

RESERVOIR LOCATION AND RECREATIONAL IMPACT IN KANSAS

by

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CHAPTER I

INTRODUCTION

Water-oriented recreation in Kansas has had a phenomenal growth since the opening of the first reservoir in 1948. This has been the result of the development and construction of more federal reservoirs. This report will be concerned with the influence of these sites on their surrounding "recreational hinterlands."

RECREATIONAL DEVELOPMENT

The population of the United States has experienced social and economic changes related to its ever expanding technological structure. A widening availability of leisure time is one product of America's technological competence which has provided far reaching economic and social influence. There are more people retired, the length of the work-day and the work-week are much shorter, and there is a larger number of paid vacations.¹ In addition to the increased availability of non-work time, Americans have been receiving larger salaries. This has meant a greater availability of money to be spent for goods and services other than the necessities of life. Even the semi-skilled worker can afford to buy items that will be put to use in his broadening leisure time.

Along with the increased leisure time and money, improved transportation facilities have provided a means of moving from place to place with

¹Marion Clawson, Land and Water for Recreation: Opportunities, Problems, and Policies (Resources for the Future, Inc., Chicago: Rand McNally and Co., 1963), p. 25.

greater speed and somewhat greater safety. Prior to the development of the train and automobile, and their associated advancement of transportation facilities, man was largely confined within a few miles of his home. There was very little personal travel.² But in the late 1920's the American began to travel greater distances. He was no longer forced to remain in his home area on non-work days. Modern man can now journey to areas some distance from his residence in a short period of time to use his increased non-work time. Not all of this activity is for recreation, but census data suggests that travel, especially by auto, for generally recreational purposes is a very large portion of the total population movement.³ The Outdoor Recreation Resources Review Commission reported that 61 percent of adults participated in automobile riding for pleasure in 1960.⁴ Since man became more mobile, his travel and use of facilities related to recreation can be stated as a relationship between the time available and the distance to them. Although there are many variables which influence riding for pleasure,⁵ Clawson and Knetsch suggested a list of the types of non-work time available and the respective distances that one might travel to put this time to use. (TABLE I was developed from this list.)

²Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation (Resources for the Future, Inc., Baltimore: John Hopkins Press, 1966), p. 97.

³Ibid., p. 98.

⁴A Report to the President and to the Congress by the Outdoor Recreation Resources Review Commission, Outdoor Recreation for America (Washington: Government Printing Office, 1962), p. 8.

⁵Many variables play on recreation travel, e.g., the different areas of use, a person's idea of what is a short drive or a long drive, and the season and type of weather which is confronting the user; Clawson and Knetsch, Economics of Outdoor Recreation, p. 98.

TABLE I. Types of non-work time and distances that might be traveled to use this available time.

<u>TYPES OF NON-WORK TIME</u>	<u>DISTANCE TRAVELED</u>
After school and during the day for mothers with small children.	Less than 1 mile, preferably less than 1/2 mile.
After work, for adults seeking special opportunities.	Up to 5 miles.
One day outing.	20 to 50 miles (further if traffic is light and attractive areas are unavailable nearer).
Weekend outing.	100 to 150 miles.
Short vacation (two weeks or less).	400 to 600 miles.
Longer vacation (more than two weeks).	1,000 miles or more.

SOURCE: Clawson and Knetsch. Economics of Outdoor Recreation. pp. 98-99.

Along with the increased leisure time, available capital, and mobility, modern man has also found that he needs a retreat from the consequences of urban advancement. One means of escape is outdoor recreation.⁶ Although it comprises only about 3 to 4 percent of all non-work time,⁷ it does provide a means of revitalization. According to Lowden Wingo, urban advancement has been associated with many negative consequences which tend to make many city dwellers unrelaxed and emotionally drained. A retreat into

⁶"Outdoor Recreation"; this type of recreation is typically carried on outdoors, which can result in a human emotional and inspirational experience arising out of this act; Clawson and Knetsch, Economics of Outdoor Recreation, pp. 6-7.

⁷Clawson, Land and Water for Recreation, p. 7.

the outdoors, either for a drive, a fishing trip, or for a weekend camping trip, may provide a way and means of revitalizing oneself.⁸

Outdoor recreation has developed greatly in the past thirty years, and one of its more phenomenal growth areas has been the expansion of activities and facilities related to water resources. These recreational endeavors, once readily available largely for the Americans situated on the ocean coasts or the shorelines of the Great Lakes, are expanding rapidly as a result of man's technical inputs into the natural environment in the form of man-made lakes and reservoirs. The development and construction of these water bodies has mainly been the responsibility of two governmental agencies; the U.S. Army Corps of Engineers, under the Secretary of the Army, and the Bureau of Reclamation, a branch of the U.S. Department of the Interior.

The number of reservoirs developed by the Corps and the Bureau is well over 500.⁹ These man-made aspects of the natural environment are developed and constructed primarily for reasons other than recreation. Flood abatement works and navigation improvement projects are the concerns of the Corps of Engineers, while the Bureau of Reclamation is concerned with irrigation, water supply, flood control, and hydroelectric power production.¹⁰ Despite the fact that recreation is not the primary development responsibility, once the sites are opened for the public the secondary recreational activities tend to overshadow the primary concerns on the local level.

⁸Lowden Wingo, "Recreation and Urban Development: A Policy Perspective," Annals of the American Academy of Political and Social Science, Vol. 352 (1969), pp. 729-740.

⁹In 1960 there were 428 reservoirs, so the writer estimated there would be at least 500 to date; Clawson, Land and Water for Recreation, p. 69.

¹⁰Ibid., p. 25.

Consequently, many pleasure-seekers using these reservoirs tend to believe that recreation is a primary concern.

The Bureau of Reclamation began building storage reservoirs for irrigation soon after it was created in 1902. Management of the reservoirs and surrounding lands for recreation has been turned over to other Federal agencies, such as the Forest Service when the reservoir was within national forests, or to state and local recreation agencies whenever such an administrative unit existed that could undertake this task.¹¹ As an example of state agencies managing Bureau projects, the Kansas Forestry, Fish and Game Commission and the Kansas Parks and Resources Authority have this responsibility for Kansas.

The Corps of Engineers has been concerned with flood control and navigation improvements for more than a hundred years. It was not until the last forty years that this agency has relied upon major dams and reservoirs. It also tries to induce state and local agencies to administer the recreation areas and programs around these reservoirs.¹² The Kansas Parks and Resources Authority does have management responsibilities over a few recreational areas. Examples are the Pleasant View Area at Milford and the Spillway Park Area at Tuttle Creek.

These reservoirs have added an impetus to the growth of water-oriented recreation in areas where the natural environment did not include large, naturally occurring water bodies. The physical region of which Kansas is a part, the Great Plains, is an example. The combination of new lakes and the general postwar boom in outdoor recreation has led to an extremely rapid rise in water related recreational activities in the State.¹³

¹¹Ibid., p. 25. ¹²Ibid., p. 27. ¹³Ibid., p. 70.

Since Kansas does not have many naturally occurring lakes, and few large rivers, one may assume that recreational opportunities related to its water resources were almost nonexistent prior to 1948. Reservoir use began at Kanopolis in 1948 and at Fall River in 1949.¹⁴ As the Federal reservoir construction developed, the State's recreational opportunities improved with each reservoir opening.¹⁵ Presently, Kansas has 19 reservoirs with a water surface acreage of approximately 123,190 acres.¹⁶ This water surface acreage is not exclusively used for recreational activities, but it does provide the possibility for the growth of water-oriented outdoor recreation in the State.

BACKGROUND RESEARCH RELATED TO RESERVOIR DEVELOPMENT

Recreational research has been conducted mainly by scholars in fields other than Geography. Economists have observed and compiled data relative to the importance of outdoor recreation in the United States. An example is the research which has been conducted by Marion Clawson. His work should be considered in the basic plan of any outdoor recreation study. Clawson has authored or co-authored at least seventeen related books and articles. Probably the most important was his co-authorship in 1966 with Jack Knetsch of Economics of Outdoor Recreation, which explored the total aspect of

¹⁴U.S. Army Corps of Engineers, Kansas Water Resources Development (Dallas, Texas: Office of the Division Engineer, 1971), pp. 11, 25.

¹⁵Federal law requires the construction agencies to provide recreational areas and access routes to the reservoir sites. From Clayne R. Jensen, Outdoor Recreation in America: Trends, Problems, and Opportunities (Minneapolis, Minnesota: Burgess Publishing Co., 1970), pp. 74-75.

¹⁶The Kansas City Star, "Travel--Mid-America Vacationland," Supplement, Sunday, April 9, 1972, pp. 16-1, 17-1.

outdoor recreation.¹⁷ But it seems that geographers have not studied this aspect to any detail. This should not be the case. Since recreation sites of this nature are not located primarily in the areas of demand, the recreationalist must travel to use them. Consequently there is a spatial interaction between two points and within this interaction there is a wide array of interesting studies that could develop.

Recognition of the inadequate concern for recreational research in Geography goes back at least to 1930. K. C. McMurray expressed the need for this type of research and stated that ". . . the geographic inventory is merely the first step in the study of an area."¹⁸ Even though McMurray was considering only an inventory aspect in relation to geographic research, Robert M. Brown in 1935 expressed a need for greater detail when he stated the following:

The advantages offered to the vacationist and the tourist from the geographers point of view offers inviting possibilities. There is scope for the development of new and ingenious techniques of research and for the discovery of facts of value in their social implications in what is virtually a virgin field.¹⁹

R. E. Murphy (1963), R. I. Wolfe (1964), L. S. Mitchell (1968), D. C. Mercer (1970), and C. S. Van Doren (1971), upon reviewing various areas of the recreation field, have also commented on the relative lack of relevant literature in Geography. But they did note that it was abundant in other fields. Murphy and Mitchell commented on the fact that the recreational

¹⁷Clawson and Knetsch, Economics of Outdoor Recreation.

¹⁸K. C. McMurray, "The Use of Land for Recreation," Annals of the Association of American Geographers, Vol. XX (1930), pp. 7-20.

¹⁹Robert M. Brown, "The Business of Recreation," The Geographical Review, Vol. 25 (1935), pp. 467-473.

aspect of the nation's economy is growing, and because of this growth, there is a definite need for research which will study the problems presented by the rapid growth and demand for recreation.²⁰ Wolfe expressed the need for research related to tourist travel,²¹ and Mercer commented on the need for research dealing with the "recreational hinterlands" of urban areas.²² Finally, and of particular importance to this report, C. S. Van Doren expressed the concern for further research related to reservoir impact.²³

Even though geographic research is limited, there have been studies conducted in the discipline which are relevant to studies dealing with reservoir development and impact. Such a study was undertaken in the late 1950's by Edward L. Ullman and Donald J. Volk. Their problem was twofold. First they wanted to predict attendance for a potential large reservoir far from other reservoirs in the state of Missouri, and second, they desired to estimate the minimum benefits from the "intangible" activity of recreation on certain urban areas, primarily St. Louis. They were able to answer this dual problem using a gravity model. From this, they found that an area lacking in recreation water opportunity extended from Omaha-Kansas City through

²⁰R. E. Murphy, "Geography and Outdoor Recreation: An Opportunity and an Obligation," The Professional Geographer, Vol. 5, No. 5 (1963), pp. 33-34; L. S. Mitchell, "Recreational Geography: Evolution and Research Needs," The Professional Geographer, Vol. 21, No. 2 (1969), pp. 117-119.

²¹R. I. Wolfe, "Perspective on Outdoor Recreation--A Bibliographical Survey," The Geographical Review, Vol. LIV, No. 2 (1964), pp. 203-235.

²²D. C. Mercer, "Urban Recreational Hinterlands," The Professional Geographer, Vol. 22, No. 2 (1970), pp. 74-78.

²³Based on personal correspondence between Dr. Carlton S. Van Doren, Associate Professor of the School of Natural Biosciences, Department of Recreation and Parks, Texas A and M University, and the writer, on March 28, 1972.

St. Louis and eastward.²⁴ C. S. Van Doren and B. Lentnek conducted research related to reservoirs in 1969. They examined the effects of "activity specialization" in boating, which was reflected in the distance traveled and the time spent in the activity. They found that the distance traveled was directly related to the time available, consequently each specialization was expressed in time need. In turn, they were able to express the distances one might travel for pleasure cruising, fishing, waterskiing, and sailing.²⁵

STATEMENT OF THE PROBLEM

Manmade inputs into the Kansas environment in the form of lakes and reservoirs has had far reaching affects on the recreational opportunities of the State. This has involved tens of thousands of people in the State. One can observe the greater occurrence of boats and associated recreational goods on the highways and at domestic residences within the State.

Because of the documented increase in the use and sales of recreational goods, it can intuitively be said that the reservoirs have had an impact on the State. The object of this report will be to examine the distances influenced by reservoir development in Kansas. In other words, what are the present "recreational hinterlands," or areas of influence of the existing Kansas reservoirs?, and How has the construction of Federal

²⁴Edward L. Ullman and Donald J. Volk, "An Operational Model for Predicting Reservoir Attendance and Benefits," Papers of the Michigan Academy of Science, Arts, and Letters, Vol. 47 (1962), pp. 473-484. This article was a summary of the following research and publication: E. L. Ullman, R. R. Boyce, and D. J. Volk, The Meramec Basin: Water and Economic Development; Report of the Meramec Basin Research Project, (3 Vols., Washington University, St. Louis, Missouri, 1962).

²⁵C. S. Van Doren and Barry Lentnek, "Activity Specialization Among Ohio's Recreational Boaters," Journal of Leisure Research, Vol. I (Autumn, 1969), pp. 296-315.

reservoirs influenced the distribution of Kansas water-oriented recreation through time?

In order to answer the above questions the idea of "recreational hinterlands," or areas of influence, must be examined. Urban geographers have referred to the "hinterland" as that portion of space which is dependent on and serves a nodal area, the city. This node serves as the economic, social, and cultural, in some cases administrative, center for a region, or the area of influence.²⁶ In turn, the reservoir is a node for the recreational activities of a particular area. It provides for the recreation needs of an area and is then used by the population of the area. (The area that is influenced is probably within the Clawson and Knetsch "one day outing" and "weekend outing" classifications; 20 to 50 and 100 to 150 miles respectively.) Since a reservoir can be a node for an area of recreational influence, then the area of influence can be referred to as the "recreational hinterland" of that reservoir.

In providing a statement of the recreational hinterlands of Kansas reservoirs, the writer will use data compiled by the Corps of Engineers and the Bureau of Reclamation, and its associated state agencies. This data, known as "distance traveled" or "origin of visitation," will be explained and mapped. Along with the origin of visitation, boat registrations per county will also be mapped. In order to accomplish this, the writer conducted a sampling of the Kansas Forestry, Fish and Game Commission records on boat registrations. In addition, the demand area size, acreage, and accessibility of the reservoirs will be described. This description will present the

²⁶Robert E. Dickinson, City and Region: A Geographical Interpretation (London: Routledge and Kegan Paul Ltd., 1966), pp. 227-230.

characteristics of these recreational sites which influence hinterland extent. Together, these data types and reservoir characteristics will provide a descriptive measurement and analysis of the recreational hinterlands of Kansas Reservoirs.

The distribution of water-oriented recreation through time, would largely be a function of new reservoir influence on existing reservoir hinterlands. As the new reservoirs come into use, they provide for greater recreational opportunities. This consequence will be observed and described with the statement of the situations of two areas in Kansas, Tuttle Creek-Milford and Fall River-Toronto.

CHAPTER II

RESERVOIRS IN KANSAS

Water-oriented recreation in Kansas related to large water bodies had its beginning in 1948. In that year Kanopolis Reservoir, located on the Smoky Hill River thirty miles southwest of Salina, was opened for use. Two more reservoirs were finished by 1951. They were Fall River in 1949 and Cedar Bluff in 1951, the first Bureau of Reclamation project. A list of reservoir development is given in Table II.

The Corps of Engineers has constructed thirteen reservoirs in the State. (TABLE II) They are primarily situated in the eastern half of Kansas and deal mainly with flood prevention and river navigation control. (See MAP I) Since the river drainage systems upon which these sites were developed leave the State in two directions, to the East, by way of the Kansas and Marais des Cygnes Rivers, and to the South, by way of the Neosho, Verdigris, and Arkansas Rivers, Kansas has been divided into two Corps of Engineer districts. Eastward flowing rivers, part of the drainage system of the Missouri Basin, are the responsibilities of District 13 based at Kansas City, Missouri. District 35, with its main office at Tulsa, Oklahoma, is concerned with the southward flowing rivers of the Arkansas Basin.²⁷

The Bureau of Reclamation has constructed six reservoirs, and its regional office is located in Denver, Colorado. These sites are situated

²⁷ Definition of "Districts," based on personal correspondence between Mr. Harold R. Green, Regional Director of the Bureau of Outdoor Recreation, Mid-Continent Region, Denver, Colorado, and the writer, on October 26, 1972.

TABLE II. Kansas reservoirs; their construction agencies, date finished, and description of location by river and city.

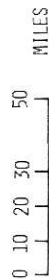
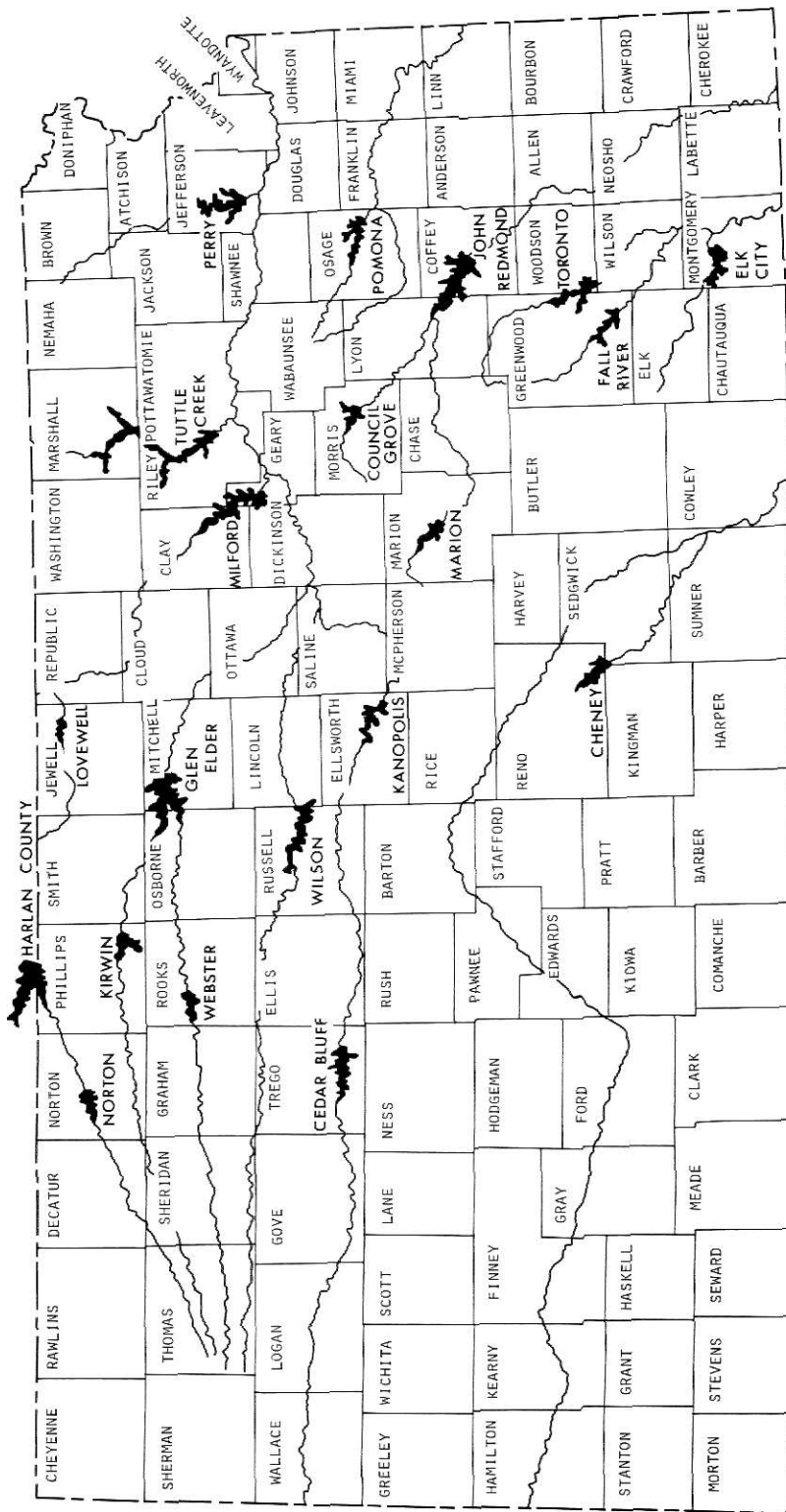
<u>RESERVOIR</u>	<u>AGENCY</u> ^{1/}	<u>DATE FINISHED</u>	<u>RIVER</u>	<u>BRIEF AREA DESCRIPTION</u> ^{2/}
Cedar Bluff	B.R.	1951	Smoky Hill	18 miles S.W. of Ellis
Cheney	B.R.	1965	Ninnescah	21 miles west of Wichita
Council Grove	C.E.	1964	Neosho	3 miles N.W. of Council Grove
Elk City	C.E.	1966	Elk	7 miles N.W. of Independence
Fall River	C.E.	1949	Fall	17 miles N.W. of Fredonia
Glen Elder	B.R.	1969	Solomon	10 miles west of Beloit
John Redmond	C.E.	1965	Neosho	2 miles N.W. of Burlington
Kanopolis	C.E.	1948	Smoky Hill	30 miles S.W. of Salina
Kirwin	B.R.	1956	Solomon (N. FORK)	15 miles S.E. of Phillipsburg
Lovewell	B.R.	1958	White Water Creek	5 miles N.W. of Lovewell
Marion	C.E.	1968	Cottonwood	3 miles N.W. of Marion
Milford	C.E.	1969	Republican	4 miles N.W. of Junction City
Norton	B.R.	1966	Prairie Dog Creek	2 miles N.W. of Norton
Perry	C.E.	1971	Delaware	15 miles N.W. of Lawrence
Pomona	C.E.	1964	Marais des Cygnes	17 miles west of Ottawa
Toronto	C.E.	1960	Verdigris	4 miles S.E. of Toronto
Tuttle Creek	C.E.	1962	Blue	6 miles north of Manhattan
Webster	B.R.	1957	Solomon (S. FORK)	10 miles S.W. of Stockton
Wilson	C.E.	1966	Saline	10 miles north of Wilson

^{1/} "B.R."--Bureau of Reclamation, "C.E."--Corps of Engineers.

^{2/} All cities mentioned in this "Brief Area Description" are Kansas cities.

SOURCE: The Kansas City Star. "Travel--Mid-America Vacationland." (Supplement) Sunday, April 9, 1972. pp. 16-1, 17-1.

FEDERAL RESERVOIRS IN KANSAS - 1972

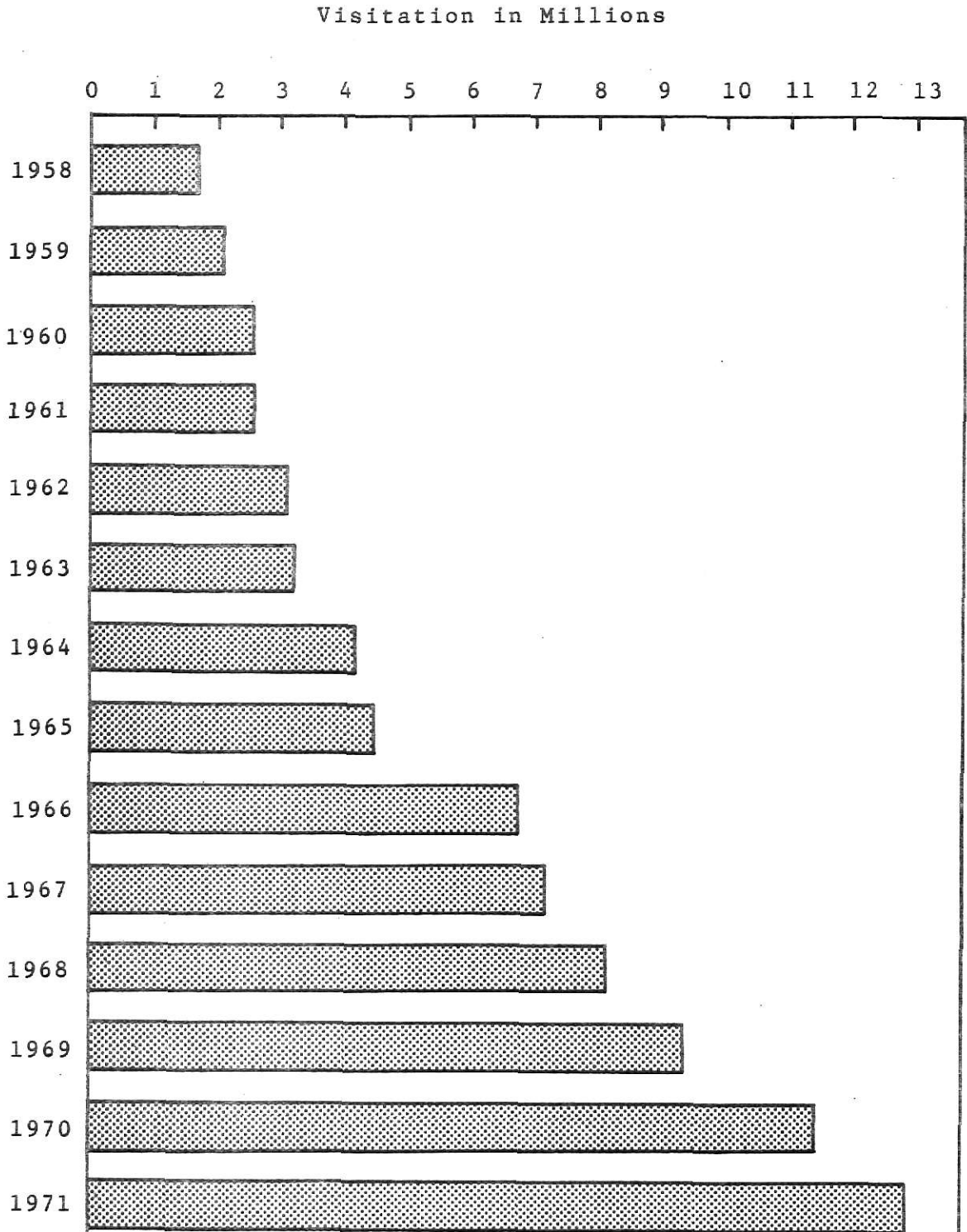


mainly in the western half of the State. They are concerned primarily with irrigation and water-supply for this semi-arid region. Soon after the construction of these sites, the Bureau relinquished the management of them. Three state agencies now manage five of these reservoirs; the Bureau of Sport Fisheries and Wildlife manages Kirwin, while the Kansas Park and Resources Authority and the Kansas Forestry, Fish and Game Commission have dual management concerns for Cedar Bluff, Glen Elder, Lovewell, and Webster Reservoirs. Cheney, the remaining reservoir, is a municipal water supply project for Wichita and is managed by that city.²⁸

Reservoir attendance in the State has grown steadily since 1948. Although total yearly visitation data is not available between 1948 and 1958, the data that is presented shows a definite rise in the total number of recreational visits at Kansas reservoirs since 1958, 1,719,928 to 13,026,523 in 1971. (GRAPH I) At this date, 1971, all reservoirs had over 100,000 visits, with four having over 1,000,000. (TABLE III)

The State's water-oriented leisure time situation should improve in the future. Presently, there are thirteen authorized reservoir sites. (TABLE IV) Once these sites are developed and opened for use there will be an even greater recreational impact. In turn, reservoir attendance should have a continued rise in its total yearly numbers.

²⁸"State Agency Management," based on personal correspondence between Mr. James M. Ingles, Regional Director of the Bureau of Reclamation, Mid-Continent Region, Denver, Colorado, and the writer, on October 18, 1972.



GRAPH I: Reservoir Visitation in Kansas,
from 1958 to 1971.

SOURCE: The Kansas Park and Resources Authority.

TABLE III. Reservoir attendance in 1971.

<u>RESERVOIR</u>	<u>1971 VISITATION</u>
Perry	2,587,086
Tuttle Creek	1,386,593
Milford	1,274,353
Council Grove	1,012,400
Pomona	935,989
Cheney	885,697
Marion	832,400
Toronto	656,000
John Redmond	593,100
Elk City	556,400
Wilson	459,154
Fall River	424,680
Glen Elder	341,933
Kanopolis	318,500
Kirwin	229,620
Lovewell	172,839
Cedar Bluff	154,579
Webster	104,802
Norton	100,388
	<u>13,026,523</u>

SOURCE: Kansas Parks and Resources Authority. "State Park and Total Reservoir Visitation by Calendar Year." 1971 (Mimeographed)

TABLE IV. Authorized federal reservoirs; to be completed at a future date in Kansas.

<u>COUNTY</u>	<u>RESERVOIR</u>
Pottawatomie	Onaga
Jackson	Grove
Douglas	Clinton
Osage	Melvern [*]
Miami	Hillsdale
Anderson	Garnett
Bourbon	Fort Scott
Wilson	Neodesha
Labette	Big Hill
Chase	Cedar Point
Butler	El Dorado, Towanda, and Douglas

^{*} Presently under construction.

SOURCE: U. S. Army Corps of Engineers, Southwestern Division. Water Resources Development in Kansas, 1971. (Dallas, Texas: Office of the Division Engineer, January 1971.) pp. 4, 4-A, and 18.

CHAPTER III

DETERMINING RESERVOIR IMPACT

METHODS USED IN COLLECTING DATA

Since the Kansas reservoirs do have measurable areas from which their recreational visitation is drawn, they will have areas of influence, or "recreational hinterlands." D. C. Mercer, in the March 1970 issue of The Professional Geographer, provided a relevant statement of the spatial interaction between the city and the rural recreational areas when he referred to this latter area as the "recreational hinterland" of the city. He also said that the opposite could be true. Although it is rarely investigated, one could observe the consequence of the rural facility as being the node of the "recreational hinterland." In this case the rural recreation facility is the attractor of recreational and social traffic.²⁹

With this in mind, one must find supportive data. Mercer suggests four kinds of data that can be used in delimiting recreational hinterlands. Even though these sources relate more to the idea of an urban node, they might be used to formulate hinterlands with respect to reservoir sites. The first two use the interview technique. Mercer stated that from "home interview surveys" one can denote ". . . the extra-metropolitan recreational activities, travel patterns and transport modes of different socio-economic groups within the cities."³⁰ The "on-site" or "roadside interview" has been

²⁹ Mercer, "Urban Recreational Hinterlands: A Review and Example," p. 75.

³⁰ Ibid., p. 75.

used extensively to gain information on the origins and destinations of tourists within the hinterlands of large cities. One may also determine an index of intensity of recreational use from this form of data collecting. The third data source, that of "mechanical traffic volume counts," in a limited way, can provide some indication of the size and orientation of a city's recreational hinterland. Its limited aspect relates to the fact that no urban area is truly isolated because there are usually too many routes out. Finally, the "visible land use indicators," such as vacation home resorts, have the virtue that they can provide the geographer with ample evidence of a tangible link with a parent urban area.³¹

The data types which are used in this report fall mainly into the "on-site," or "roadside interview," and "mechanical traffic volume count" categories. Boat registrations, which are derived from forms that are completed by all boat owners,³² would be an exception. This data type could be considered as a form of home interviews, for they are filled out at home and then they are sent to a central location for compiling. On-site data collecting is done by the Corps of Engineers and State agencies at their respective reservoir sites. The Corps compiles data which is known as a "Summation of Recreation Use." While the State agencies formulate a "Recreation and Wildlife Summary." Of primary concern to this report is the "origin of visitation" and "distance traveled" data, which are compiled by the Corps of Engineers and the State agencies, along with other recreational aspects,

³¹Ibid., pp. 76-77.

³²State law requires boat purchasers and owners to register with the Kansas Forestry, Fish and Game Commission every three years, or on purchase. From Kansas Forestry, Fish and Game Commission, Synopsis: State of Kansas Boat and Water Safety Laws (Topeka, Kansas: Office of the State Printer, 1971), p. 2.

by roadside or on-the-site interviews with the recreationalists. The writer also compiled on-site data in the form of a license tag count. This count was conducted at two reservoir sites, Milford and John Redmond.

Mechanical traffic volume counts, limited in usefulness for urban areas, are very useful as far as reservoirs are concerned. Since all reservoirs are accessible by certain transportation links, electronic counters can be utilized to determine vehicular visitation. From this count a reasonably accurate statement of total visitation can be compiled, along with the use numbers at individual recreation sites at reservoirs. Both data collecting agencies, the Corps of Engineers and the Bureau of Reclamation, with its associated state agencies, obtain visitation figures by this method.

Along with the governmental data sources, the writer will also observe the primary site characteristics of the Kansas reservoirs. Three factors appear to be primary concerns; the location of a reservoir relative to a large demand area, highway accessibility, and reservoir size. These concerns provide each site with the individuality necessary to have a spatial influence over its respective hinterlands. Once these characteristics and data sources have been illustrated and ordered, a measurement of recreational impact of Kansas reservoirs will be observable.

FINDINGS OF IMPACT MEASUREMENT

Origin of visitation is one type of data that provides a statement of the area of influence, or recreational hinterland, of Kansas reservoirs. This data has been organized to show frequency of visit by distance traveled. The Corps of Engineers' studies provide five categories of traveling distances; within 25 miles, 26 to 50 miles, 51 to 75 miles, 76 to 100 miles, and over 100 miles. Bureau of Reclamation studies, conducted by state

agencies, are divided into four categories. The first three correspond to the Corps' categories, with the final category being over 75 miles. In order to make the data conform, the writer has combined the two final categories of the Corps' data. Not all reservoirs have had this type of study conducted at their sites. Twelve of the nineteen reservoirs in Kansas have had this information collected. (TABLE V)

The writer has constructed a map which shows the generalized recreational hinterlands of these reservoirs. (MAP II) As one may observe, six of the twelve had at least fifty percent of the recreational visitation within a twenty-five mile radius of the reservoir site. Kanopolis had over sixty percent of its visitation from a 26 to 50 mile radius, with over seventy-three percent between 0 and 50 miles. Pomona had the same distance influence as Kanopolis, with over fifty percent of its visitation coming from 50 miles or less. Two reservoirs have a more even visitation percentage per category, Cedar Bluff and Wilson. Toronto and Fall River receive their highest percentage of visitors in the last two categories. As one might notice, all the respective hinterlands of these reservoirs fit in the "one day outing" and "weekend outing" classification presented by Clawson and Knetsch.

During the summer of 1972 a count was taken by the writer of the county abbreviations on Kansas license plates at two reservoirs, Milford and John Redmond. The count was conducted on two days per site, once on a weekend and once during the week. May 29 and June 1, 1972, were the respective dates for Milford, while those for John Redmond were May 28 and 31, 1972. Since Milford does have an origin of visitation statement, this count provides additional support for its previously measured hinterland. John Redmond does not have this visitation data. Consequently, this data provides a first-hand summary of its visitation origin.

TABLE V. Origin of reservoir visitation, by distance traveled.

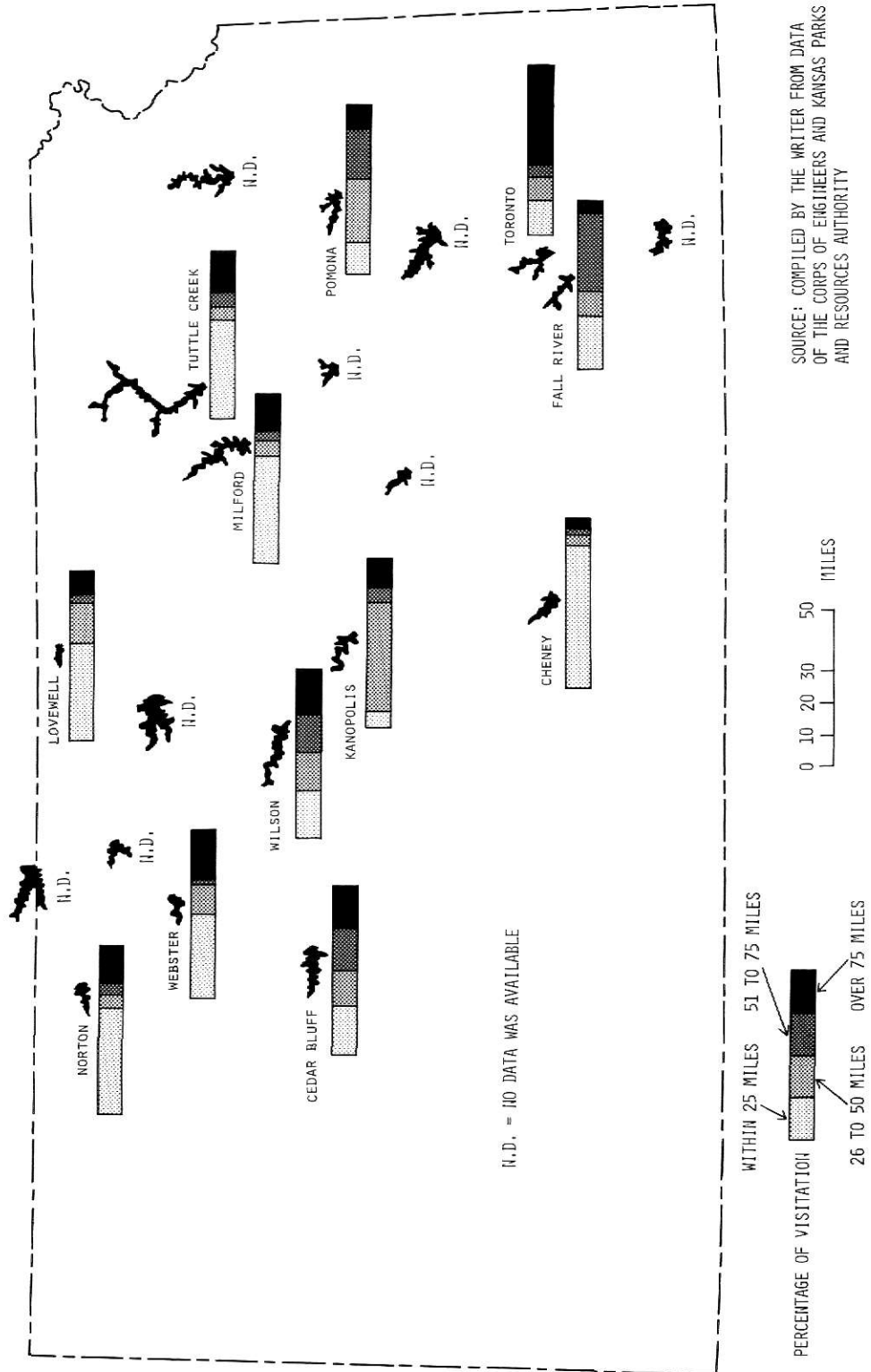
RESERVOIR	DISTANCE TRAVELED (PERCENT OF VISITATION)			
	WITHIN 25 MILES	26 TO 50	51 TO 75	OVER 75 MILES
Tuttle Creek	55.7	9.1	8.5	26.7
Pomona	19.7	38.1	29.1	12.5
Kanopolis	9.9	63.6	9.2	17.3
Wilson ^{1/}	28.2	22.7	21.0	28.1
Milford ^{1/}	62.7	9.5	5.6	22.2
Fall River	31.0	15.0	47.0	7.0
Toronto ^{2/}	20.0	14.0	7.0	59.0
Cedar Bluff	29.4	20.6	25.4	24.6
Cheney	84.1	6.6	2.3	7.0
Lovewell	57.3	23.6	3.4	15.7
Norton	62.4	8.2	6.7	22.7
Webster ^{3/}	50.0	17.0	2.7	30.3

^{1/} U. S. Army Corps of Engineers, Kansas City District. "Summation of Recreation Use at Corps of Engineer Reservoirs", (Kansas City, Missouri, 1972. Mimeographed.)

^{2/} U. S. Army Corps of Engineers, Tulsa District. "Recreational Use Summaries for Corps of Engineer Reservoirs", (Summaries of Fall River and Toronto Reservoirs. Tulsa, Oklahoma. 1969. Mimeographed.)

^{3/} The Kansas Parks and Resources Authority. Summary of Summer and Winter Visitor Use Surveys at Eight State Parks in Kansas. (Topeka, Kansas. 1970.) p. 16

ORIGIN OF RESERVOIR VISITATION



N.D. = NO DATA WAS AVAILABLE

The author found that John Redmond's origin of visitation was as follows; 0 to 25 miles--36 percent, 26 to 50 miles--5 percent, 51 to 75 miles--24 percent, over 75 miles--34.8 percent. Counties which provided the largest portion of visitations were Coffey, Shawnee, Johnson, and Wyandotte. (TABLE VI) Milford's origin of visitation was close to the one established by the Corps of Engineers; 0 to 25 miles--59 percent, 26 to 50 miles--8.2 percent, 51 to 75 miles--5.3 percent, and over 75 miles--26.1 percent. The counties which provided the largest number of recreationists were Geary and its associated Fort Riley Identification Stickers, Dickinson, Riley, Saline, Sedgwick, and Shawnee. (TABLE VI)

Since boats are one of the largest capital investments made by the water-oriented recreationist,³³ an illustration of this item's spatial distribution, in relation to areas of use, should provide further insight into the idea of recreational hinterlands. Although data related to boat sales per county were not available, the writer was able to sample Kansas boat registration data.³⁴ A sampling of one-half percent, of the 64,000 boat registrations, was conducted. A count was taken of the occurrence of boat registrations per county and then the number per county was divided by the population of that county. This computation provides a statement of the boats per capita, or per one thousand inhabitants. Once this data is transferred to a map, the influence of reservoir location can be observed. The

³³U.S., Department of the Interior, Outdoor Recreation Review Commission, Water for Recreation, Values and Opportunities: Report 10 (Washington: Government Printing Office, 1962), p. 8.

³⁴The writer was able to sample these records only after a memorandum, which stated that these records were public, had been sent from the Office of the Attorney General to this State Agency. This sampling was conducted at the Kansas Forestry, Fish and Game Commission, Pratt, Kansas, on November 21 and 22, 1972.

TABLE VI. Tag count data; counties providing the greatest number of counts, 10 or more.

MILFORD	COUNTIES	COUNTS		TOTAL
		1ST	2ND	
	Geary***	260	44	304
	Dickinson	61	6	67
	Harvey	14	--	14
	Johnson	15	2	17
	Riley	22	6	28
	Saline	47	3	50
	Sedgwick	35	--	35
	Shawnee	17	2	19
	Wyandotte	11	--	11
	Other Counties	49	1	50
	(Fort Riley Stickers)	64	6	70
	Out of State*	46	6	52
	TOTAL TAG COUNT ^{1/}	641	76	717
JOHN REDMOND				
	COUNTIES	1ST	2ND	TOTAL
	Coffey***	94	29	123
	Johnson	28	6	34
	Lyon	13	3	16
	Osage	12	--	12
	Sedgwick	11	4	15
	Shawnee	41	3	44
	Wyandotte	32	11	43
	Other Counties	40	10	50
	Out of State**	64	9	73
	TOTAL TAG COUNT ^{1/}	335	85	420

*Missouri and Nebraska had a total of 18 each for the two counts.

**Missouri had a total of 49 for the two counts.

***County in which reservoir site is located.

^{1/} "Total Tag Counts", represents all the counts that were taken. Milford's counts were taken on May 29 and June 1, 1972, John Redmond's counts were taken on May 28 and 31, 1972. All counts were conducted by the writer.

counties which have reservoirs situated within their boundaries were found to have a higher per capita occurrence of boats than do non-reservoir counties. (See MAP III and TABLE VII)

There are four counties which appear to be exceptions to this idea. Two, Montgomery and Ellsworth, have registrations per capita which are above the State average of 1.45, but well below the average for reservoir counties, which was 2.20. Sedgwick, Reno, and Montgomery are three counties where boat registrations were lower than expected considering proximity to reservoirs. They were probably reduced by their high urban population numbers. Urban populations have a greater variety of leisure time alternatives than do the people in the more rural reservoir counties. Ellsworth is more difficult to explain. It does not have a large urban population concentration and its rural attributes are similar to some of the other reservoir counties. This county's low 1.46 boat registrations per 1,000 inhabitants could be a result of Kanopolis' only fair highway accessibility. There is also the fact that a larger percentage of this site's users are from outside the county (visitation origin, within 25 miles--9.9, 26 to 50 miles--63.6). In turn, the residents of this county probably do not use the facilities that are provided like the other inhabitants of reservoir counties do.

The eighteen remaining reservoir counties do constitute a higher per capita boat registration occurrence than do the majority of Kansas non-reservoir counties; they range from 4.31 to 1.96 boat registrations per 1,000 inhabitants. Phillips County with 4.31 boats per capita is largest. It has one reservoir within its county boundaries and three other reservoirs within a forty mile radius of its center. These four reservoirs are Kirwin (Phillips County), Norton (Norton County), Webster (Rooks County), and Harlan County, which is situated in Nebraska on Phillips County's northern boundary.

MAP III

BOAT REGISTRATIONS PER 1000 POPULATION - 1972

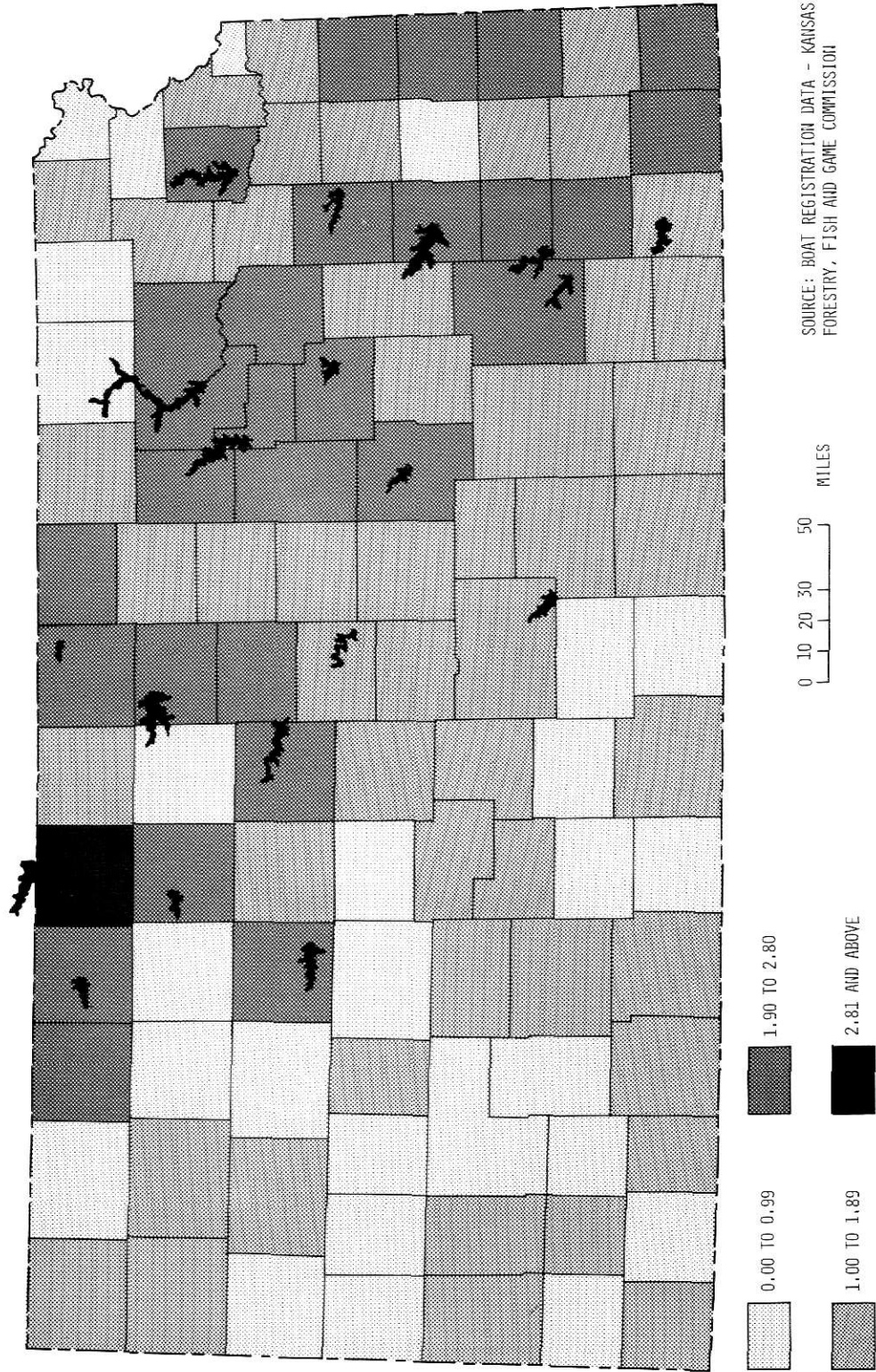


TABLE VII. Boat registrations; the occurrence in reservoir counties and the higher occurrence non-reservoir counties.

(RESERVOIR COUNTIES)

<u>COUNTY</u>	<u>RESERVOIR</u> ^{1/}	<u>BOATS PER</u> <u>1,000 INHABITANTS</u> ^{2/}
Clay	Milford	2.02
Coffey	John Redmond	2.30
Ellsworth	Kanopolis	1.46
Geary	Milford	2.14
Greenwood	Fall River	2.19
Jefferson	Perry	2.60
Jewell	Lovewell	2.13
Marion	Marion	2.01
Mitchell	Glen Elder	2.75
Montgomery	Elk City	1.83
Morris	Council Grove	2.17
Norton	Norton	2.06
Osage	Pomona	2.02
Pottawatomie	Tuttle Creek	1.96
Phillips	Kirwin	4.31
Reno	Cheney	1.35
Riley	Tuttle Creek	2.06
Rooks	Webster	2.23
Russell	Wilson	2.65
Sedgwick	Cheney	1.25
Trego	Cedar Bluff	2.71
Woodson	Toronto	<u>2.09</u>
AVERAGE		<u>2.20</u>

(NON-RESERVOIR COUNTIES)

Bourbon	1.97
Cherokee	2.13
Dickinson	2.35
Labette	2.37
Lincoln	2.18
Linn	2.19
Miami	2.18
Republic	2.00
Wabaunsee	2.03
Wilson	<u>2.03</u>
AVERAGE	<u>2.14</u>

^{1/} Reservoir in respect to county, from...U. S. Department of the Interior, Geological Survey. Water Resources Data for Kansas, 1970: Part 1, Surface Water Records. (Washington, D. C.: U. S. Government Printing Office, 1971.)

^{2/} "Boats per 1,000 Inhabitants", calculated from the data which was compiled by the writer from a sample of the Kansas Forestry, Fish and Game Commission's "boat registration records" on November 21-22, 1972.

Ten non-reservoir counties had at least 1.97 boat registrations per 1,000 inhabitants, with their average being 2.14. (TABLE VII) Of the ten, four counties, Lincoln, Wabaunsee, Dickinson, and Wilson, are within thirty miles of three reservoirs, while Decatur, Labette, and Republic are within thirty miles of one Kansas reservoir. The remaining non-reservoir counties are situated along the Missouri and Oklahoma borders. Cherokee County is within thirty miles of a large Oklahoma reservoir, Pensocola, while Miami, Linn, and Bourbon are situated in close proximity to reservoirs of the Kansas Southeast and the Missouri Lakes in the South Central portion of that state.

Reservoir characteristics provide each site with an individuality which is observed in its respective area of influence. These aspects, or reservoir characteristics, are the close proximity of a site to large population concentrations, highway accessibility, and reservoir size. Once these characteristics are presented, the reasons for reservoirs experiencing particular distances of influence will be observable.

Since an activity must have a demand before it can be satisfied, the consideration of distances from reservoir sites to areas of demand, or population concentrations, should be noted. Five reservoirs are situated within an area where there is a population of at least 100,000 within a twenty-five mile radius of the dam site.³⁵ (TABLE VIII) These reservoirs were Cheney, Milford, Perry, Pomona, and Tuttle Creek. Reservoirs that were situated in an influence area of greater than 50,000, but less than 100,000, were Council Grove, Elk City, John Redmond, Kanopolis, and Marion Reservoirs.

³⁵The writer used the dam site as the center of a 25 mile radius and has totalled the population within this radius. This radius had to at least take in one-third of a county before a county's population was totalled within the area of influence.

TABLE VIII. Reservoir characteristics; a consideration of reservoir proximity to large demand areas, highway accessibility, and reservoir size.

	<u>PROXIMITY</u> ^{1/}	<u>ACCESS</u> ^{2/}	<u>SIZE</u> ^{3/}
Cedar Bluff	p3	a1	s2
Cheney	p1	a1	s2
Council Grove	p2	a1	s4
Elk City	p2	a1	s3
Fall River	p3	a2	s4
Glen Elder	p3	a1	s1
John Redmond	p2	a1	s2
Kanopolis	p2	a2	s3
Kirwin	p3	a1	s3
Lovewell	p3	a2	s4
Marion	p2	a1	s2
Milford	p1	a1	s1
Norton	p3	a1	s4
Perry	p1	a1	s1
Pomona	p1	a1	s3
Toronto	p3	a1	s4
Tuttle Creek	p1	a1	s1
Webster	p3	a1	s3
Wilson	p3	a1	s2

1/ "Proximity": the writer has used the reservoir as the node of a 25 mile radius and has totalled the population within this radius (the radius had to at least take in one third of a county, before its population was considered.); p1-over 100,000, p2-over 50,000, p3-over 10,000.

2/ "Access": a1-the reservoirs are situated on or near a highly traveled, good condition, Federal and/or State highway, or(s), in some cases, on access routes that were within 10 miles of a major State or Federal highway (good access); a2-the reservoirs are situated on an access route, either State or County, which is over 10 miles from a major Federal or State highway (fair access).

3/ "Size": surface acreage of reservoirs. s1-more than 10,000 acres, s2-more than 6,000 acres, s3-more than 3,000 acres, and s4-more than 2,000 acres.

SOURCE: 1/ From a map constructed by the writer, with the county populations taken from, U. S. Bureau of the Census, Census of Population: 1970 General Population Characteristics, Final Report PC(1)-B18, Kansas, 1971, pp. 56-57. 2/ Kansas State Highway Commission. "Official Map of Kansas," 1971. 3/ Taken from The Kansas City Star. (supplement. April 9, 1972.) pp. 16-1, 17-1.

The remaining reservoirs had an area of demand greater than 10,000 but less than 50,000. This characteristic does not provide a precise explanation of the distances influenced by Kansas reservoirs, but it does provide further insight into the reason why some experience higher yearly visitations than do others. Five of the seven most visited sites were observed in the first category, while the second contributed two, Council Grove and Marion. Only one of the reservoirs with a demand area of less than 50,000 had a visitation above 500,000.

Reservoir location within large areas of demand did not provide a complete description of distances influenced by these sites. Highway accessibility is another factor that can provide understanding of the areas which are influenced by reservoirs. This accessibility must be possible so that the opportunities provided by a site can be obtained by the people wanting to participate in water-oriented activities. (TABLE VIII) Of the nineteen reservoirs, fifteen have good accessibility. This means that the reservoirs are situated on or near an all-weather, hard-surfaced Federal or State highway. In some cases, they had access routes that were within 10 miles of a major State or Federal route. Glen Elder, Webster, Tuttle Creek, and Perry are situated on or near U.S. 24, U.S. 75 is the main route to three reservoirs, Pomona, John Redmond, and Elk City, Interstate 70 provided access to Cedar Bluff and Wilson Reservoirs, by way of State highways 147 and 232 respectively, and U.S. 54 linked Cheney and Toronto to their visitors, by way of State 251 and 105. The remaining good access reservoirs are Council Grove, Kirwin, Marion, Milford, and Norton, which were linked to their users by State 177 and U.S. highways 183, 56, 77, and 283 respectively. Three reservoirs were categorized as having fair accessibility. This means that the

sites were located on a secondary State highway or county access route which was over ten miles from a primary U.S. or State highway. Lovewell is situated near a county access route, which is located eleven miles north of U.S. 36, while Kanopolis and Fall River are situated on the respective State highways of 141 and 96.

A third aspect which, along with closeness to demand areas and highway accessibility, can provide a statement of the reasons for some sites experiencing greater distance influence, than do others, is reservoir size. The acreages of the reservoir sites delimit the kinds and volume of activities that will be available at these recreational nodes. If the acreage is small, less pleasure boating and waterskiing will be possible (this could also mean there would be a greater use by fishing enthusiasts). On the other hand, if the site is large there will be more boating and associated concerns, there would be more areas available for picnicking and camping, and the fishing possibilities would be wider. Since the acreage of a site is influential in providing recreational activities, if its extent is large, its distance of influence should also be large. But as it was observed, not all reservoirs' influence are a consequence of this characteristic. The nineteen reservoirs were divided into four categories; those having an acreage above 10,000, those having an acreage above 6,000, those having an acreage above 3,000, and the last category had an acreage over 2,000. (TABLE VIII) The first category consisted of Milford, Tuttle Creek, Glen Elder, and Perry, the second had Cheney, John Redmond, Cedar Bluff, Wilson, and Marion, the third had Kirwin, Pomona, Elk City, Kanopolis, and Webster, with the final category consisting of Lovewell, Council Grove, Toronto, Fall River, and Norton Reservoirs.

NEW RESERVOIR INFLUENCE

Since reservoirs do have their respective areas of influence, the opening of a second reservoir within close proximity of an established site should affect the existing hinterland. The new reservoir could take visitation and influence away from the existing reservoir, or the opening of a new site could provide impetus for growth and the establishment of a new area of influence, which would be larger than the previously existing hinterland. There are presently three areas where a new reservoir did come into use within close proximity of an established site, Kirwin-Webster, Toronto-Fall River, and Tuttle Creek-Milford. The writer will provide a statement of the last two areas, which have available data related to yearly visitation. Toronto and Fall River reservoirs are situated within fifteen miles of each other, but their highway accessibility is close to thirty miles. Tuttle Creek and Milford are located within twenty-five miles of each other, with highway access mileage being over thirty miles.

Since data, related to origin of visitation, is not available for the early use period of the Toronto-Fall River area, any comparison that is conducted must be related to yearly visitation figures. From this comparison, one can observe that there was no substantial decline in visitation at the previously existing site, Fall River. (TABLE IX) A growth in the yearly visitation figures occurred; from 490,000 in 1960 to 620,000 in 1963. Following 1963 the visitation figures leveled off. This leveling of visitation could be a result of the reservoir development in this Southeast section of Kansas. John Redmond and Elk City Reservoirs were opened for use in 1965 and 1966 respectively.

A more precise statement of the influence of a new reservoir on an existing site can be made for the Tuttle Creek-Milford area, since data

TABLE IX. Visitation at reservoirs within close proximity of each other.

	(IN THOUSANDS)													
	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
Fall River	397	343	490	552	564	620	538	459	407	468	386	402	379	425
Toronto			429	426	380	330	362	327	281	347	332	338	512	656
Tuttle Creek				208	702	1,012	1,298	931	892	857	1,102	1,301	1,343	1,387
Millford											1,069	1,382	1,577	1,275

SOURCE: The Kansas Parks and Resources Authority. "State Park and Total Reservoir Visitation by Calendar Year." (1971. Mimeographed.)

related to origin of visitation and yearly visitation were available. From the yearly visitation figures, one can observe that Tuttle Creek experienced growth during its early use years, 1961 to 1964, with a loss in visitation until Milford opened for use in 1968, then began and is presently experiencing an expansion in the total numbers of yearly visitation. (TABLE IX) Origin of visitation data, for Tuttle Creek, shows a loss in the 0 to 25 mile category from 1963 to 1965, with an increase once Milford's influence provided an impetus for growth, 1968 to 1972. (TABLE X) Milford has also experienced an influence in its origin of visitation, with an increase in its 0 to 25 mile category.

As one might observe, the consequence of a new reservoir opening for use within close proximity to an existing site does not necessarily reduce its yearly visitation or the distance traveled by its visitors. Apparently there is a creation of a more intensified area of influence or hinterland, because of the wider variety of recreational facilities. Both areas compared experienced a growth in visitation, with the established sites showing a greater yearly increase as a result. It was also shown in the Tuttle Creek-Milford comparison that the immediate hinterland visitation use was strengthened as a result of the two reservoirs' proximity.

ANALYSIS OF FINDINGS

The previous sections of this report have presented data which is relevant to the understanding of distances influenced by reservoir development in Kansas. Visitation per site, with respect to the distances traveled per reservoir, was observed with the description of origin of visitation and tag count data. Economic influence, related to variation in intensity by distance from reservoirs, was presented with the statement of boat

TABLE X. Origin of visitation data for Tuttle Creek and Milford.

<u>TUTTLE CREEK</u> ^{1/}				
<u>DISTANCE TRAVELED</u> (in miles)	<u>1972</u>	<u>1968</u> (percent of visitation)	<u>1965</u>	<u>1963</u>
0 to 25	58.12	54.50	47.87	60.74
26 to 50	4.85	7.78	16.62	8.97
51 to 75	9.31	6.05	7.04	8.28
75 to 100	4.86	4.25	5.63	4.59
over 100	22.53	28.58	24.03	19.29
<u>MILFORD</u> ^{2/}				
<u>DISTANCE TRAVELED</u> (in miles)	<u>1972</u> (percent of visitation)			<u>1968</u>
0 to 25	70.48			60.95
26 to 50	5.08			9.59
51 to 75	7.60			5.90
76 to 100	3.25			4.22
over 100	13.60			18.48

1/ "Tuttle Creek" data taken from the Corps of Engineers, Administrative Office Records, at Tuttle Creek Reservoir, by the writer on November 14, 1972.

2/ "Milford" data taken from the Corps of Engineers, Administrative Office Records, at Milford Reservoir, by the writer on November 14, 1972.

registrations per capita. Reservoir proximity, the consequence of distance between sites, provided a description of the resulting growth in yearly visitation and hinterland strengthening. Three reservoir characteristics which influence distance were also observed; the proximity of a site to large demand areas, highway accessibility, and reservoir size. These factors provided a basis for describing the influence reservoirs had over their respective hinterlands. The writer regionalized these respective areas of influence as follows: the Kansas Northwest, East Central, and Southeast. Each region had generalized characteristics which prevailed for the majority of its sites.

East Central Kansas reservoirs were characterized by their proximity to large demand areas. In turn, the sites had smaller areas of intense use, or distances of influence. These areas were fifty miles or less. As it was observed in the origin of visitation summaries, Tuttle Creek, Milford, and Cheney had over fifty percent of their visitation within twenty-five miles of their site. Pomona and Kanopolis on the other hand had an intense influence of less than fifty miles, which relates to the distances between these sites and urban areas. Topeka and Lawrence, and Salina are the respective demand areas which provided the majority of visitors at these sites. Since Perry and Marion Reservoirs are situated within or close to large demand areas, one may deduce that their distances of influence would probably be less than fifty miles.

Council Grove differs from the other East Central reservoirs in that its immediate area is not intensely populated, but it does experience a high rate of use, 1,012,400 visitors in 1971. This rate of use could be a result of its location within forty miles of the Tuttle Creek-Milford Area and its good highway accessibility. The recreationalists using Milford and

Tuttle Creek may journey to the site, or during times of congestion at these sites people may use Council Grove Reservoir. Even though highway accessibility did not appear to be a direct hinterland influence, all the sites in East Central Kansas do have good access. This facilitates a higher visitation rate for them, but as they are situated in or near large areas of demand this factor was probably not directly responsible.

Since these reservoirs influence an area within fifty miles of their site, their economic impact should be observable. And, in fact, most do have a high intensity of boat registrations per capita within their counties. There is also observable influence on non-reservoir counties situated near them. Dickinson County is influenced by Milford, while Council Grove and Tuttle Creek have influence over Wabaunsee County. The county in which Kanopolis is situated, Ellsworth, and Cheney's respective counties, Reno and Sedgwick, are exceptions to this measure of economic impact. The populations of Reno and Sedgwick Counties are possibly large enough to reduce the per capita occurrence of boats because there is a larger variety of opportunities related to leisure time activities. Kanopolis Reservoir on the other hand has a large percentage of its visitors traveling a distance of twenty-six to fifty miles, which is probably from Salina and its surrounding area, resulting in a greater external county influence for Ellsworth. (Saline County has ten percent more boats registered per capita than the Kansas average.)

Southeast Kansas has smaller areas of demand which results in larger hinterlands for the sites of this area. The largest percentage of this area's recreational visitors come from distances greater than fifty miles. Wichita would probably provide the largest percentage of visitors for Toronto

and Fall River, while John Redmond's visitation appears to be a function of its distance from Topeka and the urban concentration of Kansas City. Elk City on the other hand has a moderately large demand area, consequently its area of influence would probably be smaller than the other reservoirs of this region. Again access is not a direct distance influence factor, although the smaller rate of visitation at Fall River could be a result of its only fair highway accessibility. This region's intensity of boat registrations was greatest in the reservoir counties, with the exception of Elk City's county, Montgomery. Its lower occurrence may be a result of a greater variety of leisure time alternatives available. Labette and Wilson Counties had no reservoir sites, but were located in close proximity to reservoir counties. In turn, they had a high intensity of boat registrations per capita.

Northwestern Kansas reservoirs are situated in close proximity to each other and in a region of low population concentrations. The recreational hinterlands of these sites are small. The largest percentage of visitors come from twenty-five miles or less. Norton, Webster, and Lovewell have a high intensity of use within their immediate areas, 25 miles or less. Since Kirwin and Glen Elder are situated close to these three sites, it is probable that their distances of influence would also be within twenty-five miles. Accessibility is not primary in providing influence over the above site's hinterlands, but it does have influence over the hinterlands of two reservoirs. Wilson and Cedar Bluff are situated close to a major transportation network, Interstate 70. Their origin of visitation statements suggests that highway accessibility, more than any other factor, provides these sites with an attraction which results in larger areas of influence.

Boat registrations have a high intensity occurrence in reservoir counties within Northwest Kansas. Phillips has the highest county occurrence for the State, probably because of the location of four reservoirs within a forty mile radius of the County's center (Norton, Webster, Kirwin Reservoirs in Kansas and Harlan County Reservoir in Nebraska). Lincoln, Decatur, and Barton, non-reservoir counties, are situated in close proximity to counties with these sites. In turn, they have a higher occurrence of boat registrations per capita.

Reservoir visitation can also be associated with the above mentioned regions of the State. As one might observe from Table III, the sites receiving the largest number of visitors are those situated in East Central Kansas. One exception to this visitation and regionalization parallel is Kanopolis. Although it is considered in this East Central region, it does not have the market area size of the other seven reservoirs in this region. In turn, it would receive less visitors. The Southeast reservoirs have smaller demand areas than East Central Kansas, but demand areas are within reasonable driving distance, 100 miles. Consequently, the recreational sites of this region share a medium rate of visitations for the State. Northwest Kansas reservoirs, situated in an area of low population densities with no large demand areas within reasonable driving distance, have the smallest visitations for the State. One exception within this last category is Wilson Reservoir. Its higher rate of visitation is probably a result of its location within five miles of Interstate 70.

It is apparent that Kansas reservoirs do have "recreational hinterlands." Since there is no single variable that will account for all reservoir hinterlands, the writer has presented an analysis of several

factors which help explain the generalized distances of influence of the State's water-oriented, recreational sites. Four factors were considered. The primary aspect was the presence or absence of large demand area proximity. Highway accessibility, although good for most reservoirs, appeared to be an important primary hinterland influence for two reservoirs, Wilson and Cedar Bluff. Secondary consequences that were also observed were the closeness of reservoirs to each other and reservoir size. One can intuitively say that reservoir development in Kansas has had an impact on the respective distances of influence, or "recreational hinterlands", of these recreational nodes.

CHAPTER IV

CONCLUSION

Before making the concluding remarks that are the primary concern of this chapter, suggestions will be made for further research related to the recreational impact of reservoirs.

SUGGESTIONS FOR FURTHER RESEARCH

One possible area of investigation could involve a study of the other variables that might give sites certain characteristics which would shape their respective distances of influence. The quality and condition of the recreational facilities and the site could be evaluated. An examination could be made of the number and condition of the beaches or swimming areas, shower facilities and restrooms, launching ramps, docking facilities, camping facilities, and picnic tables and shelters. Questions related to the site's water quality, its fishing opportunities and fish varieties, and the extent and variety of the shade trees that might provide shelter for the picnicker and camper could also be examined. This investigation would provide a measurement of the attractiveness of reservoir sites. In turn, the area of influence should be much larger for sites experiencing adequate and varied facilities in good condition.

A second area of investigation could be an analysis of the distance decay of reservoir visitors. This study could be compiled from the license plate counts taken at Kansas reservoirs. This type of analysis would provide a more precise statement of the origin of visitations and the distances influenced by these reservoir sites.

CONCLUSION

This report has provided a statement of the distances influenced by reservoir development. Since Kansas does not have the natural environment which provides for large water bodies of the size and extent necessary for water-oriented recreation, any water bodies that are developed in the State having the needed acreage will have an impact on this leisure time activity. Even though the construction agencies are not primarily concerned with the recreational aspects of reservoir advancement, the development of these sites will generate their own respective areas of recreational influence. These areas of influence, or recreational hinterlands, were established because the sites and the overall region had certain characteristics which provided for the growth of these hinterlands.

Four characteristics were observed. They were large demand area proximity, highway accessibility, reservoir acreage, and the closeness of one reservoir to another. Since no single factor provided a precise explanation for all reservoirs, the writer examined each site. From this examination it was observed that the State could be divided into regions of distances influenced by certain reservoir characteristics.

The East Central section of the State, with the largest average population densities per county, was characterized by a distance of influence that was primarily a result of demand area proximity. The sites of this area also had good accessibility, which probably added to their influence. Reservoir location within close distance of another site also provided for a more intensified area of influence in the case of three reservoirs, Tuttle Creek, Milford, and Council Grove. Not all reservoirs within this region had an immediate influence over their surrounding territory. Pomona and

Kanopolis had areas of influence of fifty miles or less, which was a consequence of their distance from large urban areas (Topeka and Lawrence for Pomona, and Salina for Kanopolis).

A second region, the Southeast, was characterized by small demand areas and in most cases good accessibility. In turn, the reservoirs had larger areas of influence. The largest percentage of their visitations came from distances greater than fifty miles. Wichita provided visitors for Toronto and Fall River, while the urban populations of Kansas City and Topeka provided the largest percentage of visitors at John Redmond Reservoir. Finally, the Northwestern Kansas reservoirs had a dual character. Two sites, Cedar Bluff and Wilson, had excellent accessibility. They were located on state highways which linked them to a major limited access route, Interstate 70. This provided for an even influence over a much larger distance. The remaining reservoirs had distances of influence that were a consequence of the sites being situated close to others and the lack of large demand areas. Their respective areas of influence were small, which meant that their visitors came from the immediate surrounding areas, 0 to 25 miles.

Distance influence of the economic consequences of reservoir development was observed. This observation was provided with the statement of boat registrations per capita per county. It was found that there is a higher intensity of boats in reservoir counties than in non-reservoir counties. Eighteen of the twenty-two counties having these sites did have a higher occurrence of boats per capita. Ten non-reservoir counties had a high per capita occurrence of boat registrations. All but four counties were situated in close proximity to counties with reservoirs. The four administrative units with a high intensity occurrence of boats, that were not situated

within close proximity to Kansas reservoir counties, were located within close distances of reservoirs in Oklahoma and Missouri.

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RESERVOIR LOCATION AND RECREATIONAL IMPACT IN KANSAS

by

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AN ABSTRACT OF A MASTER'S REPORT

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Outdoor recreation has had a phenomenal growth in the last three decades. This has been a result of the increased leisure time, money, and transportation mobility now available to the modern American. Paralleling these changes is man's growing need for relaxation, which is a result of the growth of the urban centers. One aspect of outdoor recreation, water-oriented activities, has experienced an unparalleled expansion. Its development is a result of the same causes as the total field of outdoor recreation and is facilitated by human technological inputs into the environment in the form of lakes and reservoirs. These man-made water bodies often provide for recreational opportunities that were not available, because the environment did not contain natural lakes and streams of the size and extent necessary for the development of water-oriented activities.

The state of Kansas is situated in a natural area, the Great Plains, which has few large natural water bodies. Consequently, the Federal reservoirs which have been developed within its borders have had a substantial influence on the growth of water-oriented recreation in the State. This report presents a statement of this influence by providing an explanation of the hinterlands of water-based recreational sites.

To provide a description of the areas of influence, or "recreational hinterlands," of the nineteen Federal reservoirs presently in use, the writer utilized several governmental sources. The Corps of Engineers and the Bureau of Reclamation, and its associated State agencies, provided "origin of visitation" and "distance traveled" data respectively, while the Kansas Forestry, Fish and Game Commission provided a second, "boat registrations" per capita. To provide a further statement of recreational hinterland

influence, a study was conducted of the consequences of a new reservoir opening for use in close proximity to an established site.

With an analysis of the above data and the reservoir characteristics, which give these sites influence over their respective hinterlands, it was found that recreational hinterlands do exist. "Origin of visitation" data provided a statement of the distance decay of visits per site. In turn, a generalized description of the hinterlands of these recreational sites was observed. A more precise explanation of reservoir influence was observed by the mapping of boat registrations per capita per county. It was shown that boat registrations do have a higher occurrence per capita in counties situated close to reservoirs than do counties located at further distances. And with the examination of reservoir characteristics, it was found that three regions of Kansas had an individuality in respect to these factors. The East Central region had small distances of influence because of its close proximity to large demand areas, and Southeast Kansas had larger zones of influence because the demand areas were small within this region, but there were large areas from without. Northwest Kansas had small hinterlands because of the sparse population of this region and the closeness of the majority of the sites to each other. An exception within this region relates to the highway accessibility of two sites.