

SOME LAND USE IMPACTS IN A PORTION OF THE  
IMMEDIATE AREA OF TUTTLE CREEK  
RESERVOIR, KANSAS

by 544

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A MASTER'S THESIS

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requirements for the degree

MASTER OF ARTS

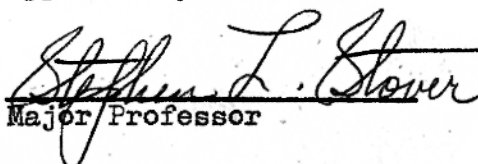
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## TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION . . . . .	1
Statement of Problem . . . . .	2
Statement of Purpose . . . . .	2
Justification . . . . .	2
Method of Approach . . . . .	4
Study Area . . . . .	5
Plan of the Thesis . . . . .	6
Review of the Literature . . . . .	7
II. BACKGROUND . . . . .	9
National and State Views Toward Water . . . . .	9
Historical Setting of Tuttle Creek Reservoir . . . . .	14
Federal government interests . . . . .	14
Government action concerning Tuttle Creek . . . . .	17
Flood of 1951 and Aftermath . . . . .	20
Current Overtones . . . . .	29
III. IMPACT ON AGRICULTURAL LAND USES . . . . .	34
Agricultural Activity in 1956 . . . . .	34
Land Use in 1966 . . . . .	43
Privately owned lowland . . . . .	44
Corps of Engineers land . . . . .	46
Fish and Game Commission land . . . . .	49
Upland use . . . . .	52
Land Values . . . . .	58

Summary . . . . .	61
IV. IMPACT ON URBAN-ORIENTED LAND USES . . . . .	63
Towns Affected by Tuttle Creek Reservoir . . . . .	63
Development Areas . . . . .	74
Other Uses . . . . .	87
V. IMPACT ON RECREATIONAL LAND USES . . . . .	91
Parks . . . . .	91
Spillway State Park and Marina . . . . .	104
Other Recreational Land Uses . . . . .	111
VI. SUMMARY AND CONCLUSIONS . . . . .	113
APPENDIX . . . . .	119
BIBLIOGRAPHY . . . . .	120

## LIST OF TABLES

TABLE	PAGE
I. Overflows of Major Rivers in Kansas, 1844 - 1951 . . . . .	15
II. Estimated Flood Damage in Kansas, 1926 - 1953 . . . . .	16
III. Municipalities Affected by Tuttle Creek Reservoir . . . . .	64
IV. Randolph Population, 1955 - 1966 . . . . .	66
V. Status of Development Sites - 1966 . . . . .	78
VI. Parks and Park Facilities: Tuttle Creek Reservoir, 1966 . . . . .	93
VII. Rankings of Parks by Number of Visitations: Tuttle Creek Reservoir, 1963 - 1966 . . . . .	94
VIII. Number of Persons Visiting Tuttle Creek Reservoir, 1963 - 1967 . . . . .	102
IX. Number of Fishermen per Year and Their Percentage of All Recreational Uses, 1963 - 1966 . . . . .	103
X. Spillway State Park and Marina Recreational Uses, 1963-1966 . . . . .	107
XI. Spillway Marina Boat Slip Facilities - 1966 . . . . .	109

## LIST OF FIGURES

FIGURE	PAGE
1. Area of Study . . . . .	33
2. Federal Expenditures for Water Resources Development in Kansas	13
3. Flooded Areas of Kansas-Missouri during July, 1951 . . . . .	21
4. Distribution of Flood Damages, May-July, 1951 . . . . .	23
5. Topography and Vegetation . . . . .	36
6. Land Uses - 1956 . . . . .	<del>REAR</del> FOLDER
7. Land Uses - 1966 . . . . .	.REAR FOLDER
8. Fish and Game Commission Land . . . . .	50
9. Land Values - 1956 . . . . .	59
10. Land Values - 1966 . . . . .	60
11. Randolph Population, 1955 - 1966 . . . . .	67
12. Randolph - 1966 . . . . .	70
13. Development Areas . . . . .	75
14. Number of Visitations: Tuttle Creek Reservoir, 1963-1966 .	101
15. Spillway Park . . . . .	108

## LIST OF PLATES

PLATE	PAGE
I. Sign on west side of dam . . . . .	ix
II. View of the dam from upper observation point . . . . .	ix
III. View of the west side of the dam . . . . .	28
IV. View of the reservoir looking north . . . . .	28
V. The valley bottom as it was exposed . . . . .	32
VI. Tuttle Creek Reservoir as seen looking south . . . . .	32
VII. Uplands in the area of Randolph State Park . . . . .	54
VIII. Typical uplands in the area of the dam . . . . .	54
IX. View of the Highway 16 bridge from the site of Old Randolph	69
X. Another view of Old Randolph . . . . .	69
XI. An aerial view of New Randolph looking west . . . . .	72
XII. Another view of the town of Randolph . . . . .	72
XIII. Typical permanent home construction on the Paul Thompson Development site . . . . .	81
XIV. The effect of the 1966 draw down on boat ramps . . . . .	81
XV. Another view of the boat dock "drouth" in 1966 . . . . .	85
XVI. The Lakeview Motel . . . . .	85
XVII. An aerial view of the Blue Hills Development area . . . . .	89
XVIII. University Park Development area as seen from the air . . . . .	89
XIX. An aerial view of Stockdale Park . . . . .	97
XX. A typical scene of an old road in the valley which is now used by fisherman . . . . .	97
XXI. Spillway Marina . . . . .	106
XXII. View of the open slips at Spillway Marina . . . . .	106

## EXPLANATIONS OF PLATES I AND II

- I. Sign on the west side of the dam.
- II. View of the dam from the upper observation point located on the west side. The conduit tower appears in the foreground.



PLATE I



PLATE II



## CHAPTER I

### INTRODUCTION

When a 200 or 300 million dollar dam is built across a river, you can expect things will be different in that locality from then on. Such a dam is more than an engineering masterpiece. It is also a major alteration in the geography of the locality where it is built...A less generally recognized but perhaps more important impact of reservoirs is the increased difficulty of<sup>1</sup> managing and developing the resources which lie around them.

If geographers are to maintain their rightful place in an increasingly inquisitive society, then they must devote time and study to the problems which are of greatest concern in the society. There can be little refutation of the geographer's intensive studies into urban, transportation, or agricultural problems, all of which are of primary concern in today's society. There has been, however, a definite enquiringness by geographers into a natural resource which affects the city, modes of transportation, and the very life of the farmer. That resource is water.

Geographers have been concerned with water in the forms of precipitation, groundwater, and evaporation and transpiration. They have also considered modes of transportation which use water routes. But it is only in the past few decades that they have given serious attention to water and the role it plays in man's activities.

One noticeable lack of inquiry is studying the changes that occur

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<sup>1</sup>Blair Hutchinson, "Fitting Big Dams into Little Economies," Land Economics, XXX (November, 1954), 330.

in human activity if a permanent pool of water is introduced into a balanced relationship between man and his environment.

### I. STATEMENT OF PROBLEM

This thesis is an inquiry into one aspect of man's activities, land use, and the changes that have occurred therein after a permanent pool of water, Tuttle Creek Reservoir, was introduced into the landscape.

### II. STATEMENT OF PURPOSE

The major objective of this thesis is to examine the changes in land uses in the area of Tuttle Creek Reservoir. More specifically the purpose is to seek answers to the following questions:

1. What has been the impact of the reservoir upon agricultural land uses?
2. What has been the impact upon urban-oriented<sup>2</sup> land uses?
3. What has been the impact upon the recreation land uses?

### III. JUSTIFICATION

Tuttle Creek Reservoir (Fig. 1) provides an excellent case study for several reasons: it is (1) a part of the reservoir system within Kansas; (2) the largest reservoir in the state; and (3) representative

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<sup>2</sup>The phrase "urban-oriented" has been coined by the author to refer to those areas surrounding the reservoir which are not in agricultural land use or a federal or state park. It does refer to those areas which are or were towns, development sites, and providing tertiary services.

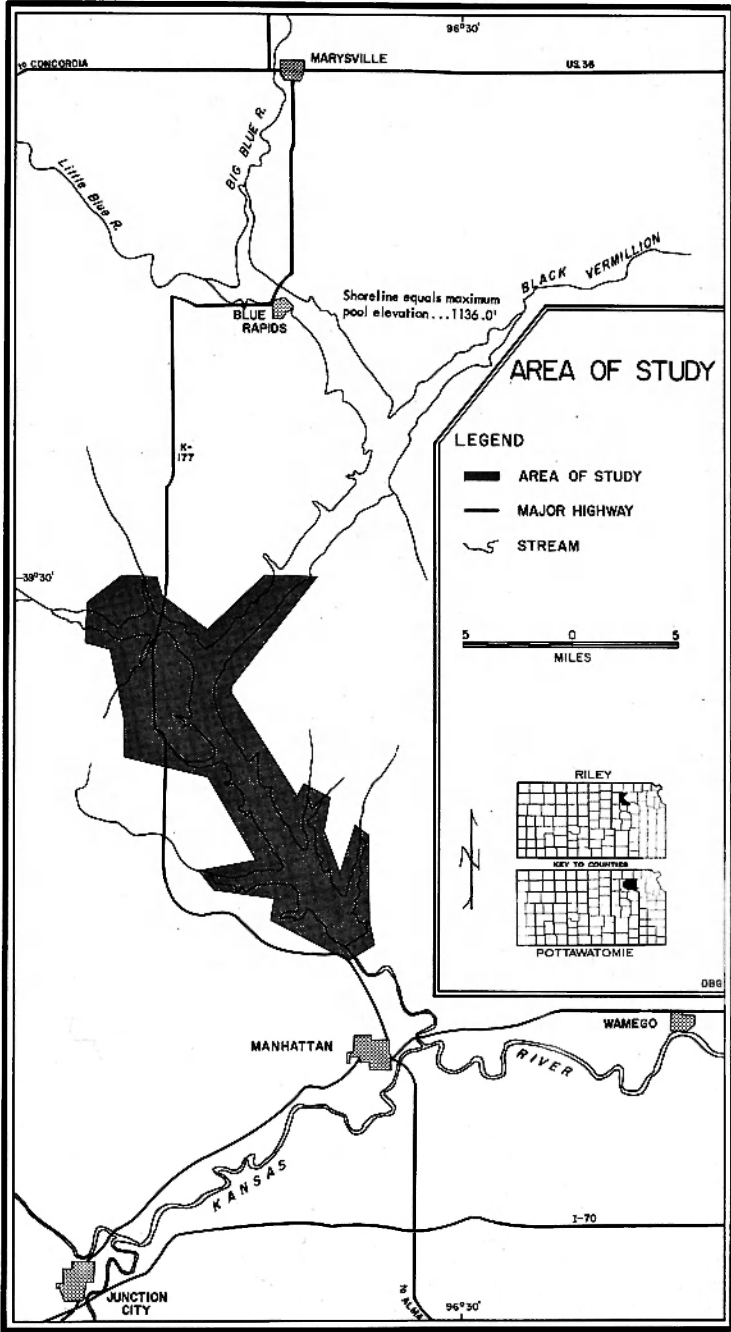


Fig. 1. Area of study.

of a multiple purpose reservoir. Additionally, and from a geographic point of view, it provides an excellent study because the immediate vicinity has been heavily affected by the reservoir's introduction. It was not a case of a few unfertile acres<sup>3</sup> or a few farms being dislocated, but rather 37,000 acres of rich alluvial soil being condemned and eight hundred people being dislocated.<sup>4</sup>

Second, the land uses within the area experienced important revisions. The previously fertile valley had been planted to forage, feed-grain and cash-grain crops, and these were used in association with the upland ranges to provide a balanced system. With the removal of a major part of the system, adjustments had to be made.

Third, Tuttle Creek Reservoir has been operational for less than seven years. This means that many of the dynamics of change have either occurred recently or are still in the process.

#### IV. METHOD OF APPROACH

In the following chapters the questions posed under statement of

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<sup>3</sup>The Bureau of Reclamation attempted to give an opposite impression when it stated: "Some land and improvements in river bottoms will be flooded, but with few exceptions, reservoirs will cover lands of little or no agricultural value." U.S. Congress, Senate, The Missouri River, Conservation, Content and Use of the Missouri River Basin in Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, Iowa, and Missouri, 78th Congress, 2d Session, 1944, Senate Document 191, p. 23. In the eastern part of Kansas, the valleys are the only really fertile cultivable lands. The valley walls are too steep and the uplands have shallow and stony soils except where covered by loess. In the area immediately surrounding Tuttle Creek Reservoir, the only cultivable area in the uplands is near Randolph near the northern end of the reservoir.

<sup>4</sup>U.S. Army, Corps of Engineers, Lower Kansas River Basin Reservoir Regulation Manual: Tuttle Creek Reservoir, Vol. II (Washington: Government Printing Office, December, 1966), pp. IV-13.

purpose will be answered in a narrower fashion than they are given. It is beyond the scope of this study to seek out all of the impacts the reservoir has had. For this reason a broader view of the overall situation is first presented; a closer focus into each of the major themes is then presented utilizing examples.

In order to describe and explain the changes, a comparative approach is used. Looking at the patterns in 1956 and again in 1966 produces a simplified picture of the changes as well as questions seeking solution.

The years 1956 and 1966 were chosen because (1) aerial photos were available for both years; (2) there is an approximately equal span of time on either side of the dam's first year of operation in 1962, and (3) the most pertinent data for this study were unavailable beyond the 1966 calendar year.

## V. STUDY AREA

Figure 1 shows the study area of this thesis in addition to the general location of Tuttle Creek Reservoir within Kansas. The southern extent of the study area lies along the southern side of River Pond Park. The area to the south of the park has not been affected by the reservoir in much more than a psychological manner. The boundary running parallel to the reservoir is about one-half mile from the 1140 foot contour line, the elevation at which government land purchase ceases. This distance was selected after the land uses for a wider area had been studied. It was the author's belief after studying the wider area that the land use changes occurred within the half-mile limits. Finally, the northern end of the map was drawn more by necessity than choice. There were no

base maps beyond this line which would allow continued mapping to the county line. It does not, however, hinder the study, for the major land uses south of this line are representative of those farther north.

## VI. PLAN OF THE THESIS

The remainder of Chapter I is concerned with other studies dealing with land and water uses, and attempts to show how this thesis can fill a gap in the geographic literature of today. Chapter II deals with national and state views of water, the role of Kansas in current water uses and where Tuttle Creek Reservoir fits into the total picture. The chapter also gives details of the history of the reservoir, tracing its political life and some of the difficulties encountered along the way to completion. The chapter ends by looking at current views of the reservoir. Chapter III begins with a background of the agricultural patterns for the 1956 land uses. The next part of the chapter describes the agricultural land use patterns for 1966 and analyzes the changes that occurred over ten years. A short discussion of changing land values is also included. Chapter IV deals with the urban-oriented land uses. There is a description and analysis of how the reservoir affected towns and development projects. The chapter ends with mention of a few tertiary services. Chapter V continues along this same line by describing and analyzing recreation patterns at the lake. Chapter VI is a short summary of the preceding chapters and outlines the conclusions derived from the study.

## VII. REVIEW OF THE LITERATURE

Land use studies have not been lacking in the academic pursuits of geographers, as witnessed in the indexes of Economic Geography, Annals of the Association of American Geographers and the Geographical Review.<sup>5</sup> Similarly there are a number of papers devoted to the subject of water and the interaction between water and man. The Department of Geography Research Papers from the University of Chicago have a number of publications devoted to man and water problems. Gilbert White is one of the foremost authorities concerning problems dealing with man and water, and he has published several papers on the subject.<sup>6</sup>

A further search into the literature produces two studies dealing with water and land uses. Ruth Baugh describes the changes in agricultural land uses that occurred in a California valley after the streams in the valley were siphoned-off to fulfill municipal water needs in Los Angeles two hundred miles away.<sup>7</sup> Ian Burton looks at various agricultural land

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<sup>5</sup>For example: S. Van Valkenburg, "Land Use Within the European Common Market," Economic Geography, XXXV (January, 1959), 1-24; Preston James, "Patterns of Land Use Changes in Northeast Brazil," Annals of the Association of American Geographers, XLIII (June, 1953), 98-126; C.S. Chen, "Land Utilization in Formosa," Geographical Review, XLI (1951), 438-456.

<sup>6</sup>Gilbert White, Human Adjustment to Floods, (Department of Geography Research Paper No. 29. Chicago: University of Chicago, 1942); White, et. al., Changes in Urban Occupance of Flood Plains in the United States. (Department of Geography Research Paper No. 57. Chicago: University of Chicago, 1958); and White (ed.), Papers of Flood Problems, (Department of Geography Research Paper No. 70. Chicago: University of Chicago, 1961).

<sup>7</sup>Ruth Baugh, "Land Use Changes in the Bishop Area of Owens Valley, California," Economic Geography, XIII (January, 1937), 17-34.



use patterns in different parts of the United States which are affected by various flood plain and flooding characteristics.<sup>8</sup>

One other study which deals with water and land uses and significant to this thesis, is the study of the Kansas Basin by Charles Colby and other geographers from the University of Kansas.<sup>9</sup> This study looks extensively at the various facets of the Kansas Basin including hydrology, climate, terrain, and social and economic relationships in the basin. Land use is only briefly mentioned, and as in many other studies, it is discussed in light of present occupance with no attention given to future impacts by reservoirs on land use.<sup>10</sup>

There is a noticeable lack of study by geographers into the aspect of a reservoir's impact upon the land uses in the area immediately surrounding the water. This thesis was partially designed with the intent of filling this gap in the geographic literature.

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<sup>8</sup>Ian Burton, Types of Agricultural Occupance of Flood Plains, (Department of Geography Research Paper No. 75. Chicago: University of Chicago, 1962).

<sup>9</sup>Charles Colby, Director, The Kansas Basin (Lawrence: University of Kansas Press, 1956).

<sup>10</sup>Sewell points out in his study of the Fraser River Basin that an important factor overlooked by the area Regional Planning Board was the impact of certain flood control measures on the land use patterns in various parts of the flood plain. W.R. Derrick Sewell, Water Management and Floods in the Fraser River Basin, (Department of Geography Research Paper No. 100. Chicago: University of Chicago, 1965), 101.

## CHAPTER II

### BACKGROUND

#### I. NATIONAL AND STATE VIEWS TOWARD WATER

Across the nation as well as the state of Kansas, attitudes toward water and its utility vary in response to the need placed upon it. For example, there is a major disparity of attitudes between the farmer in western Illinois and the farmer in western Kansas. Where the Illinois farmer is usually more concerned with the problem of too much moisture due to spring floods, the Kansas farmer is concerned with the seasonal lack of moisture. Where one employs dikes to keep the water out, the other uses dikes in irrigation to keep in the water. Where one desires the water to cease falling and flowing, the other may wait months for such a blessing.

Another variation of attitudes exists between the urbanite of eastern Kansas and the small town resident in western Kansas. The urbanite has the choice of pursuing several types of water recreation, while the townsman must decide how far he is willing to travel to pursue any water recreation.

Because of the greater population in eastern Kansas than western Kansas, it would appear that the greater population would be able to exert more pressure on the persons in responsible political positions to obtain recreational facilities. Also, the population in eastern Kansas is more urban oriented than the population in western Kansas. It would seem, therefore, that the easterners have more leisure time for pursuing recreational activity.

These views are supported by the following statements:

Although agriculture's current position is very strong in the use of water and land resources, some diminution of use is likely in the years ahead. Two factors are primarily responsible for this probable change in use patterns: (i) sharp increases in numbers of people who demand greater quantities of other uses, and (ii) the greater economic values of competing uses.<sup>1</sup>

and:

Population increases, income increases, leisure time increases and improved transportation facilities have all led to the public demand for a greater use of land for extensive recreational activities.<sup>2</sup>

Ackerman lists five physical-cultural features which vary the demand for water among the several national regions. These also appear applicable to the state of Kansas. The features are:

1) The size and growth characteristics of the population, 2) the character of natural resources other than water and their peculiar combinations with the regions, 3) the space characteristics of the land that help to determine the location of service functions in the economy, 4) popular attitudes toward climate and other outdoor amenities, and 5) political structure and political policy.<sup>3</sup>

In short, he is stating that the demand for water varies not only in the quantity used from place to place, but also by the use to which it is subjected.

The farmer in western Kansas is more concerned about water for his crops than for recreation. Likewise the urbanite of eastern Kansas will

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<sup>1</sup>B. Delworth Gardner, "Agriculture as a Competitive Segment of Multiple Use," Land and Water Use (ed. Wynne Thorne, Washington, D.C.: American Association for the Advancement of Science, 1963), p. 111.

<sup>2</sup>Keith Roberts, "Managing Private Lands in Relation to the Changing Uses of Public Lands," Land and Water Use (ed. Wynne Thorne, Washington, D.C.: American Association for the Advancement of Science, 1963), p. 118.

<sup>3</sup>Edward Ackerman and G. Lof, Technology in American Water Development (Baltimore: Johns Hopkins Press, 1959), p. 61.

consider his domestic water needs more important than the water for recreation. But there is an increasing demand for water to be made available for recreation while maintaining the domestic needs. The average American who puts in a forty hour week is finding himself with more free time to enjoy the greater amenities of life. As a result outdoor recreation is on the increase, and the focus of this activity is on water-centered recreation.

Water is an integral part of many recreational activities. Swimming, boating, water-skiing, fishing, duck hunting and other water sports require a body of water. Other recreational activities such as camping, hiking, picnicing, or just a pleasant drive are enhanced in beauty by the presence of water. Few campsites, parks or woods appeal to the public without the presence of water facilities. Finally, there are few cottage or cabin sites throughout the United States which are not water-oriented.<sup>4</sup>

Kansas is a participant in this recreation surge. With about nine-tenths of its area in farms, the state has little area available which can be put into recreational use, and only a portion of that area is near or already in natural water bodies. When the sight of water would be most welcome during the summer heat, most of the rivers and creeks are likely to dry up. Natural lakes in Kansas are rare because of the well developed drainage system. In an effort to overcome this lack of lakes, artificial lakes have been constructed for multiple

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<sup>4</sup>F.C. Foley, R.V. Smrha, and D.F. Metzler, Water in Kansas (Topeka: Kansas State Legislature, 1955), p. 79.

purposes, recreation often being one of the purposes. The stocking of fish has helped encourage recreational development.<sup>5</sup> Federal expenditures have proportionately increased in the state to provide these latter mentioned and other services (Fig. 2).

In 1950 there were 700,000 visitor days<sup>6</sup> to two federal reservoirs in Kansas; in 1964 that figure had spiraled to 4,250,000 visitor days for nine reservoirs, Tuttle Creek being one of these. Further, motor-boat registrations increased from 15,700 to 24,300 between 1960 and 1964.<sup>7</sup>

Many of the reservoirs in Kansas have been constructed for multiple purposes<sup>8</sup> because the major demands for water are usually seasonal. To have multiple use of water requires a key facility, a storage reservoir or a reservoir with a conservation pool.<sup>9</sup> The pool level is then varied seasonally depending upon the need for the particular season. The usual sequence is as follows: in early fall draw downs are common in order to provide water for irrigation to supplement usual deficits in late summer precipitation. Draw downs also occur for the stabilization of

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<sup>5</sup>Ibid.

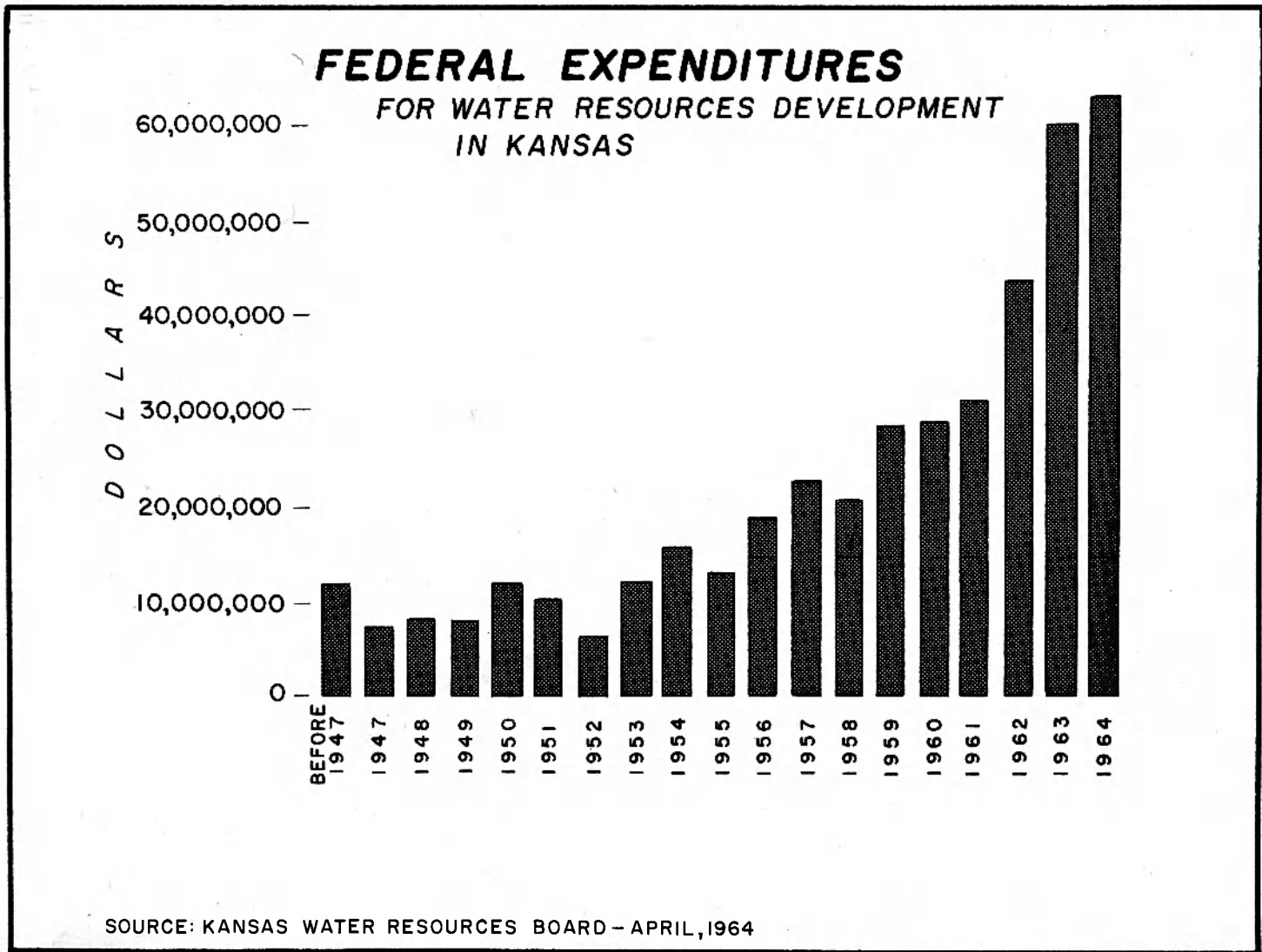
<sup>6</sup>A "visitor day" is defined as one person visiting a specific area for a period of one day.

<sup>7</sup>Kansas Water Resources Board, Planning for Plenty (Topeka: State of Kansas, 1964), p. 79.

<sup>8</sup>"Multiple use is nothing more than making the same water...serve effectively all the existing forms of demand for withdrawal, flow-use or on-site use." Ackerman, op. cit., p. 89.

<sup>9</sup>Ibid.

Fig. 2. Federal expenditures for water resources development in Kansas.



major rivers used for navigation. The pool is allowed to build again in the spring when snow-melt waters provide abundant water supplies throughout the basin. When summer arrives the conservation pool level is back to normal for the resurgence of recreational activity. Into this pattern of multiple use, the desire for recreation and water for navigation, fits Tuttle Creek Reservoir.

## II. HISTORICAL SETTING OF TUTTLE CREEK RESERVOIR

Floods have long been a part of Kansas history. The Indians related stories of floods to the settlers and advised them against building close to the river.<sup>10</sup> But these new inhabitants gave little thought to the Indians' advice and built their towns adjacent to the water. As a result the towns have been subjected to frequent flooding and sometimes heavy property loss. It was soon learned that Kansas was an area where the major streams spilled over their banks regularly (see Table I). For example, between 1844, the earliest known and recorded flood in Kansas, and 1951 the Kansas River never went longer than eight years without flooding, and not a year passed that some place within the state was not subjected to floods and damage (see Table II).

Federal Government Interests. In 1928 the Blue River was first mentioned in official government documents, and in 1931 was considered in a "308 Report" entitled "Kansas River, Colorado, Nebraska, and Kansas,"

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<sup>10</sup> Anna E. Arnold, A History of Kansas (Topeka: State of Kansas, 1916), p. 135.

TABLE I  
OVERFLOWS OF MAJOR RIVERS IN KANSAS  
1844 - 1951

<u>Kansas River</u>	<u>Blue River</u>	<u>Republican River</u>	<u>Smoky Hill River</u>	<u>Neosho River</u>	<u>Verdigris River</u>	<u>Marais Des Cygnes River</u>
1844 1858	1844	1844	1844	1844		1844
				1885		
1892					1889	
1896 1897			1895 1896	1896	1895 1896	1895
						1898
1902 1903 1904	1902 1903	1903 1904 1905	1903	1903 1904 1905	1899 1901 1902 1903 1904	1904
1908 1909	1908 1909	1908	1909	1907 1908 1909	1906 1907 1908	1909
1915	1915 1916	1915		1912 1915 1916 1919		1915
1923	1925	1923		1922 1923	1922 1923	1922 1923
1929	1927		1927 1928	1926 1927 1928 1929	1926 1927 1928 1929	1927 1928 1929
			1930		1931	1931 1932
1935	1935	1932 1933 1935	1935	1933 1935 1937	1935	1935
1941	1941	1941 1942	1938 1941 1942	1938 1941 1942	1938	1938 1941 1942
1943 1944 1945	1943 1944 1945 1947	1943 1944 1945 1947	1944 1945	1943 1944	1943 1944	1943 1944
1950			1948	1948		1948
1951	1951	1950 1951	1951	1951	1951	1951



TABLE II  
ESTIMATED FLOOD DAMAGE IN KANSAS  
1926 - 1953

Year	Estimated loss (contemporary prices)	Loss adjusted to 1951 prices <u>a/</u>
1926	\$ 5,125,000	\$ 9,251,000
1927	9,875,000	18,667,000
1928	7,099,000	13,244,000
1929	6,299,000	11,929,000
1930	105,000	219,000
1931	25,000	60,000
1932	726,000	2,023,000
1933	208,000	568,000
1934	15,000	37,000
1935	8,600,000	19,412,000
1936	236,000	526,000
1937	236,000	493,000
1938	2,640,000	6,054,000
1939	150,000	351,000
1940	156,000	358,000
1941	12,563,000	25,957,000
1942	4,273,000	7,798,000
1943	5,030,000	8,810,000
1944	14,000,000	24,306,000
1945	6,218,000	10,611,000
1946	1,965,000	2,928,000
1947	11,650,000	13,820,000
1948	20,832,000	22,767,000
1949	3,852,000	4,484,000
1950	3,771,000	4,213,000
1951	767,370,000	767,370,000
1952	17,347,000	17,847,000
1953	3,560,000	3,712,000

a/ Adjusted by using the wholesale price index compiled by the Bureau of Labor Statistics.

Source: F.C. Foley, Water in Kansas, p. 8.

which was presented to the Congress and later published as a House Document.<sup>11</sup> All of this stemmed from a Congressional request in 1926<sup>12</sup> to make a thorough investigation of potential water development projects. The Kansas Basin and the Blue River were part of this search.

The total program was concerned with flood control, navigation stabilization, the development of potential water power, and irrigation. Floods were taking their yearly toll while river transportation was subjected to seasonal fluctuations of the river. By stabilizing the amount of water, year-round shipping activities could be maintained. Further, by placing storage reservoirs in the Kansas Basin, there could be an extension of the navigation season between St. Louis and Kansas City.<sup>13</sup>

Government Action Concerning Tuttle Creek. A reservoir was proposed in the "308 Report" to be built north of Manhattan, Kansas, near a Blue River tributary called Tuttle Creek. This ~~would~~ fulfill the needs of navigation between St. Louis and Kansas City while being part of the more complex Mississippi River navigation program. Additionally, it would serve as a conservation storage pool and help with flood control.

The following sequence of studies, reports and laws followed House Document 308 and portrayed the birth of Tuttle Creek Reservoir.

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<sup>11</sup>U.S. Congress, House, Kansas River, Colorado, Nebraska, and Kansas, 73rd Congress, 2nd Session, 1934, House Document 195.

<sup>12</sup>U.S. Congress, House, Examination of Streams for Water-power Development, 69th Congress, 1st Session, 1925, House Document 308.

<sup>13</sup>Luna B. Leopold and Thomas Maddock, Jr., The Flood Control Controversy. (New York: Ronald Press, 1954), p. 100.

1. In 1936 a general Flood Control Act was passed in which Congress broadly asserted federal responsibility and control of navigable rivers and their tributaries including improvements for the nation's general welfare.<sup>14</sup> In a supplementary study for the Act, three reservoir sizes at Tuttle Creek were studied: (1) 1,180,000 acre feet for flood control detention, (2) 1,180,000 acre feet for the same purpose as (1), but an additional 293,000 acre feet for conservation, and (3) 1,655,000 acre feet for flood control with the same supplementary allotment for conservation as in (2).<sup>15</sup>

2. In 1937 a report<sup>16</sup> was submitted by the Chief of Engineers recommending construction of two reservoirs in the Kansas River Basin for the purpose of reducing flood damage in the lower Missouri and Mississippi Rivers. The two reservoirs were to be at Tuttle Creek with a capacity of 1,180,000 acre feet,<sup>17</sup> and at Milford with 1,170,000 acre feet.<sup>18,19</sup>

3. A Flood Control Committee Report<sup>20</sup> recommended seven reservoirs

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<sup>14</sup>Ibid.

<sup>15</sup>Corps of Engineers, op. cit., p. IV-1.

<sup>16</sup>This became: U.S. Congress, House, Flood Control Committee Document No. 1, 1937, 75th Congress, 1st Session.

<sup>17</sup>The actual capacity of Tuttle Creek Reservoir in 1966 was 1,933,000 acre feet.

<sup>18</sup>The actual capacity of Milford Reservoir in 1966 was 1,160,000 acre feet.

<sup>19</sup>Corps of Engineers, loc. cit.

<sup>20</sup>U. S. Congress, House, Flood Control Committee Report No. 2353, 1938, 75th Congress, 1st Session, House Report 10618.

for the Missouri River Basin Comprehensive Plan. Included was Tuttle Creek with the combined expressed purposes of flood control and navigation. It was estimated to cost \$27,953,000.<sup>21</sup>

4. The initial authority to construct Tuttle Creek Reservoir was given in the 1938 Flood Control Act, Public Law No. 761, 75th Congress, 3rd Session.<sup>22</sup>

5. The next recommendation by the Corps of Engineers was one of expansion.<sup>23</sup> In 1943 the Corps suggested modifications in the Missouri Basin Comprehensive Plan. They called for Tuttle Creek to have an increased capacity to 1,473,000 acre feet at a cost of \$28,000,000. Further, it was to assume the purposes of "irrigation, navigation, power and other multiple uses."<sup>24</sup>

6. The Flood Control Act of 1944,<sup>25</sup> or the Pick-Sloan Plan<sup>26</sup> as it is more commonly known, had no immediate effect on Tuttle Creek.

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<sup>21</sup>Corps of Engineers, loc. cit.

<sup>22</sup>Ibid.

<sup>23</sup>U.S. Congress, House, 1943, 78th Congress, 1st Session, House Document 475.

<sup>24</sup>Corps of Engineers, op. cit., p. IV-2.

<sup>25</sup>U.S. Congress, 1944, Flood Control Act, 78th Congress, 2d Session, Public Law No. 534.

<sup>26</sup>If more information is sought concerning the Pick-Sloan Plan, the reader is referred to the following: Leopold, Op. Cit.; Marian E. Ridgeway, The Missouri Basin's Pick-Sloan Plan: A Case Study in Congressional Policy Determination, (Urbana: University of Illinois Press, 1955); and Rufus Terral, The Missouri Valley, Land of Drouth, Flood and Promise (New Haven: Yale University Press, 1947). One of the greatest deficiencies in both plans, Pick's and Sloan's, is the cursory attention given to land use problems as these references make note.

The only notable point is that Tuttle Creek was considered an integral part of the Pick Plan in which it was to act as part of mutually reinforcing reservoirs throughout the Missouri Valley.<sup>27</sup> After the flood of 1951, the Pick Plan met stern opposition in connection with the Blue Valley and Tuttle Creek Reservoir.

7. In a 1950 House Document<sup>28</sup> the results of a study made a few years earlier were published. This study was made to determine the feasibility of building a series of smaller reservoirs in the Upper Blue River Basin, but concluded that Tuttle Creek would be more effective for controlling floods in the Blue River while affording further protection from floods for the lower Kansas and Missouri River Basins.<sup>29</sup>

### III. FLOOD OF 1951 AND AFTERMATH

In July 1951, the Kansas Basin experienced an unusual deluge of precipitation that resulted in the greatest recorded flood within the basin.<sup>30</sup> Consequently this flood made a firm impact upon governmental decisions concerning the proposed reservoir at Tuttle Creek (Figure 3). Damages by the flood for the Kansas Basin alone have been listed at \$767,000,000 with the direct loss to urban areas set at 39 percent and

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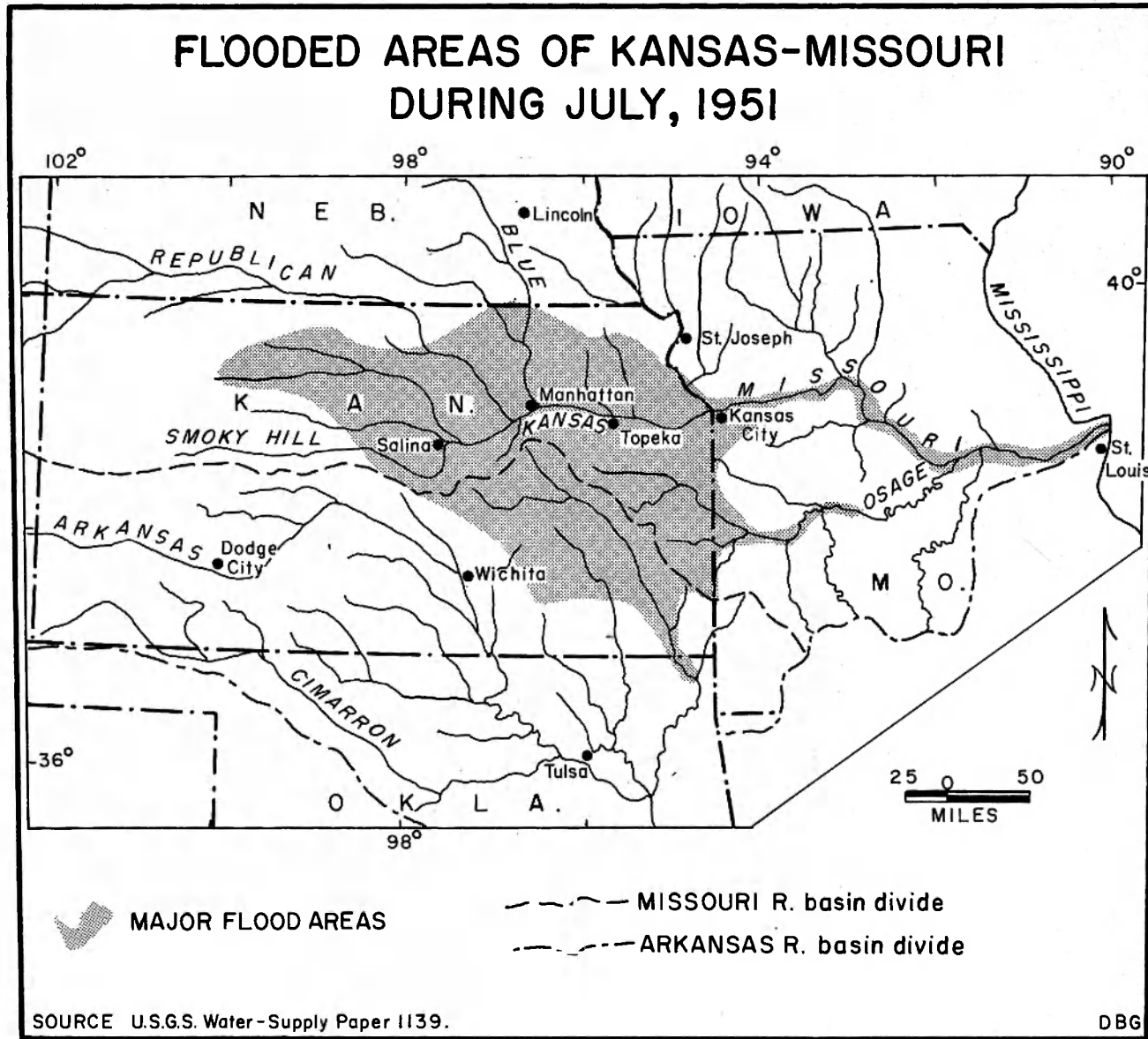
<sup>27</sup>Kenneth Davis, River on the Rampage (Garden City, New York: Doubleday and Co., Inc., 1953), p. 170.

<sup>28</sup>U.S. Congress, House, 1950, 81st Congress, 2d Session, House Document 642.

<sup>29</sup>Corps of Engineers, log. cit.

<sup>30</sup>The 1951 flood is estimated to have been even greater than the flood of 1844, even though there is no data for 1844.

Fig. 3. Flooded areas of Kansas-Missouri during July, 1951.



rural damages at 19 percent<sup>31</sup> (see Figure 4). There arises at this point a discrepancy concerning the flood damage in rural areas. In a water-supply paper by the United States Geological Survey, the implication is given that much of the damage to the farmlands and buildings resulted both from the deposition of a heavy silt load and from scour action.

At some places along the Kansas River after the flood one could observe large 'drifts' on land lying in proximity to a large scoured hole...Apart from the damage to farm lands caused by sediment and scour, agricultural losses in crops were high, as high velocity currents washed out many crops.<sup>32</sup>

There is no challenge about the loss of crops, but the implied harm to the land is questionable. As soon as there is a flood many people think of one word, damage. But when the Nile River floods, the local peasants' thought turn to another word, fertility. The story of the Nile floods and subsequent deposition of fertile alluvium is ageold. Why then should Americans scream "destruction" whenever there is a flood? The need to understand a floodplain and associated settlement problems is necessary. Kollmorgen has written an appropriate article about this, titled, "Settlement Control Beats Flood Control."<sup>33</sup>

To return to this discrepancy about the damages caused by siltation and scour on the Kansas River floodplain, Kollmorgen points out in another article that soil technicians at Kansas State University made

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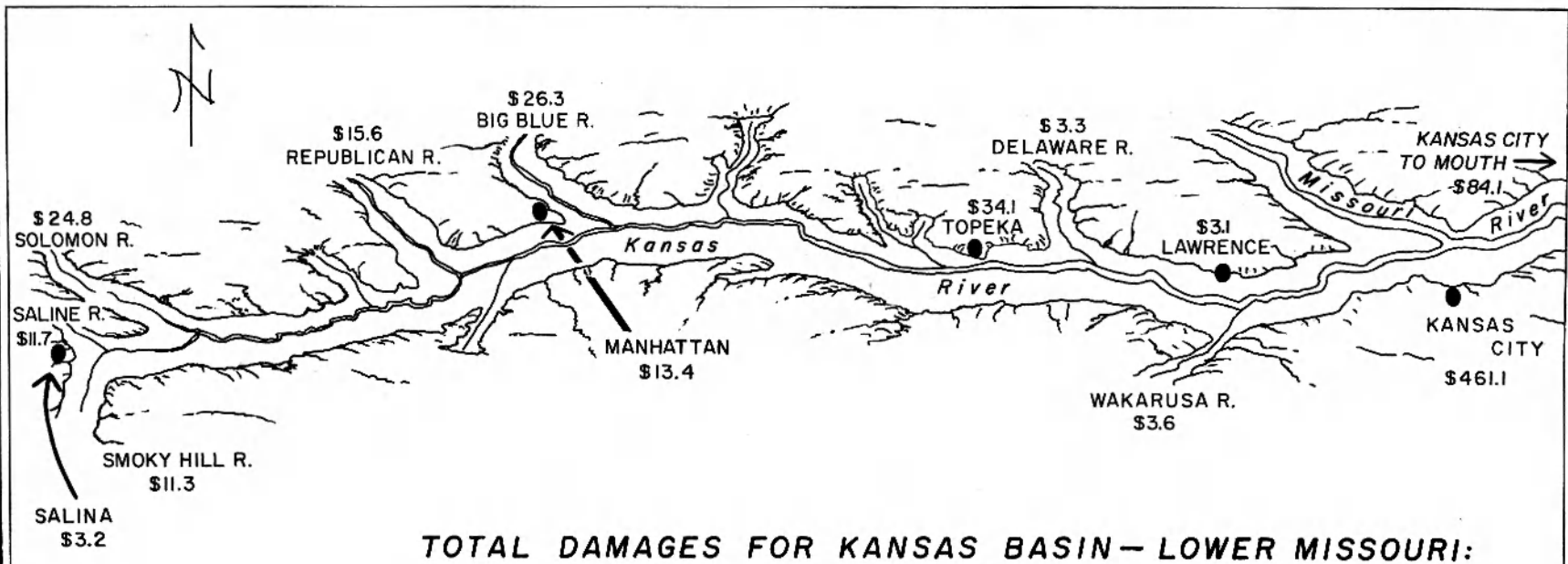
<sup>31</sup>Foley, op. cit., p. 7.

<sup>32</sup>United States Geological Survey, Kansas-Missouri Floods of July, 1951, Water-Supply Paper 1139, (Washington: U.S. Government Printing Office, 1952), p. 35.

<sup>33</sup>See Economic Geography, XXIX, No. 3, 1953.

# DISTRIBUTION OF FLOOD DAMAGES, MAY-JULY 1951

## KANSAS RIVER BASIN AND LOWER MISSOURI RIVER



**TOTAL DAMAGES FOR KANSAS BASIN - LOWER MISSOURI:**  
**\$ 809.2**

VALUES IN MILLIONS OF DOLLARS

SOURCE: Foley, et.al., "Water in Kansas", 1955

DBG

Fig. 4. Distribution of flood damages, May-July, 1951.



a study of the soil after the flood and arrived at the following conclusions:

"...76.6 percent of the acreage studied was slightly or materially improved by flooding; in about 13 percent of the area no change occurred, about 6.8 was slightly impaired, and only 7 percent was considerably impaired."<sup>34</sup>

It appears to the author that this statement matches the geographer's conception of floods and alluvium, where the former statement is based on the technician's seven percent impaired soil.

The government reacted to the flood situation by placing its sympathies with the urban inhabitant. After all, 39 percent of the damages occurred in these areas and most of the population was centered there. Supporters of the Pick-Sloan Plan were soon convinced that the benefits of the proposed dams would have been substantial in the conditions just witnessed. Little did they realize that ~~this~~ flood was of such proportions and so irregular that its recurrence is estimated to be once every few centuries.<sup>35</sup> Further, if they were aware of such information, it appears they simply refused to accept it.

Staunch opposition immediately arose over the now improved chances for Tuttle Creek Reservoir. As a result several developments occurred: (1) Congress appropriated five million dollars to begin construction of Tuttle Creek Reservoir. (2) In a congressional election within the area, a Democrat won for the first time in history on the platform of opposition to Tuttle Creek Reservoir. (3) The governor of Kansas

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<sup>34</sup>Walter Kollmorgen, "And Deliver Us from Big Dams," Land Economics, XXX (November, 1954), p. 345. If interesting reading is sought concerning a geographer's plea and protest against dams and reservoirs, this article is enlightening.

<sup>35</sup>Ibid., p. 333.

requested three of the nation's best engineers to study the basin's flood problems. (4) President Truman's Committee on Flood Control issued its report on the Missouri River Basin expressing a deep reluctance towards dam building in the Kansas Basin.<sup>36</sup>

With the great fervor of opposition to the reservoir and a request for concillatory action, the United States Senate Committee on Appropriations issued the following statement in its 1953 Fiscal Year Report:

An appropriation for \$10,000,000 is recommended for flood control works in connection with the Tuttle Creek Reservoir, Big Blue River, Kansas with the understanding that the dam will be operated as a dry dam,<sup>37</sup> without either power or recreational features.<sup>38</sup>

This decision was reversed, however, in 1957<sup>39</sup> when the restriction on the conservation operation of the reservoir was lifted under the pressure of a prolonged drought in the Midwest, and the accompanying need for an improved flow in the Kansas River. In addition, interested individuals and organizations with political influences had long pressured for recreation improvements to the site.<sup>40</sup>

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<sup>36</sup> Ibid., p. 335.

<sup>37</sup> A dry dam is "so constructed that only during times of excessive precipitation would water be impounded back of the dam to create a temporary reservoir or pool and that at other times farming, etc. would go on as before." Walter H. Schoewe, "The Geography of Kansas, Part II Concluded-Hydrogeography," Transactions of the Kansas Academy of Science, LVI (June, 1953), 160.

<sup>38</sup> Corps of Engineers, op. cit., p. IV-3, citing U.S. Congress, Senate, 1952, 82d Congress, 2d Session, Senate Report 1754 (House Report 7268).

<sup>39</sup> U.S. Congress, Senate, 1957, 85th Congress, 1st Session, Senate Report 600 (Accompanying House Report 8090).

<sup>40</sup> Leopold states the basic problem of opposition thus: "The benefits of the program are often located in one section of the river valley whereas the damages caused by land acquisition are located in another

It seems, also, that the farmers were little impressed with the dry dam idea. When they compared the terrain in their area to the proposed dry dam specifications, which were tailored from the Miami, Florida Conservancy District dams, the farmers felt that the apparent concession was little more than a gesture by the Corps.<sup>41</sup>

Finally, the Corps won the dispute after (1) the elected Representative from the First District succumbed to political pressure and relaxed the pressure on Congress to stop the project, and (2) the Congress passed the necessary laws appropriating money for construction, thereby giving support to the project.<sup>42</sup>

The Corps of Engineers' Manual of Tuttle Creek Reservoir has the following to state concerning local opposition:

Beginning in the early '50's and continuing until after construction was resumed in 55, a vocal minority violently opposed construction of the project at local, state and national levels. After several years of debate which extended over the hydrologic extremes of the 1951 flood, and subsequent drought years, the proponents of the project, which consisted primarily of downstream interests desiring flood protection and regulated releases during

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part of the drainage basin, perhaps some distance away from the first. This frequently means that two separate groups have vested interests in the flood control program, one for and one against. This results in a geographically determined division of opinion.

A prime example of this conflict is the controversy raging over the construction of Tuttle Creek Dam on the Big Blue River...This structure is greatly desired by interests in Kansas City, Manhattan, Topeka, and Lawrence. However, it is violently opposed by residents of the Big Blue River basin." Leopold, op. cit., p. 141.

<sup>41</sup>E.T. Peterson, Big Dam Foolishness (New York: Devin-Adair Co., 1954), p. 62.

<sup>42</sup>This latter point has been considered by many of the people the author interviewed as the coup de grâce for any opposition to the reservoir. Once the money was appropriated, the tide of the battle reversed.

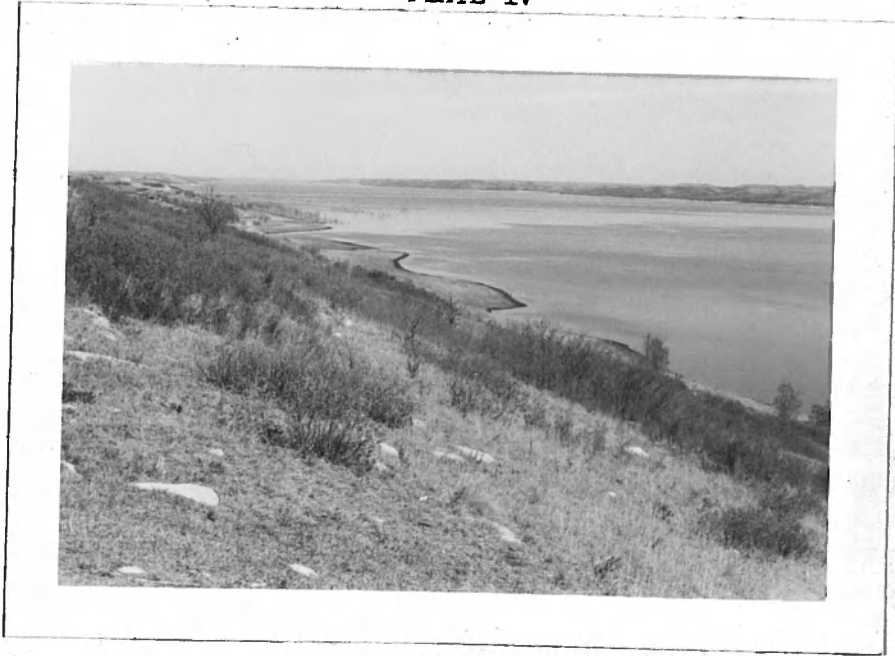
## EXPLANATIONS OF PLATES III AND IV

- III. View of the west side of the dam including the lower observation point and the outflow stream from the conduit tower. The stream connects with the old river channel just below the second bend.
- IV. View of the reservoir looking north from the upper observation point on the west side of the dam. Compare this view of the valley with the previous plate.

PLATE III



PLATE IV



low flow periods, predominated. Support for the project was found at both national and state levels. During the later phases of construction, local opposition had dwindled to a dozen or so landowners who resisted right-of-entry and evacuation until compelled to yield by court order. As prospects of a large conservation pool became apparent to the community, enthusiasm for the project predominated.<sup>43</sup>

This picture presented is, of course, biased to the Corps' side of the dispute. It would appear that the opponents to the reservoir were but a handful of nobodies, where quite to the contrary, several were wealthy and prominent people in the area.

Once the final appropriations for the construction were passed, there was nothing left but the actual construction of the reservoir. In July, 1959 the earthen dam was closed at the point where the Blue River had flowed since before construction. With this closure the dam was able to provide limited operation for flood control, and in the spring of 1960, about 360,000 acre feet of melt water were retained.

Official completion and full operation were achieved on July 1, 1962, and since that time the reservoir has begun to extend its influence on the local, state, and interstate recreation economy.

#### IV. CURRENT OVERTONES

In September, 1966, the water in the reservoir began to recede much to the consternation of the businesses and other interested people located around the lake. The reason for the draw down was to aid the navigation on the Missouri River between St. Louis and Kansas City (see p. 17), and it is this use of the water which most upset the local

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<sup>43</sup>Corps of Engineers, op. cit., p. IV-5.

population.

The problem was one of unfortunate circumstances. Kansas was experiencing an unusually dry year and up to September only 13.5 inches of moisture had fallen. Now the recreation season had passed, and it was time to begin letting water out to flow into the Missouri River. The draw down for navigation caused the pool level to sink lower than ever before. Rather than remaining close to 1075 feet, conservation level, the pool dropped fourteen feet to 1061 feet.<sup>44</sup>

The economic and social impacts were more than moderate. Boat ramps were left from 50 to 150 feet from the water. The author observed one ramp at Randolph State Park as far as 200 yards from the water. Commercial boat marinas were left with docks and boats stuck in the mud. Successful fishing became difficult due to turbidity, and overall the reservoir was an eyesore of mud and desolation along the edges, tributaries and north end.

The Tuttle Creek Lake Association was considering filing for an injunction with the U.S. District Court in Topeka to prevent the Corps from draining all the water from the lake. As one local resident and businessman stated. "It has been a shock to us that they can drain our lake."<sup>45</sup> Another stated:

When the Corps came out here to sell the people on the idea of this dam, they didn't talk about navigation. They talked about what a wonderful recreation spot it would be, and how good it would be for the economy. And they talked about flood control because

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<sup>44</sup>On April 10, 1967, the lake was still at 1064.2 feet.

<sup>45</sup>News item in the Kansas City Star, December 18, 1966.

## EXPLANATIONS OF PLATES V AND VI

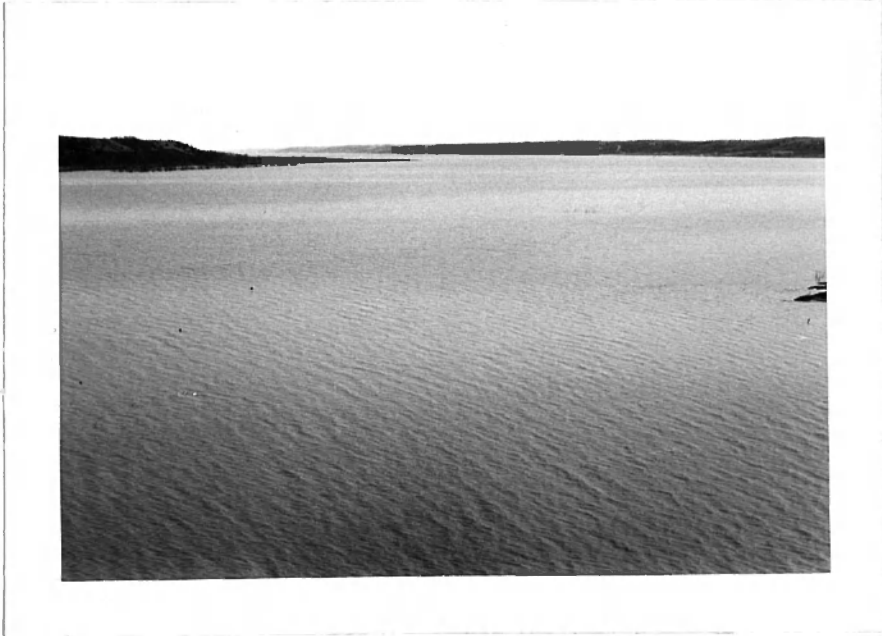
- V. The valley bottom as it was exposed after the large draw down in the fall of 1966. An old farm's foundation is visible in the right-center of the picture. Scene is looking north from the west side of the Highway 16 bridge near Randolph.
- VI. Tuttle Creek Reservoir as seen looking south from the west side of the Highway 16 bridge.



PLATE V



PLATE VI



Manhattan had been hit pretty hard by the flood of '51. They didn't mention anything about navigation.<sup>46</sup>

As of April, 1967 the law suit has not been pressed, for the Corps verbally agreed early in 1967 not to drop the level of the lake as drastically as it did in the autumn of 1966. It is well that the Corps agreed to this as development sites, marinas and agricultural activity all felt the impact from the draw down. This impact was, and will probably be, a decline in trade for developers and marinas in 1967. For the farmer the impact occurred when his wells began to run dry with the water table fall-off, which is only a short-run problem. But the developers and marina owners are afraid that many potential consumers have been permanently discouraged.

It seems that a dispute between the government and the people is engrained into this project. The Corps continues to support the "big picture" while the people continually strive to gain their fair return from the available resource, be it valley farmland or a reservoir. Though the basis for these disagreements, land use, has changed, the battle rages between the little man striving for his personal rights and economic profit and the government, attempting to do the greatest good for the greatest number of people.

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<sup>46</sup>Ibid.

CHAPTER III  
IMPACT ON AGRICULTURAL LAND USES

I. AGRICULTURAL ACTIVITY IN 1956

In eastern Kansas the general agricultural pattern was one of intensively cultivated lowlands in stream valleys, and extensively grazed uplands where soils were generally too thin and rocky to be cultivated. The Big Blue River Valley formed one of the ribbons of productive lowlands which wound its way through the northwestern extremity of the Flint Hills. This locational factor places it in a specific type of agricultural activity to be discussed later.

The Blue River Valley is composed of alluvial materials of post-glacial age and forms the parent material for soils which are friable, and silty to clayey texture. Because of these traits and their physical location, the land requires no special practices in order to maintain suitable production. In addition, the alluvium provides easy infiltration in most places while the underground water, which permeates the underlying material easily, adds considerably to the usefulness and value of the land.<sup>1</sup>

In 1956 this band of highly productive land formed an integral part of the total agricultural picture, one of a cattle-grass-feed economy. There were several major crops which predominated on this land and formed the basis for supporting this particular livestock operation while adding stability to the area's economy. These crops

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<sup>1</sup>Colby, op. cit., p. 13.

were corn, wheat, and feed crops, usually forage sorghum and alfalfa.

The Blue River area did not have a strict cash-grain economy because of physical and historical reasons. The alluvial valley provided the only land truly suitable for cultivation. Though some upland areas could be cultivated, they had mostly thin and stoney soils. Thus, the area available for growing cash-grain crops was limited. Historically there are a few reasons which prevented the area from becoming cash-grain. First, in the early 1900's the price of corn, which was and still is the primary crop in the valley, was so low that the farmers had to feed it as forage to their cattle, hogs, and chickens if they ever hoped to realize a profit. Second, to the west of the valley, Fort Riley provided the only market, and to send the corn east to either Missouri or Iowa would have cost too much; but by sending the corn-fattened cattle and hogs instead, the farmers realized a profit. The factors which kept the farmers from becoming strict cash-grain producers can be summed up as: a limited area for growing cash-grain crops, low grain prices, high transportation costs, and the locational factor of markets.<sup>2</sup>

The remainder of the land in this cattle-grass-feed economy was made up of relatively steep slopes, which form the valley walls, and broad expanses of undulating uplands which were often dissected by intermittent stream courses. The slopes were covered with native grasses; whereas, the ravines which cut into the valley walls forming steep and short flowing intermittent tributaries were covered with woods (see Fig. 5).

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<sup>2</sup>Robert M. Webb, "Relationships Between Agricultural Lowlands and Uplands in a Portion of the Big Blue Valley Region of Kansas," (Unpublished Ph.D. dissertation, University of Kansas, Lawrence, 1962), 29-30.

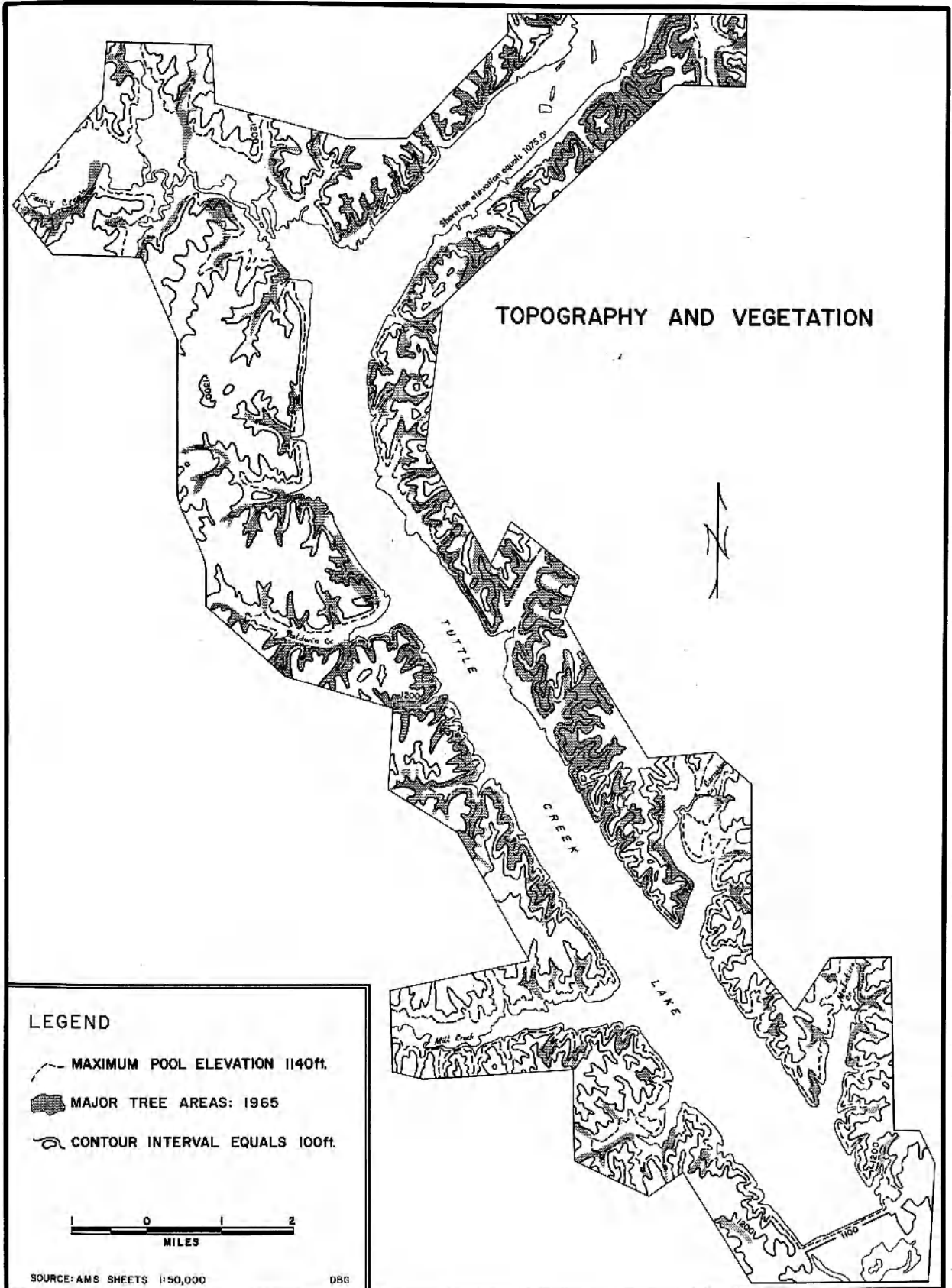


Fig. 5. Topography and vegetation.

The protection afforded by these ravines was considerable and farmers valued them highly. Their "quality" of use was found in the shelter provided for cattle against the cold winter winds and hot summer sun.<sup>3</sup> The uplands were basically native grasses,<sup>4</sup> but there were some cultivated fields intermixed in a few places where soils were deeper usually due to a loess cap, and the topography was more gently sloping thus counteracting erosion. When needed, terracing and other conservation practices were incorporated to give added protection against erosion.

This mixture of floodplains, hills and undulating uplands led to diverse, but complementary agricultural activities. Although the farmer had to contend with several types of land use problems, he obtained an integration of uses. The result of all these factors was a farm enterprise in which forage feed crops were produced in the bottomland to be used as winter supplement for cattle which were upland grazed on the nutritious native grasses during the summer months.

A more detailed description is now needed in order to permit better understanding of the area by the reader, and to aid in analyzing the land use changes which occurred after the introduction of the reservoir. Today most of the farms in the Big Blue Valley area are livestock farms as they were in 1956. The difference is in the type of program followed in 1956 compared to 1966. The Blue Valley livestock farmer pursued two basic types of livestock programs ten years ago. One was called the deferred system and the other a cow-calf herd operation.

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<sup>3</sup>Ibid., p. 32.

<sup>4</sup>The major types of native grasses in this area are the Big Bluestem, Little Bluestem, Indian grass, and Switch grass.

Under the deferred system of livestock production, the farmer utilized a combination of roughage, grass and grain. Calves were purchased in the fall and roughed through the winter on the residue from the previous summer's crops and on the winter wheat which broke out through the ground surface. Around the end of April the animals were placed on the upland pastures, which included the slopes of the valley, and left there until August. At this time they were fed for about three months from grain and forage crops grown on the bottomlands, and then the animals were shipped to market.<sup>5</sup> Many of the farmers who were located on the floodplain in 1956 were able to pursue this system. They owned a sufficient amount of bottomland for growing grain and forage crops for feed, and wheat for cash. Their property usually extended up the slopes of the valley behind the farm and in many cases there was a sizeable acreage of undulating upland.

The most popular system of beef production in the valley, however, was the use of a cow herd for calf production. Its popularity stemmed from the advantages of greater flexibility in operation and less risk. In this system the calves, after being born around the latter part of February, were allowed to remain on the pasture with the cows. They were taken off the pasture in September at which point the farmer had three choices: (1) he could sell the calves to a feedlot; (2) he could grain feed them through the winter and send them to market in the spring; or (3) he could roughage feed them through the winter, graze them through a second summer, and grain feed them a short period of time before sending

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<sup>5</sup>Webb, op. cit., p. 33.

them to market in the early fall.<sup>6</sup>

This latter system was useful not only to lowland farmers, but also to upland farmers who had little or no bottomland or limited supplies of crops from upland fields. In the Big Blue Valley region where the hills and upland pastures lay adjacent to the bottomlands, it is easy to see how these two systems were easily manageable and provided best use of the land resources within the area.

The Land Use map for 1956 (see Fig. 6) shows the juxtaposition of the uplands and bottomlands. The sinuous line of cultivated fields follows the lower break in the slope of the hills where it is in contact with the floodplain. The tributary valleys are apparent as the line slides in and out of the valleys, giving the appearance of a branch with thorns. It is noticeable in comparing this map with the physical map (Fig. 5) that the amount of cropland in the tributary is proportional to the width and length of the tributary valley. Compare, for example, the tributary valleys of McIntyre Creek and Carnahan Creek, and the small coves between. The extent of the cropped land into the major tributaries is much more extensive than the cropland in the minor, short-run creeks between them.

This 1956 Land Use map does not show farmyard areas, for it was decided that they lend little to an understanding of the overall land use pattern. It should be pointed out, however, that farmsteads were located at the mouth of nearly all the small tributary valleys along the Big Blue Valley, and that as many as three farms were found at the

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<sup>6</sup>Ibid., p. 34.



mouth of the larger tributary valleys. In most cases there was only one farm in this latter location, but a second farm would be located within a half-mile upstream in the tributary. An explanation of the other land use categories is presented at this point.

The classification of grazing lands encompasses three land uses in farming activity. The first is straight cattle grazing on natural grasses; the second is natural grass that has been cut and baled as prairie hay; and the third is grazing on brome grass. The reason for including all three variations under one classification is that the final use is feeding cattle noncultivated plants.

It was also decided to omit a woodland classification from the two land use maps because of the statement made by Webb in his study concerning the value which the wooded ravines and coves have to livestock protection. Therefore, all of the wooded ravines and coves fall into the classification of grazing, for they are primarily used in that activity. However, some wooded areas on the 1956 Land Use map were labeled as "idle" land. This was done for those wooded areas found in the meander loops of the Big Blue River as well as wooded areas located along the railroad. It is the author's belief that these areas were little used, if at all, by the farmer, and if they were in use, it was only for a short period of time in the winter when the cattle may have been given protection amongst the trees. To classify these areas, then, under grazing as the wooded ravines were, would be fallacious.

The other areas classified as idle land are those which were located in waste sections of cultivated fields, often near streams, and in the area

adjoining Randolph. Whether or not some of these areas had been cropped at one time and only recently left fallow was undeterminable from the aerial photos. Further, the maps are drawn on the basis of "present" use and not on the previous year's or years' use. The classification "idle" serves well as a category, for it relieves the necessity of distinguishing waste areas from fallowed land.

It will also be noted that a rather large area of land near the south end of the map is classified under a rather dubious term of "other." The area was undoubtedly cropland and upland grazing prior to 1956, and especially prior to 1950. It has the same physical characteristics of floodplain, slopes or valley walls, and upland. But this is the area where Tuttle Creek Dam was constructed, and in 1956 the expanse of construction activity showed itself. A large borrow-pit, later to become an artificial lake for recreation, was in the process of being dug, the earthen dam was mounting above the valley floor, and a large slice of earth was being removed from the hill immediately to the east, where the spillway was eventually to be placed.

To return to the discussion of cropland and grazed uplands, it will be noted that a large area of cropland appears just north of Baldwin Creek on the west side and becomes increasingly greater the farther north one moves. It was mentioned that the area around New Randolph has a loess cap over the limestone-shale beds; due to the thicker soil zone, the area is cultivable, but the added precautions of terracing, strip-cropping, contour plowing, and grassed waterways are necessary.

The main crops grown on these upland fields in 1956 were wheat,

corn, alfalfa, and sorghums, basically the same crops grown in the valley.<sup>7</sup> The reason for this was simple enough; wheat provided the farmer with a cash-grain crop which added to his flexibility; alfalfa released large areas of land from being used as prairie hay, while producing more hay on smaller acreages, and sorghum was starting to mount its appeal over corn because of its higher resistance to drought.

In 1956 there was an increasing trend for upland farmers to begin finding a means of support without the aid of the lowland farms. Up to this time there had been a balanced interaction between the two locations. The upland farmer was often unable to function effectively under the system without lowland farms. Although he had plenty of grazing land for the summer months, he was without land that could produce crops to feed his cattle for the market.<sup>8</sup>

The lowland farmer, producing more grain than he could use, sold products to the elevators in Randolph and Manhattan from where the upland farmer had a local source of feed supply. This supply became increasingly important in the drier years, for farmers who were able to cultivate some upland, as the area around Randolph, were forced in these years to fall back on the lowland grain supply to replace the upland crops that failed.

In 1956 with the appropriations for Tuttle Creek construction granted and the certainty that the lowlands would be lost, the upland farmer began growing more sorghum than corn to begin balancing dimin-

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<sup>7</sup> Webb, op. cit., p. 46.

<sup>8</sup> The two livestock systems were discussed at the beginning of this chapter.

ishing grain production below. It also became clearer from that time on that to maintain economic stability and growth would mean a shifting of activities and the necessary growth in farm size. The cost to import feed from more distant locations would not be economically feasible for the smaller upland farmers.

The general land use pattern for 1956, then, may be stated as one of cultivated bottomlands, grazed hillsides and uplands with some uplands basically devoted to forage crops, especially alfalfa and sorghums.

## II. LAND USE IN 1966

When the Corps purchased land to be used for the reservoir, it did so by two methods. Fee-simple acquisition was the first method, and under this type of purchase the Corps bought the title to the land outright. The average price paid under this type of purchase was about \$246.00 per acre. The second type of purchase was easement right. Under this method the farmer retains all titles, rights and privileges of private ownership. The difference is that the Corps has bought the right to flood the purchased land whenever it wishes. The average price paid for this right of easement was about \$216.00 per acre. Under both plans all structures had to be removed from the land purchased. This means there is no building of any kind below the elevation of 1140 feet, the height of maximum flood pool. In 1966 there were three groupings of land ownership below elevation 1140 feet, each affecting land use. The three were private ownership, the Corps of Engineers, and the State Fish and Game Commission. Each of these three lowland ownership groups will be discussed regarding the types of land use for 1966. Following

this there will be a discussion of the upland land use in 1966.

Privately Owned Lowland. The land which was not purchased by the government or which was bought under easement rights constitutes the area of this discussion. It was mentioned above that the land which was bought under easement had no effect on controlling the types of crops which could be grown in the area. The only restriction placed on the farmer was the necessary removal of the structures on easement land.

The author hypothesized there had been a change in the land use patterns for short reaches in the tributary valleys and beyond the 1140 feet contour line. He also believed there would be a distinct shift on easement lands from more profitable crops, such as wheat and corn, to less profitable crops, such as alfalfa and forage sorghum. The first thing which the 1966 Land Use map showed was a basic retention of previously existing croplands. The main tributary valleys had almost as much cropland as there was in 1956, the major reductions appearing as a result of inundation and freeboard.<sup>9</sup>

Field observations and interviews were employed to learn of actual shifts in land use patterns and types of crops grown. Both of the above hypotheses went unsupported when the field work was concluded. The farmers who owned land beyond easement were maintaining the same patterns which existed in 1956. Corn, wheat and sorghums were the major crops and in the winter the cattle were often roughage fed on this cropland. The farmer who owned land under easement also maintained these same

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<sup>9</sup>Freeboard is land which usually lies between the water and cultivated land. It exists to allow for wave action, saturation effects, etc.

patterns.

As for the shift in crop types from more to less economical types, there seemed to be a balance. A few farmers that were interviewed along Mill Creek, just west of Stockdale Park and with farmland lying just behind fee-simple acquisition land, stated that they gave little consideration to their crops being inundated by the reservoir water. They believe flooding is a natural hazard to any farmer when he locates near a stream or river. These farmers had owned land in the valley near Carnahan Creek before the reservoir and experienced the floods by the Big Blue River; now they owned land that might be flooded by the reservoir, but their primary concern is still growing the crops they need, not planting crops which are monetarily less valuable in case of flooding. If floods were to wash out their crops, they would be only temporarily hurt, for flooding is a factor considered in their yearly pattern.

Conversely, a farmer who owned land under easement on the side near Spillway State Park had suffered a setback when the lake rose and flooded about eighty acres of grain crops in 1965. As a result he now grows his grain crops beyond the easement line and his forage crops on the easement land. At the same time he allows anywhere from 200 to 400 feet for additional protection against water level increases.

It was not necessary to interview other farmers on other tributaries because they were either too far up the tributary valley to have the above problem except once every five to ten years, or they were far enough up the tributary that their land under easement would be flooded only when the reservoir went well beyond normal conservation pool level.

Therefore, the reservoir had had little or no impact upon land use

in terms of privately owned agricultural lowland lying beyond conservation pool. Reductions in crop acreages have occurred, but the author does not believe the reductions are significant. Most of the reductions have occurred along the fringes of the private property due to free-board and the farmer's choice of allowing some distance between the water and the edge of his cropped land.

Corps of Engineers Land. The land to which the Corps holds title is subject to several uses depending upon the Corps' needs and desires. The land may (1) remain idle, (2) be leased for one to five years, or (3) be put to any use deemed necessary by the Corps. This latter use means the Corps may put a park on the land, grow crops on it, or use it in any manner the Corps considers to be in the best interest of the reservoir and local community.

The most common choice of the above list is to lease the land for periods of one to five years. After the Corps purchased the land subject to direct inundation, the original owners had the right and priority to lease the land above conservation pool level for a five year period beginning at the time the reservoir became fully operational. After the first five year lease expires, the original owner must bid for the lease the same as any other interested person must do. The lease goes to the highest bidder for this one to five year period. The length of this second and all subsequent leases will depend upon a few factors which are discussed in the following paragraphs.

It has been the Corps' experience to lease land to farmers who refuse to cooperate with government established programs. As a result, the Corps will lease land for only one year, during which time the Corps

will determine the farmer's cooperativeness. If he is found cooperative, then a five year lease is often given.

Another factor which determines the lease term is the expected future reservoir use. If the Corps expects to increase the pool elevation in a particular year, it will withhold those leases which terminate during that year in order to deter losses to the lessee. They will also give leases for shorter periods of time than usual to assure the withholding of the land from use the year of expected flooding. It may also be that the Corps would prefer to let the land lie idle. Though it may not show direct economic benefit, the growth of natural vegetation will be helpful to animal conservation practices.

The choice of grazing or cultivating leased land, in addition to any possible Corps stipulations, depends on (1) the locational factors of distance from the reservoir to the valley wall and size of tract leased, and (2) the lessee's predetermined use of the land. In many cases there is a strip of land, approximately 100 to 200 yards wide, lying at the base of the valley wall and extending to the edge of the reservoir. This land, when leased, is most often used for grazing and does not appear distinct on the 1966 Land Use map (Fig. 7) because the slopes adjoining it are also grazed. With the trend being towards larger farms in order to derive greater economic benefits, the leased land helps to accomplish this goal. The average cost for leasing Corps land for the purpose of grazing is \$2.50 per acre per annum. The results of using this land will normally produce returns that outweigh this lease price. Lastly, one other benefit arises as a result of this type of lease. The cattle may be grazed to the water's edge thus eliminating the need for



ponds or wells on these lands.

The land owned by the Corps in the larger tributary valleys is often used for cropland rather than grazing. The reason for this is that there are larger amounts of land leased in one tract. Smaller tracts do not provide sufficient returns for the amount of labor, etc. required to produce a crop. In addition, if a farmer owns cultivable land adjacent to that which he leases, his economic costs to cultivate the leased land are less than the farmer who hauls in equipment to cultivate the same area.

There are restrictions placed on the type of crops grown on Corps leased land. Basically stated no government price supported crops may be grown, except where the land is leased to the original owner and then only certain price support crops may be grown by agreement between lessee and lessor. Certain other exceptions are explicitly laid down by the Corps concerning particular crops and the use of them.<sup>10</sup> If the original owner<sup>11</sup> leases the land and plants restricted crops, he rents the land for \$6.00 per acre. However, if he leases the land to plant unrestricted crops, as all lessees other than the original owner must do, then the cost is only \$4.00 per acre.

The usual crops grown on restricted land are sudan-sorghum and popcorn, i.e. a forage crop to supplement the cattle-grass-feed system and a cash-grain crop to supplement the farmer's profit. On land leased

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<sup>10</sup> For a detailed listing see the Corps of Engineers Land Use Regulations, Lease No. DA-23028-Civeng, p. 1.

<sup>11</sup> The "original owner" is the owner of the land from whom the Corps of Engineers purchased said land by fee-simple acquisition.

by the original owner, the usual pattern of wheat, corn and sorghum appears.

Generally speaking, there are several ways the land is used under the Corps of Engineers' program. When leased, the land along the main valley is most often grazed while the tributary valleys are still cropped with the only real variation being the appearance of popcorn for cash-grain purposes. When not leased, the land most often lies idle and reverts to a natural vegetation cover.

Fish and Game Commission Land.<sup>12</sup> When the Corps of Engineers purchased land by fee-simple acquisition, it turned over a major portion of the land north of Randolph to the State Fish and Game Commission (see Fig. 8). This area was about 12,000 acres of land and water,<sup>13</sup> of which only 6,000 acres were actually useable for cultivation, allowing for freeboard.

This land is leased out much the same as the Corps owned land, but instead of the lessee acquiring complete use of the land, the Fish and Game Commission has a sharecropping program. Under the program the farmer receives two-thirds of the crop and the Commission one-third. While the farmer removes his share from the field, the program calls for the Commission's share to be left in the field.

It should be mentioned here that none of the Commission land is leased for grazing. The Commission's primary purpose is providing feed and cover for game while aiding the farmer and local economy. The 1966

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<sup>12</sup>The following information was obtained in an interview with Mr. Robert McWhorter, Fish and Game Commissioner, April, 24, 1967.

<sup>13</sup>This includes Marshall County.

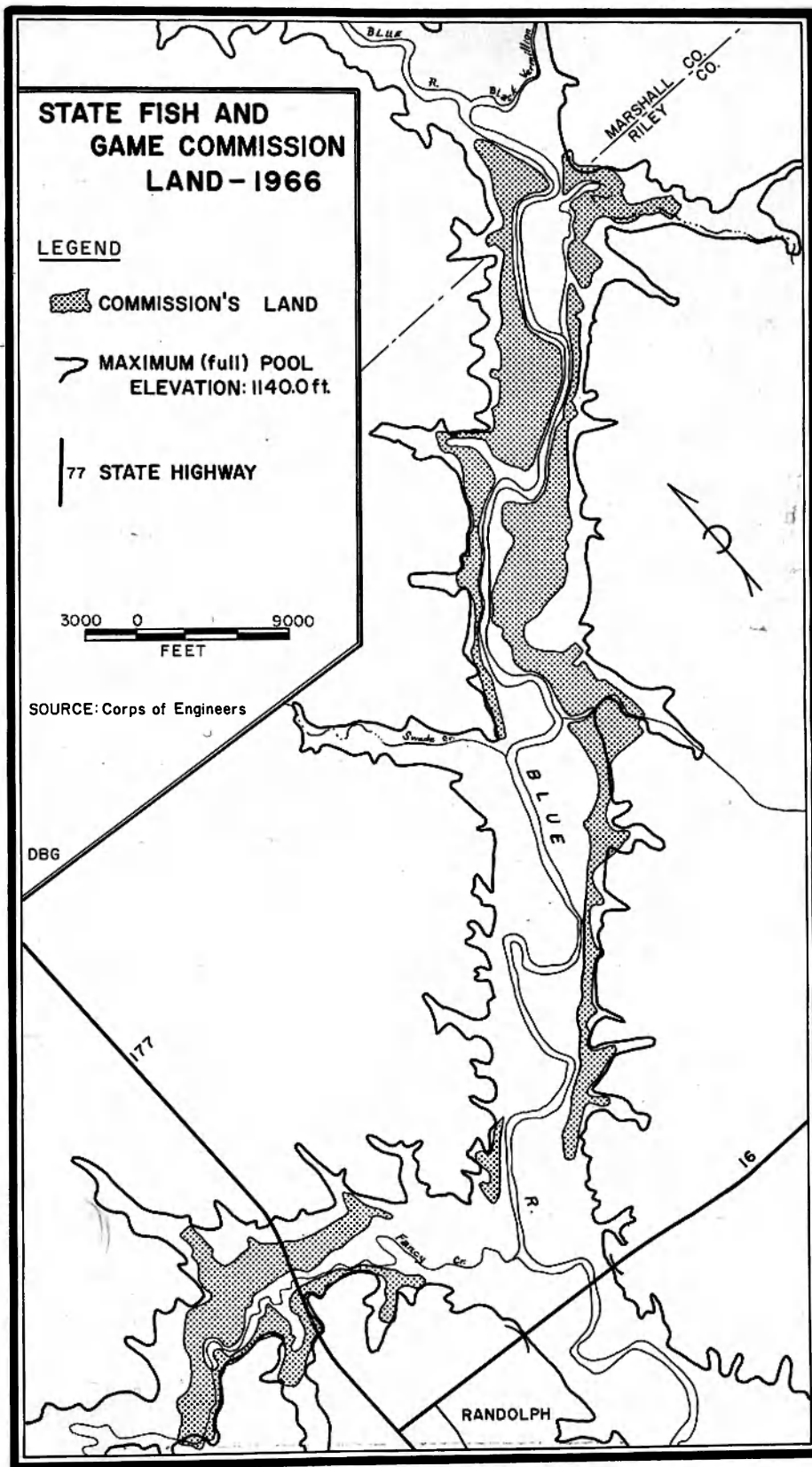


Fig. 8. Fish and Game Commission land.

Land Use map (Fig. 7) shows all of this land as cropland, and thus no change appears from 1956. However, the change occurs in crop types and from complete ownership to sharecropping.

The basic crops grown on Commission land are wheat, corn, grain sorghum and a minor quantity of forage sorghum to produce ensilage. The reason for the presence of price-supported crops, when they are restricted on Corps land, is that the price-supported crops are often grain crops and thus the ones most desirable for the Commission's purpose. Wheat is the most important crop at the moment because of its ability to control noxious weeds. Once this weed control has been gained, the shift will most likely go towards grain sorghums and corn. The Fish and Game Commission prefers these crops, for they believe the crops provide the best feed for both resident game as well as water fowl.

Under this sharecropping program the farmer and the Commission work out an agreement as to which crops will be grown, assuming the farmer does not leave the land idle that particular year, an unlikely occurrence due to the already decreased availability of cultivable land. When the farmer removes his share from the fields, he may sell the share if he chooses, but at market value. He cannot receive the price-support. Usually, then, the farmer uses the crop on the farm to fit his cattle-grass-feed activity.

Often the original owner is the lessee of the Commission land and will have his own land lying adjacent to the leased land. Like the person next to Corps of Engineers land, he can produce more economically on the adjacent land than can an outsider. Further, the Commission-land lessee has a definite advantage over the Corps-land lessee because the former

will be growing grain crops whereas the latter will be very limited in this type of crop or have none at all. There is one crop, however, which the latter may grow and the former may not; that crop is alfalfa. The reason is simple; it will be of little or no benefit to game animals and birds, and therefore, of no benefit to the Commission.

For the area under game management control the only changes in land use are (1) from complete removal to partial removal of crops from the field, and (2) the disappearance of alfalfa.

Upland Use. Agriculturally the remaining area of the 1966 Land Use map (Fig. 7) is an upland under private ownership. The major portion of this upland, which includes the valley walls, has retained the same land uses which existed in 1956, those being grazing and upland cultivation.

Though the reservoir took about 34,000 acres of cropland from the cattle-grass-feed activity, the farmers have found methods to adjust to this situation. One method involves land that is located in non-contiguous places, which are often in two or three areas and up to sixty miles apart. In 1956, when Webb was predicting a complete shattering of this cattle system along with Kollmorgen's similar predictions, one important factor was not considered which has saved the situation, that being improved transportation. Field inquiry produced several representative situations of adaptation.

The first situation is one of a dislocated farmer who was able to relocate either south of the dam in the Big Blue or Kansas River Valley, or in another river valley such as the Republican. In this new location the farmer is able to maintain the same activity as before, but on

## EXPLANATIONS OF PLATES VII AND VIII

- VII. Uplands in the area of Randolph State Park. Notice the abundant growth of vegetation in the stream course.
- VIII. Typical uplands in the area of the dam. Grazing is the predominant agricultural activity on these lands.

PLATE VII



PLATE VIII



non-contiguous lands. The cattle are roughage fed during the winter at the new location where wheat, corn, sorghum and alfalfa are grown. In the spring the cattle are trucked from the new location to the pastures still owned at Tuttle Creek. In some cases there is also additional land acquired by leasing. The cattle are trucked back to the farm at the end of the summer, and before being shipped to market they are grain fed from the crops grown at this new location.

In the second situation a farmer who previously lived outside the area has leased or bought grassland, thereby allowing him to expand his operation. These farmers either own a farm in another river valley where they can grow the needed crops with supplement grains purchased as needed, or they own an extensive grazing operation further south and/or east in the Flint Hills. There is one farmer who has bought a sizeable portion of grazing land on the east side between Garrison and Randolph State Parks and is leasing additional land in the adjoining areas. The actual farm is located on the Republican River floodplain near Concordia, a distance of about 70 miles. With this large operation he is able to pay the cost of transporting his cattle between the two locations. He has no intention of growing any crops on the uplands because he wants only rangeland on these uplands.

Another farmer on the east side lives in Alma where he maintains not only cropland, but also a large grazing operation on the uplands. Like the farmer from Concordia, he is looking for more land in order to expand his operation. His land at Tuttle Creek is being leased from a development company which has only put roads on the land, but never sold a lot. On the map this appears just north of Carnahan Creek State Park.



This farmer operates under a system which is being phased out of the area; he purchases his cattle from southern states such as Texas, New Mexico, and Arizona, grazes them from May to October and either ships them east to feed lots or grain feeds them himself before sending them to market.

Finally, there is the situation where a farmer owned land used entirely, or almost entirely, for grazing in 1956. With the possibility of leasing lowland in 1966, he would be able to expand his operation while cutting some costs. Growing forage and some grain crops would alleviate the need for outright purchase of each while giving him a place to roughage feed his cattle in the winter, an activity previously unavailable. This farmer will not only transport the cattle from one area to the next, but the cattle will be on the non-contiguous owned land in the winter, a reversed situation compared to the previous farmers who put their cattle on the leased property in the summer. There is also the need to have the winter forage crops available at this leased location. If the forage is taken from leased cropped lands, it can be stored on site and made readily available. But prairie hay and some forage grains still may have to be brought to the cattle.

By these basic methods, then, the cattle-grass-feed activity which existed in 1956 has been saved from destruction in the area. Where the farmer simply opened his back gate and let the cattle walk out and up onto the pastures in 1956, he opens the back gate of the truck in 1966, and the cattle have made the same transfer from winter forage feeding to summer grazing. Although it cannot be denied that the lowland farms were destroyed, the overall pattern has been retained through adaptation and flexibility. Further, by an increase in farm size, the smaller, less

economically stable farms are removed, and the larger units become more economically sound.

There is a change, however, which is noticeable on these uplands. On the west side there is a reduction in the acreage of cultivated upland. This is converse to (1) what Kollmorgen and Webb believed would happen, and (2) what the Riley County Agent said had happened. Charles Colby in his study of the Kansas Basin and Robert Webb in his study of the Big Blue River stated that Tuttle Creek Reservoir would force the farmers to break out land for forage and grain crops in order to compensate for the land lost to flooding. The County Agent also stated in an interview that much land now under the plow in these uplands would not have been broken out if the reservoir did not exist.<sup>14</sup>

The farmers interviewed, on the other hand, all stated that the land was reverting from crops to native grasses. There was a general consensus that the upland farmers found it dangerous, erosion-wise, to cultivate these uplands without the necessary conservation practices of terracing, stripcropping, and grassed waterways. Also there is a lack of grassland available for grazing, and pressure exists to make as much land as possible available for grazing. The 1966 Land Use map supports the farmer's statements as evidenced by the reduction in the amount of cropland. If there has been additional land plowed for the first time since 1956, then it must be outside this thesis study area.

One other pattern is visible after comparing the 1956 and 1966 Land Use maps. The east side has remained almost exclusively in agri-

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<sup>14</sup>Interview with Riley County Agent, April 12, 1967.

culture while the west side has witnessed a considerable reduction in agricultural land uses. This will be considered in the following chapters.

### III. LAND VALUES

There is one further consideration which relates directly to land use, and that is the land's value. Obviously the greater the productivity of the land, the greater its economic value. It had been hypothesized by the author that the land values would increase in most of the study area as developments and speculation came to light. Kollmorgen believed that the values would decrease because the uplands would not be as valuable without the adjoining, highly productive valley cropland.

The 1956 and 1966 Land Value maps appear to support the latter hypothesis. The average trend of land values across the study area is a decrease of one scale unit. There are some areas where values increased, but this is usually explainable by (1) the addition of buildings to the farm unit, or (2) development projects. The reader will notice that the land north of Randolph in both counties has maintained its value from 1956 to 1966. On the other hand the land in both counties south of Randolph has generally decreased in value. The county assessor was interviewed to obtain any explanations he might be able to offer regarding the general value decrease. Unfortunately he was unable to suggest any substantial conclusions regarding the area. He did state that there has been a general decrease in farm values across Kansas, but aside from this he could not provide any explanations. Whether this decrease is due to severance from previously adjoining lowlands, as Kollmorgen proposed,

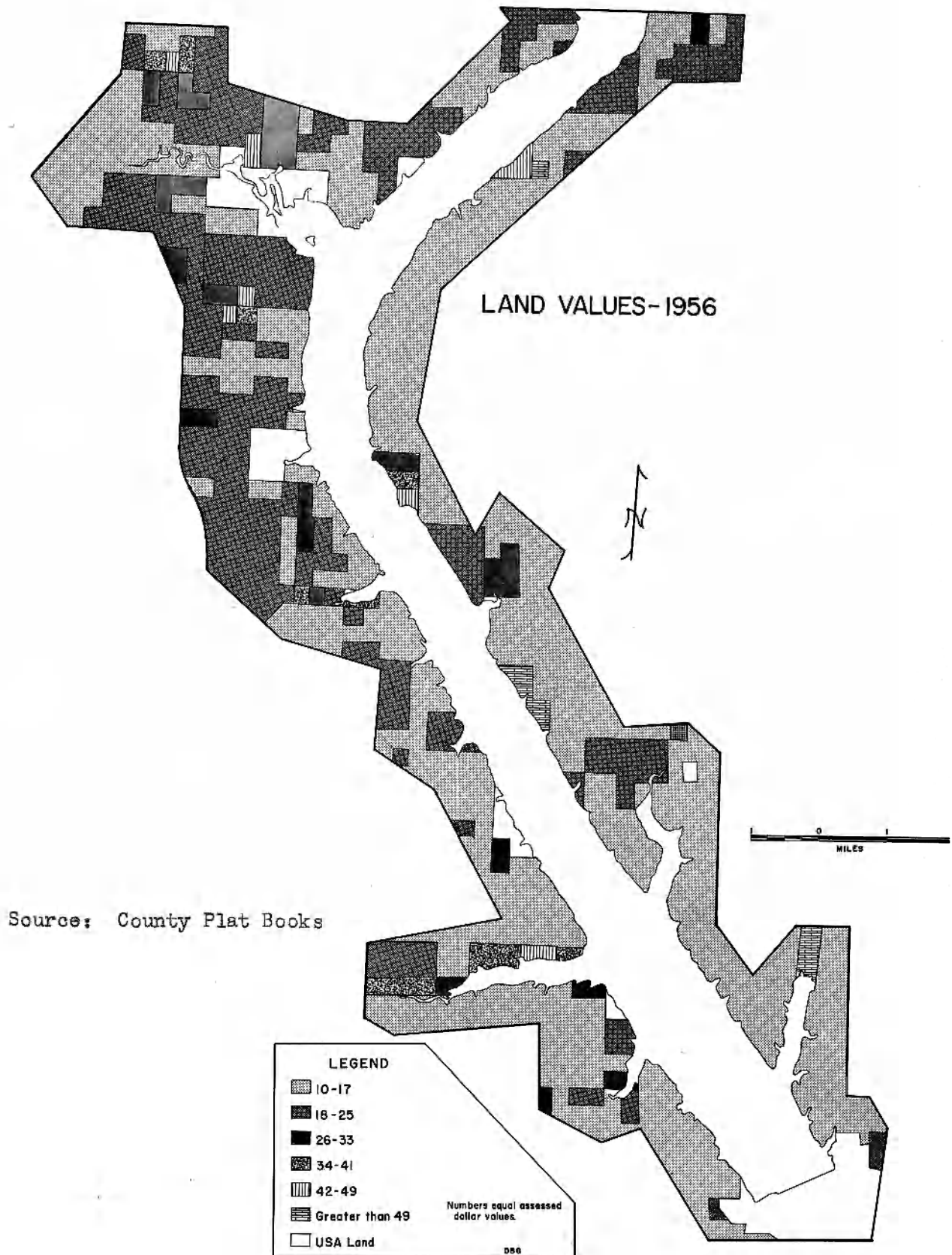


Fig. 9. Land values - 1956.

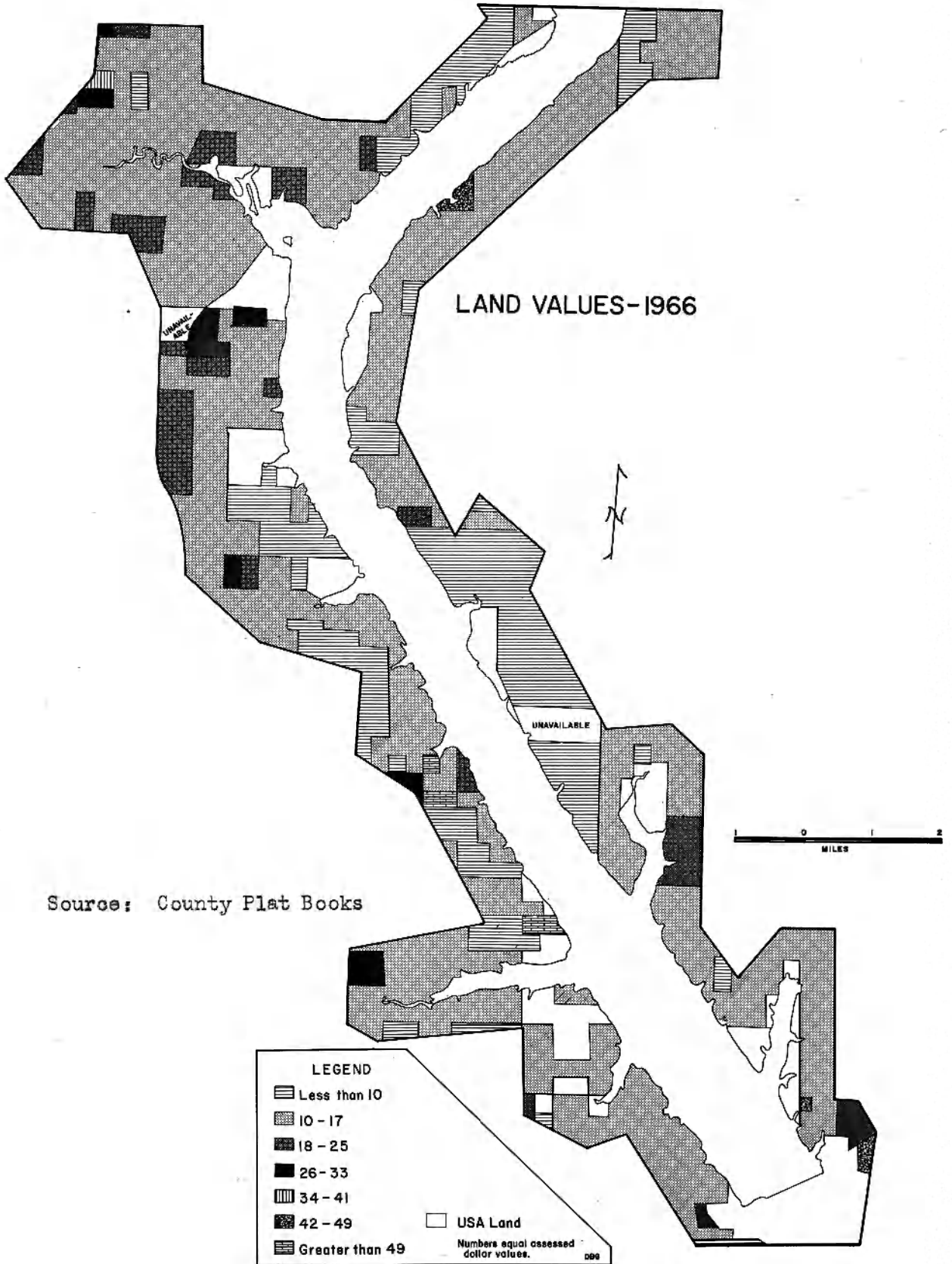


Fig. 10. Land values - 1966.

or to some other factor(s), it is impossible to state at this time. In any case, the author's original hypothesis is invalidated by these two maps, which at the same time provide questions for another study.

#### IV. SUMMARY

Because of the unique location of uplands and lowlands, and several economic considerations, the Big Blue River Valley established itself in the early 1900's as a cattle-grass-feed area. Under this particular type of activity the basic pattern has been grazed uplands and cropped lowlands. The uplands are rich in native grasses for summer pasturing while the rich alluvial lowlands produce forage and some cash-grain crops, the former being used to winter feed the cattle, and the latter being sold directly or used in the fall to fatten the cattle before shipment to market.

Two systems under this cattle-grass-feed program are the deferred and the cow-calf herd systems. Under either system there is a close relationship between the upland grazing and lowland crops. The systems depend upon this balanced situation, and the removal of one threatens the life of the other.

When Tuttle Creek Reservoir inundated the cropland, geographers predicted the complete destruction of the systems in the immediate areas of the reservoir. True, the reservoir did accomplish a break-up of the farms which had been located in the valley, but it did not break-up the total system. Transportation, increased farm unit size, and adjustments in original patterns were the primary factors in rejuvenating the program. Grazing land is still grazing land, and the lowlands of larger tributaries

are still cultivated with the same crops as 1956, those being wheat, corn, sorghum and alfalfa.

There are three major owners of the land in the study area, private owners, the Corps of Engineers, and the State Fish and Game Commission. The land under control of the two governmental agencies has experienced a slight shift in the types of crops grown, but on the whole, the reservoir has only caused variations in agricultural land use patterns, not a complete change as many people, including geographers, had expected. One change which did occur that had been questionable was the shift in land values. The overall pattern was a decline, rather than a marked increase from development and speculation as some, including the author, suspected. The declined values may be attributed to the severance with highly productive adjoining croplands, or to some other factor unknown at this time.

In conclusion, the basic agricultural land use patterns have remained, showing only a few variations, while smaller less economically stable farms are removed from the area allowing the larger farms to increase their total resources and improving their economic stability. These land use patterns are a direct consequence of economic pursuits, and these pursuits are the primary goal and motivating force in all situations.

## CHAPTER IV

### IMPACT ON URBAN--ORIENTED LAND USES

The most obvious land use impact of Tuttle Creek Reservoir, aside from inundation, has been on urban-oriented land uses. Driving around the reservoir, standing on the observation platform at the dam, or flying over the area at low elevations reveals one immediate sight--the growth and location of numerous cottage sites by development projects. People more familiar with the reservoir also recognize the small community of Randolph, a skeleton of what existed only ten years ago at the mouth of Fancy Creek.

#### I. TOWNS AFFECTED BY TUTTLE CREEK RESERVOIR

As a result of inundation there were six towns which were removed from the valley; they were Barrett, Bigelow, Cleburne, Garrison, Randolph and Stockdale. Table III shows the number of people and homes which were affected by the reservoir and whether the whole town was purchased or just the land below 1140 feet contour. The whole story is not told in the case of Garrison, for in 1966 only two buildings and a cemetery remain. The two buildings are a church and part-time used parsonage, otherwise no evidence remains of any former town.

With the exception of Randolph these towns were simply small farm communities or minor trade centers. Basically they had no services except a service station, a grocery store, which was more of a general store that handled a small quantity but large variety of goods, and possibly a small feed counter and/or tavern. Banking, agricultural



TABLE III  
MUNICIPALITIES AFFECTED BY TUTTLE CREEK RESERVOIR

<u>Municipality</u>	<u>County</u>	<u>No. Affected</u>		<u>Purchased</u>	
		<u>Persons</u>	<u>Houses</u>	<u>All</u>	<u>Below 1140</u>
Barrett	Marshall	30	10	X	
Bigelow	Marshall	375	30	X	
Cleburne	Riley	150	40	X	
Garrison	Pottowatamie	125	30		X
Randolph	Riley	391	130	X	
Stockdale	Riley	30	12	X	

Source: U.S. Army, Corps of Engineers, Lower Kansas River Basin Reservoir Regulation Manual: Tuttle Creek Reservoir, Vol. II (Washington: Government Printing Office, December, 1966).

equipment, major mechanical repairs, and other large scale services could only be obtained in Randolph or Manhattan,

The people who were dislocated from these towns resettled in several places in the state and elsewhere in the Midwest. However, the surrounding towns of Blue Rapids, Waterville, Frankfort, Olsburg, Marysville and Manhattan experienced a population increase as most of the people resettled in these towns.

Further, whereas the sparsely populated towns were completely dismembered and removed from existence, Randolph was the one town which was relocated. The primary reason for this was public pressure. Randolph had a population of nearly four hundred in the early 1950's that could demand certain considerations, whereas the other towns rarely had a population over two hundred.

After it became evident that the reservoir would be constructed in spite of the resistance by the communities, the population of Randolph began a slow decrease and then plunged to a mere fragment of its original size as the completion date for the reservoir approached. When the town was shifted to its new location in 1960, the population fell to nearly ten percent of its size a decade earlier. Since then there has been a gradual but extremely slow increase in population. Table IV shows these population trends and Fig. 11 presents it graphically.

In 1956 there were one hundred thirty homes in Old Randolph, but in 1966 there were only thirty-nine in the new location. Twelve trailer homes were also present which brings the total to fifty-one families for 1966. The following modes of land use were the only ones left in 1966 from the once prosperous market center:

TABLE IV  
 RANDOLPH POPULATION 1955--1966

1955	373	1961	36
1956	361	1962	40
1957	353	1963	47
1958	260	1964	58
1959	92	1965	71
1960	42	1966	95

Source: State of Kansas, "Riley County Census of Population" (unpublished data) 1955 through 1966.

1 community hall (completed 1966)	2 cafes
1 high school	1 sporting goods store
1 elementary school	1 automatic laundromat
1 church	1 beauty salon
2 service stations	1 motel (7 units)
1 mechanic's shop	

These are located in Fig. 12. One important service is conspicuously missing, that being a grocery store. There had been one grocery store for a few years, but the owner became interested in other activities and invested his money elsewhere. The town is now experiencing difficulty in attracting a grocer. Some Randolph people attribute this to the town's size. To complicate the situation further, teachers for the elementary and high schools do not remain long because, for one reason, they dislike the lack of available services. Traveling to other towns to buy groceries, coupled with the lack of housing, has made it difficult

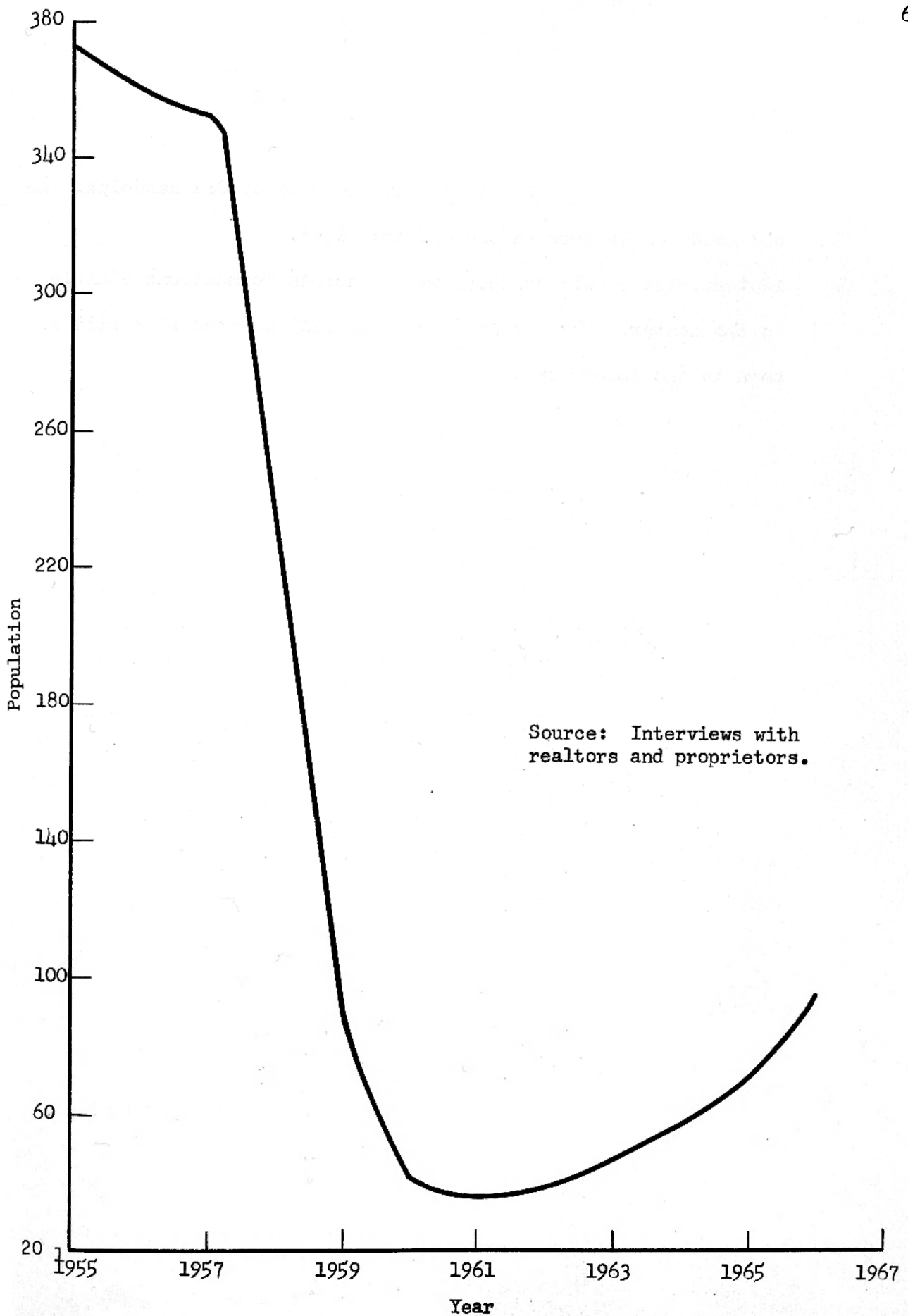


Fig. 11. Randolph population, 1955-1966

## EXPLANATIONS OF PLATES IX AND X

- IX. View of the Highway 16 bridge from the site of Old Randolph. An old road can be seen on the extreme right.
- X. Another view of Old Randolph with concrete foundations visible in the center. The streets have been well covered with silt as seen in the foreground.

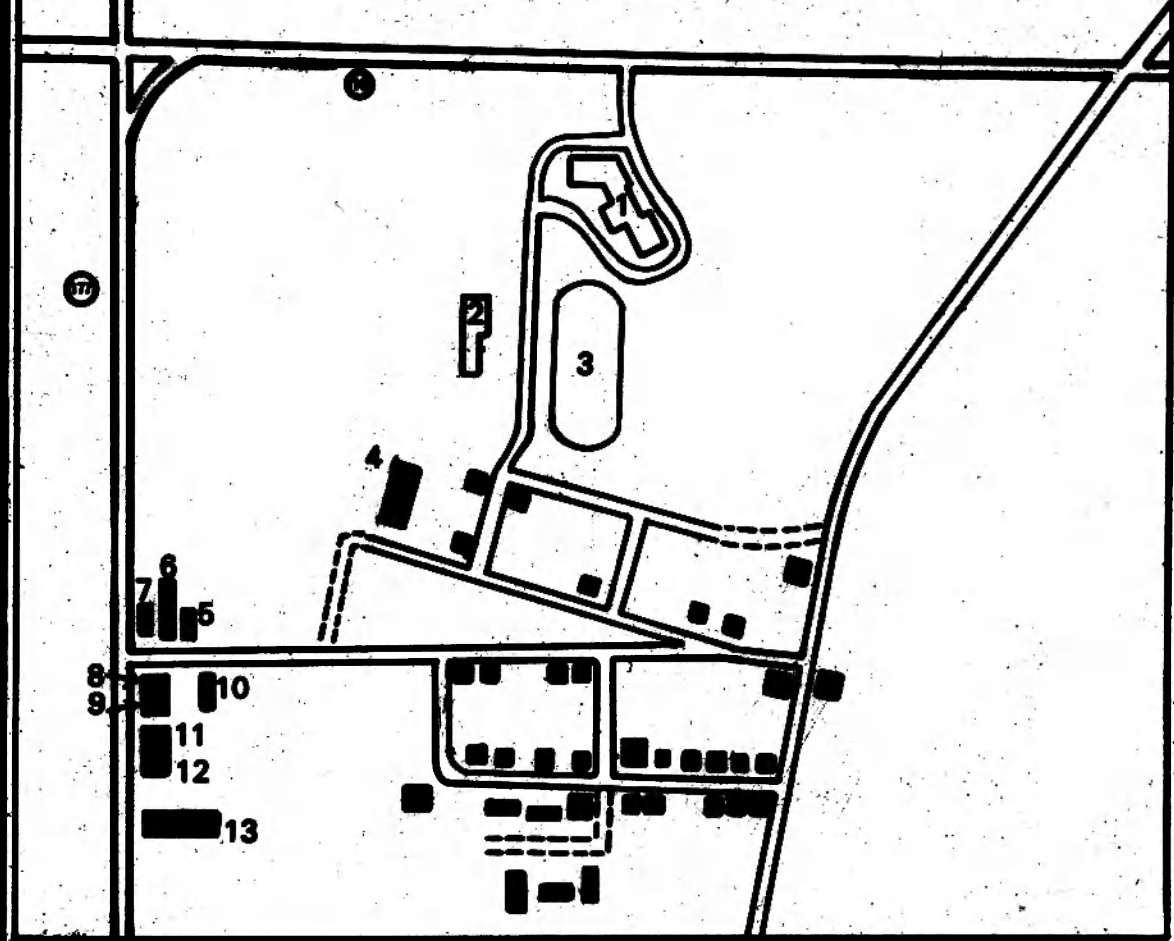
PLATE IX



PLATE X



# RANDOLPH-1966



## LEGEND

- |                     |                   |                   |
|---------------------|-------------------|-------------------|
| ■ HOUSES            | 4 CHURCH          | 9 BEAUTY PARLOR   |
| ■ TRAILER HOUSES    | 5 COMMUNITY HALL  | 10 POST OFFICE    |
| 1 HIGH SCHOOL       | 6 MECHANIC SHOP   | 11 COIN LAUNDRY   |
| 2 ELEMENTARY SCHOOL | 7 SERVICE STATION | 12 SPORTING GOODS |
| 3 ATHELETIC FIELD   | 8 RESTAURANT      | 13 MOTEL          |

DBB

Fig. 12. Randolph - 1966.

## EXPLANATIONS OF PLATES XI AND XII

- XI. An aerial view of New Randolph looking west. The high school track is just visible on the right.
- XII. Another view of the town of Randolph.



PLATE XI



PLATE XII



to attract new residents, especially teachers.

The story here is the same as it appears all along the lake in the development areas; people cannot be attracted to the area because of the large void in services, and the services will not establish themselves because of the meager population.

Finally, the government received criticism from the local communities when it built the elementary and high schools at New Randolph. Though this construction was a requirement placed upon the government by the local people, the government overbuilt the facilities of the high school while just building enough space for the elementary enrollment. The cost of the high school was \$550,000, a price that brought still further criticism. The capacity of the high school is 225 students and for the 1966-1967 school year the enrollment was 133. A football stadium with bleachers, lights, and encircling track was also built.

As for the elementary school, it had a capacity of 150 originally, but with an addition the capacity has been boosted to 250 students. For the 1966-1967 school year the enrollment was 147 students. Facility-wise they received much less than the high school, but in terms of the 1960 to 1966 enrollment, they also had more than sufficient facilities.

From the above discussion it becomes apparent that the impact of the reservoir on towns was devastating in most instances, and injurious to the life of Randolph. Though Randolph is slowly rebounding, it seems uncertain at this time and for some years to come that the town will regain its population and its importance as a trade center. Certainly the American economy and population are capable of explosive activity in these situations, but the lack of interest and desire to challenge

the risks of providing services in this community will suppress growth in the foreseeable future.

## II. DEVELOPMENT AREAS

There are numerous locations around the reservoir lake where speculators have bought the land, platted lots, and are now selling these lots for summer cabins and permanent homes. Competition is fairly strong and this has created the development of additional amenities in some oases to attract prospective buyers. There are those areas, too, which offer no amenities other than a choice lot overlooking the lake where a permanent home can be built and a suburban life enjoyed.

In the early 1960's when the farmers were in the process of deciding to sell out completely or lease what land they still owned, speculators saw an opportunity to buy land at premium prices, develop it and realize a lucrative return on their investment. These speculators ranged from large development companies to a small group of businessmen who were after an easy profit. But there are variations in this pattern. The Kansas State University Endowment Association, which has developed University Park, found the land it owns when the original owner, a graduate of the university, decided that as long as he planned to sell out, it would be to the university. Like many other farmers who sold their land, this particular farmer was well past sixty and no longer cared to farm. Further, he did not want to remain involved in the troubles of leasing his land. In other cases, the farmer has either raised the capital himself and developed small areas, or passed on the land to his children and let them develop it. Not all of the developments, then, have been

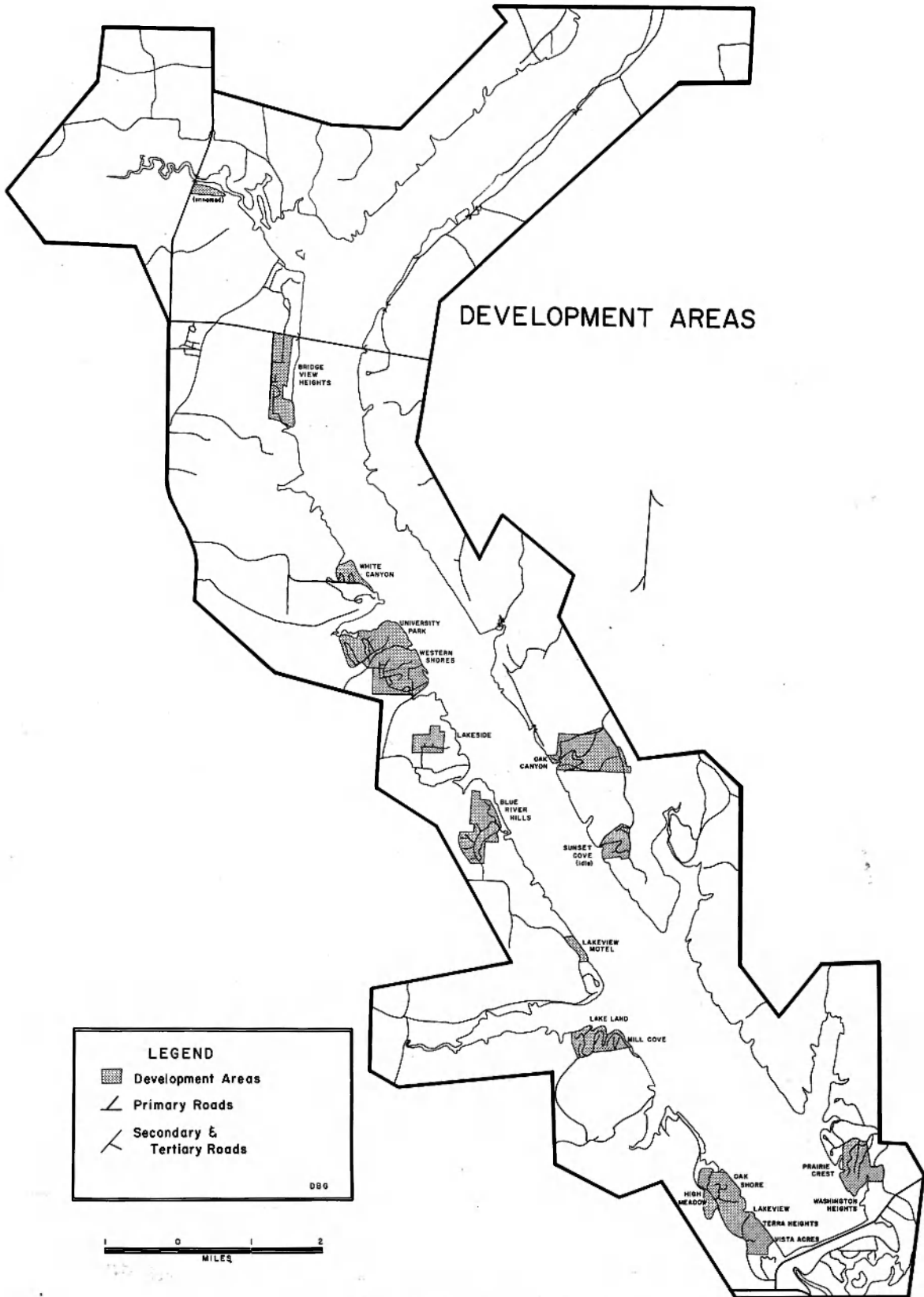


Fig. 13. Development areas .

constructed by companies who are specialized in this work.

The 1966 Land Use map shows a definite imbalance in the areal location of these development sites. The highest density occurs on the western shore; in fact, all of the sites occur on the west side with the exception of Oak Canyon, north of Carnahan, and the dual development site next to Spillway Park. Two primary reasons are given for this imbalance, but it is debatable as to which is the more important. The first reason is the lack of roads on the east side. The major highway between Manhattan and New Randolph on the west side provides easier access to the lake than the winding gravel road on the east side. The second reason is related to direction. Partially, people live at the lake because of the scenic view it affords. But the discomforts of looking into sunlight reflecting off the water, coupled with the sun's adverse effects on furniture, hinders development. Protection in the form of trees or building behind a hill improve development conditions considerably. In contrast the west side is concerned with sun conditions only in the early morning hours.

When reasons were sought concerning this imbalanced development, it was found that the men offered the transportation problem as the greatest cause while the women offered the problem of the sun most often. It appears that location explanation in this problem is based upon place of work; the commuting husband does not desire to travel on gravel roads every day and the work-at-home wife wants her house to be attractive and comfortable. It seems reasonable to assume, then, that the areal variations of development sites can be primarily attributed to these two preferences.

There is another location factor which does not appear on the map,

but does in Table V. This Table is arranged so that the areas presented are located from south to north along the reservoir, or from the dam to the upper end of the lake. The Table shows the following trends: (1) the size of the lots diminish as one moves away from the dam; (2) the value per lot decreases more rapidly than does the lot size; (3) the number of available lots increases more rapidly than the lot size decreases, which means the development areas become larger as one moves north; (4) there is a decrease in the number of houses constructed, proportional to the number of lots sold; and finally (5) though it is not in this table, the homes at the dam are all permanent, while the homes become more seasonal as one moves north. The basic reason for these trends is location near an urban community. Manhattan is the largest urban area near the reservoir. Because of this it provides many services and offers employment opportunities. People who wish to work in Manhattan and live at the lake will naturally prefer to live closer to the city-end of the lake.

There is one other factor which has not only helped development close to the dam, but also helped the west side. That factor is delivery service. For those living in or between Vista Acres and Oak Shore, the west side's most southern development area, there is daily newspaper delivery, laundry service twice weekly, trash pick-up twice monthly, and school bus service to nearby schools. The Pottawatomie County residents adjacent to the dam are unable to obtain these services for varying reasons. There are too few people to merit the expense of providing laundry, newspaper and trash services. The school buses cannot reach the children in this area, which belongs to the Riley School District, Unified District

TABLE V  
STATUS OF DEVELOPMENT SITES - 1966

<u>Platted Development Sites</u>	<u>Number of Lots</u>	<u>Number of Lots Sold</u>	<u>Average Lot Size (Acres)</u>	<u>Average Price per Lot</u>	<u>Number of Buildings Constructed</u>
RILEY COUNTY					
Vista Acres	22	19	1.00	\$2500	8
Terra Heights	29	20	1.00	2500	9
Lakeview	25	12	1.00	2500	3
High Meadows	25	66	1.00	2500	2
Oak Shore	13	13	1.00	2500	13
Mill Cove	44	12	1.00	2000	4
Lake Land	43	22	0.50	1700	7
Lakeview Motel	21	1	0.75	3000	0
Blue River Hills	265	70	0.75 <sup>a</sup>	2000	21
Lakeside	423	400	0.50 <sup>a</sup>	X	30
Western Shores	X	X	X	X	X
University Park	369	289	0.33	1700	23
White Canyon	106	19	1.00	1200	9
Bridge View Heights	523	350	0.50 <sup>a</sup>	X	5
POTTAWATOMIE COUNTY					
Washington Heights	40	15	1.00	2000	5
Prairie Crest	55	55	1.00	2000	1
Sunset Cove	X	0	X	X	0
Oak Canyon	320	135	0.60	600	25

X - Information unavailable

a - Estimated

Note: Only about 11% of all lots sold have buildings on them.

Source: Interviews with realtors and proprietors.

#378, for the area has been separated by the reservoir from the rest of the district. The school buses are not permitted to travel outside their district; to reach the east side of the dam, the Riley buses would have to cross through the Manhattan school district. For the present the children must be transported by the parents, who are reimbursed by the school for the expense incurred. The situation will be adjusted only after there are enough people living in this separated area to exert pressure for redistricting.

The last two factors which have hindered development are (1) the changing lake levels, and (2) lack of available services towards the upper end of the lake. Though many lots have been sold near the upper end, the buyers are skeptical about investing one thousand or more dollars for property and building a home or cabin if boating facilities are unusable, fishing conditions are poor, and needed services are unavailable.

It will be useful at this point to look briefly at two different development sites and how they change in lot sizes, type and number of buildings, extra amenities and successfulness depending on location.

The area developed by Paul Thompson lies near the dam and on the west shore. This area is subdivided into Vista Acres, Terra Heights, Lakeview and High Meadows. The lots are one acre in size, for the Thompsons believe people who come to the lake to buy land want privacy. They believe a one acre lot provides this privacy, but it is not an unmanageable area for a family. All of the homes built on their land are permanent because the owners have come to live in suburban comfort with a view of the lake, yet live close enough to Manhattan for ease



## EXPLANATIONS OF PLATES XIII AND XIV

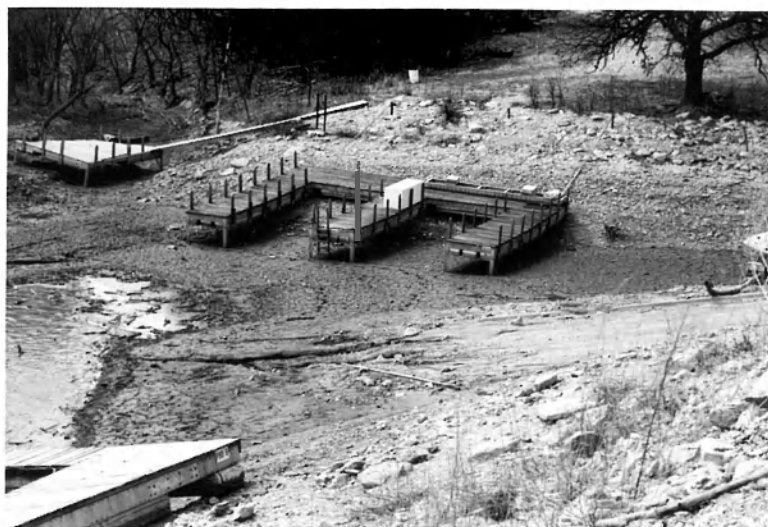
XIII. Typical permanent home construction on the Paul Thompson Development site near the dam.

XIV. The effect of the 1966 draw down on boat ramps in the Blue Hills Development area.

PLATE XIII



PLATE XIV



in commuting. The Thompson area offers no recreation amenities with the exception of a boat ramp. They considered building another ramp, but when it became apparent that many outsiders were flocking to the first ramp, the second ramp was not built. If any resident wishes to build a boat dock, space will be provided for him to do so on his own.

Because this development area lies close to Manhattan, has paved roads, and many permanent homes, it has not been difficult to attract services into the area, those being newspaper and laundry delivery, trash pick-up and school bus services. These are the amenities which are now available, but which were attracted by the development, as opposed to being offered to attract development. As a result of their location, the services which have been attracted and the atmosphere of a suburb, the Thompsons have sold fifty-seven of the hundred and one lots available and have twenty-two permanent homes already built. There is a consideration which must be taken into account at this point. High Meadows was platted in 1966, and there has been little time for development to take place. Vista Acres, however, has nineteen of twenty-two lots sold and eight homes built.

It was learned from Mrs. Thompson that loans are difficult to obtain for building homes, and as a result construction of houses is slow, though gradual. The financing companies have not been very helpful, and in fact seem to stall approvals for loans. This falls into the overall pattern of disinterest or uninvolved involvement mentioned earlier.

The second area of development is Lakeside which is owned by National Development Company and located across the lake from Garrison Park (see Fig. 13). Four hundred and twenty-three lots have been platted

and since 1962, four hundred of these have been sold. However, only thirty buildings, all summer type, have been built on the small half-acre lots. Several amenities are advertised in order to draw potential buyers from other development sites. Financing assistance, telephone lines, power lines, roads, and a boat ramp with a dock and picnic facilities are all part of the bargain. The irony of this is that all the other development areas also offer telephone and power lines, and roads as part of the site. Boating facilities are also offered on many of the development sites.

The lack of building in spite of the high percent of lot sales is due to two reasons: (1) National Development brought in trained salesmen from the company's sales force who sold lots by high powered methods. This tactic has been resented by the more local developers who are more concerned with friendly salesmanship than pressure sales. The buyers who purchased under this high pressure selling tactic gave greater consideration to building problems once separated from the salesman. (2) People are waiting to see what will happen to the lake level, as discussed above, before investing in the area.

Location is again the main factor which gives these two development sites their particular land use characteristics. Lakeside is a summer home site, whereas the Thompson site is a permanent residence area. Lakeside has hundreds of small lots that will result in crowded conditions if the area is completely built-up, while the Thompson site has fewer lots with more space and privacy. Finally, Lakeside must offer services in order to attract buyers for development while the Thompson site attracted the services because of its development.

Before ending the discussion of development areas, there is one

## EXPLANATIONS OF PLATES XV AND XVI

- XV. Another view of the boat dock "drouth" in 1966 in the Blue Hills Development area.
- XVI. The Lakeview Motel on the west side of the reservoir.

PLATE XV



PLATE XVI



last site, a combination motel-development area, which merits attention. The Lakeview Motel is located just north of Stockdale Park (Fig. 13). It occupies a location that was grazing land in 1956, and part of the land purchased by the motel proprietor is still being used for this purpose. The motel is actually a consolidated resort-cabin area rather than a motel in its more commonly known sense. There are twenty units in the motel with kitchenettes. Because fishermen were expected to be, and are, the usual room occupants, the owner provided cooking facilities so these people could prepare their fish catches. In addition, the nonexistence of restaurants for nearly ten miles made it necessary to provide these facilities.

The owner of the motel has also platted the land for cabins on the slopes leading down to the lake. One lot has been sold since sales began in September, 1966, but the author is pessimistic about the other lots being sold easily. This is because of the high prices, the highest at the lake, being asked for the land.

In conclusion, there is no other motel located next to the lake providing easy access to the water. The next closest motels are located in Manhattan and Randolph. The Holiday Inn at Manhattan is too luxurious and expensive for a simple weekend fishing trip, not to exclude the fact it is several miles from the lake. The motel at Randolph, though it is inexpensive, and within three miles of the reservoir, is too small to handle the summer weekend flow of visitors (see modes of land use, p. 66).

The need for motels and restaurants at the lakeside is there, but

the difficulty of obtaining loans for construction<sup>1</sup> and the apparent lack of interest, due to changing lake levels, decreasing visitations and these loan difficulties, have discouraged development. In time there should be a true realization of the potential trade at the lake. This realization linked with sound speculation will result in the growth of other motels and the establishment of restaurants.

### III. OTHER USES

There are a few additional services which have established themselves in the 1966 land use pattern and therefore deserve at least passing attention.

A store dealing in fishing and camping equipment and boat sales is located at the intersection of Highway 177, the main highway on the west side of the reservoir, and Highway 13, the road which crosses over the dam. This store has established itself in a prime location, for it lies at the south end of the reservoir and can attract the northbound traffic, which is greater than the traffic coming south through Randolph.<sup>2</sup>

Adjacent to this store is a service station which provides complementary services. A person who stops for gas for his car and/or boat finds it convenient to walk next door to the boat dealer and pick up some incidental fishing equipment such as a new plug, hooks, etc. or camping equipment. The possibilities are numerous, and the situation is optimum in terms of location for these services.

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<sup>1</sup>The author was informed that loan companies are hesitating to aid a potential motel or restaurant builder unless each can find a supporting service to locate in the vicinity to help attract consumers.

<sup>2</sup>The unpublished Tuttle Creek Corps of Engineers' visitation figures would support this statement.



## EXPLANATIONS OF PLATES XVII AND XVIII

XVII. An aerial view of the Blue Hills Development area.

XVIII. University Park Development area as seen from the air.

PLATE XVII



PLATE XVIII



About three miles north of Randolph, there is another new service station. This one is in connection with a small restaurant, and again has the location advantage of being on a major route. Although there is less traffic in the winter months, there are still travelers and truckers who provide sufficient income until the next summer surge. The drawback of this particular location is that it lies along a high speed highway some distance from any crossroad. Thus there is less occasion to slow down and stop as in the case of the first service station mentioned.

Finally, on the east side of the dam and at the intersection of the road leading to Spillway State Park and Marina, a boat-storage warehouse has been built. Its location is excellent, for the people who rent slips at Spillway Marina only have to transport their boats about one mile to and from winter storage. This type of supporting land use for recreation activity, as well as motels like the Lakeview, should be able to expand and grow as the recreation use of the lake increases.

## CHAPTER V

## IMPACT ON RECREATIONAL LAND USES

Construction of the Tuttle Creek Project, at a cost of \$80 million, had a major impact in the Big Blue River Valley from Manhattan to Marysville, and for short reaches along the lower end of all tributaries entering into this reach. Removal of 33,792 acres of valley land from cultivation by fee simple acquisition...and the operation of a 15,750 acre lake transformed the immediate area from an agricultural economy to one based primarily on recreation pursuits.<sup>1</sup>

In the preceding chapter it was stated that the most obvious impact of the reservoir, aside from inundation, has been upon urban-oriented land uses. Recreation is the second most obvious impact. One of the greatest pressures exerted in the 1950's by communities outside the Big Blue River area was for the building of a conservation pool to permit recreational uses of the reservoir. When the "dry dam" prospect was eliminated during the final appropriations to complete the dam, these external urban communities could be credited with demonstrating their power and interests regarding the future use of the area. They proved to be an example of modern urbanized society seeking recreation resources for reasons discussed in Chapter II.

## I. PARKS

The 1966 Land Use map (Fig. 7) shows the location of the parks around the reservoir. For the most part the parks are located on what was grazing land in 1956 with only Carnahan and Swede Creek being located on what was then cropland. Stockdale is located on the north edge of

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<sup>1</sup>Corps of Engineers, op. cit., p. II-16.

the old town of Stockdale, and the two parks below the dam are located on what was construction area, designated "other" on the 1956 map (Fig. 6).

Table VI lists each of the parks and is number coded to the parks on the 1966 Land Use map (Fig. 7). It also tells which parks are state operated, while those without this designation are federally owned and operated. The parks are located at strategic points around the reservoir permitting the greatest use of the lake. With the exception of the two lower-dam parks, it will be noted that nearly all of the other parks appear near the mouth of each major tributary valley. The reasons for this location are simple. Before the inundation there were roads which ran up each of these major valleys. Most of the roads remained above conservation pool level after flooding and provided the easiest access to the parks, thus conserving on the costs of building new roads. Also, park visitors would want to be at the edge of the main lake and not at the back of the tributary coves.

When the parks were planned, the Master Plan for the reservoir set up a few prime areas for park location. The Corps then observed where the people congregated, which land had the highest use for picnics, boating, etc. and then built the parks at those areas. This saved on second guessing the public's preferences. Tuttle Creek Cove, the last park area to be developed, 1966-1967, was being used by many people before the gravel road, boat ramp, or other facilities were built. It is expected that this park will have the highest or second highest use after becoming fully operational.

Table VII shows the rankings of park use, or visitations, for the years 1953, the first full year of operation, through 1966. The rankings

TABLE VI  
 PARKS AND PARK FACILITIES: TUTTLE CREEK RESERVOIR  
 1966

PUBLIC-USE AREA	AVAILABLE RECREATION FACILITIES								
	Boat Ramp	Boat Rental		Picnic Tables	Gas & Oil	Toilets	Water Supply	Camping	Swimming
Outlet				X		X	X		
River Pond State Park	X			X		X	X		X
Spillway State Park	X	X	X	X	X	X	X	X	
Carnahan Creek				X		X			
Garrison	X			X		X	X		
Randolph State Park	X			X		X	X	X	
Swede Creek	X			X		X			
Fancy Creek State Park	X	X	X	X	X	X	X	X	X
Baldwin	X			X		X	X		
Stockdale	X			X		X	X		
Tuttle Creek Cove	X			X			X	X	

Source: U.S. Corps of Engineers, Tuttle Creek Dam.

TABLE VII  
RANKINGS OF PARKS BY NUMBER OF VISITATIONS  
TUTTLE CREEK RESERVOIR, 1963-1966

Park	1963	1964	1965	1966
River Pond	1	1	1	1
Spillway	2	2	2	2
Fancy Creek	3	3	3	3
Randolph	4	4	4	5
Stockdale	5	5	6	4
Baldwin Creek	6	6	5	6

Source: Unpublished visitation statistics, Corps of Engineers, Tuttle Creek Dam.

are based on visitation statistics collected by the Corps of Engineers at Tuttle Creek Dam. The numbers chosen were the cumulative totals for each calendar year. River Pond, Spillway, and Fancy Creek will most likely retain their rankings and leads for a few more years when Tuttle Creek Cove Park may begin to overtake them. The reason they have ranked highest and will continue to is their location. All of these parks are located next to major highways. Further, River Pond and Spillway Parks are located near Manhattan and Kansas State University. These are the major sources of visitors for these parks. Fancy Creek draws primarily upon the towns of Blue Rapids, Marysville, and others located north of New Randolph.

The River Pond is most popular, especially with students, because it is the nearest reservoir park to Kansas State University. Spillway Park is about two miles further, thus River Pond allows easy access in a short period of time. Motor bikes, scooters and cycles are popular

and convenient methods for traveling to River Pond. Though Spillway Park is only this short distance further, there appears to be a psychological hesitancy about the return value of use for the extra distance traveled. Swimming is permissible at River Pond whereas it is not at Spillway. Lying on the beach is much less expensive and apparently for students more relaxing than renting a boat.

The Spillway Park visitation figures were close in all four years to the visitation figures of River Pond Park. However, the distance factor between the two parks and the student population at River Pond appears to have overshadowed any visitation gains that may have occurred during the summer months at Spillway when boating would be more popular and student visitations at River Pond greatly decreased.

Fancy Creek State Park is markedly trailing the other two parks in visitations, though this fact does not appear in the table. The popularity for Fancy Creek, in spite of its location nearly fifteen miles from the dam, is due to two factors. First, Fancy Creek is located on a major highway and draws primarily upon a different trade area than River Pond and Spillway Parks. People living north of the reservoir find Fancy Creek convenient and closer than the other parks. Although one other park, Swede Creek, is located further north than Fancy Creek, it lies several miles off the main highway. Pool level decreases can easily leave Swede Creek Park and its boat ramp far above water level, thus Fancy Creek has the advantage.

Second, Fancy Creek's facilities are surpassed only by the Spillway Marina, but by the summer of 1967 Fancy Creek will be allowing swimming at its new beach, something not offered at Spillway.



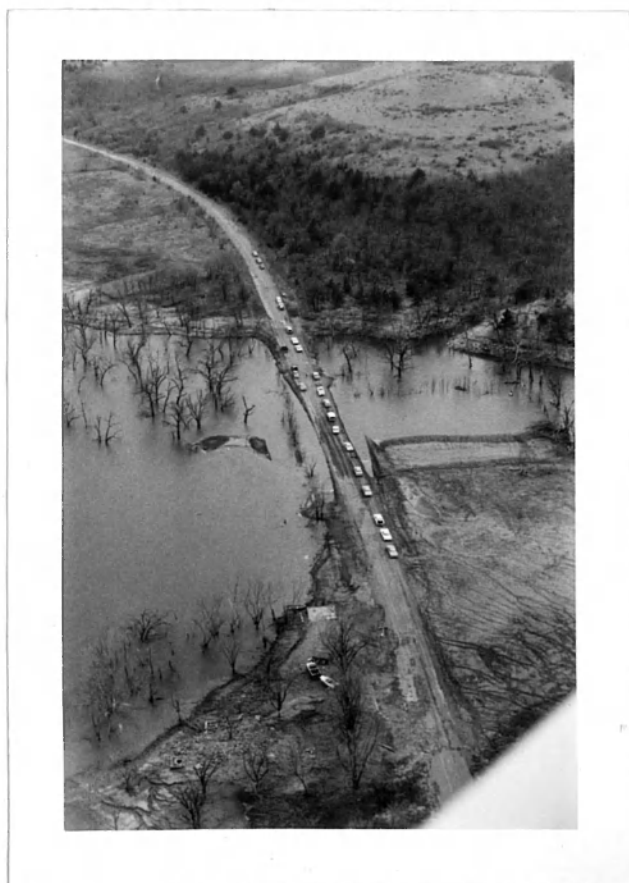
## EXPLANATIONS OF PLATES XIX AND XX.

- XIX. An aerial view of Stockdale Park. The boat ramp and dock are far above water level as a result of the 1966 draw down. The water's edge is just visible in the extreme lower left corner.
- XX. A typical scene of an old road in the valley which is now used by fishermen when the water level is down permitting access to the lake's edge.

PLATE XIX



PLATE XX



The changing positions of the last three parks ranked in Table VII are also the result of a location factor. Randolph Park is located just one mile from Fancy Creek, but has a large separation, statistically, between Fancy Creek and itself. Also, its declined position in 1966 is a result of this location. The following examples are among the factors responsible for Randolph Park's decline: (1) where Randolph Park sits exposed on an old grazing hill, Fancy Creek Park is nestled amongst ravines with trees, located on a sheltered inlet, and still offers a large open field; (2) Fancy Creek's west shore location means the sun is at one's back throughout the afternoon. A person looking at the lake does not suffer any inconveniences from the sun, whereas this would occur at Randolph Park; finally (3) the services offered at Fancy Creek attract many people who might otherwise use Randolph Park.

Stockdale and Baldwin Parks changed rankings in 1965 and 1966 for two primary reasons. In 1965 the water level was too high to permit use of Stockdale, and people simply traveled to either Baldwin or Fancy Creek Parks. In 1966 Stockdale jumped two rank positions because of (1) the lowered lake level and returned serviceability of the park, and (2) the number of people who probably discovered the floating pier providing better boating facilities than the other parks, except for Spillway and Fancy Creek.

One last location distribution must be noted before leaving these rankings. All of the ranked parks above the dam are located on the west side of the reservoir with the exception of Randolph and Spillway parks. Though Tuttle Creek Cove is not included in Table VII at this time, it should be kept in mind as a potential area for the near future. The

explanations for this locational distribution of the parks are twofold: (1) the transportation network is more developed on the west side than the east, and (2) the higher density of population at the lake, as shown in the preceding chapter, is also located on the west side.

In the Corps of Engineer's plan for Tuttle Creek, it was predicted that the project's effectiveness would depend to a large extent upon convenient access to the lake. In short this means areas were needed where boat ramps could be placed to attain maximum use of the lake. The problem here was not simply one of finding where the people wanted parks and boat ramps, as mentioned above, but of placing the ramps in locations that would provide flexibility for changes in pool levels. If the lake were to drop to 1071 feet from 1075 feet, the conservation level, most of the ramps that were planned would be separated from the water. A further drop below 1071 feet would create a reduction in recreational use by nearly forty percent. In a similar manner, high water levels above 1079 feet would also reduce the use of the parks and boat docks.<sup>2</sup> This latter situation is demonstrated from the above discussion in the changes of rankings, Table VII. The problem of low water became an actuality in the fall of 1966 when the lake level fell to 1061 feet, ten feet below the level where a forty percent use reduction would occur. This situation was discussed near the end of Chapter II under CURRENT OVERTONES.

Prior to the reservoir, water recreation in the Big Blue River Valley was confined to fishing in natural streams, small mill-dam ponds,

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<sup>2</sup>Ibid., p. IX-5.

and a few small man-made lakes which were built for water supply. The Corps made it known in the 1950's that attendance at other parks and recreation areas in eastern Kansas had tripled over a ten year period.<sup>3</sup> With an expected continuation in this trend due to increasing population and more leisure time, Tuttle Creek Reservoir would become a recreation showcase.

In 1965 the Corps released attendance figures for the two preceding years. The attendance had nudged over the one million visitor mark in 1963 and reached 1,300,000 in 1965. The Corps anticipated that this amount would increase to over two million visitors in the next few years.<sup>4</sup> Unfortunately its conclusions were negative. Table VIII shows the actual figures recorded for the years 1963 to 1966 and includes the first quarter of 1967. Figure 14 represents this information graphically.

There are three primary reasons for the sharp decline in visitations beginning in 1965. The first reason is the decline in the reservoir's novelty. A major portion of the people who came to the reservoir in 1963 and in 1964 were curiosity seekers. The largest reservoir in Kansas had just been completed, and only a few years earlier its inception was the cause of heated political and legal debates. Many people from nearby towns and cities constituted these visitors, and in addition there were many out-of-state travelers who made side trips in order to see Tuttle Creek. Many who came from other areas of Kansas, where there was a reservoir already completed, rarely returned for they found Tuttle Creek

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<sup>3</sup>See Chapter II, p. 12.

<sup>4</sup>Corps of Engineers, op. cit., p. II-16.

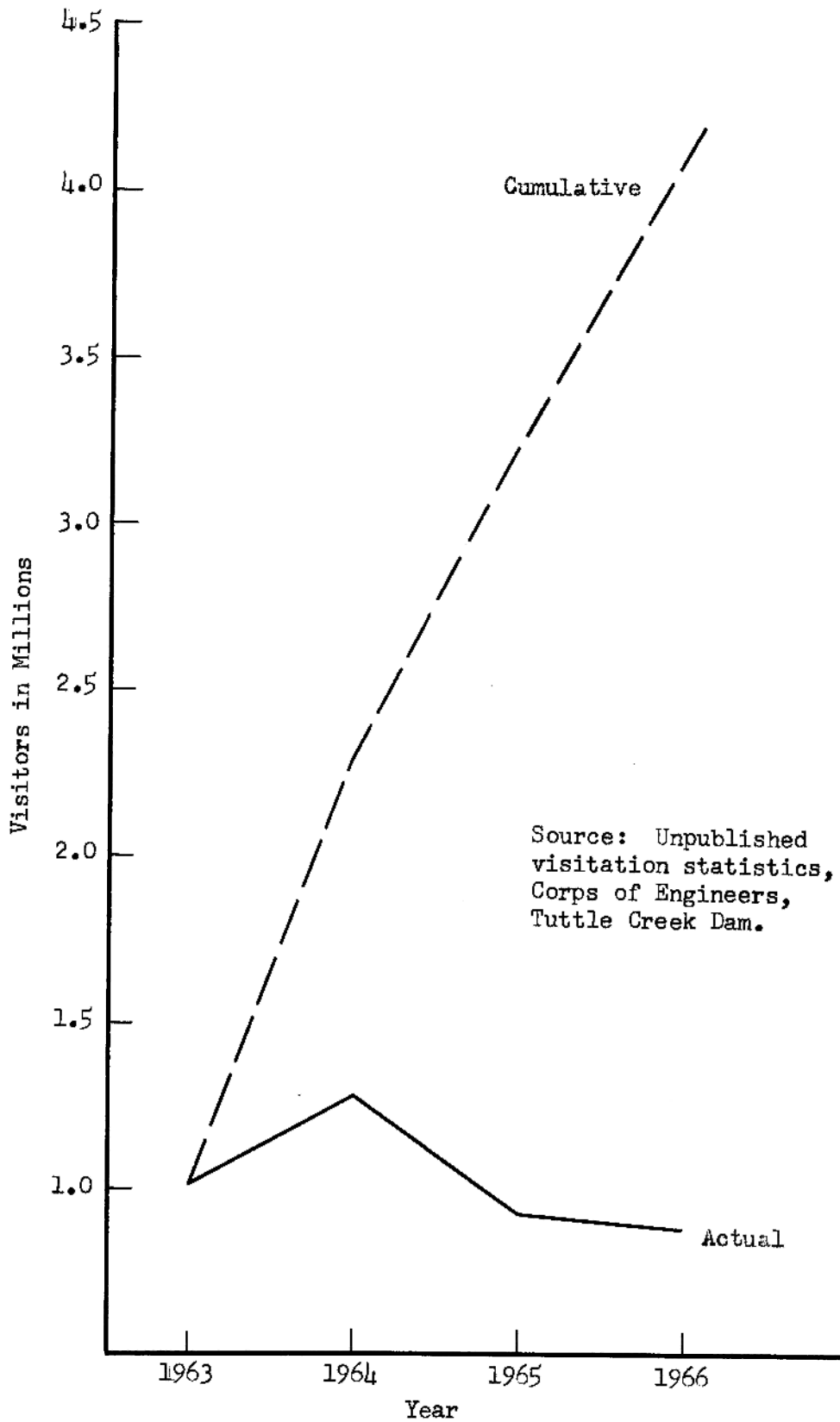


Fig. 14. Number of visitations: Tuttle Creek Reservoir, 1963-1966

TABLE VIII  
 NUMBER OF PERSONS VISITING TUTTLE CREEK RESERVOIR  
 1963 - 1967\*

Year	Total per Year	Cumulative
1963	1,012,209	1,012,209
1964	1,298,430	2,310,639
1965	931,480	3,242,119
1966	891,947	4,134,066
1967 (1st Quarter)	190,058**	4,324,124

\*These figures include all areas of the reservoir, e.g. observation points, parks, etc.

\*\*This figure is running slightly less than the comparable quarter for 1966.

Source: Unpublished visitation statistics, Corps of Engineers, Tuttle Creek Dam.

to be no different than their own. Further, because Tuttle Creek was only recently opened when they came, the facilities were lacking in comparison to a reservoir several years older, and this probably discouraged many return visits.

Second, the increasing number of reservoirs in Kansas, and especially in the eastern part of the state, has created a competitive situation. When Tuttle Creek was officially opened in 1962, there were only seven other completed reservoirs in Kansas. In 1965 that figure had increased to eleven completed reservoirs. People now weighed the distance factor to a reservoir more heavily than before as a result of the wider selection. Those who were once willing to drive many miles to Tuttle Creek now enjoyed the same recreational activity with less

traveling. Also, Milford Reservoir, located just 15 miles further west from Tuttle Creek, began to draw upon the visitors to Tuttle Creek.

The third reason for fewer visitations again refers to water level problems. The amount of turbidity in the water, caused by changing lake levels, resulted in poor fishing conditions. The fish were constantly on the move because of these lake variations, and when this factor was linked with unusable boat ramps, many people were not attracted.

In 1966 the story remained basically the same. The novelty had decreased further, and fishing was still poor because of the continued turbidity due to the large draw down in the lake level in order to return to conservation pool. Although the boat ramps were again accessible, the substandard fishing meant continued poor lake utilization.

It should be pointed out that fishing is one of the primary uses of the lake as shown in Table IX.

TABLE IX

NUMBER OF FISHERMEN PER YEAR AND THEIR PERCENTAGE  
OF ALL RECREATIONAL USES 1963-1966

Year	Number	Fishing as a Percent of All Uses
1963	62,829	6.2
1964	217,033	16.7
1965	183,235	19.7
1966	164,330	18.4

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Source: Unpublished visitation statistics, Corps of Engineers,  
Tuttle Creek Dam.

The actual number of fishermen had declined since 1964, the first real fishing year. In 1963 fewer people who visited the reservoir knew of the fishing opportunities than those who came in 1964. The decrease



since then follows the trend for all of the recreation uses. However, the percentage figures show that even though the actual number of fishermen had decreased, the other uses have decreased even more rapidly, and fishing has gained in importance as a type of utilization. The percentage drop in 1966 is a result of the poor fishing season for the second consecutive year. With improved conditions the number of fishermen will increase, and the percentage should follow.

## II. SPILLWAY STATE PARK AND MARINA

There are only two marinas located on the reservoir; one is Fancy Creek State Park and Marina near New Randolph. The other is Spillway State Park and Marina near the east side of the dam. The latter has been chosen for two reasons to provide an example of a park and marina. First, Spillway is a better established marina with more and better facilities, and it has many more visitors than does Fancy Creek. Second, Spillway was closer for field work and opened earlier in the year for business.

Spillway provides all the types of recreational facilities that are available at the parks around the reservoir except a swimming area (see Table VI). Its many facilities and attractive location near Manhattan place it second in overall use as shown earlier. The distribution of recreational uses at the park and marina is shown in Table X.

The overall drop in use of this park follows the same patterns as the total decline in the use of the reservoir. Also, the explanations for this drop are the same as those listed earlier for all visitations. One further statement is needed, however, to explain the significant

## EXPLANATIONS OF PLATES XXI AND XXII

- XXI. Spillway Marina with the boat ramp visible in the foreground. Spillway State Park occupies the upper ground in the back of the picture.
- XXII. View of the open slips at Spillway Marina. The covered slips are visible at the extreme right.

PLATE XXI



PLATE XXII



TABLE X  
 SPILLWAY STATE PARK AND MARINA RECREATIONAL USES  
 1963 - 1966

Year	Camping	Picnics	Boating	Fishing	Hunting	Sightseeing	Skiing
1963	1,933	37,471	45,562	5,862	218	99,997	13,101
1964	8,936	9,887	38,202	27,081	443	102,315	18,986
1965	6,286	1,085	33,792	28,404	173	87,543	10,943
1966	4,192	8,457	26,365	19,021	273	74,629	9,460
TOTAL	21,347	56,900	143,921	80,368	1,107	364,484	52,490

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Total all years: 720,617

Percent of all Tuttle Creek Visitors: 17%

Source: Unpublished visitation statistics, Corps of Engineers, Tuttle Creek Dam.

drop in 1965 for picnic visitations. High winds or other weather conditions which suppress outdoor activity are probably the major explanations for this. The effect would be felt most seriously over weekends when the reservoir has its greatest use.

Spillway Park demonstrates its value to the recreation picture at Tuttle Creek when the percent of park visitors is compared with all the visitations to the reservoir. Assuming recreational facilities are equally available at each park, the average share of visitors would be eight percent per park. As noted in the last table, Spillway has seventeen percent of the total visitors. Thus, the larger number of recreational facilities helps attract more visitors to the park.

Lastly, in regard to the park area, the following picnic equipment is available for use:

Group Shelter	1	Outdoor Grills	12
Picnic Tables	24	Group Fireplaces	2

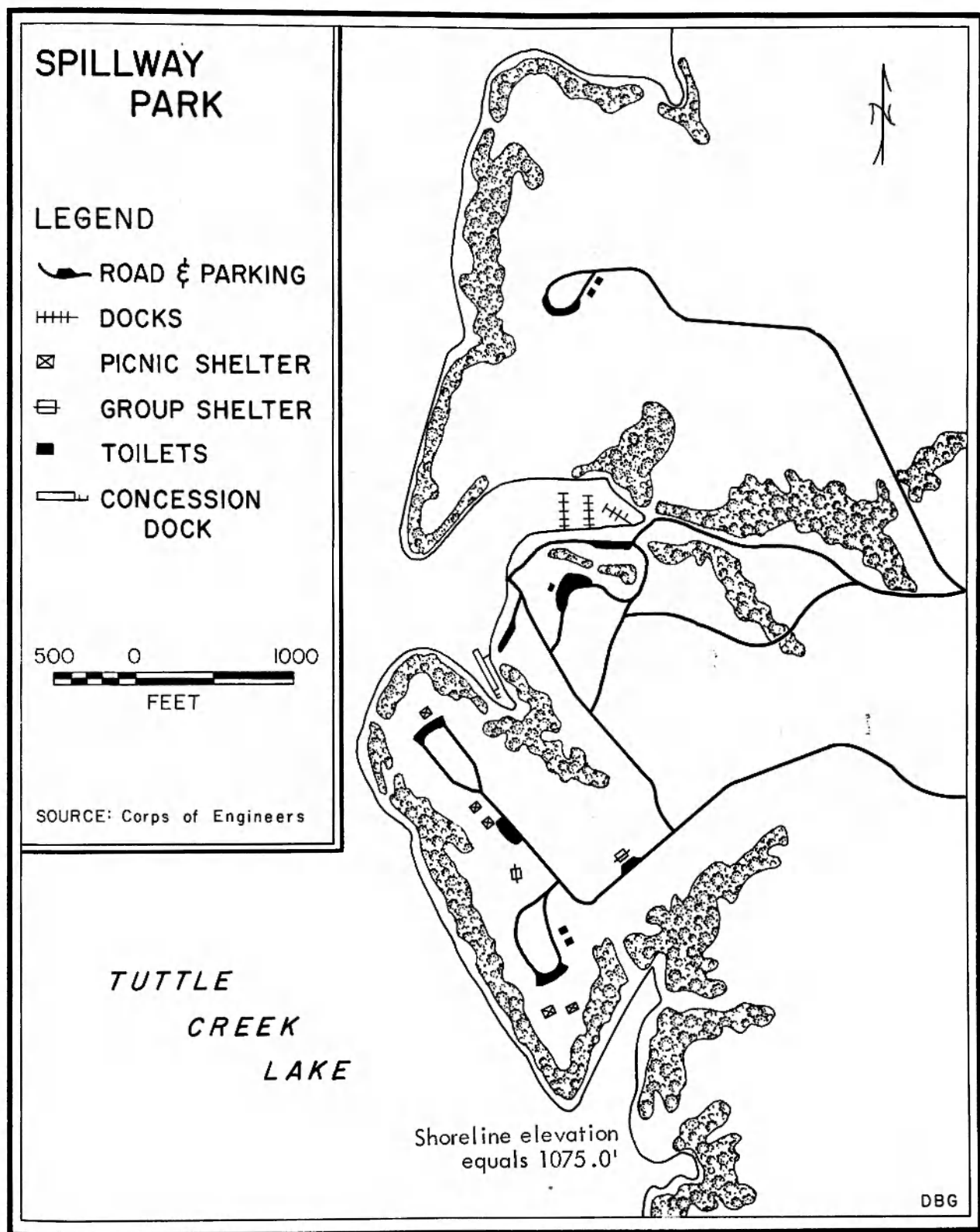


Fig. 15. Spillway park.

Figure 15 shows the different recreation areas in the park as well as the location of various picnicing equipment.

The Spillway Marina is an integral part of the whole park area and accounts for much of the fishing at the park and all of the boating and water skiing. The marina first opened in 1963 after one year was spent building the facility, a process which continues today. The land is leased from the State of Kansas and managed with the state's approval. Any building or other expansion programs are first subject to the Corps of Engineers' approval, and then the state's.

The marina provides many water recreation facilities. There are eighteen boats from twelve feet long to a house boat on pontoons which may be rented. There is an equal range of motor sizes for rent in addition to ski and miscellaneous other equipment. At present there is a large number of slips which are completely rented during the summer season. The number of slips and sizes available are listed in Table XI.

TABLE XI  
SPILLWAY MARINA BOAT SLIP FACILITIES - 1966

<u>Size of Slip</u>	<u>Number Available</u>
Covered slip for 20 ft. boats	26
Open slip for 20 ft. boats	24
Open slip for 30 ft. boats	4
Covered slip for 40 ft. boats	12
Dry Docks	12

Source: Interview with Lot Taylor, Proprieter, Spillway Marina.

There is a need for more boat docking space because of the requests made

to rent the present slips. But construction will not be undertaken until a breakwater has been placed at the mouth of the channel to lessen the water turbulence which often disrupts the use of the present docks. This need for expansion does point out that there is an increasing use of the boating facilities, but the increase is being tempered by lack of more docking space. To carry this thought one step further, if it were not for administrative delays by the Corps of Engineers and the State of Kansas, this increasing use would have occurred earlier than it has, or will. But the Corps is slow in granting permission for the needed breakwater while the State of Kansas is slow in finding the funds to build it. As a result there has been little growth, and statistically there has been a decline in water recreation at the park.

Finally, the greatest problem at the moment which is restraining growth of recreational uses is the high variability in lake levels. The worst disaster to water sports was the lake drop in late 1966. The marina owners have lost confidence in the Corps to maintain a stable lake level, and they refuse to build more boating facilities until water is guaranteed. When the present docks are thirty feet and more from the water due to the water drop, it is out of the question to think of more expansion.

Other areas that may have been developed with some type of commercial water facilities will have lost their interest for the same reason. Thus there are several problems directly affecting water recreation uses that must be solved before growth will ensue. Until someone in the right position realizes and becomes concerned about the true potential of the recreation uses, there will be a frustration of development and use

resulting in suppressed economic growth.

### III. OTHER RECREATIONAL LAND USES

There are a few other ways the reservoir is being used for recreational uses which merit a passing consideration. Fishing was mentioned earlier, but not hunting. The State Fish and Game Commission estimated 12,000 hunter-use days in 1965 and 15,000 in 1966. The increase is expected to continue as the Commission develops better game areas on the land under its control. The number of fields being left in grain crops, the growth of cover along roads, streams and the reservoir, and improved management are creating better game conditions. These improved conditions are attracting more hunters to the area.

Quail, doves, deer, ducks and squirrels are the main game being hunted. Ducks are expected to gain in importance as their numbers increase at the lake. There were approximately 26,500 mallards and 2,500 geese which remained at the reservoir during the 1966-1967 winter months. Previously there had been fewer than 15,000 ducks and 1,000 geese. With these improving conditions, duck hunters will be a more common sight in the near future.

Finally, there were two riding stables developed after the introduction of the dam, one being located on the east side north of Carnahan Creek, and second being an additional facility at Blue River Hills Development. By the end of 1966, however, both of these stables had ceased to exist. The stable on the east side failed to attract clientele because of the usual restriction factors of location for that shore: poor roads, and too great a distance from the consumer. The stable at



Blue River Hills also failed because of little use. Though it was located in the center of its consumers, there was a lack in supply. In other words, too few people were living permanently at Blue River Hills. Given better roads and/or a location closer to a substantial consumer market, there appears to be little reason why a stable should not be profitable at Tuttle Creek.

CHAPTER VI  
SUMMARY AND CONCLUSIONS

Though reservoirs are becoming a more familiar scene in the American landscape, a major gap exists in each pre-reservoir study conducted by the U.S. Army Corps of Engineers. Land use changes in response to permanent inundation of valley are given less than passing consideration. More importantly, there has been no study of the changes in land use after the reservoir's completion.

Tuttle Creek Reservoir was first considered in 1928 in a government study to determine the best means of aiding navigation on the Mississippi River while controlling flood problems. Through the years Tuttle Creek gained attention as an important part of the reservoir system in eastern Kansas as an aid to navigation not only on the Mississippi, but also on the Missouri between Kansas City and St. Louis. Due to the major flood of 1951 that inundated the river valley from Junction City, Kansas to beyond Kansas City, the government decided to begin construction of the dam at Tuttle Creek. After several years of bitter dispute by the people directly concerned with the permanent flooding from the proposed reservoir, appropriations were granted, the people were removed from the valley, and in 1962 the dam was officially operative with close to 16,000 acres of alluvial floodplain under water, and another 17,000 acres subject to inundation. Between 1956 and 1966 there have been several significant changes in land use which are the result of the reservoir's impact.

One major impact has been upon agriculture. In eastern Kansas

there is a unique opportunity for agriculture to pursue a cattle-grass-feed activity. Two diverse systems are followed within this type of activity depending upon the farmer's choice, but in both there is still the pattern of winter forage and roughage feeding, summer grazing on native grasses, and grain fattening the cattle before shipment to market in the fall. Inundation of the Big Blue River Valley shattered the farm units because they lost their most productive land and retained only upland pastures. Major shattering of the local economy has been prevented, however, with the employment of modern transportation. Though the farm land is no longer contiguous, the system has been maintained. By using another valley for crops and maintaining grazing along the now flooded Big Blue River sides, the activity continues as before.

Aside from the direct inundation of this rich cropland, the most obvious impact has been on urban-oriented land uses. Development sites are springing up along both sides of the reservoir, especially on the west side. What was a farmer's back eighty acres in 1956 and a native grass pasture, is the site of modern cabins and permanent homes in 1966.

The deterioration of the town of Randolph, though relocated above flood waters, has been an important factor in the amount of development on these sites. With no services being provided at the north end of the lake, there is little building on lots bought in the development sites, not to overlook the fact that fluctuating lake levels have caused people to lose confidence in the water level and to hesitate investing money until the situation is corrected. The main construction of houses in 1966 is at the dam-end of the lake which is close to a major trade city, Manhattan.

The second most obvious impact of the reservoir has been upon recreation. Prior to the reservoir, water recreation was limited to fishing in natural streams, mill ponds and small man-made lakes. In 1966 there were over 891,000 visitors to eleven recreation areas around the reservoir. Camping, fishing, boating, water skiing, swimming, and hunting are now available in this once poor recreation area. The transformation has been strong and swift. The major problem at the moment is, again, the variable lake level which makes fishing conditions sub-standard, keeps boat ramps and piers almost submerged one year, and fifty yards from the water the next year. The total effect is discouragement of recreational activity.

There are several conclusions which have been derived in the course of, and at the conclusion of, this thesis. Below is their enumeration.

1. Undoubtedly the major impacts of this thesis revolve around one factor, location. All of the major changes, variations and continuing patterns find meaning and explanation by the employment of this word. One development site is more progressive than another because location is one of the factors. A land area involved in a particular agricultural use in 1956 and which had the same use through 1966, maintained that use because of location. Parks around the reservoir have visitation variances because of their location. The key to explaining and analyzing land use changes on this reservoir, then, is location.

2. The major impacts in the area of this study have occurred for the most part within one-half mile of the conservation pool level. Beyond this distance the land uses in 1966 appear the same as they were in 1956. It is the author's belief that this impact line will remain the same for

at least another decade.

3. Geographers, agricultural agents, and others predicted in the early 1950's, and some still believed in 1966, that Tuttle Creek Reservoir would drive the farmers who lost bottomland to the uplands. There they would break out large amounts of the thin-soiled upland for crops. The 1956 and 1966 Land Use maps refute this theory, however. If any change has occurred, there has been a decrease in cropped uplands.

4. There is a lack of interest regarding development of the lake and its immediate area. Loans are difficult to obtain for construction, and this has slowed considerably the amount of progress that could have occurred by 1966. The more progressive developers realize the consequences this disinterest is having upon the local economy and the level to which it could be developed.

5. There will be a marked development of the area in five to ten years, for the probable population increase in Manhattan linked with higher levels of living, which means better earnings, more leisure time and more pressure for recreational land uses, will stimulate the spread of a suburban area along the southern end of the lake. If advertisements, which are momentarily lacking, are effectively employed, these will also help attract residents to the area.

6. There is a definite avoidance of risk taking from both the prospective resident and those engaged in tertiary services. A stalemate has been temporarily encountered, for the buyer refuses to build a house on a lot until services on the order of groceries, service stations, and even restaurants are provided. He does not want to live fifteen miles from the nearest grocery store or ten miles from the service

station, nor does he want to forego eating out from time to time. On the other hand, those providing services are against establishing their businesses until they can see more people in order to assure an economic return on the investment. The author believes that the situation will remain thus for several years when population increases will finally attract the services. The author also believes that this time could be shortened by the immediate establishment of the services. At least a seasonal establishment would stimulate development and growth beyond the current rate.

7. Where either recreational land uses or development sites occur, the other will follow. As more people use the recreation facilities, there will be more stores selling bait, fishing and camping equipment, boats and its equipment, and there will be more service stations, restaurants, and motels. Conversely, as motels, restaurants, and service stations build, there will be more people to use the facilities. One of the major drawbacks to use and development of the reservoir at this time is lack of tertiary services. When these are available for use, the people will return to the reservoir in numbers equal to the first few years of operation.

8. Finally, the limited success of this reservoir is the result of mismanagement and lack of communication. The debate over the explicit purpose of the reservoir, which includes the right of drawdowns, has caused discouragement, bitterness, and economic suffering. The Corps states it has the right to drop the water level; the residents and other interested people state the Corps sold them on the idea of the reservoir because of the recreational uses of the lake. Until this is explicitly

and unequivocally clear, the hardships and bitterness will continue to prevail. Adjustments will not be expected, planned, nor agreed upon by either side.

This thesis has stimulated questions suggesting further studies. Another investigation in five or ten years such as this one will either prove or disprove many of the conclusions in this thesis. Also, the impacts will have had a better opportunity to establish themselves in the landscape. A major land use impact, which was beyond the scope of this study, has been on transportation nets and nodes. The many roads that crossed the Big Blue River valley have been rerouted to just two or three links. Traffic flows, the flow of goods, and commuting patterns have experienced significant changes. Finally, there is a definite need for a detailed analysis of land values. Whether the land lost its value because of separation from more valuable land, or what other factor(s) may have been the cause is a motivating question.

It is the belief of the author that this study has accomplished its primary goal, to fill the gap in geographic literature by providing a study of land use changes as a result of permanent inundation. It is the hope of the author that others will be stimulated to pursue in similar areas comparable studies that might eventually lead to a generalization concerning land use impacts in the immediate area of a reservoir.

## APPENDIX

Location of dam: Six miles north of Manhattan, Kansas on Big Blue River at mile 10.0.

Purpose: Flood control and conservation.

Initial Authorization: Flood Control Act approved 22 June 1938. Public Law No. 761, 75th Congress, 3rd Session.

Official date of first operation: July, 1, 1962.

Operating Agency: Corps of Engineers

Drainage area, above dam: 9,628 square miles

Approximate length of the reservoir: At top of flood control pool (1140 feet): 50 miles on Big Blue River to Marysville. 12 miles on Black Vermillion River to Frankfort. 14 miles on Little Blue River.

Time of water travel: Average 3.5 days to Missouri River.

Cost: \$79,822,057 (June, 1965).



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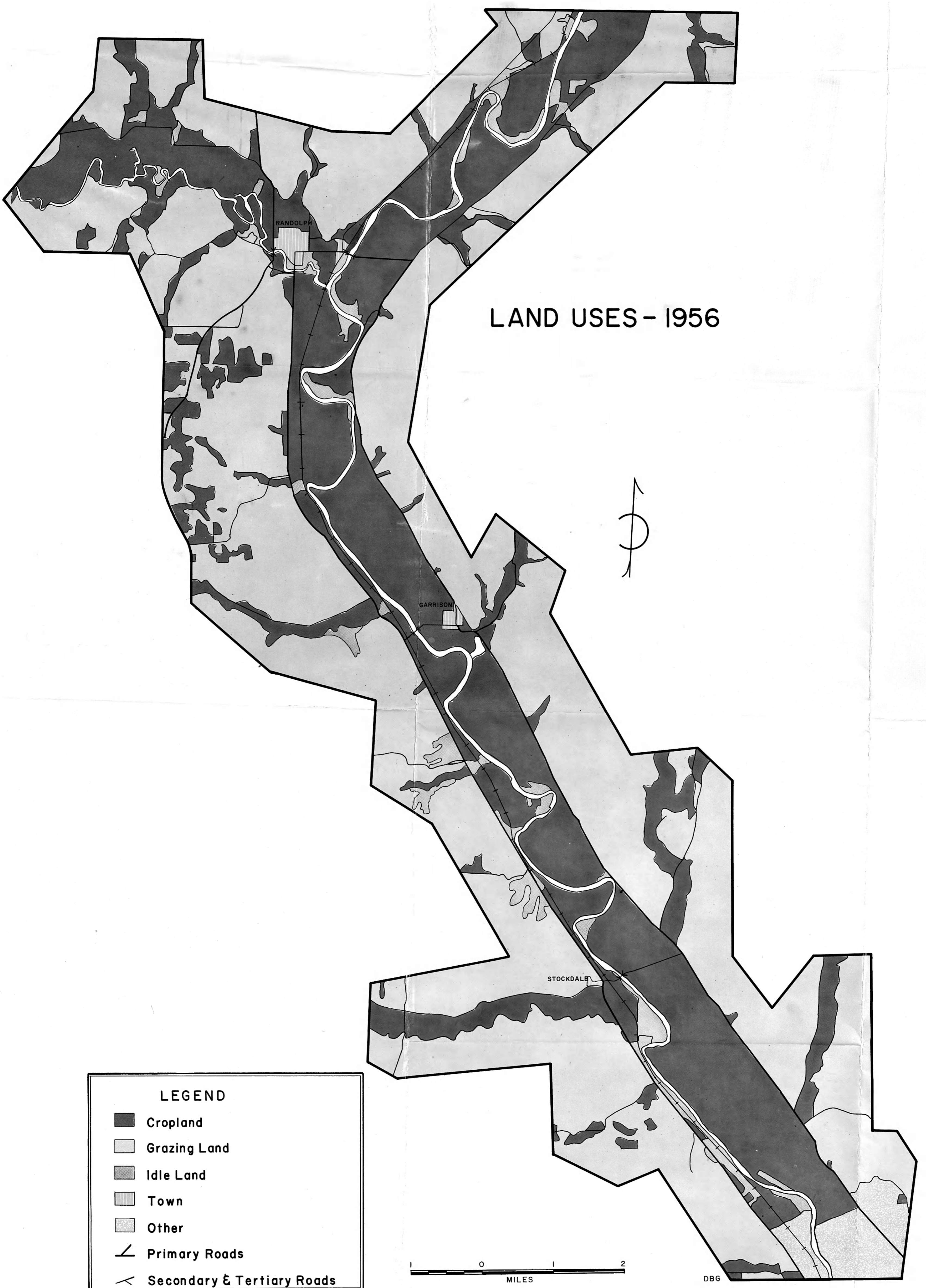
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Interview with Lot Taylor, Proprietor, Spillway Marina, April 9, 1967.



LAND USES - 1956

**LEGEND**

- Cropland
- Grazing Land
- Idle Land
- Town
- Other
- Primary Roads
- Secondary & Tertiary Roads

0 1 2  
MILES

DBG

Fig. 6. Land uses - 1956.

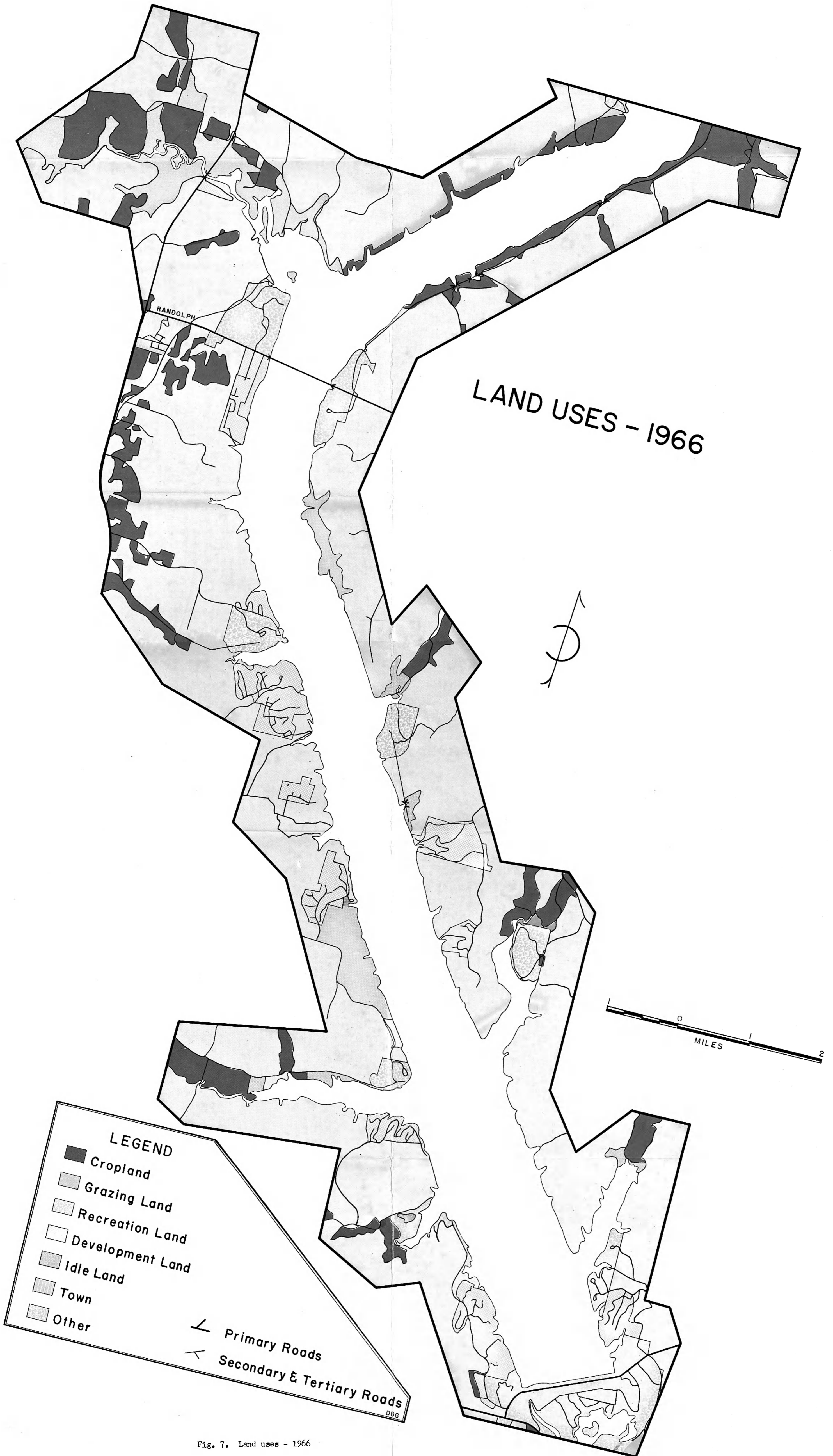


Fig. 7. Land uses - 1966

SOME LAND USE IMPACTS IN A PORTION OF THE  
IMMEDIATE AREA OF TUTTLE CREEK  
RESERVOIR, KANSAS

by

DAVID BART GATTORNA

B.S., Carroll College, 1963

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AN ABSTRACT OF A MASTER'S THESIS

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requirements for the degree

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KANSAS STATE UNIVERSITY  
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1969

Reservoirs are becoming a more common scene in the American landscape as the desire for flood control increases. The introduction of a reservoir results in impacts that are both intensive and extensive. This thesis is a study of the more intensive land use impacts of Tuttle Creek Reservoir between 1956 and 1966; three land use types, agricultural uses, urban-oriented uses, and recreation uses, are described and analyzed.

Tuttle Creek Reservoir lies at the southern end of the Big Blue River valley. The unique combination of bottomland-upland gave the area an agricultural land use pattern which utilized the various types of land resources available. Though the farms lying wholly or partially within the area of inundation were shattered by loss of land, there have been adjustments since the official opening of the reservoir in July, 1962. The land which was in a particular agricultural land use in 1966 had the same use in 1956 with the exception of a few acres. The changes occurred, however, in the agricultural methods, not in the use.

Aside from the direct inundation of land, the most obvious land use impact has been upon urban-oriented land uses, those which are non-agricultural and whose explicit use is non-recreational. The location along the edges of the lake of development sites is the result of two major controlling forces. First, transportation is better developed along the west side than the east side. Second, many potential east side residents find the sun and its reflections off the lake undesirable. Because of this there has been greater west shore development and an unbalanced impact on the agricultural land uses along the length of the reservoir. There has also been a difference in the type and amount of development from the lower to the upper end of the lake.



The last major impact considered in this study has been that upon recreation. Prior to the reservoir recreation was limited to fishing in natural streams. Boating, water skiing, fishing and other recreation activities are now available with the presence of a large water body. Visitation patterns to the parks also demonstrate the location factors of distance and direction. The parks near important roads and larger towns received a heavily weighted share of the visits compared to the more secluded parks.

The research for this study was accomplished by using aerial photographs which were available for 1956 and 1966, field checking the maps drawn from the photos, and analyzing the changes observed.

The conclusions from the above findings are basically these:

- (1) the impact on land use rarely extended beyond one-half mile from the conservation pool level;
- (2) location, in terms of proximity to the reservoir, major routes and towns, usually explains the degree of impact that has taken place within the first four years of the reservoir's presence;
- (3) the agricultural activity was not shattered as predicted, nor was there a major outbreak of cropped fields on highly erodible uplands. Adjustments were made to preserve the agricultural activity, and there was a decrease of cropped uplands rather than an increase; and
- (4) the lack of development success can be attributed to disinterest, poor management and exploitation motives.