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COMPTON, Aileen Thomas, 1937-
THE IMPACT OF A WATER ORIENTED RECREATIONAL FACILITY ON THE COMMUNITY.

The University of Oklahoma, Ph.D., 1973
Health Sciences, recreation

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UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE IMPACT OF A WATER ORIENTED RECREATIONAL FACILITY ON THE COMMUNITY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

AILEEN THOMAS COMPTON

Oklahoma City, Oklahoma

1973

THE IMPACT OF A WATER ORIENTED RECREATIONAL

FACILITY ON THE COMMUNITY

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ACKNOWLEDGMENTS

The author expresses appreciation to her graduate committee, Dr. R. A. Mill, Chairman, Dr. R. W. Ketner, Dr. W. D. Steen, Dr. C. H. Lawrence and Dr. E. D. King, whose help and guidance were invaluable in conducting this study and in the preparation of this dissertation.

Special appreciation is extended to Dr. R. A. Mill who gave generously of his time and knowledge as Chairman.

The author owes her deepest appreciation to her husband, James, and daughter, April, for their sacrifices, hard work, encouragement and devotion during her graduate studies.

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THE IMPACT OF A WATER ORIENTED RECREATIONAL FACILITY ON THE COMMUNITY

CHAPTER I

INTRODUCTION

The increased amount of leisure time that has in part led to an increase on the demand for outdoor recreational facilities has been recognized as a problem in the United States for at least 10 years. During the first half of the century leisure was only for those who were socially trained to use and enjoy it (1). According to Mills (1), "It has only been in the last half of the century that leisure has been widely available to the weary masses of the big city." The work and leisure cycle has imparted two self images to people; one has been the everyday image based on work and the other image has been based on holiday and leisure. Mills has referred to work as the way modern man has made money and leisure as the way man has spent money. Fromm (2) has associated leisure and work in light of the perfunctory status of persons in the bureaucracy. He stated that, "If man is passive in the process of production and organization, he will also be passive during his leisure time." Consequently he has viewed man as having more leisure but mostly of the spectator type.

There has been a sizeable segment of the work force taking one 3-day weekend out of four available weekends. This has made a 4-day

work week in operation in about 25 per cent of the total weeks worked in a large portion of American business and industry (3). Three and 4-week vacations have been popular in some industries while other industries have been offering 3-month vacations every 5 years. At the present time factors that have been cited as increasing the demand on outdoor recreational facilities are; the Monday holiday law, the predicted 37-hour work week by 1975, the proposed 30-hour work week by 2000, the increasing mobility of the population (citizens taking advantage of the interstate highways and high speed automobiles) and greater amounts of disposable income. One other factor that should be considered is the conversion of some recreational facilities to the closed club system that caters to private groups because of drugs, racial disturbances, gambling and liquor.

In 1958, the Outdoor Resources Review Commission was created by Public Law 85-470,72 Statute 238 (4). The Commission's task was to answer the following three questions. Firstly, what are the recreation wants and needs of the American people now and what will they be in the years of 1976 and 2000? Secondly, what are the recreation resources of the nation available to fill those needs? Thirdly, what policies and programs should be recommended to insure that the needs of the present and future are adequately and efficiently met?

The Commission had reported that 90 per cent of adults participated in one or more outdoor recreational activities during the year of the survey (4). The activities that were defined in the survey as outdoor recreation included outdoor swimming, boating and canoeing, fishing and hunting, driving for sight seeing and relaxation, skiing and

winter sports, nature or bird walks, picnics, camping and horseback riding. Although some of the activities could have been carried out at home, the survey tried to limit the activities to those activities which took place on weekends and vacation trips and outings of 1 day or less. There were some persons in the survey who indicated that they desired to participate in more outdoor recreational activites in the future. The reasons they gave for not having participated in outdoor recreational activities to the full extent of their desires included the lack of time, the lack of money and the lack of facilities. There have been small differences in participation in outdoor recreation observed in the comparison of urban to rural regions. The most significant differences have been observed where age, income and other indicators of social status were used to classify persons. An increase in the use of outdoor recreational facilities was expected by the Commission as more people have moved into higher income brackets. Outdoor recreation has been viewed as a new life style initiated by the middle and upper classes; however, as the lower income persons have become more affluent, as education levels have risen and more persons gain skilled occupations, they have taken part in this new life style.

The rate of participation in outdoor recreation had exceeded the predictions of the Commission within the first 10 years following the survey. Perhaps the most accurate philosophy on the factors that affect the recreational demand was in the foreword to one of the reports written for the Commission (5).

> The factors which underlie and account for changes in the demand for outdoor recreation are themselves variables. They are generally cultural and social in character. That is, they inhere in the

> patterned activities, needs and wants of people in their relationships with social and physical environments. They tend to be highly interdependent: what happens to one of them affects all the others frequently in manifold ways.

The United States Discover America Travel Organization has recommended that the United States Census Bureau be provided with enough funds to conduct national travel surveys on an annual basis in lieu of the 5-year intervals (4). These 5-year gaps in information have been looked upon as imposing blind spots in important planning projects. The same organization has also recommended that it assist the Federal Government, State Governments and the travel industry to plan for the orderly growth of needed economically viable tourist and recreational facilities in the United States. The environmental aspects of tourism have been mentioned in the recommendations.

The travel industry, tourism and recreation are often placed within the same framework. In spite of the fact that thousands of companies and units of government produce goods to provide for leisure, there has been no designated leisure industry. The sophistication of leisure time activities has accounted for expenditures in excess of $150 billion (6). Tourism expenditures take into account receipts from hotels, restaurants, transportation and gas stations while recreation expenditures include receipts from books, toys, pleasure boats, aircraft, stereo equipment, spectator amusement, golf and other activities.

The demand for recreational goods and services has varied depending on the item, season and geographical location. The benefits that represent 20 per cent or better to establishments from increases in tourism and recreational facilities are shown in rank order in Table 1 (7). According to the table, the sporting and recreational camps

TABLE 1

THE INCREASE IN BENEFIT TO ESTABLISHMENTS FROM TOURISM AND RECREATIONAL EXPENDITURES (7)

RANK	ESTABLISHMENT CLASS	BENEFIT (Percentage)
1	Sporting and Recreational Camps	100
2	Motel, Tourist Courts	94
3	Seasonal Motel	93
4	Year Round Hotels	60
5	Gift and Souvenir Shops	49.5
6	Eating Places	35.5
7	Drinking Places	35.5
8	Amusements (Except Cinema)	35.0
9	Gasoline, Auto Accessories, Auto Repair	25.0
10	Boat Dealers	22.0
11	Trailer Parks	20.0

were 100 per cent beneficial. In 1950, the National Park System realized the economic impact that their system had on the areas which surrounded the parks and a study was initiated to determine the economic impact of the National Park System on the national economy. In 1967, expenditures on travel, recreation and supporting industries amounted to $6.4 million, personal income was $4.8 billion and federal taxes earned $9.52 million. In 1971, the National Park System reported $11.1 billion in expenditures, $8.3 billion in personal income and $11.6 billion in federal taxes (8).

The United States Department of Commerce has conducted a study in 16 states, from all regions of the country, to determine the distribution of tourists' expenditures among lodging, food, meals and transportation (9). On a percentage basis, lodging expenditures amounted to 22.4, food and meal expenditures 26.6, transportation expenditures 23.7 and other tourists' purposes have been assessed at 27.2. The Commerce Department has estimated an increase in 100 tourists per day in an average community as equivalent to 111 new jobs, $777,000 in personal income, $1,120,000 in retail sales, $78,000 in sales tax receipts, enough taxes to support 156 pupils, $144,000 in bank deposits, support of seven retail stores, $22,000 for recreation, $252,000 for housing units and $163,000 for automobiles (9).

The Commerce Department has likened the tourist business to a huge economic pie, from which any community has been able to obtain a slice; however, the community's share depended on its attitude toward tourists, its recognition of the value of tourist business, and the steps it took to stimulate and promote this business. Any community that had

a road on which tourists could enter and a road on which they could leave, was rated as having a fair chance of attracting tourists. Comfort, change, amusement and pleasant surroundings provided at a reasonable price were listed as essential for the development of a tourist business; in return a community that attracted a couple of dozen tourists a day throughout the year had increased their economy as if a new manufacturing plant had been added with an annual payroll of $100,000. Twenty-four visitors per day to a park community has been estimated to be equal to an industrial payroll of $160,000. According to Hartzog, (8) National Park Director, the park visitor leaves only his dollar and his footprints, but he has taken away with him memories that remain a life time. Hartzog also thought of the economic benefits as incidental to the primary purpose of National Parks, which was considered by him to be the preservation of natural beauty and cultural resources, for the use and enjoyment of the present and future generations of America.

The Bureau of Outdoor Recreation has offered technical assistance to persons who had land or desired land for the development of outdoor recreational facilities. This assistance carried out the policy of the administration which has been to enhance rural development such that more opportunities were created in small towns throughout the countryside. Rural development had been encouraged to give people a better choice as to where they live and want to work as opposed to the mass migration that has taken place and has caused crowded urban centers. Jobs in businesses oriented toward recreation and located in rural America have been looked upon as an influence for better balance in the nation's growth. A new program of expanded credit for rural America was recently proposed by the

President in his message on rural America which has been referred to as a new rural development credit fund. It was designed to provide loans, loan insurance and loan guarantees to states for assisting in development. A credit up to 80 per cent of the cost of establishing or improving businesses including recreationally and tourist oriented enterprises was provided to create economic growth in rural areas.

The inundane growth of recreational enterprises in rural areas has often been a source of controversy among some public officials and the general public over economic interests and environmental interests. Some 25,000 citizens in Colorado, who were interested in the environment, petitioned successfully against the winter olympics. Boulder, Colorado has passed a referendum that banned new water outlets. The city wanted its population limited to 100,000 persons and strongly emphasized no more tourism. At the beginning of the 1972 season, the Missouri Park Board adopted a policy that closed state parks to campers once a designated number had been admitted to the park. One Missouri camp group responded to the park board action as unjustified especially in light of their (park board) efforts to promote tourism. Yellowstone National Park has started to close entrances because of overcrowding, signs have been posted that direct persons back toward Cody for accommodations and facilities. The overcrowded conditions at the national park in Oregon has alluded to a move to restrict the use of national parks to residents of the state.

Not all tourist or recreational lodging has been provided on a transient basis. In 1966, it was predicted that 20 per cent of the homes built within the next 10 years would be vacation or second homes (10). Although many counties and rural areas have depended upon zoning to keep

out developers, "fly-by-night" second home promoters have managed to keep ahead of the county law in many recreational regions. Recreation sites have also been the choice of many families for primary home sites.

The recreational demand cannot be studied as an isolated problem. It has to be investigated as an integral part of American attitudes and lifestyles, the increased amount of leisure time, the population explosion, the conflict on apportioned space to various uses, the decreased amount of space per person and the competition for the use of the remaining natural resources (11).

CHAPTER II

LITERATURE REVIEW

Outdoor Attitudes and the American Lifestyle

When the early settlers came to the new World, they had left a land where every acres of ground was owned and bounded, the right-of-way laws were strict, the penalty for hunting game was severe and bitter quarrels over the inheritance of land existed (12). Once the settlers reached the New World they developed the attitude that there was an unlimited supply of land available. Hence, they immediately proceeded to domesticate the wilderness by building settlements and roads that connected the settlements to farms in outlying areas. They also treated the earth as a storehouse for natural resources by removing coal, iron, gold, silver, furs and planting crops that depleted the soil of fertility. No one thought about the future because one could always move farther west into the wilderness.

The independent farmers who tamed the wilderness have been viewed as those who maintained a personal interest and investment in the land while the settlers who came later to work as laborers in the mines and factories have been viewed as those who had no personal interest or investment in the wilderness (12). The latter groups of settlers resided in company towns with the same deplorable conditions as the mining towns

of the Old Country; therefore, the settlers had no reason to take pride in their living environments. The only escape for the majority of them was a day outdoors by a river bank, the side of a road or the beach. Meade (12) implied that the laboring classes carried their living habits to the outdoors.

> Any outdoor space, any free space where others will also come and see what one has done, becomes some thing to clutter up and use for the moment to get a sense of freedom from the narrow and restricted space of everyday life. As the Old World land owner had to contend with the poacher, the American landowner especially the landowner living beside a traveled road, the community itself, and the public parks-Municipal-State, and National with their rules for making fires and picknicking and camping, have had to battle ceaselessly against the willful carelessness of those who wanted the outdoors for a place where, for a brief time, they could be irresponsible and careless.

The life styles of the wealthy have also influenced the American attitude towards the outdoors. In the earlier days, a premium was placed on being within reach of other people for protection, social life, and emergencies. Instead of planning for physical space, the emphasis was placed on social space which enabled one to reside in a neighborhood that was fashionable and to have the right kind of neighbors. However, improved roads and transportation enabled the wealthy to move away from the city; then space around the house became a sign of prestige. The distance of the successful man's house from the city increased as throughways and highways replaced the winding country roads where various styles of homes could be found back from the road among the trees. The out-of-city residence of the well-to-do was situated such that one could look out at something which was unspoiled or that on which man had not built. The earlier wealthy suburb reflected the recreational patterns of the wealthy in that they had access to the real wilderness for sophisticated homes, camps and clubs.

Work and Leisure

Work has provided the great satisfactions of life for some persons while others have turned to leisure for some of the deep satisfactions of life (1). In the past work has been looked upon as something that was unpleasant but good and necessary. Eventually, the shift to mass leisure had replaced the old middle class work ethic (1). Some of the factors that influenced the shift to mass leisure were the new power sources and cybernation, increased leisure time, increased income, greater health and longevity, improved standards of living and greater mobility (13).

Carlson (13) stated that: "Cybernation may well presage the second great industrial revolution, the consequences of which may be even more far reaching than the first." Many routine jobs in industry have been eliminated through the science of electronics and the development of atomic power (13). The production per man hour has continued to increase but the number of workers needed in industry has been reduced. Billions of dollars have been spent on various types of research that have created new materials, more efficient manufacturing methods and new ways of using power. Computer systems in combination with the factors already mentioned have expanded man's capabilities to the point where new wealth, higher production, intellectual breakthroughs and more leisure have resulted.

At the beginning of the century, the 70-hour work week of 1850 had been reduced to 60 hours and 1 week of vacation (14); by 1950 the work week had declined to 40 hours and 2 weeks of vacation; hence, a 24 hour work week has been predicted for the year 2000 with 72 to 80

hours of discretionary time (13). For various reasons the increased amount of leisure time has not been uniformly distributed throughout all the segments of the work force. Management responsibilities, many service occupations and the professions have not been included in the projected decreased work week of the future.

In spite of the fact that the income level which defined poverty was raised between 1959 and 1966, the number of families that were classified as poor was reduced from 8 million to fewer than 5 million (14). A further decrease in the number of persons in low income brackets, a better opportunity to earn a decent living and an average income of $20,000 has been predicted for the year 2,000 (13). As cybernation has decreased labor requirements, more persons have been absorbed into the service occupations with more income and increased leisure time to such an extent that the industries and services that have supplied leisure needs have become more important.

Modern science has been successful in conquering diseases in the past and it has spent many years on research to combat heart disease, cancer and mental illness while geriatric research has added to the life span and made the aging years more pleasant and vigorous. The increased life span (71 years for males and 74 years for females) has placed more persons in the post-retirement period that have a need for special leisure time activities and recreation. Medicine and science have also improved the health and vigor of all ages to the point where the pursuit of physical activities during leisure time has been in demand.

The standard of living of Americans has continued to improve as incomes have increased, medical knowledge has advanced and leisure

time has increased. Automation has made the modern home more comfortable and reduced the amount of labor that has been involved in the maintenance of the home. A vast amount of money has been spent on leisure activities due to the larger amount of disposable income that has become available. However, this income has brought about a materialistic standard of living that has contributed to the rapid comsumption of natural resources for leisure activities. The mobility of Americans has risen with the advent of new highways, the ease of motor travel and more economical transportation by "jumbo jet" aircraft. All of the parts of the world have become accessible to persons that have more time and money to the extent that extreme pressures have been placed on parks, forests and recreation.

Recreational Demand and Population

Among the developments that have affected American life were the postwar resurgent population growth and the accelerated growth of urbanization and metropolitanization. The trends of population growth have implied a great increase in mass future outdoor recreational facilities and services (15,16). Hauser (15) has stated that:

> Present and future demand for outdoor recreation resources is obviously in a fundamental sense a function of the size, distribution, and composition of the population. Moreover, at any given time the demand for outdoor recreation will be greatly affected by the rates of change in respect to the population characteristics in relation to rates of change of outdoor recreation facilities and services. Some reasonable equilibrium between demand for and supply of, outdoor recreation resources will largely depend on the extent to which rates of change in factors affecting demand and the rates of change affecting supply are synchronized.

In 1790, the first decennial census was taken. Since that time the population has doubled five times and the sixth doubling has been projected for 1990 (15). The Outdoor Recreation Commission's

Staff judgement projections have indicated a national population of 230.7 million in 1976 and 351.1 million in 2000 (17). Total population growth has been a critical issue in outdoor recreation as well as for the nation as a whole, particularly when the ratio of the population to the gross water and land areas in the United States is considered. The coterminous United States had reached a maximum area of 2,993,000 square miles in 1850 (15). That area has remained relatively constant in that the 1971 estimated area of land and water was 3,022,260 square miles (18). When the ratio of persons in the population was compared to the land area, the average land area per person was 82.6 acres in 1850, and 12.8 acres per person in 1950 (15). Judgement predictions based on the previous years have reported 8.4 acres per person by 1976 and 5.4 acres per person by 2000 (15).

The aqueous area of the coterminous United States was 50,000 square miles in 1850 and 58,262 miles in 1971 (18). In 1850, the average amount of water surface per person in the population was 1.4 acres, by 1900 it had decreased to 0.4 of an acre and in 1950 it dropped to 0.2 of an acre (15). If the population continues to increase to the projected size expected, in 1976 the water surface per person will be 0.12 of an acre (15). These water surface areas have been interpreted from the perspective that if each person in the United States utilized a boat simultaneously in the year 2000, then one would have less than 60 square feet of water surface.

The distribution of the population in the United States has become concentrated in specific areas over the last century. In 1900, approximately 60 per cent of the 70 million people in the population lived

in rural areas while there were only four urbanized areas (population more than 1 million) namely Boston, Chicago, New York and Philadelphia. By 1920 the number of major urbanized areas (population of more than 100,000) was 70 (19); from 1900 to 1960 the total urbanized population increased by 423 per cent and the major urbanized population increased by 342 per cent (15). In 1965, 13 of the 225 metropolitan areas in the country contained 50 per cent of the United States population (20). Around this time the term megalopolis was used to describe how some of the metropolitan areas had coalesced into super metropolitan areas like the continuous urbanized region from Boston to Washington, D.C. (11,21,22).

The concentration of the population in urban areas has been a manifestation of the technological and organizational developments that have made an aggregate of people the most efficient producing and consuming unit (15). Continued aggregation into urban centers has made the increased division of labor possible, more ready utilization of machines and non-human energy, external economies, minimization of the fraction of space and encouragement of the entrepreneur and small business.

Decentralization of the population or the so called flight to the suburbs has often been looked at as a part of one's desire to return to the country and to escape the urban environment. Population decentralization has also reflected the technological, industrial, economic and social transitions in the United States for the past 100 years (23). The non-urban areas adjacent to cities or suburbia have been influenced by three wars and a period of social and industrial change. Matsler (23) has summarized that era as follows:

> A Civil War which reunited a nation but left a serious civil rights problem a question which is still unanswered; a period of industrial development which freed men from the drudgery of toil but left in its wake slums which embarass even the most greedy; a period of improved communication and transportation which provided the greatest freedom travel ever known but has created the biggest traffic jam in history; a period of two world wide conflicts which destroyed two mad men and an avaricious nation but created the greatest social problems faced by the nation; a period of economic growth and prosperity which brought the highest standard of living known but created urban sprawl lacking in intelligent physical, social and political planning; a period of industrial life but laid waste much of our natural resources, water and wild life.

In his statements, Matsler alluded to the patterns of population concentration and distribution that have come about from the changed patterns of land use in the United States. In the past, cities have grown around business and industrial areas by radial expansion which meant that the new populations which consists of immigrants, minorities and low income groups have migrated to the older sections of the city that the higher economic and social groups of longer residence have abandoned for outlying areas. In 1965, the Department of Housing and Urban Development was established as a new Cabinet post by Congress to look at the problems and patterns of urban land use (20). It had finally become clear to the administration that whatever action was taken to solve the problems of the cities would effect the nation as a whole for better or for worse; thus, city and regional planners along with the Federal Government had begun to try and change the land use patterns in the United States.

Recreation and Land Use Planning

Ideally, use of land should be studied according to the nature and degree of consciousness of the decisions underlying its management (24). Use has been single, where it excluded other uses or it has been

multiple where one use has had dominance and others subordinance. Mott (25) cited single purpose planning as one of the problems in parks and recreational planning. He has recommended the use of a planning method which was thought to be superior to the single purpose plan because it has included environmental planning coupled with social planning. The integral plan has used a team approach where the team has included architects, ecologists, botanists, zoologists, economists, psychologists, sociologists, anthropologists and other community resource persons. According to Mott, it would be impossible to have planned a park without consideration of the flora and fauna, the historical geology, weather, history, archeology and the economic and social patterns of the area.

Many parks and recreation departments have realized the importance of environmental planning but they have not understood that they have been dealing with people (25). There has to be an emphasis placed on the people that have been served by the park and recreational facilities. The impact of crime and social unrest have had an effect on recreation since World War II (26). Increased criminal activity has made parks and recreation areas dangerous by day and unsafe at night. Crime and vandalism in parks have increased to the extent that park personnel had to be trained to recognize the effects of drugs, learn how to cope with a person under the influence of drugs, and gain a knowledge of the limitations of the law (25). The parks and recreational facilities have been used frequently for riots, protests, demonstrations and criminal acts (23). In 1970, 200,000 persons camped at Yosemite Valley on the 4th of July for a long holiday weekend. Somehow that weekend turned into a

confused disorganized situation where 200,000 persons turned against the establishment (25). At Yosemite Park the leisure time was used destructively, which indicated that there had been a need for greater management of people in parks from a social planning prospective (25).

Recreation has taken place on land with almost any type of vegetative cover, but there has been strong preference among many people for wooded areas, especially if these areas included small bodies of water. Clawson and Stoddard (24) described three types of land use patterns in recreation, the consumer or user oriented recreation areas, the resource based areas and intermediate areas.

User or consumer oriented outdoor recreational areas have included municipal and county parks which are important because they have served the most densely populated area. The total area of most municipal and county parks have been judged inadequate for the population that they have served (24). The problem with user oriented areas has occurred in that some cities and parts of large cities have been well supplied while other cities have had insufficient facilities. The oldest parts of many cities, which tended to be slums or at least seriously decadent, have lacked adequate parks and in some cases they have lacked parks entirely. At the other extreme, many of the suburbs that have experienced fast growth have not had adequate provisions for parks. The land has been used in large developments and there has been neither vacant lots or vacant sites on which to build parks (26). Land, recreational facilities, and financial resources have been listed as some of the recreational needs of the cities and the suburbs (23); however, the most difficult problem has been to determine the acreage

needed for the construction of adequate park and recreational facilities. One established standard has been 10 acres of park and recreational space for each 1,000 inhabitants, while the American Society of Planning Officials have suggested 10 acres per 2,000 population for cities over 500,000 population and 10 acres per 3,000 population for cities over 1,000,000 population (27). Another plan has been to allow 10 per cent of a city's area for recreation and park purposes. In a survey conducted by the National League of Cities, the ratio of park and recreational land to population ranged from a high of 10 acres per 217 population in Peoria to a low of 10 acres per 5,000 population in Chicago (28). Very often the need for facilities has been greatest in the densely populated areas where cost per acre of land is high; in this case planners have tried to furnish quick and economical transportation to the location of facilities (28).

When cities have had to cut expenditures, reductions of the recreation budget has proved an expedient method of cutting expenses (26). Most cities did not have the financial capabilities to support adequate recreational facilities, so they have depended on the State and Federal governments. In most cases the state has been negligent but Federal aid has been more abundant for individual projects. One of the problems with finances in suburban areas has been who was going to accept the financial responsibility for public recreation (23). Oregon attempted to solve this problem by a plan in which the city acquired the land and developed the parks in suburban areas and the county assumed responsibility for these areas (23).

The resource based outdoor recreation areas have been those areas of such an unusual quality that people were willing to travel con-

siderable distances if necessary to visit them (24). These facilities were federally owned unique natural or historical sites which have included mainly the National Parks System and the National Forests. Resource based recreational areas were originally concerned with conservation and have been selected for their physical characteristics rather than their recreational value.

The year the forest conservation movement began in America has been regarded as 1876. At that time Congress authorized the Commissioner of Agriculture to appoint a special forestry agent to study the annual consumption of timber products, their import and export, the probable future supply and the best method of protecting the supply (29). The early foresters were indifferent to recreation and viewed the forests as the source of useful products that had to be protected from exploiters for the good of the people (29). This philosophy fell victim to the automobile and the highway when pleasure driving through the forests became popular after World War I. Hence, Congress passed a law in 1915 that permitted term leases of national forest lands for summer homes, hotels and other public convenience or recreation structures. Chief Forester Greeley reported in 1921, that provisions for outdoor recreation represented a major use of national forests and by 1922, $10,000 for improvement of national campgrounds had been appropriated (29). The Civilian Conservation Corps programs of the 1930's, involved 2 million young men who contributed to forest conservation projects and recreation. Later in the 1950s, a new 5-year program was adopted to improve and expand recreational facilities in the national forests. With the success of that program the Secretary of Agriculture reported that his department

was administering the world's largest outdoor playground (29).

Yellowstone National Park was signed under federal guardianship by the President in 1872 as a public park or pleasure ground for the benefit and enjoyment of the people (29). In 1903, President Roosevelt established the second national park at Yosemite, California. From 1872 to 1916, the National Parks went through a period of rapid deterioration due to sheepmen and some lumbermen who saw no need to conserve meadows and forests for sentimental nonsense. Poaching and evidence of racketeering type shakedowns on park visitors led to the appointment of calvary and troops as caretakers of the parks. Their duties were to remove trespassers from the parks, post regulations and punish those who violated rules (29). The National Parks Service was created in 1917 for the purpose of park development, park maintenance and park enjoyment. As the years have passed, other agencies, commissions and bureaus have been created to try and deal with the problems on public lands.

In 1959, there were 230 million acres of public land potentially available for resource based recreation (15). This included 40 million acres of federal land set aside specifically for recreation. The impact of population on the 230 million potentially available resource based recreation areas has changed the number of acres per capita from 3 in 1900 to 1.3 acres per capita in 1960 and an estimated 0.7 acre in 2000 (15). Population impact on the 40 million acres of recreation land has reduced the more than 0.5 acre of land per capita in 1900 to 0.2 acre in 1960 and 0.1 acre per capita in 2000 (15). The National Park land provided each person in 2000 has been projected to be 0.07 acre (15).

The major problems that have occurred in the use of resource based areas arose from the flood of visitors, inadequate facilities to care for them and inadequate funds for administering the areas. Another set of problems has stemmed from the use of the areas for quick entertainment rather than appreciative contemplative study (29). The National Parks and Conservation Association has developed a plan to control the increased crowds and traffic in the parks by including free shuttle bus service in the park, comfortable motorcoach transportation into the parks, a freeze on roads, motels, campgrounds and other facilities in the parks. They have also reduced utilization for company purposes of great regions of public and private lands around the park and have encouraged the subsidized development of private recreational facilities outside public lands (30).

Intermediate type outdoor recreational areas have looked both to user based recreation, which it had to resemble in order to provide a degree of convenience to the users (1- to 2-hour travel distance) and to resource recreation, in that the best sites within the allowable radius were chosen. The intermediate recreational areas have been chiefly State parks and reservoir areas of the TVA system, Corps of Engineers and Bureau of Reclamation (24). These areas usually have been located not too far from a major city and used for day and weekend outings. One-hundred to several thousands of acres have been devoted to the intermediate facilities where many persons have gone to camp, picnic, hike, swim, boat and fish (24,31,32).

The Corps of Engineers has been infamous in their reputation as the developer of these types of projects. There have been several

phases of development in Federal land acquisition policy, since Section 4 of the 1944 Flood Control Act initiated a basis for recreational development of Corps of Engineer Lakes (33). Prior to 1953, land was acquired in fee only to the top of the flood control storage with easements above for possible spillway surcharge. The land acquisition was oriented toward navigation, flood control and power with no land acquired for recreational development as such. In 1953, a joint policy between the Department of the Interior and the Department of the Army provided for acquisition of lands required for recreation outside the fee owned areas if it fell within the category of below the 5-year flood frequency level with easement on land occasionally flooded or adversely affected by construction and operation of the project. This procedure was challenged on several occasions due to the fact that certain land was being acquired at the request of states to add land for public recreational facilities and conservation (33). The Fish and Wildlife Act of 1958 provided land acquisition for conservation whereby areas of land could be acquired at reservoir projects for all purposes including fish and wildlife mitigation of project induced losses (33). In this case the planning was coordinated with the state agency that had been responsible for fish and wildlife mitigation and enhancement.

Under the 1953 land acquisition policy, projects often failed to provide the public with either adequate access or room for realization of project created recreational potentials. In some cases the original acquisition was inadequate to public demand, private development occurred to the edge of the water and the public was denied the use and enjoyment of its investment. Accordingly, a new joint policy was adopted in 1962

under which land was acquired in fee to the top of the flood control pool or spillway crest, plus a freeboard. This freeboard was meant to be a buffer zone that provided a green belt for the preservation of the natural aesthetics of the lakes. The only easements acquired in the upper reaches were those that would have no substantial value for the protection or enhancement of fish and wildlife resources or for public outdoor recreation and if it were to the advantage of the government to take easements in lieu of fee title (33).

In 1959, the executive agencies had begun to treat recreational development at reservoir projects as a bona fide project purpose; at a later date this practice was confirmed in Senate Document Number 97, 87 Congress, May 29, 1962 (33). The document outlined a policy that "Plans for water and related land resources should be formulated to meet all foreseeable short and long term needs." According to the document, full consideration was to be given to provisions for outdoor recreational, fish and wildlife opportunities where they could be provided or enhanced by development works (33). The 1962 Flood Control Act amended the 1944 Act in that all water resource projects were included and it also continued and emphasized that local interests be given the opportunity to construct, operate and maintain parks and recreational facilities at Federal projects (33).

Public Law 89-72 (the Federal Water Project Recreation Act of 1965) provided full consideration of land acquisition for recreation and fish and wildlife enhancement in project planning (33). The act stipulated that for there to be recreational development at a project, the state or local interests had to pay 50 per cent of the costs attributable

to recreation and assume the maintenance and operational responsibilities. Where the state or local interests did not agree to cost share for recreational development, section 3 of the act provided for only minimal access and health and safety facilities. Section 3 also provided for the acquisition of land at federal expense to preserve the recreational potential of the project and specified that the land acquired be held 10 years. However, if no assurance of cost sharing had taken place at the end of 10 years the land could be used for any legal purpose or disposed of as surplus (33).

Water has been identified as the focal point of outdoor recreation. The growth of attendance at Corps of Engineer lakes has been more than anticipated when the lakes were originated (33). In 1950 there were 50 projects with an estimated attendance of 16,000,000, by 1960 the number of projects had increased to 146 and the attendance was 109,000,000; by the year 1969 the number of Corps projects had been boosted to 199 with an attendance of 254,808,000 (33).

In 1971, three major conclusions had been drawn from the Corps of Engineers' experience with water based recreational facilities (33):

a) Land acquisition policy and procedures have been applied to achieve a sound and practicable basis for serving the economic development, environmental quality, and public recreational needs, with minimum impact on the other local development objectives.

b) A program for upgrading the quality and quantity of recreational facilities and associated personnel requirements to meet diverse and growing public recreational demands, including adequate funding for personnel and operation and maintenance, was needed and has been developed

for early presentation to the Secretary of the Army. If determined necessary, it could have been accompanied by specific recommendations for legislative action.

c) They have continued to seek increased cooperation from non Federal public entities. The apparent difficulties of non Federal entities to meet the cost sharing requirements of Public Law 89-72 has required serious study. So has the matter of bringing all Federal agencies with like recreation programs under a consistent cost sharing policy.

Recreation and Economic Development

The classical series of urban business districts have been the central business district, the shopping thoroughfare, the neighborhood business districts and isolated retail nodes (34). However, Rickert and Stansfield (34) have added to the series a recreational business district, which has existed almost entirely on the proceeds of tourism and recreation. Since it has been dependent on a recreational attraction rather than upon proximity to residential areas or transportation routes, the recreational business district has been spatially as well as functionally separated from other business districts. There has been a social as well as economic phenomena associated with the district whereby families who may not otherwise shop with each other, have shopped together motivated by the desire to take home visible evidence of the visit and needs generated on site. The categories of the business in the recreation business district have been listed by Rickert and Stansfield (34) as

a) Food and Beverage Consumption,

b) Gift-Novelty-Variety,

c) Drug and Proprietary,

d) Clothing and Shoes,

e) Gasoline Service Stations,

f) Automobile Sales Accessories,

g) Candy, Nut, and Confectionary,

h) Commercial Amusements and Theaters,

i) Personal Services,

j) Financial Services,

k) Grocery and Delicatessen, and

l) General Shopping and Specialty Merchandise.

In 1972, the House of Representatives' Select Committee on Small Business held hearings to ascertain small business opportunities in connection with tourism and recreation in relation to Federal programs (35). The small business enterprise in recreation and tourism has offered the opportunity for the continued economic health of rural areas (6).

Ninety per cent of the business and industrial establishments in the Tennessee Valley region have been classified as small businesses; that is, their gross receipts have been less than $1 million dollars. The Tennessee Valley Authority which has gathered recreation data on its reservoirs since 1947 when there were 100 commercial enterprises, chiefly boat docks located on 22 reservoirs, has come to the conclusion that the reservoirs have stimulated growth in the development of small business oriented toward the public's pursuit of outdoor recreational activities (36). The 1947 capital investment for the enterprise was $2.5 million and 258 man years of employment. By 1970 the number of

recreational businesses had increased to 335 with a capital investment of over $75 million and annual employment of 1,049 man years. In 1970, the types of businesses had expanded from simple boat docks to include marinas, campgrounds, marine repair facilities and similar enterprises.

A 170,000 acre peninsula between the TVA Kentucky Lake and the Corps of Engineer Lake Barkley on the Cumberland River has been used as a demonstration project to show how underdeveloped natural resources can be converted to public recreation and education benefits (37). The development project has excluded recreational accommodations and normal small business services from locating within the boundaries. Overnight camping accommodations have been set up but all supplies have to be purchased outside of the project. The accommodations outside of the project have included resorts, motels, food service, sporting goods and boating services. The personal income for the area for 1962 and 1969 increased by 76.6 per cent while retail sales between 1963 and 1967 increased 33.2 per cent (36). When these figures were compared to the retail sales for the states of Kentucky and Tennessee combined, the project area had a 41.2 per cent increase in sales and the two states combined had a 26.5 per cent increase in sales for the same period of time (36).

In the Arkansas White Red River Basin, 17 counties with shorelines on the reservoir have been studied with respect to population growth, per capita income, annual wages, retail sales, bank deposits and investments (37). In the 17 reservoir counties, only 8.5 per cent of the population was lost compared to the 25.1 per cent lost in the none reservoir counties. The reservoir counties had a 57 per cent increase in income, increased bank deposits from $82.6 million in 1948 to $130.0

million in 1958 and gained a 296 per cent increase in school taxes for the period from 1945 to 1956. For the same periods of time, non reservoir counties increased income by 23 per cent bank deposits went from $15.1 million to $21.2 million and school taxes increased 190 per cent. The initial investments in overnight accommodations in 1945 of $1.4 million had been increased to $20.8 million in 14 reservoir counties in 1958.

Effects of Recreation on the Tax Base and Land Values

There have been local officials in some rural areas who have been of the opinion that acquisition of land for recreation adversely affected the capacity of schools and local governments to secure local revenues (38). These opinions were based on the exemption of publicly owned land from taxation which reduced the potential of units dependent on real estate. Contrary to this view, Essex County, New Jersey found that land adjacent to parks increased in value three times as fast as other property (39). It has often been the residential development that was in competition for space with recreational areas, where this has been true the recreational areas have been thought of as less expensive to governments and the community (39). The latter conclusion was due to the idea that residential developments had to have schools, streets and other services at the expense of the government.

In a study on the Tennessee Valley Authority reservoirs, it was concluded that the increased sales price of land established on the real estate market was a direct result of location on or near the reservoir projects (40). Other investigators have found that the increase in property values were associated with nearness to the park, suitable of

subdivision and access and nearness to a growing city (41). Bates (42) studied three large reservoirs in Kentucky to determine the effect of reservoir construction on county governments and local school districts. When he compared the changes in real estate taxes levied he found that the taxes levied had increased less than the tax base or income. In some cases the value of taxable real property dropped for the year when the land was purchased but the total value recovered after 2 years. A study in Pennsylvania reported the same results as those of Bates. Epp (38) also found that at the time public acquisition of land took place the values increased rapidly, followed by a period where land values increased at about the rate expected without recreational development.

Recreation and Residential Sites

In the past 20 years there has been a large increase in the residential utilization of multi-purpose reservoirs. Permanent residences have been associated with accessibility to employment areas, major cities and schools while the second or vacation home has been concerned chiefly with utilities and road access (43,44,45). Vacation homes have served as a means of providing the needed tax revenues for governments; however, in some cases, poorly planned recreational subdivisions have diminished the quality of prime recreational attractions without adding to the tax base (38). A large portion of the residential sites which have been created in reservoir areas have appeared to be the results of land owner decisions to capitalize on the appreciation in land value made possible through recreational development (43).

Tombaugh (46) has investigated the location of vacation homes in Michigan with respect to household income, occupation of the head of the house, age of the head of the house and the size of the community in which the primary residence was located. His study showed that professional and high income households tended to locate vacation homes farther from their homes when compared to other categories and households in large cities have been willing to travel longer distances to get away from home than those in small communities.

In spite of the planning that has gone into the development of many recreational facilities, they too have become overcrowded and overused. There has also been a move among some of the more popular tourist oriented cities and managers of recreational facilities to de-emphasize tourism. The tendency to play down tourism has been a direct result of the undesirable effects that tourism has had on the recreational community and environment. Thus the recreational demand problem needed to be studied to determine the indicators in a community prior to construction of a facility, that would lend some consistency to the prediction of future overuse and overcrowding and the impact of the facility on the community. These indicators would help to establish the patterns that have developed in relation to the changes in the community and surrounding areas that have lead to eventual devestation of the recreational environment.

CHAPTER III

PURPOSE AND SCOPE

One of the problems that has been associated with the recreational demand was the overcrowded conditions that have existed at many recreational facilities. When recreational managers have realized the impact that overcrowded recreational facilities have had on the environment, they have attempted to place quotas on the number of users in a given recreational area at one time and/or created a user fee or tax. At the same time the recreational consumer has demonstrated a desire for more recreational facilities, unlimited access to the facilities and the use of public facilities for no fees other than tax dollars.

In some regions, tourist oriented organizations have evaluated the economic impact of the tourist dollar as at least 15 per cent greater than a payroll dollar (47). Other regions have reported that 80 per cent of the tourist dollar has stayed in the community where it was spent (8). The anti-tourism attitude was believed by some persons to have originated in two types of localities; one included those communities that have already established their tourist economy while the other locality included those communities that have benefited to the extent that competition was not welcome (8). The Federal government has favored the development of tourism and recreationally oriented businesses as a means

of narrowing the economic gap that has existed between urban and rural America. Consequently, Federal money has been made available to support the development of recreational facilities in rural America.

The purpose of this study was to predict the impact of population and to determine the environmental, economic and social impact of a water oriented recreational facility on a community and, in so doing, develop a wholistic model applicable to evaluating public use of natural resources in a broader context. Hopefully, such modeling and the uses thereof will be utilized in the planning and development of such facilities to the extent that optimum user benefits and minimum adverse effects can be achieved.

The scope of this study was an intermediate recreational facility; namely, Lake Thunderbird near Norman, Oklahoma. This lake allowed extrapolation to a user type facility due to its close proximity to a large urban population and a resource based facility in that persons have traveled long distances for visits and that the site of the lake was not chosen primarily for its recreational potential.

CHAPTER IV

MATERIALS AND PROCEDURES

The experimental laboratory for this study was the Little River State Park Reservoir located in central Oklahoma (Figure 1), better known as Lake Thunderbird. In 1961, Del City, Midwest City and Norman approved contract proposals for the construction of the lake east of the city of Norman. The primary purpose of the lake was for a municipal and industrial water supply and flood control, while the recreational benefits of the lake were described as incidental and subordinate to the primary purposes. However, certain portions of the reservoir had been financed by the Federal government for improvement of fish and wildlife resources and recreational opportunities.

The climate of Little River Basin is suitable for recreation in that there is sunshine 70 per cent of the time during the summer and fall. In this period which covers the seasons of greatest recreational use, most of the rainfall comes in torrential downpours which only briefly interferes with outdoor activities and generally improves conditions (48).

In 1960, Little River rose near the town of Moore in Cleveland County, Oklahoma, and flowed southeasterly a distance of about 115 miles to its confluence with the Canadian River about 6 miles southeast of Holdenville in Hughes County, Oklahoma (49). The watershed of Little

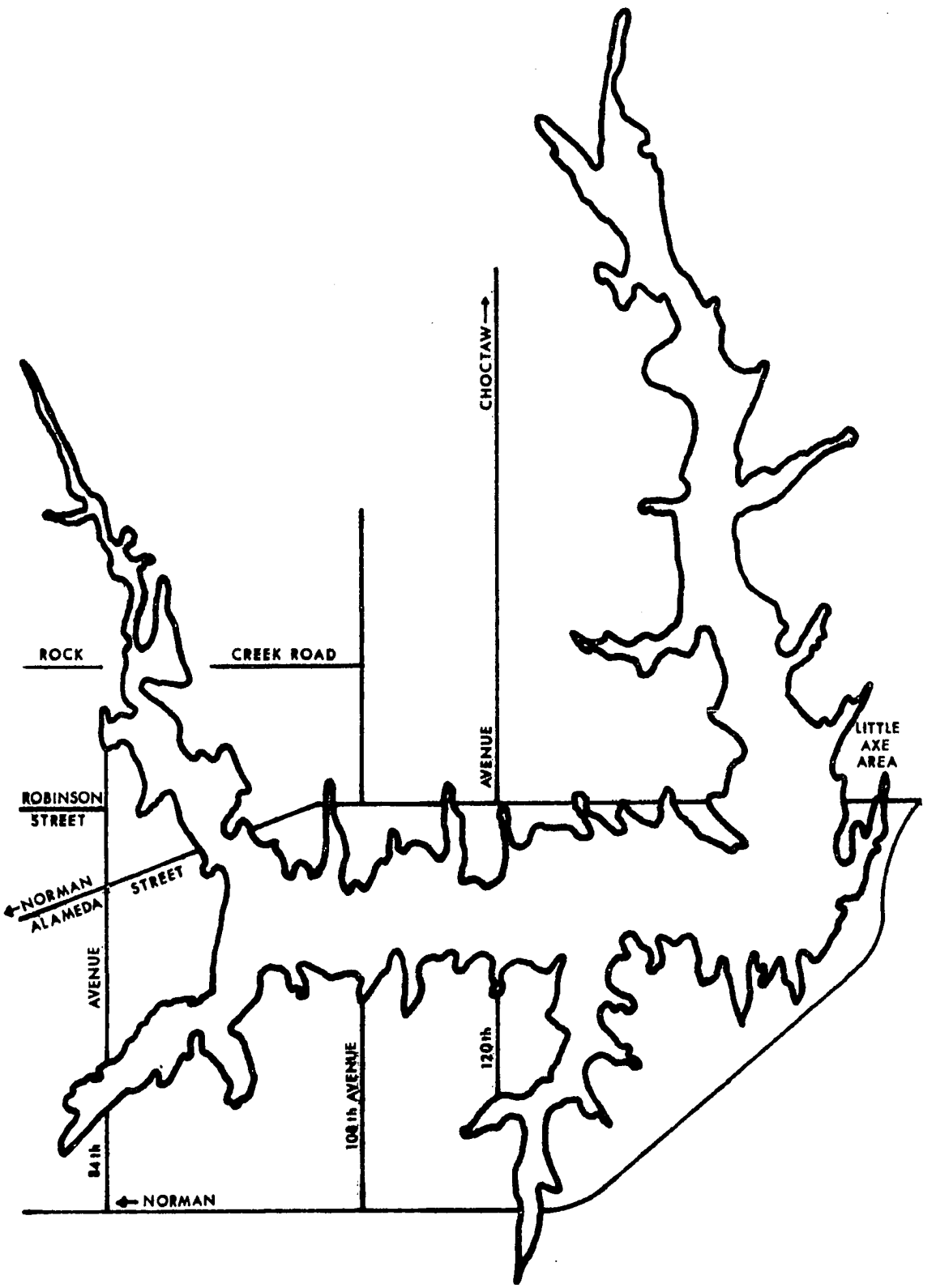


Figure 1 -- Map of Lake Thunderbird

River was about 72 miles in length, had a maximum width of 20 miles, and a total area of about 973 square miles. Elevation of the river varied from about 1,300 feet above mean sea level at the western limits of the basin to about 695 feet at the mouth. The principal tributaries of Little River have been Salt Creek and Hog Creek with drainage areas of 239 and 83 square miles respectively.

The topography of Little River Basin has been directly related to surface geology. The western portion, about 64 square miles in extent, is situated on the outcrop of the Hennessey shale which has weathered to a dark, comparatively rich loam forming a flat or gentle, sloping prairie which has been used for cultivated crop land and grazing. East of the prairie area the topography changes abruptly to moderately rugged "scrub-oak" covered hills formed by erosion of the interbedded sandstones and shales of the Barger, Wellington and older formations which outcrop in an eastward direction. The soils on the hills are generally sandy, low in organic matter and have undergone severe sheet and gully erosion where native "scruboaks" were removed. The bottom lands along the Little River comprise the major portion of the lands eastward of the prairie area that could have agriculture production potential. However, this type of production has been limited by frequent flooding and drainage difficulties aggravated by heavy sediment loads in the stream.

In 1954, oil and gas production was the principal industrial development in the immediate area outside the Little River Basin limits and it far exceeded the value of agricultural production. From 1949 to 1954, the population of livestock in the basin increased by 50 per cent.

Tinker Air Force Base, a permanent major aircraft supply and repair center, was the largest single industrial development in the immediate area outside the basin limits. Other industrial and commercial enterprises were located in Oklahoma City metropolitan areas and surrounding urban centers which were the most densely populated areas in the state of Oklahoma.

From the time the lake construction was started in 1962 and since its completion in 1965, it has been located within 50 miles of the most densely populated area in the state of Oklahoma. Lake Thunderbird has been the only recreational facility within a 50 mile radius for 75 per cent of the population. In 1960, the dominant recreational need of the area was for a facility that would accommodate brief stay local visitors, semi-public group camping and individual area camping or living. The former needs were related to satisfying the recreational demand created by the university, ecclesiastical and military groups in the community while the latter needs would have served the demand for private cabins, summer homes and year round homes associated with water based recreational facilities. Since the only means of access to the lake at this time was by automobile and the activities have involved small groups, the number of visits based on total population, household population and registered automobiles was calculated.

The United States Census Reports on Oklahoma were used to abstract the population characteristics for 11 counties within a 50 mile radius of the Lake Thunderbird site in 1960. The total population of each county along with the total number of households and population of households were recorded from the census.

The number of automobiles registered in the 11 counties for the year of 1960 was determined from a list furnished by the Oklahoma State Highway Department. Since the lake could only be reached by automobile, a potential user population was computed by multiplying the population per household of a county by the number of registered automobiles and taking a total. However, a search of the literature for the attendance per capita at other state parks in Oklahoma and similar reservoirs in the country yielded two multiplier factors that were used to predict expected visits to the lake for each population, namely total population, "automobile population" and household population.

Seventeen named additions that immediately surrounded the lake were used for the land value data. These additions were of the same legal description as the land that was procured for the lake or they were located within close proximity to it. Cleveland County Courthouse land records were searched for data on land values in the lake area before and after the lake was built. The land records in the County Assessor's Office were examined according to school districts to determine the changes in assessed values of real estate, personal property and public utilities. The tax records in the County Treasurer's Office were also used to determine changes in assessed values. The deeds and mortgage records in the County Treasurer's Office were examined to obtain the market value of land in the lake area. When a deed was searched, the tax stamps were totaled to determine the price of the land. The use of the lake by developers and sales promoters was determined by scanning newspaper microfilms. Classified advertisement sections of the Norman Transcript and Daily Oklahoman were scanned from microfilm for the years before and after the lake

was constructed.

Recreationally oriented businesses that have developed since the lake was built were determined through two methods. One method involved researching the yellow pages for 1964, 1965, 1970 and 1973. The other method was through direct interviews with business owners in the lake area.

Crime and accident statistics were gathered from the Norman City Police Department. Two Norman policemen were interviewed to determine the effect of crime in the lake area on their Department.

Two persons from the community of Lake Thunderbird were interviewed; namely, Harold Cooksey and the Reverend Ted Reynolds. Mr. Cooksey was the chairman of the Three Cities Committee when the lake was built, a long time resident of the city of Norman and has been serving as the chairman of the Norman Environmental Quality Committee on Lake Thunderbird. Mr. Cooksey taped an interview on his observations of the effect of the lake on Norman and on recreational planning before the lake was constructed.

Reverend Reynolds has been a long time resident of Little Axe, the community that was annexed by the city of Norman when the lake was built. Reverend Reynolds taped an interview on the impact of the lake and annexation on the Little Axe community.

The Oklahoma Historical Society and the Western History Collections in the University of Oklahoma Library in Norman Oklahoma were also a source of data on the Norman and Little River areas before the lake was built. Harold S. Cooksey's Collection, Norman Project, Oklahoma, Little River Basin Oklahoma was the main source of data in the Western History

Collections.

The data collected in this study were used to predict the effect population density had on Lake Thunderbird and to determine the effect the lake has had on the community.

CHAPTER V

RESULTS AND DISCUSSION

At the time Lake Thunderbird was planned, all of the attention was focused on the need for a water supply in the area. This focus was justified since two previous studies on the use of Little River as a surface water supply and flood control project had been declared not economically justified and unfavorable as a Federal project by the Corps of Engineers in 1936 and 1949 respectively. However, the issue was pursued by local interests and the 1949 Congressional delegation from Oklahoma through the Bureau of Reclamation until it was established that an adequate and reasonably priced surface water supply was necessary for the city of Norman and urban areas to grow. In 1953, Oklahoma City requested the Bureau of Reclamation to include in their study a possible source that could be developed for a municipal water supply. In light of the competition from Oklahoma City for the Little River site, Moore, Del City, Midwest City and Norman formed the Central Oklahoma Water Users Association in November, 1953. The purpose of this association was to solve the long range water supply problems of the cities and Tinker Air Force Base, which was not a member of the association but had participated in the discussions and procured data for the project formulation.

In 1954, the Bureau of Reclamation reported a plan for the development of the Little River Canadian River Basin as a water supply as well as for recreational and fish and wildlife benefits. At this time the location site for the lake was one that had been privately owned and posted with limited fishing and hunting available at a few farms which offered fishing permits and one farm that had a cooperative agreement making it a game refuge. Limited boating and fishing opportunities were available at Shawnee Lake near the city of Shawnee (population 22,948), Tecumseh Lake near the town of Tecumseh (population 22,750) and Lakes Overholser and Hefner in Oklahoma City (population 243,504). None of the recreational facilities listed had the capacity to meet the recreational demands of the area at the time Lake Thunderbird was planned.

Lake Thunderbird was planned for an area that had two special population factors with abnormal social and recreational needs. One of the special population factors was the location of Tinker Air Force Base in the area which had caused the population of the area to double from 1940 through 1950. The other special population factor was the location of universities and colleges in the area; namely, Oklahoma University, St. Gregory's College, Oklahoma Baptist University in Shawnee, Oklahoma College for Women in Chickasha and Oklahoma City University. There was a greater demand for leisure and recreational activities among the faculty and students of colleges and universities than among the general population which included all ages and economic levels (48).

In addition to the other demands in the area for recreational facilities, a study was done on the recreational needs of the city of Norman in 1954, which recommended the proposed reservoir as a means of

solving the recreational deficiencies that existed in the Norman community at that time. In one report on the development of recreation at the reservoir, the needs of Norman and Oklahoma were envisioned as a burden on the shore area of the reservoir (48).

The majority of the data available on the area in which the lake was to be built showed that it would become a major recreational facility for persons in the 11 counties that were within a 50 mile vicinity of the lake. There was an exception to the previous statement, in that several other reservoirs were proposed at this time which were to offer recreational opportunities that would relieve some of the user pressure on Lake Thunderbird. These reservoirs which have not been built to date were to be located at Purcell in McClain County, Pearson in Pottawattomie County, Purdy in western Garvin County, Crescent and Seward in southwestern Logan County, Union in Canadian County and Meeker, Chandler, Fallis and Wellston in Lincoln County. Oklahoma Water Incorporated ("Up with water . . . for people") has included Union, Crescent and Wellston Reservoirs in their total commitment by 1976, while other proposed reservoirs for the area include Okarche in Canadian County, Arcadia in Oklahoma County, Kechi in Grady County, Dibble and Clearbrook in Cleveland County, Centerpoint in Pottawattomie County, Sasakwa in Seminole County, Purdy in Garvin and Ada in Pontotoc County. The future development of the proposed reservoirs with recreational and fish and wildlife benefits would place one or more facilities in each of the 11 counties considered in this study.

In 1956, the number of visits to Oklahoma State Parks based on the 1954 population was 4.33 per capita while the number of visits

to similar reservoirs in the country was 2.17 per capita (24). When the visits per capita were applied to the population data for the 11 counties the number of predicted visits to Lake Thunderbird were comparable to the actual visits which were reported in a previous study as 2,068,637 for the period of January 1972 to September 1972 (49).

Three 1960 populations were used to predict the numbers of visits to Lake Thunderbird; namely, the household population (Table 2), the total population (Table 3), and the population of persons in automobiles (Table 4). The household population included the total number of persons in the 11 counties who resided in a household in 1960. This population represented the lowest population available to visit the lake; thus, it was used to predict the minimum number of visits to the lake (Table 5). The total population which was used to predict the medium number of visits to the lake (Table 5) included all persons in the 11 counties regardless of their residences. The population of persons in automobiles was the highest generated population that was available to visit the lake (Table 5). This population took into account the total number of automobiles and the total number of persons in households.

It should be noted that the data used to make these predictions were available prior to lake construction, that is, two million visitors could have been predicted for the lake. The 4.33 per capita visits predicted high for all populations while 2.17 visits per capita predicted low. However, the 2.17 visits per capita times the persons in automobiles predicted extremely close. The initial planning for the lake should have taken into account methods of limiting and controling the population having access to the lake particularly in view of the topography and

TABLE 2

POPULATION WITHIN 50 MILES OF LAKE THUNDERBIRD
BY COUNTY AND HOUSEHOLD IN 1960

County	Total Number of Households	Population of Households	Population Per Household	Percentage of Total (Population of Households)
All Counties	227,300	697,691	3.07	100
Canadian	7,552	23,273	3.08	3.33
Cleveland	13,025	40,273	3.09	5.77
Garvin	8,764	27,572	3.15	3.95
Grady	9,735	29,055	2.98	4.16
Lincoln	6,244	18,693	2.99	2.68
Logan	6,120	17,729	2.90	2.54
Oklahoma	139,844	432,875	3.09	62.03
McClain	3,989	12,652	3.17	1.81
Pontotoc	9,275	27,584	2.97	3.95
Pottawatomie	13,638	40,263	2.95	5.77
Seminole	9,114	27,992	3.07	4.01

TABLE 3

POPULATION WITHIN 50 MILES OF LAKE
THUNDERBIRD BY COUNTY IN 1960

County	Population in Thousands	Percentage to Total
All Counties	717,539	100
Canadian	24,727	3.45
Cleveland	47,600	6.64
Garvin	28,290	3.93
Grady	29,590	4.12
Lincoln	18,783	2.61
Logan	18,662	2.60
Oklahoma	439,506	61.27
McClain	12,740	1.78
Pontotoc	28,089	3.91
Pottowatomie	28,066	3.91
Seminole	41,486	5.78

TABLE 4

THE NUMBER OF VISITS EXPECTED AT LAKE THUNDERBIRD BY COUNTY BASED ON THE NUMBER OF AUTOMOBILES REGISTERED IN 1960

County	Registered Automobiles	Persons in Automobiles	Percentage to Total (Persons in Automobiles)
All Counties	289,381	889,857	100
Canadian	12,221	37,653	4.23
Cleveland	17,516	54,142	6.09
Garvin	10,286	32,360	3.64
Grady	11,084	33,075	3.72
Lincoln	7,067	21,444	2.38
Logan	6,824	19,762	2.22
Oklahoma	183,882	569,115	63.95
McClain	4,373	13,867	1.56
Pontotoc	10,338	30,745	3.45
Pottowatomie	10,139	29,930	3.36
Seminole	15,651	48,064	5.40

TABLE 5

THE NUMBER OF VISITS EXPECTED AT LAKE THUNDERBIRD BASED ON ATTENDANCE PER CAPITA AT OKLAHOMA STATE PARKS AND OTHER RESERVOIRS

All Counties		Visits Expected Based on Attendance Per Capita at Oklahoma State Parks	Visits Expected Based on Attendance at Other Reservoirs
Total Population of Households	697,961	3,022,171	1,514,575
Total Population	717,539	3,106,944	1,557,059
Total Persons in Automobiles	889,857	3,853,081	1,930,099

degradation of the environment.

Over population of the lake's recreational area with respect to user patterns and user density has been reported in another study on Lake Thunderbird (50). This study showed that over 54 per cent of the users visited the lake area on weekends within a 4-month period. In the summer of 1972, 40,000 visitors utilized the 1,000 acres of recreational space available on individual days which allowed .025 acre per person. The premium on space was such that campers and automobiles were parked a few inches apart in every accessible location including on the grass, under trees and at other unauthorized locations. The previous mentioned situation along with the removal of vegatation from the area by visitors to construct new access roads and to make room for tents and camping vehicles has caused soil erosion and massive gullies along the shore of the lake. Beach erosion resulting from the wave action of power boats has also been observed. The boat traffic on the water has been heaviest on weekends and on some days there have been over 500 boats on the lake.

The quality of water in Lake Thunderbird has been described as good for both drinking water and recreational use when recreational use is at a minimum (49). However, during the peak recreational season, the bacteriological quality of the water has posed a health hazard to the user. The fecal coliform counts have been reported as a direct result of the over population of some areas where activities include body contact with the water.

Peace (50) has described the solid waste problem at the lake as twofold. One problem involves the amount of waste generated by recreational activities and the other involves littering of the premises.

The Effect of Lake Thunderbird on the Tax Base Assessed Values

The majority of the land procured for the lake was located in school districts 31 and 70. In school districts 31 and 70, the assessed value of personal property, gross real estate and public service were examined from 1957 to 1965, the latter was the year in which the lake was completed. The average value of personal property in district 31 was $54,156 prior to completion of the lake while the average value after completion of the lake was $242,461 (Table 6). The average value of gross real estate was $218,348 prior to lake construction and $321,656 after completion. The gross real estate in district 31 was adjusted for the addition of district 32 in 1968 which caused the large increase shown in Table 6. Public service increased at a rate of $9,820 per year before the lake was built and this rate increased to $27,069 per year after the lake was completed.

In district 31 the assessed values of personal property, gross real estate and public service have increased. The impact of the lake on this area has been reflected in the marked increase in personal property assessment which indicates an increase in population and development. An increase in population brings more presons to the community that are in need of services from the taxes paid.

In school district 70 for the first 6 years before the lake was built, the average value of personal property was $44,230 (Table 7). During the 3 years of lake construction, this value increased to $75,005; however, after the lake was completed it dropped to $42,430. The only period in which personal property increased in school district 70 was during the construction of Lake Thunderbird. If one considers the average

TABLE 6

ASSESSED VALUE OF PERSONAL PROPERTY, GROSS REAL ESTATE AND PUBLIC SERVICE IN SCHOOL DISTRICT 31 BY TAXABLE YEAR

Taxable Year	Personal Property (All Items Except Real Estate) In Thousands of Dollars	Gross Real Estate (Before Homestead Including Land and Improvements) In Thousands of Dollars	Public Service (Pipelines, OG & E, ONG and Telephone) In Thousands of Dollars
1957	37,545	70,805	47,275
1958	46,120	167,925	99,206
1959	68,710	173,325	98,470
1960	84,555	200,030	104,796
1961	52,255	236,275	101,230
1962	59,155	247,510	100,832
1963	60,710	267,205	127,028
1964	46,950	282,205	136,039
1965	31,400	319,850	135,661
1966	71,985	331,025	137,524
1967	223,590	358,300	137,032
1968	242,725	489,850	286,401
1969	271,350	521,535	296,692
1970	293,215	542,445	297,808
1971	291,510	577,855	311,719
1972	302,855	668,955	327,013

TABLE 7

ASSESSED VALUE OF PERSONAL PROPERTY, GROSS REAL ESTATE AND PUBLIC SERVICE IN SCHOOL DISTRICT 70 BY TAXABLE YEAR

Taxable Year	Personal Property (All Items Except Real Estate) In Thousands of Dollars	Gross Real Estate (Before Homestead Including Land and Improvements) In Thousands of Dollars	Public Service (Pipelines, OG & E ONG and Telephone) In Thousands of Dollars
1957	37,000	98,575	119,155
1958	46,670	103,240	118,326
1959	35,820	104,605	117,969
1960	53,165	117,085	123,543
1961	57,060	130,245	122,831
1962	35,655	120,865	114,344
1963	68,725	242,390	179,860
1964	79,470	319,010	201,571
1965	76,820	339,870	201,508
1966	45,930	355,095	197,308
1967	53,530	362,615	199,300
1968	35,880	371,080	209,199
1969	44,795	384,080	212,262
1970	39,600	394,885	219,056
1971	38,760	404,815	298,580
1972	37,855	476,435	321,222

value of gross real estate was $175,098 before the lake was built and it increased to $392,715 after construction was completed. Public service in district 70 increased at a rate of $9,150 per year and this rate increased to $31,988 per year after the lake was constructed.

School district 70 has been penalized more from the presence of the lake when compared to school district 31. Their tax base has increased and the personal property has decreased, which indicated little increase in population or development. The persons in this district have been taxed at a rate equal to that of the other districts but they have not had the development to place the same demand on community services.

Prior to the completion of Lake Thunderbird, the market value of land in the area ranged from a low of $3.13 per acre to a high of $250 per acre, where the latter included some mineral rights (see Table 8). The majority of the land was sold in large acreages before the lake was completed, while the tendency for smaller acreages to be sold as part of an addition was more pronounced after the lake was completed. Five of the 17 additions that were studies in the vicinity of the lake were in existence before the lake was completed. In the first few years after the lake was completed there was a wide variation in the price per acre of the land in additions; however, the higher priced acreages were located in the additions that existed before the lake was completed and had more development and improvements than other additions (see Table 9). The increase of market value in land around the lake was better than 1,000 per cent for the periods covered in Tables 8 and 9 for all years. The sale of land in the vicinity of the lake has been facilitated by the creation of additions, which have given the consumer the impression that their land

TABLE 8

SALES PRICE OF LAND BEFORE LAKE
THUNDERBIRD WAS COMPLETED

Year	Acres of Land	Sales Price in Dollars	Sales Price Per Acre in Dollars
All Years	2,560.51	190,000	74.20
1947	152.41	1,000	6.56
1950	160.00	2,000	12.50
1954	40.00	500	12.50
1955	160.00	500	3.13
1955	137.66	6,500	47.20
1955	80.00	6,500	81.25
1955	480.00	1,500	3.13
1956	160.00	4,500	28.12
1956	10.00	500	50.00
1957	160.00	7,500	46.88
1958	80.00	3,000	3.75
1960	82.98	12,500	150.63
1961	80.00	6,000	75.00
1962	320.00	60,000	187.50
1962	160.00	20,000	125.00
1962	66.66	13,000	195.00
1962	66.00	12,000	181.82
1963	80.00	12,000	150.00
1963	80.00	20,000	250.00
1964	4.8	500	104.16

TABLE 9

SALES PRICE OF LAND AFTER LAKE
THUNDERBIRD WAS COMPLETED

Year	Acres	Sales Price in Dollars	Sales Price Per Acre in Dollars
All Years	85.93	114,278	1,330
1967	2.41	1,000	415
1967	2.77	2,588	934
1967	3.00	2,000	667
1968	2.41	4,000	1,660
1968	5.54	4,000	722
1969	2.41	3,000	1,244
1970	5.00	10,500	2,100
1970	2.23	2,500	1,121
1970	2.23	1,500	673
1971	2.41	4,000	1,660
1971	2.23	2,000	897
1971	2.23	2,000	897
1971	2.51	2,500	996
1971	2.51	2,500	996
1971	2.51	2,500	996
1972	4.88	5,500	1,127
1972	4.88	6,500	1,332
1972	4.88	6,500	1,332
1972	2.23	2,000	897
1972	3.00	4,000	1,333
1972	2.77	4,000	1,444
1972	2.50	6,000	2,400
1972	2.50	5,000	2,000
1973	2.77	4,500	1,625
1973	3.00	5,845	1,948
1973	3.00	5,845	1,948
1973	2.50	3,000	1,195
1973	2.31	4,500	1,948
1973	2.31	4,500	1,948

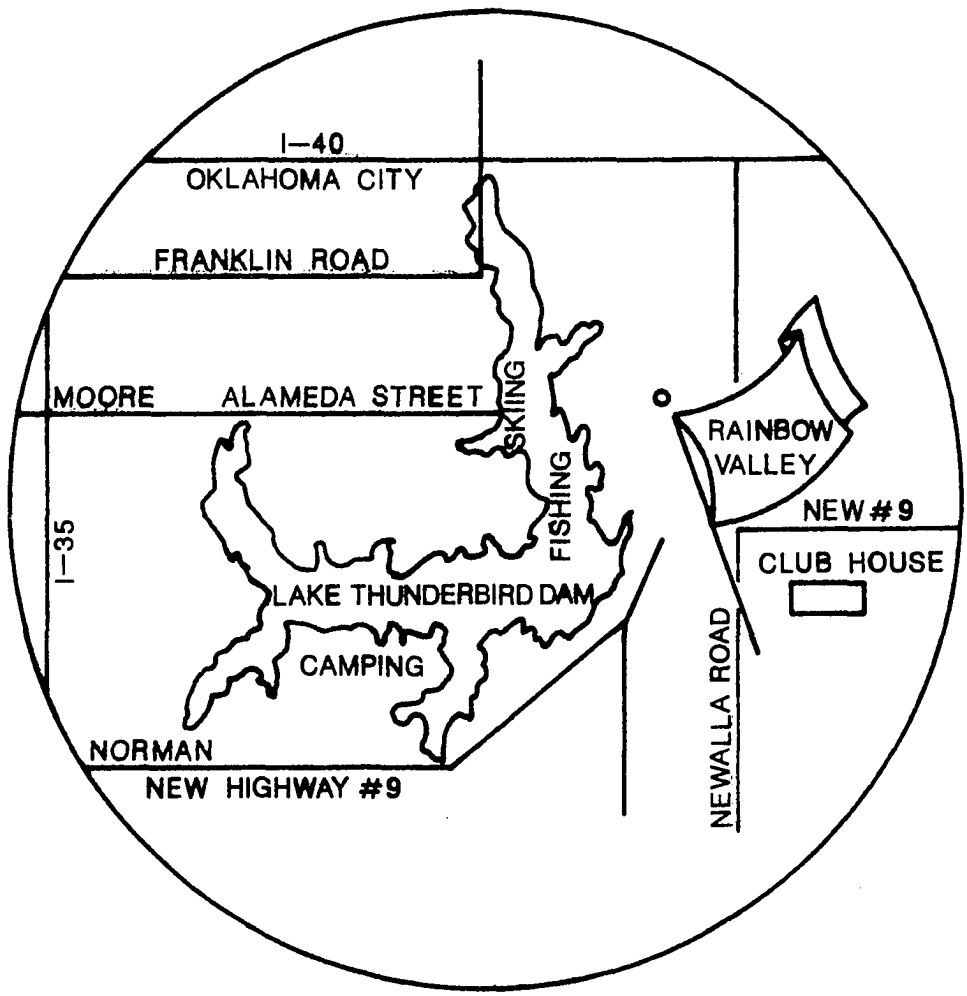
will be part of a suburban development which, in fact, may never come into existence. Some developers have been able to convince consumers that he or she is not purchasing a piece of land but a site where recreational benefits are immediately available; in such cases the developer has used the mass media to promote sales in the vicinity of the recreational area (see Figures 2 and 3).

The Norman City Planning Department has made an estimate on the rate of development in the platted additions which have undeveloped acreages. If the 1972 rate of development continues then it will take 16.3 years for those acreages to be developed. The development rate is limited by the fact that it was based on the number of building permits issued during that year and it does not reflect any of the demographic or sociological changes that could occur in the area over the next 16 years.

Recreationally Oriented Businesses

Commercial development observed along the access roads to Lake Thunderbird included "bait for sale" stands, boat storage facilities and "one stop" groceries that sell gasoline. In each instance the lake was considered as an influence on the location of businesses in the area.

From interviews and observations, the typical "one stop" grocery is run by family and friends and employs no outside help. Although the majority of these stores were located on commercial sites that existed before the lake was built, none of the owners had been in the location for more than 2 years indicating considerable change or turnover. In one case a customer remembered the store being in that location since the



INVEST IN ONE OF OKLAHOMA'S FASTEST GROWING AREAS: 20 MINUTES FROM NORMAN, 20 MINUTES FROM SHAWNEE, 45 MINUTES FROM OKLAHOMA CITY, JUST 5 MINUTES FROM LAKE THUNDERBIRD

Figure 2 -- Use of Lake Thunderbird by developers for sales promotion

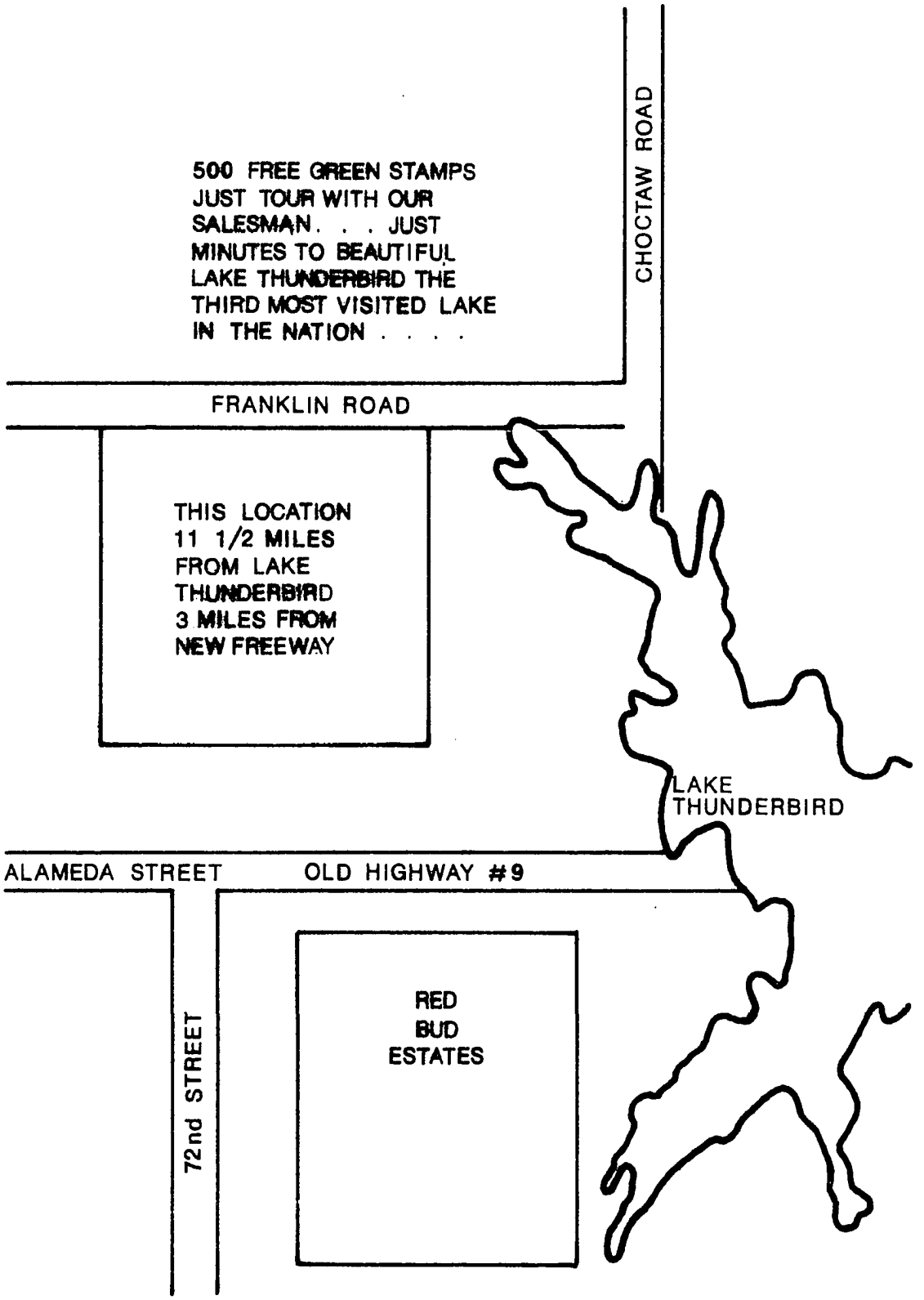


Figure 3 -- Use of Lake Thunderbird by developers for sales promotion

early 1930s. The inventory of the groceries represented capital investments ranging from several hundreds of dollars to $10,000. The capital investment in the property for one grocery was said to be $30,000 by the owner, while another owner felt that with leased gasoline equipment her property was worth an $80,000 capital investment; however, several persons were reluctant to talk about their personal finances.

In 1964 and 1965, there were four recreationally related businesses listed in the Norman telephone directory, which offered boat services. By 1970, the services related to water sports and boating had increased to 9 with a considerable expansion of the types of products and service offered (see Figure 4).

Interview with Harold Cooksey

Harold Cooksey is a retired businessman, a resident of Norman and has been involved in wildlife and conservation activities within the state for many years. He served as a member of the Water Study Committee under former Governor Gary, President of the Oklahoma Outdoor Council, Director of the Oklahoma Wildlife Commission, President of the Central Oklahoma Water Users Association and was instrumental in the establishment of Norman Project, Little River Reservoir.

In 1959 and 1960, Cooksey presented the case for recreational and fish and wildlife benefits at Lake Thunderbird before the Senate in Washington (51).

> House Document 420, 85th Congress, 2d session, on pages 106 and 118, shows the recreation values to be $100,000 per year, and the fish and wildlife values at $190,000 per year. The capitalization of these two items would amount to approximately $10,984,090 over the life of the project. This seems to be a huge sum, but when one realizes that within a radius of 50 miles of this lake reside one-third of the

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Boat Repairing

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Womack & Simmons Boat & Motor Repair
6520 Alameda--329-5284

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THUNDERBIRD

SERVICE DEPARTMENT & REPAIRS

364-3061 or Okla. City Phone **794-8334**

If No Answer Call Okla. City 794-6093

1315 24 AVENUE S.W.

Figure 4--Number of recreationally oriented businesses in 1970 Norman yellow pages

> population of Oklahoma, and that Oklahoma is an outdoors-conscious State, as evidenced by the fact that there are 600,000 resident license holders, the sum does not seem out of proportion. We feel that the impact of this lake, if properly managed, will be felt far beyond the borders of Oklahoma. Many vacationers visit Norman and Oklahoma City annually. The site is just a few miles from U.S. 77 and 66, and Interstate 35, which funnel many people into central Oklahoma each year from every State in the Union. It is inconceivable that many of these people will not stay for a day's fishing. The lake will be located in the heart of wooded hills, which should furnish beautiful surroundings for a spring or autumn vacation, and it is to be expected that it will be utilized to the fullest by the populations of Oklahoma and other States.

According to Cooksey, the present impact has been from the proliferation of building, terrific inflation on land prices and fast growth. The city of Norman has already reached the population that was predicted for 1980 in the 1953 Bureau Reclamation's report on the water needs of Norman and the vicinity. Water attracts people and Cooksey felt that if the water was not there the people would not be there. No one had the idea at the time the lake was built that so many persons would come to the area for recreation and to live.

Cooksey has maintained a feeling of responsibility and interest for the lake for many years, part of his interest was stimulated by the remarks of John McBride, who was Senator Kerr's assistant.

> Now Harold, that lake is in a perfect position to become the most polluted lake in Oklahoma. Now you go back to Norman and try and keep that thing clean. It is going to take a struggle.

On the morning of this interview, Cooksey had been to a radio station to make a tape. While at the station, he heard an advertisement which he thought reflected the impact of the lake on the Norman community. The advertisement was for campers sold in Norman. It encouraged persons to buy a camper and go out to Lake Thunderbird.

Until 2 years ago, there was no formal way for Cooksey to channel his interest in the quality of Lake Thunderbird. At that time, the City of Norman formed an Environmental Control Advisory Board. The interest and reports that have been shown in the lake by the board are shown in Appendix A.

In retrospect, Cooksey felt that in light of the present conditions at the lake, he would finance the lake locally, if he had to build it today. His present opinion concurs with the Department of the Army's field comments on the Norman Project in 1954 (52).

> The report shows that municipal water supply is the principal justification and that the only primary Federal interest is flood control . . . . It may be appropriate for local interests to construct the project with the Federal government paying costs allocated to flood control.

Law enforcement was another problem mentioned by Cooksey in that there are several agencies involved; wildlife rangers look after the wildlife, public safety, the boating and the Sheriff's Office and Norman City Police Department investigate crimes. Although, these agencies cooperate closely, Cooksey does not envision them as operating under the same directives and philosophies and this, he feels, hinders good law enforcement.

Crime and Accidents

The Norman Police Department does not normally keep separate records for the lake area; however, the number of crimes investigated in the area were 74 in 1969, 120 in 1971 and 61 for the first 6 months of 1972 (53). The total number of crimes investigated in the area increased 62 per cent from 1969 to 1971, while the crimes reported in 1971 ap-

proached the 1970 crime index for Cleveland County which was reported as 137 (54). In the first 6 months of 1972, the number of crimes reported were half those reported in 1971. Since this included the off season for the lake, one would expect an increase for that year once the lake reached the months of greatest utilization. The crimes investigated included petty thievery, vandalism, burglary and grand larceny, of which petty thievery and vandalism have been reported most frequently. One of the officers felt that many crimes in the area do not go on record because some persons wait until they return home to report them to their local police department which has no jurisdiction in the lake area.

In 1969, 91 traffic accidents were investigated by the Norman City Police Department and in 1971, 109 were reported. The majority of the accidents in the area were accidents without injury. The Police Department has lowered the speed limit on Alameda (old Highway 9) to reduce the accident rate in the lake area.

The Norman Police Department has been concerned about the development of boat safety on the lake and adequate facilities such as a boat to assist in cases where a drowning has occurred. In 1971, there were 5 drownings reported and for the first 6 months of 1972, 4 drownings were reported. The increased stress on the Police Department, which was not originally projected, is indicated in Appendix B.

Annexation by Norman

Impact on Absentee Shawnee Indians

The reservoir site was not originally a part of the City of Norman; however, in 1961, the city of Norman annexed the reservoir area,

drainage basin of the lake (not in the city limits) and other areas outside or urban Norman. The logic behind the annexation of the reservoir area was based on the $11.9 million public investment and the absence of County zoning which could cause a public liability or lead to pollution of the lake. The annexation expanded the area of Norman from 10 square miles to 186 square miles. At that time, area wise, Norman became the tenth largest city in the United States. There was some dissension about the annexation but it has been upheld in Federal Court and survived a grand jury investigation as well as an appeal in higher court.

Part of the annexed land was occupied by the Absentee Shawnee Indians who were members of a tribe which wandered the United States to avoid the encircling movements of the "white man." The Shawnees had never given up their dream of a home where they could live under their old tribal form of government and perpetuate their culture. In the latter part of the 17th Century the Shawnees were divided into two groups; one group lived in North Carolina and the other group lived in Tennessee. Later both groups moved to Ohio where they were united. In 1886, the Absentee Shawnee moved from Ohio to an area east of Norman (under the Dawes Act) onto restricted government land. This area was named Little Axe, after an enterprising Mexican (Billy Little Axe) who was adopted by the Shawnee and also established a trading post in the area. In 1961, 200 Shawnee Indians resided in the area which is now the floor of Lake Thunderbird. Even though the Bureau of Reclamation paid all persons whose land became flooded, this did not represent a substantial amount of money because so many persons were heirs to parcels of land. Mrs. Little Jim, widow of the Shawnee Chief stated, "The Indians know, however,

that the dam and its lake will be beneficial to the area.... They will accept this as their people have accepted uprootings in the past." At the same time that the Shawnees were being displaced from their land, the State Land Commission had 320 acres of land in the area that could be sold only through auction. Reverend Ted Reynolds, a missionary working with the Shawnees, devised a plan whereby the mission would pay for the land and the Bureau of Indian Affairs would hold the land in trust, thus the Bureau of Reclamtion would pay the other bureau through intra-Interior Department arrangement. The land was offered for auction at 25 per cent down and 25 years to pay off the mortgage, however, if the land was for Indian use there could be no mortgage attached. Reynolds was prepared to pay the appraised price of the land which was $50 per acre, but the land was sold to another bidder for $44,000. In the initial report on the Little River Project, each Federal agency was asked to submit a statement about the project, the Bureau of Indian Affairs made no statement about the relocation of the Shawnees. However, they did state that "There were Indian tracts within the project which might benefit from the project development (51)."

Interview with Reverend Ted Reynolds

In 1952, Reverend Ted and Maude Reynolds established the Maude Reynolds Memorial Mission from personal funds. In addition to religious activities they secured clothing, hospitalization and medical care for the Shawnees and opened a library for the community in 1963. According to Reynolds (Ted), 50 families were displaced by the lake, the majority of whom did not receive sufficient funds to relocate. He felt the dispos-

session of the Indians from the land where they felt that they were a part of the good earth and where their dead were buried, caused a spiritual loss which was essential to their well being.

Reynolds also felt that the people who use the lake do not have any concern for the community or the ecology of the lake.

> They treat it more as a dump ground than as a place where people should have some enjoyment and pleasure and recreation. Just immediately in front of us, we are close to the lake, I spend a great deal of time picking up bottles, cans and stuff that people throw from their cars and empty from their boathouses along the road. If people would have some concern and care about taking care of what they have been blessed with, it would not be so difficult. People throw everything along the highway; they throw it into the lake and around the water front. The library that was a part of the Mission has been closed due to repeated vandalism and trespassing. The disrespect that people have shown up to this time has been one of the tragedies of the community.

According to Reynolds, opposition was voiced about construction of the lake in the area, but it was silenced or ignored by powerful politicians. The lake has not brought employment to the community. Persons still go into Tinker, Shawnee and Norman for employment as they did before the lake was built. He considered the annexation as having added to the problem since the community had no voice in its fate and it has been taxed for services that it does not receive.

Location of Lake Thunderbird in this community has been of negative benefit in that an established culture was relocated without regarding its means of survival. The community has also been subjected to taxation without the benefits of urban living such as sewage treatment, water supply, fire department and immediate police protection.

Impact on Agriculture

During the Run of 1889, several families settled east of Norman where there was water and trees. As Norman became the urban center for the area many of the families moved into Norman while the families that remained in the area continued to farm. In the 1930s the area was described as predominantly agricultural, shortly after the depression there was an exodus from the area to California which made large areas of land for sale at a reasonable price. Some individuals acquired large amounts of land, thus ranching became predominant in the area, up until the time the lake was built. According to one source the ranchers in the area protested building the lake on this property (55). The objection could have been based on the initial estimates of the 11,600 acres of land that would be inundated by the lake. This acreage included 571 acres of alfalfa, 2,214 of alluvial open pasture, 2,156 acres of upland pasture, 4,140 acres of wooded pasture, and 2,519 acres of corn, grain, sorghums, cotton, stalk and Johnson grass pasture, wheat, oats, cotton seed and small grain pasture. The Bureau of Reclamation estimated the acquisition of this land to cost $995,000 or about $85 per acre. Later 7,000 acres were acquired for the reservoir with flow easements on other land between the boundary and the project or it may be used for agriculture and other open uses (51). The value of farm production in the area was estimated as $137,331, which amounted to a net farm income of $55,000 (51).

CHAPTER VI

SUMMARY AND CONCLUSIONS

This study was designed to predict the impact of population on a water based recreational facility and to determine the environmental, economic and social impact of the facility on the community. Lake Thunderbird was used as a laboratory model in this study. The household population, total population and a potential population for the year of 1960 was used to predict the impact of population on the environment of the facility. Cleveland County Court records were searched to determine the impact of the lake on land sale prices and the tax base in school districts. Crime and accident records were obtained from the Norman Police Department to estimate total numbers of crimes and accidents in the lake area. Businesses that catered to recreational needs in the area were determined with respect to location of the lake and the increase in numbers after the lake was built. The sentiment and attitude of the community toward the lake was determined through personal interviews with Harold Cooksey and Reverend Ted Reynolds. The former has served as chairman of the committee which built the lake and the latter is a member of the community that was annexed to facilitate building the lake.

Based on the results obtained from the population data that was available when the lake was built, the following conclusions have been drawn:

1. There were enough data available in the early 1960s to gain insight into the number of visits to the lake using the total population of counties within a 50 mile radius of the lake and the number of visits to Oklahoma State Parks and the number of visits to similar facilities in other regions.

2. When the actual number of visits to the lake were compared to the number of visits expected in this study, the former value fell between visits based on per capita attendance at local state parks and visits based on per capita attendance at other reservoirs.

Based on the physical environment at the lake site before and after the lake was constructed, the following conclusions have been drawn:

1. The climate of the area was such that maximum use of the recreational facility should have been expected.

2. The information on the type of soil and vegetation in this area was available when recreational development was initiated; thus, over population by users has caused erosion and massive gully formation on the shore of the lake.

3. The quality of the recreational environment has become hazardous to the user during peak recreational use due to over population of areas where close body contact water recreational activities and boating activities are pursued. The former activities increase the fecal contamination in the water and the latter activities create a safety hazard to users and the authorities responsible for water safety.

4. The solid waste problem which has been the result of over population can not be handled by the present conventional methods used at the park.

Based on the economic data obtained in this study, the following conclusions were drawn:

1. The price of land has increased in market value due to the lake being located on that site.

2. The effect of the lake on the tax base has not been beneficial to undeveloped areas, but it has been more beneficial to those in developed areas.

3. The number of businesses oriented toward recreation has increased since the lake was built. However, the cost of recreation to the community with regard to increased police protection, treatment and removal of waste, correction of erosion and gully formation and loss of esthetic qualities should be considered.

Sociological data collected in the community has influenced the following conclusions:

1. There has been a polarization of persons in the community due to the annexation of the Little Axe area by Norman. This has been reinforced by urban taxation of rural areas which have not received immediate police and fire protection, sewage treatment, water supply and other urban utilities.

2. The number of crime and accidents has increased in the area since the lake was built. This has placed a certain amount of stress on the Norman Police Department.

3. An ethnic group with an established culture and history in the area has been uprooted without regard to re-establishment or relocation as a group.

4. A predominantly agricultural community has been changed to

a recreational community.

Other conclusions and recommendations that have been drawn from this study are:

1. Lake Thunderbird was planned in a haste due to the competition with Oklahoma City for a source of water, which caused an oversight in planning and recreational development.

2. The non-reimbursable funds furnished by the Federal government for recreation could have been furnished by the three cities, and many problems that have existed because of overcrowding and overuse could have been avoided.

3. The community should have followed the advice given by several persons to build the lake with local funds, if recreational facilities were a part of the plan.

4. In order to alleviate some of the problems at the lake, there should be an integration of the administrative, maintenance and protection facets in the lake area.

5. The Environmental Quality Committee could become a cause of further polarization in the community when business and environmental interests conflict.

6. Further studies should be conducted to determine when land purchasers plan to develop their land; family structure, economic status and type of improvement should be included in these studies.

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APPENDICES

APPENDIX A

REPORT AND RECOMMENDATIONS

Water & Air Polution - Sub Committee

Environmental Control Advisory Board

Members of your Committee have conducted interviews with the Cleveland County Sheriff, the Norman Police Department, the Superintendent of the Park and the University of Oklahoma Medical School, in addition to Mr. Jim Townsend, member of the House of Representatives, Mr. Phil Smalley, State Senator from this District and Rep. Tom Steed of the United States Congress. A field trip also was made at which time the swimming beaches, the camping sites, the solid waste facilities, the Lagoon for Sewerage, the Marina, the Old Little Axe School and other areas were inspected.

From these sources, we arrived at the following recommendations:

1. Actions which should be taken by the Park Department.
   a. Additional manpower should be employed to properly police the area.
      (1.) Boat safety and general conduct on water safety and enforcement of rules should have additional personnel and training for patrol duties.
      (2.) Additional personnel should also be added for keeping rules enforced as well as cleanliness.
   b. Camping
      (1.) Camping sites should be established, marked and permits issued. When they are full, others should be turned away.
      (2.) Camping should not be allowed where there are no sanitary

facilities.

c. Swimming should be confined to swimming areas only.

d. Increase the number and convenience of sanitary facilities.

e. The Marina should be moved farther away from water intake area. The polution in this area is obvious without scientific testing.

f. Soil Erosion. It is quite obvious that little attention has been given to soil erosion due to so many people, 2,300,000 in 1971. Some parking areas as well as camp sites have had no surfacing and have been eroded down to the sandstone of the area. Wave action on some of the unprotected banks is becoming an obvious problem. This adds to the expense in filtration systems of the cities using the water and is destructive to the fishery.

2. Central Oklahoma Master Conservancy District.

a. The Conservancy District should call to the attention of the U.S. Congress and the Bureau of Reclamation the small sum of non-reimbursable funds which were originally incorporated in the cost-benefit ratio in allocating the expenses involved in the construction of the lake and grounds. This should be done by a petition to the Congress for a new survey and re-allocation due to the vastly increased usage of the lake.

b. Investigation and Correction of Soil Erosion where wind-driven water is damaging the banks and causing increased difficulty in filtration and destruction of the fishery and the park.

c. Although the Conservancy District employs a full time Sanitarian

for inspection of private and public sanitary facilities, no provision is made for continuing inspection of maintenance and upkeep on such facilities. It is the feeling of the Committee that either by ordinance or State law that sanitary facilities on private and public lands should be inspected regularly to see that they are operating at full efficiency. This recommendation is being made in view of the fact that there appears to be no evidence at the present time of any pollution coming from outside the lake. It is merely a precautionary recommendation to prevent any future damaging contamination.

d. The Committee was not able to determine what had been done about sewage disposal at the Old Little Axe School. If the original septic tank and lateral field is still being used, it should be abandoned and new facilities worked out so that this would not be a potential source of damaging pollution.

3. The Oklahoma Legislature.

a. Determination should be made as to the number of personnel and amount of equipment needed to bring about a guarantee that this lake will not be a polluted body of water. Adequate appropriations should be provided.

b. The necessary laws should be introduced and passed by the Oklahoma Legislature to provide the Health Department and the Park Department with enforcement of the necessary rules and regulations to guarantee that no pollution be permitted.

(1.) A proper Water Safety Code should be adopted.

(2.) Consideration should be given to a Boat Operator's License

granted only after written examination. Fees from this source could be used for financing an adequate police force by the Department of Public Safety.

4. The Cities Comprising the Central Oklahoma Master Conservancy District.

   a. The City of Norman.

      The City of Norman should enact the necessary ordinances for the continuous inspection and cleaning of sanitary facilities on private lands with the city limits. Some provision for solid waste should be made for private property.

   b. The other cities which comprise the Master Conservancy District should do the same thing within their city limits as prescribed for Norman.

   c. Oklahoma City.

      Oklahoma City should be requested to enter into a program similar to that recommended for the other cities.

In conclusion, it must be stated that some of these recommendations are based on insufficient data and it is the feeling of the Committee that continued investigation should proceed; that it is the obligation of the governmental agencies to conduct them and make sure that the water supply of the three (3) cities involved is not contaminated. No investigation was made as to the findings of the Health Department in connection with the filtration plants nor any difficulties they might have in connection with purification of the water.

We should point out that no investigation has ever been made regarding

the possibility of contaminating viruses and that the present governmental minimum standards are just that: minimum standards. And due to the obligation which the City of Norman particularly has in connection with the University of Oklahoma, it is quite important that we not stop at minimum standards but proceed to make sure that this supply of human consumed water is pure at all times.

Respectfully submitted,

Harold S. Cooksey, Chairman

Dr. Elroy Rice

Mrs. Frances Fowler

Glenn Sullivan

APPENDIX B

July 28, 1972

Mr. Vernon J. Frye, Chairman
Environmental Control Advisory Board
Norman, Oklahoma

On July 24th, 1972 I personally interviewed Mr. Bill Porter of the Sheriff's office and Captain Rawlins of the Police Department of the City of Norman regarding their activities in the area of Lake Thunderbird.

The following comments were made by Mr. Porter:

#1 The patrol forces on the lake should be doubled at least and more patrolmen would not be amiss. The patrolmen are inadequately trained, inadequately equipped and without the proper vehicles or communication equipment.

#2 There seems to be only slight difficulties in connection with the jurisdiction of the various governmental agencies but any activity in the park areas is under the supervision of the City, the County, the Park Board and the Highway Patrol.

Although no records are kept in connection with the numbers of crimes committed in that area by the Sheriff's office, they seem to rank as follows: Petty thievry, Vandalism and Major Crimes.

This is about all that Sheriff Porter had to say.

Captain Rawlins was quite cooperative and although he did not, at the time, have a full transcript of the crimes committee on the lake for the last year and a half, he has promised to get this to me.

From memory he suggested there would be about 150 crimes per year. Crimes since the first of January, 1972 were complete and we have a table enclosed which shows the type of crime and numbers.

Captain Rawlins' comments were that there was a shortage of water patrolmen to supervise the numbers of boats on the water; that there are no qualifications or code for water conduct. In fact he stated that they had one diver who was attempting to recover a body when he heard a propeller from a boat directly over his head. This boat had disregarded the buoys in the water to designate that there was a diver in the water. This fellow has now declined to enter the water again.

Captain Rawlins feels that our Legislature should adopt a boat safety or water safety code.

The remainder of the statistics will be supplied soon.

Harold S. Cooksey

HC:LB

APPENDIX B--(Continued)

July 28, 1972

Mr. Vernon J. Frye, Chairman
Environmental Control Advisory Board
Norman, Oklahoma

On July 26, 1972 Dr. Elroy Rice, Member of the Committee, and I went to the State Parks at Lake Thunderbird and personally investigated various things. We interviewed Mr. Robert Morren, Superintendent of the two state parks located on Thunderbird. Mr. Morren stated that he had in the employ of the Parks, eleven (11) employees; that as an example, Lake Murray has thirty-five (35 permanent employees. Mr. Morren has one patrolman in the parks on a permanent basis and two seasonal patrolmen. He feels that he needs at least 5 patrolmen to handle the situation and he feels that he should have substantially more maintenance help.

We visited one of the lagoons where the sewa e is disposed of and found it in good order without odor and well-kept. As for location or other qualities we did not feel capable of judging. We did not visit the one on Clear Bay but the one on Indian Point.

We also visited the solid waste disposal area where we found that inadequate facilities are available for the proper covering of solid waste. They use one tractor for the two solid waste areas and this means the transporting of a tractor about 8 or 10 miles every time the garbage is covered. The operation is principally a buring operation rather than a compacting landfill type operation. They have about three (3) pickup loads of solid waste from each park daily between Monday and Friday. Then it increases substantially. The money spent on the park by the Park Board has been substantially the same during the past 3 years.

On weekends the traffic is extremely heavy and averages about 2580 campers per day and 1126 trailers. The handling of crowds seems to be as good as could be expected with the staff that is supplied by the State Park Department. Dr. Rice and I proceeded to the Clear Bay area and our attention was directed toward several things.

#1 The open stable for the riding horses which is substantially away from the lake, but as far as we could determine, has no unusual sanitary precautions.

#2 We proceeded to the old Little Axe School which is now the Little Axe Community Center and from our observation (this has not been definitely verified) the lateral field for the disposal plant for this facility has not been changed and is roughly in the same area as it was when the building was used for the Little Axe School. The public uses this building and uses the sewerage system regularly. The lateral field is almost at water level and now and there is some evidence that it has been under water in the past. If the lake were to be completely filled, we feel that this lateral field would be under water. This should be changed immediately, in our opinion.

Soil Erosion - It is quite obvious from a perfunctory examination of the parks that little or no attention has been paid to soil erosion. This is an untenable situation. The soil in that area is of such a nature that it easily, when disturbed, will float into the water. In some instances parking areas are not even paved. We found no evidence of paving or soil stabilization of camping sites. Water side camping is permitted and unpaved roads lead directly into the water which creates a situation that is very difficult to control. This is one area where there should be a major program inaugurated or the lake will be silted far before its time.