

VISITOR USE AND RECREATION PLANNING
FOR ARCADIA LAKE

BY

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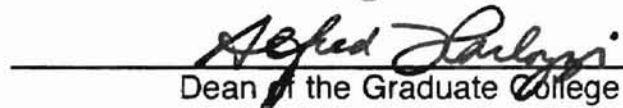
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CHAPTER I
INTRODUCTION
Background

Historically, the provision of parks and recreation services by local governments was a response to the plight of those living in cities in the latter part of the 19th century. Due to intense development of land for industrial purposes, many of the urban poor were cut off from play areas (Kelly, 1983). The first recreation reformers were motivated by inequities between the wealthy, who could afford to relocate away from city centers, and the poor working-class, trapped in inner-cities by a cycle of poverty and over-crowding. The urban recreation movement determined those unable to pay should have access to activities the wealthy could afford to purchase (Kelly, 1983). From this beginning has grown the assumption that outdoor recreation is an American birthright (Douglass, 1993).

In the early years of the recreation movement, preferences of recreation users were not formally assessed. According to Summers (1987), citizen participation and needs assessments for recreation originated in the aftermath of World War II, and since that time most major congressional acts have mandated "citizen participation in administrative policymaking and program evaluation" (p.8). State and local governments followed suit and instituted the practice of citizen participation (Summers, 1987). In 1958 the first nationwide study requiring an assessment of outdoor recreation in the United States was mandated by Congress (Douglass, 1993). The Outdoor Recreation Resources

and Review Act (PL 85-470) created a commission to determine, among other things, the outdoor recreation wants and needs of Americans.

Interest in assessment was prompted by growing participation in outdoor recreation. This growth has been attributed to increases in population, income and leisure time in the years following World War II. The interstate highway system, which made wildland areas more accessible, was also an important factor in the swelling interest in outdoor recreation. Later, technology expanded the type, efficiency and availability of recreational opportunities (Clawson & Harrington, 1991).

While participation in outdoor recreation has increased, available wildland areas have decreased, often resulting in conflicts over use of publicly owned lands. This struggle occurs not only between recreational and nonrecreational users, but also among devotees of the same sport who differ over its acceptable expression (Sharpe, Odegaard & Sharpe, 1994). Campers, for instance, run the gamut from those who prefer developed campgrounds supplied with electricity, hot water and play equipment for children to the outdoor enthusiasts whose camping experiences are enhanced by the lack of such amenities. Divergent expectations present a challenge for management of wildland recreation. Though recreation is for the benefit of all people not all users can be accommodated at all recreational settings. Management's predicament is determining which recreational pursuits to provide.

Arcadia Lake, in Edmond, Oklahoma serves as an example of a wildland area with competing demands for its use. Visitor suggestions for recreation at the lake include such diverse activities as off-road vehicle trails, paddle boats and a golf course. This study was undertaken to furnish Arcadia Lake management personnel with information intended to guide decisions concerning appropriate activities, programs and facilities for lake visitors.

Recreational opportunities at the lake must meet the needs of the community while preserving its rustic character and ecological and municipal functions.

Statement of the Problem

Physical Setting and Characteristics of the Resource

Arcadia Lake is a flood control lake on the Deep Fork River. The Army Corps of Engineers, Tulsa District, completed construction of the lake, including the embankment and the recreation areas, during the summer of 1987. Arcadia Lake, which includes the lake and lake environs, is located within the city limits of the City of Edmond in Oklahoma County. The lake at normal pool is 1,820 acres with a surrounding land base of 5,762 acres (Table I, page 4). The state of Oklahoma owns the water. The Army Corps of Engineers owns the property and leases 5,312 acres of land to the City of Edmond and 450 acres of land to the Oklahoma Department of Wildlife Conservation (ODWC). Each agency manages their respective acreage independently; the Corps, however, retains the right to approve administrative decisions and actions affecting Arcadia Lake (U. S. Corps of Engineers, 1980).

The impoundment making Arcadia Lake includes a 5,250 foot long rolled, earth-filled dam, a controlled-type outlet works, an abutment spillway, and support facilities. The spillway is concrete with a maximum height above the streambed of 104 feet. The dam is located at mile 213.8 on the Deep Fork River. With initial watershed conditions, storage of Arcadia Lake was anticipated to yield 11 million gallons per day, but with future urbanization yield was expected to increase to 15 million gallons per day (U. S. Corps of Engineers, 1980). The City of Edmond Water Treatment Plant currently treats an average of 3.9 million gallons per day (Edmond Department of Public Works, 1999).

Basin Hydrologic Summary

The headwaters of the Deep Fork River are in the metropolitan area of Oklahoma City. The drainage area, which covers approximately 105 square miles, is roughly rectangular in shape with a length of about 25 miles (Appendix A). Arcadia Lake is in the northeastern portion of the watershed (U. S. Corps of Engineers, 1980). Approximately 32% of the Arcadia Lake drainage area is defined as pasture and range land and 18% as forest and cropland. This vegetative cover provides valuable protection for the quality of surface waters running into Arcadia Lake. The remaining 50% of the watershed is defined as urban and includes roads, human habitation, cities and additional surface water in smaller impoundments (Oklahoma Department of the Water Resources Board. Report in draft, 2000).

TABLE I
MORPHOLOGICAL CHARACTERISTICS OF ARCADIA LAKE

Morphological Features	Normal Pool	Flood Pool
Elevation	1006	1029.5
Surface area (acres)	1820	3820
Mean depth (feet)	16	
Capacity (acre-feet)	27380	64430
Shoreline (miles)	26	
Contributing drainage area (square miles)	105	105

Climate Summary

The mean annual temperature for this region of the state is approximately 61 degrees Fahrenheit. Normal annual precipitation over the watershed above the dam is approximately 31 inches. Approximately 67% of the normal annual precipitation occurs during the months of April through September. The average annual snowfall is approximately eight inches and has a minor effect on flooding. Prevailing wind is from a southerly direction with greatest movement

during the spring months. A wind velocity of 45 miles per hour is the highest wind velocity which can be expected for a duration of an hour or more (U.S. Corps of Engineers, 1980).

Water Conditions

The Oklahoma Water Resources Board sets the standards for beneficial uses for water and has approved Arcadia Lake for the following: municipal water supply, warm water fish and wildlife propagation, primary body contact recreation, industrial and municipal processing and cooling water, and esthetics (OAC Title 785).

Management of the Resource

The original authorization for Arcadia Lake specified the following purposes for the lake: 1. flood control; 2. drinking water and; 3. recreation (U. S. Corps of Engineers, 1980). In addition to those purposes, the lake and environs are now managed for water quality, fish and wildlife. The ODWC portion of the lake property is used for aquatic education in the summer and opens for deer hunting in the fall (Oklahoma Department of Wildlife Conservation, 1999). The agency maintains no permanent structures on the property, but has tentative plans for constructing ODWC headquarters on the site.

Each of the four Arcadia Lake parks, in addition to the wildlife management areas, is managed by the City of Edmond as part of their Department of Parks and Recreation. Approximately 180 acres have been developed for recreation and include four separate areas consisting of 150 camp sites, three covered group pavilions and three swim beaches (See Appendix B for map). The only 36 hole disk golf course in the state is located at the lake. Activities sponsored by lake management include fishing clinics, live animal programs and outdoor classrooms. Project Learning Tree, Nemaha

Ridge Triathlon, Kids Fishing Derby, Sailing Regatta and Duathlon, and Eagle Watch are the major yearly activities (Edmond Department Parks and Recreation, 1999b). Table 2 describes the variety of services and facilities available at each of the three parks and one closed campground.

Fishing is allowed within any open park area of the lake and from any boat with a maximum boat length of 28 feet. There are two areas designated as no-fee fishing sites. Skiing and personal watercraft are permitted in designated areas of the lake (Edmond Department Parks and Recreation, 1999b).

TABLE 2
RECREATION AREA DESCRIPTION AND AMENITIES

Amenities	Central State Park	Edmond Park	Spring Creek Park	Scissortail Campground
Boat launching ramp	*	*	*	
Boat trailer parking	*	*	*	
Camping, full hook-up sites	*	*		*
Camping, regular	*	*		*
Camping, tent		*		
Change house with outside shower		*	*	
Courtesy dock	*	*	*	
Designated swim area	*	*	*	
Disc golf course			*	
Kid's fishing area		*	*	
Multi-use trail	*	*	*	
Multi-use alternate trail	*	*	*	
Picnic areas	*	*	*	
Picnic pavilion	*	*	*	
Playground	*	*		
Restroom	*	*	*	*
Restroom with showers	*	*		*
Sanitary dump station	*	*		*
Softball field		*		

Recreation opportunities managers choose to make available at particular sites are often influenced by those available regionally. For this reason, the recreation opportunities offered by lakes within close proximity of

Arcadia Lake are relevant to the efforts of management personnel to provide appropriate opportunities; planning for Arcadia Lake should take into account those opportunities available at other sites within a certain proximity. Lakes Overholser, Hefner, and Draper are within a 20 mile radius of Arcadia Lake and are managed by the City of Oklahoma City. The use of all types of watercraft, both motorized and nonmotorized, are permitted on Lakes Draper and Overholser. Watercraft on Lake Hefner that measure 12 feet or less are prohibited from creating a wake, effectively outlawing personal watercraft. Waterskiing is permitted on Lake Draper, but not on Lakes Hefner and Overholser. None of the lakes zone, either by area of lake or by time or day, for particular types of watercraft. Swimming is not permitted on any of the Oklahoma City lakes, though windsurfing is allowed on Lake Hefner. Camping is not permitted at Lakes Hefner and Overholser, but is permitted within designated areas of Lake Stanley Draper (Oklahoma City Department of Parks and Recreation, 1999).

City of Edmond Demographics

The 1990 population of Edmond, Oklahoma was 52,315 (U.S. Census, 1990). The 1999 estimated population was 69,270, an increase of almost 31% during the decade. The estimated Edmond 1999 median family income was \$51,967. The State of Oklahoma's estimated 1999 median family income was \$31,595, while the United States' estimated 1999 median family income was \$40,926 (National Decision Systems, 1999). According to the 1994-1995 National Survey on Recreation and the Environment (NSRE), participation in recreation programs increases with income level; therefore, the Edmond community should have the potential for high levels of participation in recreation (Bowker, Donald, English and Cordell, 1999).

For 1999, National Decision Systems estimated that 64.7% of Edmond

households consisted of a married couple either with or without children. This is almost 17.1% higher than the national figure of 55.2%. Among single adults 19.1% were estimated to live alone, while 16.1% were estimated to be a household head (National Decision Systems, 1999). According to the 1990 census, almost 60% of Edmond households contained at least one child (U.S. Census, 1990). Arcadia Lake should be affected by the large numbers of Edmond households with children. The 1994-1995 NSRE survey reported that households with one or more children were the most likely to have participated in recreation (Bowker et al., 1999).

According to 1999 estimates, 29.2% of Edmond residents had some college or an associate's degree, while 28.2% had a bachelor's degree and 15.2% had a graduate degree. Nationally, 13.1% of Americans were estimated to have a bachelor's degree and 7.2% a graduate degree (National Decision Systems, 1999). Research indicates recreation patterns are often influenced by education level. The 1994-1995 NSRE reported that individuals with higher levels of education were more likely to have participated in local recreation and park services than those with lower levels of education (Bowker et al., 1999). The large percentage of Edmond residents with either a bachelor's or a graduate degree should also influence recreation patterns at Arcadia Lake.

Arcadia Lake Attendance

For 1995-1999 average attendance at Arcadia Lake, as tabulated by fee collection stations, was approximately 168,591 persons per year. Visitation for FY 1999 was 145,580, down from 187,635 in 1998. Visitor city of origin is not recorded, consequently there is no information regarding the number of visitors from Edmond or the number of repeat visitors. Six hundred eighty seven yearly passes, or approximately 78.4% of the total sold in 1998, were purchased by Edmond residents (Edmond Department of Leisure Services, 1999a). Lake

records, however, do not differentiate between passes belonging to Edmond residents used to gain admittance to the lake and those that do not belong to Edmond residents. Based on number of yearly passes sold, attendance at the lake, and population of Edmond, Arcadia Lake management considers the number of Edmond residents who visit the lake to be low.

Significance of the Study

Increasing usage of Arcadia Lake by Edmond residents is a goal of Arcadia Lake management. To achieve this goal, the programs, facilities and activities that attract and interest Edmond residents must be identified, as well as those that repel or disinterest residents. The acquisition of this information will contribute toward fulfilling an Edmond Master Plan III mandate which requires residents' recreational needs and desires to be considered in park planning. Goal PR 5 of the plan states that management must "develop, operate and maintain park land ... in a manner that is responsive to the site and the needs of the community" (Edmond Plan III Guide Text (final draft), 1999, p. 29). Goal PR 9 recognizes the need to "maximize the public investment in Arcadia Lake recreational facilities with continued efforts to make better use of facilities and opportunities while continuing to protect the rustic character of the lake environs" (Edmond Plan III Guide Text (final draft), 1999, p. 29).

Thus, the general purpose of this study is to elucidate the recreational needs and wants of Arcadia Lake visitors and Edmond residents in order to maximize the recreational potential of the lake while preserving its ecological and municipal functions. Specifically, this study seeks to achieve the following:

1. assess current patterns of recreation at Arcadia Lake;
2. delineate reasons for Edmond resident's low rates of participation in recreation activities at the lake and;
3. identify recreation opportunities that will increase lake use by Edmond

residents. To accomplish these goals the following research questions were developed and tested:

1. What effect does visitation and the perception of crowding have on actual visitation rates among frequent and nonfrequent lake visitors?
2. Which additional recreational opportunities at Arcadia Lake will make it likely that Edmond residents will visit Arcadia Lake more frequently?
3. What are the reasons Edmond residents do not recreate at Arcadia Lake?
4. What preferences do Edmond residents have for recreation at Arcadia Lake?
5. What benefits do Arcadia Lake recreationists derive from their visit?

Summary of Method

The research design employed in this study is the total design method as proposed by Dillman (1978). Specifically, this study is based on a modified Dillman mail survey. The modification of Dillman's total design method is the exclusion of the registered mail component as originally recommended by Dillman.

The Arcadia Lake Visitor Use Survey was distributed to Edmond residents via the postal service. Recipients of the mail survey were a sample of 726 Edmond residents drawn from the 1999 Southwestern Bell Edmond Telephone Directory.

A "pilot study" designed to test the reliability of the survey instrument was distributed at Arcadia Lake. Responses were to be coded and analyzed in the same manner as responses from the main survey effort and reliability coefficients calculated; however, Chi-square analysis of the demographic data from surveys distributed at the lake and those distributed via the postal service

revealed no differences depending on method of distribution. For this reason data were analyzed as a whole.

On September 1, 1999 the Edmond Sun newspaper featured a front page article about the Arcadia Lake research project (Appendix C). A brief history of the research project was included as well as an explanation of its purpose. Examples of survey questions were provided to familiarize the Edmond community with the survey.

The OSU return address was printed on the back of the Arcadia Lake Visitor Use Survey. The use of an OSU mail permit allowed the respondent to mail the survey with minimal effort and without personal expense.

Extent of the Study

The nomenclature "Arcadia Lake" refers to the lake itself and the lake environs surrounding the lake managed by the City of Edmond and the ODWC. The lake property is leased by the City of Edmond from the United States Corps of Engineers with the exception of 450 acres on the south shore leased from the Corps by the Oklahoma Department of Wildlife Conservation. The undeveloped ODWC area, located on the south shore, is open to the public, but there are no fees charged to enter and no records of visitor use. The water in the lake is the property of the State of Oklahoma and managed by the City of Edmond. For the purpose of this study, the area of research was limited to that property managed by the City of Edmond.

Survey respondents were age 18 or older and Edmond residents with phone numbers and addresses in the 1999 Edmond Southwestern Bell Telephone Directory.

Limitations

Certain specific limitations were recognized and considered during the

planning phase of the study. They are enumerated as follows:

1. Respondents under age 18 were not included in the study.
2. Benefits derived from visiting the lake were requested in the survey.

Responses might have been affected by the amount of elapsed time between visiting the lake and completing the survey.

3. Intervening variables, such as inclement weather, might have affected evaluation of the lake experience.

4. Not all Edmond residents or Arcadia Lake visitors who received surveys returned them; therefore, the potential for nonresponse bias exists.

5. The sample to whom surveys were mailed was drawn from the 1999 Edmond Southwestern Bell Telephone Directory. The potential for bias exists due to the number of residents who either do not have a phone or have an unlisted number.

6. The responses of Arcadia Lake visitors during the months of September and October and may not be representative of users during the entire year.

Assumptions

Certain specific assumptions were recognized and considered during the planning phase of the study. They are enumerated as follows:

1. Those who completed the survey did so honestly.
2. Those who entered Arcadia Lake did so for recreational purposes.

Research questions

For this study several research questions are suggested by the literature and were of interest to lake management. Question # 1 was tested as a null hypothesis.

1. What effect does visitation and the perception of crowding have on

actual visitation rates among frequent and nonfrequent lake visitors?

2. Which additional recreational opportunities at Arcadia Lake will make it likely that Edmond residents will visit Arcadia Lake more frequently?

3. What are the reasons Edmond residents do not recreate at Arcadia Lake?

4. What preferences do Edmond residents have for recreation at Arcadia Lake?

5. What benefits do Arcadia Lake recreationists derive from their visit?

Definitions

For the purpose of this study certain terms hold specific meanings. The following terms are defined as given throughout the study.

Arcadia Lake-The lake itself and the property surrounding the lake managed by the City of Edmond.

Arcadia Lake visitor-Any individual who enters Arcadia Lake to pursue recreation.

Attitude-“The degree to which one evaluates an object positively, and the degree to which it is evaluated negatively” (Krosnick & Petty, 1995, p. 6).

Benefit-“A change that is viewed to be advantageous- an improvement in condition or a gain” (Driver, Brown & Peterson, 1991, p. 4).

Edmond resident-Any individual who resides permanently within Edmond city limits.

Displacement-Pursuing the same activity at a different location due to unacceptable changes in the original site (Douglass, 1994).

Need-A gap between current conditions and desired conditions (Witkin & Altschuld, 1995).

Needs assessment-A systematic set of procedures undertaken “for the purpose of deriving information and perceptions of values as a guide to making

policy and program decisions that will benefit specific groups of people” (Witkin & Altschuld, 1995, p. 5).

National Survey on Recreation and the Environment (NSRE)-The survey conducted in 1994-1995 was the most recent in a series first recommended by the Outdoor Recreation Resources and Review Commission in 1960 (Betz, 1999).

Outdoor recreation-Wholesome recreation done without the confines of a building (Douglass, 1994, p. 4).

Physical carrying capacity-The amount of recreational use an area can support without any deterioration in the quality of the site (Hammitt & Cole, 1998).

Recreation visitor-Any individual who entered Arcadia Lake for the purpose of recreation.

Significance level-The probability of rejecting the null hypothesis when it is true. The significance level used in this study is 5% ($\alpha = 0.05$).

Social carrying capacity-The level of activity most acceptable to the user (Wagar, 1974).

Survey population-All individuals, 18 years of age or older, who reside permanently in Edmond and visitors to Arcadia Lake, 18 years of age or older.

Zoning-“To arrange in or mark off into zones; specifically: to partition ... into sections reserved for different purposes” (Webster’s Ninth New Collegiate Dictionary, 1991).

CHAPTER II
LITERATURE REVIEW
Recreation

Introduction

According to Betz, English and Cordell (1999), outdoor recreation is broadly defined as “any leisure activity that takes place out-of-doors, regardless of setting” (p. 40). “Wholesome recreation that is done without the confines of a building,” including backyards, streets and playgrounds, is another inclusive definition proposed by Douglass (1994, p. 4). The more traditional view of outdoor recreation emphasizes activities which occur in the outdoors and which relate directly to a natural environment (Jensen, 1973). According to Betz et al. (1999), the traditional view maintains that outdoor recreation takes place in rural areas on natural resources such as rivers, lakes and forests, but acknowledges that such resources in close proximity to cities can also meet the needs of outdoor recreationists. Another understanding of outdoor recreation more closely links the activity to the outdoor resource and is known as “resource-oriented recreation” (Sharpe et al., 1994, p. 2). Here the land or water resource is key and shapes the type of activities pursued.

Outdoor recreation preferences

Outdoor recreationists have a variety of motives for their experiences and enjoy a wide range of activities from walking and hiking, to swimming, hunting and softball. Regardless of the specific activity in which they were engaged, the

majority of Americans identified open space and nature as very important to their experience, according to a survey conducted by the President's Commission on Americans Outdoors (1986). In addition, the survey identified natural beauty as the single most important criterion for selection of a site for outdoor recreation. According to Hiss (1991), outdoor recreationists consider the act of being in a park as a benefit in and of itself. The value which recreationists place on natural beauty is reflected in a 1992 California survey, "Public Opinions and Attitudes On Outdoor Recreation," where those surveyed approved of constructing more simple campgrounds and more trails where no motorized vehicles were allowed (80%) but expressed strong disapproval for providing more commercial hotels or motels, restaurants or shops. According to a nationwide study sponsored by the National Recreation and Park Association, the most frequently mentioned benefit of parks was exercise related (Godbey, Graefe & James, 1992). The next nine benefits valued by users were "relaxation and peace," "open space," "place for kids to go," "nature," "family time together," "fun and entertainment," "enjoy being outdoors/natural resources," "place to go," and "place for recreation" (Godbey et al., 1992). In addition, recreationists prefer activities which are relatively low cost and do not require a great deal of physical exertion or special equipment or skills (Cordell, McDonald, Teasley, Bergstrom, Martin, Bason & Leeworthy, 1999).

Outdoor Recreation Assessment

The first attention to national assessments of outdoor recreation began in the late 1950s with the establishment of the Outdoor Recreation Resources Review Commission (ORRRC). The ORRRC's first report, "Outdoor Recreation for America," was released in 1962. Subsequent reports were completed in 1973, 1979 and 1987. The 1994-1995 "National Survey on Recreation and the Environment" was the most recently completed survey in a series first

recommended by the ORRRC in 1960 (Betz, 1999). This survey collected data from some 17,000 Americans. The results were published as "Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends." Among other objectives, the assessment described current rates of participation in various outdoor recreation activities, as well as forecasts future participation trends (Cordell, 1999).

Outdoor Recreation Participation

Outdoor recreation is popular with Americans. The 1999 Roper Starch survey reported 67% of Americans age 18 or older participated in outdoor recreation at least monthly during the year prior to the survey and 24% recreated "several times a week" (The Recreation Roundtable, 1999). According to the 1994-1995 National Survey on Recreation and the Environment, 95% of the population of the United States age 16 years of age or older participated in at least 1 of 80 activities between January 1994 and April 1995 (Cordell, et al., 1999). The most popular types of outdoor recreation in 1994-1995, when measured by the number of participants, were viewing and learning-oriented activities, trail, street and road activities, social activities, spectator activities, and swimming in pools and natural waters (Cordell et al., 1999).

The most popular activities in 1999, as measured by the number of participants, were walking for fitness/recreation, driving for pleasure, swimming, picnicking, fishing and bicycling (The Recreation Roundtable, 1999). For total activity days for a 12 month period, the 1994-1995 NSRE revealed the top six land-based recreation activities to be walking, bird-watching, wildlife viewing, biking, sightseeing, and family gatherings. The top water-based activities were visiting a beach or water-side, swimming in pools, studying nature near water and swimming in rivers, lakes and oceans. For mean number of days per year, walking and bird watching had the most dedicated participants for land

activities. For water-based activities, surfing and pool swimming were numbers one and two, respectively. The fastest growing activities since 1982-83, as measured by number of participants, were bird-watching, hiking, backpacking, motor boating, and swimming in rivers, lakes, oceans and pools (Cordell & O'Leary, 1998).

The 1994 Roper Starch survey identified motivations for participation in outdoor recreation (The Recreation Roundtable, 1994). The three most frequently identified motivations were "for the family to be together" (69%), "to experience nature" (64%) and "to learn new skills" (48%). Survey results also indicated that "the proportion of those completely satisfied with the quality of their lives is significantly higher among those who recreate outdoors several times a week" rather than monthly, less often or never (The Recreation Roundtable, 1994).

Outdoor Recreation Trends

Outdoor recreation is expected to play a growing role in the lives of Americans (Cordell, 1999). From 1994 through 1999 Roper Starch survey results showed a steady increase in the percentage of Americans who recreate at least once a month (The Recreation Roundtable, 1999). In 1997, 23% of Americans stated that they expected to participate in more outdoor recreation in the future than they had in the past. Affluent Americans and those who said they participated in outdoor recreation several times a week were more likely than Americans overall to say that they planned to participate in more outdoor recreation in the coming year (The Recreation Roundtable, 1997).

When asked to select those activities in which they would participate more frequently if they were more readily available, respondents in a 1992 California survey identified the following (in ranked order): camping in developed sites, walking, trail hiking, general nature study, freshwater fishing,

beach activities, visiting museums/historic sites, camping in primitive areas and picnicking in developed areas (California Department of Parks and Recreation, 1992).

While outdoor recreation is expected to play a growing role in the lives of Americans, the size of the role will be affected by supply. Research indicates the amount of participation in outdoor recreation is linked to factors such as proximity and availability of recreation resources; these factors affect the degree to which an individual participates in recreation according to Walsh, Jon, McKean and Hof (1992). Growth in outdoor recreation is expected to continue through the middle of the next century with demand concentrated on nearby recreation resources (Walsh et al. 1992).

The biggest relative increase in days of participation for water sports will occur in canoeing. According to Bowker et al. (1999), "the number of days spent canoeing is expected to increase about 30% more than population growth by the year 2050" (p. 329). The largest percentage increase will occur in the Pacific coast region, but the North and South will continue to account for the majority of canoeing due to the large number of recreationists who currently participate. Nationally, the number of primary purpose canoe trips is expected to increase by 29% through 2050 (Bowker et al., 1999).

Motorboating is currently the most popular recreational boating activity and should continue to maintain this position through 2050 with participation, days and trips expected to increase slightly more than the population, according to projections. Swimming in natural settings is the single most popular water-based recreation activity and rate of growth estimates project it to remain the most popular. Visiting a beach or waterside is also popular and is expected to remain so, with the number of days recreationists spent at beaches or watersides projected to increase faster than the population for all areas of the

United States (Bowker et al., 1999).

Fishing was the fifth most popular activity in the United States for every year of the Roper Starch survey on recreation (1994-1999) and showed a 6% increase from 1998 to 1999 (The Recreation Roundtable, 1999). Fishing is expected to increase 36% through 2050, slightly less than projected population growth. The most fishing activity occurs in the South and North with the highest proportion of individuals fishing (30%) (Bowker et al., 1999).

The following land-based activities are expected to show increased participation through the year 2050: developed camping, walking, biking, sightseeing, visiting historical places, and family gatherings (Bowker et al., 1999). The number of biking participants grew by 6% from 1996 through 1999 (The Recreation Roundtable, 1999) and is expected to continue to grow 70% through 2050, with most growth occurring in the South (Bowker et al., 1999). The number of people who participate in developed camping is expected to nearly double in the South by 2050. Family gatherings are expected to increase 60% nationwide and 76% in the South by 2050 (Bowker et al., 1999).

According to Bowker et al. (1999), nonconsumptive wildlife activity includes photography, bird watching, and other types of wildlife observation. Participation in these types of activities is expected to increase 61% through 2050, with the largest relative increase in the South.

Recreation and environmental attitudes

Early research on links between environmental concern and general outdoor recreation activities showed a weak relationship (Dunlap & Heffernan, 1975). However, participation in specific activities, termed "appreciative," and environmental concern showed a somewhat stronger relationship than general outdoor recreation activities and environmental concern. Appreciative activities included such outdoor pursuits as hiking and photography. Dunlap and

Heffernan (1975) found a stronger association between appreciative activities and pro-environmental attitudes than between consumptive activities and pro-environmental activities. In 1979 Pinhey and Grimes found that recreationists participating in appreciative activities tended to be more pro-environment concerning the land use of natural areas, but were equally or less likely to value natural areas than did other outdoor recreationists. Later research (Van Liere & Noe, 1981) again found a weak relationship between outdoor recreation and environmental concern and a stronger relationship between appreciative activities and environmental concern. According to Nord, Lolloff and Bridger (1998) there is a gap in environmental research from the early 1980s through the late 1990s. Nord et al. (1998) further investigated a link between outdoor recreation and environmentalism by dividing environmentalism into two areas: environmental concern and pro-environmental behavior. Results indicated a strong association between forest recreation and pro-environmental behavior and a weak association between forest recreation and environmental attitude.

According to the Recreation Roundtable (1999), concern for the environment reached its height in the late 1980s; however, 1999 Roper Starch survey identified the environment as one of the top ten issues about which Americans were most personally concerned. Among reasons for wanting to protect the natural environment, 20% of Americans identified to "preserve recreation areas/national parks" as important, and 48% identified, "protect resources for future generations" (The Recreation Roundtable, 1999). In addition, the survey found that most Americans (89%) think outdoor recreation benefits the environment because it gives people reason to be concerned about environmental issues.

Use and Management

Attitude strength

The provision of recreation experiences that satisfy the wants and needs of the public while protecting the environment is the goal of most recreation resource managers (Hammit & Cole, 1998). According to Bright (1997) the acquisition of attitude information from the public is an important component in a wildland manager's decision-making process because "it aids in the provision of a quality recreation product for the public and increases knowledge about new and diverse user groups" (p. 363). Social psychologists have traditionally defined attitudes as enduring predispositions to respond to some object, person, issue or event (Lavine, Huff, Wagner & Sweeney, 1998). More recent research has indicated that attitudes may be transitory in nature and subject to change depending upon information available at the time of the evaluative process (Lavine et al., 1998). However, those attitudes characterized as strong are more persistent over time, resistant to change and influence behavior (Krosnick, Boninger, Chuang, Berent & Carnot, 1993). Bright (1997) defined attitude-strength as the "extent to which attitudes are formed" (p. 364).

The extent to which people act consistently with their attitudes is dependent upon the amount of information available at the time of decision-making. Individuals with strong attitudes are more likely to possess more information about the target issue than those with weak attitudes (Lavine et al., 1998). Attitudes that have greater personal relevance to an individual are more stable (Krosnick, 1988). In addition, in certain situations, Bright and Larsen (1991) found that attitudes with greater personal relevance are better predictors of behavior.

Carrying capacity

All outdoor recreation participation in wildland areas disturbs the natural environment (Hammitt & Cole, 1998). Because society and public policy have made wildland areas available for recreational use, the challenge for management becomes what type of use and how much impact is acceptable for a particular area (Douglass, 1993). Many factors affect management decisions, including the intended purpose of the land as dictated by policy, the ecological impacts of recreational use, and the preferences of recreationists. In addition, economic constraints, such as willingness of the user to pay, may be necessary considerations. According to Dwyer (1983), the willingness of users to pay is influenced by the proximity of both the recreation site and substitute sites.

Carrying capacity is the concept that the number of participants affects the quality of the recreation experience. Developed by wildlife and range managers, the concept of carrying capacity originally dealt with ecological impacts of overuse by wildlife (Burch, 1981). Carrying capacity has evolved to include the physical and social carrying capacity of recreational settings and becomes one of the primary tools for guiding management decisions. Physical carrying capacity is the amount of recreational use an area can support without any deterioration in the quality of the site (Hammitt & Cole, 1998). Wagar (1974) defined social carrying capacity as the level of activity most acceptable to the user.

Shelby and Heberlein (1986) expanded the definition of social carrying capacity to "the level of use beyond which social impacts exceed acceptable levels specified by evaluative standards" (p. 21). This psychological aspect of the recreation experience may incorporate such factors as crowding, noise, and esthetics (Sharpe et al., 1994). Williams, Roggenbuck and Bange (1991) found that recreationists could report feeling crowded and still report high levels of

satisfaction. Crowding is only one variable that factors into a satisfactory water-based recreational experience; others include weather, insects and water level (Williams, 1989).

According to Lewis, Lime and Anderson (1996) tolerance for encounters with others depends on the nature of the recreational activity encountered. The more obtrusive the activity, the lower the tolerance when those activities are encountered. The type of activity in which one is engaged also affects perception of crowding. Recreationists who participate in different activities show different levels of tolerance for encounters (Tarrant, Bright, Smith & Cordell, 1999). For instance, canoeists experienced crowding more when encountering motorboaters than when encountering other canoeists, even when the numbers were the same (Schreyer & Roggenbuck, 1978). However, when high density is a desirable condition for recreationists, research indicates that tolerance for boaters increases (Lewis et al., 1996). Whittaker and Shelby (1986) found that visitors at higher use resources were more tolerant of social conditions, not less.

When the number of participants exceeds psychological capacity for any activity, overcrowding results, often causing displacement. Displacement occurs when users reject a site because of over-crowding and pursue the same activity at another location (Shelby & Heberlein, 1986). Regular long-term users are the most likely to be displaced because they have a fixed idea of the experience (Douglass, 1993). However, research with boaters revealed that those who felt the most crowded did not leave the area, but adjusted their activity patterns within the site; a phenomenon termed intrasite displacement (Kuentzel & Heberlein, 1992).

Management may select an application of a carrying capacity model for a particular site, but the relationship between amount of use and amount of

impact is not direct. According to Hammitt and Cole (1998), amount of impact is affected by the “timing, type and distribution of use, the setting where use occurs and mitigative actions taken by management” (p. 15). The key for management is to set specific objectives and monitor conditions. These objectives include how much human impact is too much, termed “Limits of Acceptable Change” (LAC). LAC divides acceptable human impact from unacceptable. Acceptability of impact has two components, the ecological significance of impact and the perception of impact. The most damaging impact may not be the most obvious to the visitor (Hammitt & Cole, 1998).

Recreational Boating Capacity

The concept of carrying capacity applies to land-based activities and to activities which take place on water resources, as well. A number of factors influence the carrying capacity of lakes used for recreational boating. According to Rea and Warren (1986, p. 45) the following are important factors which influence recreational boating capacity:

1. Location of the lake in relation to population served. Users from urban population centers are more accustomed to higher densities than participants from rural areas. Also, users at a recreation areas located near or within an urban/metropolitan area expect to see more people and tend to be more tolerant of being closer to other participants.
2. Multiple use of water area. Multiple use (a mix of different activities) of a lake generally causes the capacity level of each activity to be lower.
3. Shoreline configuration. A highly irregular shoreline results in a lower carrying capacity.
4. Amount of open water. Large open areas are necessary to safely accommodate sailboats, unlimited power boats and water-skiing. Thus, open areas increase capacity.

5. Amount of facility development. Areas with a high degree of development (restrooms, launching ramps, marinas, etc.) can carry a higher capacity than a less developed area.

Rea and Warren (1986) recommend certain basic standards be used when calculating a lake's carrying capacity for boats. These standards included the number of recommended acres per type of boat. For instance, nonpower boats require 1.3 acres per boat, while power boats pulling skiers require 12 acres (Table 3).

Table 3
Number of Recommended Acres per Type of Boat

Type of Boat	Acres Needed per Boat
Unlimited power	9
Power with skis	12
Limited power	4.3
Nonpower	1.3
Sailing	4.3

Citizen Involvement

Environmental and social changes inevitably occur as a result of recreational use of any wildland area. As a result, the salient question for management becomes how much change will be allowed (Stokes, 1990). The limit of human-influenced change is a judgment call established by management who must weigh policy, economic and public use considerations as well as ecological criteria (Hammitt and Cole, 1998). Public involvement is the key to making LAC successful. Citizens participating in the LAC process have a high degree of ownership for the outcome (Stokes, 1990).

Recreation clientele using public resources have a legitimate claim to participate in the decision making process because recreation activities are defined by the user. Every participant in recreation has a set of priorities and

expectations for their experience which the park manager should not define without input from participants. Public involvement provides management with a realistic basis for policy formulation. The National Environmental Policy Act (PL 91-190) legitimized public desire for participation by requiring that citizens be informed and involved in the decision making process.

Zoning

The increasing demand for recreational opportunities on a limited land base can create a dilemma for management. Zoning is a way of accommodating a variety of activities and experiences on the same resource. When deciding which opportunities to provide, managers should cater to those uses most appropriate in the area. Appropriateness is based to some extent on which and how many opportunities are available regionally (Hammit and Cole, 1998). According to Sharpe et al. (1994), the area where land and water intersect must be zoned to minimize conflict. Zoning for water-based recreation can be by size of boat, horsepower, space or time. Fishing and waterskiing can be allowed in the same waters by alternating days of use or by time-zoning, which permits different activities at different times of the day.

Zoning presently exists for Oklahoma outdoor recreation resources. Oklahoma State parks zone certain land areas for either camping or day use. The Oklahoma Scenic Rivers Commission has zoned the Illinois River and its tributaries in the Oklahoma Scenic Rivers Act (OSA 82 s). Management of Oklahoma's numerous lakes commonly zone for specific recreation opportunities.

Lakes Overholser, Hefner, and Draper are within a 20 mile radius of Arcadia Lake and are managed by the City of Oklahoma City. The use of all types of watercraft, both motorized and nonmotorized, are permitted on Lakes Draper and Overholser. However, watercraft on Lake Hefner that measure 12

feet or less are prohibited from creating a wake, effectively outlawing personal watercraft. Waterskiing is permitted on Lake Draper, but not Lakes Hefner and Overholser. Only boats involved in waterskiing activities are allowed in the waterski area on Lake Stanley Draper. Canoes on all three lakes must meet minimum size requirements. Swimming is not permitted on any of the Oklahoma City lakes, though windsurfing is allowed on Lake Hefner. Camping is not permitted at Lakes Hefner and Overholser, but is permitted within designated areas of Lake Stanley Draper (Oklahoma City Department of Parks and Recreation, 1999).

Arcadia Lake zones for many of its activities. The lake's water-based activities are zoned by area rather than by time or days of use. Personal watercraft are permitted in a small area south of Spring Creek Park. Waterskiing is allowed in a circular area in the middle of the lake. Camping is restricted to designated campsites. Campgrounds at the lake have open access with the exception of Scissortail Campground, which requires the visitor be camping or visiting a campsite, to gain admittance. Campfires are restricted to picnic areas with a fire ring. Fishing is allowed any place on the lake and no-fee fishing is restricted to two sites: the overview at the Arcadia Lake Project Office and the loop off 15th street just south of the Spring Creek Park gate. The beaches open at 6:00 a.m. and close at 10:00 p.m. (Edmond Department of Leisure Services, 1999b).

Socioeconomic and Cultural Demographics

Participation in outdoor recreation varies according to certain demographic variables such as age, income and household size. According to a 1992 nationwide study of the benefits of recreation and parks services sponsored by the National Recreation and Parks Association (NRPA), 30% of

those surveyed used local park and recreation services sometime during the last year; however, for nonrural residents, 61% used services (Godbey et al., 1992). The NRPA study indicated that individuals between 21 and 35 were more likely to say they had less time for leisure than any other age group, while those between 65 and 75 were more likely to report more time than other groups (Godbey et al., 1992).

Participants in recreation feel more positive about availability of resources. Virtually all participants in 1 of 35 outdoor recreation activities in the 1997 Roper Starch survey were more likely than Americans overall to say that availability of local outdoor recreation sites was either good or excellent (The Recreation Roundtable, 1997). Specifically, those who participated in canoeing/kayaking were among those most satisfied with their local outdoor recreation resources (The Recreation Roundtable, 1997).

Participation in locally sponsored recreation programs increases with education level. According to results of the NRPA study (1992), those with higher levels of education were considerably more likely to have participated in local recreation and park services than those with lower levels of education (Godbey et al., 1992). Similarly, the 1994-1995 NSRE found that individuals with higher levels of education were more likely to have participated in local recreation and park services than those with lower levels of education; specifically, those with at least four or more years of college were more likely to use parks than those with less than twelve years of education (Bowker et al., 1999).

Recreation patterns are also influenced by household size. Households with three to four people were most likely to report participating in an activity sponsored by a local parks and recreation department, while those who lived alone were least likely, according to results of the 1992 NRPA study.

Households with one or more children under age 19 were more likely to have participated in a sponsored activity than those with no children under the age of 20 (Godbey et al., 1992). Results of the 1994-1995 NSRE also indicated that recreation is influenced by household size. Households with one or more children were the most likely to have participated in recreation (Bowker et al., 1999).

National Decision Systems estimated that in 1999, 64.7% of Edmond households consisted of a married couple either with or without children. This is approximately 17.1% higher than the national figure of 55.2%. Among single adults 19.1% were estimated to live alone, while 16.1% of single adults were estimated to be a household head (National Decision Systems, 1999). According to the 1990 census almost 60% of Edmond households contained at least one child (U. S. Census, 1990).

Income also influences the amount of recreation participation. Those with higher income levels were more likely to use local parks, according to the 1992 NRPA survey (Godbey et al., 1992). Bowker et al., (1999) report that participation in recreation programs increased with income level. The 1999 Roper Starch survey also found a link between income and participation in outdoor recreation. Survey results revealed that 77% of respondents with incomes of at least \$50,000 reported participating in outdoor recreation at least once a month, compared with 67% of all Americans. (The Recreation Roundtable, 1999).

Income is also linked with the likelihood of an individual having begun a new activity in the last year, or intending to increase outdoor recreation participation the following year. According to Godbey et al. (1994), slightly more than one in five Americans reported taking up a new recreation activity during the last 12 months and income was a predictor in the likelihood of having begun a new activity; the higher the income level the greater the likelihood (Godbey et

al., 1992). The 1997 Roper Starch survey found that survey respondents with an income of \$75,000 or more were more likely than respondents overall to plan for more outdoor recreation in the next year (The Recreation Roundtable, 1997).

Edmond residents have high income levels. The estimated 1999 median family income for Edmond was \$51,967. The State of Oklahoma's estimated 1999 median family income was \$31,595, while the United States' estimated 1999 median family income was \$40,926 (National Decision Systems, 1999).

Needs and Benefits

According to Driver, Brown and Peterson (1991), the simple definition of benefits is "improved conditions" (p. 4), however, their expanded definition explains that a benefit is "a change that is viewed to be advantageous-an improvement in condition or a gain to an individual, a group, to society or to another entity" (p.4). As it pertains to leisure, Driver et al. (1991) explained that a benefit is the realization of a satisfying psychological recreation experience.

Reviere, Berkowitz, Carter and Ferguson (1996) define a need as a gap between the real and ideal conditions. In addition, Reviere et al., (1996) believe the gap must be acknowledged by community values and have the possibility of improvement. According to York (1982), narrowing the gap is one of the purposes of measuring the difference in real and ideal conditions.

Needs Assessments

In a democratic system, people expect to be able to express their views concerning their lives and communities. Citizen participation in decision making is the essence of a needs assessment (Summers, 1987). The President's Commission on National Goals (1960) stated that public participation by all citizens is essential. Needs assessments are usually done with the idea that the

unmet need can be met by some agency that has the capacity to respond. According to Hobbs (1987), needs assessments should determine the following:

1. Who the assessment is attempting to inform, influence or persuade.
2. What purpose the needs assessment is intended to accomplish.
3. Whose needs are to be assessed.
4. What questions are to be asked.
5. What resources are available to do a needs assessment, including time and organization as well as funds and expertise.

Surveys are typically used for gathering data for a needs assessment. According to Johnson and Meiller (1987), the survey is an excellent technique for getting information from the public and is representative of a given population. The survey should be focused on information regarding a set of needs which cannot be gathered any other way. Needs surveys furnish management data for planning, resource allocation or program evaluation. The survey format and methods of data analysis should allow inferences to be drawn about "priorities and criticality of needs" (Witkin and Altschuld, 1995, p. 130). The most effective type of survey for needs assessment asks respondents for informed opinions based on "personal experience, background, expertise, or knowledge, or for facts about themselves and others about which they have direct knowledge" (Witkin and Altschuld, 1995, p. 130).

Though surveys are a useful tool for information gathering, they have disadvantages, including the requirement of literacy. Even if the respondent is literate, the type and level of language might make the questions incomprehensible, and there is no way to check on the respondent's

understanding of the questions (Anastas and MacDonald, 1994). Another disadvantage, according to Schreyer (1980), is the time factor. Surveys conducted during one season of use are limited in that they may not be representative of visitors during other seasons. Visitor profile may change according to the time of year and recreation activities pursued during a particular season, resulting in biased survey results.

Mail Sample Surveys

Once a survey is selected as a tool for gathering data, the survey distribution method has to be chosen. Among the methods of survey distribution are mail, newspaper and organizational newsletter. The selection for method of distribution for a survey is guided by time, cost, ease of reaching the target population and estimated rate of return (Witkin & Altschuld, 1995). This research will utilize a mail survey as its data collection instrument. Guidelines for successful mail sample surveys have been established which result in potentially high rates of response. Surveys should be visually uncomplicated, printed on high-quality paper and in booklet form. A cover letter of explanation should accompany the survey (Dillman, 1978). In addition, research shows that return rate increases if a stamped, self-addressed envelope is included with the mailed survey (Witkin & Altschuld, 1995).

Though guidelines for increasing response rate are adhered to, it is unlikely response rate will be 100%. According to Brown and Wilkins (1978), nonresponse can bias results from a survey even with a response rate as high as 70%. However, when dealing with a homogeneous group high response rates were shown not to be necessary in order to avoid bias (Becker & Iliff, 1983). Recent research on voting behavior has shown that low response rates can actually predict voter behavior more accurately and better represent voter

demographics than large response rates (Krosnick, 1999). These conflicting results highlight the lack of a definitive return percentage needed for the researcher to claim unbiased results. However, for purposes of statistical analysis, a sample of thirty individuals is assumed to be normally distributed and adequate for analysis utilizing the Chi-square statistic (Glass & Stanley, 1970).

Conclusion

In conclusion, planning for recreational opportunities for a growing population on a diminishing land base is a challenging process. This process involves accounting for such disparate factors as social and physical carrying capacity, the needs and desires of the visitors to be served, and the proximity of additional recreational opportunities. Surveys have been proven an effective tool for determining the recreational interests of a community; thus, the Arcadia Lake Visitor Use Survey was developed to guide the management personnel decision-making process as they seek to fulfill the Arcadia Lake mission statement: Provide quality outdoor recreation opportunities and protect the natural resources of Arcadia Lake.

CHAPTER III PROCEDURES FOR RESEARCH

Introduction

This study was designed to elucidate the recreational needs and wants of Arcadia Lake visitors and Edmond residents in order to maximize the recreational potential of the lake while preserving its ecological and municipal functions. To accomplish the purposes of this research, a data collection instrument was developed, the instrument disseminated, and statistical procedures applied to collected data.

Data Collection

The data collection instrument for this study was a questionnaire developed by the researcher in collaboration with John Young, Arcadia Lake manager. Mr. Young offered insight, direction and suggestions as to the type of information which, when gleaned from the public, would guide management in their efforts to provide a spectrum of recreational opportunities intended to encourage increased lake use by Edmond residents.

For the pilot study, the target population was Arcadia Lake visitors. The sample was 4,000 visitors who received surveys distributed at Arcadia Lake beginning September 2, 1999. For the main research effort, Edmond residents were the target population and the sample was 726 Edmond residents who were selected utilizing the systematic sampling technique. Surveys were mailed October 1, 1999. The response group consisted of Arcadia Lake visitors and

Edmond residents who returned surveys prior to November 15, 1999.

Institutional Review Board (IRB) approval was requested by the researcher and granted by the IRB at Oklahoma State University (Appendix D).

Research Instrument

The research design employed in this study is the total design method as proposed by Dillman (1978). Specifically, this study is based on a modified Dillman mail survey. The modification of Dillman's total design method is the exclusion of the registered mail component as originally recommended by Dillman. To avoid the appearance of coercion, the registered mail component was excluded. A respondent has the right to refuse to participate in the survey and "this right must be respected," according to Anastas and MacDonald (1994, p. 387).

A 22-item paper and pencil questionnaire was used to collect information (Appendix E). The actual survey instrument was presented as a small pamphlet. Two sets of instruments were printed: white surveys for distribution at the lake and tan-colored for distribution to Edmond residents via the postal service. The survey was entitled, "Arcadia Lake Visitor Use Survey." The six-page instrument began with an explanation of the purpose of the survey.

The survey was roughly divided into two areas of exploration. In addition, there were two items characterized as miscellaneous. The first area of exploration included five questions intended to gain information about subjects' current recreation patterns, as well as potential recreation patterns (Appendix E). The second area of exploration included 16 items designed to identify subjects' levels of satisfaction with the current state of recreation at Arcadia Lake as well as in their community.

Two questions were miscellaneous in nature. Survey Question # 6 asked the subject to identify those special events and program facilities at Arcadia

Lake of which they were aware. This list was not inclusive but included those special events, programs and facilities suggested by Mr. John Young. Survey Question # 7 asked the subjects to select what they consider benefits of Arcadia Lake. The list of 27 benefits was primarily suggested by the Godbey et al. (1994) nationwide study on the benefits of local parks and recreation services.

The survey included nine demographic questions which asked participants to answer questions about their sex, income, age, years of formal education, zip code, employment status and living arrangements.

When the initial questionnaire was prepared, John Young was asked to review the questionnaire and make recommendations. Mr. Young made no recommendations and suggested no changes.

Methods and Procedures

The Arcadia Lake Visitor Use survey was distributed to Edmond residents via the postal service and to Arcadia Lake visitors by personnel at the gatehouses. Gatehouses are staffed and located at the entrance to each lake park. Before entering a park, visitors must stop at a gatehouse and pay the user fee or provide proof of a yearly pass. As each vehicle stopped to pay, gatehouse staff gave a survey to the driver, along with a brief description of the survey and its intended purpose. Arcadia Lake staff began distributing surveys Thursday, September 2, 1999, the official start of Labor Day weekend, and continued until the supply was depleted. The surveys were mailed to Edmond residents October 1, 1999. Returned surveys were accepted via mail and at the lake through November 15, 1999.

Recipients of the mail survey were a sample of 726 Edmond residents drawn from the 1999 Edmond Southwestern Bell Telephone Directory. A sample size of 387 was determined to be necessary in order to achieve a confidence level of 95% (Reaves, 1992). According to Reaves, if the researcher

is willing to decide in advance how large an effect she wants to find, a table of needed sample sizes may be used to determine how large the sample size should be. Because the researcher assumed a 55% return rate, it was determined 700 surveys should be mailed. However, in order to simplify the selection process, three Edmond residents were identified from each page of the Edmond phone book, resulting in 726 residents who were mailed surveys.

A template with three randomly placed holes was placed over each page of the telephone directory and names and addresses marked. If the name marked was a commercial listing or other noneligible respondent the name immediately following the one marked was selected. If that name was noneligible also, the one following was selected and this process repeated until an eligible name appeared. The Arcadia Lake Visitor Use Survey included a self-addressed (OSU return address), postage paid, back page. The use of an OSU mail permit allowed the respondent to mail the survey with minimal effort and without personal expense. The survey recipient was instructed to staple or tape the survey closed and place it in the mail.

On September 1, 1999 the Edmond Sun newspaper featured a front page article about the Arcadia Lake research project (Appendix C). A brief history of the research project was included as well as an explanation of its purpose. Examples of survey questions were provided to familiarize the Edmond community with the survey.

Originally, the surveys distributed at Arcadia Lake were intended as a "pilot study" designed to test the reliability of the survey instrument. The gatehouse attendants were instructed to encourage the visitors to complete and return the surveys to the gatehouse attendant as they exited the lake, or return it by mail. The Arcadia Lake Project Office address was printed on the last page of the survey. No mail permit was included. The researcher accepted returned

surveys through November 15, 1999.

Responses from the "pilot study" were coded and analyzed separately, but were not utilized as a "pilot study." When Chi-square analysis of this demographic data and data derived from surveys mailed to Edmond residents indicated there were no differences in respondents' income, education, household size and employment status depending on method of distribution, the decision was made to analyze the data as a whole.

Statistical Analysis and Treatment of Data

A 5% significance level (95% level of confidence) was assumed for all statistical tests and analyses utilized in the study. The data were coded, transferred to the computer and analyzed. The data was entered into the Statistical Package for the Social Sciences (SPSS) computer program (SPSS, 1990). SPSS was used to calculate frequencies, Chi-square and crosstabulations. The researcher manually calculated the Pearson product-moment rank (PPM) for Survey Questions # 2, # 4, and # 15.

The data from each survey question, with one exception, are reported as frequencies, percentages and/or cumulative percentages and are presented in tables. The exception was Survey Question # 16, for which respondents were provided space to describe the most and least appealing features of Arcadia Lake. Comparisons between variables were made and differences analyzed utilizing Chi-square analysis, crosstabulations and the Pearson product-moment rank. The crosstab procedure produces contingency tables that show column, row and table totals and percentages.

The Pearson product-moment rank assigns value according to rank. A variable ranked one was assigned a value of three, a variable ranked two was assigned a value of two and a variable ranked three was assigned a value of

one. For each variable, the assigned values were summed to result in the Pearson product-moment rank. The Chi-square statistic was used to determine significant differences between opinions, attitudes or demographics for two or more groups. The Chi-square value with degrees of freedom was used in determining significance.

Sample size is important in drawing inferences about populations from a sample. Samples of 30 individuals or larger are assumed to be normally distributed (Reaves, 1992). According to Glass and Stanley (1970), samples of this size are adequate for utilizing Pearson's Chi-square Goodness-of-Fit test. The sample data generated from surveys distributed at the lake and the sample data generated from surveys mailed to Edmond residents both exceed 30 individuals. In addition to sample size, the size of N of each contingency table is relevant for interpretation of results. Not more than one fifth of the cells of contingency tables should contain frequencies between zero and five (Hays, 1973).

The Chi-square statistic was utilized to discern differences in the demographic data between surveys distributed at the lake and those mailed to Edmond residents. In addition, the Chi-square statistic was utilized to discern any relationship between number of visits per year and responses to Survey Question # 5. The Chi-square statistic was also utilized to discern any differences in attitudes toward zoning for watercraft (Survey Questions # 6 and # 14) depending on reasons for visiting the lake (Survey Question # 2). The Pearson product-moment rank was used to rank responses to Survey Questions # 2, # 4 and # 15.

For this study, the following research questions were suggested by the literature and of interest to lake management.

Research Question # 1 was, "What effect does visitation and

the perception of crowding have on actual visitation rates among frequent and nonfrequent lake visitors?" Research Question # 1 was tested as the following null hypothesis: The visitation patterns of frequent visitors are not different from the visitation patterns of nonfrequent visitors given respondents' perceptions of crowding at the lake. Chi-square analysis was utilized to discern any differences between visitation patterns of frequent Arcadia Lake visitors and the visitation patterns of infrequent Arcadia Lake visitors (Survey Question # 1) and responses to Survey Question # 5: Would larger crowds cause you or your family to come to the lake more often, less often have no effect, or cause you to look somewhere else to recreate?

Research Question # 2 was, "Which additional recreational opportunities at Arcadia Lake will make it likely that Edmond residents will visit Arcadia Lake more frequently?" Survey Question # 4 provided an opportunity for respondents to identify those recreational activities which would increase their frequency of visitation at Arcadia Lake. The question states, "From the following list please identify the three recreational opportunities which would make it likely that you or your family would visit Arcadia Lake more frequently." Edmond residents were identified by zip code and their responses analyzed employing the Pearson product-moment rank.

Research Question # 3 was, "What are the reasons Edmond residents do not recreate at Arcadia Lake?" Survey Question # 15 asked respondents to identify, from a list of 12, their three most important reasons for not visiting the lake. The question states, "If you or your family do not visit Arcadia Lake, or do not visit frequently, please identify the three most important reasons for not visiting." Responses were analyzed employing the Pearson product-moment rank.

Research Question # 4 was, "What preferences do Edmond

residents have for recreation at Arcadia Lake?" Preference for recreation includes those activities in which the respondent currently participates, activities in which the respondent would participate if such activities were available, the type of social/environmental setting preferred for recreation, and perceived benefits of recreation. Therefore, Edmond residents' most important reasons for visiting the lake are presented as well as opportunities which would result in increased numbers of visits. In addition, respondents' perceived benefits of Arcadia Lake are included along with responses to questions pertinent to social/environmental setting. Edmond residents were identified by zip code. The following survey questions were analyzed to gain understanding of Edmond residents preferences for recreation. Questions are grouped according to method of analysis.

The Pearson product-moment rank, frequencies and percentages were utilized to analyze the following questions:

Survey Question # 2 was, "From the following list, please identify your three most important reasons and three least important reasons for visiting Arcadia Lake."

Survey Question # 4 was, "Identify recreational opportunities which would make it likely that you or your family would visit Arcadia Lake more frequently. Respondents were offered 15 specific recreational opportunities and an "other" category."

The following responses were analyzed by calculating frequencies and percentages:

Survey Question # 2 was, "From the following list, please identify your three most important reasons and three least important reasons for visiting Arcadia Lake."

Survey Question # 4 was, "Identify recreational opportunities which

would make it likely that you or your family would visit Arcadia Lake more frequently. Respondents were offered 15 specific recreational opportunities and an "other" category."

Survey Question # 7 was, "What do you consider a benefit of Arcadia lake?"

Survey Question # 8 was, "How do you feel about the amount of development at Arcadia Lake such as roads, campgrounds and pavilions?"

Survey Question # 9 was, "Outdoor recreation is important to my quality of life."

Survey Question # 10 was, "There are enough outdoor recreation areas and facilities available that are convenient for me or my family."

Survey Question # 11 was, "Protection of the natural environment is an important aspect of outdoor recreation areas. Responses were analyzed by calculating frequencies and percentages."

Survey Question # 12 was, "More outdoor recreation areas are needed in or near my city."

Survey Question # 13 was, "I or my family would use a biking and walking trail system linking Edmond and Arcadia Lake."

Survey Question # 14 was, "I or my family would use nonmotorized watercraft such as canoes on days motorized watercraft were prohibited at the lake."

Survey Question # 17 was, "How many times do you or your family participate in outdoor recreation?"

Research Question # 5 was, "What benefits do Arcadia Lake recreationists derive from their visit?" Survey Question # 7 provided an opportunity for respondents to select, from a list of 27, what they perceive to be benefits of Arcadia Lake. The list of benefits was primarily suggested by the

Godbey et al. (1992) study on the benefits of local recreation and parks services. The question states, "What do you consider a benefit of Arcadia lake?" Responses were analyzed by calculating frequencies and percentages.

In summary, a 22-item questionnaire was developed for the purpose of identifying recreational activities and programs that would increase use of Arcadia Lake by Edmond residents. The survey was distributed to 726 Edmond residents via the postal service on October 1, 1999 and given to 4,000 recreationists who entered Arcadia Lake after September 1, 1999. Data from the returned surveys were combined after Chi-square analysis indicated no demographic differences existed between respondents who were mailed surveys and those who received surveys at the lake. SPSS was utilized to calculate frequencies, Chi-square and crosstabulations. The researcher manually calculated the Pearson product moment rank.

CHAPTER IV
RESULTS AND DISCUSSION

Introduction

The data generated for this study were derived from the Arcadia Lake Visitor Use Survey discussed in Chapter III. The questions and statements included in the survey were designed to gain the following information from respondents: patterns of visitor recreation at Arcadia Lake, knowledge of the lake's activities and programs, reasons for visiting the lake, recreational opportunities which would increase lake visitation, attitudes about zoning for non-motorized watercraft, attitudes about outdoor recreation, and perceived benefits of the lake. The survey also obtained demographic information from respondents. The data were analyzed using statistical procedures including Pearson's Chi-square goodness-of-fit and Pearson's product-moment rank. Reported percentages may not total 100% because of rounding.

Mail Survey Response Rate

A total of 122 surveys were returned either by mail or to the Arcadia Lake gatehouse; however, two surveys were not included in the analysis because the minimum age requirement was not met. Response rates were low. Of the 4,000 surveys distributed at the Arcadia Lake gatehouses 80 (2%) were returned. The effort required of the visitor to return the survey at the lake is a possible factor in the low rate of return. If the visitor chose to return the survey to an Arcadia Lake gatehouse rather than by mail, the gatehouse attendant's attention had to be

gained as the visitor exited the lake. If the attendant was occupied with tasks required to permit visitors to enter the lake, securing the attendant's attention may have resulted in an undue delay. If the gatehouse was not attended by park staff at the time of departure, the visitor had to get out of his or her vehicle and walk around to the front of the gatehouse and locate the proper box in which to deposit the survey.

Of the 726 surveys mailed to Edmond residents, 42 (6%) were returned. Several factors may have contributed to this low rate of return, including general disinterest in the lake. Arcadia Lake management personnel believe lake visits by Edmond residents to be low as measured by the number of annual passes purchased by Edmond residents. Another factor may have been the lack of a follow-up letter.

Not all the returned surveys contained responses to every question. Each survey's responses were included in the analysis even if not all questions were answered; therefore, the number of responses changed slightly between analyses. Chi-square analysis of demographic data indicated there were no differences in respondents' income, education, household size and employment status depending on method of distribution. As a result, the data derived from the surveys distributed at Arcadia Lake gatehouses and the data derived from the surveys mailed to Edmond residents were analyzed as a whole (Table 4, page 47). However, several research questions pertained specifically to Edmond residents; therefore, the demographic data generated from Edmond residents' surveys (as identified by zip code) is of interest and were analyzed separately as were data pertaining to several survey questions.

TABLE 4
COMPARISON OF DEMOGRAPHICS BY SURVEY
DISTRIBUTION METHOD

Demographic	Lake Distribution	Mail Distribution	Total	Chi-square	Degrees of Freedom	Probability
Gender	72	39	111	0.12	1	0.729
Employment	77	40	117	9.41	5	0.094
Household Size	77	41	118	0.89	3	0.827
Education	75	40	115	0.73	3	0.967
Income	72	36	108	10.41	7	0.166

Demographic Information Generated from Combined Data

Chi-square analysis of demographic data revealed no differences in the demographic information between the data collected from surveys distributed at the lake and those that were mailed to Edmond residents; therefore, the data were combined and analyzed as a whole. The following statistical analyses are the result of this combined data. Frequency tables related to respondent's demographics are shown in Tables 5 through Table 9. A "missing" response indicates the respondent did not reply to that particular question. Respondents' place of origin was determined by zip code. Eighty-six respondents (71.7%) were Edmond residents, 29 (24.1%) were from a place other than Edmond and five did not respond to the question.

The mean age of respondents was 47.4 years, the range of ages was 18 to 82 and the median age was 46 years (Table 5, page 48). Though the survey requested respondents' exact ages, for ease of understanding results are reported in categories. A complete table of all reported ages is in Appendix F. The age range with the highest percentage of responses was 46-55 with 22.6% of responses, while age ranges 26 to 35 and 36 to 45 both had 21.7%.

The type of employment respondents reported is shown in Table 6.

“Employed full-time,” was the most frequently reported response with 50.8%, while 17.5% reported “retired,” and 15.8% reported “employed part-time.” The majority of “other” responses were related to self-employment. A complete list of “other” responses is shown in Appendix G.

TABLE 5
AGE DISTRIBUTION OF RESPONDENTS

Age	Frequency	Percent	Cumulative Percent
18 to 25	5	4.1	4.1
26 to 35	25	21.7	25.8
36 to 45	25	21.7	47.5
46 to 55	27	22.6	70.1
56 to 65	19	15.8	85.9
66 and older	14	11.6	100.0
Total	115	95.8	
Missing	5	4.2	
Total	120	100.0	

Mean 47.4 years; Median 46.0 years

TABLE 6
EMPLOYMENT STATUS OF
RESPONDENTS

Employment	Frequency	Percent
Full-time	61	50.8
Retired	21	17.5
Part-time	19	15.8
Other	12	10.0
College student	3	2.5
Military	1	0.8
Missing	3	2.5
Total	120	100.0

Survey respondents had particularly high education levels (Table 7). Over 80% of respondents reported they had attended some college. Specifically, 45.8% reported "some college or an undergraduate degree," while 35% reported "a graduate degree." The percentage of respondents who reported a graduate degree was considerably above the estimated national average of 7.2% (National Decision Systems, 1999).

Survey respondents most frequently reported living with "one or more adults" (48.3%) (Table 8, page 50). The second most frequently reported living arrangement was "one or more adults and one or more children" (35.6%). Nationally, 33.1% of the population reported living with at least one child, compared to 42.5% of survey respondents who reported living with one or more children and/or one or more adults and one or more children (National Decision Systems, 1999).

TABLE 7
HIGHEST LEVEL OF EDUCATION OF
SURVEY RESPONDENTS

Education Level	Frequency	Percent	Cumulative Percent
Some high school	4	3.3	3.5
A high school diploma	14	11.7	15.7
Some college or an undergraduate degree	55	45.8	63.5
A graduate degree	42	35.0	100.0
Missing	5	4.2	
Total	120	100.0	

TABLE 8
LIVING ARRANGEMENTS REPORTED BY
SURVEY RESPONDENTS

Living arrangements	Frequency	Percent
With one or more adults	57	47.5
With one or more adults and one or more children	42	35.0
Alone	10	8.3
With one or more children	9	7.5
Missing	2	1.7
Total	120	100.0

Because respondents were asked to answer the question about income by marking selected ranges, central tendencies such as means could not be calculated; therefore, income information is reported in categories. In addition, there was a "do not know" category. The median reported income category was \$50,000 to \$74,999 (Table 9). The estimated median household income for the U.S was \$40,926 in 1999 (National Decision Systems, 1999). The income category with the highest percentage of responses was the \$50,000 to \$74,999 category with 17.5%, however, the \$75,000 to \$99,000 category and the \$100,000 or more category both received 16.7% of responses.

TABLE 9
INCOME REPORTED BY SURVEY RESPONDENTS

Income level	Frequency	Percent	Cumulative Percent
1. Do not know	4	3.3	3.7
2. Less than \$20,000	2	1.7	5.6
3. \$20,000 to \$29,999	10	8.3	14.8
4. \$30,000 to \$39,999	15	12.5	28.7
5. \$40,000 to \$49,999	16	13.3	43.5
6. \$50,000 to \$74,999	21	17.5	63.0
7. \$75,000 to \$99,999	20	16.7	81.5
8. \$100,000 or over	20	16.7	100.0
Missing	12	10.0	
Total	120	100.0	

Sixty three respondents (52.5%) were male, 48 (40.0%) were female and nine (7.5%) did not respond to the question.

Demographic Data Generated from Edmond Residents

Three research questions specifically addressed the recreational interests and attitudes of Edmond residents; therefore, the responses of Edmond residents (as identified by zip code) were analyzed separately from respondents who did not reside in Edmond. Frequency tables related to Edmond respondents' demographic information are shown in Tables 10 through 14.

The type of employment reported by Edmond respondents is shown in Table 10. The most frequently reported type of employment was "employed full-time" (51.2%). There were ten "other" responses, with four respondents specifying "housewife," or an equivalent, three "self-employed," one "med school," one "insurance," and one did not state his or her type of employment.

TABLE 10
EMPLOYMENT STATUS REPORTED
BY EDMOND RESPONDENTS

Employment	Frequency	Percent
Full-time	44	51.2
Part-time	16	18.6
Retired	13	15.1
Other	10	11.6
College student	1	1.2
Military	0	0
Missing	2	2.3
Total	120	100

Edmond residents who visited Arcadia Lake had particularly high education levels (Table 11). Among survey respondents 85.7% reported having at least some college. Specifically, 44.2% reported some college or an undergraduate degree, while 40.7% reported a graduate degree. National Decision Systems (1999) estimates 72.7% of Edmond residents have some college or an undergraduate degree, while 9.1% have graduate degrees. The high number of survey respondents with graduate degrees would seem to reflect results of the 1994-1995 National Survey on Recreation and the Environment (NSRE) which revealed that the portion of the population with highest levels of education were considerably more likely to have participated in local recreation and park services than those with lower levels of education (Bowker et al., 1999). Nationally, 13.1% of Americans were estimated to have a bachelors degree and 7.2% a graduate degree (National Decision Systems, 1999). If Edmond residents follow national trends, recreation patterns at Arcadia Lake should be influenced by the large percentage of residents with either a bachelors (28.2%) or a graduate degree (15.23%).

TABLE 11
HIGHEST LEVEL OF EDUCATION REPORTED
BY EDMOND RESPONDENTS

Education Level	Frequency	Percent	Cumulative Percent
Some high school	2	2.3	2.4
A high school diploma	9	10.5	13.1
Some college or an undergraduate degree	38	44.2	58.3
A graduate degree	35	40.7	100
Missing	2	2.3	
Total	86	100.0	

Because respondents were asked to answer the question about income by marking selected ranges, central tendencies such as means could not be

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calculated; therefore, income information is reported in categories. In addition, there was a "do not know" category (Table 12, page 54). The median reported income category was \$50,000 to \$74,999 (16.3%). Estimated median family income for Edmond in 1999 was \$51,967 while the estimated median household income for the U.S. in 1999 was \$40,926 (National Decision Systems, 1999). The \$100,000 or more income category received the highest percentage of responses with 20.9% while the \$75,000 to \$99,000 category received 18.6% and the \$50,000 to \$74,999 category received 16.3%. Almost 60.0% of respondents had incomes of \$50,000 or greater. According to the 1994-1995 NSRE (Cordell et al., 1999), participation in outdoor recreation is greatest in households with incomes over \$50,000.

Living arrangements reported by Edmond survey respondents are shown in Table 13 (page 54). The majority of Edmond residents (46.5%) reported living with one or more adults while 45.3% reported at least one child in the house. This percentage is close to the NDS estimate (1999) of 45.2% of Edmond households with at least one child. The NSRE (1994-1995) revealed that households with one or more children were the most likely to have participated in recreation (Bowker et al., 1999).

Forty-seven Edmond residents were male (54.7%) and 36 were female (41.9%). The average age of Edmond respondents was 47.8, the range was 18 to 82 (Table 14, page 54). Though respondents were asked for their exact age, for ease of understanding, results are reported in categories. A complete table of reported ages is in Appendix F. The age range with the most responses was 46-55 (25.7%).

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TABLE 12
INCOME REPORTED BY EDMOND
RESPONDENTS

Income level	Frequency	Percent	Cumulative Percent
1. Do not know	3	3.5	3.9
2. Less than \$20,000	0	0	3.9
3. \$20,000 to \$29,999	4	4.7	9.1
4. \$30,000 to \$39,999	11	12.8	23.4
5. \$40,000 to \$49,999	11	12.8	37.7
6. \$50,000 to \$74,999	14	16.3	55.8
7. \$75,000 to \$99,999	16	18.6	76.6
8. \$100,000 or over	18	20.9	100.0
Missing	9	10.5	
Total	86	100.0	

TABLE 13
LIVING ARRANGEMENTS REPORTED BY
EDMOND RESPONDENTS

Living Arrangements	Frequency	Percent
Alone	6	7.0
With one or more children	7	8.1
With one or more adults	40	46.5
With one or more adults and one or more children	32	37.2
Missing	1	1.2
Total	86	100.0

TABLE 14
AGE DISTRIBUTION OF EDMOND RESPONDENTS

Age Group	Frequency	Percent	Cumulative Percent
18 to 25	3	3.5	3.6
26 to 35	16	18.6	22.6
36 to 45	19	22.2	45.2
46 to 55	22	25.7	71.4
56 to 65	14	16.5	88.1
66 and older	10	11.8	100.0
Total	84	97.7	
Missing	2	2.3	
Total	86	100.0	

Mean 47.8 years; Median 47.5 years

Data Related to Responses to Survey Questions

The Arcadia Lake Visitor Use survey consisted of 17 questions. Frequency tables for each question and statement are shown in Tables 15 through 28. The statistical analyses were performed on data combined from the surveys distributed at the lake and from surveys mailed to Edmond residents.

Question # 1: "How often do you, or family members, visit Arcadia Lake In a year?"

The majority of respondents (36.7%) indicated they visited "more than ten times a year," while 10.0% indicated they did not visit the lake (Table 15, page 56).

TABLE 15

RESPONSES TO QUESTION # 1: HOW OFTEN
DO YOU OR FAMILY MEMBERS VISIT ARCADIA
LAKE IN A YEAR?

Visits	Frequency	Percent
None	12	10.0
One	14	11.7
Two to five	28	23.3
Six to ten	13	10.8
More than ten	44	36.7
Missing	9	7.5
Total	120	100.0

Question # 2 was, "From the following list, please identify your three most important reasons and three least important reasons for visiting Arcadia Lake. Put a 1 by the most important reason, a 2 by the second most important reason and a 3 by the third most important reason and then do the same for the least important reasons."

According to the Pearson product-moment rank (shown in parentheses), the five most important reasons for visiting the lake were: relaxing (84), walking (70), picnicking (63), fishing (49) and swimming (48) (Table 16, page 57). These results are similar to the NSRE (1994-1995) which found walking and picnicking the first and third most participated in recreational activities, respectively. The popularity of fishing at Arcadia Lake is reflective of its popularity with the general population, almost 60% of whom reported fishing for the year 1994-1995 (Cordell et al., 1999).

The five reasons which ranked as least important reasons for visiting the lake were: fishing tournaments (82), education/workshops (47), canoeing (44), kayaking (42) and waterskiing (31) (Table 17, page 58).

TABLE 16
 RESPONSES TO QUESTION # 2: MOST IMPORTANT REASONS FOR VISITING THE LAKE

Activity	Reason 1	Reason 1	Reason 2	Reason 2	Reason 3	Reason 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Biking on trails	10	8.3	4	3.3	2	1.7	16	13.3	40
Biking on roads	1	0.8	6	5.0	0	0	7	5.8	15
Bird watching	3	2.5	2	1.7	1	0.8	6	5.0	14
Camping-full hook-up	3	2.5	3	2.5	0	0	6	5.0	15
Camping-regular	11	9.2	4	3.3	4	3.3	19	15.8	45
Camping-tent	5	4.2	2	1.7	3	2.5	10	8.3	22
Canoeing	0	0	0	0	2	1.7	2	1.7	2
Disc golf	3	2.5	0	0	2	1.7	5	4.2	11
Education workshops	0	0	0	0	0	0	0	0	0
Fishing	10	8.3	8	6.7	3	2.5	21	17.5	49
Fishing tournaments	0	0	0	0	0	0	0	0	0
Jet skiing	0	1.7	2	1.7	0	0	2	1.7	4
Kayaking	0	0	0	0	0	0	0	0	0
Motorboating	4	3.3	3	2.5	1	0.8	8	6.7	21
Partying	1	0.8	1	0.8	2	3.3	4	3.3	7
Picnicking	9	7.5	11	9.2	14	11.7	34	28.3	63
Relaxing	12	10	17	14.2	14	11.7	43	35.8	84
Running	2	1.7	1	0.8	1	0.8	4	3.3	9
Sailing	2	1.7	0	0.8	3	2.5	3	2.5	7
Sail-boarding	0	0	0	0	0	0	0	0	0
Solitude	6	5.0	5	4.2	5	4.2	16	13.3	33
Swimming	7	5.8	5	4.2	17	14.2	29	24.2	48
Walking/hiking	13	10.8	9	7.5	13	29.2	35	29.2	70
Water-skiing	5	4.2	4	3.3	1	0.8	10	8.3	24
Wildlife watching	2	1.7	2	1.7	9	4.2	9	7.5	15
Other	0	0	0	0	0	0	0	0	0

TABLE 17
 RESPONSES TO QUESTION # 2: LEAST IMPORTANT REASONS FOR VISITING THE LAKE

Activity	Reason 1	Reason 1	Reason 2	Reason 2	Reason 3	Reason 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Biking on trails	4	3.3	1	0.8	1	0.8	6	5.0	15
Biking on roads	6	5.0	2	1.7	3	2.5	11	9.2	25
Bird watching	6	5.0	3	2.5	5	4.2	14	11.7	29
Camping-full hook-up	1	0.8	3	2.5	1	0.8	5	4.2	10
Camping-regular	2	1.7	0	0	3	2.5	5	4.2	9
Camping-tent	3	2.5	3	2.5	3	2.5	9	7.5	18
Canoeing	6	5.0	10	8.3	6	5.0	22	18.3	44
Disc golf	0	0	1	0.8	6	4.2	6	5.0	7
Education workshops	9	7.5	4	3.3	3	2.5	16	13.3	47
Fishing	3	2.5	2	1.7	3	2.5	8	6.7	16
Fishing tournaments	16	13.3	13	10.8	8	6.7	37	30.8	82
Jet skiing	2	1.7	1	0.8	7	5.8	10	8.3	15
Kayaking	7	5.8	7	5.8	7	5.8	21	17.5	42
Motorboating	4	3.3	6	5.0	4	3.3	14	11.7	28
Partying	0	0	1	0.8	1	0.8	2	1.7	3
Picnicking	0	0	0	0	0	0	0	0	0
Relaxing	0	0	0	0	0	0	0	0	0
Running	1	0.8	2	1.7	2	1.7	5	4.2	9
Sailing	2	1.7	0	0	3	2.5	5	4.2	9
Sail-boarding	2	1.7	3	2.5	1	0.8	6	5.0	2
Solitude	0	0	1	0.8	0	0	1	0.8	1
Swimming	0	0	0	0	1	0.8	1	0.8	3
Walking/hiking	1	0.8	0	0	0	0.8	1	0.8	31
Water-skiing	3	2.5	9	7.5	4	3.3	16	13.3	3
Wildlife watching	2	1.7	0	0	1	0.8	3	2.5	13
Other	1	0.8	0	0	1	0.8	2	1.7	4

Question #3 was, "Which program facilities and special events are you aware Arcadia Lake offers?"

The question contained a list of 14 programs, facilities and special events which the lake manager suggested be included. The respondent was instructed to check all of which they were aware. The most frequently selected response was "beaches" (82.5%) (Table 18). Also frequently selected were "Eagle Watch" (64.2%) and "multi-use hiking trails" (56.7%). Arcadia Lake is a wintering place for bald eagles and the annual event, termed "Eagle Watch," is well-publicized through local media.

The least frequently selected responses were "live animal programs" (11.7%), "interpretive teaching trails" (13.3%) and "fishing clinics" (15.8%).

TABLE 18
RESPONSES TO QUESTION # 3: WHICH
PROGRAM FACILITIES AND SPECIAL EVENTS ARE
YOU AWARE ARCADIA LAKE OFFERS?

Program Facilities and Special Events	Frequency	Percent
Agony at Arcadia Lake	33	27.5
Arcadia Lake Sweep	37	30.8
Disc golf course	52	43.3
Eagle Watch	77	64.2
Kids' Fishing Derby	50	41.7
Fishing clinics	19	15.8
Live animal programs	14	11.7
Interpretive teaching trail	16	13.3
Outdoor classrooms	17	14.2
Multi-use hiking trails	68	56.7
Sailing Regatta	35	15.8
Sandy swimming beaches	99	82.5
Summer recreation programs	29	24.2
Watchable Wildlife Weekend	21	17.5

Question #4 was, "From the following list, please identify the three recreational opportunities which would make it likely that you or your family would visit Arcadia Lake, or visit more frequently, by putting a 1 by the most important opportunity, a 2 by the second most important opportunity and a 3 by the third most important opportunity. Then do the same for the recreational opportunities which would make it likely that you would visit less frequently."

According to the Pearson product-moment rank, the five opportunities that would make it likely Arcadia Lake would be visited more frequently were: fishing piers (73), canoe/kayak rental (67), marina (63), paved bike trail (59) and cabins (58) (Table 19, page 61).

Though fishing piers and marina were ranked first and third, respectively, as desirable recreational opportunities, only 18.3% of survey respondents selected fishing as a most important reason for visiting Arcadia Lake (Table 16, page 57). There are two possible explanations for this discrepancy. First, a marina might be perceived as a resource for other than fishing-linked activities; or second, the amenities offered by a marina and the convenient fishing accessibility offered by a pier might increase the attractiveness of fishing for some people.

Though few respondents selected canoeing as a most important reason for visiting the lake (Table 16, page 57), canoe/kayak rental was the second-ranked recreational opportunity which respondents indicated would make it likely that they would visit the lake more frequently. This interest appears to reflect national trends, which show a growing interest in canoeing and kayaking. According to Cordell et al. (1999), participation in those activities increased over 600% from 1960 through 1995.

TABLE 19

RESPONSES TO QUESTION # 4: PLEASE IDENTIFY THE RECREATIONAL OPPORTUNITIES WHICH WOULD MAKE IT LIKELY YOU WOULD VISIT ARCADIA LAKE MORE FREQUENTLY

Opportunity	Opp. 1	Opp. 1	Opp. 2	Opp. 2	Opp. 3	Opp. 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Cabins	13	10.8	6	5.0	7	5.8	26	21.7	58
Cabins with indoor recreational facility	9	7.5	2	1.7	5	4.2	16	13.3	36
Camping, large group site	7	5.8	2	1.7	2	1.7	11	9.2	27
Camping, primitive	5	4.2	8	6.7	4	3.3	17	14.2	35
Canoe/kayak rental	16	13.3	7	5.8	5	4.2	28	23.3	67
Concessionaires	6	5.0	8	6.7	13	10.8	27	22.5	47
Fishing piers	15	12.5	8	6.7	4	3.3	27	22.5	73
Enclosed fishing dock	9	7.5	5	4.2	2	1.7	16	13.3	39
Marina	10	8.3	10	8.3	13	10.8	33	27.5	63
Motor boat rental	6	5.0	5	4.2	1	0.8	12	10.0	29
Nature museum	7	5.8	12	10.0	8	6.7	27	22.5	53
Off-road vehicle trail	2	1.7	3	2.5	5	4.2	10	8.3	17
Paved bike trail	8	6.7	12	10.0	11	9.2	31	25.8	59
Sailboat rental	6	5.0	7	5.8	5	4.2	18	15.0	37
Sand volleyball courts	4	3.3	1	0.8	6	5.0	11	9.2	20
Other	8	6.7	2	1.7	1	0.8	11	9.2	29

A paved bike trail was the fourth-ranked recreational opportunity which visitors indicated would influence frequency of visitation. The lack of designated bike trails in Edmond coupled with increasing numbers of outdoor enthusiasts who participate in the activity may be a factor in the high ranking of paved bike trail. When viewing/learning activities were not included, biking was the second most frequently participated in land-based activity in 1994-1995 (Cordell et al., 1999). Cordell et al. (1999) predict the number of biking participants to grow by 70% by the middle of this century. The 1999 Roper Starch survey results indicated 22% of Americans bicycled on paved roads in the year prior to the survey (The Recreation Roundtable, 1999).

The five highest-ranked recreational opportunities that respondents indicated would make it likely the lake would be visited more frequently would require additional development-with the exception of canoe/kayak rental. However, 60% of survey respondents reported they feel the amount of development at Arcadia Lake is "about right" (Table 24, page 67). This discrepancy suggests respondents enjoy the lake in its current semi-natural state, but would tolerate more development if it was for an activity in which they participated. There was no apparent pattern to the eight "other" responses (Table 20, page 63).

According to the Pearson-product moment rank the five opportunities which would make it likely visitors would visit less often were: off-road vehicle trails (108), motor boat rental (43), enclosed fishing dock (41), canoe/kayak rental (34) and camping-large group site (28) (Table 21, page 64). The lack of interest in motor boat rental, camping-large group and off-road vehicle trails would seem to be congruent with some of the most frequently identified benefits of the lake (Figure 1, page 68). Those benefits include nature, natural beauty, stress release and peace. The least important benefits of the lake identified by

respondents were noise and party atmosphere. Lake visitors seem to value an experience devoid of certain types of motorized recreation and low in noise levels.

There was only one "other" response for recreational opportunities which would make it likely that Arcadia Lake would be visited less frequently. This respondent indicated the jet ski area was too small; therefore, he recreates elsewhere.

TABLE 20

**"OTHER" RESPONSES TO QUESTION # 4: PLEASE
IDENTIFY THE THREE RECREATIONAL
OPPORTUNITIES WHICH WOULD MAKE IT LIKELY
YOU OR FAMILY MEMBERS WOULD VISIT
ARCADIA LAKE MORE FREQUENTLY**

Survey Number	Recreational Opportunities
14	Connect parks
42	Paddle boat rental
56	Clean restrooms. More showers.
78	Better trash pick up and recycling bins
88	Roof or canopy over picnic tables
90	Duck blinds. For waterfowl season. It would be nice if you carried sports activities (like baseball, soccer, football) like Hafer Park.
104	Access to south side
117	Paddle boats

Michigan State University

TABLE 21

RESPONSES TO QUESTION # 4: PLEASE IDENTIFY THE RECREATIONAL OPPORTUNITIES WHICH WOULD MAKE IT LIKELY YOU WOULD VISIT ARCADIA LAKE LESS FREQUENTLY

Opportunity	Opp. 1		Opp. 2		Opp. 3		Total		PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Cabins	4	3.3	3	2.5	8	6.7	15	12.5	26
Cabins with indoor recreational facility	3	2.5	5	4.2	6	5	14	11.7	25
Camping, large group site	3	2.5	7	5.8	5	4.2	15	12.5	28
Camping, primitive	3	2.5	2	1.7	3	2.5	8	6.7	16
Canoe/kayak rental	7	5.8	5	4.2	3	2.5	15	12.5	34
Concessionaires	4	3.3	5	4.2	5	4.2	14	11.7	27
Fishing piers	4	3.3	5	4.2	4	3.3	13	10.8	26
Enclosed fishing dock	6	5	10	8.3	3	2.5	19	15.8	41
Marina	3	2.5	3	2.5	6	5	12	10.0	21
Motor boat rental	8	6.7	7	5.8	5	4.2	20	16.7	43
Nature museum	2	1.7	2	1.7	4	3.3	8	6.7	14
Off-road vehicle trail	23	19.2	16	13.3	7	5.8	46	38.3	108
Paved bike trail	6	5	2	1.7	3	2.5	11	9.2	25
Sailboat rental	3	2.5	1	0.8	9	7.5	13	10.8	20
Sand volleyball courts	3	2.5	5	4.2	4	3.3	12	10.0	23
Other	0	0	1	0.8	0	0	1	0.8	2

Question # 5 was, "Would larger crowds at Arcadia Lake cause you or your family to come to the lake more often, less often, have no effect or cause you to look somewhere else to recreate?"

The majority (48.3%) responded "less often," (Table 22). This is consistent with the Cordell et al. study (1992) which found crowding a reason for nonparticipation in recreational activities.

TABLE 22

RESPONSES FOR QUESTION # 5:
WOULD LARGER CROWDS AT ARCADIA
LAKE CAUSE YOU OR YOUR FAMILY TO TO COME
THE LAKE MORE OFTEN, LESS OFTEN, HAVE NO
EFFECT OR FIND SOMEWHERE ELSE TO RECREATE?

Response	Frequency	Percent
More often	2	2.1
Less often	48	50.0
Have no effect	32	33.3
Find somewhere to recreate	14	14.6
Missing	24	20.0
Total	96	100.0

Question # 6 was, "Would an area of the lake off-limits to motorized watercraft but open to canoes, kayaks and other nonmotorized watercraft cause you or your family to come to the lake more often, less often, have no effect or cause you to look somewhere else to recreate?"

The majority (51.7%) responded "have no effect," while 33.3% responded "more often" (Table 23, page 66). The large percentage of respondents who reported "more often" might reflect a national trend toward increased participation in canoeing and kayaking and/or a tendency by respondents to prefer nonmotorized watercraft recreation activities at the lake.

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This preference is revealed in the large number of responses (269) for nonmotorized watercraft recreational activities as an important reason for visiting the lake as opposed to the number of responses (20) for motorized watercraft recreation (Table 16, page 57). In addition, lake visitors seem to value the relative tranquility of the lake, evidenced by the large percentage of respondents who selected peace as an Arcadia Lake benefit (65%) as opposed to noise (4%) (Figure 1, page 68).

TABLE 23

RESPONSES FOR QUESTION # 6: WOULD AN AREA OF THE LAKE OFF-LIMITS TO MOTORIZED WATERCRAFT BUT OPEN TO CANOES KAYAKS AND OTHER NONMOTORIZED WATERCRAFT CAUSE YOU OR YOUR FAMILY TO COME THE LAKE MORE OFTEN, LESS OFTEN, HAVE NO EFFECT OR CAUSE YOU TO FIND SOMEWHERE ELSE TO RECREATE?

Response	Frequency	Percent
More often	40	33.3
Less often	8	6.7
Have no effect	62	51.7
Find somewhere to recreate	2	1.7
Missing	8	6.7
Total	120	100.0

Question # 7 was, "What do you consider a benefit of Arcadia Lake? (Check all that apply)."

From the 27 benefits listed in the survey, the five most frequently selected were: enjoy being outdoors/natural resources (72.7%), nature (72.7%), natural beauty (66.9%), relaxation-place to relax (59.5%), and escape (58.7%) (Figure 1, page 68). These findings are similar to those in the Godbey et al. (1992) study that showed that nature, enjoyment of being being outdoors/natural resources, and relaxation were among the top benefits Americans enjoyed

about outdoor recreation. The five least frequently selected benefits perceived by survey respondents were crowds (3.3%), noise (3.3%), party atmosphere (4.1%), keeping mind occupied (16.5%) and learning/education (9.1%) (Figure 1, page 68).

Question # 8 was, "How do you feel about the amount of development at Arcadia Lake such as roads, campgrounds and pavillons?"

The majority (60%) reported "about right," while 2.5% reported "too much" and 28.6% reported "too little" (Table 24).

TABLE 24

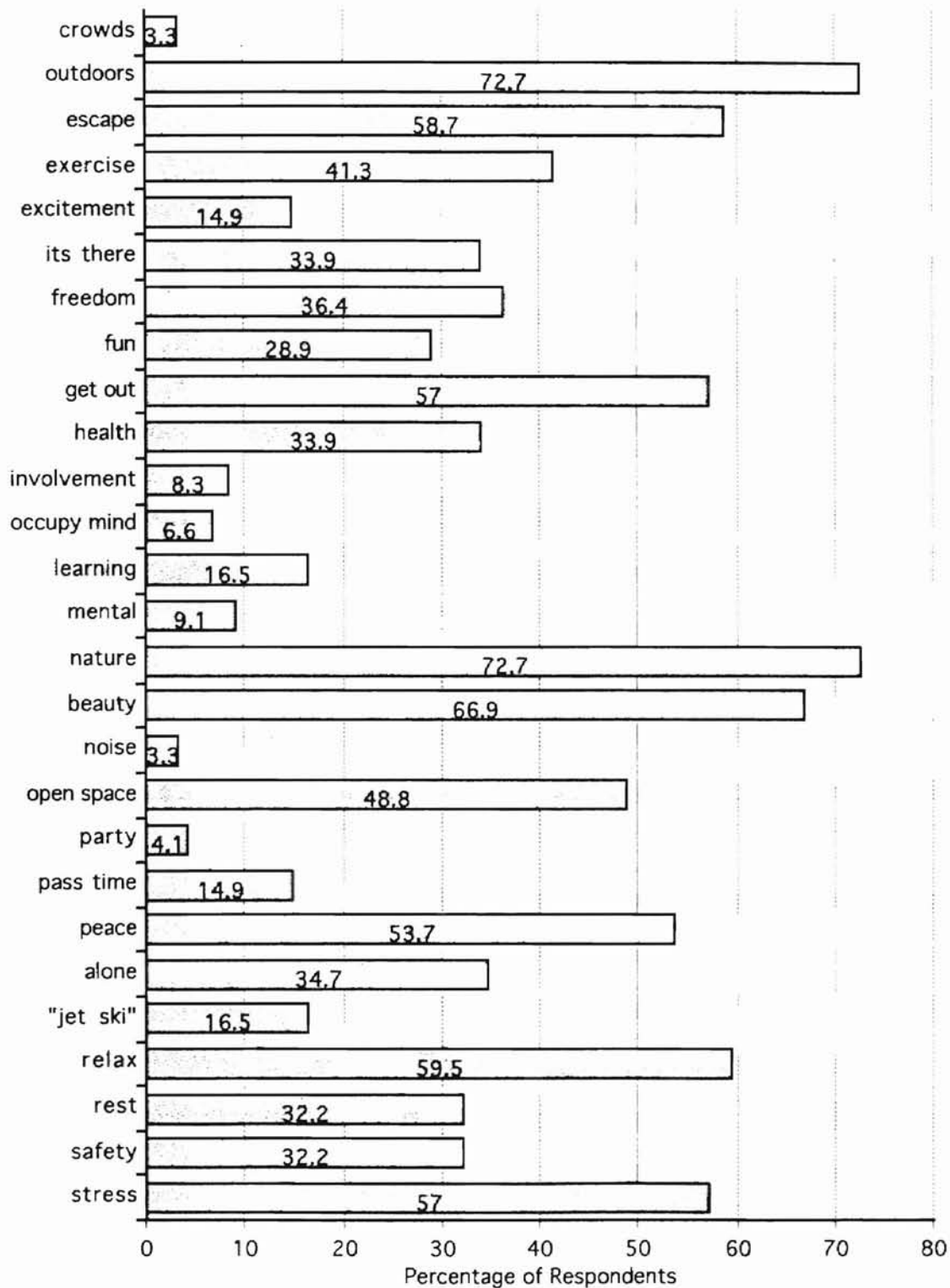
RESPONSES TO QUESTION # 8: HOW DO YOU OR YOUR FAMILY FEEL ABOUT THE AMOUNT OF DEVELOPMENT AT ARCADIA LAKE SUCH AS ROADS CAMPGROUND AND PAVILIONS?

Response	Frequency	Percent
Too much	3	2.5
About right	72	60.0
Too little	30	25.0
Missing	15	12.5
Total	120	100.0

Michigan State University

FIGURE 1

RESPONSES TO QUESTION # 7: WHAT DO YOU
CONSIDER A BENEFIT OF ARCADIA LAKE



For questions 9-14 respondents were asked to respond to statements by selecting responses from among five levels of intensity in a Likert type scale. The choices were: strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree with each statement. Table 25 is related to Survey Questions 9 through 14 and is shown on page 70.

Question # 9 was, "Outdoor recreation is important to my quality of life."

The majority (85.5%) responded either strongly agree or agree (Table 25, page 70). This large percentage of respondents who reported that outdoor recreation is important to their quality of life would seem to reflect a national interest. The 1994-1995 NSRE found that 94.5% of the population age 16 or older participated in some form of outdoor recreation (Cordell et al., 1999).

Question # 10 was, "There are enough outdoor recreation areas and facilities available that are convenient for me or my family."

Agree and disagree were the most frequently selected responses with 31.7% and 30.8%, respectively (Table 25, page 70). Among the general population 16.8% reported inadequate facilities as a reason for nonparticipation (Cordell et al., 1999).

Question # 11 was, "Protection of the natural environment is an important aspect of outdoor recreation areas."

A strong majority (85.0%) of respondents agreed or strongly agreed with this statement (Table 25, page 70). This high percentage of respondents who link outdoor recreation to protection of the natural environment probably reflects the increasing awareness in this country of the importance of environmental protection (Watson & Landres, 1999)

TABLE 25
RESPONSES TO QUESTIONS #9 - #14

	Question Nine	Question Nine	Question Ten	Question Ten	Question Eleven	Question Eleven
Response	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	5	4.2	14	11.7	2	1.7
Disagree	0	0	37	30.8	2	1.7
Neither agree nor disagree	9	7.5	18	15.0	9	7.5
Agree	30	25.0	38	31.7	49	40.8
Strongly agree	72	60.0	8	6.7	53	44.2
Missing	4	3.3	5	4.2	5	4.2
Total	120	100.0	120	100.0	120	100.0
	Question Twelve	Question Twelve	Question Thirteen	Question Thirteen	Question Fourteen	Question Fourteen
Response	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	1	0.8	10	8.3	23	19.2
Disagree	9	7.5	16	13.3	12	10.0
Neither agree nor disagree	31	25.8	35	29.2	41	34.2
Agree	36	30.0	29	24.2	28	23.3
Strongly agree	35	29.2	24	20.0	8	6.7
Missing	8	6.7	6	5.0	8	6.7
Total	120	100.0	120	100.0	120	100.0

Question # 12 was, "More outdoor recreation areas are needed in or near my city."

Almost 60% of respondents either agreed or strongly agreed with this statement (Table 25, page 70). While the number of parks in Edmond has increased from 3 to 17 since 1980, the total acreage of parklands is 450. The 1999 estimated population of Edmond was almost 70,000 and the 1999 estimated median income of Edmond residents was \$51,967 (National Decision Systems, 1999). Because participation in recreation programs increases with income level the Edmond community has potential for high levels of participation in recreation (Bowker, Donald, English and Cordell, 1999). The number of acres of parks may be inadequate to meet the participation needs of residents. Alternatively these percentages might reflect a difference in location of respondents relative to parks.

Question # 13 was, "I or my family would use a biking and walking trail system linking Edmond and Arcadia Lake."

The majority (44.2%) of respondents agreed or strongly agreed with this statement, while 29.2% responded neither agree nor disagree (Table 25, page 70). This neutral response could mean respondents were undecided or they did not possess enough information to make a determination. Those respondents who do not live in Edmond, along with some Edmond residents, might simply be disinterested. Edmond residents did tend to be somewhat more favorable toward trail use with 51.1% indicating they agreed or strongly agreed.

Question # 14 was, "I or my family would use nonmotorized watercraft such as canoes on days motorized watercraft were prohibited at the lake." The majority responded neither agree nor disagree (34.2%), while 30.0% responded agree or strongly agree, and 29.2%

responded disagree or strongly disagree (Table 25, page 70). The percentage who responded neither agree nor disagree might reflect disinterest or lack of information. In order to further discern attitudes toward zoning for watercraft, respondents were separated into two groups. The first group was comprised of those respondents who selected a motorized watercraft activity as an important reason for visiting the lake (Table 26). The second group is comprised of those respondents who selected reasons other than a motorized watercraft activity, such as walking and picnicking, as an important reason for visiting the lake. Chi-square analysis of the two groups with Question # 14 resulted in a significant difference (Chi-square 42.231; d.f. 4; $p < 0.01$) (Table 26). Among respondents in the motorized watercraft recreation group 80% strongly disagreed with this statement resulting in four of the five cells (40%) under motorized watercraft recreation with fewer than five responses. Almost 37.7% of those who participated in nonmotorized watercraft activities indicated they agreed or strongly agreed that they would use nonmotorized watercraft on days motorized watercraft were prohibited at the lake, compared to none who participated in motorized watercraft activities.

TABLE 26

COMPARISON OF RESPONSES TO QUESTION # 14: BY MOST
IMPORTANT REASON FOR VISITING ARCADIA LAKE

Response	Motorized Recreation	Motorized Recreation	Non-motorized Recreation	Non-motorized Recreation
	Frequency	Percent	Frequency	Percent
Strongly disagree	12	80.0	6	7.8
Disagree	1	6.7	10	13.0
Neither agree nor disagree	2	13.3	32	41.6
Agree	0	0	22	28.6
Strongly agree	0	0	7	9.1

Chi-square 42.231; d.f. 4; $p < 0.01$

Question # 15 was, "If you do not visit Arcadia Lake please identify your three most important reasons for not visiting Arcadia Lake. Put a 1 by the most important reason, a 2 by the second most important reason and a 3 by the third most important reason."

Responses were ranked using the Pearson product-moment rank. The five highest-ranked reasons were: "entrance fees are too high" (102), "other," (38), "not aware of the variety of activities available" (37), "too crowded" (36), and "concerned about safety (26) (Table 27, page 74). The least frequently mentioned reason was "do not enjoy outdoor activities (0). Among "other" responses, 35.3% of the reasons related to time limitations (Appendix H).

The most frequently mentioned barrier (42.5%) to participation in the 1994-1995 NSRE was lack of money (Cordell et al., 1999). The entrance fees for Arcadia Lake are \$7.00 per vehicle and an additional \$7.00 for a boat (Edmond Department of Parks and Recreation, 1999b). Yearly passes for Edmond residents are \$48.00 for the first vehicle in a family and \$24.00 for the second vehicle. Subsequent vehicles in the family follow the same pattern beginning with \$48.00 for the third vehicle. Nonresidents pay \$60.00 for the first vehicle and \$30.00 for the second (see Appendix I for complete fee schedule).

Crowding, the fourth-ranked barrier (20.5%), was the sixth-ranked barrier to participation in the 1994-1995 NSRE (Cordell et al., 1999). In the 1992 Godbey et al., study, 52% of respondents selected "not enough time" as a reason for nonparticipation. For this study, time limitations were the most frequently mentioned barrier to participation in the "other" category.

TABLE 27

RESPONSES TO QUESTION # 15: IF YOU DO NOT VISIT ARCADIA LAKE
PLEASE IDENTIFY THE THREE MOST IMPORTANT REASONS FOR NOT VISITING

Reason	Reason 1	Reason 1	Reason 2	Reason 2	Reason 3	Reason 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Concerned about safety	7	5.8	2	1.7	1	0.8	10	8.3	26
Concerned about the number and types of watercraft	2	1.7	3	2.5	5	4.2	10	8.3	17
Do not enjoy outdoor activities	0	0	0	0	0	0	0	0	0
Entrance fees are too high	27	22.5	7	5.8	7	5.8	41	34.2	102
Have no-one with whom to participate in activities	2	1.7	4	3.3	1	0.8	7	5.8	15
Not aware of its existence	0	0	0	0	1	0.8	1	0.8	1
Not aware of the variety of activities available	2	1.7	13	10.8	5	4.2	20	16.7	37
Not crowded enough	3	2.5	3	2.5	2	1.7	8	6.7	17
Too crowded	5	4.2	8	6.7	5	4.2	18	15	36
Too noisy	2	1.7	3	2.5	6	5	11	9.2	18
Too far from my home	3	2.5	0	0.8	1	3.3	4	3.3	10
Other	7	5.8	5	4.2	7	5.8	19	15.8	38

Question # 16 was, "Briefly describe the most and least appealing feature of Arcadia Lake."

Responses are reported in Appendix J and Appendix K. "Most appealing" responses (Appendix J) tended to focus on the natural beauty and accessibility of the lake. "Least appealing" responses (Appendix K) tended to fall into the following seven categories: 1. lack of cleanliness of the lake and facilities; 2. high entrance fees; 3. disruptive and/or illegal and/or dangerous behavior by visitors; 4. personal watercraft; 5. inadequate camping facilities and support services; 6. noise and; 7. crowds.

Question # 17 was, "How many times a week do you or your family participate in outdoor recreation?" The majority of respondents reported "one to two" (36.7%), while 29.2% reported "three to four" and 27.5% reported "five or more," and 5% reported "do not participate" (Table 28).

TABLE 28

RESPONSES TO QUESTION # 17: HOW MANY TIMES DO YOU OR YOUR FAMILY PARTICIPATE IN OUTDOOR RECREATION?

Participation	Frequency	Percent	Cumulative Percent
None, I do not participate	6	5.0	5.1
1-2	44	36.7	42.4
3-4	35	29.2	72.0
5 or more	33	27.5	100.0
Missing	2	1.7	
Total	120	100.0	

Results for Research Questions

The following research questions were developed and tested.

Research Question # 1 was, "What effect does visitation and the perception of crowding have on actual visitation rates among frequent and nonfrequent lake visitors?" In order to discern differences in the visitation patterns of frequent visitors and infrequent visitors with larger crowds at the lake, a crosstabulation was utilized to discern any relationship between number of visits per year (Table 29, page 77) and responses to Survey Question # 5: Would larger crowds cause you or your family to come to the lake more often, less often, have no effect, or cause you to look somewhere else to recreate (Table 22, page 65)? The analysis yielded inadequate cell count with 70% of the cells having less than the expected cell count of five. To compensate, the four variables representing respondents' number of visits per year were collapsed into two. Variables "one time" and "two to five times" were collapsed and named "Infrequent Visitor," while variables "six to ten times" and "more than ten" were collapsed and named "Frequent Visitor." Again, a crosstabulation was utilized to discern any relationship between frequency of visits and responses to Survey Question # 5 (Table 29, page 77).

Statistical analysis revealed there was no difference in the responses of the two groups (Chi-square = 7.53, d.f. = 3, $p = 0.057$). Two cells had expected values less than five resulting in 25% of the cells with inadequate cell count. Low cell count was due to only one person in the frequent visitor group and only one person in the the infrequent visitor group reporting that larger crowds would cause them to come to the lake more often. Statistical analysis indicated the visitation patterns of frequent visitors and infrequent visitors would not differ with larger crowds at the lake.

Among frequent visitors, 52.6% reported they would recreate less often

with larger crowds at the lake and 21.1% reported they would find somewhere else to recreate for a total of 73.3% who anticipate a negative influence on their lake recreation patterns. This is consistent with the Cordell et al. study (1992) which found crowding a reason for nonparticipation in recreational activities. Among infrequent visitors, 46.2% reported they would recreate less often with larger crowds at the lake while only 5.1% reported they would find somewhere else to recreate.

TABLE 29

**INFLUENCE OF NUMBER OF VISITS PER YEAR
ON RESPONSE TO QUESTION # 5: WOULD LARGER
CROWDS CAUSE YOUR FAMILY TO COME TO
THE LAKE MORE OFTEN, LESS OFTEN, HAVE NO
EFFECT OR CAUSE YOU TO LOOK SOMEWHERE
ELSE TO RECREATE**

Visitor Group	Infrequent Visitor	Infrequent Visitor	Frequent Visitor	Frequent Visitor
	Frequency	Percent	Frequency	Percent
More often	1	2.6	1	1.8
Less often	18	46.2	30	52.6
Have no effect	18	46.2	14	24.6
Look somewhere else to recreate	2	5.1	12	21.1
Total	39		57	

Chi-square = 7.53, d.f. = 3, p = 0.057

Research Question 2 was, "Which additional recreational opportunities at Arcadia Lake would make it likely that Edmond residents would visit Arcadia Lake more frequently?"

Survey Question # 4 was, "From the following list please identify the three recreational opportunities which would make it likely that you or your family would visit Arcadia Lake more frequently." This question provided an opportunity for respondents to identify those recreational activities which would increase their frequency of visitation at Arcadia Lake. Edmond residents were identified by zip code and their responses analyzed. According to the Pearson

product-moment rank, the five most important opportunities which would make it likely Arcadia Lake would be visited more frequently were canoe/kayak rental (62), paved bike trail (51), fishing piers (47), nature museum (46) and marina (43) (Table 30, page 79).

Though only two Edmond respondents selected canoeing as an important reason for visiting the lake and none selected kayaking (Table 34, page 84), canoe/kayak rental was the first-ranked recreational opportunity which would make it likely that Edmond respondents would visit the lake more frequently. This interest in canoeing and kayaking is indicative of national trends which show growing participation in these activities. The percentage of outdoor recreationists who canoed and/or kayaked increased over 600% from 1960 through 1995 (Cordell et al., 1999). Enthusiasm for these activities is not expected to wane, according to Bowker et al. (1999) who claim "the number of days spent canoeing is expected to increase about 30% more than the population growth through the year 2050." Income is apparently a factor in the selection of canoeing as a recreational activity. Among those who participated in canoeing 27% had incomes \$50,000 or over, while 19% had incomes under \$50,000 (Cordell et al., 1999)

TABLE 30

EDMOND RESIDENTS' RESPONSES TO QUESTION # 4: PLEASE IDENTIFY THE THREE RECREATIONAL OPPORTUNITIES WHICH WOULD MAKE IT LIKELY YOU WOULD VISIT ARCADIA LAKE MORE FREQUENTLY

Recreational Opportunity	Opp. 1	Opp. 1	Opp. 2	Opp. 2	Opp. 3	Opp. 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Cabins	7	8.1	5	5.8	4	4.7	16	18.6	35
Cabins with indoor recreational facility	6	7.0	1	1.2	3	3.5	10	11.6	23
Camping, large group site	4	4.7	1	1.2	2	2.3	7	8.4	16
Camping, primitive	4	4.7	6	7.0	3	3.5	13	15.1	27
Canoe/kayak rental	16	18.6	5	5.8	4	4.7	25	29.1	62
Concessionaires	5	5.8	4	4.7	7	8.1	16	18.6	30
Fishing piers	11	12.8	5	5.8	4	4.7	20	23.3	47
Enclosed fishing dock	8	9.3	5	5.8	1	1.2	14	16.3	35
Marina	7	8.1	6	7.0	10	11.6	23	26.7	43
Motor boat rental	4	4.7	4	4.7	1	1.2	9	10.5	21
Nature museum	6	7.0	12	14.0	4	4.7	22	25.6	46
Off-road vehicle trail	2	2.3	2	2.3	4	4.7	8	9.3	14
Paved bike trail	8	9.3	9	10.5	9	10.5	26	30.2	51
Sailboat rental	5	5.8	7	8.1	5	5.8	17	19.8	34
Sand volleyball courts	2	2.3	1	1.2	6	7.0	9	10.5	14
Other	5	5.8	2	2.3	1	1.2	8	9.3	20

Paved bike trail was the second-ranked facility which Edmond residents indicated would influence frequency of visitation. There are no designated bike trails in Edmond and this factor, coupled with the growing numbers who participate in biking, possibly influenced respondents to indicate a desire for a paved trail. From 1960 to 1995 the number of people nationwide who participated in biking increased by 48.7%. Biking showed the second-highest participation rate among land-based activities in 1994-1995. Viewing/learning activities were not included in this ranking (Cordell et al., 1999). Cordell et al. (1999) predict that the number of participants in biking will grow by 70% by the middle of this century. The 1999 Roper Starch survey also found biking to be popular, with 22% of Americans reporting they had participated in biking for recreation sometime in the previous year (The Recreation Roundtable, 1999).

Edmond respondents ranked fishing piers and marina as their third and fifth most desirable recreational opportunities. However, only 10.5% selected fishing as their primary reason for visiting Arcadia Lake (Table 34, page 86). The selection of piers and marina might indicate a desire by Edmond respondents to fish, or fish more frequently. Fishing is popular with the general population, almost 60% of whom reported fishing for the year 1994-1995 (Cordell et al., 1999), and more Edmond residents might fish, or fish more frequently, under certain conditions. Other explanations may account for the discrepancy between the number who fish and the number who desire fishing piers and a marina. A marina could be perceived as a resource for other than fishing-linked activities; or the fishing accoutrement offered by a marina and the accessibility provided by a pier may increase the sport's appeal.

Nature museum was the fourth-ranked recreational opportunity which Edmond residents indicated would influence frequency of visitation. Nationally, 46.4% of Americans visited a nature center for 1994-1995 (Cordell et al., 1999).

Four of the five most important opportunities which would make it likely Edmond respondents would visit more frequently would require additional development. The exception was canoeing/kayaking. However, 60% of Edmond survey respondents feel the amount of development at Arcadia lake is "about right" (Table 31). These results suggest lake visitors enjoy the lake in its current semi-natural state but would tolerate more development, if the development was for an activity in which they participated.

TABLE 31

**EDMOND RESIDENTS' RESPONSES TO QUESTION # 8:
HOW DO YOU OR YOUR FAMILY FEEL ABOUT THE
AMOUNT OF DEVELOPMENT AT ARCADIA LAKE SUCH AS
ROADS CAMPGROUND AND PAVILIONS?**

Response	Frequency	Percent
Too much	3	3.5
About right	55	64.0
Too little	17	19.8
Missing	11	12.8
Total	86	100.0

Research Question # 3 was, "What are the reasons Edmond residents do not recreate at Arcadia Lake?"

Respondents were asked to identify, from a list of 12, their three most important reasons for not visiting the lake. According to the Pearson product-moment rank the five most important reasons Edmond residents identified as reasons for not recreating at the lake were: "entrance fees are too high" (72), "other" (31) and "too crowded" (31), "not aware of the variety of activities" (20), and "too noisy" (16). (Table 32, page 83). "Other" responses were varied, though two respondents indicated time was a factor (Table 33, page 82). This concurred with the Godbey, et al. (1992) nationwide study in which 52% of

respondents selected "not enough time" as a reason for nonparticipation. For the 1994-1995 NSRE, lack of money was the most frequently mentioned barrier to participation (42.5%), while crowding was the sixth-ranked barrier (20.5%) (Cordell et al., 1999).

The lack of specific recreational opportunities were not included in the list as reasons for not visiting Arcadia Lake, however, it is possible Edmond residents do not visit Arcadia Lake because their preferred activity is not available. For this reason Edmond residents' responses to Survey Question # 4 provide additional insight. Question # 4 was, "Identify recreational opportunities which would make it likely that you or your family would visit Arcadia Lake more frequently." Respondents were offered 15 specific recreational opportunities and an "other" category. According to the Pearson product-moment rank the five most important opportunities which would make it likely Arcadia Lake would be visited more frequently were: canoe/kayak rental (62), paved bike trail (51), fishing piers (47), nature museum (46) and marina (43) (Table 35, page 78). Because these opportunities are not currently available at Arcadia Lake, it is possible Edmond residents do not visit the lake because participation in their preferred activity is not possible at present.

TABLE 32

EDMOND RESIDENTS' RESPONSES TO QUESTION # 15: IF YOU DO NOT VISIT ARCADIA LAKE
PLEASE IDENTIFY THE THREE MOST IMPORTANT REASONS FOR NOT VISITING

Reason	Reason 1	Reason 1	Reason 2	Reason 2	Reason 3	Reason 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Concerned about safety	3	3.5	1	1.2	1	1.2	5	5.8	12
Concerned about the number and types of watercraft	1	1.2	2	2.3	5	5.8	8	9.3	12
Do not enjoy outdoor activities	0	0	0	0	0	0	0	0	0
Entrance fees are too high	21	24.4	3	3.5	3	3.5	27	31.4	72
Have no-one with whom to participate in activities	1	1.2	2	2.3	0	0	3	3.5	7
Not aware of its existence	0	0	0	0	1	1.2	1	1.2	1
Not aware of the variety of activities available	1	1.2	7	8.1	3	3.5	11	12.8	20
Not crowded enough	0	0	2	2.3	2	2.3	4	4.7	6
Too crowded	5	5.8	7	8.1	2	2.3	14	16.3	31
Too noisy	2	2.3	3	3.5	4	4.7	9	10.5	16
Too far from my home	0	0	0	0	1	1.2	1	1.2	1
Other	6	7.0	4	4.7	5	5.8	15	17.4	31

Table 33

**"OTHER" RESPONSES OF EDMOND RESIDENTS TO
QUESTION # 15: IF YOU OR YOUR FAMILY DO NOT VISIT
ARCADIA LAKE OR DO NOT VISIT FREQUENTLY, PLEASE
IDENTIFY THE THREE MOST IMPORTANT REASONS
FOR NOT VISITING**

Reason
Lack of connecting roads between parks
Too much beer drinking
Trash and dirty restrooms
Too many rowdy teenagers
Time to have recreation
Fecal material in swim area
No boat
No interest in lake
Too many rules/regulations
Too busy
As a taxpayer in Edmond since 1923, no entrance fee should be imposed
Don't think about it

Research Question # 4 was, "What preferences do Edmond residents have for recreation at Arcadia Lake?"

Preference for recreation includes those activities in which the respondent currently participates, activities in which the respondent would participate if such activities were available, the type of social/environmental setting preferred for recreation, and perceived benefits of recreation. Therefore, Edmond residents' most important reasons for currently visiting the lake are discussed as well as opportunities which would result in increased number of visits. In addition, respondents' perceived benefits of Arcadia Lake are included as well as responses to questions pertinent to social/environmental setting.

Survey Question # 2 was, "From the following list, please identify your three most important reasons and three least important reasons for visiting Arcadia Lake." Respondents selected reasons from among 26 specific

recreational opportunities and an "other" category reasons and ranked them utilizing numbers 1 through 3. According to the Pearson product-moment rank the five most important reasons Edmond residents visited the lake were: walking (62), relaxing (60), picnicking (44), fishing (38) and biking on trails (34) (Table 34, page 86).

These findings indicate Edmond residents recreational habits are similar to those of the general population. When measured by rate of participation, the recreational activities walking and picnicking ranked first and third among all Americans, according to the 1994-1995 NSRE. Almost 60% of Americans reported fishing for the year and 28.6% reported biking, though not specifically biking on trails (Cordell et al., 1999). The NSRE also showed most trail biking is participated in by individuals with at least some college and an income of over \$30,000 a year. This profile is similar to that shown among many Edmond respondents (Cordell et al., 1999).

TABLE 34

EDMOND RESIDENTS' RESPONSES TO QUESTION # 2

Recreational Activity	Reason 1	Reason 1	Reason 2	Reason 2	Reason 3	Reason 3	Total	Total	PPM Rank
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	
Biking on trails	8	9.3	4	4.7	2	14.3	14	16.3	34
Biking on roads	0	0	5	5.8	0	0	5	5.8	10
Bird watching	2	2.3	2	2.3	1	1.2	5	5.8	11
Camping, full hook-up	0	0	1	1.2	0	0	1	1.2	2
Camping, regular	7	8.1	3	3.5	2	2.3	12	14	29
Camping, tent	2	2.3	1	1.2	3	3.5	6	7	11
Canoeing	0	0	0	0	2	2.3	2	2.3	2
Disc golf	2	2.3	0	0	2	2.3	4	4.7	8
Education/workshops	0	0	0	0	0	0	0	0	0
Fishing	9	10.5	5	5.8	1	1.2	15	17.4	38
Fishing tournaments	0	0	0	0	0	0	0	0	0
"Jet skiing"	0	0	2	2.3	0	0	2	2.3	2
Kayaking	0	0	0	0	0	0	0	0	0
Motor/power boating	3	3.5	1	1.2	1	1.2	5	5.8	12
Partying	1	1.2	1	1.2	1	1.2	3	3.5	6
Picnicking	5	5.8	9	10.5	11	12.8	25	29.1	44
Relaxing	9	10.5	11	12.8	11	12.8	31	36	60
Running	2	2.3	1	1.2	1	1.2	4	4.7	9
Sailing	2	2.3	0	0	1	1.2	3	3.5	7
Sail-boarding	0	0	0	0	0	0	0	0	0
Solitude	6	7.0	4	4.7	3	3.5	13	15.1	29
Swimming	5	5.8	3	3.5	9	10.5	17	19.8	30
Walking/hiking	13	15.1	7	8.1	9	10.5	29	33.7	62
Water-skiing	3	3.5	2	2.3	0	0	5	5.8	13
Wildlife watching	1	1.2	2	2.3	4	4.7	7	8.1	11
Other	0	0	0	0	0	0	0	0	0

Survey Question # 4 was, "Identify recreational opportunities which would make it likely that you or your family would visit Arcadia Lake more frequently." Respondents were offered 15 specific recreational opportunities and an "other" category. According to the Pearson-product moment rank the five most important opportunities which would make it likely Arcadia Lake would be visited more frequently were: canoe/kayak rental (62), paved bike trail (51), fishing piers (47), nature museum (46) and marina (43) (Table 35, page 88).

The large percentage of Edmond respondents who selected canoeing/kayaking (29.1%) as a recreational opportunity which would make it likely that they would visit more frequently is probably indicative of national trends which show a growing interest in those activities. According to Cordell et al., (1999) participation in canoeing and/or kayaking increased over 600% from 1960 through 1995. Because Edmond residents expressed strong interest in nonmotorized watercraft activities such as canoeing, kayaking and sailing, two survey questions pertaining to zoning and nonmotorized watercraft were analyzed in order to more clearly elucidate respondents' attitudes about motorized watercraft and nonmotorized watercraft.

Question # 6 asked, "Would an area of the lake off-limits to motorized watercraft but open to canoes, kayaks and other non-motorized watercraft cause you or your family to come to the lake more often, less often, have no effect or cause you to look somewhere else to recreate?" Among Edmond residents, 44.2% reported they would recreate at the lake more often if there was an area off-limits to motorized watercraft but open to canoes, kayaks and other non-motorized watercraft (Table 35, page 88). Only 5.9% indicated they would recreate less often or find somewhere else to recreate.

Question # 14 was, "I or my family would use nonmotorized watercraft such as canoes on days motorized watercraft were prohibited at the lake." The

majority (36%) agreed or strongly agreed, while 29.1% disagreed or strongly disagreed (Table 36). The apparent discrepancy in answers to these two questions would seem to relate to the specificity of question # 14, which asked if the respondent would use a certain type of watercraft on days motorized were prohibited. Question # 5 was more general in nature, attempting to ascertain attitudes toward motorized watercraft.

TABLE 35

**EDMOND RESIDENTS RESPONSES
QUESTION # 6: WOULD AN AREA OF THE LAKE OFF-
LIMITS TO MOTORIZED WATERCRAFT BUT OPEN TO
CANOES KAYAKS AND OTHER NON-MOTORIZED WATERCRAFT
CAUSE YOU OR YOUR FAMILY TO COME THE LAKE
MORE OFTEN, LESS OFTEN, HAVE NO EFFECT OR CAUSE
YOU TO FIND SOMEWHERE ELSE TO RECREATE?**

Response	Frequency	Percent
More often	38	44.2
Less often	4	4.7
Have no effect	40	46.5
Find somewhere to recreate	1	1.2
Missing	3	3.0
Total	86	100.0

TABLE 36

**EDMOND RESIDENTS RESPONSES TO QUESTION # 14:
I OR MY FAMILY WOULD USE NON-MOTORIZED WATERCRAFT
ON DAYS MOTORIZED WATERCRAFT WERE PROHIBITED
AT THE LAKE**

Response	Frequency	Percent
Strongly disagree	16	18.6
Disagree	9	10.5
Neither agree nor disagree	25	29.1
Agree	24	27.9
Strongly agree	7	8.1
Missing	5	5.8
Total	86	100.0

Question # 8 asked, "How do you feel about the amount of development at Arcadia Lake such as roads, campgrounds and pavilions?" The majority (64%) of Edmond survey residents responded "about right" (Table 37, page 90). Though a large percentage feel development is about right, four of the five recreation opportunities that would draw residents to the lake more frequently would require extensive additional development. The exception was canoeing/kayaking. This suggests lake visitors enjoy the lake in its current semi-natural state but would tolerate more development if the development was for an activity in which they participated.

Several survey questions suggest outdoor recreation was important to Edmond survey respondents. Almost 85% of Edmond respondents agreed or strongly agreed that "outdoor recreation is important to my quality of life" (Table 38, page 91) while 95.4% reported that they participated in outdoor recreation at least once a week. Among Edmond residents, 53.5% agreed that "more outdoor recreation areas are needed in or near my city" (Table 38, page 91), and 45.4% of Edmond residents disagreed or strongly disagreed that "there are enough outdoor recreation areas and facilities available that are convenient for me or my family" (Table 38, page 91).

A majority (51.1%) of Edmond respondents indicated "I or my family would use a biking and walking trail system linking Edmond and Arcadia Lake. (Table 38, page 91). These numbers fall short of the total of those Edmond respondents who reported walking/hiking and/or running (38.4%) and biking on roads and/or biking on trails (22.1%) as important reasons for visiting the lake; present participation is lower than willingness to participate. There are several possible reasons for this discrepancy, including a lack of knowledge. Many residents may not be aware that a trail system currently exists at the lake or they may be interested in a trail for an activity other than those listed in the survey;

such as rollerblading. In addition, a trail system would be more accessible to many residents and perhaps viewed as more time-effective.

TABLE 37

EDMOND RESIDENTS' RESPONSES TO QUESTION # 8:
HOW DO YOU OR YOUR FAMILY FEEL ABOUT THE
AMOUNT OF DEVELOPMENT AT ARCADIA LAKE

Response	Frequency	Percent
Too much	3	3.5
About right	55	64.0
Too little	17	19.8
Missing	11	12.8
Total	86	100.0

TABLE 38

EDMOND RESIDENTS' RESPONSES TO QUESTIONS #9 - #14

	Question Nine	Question Nine	Question Ten	Question Ten	Question Eleven	Question Eleven
Response	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	4	4.7	9	10.5	1	1.2
Disagree	6	7.2	30	34.9	2	2.3
Neither agree nor disagree	18	20.9	15	17.4	5	5.8
Agree	0	0	24	27.9	33	38.4
Strongly agree	55	64.0	6	7.0	43	50
Missing	3	3.5	2	2.3	2	2.3
Total	86	100.0	86	100.0	86	100.0
	Question Twelve	Question Twelve	Question Thirteen	Question Thirteen	Question Fourteen	Question Fourteen
Response	Frequency	Percent	Frequency	Percent	Frequency	Percent
Strongly disagree	1	1.2	8	9.3	16	18.6
Disagree	9	10.5	10	11.6	9	10.5
Neither agree nor disagree	25	29.1	22	25.6	25	29.1
Agree	21	24.4	21	24.4	24	27.9
Strongly agree	25	29.1	23	26.7	7	8.1
Missing	5	5.8	2	2.3	5	5.8
Total	86	100.0	86	100.0	86	100.0

TABLE 39

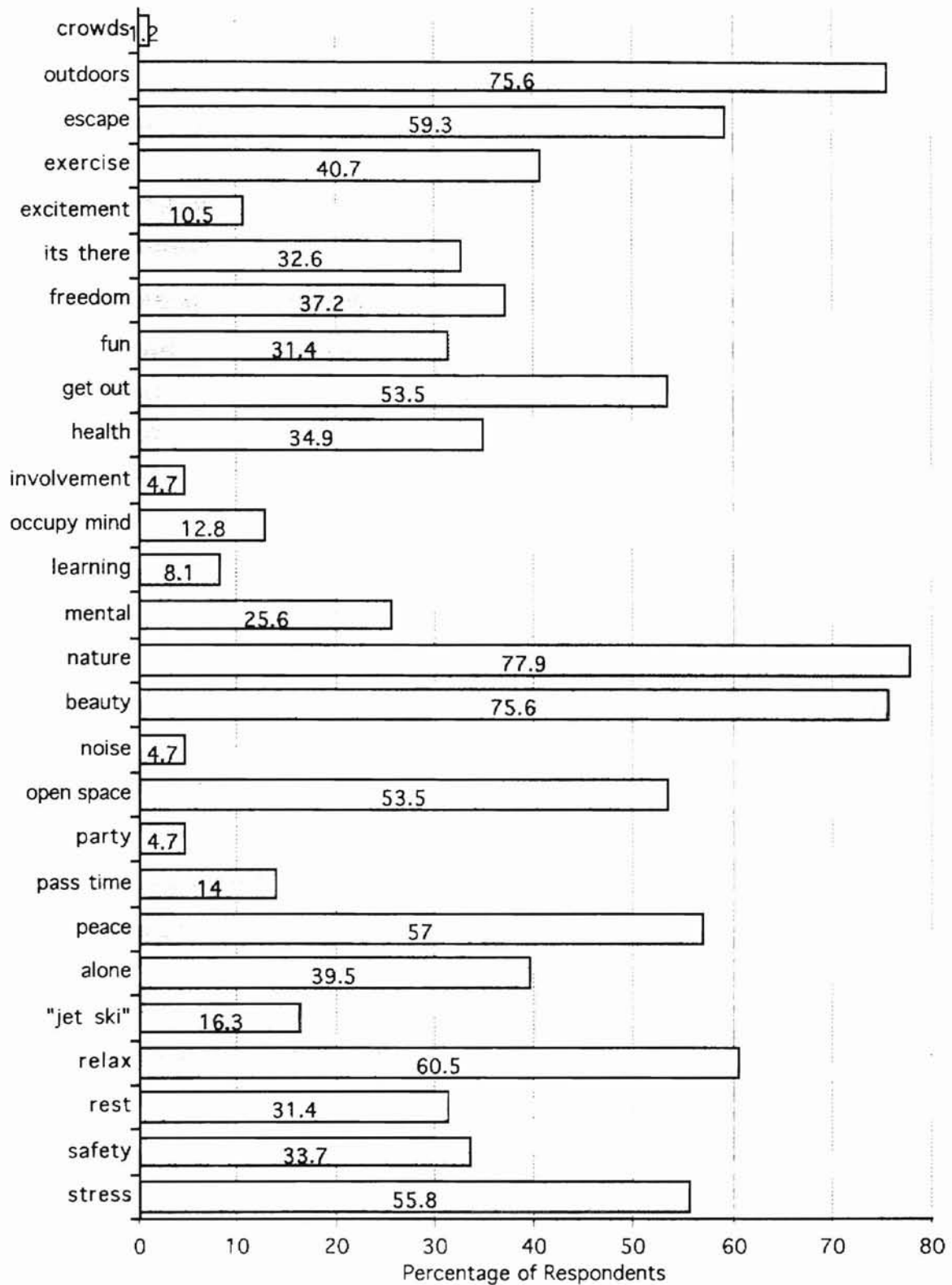
**EDMOND RESIDENTS' RESPONSES TO QUESTION # 17:
HOW MANY TIMES A WEEK DO YOU OR YOUR FAMILY
PARTICIPATE IN OUTDOOR RECREATION?**

Participation	Frequency	Percent	Cumulative Percent
None, I do not participate	4	4.7	4.7
1-2	27	31.4	36.0
3-4	28	32.6	68.6
5 or more	27	31.4	100.0
Missing	0	0	
Total	86	100.0	

Another survey item relevant for understanding Edmond residents' preferences for recreation is Question # 7 was, "What do you consider a benefit of Arcadia Lake?" Edmond residents most frequently identified the following as benefits of Arcadia Lake: enjoy being outdoors/natural resources (75.6%), 92 nature (77.9%), natural beauty (75.6%), relaxation-place to relax (60.5%), escape (59.3%) and peace (57%) The least frequently selected benefits were crowds (1.2%), noise (4.7%), party atmosphere (4.7%), learning/education (8.1%) and keeping mind occupied (12.8%) (Figure 2, page 91).

FIGURE 2

EDMOND RESIDENTS' RESPONSES TO QUESTION # 7:
WHAT DO YOU CONSIDER A BENEFIT OF ARCADIA LAKE?



Research Question # 5 was, "What benefits do Arcadia Lake recreationists derive from their visit?"

Question # 7 was, "What do you consider a benefit of Arcadia Lake?"

The most frequently identified benefits of Arcadia Lake from the 27 listed in the survey were: enjoy being outdoors/natural resources (72.7%), nature (72.7%), natural beauty (66.9%), relaxation-place to relax (59.5%), and escape (58.7%) (Figure 1, page 68). The least frequently selected benefits were crowds (3.3%), noise (3.3%), party atmosphere (4.1%), keeping mind occupied (16.5%) and learning/education (9.1%). These findings are similar to the Godbey, et al. (1992) study that found nature, enjoy being outdoors/natural resources, and relaxation among the top benefits of parks identified by respondents.

Chapter V
Conclusions and Recommendations
Research Summary

In July, 1999, a 22-item questionnaire was developed for the purpose of identifying recreational activities and programs that would draw larger numbers of Edmond residents to Arcadia Lake. The booklet-type survey was mailed to 726 Edmond residents on October 1, 1999. Beginning September 2, 1999, Arcadia Lake staff distributed 4,000 surveys to recreationists as they entered the lake. Response rates were low. Data from the returned surveys were coded and analyzed using statistical procedures including Pearson's Chi-square goodness-of-fit and Pearson's product-moment rank. After statistical analysis indicated there was no demographic difference in data generated from surveys distributed at the lake and data generated from surveys mailed to Edmond residents, the data were combined for further analysis.

Statistical analysis of the data identified the following: the most important reasons visitors recreated at Arcadia Lake; the program facilities and special events of which people were most aware; the perceived benefits of the lake; reasons people do not recreate at the lake; attitudes concerning zoning at the lake; attitudes concerning number, convenience and type of recreation areas and facilities available. In addition, the survey identified recreational opportunities which would draw more Edmond residents to Arcadia Lake. According to the Pearson product-moment rank, the five most important opportunities which would make it likely Edmond residents would visit more

frequently were: 1. canoe/kayak rental, 2. paved bike trail, 3. fishing piers, 4. nature museum and; 4. marina.

Conclusions

The following conclusions were drawn, taking into consideration related literature, the limitations, delimitations and results of the study.

Conclusion 1. Canoe/kayak rental and zoning for nonmotorized watercraft may increase Edmond residents' recreation participation at Arcadia Lake. "Canoe/kayak rental" obtained the number one ranking as the recreational opportunity which would draw more people to the lake. Among Edmond residents, 25 identified canoe/kayak rental as the recreation opportunity which would make it likely they would visit the lake more frequently; however, eleven residents identified canoe/kayak rental as the recreation opportunity which would make it likely they would visit the lake less frequently. Though 11 residents seem to not want canoe/kayak rental, several factors suggest such opportunities would actually increase recreation at the lake. First, responses to two survey questions support this possibility. Among Edmond residents, 44.2% indicated zoning to create an area of the lake off-limits to motorized watercraft but open to nonmotorized watercraft would cause them to come to the lake more often. Also among Edmond residents, 36% indicated they would actually use nonmotorized watercraft, such as canoes, on days motorized watercraft were prohibited at the lake. According to survey results, the creation of zoning for nonmotorized watercraft recreation will have a positive impact on frequency of visitation among a large portion of the Edmond population.

The attraction of zoning among people who do not anticipate using nonmotorized watercraft is probably linked to the most frequently identified

benefits of Arcadia Lake (survey question # 7) as well as to the least appealing features of the lake (survey question # 16). The benefits most frequently identified by Edmond residents suggest respondents appreciate the area as a place to relax and enjoy natural beauty, peace and quiet. Respondents do not perceive crowds, noise and a party atmosphere as desirable. These were least frequently identified as benefits by survey respondents. In addition, personal watercraft and noise were two of the most frequently mentioned "least appealing features" of the lake (survey question # 16). Presumably, the noise inherent with motorized watercraft recreation is not appealing to the majority of Edmond respondents and contributes to an interest in zoning among those who do not actually plan to canoe, kayak or sail. In addition, motorized watercraft might be perceived as linked to crowds and a party atmosphere.

At the time of the survey, only two Edmond respondents reported canoeing at Arcadia Lake and three reported sailing; none reported either kayaking or sailboarding. However, several factors suggest Edmond residents would participate in such activities. Recreation Roundtable (1992) survey results indicate that 48% of people who participate in outdoor recreation do so to learn a new skill. In addition, income is a predictor of willingness to participate in a new activity; the higher the income the greater the likelihood of participation. There is a specific relationship between sailing and canoeing and income. Sailing participation is about four times greater for the highest as for the lowest income group, while canoeing participation is about three times greater (Cordell, 1999). Affluent Americans were more likely to say they planned to participate in more outdoor recreation in the coming year.

Proximity and availability also affect the degree to which an individual participates in a particular recreational activity. Previous research has shown that the amount of outdoor recreation settings or opportunities will affect an

individual's choice and intensity of participation in given activities; if opportunities are available, people tend to participate (Walsh, Jon, McLean and Hof, 1992). Given these factors, all relevant to the Edmond community, it seems likely many Edmond residents would adopt nonmotorized watercraft recreation as a favored activity at Arcadia Lake if circumstances were right. Such participation would be consistent with national trends. Canoeing and/or kayaking increased over 600% from 1960 to 1995 and, according to Bowker et al. (1999), enthusiasm for canoeing and kayaking is not expected to wane, but "the number of days spent canoeing is expected to increase about 30% more than the population growth through the year 2050" (p. 329).

Conclusion 2. Zoning of the lake to exclude motorized watercraft would not displace many visitors. Only three Edmond respondents reported "motor/power boating" as their most important reason for visiting the lake and none reported "jet skiing." This leads the researcher to conclude there will not be appreciable numbers of Edmond residents displaced by zoning that excludes motorized watercraft.

Conclusion 3. The increased numbers of lake visitors anticipated from zoning and canoe/kayak rental will not displace frequent visitors. Among frequent visitors to the lake, 73.7% reported that larger crowds would cause them to "come to the lake less often" or "look for somewhere else to recreate." However, for most people, zoning for nonmotorized watercraft, such as canoeing and sailing, will enhance enjoyment of the lake. This is concluded from the most frequently identified benefits of the lake. A large percentage of respondents appreciate the lake as a place for relaxation, peace and quiet, and a place to enjoy being outdoors. Respondents also identified nature and natural beauty as important benefits of the lake.

Research shows that the more obtrusive the activity, the lower the

tolerance when recreationists encounter those activities. Because activities such as canoeing are relatively unobtrusive and quiet they should not detract from the experience of the majority of recreationists or reduce numbers of visits to the lake by most frequent visitors.

Conclusion 4. Edmond residents do not recreate at Arcadia Lake for a variety of reasons, but primarily because of the perception of high entrance fees, crowds, noise, time limitations and lack of awareness of the variety of activities available. These factors are, to some extent, within the control of lake management.

Conclusion 5. Arcadia Lake is not currently fulfilling the mandates of the Edmond Master Plan III. Goal PR 5 of the plan states that management must, "develop, operate and maintain park land ... in a manner which is responsive to the site and needs of the community." Goal PR 9 recognizes the need to "maximize the public investment in Arcadia Lake recreational facilities with continued efforts to make better use of facilities and opportunities while continuing to protect the rustic character of the lake." Survey results indicated only 5.8% of Edmond respondents reported "motor/power boating" as an important reason for visiting the lake, while 36% of Edmond respondents reported they would use nonmotorized watercraft such as canoes on days motorized watercraft were prohibited. Arcadia Lake management is currently providing only a small percentage of Edmond residents an opportunity to participate in a preferred activity.

Conclusion 6. Management is not perceived as being responsive to the preferences of the community in planning for organized recreation at Arcadia Lake. The five most important reasons Edmond residents visited Arcadia lake were walking, relaxing, picnicking, fishing and biking on trails. No Edmond respondents identified any special event or educational workshop as important

reasons for visiting the lake. The important reasons for visiting Arcadia Lake seem to indicate residents prefer activities that are easy to do, convenient and relatively inexpensive. Management programs with the intention of attracting Edmond residents; however, programs have been implemented without knowledge of their compatibility with the preferences of the Edmond community for outdoor recreation. Many Arcadia Lake programs do not reflect the needs and interests of the community.

Conclusion 7. Management is not acting in accordance with the Edmond Plan III mandate "to protect the rustic character of the lake." Arcadia Lake and surrounding environs is currently managed for flood control, drinking water, water quality, fish and wildlife, and recreation. Programs at Arcadia Lake compatible with these authorized purposes should also protect its rustic character. The suitability of programs such as Agony at Arcadia Lake are questioned for their assault on the rustic character of the lake. Agony at Arcadia Lake takes place over a nine day period in late October. Scary scenes are enacted by employees costumed in the spirit of Halloween. Lake visitors wind their way along a trail as the actors attempt to frighten them. This program does not seem to be inherently linked to recreation in an outdoor setting as are such programs as Eagle Watch and Watchable Wildlife Weekend. Arcadia Lake has adequate space to accommodate many activities and programs; however, not all activities and programs are in harmony with the spirit of outdoor recreation in a rural setting.

Conclusion 8. Because income predicts both participation and the likelihood of beginning a new activity, the Edmond community should have the potential for high levels of participation in recreation, as well as a willingness to participate in new activities. The estimated Edmond 1999 median family income was \$51,967 which is approximately 60% higher than the State of Oklahoma's

estimated 1999 median family income of \$31,595 (National Decision Systems, 1999).

Conclusion 9. Response rate was low. Of the 726 surveys mailed to Edmond residents, 42 (5.8%) were returned and of the 4,000 surveys distributed at the lake 80 were returned (0.2%). There are several possible explanations for the low number of returned surveys. A contributing factor may have been the difficulty of returning the survey at the lake. To return the survey at the lake visitors had to stop as they exited the lake and gain the attention of the gatehouse attendant. If the gatehouse was not staffed at the time of the visitor's departure, the visitor would have to get out of her or his vehicle and locate the proper box in which to deposit the survey.

The low number of surveys returned by Edmond residents may reflect a general disinterest in the lake. Arcadia Lake management personnel assume few lake visitors are Edmond residents because of the low number of yearly passes purchased by residents. Edmond residents may not perceive the lake as a viable source of outdoor recreation experiences and, therefore, are neither concerned about its present or future condition. The lack of interest may be rooted in various barriers to participation such as economic or time constraints.

Another possible reason for low rate of response is a belief that one's voice will not be heeded by those who make decisions about the lake. If opinions have no effect on management personnel then the time and effort expended completing the survey would be wasted.

The design of the survey may also have contributed to low rate of response. Long and detailed explanations of how to correctly respond to two of the questions on the first pages may have been difficult to comprehend for some people. In addition, the number of choices offered on these same questions may have been intimidating.

Recommendations

1. The researcher recommends Arcadia Lake be zoned for nonmotorized watercraft recreation either by days of the week or weeks of the month. There are no lakes of comparable size within a 20 mile radius of Arcadia Lake which currently zone to exclude motorized watercraft either by day, time of day or area. The implementation of such zoning would increase the lake's appeal, probably beyond that indicated by outcomes of the survey, and could result in the lake becoming a mecca for canoeing, sailing, sailboarding and kayaking enthusiasts.

2. The researcher recommends Arcadia Lake provide canoe and kayak rental. Canoe and kayak rental, along with zoning, should help Arcadia Lake management achieve their goal of increased lake use by Edmond residents, resulting in fulfillment of two Edmond Master Plan III mandates. Canoe/kayak rental should not necessitate a great deal of additional development, accommodating the preferences of the majority of respondents, the highest percentage of whom indicated the amount of development at Arcadia Lake was "about right."

3. Fees, crowds, lack of awareness of the variety of activities and noise are the major reasons Edmond residents do not recreate at the lake. Time limitations are a factor for many as well. It is recommended management implement a public awareness campaign through a variety of media to correct certain misconceptions about the lake and ameliorate perceived blocks to recreating at the lake. Specifically, this campaign should stress the savings possible with the yearly pass program. When residents purchase a pass for \$48.00, and visit the lake just once a month, the result is a cost of \$4.00 per visit. In addition to publicizing the pass program, management should seek to accomplish the following: 1. encourage use of the lake mid-week when crowds

are at a minimum; 2. increase awareness of Arcadia Lake's activities; 3. control for noise by zoning for nonmotorized watercraft; and 4. publicize the lake's close proximity to Edmond for those with time limitations.

The researcher recommends Arcadia Lake management personnel assume responsibility for educating and informing Edmond residents about the lake's authorized purposes. Because lack of knowledge can effect behavior, it is important residents understand the link between certain behaviors and the ecological health of the lake. Edmond is situated within the Arcadia Lake watershed and activities of residents within the watershed affect water quality. Runoff which transports nutrients such as fertilizers to the lake can stimulate algal growth resulting in changes to the biological, physical and chemical condition of the system. The decomposition of algae can lead to oxygen depletion and harm to many lake organisms. Pesticides, including insecticides and herbicides, can disrupt ecological functions such as productivity. Lake-based education should enlighten the public about the effects of human impact and the ways individuals can help protect the health of the lake. Indifference, misunderstanding and ignorance can result in destruction.

The school system, library and various public service organizations are avenues through which the public can be educated about the lake's authorized purposes. Management personnel should assume responsibility for going into the community and creating interest in the lake. During the off-season, the school system should welcome opportunities to supplement their science curriculum with visits by lake professionals who can discuss environmental science as it pertains to Arcadia Lake. To further make the subject relevant, field trips can be conducted which allow for exploration of the Arcadia Lake ecosystem.

Because certain types of outdoor recreation have been linked to pro-

environmental behavior, increased participation at the lake is a worthy goal. People who feel ownership for Arcadia Lake because it is a place critical to meeting their recreation needs will become concerned for its ecological health. The Edmond population will in turn benefit from a cleaner natural environment and less expensive water treatment.

4. The researcher recommends Arcadia Lake management embark on a continuing research effort to ensure the provision of recreational opportunities commensurate with Edmond residents' needs and preferences. In order to thoroughly evaluate the adequacy of Arcadia Lake programs, facilities and special events, a city-wide survey effort should assess the recreation needs and preferences of the community.

A portion of the continuing research effort should include face-to-face contact with residents. Personal interviews have certain advantages including the inclusion of people with vision problems or those who cannot read or write. Personal interviews also obtain a much higher rate of participation than mailed surveys (Witkin & Altschuld, 1995). Management personnel can also gain information from the public through open forums where the community is invited to discuss their recreation needs and specific expectations for Arcadia Lake.

Along with the continuation of survey efforts, the researcher recommends a permanent "survey return" box be installed at an easily accessible place near the gatehouse. The visitor should not have to exit a vehicle in order to return a survey or wait a lengthy amount of time before gaining the attention of the gatekeeper.

5. The researcher recommends all Arcadia Lake programs be carefully reviewed before implementation to ensure preservation of the rustic character of the lake and protection of fish and wildlife. Arcadia Lake recreation programs should not violate the spirit of outdoor recreation in a rural setting.

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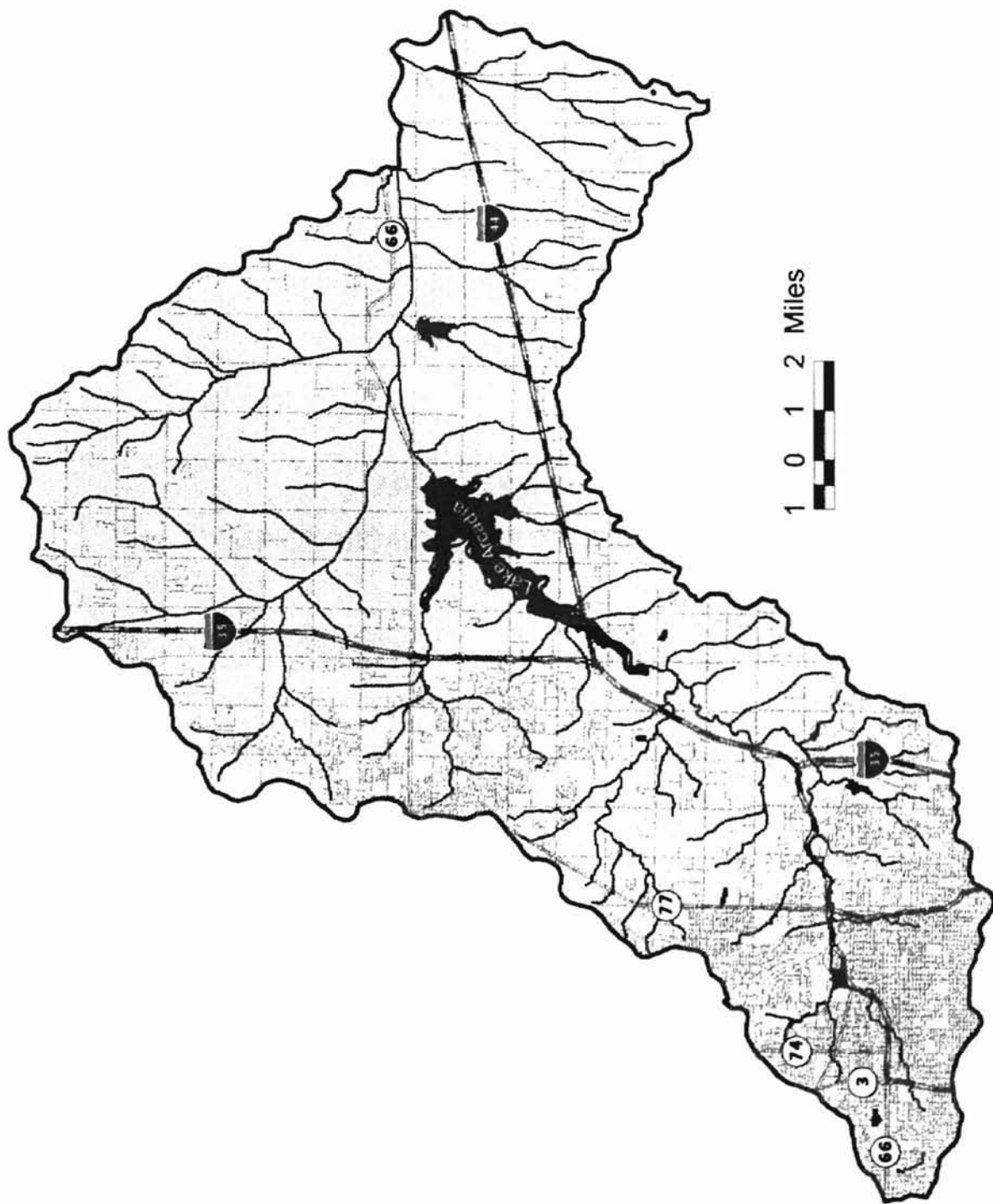
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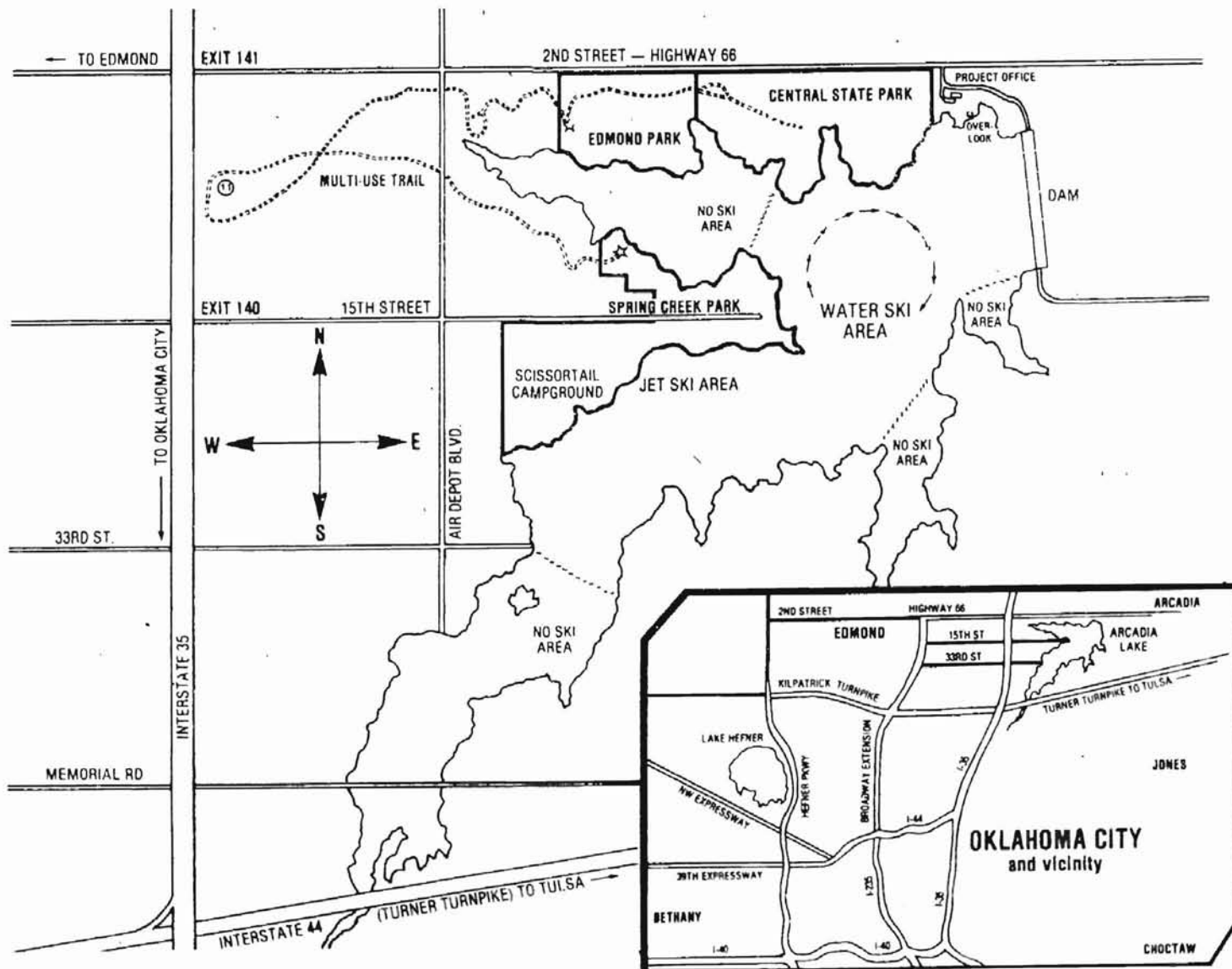
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APPENDICES

APPENDIX A
MAP OF ARCADIA LAKE WATERSHED



APPENDIX B
MAP OF ARCADIA LAKE WITH PARKS



APPENDIX C
EDMOND SUN NEWSPAPER ARTICLE

What do you like about the lake?

■ Graduate student conducting survey

By **SHARLA BARDIN**
Sun Staff Writer

Jan Duiker is a fan of Arcadia Lake.

The Edmond resident has a season pass and enjoys frequent bicycle rides along the trails.

She also happens to be an environmental science graduate student at Oklahoma State University. So, it wasn't too much of a stretch for her to get involved in research about the lake.

As her thesis project, Duiker has developed a survey about the lake and its activities to give to visitors starting this Labor Day weekend, and she is also mailing the queries to random residents.

The purpose of her research is to determine use patterns, knowledge about the lake's events and facilities and recreational preferences. In addition, the survey seeks to determine what additional activities would increase

See **ARCADIA**, Page 4A

ARCADIA: Student says survey work is enjoyable

■ From Page 1A

usage.

Surveys will be available at the lake entrances this weekend. Residents can then return those to the entrances or mail in at a later date.

The deadline is Nov. 15.

Some of the survey questions include why visitors like coming to the area and whether or not they would use a biking and walking system linking the lake to Edmond.

Duiker said her adviser had suggested Arcadia Lake as an option for the thesis project, and in June, she contacted lake officials about the idea.

She discussed the survey with Arcadia Lake Supervisor John Young to help formulate the type of questions.

Duiker said the lake staff has been helpful. Also, the city will pay for the printing of 4,000 surveys distributed at the lake this weekend. She will then handle the mailing of 700 surveys to residents.

Once she collects the surveys, Duiker will spend a couple of months analyzing the data. She will then submit the information to lake staff.

The whole project has been a worthwhile experience for the University of Central Oklahoma alumna, who spent five years as a teacher in Oklahoma City.

However, the nature lover was interested in a career change.

"It was just kind of a natural direction to go in," she said of her decision to study environmental science.

As for the surveys, Duiker hopes the information will be beneficial for lake officials and will serve as a way to meet the community's needs for the 2,000-acre lake.

"It's been a wonderful experience," she said.

Survey sample

Following are some of the questions listed in the survey from Oklahoma State University graduate student and Edmond resident Jan Duiker. Lake visitors this Labor Day weekend will have the opportunity to answer the surveys.

1. How often do you or family members visit Arcadia Lake in a year?

- One
- Two to five times
- Six to ten times
- More than ten

2. Which program facilities and special events are you aware Arcadia Lake offers?

- Agony at Arcadia Lake
- Arcadia Lake Sweep
- Disc golf course
- Eagle watch
- Kids' fishing derby
- Fishing clinics
- Interpretive teaching trail
- Live animal programs
- Multi-use hiking trails
- Outdoor classrooms
- Sailing regatta
- Sandy swimming beaches
- Summer recreation programs
- Watchable Wildlife Weekend

3. Outdoor recreation is important to my quality of life.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

APPENDIX D
INSTITUTIONAL REVIEW BOARD APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Date: September 15, 1999 IRB #: ED-00-162

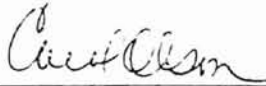
Proposal Title: "CARRYING CAPACITY, VISITOR USE AND RECREATIONAL PLANNING FOR ACADIA LAKE"

Principal Investigator(s): Lowell Caneday
Jan Duiker

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature:



Carol Olson, Director of University Research Compliance

September 15, 1999

Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX E
ARCADIA LAKE VISITOR USE SURVEY

This survey is being conducted to provide valuable information for Arcadia Lake management and to City of Edmond planners. Your opinion is very important and the information will be used to guide decisions about the future of Arcadia Lake. Participation is completely voluntary and your name is not requested respondents must be 18 years of age.

1. How often do you, or family members, visit Arcadia Lake in a year?

Do not visit (If you do not visit please go to question three.)

One

Two - five times

Six to ten times

More than ten

2. From the following list, please identify your three most important reasons and three least important reasons for visiting Arcadia Lake. Put a **1** by the most important reason, a **2** by the second most important reason and a **3** by the third most important reason and then do the same for the least important reasons.

Biking on trails

Biking on roads

Bird watching

Camping- full hook-up (dump, electricity and water)

Camping- regular (electricity and community water)

Camping- tent (community water)

Canoeing

Disc golf

Education/workshops

Fishing

Fishing tournaments

"Jet skiing"

Kayaking

Motor/power boating

Partying

Picnicking

Relaxing

Running

Sailing

Sail-boarding

Solitude

Swimming

Walking/hiking

Water-skiing

Wildlife watching

Other: (Please describe)

3. Which program facilities and special events are you aware Arcadia Lake offers? (Check all that apply)

- Agony at Arcadia Lake
- Arcadia Lake Sweep
- Disc golf course
- Eagle Watch
- Kids Fishing Derby
- Sailing Regatta
- Fishing clinics
- Live animal programs
- Interpretive teaching trail
- Outdoor classrooms
- Multi-use hiking trails
- Sandy swimming beaches
- Summer recreation programs
- Watchable Wildlife Weekend

4. From the following list, please identify the three recreational opportunities which would make it likely that you or your family would visit Arcadia Lake, or visit more frequently, by putting a **1** by the most important opportunity, a **2** by the second most important opportunity and a **3** by the third most important opportunity. Then do the same for the recreational opportunities which would make it likely that you would visit less frequently.

- Cabins
- Cabins clustered with an indoor recreational facility
- Camping- large group site
- Camping primitive
- Canoe/kayak rental
- Concessionaires
- Enclosed fishing dock
- Fishing piers
- Marina
- Motor boat rental
- Nature museum
- Off-road vehicle trails
- Paved bike trails
- Sailboat rental
- Sand volleyball courts
- Other: (Please describe)

5. Would larger crowds at Arcadia Lake cause you or your family to come to the lake more often, less often, have no effect or cause you to look somewhere else to recreate?

- More often
- Less often
- Have no effect
- Find somewhere else to recreate

6. Would an area of the lake off-limits to motorized watercraft but open to canoes, kayaks and other non motorized watercraft cause you or your family to come to the lake more often, less often, have no effect or cause you to look somewhere else to recreate?

- More often
- Less often
- Have no effect
- Find somewhere else to recreate

7. What do you consider a benefit of Arcadia Lake? (Check all that apply)

- Crowds
- Enjoy being outdoors/natural resources
- Escape
- Exercise/fitness and conditioning
- Excitement
- Feel good because it's there
- Freedom
- Fun/entertainment
- Getting out of the house
- Health
- Involvement- getting more involved
- Keeping mind occupied
- Learning/education
- Nature
- Natural beauty
- Noise
- Open space
- Party atmosphere
- Passing the time- providing something to do
- Peace and quiet
- Place to be alone
- Place to motor-boat or "jet-ski"
- Relaxation- place to relax
- Rest
- Safety- feel secure
- Stress release

8. How do you feel about the amount of development at Arcadia Lake such as roads, campgrounds and pavilions?

- Too much
- About right
- Too little

For questions 9-14 indicate whether you strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree with each statement.

9. Outdoor recreation is important to my quality of life.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

10. There are enough outdoor recreation areas and facilities available that are convenient for me or my family.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

11. Protection of the natural environment is an important aspect of outdoor recreation areas.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

12. More outdoor recreation areas are needed in or near my city.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

13. I or my family would use a biking and walking trail system linking Edmond and Arcadia Lake.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

14. I or my family would use nonmotorized watercraft such as canoes on days motorized watercraft were prohibited at the lake.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

15. If you do not visit Arcadia Lake please identify your three most important reasons for **not** visiting Arcadia Lake. Put a **1** by the most important reason, a **2** by the second most important reason and a **3** by the third most important reason.

- Concerned about safety
- Concerned about the number and types of watercraft
- Do not enjoy outdoor activities
- Entrance fees are too high
- Have no-one with whom to participate in activities.
- Not aware of its existence
- Not aware of the variety of activities available
- Not crowded enough
- Too crowded
- Too noisy
- Too far from my home
- Other: (Please describe)

16. Briefly describe the most and least appealing feature of Arcadia Lake.

Most appealing:

Least appealing:

17. How many times a week do you or your family participate in outdoor recreation?

- None, I/we do not participate
- 1-2
- 3-4
- 5 or more

Demographic Information About Respondent

Please provide us with a little background information

18. Home zip code: _____ Age: _____ Gender: _____

19. Employment status:

- Retired
- Employed full-time
- Employed part-time
- Military
- Full-time college student
- Other _____

20. Household information: I live

- Alone
- With one or more children
- With one or more adults
- With one or more adults and one or more children

21. Education information: I have

- Some high school
- A high school diploma
- Some college or an undergraduate degree
- A graduate degree

22. Finally, please provide your annual family income before taxes:

- Do not know
- Less than \$20,000
- \$20,000 to \$29,000
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 or more

Thank you very much for your participation in this study. We greatly appreciate your time and effort. Please tape or staple the survey closed and place it in the mail.

APPENDIX F
AGES OF SURVEY RESPONDENTS

Survey Number; Location*	Age	Survey Number; Location*	Age	Survey Number; Location*	Age
* 1	58	*43	69	*85	32
* 2	43	*44	26	*86	46
3	47	*45	49	*87	44
* 4	50	*46	28	*88	18
5	20	*47	56	*89	41
6	19	*48	48	*90	28
7	64	*49	67	*91	53
* 8	56	*50	40	*92	18
* 9	41	*51	50	*93	52
*10	46	52	41	*94	25
11	58	*53	65	*95	35
12	41	*54	47	*96	46
13	50	*55	35	*97	61
14	70	*56	67	*98	51
15	62	57	39	*99	76
16	42	*58	30	*100	63
*17	53	59	32	*101	41
*18	54	*60	72	*102	73
*19	45	*61	39	*103	39
*20	49	*62	35	*104	52
*21	50	*63	62	*105	82
*22	30	64	34	*106	37
*23	33	65	34	*107	50
*24	45	*66	34	*108	76
*25	53	67	29	*109	75
26	35	*68	56	*110	27
27	41	*69	40	*111	55
28	28	*70	43	*112	37
*29	67	*71	34	*113	45
30	62	*72	63	*114	37
31	66	*73	41	*115	42
*32	40	74	55	*116	57
33	65	75	72	*117	45
34	48	*76	39	*118	41
35	50	77	65	*119	34
36	45	*78	65	*120	35
37	35	*79	73		
38	34	*80	65		
39	44	*81	35		
40	30	*82	54		
41	65	*83	59		
*42	50	*84	54		

* Indicates an Edmond resident

APPENDIX G
"OTHER" RESPONSES TO DEMOGRAPHIC QUESTION :
TYPE OF EMPLOYMENT

Survey Number; Location	Employment
*10	Self-employed
*24	Self-employed
28	Self-employed
*32	Housewife
*43	Self-employed
*63	Med school
*89	Mother at home
*101	Housewife
113	Insurance
*114	Homemaker

* Indicates an Edmond resident

APPENDIX H
"OTHER" RESPONSES TO SURVEY QUESTION # 15

Survey	Reason
5	Too many cops
14	Too busy
27	Too busy to get out to park
*30	Lack of connecting roads between parks
37	Busy with work
36	No time
*42	Too much beer drinking
*56	Trash and dirty restrooms
*66	Too many rowdy teenagers
*76	Time to have recreation
*81	Fecal material in swim area
*82	No boat
84	No interest in lake
*95	Too many rules/regulations
*98	Too busy
*99	As a taxpayer in Edmond since 1923, no entrance fee should be imposed
*116	Don't think about it

* Indicates an Edmond resident

APPENDIX I
ARCADIA LAKE FEE SCHEDULE

		Edmond Residents	Nonresidents
Yearly Pass	First vehicle	\$48.00	\$60.00
	Second vehicle	\$24.00	\$30.00
Daily Fee	Walkers	\$3.00	\$3.00
	Bicyclists	\$3.00	\$3.00
	Horseback riders	\$4.00	\$4.00
	Motorcyclists	\$3.00	\$3.00
	Vehicle	\$7.00	\$7.00
	Vehicle with boat trailer	\$14.00	\$14.00
	*Camping, tent	\$10.00	\$10.00
	*Camping, regular	\$15.00	\$15.00
	*Camping, full-hook-up	\$20.00	\$20.00

* Camping with a boat is an additional \$7.00 per night

APPENDIX J
MOST APPEALING FEATURES OF ARCADIA LAKE

* 1	Facilities, trails, nature, upkeep & maintenance, park personnel
* 2	Solitude- opportunity for exercise outdoors
3	Convenience
* 4	The lack of crowds
5	Water & women
6	Nice lake area and beaches
7	Clean & good security
* 8	Peacefulness/security
* 9	Areas of lake front where no one else goes
*10	Boating
11	Close to home- nice area
12	Nice, clean, well-kept camp sites & swimming beaches
13	Cleaner than most lakes near OKC. Attendants helpful and nice. Feel safer here. Lake is pretty
14	NR
15	Nature
16	Central location
*17	Excellent bike trails
*18	Birds and other wildlife, unspoiled woods and grasslands.
*19	Nature, animals, not crowded in on.
*20	Beauty
*21	Great off-road bicycling
*22	Location near Edmond & OKC. Great lake attendants- helpful. Water. nature. beauty.
*23	Sandy beach, beauty, wildlife, water, natural resources and water front camping.
*24	NR
*25	Excellent bike trails.
26	Nature, boat ramps and camping.
27	All the trees. Sandy beaches
28	Water, pavilions, nature, beauty of park.
*29	Privacy of picnic and camping areas.
*30	Naturalness
*32	Water. Peaceful most of the time.
*33	Facilities, tables clean
34	Close enough to home to get away for weekends.
35	Sandy beaches. adequate areas to swim.
36	Serene
37	Close to city but seems like far away escape
38	Beauty.
39	Quiet, accessibility.
40	Location between Edmond & OKC, scenery, wildlife, jet ski area on 15th.
41	Cleanliness

* Indicates an Edmond resident; **NR indicates no response

41	Cleanliness
*42	Natural but clean environment
*43	Naturalness maintained by distance between picnic tables or campsites. Lack of commercialism.
*44	The fact that you charge a fee to enter. It helps keep out the trouble makers!
*45	Trails/solitude
*46	Availability of walking/biking trails, off-beach swimming, campfires and solitude while enjoying wildlife!
*47	Relatively unspoiled woods & grassland trails.
*48	Close proximity to where I live.
*49	Natural aspect.
*50	NR
*51	Location
*52	Naturalness
*54	Good place to get away from home.
*55	The naturalness of the park. You have to create your own enjoyment.
*56	Relative privacy of picnic spots.
57	Close to home.
*58	Florida hybrids.
59	Nature, foliage
*60	Being able to fish.
*61	Nice swim areas and trails.
*62	Boating, bike riding, lake, beach.
*63	Wildlife. The lake, trees and natural beauty, quiet, get away, fishing, boating, children have fun.
64	Close to home. Close to church.
*66	Nice campgrounds
67	Events
*68	Walking- being outdoors- natural beauty.
*69	Clean w/police protection
*70	Close to home
*71	Natural beauty
*72	The park's cleanliness, security and convenience
*73	Disc golf w/ lake view.
74	Large trophy bass close to home
75	NR
*76	Close to home
77	NR
*78	"Naturalness" of area
*79	Nature trails
*80	Distance from Edmond
*81	Good location
*82	Lake that is close
*83	Sailing opportunity
*84	NR

*85	Location
*86	Camping & picnic facilities, hiking, clean grounds & facilities
*87	Neatness
*88	Surroundings: water, trees, beach, stars (at night).
*89	Location
*90	Scenery
*91	Providing water
*92	NR
*93	Close to home
*94	Nice camping area
*95	Close to home
*96	Nature
*97	The access to nature
*98	Beautiful and peaceful
*99	Close
*100	Controlled, secure, stable, clean
*101	Close to home
*102	Fishing
*103	Beauty of nature
*104	Able to fish in quiet peaceful atmosphere in colder weather
*105	NR
*106	Location!
*107	Beauty
*108	None
*109	
*110	Nature
*111	
*112	Close to home
*113	Location- availability
*114	Close to Edmond
*115	Nature
*116	Nature, quiet
*117	Close to home
*118	
*119	Scissortail campground
*120	Outdoor family recreation

APPENDIX K
LEAST APPEALING FEATURES OF ARCADIA LAKE

Survey Number; Location	Comments
1 *	Visitors lack of concern with trash and protecting environment
2 *	Mass (sic)-Full camping slots
3	Too many boats
4 *	Jet-skis
5	Land; men
6	Too many policeman
7	Water needs to be closer to tables
8 *	Filthy camp sites; not enough amps per lot outlet
9 *	Crowds and holidays
10*	Jet Skis
11	More hook-ups, water, sewer
12	No sewer hook-ups
13	Not enough water or hook-ups
14	Heat in the summer
15	Late night parties in camp ground
16	Cost to enter
17*	Trails not linked to Edmond trails
18*	Noise from Jet-Skis, speed boats and radio; trash left behind
19*	Loud campers, Jet-Skis, and motor boats; Noise!
20*	Facilities, restrooms, no food service
21*	Jet-Skis
22*	Prices-\$5 per vehicle was plenty, not \$6-\$7
23*	Prices are too high. \$4 was more affordable than \$7. More electrical camping, more restrooms with showers, and no cabins.
24*	Ski-Jets darting out in front of boats
25*	Trails are not linked to Edmond trails
26	Prices too steep for trucks with boats. Go back to \$4 per vehicle or boat/ Jet-Ski
27	NR**
28	Prices need to be cheaper, restrooms nasty, no hand soap in restrooms
29*	Amounts of trash left by fisherman, lack of flush toilets
30*	Lack of proper toilets and trash left behind
31	NR
32*	Kids partying and drinking; honor box people not paying; change prices to \$4 again.
33	Waters edge
34	Not enough water hookups.
35	Red water; excessive wakes from reckless boat/ski operator boats
36	Water spouts don't work
37	Safety-No park rangers/ security on duty
38	\$7 too much. Bathrooms disgusting, no soap in restrooms. Party atmosphere on weekends.
39	NR

*Indicates an Edmond resident; **NR indicates no response

40	Prices; gate house sold only pop and junk food; larger jet ski area; need primitive area on 15th
41	Teenagers that get drunk (or whatever and drive too fast around lake. Some get really crazy which has slowed us down from coming out as much)
42*	Loud alcohol and drinking rule breakers in park
43*	Trash left by fisherman and boaters which collects along shore areas. Lake of containers for recycling aluminum or plastic-for shame!
44*	It is very crowded sometimes. Also the Jet-Skis and boats are always out of their area and come very close to people fishing on the shore.
45*	Noise/Crowds/Trash
46*	Trash and fishing equipment abandoned by irresponsible fishermen!
47*	Noise (Jet-Skis, loud radios and powerboats)
48*	Trashy area, dirty toilets
49*	Lack of recycling containers
50*	paying
51*	Junk left behind
52	Teenage partiers- Never saw a ranger all three days I was here. More trash on ground than previous visits. Most every time I've been here I see carloads of kids arrive after 11:00 & party & make noise. They come and go all night.
52 (cont'd)	I know several families who don't camp at Arcadia because of this.
53*	Trash left behind by fisherman
54*	Not enough waterpower R.V. spaces. Teenage beer busts at Scissortail.
55*	Fishermen who leave their trash. Jet-Skis and wave runners.
56*	Trash left by fishermen and dirty water
57	Brown water. Small lake.
58*	A lot of trash.
59	Dirty restrooms. Prices too high.
*60	Would like a fishing pier and a covered fishing dock. Boating and
*61	Jet skis.
*62	Teenage noise. Need water to more sights, showers. Slow down
*63	Destructiveness by campers, teenage drinking and driving to fast. Late night noise. Not enough water hook-ups. Need big dumpsters
64	Would like cleaner toilets.
*66	Lack of enforcement of rules.
67	The quality of lake visitors (trashy, low-class, vulgar, loud music,
*68	Entrance fee, large and noisy parties.
*69	Fees for full hook-up high. Limited jet ski area.
*70	Dirty water/ trash
*71	Inconsiderate people who are rude
*72	Alcohol consumption inside the park
*73	Loud activities
74	Too crowded
75	Need more police patrols. The fast driving. Big dogs not on leashes
*76	Trees in lake

77	Not having full service
*78	Noisy "jet skis" and trash that fishermen leave behind
*79	Crowded parking spaces on holidays
*80	Inadequate police patrols
*81	People who do not respect cleanliness of lake and others
*82	Lake that is not clean
*83	Jet skis
*85	Beaches
*86	High access fee for day use
*87	Water quality- murky
*88	Lots of people, trash (litter).
*89	None
*90	Crowds, price
*91	Trash
*93	Too expensive
*94	# of accidents heard on news
*95	Too expensive
*96	The knobby trees sticking out of the water at the Memorial Rd. bridge
*97	Entry fee
*98	Not enough access
*99	NR
*100	Crowds, rowdy groups
*101	While there (the only time I've been there) the people are not those I would want to associate with
*102	Jet skiing
*103	The less cultured lake visitor
*104	Jet skis too close to shore
*105	NR
*106	Fees and restrictions
*107	Fee
*108	NR
*109	NR
*110	NR
*111	NR
*112	For campers: Not enough fresh water hook-ups
*113	Too expensive! Can't even go for a picnic without exorbitant fees
*114	NR
*115	Dirty water, toilets
*116	Partying, noise, big crowds
*117	The cost of entry is too high vs. facilities & natural beauty
*118	NR
*119	Jet ski area, lake should be open
*120	Trash, especially by Air Depot Blvd.

VITA

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Candidate for the Degree of

Master of Science

Thesis: VISITOR USE AND RECREATION PLANNING FOR ARCADIA LAKE

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