suburban communities.

If such a proposal were carried out, Jackson would be extended south to include Southland and Woodland; east, Vandercook Lake and Michigan Center; north, about one and one half miles to Southern Michigan Prison and west two miles past Reynolds airport. It is not known how much this would increase the population of Jackson, but probably by about ten thousand persons or more.

Such a plan would not help city finances of Jackson to any great extent since so much area would come under city control that is now under county control. It would however bring all the urban land in Jackson county under one government for future direction and control and would provide undeveloped land for future development. Such a move in connection with a county zoning ordinance and minimum building construction ordinance would eliminate haphazard development in the future around the edges of the city.

An alternate plan in place of expansion of the city limits would be to adopt a county zoning ordinance with essentially the same provisions as would be provided in the

city of Jackson, such a plan to be administered by the county. This was being done in Southland, Woodland, Vandercook Lake and Michigan Center in respect to sewage disposal at the time of the study.

2. Pass zoning and minimum construction ordinances.

The following zoning classes with minimum construction for each class are given:

Residence Land--all land used for homes not including seasonal dwellings.

Urban--minimum width of lot: fifty feet.

a. Small homes--not less than three hundred and fifty square feet.

b. Medium homes--not less than eight hundred square feet.

c. Large homes--not less than twelve hundred square feet.

Rural--minimum distance between dwellings: two hundred feet.

Other specifications same as for urban.

Commercial Land--all land set aside for commercial establishments, i.e. beer gardens, gas stations, stores, restaurants, tourists courts, banks, garages, theaters, etc. Minimum construction: all buildings should be of sound construction with solid foundations, safe sewage disposal,

pollution control and fire protection. Minimum width of lot: fifty feet.

Industrial Land--all land used for public utilities, manufacturing, railroads, shops, etc. Same construction and lot specifications as for commercial land.

Agricultural Land--all land used for the production of farm products.

Farm--any parcel or parcels of land of more than twenty acres which provide more than 50 per cent of the income of one family.

Minimum construction: no dwelling shall be built of less than three hundred and fifty square feet of floor area.

Part-time farm--any parcel of land of from one to twenty acres in size which provides part of the income of one family. Same specifications.

Private Recreational Land--all land used for outdoor recreation not in public ownership, i.e., golf course, summer cottages, skeet ranges, archery ranges, hunting and fishing clubs, boat houses, bathhouses, etc.

Seasonal Dwelling--not less than two hundred square feet of floor space.

A. Seasonal dwellings must be one hundred feet apart unless public sewage disposal system is installed when fifty feet apart will be allowed. All seasonal dwellings must

have sanitary sewage disposal systems of either public disposal system type of septic tank type. In either case there must be adequate treatment of sewage before dumping into a stream of lake. Minimum lot: fifty feet.

B. All other recreational buildings must provide for safe sewage and waste disposal and adequate fire protection. Minimum lot: fifty feet.

Government Land--Buildings on township, county, state and Federal land shall provide for fire protection and safe sewage disposal and shall not permit other uses detrimental to the health, welfare or morals of the people. Specifications are the same as for commercial land.

Miscellaneous Land--land that does not fall into any other class shall be termed miscellaneous land and shall conform to the general rule of not harming the health, welfare or morals of the people. Specifications are the same as for commercial land.

3. Build new county roads.

Several new county roads should be built northeast of Jackson to open up the Waterloo Land type for rural residence use. This land offers ideal topography for residential use if adequate roads were provided. This land type offers no better use since it is too rough for most kinds of agriculture and is not close enough to water at most places to be classed as recreational land.

VI. AGRICULTURAL PROBLEMS

Soil Conservation and Soil Fertility Problems

Serious sheet and gully erosion is in evidence on practically all of the undulating and hilly land. Soil fertility problems exist wherever agriculture is practiced.

No simple solution is seen for these problems. The need for education in proper land use is evident, but the methods of educating are not so obvious. In 1940 the amount of commercial fertilizer used in the county in tons per acre was so small in several of the agricultural townships as to be negligible (28). No figures were available for the amount of lime used, but the need for lime is seen on much of the land of the county.

The writer saw the solution to the problem of soil conservation and soil fertility as an educational process and not in subsidy or force of law. The writer also felt that the past education had not solved these problems.

With the increase in investment to start farming and the increase in the complexity of farming operations, the operators of large farms will become more aware of conservation and fertility factors in farm management because natural economic selection will eventually eliminate those farmers not capable of competing in a highly commercialized

agriculture. In this way a part of the problem will solve itself. There will remain hundreds of small farms, managed by factory workers, subsistence type farmers and other classes of people living on farms either having other sources of income or willing to accept a low standard of living. These are the people who will need education in soil conservation and soil fertility; these also are the people most difficult to educate. As any agricultural extension worker knows, the person who receives the educating is the one who needs it least.

The author feels that three programs are needed to educate people to solve these problems. One is an adult education program much more intensive than has been attempted by the extension service of the U.S.D.A., with classroom discussion and training, followed by on-the-farm training. This would indoctrinate many farmers with correct methods on their own farms.

The second program needed is the intensification of the young people's programs to include more adequate training on the farm. The writer is convinced that 4-H club work fairs and exhibits and Smith-Hughes class room training are of no value unless application of correct methods can be made on the home farm under the direct supervision of a

qualified person.

The third educational program needed is a better mass education program to mold public opinion in the use of the natural resources, particularly the soil. Only after public opinion has become favorable to the use of subsidization or force by law can these same two methods be used to direct land use.

The need is seen for conservation courses in the public schools plus campaigns of the press and radio to bring about favorable opinion towards control of farm land misuse.

Size of farm

In the county are several thousands of acres of land that went out of agricultural production during the depression of the thirties because of the wrong size of farm. This land fell mostly on the Waterloo Land type land of Waterloo, Grass Lake, Leoni and Liberty townships. The farms of this area were too small for the lay of the land.

At the present rate of land valuation in Jackson county, it is difficult to encourage farmers to invest money in large farms which are needed on this land type if successful farming operations are to be carried on. Since practically all Waterloo type is sloping land, grass will have to

be the main crop; ranching, therefore, is recommended. The only way this could be accomplished is for the land to sell at less than $30.00 per acre. Since the average price paid for the Waterloo Recreation area in the county was slightly over $30.00 per acre (35), it is doubtful if land could be purchased cheaply enough for ranch purposes.

The only alternatives to changing the size of farm to ranch size on the Waterloo land type is use it for rural residence or government use.

Farm Land Better Suited For Non-Agricultural Uses

There were several hundred acres of farmland in the northeast part of the county better suited to government ownership land than to agriculture. This land consists of organic soils needed for the protection of the public water supply.

Farm Woodlot Management Problems

Most of the woodlands of the county are of the farm woodlot type. According to census figures (27), about half are pastured. Many of the woodlots are mature with little or no reproductive stock.

Either the woodlots should be left alone and allowed to grow free from pasturing or else they should be cut and

the land put into pasture land. The writer sees a need for better marketing methods of local timber to make wood production on the farm a steady and paying business. Education of the farmers and introduction of co-operative marketing methods could go a long way in helping the farmer to produce better timber.

Individual Farm Organization Problems

Some problems are present to some degree on every farm. These depend upon man and not upon land. They consist of such items as having insufficient animal units and mechanical equipment on the farm, having too little capital or too little labor to utilize the land efficiently. However this type of problem is beyond the scope of this thesis.

Need for Social Institution Improvement

In Jackson county there is a need for additional social institution improvement. In July of 1947, there were still eighty-four school districts with less than fifty pupils on the school census (21). Many of these schools had less than twenty students, causing high operating costs per student. Many were lacking important sub-

jects in the curriculum. Although this problem existed at the time of the study, it was rapidly being remedied and should not exist in several years.

Other needs in the rural areas are better medical service, organized libraries and community recreation centers. These will come if the farm population can be stabilized to develop tight community organizations. This can partially be accomplished by stabilizing population movement by zoning.

VII. RECREATION PROBLEMS

The most urgent recreation needs of the county are for organized community recreation centers and more water frontage, for public parks and summer residences.

The development of community recreation centers is a problem that can only be solved in the communities themselves. It is up to local leaders to develop a means of providing them.

Suitable water frontage is inadequate for local needs. In the writers opinion the only available means of increasing this is with dams to raise the water level of the mud-shored lakes to a point where sandy beaches and shores can be had. Brill Lake, a mud-shored lake is a good example of this. The topographic map of the area

shows that the construction of a five foot dam at the outlet of the lake would provide sandy shores and beaches, thus making it desirable for home-building (15).

VIII. PUBLIC ADMINISTRATION PROBLEMS

Even more important than the physical problems of haphazard rural non-farm development, soil erosion and water level control is the problem of inefficient public administration.

At the time of the investigation there were nineteen township governments, one city government, one county government and several village governments in operation. Many of the functions of each overlapped and some functions were lacking.

The need is seen for county and township reorganization along natural social economic community boundary lines. If this were done, Jackson County would increase in size to cover all the Jackson city community. This would extend the county several miles in every direction beyond its present boundaries. This large city community could then be broken down into its town communities. School districts should be organized along these town community boundary lines. This would break Jackson county into

about fifteen town communities. Such a system would make it easier to administer local government without the overlapping of functions so prevalent under the political township system.

If Jackson county were reorganized into a large city community segregated into about fifteen smaller town communities, future direction of land use would be easier since the population of each town community would be more or less homogeneous in occupation and thinking. Communities would be more strongly knit because of higher interests in government than under the present township system where a man trades in one town and votes in another. This tighter social organization would result in closer social control of government, hence more interest and control of future land use.

IX. THE LAND USE PLAN

To present a more integrated view of the total land use plan for Jackson County, the writer summarizes the proposed solutions to the various problems on a land use map, Fig. (27). And makes recommendations as follows:

It is recommended that:

1. the Governor appoint a board to study water

level control in Michigan rivers.

2. the swampland in the Munith area of Jackson county be purchased by the state government as a water control project.

3. all state and Federal highways be zoned to permit right of entrance every half mile except in rural farm areas.

4. the county be given a period of time to construct other roads for people now living on the state and Federal highways, eliminating present entrances in crowded areas.

5. sections 29 and 30 and the north half of sections 31 and 32, Blackman township, be set aside for future airport facilities.

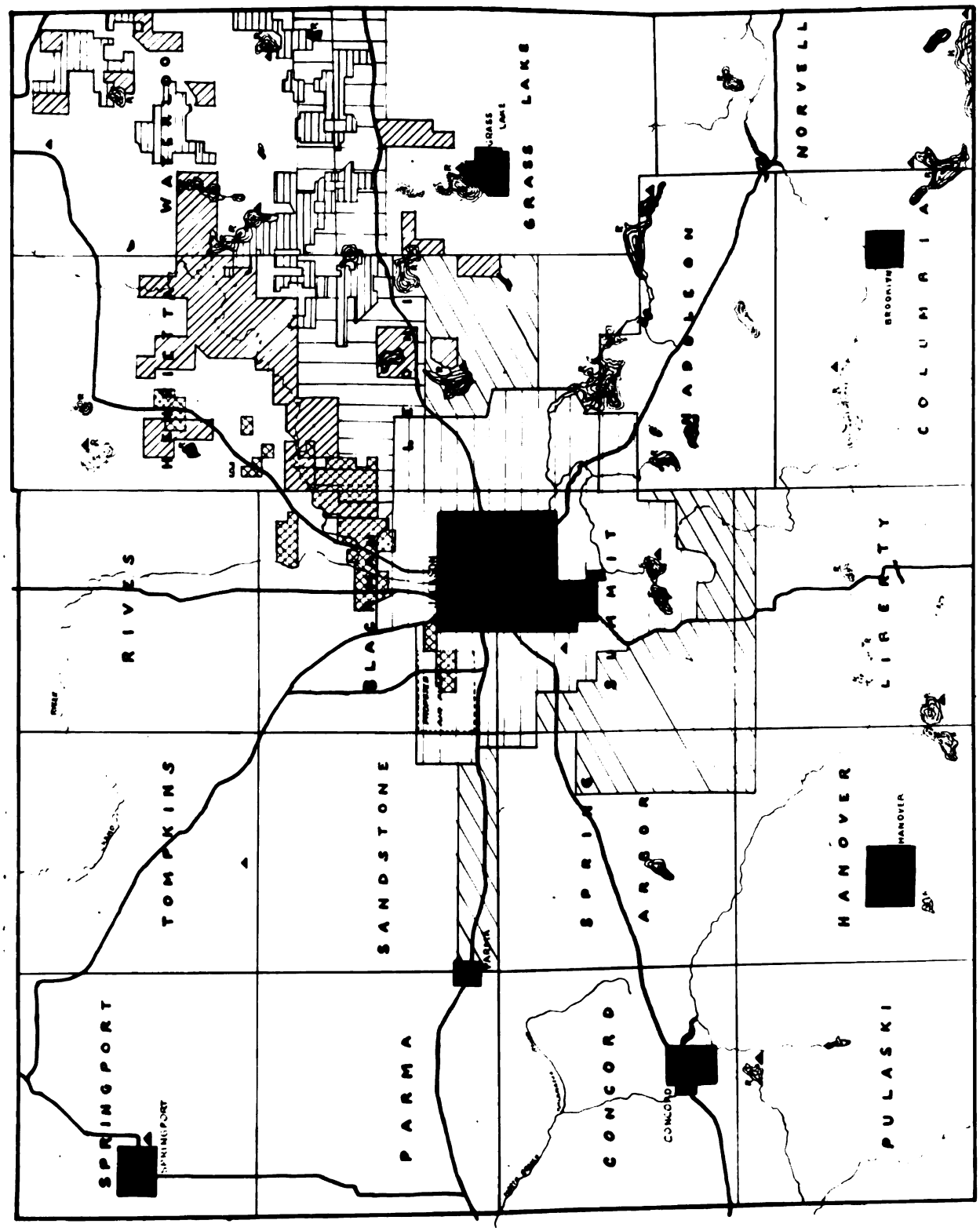
6. all roads not needed for the transportation system be abandoned.

7. money be used from parking meters to purchase city parking lots; parking meters be installed in these lots and the income be used for defraying the cost of traffic control and other services needed by the Jackson city community.

8. the size of Jackson city be increased to include all its natural urban community.

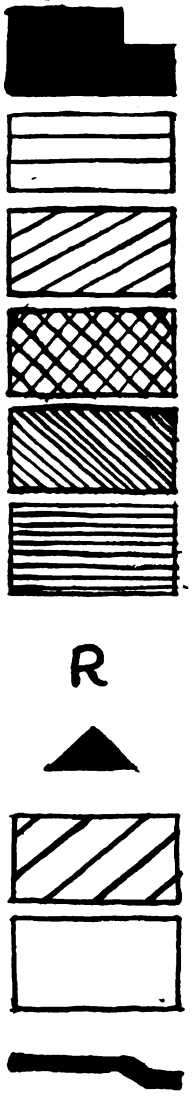
FIGURE 27

PRESENT AND PROPOSED LAND USE FOR JACKSON COUNTY, MICHIGAN



See next page for key.

KEY TO FIGURE 27



PRESENT URBAN LAND

PROPOSED INCREASE IN THE SIZE OF JACKSON CITY

PROPOSED PART-TIME FARMING AREA

PRESENT STATE PRISON FARM

PROPOSED INCREASE IN THE WATERLOO RECREATION AREA

PRESENT WATERLOO RECREATION AREA

PRESENT RECREATIONAL LAKE

PRESENT STATE OR COUNTY PARK

RURAL RESIDENTIAL LAND AND PROPOSED HOME SITES

PROPOSED FINAL AGRICULTURAL AREA

PRESENT MAIN ROADS

9. county zoning and minimum construction ordinances be passed to direct future land use and to provide for safe, sanitary, permanent construction.

10. several new county roads be built into the very hilly sandy natural land type northeast of Jackson to facilitate the development of a rural residence area.

11. to solve the soil fertility and soil erosion control problems three kinds of agricultural education programs be inaugurated: an adult on-the-farm training program, a youth on-the-farm training program and a mass radio-press-school conservation familiarization program.

12. the size of farm units be changed on the very hilly sandy natural land type from general farm size to ranch size, to utilize better the sloping land of that land type.

13. farm timber co-operative marketing associations be established.

14. farm woodlot management be introduced into the agricultural education program.

15. rural school districts be reorganized into larger, more efficient-sized districts.

16. local community recreation centers and libraries be started.

17. more Class I recreation land be developed by

damming the outlets of muck-shored lakes to raise the water level to where the shores would be sandy.

18. county and township political boundaries be reorganized on a natural community boundary basis into one large city community broken down into about fifteen smaller town communities. School district boundaries would coincide with the town community boundaries.

The greatest single need in Jackson county was the need for public awareness to the problems facing the county. Population was increasing at the time of the study, new homes were being built at an alarming rate in all directions from Jackson. Agricultural, recreational, commercial, residential and industrial land was being developed or exploited with no thought of public interest or any reference to over-all planning. Many problems in land abandonment, taxation, public health, education and others that will surely come from such haphazard development could have been easily prevented at the time of the study by intelligent thought and planning by the leaders of the communities making up the county, followed by intelligent public action.

The county has gone from the agricultural stage into the industrial-commercial stage of development and as

yet has not realized it. The problems facing the county become less and less problems or agriculture and more and more those of the city. Time and experience will provide solutions of some sort to the problems but how much more efficient it would be for the county leaders to look around them now, to take inventory of their county and to provide, not wait, for the future.

SELECTED BIBLIOGRAPHY

1. Agricultural Adjustment Administration. Aerial Flight Photographs; B.D.V., Jackson County, Michigan. Contact Prints, Scale 1:20,000. Washington, D.C., 1938.

2. Blois, John T., Gazeteer of the State of Michigan, in Three Parts. Detroit and New York, 1839.

3. Climate of the United States; Michigan. Agricultural Yearbook separate, No. 1840. Washington, D.C.: United States Government Printing Office, 1941. Pp. 914-924.

4. United States Department of Agriculture Weather Bureau. Climatic Summary of the United States; Sec. 65; Eastern Lower Michigan. Washington, D.C.: United States Government Printing Office, 1930. 29pp.

5. De Land, Mary G. A Series of Useful Brief Papers on the Settlement of Jackson County, Michigan. Michigan Pioneer and Historical Collections, Vol. V: Lansing, 1882. Pp. 348-349.

6. Firey, Walter, Social Aspects To Land Use Planning In the Country - City Fringe: The Case of Flint, Michigan. Michigan Agricultural Experiment Station. Special Bulletin 359: East Lansing, 1946. 57pp.

7. Fuller, G.N. editor, Michigan, A Centennial History of the State and its People, Vol. I. Chicago: Lewis Publishing Co. 1939.

8. Hibbard, B.J., A History of Public Land Policy. New York: The Macmillan Co., 1924. 591pp.

9. Jackson County, Michigan Road Map. Jackson: Jackson County Road Commission, 1947.

10. Leverett, Frank, Map of the Surface Formations of the Southern Peninsula of Michigan. Lansing, Michigan State Department of Conservation, 1924.

11. _____, Surface Geology and Agricultural Conditions of Michigan. Lansing: Wynkoop Hallenbeck Crawford Co., 1917. 223pp.

12. McGee, M., The Early Days of Concord, Jackson County, Michigan. Michigan Pioneer and Historical Collections, XXI: Lansing, 1892. Pp. 418-431.

13. Martin, Helen M., The Centennial Geologic Map of Michigan; Publication No. 39., Geologic Series 33: Michigan State Department of Conservation: Lansing, 1936.

14. Michigan State Corrections Commission, Unpublished Records. Lansing, 1947.

15. Michigan Geological Survey, Quadrangle Topographic Maps; Scale 1:62,500. Springport, Rives Junction, Stockbridge and Cement City. Washington, D.C.: United States Government Printing Office, 1916-1938.

16. Michigan State Highway Department. Official Highway Map for 1947. Lansing: Michigan State Highway Department, 1947.

17. Michigan State Highway Planning Survey, General Highway Map of Jackson County, Michigan. Lansing: Michigan State Highway Department in Cooperation with Federal Work Agency Public Roads Administration.

18. Michigan State Tax Commission, Unpublished Records. Lansing, 1947.

19. Pasco, Ray E., Some Relationships Between Soil Types and Use of Land In Southern Michigan. Thesis; Michigan State College. East Lansing, 1932. 38pp.

20. Prescott, Samuel, Early Settlers In the Town of Blackman. Michigan Pioneer and Historical Collections, Vol. VII. Lansing, 1884. P. 464.

21. School Census of Jackson County, Michigan. 1946-1947 Directory Rural and Graded Schools, Jackson County. Jackson: Office of County School Commissioner, 1947. 44pp.

22. Schoenmann, Lee Roy A., Land Inventory For Rural Planning In Alger County, Michigan. Papers of the Michigan Academy of Science, Arts and Letters, Vol.XVII: Ann Arbor, 1932. 28pp.

23. Thaden, J.F., Population Trends In Michigan. Michigan Agricultural Experiment Station. Special Bulletin 236. East Lansing, 1933. 38pp.

24. _____, The Lansing Region and its Tributary Town Country Communities. Michigan Agricultural Experiment Station. Special Bulletin 302. East Lansing, 1940. 50pp.

25. Trull, F.W., The Soils of Jackson County, Michigan. Thesis; Michigan State College. East Lansing, 1928. 36pp.

26. United States Bureau of the Census: 16th. Census 1940. Areas of the United States. Table 3 and 4; United States Bureau of Commerce. Washington, D.C.: United States Government Printing Office, 1942. 465pp.

27. _____, Census of Agriculture for 1945 By Counties and Minor Civil Divisions. United States Department of Commerce, Washington, D.C.: United States Government Printing Office, 1946.

28. _____, 16th. Census 1940. Census of Agriculture By Counties and Minor Civil Divisions. United States Department of Commerce, Washington, D.C.: United States Government Printing Office. 1942.

29. _____, Census of Agriculture for 1935 by Counties and Minor Civil Divisons. United States Department of Commerce, Washington, D.C.: United States Government Printing Office, 1936.

30. _____, 16th. Census 1940, Population, Vol I: Number of Inhabitants, Table 3. Washington, D.C.: United States Government Printing Office, 1943.

31. _____, _____, Characteristics of the Population. United States Department of Commerce, Washington, D.C.: United States Government Printing Office, 1943.

32. Veatch, J.O., The Idea of The Natural Land Type, Soil Science Society of America Proceedings II: 499-503, 1937.

33. _____, H.G. Adams, E.H. Hubbard, C. Dorman, L.R. Jones, J.W. Moon, and C.H. Wonser, Soil Survey, Ingham County, Michigan. U.S.D.A. Bureau of Plant Industry in Cooperation with Michigan Agricultural Experiment Station. Washington, D.C.: United States Government Printing Office, 1941. 43pp.

34. _____, F.W. Trull and J.A. Porter, Soil Survey of Jackson County, Michigan. U.S.D.A. Bureau of Chemistry and Soils in Cooperation with Michigan Agricultural Experiment Station. No. 17. Washington, D.C.: United States Government Printing Office, 1926. 30pp.

35. Waterloo Recreation Area. Folder, Michigan State Department of Conservation. Lansing, 1936.

36. Wolfanger, L.A., Your Community and Township Zoning. Michigan Agricultural Experiment Station. Bulletin 184. East Lansing, 1945. 50pp.