

A RECREATIONAL ANALYSIS OF FIVE  
KANSAS RESERVOIRS

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A Thesis  
Presented to  
the Department of Social Science  
Kansas State Teachers College

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

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by  
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August 1973

11-1-19  
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312543<sup>6</sup>

## ACKNOWLEDGMENTS

The author gratefully acknowledges assistance given by state park managers and resident engineers of study reservoirs. Without their cooperation the study could not have been completed.

Dr. Edwin C. Moreland, committee chairman, unselfishly gave his time and knowledge to the study. Dr. William Phillips gave valuable assistance in completion of study illustrations.

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## Chapter I

### A RECREATIONAL GEOGRAPHY OF FIVE SELECTED KANSAS RESERVOIRS

In 1950 there were two federal reservoirs in Kansas. Today there are twenty-two federal reservoirs, with nine additional reservoirs either under construction or in various steps of authorization. Of the twenty-two existing reservoirs, 14 were constructed by the United States Army Corps of Engineers with the remaining eight being constructed by the Bureau of Reclamation. Regarding the nine additional reservoirs, all will be constructed by the Corps of Engineers, with none being constructed by the Bureau of Reclamation.<sup>1</sup>

Five reservoirs were selected for this study. Four were constructed by the Corps of Engineers; one was constructed by the Bureau of Reclamation.<sup>2</sup> Perry Dam and Reservoir, Elk City Dam and Reservoir, John Redmond Dam and Reservoir, Fall River Dam and Reservoir were constructed by the Corps of Engineers. Cheney Dam and Reservoir was constructed by the Bureau of Reclamation.<sup>3</sup>

Statement of the problem. Not all federal reservoirs have the same physical resources, developed facilities, nor draw from the same

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<sup>1</sup> Kansas Recreation: Past, Present, Future (Studies in Outdoor Recreational Needs of Kansas. Topeka: Governor's Advisory Council on Outdoor Recreation, 1963), p. 5.

<sup>2</sup> Ibid., p. 2-A.

<sup>3</sup> Ibid., p. 2-A.

population clusters. This study will attempt to analyze objectively the relationship between these variables and a reservoir's capabilities as an outdoor recreational area by studying five Kansas reservoirs possessing varying site and situational characteristics.

Importance of the study. Even the most casual observation shows some reservoirs to be more attractive than others for recreation. However, some important differences are not so clearly delineated or easily observable. This paper will develop specific and objective rating scales for measuring the recreational potential of a reservoir.

This study would seem to have great utility in research, planning, and administration of outdoor activities associated with reservoir developments.

Procedure. The study will begin with a description of those variables included in the study. A rating scale and procedure for rating physical variables, developed facilities, and population variables will be explained in this chapter. The study then evolves into a consideration of the reservoirs and their variables. Each reservoir is rated for the value of its variables according to the procedure explained above. The concluding portion of the study is devoted to a final evaluation of the recreational possibilities and limitations of each study reservoir.

Definition of Terms Used. Adjusted Market Area - Market area which has had its radius adjusted to fit existing county and state boundaries.

Bureau of Reclamation - Agency of the federal government which builds multi-purpose reservoirs primarily for water supply and irrigation



rather than flood control. Recreational development is achieved primarily through cooperation with federal, state, and local agencies.

Conservation Pool - Surface area of water in the reservoir pool under normal conditions.

Dam - In Kansas, a dam is any barrier of filled earth and rock materials built to hold back flowing water.

Day-Use Population - Population in adjusted market area which is within a twenty-five mile radius of the selected reservoir.<sup>4</sup>

Developed Facilities - Public use facilities which enhances the enjoyment gained from outdoor recreational facilities.

Elevation - The vertical distance above or below a reference point or surface.

Flood Pool - Surface area of water in the reservoir pool at flood conditions.

Governor's Advisory Council on Outdoor Recreation - An agency of Kansas government which provides intrastate and state-federal coordination of development, administration, and management of recreation, fish, and wildlife areas.

Kansas Forestry, Fish and Game Commission - A Kansas Governmental agency which develops, operates, and maintains recreational resources in interests of public hunting and fishing and wildlife preservation and propagation.

Kansas Water Resources Board - An agency of Kansas government which considers recreational needs in preparing comprehensive state plans for water resource development.

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<sup>4</sup> Park and Resources Authority. May, 1972.

Market Area - Land area within a seventy-five mile radius of the selected reservoir.<sup>5</sup>

Outdoor Recreation - Any activity performed for enjoyment or pleasure in leisure time out-of-doors and in some way involving utilization of land and/or water resources.

Park and Resources Authority - A state agency which develops, operates, and maintains roadside parks and builds access roads to reservoirs.

Pollution - As used in this study, pollution is the presence of foreign matter which causes the water to be less desirable for outdoor recreational activities. Pollution is viewed subjectively as perceived by members of the State Park Authority.

Pool Fluctuations - Amount of change in conservation pool level over a three-year period.

Reservoir - A natural or artificial place where water is collected to prevent flooding or stored for future use.

Slope - The degree from which the topography deviates from a horizontal plane.

Standard Metropolitan Statistical Area - According to the United States Census Bureau, a Standard Metropolitan Statistical Area is a county or group of contiguous counties (except in New England) that conforms to three major criteria used to determine the areal extent of SMSA's: (a) Population criteria: containing either one city of 50,000 inhabitants or two cities having contiguous boundaries and constituting,

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<sup>5</sup>Ibid.

for general economic and social purposes, a single community with a combined population of at least 50,000, the smaller of which must have a population of at least 15,000. In cases where two cities in adjacent counties within twenty miles of each other show definite evidence of social and economic integration, and one contains at least 50,000, or they conform to twin cities criteria, they will be included. (b) Criteria of metropolitan character: These relate primarily to the attributes of a county as a place of work or as a home for a concentration of non-agricultural workers. (c) Criteria of integration: These relate primarily to the extent of economic and social communication between the outlying counties and the central county. In New England, towns and cities rather than counties are defining Standard Metropolitan Statistical Areas. For the 1970 census, State Economic Areas will be used for the New England states.<sup>6</sup>

State Highway Commission - State agency of Kansas which develops, operates, and maintains roadside parks and builds access roads to reservoirs.

Surface Acres - Area covered by the water surface of water contained in a reservoir.

Turbidity - Condition of the water in which it is thick, dense, or dark. Turbidity is viewed subjectively as perceived by the State Park Authority.

United States Army Corps of Engineers (Kansas City District) - Federal agency which builds multi-purpose reservoirs and has authority

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<sup>6</sup>Allen A. Schneider and others, A Dictionary of Basic Geography (Boston: Allyn and Bacon, Inc., 1970), p. 181.

to construct, maintain, and operate minimum basic facilities in reservoir area. The "Kansas City District" is that branch of the Corps of Engineers which has authority over those reservoirs on rivers and water bodies which originate on or are tributaries of the Kansas River.

United States Army Corps of Engineers (Tulsa District) - Federal agency which builds multi-purpose reservoirs and has authority to construct, maintain, and operate minimum basic recreational facilities in reservoir area. The "Tulsa District" is that branch of the Corps of Engineers which has jurisdiction over those reservoirs on rivers and water bodies which originate on or are tributaries of the Arkansas River.

### Organization of the Project

Chapter Two. This chapter is concerned with a description of the site and situational characteristics of the reservoirs with special attention given to the uniqueness of each reservoir setting and situation.

Chapter Three. These variables: (1) physical resources, (2) developed facilities, (3) and population variables are to be analyzed for their effect upon a reservoir's outdoor recreational opportunities. In this section, the rating scale is explained. The interaction between a reservoir's variables is explained to the fullest extent. This section includes a sample reservoir rating sheet.

Chapter Four. Chapter four examines the physical resources of the study reservoirs. The chapter begins with an explanation of the effect which physical variables have upon differing outdoor recreational

activities. The reservoirs' physical variables are rated by the variable rating scale.

Chapter Five. This section of the study deals with developed facilities, giving emphasis to quantity, quality, and diversification of developed outdoor facilities. The developed facilities are rated by the variable rating scale.

A section of this chapter considers aspects of reservoir management affecting recreation. Particular attention is given to the recreational management policies of the Bureau of Reclamation and the United States Army Corps of Engineers.

Chapter Six. In this section population variables are studied. The variables considered are: total adjusted market area population, percentage of adjusted market area population which is day-use, percentage of adjusted market area population which is contained in Standard Metropolitan Statistical Areas, percentage of adjusted market area population which is urban, and percentage of adjusted market area population which is rural. These variables are rated by the variable rating scale for each selected reservoir.

Chapter Seven. This concluding section is devoted to a final rating of reservoir variables. Ratings are taken from chapters four, five, and six for the final rating on the variable rating scale. Conclusions regarding the outdoor recreational capabilities of the study reservoirs are drawn from these final ratings.

## Chapter II

### SITE AND SITUATION OF EACH STUDY RESERVOIR

Each study reservoir has varying site and situational characteristics. The variances of site and situational characteristics is responsible for their differing capabilities as recreational centers. Site describes the specific area where each dam and reservoir is located. Situation is the reservoir's location in relation to developed facilities and population variables.<sup>1</sup>

#### Perry Dam and Reservoir

Dam Site. Perry Dam is located in northeastern Kansas on river mile 5.3 of the Delaware River approximately three miles northwest of Perry, Kansas. The Delaware River joins the Kansas River from the north between Topeka and Lawrence. The dam site is in the south central part of Jefferson County, Kansas. Perry Dam was constructed by the United States Army Corps of Engineers, Kansas City District. The dam is a rock and rolled earth-fill type extending approximately 7,750 feet across the streambed of the Delaware River. The dam's maximum height is 94 feet.<sup>2</sup>

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<sup>1</sup> Schmieder, op. cit. p. 176.

<sup>2</sup> United States Army Corps of Engineers, Perry Dam and Reservoir (Washington: Government Printing Office, 1969).

Reservoir Site. Perry Reservoir contains 12,200 acres of water at conservation pool level with 110 miles of shoreline. Perry Reservoir has the longest shoreline and largest water surface area of all the study reservoirs. The reservoir pool is an excellent fishing reservoir having large amounts of crappie, black bass, walleye, and northern pike. Migratory waterfowl frequenting the reservoir are: Blue-Snow Geese, Canadian Geese, Mallards, and pintails.<sup>3</sup>

Perry Reservoir has 14,747 acres of land available for recreational use. The topography of this acreage is typical of northeastern Kansas. Perry's landscape consists of numerous uplands with sharply defined valleys. Changes in elevation can be rather abrupt. A significant feature of the reservoir's landscape is the presence of numerous uplands adjacent to the reservoir pool.<sup>4</sup>

Vegetative cover is dominated by grasslands, timber, and row crops. The valley floors are intensively planted to row crops with grasslands and timber covering the uplands. The native grasses are of the tall grass, prairie variety with Bluestem being the dominant species. Woody types are brushy oak timber.

Perry Reservoir has a significant upland game population. The bobwhite quail is the most numerous upland game species. Other upland game species include: rabbits, squirrels, white-tailed deer, and mourning doves.<sup>5</sup>

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<sup>3</sup> Kansas Forestry, Fish, and Game Commission, Perry Game Management Area (Topeka: State Printing Office, 1969), p. 1.

<sup>4</sup> Gary Haller and others, Perry State Park: Master Plan (Topeka: Kansas Park and Resources Authority, 1969), p. 2.

<sup>5</sup> Kansas Forestry, Fish, and Game Commission, op. cit., p. 1.

Situation. Perry Reservoir became a functional structure in January, 1969; making it the most recently constructed of the study reservoirs. Perry Dam and Reservoir was constructed by the United States Army Corps of Engineers, Kansas City District. Recreational areas are administered by the following governmental agencies: United States Army Corps of Engineers, Kansas City District; State Park Authority; and the Kansas Forestry, Fish, and Game Commission.<sup>6</sup>

Numerous developed facilities are present in the public use areas. Some of the facilities present include: swimming beaches, camp sites, boat ramps, picnic tables, picnic shelters, bath houses, marina, pit toilets, modern shower and latrine buildings, barbecue grills, and trailer campgrounds.<sup>7</sup> Access to Perry Reservoir is provided by the Kansas Turnpike, U.S. Highway 50, U.S. Highway 75, and Interstate 70. Perry Reservoir can also be reached by numerous county roads.

Perry Reservoir, possessing physical resources quite conducive to outdoor recreation; has the largest adjusted market area population of any study reservoir.

#### John Redmond Dam and Reservoir

Dam Site. John Redmond Dam site is at Neosho River mile 343.7 in Coffey County, two miles northwest of Burlington, Kansas. Coffey County is in the southeastern section of Kansas. John Redmond Dam is an earth-

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<sup>6</sup> Haller, G., op. cit., pp. 2-5.

<sup>7</sup> United States Army Corps of Engineers, Perry Reservoir: Developed Facilities (Kansas City: Federal Office Building, 1973), p. 1.



fill dam extending 21,790 feet across the floor of the Neosho River Valley. The dam's maximum height above the streambed is 84.5 feet.<sup>8</sup>

Reservoir Site. John Redmond Reservoir, situated in a broad, flat basin of the Neosho River; contains 7,780 water surface acres with a shoreline length of 50 miles. Fish species present in the reservoir include white crappie, largemouth bass, walleye, white bass, channel catfish, flathead catfish, and various sunfish species. Due to its location in the vast central flyway, the reservoir is on an important flight path for migrating ducks and geese. Canvasback Ducks, Snow Geese, and Blue Geese are present in large numbers.<sup>9</sup>

John Redmond Reservoir has 10,720 acres of land available for recreational use. Vegetation consists chiefly of native grasses; with the dominant species being bluestem and side oats gamma. Small areas of woodland are present as farm windbreaks or along streams and other water bodies. Large sections of the reservoir lands are under cultivation. Principal crops are corn, grain sorghums, forage sorghums, and soybeans. Land adjacent to the reservoir are flat rolling plains with no abrupt changes in elevation. Upland game population includes greater prairie chicken, whitetail rabbit, squirrel, deer, and quail.<sup>10</sup>

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<sup>8</sup>United States Army Corps of Engineers, Kansas City District, John Redmond Dam and Reservoir (Washington: Government Printing Office, 1969).

<sup>9</sup>Kansas Forestry, Fish, and Game Commission, Otter Creek Game Management Area (Topeka: State Printing Office, 1969), p. 1.

<sup>10</sup>John Redmond Dam and Reservoir, op. cit.

Situation. John Redmond Dam and Reservoir was constructed by the United States Army Corps of Engineers, (Kansas City District). Construction was completed in 1964.<sup>11</sup> Public use areas are administered by the following governmental agencies: United States Army Corps of Engineers; Flint Hills National Wildlife Refuge; and Kansas Forestry, Fish, and Game Commission. Facilities present in the public use areas include: boat ramps, picnic shelters, camper pads, and water fountains. Access to John Redmond Reservoir is provided by U.S. Highway 75 on the east and U.S. Highway 50 from the north.

John Redmond Reservoir is quite limited in physical resources and developed facilities, but draws from the second highest population densities among the study reservoirs.

#### Fall River Dam and Reservoir

Dam Site. Fall River Dam is located on river mile 54 of Fall River in Greenwood County. It is approximately 4 miles northeast of Fall River and 17 miles southeast of Eureka. The dam is a rolled earth-fill embankment extending for a length of 5,545 feet and a maximum height of 94 feet above the original riverbed.<sup>12</sup>

Reservoir Site. Fall River Reservoir has 2,450 water-surface acres at conservation pool level with a shoreline length of 40 miles. Of the study reservoirs, it is the smallest in shoreline length and

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<sup>11</sup> Ibid.

<sup>12</sup> United States Army Corps of Engineers, Kansas City District, Fall River Dam and Reservoir (Washington: Government Printing Office, 1969).

water surface acres. Principal fish species in the reservoir are white crappie, white bass, channel catfish, largemouth bass, flathead catfish, walleye, and various sunfish species. Migratory waterfowl include Mallards, Pintails, Teal, Widgeon, Sadwall, Wood Duck, Shovelter, Ring-Necked Duck, Lesser Scaup, Redhead, Canvasback, Hooded Mergansor, and Canadian Geese.<sup>13</sup>

Fall River Reservoir has 11,892 acres of land available for recreational use. Land surrounding the reservoir is characterized by numerous hills and gently undulating valleys. One-half of the reservoir area is in cropland with the remainder in pastures and woodlands. A notable feature of the reservoir landscape is the many limestone-capped ridges. The bobwhite quail is the dominant upland game species of Fall River. Other game species include the cottontail rabbit, mourning dove, fox squirrel, and white-tailed deer.<sup>14</sup>

Situation. Fall River Dam was constructed by the United States Army Corps of Engineers (Tulsa District) with construction being completed in 1949. It is the oldest of the selected reservoirs.<sup>15</sup> Fall River's recreational areas are administered by the following governmental agencies: United States Army Corps of Engineers (Tulsa District); State Park Authority; and Kansas Forestry, Fish, and Game Commission.

Developed facilities include a swimming beach, picnic tables, camper pads, boat ramps, and group shelters. Access to Fall River

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<sup>13</sup> Ibid.

<sup>14</sup> Kansas Forestry, Fish, and Game Commission, Fall River Game Management Area (Topeka: State Printing Office, 1969), p. 1.

<sup>15</sup> Ibid.

Reservoir is provided by U.S. Highway 54 and State Highways 96 and 99.

Fall River is a physically attractive reservoir having a sparsely adjusted market area. Fall River faces intense competition from Toronto Reservoir and Elk City Reservoir.

### Elk City Dam and Reservoir

Dam Site. Elk City Dam was built on mile 8.7 of the Elk River, a tributary of the Verdigris River; in Montgomery County, Kansas. Elk City Dam is located six miles east of Elk City and five miles northwest of Independence in Montgomery County, Kansas. The dam is a compacted earthfill embankment extending approximately 4,902 feet across the streambed of the Elk River. The dam's maximum height is 107 feet.<sup>16</sup>

Reservoir Site. Elk City Reservoir has 3,550 surface acres of water at conservation pool level with a shoreline length of approximately 50 miles. Principal fish species in the reservoir are white crappie, white bass, channel catfish, largemouth bass, flathead catfish, walleye, and various sunfish species. Elk City Reservoir is located on the eastern edge of the vast central waterfowl flyway. Mallards, pintails, teal, widgeon, gadwall, woodduck, shoveler, ring-necked, lesser scaup, redhead, canvasback, hooded merganser, Canadian Geese, and lesser snow geese frequent the area during spring and fall migrations.<sup>17</sup>

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<sup>16</sup> United States Army Corps of Engineers, Kansas City District, Elk City Dam and Reservoir (Washington: Government Printing Office, 1969).

<sup>17</sup> Kansas Forestry, Fish, and Game Commission, Elk City Game Management Area (Topeka: State Printing Office, 1969), p. 1.

Elk City Reservoir has 14,907 acres of land for recreational use. The reservoir is located entirely in Montgomery County. Elk City Reservoir is located on the eastern edge of the Chautauqua Hill Region. Topography is characterized by the presence of many steeply wooded slopes dropping quickly into broad level valleys. A prominent feature of the landscape is the precipitous rock bluff of table land that marks the north margin of the river valley for several miles above the dam.<sup>18</sup>

The dominant vegetative cover is native grasses and row crops. Portions of the reservoir lands are in timberland. Approximately one-half of the wildlife project lands are intensively cultivated. The principal crops are corn, grain sorghums, forage sorghums, wheat, and soybeans.<sup>19</sup>

The bobwhite quail is the dominant upland game bird. Other upland game includes: cottontail rabbit, mourning dove, fox squirrel, and white-tailed deer.<sup>20</sup>

Situation. Construction of Elk City Dam and Reservoir was by the United States Army Corps of Engineers, (Tulsa District). Construction was completed in 1966. Public use areas are administered by the following agencies: United States Army Corps of Engineers; Kansas Forestry, Fish, and Game Commission; and the State Park Authority.

Developed facilities include: boat ramps, picnic shelters, picnic grills, paved access roads, information center, swimming beaches,

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<sup>18</sup> Elk City Dam and Reservoir, op. cit.

<sup>19</sup> Elk City Game Management Area, op. cit., p. 1.

<sup>20</sup> Ibid., p. 1.

and sanitary facilities. Access to Elk City Reservoir is provided by U.S. Highway 75, U.S. Highway 160 and K-39.

Elk City Reservoir possesses physical resources which are conducive to outdoor recreation and is located in an adjusted market area having high population densities.

### Cheney Dam and Reservoir

Dam Site. Cheney Dam is located on the North Fork of the Ninnescah River in Kingman and Sedgwick Counties, Kansas. Cheney Dam is in south central Kansas twenty-seven miles west of Wichita and 13 miles south of Hutchinson. Cheney Dam is a rolled earth structure with a length of  $1\frac{1}{2}$  miles and a height of eighty-six feet.<sup>21</sup>

Reservoir Site. Cheney Reservoir has 9,000 surface acres of water at conservation pool with a shoreline length of 67 miles. Fish species present in the reservoir include: walleye, white bass, channel catfish, crappie, and northern pike. Migratory waterfowl frequenting the area during the fall and spring migration include: mallard, green and blue wing teal, gadwall, lesser scaup, widgeon, shoveler, pintail, and redhead.<sup>22</sup>

Cheney Reservoir has 9,238 acres of land for recreational use. Cheney Reservoir is located on the eastern edge of the Great Plains. The surrounding topography is generally flat with limited vegetation

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<sup>21</sup> Gary Haller and others, Cheney State Park: Master Plan (Topeka: Kansas Park and Resources Authority, 1969), p. 1.

<sup>22</sup> Ibid., p. 1.

and trees except for an occasional farmstead or shelter belt planted in the upland areas. Vegetation is limited chiefly to a mixed grass prairie climax vegetation. Principal grass species in the area are: buffalo grass, blue grama, big bluestem, little bluestem, side-oats grama, switchgrass, and sand love grass. Woody vegetation is restricted chiefly to scattered farmsteads with small amounts of timber along the Ninnescah River. Principal woody species on the recreational lands are: cottonwood, hackberry, eastern red cedar, wild plum, and black locust. Upland game species include: white-tail deer, mourning dove, pheasant, and squirrel.<sup>23</sup>

Situation. Cheney Dam and Reservoir was constructed by the Bureau of Reclamation. Construction was completed in 1965.<sup>24</sup> Public use areas are administered by the following governmental agencies: State Park Authority; Kansas Forestry, Fish, and Game Commission.

Developed facilities include: bathhouse and swimming beaches, exhibit shelters, covered boat slips, camping areas, and picnic shelters. Access to Cheney is provided by U.S. Highway 54 from Wichita; and Kansas Highways 17 and 96 from the north.

The topography and vegetation at the reservoir site offer few scenic attractions. However, Cheney is heavily used due to her proximity to several large urban centers.

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<sup>23</sup> Ibid., p. 1.

<sup>24</sup> Ibid., p. 1.

## Chapter III

### THE EFFECT OF VARIABLES UPON STUDY RESERVOIRS' OUTDOOR RECREATIONAL CAPABILITIES

Three categories of variables affect a reservoir's outdoor recreational capabilities. These categories are: physical variables, developed facilities, and population variables. This section contains the individual variables contained in each category, and provides a rating scale showing the importance of each variable in determining the recreational capabilities of each study reservoir.

#### PHYSICAL VARIABLES

Outdoor recreation involves the utilization of physical resources. Reservoirs have two physical resources, land and water, which are utilized by participants for outdoor recreation. An integral part of a reservoir's recreational desirability is the quality of its physical resources. (A complete list of physical variables is contained on pages 19-22.)

#### Primary Outdoor Recreational Activities

Assessment of a reservoir's physical resources is most easily understood by considering the effect which the absence or variance of a physical resource can have upon primary outdoor recreational activities. Primary outdoor recreational activities are: boating, water-skiing,



Physical Variable Rating Scale

Variable	Possible Range of Variables	Scale Points	
		Possible	Received
A. Water Resources	0 - 3,000 Acres	2	
1. Water Surface Acres	3,001 - 6,000 Acres	4	
	6,001 - 9,000 Acres	6	
	9,001 - 12,000 Acres	8	
2. Average Depth of Reservoir Pool	0' - 7'	2	
	7' - 9'	4	
	9' - 11'	6	
	11' - 13'	8	
3. Water Pollution	No pollution	8	
	Minor pollution	6	
	Moderate pollution	4	
	Major pollution	2	
4. Water Turbidity	No turbidity	8	
	Minor turbidity	6	
	Moderate turbidity	4	
	Major turbidity	2	
5. Shoreline Access	Easy Access	8	
	Relatively Easy	6	
	Some Difficulty	4	
	Difficult	2	

Table I (continued)

Variable	Possible Range of Variables	Scale Points	
		Possible	Received
6. Shoreline Composition	Sandy	8	
	Sand and Silt	6	
	Hard Clay	4	
	Mud	2	
7. Shoreline Length At Conservation Pool	120 miles - 100 miles	8	
	99 miles - 80 miles	6	
	79 miles - 60 miles	4	
	59 miles - 40 miles	2	
8. Normal Conservation Pool Variations	0' - 2'	8	
	3' - 5'	6	
	5' - 7'	4	
	8' and over	2	
9. Normal Flood Pool Variations	0' - 12'	8	
	12' - 16'	6	
	17' - 21'	4	
	22' - 26'	2	
B. Land Resources			
10. Lands For Recreational Use	14,750 - 13,000	8	
	12,999 - 11,250	6	
	11,249 - 10,750	4	
	10,749 - 9,250	2	

Variable	Possible Range of Variables	Scale Points	
		Possible	Received
11. Local Relief	206 - 175	8	
	174 - 150	6	
	149 - 125	4	
	124 - 100	2	
12. Slope	15% - 12%	8	
	11% - 6%	6	
	5% - 2%	4	
	1% - 0%	2	
13. Vegetative Cover	A. Percentage of Recreational Lands In Cropland	100 - 75	0
		74 - 50	2
		49 - 25	4
		24 - 0	6
	B. Percentage of Recreational Lands In Grassland	100 - 75	2
		74 - 50	4
		49 - 25	6
		24 - 0	8
	C. Percentage of Recreational Lands In Woodland <sup>1</sup>	100 - 75	8
		74 - 50	6
		49 - 25	4
		24 - 0	2

<sup>1</sup> Park and Resources Authority. "Reservoir Rating Sheet" (Topeka: Kansas Park and Resources Authority, 1972). (Mimeographed).

Table I (continued)

Variable	Possible Range of Variables	Scale Points	
		Possible	Received
14. Topography <sup>2</sup>	Rough, Dissected Plains	8	
	Rolling Plains	6	
	Undulating Plains	4	
	Flat Plains	2	

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<sup>2</sup> Vernor C. Finch and Glen T. Trewartha, Elements of Geography (New York: McGraw-Hill Book Co., Inc., 1949), p. 258.

hunting, fishing, camping, and swimming.<sup>3</sup>

Boating. Boating is a popular outdoor recreational activity which is most pleasurable in a deep reservoir. A shallow reservoir produces high wave action; in turn creating a rough water surface and a resultant rough boat ride. Boating participants prefer a large lake surface. A larger lake surface provides more room for boating. Water with low or negligible amounts of pollution enhance boating at a reservoir.<sup>4</sup>

Land resources affect boating. The land resources most affecting boating is topography. A reservoir surrounded by bluffs or hills will have reduced wave action. Consequently, a reservoir will have a less turbulent water surface which will enhance boating activities.<sup>5</sup>

Water-Skiing. Water-skiing is influenced by many of the same variables affecting boating. Water-skiing is most pleasurable on a reservoir having a large amount of water-surface acres because the skier has more water upon which to ski. With a large lake surface, the skier is less apt to be subjected to wash from other boats. Like boaters, skiers prefer a lake with little wave action. Reservoirs with significant wave action have limited participation in water-skiing. Water-skiing

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<sup>3</sup> Duane Olsen, Outdoor Recreation and Tourism In Kansas (Report No. 13 of Outdoor Recreation and Tourism in Kansas, 15 Reports; Manhattan: Kansas State University Press, June, 1970), p. 4.

<sup>4</sup> Statement by Lyle Stemmerman, personal interview.

<sup>5</sup> Ibid.

can also be limited if large amounts of underwater obstructions are present beneath the water surface.<sup>6</sup>

Fishing. Fishing is affected by a combination of land and water resources. Water resources having greatest effect upon fishing are water pollution and water turbidity. Water pollution, if present in sufficient quantities, can seriously decimate a reservoir's fish population. Water turbidity has an adverse effect upon fishing. Sight-feeding fish; such as bass and white-pike are less active in turbid waters due to limitations of their sight.<sup>7</sup>

Shoreline-length, a land resource, affects fishing. A long shoreline gives fishermen more land area and more fishing opportunities. Two other shoreline characteristics, shoreline accessibility and shoreline shape both affect fishing. A shoreline which is readily accessible for its entire length encourages fishing. Fishermen prefer an irregular shoreline with numerous indentations. These indentations provide favorite feeding grounds for fish and provide excellent fishing areas.<sup>8</sup>

Hunting. Hunting is equally dependent upon land and water resources. Land features having particular importance are vegetative cover and acres of available hunting land. Upland game species, with the possible exception of the pheasant, thrive in areas of grassland

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<sup>6</sup> Statement by Dick Haggar, personal interview.

<sup>7</sup> Statement by Ray Howland, personal interview.

<sup>8</sup> Ibid.

interspersed with timber and woody vegetation. An area with sufficient acreage will provide better hunting.

Picnicking. Picnicking is often enjoyed in conjunction with other activities. Variables affecting boating and water-skiing also affect picnicking. The variables most directly affecting picnicking are conservation pool fluctuations and amount of tree cover adjacent to reservoir shore.

Picnicking is likely to give a high degree of user satisfaction when located near the reservoir's shoreline and the reservoir's public-use facilities. A reservoir with a large pool fluctuation discourages picnicking. Facilities which have been submerged or surrounded by water often have an obnoxious odor. Mud and other debris is often present. Before normal recreational activities can be resumed, it becomes necessary to clear the area of debris and mud. Boating and water-skiing will be quite limited by access to docks and boat ramps.<sup>9</sup>

Camping. Camping involves utilization of land and water resources. Camping, like picnicking, gives greatest enjoyment in close proximity of the reservoir shoreline. A reservoir having large pool fluctuations seriously hinders camping by limiting use of developed facilities. Once the water recedes to a normal level; large amounts of debris must be cleared before facilities are ready for normal use. Camping is preferable in shade.

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<sup>9</sup> Statement by Lyle Stemmerman, personal interview.

Swimming. Swimming is most strongly influenced by water turbidity, water pollution, and shoreline composition. Water turbidity and water pollution, if present in significant quantities, seriously hamper swimming. Shoreline composition affects swimming and related activities. (Examples of related activities are sun-bathing and volleyball.) The most desirable shoreline compositions are sand and silt. Other compositions are viewed as being quite undesirable.<sup>10</sup>

#### DEVELOPED FACILITIES

As in a retail store, developed facilities represent services to a consumer. In selecting a shopping center, one variable influencing a shopper is the services available. An outdoor recreational participant is similar to a shopper; one variable affecting his choice will be the services (i.e. developed facilities) which are available.<sup>11</sup> (Table 2 on pages 28-33 contains a complete listing of developed facilities.)

#### Facilities For Primary Outdoor Recreational Activities

Boating. Pleasure boating involves the use of several developed facilities. The primary facility is boat ramps. Boat ramps are used for placing boats in water and for removing the boats from the water. Boating is aided by the presence of these additional facilities: change house, boat dumping stations, courtesy docks, marina, access roads, and boat and trailer spaces.

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<sup>10</sup> Statement by Lyle Stemmerman, personal interview.

<sup>11</sup> Carlton Stevens Van Doren, "An Interaction Travel Model For Projecting Attendance of Campers At Michigan State Parks" (Michigan State University, Ann Arbor, 1967), p. 47.



Change houses provide boaters an opportunity to change into suitable boating apparel. Boating dumping stations are used for dumping refuse collected while boating. Courtesy docks give the boater an opportunity to store his boat. Marinas are quite important. Given the assumption that an outdoor recreational participant often travels considerable distances to his destination; the carrying of boating supplies can be a considerable inconvenience. Marinas greatly aid boating by enabling the participant to buy needed boating supplies at the reservoir site. Access roads provide the boater access to various ramp sites. Access roads having the most desirable characteristics are those which are paved and provide a direct access to boating sites.

Water-Skiing. Water-skiing involves the utilization of the same developed facilities as boating.

Fishing. Fishing does not involve the utilization of many developed facilities. Those facilities receiving greatest use are marinas and access roads. Marinas could serve as a source of fishing supplies. Access roads are used for providing transportation to fishing sites.

Hunting. Hunting, like fishing, involves little utilization of developed facilities. Marinas provide hunting supplies, and access roads provide transportation to various hunting areas.

Picnicking. Picnicking involves tremendous utilization of developed facilities. Picnic tables provide a surface for placing food. It is desirable to have table shelters as food may be spoiled by exposure

Table 2  
Developed Facilities

Variable	Possible Range of Values	Scale Points	
		Possible	Received
1. Group Shelters	18 - 15	4	
	14 - 10	3	
	9 - 5	2	
	4 - 1	1	
	0	0	
2. Table Shelters	22 - 17	4	
	16 - 11	3	
	10 - 5	2	
	4 - 1	1	
	0	0	
3. Picnic Tables	927 - 496	4	
	495 - 265	3	
	264 - 100	2	
	99 - 1	1	
	0	0	
4. Outdoor Grills	607 - 450	4	
	449 - 300	3	
	299 - 150	2	
	149 - 1	1	
	0	0	

Table 2 (continued)

Variable	Possible Range of Values	Scale Points	
		Possible	Received
5. Fireplaces	100 - 75	4	
	74 - 50	3	
	49 - 25	2	
	24 - 1	1	
	0	0	
6. Camper Pads	360 - 240	4	
	239 - 150	3	
	149 - 60	2	
	59 - 1	1	
	0	0	
7. Swimming Beaches	2	4	
	1	2	
	0	0	
8. Bath House	1	4	
	0	0	
9. Change Houses	2	4	
	1	2	
	0	0	
10. Pit Privies	44 - 39	4	
	38 - 33	3	
	32 - 27	2	
	26 - 1	1	
	0	0	

Table 2 (continued)

Variable	Possible Range of Values	Scale Points	
		Possible	Received
11. Shower Latrine Buildings	14 - 10	4	
	9 - 6	3	
	5 - 3	2	
	2 - 1	1	
	0	0	
12. Comfort Stations No Shower	3	4	
	2	3	
	1	2	
	0	0	
13. Sewage Lagoons	14 - 11	4	
	10 - 6	3	
	5 - 2	2	
	1	1	
	0	0	
14. Sewage Treatment Plants	2	4	
	0	0	
15. Trailer Dumping Stations	11 - 9	4	
	8 - 6	3	
	5 - 3	2	
	2 - 1	1	
	0	0	
16. Boat Dumping Stations	1	4	
	0	0	

Table 2 (continued)

Variable	Possible Range of Values	Scale Points	
		Possible	Received
17. Water Treatment Plants	4	4	
	3	3	
	2	2	
	1	1	
	0	0	
18. Roads On Recrea- tional Lands Adjacent to Reservoir (paved)	35 - 23	4	
	22 - 11	3	
	10 - 5	2	
	4 - 1	1	
	0	0	
19. Roads On Recrea- tional Lands Adjacent to Reservoir	7 - 6	4	
	5 - 4	3	
	3 - 2	2	
	1 - $\frac{1}{2}$	1	
	0	0	
20. Water Fountains	7 - 6	4	
	5 - 4	3	
	3 - 2	2	
	1	1	
	0	0	

Table 2 (continued)

Variable	Possible Range of Values	Scale Points	
		Possible	Received
21. Water Hydrants	33 - 25	4	
	24 - 18	3	
	17 - 9	2	
	8 - 1	1	
	0	0	
22. Boat Ramps - One Lane	6 - 5	4	
	4	3	
	3	2	
	2	1	
	0	0	
23. Boat Ramps - Two Lane	6 - 5	8	
	4	6	
	3	4	
	2	2	
	0	0	
24. Boat Ramps - Three Lane	6 - 5	12	
	4	10	
	3	8	
	2	6	
	0	4	

Table 2 (continued)

Variable	Possible Range of Values	Scale Points	
		Possible	Received
25. Boat Ramps - Four Lane	6 - 5	16	
	4	14	
	3	12	
	2	10	
	0	0	
26. Courtesy Docks	8 - 7	4	
	6 - 4	3	
	3 - 2	2	
	1	1	
	0	0	
27. Marina	2	4	
	0	2	

to the sun. Since much picnicking involves outdoor cooking, outdoor grills and fireplaces are desirable. It is also desirable to have these facilities near picnic shelters. Inclement weather can seriously hamper picnicking, if group shelters are not available for protection. Picnicking creates debris which may be held in check by trash containers near the picnic tables and shelters.<sup>13</sup>

Picnicking involves the utilization of restrooms, and rest areas having water borne toilets are preferred over pit privies. Restrooms should be located within easy access of picnic areas.

Camping. Outdoor recreation involves two types of camping: camping in tents and camping in mobile camper units. Those camping in tents have different needs from those camping in camper units.

Tent camping involves utilization of picnic tables, outdoor grills, and fireplaces. Group shelters would be needed in inclement weather. Additional facilities receiving use would be: change house, shower and latrine building, bath house, and toilet facilities.

Mobile camper units would use many of the same facilities as tent campers. Additional facilities needed by mobile camper units would be trailer dumping stations, sewage lagoons, and trailer spaces.

Swimming. Swimming most heavily involves use of the following facilities: change house, and shower building. A change house is necessary for swimming participants.

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<sup>13</sup> Trash containers are not included among the developed facilities. The State Park Authority had no record of available trash containers. Park and Resources Authority. loc. cit.



## POPULATION VARIABLES

Population variables affect a reservoir's ability to function as an outdoor recreational center. This study considers the following population variables: total adjusted market area population, percentage of adjusted market area population in SMSA's, percentage of adjusted market area population which is urban, percentage of adjusted market area population which is rural, and percentage of adjusted market area population which is day-use. (Turn to Table 3 on pages 39-40 for complete list of population variables.)

### Total Adjusted Market Area Population

The importance of total adjusted market area population can be illustrated by a hypothetical case. There are two reservoirs; each having identical physical resources and developed facilities. Reservoir A has a total adjusted market area population of 2,000,000. Reservoir B has a total adjusted market area population of 350,000. Reservoir A will receive greater outdoor recreational use than Reservoir B due to the presence of a larger total adjusted market area population.

### Percentage of Adjusted Market Area Population In SMSA

This study dealt with five Standard Metropolitan Statistical Areas: Kansas City, Kansas; Kansas City, Missouri; Topeka, Kansas; Wichita, Kansas, and St. Joseph, Missouri. Standard Metropolitan Statistical Areas are important for two reasons: (1) they are areas

of high population densities; (2) socio-economic characteristics of the residents are conducive to higher recreation participation.<sup>14</sup>

Percentage of Adjusted Market Area Population Which is Urban

Urban population shows the same characteristics of the Standard Metropolitan Statistical Area: (1) areas of relatively high population densities; (2) reflection of socio-economic characteristics conducive to a high participation in recreation.<sup>15</sup>

Percentage of Adjusted Market Area Population Which is Rural

Rural population reflects a low degree of participation in outdoor recreation. Primary reasons for low participation are: (1) low population densities; (2) reflection of socio-economic characteristics which are not conducive to participation in recreation.<sup>16</sup>

Percentage of Adjusted Market Area Population Which is Day-Use

Day-Use Population is that part of adjusted market area population residing within twenty-five miles of the reservoir. Twenty-five miles is the limit which recreational participants will use a reservoir for recreation not involving a vacation or weekend.<sup>17</sup>

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<sup>14</sup> Gary Haller and others, Perry State Park: Master Plan (Topeka: Kansas Park and Resources Authority, 1969), p. 11.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

<sup>17</sup> Park and Resources Authority. May, 1972.

## VARIABLE RATING SCALE

In evaluating the outdoor recreational possibilities and limitations of a reservoir, a number of variables must be considered; and these variables must be carefully evaluated. The primary objective of the variable rating scale presents the following information: variables considered for the evaluation; possible range of variables, scale points assigned to the range of each variable; and the total value of the three selected variables for each study reservoir.

Using the Variable Rating Scale\*

Each study reservoir was rated with an identical variable rating scale. The scale contains four columns. Column 1 is entitled Variables; Column 2 is entitled Range of Variables; Column 3 is entitled Possible Scale Points; Column 4 is entitled Points Received.

The first variable considered is Water Surface Acres, Column 1. In Column 2, is the Possible Range of Variables; 0 - 3,000 acres, 3,001 - 6,000 acres, 6,001 - 9,000 acres, 9,001 - 12,000 acres. In Column 3, one sees the Possible Scale Points. 0 - 3,000 acres receives 1 point, 3,001 - 6,000 acres receives 2 points, 6,001 - 9,000 acres receives 3 points, and 9,001 - 12,000 acres receives 4 points. Column 4 shows scale points received.

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\* Refer to Table I for an explanation in use of the variable rating scale.

If a selected reservoir had a water surface acreage of 10,000 acres, it would receive 4 scale points. The number four would be placed in Column 4 under Points Received.

The total value for each category: physical variables, developed facilities, and population variables is obtained by totaling scale points received. Total value of a reservoir's three groups is obtained by totaling scale points from physical variables, developed facilities, and population variables.

Variables	Possible Range of Variables	Scale Points	
		Possible	Received
1. Adjusted Market Area Population	3,000,000 - 2,750,000	30	
	2,749,999 - 2,500,000	28	
	2,499,999 - 2,000,000	26	
	1,999,999 - 1,750,000	24	
	1,749,999 - 1,500,000	22	
	1,499,999 - 1,250,000	20	
	1,249,999 - 1,000,000	18	
	999,999 - 750,000	16	
	749,999 - 500,000	14	
	499,999 - 250,000	12	
249,999 - 0	10		
2. Percentage of Adjusted Market Area Population Which is Rural	40 - 35	22	
	34 - 30	24	
	29 - 25	26	
3. Percentage of Adjusted Market Area Population Which is Urban	66 - 50	22	
	49 - 35	20	
	34 - 20	18	
	19 - 5	16	
4. Percentage of Adjusted Market Area Population Which is Day-Use	70 - 60	22	
	59 - 50	20	
	49 - 40	18	
	39 - 30	16	
	29 - 20	14	
	19 - 10	12	
	9 - 5	10	

Table 3 (continued)

Variables	Possible Range of Variables	Scale Points	
		Possible	Received
5. Percentage of Adjusted Market Area Population in S.M.S.A.	59 - 55	20	
	54 - 50	18	
	49 - 45	16	
	44 - 40	14	
	39 - 1 0	12 0	
6. Competing Reservoirs Available For Adjusted Market Area Population	6 - 5	6	
	4 - 3	8	
	2 - 1	10	
	0	12	

## Chapter IV

### PHYSICAL VARIABLES

The first category of variables rated by the variable rating scale was physical variables. Sixteen physical variables were used. The physical variables were broken into two groups: water resources and land resources. Nine of the variables are classified as water resources and seven of the variables are as land resources. The points given for an individual variable were 8, 6, 4, 3, 2. A variable score of 8 is excellent; 6 is above average; 4 is average; and 2 is below average. The maximum possible score is 128 scale points. The lowest possible score is 32 points. Respective scale point totals for the selected reservoirs are as follows: Perry Reservoir, 106 scale points; Elk City Reservoir, 84 scale points; Cheney Reservoir, 82 scale points; Fall River Reservoir, 74 scale points; and John Redmond Reservoir, 60 scale points. (For a further examination of physical variables turn to Table 1, PHYSICAL VARIABLES on pages 19-22).

#### PERRY RESERVOIR

Perry Reservoir received the highest rating for physical variables of any selected reservoir with 106 scale points from a possible 128. (For a complete examination of scale points received by Perry Reservoir, turn to Table 4 on pages 42-43).

COMPARISONS OF SCALE POINTS RECEIVED FOR PHYSICAL VARIABLES

	Perry Reservoir	John Redmond Reservoir	Fall River Reservoir	Elk City Reservoir	Cheney Reservoir
A. Water Resources					
1. Water Surface Acres	8	8	2	2	8
2. Average Depth of Reservoir Pool	8	2	2	6	8
3. Water Pollution	6	4	6	6	6
4. Water Turbidity	6	2	6	4	8
5. Shoreline Access	6	6	6	6	8
6. Shoreline Composition	6	6	6	6	6
7. Shoreline Length At Conservation Pool		2	2	2	2
8. Normal Conservation Pool Variations	6	2	6	6	8
9. Normal Flood Pool Variations	2	2	2	2	6
B. Lands Resources					
10. Land For Recreational Use	8	2	6	8	2



Table 4 (continued)

	Perry Reservoir	John Redmond Reservoir	Fall River Reservoir	Elk City Reservoir	Cheney Reservoir
11. Local Relief	8	4	6	8	4
12. Slope	8	4	4	8	2
13. A. Percentage of Recreational Lands in Cropland	6	4	2	4	6
B. Percentage of Recreational Lands in Grassland	6	6	6	6	2
C. Percentage of Recreational Lands in Woodland	6	2	6	4	2
14. Topography	6	4	6	6	4
TOTALS	106	60	74	84	82

## Water Resources

Perry Reservoir has 12,200 water surface acres with 110 miles of shoreline.<sup>1</sup> Both of these variables were the highest among the study reservoirs. Water quality is above average as water pollution and water turbidity both received six scale points. Water pollution is caused by the presence of industries in the surrounding adjusted market area; particularly the Topeka Standard Metropolitan Statistical Area. Turbidity is present in minor quantities due to runoff from crop acreages adjacent to the reservoir. Water depth, averaging between thirteen and fifteen feet, is excellent.<sup>2</sup>

Shoreline characteristics, like water quality, received an above average rating. Perry's shoreline composition is sand and silt. Shoreline access may be classified as relatively easy. Access is limited in certain areas by the presence of numerous uplands adjacent to the reservoir pool.

Pool fluctuations received one above average rating and one below average rating. Conservation pool variations average between three and five feet.<sup>3</sup> Flood pool variations were much higher than conservation pool variations, averaging twenty-six feet.<sup>4</sup> Flood pool variations received a below average rating. Flood pool variations were the only water resources receiving a rating below average.

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<sup>1</sup> Perry Dam and Reservoir, loc. cit.

<sup>2</sup> Ibid.

<sup>3</sup> Statement by Clay Alderson, personal interview.

<sup>4</sup> Ibid.

## Land Resources

The land resources of Perry Reservoir compare favorably with the water resources. Perry Reservoir has 14,407 acres of land available for recreational activities.<sup>5</sup> Topography was classified as rolling plains with local relief measuring 206 feet.<sup>6</sup> Topography received eight scale points as did local relief. Perry's landscape is pleasing and provides excellent wind protection for the reservoir pool. Lands adjacent to the reservoir have a 10 per cent slope for eight scale points.<sup>7</sup> Perry's slope was exceeded only by that of Elk City.

Vegetative cover is a desirable combination of grasslands, woodlands, and croplands. Grasslands compose 25 per cent of the vegetative cover; receiving 8 scale points. Woodlands compose 50 per cent of the vegetative cover; receiving 6 scale points. Croplands compose 25 per cent of the vegetative cover; receiving 6 scale points.<sup>8</sup>

## Conclusions

Perry Reservoir has an excellent resource base for pleasure-boating and water-skiing. Perry's reservoir pool is of adequate depth, has a long shoreline; and has a large amount of water surface acreage well protected from prevailing wind.

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<sup>5</sup> Perry Dam and Reservoir, loc. cit.

<sup>6</sup> Finch and Trewartha, loc. cit.

<sup>7</sup> Park and Resources Authority, (Mimeographed), loc. cit.

<sup>8</sup> Ibid.

Hunting and fishing have an excellent resource base. Migratory waterfowl are attracted by the large water surface acreage and availability of feed grains near the reservoir. The area's vegetative cover provides an excellent habitat for a large upland game population.

Fishing affords a high degree of user satisfaction. Water pollution and water turbidity were negligible. The shoreline has adequate length and is indented with numerous coves and arms which provide excellent fishing areas.

Camping and picnicking face no severe limitations. Perry's shoreline has above average access. Variations in pool level are not so extreme as to hamper use of shoreline facilities. The presence of numerous shaded areas near the reservoir shoreline further enhances camping and picnicking activities.

Swimming affords a high degree of satisfaction for the outdoor recreational participant. Water quality is excellent. Surface acreage is large enough to provide swimming areas without infringement upon other water-oriented activities. Shoreline composition is above average.

#### ELK CITY RESERVOIR

Elk City Reservoir received 84 scale points for physical variables, making it possess one of the most attractive physical resource bases among the study reservoirs. (For a complete examination of scale points received by Elk City Reservoir; turn to Table 4 on pages 42-43).

## Water Resources

Elk City Reservoir received two scale points for a water surface acreage of 3,550 water surface acres.<sup>9</sup> Elk City received six scale points for average depth of reservoir. Elk City Reservoir has an average reservoir depth of ten feet.<sup>10</sup> Due to a relatively small number of surface acres, Elk City received two scale points for shoreline length.

Water quality is adequate at Elk City. Water pollution was present in minor quantities; receiving six scale points. Water turbidity received four scale points for an average rating. A factor in high water turbidity was the lack of limestone around the shoreline.

Shoreline characteristics, shoreline access, and shoreline compositions each received six scale points. Elk City's shoreline is quite accessible; but the presence of tablelands near the water's edge makes some shoreline areas inaccessible. The shoreline is a mixture of sand and silt.

Like the other Corps of Engineer projects, Elk City Reservoir suffers from relatively high flood pool fluctuations. Flood pool fluctuations frequently exceed twenty-six feet and received two scale points. Conservation pool variations are considerably less; averaging only four feet.<sup>11</sup> This received six variable scale points.

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<sup>9</sup> Elk City Dam and Reservoir, loc. cit.

<sup>10</sup> Statement by Ray Howland, personal interview.

<sup>11</sup> Elk City Dam and Reservoir, loc. cit.

## Land Resources

Land resources compare quite favorably with water resources. Elk City has 14,907 acres of land for recreational use.<sup>12</sup> Topography is classified as rolling plains with local relief measuring 191 feet.<sup>13</sup>

Topography received six scale points; local relief received eight scale points. Lands adjacent to the reservoir pool had fifteen per cent slope with slope receiving eight scale points.<sup>14</sup>

Vegetative cover is a desirable combination of croplands, grasslands, and woodlands. Croplands are present on 25 per cent of the reservoir lands, and received four scale points. Grasslands are the dominant vegetative cover with forty-eight per cent of the recreational lands being classified as grasslands. Grasslands received four scale points. The remaining twenty-seven per cent of the reservoir lands are in timberland; four scale points were received.<sup>15</sup>

## Conclusions

Elk City Reservoir has an attractive reservoir setting for all primary outdoor recreational activities. Of these primary outdoor activities, hunting and fishing appear to have the most desirable physical setting.

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<sup>12</sup> Ibid.

<sup>13</sup> Finch and Trewartha, loc. cit.

<sup>14</sup> Park and Resources Authority. (Mimeographed). loc. cit.

<sup>15</sup> Ray Howland, loc. cit.

Hunting of upland game is aided by the presence of large amounts of hunting lands. Vegetative cover is quite capable of supporting a large upland game population. Sufficient quantities of grass and forest cover are present. Croplands provide an excellent food source for many upland game species. Hunting for migratory waterfowl is excellent. Elk City Reservoir is situated on the edge of the central flyway. Other physical variables favorable for migratory waterfowl are a relatively shallow water body and the presence of large quantities of feed grains.<sup>16</sup>

Fishing is only slightly less desirable than hunting. Channel catfish fishing is limited by the shallowness of the reservoir pool. However, the shallowness is an asset for species preferring shallower waters. These species include: white bass, black bass, large-mouthed bass, crappie, and various sunfish species. The reservoir's waters had moderate amounts of turbidity which hampers feeding for sight-feeding fish. Fishing is further hampered by the small lake surface. Pleasure boaters and water skiers often create a large wash; thereby disturbing the fishermen.

Pleasure-boating and water-skiing face handicaps at Elk City Reservoir. The foremost limitation is a small amount of water surface acres. Two additional handicaps are the presence of numerous underwater hazards and the relative shallowness of the reservoir pool.

Picnicking and camping have an attractive setting. Tree cover is quite adequate near the reservoir shoreline and shoreline accessibility

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<sup>16</sup> Ibid.

is above average. The main limitation upon picnicking and camping is fluctuations in conservation pool and flood pool levels.

Swimming faces no serious limitations. Swimming would be more desirable in water having lesser amounts of pollution and turbidity.

#### CHENEY RESERVOIR

Cheney Reservoir, for physical variables, received 82 scale points; ranking third among the selected reservoirs. (For a complete examination of scale points received by Cheney Reservoir; turn to Table 4 on pages 42-43).

#### Water Resources

Cheney has excellent water resources. Water surface acres at conservation pool total 9,000 acres; second only to Perry Reservoir.<sup>17</sup> Eight scale points were given for water surface acres. Shoreline length at conservation pool level totals 67 miles; second only to Perry Reservoir.<sup>18</sup>

Water quality was above average. Only minor quantities of pollution were present. Six scale points were given for water pollution. Virtually no turbidity was present in Cheney Reservoir. Eight scale points were given for this variable. Cheney Reservoir is a relatively shallow lake having an average depth of nine feet for which four scale points were given. Shoreline characteristics, like water quality, are

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<sup>17</sup> Statement by Ivan Ulrey, personal interview

<sup>18</sup> Ibid.



above average. Shoreline composition, receiving six points, is a mixture of sand and silt.<sup>19</sup>

Shoreline access received eight scale points. Cheney's shoreline has easy access for its entire length. Cheney Reservoir has limited pool fluctuations. Normal conservation pool variations are two feet; normal flood pool variations are 14 feet.<sup>20</sup> Eight scale points were received for conservation pool variations; six scale points were received for flood pool variations.

### Land Resources

Cheney Reservoir has 9,238 acres adjacent to the reservoir pool.<sup>21</sup> Local relief measures 146 feet with a one per cent slope.<sup>22</sup> Acres adjacent to the reservoir pool received two scale points; local relief received four scale points; slope received two scale points. Topography of the reservoir lands is undulating plains which received four scale points.<sup>23</sup>

Vegetative cover is predominantly grassland with lesser amounts of the area in timberland and cropland. Timberland covers one per cent of the reservoir lands; cropland covers 25 per cent of the reservoir lands; and grassland covers 74 per cent of the reservoir lands.<sup>24</sup>

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19 Park and Resources Authority. (Mimeographed). loc. cit.

20 Ibid.

21 Ibid.

22 Ibid.

23 Finch and Trewartha, loc. cit.

24 Ivar Ulrey, loc. cit.

Croplands received six scale points; grasslands received two scale points; and woodlands received two scale points.

### Conclusions

Boating and water-skiing face one limitation. Topography adjacent to the reservoir offers little protection from winds and the water surface tends to be extremely rough.

Picnicking and camping have many physical variables conducive to their enjoyment. Pool variations, both in the flood pool and conservation pool, are the smallest of any study reservoir. Shoreline accessibility is excellent.

Hunting and fishing offer excellent recreational opportunities. Cheney Reservoir possesses a large upland game population with large quantities of pheasant. Two variables attract significant numbers of migratory waterfowl: shallowness of the reservoir pool and the presence of feed grains on lands adjacent to the reservoir.

Swimming affords a relatively high degree of user satisfaction. Variables favorable for swimming include low water turbidity, an above average shoreline composition, and excellent shoreline accessibility.

### FALL RIVER RESERVOIR

Fall River Reservoir received 74 scale points for physical variables. Reservoirs receiving a greater number of scale points for physical variables were Perry Reservoir, Elk City Reservoir, and Cheney Reservoir. For physical variables, Fall River received 74 scale points.

(For a complete examination of scale points received by Fall River Reservoir; turn to Table 4 on pages 42-43).

### Water Resources

Fall Reservoir is the smallest study reservoir. The reservoir pool has 2,600 surface acres of water at conservation pool with 40 miles of shoreline.<sup>25</sup> Fall River is a shallow reservoir having an average water depth of six feet.<sup>26</sup> Water surface acres received two scale points; shoreline length received two scale points; and reservoir depth at conservation pool received two scale points. All of these variables received a below average rating.

Water quality is above average with six scale points being given for water turbidity and water pollution. Minor portions of turbidity and pollution are present in the reservoir waters. Shoreline composition is sand and silt. Shoreline access was classified as above average. Shoreline composition and shoreline access each received six scale points.

Pool variations are similar to the other study reservoirs. Normal conservation pool variations average five feet. Normal flood pool variations average 29 feet. Conservation pool variations received six scale points; flood pool variations received two scale points.<sup>27</sup>

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<sup>25</sup> Fall River Dam and Reservoir, loc.cit.

<sup>26</sup> Statement by Paul States, personal interview.

<sup>27</sup> Ibid.

### Land Resources

Fall River has 11,982 acres of land available for recreational use.<sup>28</sup> Topography of the reservoir lands is rolling plains with an eight per cent slope and a local relief measuring 162 feet.<sup>29</sup>

Vegetative cover is a mixture of cropland, grassland, and woodland. Croplands compose 50 per cent of the vegetative cover; receiving two scale points. Grasslands compose twenty-five per cent of the vegetative cover; receiving six scale points. Timberlands compose twenty-five per cent of the vegetative cover; receiving six scale points.<sup>30</sup>

### Conclusions

Boating and water-skiing are limited by these physical variables: small amount of water surface acres in conservation pool, small length of shoreline at conservation pool, and shallow depth of water at conservation pool. For hunting and fishing, Fall River Reservoir has a more adequate physical resource base. Migratory waterfowl prefer a shallow reservoir. When coupled with an abundance of feed grain near the reservoir, the reservoir becomes an attractive hunting area for migratory waterfowl. Upland game populations have a desirable habitat. Croplands near the reservoir insure upland game species of an adequate food supply. Vegetative cover, in the form of grassland and timberland, appears adequate for support of upland game. Fishing has no severe limitations.

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<sup>28</sup> Finch and Trewartha, loc. cit.

<sup>29</sup> Ibid.

<sup>30</sup> States, loc. cit.

However, fishing would be better with a larger water surface acreage, a greater water depth, and a longer shoreline. A longer shoreline would provide more fishing area. A deeper reservoir would enhance fishing for channel catfish. A larger water surface acreage would provide more area for pleasure boaters and water-skiers; reducing the conflict between pleasure boaters and fishermen.

Camping and picnicking sites are limited by the small amount of shoreline. However, this handicap is somewhat alleviated by small conservation pool fluctuations. Conservation pool fluctuations average five feet.<sup>31</sup> This relatively small amount of fluctuation insures campers and picnickers of enjoying their respective activities near the reservoir shoreline.

#### JOHN REDMOND RESERVOIR

John Redmond Reservoir received 60 scale points for physical variables. These 60 scale points represent the least number of scale points received for physical variables of any reservoir. (For a complete examination of scale points received by John Redmond Reservoir turn to Table 4 on pages 42-43).

#### Water Resources

John Redmond Reservoir has 7,780 acres of water surface acreage at conservation pool level with a fifty mile shoreline. Conservation pool depth averages five feet. Water surface acreage received six scale

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<sup>31</sup> Ibid.

points; shoreline length received two scale points; and conservation pool depth received two scale points.<sup>32</sup>

Water quality is below average. John Redmond Reservoir has moderate amounts of pollution and major amounts of turbidity. Water pollution received four scale points, water turbidity received two scale points.

Shoreline characteristics considered were shoreline composition and shoreline accessibility. Shoreline composition received two scale points; shoreline accessibility received six scale points.

Conservation pool variations received two scale points. Flood pool variations received two scale points. Both of these variables received below average ratings.

#### Land Resources

John Redmond Reservoir has 10,720 acres of recreational lands adjacent to the reservoir.<sup>33</sup> Topography is undulating plains with 120 feet of local relief. Slope is two per cent.<sup>34</sup> Recreational lands received six scale points, topography received four scale points; local relief received four scale points; and slope received four scale points.

Vegetative cover is composed of croplands, grasslands, and woodlands. Croplands comprise 50 per cent of the vegetative cover; grasslands comprise 45 per cent of the vegetative cover; and timberlands comprise five per cent of the vegetative cover. Croplands received

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<sup>32</sup> John Redmond Dam and Reservoir, loc. cit.

<sup>33</sup> Ibid.

<sup>34</sup> Finch and Trewartha, loc. cit.

four scale points; grasslands received six scale points; and woodlands received two scale points.<sup>35</sup>

### Conclusions

Boating and water-skiing have an undesirable physical setting. John Redmond Reservoir is a shallow reservoir situated in a wide, flat basin unprotected from winds. The reservoir's water surface is extremely rough, discouraging boating and water-skiing. The reservoir's conservation pool experiences large fluctuations. These fluctuations limit use of shoreline facilities.

Hunting and fishing give the recreational participant the highest degree of satisfaction. Due to the shallowness of the reservoir, the presence of a large amount of surface acreage, and the presence of feed grains; hunting for migratory waterfowl is excellent. Upland game hunting is excellent. The surrounding area has the necessary vegetative cover for supporting a large upland game population.

Picnicking and camping are limited by large variations in conservation pool and flood pool levels. Normal conservation pool variations average eight feet. This large variation in conservation pool level causes many inconveniences in use of shoreline facilities.

Swimming is hampered by these variables: water pollution, water turbidity, and shoreline composition. A moderate amount of water pollution is present in the reservoir pool. Water turbidity is present in major quantities. The Neosho River deposits large amounts of silt

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<sup>35</sup> Stemmerman, loc. cit.

in the reservoir pool. Reservoir waters are shallow and unprotected from prevailing winds which keep the waters agitated. Silt remains in solution causing the water turbidity. Shoreline composition is mud, and swimmers prefer a shoreline of sand or sand and silt.



## Chapter V

### DEVELOPED FACILITIES

Developed facilities was the second category of variables considered in evaluating the outdoor recreational potential of each study reservoir. Scale points were given for twenty-seven types of developed facilities. Scale points given for each type of developed facility ranged from four scale points to no scale points. Four scale points indicate excellent development of a developed facility; three scale points indicates above average development of a developed facility; two scale points indicates average development of a developed facility; and one scale point indicates below average development of a developed facility.<sup>1</sup> No scale points received indicates an absence of the developed facility. Scale points received for developed facilities ranged from 104 scale points to 18 scale points. Perry Reservoir received 104 scale points; Cheney Reservoir received 50 scale points; Fall River Reservoir received 42 scale points; John Redmond Reservoir received 28 scale points; and Elk City received 19 scale points. Maximum scale points possible for developed facilities is 132. Minimum possible scale points for developed facilities is zero. (For a complete listing of scale points received, refer to Table 5 on page 60).

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<sup>1</sup> Three exceptions exist for possible scale points. These exceptions involve two-lane, three-lane, and four-lane boat ramps. Refer to pages 32-33 of Table 2.

Table 5

## COMPARISON OF SCALE POINTS RECEIVED FOR DEVELOPED FACILITIES

	Perry Reservoir	Cheney Reservoir	Fall River Reservoir	John Redmond Reservoir	Elk City Reservoir
1. Group Shelters	2	0	4	0	2
2. Table Shelters	2	0	1	4	2
3. Picnic Tables	4	2	2	2	1
4. Outdoor Grills	4	1	1	1	1
5. Fireplaces	0	0	4	3	1
6. Camper Pads	4	2	2	2	2
7. Swimming Beaches	4	2	4	2	0
8. Bath House	4	4	4	2	0
9. Change House	4	0	0	0	0
10. Pit Privies	4	1	1	1	1
11. Shower & Latrine Buildings	4	3	1	0	0
12. Comfort Stations	3	1	2	0	0
13. Sewage Lagoons	4	1	2	0	0
14. Trailer Dumping Stations	4	1	1	0	0
15. Sewage Plants Treatment	2	0	0	0	0
16. Boat Dumping Stations	4	0	0	0	0
17. Water Treatment Plants	4	2	2	0	0
18. Roads-Paved	4	3	2	3	2
19. Roads-Unpaved	3	2	4	2	1
20. Water Fountains	4	0	3	2	0
21. Water Hydrants	4	1	1	3	1
22. Boat Ramps One-Lane	2	2	4	1	1
23. Boat Ramps Two-Lane	0	2	0	2	4
24. Boat Ramps Three-Lane	12	8	0	2	0
25. Boat Ramps Four-Lane	12	10	0	0	0
26. Courtesy Docks	4	4	0	0	0
27. Marina	4	0	2	0	0
TOTALS	106	52	47	32	19

A section of this chapter will also deal with differing recreational management policies of the United States Army Corps of Engineers and the Bureau of Reclamation.

## PERRY RESERVOIR

Perry Reservoir received 102 scale points for developed facilities. Fireplaces and a two-lane boat ramp are the only developed facilities not present at Perry Reservoir.<sup>2</sup>

### Boating Facilities

Boating facilities present at Perry Reservoir included ten boat ramps, one boat dumping station, eight courtesy docks, two marinas, one bath house, two change houses, and forty miles of access roads.

All boating facilities received four scale points for excellent development.

### Water-Skiing

Water-skiers utilize the same developed facilities utilized by pleasure boaters.

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<sup>2</sup> Trailer spaces with water-hookup, trailer spaces with sewer-hookup, trailer spaces with electric-hookup, septic tanks, hand-water pumps, nature trails, and air strips are not present on any selected reservoir. Trash containers are not listed among the developed facilities. The Park and Resource Authority does not provide a separate inventory for trash containers. Each selected reservoir does contain an adequate number of trash containers. (Refer to Table 5 for a listing of scale points received for each developed facility.)

### Fishing Facilities

Facilities utilized by fishermen are marinas and access roads. Each of these facilities received four scale points.

### Hunting Facilities

Developed facilities utilized by hunters are marinas and access roads. Each of these facilities received four scale points.

### Picnicking Facilities

Picnicking facilities include 927 picnic tables, seven table shelters, 607 outdoor grills, nine group shelters, 44 pit privies, and seven water fountains. Perry Reservoir has no fireplaces. All picnicking facilities received four scale points except group shelters and table shelters. Group shelters and table shelters each received two scale points.

### Camping Facilities

Perry Reservoir has the following camping facilities: 927 picnic tables, seven table shelters, 607 outdoor grills, 44 pit privies, one bath house, two change houses, thirteen shower and latrine buildings, 360 camper pads, seven water fountains, eleven trailer dumping stations, and fourteen sewage lagoons.

These listed facilities received four scale points with the exception of table shelters which received two scale points.

### Swimming Facilities

Facilities aiding participation in swimming at Perry Reservoir included two change houses, one bath house, and one swimming beach. Each of these facilities received four scale points.

### Conclusions

Perry Reservoir has excellent development of developed facilities. Participation in all primary outdoor recreational activities is greatly enhanced by this development.

## CHENEY RESERVOIR

Cheney Reservoir received 51 scale points for developed facilities. Table shelters, fireplaces, change houses, sewage lagoons, boat dumping stations, water fountains, and sewage treatment plants are the developed facilities absent from Cheney Reservoir. Refer to Table 5 on page 60 for a complete listing of developed facilities and scale points received.

### Boating Facilities

Cheney Reservoir has the following boating facilities: nine boat ramps; two courtesy docks; two marinas; fourteen miles of access roads, and one bath house.<sup>3</sup>

Boating facilities not at Cheney Reservoir are change houses and boat dumping stations.

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<sup>3</sup> Kansas Park and Resources Authority, op. cit.

Cheney had three one-lane boat ramps; six three-lane boat ramps; and two four-lane boat ramps. One-lane boat ramps received two scale points; three-lane boat ramps received twelve scale points, and four-lane boat ramps received sixteen scale points.

Cheney Reservoir had twelve miles of paved access roads which received three scale points. Two miles of unpaved access roads received two scale points.

The marinas and bath house each received four scale points. Courtesy docks and unpaved access roads each received two scale points.

#### Water-Skiing

Water-skiing utilizes the same developed facilities as pleasure boating.

#### Fishing

Facilities for fishing include two marinas, twelve miles of paved access roads, and two miles of unpaved access roads. Marinas received four scale points; paved access roads received three scale points.

#### Hunting

Hunting utilizes the same developed facilities as fishing.

#### Picnicking Facilities

Picnicking at Cheney Reservoir has opportunities for utilization of these picnicking facilities: 375 picnic tables, 23 outdoor grills, and four pit privies.

Picnic tables received two scale points; with outdoor grills and pit privies each receiving one scale point.

### Camping Facilities

Cheney Reservoir has the following facilities available to campers: 375 picnic tables, 23 outdoor grills, 70 camper pads, two sewage lagoons, four pit privies, one bath house, six shower and latrine building, two trailer dumping stations.

Cheney's bath house was the only camping facility receiving four scale points for excellent development. The shower and latrine buildings received three scale points; picnic tables had average development and received two scale points. The remaining picnicking facilities all exhibit below average development and received one scale point.

### Swimming Facilities

Cheney Reservoir has one swimming beach, one bath house, and six shower and latrine buildings. Development of swimming facilities varied from excellent to average. The bath house had excellent development with the shower and latrine buildings and swimming beach, respectively having above average and average development.

### Conclusions

Cheney Reservoir has above average development of facilities for boating, water-skiing, fishing, hunting, and swimming. Camping facilities and picnicking facilities have average development. Boating, water-skiing, and swimming at Cheney Reservoir would be aided by addition of a change house and additional bath houses.

Facilities used for hunting and fishing have the highest development among Cheney's developed facilities. However, fishing and hunting would be enhanced by additional access roads.

Camping and picnicking enjoyment would be enhanced by group shelters, table shelters, water fountains, and fireplaces.

#### FALL RIVER RESERVOIR

Fall River Reservoir received 42 scale points for developed facilities. Developed facilities absent from Fall River include change houses, comfort stations, boat dumping stations, water treatment plants, water fountains, and water hydrants.<sup>4</sup> (Refer to Table 5 on page 60 for complete listing of scale points received by Fall River for developed facilities.)

#### Boating Facilities

Boating facilities available at Fall River Reservoir are six boat ramps, twelve miles of access roads, one bath house, and one shower and latrine building.

Fall River's six boat ramps are one lane and received four scale points as did the bath house. Scale points received for other developed facilities were: two scale points for five miles of paved access roads, four scale points for seven miles of unpaved access roads, and one scale point for the shower and latrine building.

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<sup>4</sup> Ibid.



### Water-Skiing Facilities

Water-skiers utilize the same facilities as pleasure boaters.

### Fishing Facilities

Fishing facilities for Fall River Reservoir only include twelve miles of access roads with the five miles of paved roads receiving two scale points and the seven miles of unpaved access roads receiving two scale points.

### Hunting Facilities

Access roads are the facility most heavily utilized by the hunter.

### Picnicking Facilities

Fall River Reservoir has these developed facilities available for picnickers: 129 picnic tables, two table shelters, 101 outdoor grills, 100 fireplaces, 18 group shelters, eight pit privies, and four water hydrants.

Fireplaces were the only developed facility showing excellent development and received four scale points. The remaining facilities, with the exception of picnic tables, which received two scale points for average development; received one scale point for below average development.

### Camping Facilities

Camping facilities at Fall River Reservoir include 129 picnic tables, 101 outdoor grills, 100 fireplaces, eight pit privies, one

bath house, one shower and latrine building, one trailer dumping station, four water fountains, two sewage lagoons, and 108 camper pads. Developed facilities for picnicking showed excellent development, average development, and below average development. Facilities with excellent development were fireplaces and the bath house. Picnic tables, sewage lagoons, and camper pads reflected average development for camping facilities. The remaining facilities reflect below average development.

### Swimming Facilities

Swimming facilities at Fall River Reservoir consist of two swimming beaches, one change house, and two shower and latrine buildings. Swimming beaches and the change house received four scale points. The shower and latrine buildings received one scale point.

### Conclusions

Fall River Reservoir has above average development of facilities utilized for picnicking, camping, and swimming. Facilities utilized for boating, water-skiing, fishing, and hunting show average development.

Boating and water-skiing at Fall River is handicapped by a lack of boat ramps, change houses, boat dumping stations, and courtesy docks.

Swimming pleasure could be enhanced through addition of change houses and bath houses.

Hunting and fishing would benefit most strongly from additional access roads.

Camping and picnicking need water fountains, sewage lagoons, and additional camper pads.

## JOHN REDMOND RESERVOIR

John Redmond Reservoir received 28 scale points for developed facilities. Facilities absent from John Redmond Reservoir include the following: group shelters, bath houses, change houses, shower and latrine building, comfort stations, sewage lagoons, trailer dumping stations, boat dumping stations, water treatment plants, water hydrants, courtesy docks, marinas, and sewage treatment plants.<sup>5</sup> (For a complete list of scale points received by John Redmond Reservoir, for developed facilities, turn to Table 5 on page 60).

Boating Facilities

Boating facilities available for the boater include three boat ramps and fifteen miles of access roads. Boat ramps consist of two one-lane boat ramps and one two-lane boat ramp. One-lane boat ramps received one scale point for below average development, and two-lane boat ramps received two scale points for average development. Twelve miles of the reservoir's access roads are paved and received three scale points for above average development. Two miles of unpaved access roads received two scale points for average development.

Water-Skiing Facilities

Water-skiing involves utilization of the same developed facilities as boating.

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<sup>5</sup> Ibid.

### Fishing Facilities

John Redmond Reservoir has only one developed facility, access roads, which are utilized by fishermen. Thirteen miles of paved access roads received three scale points; three miles of unpaved access roads received two scale points.

### Hunting Facilities

Hunters, like fishermen, chiefly utilize the reservoir's access roads. Scale points for access roads have already been stated in the preceding paragraph.

### Picnicking Facilities

John Redmond Reservoir has the following facilities available for the picnicker: 113 picnic tables, 22 table shelters, 53 outdoor grills, 79 fireplaces, 27 pit privies, and five water fountains.

Only table shelters received four scale points. Fireplaces and water fountains each received three scale points; showing above average development. Picnic tables received two scale points for average development, and pit privies received one scale point for below average development.

### Camping Facilities

For camping facilities, John Redmond Reservoir has 113 picnic tables, 53 outdoor grills, 79 fireplaces, 27 pit privies, five water fountains, and 143 camper pads. Fireplaces reflected above average development and received two scale points. Picnic tables, water fountains, and camper pads received two scale points for average develop-

ment. Pit privies and outdoor grills each received one scale point for below average development.

### Swimming Facilities

John Redmond had one swimming facility, a swimming beach. The swimming beach received two scale points for average development.

### Conclusions

At John Redmond Reservoir, facilities utilized for camping, fishing, hunting, and picnicking show average development. Facilities utilized for participation in swimming, boating, and water-skiing is below average.

Boating and water-skiing and swimming lack needed developed facilities at John Redmond Reservoir. Facilities which should be added include marinas, bath house, change house, boat dumping stations, and additional swimming beaches.

Hunting and fishing would benefit from additional access roads. Camping and picnicking need additional pit privies, sewage lagoons, water fountains, and trailer dumping stations.

### ELK CITY RESERVOIR

Elk City Reservoir received 18 scale points for developed facilities. The following facilities are absent from Elk City Reservoir: swimming beaches, bath houses, change houses, shower and latrine buildings, comfort stations, sewage lagoons, trailer dumping stations, boat dumping stations, water treatment plants, water fountains, courtesy docks, and

sewage treatment plants. (For a complete listing of scale points received for developed facilities, refer to Table 5 on page 60).<sup>6</sup>

### Boating Facilities

Boating facilities present at Fall River include three boat ramps, and five miles of access roads. Elk City's boat ramps consisted of one one-lane boat ramp and two two-lane boat ramps. One-lane boat ramps received one scale point for below average development. Two-lane boat ramps received two scale points for average development. Seven miles of paved access roads received two scale points for average development; one mile of unpaved access roads received one scale point for below average development.

### Water-Skiing Facilities

Water-skiers utilize the same developed facilities as pleasure boaters.

### Fishing Facilities

Fishing facilities include seven miles of paved access roads and one mile of unpaved access road. Paved access roads received two scale points, and unpaved access roads received one scale point.

### Hunting Facilities

Hunters utilize the same developed facilities as fishermen.

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<sup>6</sup> Ibid.

### Picnicking Facilities

Picnickers at Elk City are able to utilize the following facilities: 118 picnic tables, 121 outdoor grills, 21 fireplaces, nine pit privies, and 140 camper pads.

Camper pads showed average development and received two scale points. The remaining picnicking facilities showed below average development, and each received one scale point.

### Camping Facilities

Camping facilities at Elk City Reservoir include the following: 118 picnic tables, 121 outdoor grills, 21 fireplaces, nine pit privies, and 140 camper pads.

Camper pads showed average development and received two scale points. The remaining camping facilities showed below average development and each received one scale point.

### Swimming Facilities

Elk City Reservoir has no facilities which are directly utilized by outdoor participants in swimming.

### Conclusions

Developed facilities utilized for fishing, hunting, picnicking, and camping show average development. Those facilities utilized by participants in swimming, boating, and water-skiing show below average development.

Boating, water-skiing, and swimming are the primary outdoor recreational activities having the greatest need for additional developed facilities. Participation in swimming would be enhanced by swimming beaches, change houses, and bath houses. Boating and water-skiing would be enhanced by additional boat docks, a marina, courtesy docks, a bath house, change house, and a boat dumping station.

Hunting and fishing would benefit from a marina and additional access roads.

Camping and picnicking would be enhanced by sewage lagoons, trailer dumping stations, additional pit privies, and an increased amount of access roads.

#### COMPARISON OF JUSTIFICATIONS AND RECREATIONAL MANAGEMENT POLICIES OF THE UNITED STATES ARMY CORPS OF ENGINEERS AND THE BUREAU OF RECLAMATION\*

Of the five reservoirs selected for this study, four were constructed by the United States Army Corps of Engineers, and one was constructed by the Bureau of Reclamation. Perry Reservoir, John Redmond Reservoir, Fall River Reservoir, and Elk City Reservoir were constructed by the United States Army Corps of Engineers. Cheney Reservoir was constructed by the Bureau of Reclamation.<sup>7</sup>

The United States Army Corps of Engineers and the Bureau of Reclamation are both federal agencies which construct multi-purpose

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\* As mentioned earlier in the text, this portion of the chapter presents the different management policies of the Bureau of Reclamation and the United States Army Corps of Engineers.

<sup>7</sup> Kansas Recreation: Past, Present, Future, op. cit., p. 7.



reservoirs. These agencies use different justifications for their reservoirs and construct them for different purposes.

### Reservoir Justification

Before a reservoir is constructed by the United States Army Corps of Engineers or the Bureau of Reclamation, extensive consideration is given to benefits which will accrue to the population from construction of the reservoir. These benefits, when used as a rationale for construction of a reservoir, are labeled reservoir justifications.<sup>8</sup> (For a complete listing of reservoir justifications, refer to Table 6 on page 78).

Selected reservoirs constructed by the United States Army Corps of Engineers each have flood control as a justification. Cheney Reservoir, constructed by the Bureau of Reclamation, does not have flood control as a justification for reservoir existence.<sup>9</sup>

Reservoirs constructed by the United States Army Corps of Engineers have flood control as a primary justification for their existence.<sup>10</sup>

The Bureau of Reclamation is primarily concerned with water supply and irrigation rather than flood control.

### Reservoir Management

The Bureau of Reclamation and the United States Army Corps of Engineers have differing management policies regarding recreational

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<sup>8</sup> Stemmerman, op. cit.

<sup>9</sup> Statement by Ivan Ulrey, personal interview.

<sup>10</sup> Stemmerman, op. cit.

lands adjacent to the reservoir. Both agencies lease recreational lands to other federal and state agencies. The Bureau of Reclamation gives a greater degree of autonomy to agencies leasing reservoir lands than does the United States Army Corps of Engineers.<sup>11</sup> As an example, agencies leasing land from the United States Army Corps of Engineers must obtain permission from the Corps of Engineers before constructing developed facilities. Agencies leasing lands from the Bureau of Reclamation have complete authorization for construction of developed facilities on lands leased from the Bureau of Reclamation.<sup>12</sup>

Relationship of Proposed Nuclear Power Plant  
To John Redmond Reservoir

On February 21, 1973, Kansas Gas and Electric Company announced plans for construction of a nuclear power plant on Wolf Creek north-east of Burlington, Kansas.\* This structure could become operational as early as 1981.<sup>13</sup>

Use of Reservoir Waters. John Redmond Reservoir was designed to include water for use by industry. Almost 35,000 acre feet of water was earmarked for industrial use when the lake was designed, and in 1975; the state of Kansas must begin paying the federal government for

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\* The construction of the power plant is not yet a reality. Extensive testing will be done regarding the suitability of the site for a nuclear power plant. The plant has not yet been authorized. (This source did not wish to be quoted. However, the author takes full responsibility for the authenticity of the above statement.)

<sup>11</sup> Ulrey, loc. cit

<sup>12</sup> Ibid.

<sup>13</sup> The Daily Republican, February 21, 1973, Section One, p. 1., col. 1. (Burlington, Kansas.)

the water to help recover the cost of constructing and operating the reservoir.<sup>14</sup>

Effect Upon Recreation. Effect upon the reservoir's physical variables will be negligible. The 35,000 acre feet of water used by the power plant will not lower the reservoir below conservation pool levels.<sup>15</sup>

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<sup>14</sup> Ibid.

<sup>15</sup> Statement by Jesse O. Arterburn, personal interview.

JUSTIFICATIONS OF SELECTED RESERVOIRS

Reservoir	Justification	Constructing Agency
1. Perry Reservoir <sup>16</sup>	<ol style="list-style-type: none"> <li>1. Flood Control</li> <li>2. Recreation</li> <li>3. Fish and Wildlife Management</li> </ol>	United States Army Corps of Engineers
2. John Redmond Reservoir <sup>17</sup>	<ol style="list-style-type: none"> <li>1. Flood Control</li> <li>2. Water Supply</li> <li>3. Water Quality</li> <li>4. Recreation</li> <li>5. Industrial Use</li> </ol>	United States Army Corps of Engineers
3. Fall River Reservoir <sup>18</sup>	<ol style="list-style-type: none"> <li>1. Flood Control</li> <li>2. Conservation</li> </ol>	United States Army Corps of Engineers
4. Elk City Reservoir <sup>19</sup>	<ol style="list-style-type: none"> <li>1. Flood Control</li> <li>2. Water Supply</li> <li>3. Water Quality</li> </ol>	United State Army Corps of Engineers
5. Cheney Reservoir <sup>20</sup>	<ol style="list-style-type: none"> <li>1. Water Supply</li> <li>2. Irrigation</li> </ol>	Bureau of Reclamation

<sup>16</sup> Statement by Frank Funk, personal interview.

<sup>17</sup> Statement by Jean Anderson, personal interview.

<sup>18</sup> Ibid.

<sup>19</sup> Anderson, op. cit.

<sup>20</sup> Ibid.

## Chapter VI

### POPULATION VARIABLES

Population variables are an integral part of a reservoir's outdoor recreational capabilities. Five population variables were considered: total adjusted market area population, percentage of adjusted market area population which is rural, percentage of adjusted market area population which is urban, percentage of adjusted market area population which is day-use, and percentage of adjusted market area population which is contained in Standard Metropolitan Statistical Area. (hereafter abbreviated as S.M.S.A.)\*

An additional variable considered in this section is the number of competing reservoirs in a selected reservoir's adjusted market area.

Maximum possible score for these six variables was 132 scale points. Respective scale points received by the selected reservoirs were as follows: Perry Reservoir 112 scale points; Cheney Reservoir, 108 scale points; Elk City Reservoir, 96 scale points; John Redmond Reservoir, 92 scale points; Fall River Reservoir, 74 scale points. (Refer to page 80).

#### PERRY RESERVOIR

Perry Reservoir received 112 scale points for population variables and competing reservoir. (For a complete listing of scale points received refer to page 80).

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\* Refer to page 100 for an illustration of adjusted market areas of study reservoirs.

Table 7

## COMPARISONS OF SCALE POINTS RECEIVED FOR POPULATION AND COMPETING RESERVOIRS

	Perry Reservoir	Elk City Reservoir	John Redmond Reservoir	Fall River Reservoir	Cheney Reservoir
1. Adjusted Market Area Population	30	18	18	12	16
2. Percentage of Adjusted Market Area Population Which is Rural	26	26	22	22	26
3. Percentage of Adjusted Market Area Population Which is Urban	18	18	16	22	12
4. Percentage of Adjusted Market Area Population Which is Day-Use	16	12	10	12	22
5. Percentage of Adjusted Market Area Population Which is in S.M.S.A.	20	16	20	0	20
6. Competing Reservoirs Available for Adjusted Market Area Population	6	6	6	6	10
TOTALS	117	96	92	74	106

### Adjusted Market Area Population

Perry Reservoir had the largest adjusted market area population of any selected reservoir. The adjusted market area contains 25 Kansas counties, nine Missouri counties, and two Nebraska counties.<sup>1</sup> The adjusted market area contains three Standard Metropolitan Statistical Areas and twenty-six urban areas.<sup>2</sup> Eighteen of these urban areas are in Kansas and six of these urban areas are in Missouri. The Nebraska sector of the adjusted market contains one urban area. The adjusted market area population of 2,572, 166 received 30 scale points.<sup>3</sup>

### Rural Population

Rural population formed 18 per cent of the Perry Reservoir adjusted market area population. The Kansas portion of the adjusted market area contains 305,300 residents; the Nebraska portion of the adjusted market area contains 7,340 residents; and the Missouri portion of the adjusted market area contains 131,619 residents.<sup>4</sup> Rural population received 26 scale points.

### Urban Population

Urban population forms twenty-five per cent of the Perry Reservoir adjusted market area population. Kansas contains 214,514

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<sup>1</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita, loc. cit.

<sup>2</sup> Ibid.

<sup>3</sup> Newspaper Enterprise Association, The 1973 World Almanac and Book of Facts. (Newspaper Enterprises, Inc., 230 Park Avenue, New York, N.Y., 1973), pp. 193-194-197.

<sup>4</sup> Ibid.

urban residents; Missouri contains 408,190 urban residents; and Nebraska contains 9,140 urban residents.<sup>5</sup>

#### Day-Use Population

Perry Reservoir had a day-use population of 235,541 residents concentrated in the counties of Jefferson, Jackson, Douglas, and Shawnee. Eleven per cent of the Perry market area population may be classified as day-use. Day-use population received 16 scale points.<sup>6</sup>

#### S.M.S.A. Population

Perry Reservoir has three Standard Metropolitan Statistical Areas within its adjusted market area. These S.M.S.A. areas are: Kansas City, Kansas - Kansas City, Missouri S.M.S.A.; St. Joseph, Missouri S.M.S.A.; and the Topeka, Kansas S.M.S.A. These three S.M.S.A. contained 2,572,166 residents; containing 57 percent of the adjusted market area population. Populations contained in the S.M.S.A. received 20 scale points.<sup>7</sup>

#### Competing Reservoirs

Other federal reservoirs present in Perry Reservoir's adjusted market area are: Tuttle Creek Reservoir, Council Grove Reservoir, John Redmond Reservoir, Pomona Reservoir, Milford Reservoir, and Melvern Reservoir. Competing reservoirs received six scale points.

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<sup>5</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita, op. cit.

<sup>6</sup> Ibid.

<sup>7</sup> United States Department of Commerce, Bureau of the Census, Number of Inhabitants of Kansas, (Publication PC(1)-A27: Government Printing Office, 1971), pp. 18-36.



Table 8

## ADJUSTED MARKET AREA POPULATION VARIABLES FOR PERRY RESERVOIR

	Total Adjusted Market Area Population	Urban Population	Rural Population	S.M.S.A. Population
Kansas Totals*	1,079,283 <sup>8</sup>	214,154 <sup>9</sup>	305,300 <sup>10</sup>	559,829 <sup>11</sup>
Missouri Totals*	1,476,133 <sup>12</sup>	408,190 <sup>13</sup>	131,619	936,324 <sup>14</sup>
Nebraska Totals*	16,750 <sup>15</sup>	9,410	7,340	0
Totals	2,572,166	631,754	444,259	1,496,153
Percentages	100%	25%	18%	57%

<sup>8</sup> The 1973 World Almanac And Book of Facts. loc. cit.

<sup>9</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita, loc. cit.

<sup>10</sup> Ibid.

<sup>11</sup> United States Department of Commerce, Number of Inhabitants of Kansas (Publication PC (1) -A 27, U.S. Department of Commerce, Washington, D.C.: Government Printing Office, Bureau of the Census, 1971), p. 18-36.

<sup>12</sup> Op. cit., 1.

<sup>13</sup> United States Department of Commerce, Number of Inhabitants of Missouri, (Publication PC(1)-A23, U.S. Department of Commerce, Bureau of the Census, Washington D.C.: Government Printing Office, 1971), p. 27-33.

<sup>14</sup> Ibid.

<sup>15</sup> Nebraska Population: With Forecasts for 1980 and 1990. (Lincoln, Nebraska: Department of Economic Development, Division of Industrial Research and Information Services, 1970).

\* Kansas Counties Include: Anderson, Atchinson, Brown, Chase, Coffey, Doniphan, Douglas, Franklin, Geary, Jackson, Jefferson, Johnson, Leavenworth, Linn, Lyon, Marshall, Miami, Morris, Nemaha, Osage, Pottawatomie, Riley, Shawnee, Wabaunsee, Wyandotte.

\* Missouri Counties Include: Andrew, Bates Buchanan, Cass, Clay, Clinton, DeKalb, Holt, and Platte.

\* Nebraska Counties Include: Pawnee, Richardson.

## Conclusions

Perry Reservoir has the largest adjusted market area population of any selected reservoir. This population possesses characteristics conducive to a high degree of participation in recreation.

### CHENEY RESERVOIR

Cheney Reservoir received 108 scale points for population variables and competing reservoirs. Perry Reservoir was the only reservoir exceeding Cheney Reservoir in scale points received for these variables. (For a complete listing of scale points received, refer to page 80).

#### Adjusted Market Area Population

Cheney Reservoir had an adjusted market area population of 668,714 residents for which it received 16 scale points.<sup>16</sup> The adjusted market area contains sixteen Kansas counties. A large portion of the adjusted market area population resides in sixteen urban centers and one S.M.S.A.<sup>17</sup>

#### Rural Population

Rural population forms twenty-nine per cent of the Cheney Reservoir adjusted market area population. Rural population numbers 184,870 residents; all of whom live in sixteen Kansas counties. Rural population received twenty-six scale points.<sup>18</sup>

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<sup>16</sup> op. cit.

<sup>17</sup> Ibid.

<sup>18</sup> op. cit.

### Urban Population

Urban population forms fourteen per cent of the adjusted market area population. Urban population numbers 94,919 residents; all of whom live in sixteen urban areas. Urban population received twelve scale points.<sup>19</sup>

### Day-Use Population

Cheney Reservoir had a total day-use population of 447,581 residents concentrated in the Kansas counties of Wilson, Montgomery, Chautauqua, Elk, and Labette. Sixty-six per cent of the Cheney adjusted market area population may be classified as day-use. Day-use population received twenty-two scale points. The day-use population for Cheney Reservoir is the largest among the selected reservoirs in both absolute numbers and percentage of adjusted market area population.

### S.M.S.A. Population

The Wichita S.M.S.A. contains 389,352 residents forming fifty-seven per cent of the adjusted market area population. Population in S.M.S.A. received twenty scale points.<sup>20</sup>

### Competing Reservoirs

Other federal reservoirs in the Cheney market area are Marion Reservoir and Kanopolis Reservoir. Competing reservoirs received two scale points. Cheney Reservoir has the smallest number of competing reservoirs of any reservoir.

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<sup>19</sup> Number of Inhabitants of Kansas, loc. cit.

<sup>20</sup> Ibid.

Table 9

## ADJUSTED MARKET AREA POPULATION VARIABLES FOR CHENEY RESERVOIR

	Total Adjusted Market Area Population	Urban Population	Rural Population	S.M.S.A. Population
Kansas* Totals	668,741 <sup>21</sup>	94,919 <sup>22</sup>	184,470	389,352 <sup>23</sup>
Percentages		14%	29%	57%

<sup>21</sup> The 1973 World Almanac And Book of Facts. loc. cit.

<sup>22</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita. loc. cit.

<sup>23</sup> Number of Inhabitants of Kansas. loc. cit.

\* Kansas counties in adjusted market area: Barber, Butler, Cowley, Ellsworth, Harper, Harvey, Kingman, Marion, McPherson, Pratt, Reno, Rice, Saline, Sedgwick, Stafford, Summer.

## Conclusions

Cheney Reservoir has a relatively small market area population, but received only two less scale points for these variables than Perry Reservoir with an adjusted market area population of 2,572,166. Cheney Reservoir has two desirable population variables: a large portion of its population resides in urban areas (14 per cent) or in an S.M.S.A. (57 per cent); and 66 per cent of its population may be classified as day-use.

### ELK CITY RESERVOIR

Elk City Reservoir received 96 scale points for population variables and competing reservoirs. (Listed on page 80).

#### Adjusted Market Area Population

Elk City had an adjusted market area population of 781,657 residents. Elk City received 18 scale points for adjusted market area population. The adjusted market area population is contained in 14 Kansas counties and nine Oklahoma counties. The market area contains one Standard Metropolitan Statistical Area and twenty-three urban areas. The S.M.S.A. present in the market area is the Tulsa Standard Metropolitan Statistical Area.<sup>24</sup>

#### Rural Population

Elk City Reservoir has 204,439 residents living in rural areas. The 9 Oklahoma counties contain 116,501 rural residents, and the 9

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<sup>24</sup> Ibid.

Kansas counties contain 89,218 residents. Rural population form 26 per cent of the adjusted market area population. Twenty-six scale points were given for percentage of rural population.<sup>25</sup>

#### Urban Population

Elk City Reservoir has 204,439 residents living in twenty-three urban areas. Nine of these urban areas are in Kansas with the remaining fourteen being located in Oklahoma. Urban population received sixteen scale points.

#### Day-Use Population

Wilson County, Montgomery County, and Chautauqua County contain the day-use population for Elk City Reservoir. Day-use population totals 85,541 and forms 11 per cent of the total adjusted market area population. Day-use population received 12 scale points.<sup>26</sup>

#### S.M.S.A. Population

Elk City contains the Tulsa S.M.S.A. within its adjusted market area. The Tulsa S.M.S.A. contains 371,499 residents, comprising 48 per cent of the total adjusted market area population. S.M.S.A. population received 16 scale points.<sup>27</sup>

#### Competing Reservoirs

Six additional federal reservoirs are present in the Elk City adjusted market area. Reservoirs in Kansas include: Fall River

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<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

<sup>27</sup> The World Almanac and Book of Facts, loc. cit.

Table 10

## ADJUSTED MARKET AREA POPULATION VARIABLES FOR ELK CITY RESERVOIR

	Total Adjusted Market Area Population	Urban Population	Rural Population	S.M.S.A. Population
Kansas Totals*	200,556 <sup>28</sup>	111,338 <sup>29</sup>	89,218	0
Oklahoma Totals*	581,101	93,101 <sup>30</sup>	116,501	371,499
Adjusted Market Area Totals	781,657	204,439	205,719	371,499
Percentages		26%	26%	48%

<sup>28</sup> The 1973 World Almanac And Book of Facts, loc. cit.

<sup>29</sup> Ibid.

<sup>30</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita. loc. cit.

\* Kansas Counties In Adjusted Market Area: Allen, Anderson, Bourbon, Butler, Chautauqua, Cherokee, Coffey, Cowley, Greenwood, Elk, Labette, Montgomery, Neosho, Woodson.

\* Oklahoma Counties In Adjusted Market Area: Craig, Delaware, Mayes, Nowata, Osage, Ottawa, Rogers, Tulsa, Washington.

Reservoir, Toronto Reservoir, John Redmond Reservoir, Keystone Reservoir, Hulah Reservoir, and Oologah Reservoir.

Fall River Reservoir, Toronto Reservoir, and John Redmond Reservoir are located in the Kansas portion of the Elk City adjusted market area. Keystone Reservoir, Hulah Reservoir, and Oologah Reservoir are located in the Oklahoma portion of the Elk City adjusted market area. Six scale points were given to competing reservoirs.

### Conclusions

Elk City Reservoir has an adequate adjusted market population with population characteristics conducive to participation in outdoor recreation. Recreational potential is somewhat limited by other federal reservoirs in the adjusted market population.

### JOHN REDMOND RESERVOIR

John Redmond Reservoir received 92 scale points for population variables and competing reservoirs. (For a complete list of scale points, refer to page 80).

### Adjusted Market Area Population

John Redmond Reservoir had an adjusted market area population of 962,126; second largest among the selected reservoirs. The adjusted market population is distributed among 24 Kansas counties. Eighteen scale points were given for adjusted market area population. A



significant portion of the adjusted market area population is contained in one Standard Metropolitan Statistical Area and ten urban areas.<sup>31</sup>

### Rural Population

Thirty-five per cent of John Redmond's adjusted market area residents live in rural areas. The total number of rural residents is 505,476.<sup>32</sup>

### Urban Population

Ten urban centers in John Redmond's adjusted market area contain 65,184 residents. Urban residents form 7 per cent of the adjusted market area population, receiving 16 scale points.

### S.M.S.A. Population

The Kansas City, Kansas S.M.S.A. contains 559,829 residents, forming 58 per cent of the adjusted market area population.<sup>33</sup>

### Competing Reservoirs

Other federal reservoirs located within John Redmond's adjusted market area are: Pomona Reservoir, Perry Reservoir, Council Grove Reservoir, Marion Reservoir, and Melvern Reservoir. Six scale points were given for competing reservoirs.

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<sup>31</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita  
loc. cit.

<sup>32</sup> Ibid.

<sup>33</sup> Number of Inhabitants of Kansas, loc. cit.

Table 11

## ADJUSTED MARKET AREA POPULATION VARIABLES FOR JOHN REDMOND RESERVOIR

	Total Adjusted Market Area Population	Urban Population	Rural Population	S.M.S.A. Population
Kansas* Totals	962,126 <sup>34</sup>	624.9 <sup>35</sup>	505,476	559,829 <sup>36</sup>
Adjusted Market Totals	962,126	65,184	337,113	559,829
Percentages		7%	35%	58%

<sup>34</sup> The 1973 World Almanac And Book of Facts. loc. cit.

<sup>35</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita. loc. cit.

<sup>36</sup> Number of Inhabitants of Kansas. loc. cit.

\* Kansas Counties In Adjusted Market Area: Allen, Bourbon, Butler, Chase, Crawford, Douglas, Franklin, Greenwood, Elk, Jefferson, Johnson, Leavenworth, Linn, Lyon, Marion, Miami, Morris, Neosho, Osage, Shawnee, Wabaunsee, Wilson, Woodson, Wyandotte.

## Conclusions

John Redmond had an adjusted market area population which was exceeded only by Perry Reservoir. Even though the adjusted market population is large, certain variables will limit its participation in outdoor recreation at John Redmond. A large portion of the adjusted market population (35 per cent) is rural. Only seven per cent of the population is classified as urban. Fifty-eight per cent of the market area population resides in the Kansas City, Kansas S.M.S.A. John Redmond's draw upon this outdoor recreational market will be limited by two variables: the Kansas City, Kansas S.M.S.A. is located on the outer edge of the adjusted market area; several competing reservoirs possessing more desirable physical variables are located in close proximity to the Kansas City, Kansas S.M.S.A.

### FALL RIVER RESERVOIR

Fall River Reservoir received 74 scale points for population variables and competing reservoirs, ranking fifth among the reservoirs for these variables. (For a complete listing of scale points received, turn to page 80).

### Adjusted Market Area Population

Fall River had the smallest adjusted market area population of any selected reservoir. The adjusted market area contains 18 Kansas counties and three Oklahoma counties. The adjusted market area population contains 24 urban areas. Seventeen of these urban areas are in

Kansas City, and seven of these urban areas are in Oklahoma. The adjusted market area population of 305,985 received twelve scale points.<sup>37</sup>

#### Rural Population

Rural population forms 37 per cent of the Fall River adjusted market area population. The Oklahoma portion of the adjusted market area contains 38,328 residents while the Kansas portion of the adjusted market contains 81,816 residents.<sup>38</sup> Percentage of rural population is the highest among the selected reservoirs and received 22 scale points.<sup>39</sup>

#### Urban Population

Urban Population forms 63 per cent of the Fall River adjusted market area population. The Oklahoma portion of the adjusted market area population contains 21,619 urban residents while the Kansas portion of the adjusted market area contains 171,662 residents.<sup>40</sup> Percentage of urban population is the highest among the selected reservoirs and received 22 scale points.<sup>41</sup>

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<sup>37</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita,  
loc. cit.

<sup>38</sup> Official State Highway Map of Oklahoma, loc. cit.

<sup>39</sup> Kansas And Metropolitan Maps, loc. cit.

<sup>40</sup> Op. cit.

<sup>41</sup> Ibid.

### Day-Use Population

Fall River Reservoir had a total day-use population of 29,105 residents concentrated in the Kansas counties of Greenwood, Elk, Wilson, and Woodson. Ten per cent of the Fall River market area population may be classified as day-use. Day-use population received twelve scale points.<sup>42</sup>

### S.M.S.A. Population

Fall River Reservoir has no S.M.S.A. within its adjusted market area. No scale points were received.

### Competing Reservoirs

Other federal reservoirs located within the Fall River adjusted market area are: John Redmond Reservoir, Keystone Reservoir, Oologah Reservoir, Hulah Reservoir, and Toronto Reservoir.

Fall River Reservoir has a small adjusted market area population which contains a high percentage (37 per cent) of rural residents. Competition for this limited market area population is intense with greatest competition coming from Toronto Reservoir in Woodson County.

Table 12

## ADJUSTED MARKET AREA POPULATION VARIABLES FOR FALL RIVER RESERVOIR

	Total Adjusted Market Area Population	Urban Population	Rural Population	S.M.S.A. Population
Kansas* Totals	253,038 <sup>1</sup>	171,662 <sup>3</sup>	81,816	0
Oklahoma* Totals	52,947 <sup>2</sup>	21,619 <sup>4</sup>	38,328	0
Market Area Totals	305,985	193,281	120,144	
Percentages	100%	63%	37%	0%

<sup>1</sup> The 1973 World Almanac And Book of Facts. loc. cit.

<sup>2</sup> Ibid., pp. 200-01

<sup>3</sup> Kansas And Metropolitan Maps of Kansas City, Topeka, Wichita.  
(Kansas State Highway Department. State Office Building: Topeka,  
Kansas, 1973).

<sup>4</sup> Official State Highway Map of Oklahoma. (Oklahoma State  
Highway Commission, State Office Building: Oklahoma City, Oklahoma, 1973)

\* Kansas Counties in adjusted market area: Allen, Anderson, Bourbon, Butler, Chase, Chautauqua, Cherokee, Coffey, Cowley, Crawford, Elk, Greenwood, Labette, Lyon, Montgomery, Neosho, Osage, Woodson.

\* Oklahoma Counties in adjusted market area: Craig, Nowata, Osage.

## Chapter VII

### EVALUATION OF STUDY RESERVOIRS'

#### RECREATIONAL POTENTIALS

Maximum scale points possible for a selected reservoir was 392 scale points. Minimum scale points possible for a selected reservoir evaluation was 100 scale points. Perry Reservoir received 329 scale points; Cheney Reservoir received 290 scale points; Elk City Reservoir received 199 scale points; Fall River Reservoir received 195 scale points; and John Redmond Reservoir received 184 scale points.

#### PERRY RESERVOIR

Perry Reservoir received 117 scale points for physical resources, 106 scale points for developed facilities; and 106 scale points for population variables and competing reservoirs.

#### Conclusions

Perry Reservoir had the greatest outdoor recreational potential of any reservoir. Variables responsible for this potential are: a physical resource base which was the most conducive to primary outdoor recreational activities; excellent development of developed facilities; and an extremely large adjusted market area population with characteristics conducive to a high degree of participation in outdoor recreation.

## CHENEY RESERVOIR

Cheney Reservoir received 82 scale points for physical resources, 52 scale points for developed facilities, and 82 scale points for population variables and competing reservoirs.

Conclusions

Cheney Reservoir is limited by a small number of developed facilities and a small adjusted market area population. Its outdoor recreational potential is greatly enhanced by the presence of a large S.M.S.A.

## ELK CITY RESERVOIR

Elk City Reservoir received 84 scale points for physical resources, 19 scale points for developed facilities; and 96 scale points for population variables and competing reservoirs.

Conclusions

Elk City has a physically attractive reservoir setting surrounded by a large market area population. Outdoor recreational potential is limited by a lack of developed facilities.

## FALL RIVER RESERVOIR

Fall River Reservoir received 74 scale points for physical variables; 47 scale points for developed facilities; and 74 scale points for population variables and competing reservoirs.



### Conclusions

Fall River Reservoir is limited by a lack of developed facilities and a small adjusted market area population.

### JOHN REDMOND RESERVOIR

John Redmond Reservoir received 60 scale points for physical resources, 32 scale points for developed facilities, and 92 scale points for population variables.

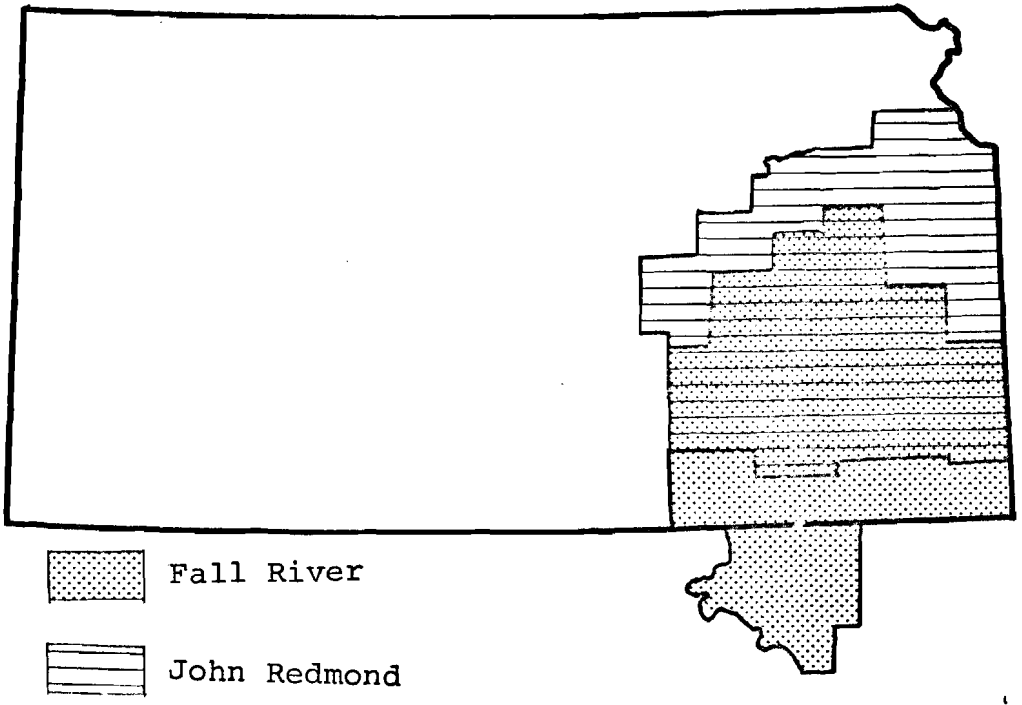
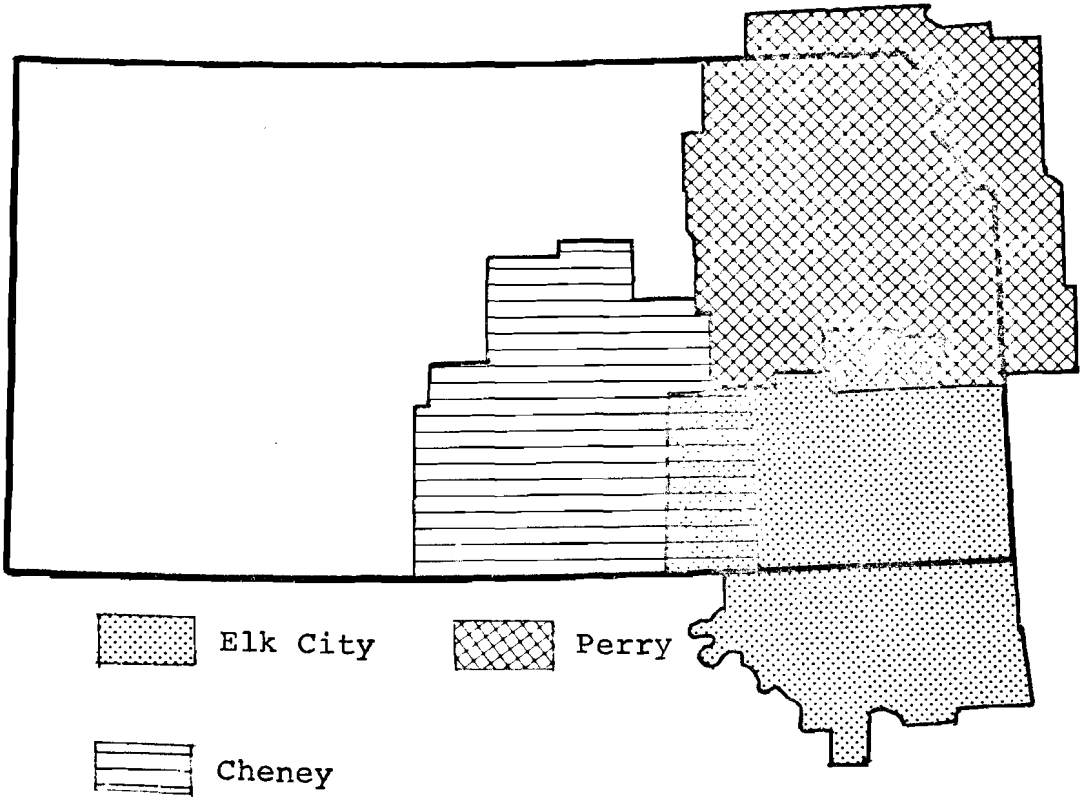
### Conclusions

John Redmond Reservoir has a large adjusted market area population, but the lack of developed facilities and an inadequate physical resource base discourages use of the reservoir as a recreational area.

### LIMITATIONS OF STUDY

This study could be improved by providing a variable rating scale for competing reservoirs and giving consideration to population potentials. Merely considering the number of competing reservoirs does not give an accurate evaluation of the effect which competing reservoirs had upon study reservoirs. Population potentials should have been included in the study. A more definite explanation of outdoor recreational participation in relationship to distance from a study reservoir would have greatly enhanced the study.

# ADJUSTED MARKET AREAS OF STUDY RESERVOIRS



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