

FINAL REPORT

Deep Creek Lake Boating and Commercial Use Carrying Capacity Study

Proposal No. KOOR2200624
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Prepared for:

Maryland Department of Natural Resources
Deep Creek Lake NRMA
898 State Park Road
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DEEP CREEK
LAKE

0.5 0 0.5 1
MILES



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1.0 INTRODUCTION

Deep Creek Lake (the lake) is located in central Garrett County, the westernmost county in Maryland. The lake has a surface area of 3,628 acres with a storage volume of approximately 106,000 acre-feet, and approximately 65 miles of shoreline. The lake drains an approximately 64.7 square mile-watershed between Marsh Mountain, Meadow Mountain, Snaggy Mountain, and Roman Nose Hill. It was created in 1923 when Youghiogheny Hydroelectric Company dammed Deep Creek, a tributary to the Youghiogheny River, to form the Deep Creek Hydroelectric Project. The lake filled by 1925. The Pennsylvania Electric Company (Penelec) purchased the project from Youghiogheny Electric in 1942. In 1968, the Federal Energy Regulatory Commission (FERC) issued a license to operate the hydroelectric project to Penelec. Penelec managed Deep Creek Lake for recreational use according to its own corporate policies until 1980, when the Maryland Department of Natural Resources (MDNR) assumed responsibility for managing recreation and access at Deep Creek Lake according to a FERC-approved contract between the MDNR and Penelec.

The MDNR's regulations concerning recreation at Deep Creek Lake were established through a public process that began in 1981 and have been updated four times since then, most recently in 2000. In 2000, General Public Utility, Penelec's holding company, sold the lake bottom and a buffer zone surrounding the lake to the State of Maryland. Also in 2000, the Maryland General Assembly recognized the unique recreational value of Deep Creek Lake and enacted legislation to guide the management of Deep Creek Lake into the future. This legislation established the Deep Creek Lake Policy and Review Board (PRB), which is responsible for advising the MDNR on issues related to lake fees, budget, and management. Since the creation of the PRB in 2000, recreation at Deep Creek Lake has been managed by the MDNR with input from the PRB. One of the primary management goals for Deep Creek Lake (as stated in Code of Maryland Regulations, Title 08, Department of Natural Resources, Subtitle 08 Deep Creek) is *"to work toward a reasonable balance preserving an acceptable quality of recreational experience on Deep Creek Lake, while at the same time providing for the greatest use of the lake consistent with a quality experience and safety of all users of the lake."*

In response to growing concern that increasing recreational boat traffic may have reached unsafe levels and was changing the character of the lake, the MDNR contracted with Urban Research and Development Corporation (URDC) to perform a recreational carrying capacity study in 1988. The URDC study suggested several management objectives for the future, and proposed several specific management actions meant to improve safety, maintain the quality of the recreational experience, and prevent management crises from developing at the lake. In response to the recommendations of the URDC study, the MDNR and the Deep Creek Lake Advisory and Review Committee (the precursor to the PRB) implemented several new regulations to address boating issues, including:

- speed limits and use restrictions in certain areas;

- a 3-knot minimum wake speed limit within 100 feet of shore;
- restrictions on personal watercraft use;
- management of new slips and buffer-strip use permits;
- an environmental monitoring program; and
- an expanded information and education effort.

Since 1988, Garrett County's population and economy have experienced significant growth. The Deep Creek Lake Land Use and Recreation Plan (LURP), which was prepared by the MDNR and PRB in July 2001, indicates that "fairly extensive development has occurred at several places around the perimeter of the Lake." It also states "more than 40 percent of the subdivisions in Garrett County between 1986 and 1996 were for homes in the Deep Creek Lake area" (LURP, 2001). Recognizing the increasing demand for lake-oriented recreation, the MDNR and PRB recommended that an independent recreation carrying capacity study be conducted to update the URDC study and to assist the MDNR and PRB in developing proactive management strategies for dealing with the increase in recreational demand at Deep Creek Lake.

The general purpose of this study is to provide the independent carrying capacity assessment as recommended by the MDNR and PRB. This study was specifically conducted to determine: current/existing recreational boating lake uses; potential/projected future recreational boating uses; optimal recreational boating use carrying capacities, the ability of the lake to accommodate existing and future demands; and management options for controlling growth if boating commercial uses at the lake meet or exceed carrying capacity. In addition to simply quantifying existing and future recreational use, this study also provides information to help address some of the recreational use issues and conflicts that currently exist at Deep Creek Lake. These include: balancing protection of Deep Creek Lake and the desire for economic development in Garrett County; the appropriate amount and type of commercial use along the Deep Creek Lake buffer; and need for additional public boat access so people without dock permits can easily access this valuable recreational resource.

2.0 METHODOLOGY

2.1 Data Collection

Several types of data related to recreational and commercial use of Deep Creek Lake were collected during the 2003 summer recreational period (approximately Memorial Day through Labor Day). These data included information on recreation facilities, recreational and commercial use patterns, boating use, and growth and development in Garrett County, particularly in the immediate vicinity of the lake.

Recreational Facility Inventory

Available recreational use information was collected and a field survey was conducted to characterize existing public, private, and commercial recreational facilities. This information was collected from several sources, including the 1988 Deep Creek Lake Carrying Capacity Report, MDNR's buffer strip use permit files, and the Deep Creek Lake Recreation and Land Use Plan. The field survey involved ground-truthing the recreational inventory, (visually confirming the locations and types of recreational facilities available at the lake by boat and car), and collecting information on the type and location of recreational facilities (e.g., boat ramps, parking) at Deep Creek Lake State Park and commercial recreational facilities at Deep Creek Lake, including boat rental facilities.

Recreational Use

Recreational users, lakeshore residents, and commercial operations were surveyed via contact surveys, mail-back surveys, and phone surveys to estimate recreational use at Deep Creek Lake. These surveys provided information from a representative sample of the different user groups (i.e., waterfront residents, non-waterfront residents, commercial operators, and day users) recreating on the lake throughout the summer. Prior to implementing the survey, the recreational contact survey form, as well as the spot count form, was presented to MDNR and PRB. Input was solicited from the PRB and MDNR on the draft forms and the forms were modified as appropriate to incorporate the PRB's and MDNR's comments. Appendix A provides the final visitor use (contact) survey.

Contact Surveys

A recreational use survey was administered to recreational users on shore at the Deep Creek Lake State Park boat ramp and on the lake at various locations by boat on randomly selected weekdays, weekends, and holidays in order to collect demographic and user preference information. A total number of 263 surveys were collected and evaluated as part of the recreational use analyses.

Spot Counts

Spot counts were conducted concurrently with the user contact surveys (at the Deep Creek Lake boat ramp and on the lake by boat), and from aerial photographs taken by plane. These spot counts included information on the number and type of watercraft on the lake during peak and non-peak periods.

Deep Creek Lake was surveyed from late May through Labor Day (study period), which corresponds to the primary recreation season at the lake. All calendar days in the study period were stratified by holiday weekends (i.e., Memorial Day, 4th of July, Labor Day weekends), other weekend days, and weekdays for each month to ensure adequate sampling for the entire summer recreational season. Table 2-1 provides a summary of the surveys administered during the 2003 recreational season. Table 2-2 provides the dates for each survey, broken down by type of day.

Table 2-1. Recreational Surveys Conducted During the 2003 Study Period

Type of Surveys or Counts	Holiday Weekends	Other Weekends	Weekdays
Boat Spot Counts and Contact Surveys	3	5	2
Ramp Spot Counts and Contact Surveys	4	6	3
Aerial Spot Counts	1	2	0

Table 2-2. Recreational Survey Dates during the 2003 Study Period

Type of Surveys or Counts	Holiday weekends	Other Weekends	Weekdays
Boat Spot Counts and Contact Surveys	5/25, 7/5, 8/30	6/22, 7/12, 7/20, 8/3, 8/16	6/4, 8/14
Ramp Spot Counts and Contact Surveys	7/4, 7/5, 8/30, 8/31	6/8, 6/21, 7/12, 8/10, 8/16, 8/24	5/21, 6/16, 8/27
Aerial Spot Counts	7/4	8/17, 8/23	N/A

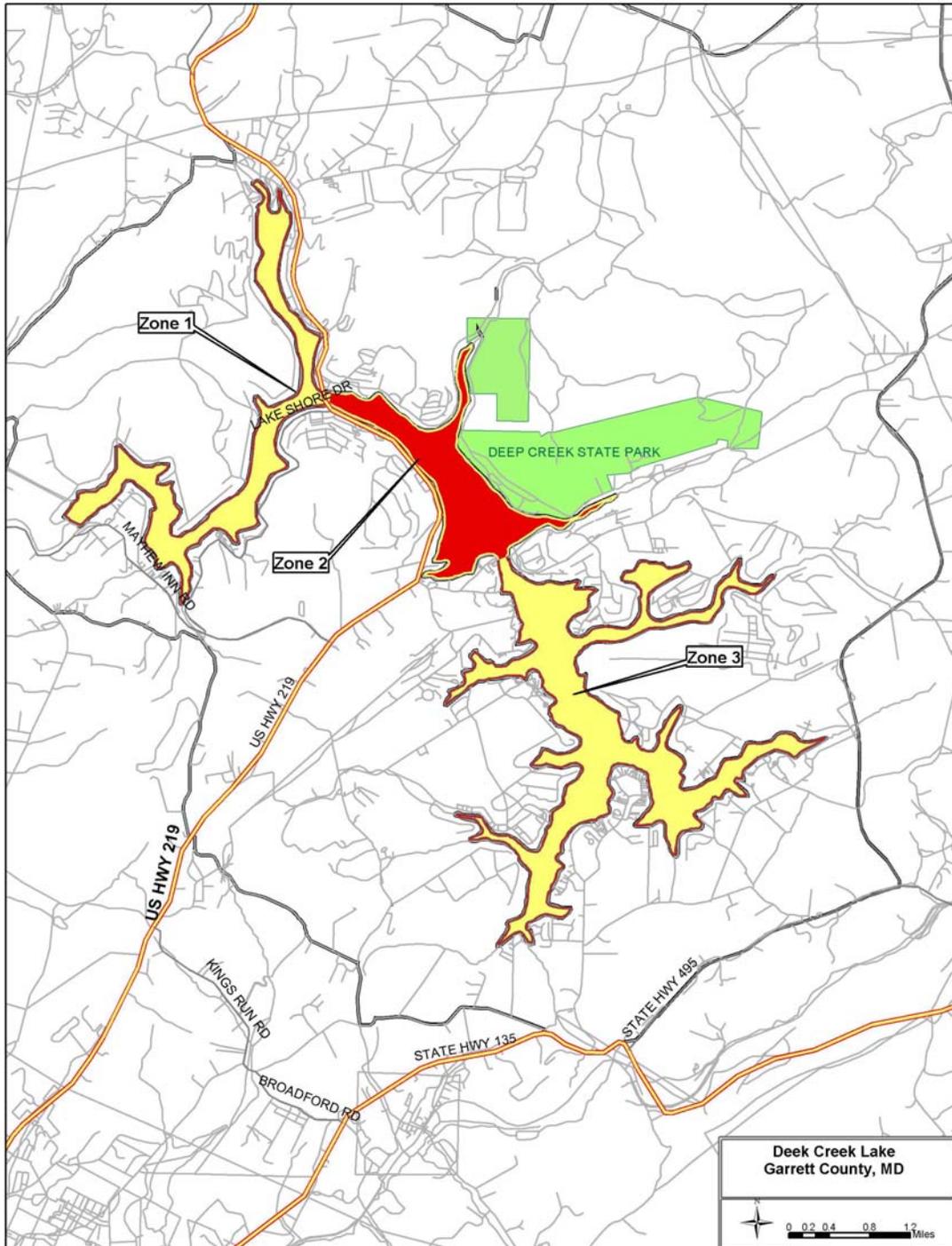
For the spot counts at the Deep Creek Lake State Park boat launch, all boats launched over a 10-hour period (approximately 8:00 am to 6:00 pm) were counted and the time boats were launched and returned was noted (boats launched before 8:00 am were counted as they returned). The number of vehicles, boat trailers, personal watercraft (PWC) trailers, and rooftop carriers (for canoes and kayaks) at the parking lot were recorded and the number and type of boats launched were tallied. In addition, the length of time people waited to launch their boat was recorded.

For the spot counts conducted by boat, the lake was toured beginning at approximately 8:30 a.m. and all boats in use were counted, noting the number and type of boats. For the purposes of the lake spot count the lake was subdivided into three sectors

(northern, central, and southern) (Figure 2-1). Two or three spot counts were conducted in each of the lake's three sectors over the course of each survey day.

For the aerial photographs, a series of almost vertical (approximately 85 degrees) photographs were taken sequentially over the lake. The photographs were taken at a sufficiently low altitude that the number and type of boats could be readily identified. This allowed an accurate estimate of the boats-at-one-time (BAOT) on the lake during these periods. This methodology was essentially identical to that used by MDNR over the past decade to count boats. The only difference was that this study took aerial photographs and counted boats from the aerial photographs while the MDNR counts were taken directly from the plane.

Figure 2-1. Lake Zones used in the DNR and ERM Aerial Boat Count Surveys



Waterfront Resident Mail Back Survey

A mail-back survey was mailed to all approximately 1,900 buffer strip use permit holders who have direct private access to Deep Creek Lake, and approximately 10 percent of the common dock slipholders. This survey provided information on user characteristics, activities, concerns, and overall recreational experience of waterfront residents and residents who live near the lake and have access to it through community piers or homeowner associations. The approximately 1,900 buffer strip use permit holders were divided into three equal sets and one third of the permit holders were each surveyed in June, July, and August. This approach controlled for weather-related effects on recreational use and other factors that have the potential to skew the results of the study. An addressed, stamped return envelope was provided with each mail-back survey to encourage a high return rate. A total number of 910 surveys were received and evaluated as part of the recreational use analyses.

The resident mail-back survey was similar to the recreational use contact survey in terms of obtaining basic user demographics, use levels, recreational activities, and opinions on the adequacy of recreational facilities and services as well as crowding. In addition, however, this survey collected information on whether the waterfront user is a year-round resident, whether the residence is used as a rental (and if so how many weeks during the summer it is rented), and other similar information to help assess overall recreational use.

Like the recreational contact survey form, the resident survey form was presented to MDNR and PRB for input and approval prior to distributing it to the public. Appendix A provides the resident survey.

Commercial Business Survey

A commercial business survey was sent to eight boat rental operators with permits for use of the Deep Creek Lake buffer strip. The surveys were used to collect information on existing services offered at Deep Creek Lake and trends in commercial activity at the lake. Eight concessionaires provided input that was incorporated into the analyses. Appendix A provides the commercial business survey.

2.2 Data Compilation and Analysis

The following section summarizes the data compilation and assessment phases of the carrying capacity assessment.

Summary of Previous Recreational Use Studies and Data Collection Efforts

A review of previous recreational studies associated with Deep Creek Lake and previous data collection efforts was conducted. Studies reviewed and summarized included a 1988 recreational carrying capacity study for Deep Creek Lake (URDC, 1988a); a study to assess the feasibility of requiring mandatory lake use stickers for

boaters on Deep Creek Lake (MDNR, 1994); a visitor use and attitude survey to provide information regarding visitors to Deep Creek Lake State Park (MDNR, 1998); and boat count data collected by MDNR on various weekend and holiday afternoons during July through early September from 1991 through 2003 (MDNR, 2004). This information provided a context for the assessment of recreational use trends and changes at Deep Creek Lake.

Recreation User Surveys and Spot Counts

Responses to the resident, commercial, and contact survey and information collected concurrently with the spot counts were analyzed to assess recreational use characteristics and boating use characteristics. Recreational use characteristics included basic demographics (e.g., age, sex, place of residence), length of stay, party or household size, frequency of recreational use at Deep Creek Lake, type of recreational activities, opinions on the degree of crowding, and conflicts with other recreational users. A boating characteristics assessment, which included analyses of boating use by type of day and month, by type of boat, by lake sector, and boating density were also completed. The 2003 spot count data and the MDNR boat count data were analyzed to determine the peak boating use measured in boats at one time (BAOT) on the lake.

Projected Future Recreational Use

An assessment of regional demographics and development trends within the region surrounding Deep Creek Lake was conducted to determine the anticipated development potential within the Deep Creek Lake area. In addition, regional recreational use trends and projections were analyzed and summarized. Finally, the development trend information, the recreational use trends information at Deep Creek Lake were assessed to provide input on anticipated future recreational use trends at Deep Creek Lake.

Carrying Capacity Assessment

The overall boat carrying capacity for Deep Creek Lake was assessed based on a modification of standards and procedures identified in *Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity* (BOR, 1977) and *Management of Aquatic Recreational Resources* (Warren and Rea, 1989). Data included in this analysis included:

- peak boating use estimate, including BAOT for weekends and holidays;
- total usable boating surface area;
- optimum boating acres per boat for each boat activity type; and
- distribution of the type of boating per category (e.g., what percent of the total boating use is motor boating, sailing, PWC)

ERM supplemented the MDNR boat count data from 2003 with boat count data from aerial over flights on July 4th, August 17th, and August 23rd. ERM's aerial surveys

were conducted generally in accordance with the same methodology used for the MDNR counts (see section 4.1); therefore the data from ERM's over flights are comparable to the MDNR's aerial boat count data.

The type and distribution of the boating use was obtained from the aerial surveys conducted during the 2003 period. The usable boating surface area was determined by subtracting a shoreline buffer of 100 feet (allowable length of piers) from the total lake surface area at full pond. These restrictions were applied to establish a conservative estimate of the usable boating surface area available at Deep Creek Lake.

The carrying capacity of the lake was calculated using the existing distribution of watercraft in each of the three zones of the lake based on ERM spot counts and applying a use factor (i.e., acres of water surface needed for safe operations per each type of watercraft) based on prior research (Warren and Rea, 1989).

Table 2-3. Boat Use by Lake Zone

Type of Watercraft	Use Factor	% Boat Use by Zone		
		North	Central	South
Motorboats -	9.0 acres per boat	59.8%	59.5%	50.3%
Boat fishing -	1.3 acres per boat	32.2%	32.0%	27.0%
Sailboats -	4.3 acres per boat	0.4%	2.1%	15.4%
Canoes/kayaks -	1.3 acres per boat	0.0%	1.0%	0.3%
Waterskiing boats -	12.0 acres per boat	7.6%	5.4%	7.0%

Since these carrying capacity calculations are focusing on peak use periods during which personal watercraft are not allowed pursuant to MDNR regulations, personal watercraft use were excluded from these calculations.

Warren and Rea (1989) also discuss other physical and locational factors that may affect lake carrying capacity, such as proximity to urban areas, multiple uses of the lake, shoreline configuration, amount of open water, and the amount of facility development. Unfortunately, Warren and Rea do not provide sufficient guidance to quantitatively evaluate these factors. ERM's own qualitative assessment resulted in a neutral score for Deep Creek Lake. Therefore, because of the lack of guidance and ERM's qualitative neutral rating, these factors were not incorporated into the carrying capacity assessment.

The final carrying capacity calculations for each lake zone takes into consideration the zone's net surface area, boating use mix, and watercraft use factor. An error was found in calculations used by Warren and Rea (1989) where they did not maintain the boating use mix. ERM developed a methodology to correctly calculate lake carrying capacity. The methodology simultaneously satisfies two conditions:

- The number of watercraft in each category multiplied by use factor (acres per water craft) summed for all categories must equal the net lake surface area.
- The number of each type of watercraft must conform to the use distribution.

The methodology involves 2 equations, including the following variables:

M = number of motor boats

F = number of fishing boats

S = number of sailboats

C = number of canoes/kayaks

W = number of waterskiing boats

A = area of each lake zone (732 acres in the North, 672 acres in the Central, and 1,535 in the South)

Equation 1: This equation insures that the first condition listed above is met, which is that the number of watercraft in each category when multiplied by the use factor must equal the net lake surface area.

$$M*9.0 + F*4.3 + S*4.3 + C*1.3 + P*4.3 + W*12.0 = A$$

Equation 2: The second equation is actually a set of equations that puts all use percentages in terms of a ratio of a single variable. We used M, although any of the variables above could be used and would result in the same answer. For example, for Northern Sector, Equations 2a - d:

Equation 2a for F:

$$M/F = 51.8/27.9 = 1.86 \gg F = M/1.86$$

Equation 2b for S:

$$M/S = 51.8/0.3 = 172.67 \gg S = M/172.67$$

Equation 2c for C:

$$M/C = 51.2/0 \gg C = 0.00$$

Equation 2d for W:

$$M/W = 51.8/6.6 = 7.85 \gg W = M/7.85$$

These expressions for each variable in terms of M are then substituted back into Equation 1, solving for M. This is then repeated with Equations 2a - d. This methodology allows for the two equations to be solved simultaneously and satisfies both conditions.

Section 6 includes a detailed discussion of the results of the overall carrying capacity calculations for each lake zone.

This methodology differs from that used in the 1988 Deep Creek Lake Carrying Capacity study (URDC, 1988). The two studies both used net rather than gross lake area for calculating lake carrying capacity. Both studies used similar assumptions (e.g., exclude 100 foot shoreline buffer), and resulted in similar estimates of net lake area

(2,968 acres in the URDC study versus 2,939 in the ERM study). The 1988 study used a four-step process to determine the carrying capacity of Deep Creek Lake:

1. Develop area/density guidelines for each boating activity using the results of a social carrying capacity survey.
2. Apply these social capacity guidelines to areas of the lake.
3. Apply the resource capacity guidelines system.
4. Evaluate and modify the social capacity level based on the user and property owner survey, past experience, mobility, and other factors.

This methodology relied on recreational users estimating preferred spacing between boats. Steps 1 and 2 above resulted in a lake carrying capacity of 702 boats. The 1988 study concluded that no adjustments to lake carrying capacity were warranted based on resource capacity guidelines. As part of Step 4, the carrying capacity was adjusted to 350 boats because of URDC's past experience, survey responses, and the mix of boating uses.

3.0 RECREATION FACILITY INVENTORY

Recreational facilities associated with boating at Deep Creek Lake include the formal and informal public boat launch facilities at Deep Creek Lake State Park, private residential docks, commercial boat rental docks, private yacht clubs, common docks (docks that are jointly owned by several residents, community associations), and transient use commercial docks and slips at restaurants, and commercial businesses. Table 3-1 provides an inventory of each type of facility at Deep Creek Lake.

Table 3-1. Boating-Related Recreational Facilities at Deep Creek Lake

Facility type	Number	Description
Public boat ramp	1	Deep Creek Lake State Park. Two boat ramps with parking for vehicles and trailers.
Car top boat launch (informal)	1	Deep Creek Lake State Park. Unimproved. On shoreline adjacent to Deep Creek Lake State Park Visitor's Center. No parking.
Private residential docks	1,626	Floating docks only. Total number of docks on lake subject to change as residents remove docks annually during winter and replace them at varying times each spring. Number of private docks in use peaks in mid-summer
Commercial boat rental businesses	8	Eight boat rental concessionaires operated on Deep Creek Lake in 2003. The total commercially available rental fleet consisted of approximately 310 boats (250 powerboats; 30 non-powered craft; and 30 PWCs) in 2003.
Private yacht clubs	2	Turkey Neck Yacht Club and Deep Creek Yacht Club are both located in the southern zone of Deep Creek Lake.
Common docks (permits)	97	The total estimated number of slips that are held by permit holders is currently about 1,560 slips
Hotel, Motel, and Restaurant slips	132	Includes 60 overnight slips for hotels and motels and 72 transient slips for restaurants.

The MDNR maintains a launch facility at Deep Creek Lake State Park. The facility consists of two double-wide boat ramps and two piers with eight transient slips available for public use. The parking lot at the State Park boat ramp has the capacity to accommodate 80-100 tow vehicles and trailers, although the capacity of the parking lot is somewhat affected by the orientation and size of parked vehicles. During scheduled special events, such as fishing tournaments, the DNR may utilize additional parking facilities to accommodate event participants' vehicles in order to maintain capacity for transient vehicles in the main lot. The MDNR also maintains another public dock for transient use at the Deep Creek Lake State Park Visitor's Center. This facility does not have individual slips, but is of sufficient size to accommodate several small to medium-sized boats.

There is one cartop boat launch area on the shoreline at Deep Creek Lake State Park adjacent to the Deep Creek Lake State Park Visitors Center. This is an informal launch area; i.e. no facilities or improvements exist at this location. No parking is provided, and no fees are charged at this location. Watercraft launched at this location are generally limited to kayaks, canoes, inflatable watercraft, and other small watercraft that may be transported without a trailer.

Private residential docks account for the largest number of on-water boat storage facilities on the lake. The MDNR regulates docks on the lake through the buffer strip use permit program. According to the MDNR's regulations all private docks must be removed from the lake by December 1 and are not permitted to be replaced on the lake until April 1. The requirement to remove docks by December 1 is strictly enforced; however the MDNR may allow property owners to replace their docks prior to April 1 if the lake is free of ice on a discretionary basis. Private dock owners may keep multiple boats at their docks, subject to limitations in the lake regulations. Private docks are not allowed to exceed 100 feet in total length, or 1/3 of the distance between the shores of lake, whichever is less. Private docks are also not allowed to extend past the side boundaries of a lot. For common residential permit holders, the total estimated number of slips that are held by permit holders is currently about 1,560 slips (see Appendix B).

There are eight commercial boat rental businesses currently operating on Deep Creek Lake (Figure 3-1). Most of these businesses rent powerboats exclusively, however one rental operation specializes in PWCs and another rents non-motorized vessels including canoes and kayaks. Boat rental docks are subject to the same regulations as private residential docks, however docks on commercial property require a commercial buffer strip use permit rather than a private buffer strip use permit. Some anecdotal evidence suggests that a significant number of boat rentals at Deep Creek Lake are long-term rentals and are kept in the water at private docks (DNR, 2004).

Turkey Neck Yacht Club and Deep Creek Yacht Club are the only two private yacht clubs on Deep Creek Lake, both of which are located on the southern end of the Lake (Figure 3-1). The total number of boats docked or moored at each club varies. The majority of boating traffic emanating from the yacht clubs consists of sailboats. Sailing regattas are held on weekends throughout the summer and generally occur in a triangular course in the vicinity of Turkey Point (Figure 3-2). Three races are scheduled on most summer weekends (one on Saturday, two on Sunday).

Figure 3.1. Boat Rental Concessionaires and Yacht Clubs at Deep Creek Lake

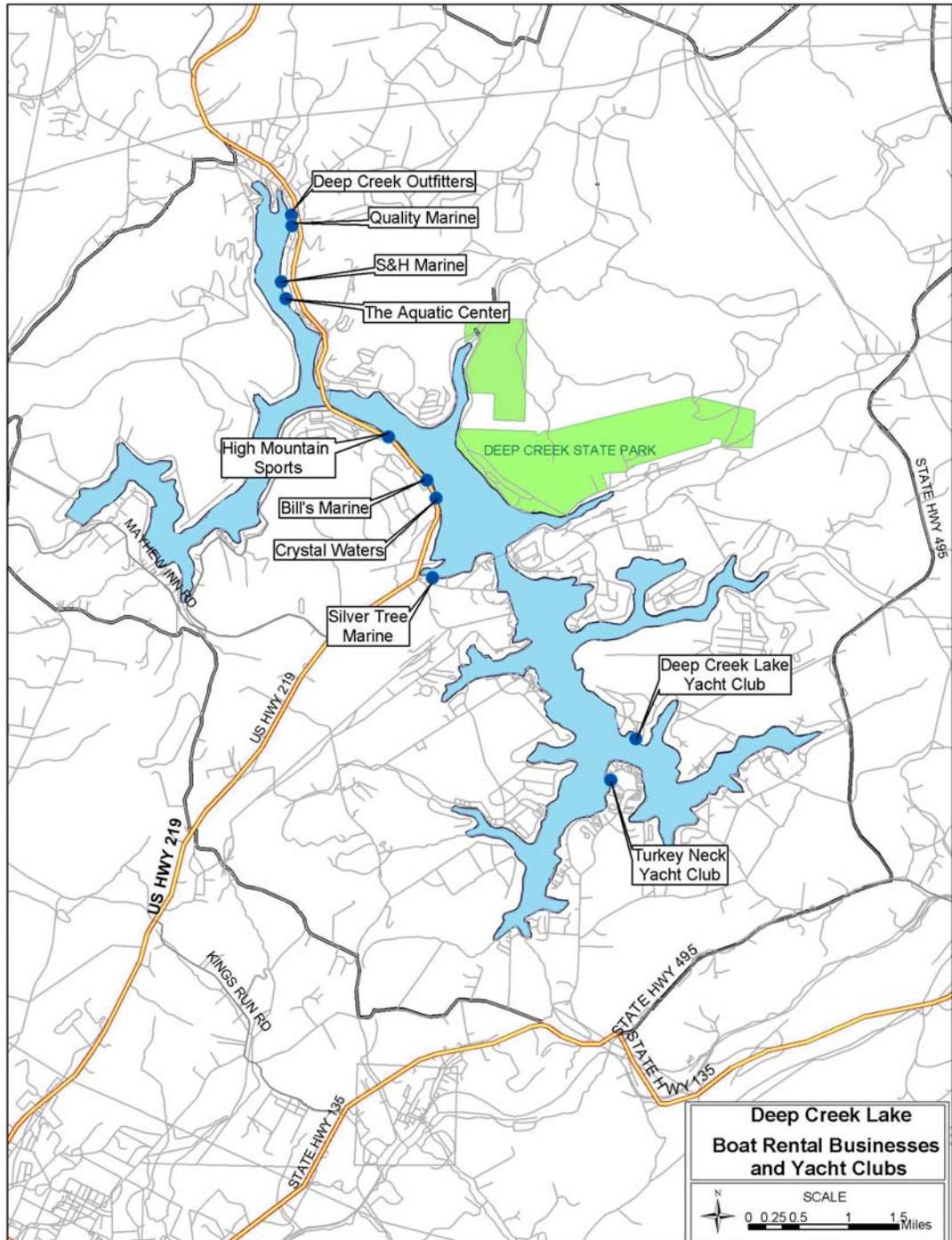


Figure 3.2. A sailing regatta near Turkey Point.



4.0 RECREATIONAL USE ASSESSMENT

4.1 Summary of Previous Recreational Use Studies

This section summarizes some of the key findings of several previous recreational use studies at Deep Creek Lake. This information provides a context for evaluating recreational use trends at Deep Creek Lake.

1988 Recreational Carrying Capacity Study

In 1988, MDNR conducted a recreational carrying capacity study for Deep Creek Lake Natural Resources Management Area (URDC, 1988a) to assess recreational use carrying capacity levels and to propose potential management guidelines for recreational use at Deep Creek Lake. The study included four surveys: an on-site user survey, a residential property owner survey, a business survey, and a boat use survey.

The results of the on-site user survey indicated that about 8 percent of the respondents were from the Deep Creek Lake area, 14 percent from the Baltimore area, 17 percent from the Pittsburgh area, 12 percent from the Washington, D.C. metropolitan area, 22 percent from other parts of Maryland, and the remaining from other areas. The primary recreational activities reported included motor boating, waterskiing, boat fishing, swimming, sunbathing, and picnicking.

The results of the residential property owner survey indicated that 23 percent of the respondents were year-round residents of the Deep Creek Lake area, 20 percent were from the Pittsburgh area, 20 percent from the Washington D.C. metropolitan area, 9 percent from the Baltimore area, and the remaining from other areas. Swimming, sunbathing, motor boating, waterskiing, and boat and shoreline fishing were the most popular summer recreational activities.

The results of the business survey indicated that about 21 percent of the businesses were involved in the motel, hotel and cottage industries, followed by contractor and other businesses, both at 13 percent, and marinas at about 9 percent. About 85 percent indicated that their business had been in existence for ten years or more, and about 67 percent had owned or managed their business for ten years or more. The clientele during 1986-87 were reported to be about 25 percent overnight/weekend visitors, 20 percent seasonal residents, 20 percent week-long to month-long residents, 17 percent non-lake county residents, 6 percent non-lake non-county residents, and 9 percent year-round residents.

The results of the boat use survey and assessment found that on peak summer weekend days there were a maximum of 275 to 280 Boats At One Time (BAOT) based on three aerial surveys taken on July 4th, July 30th, and August 1st of 1988. The study also found that an average of 3,477 boats were counted in slips on the lake on summer weekend survey days, and that an average of 102 boats were launched daily on weekends at boat ramps (the public boat ramp at Deep Creek Lake State Park and at the private boat

ramp run by Quality Marine in McHenry) during this same period. At the time of the study there was estimated to be about 6,700 boat slips under permit at Deep Creek Lake. The boating mix for the northern lake area was estimated to be about 10% boat fishing, 5% non-power boating, 45% power boating, 15% sail boating, and 25% waterskiing. The boating mix for the southern lake area was estimated to be about 10% boat fishing, 5% non-power boating, 35% power boating, 25% sailboating, and 25% waterskiing.

For the boating carrying capacity assessment, the lake was divided into four different lake areas: ends of coves, cove areas, northern lake area, and southern lake area. Table 4-1 summarizes the gross and net acres (subtracting a 100-foot no-wake zone area around the perimeter of the lake) and the estimated carrying capacity per lake zone.

Table 4-1. Summary of Boating Carrying Capacity Estimates per Lake Area

Lake Area	Gross Acres	Net Acres	Carrying Capacity
End of Coves	164	94	82 boats
Cove Areas	812	563	111 boats
Northern Lake Area	1,310	1,095	242 boats
Southern Lake Area	1,387	1,216	267 boats
Total	3,673	2,968	702 boats

Source: URDC, 1988a

The study concluded that the consideration of additional social capacity factors justified reducing the overall capacity estimate by half to about 350 boats. The factors considered included survey responses indicating that there were too many boaters on the lake during peak summer weekends (75 percent of the property owners surveys and 93 percent of the on-site users surveyed indicated that there were too many power boaters), the narrowness and irregular shape of the lake, and the mixture of boating uses, (various boating speeds and mixed boating skill levels).

1994 Feasibility Study for Boat Sticker System

In 1994 MDNR conducted a study to assess the feasibility of requiring mandatory lake use stickers for boaters on Deep Creek Lake (MDNR, 1994). As part of this study MDNR assessed the number and makeup of boat launches at Deep Creek Lake State Park. During May through September 1994 there were an estimated 5,028 total launches at the State Park boat launch. Surveys of the boat launchers were conducted in 1990 and 1994 and found the following composition of user groups:

User Group	1990	1994
Property Owners	16%	43%
Rental Property Owners	50%	18.5%
Day Use	34%	21%

As part of the study, a survey of lake boaters was conducted at various random locations around the lake. About 79% of those surveyed felt that over the previous five

years the levels of boating use had increased, about 74% felt that the level of enforcement of boating regulations and amount of patrols were appropriate, and about 77% felt that the boating use restrictions were appropriate.

1997 Visitor Use and Attitude Survey

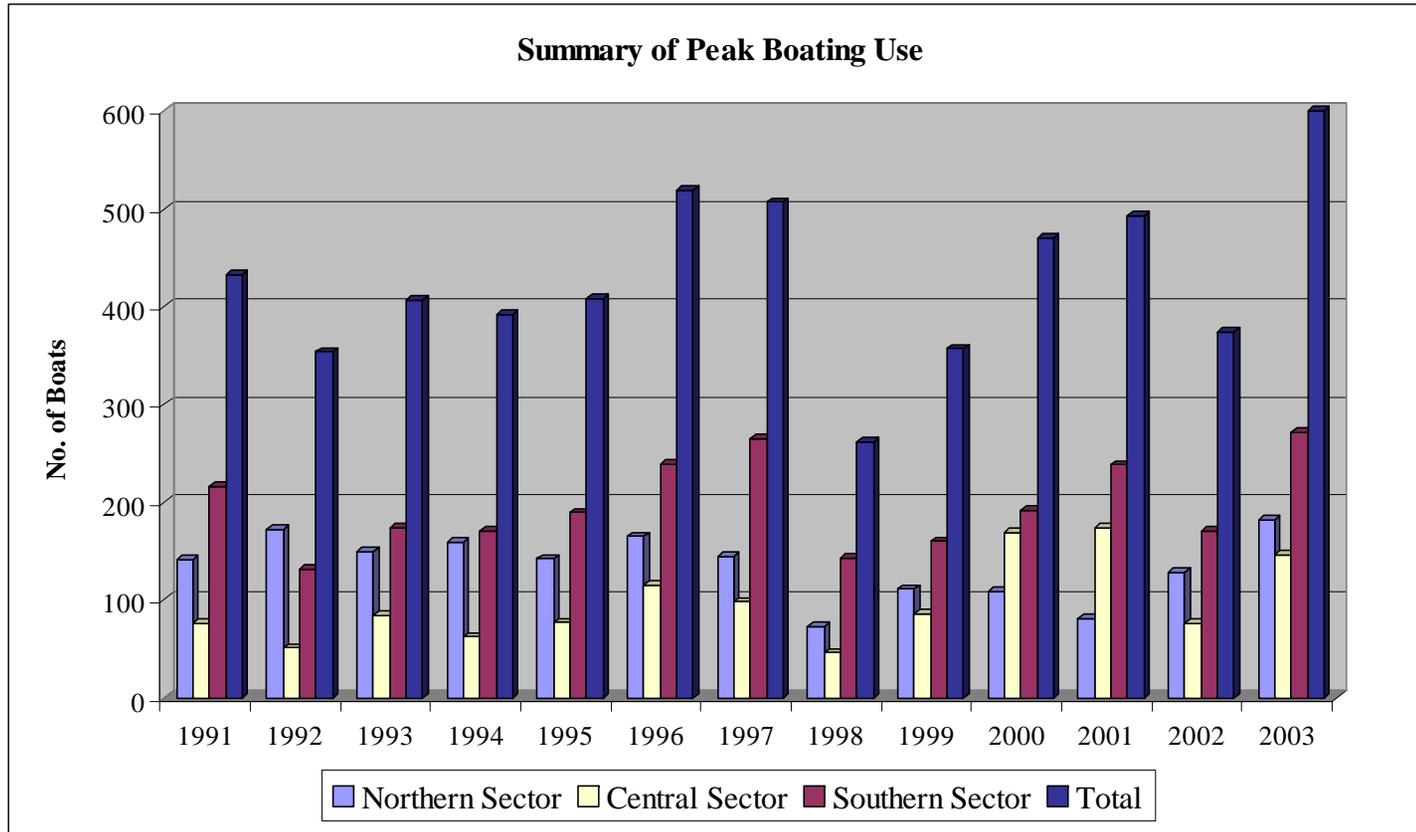
In 1997, MDNR conducted a visitor use and attitude survey to provide information regarding visitors to Deep Creek Lake State Park and perceptions about the facilities, programs and service delivery at the park (MDNR, 1998). The primary recreational activities of those surveyed were: swimming (63%), picnicking (51%), boating (49%), camping (45%), walking (44%), hiking (42%), and fishing (41%). About 75% of those surveyed reported that the park was their primary trip destination. About 54% of the respondents were Maryland residents, about 21% from Pennsylvania, about 8% from West Virginia, and about 5% from Virginia. Only about 6% reported conflicts with other people.

Boat Count Data

MDNR collected boat count data on various weekend and holiday afternoons during July, August, and early September from 1991 through 2003. The lake was separated into three sectors: north, central, and south. Boat counts were conducted in each of the three lake sectors. The portion of the lake north and west of the U.S. 219 Bridge constituted the northern sector; the area between the U.S. 219 Bridge and the Glendale Bridge constituted the central sector; and the southern sector was comprised of the area south of Glendale Bridge (see Figure 2-1). Boats that were actively being used at the time of the over flight were counted within each sector. Boat trailers at the state park boat launch area were counted during the same period that the boat counts were conducted. The over flights were conducted during the early afternoon, generally between 1:00 pm and 2:00 pm, on clear days when the temperature was 70°F or warmer. The aerial surveyors followed a standardized route for each of the surveys. It should be noted that ERM used the same weather conditions and methodology in conducting its boat counts in 2003, except that the boats were counted based on aerial photographs rather than during the flight.

Table 4-2 summarizes the median, average, minimum, and maximum number of BAOT counted during each year, including both weekend and holiday counts. The annual maximum number of BAOT ranged from 262 to 600 based on the MDNR and ERM 2003 boat counts. Figure 4-1 shows the peak day boat counts for each year broken out by lake zone and the total count for that day. Figure 4-2 shows the percent distribution of boats per lake zone for the peak day for each year. The southern portion of the lake typically received the highest level of boating use (it is the largest sector of the lake with 1,535 net acres), followed by the northern section, and then the central section.

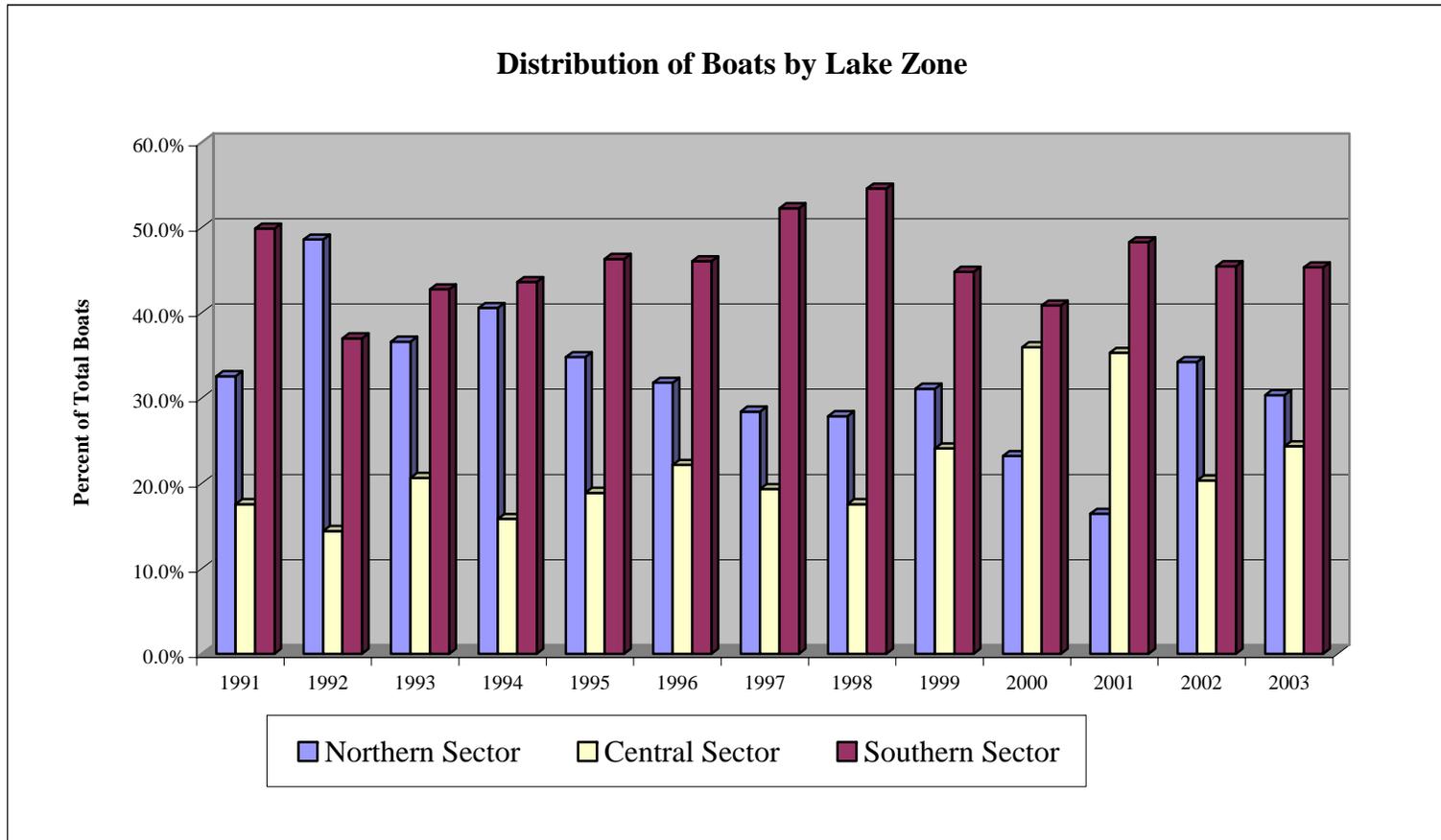
Figure 4-1. Summary of Peak BAOT for Each Year during the 1991-2003 Period



Source: Data from MDNR boat counts from 1991 to 2002, and ERM aerial photographs in 2003.

Note: Chart represents count of total boats on Deep Creek Lake at one time during peak day recorded for each year.

Figure 4-2. Distribution of Boats by Lake Zone Area for Annual Peak BAOT during the 1991-2003 Period



Source: Data from MDNR boat counts from 1991 to 2002 and ERM aerial photographs in 2003.

Note: Chart represents percent of total boats on Deep Creek Lake at one time during peak day recorded for each year.

Table 4-2. Summary of BAOT Count Data at Deep Creek Lake from 1990-2003

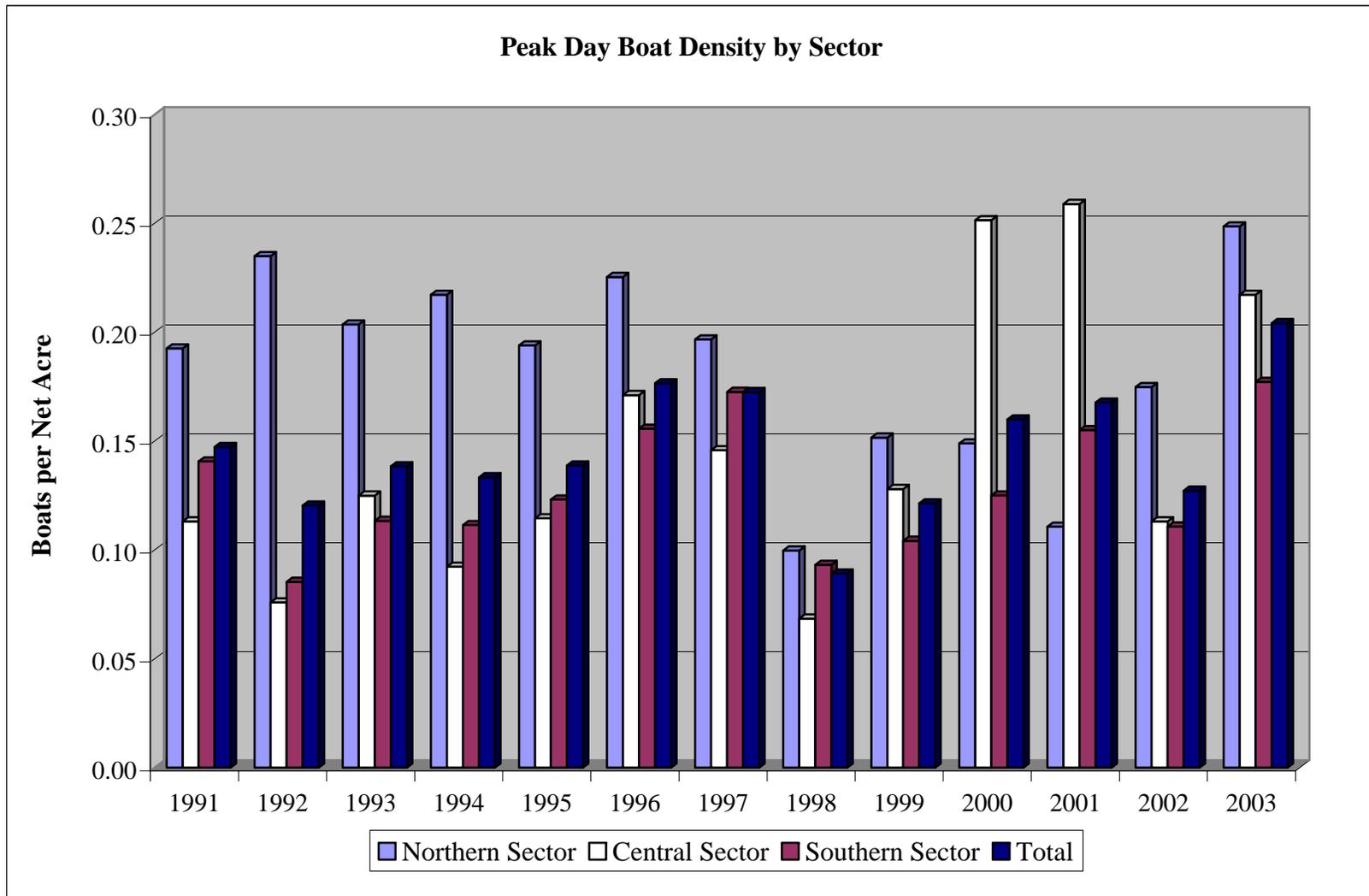
Year	No. of Counts	Median	Mean	Minimum	Maximum
1990	9	300	326	165	407
1991	12	292	295	213	433
1992	10	249	256	113	354
1993	12	325	335	258	407
1994	8	295	299	214	392
1995	12	294	294	135	408
1996	10	358	380	294	459
1997	8	306	340	253	507
1998	1	262	262	262	262
1999	7	264	256	139	357
2000	5	347	345	215	470
2001	7	301	326	233	493
2002	8	257	269	188	374
2003	7	352	334	152	600

Source: Data from MDNR boat counts from 1991 to 2003 and ERM aerial photographs in 2003.
Note: See Appendix C for breakdown by lake zone.

Figure 4-3 denotes the net boat density (number of boats divided by net lake area) by sector and for the total lake on the peak day for each year during the 1991-2003 period, based on the MDNR and ERM boat count data. The highest density was in the central sector in 2001 with a density of 0.26 boats per acre. In the early 1990's, the northern sector experienced higher use (as measured by boat densities) during peak periods (Figure 4-5). Between 1991 and 1997, boat densities in the northern section of the lake consistently exceeded densities on the central and southern sectors. Recently, boat densities have exhibited more variability across the lake. In 2000 and 2001, mean peak-day boat densities were high in the central sector. There has been no readily apparent trend in cumulative mean- or peak-boat density between 1991 and 2003, indicating that while peak densities may vary between portions of the lake from year to year, total use of the lake during peak periods has not increased substantially over the last 12 years. Likewise, there has been no clear trend in average BAOT over that same period (Table 4-2).

Table 4-3 summarizes the count of the boat trailers at the state parks during the days that data were collected by MDNR. During the 1991 to 2003 period, the average ratio of boat trailers in the state park boat launch area as compared to the total BAOT count for that day was about 22 percent, ranging from 16 to 29 percent on the peak days. The state park boat launch area has a capacity of about 80 to 100 cars with trailers. The boat ramp and parking lot was last expanded in 1991. During the 1991 through 2003 period there were 8 occasions when the number of boat trailers counted at the state park was over 80 and at no time did the number of trailers exceed 100.

Figure 4-3. Peak Day Net Boat Density By Sector



Source: Data from MDNR boat counts from 1991 to 2003 and ERM aerial photographs in 2003.

Note: Chart represents density of boats on Deep Creek Lake at one time during peak day recorded for each year.

Table 4-3. Summary of Boat Trailer Counts at State Park

Year	No. of Counts	Mean	Minimum	Maximum	No. Times Count over 80
1991	12	54.5	34	68	0
1992	8	57.1	37	74	0
1993	1	70.0	70	70	0
1994	6	62.8	46	81	1
1995	12	46.5	15	83	1
1996	9	59.6	48	81	1
1997	6	58.8	36	70	0
1998	1	63.0	63	63	1
1999	6	59.0	32	87	1
2000	2	54.0	47	61	0
2001	6	73.2	57	91	1
2002	8	67.9	45	93	1
2003	6	70.3	52	95	1

Source: Data from MDNR, 2004

In addition to counting boats on the lake, MDNR has historical counts of boats at docks and along the shoreline of the lake during the peak recreation season (July, August and early September) for certain days of each year. MDNR provided these data for the years 1996 through 2003 to ERM for analysis. The total number of boats counted along the shoreline and docks combined ranged from 4,288 to 5,350 during this period. Of the two areas (docks and shoreline), the majority of the boats were located at docks, ranging from about 70 to 80 percent of the total as compared to those along the shoreline.

Typically, the largest category of boats located at docks along the lake was motor boats, ranging from 55 to 68 percent of the total boats counted along the shoreline. The largest category of boats along the shoreline was PWC, ranging from 47 to 72 percent of the total boats along the shoreline. Several of the counts were conducted during days when boats on the lake were also counted. During these periods, the boats counted on the lake represented about 3.6 to 7.4 percent of the total boats counted along the shoreline, at docks, and on the lake.

MDNR also collected information about the number of boats launched and rented from commercial marinas surrounding the lake. Table 4-4 provides a summary of the average boat rentals and boat launch counts for the weekends and holidays at the commercial facilities and at Deep Creek Lake State Park.

Table 4-4. Summary of Average Number of Private Boat Launches at Commercial Facilities, Rentals, and Launches at Deep Creek Lake State Park

Year		July		August	September	
		Holiday	Weekend	Weekend	Holiday	Weekend
1991	Day Rentals	39	46	69	55	ND
	Boat Launch	14	25	25	31	ND
1992	Day Rentals	53	10	14	ND	35
	Boat Launch	214	109	96	ND	110
1993	Day Rentals	0	13	11	0	0
	Boat Launch	57	104	110	78	101
1994	Day Rentals	19	10	1	ND	0
	Boat Launch	159	92	119	ND	75
1995	Day Rentals	18	10	21	7	ND
	Boat Launch	69	49	96	65	ND
1996	Day Rentals	ND	25	8	ND	22
	Boat Launch	ND	105	92	ND	115
1997	Day Rentals	ND	9	11	ND	ND
	Boat Launch	ND	84	94	ND	ND
1998	Day Rentals	25	ND	ND	ND	ND
	Boat Launch	163	ND	ND	ND	ND
1999	Day Rentals	ND	22	11	29	ND
	Boat Launch	ND	111	85	114	ND
2000	Day Rentals	ND	15	ND	ND	ND
	Boat Launch	ND	105	ND	ND	ND
2001	Day Rentals	ND	13	16	ND	ND
	Boat Launch	ND	120	121	ND	ND
2002	Day Rentals	ND	22	18	ND	ND
	Boat Launch	ND	120	120	ND	ND
2003	Day Rentals	102	57	76	ND	ND
	Boat Launch	11	7	16	ND	ND

Source: Data from MDNR, 2004.

Note: ND= no data available.

4.2 Recreational Use During the 2003 Study Period

The following section provides a summary of the key findings of the surveys and spot count information gathered during the 2003 study period. Appendix C includes a summary of the primary responses to the resident and contact surveys.

Recreational User Profile and Activity

Respondents to the contact survey indicated that their primary residence was outside of Maryland (51%); within Maryland, but not within Garrett County (24%); within Garrett County (3%); and a lakefront property at Deep Creek Lake (22%). In response to where they were staying, respondents to the contact survey indicated that they stayed at a vacation home (28%), were staying at a hotel or motel (12%), at their permanent residence (10%), were renting lakefront (10%), were renting a house near the lake (10%), were tent camping (8%), were trailer or RV camping (7%), or indicated other (4%). About 15% of the resident survey respondents indicated they stayed 0-5 days per month during the summer at their lakefront home 2003, about 24% indicated 6-10 days, about 29% indicated 11-20 days, and about 32% indicated 21-30 days. The resident survey respondents indicated that they typically rented out their dwelling an average of 3.79 weeks between Memorial Day and Labor Day.

For the contact survey, 61% of the respondents were male and 39% were female. The age distribution was 49% in the age group 46-65, 31% in the age group 31-45, 11% in the age group 18-30, 7% over 65, and 2% under 18. For the resident survey, 72% of the respondents were male and 28% were female. The age distribution was 57% in the age group 46-65, 29% over 65, and 14% in the age group 22-45.

Respondents to the resident survey indicated that the distribution of watercraft at their lakefront home included: 44% power boats, 30% canoe/ kayak/rowboat, 14% personal watercraft/jet ski, and 12% sailboat/boards. Respondents to the contact survey indicated that the distribution of watercraft at their lakefront home included: 63% power boats, 20% personal watercraft/jet ski, 10% canoe/kayak/rowboat, and 6% sailboat/boards. Respondents to the resident survey indicated that they keep a watercraft owned by someone other than a member of their household in the water or at their dock at their lakefront home an average of 5.1 days during the period June 1st through September 30th. About 60% of the respondents to the contact survey indicated that they would keep a boat with them either on a trailer or in the water overnight during their stay, and of those respondents, 86% stated they would keep the boat at a private dock, 8% at a community dock, and 6% at a commercial dock.

Figure 4-4 summarizes the distribution of recreational activity based on the contact survey. The primary activities included motor boating, boat fishing, swimming and waterskiing. Primary activities listed in the "other" category included tubing, bicycling and sightseeing. For the contact survey, the average group size was 3.8 for ages 18 and older and 1.22 for ages less than 18 years. About 65% of the respondents were on an overnight trip and about 35% indicated they were on a day trip. The average length of stay for day trips was 5.4 hours and for overnight trips was 5.1 nights. Figure 4-5 summarizes the average number of days that the resident survey respondents indicated they recreated in various recreational activities during the month for which the survey was completed. Primary activities listed in the "other" category included, wake boarding, tubing, fishing from dock, paddle boating, picnicking and sunbathing.

Figure 4-4. Distribution of Recreational Activities of Contact Survey Respondents

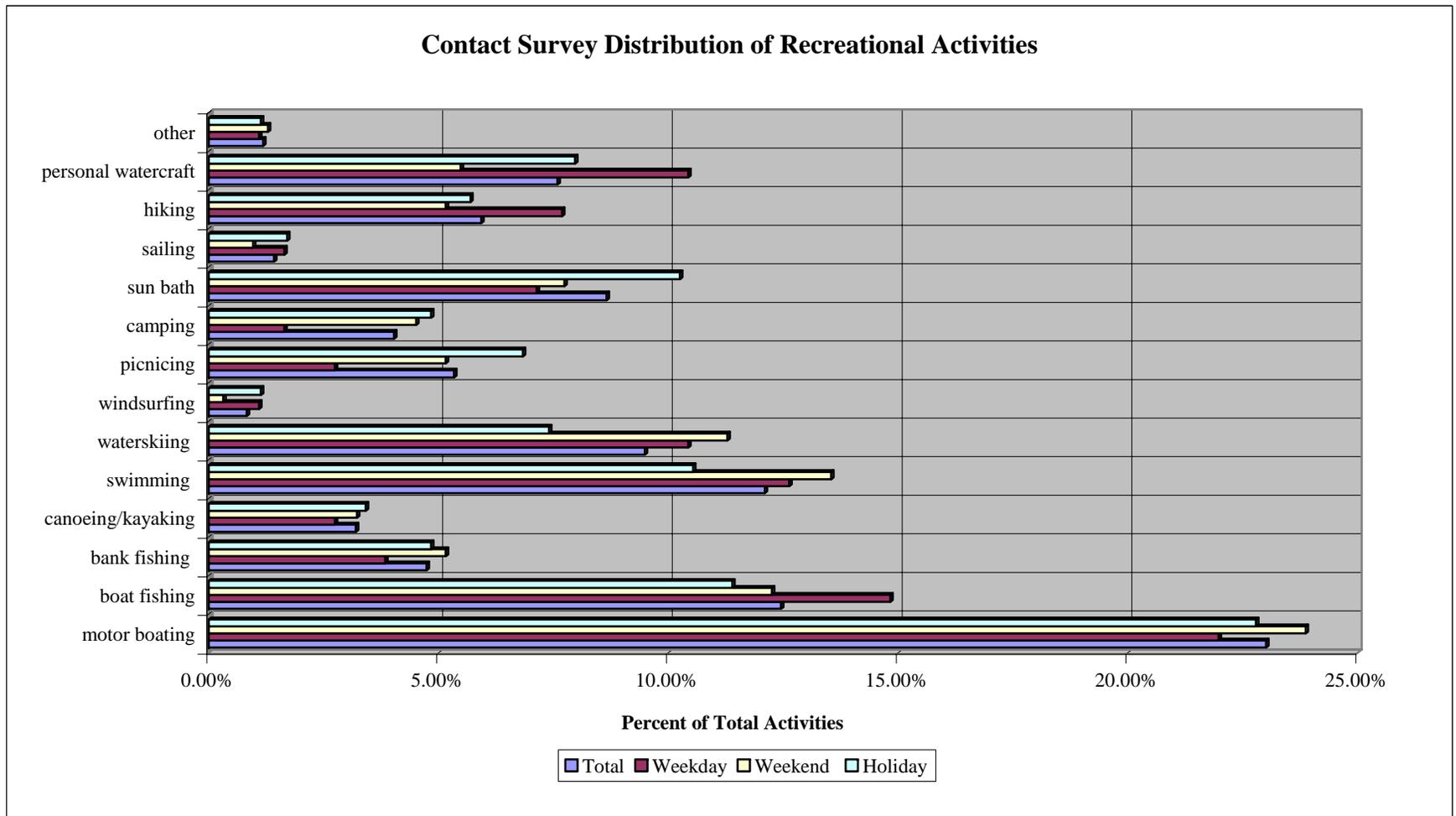
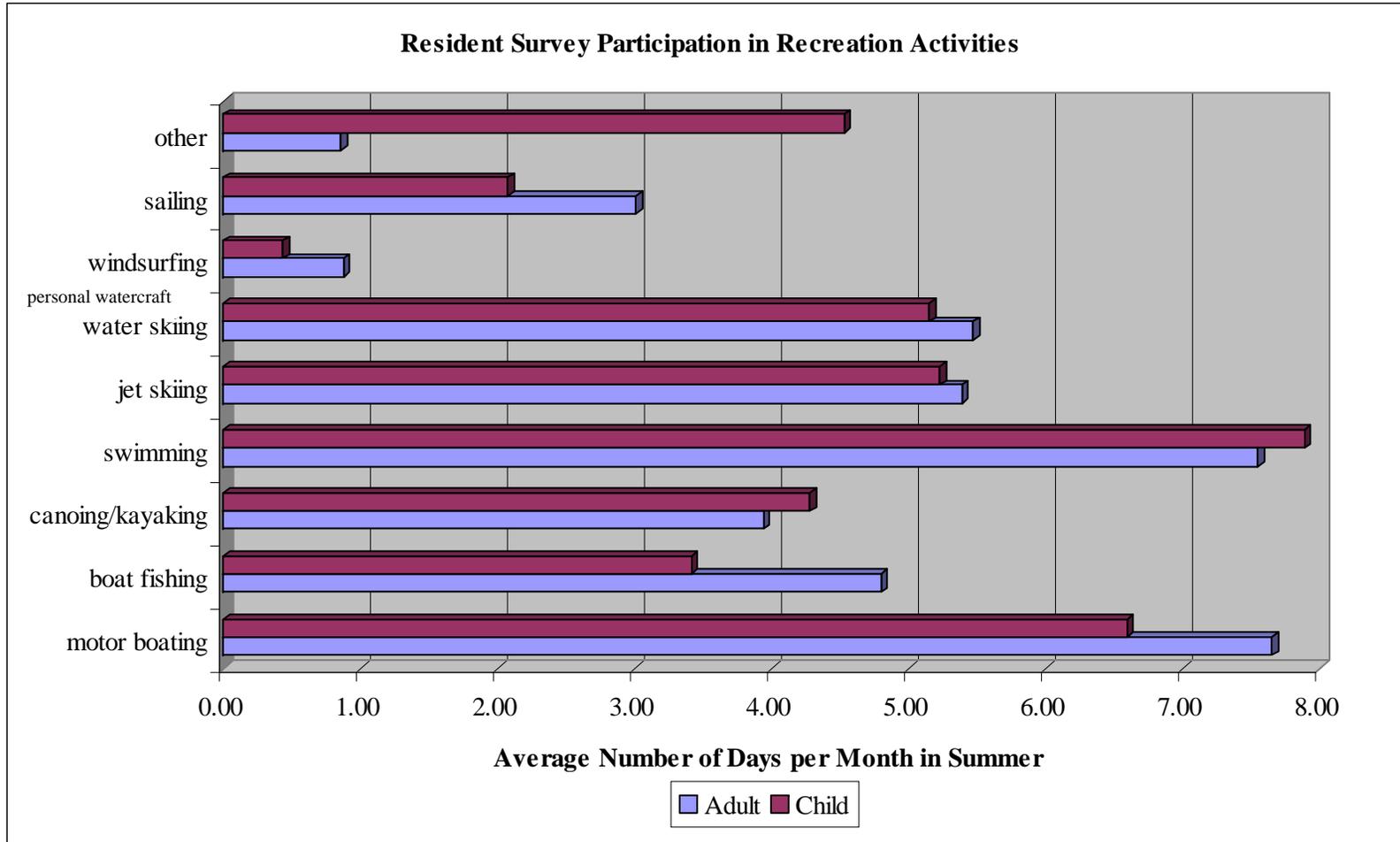


Figure 4-5. Resident Survey Respondents Participation in Recreational Activities

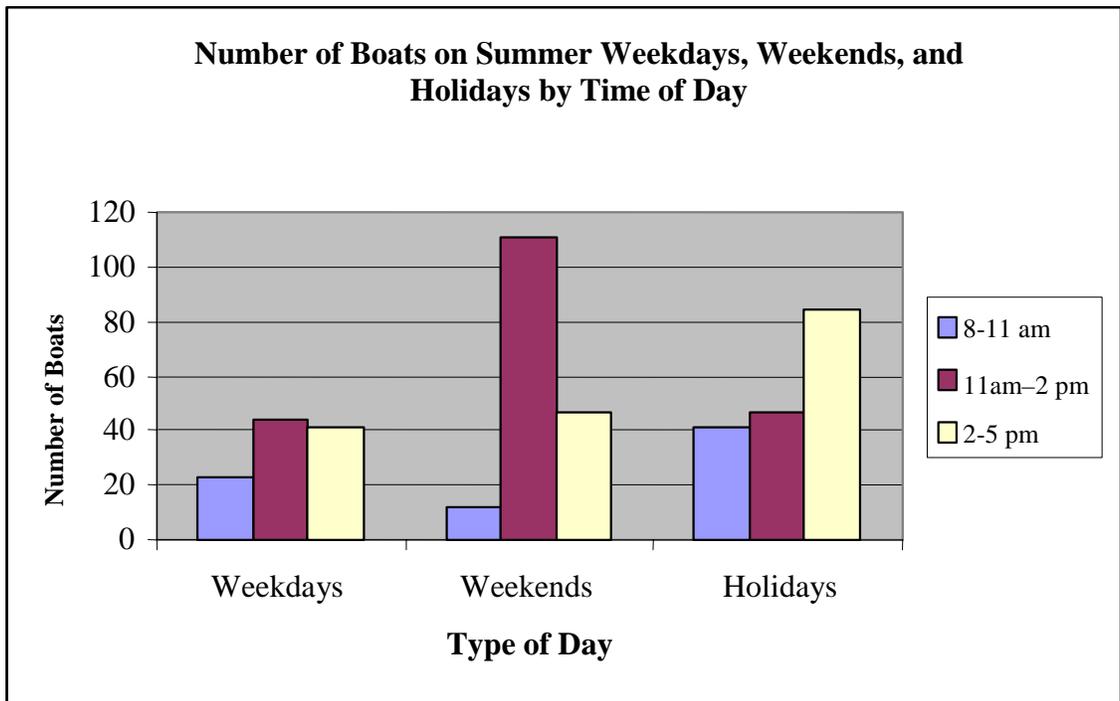


Boating Use and Characteristics

Boating Use by Time of Day

Boating use was counted in terms of time of day during the 10 days when boat spot counts were conducted (see Table 2-2 for dates). Average boating use in 2003 was the least in the mornings (8 to 11 am), although this was a popular time for anglers. Average boating use in 2003 was the highest during mid-day (11 am to 2 pm) and afternoons (2 to 5 pm) for weekends and holiday weekends, respectively (Figure 4-6).

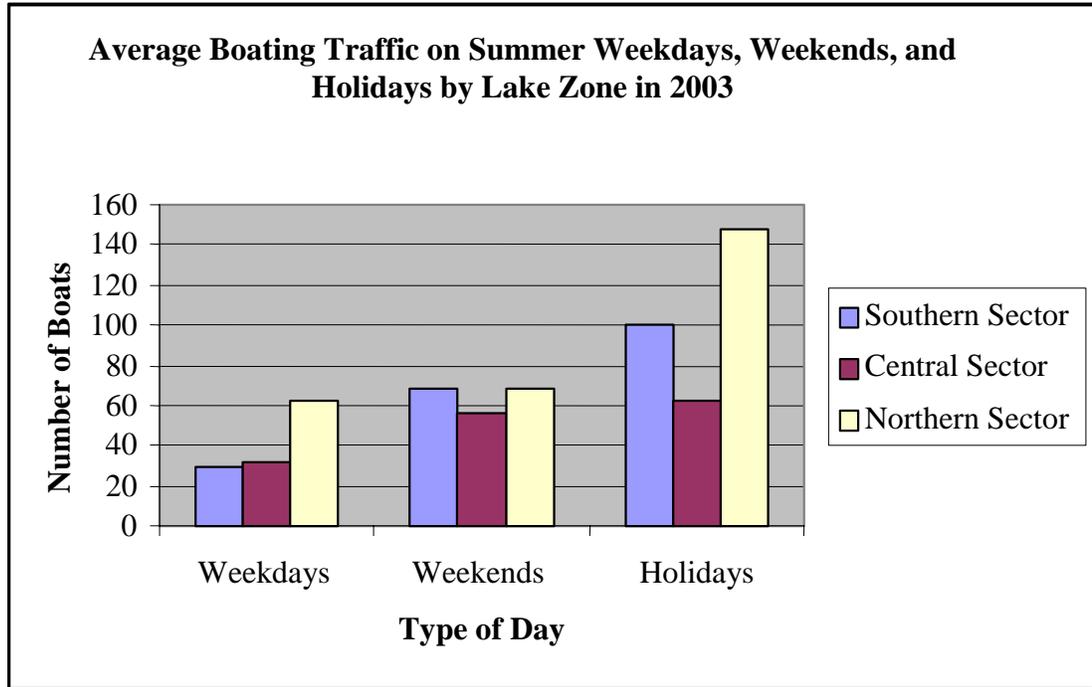
Figure 4-6. Average Number of Boats on Summer Weekdays, Weekends, and Holiday Weekends in 2003 by Time of Day (Source: ERM spot counts, 2003)



Boating Use by Type of Day

Boating use was also tracked by type of day (i.e., weekday, weekend day, holiday weekends). Figure 4-7 depicts the average daily boating use levels documented during Summer 2003, broken down by type of day, in each sector of the lake.

Figure 4-7. Average Boating Traffic on Summer Weekdays, Weekend days, and Holidays by Lake Zone in 2003 (Source: MDNR aerial counts and ERM aerial photographs for 2003.)



Boating Use by Month

The recreational boating season at Deep Creek Lake is generally considered to extend from approximately Memorial Day weekend to Labor Day weekend. Based on our observations, recreation use increases significantly around 4th of July weekend and remains fairly high until Labor Day weekend, assuming the weather remains fairly good. Less recreational boating definitely occurs in June.

Boating Use by Sector

Boat counts were conducted by MDNR (see section 4.1) and by ERM from the aerial photographs taken in 2003 during peak time periods.

The number and type of boats were then counted per each lake sector. Table 4-5 summarizes the boat count data per sector for the 2003 study period. A total of 10 count days were conducted, including three days of aerial photograph counts. The maximum number of BAOT on the total lake recorded was 600 during the Fourth of July holiday, a warm, sunny day that followed a very wet June. The minimum count day recorded was 152 for the total lake on a cloudy weekend day in July. Based on the 7 count days, the average boat count for the lake was 334 boats. Based on the average of the 2003 counts for each sector, the northern sector received about 27%, the central sector about 22%, and the southern sector about 51% of the total average use.

Table 4-5. Summary of the 2003 Boat Counts per Sector

Lake Sector	Median	Mean	Minimum	Maximum
Northern Sector	79	90	51	182
Central Sector	62	74	38	146
Southern Sector	157	169	56	272
Total Lake	352	334	152	600

Sources: MDNR, 2004 and ERM, 2004.

Note: MDNR conducted aerial boat counts on the following dates: 7/5, 7/12, 7/26, 8/02, 8/17, and 8/23. ERM conducted aerial boat counts on 7/4, 8/17, and 8/23.

Boating Use by Type of Watercraft

The DNR aerial boat count data do not distinguish among the type of watercraft. Therefore, the only available data regarding the type of watercraft are the ERM 2003 aerial photographs. Table 4-6 summarizes the count and distribution of the type of boat per each sector and for the total lake based on the three ERM aerial photographs (July 4, August 17, and August 23, 2003). Motor boating was the category with the highest use in each sector, accounting for over 70% of the total lake use within each sector.

Table 4-6. Distribution of Boat Type per Sector

Activity	Northern Sector		Central Sector		Southern Sector		Total Lake	
	Count	% of Sector	Count	% of Sector	Count	% of Sector	Count	% of Lake
Motor Boating	267	79.7%	218	82.6%	563	72.3%	1,048	76.1%
Sailing	1	0.3%	5	1.9%	112	14.4%	118	8.6%
Canoe/Kayak	0	0.0%	2	0.8%	2	0.3%	4	0.3%
PWC	45	13.4%	26	9.8%	51	6.5%	122	8.9%
Water Skiing	22	6.6%	13	4.9%	51	6.5%	86	6.2%
Total	335	100.0%	264	100.0%	779	100.0%	1,378	100.0%

Source: ERM, 2003

Note: Total counts in Table 4-6 represent the sum of the total number of boats counted by ERM on 7/4, 8/17, and 8/23.

Boat Launch

Table 4-7 summarizes the characteristics of the type and timing of boat launches and type of activities observed at the state park boat launch area. The average number of boats launched ranged from 15.7 on weekdays to 50.3 on holidays. The maximum wait time at the state park boat ramp for launching a boat was 4 minutes on weekdays, 5.7 minutes on the weekends and 12.2 minutes on holidays. The average wait time ranged from 2.3 minutes on weekdays to 8.4 minutes on holidays. The largest category of boats launched was motorboats, followed by personal watercraft and fishing boats. The

primary recreational activities observed at the boat launch area was bank angling, picnicking, and sunbathing.

Table 4-7. State Park Boat Launch Summary during Summer 2003

	Weekday	Weekend	Holiday
Avg. No. Boats Launched	15.7	49.3	50.3
Max. Boats Launched	27.0	90.0	59.0
Min. Boats Launched	5.0	4.0	33.0
Avg. Wait Time (minutes)	2.3	3.0	8.4
Max. Wait Time (minutes)	4.0	5.7	12.2
Avg. No. Fishing Boats Launched	5.0	8.2	0.0
Avg. No. Pontoon Boats Launched	1.3	1.5	0.0
Avg. No. Motor Boats Launched	7.7	33.3	29.0
Avg. No. Water-skiing Boats Launched	0.3	1.0	0.0
Avg. No. Sail Boats Launched	0.0	0.0	0.0
Avg. No. PWCs Launched	1.3	5.0	4.0
Avg. No. Windsurfers	0.0	0.3	0.0
Avg. No. Canoeists/Kayakers	0.0	1.2	1.0
Avg. No. Bank Anglers	2.7	6.2	1.7
Avg. No. Sunbathers	0.0	0.3	0.7
Avg. No. Picnickers	0.0	2.7	5.3

Source: Data from ERM Spot Counts at the Deep Creek Lake State Park boat ramp.

Note: Weekday data based on 3 observation days, weekend data based on 6 observation days, and holiday data based on 4 observation days during Summer 2003.

Recreational Issues

Respondents to the contact and resident survey were asked whether they had encountered certain conditions at Deep Creek Lake that interfered with their recreation experience. They were asked to check whether the listed conditions were not a problem (1), a slight problem (2), a moderate problem (3), or a big problem (4). Tables 4-8 and 4-9 summarize the average ratings of both the resident and contact survey respondents, respectively.

For the resident survey, respondents indicated that the conditions that caused the most problems included boat wakes, too many watercraft on the lake, and eroding shoreline. As Figure 4-8 indicates, approximately 67 percent of waterfront residents consider too many watercraft and boat wakes as moderate or big problems.

For the contact survey the conditions that caused the most problems included availability of public sanitary facilities or port-a-johns, and loud, rude or inconsiderate behavior by other recreation users.

Table 4-8. Rating of Conditions Encountered that Interfered with Residents' Recreation Experience

Condition	Resident Survey
Boat wakes	2.94
Too many watercraft on the lake	2.89
Eroding shoreline	2.53
Muddy water	2.08
Loud, rude or inconsiderate behavior by recreation users	2.00
Improper disposal of litter, trash, etc.	1.79
Conflicts with other recreation users	1.77
Boating hazards (i.e., stumps, shallow areas)	1.54
Availability of public sanitary facility	1.42
Tree cutting along the shoreline	1.34
Too many people along the shoreline	1.33
Bulkheads/riprap along the shoreline	1.32

Rating scale: 1 = not a problem, 2 = slight problem, 3= moderate problem, 4 = big problem

Table 4-9. Rating of Conditions Encountered that Interfered with Contact Survey Respondents' Recreation Experience

Condition	Contact Survey
Availability of public sanitary facility	2.49
Loud, rude or inconsiderate behavior by recreation users	2.41
Improper disposal of litter, trash, etc.	2.37
Conflicts with other recreation users	2.37
Too many watercraft on the lake	2.33
Too many people along the shoreline	2.27
Boating hazards (i.e., stumps, shallow areas)	2.25
Boat wakes	1.88
Eroding shoreline	1.53
Muddy water	1.38
Tree cutting along the shoreline	1.32
Bulkheads/riprap along the shoreline	1.26

Rating scale: 1 = not a problem, 2 = slight problem, 3= moderate problem, 4 = big problem

Figure 4-8. Distribution of Recreational Activities of Contact Survey Respondents

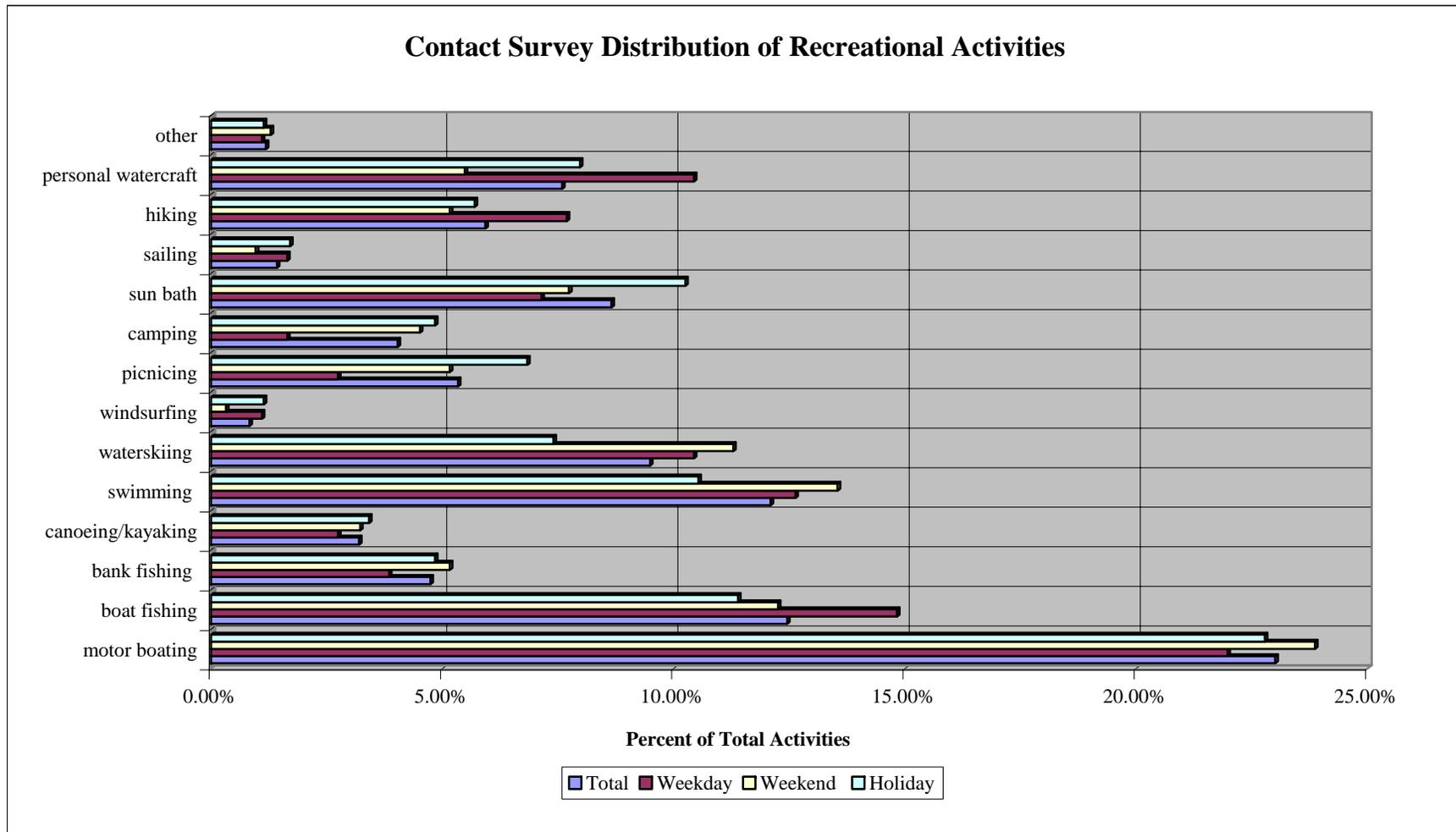
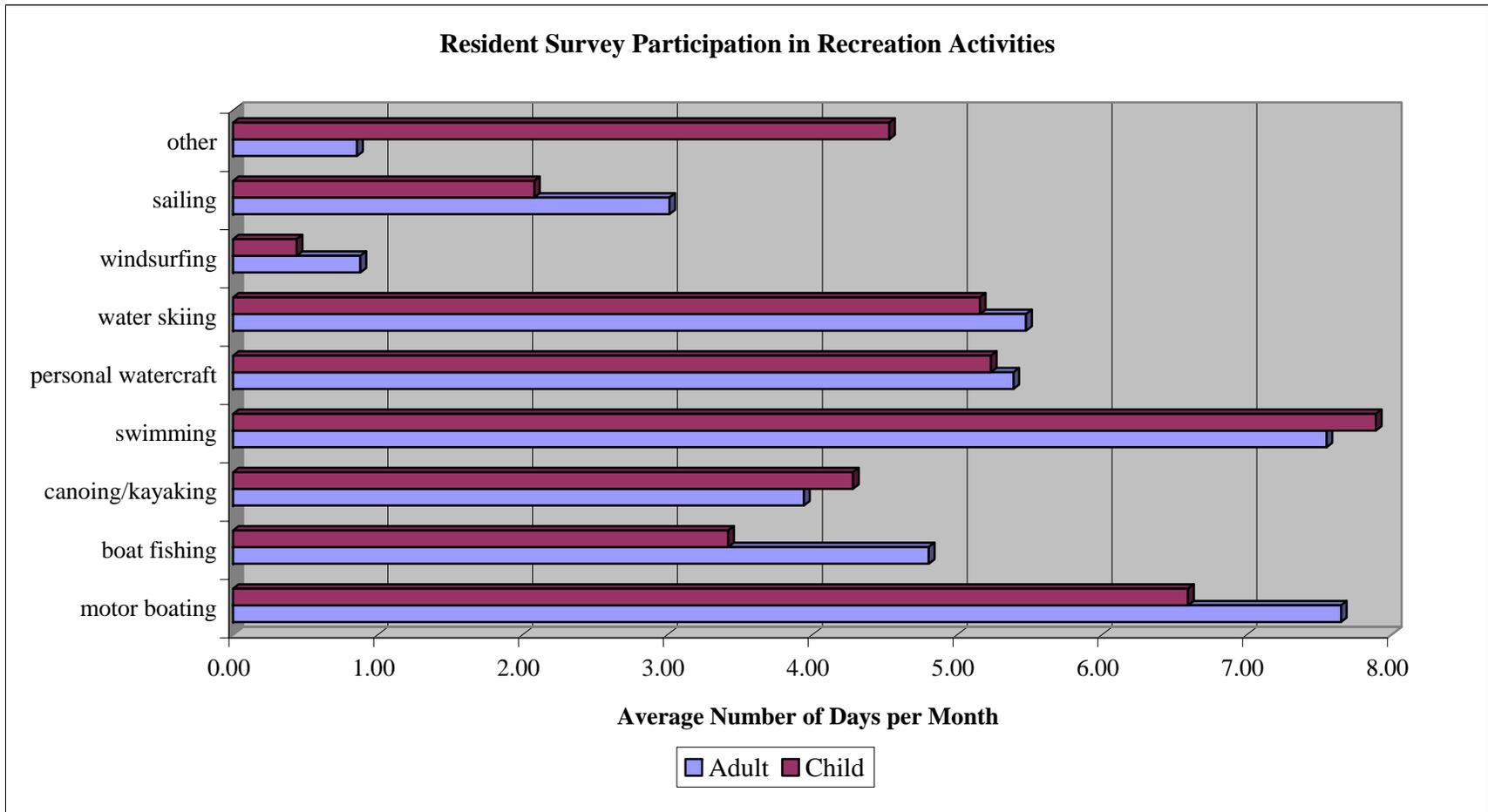


Figure 4-9. Resident Survey Respondents Participation in Recreational Activities



These results do highlight the differences between waterfront residents and visitors (most respondents to the contact survey were not waterfront residents). As would be expected, waterfront residents are more concerned than visitors regarding boat wakes, shoreline erosion, and muddy water along the shoreline, since erosion and turbidity have a direct impact on their properties' shoreline. Conversely, visitors are more concerned about the lack of public bathrooms since they are dependent on these facilities, unlike the waterfront residents. Perhaps more significantly, however, waterfront residents are more concerned about the number of watercraft on the lake. We attribute this heightened sensitivity regarding crowding to several factors:

- Some waterfront residents are year-round residents and are more accustomed to a rural setting than many of the visitors who come from the Baltimore- Washington and Pittsburgh metropolitan areas and are more accustomed to crowding.
- Waterfront residents spend more time at the lake than visitors and have greater exposure to crowding issues over the duration of the summer.
- Many waterfront residents have lived at Deep Creek Lake for several years and may be concerned by their perception of increased crowding.

Noise

Respondents to the contact and resident survey were also asked whether they had encountered certain noise-related conditions at Deep Creek Lake. They were asked to check whether the listed conditions were not a problem (1), a slight problem (2), a moderate problem (3), or a big problem (4). Table 4-10 summarizes the average ratings of both the resident and contact survey respondents. For the resident survey respondents, noise from powerboats and personal watercraft were rated as a slight to moderate problem. The contact survey respondent indicated that noise related issues were primarily not a problem.

Table 4-10. Rating of Noise-Related Conditions Encountered

Condition	Resident Survey	Contact Survey
Noise from powerboats	2.47	1.55
Noise from personal watercraft	2.61	1.50
Noise from airboats	1.80	1.18
Noise from on-shore activities during the day	1.29	1.26
Noise from on-shore activities during the night	1.76	1.27
Noise from others recreational users on the lake	1.56	1.26

Rating scale: 1 = not a problem, 2 = slight problem, 3= moderate problem, 4 = big problem

In response to whether they had any other comments regarding noise at Deep Creek Lake, respondents to the resident survey stated various concerns and problems, including: loud boats, such as those with modified exhaust systems or boat exhaust systems above the water; loud jet skis; loud airboats; the need to enforce noise regulations; loud music from on-shore and boats; loud boats at nighttime and early

morning (i.e., “bass fishing boats noise”); the need for a better method of evaluating boat motor noise (i.e., “at idle at the dock doesn’t do it”; “measure boats (noise) at full throttle, 50 yards from shore”; “cut outs on power boats should be banned”); and loud noise from renters. Respondents to the contact survey generally did not have any additional negative comments, a few indicated personal watercraft as a noise problem, and several stated that noise was not a problem.

General Comments

In the general comment response, the resident survey respondents frequently commented on the excessive noise, too many boats, and related safety concerns, and concerns about shoreline erosion as a result of fluctuating water elevations. Several respondents commented on the practice of “rafting” in which two or more boats anchor together. Rafting most frequently occurs close to shore and in coves because the coves are protected from wind and wave action. Residents commented that rafted boaters may be excessively loud and may impeded traffic, particularly in narrow coves where several boats rafted together may block ingress or egress to private docks in the upper reaches of the cove.

Comments from the contact survey respondents generally indicated a favorable recreational experience at the lake. There were also a few comments regarding the need to control noise and boat crowding.

Quality of Recreation Experience

The contact survey asked recreational users whether they will return to Deep Creek Lake. At a fundamental level, the responses to this question may be the best indicator of overall recreational experience. If people enjoyed their visit, they will return again. If not, they will not return. They were asked to indicate whether they will certainly return again, probably will return again, probably will not return again, and certainly won’t return again. Table 4-11 summarizes the responses by type of day.

Table 4-11. Responses to Contact Survey Question – Will you return to Deep Creek Lake?

Response	Weekday	Weekend	Holiday	Total
Certainly will return	82%	91%	80%	85%
Probably will return	13%	7%	20%	13%
Probably will not return	2%	2%	0%	1%
Certainly will not return	2%	0%	0%	1%

These data suggest that the overall recreation experience at Deep Creek Lake is very good, and that nearly all visitors will return to the lake.

Commercial Operators Survey Responses

A total of 8 commercial operations on Deep Creek Lake were surveyed. Of these, respondents stated they had been in business ranging from 7-45 years, with the majority of them being locally owned. At the commercial operations there are a total of 270 powerboat rentals available, ranging from 0 to 71 at an individual business, and a total of 30 non-power boats (canoes, kayaks, etc.). On a non-holiday summer weekend day, the respondents indicated that they rented between 2 to 50 boats. By extrapolation, ERM concluded that on a non-holiday summer weekend day, the commercial boat rental concessionaires rent an average of 157 boats, in aggregate. Anecdotal evidence suggests that many of these boats are rented for a week or longer and kept at waterfront docks.

When asked about the average party size per boat rental the respondents indicated that the average party size was 8 to 12 people for pontoon boat rentals and 2 to 4 people for other boat types. Only one business indicated that they allowed privately owned boats to be launched at their facility. Five of the businesses indicated that they rent boat slips on a seasonal basis, ranged from 2 to 74 slips per business, for a combined total of 168 slips. The respondents indicated that they conducted about 20% of their business in June, about 32% of their business in July, and about 29% of their business in August. All but one of the businesses indicated they were open year-round.

5.0 PROJECTED FUTURE RECREATIONAL USE

This section includes an assessment of regional demographics and development trends within the region surrounding Deep Creek Lake. In addition, an assessment of regional recreational use trends and projections and a summary of projected future recreational use trends at Deep Creek Lake are provided.

5.1 Regional Demographics and Development Trends

The market area for development around Deep Creek Lake is an approximately 70 square mile (44,326 acre) area surrounding the lake (see Figure 5-1). This area is recognized as the primary market area for second home development in the Deep Creek Lake area by both planning staff and by local real estate professionals. This area also corresponds approximately to the Deep Creek Watershed, an area Garrett County has for many years used as a planning area. The development market area surrounding Deep Creek Lake comprises approximately 10 percent of the area of Garrett County.

As of 2000, according to the US Census, the population of the market area was 3,845; approximately 12.9% of the total population of Garrett County (see Table 5-1). Between 1990 and 2000 the market area population increased by 21 percent compared to six percent for Garrett County as a whole.

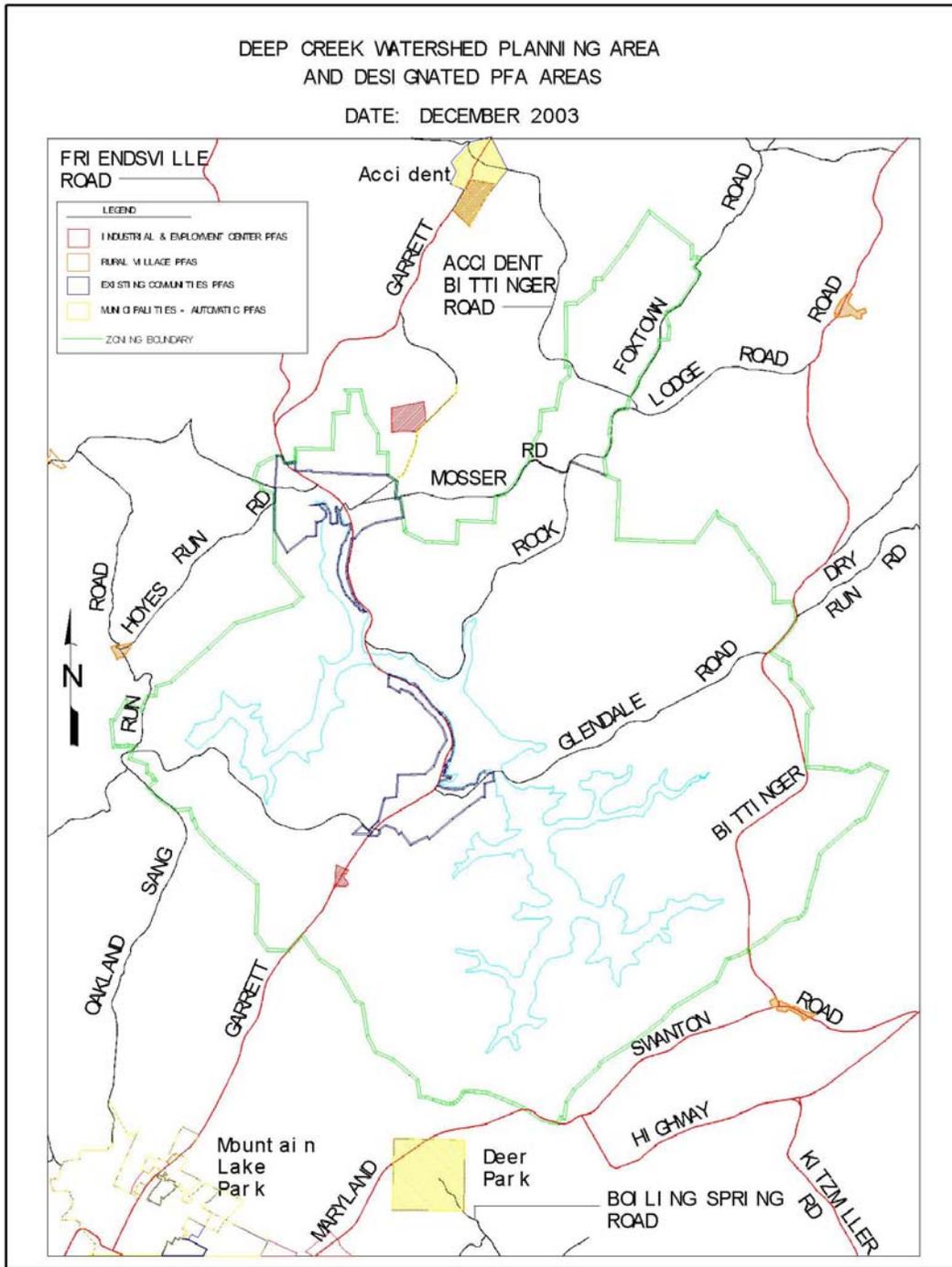
Table 5-1. Population and Housing

<i>Census Tract 0005.00</i>				
	1990	2000	Change 1990-2000	
			Number	Percent
Population	3,174	3,845	671	21.1
Housing Units	3,970	5,009	1,039	26.2
Occupied	1,252	1,618	366	29.2
Owner	1,093	1,343	250	22.9
Renter	159	275	116	72.9
Vacant	2,718	3,391	673	24.8
Seasonal/recreational/occasional Use	2,394	3,007	613	25.6
Garrett County				
	1990	2000	Change 1990-2000	
			Number	Percent
Population	28,138	29,846	1,708	6.1
Housing Units	14,119	16,761	2,642	18.6
Occupied	10,110	11,476	1,366	13.5
Owner	7,998	8,945	947	11.8
Renter	2,112	2,531	419	19.8
Vacant	4,009	5,285	1,276	31.8
Seasonal/recreational/occasional use	3,022	3,996	974	32.2

Source: US Bureau of the Census 1990 and 2000

Note: Census data is not collected for the exact area of the Deep Creek Watershed. The data in the table are for Census tract 0005, which nearly approximates the Deep Creek Watershed. A small area between Foxtown Road and Accident Bittering Road is outside tract 0005 but is inside the watershed.

Figure 5-1. Deep Creek Watershed



As of 2000, there were a total of 5,009 housing units in the market area, an increase of 1,039 units or 26 percent over the 1990 total of 3,970 (Table 5-1). Approximately 68 percent (3,391 units) of the total 5,009 units were vacant on census day (April 1, 2000), and the Bureau of the Census identified 88 percent of these (3,007 units) as vacant because they were “seasonal, recreation, occasional use” units. As a result, the census likely provides an accurate estimate of the full-time or year round population of the market area, but does not reflect the summer population when the number of visitors and vacationers is highest.

Existing Property Development

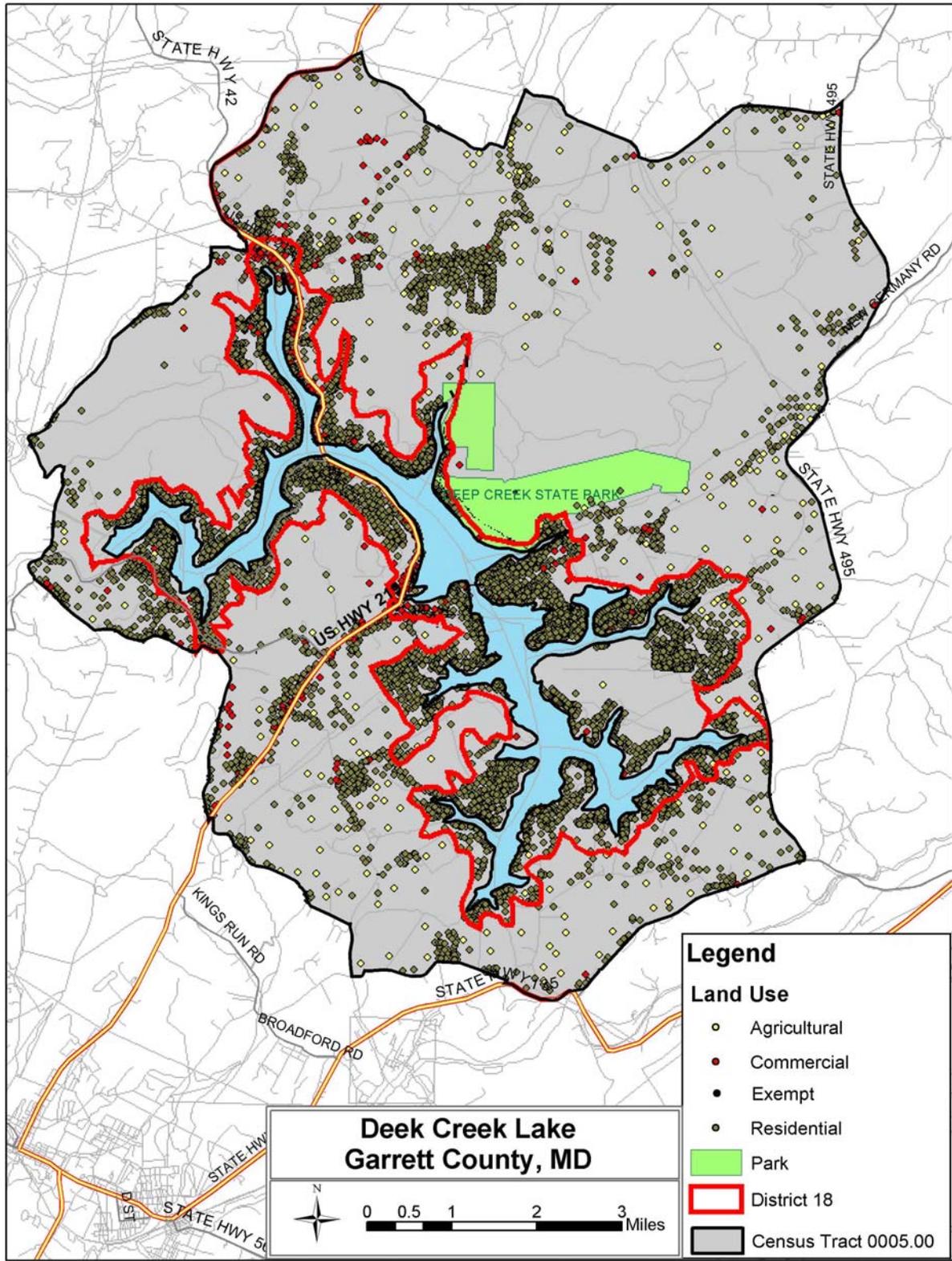
As of 2001, according to the Maryland Department of Assessment and Taxation’s (DAT) database, the market area contained approximately 7,563 properties (parcels of land with a property identification number). Of these, 5,006 were improved and 2,557 were unimproved (that is, they had a zero dollar market value for improvements). An unknown number of undeveloped properties that were created by deed prior to 1975 when zoning was first adopted in the Deep Creek area exist in the market area. They come to the County’s attention when a development is proposed, at which time the legality of the property is established. Garrett County planning staff estimates the number of such properties that come to their attention annually to be small (10 to 20). There are approximately 2,000 waterfront properties at Deep Creek Lake of which 1,784 have buffer use permits issued by MDNR¹.

Figure 5-2 gives an indication of the approximate distribution of properties in the market area. On the figure, each small circle represents a single property. The circles are color-coded based on their land use for assessment purposes: residential, commercial, agricultural, or exempt. Figure 5-2 shows the concentration of properties near and along nearly the entire extent of the lakefront.

The DAT has created a special assessment district called District 18 comprising “lake influenced” property. Figure 5-2 shows a geographic representation of the District 18 properties by drawing a line (the red line on the figure) around the District 18 properties. As shown on Figure 5-2, District 18 hugs the lake, and comprises only a portion of the area of the entire market area. Approximately 71 percent (5,412) of the properties in the market area are within District 18. Of the 5,412 properties, 3,861 (71 percent) are improved and 1,551 are unimproved. Approximately 90 percent of the improved properties (3,477 properties) are owned by non-resident property owners.

¹ The exact number of properties is not known. DNR has issued 1,784 buffer use permits, and estimates that 95 to 98 percent of lakefront property owners are under permit. The Department of General Services is conducting a Lake Front Buy Down project and has prepared 1,847 drawings of surplus property to be offered for sale to adjoining owners. We use an estimate of 2,000 properties because this number of drawings does not include properties where there is no adjoining surplus property or properties where the DNR wishes to retain the property (Cathy Mateer, Maryland Department of General Services).

Figure 5-2. Improved Properties in Census Tract 0005 and District 18



Development Activity

The rate of development activity in the Deep Creek area has increased in recent years. This is shown both in subdivision activity (the creation of new building lots) and in the number of building permits issued for new dwellings. Between 1997 and September 2003, a total of 757 new building lots were created by subdivision in the Deep Creek Lake Watershed, for an average of approximately 108 per year (Table 5-2). Of the total, 522 lots were created between 2001 and 2003 compared to 235 between 1997 and 2000².

Table 5-2. Lots Created by Subdivision in the Deep Creek Lake Watershed

	Major Subdivision	Minor Subdivision	Planned Residential Development	Total
1997	0	2	0	2
1998	18	17	55	90
1999	24	35	0	59
2000	53	31	0	84
2001	92	44	22	158
2002	242	21	40	303
2003	58	3	0	61
Lots Created 1997-2000	95	85	55	235
Lots Created 2001-2003	392	68	62	522
Lots Created 1997-2003	487	153	117	757
Total Number of Subdivisions	30	70	3	103

Source: Garrett County Department of Planning and Zoning

As with subdivision activity, building permit activity has increased since 2000 compared to the period 1990 to 2000. Between 1981 and September 2003, a total of 2,979 permits were issued (an average of 131 per year). Between 1981 and 1990, an average of 134 permits per year were issued. Between 1991 and 2000, the average per year fell to 107 per year. For the years 2000 through September 2003, the average has increased to 207 per year. In 2002, 237 permits were issued, the highest number since 1988.

There is a trend in the Deep Creek Lake area towards larger dwellings, especially for vacation homes. Between 1990 and 2000, the median number of rooms in housing units in the market area increased from five to six. The number of housing units in the market area with seven, eight, and nine or more rooms increased by 112, 131, and 85

² These numbers appear low compared to the period 1987 to 1993. During this 6.5 year period, 1,309 dwelling units were approved in the Deep Creek Lake Sewer Service Area for an average of 201 per year (A Second Close Look at Garrett County, URDC, December 1993, page IX-11). Further investigation is needed to determine whether the 1997 to 2003 data and the 1987 to 1993 data are truly comparable.

percent respectively compared to 1990. Although the trend towards larger dwellings is a national trend, the increases in the Deep Creek Lake market area are far greater than the percent changes for Garrett County or for the State of Maryland. Some of these larger homes are replacing, older, smaller homes built in the 1950s through the 1970s. Through this “redevelopment”, the number of people living at or visiting Deep Creek can increase even though there is no increase in the number of lots or in dwelling unit density, i.e., the number of dwelling units.

Concerns over the potential effects of very large dwellings on nearby properties lead the County to adopt zoning amendments to regulate large homes that are used for vacation rentals. The regulations, adopted in August 2003, created a new use category called “transient vacation rental unit” and set a limit of eight bedrooms per this type of unit where there had previously been no limit. Further, transient vacation rental units with six to eight bedrooms now require special exception approval in the LR-Lake Residential zoning district, the most extensive district in the watershed.

Visitation

There are no universally accepted, overall visitation numbers for Garrett County or for the market area. The Garrett County Chamber of Commerce estimates that more than one million visitors come to Garrett County each year, though the Chamber does not offer a specific visitation number for the Deep Creek area. Another commonly cited statistic is that the population of the County doubles in the summer, which would mean the County’s population reaches approximately 60,000 people in summer. A 1993 report cited a total of 11,718 persons in the lake area during peak summer vacation periods, based on the 1990 population of 3,174 plus up to 8,544 seasonal residents³.

Most visitors to the Deep Creek Lake area stay in rental vacation homes. As of 2001, there were 3,477 second homes (improved properties with non-resident property owners) in District 18. There are three primary vacation property management companies, Coldwell Banker Deep Creek Realty-Rentals, Long & Foster Resort Rentals, and Railey Mountain Lake Vacations. As of 2000, these companies rented 570 properties⁴. Currently, there are 11 hotels (411 rooms) and nine bed and breakfast inns (59 rooms) in the market area offering a total of approximately 470 rooms to visitors and tourists year round⁵. One new hotel is currently planned at the Silvertree Resort in Thayerville.

³ A Second Close Look at Garrett County, URDC December 1993, page X-5.

⁴ The Economic Significance of Garrett County’s Second Home Market, Nancy Railey and George Volsky (2000).

⁵ Alpine Village Inn (21 rooms); Comfort Inn Deep Creek Lake (75 rooms); Innlet Motor Lodge (20 rooms); Lake Breez Motel (10 rooms); Lake Side Motor Court (10 rooms); Panorama Motel (20 rooms); The Garrett Inn (10 rooms); The Inn at Point View (18 rooms); Will O’ Wisp Prestige Condominiums (48 rooms); Wisp Mountain Resort Hotel and Conference Center (169 rooms); and Lake Point Inn (10 rooms).

Development Potential

Deep Creek Lake attracts visitors from a large geographic area including the Baltimore, Washington, and Pittsburgh metropolitan areas. With such a large, populous area to draw from, the number of potential vacation, second home, and vacation homeowners and visitors is very large. Away from the immediate vicinity of Deep Creek Lake, the market area has a large amount of undeveloped and underdeveloped land. A land capacity study conducted in 1987 concluded that the Deep Creek Lake area had the capacity to accommodate between 26,000 and 39,000 people⁶. Overall, therefore, the amount of additional development potential is large.

The general consensus among planners and real estate professionals is that the Deep Creek lakefront is largely developed. We identified a total of four lakefront properties, including Thousand Acres property, Ann Blakeslee Smith Property, Holy Cross property, and Carnegie Institute property (see Figure 5-3), with significant (i.e., the potential to create more than two to three new development lots through subdivision) additional development potential⁷. Combined, the four properties total more than 1,200 acres with an estimated potential for several hundred lots. Of the four properties, only one, Thousand Acres, is in active development. These four properties collectively have approximately 14,300 linear feet of shoreline on Deep Creek Lake. This would allow a maximum of approximately 286 additional slips, assuming 1 slip per every 50 feet of shoreline for common docks.

As property in close proximity to the lake has become more developed and costly, buyers are increasingly considering property further away from the Lake, where there may be views of the lake or other scenic areas, or where an otherwise desirable environment can be obtained. Several subdivisions have been created on the hillsides overlooking Deep Creek Lake.

Future Growth Potential

The period from 2001 to 2003 has been one of rapid growth in the Deep Creek Lake market area with over 460 new building lots created and an average of over 200 building permits issued per year. This amount of growth is a significant increase over the rate of growth experienced since 1980, but it is difficult to say whether this is the beginning of a new sustained, higher level of growth or a brief spurt brought on by factors such as the aging baby boomer demographic and a poorly performing stock market that has renewed investor interest in real estate.

Whatever the causes, it is reasonable to assume that the long-term trend of steady growth in the Deep Creek market area will continue through 2013 with at least between

⁶ Recreational Carrying Capacity Study and Management Guidelines for Deep Creek Lake Natural Resources Management Area, Final Report, October 31, 1988.

⁷ The properties were identified by analyzing tax maps of the area and verifying information through conversations with Garrett County Planning and Zoning staff, local real estate professionals, and property owners.

100 and 150 new homes added per year. The new homes will serve second homeowners, retirees, and vacation home investors. A portion of the homes will be on new building lots and some will replace existing, older homes. Of the 100 to 150 new homes per year, we estimate that approximately five to ten will be waterfront homes on Deep Creek Lake. People living in and visiting these 100 to 150 new homes will add to the pool of potential users of Deep Creek Lake.

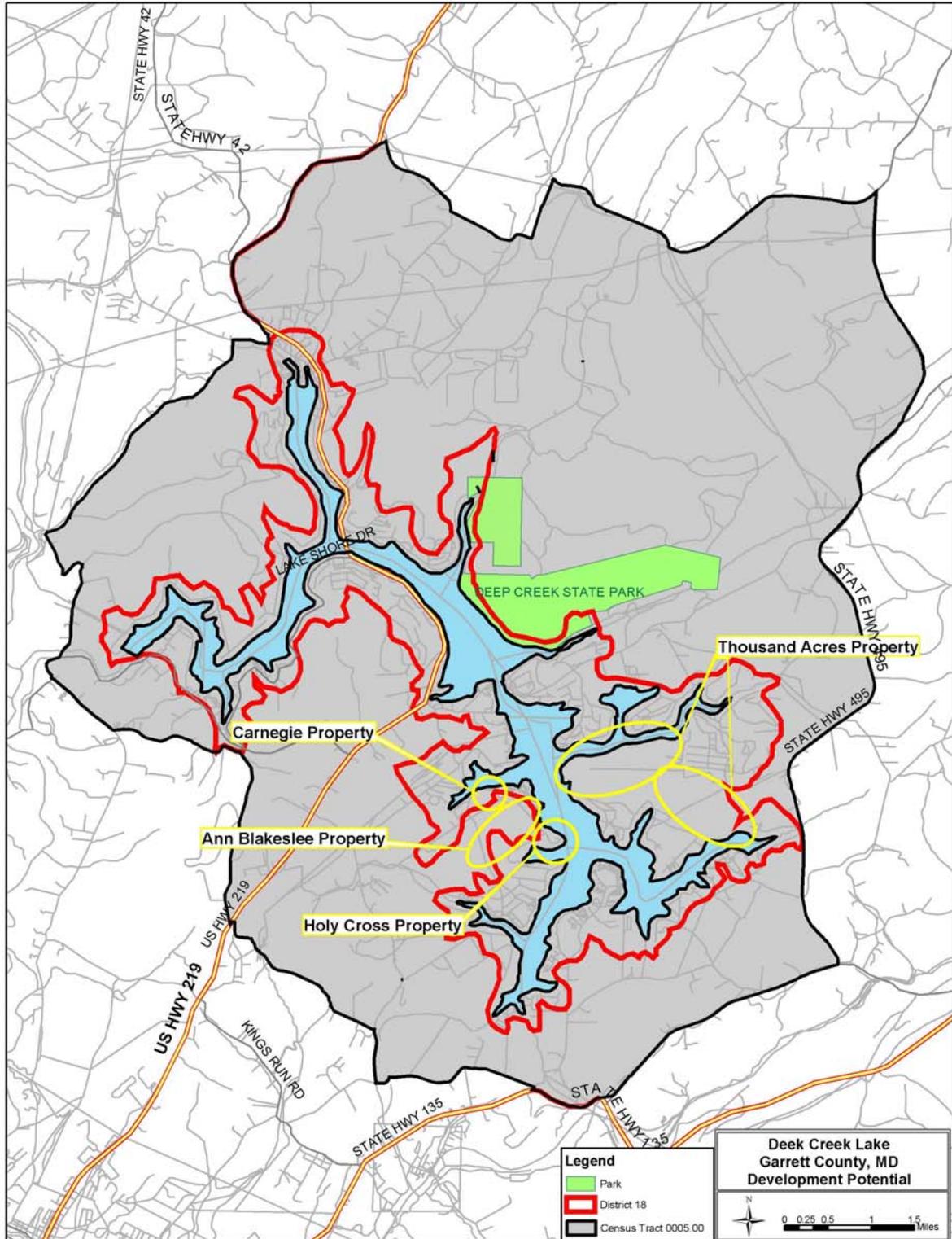
Projections for 2008 and 2013

Table 5-3 presents peak day population projections for the market area for 2008 and 2013. Peak day numbers are provided as input for the peak-day lake use analysis. Peak day is assumed to be a summer weekend/holiday. As shown in Table 5-3, we estimate that in 2000, the peak day population was approximately 25,000, and that this population will increase to 30,500 in 2008, and to 33,400 by 2013.

Table 5-3. Peak Day Projections for the Deep Creek Lake Watershed

			2000	2003	2008	2013
Year round population			3,845	4,246	4,915	5,441
Day users			1,474	1,483	1,497	1,536
Visitors	1	Campers (state park)	392	392	392	392
	2	Population in marketed rental homes	3,910	4,315	4,754	5,179
	3	Population in hotels	846	880	936	1,026
	4	Population in other seasonal homes	14,500	15,817	18,011	19,796
Total			24,968	27,044	30,505	33,370
Units & Lodging						
Year round occupied units			1,618	1,779	2,048	2,267
Visitors	1	Camp sites	112	112	112	112
	2	marketed rental homes	570	616	693	755
	3	hotel rooms	470	489	520	570
	4	Other seasonal homes	2,437	2,658	3,027	3,327
Total peak occupied units			4,625	5,096	5,880	6,461
Vacant not seasonal			384	416	470	514
Total Units			5,009	5,512	6,350	6,975

Figure 5-3. Deep Creek Lake Development Potential



5.2 Regional Recreational Use Trends and Projections

This section discusses regional recreational use trends and projections, both nationally and within the western Maryland region. These regional trends help to characterize potential changes in recreational use in the future and can help to provide further guidance regarding expected future recreational user trends within the Deep Creek Lake area.

National and Southern Region

National and regional recreation participation trends and projections were assessed as part of the 2000 National Survey on Recreation and the Environment (NSRE), coordinated by the USDA Forest Service. The NSRE included a phone survey of about 50,000 households nationwide, addressing areas such as outdoor recreation participation, demographics, constraints to participation, and other related factors. The NSRE survey results were applied to recreation demand models to project future outdoor recreation participation and consumption nationally (Bowker, English and Cordell, 1999). Projections were conducted for various activities, including projections of changes in recreation participation and number of recreation days. Table 5-4 provides a summary of the projections for the southern region (Maryland is within the southern region for the purposes of this survey) for outdoor recreation participation for some of the activities that occur within the Deep Creek Lake area. The projected indices of change were estimated on a 1995 base recreation participation rate. For example, the base participation rate for canoeing is translated to 4.2 million people canoeing a total of 17.6 million days in 1995 in the Southeast region, or a little over an average of 4 days per participant. The number of people canoeing is expected to increase by 11 percent, and the number of days canoeing is expected to increase by 13 percent by the year 2020.

In the 1995 base year, the most popular outdoor recreational activities were wildlife viewing and visiting a beach/waterside. Wildlife viewing and visiting a beach/waterside, sightseeing and picnicking were the activities with the greatest number of participants. Camping (68% increase), wildlife viewing (59% increase), and hiking (48% increase) are the activities projected to have the greatest increase in recreation days by the year 2020. Cross-country skiing was projected to decrease (-51%) in recreation days by the year 2020. Other activities projected to have minimal growth by 2020 included rafting/floating (3%) and motor boating (2%), although the participation rate for motor boating was projected to increase by 24%.

Kelly and Warnick (1999) conducted an assessment of national recreation trends and markets, including projected future trends for participation in recreational activities. The trend assessment was based on data from national surveys, such as the Simmons National Survey and the National Sporting Goods Survey. Table 5-5 summarizes the projected trends for various recreational activities that occur within the project area. This information provides further context regarding what recreational activities are anticipated to exhibit future growth nationally. The key differences between these two sources of projected national and regional recreational trends are in the projected large growth

increase in wildlife viewing and camping by Bowker, English and Cordell (1999), and the projected minimal growth in these areas by Kelly and Warnick (1999).

Table 5-4. Projected Indexes of Change in Recreation Days and Participation for the Southern Region of the United States

Activity	Unit	1995 ¹	2000 ²	2010 ²	2020 ²
Canoeing	Days	17.6	4%	9%	13%
	Participants	4.2	3%	7%	11%
Motor boating	Days	294.0	-1%	0%	2%
	Participants	15.5	4%	13%	24%
Nonpool Swimming	Days	410.9	-4%	2%	8%
	Participants	23.3	5%	15%	27%
Visiting Beach or Waterside	Days	1,037.5	5%	16%	28%
	Participants	37.7	7%	20%	30%
Rafting/Floating	Days	24.2	0%	1%	3%
	Participants	4.9	1%	1%	2%
Fishing	Days	491.5	2%	11%	19%
	Participants	20.2	4%	11%	19%
Cross-Country Skiing	Days	1.4	-11%	-34%	-51%
	Participants	0.7	8%	-34%	-45%
Wildlife Viewing	Days	2,322.1	9%	32%	59%
	Participants	34.2	7%	22%	38%
Hiking	Days	194.7	7%	27%	48%
	Participants	11.3	5%	17%	32%
Camping	Days	115.5	10%	37%	68%
	Participants	10.7	6%	22%	34%
Picnicking	Days	311.2	7%	19%	32%
	Participants	27.4	6%	21%	38%
Sightseeing	Days	605.4	7%	23%	40%
	Participants	33.9	8%	25%	43%

Source: Bowker, English and Cordell, 1999

¹ Estimated 1995 base recreation participation rate for millions of days and millions of participants

² Estimated projected percent increase in change from the 1995 base participation rate.

Table 5-5. Projected Trends in Future Recreational Activities

Activity	Projected Trends
Canoeing	fluctuating, recent decline
Motor boating	fluctuating, some short-term minimal growth, likely to plateau
Sailing	steady decline
Jet skiing	some minimal growth and then steady
Waterskiing	gradual decline
Nonpool Swimming	stable, possible slight increase
Visiting Beach or Waterside	fluctuating
Rafting/Floating	maintain similar levels
Fishing	maintain similar levels
Wildlife Viewing	gradual minimal growth
Hiking	steady increase
Camping	gradual small increase
Cross-Country Skiing	steady or slow gradual decline

Source: Kelly and Warnick, 1999

Western Maryland Region

The Maryland Institute for Policy Analysis and Research (MIPAR) and the Center for Urban Environmental Research and Education (CUERE) of the University of Maryland conducted two recreation-related surveys for the MDNR and the Maryland Department of Planning (MDP) in 2003. One study included an assessment of public opinion regarding Maryland state parks and natural resource areas (Norris and Hansen, 2003). The survey was conducted of 800 randomly selected Maryland households during the winter of 2003, and the results of the survey were summarized and broken out by regions. Deep Creek Lake is located within the western region. For the western region, the top recreational activities that the respondents indicated they participated in included: family outing (89.7%), walking (87.7%), family picnicking (61.6%), nature appreciation (67.1%), hiking (46.6%), fishing from shore or pier (45.2%), bicycling (38.4%), picnicking/outing with organized group (33.7%), and camping at a campsite (30.8%). In terms of rating of experiences in parks and natural resource areas and facilities and amenities, the respondents indicated primarily a good or excellent rating, which is consistent with responses in other regions within Maryland.

The survey also included questions regarding governmental actions concerning open space protection. For the western region, about 48.5 percent felt that enough was being done by the government to protect open space and about 36.5 percent felt that not enough was being done. In terms of governmental actions to protect open space, about 54 percent felt that it was very important and about 28.5 percent felt it was somewhat important to acquire parkland for active recreation. About 83.5 percent felt it was very important and about 13.5 percent felt it was somewhat important to protect lands for

protection of wildlife and environment. About 41 percent felt it was very important, and about 45.5 percent felt it was somewhat important to provide public access to the bay or rivers.

For the second study, about 2,800 households were surveyed in January 2003 to obtain information about participation in local park and recreation activities (Norris, Hanson, and Coleman, 2003). The survey results were summarized by regions (400 households per region), with Deep Creek Lake being in the western region, which includes Garrett, Allegany, Washington, and Frederick counties. The most popular recreational activities of those surveyed included: walking (70%), attending fairs or festivals (66.3%), swimming at beach/river/lake (53.3%), swimming at pool (49%), picnicking (45%), visiting playgrounds (39.3%), hiking (36.3%), attending outdoor concerts (33.5%), fishing from shore/bank (30.5%), and hunting (26.3%).

The survey also obtained information from the respondents regarding the percent of households participating in various recreation activities, the average number of participants per household, the individual participation rate, and the frequency of participation per person. The individual participation rate and frequency of participation per person can be used, combined with population projections for the area, to provide information about future recreational demand within the region. Appendix E includes estimates of future demand in estimated user occasions to accommodate those participating in each activity based on the participation rates and frequency of participation rates for the western region provided from the study (Norris, Hanson, and Coleman, 2003) and household population projections for Garrett County (MDP, 2003). Table 5-6 provides a summary of the projected annual user occasions from the baseline year of 2000 out to 2030.

As part of the development of the 1998 Garrett County Land Preservation and Recreation Plan (LPRP) (URDC, 1998b), a countywide survey was conducted of recreation needs in 1992. Both residents and visitors were included in the survey. The most popular recreational activities among the respondents included walking and jogging (35%), downhill skiing (34%), swimming in a pool (33%), nature walks (28%), sailing and boating (27%), hiking (26%), fishing (25%), picnicking (25%) and bicycling (21%). In terms of facilities that they would like to see developed, the most common responses included: swimming pools, ice skating, outdoor volleyball, tennis, bicycling, nature walks, off-road vehicle area, skeet shooting areas, horseback riding areas, hiking areas, basketball courts, mountain biking areas, and baseball/softball fields. In terms of proposed recreational facility and program development, the LPRP did not propose any specific facility and program improvements to the Deep Creek Lake area. However, the LPRP stated that many residents and visitors indicated an interest in the MDNR expanding its environmental education programs.

Table 5-6. Annual User Occasions to Accommodate Those Participating in Each Activity

Activity	2000	2005	2010	2015	2020
Swimming at Beach/River/Lake	105,774	108,977	111,607	113,790	115,758
Power Boating	28,772	29,643	30,359	30,952	31,488
Canoeing	5,517	5,684	5,822	5,935	6,038
Waterskiing	4,910	5,059	5,181	5,283	5,374
Sailing	3,481	3,587	3,673	3,745	3,810
Kayaking	22,074	22,742	23,291	23,747	24,157
Fishing from Shore/Bank	49,170	50,659	51,882	52,896	53,811
Fishing from Boat	34,384	35,426	36,281	36,990	37,630
Fishing from Pier	15,722	16,198	16,589	16,914	17,206
Cross-Country Skiing	2,525	2,602	2,665	2,717	2,764
Hiking	59,914	61,728	63,218	64,454	65,569
Nature Walks	8,092	8,337	8,538	8,705	8,856
Tent Camping	18,032	18,578	19,026	19,398	19,734
Cabin Camping	4,159	4,285	4,388	4,474	4,552
Picnicking	55,327	57,002	58,378	59,520	60,549

Trends in Recreational Use at Deep Creek Lake

Based on a review of the previous and current recreational use at Deep Creek Lake, various key trends or influencing factors on recreational use can be identified. Overall the types of recreational activities that occur at Deep Creek Lake have remained fairly constant. These include motor boating, swimming, fishing, camping, hiking, and picnicking as some of the key recreational activities. Increased use has influenced the type of recreational experience at the Lake on peak weekends and holidays to reflect more of a busy, high use recreational area.

In terms of boating use, the peak day boating use has fluctuated over the past 14 year period, with the highest boat count (600 BAOT) during this period occurring this past year (2003). The 1988 survey estimated that the peak BAOT on summer weekend days was at about 280, while based on the MDNR data, the peak BAOT ranged from 262 to 600 throughout the 1990 to 2003 period. A linear regression of the annual peak BAOT data (excluding 1998 when there was only one boat count, which is not a sufficient sample size) indicated a slight, but statistically significant ($R^2=0.23$), trend of increasing boat use (Figure 5-4). Nine of the ten highest boat counts have occurred since 1996.

The distribution of boating activity use (boating mix) has changed somewhat from 1988 to the present. During the 1988 study (URDC, 1988) the boating mix for the Deep Creek Lake was estimated to be about 50% motor boating (including cruising and boat

fishing), 20% sailing, 5% canoeing/kayaking, and 25% waterskiing. The boating mix during the 2003 study period for the entire lake area was estimated to be about 76% motor boating (including both motor boating and boat fishing), about 9% sailing, less than 1% canoe/kayak, about 9% PWC, and about 6% waterskiing. The most significant, sustained trends over the past 15 years in terms of the mix of recreational boating uses at Deep Creek Lake involve the use of motorized vessels. The use of motorized vessels (powerboats, PWC, and waterskiing) has increased from 75% of boating use in 1988 to 91% in 2003. The reduction in waterskiing has been to some extent offset by increases in PWC use. Concurrently there has been a reduction in sailing and canoeing/kayaking, at least during peak hours on weekends and holidays during the summer. These trends may reflect changes in recreational preferences (see Table 5-5) or possibly reflect sailors/canoeist/kayakers avoidance of peak hours for crowding and safety reasons.

5.3 Future Peak Day Recreational Use at Deep Creek Lake

Two different methods were used to calculate future (2008 and 2013) annual peak day recreational boating use at Deep Creek Lake:

- Future Growth Projection Method - A method based on projected increases in the peak day population; and
- Past Trends Method - A statistical method using linear regression to predict future use based on past trends.

Future Growth Projection Method

Recreational use at Deep Creek Lake is anticipated to increase in relation to changes in residential development in the vicinity of Deep Creek Lake. Based on the peak day projections for the Deep Creek Lake watershed area (see Table 5-3), there is a projected increase in the peak day population of about 23% from the year 2003 to the year 2013. This increase in the peak day population does not necessarily translate into a proportional increase in boating use because the different groups (e.g., waterfront residents, day visitors, overnight visitors) that compose the peak day population have different boating participation rates (e.g., waterfront residents have a higher participation rate than overnight visitors staying at hotels).

Based on 2003 contact survey data and recent (1997-2003) DNR aerial photograph boat counts, ERM estimates the peak day boaters access the lake as follows:

- Direct access from waterfront properties or common docks – 67%
- Deep Creek Lake State Park boat ramp – 15%
- Commercial boat rentals – 18%

Based on these figures, waterfront residents/visitors and persons with access to common docks represent approximately 67% of peak day boat use. Day visitors and others who do not have access to piers or common docks represent approximately 33 percent of peak day boat use. These boating groups are estimated to have the following boating participation rates:

- Waterfront residents/visitors – 20%
- Day visitors – 17%
- Non-waterfront overnight visitors – 6%

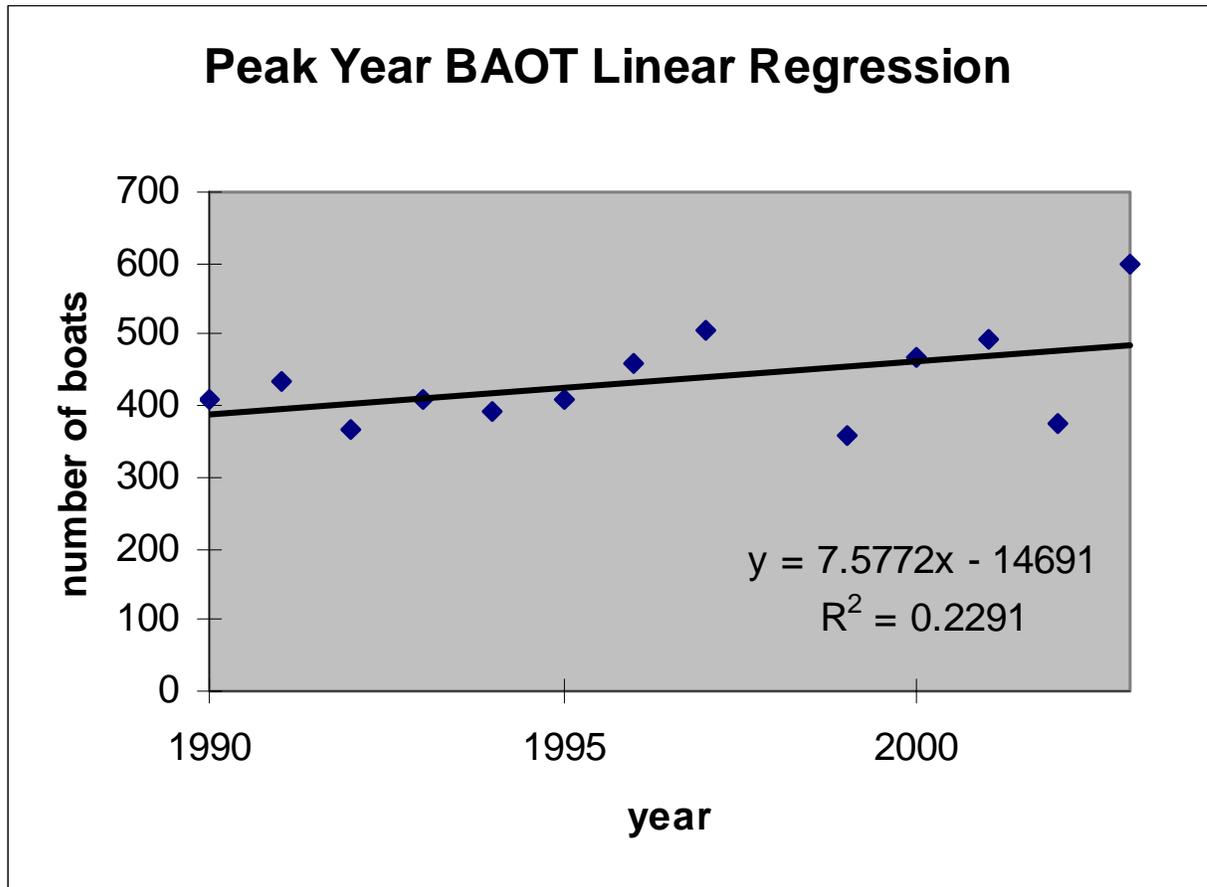
We assume that approximately 20 new piers or common dock slips will be added each year to the existing total of approximately 2000. The number of day users is only projected to increase slightly (see Table 5-3). Most of the increase in the projected peak day population is with non-waterfront overnight visitors, but this group has the lowest boating participation rate.

Based on these assumptions, ERM projects a 7% increase in annual peak day BAOT by 2008 and a 15% increase in annual peak day BAOT by 2013.

Past Trends Method

Trends in annual peak BAOT data (excluding 1998 when there was only one boat count, which is not a sufficient sample size) were evaluated using linear regression. This analysis indicated a slight, but statistically significant ($R^2=0.23$), trend of increasing boat use (see Figure 5-4). The linear regression equation can be used to predict future annual peak day BAOT, assuming that past trends continue into the future. Using the model's prediction for 2003 of 486 boats as the base, the regression model predicts an 8% increase in annual peak BAOT by 2008 and a 16% increase in annual peak BAOT by 2013. It should be noted that there are lots of factors that influence the annual peak day BAOT (e.g., weather forecasts, actual weather conditions, special events); therefore there is considerable uncertainty in predicting boating levels for a single day.

Figure 5-4. Peak Year BAOT Linear Regression



Note: Chart represents the peak boating day for each year

Summary

Two different methods were used to estimate future annual peak day BAOT. Both methods resulted in similar estimates of 7 to 8% increases by 2008 and 15 to 16% by 2013.

6.0 RESERVOIR RECREATIONAL BOATING CARRYING CAPACITY

The following sections provide an assessment of the boating carrying capacity assessment based on both physical and social carrying capacity analysis. The first section (6.1) is primarily based on physical characteristics of Deep Creek Lake and peak day BAOT use at Deep Creek Lake. The second section (6.2) discusses social carrying capacity factors as determined from the results of the survey data collected, such as crowdedness ratings and acceptable boating levels. In Section 6.3 we compare the results of the physical and social carrying capacity analyses. Finally, in Section 6.4, we evaluate the effects of future growth on the lake carrying capacity.

6.1 Physical Boating Carrying Capacity Assessment

The methodology for the physical carrying capacity assessment is discussed in Section 2.2. For the purposes of this assessment, the lake was broken down into the three lake zone areas (or sectors) used by MDNR in past data collection efforts (see Figure 4-1). Table 6-1 summarizes the lake zone water surface acreages, both gross and net, used in this analysis. The gross acreages equal the total surface acreage of each segment of the lake. The net acreage equals the total surface acreage of each segment of the lake minus a 100-foot buffer around the shoreline of the lake, and is considered the usable acreage for purposes of carrying capacity calculations. The 100-foot buffer reflects shallow areas along the lake margin that is used for piers or swimming, and is included in MDNR's no wake zone. This area is subtracted from the gross lake area because it is less suitable for most boating activities than the open portions of the lake further from shore.

Table 6-1. Deep Creek Lake Surface Acreages

Lake Area	Gross Surface Acreage	Net Surface Acreage
Northern Sector	927	732
Central Sector	794	672
Southern Sector	1,907	1,535
Total	3,628	2,939

The boating mix was derived from an assessment of the distribution of boating types from the aerial photos during 2003 (adjusted to back out PWC, which are not allowed on the lake during peak hours on summer weekends and holidays). In order to determine the distribution of motor boating and boat fishing (as the type of motor boating activity occurring was not discernable from the aerial photographs) the total number of powerboats counted was split by 65% motor boating and 35% boat fishing (in fact, ERM's boat counts on July 4, 2003 indicate that the motor boating/boat fishing mix may be closer to 50%/50%). For purposes of this analysis, boat fishing is defined to include all essentially stationary boat uses (e.g., fishing, swimming, picnicking, rafting up). This percentage split was derived from the survey responses.

Northern Lake Sector

Table 6-2 summarizes the assessment of the physical boat capacity based on the usable water surface acreage and the boating activity mix identified from the aerial photographs taken during 2003.

Table 6-2. Northern Lake Sector Boat Carrying Capacity Assessment

Boat Activity	Usable Acreage	Use Factor	Max. No. Boats	% Usage	Est. Capacity by Boat Mix
Motor Boating	732	9.0	81	59.8%	65
Boat Fishing	732	1.3	563	32.2%	35
Sailing	732	4.3	170	0.4%	0
Canoe/Kayak	732	1.3	563	0.0%	0
Water Skiing	732	12.0	61	7.6%	8
Total				100%	108

Note: % Usage was determined separately for each sector based on the boat counts taken on Deep Creek Lake during the summer of 2003.

Central Lake Sector

Table 6-3 summarizes the assessment of the physical boat capacity based on the usable water surface acreage and the boating activity mix identified from the aerial photographs taken during 2003.

Table 6-3. Central Lake Sector Boat Carrying Capacity Assessment

Boat Activity	Usable Acreage	Use Factor	Max. No. Boats	% Usage	Est. Capacity by Boat Mix
Motor Boating	672	9.0	75	59.5%	61
Boat Fishing	672	1.3	517	32.0%	33
Sailing	672	4.3	156	2.1%	2
Canoe/Kayak	672	1.3	517	1.0%	1
Water Skiing	672	12.0	56	5.4%	6
Total				100%	103

Note: % Usage was determined separately for each sector based on the boat counts taken on Deep Creek Lake during the summer of 2003.

Southern Lake Sector

Table 6-4 summarizes the assessment of the physical boat capacity based on the usable water surface acreage and the boating activity mix identified from the aerial photographs taken during 2003.

Table 6-4. Southern Lake Sector Boat Carrying Capacity Assessment

Boat Activity	Usable Acreage	Use Factor	Max. No. Boats	% Usage	Est. Capacity by Boat Mix
Motor Boating	1,535	9.0	171	50.3%	121
Boat Fishing	1,535	1.3	1181	27.0%	65
Sailing	1,535	4.3	357	15.4%	37
Canoe/Kayak	1,535	1.3	1181	0.3%	1
Water Skiing	1,535	12.0	128	7.0%	17
Total				100%	241

Note: % Usage was determined separately for each sector based on the boat counts taken on Deep Creek Lake during the summer of 2003.

Total Lake Boating Carrying Capacity

Table 6-5 shows the overall boat carrying capacity for Deep Creek Lake based on the usable water surface acreage and the boating activity mix identified from the surveys.

Table 6-5. Deep Creek Lake Overall Boat Carrying Capacity

Boat Activity	North Lake Zone	Central Lake Zone	South Lake Zone	Total
Motor Boating	65	61	121	247
Boat Fishing	35	33	65	133
Sailing	0	2	37	39
Canoe/Kayak	0	1	1	2
Water Skiing	8	6	17	31
Total	108	103	241	452

For the purposes of assessing the peak day carrying capacity the peak weekend and the peak holiday boat counts during 2003 were applied. Table 6-6 presents the peak 2003 weekend and holiday boat counts for each sector of the lake.

Table 6-6. 2003 Peak Day Boat Count Summary

Lake Area	Weekend	Holiday
	8/23/03	7/4/03
Northern Sector	93	182
Central Sector	62	146
Southern Sector	271	272
Total	426	600

Table 6-7 compares the calculated net carrying capacity with actual peak 2003 weekend and holiday boat counts. During the peak weekend in 2003, boating use was approximately 94% of carrying capacity, while during the peak holiday period boating use was approximately 133% of capacity.

Table 6-7. Comparison of 2003 Peak Boating Use to Net Carrying Capacity

Lake Zone	Net Carrying Capacity	Peak 2003 Weekend		Peak 2003 Holiday	
		# of Boats	Percent Capacity	# of Boats	Percent Capacity
North Lake Zone	108	93	86%	182	169%
Central Lake Zone	103	62	60%	146	142%
South Lake Zone	241	271	112%	272	113%
Total Lake	452	426	94%	600	133%

Although peak use levels in 2003 exceeded the calculated net physical carrying capacity of Deep Creek Lake, it should be noted that the boat count for the 4th of July weekend of 600 boats was the highest count recorded since MDNR started systematic boat counts in 1990. In fact, there has only been 7 times (out of 116 counts) since MDNR started the boat counts that use levels exceeded the calculated net physical carrying capacity of 452 boats. These high boat levels, however, have been rare – 1996 was the only year that more than 400 boats have been counted more than twice (Table 6-8).

Table 6-8. Summary of DNR Boat Counts

Year	Number of Boat Counts	# of Counts above 500 boats	# of Counts between 400 – 499 boats	# of Counts between 300 – 399 boats	# of Counts below 300 boats
1990	9	0	2	3	4
1991	12	0	1	6	5
1992	10	0	0	4	6
1993	12	0	2	7	3
1994	8	0	0	5	3
1995	12	0	2	3	7
1996	10	0	4	5	1
1997	8	1	1	2	4
1998	1	0	0	0	1
1999	7	0	0	2	5
2000	5	0	2	1	2
2001	7	0	1	3	3
2002	8	0	0	2	6
2003	7	1	1	3	2
Total	116	2	16	46	52

6.2 Social Carrying Capacity Assessment

Social carrying capacity reflects users' perceptions of crowding and the effect of crowding on their recreational experience. Social carrying capacity was assessed in several ways as part of this study:

- Responses to a question regarding how crowded the lake was on the contact survey.
- Responses to a question regarding the number of people at the lake on the contact survey.
- Responses to questions regarding crowding on typical summer weekends and weekdays on the waterfront resident survey.
- Responses to photographs showing various levels of crowding on both the contact and waterfront resident survey.

These responses are discussed below.

Responses to Crowding Questions on the Contact Survey

The contact survey was administered at both the Deep Creek State Park boat ramp, which is primarily used by visitors (non-waterfront residents), and on the lake, which would capture both waterfront residents and visitors. The advantage of contact surveys is that the responses reflect users' actual experience on the day they were surveyed.

Respondents to the contact survey indicated an overall average rating of 2.52 on a scale of 1 (not crowded) to 5 (very crowded). The responses were disaggregated by type of day with an average rating of 1.88 for weekdays, 2.31 for weekends, and 3.02 for holidays. Since a rating of 3.0 would be midway between not crowded and crowded, most recreation users did not consider the lake very crowded. Even on the busiest days (holiday weekends) the average crowding rating just barely exceeded the mid-point on the scale.

Respondents to the contact survey were asked to describe the number of people at Deep Creek Lake during the day they completed the survey. Following is the summary of responses (Table 6-9). Respondents typically felt that the number of people recreating at the lake was just the right number.

Table 6-9. Responses to Contact Survey Crowding Question

	Weekday	Weekend	Holiday
Too Many	9.1%	17.6%	25.5%
Just Right	75.0%	78.9%	72.3%
Too Few	15.9%	3.5%	2.1%

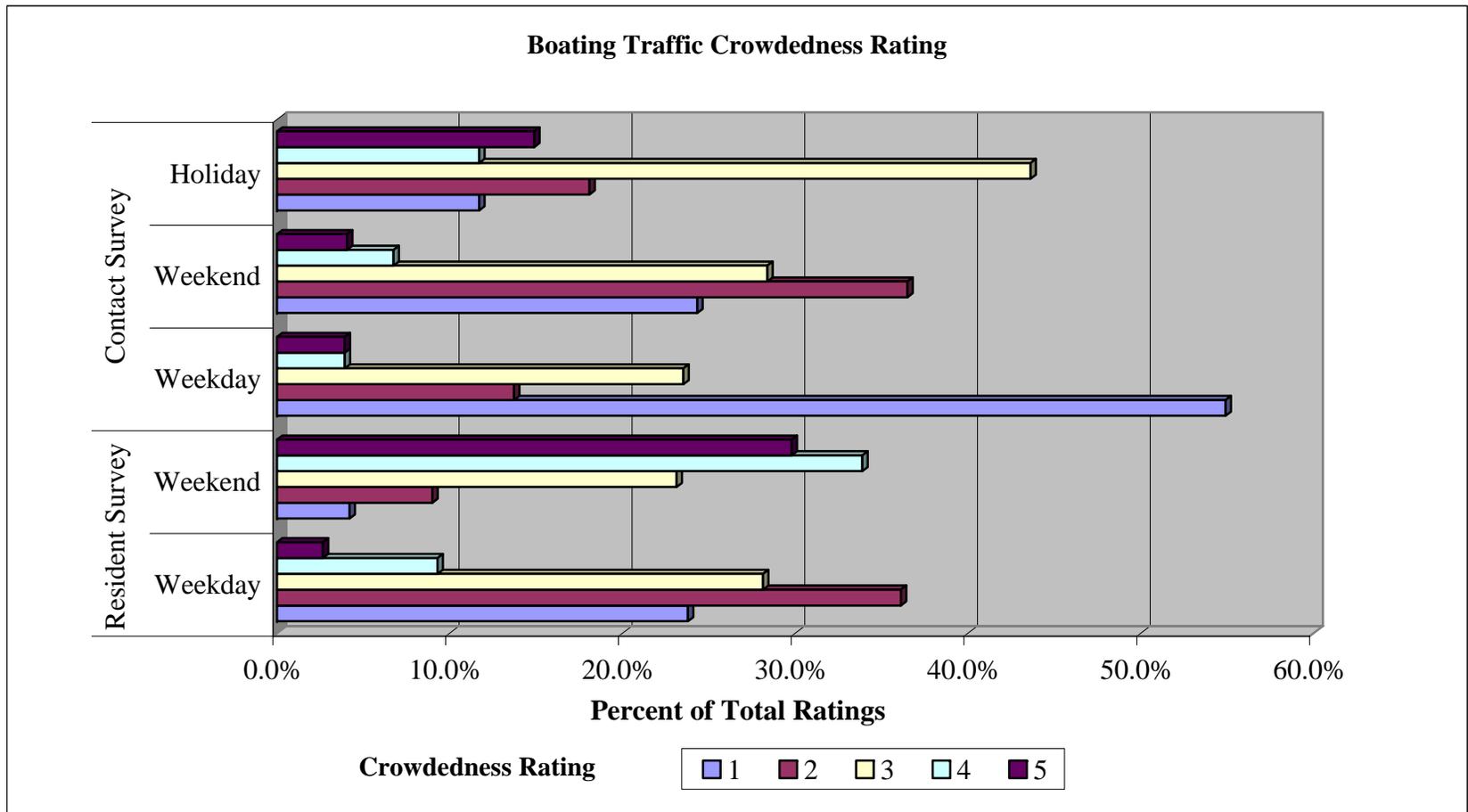
Responses to Crowding Questions on the Waterfront Resident Survey

The responses to the waterfront resident survey obviously reflect the opinions of waterfront residents. Since this was a mail-back survey, the responses do not reflect users' experience on a given day, but rather their overall impression of crowding issues. They were asked to differentiate between typical weekend days and weekdays.

Respondents indicated an average rating of 2.32 on a typical weekday and 3.75 on a typical weekend during the summer of 2003, again on the same scale of 1 (not crowded) to 5 (very crowded). The responses were also disaggregated by month with significantly higher ratings in July (weekend rating of 4.17) and August (weekend rating of 4.06) than in June (weekend rating of 3.34). Ratings of over 4.0 reflect significant concerns regarding crowding.

Figure 6-1 denotes the distribution of the crowding rating (percent) by category (i.e., 1 to 5) for both the resident and contact survey respondents.

Figure 6-1. Summary of Boating Traffic Crowdedness Rating for Summer of 2003



Responses to Photographs Showing Different Levels of Crowding

Respondents were also asked to select from a series of photos depicting boating use levels (see Figure 6-2; Photo A shows the least boats and Photo E shows the most boats) which photo would best represent various comfort levels of boating use on Deep Creek Lake. This photo-simulation approach is commonly used in social carrying capacity assessments (e.g., Mount Hood National Forest in Oregon by Dr. Troy Hall of the University of Idaho).

The first question asked which of the photographs reflected their preferred boating use level. Table 6-10 contains a summary of responses.

Table 6-10. Preferred Boating Use Level

	Photo A	Photo B	Photo C	Photo D	Photo E	None
Resident Survey	38.7%	43.0%	14.9%	2.0%	1.0%	0.00%
Contact Survey	42.5%	34.3%	17.9%	3.7%	1.5%	0.00%

The second question asked respondents to select the photo at which the boating level was so high that they would not boat on Deep Creek Lake. Table 6-11 contains a summary of responses.

Table 6-11. Boating Use Level that would Discourage Use

	Photo A	Photo B	Photo C	Photo D	Photo E	None
Resident Survey	0.0%	0.6%	9.3%	32.8%	37.5%	19.7%
Cumulative Resident Survey	0.0%	0.6%	9.9%	42.7%	80.2%	99.9%
Contact Survey	1.6%	1.6%	10.8%	27.7%	40.2%	18.1%
Cumulative Contact Survey	1.6%	3.2%	14.0%	41.7%	81.9%	100.0%

The third question asked which photo indicated the boating level at which some type of management action should be taken. Table 6-12 contains a summary of responses.

Table 6-12. Boating Use Level that Requires Management

	Photo A	Photo B	Photo C	Photo D	Photo E	None
Resident Survey	0.0%	0.8%	9.2%	33.2%	42.0%	14.8%
Cumulative Resident Survey	0.0%	0.8%	10.0%	43.2%	85.2%	100.0%
Contact Survey	0.0%	0.0%	5.3%	20.5%	41.7%	32.6%
Cumulative Contact Survey	0.0%	0.0%	5.3%	25.8%	67.5%	100.1%

As would be expected, Photos A and B reflect the preferred boating use level for both waterfront residents and respondents to the contact survey (primarily visitors). However, boating use would have to reach approximately the levels shown in Photo D

before most respondents would decide not to boat. Similarly, boating use would need to approach the levels shown in Photo E before most respondents supported taking some type of management action to restrict use, although a high percentage of waterfront residents (43%) support management action by Photo D use levels. Generally waterfront residents (resident survey respondents) were more concerned over crowding than day users or visitors (contact survey respondents). Typically, crowding was of the most concern on holiday weekends (i.e., 4th of July and Labor Day) and other weekends in July and August with good weather.

Based on an estimated lake surface area shown in the photos of approximately 80 acres, boating densities were calculated for each photo, applied to the entire net acreage of the lake, and overall boat levels were estimated for the net acreage of Deep Creek Lake and compared to the computed net carrying capacity (452 boats).

Photo	Boat Density	DCL Boats	Percent of Physical Carrying Capacity
Photo A	0.038 boats/acre	112 boats	25% of carrying capacity
Photo B	0.100 boats/acre	294 boats	65% of carrying capacity
Photo C	0.125 boats/acre	367 boats	81% of carrying capacity
Photo D	0.163 boats/acre	479 boats	106% of carrying capacity
Photo E	0.238 boats/acre	699 boats	155% of carrying capacity

As the table above indicates, the calculated net physical carrying capacity of Deep Creek Lake would be slightly less than the boating levels shown in Photo D. However, over 40% of respondents (including both waterfront residents and contact survey respondents) indicated that use levels as high as Photo D would discourage them from boating. Crowding is definitely an issue when this many boaters would decide not to boat. Relatively few respondents indicated that the use level in Photo C would discourage them from boating (only 10 to 14% of respondents), so clearly the photo-simulation method suggests a social carrying capacity somewhere between Photo C and D, or between 367 and 479 boats, for Deep Creek Lake.

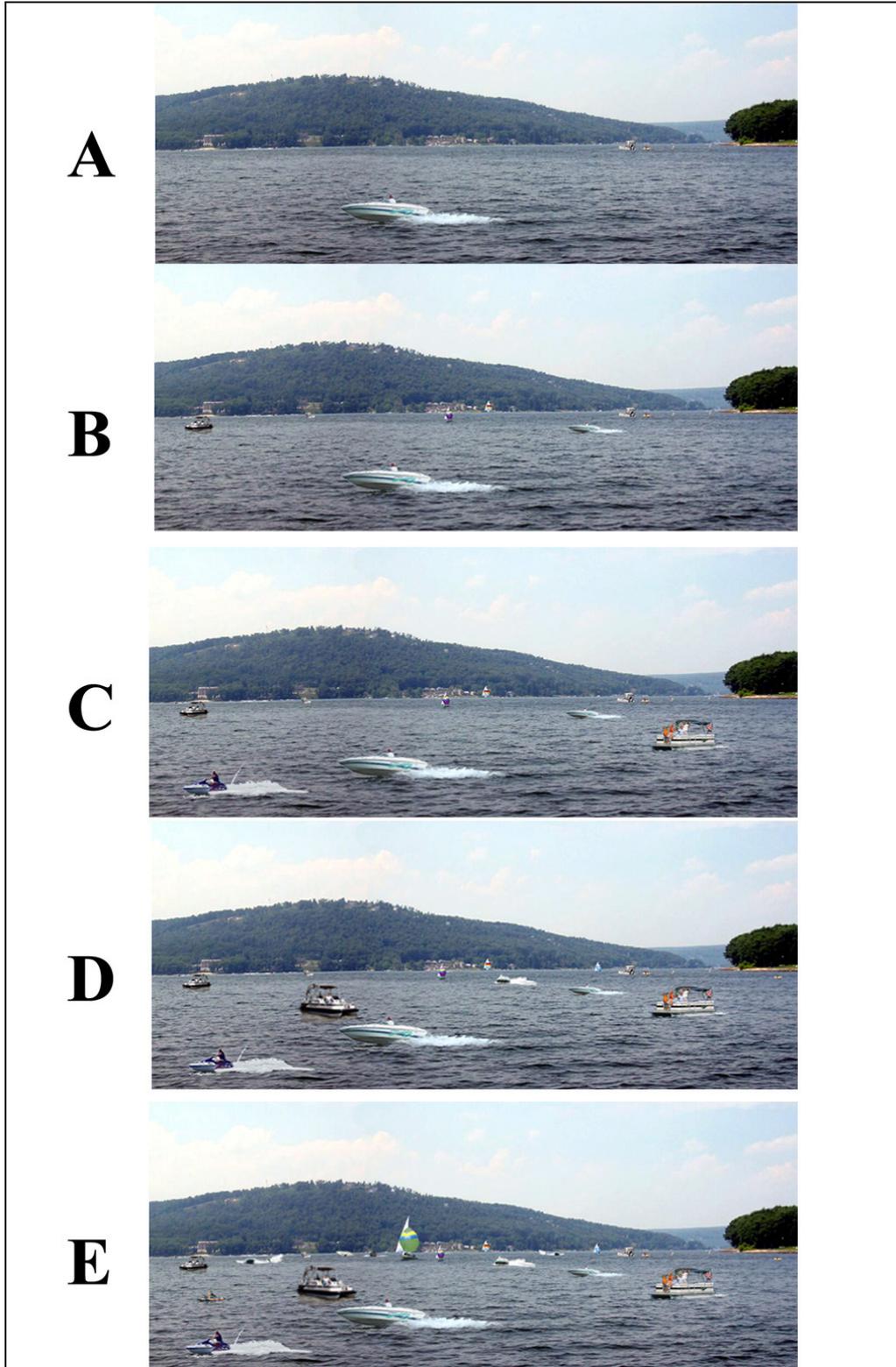
Social Carrying Capacity Summary

Several different methods were used to assess social carrying capacity. Qualitatively, most respondents to the contact survey did not consider the lake too crowded on the days they visited and thought the number of people at the lake to be just right, even on weekends and holidays in July and August. Conversely, most residents generally considered the lake very crowded on weekends and holidays in July and August. Although the results were somewhat mixed, the data indicate that crowding is an issue for a significant number of boaters during the peak hours of weekends and holidays in July and August when the weather is good.

Quantitatively, the photo-simulation suggests a social carrying capacity somewhere between 367 and 479 boats. Only 10 to 14 percent of respondents considered Photo C (which approximately equates to a carrying capacity of 367 boats) as a level that

would discourage their boating. This is a relatively low response so the social carrying capacity is clearly higher than 367 boats. Approximately 42% of respondents considered Photo D (which approximately equates to a carrying capacity of 479 boats) as a level that would discourage their boating. This response (42%), while not a majority, is quite high and in our opinion would exceed an acceptable social carrying capacity. Although there is no exact standard for determining social carrying capacity, once 33% of respondents indicate that use levels are sufficiently high to discourage them from boating, we would consider the social carrying capacity to be reached. This would equate to approximately 445 boats at Deep Creek Lake, assuming a linear relationship between Photos C and D.

Figure 6-2. Photos of Boating Use Levels Used for the Surveys



6.3 Comparison of Physical and Social Carrying Capacity

The physical carrying capacity assessment identified 452 boats as the overall Deep Creek Lake boating net physical carrying capacity. One factor that influences the carrying capacity is the boating mix (e.g., the percent of motorboats versus non-power boats, the percent of water skiers). The boating mix appears, based on a general review of the past boating use studies, to have been comprised of more non-power boats (i.e., canoe, kayak, and sailing) than under current conditions, in which there are a greater number of powerboats, including motorboats and personal watercraft. Increases in the number of motorboats, which typically need greater surface acreage for safe operation conditions, can reduce the overall carrying capacity of the lake. As indicated above, the physical carrying capacity is based on the current mix of watercraft and recreational activities. To the extent that during peak boating periods more power boaters are anchored for fishing, picnicking, or swimming; or are using the 100-foot buffer for these activities; then the lake can safely accommodate more than 452 boats. Lake managers, however, should not rely on boaters using the 100-foot buffer, and should not encourage use of this buffer for safety and environmental reasons.

The social carrying capacity analysis indicates a social carrying capacity of approximately 445 boats. The highest boating use day ever recorded at Deep Creek Lake was July 4, 2003. Review of aerial photographs identified 600 boats on the lake that day, approximately 133% of the physical carrying capacity of the lake. Despite even this high boating level, the average rating for crowding that day (based on 32 survey responses) was only a 3.4 on a 1 (not crowded) to 5 (very crowded) scale. This indicates that most boaters would find the calculated carrying capacity of the Deep Creek Lake (452 boats) acceptable from a recreational experience perspective. This conclusion is further supported by the fact that 100% of respondents to the contact survey on holiday weekends (peak use periods) indicated that they would certainly or probably return to Deep Creek Lake. This suggests that existing boating use levels are not so high as to adversely affect the overall recreational experience.

Over 80% of respondents indicated that the boating use levels in Photo E (a boat density equivalent to a net carrying capacity of 699) would be sufficient to discourage them from boating. Even at the use levels in Photo D (a boat density equivalent to a net carrying capacity of 479 boats, which is slightly higher than the proposed physical carrying capacity), about 43% of respondents indicated that they would not boat at this level. Yet, the lake appears to have accommodated 600 boats while maintaining a quality recreational experience on July 4, 2003 based on the results of the contact survey. This may be due, however, to extenuating circumstances. There was a sailboat regatta occurring during this peak use period, in which many boats were concentrated, thereby leaving the rest of the lake at slightly less dense boating levels. Further, some boats were using the 100-foot shoreline buffer.

Recreational users, especially visitors, may be willing to tolerate crowded conditions for a short period on a high use weekend without it adversely affecting their

overall recreational experience. If this high use level was to occur more consistently, however, it could begin to adversely affect the experience of recreational boaters.

We recommend using 450 boats as a reasonable and prudent carrying capacity estimate for achieving MDNR's management goal of "providing for the greatest use of the lake consistent with a quality experience and safety of all users of the lake." It should be recognized that higher use levels, although probably not higher than 600 boats, can be accommodated occasionally for short durations (e.g., the afternoon of a sunny holiday weekend) and during periods when the mix of boats on the lake includes large numbers of boats with relatively low acreage requirements without significantly adversely affecting the overall recreational experience for most boaters. To the extent that use levels start to more regularly exceed the 450-boat carrying capacity, MDNR should consider further action. This is discussed in more detail in Section 7.

As noted above, use is not currently evenly distributed across the lake. There are a few areas of the lake today that are routinely crowded and may pose safety concerns. These areas include the channels near the two bridges across Deep Creek Lake, which function as bottlenecks, and the Turkey Neck area during sail regattas.

6.4 Effects of Future Growth on Carrying Capacity

As discussed in Section 5.3, future growth in resident population and visitors will result in increases in boating use at Deep Creek Lake. Future increases in boating traffic are expected to come primarily from increases in lake use by residents, because the MDNR has no plans to expand parking facilities at Deep Creek Lake State Park, and commercial rental operations on the lake have maximized the available rental fleet to the extent permitted under the existing dock use regulations. Two different methods predicted similar increases in annual peak day BAOT – approximately 7 to 8% by 2008 and 15 to 16% by 2013. Based on the linear regression method, the annual peak day BAOT is predicted to be approximately 562 boats, based on past trends. This level is approximately 125% of the recommended lake carrying capacity.

This increase in use may also result in boating use more frequently exceeding the recommended carrying capacity. A review of MDNR boat counts since 1990 indicates that only in one year was the recommended carrying of 450 capacity exceeded more than once – that was in 1996 when it was barely exceeded 3 times (452 boats on July 21, 459 boats on August 31, and 457 boats on September 1). We also evaluated whether the projected increase in boating use would have resulted in historic (1990 – 2003) use exceeding the recommended carrying capacity more frequently. As Table 6-13 indicates, the number of days exceeding the recommended carrying capacity would increase from 7 to 37 over the 14 year period, with as many as 5 exceedences in one year.

Table 6-13. Comparison of Effect of Projected Increase in Boating Use on Historic Boating Levels

<u>Year</u>	# of days over 450 boats	
	<u>Actual historic</u>	<u>Historic Use plus growth</u>
1990	0	4
1991	0	5
1992	0	3
1993	0	5
1994	0	3
1995	0	4
1996	3	5
1997	1	3
1998	0	0
1999	0	0
2000	1	2
2001	1	1
2002	0	0
<u>2003</u>	<u>1</u>	<u>2</u>
Total	7	37

7.0 MANAGEMENT OPTIONS

This section discusses the responses from the resident survey, the contact survey, and the commercial operators survey regarding potential management options.

Respondents to the resident, contact, and commercial surveys were asked to indicate whether they would support or oppose certain commercial uses (e.g., allowing boat races) as well as certain government management actions (e.g., instituting lower speed limits) at Deep Creek Lake. They were asked to describe their reaction to these potential measures as follows: strongly oppose (-2), oppose (-1), neutral (0), support (+1) or strongly support (+2). Figures 7-1 and 7-2 summarize the average ratings provided by the resident, contact and commercial survey respondents to the potential management actions.

7.1 Survey Responses Regarding Government Management Options

In terms of government-related management options, the only options that received any relatively strong support (scores over 1.0) were by respondents to the resident survey who were in favor of limiting residential development (average rating of 1.22) and limiting commercial development around Deep Creek Lake (average rating of 1.02). Respondents to the contact survey were not strongly in support or opposition of any of the management options, but were most opposed to increasing fees to use the lake or public facilities adjacent to the lake (average rating of -0.77) or requiring prior reservations or permits to use the lake or public facilities adjacent to the lake (average rating of -0.62). The respondents to the commercial business survey were generally not in favor of any of the potential government actions, and were strongly opposed to limiting commercial development (average rating of -1.29) and requiring reservations or permits (average rating of -1.29). Overall, waterfront residents were most in favor of government management options, commercial operators were most opposed to government management options, and visitors (respondents to the contact survey) tended to support residents in limiting residential and commercial development and support commercial operators in opposing increased fees or requiring permits to use the lake.

The responses to the government management options are quite polarized, although relatively typical of a lake that is growing in popularity. Waterfront residents are usually more sensitive to increasing recreation use as they are exposed to it on a more frequent basis. Commercial operators generally support increasing recreational use as good for business. Visitors are often concerned that government management actions may limit or restrict their access or use of the recreational resource.

The waterfront residents were relatively strongly in support of limits on residential and commercial development, stricter boat noise restrictions, and increased law enforcement (all received ratings above 0.5). All other management options received little or no support. Visitors (as reflected in the contact survey) also supported limiting residential and commercial development (both received ratings above 0.5) and strongly opposed requiring reservations/permits and increased fees to use the lake (both received

ratings below -0.5). The relatively high scores from both waterfront residents and visitors for limiting residential and commercial development may reflect both concerns about the loss of rural character and shoreline aesthetics and the future potential for increased boating use. The commercial operators opposed or strongly opposed (all received ratings below -0.4) all potential government options except increased law enforcement, which received a neutral score. The commercial operators were clearly concerned that increased government manage would limit, and possibly reduce recreational use, which would adversely affect their businesses.

Based on the responses shown in Figure 7-1, there is little support for MDNR taking any immediate management actions. The strongest support for government management was related to limiting residential and commercial development, with support from waterfront residents and, to a lesser extent, visitors. As discussed in Section 5.3, projected increases in residential development in the Deep Creek Lake market area would contribute to slightly increased boating use. Any actions on limiting development in the market area, however, would need to come from Garrett County rather than the Maryland Department of Natural Resources. A separate study on growth management options for the Deep Creek Lake area is currently underway by Garrett County.

The other management options that received relatively strong support were stricter boat noise restrictions and the need for greater law enforcement. Approximately 67% of waterfront residents supported stricter noise restrictions on boats. Although commercial operators and visitors both opposed stricter noise restrictions, it is the waterfront residents who are most impacted. Although a noise study was beyond the scope of this study, noise from powerboats and PWC were rated as significant issues by many waterfront residents and warrants further study. The need for greater law enforcement was supported or strongly supported by approximately 57% of waterfront residents, although both visitors and commercial operators were neutral. It is not clear the motivation for this support. As boating use increases, and especially if the physical carrying capacity of the lake is exceeded as was the case on July 4, 2003, there will be an increasing need for law enforcement to maintain safe boating conditions at Deep Creek Lake.

7.2 Survey Responses Regarding Commercial Uses

Based on the responses to the contact and waterfront resident surveys, there is little support for expanding the commercial offerings at Deep Creek Lake. The commercial options received strong support from commercial operators, as would be expected, but only allowing musical performances, scuba diving services, and water taxis received any support from recreational users. Respondents to the contact surveys indicated they would support (average rating of 0.61) and resident survey respondents stated they would somewhat support (average rating of 0.11) allowing musical performances on the lake or along the lake shoreline. Respondents to the contact survey indicated they would somewhat support allowing water taxis (average rating of 0.19) and scuba diving services (average rating of 0.13).

Respondents to both the resident and contact surveys were not in support of most of the other potential commercial management options. Respondents to the resident survey indicated that they would oppose allowing larger boat tours (average rating of –1.17), allowing parasailing (average rating of –0.97), allowing additional boat tours (average rating of –0.95), and allowing vending boating (average rating of –0.93).

The responses to the potential commercial options provide insight into the type of recreational experience preferred by most users of the lake. The results suggest that most lake users prefer a less commercialized experience. Few complaints were received about current commercial operations along the lake (e.g., boat rentals, gasoline sales, restaurants, and fishing supplies) that support the primary recreational activities (e.g., boating and fishing). More commercialized activities (e.g., additional or larger tour boats, parasailing, and boat races) were opposed, even by visitors for whom these events would primarily be targeted. Even relatively unobtrusive commercial uses such as SCUBA diving and water taxis received only mild support from visitors.

Figure 7-1. Summary of Average Ratings for Government Related Management Options

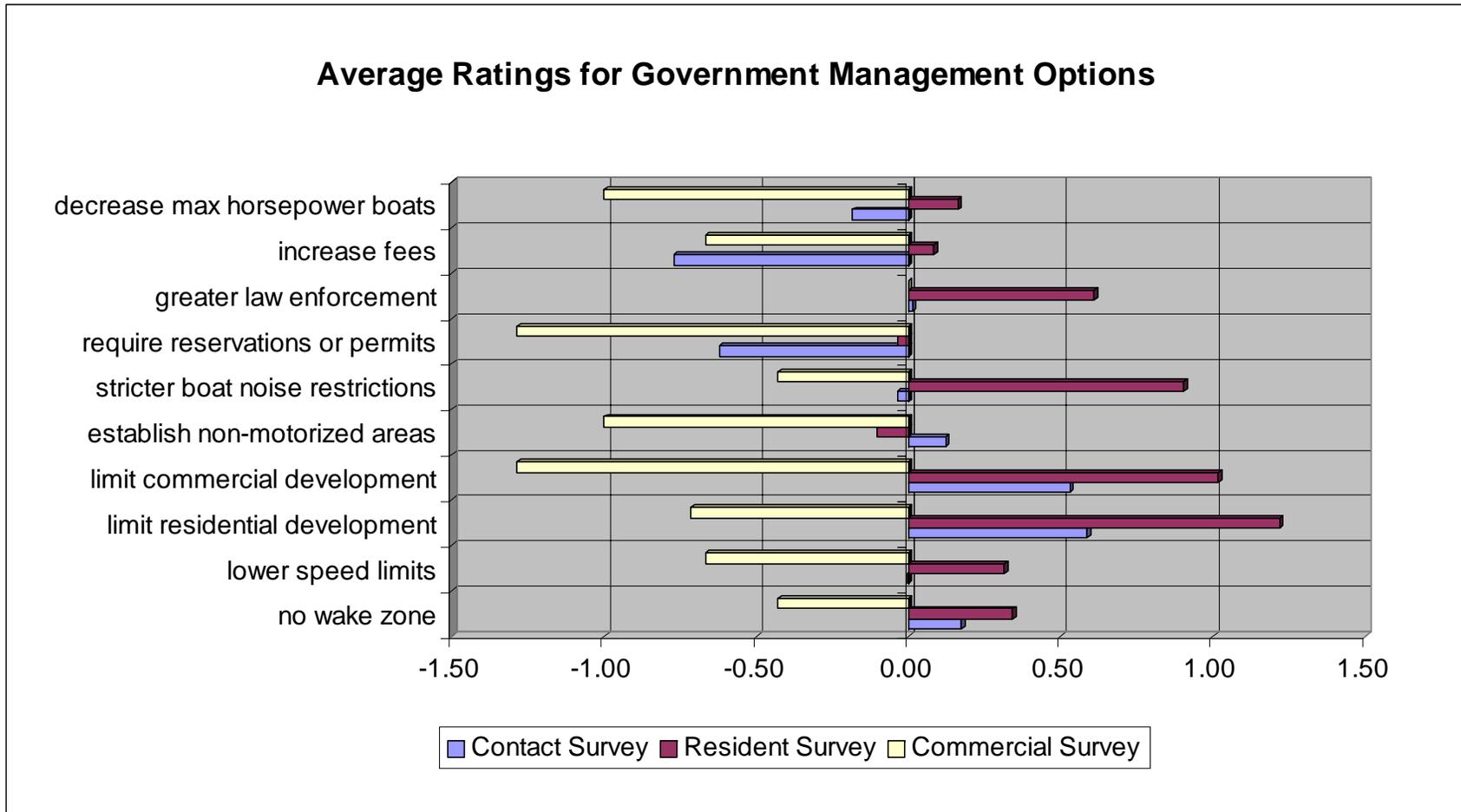
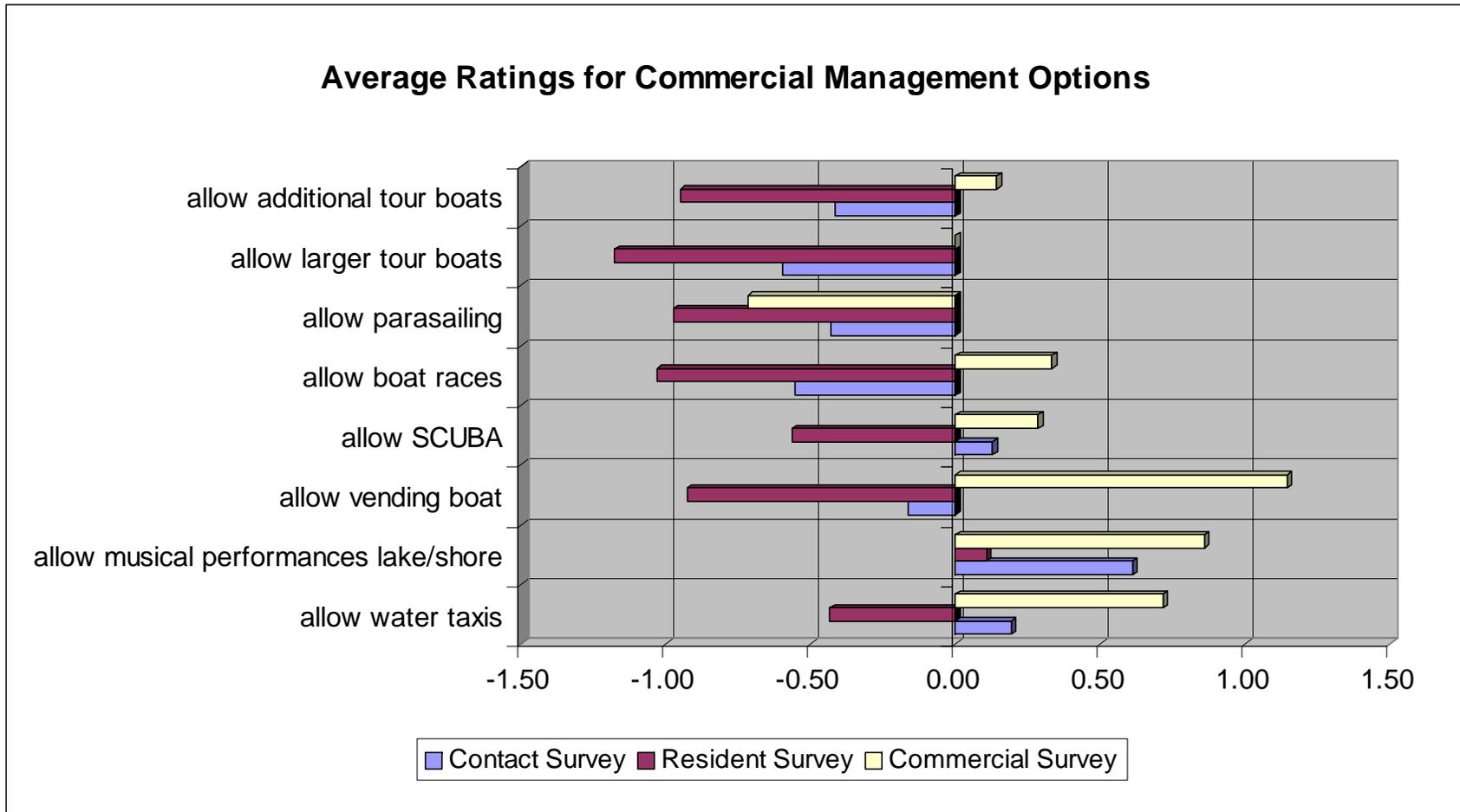


Figure 7-2. Summary of Average Ratings for Commercial Related Management Options



8.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

This section briefly summarizes the findings and recommendations of this study and proposed metrics for use in a Limits of Acceptable Change monitoring program.

8.1 Findings

Recreational Boat Carrying Capacity

Based on the carrying capacity analysis, we recommend 450 boats as a prudent and safe recreational boating carrying capacity for Deep Creek Lake. This is a boating level that has only been exceeded 7 times over the past 14 years and usually on holiday weekends (once on 4th of July and four times on Labor Day weekends), although other weekends in July and August can approach or exceed this level if weather conditions are good. Generally, recreational use is well below this level (85% of 116 DNR summer weekend aerial boat counts since 1990 were less than 400 boats and these counts only occur during high use periods – during good weather on weekends and holidays between 4th of July and Labor Day weekends).

The highest boat count at Deep Creek Lake was recorded this summer (600 boats), and while concerns regarding crowding were identified, use levels on that day did not appear to significantly adversely affect boater's recreational experience. Of course, many boaters may have chosen not to boat that day because of the degree of crowding. Further, sustained use at this high level will likely adversely affect boater's recreational experience. Overall, however, it appears that recreational users are willing to tolerate occasional short-term crowding conditions.

Based on the survey responses, we believe that use levels over approximately 450 boats will result in a less desirable recreational experience. The surveys indicate that at current use levels, there is relatively little support for additional management (e.g., user fees, boat horsepower restrictions, lower speed limits). MDNR should continue to monitor recreational use and if use levels begin to exceed the recommended carrying capacity (450 boats), especially on non-holiday weekends, management actions should be considered. There are few fair options available, however, to actually control boating levels – the easiest is to restrict access at the Deep Creek Lake boat launch, but this would disproportionately impact visitors. Increased law enforcement and restrictions on boat speeds and engine horsepower would not directly address the carrying capacity issue, but would help to maintain boating safety during high use periods.

Trends in Recreational Use

Recreational boating use at Deep Creek Lake is projected to increase by approximately 15 to 16% by 2013 based on both a statistical analysis of past trends in annual peak day BAOT and projections on increases in second home development, resident population, and visitors. The linear regression model predicts an annual peak day BAOT of 562 boats in 2013, based on past trends in DNR aerial boat counts. This

estimate is well above the recommended carrying capacity. This growth in boating use will also likely result in increases in the frequency that the recommended carrying capacity is exceeded.

Other trends in recreational boating at Deep Creek Lake include increased PWC use; less waterskiing, but more boats (including PWC) pulling tubes; and more rafting up. The effects of these trends should be monitored to determine if they raise any safety concerns.

Boating Safety

Overall, Deep Creek Lake provides a safe and attractive boating environment. As indicated above, there are times when the lake's recreational carrying capacity is exceeded and additional law enforcement may be required. It should be noted, however, that boating use is not evenly distributed across the lake. There are a few areas of the lake that are routinely crowded and may pose safety concerns. These areas include the channels near the two bridges across Deep Creek Lake, which function as bottlenecks, and the Turkey Neck area during sail regattas. Greater law enforcement may be required in these areas. There are also certain events (e.g., 4th of July fireworks display) where large numbers of boats assemble that may also require additional law enforcement to maintain safe boating conditions.

Quality of the Recreational Experience

Generally, the visitors to Deep Creek Lake (contact survey respondents) had a favorable recreational experience and indicated that they would return to Deep Creek Lake in the future. The visitors were generally more tolerant of higher boating use levels than were the shoreline residents (resident survey respondents). The residents were concerned with boating use levels and associated crowdedness; boating noise; safety issues, such as reckless boating use; and shoreline erosion conditions. Increased use on peak weekends and holidays has changed the type of recreational experience during these periods to reflect more of a busy, high use recreational area.

Type of Recreational Experience

The responses to the potential commercial options provide insight into the type of recreational experience preferred by most users of the lake. The results suggest that most lake users prefer a less commercialized experience. Few complaints were received about current commercial operations along the lake (e.g., boat rentals, gasoline sales, restaurants, fishing supplies) that support the primary recreational activities (e.g., boating and fishing). More commercialized activities (e.g., additional or larger tour boats, parasailing, and boat races) were opposed, even by visitors for whom these events would primarily be targeted. Even relatively unobtrusive commercial uses such as SCUBA diving and water taxis received little support from visitors.

Differences Between Waterfront Residents and Visitors

There are clear differences in opinions between waterfront residents and visitors regarding recreational use of Deep Creek Lake. Waterfront residents tend to be more concerned about crowding, noise, boat wakes, and shoreline erosion than visitors. These are legitimate concerns as waterfront residents experience these problems for most of the summer while visitors may only be at Deep Creek Lake for the weekend. It was beyond the scope of this study to identify and evaluate the severity of shoreline erosion. If erosion is occurring in some areas, speed limits, expanded or more strictly enforced no wake zones, and/or shoreline protection measures should be considered.

Visitors tend to be more concerned about public access and public restrooms. These too are legitimate concerns. There is currently only one public, non-commercial, access point to Deep Creek Lake at Deep Creek Lake State Park. Given the popularity of Deep Creek Lake, MDNR or Garrett County may wish to consider providing a second public access area somewhere along the lake so that non-waterfront residents have good access to this valuable recreational resource. The existing boat trailer parking lot at Deep Creek Lake State Park is only occasionally full, so it is not currently limiting access. Perhaps a smaller cartop boat put-in for canoes or kayaks on one of the coves would provide improved access for non-motorized watercraft.

8.2 Limits of Acceptable Change

In the development of management goals and measures, components of the Limits of Acceptable Change (LAC) planning system can be applied (Stankey, et al., 1985). The LAC process utilizes a primary emphasis on the conditions desired in an area rather than on how much use an area can physically tolerate. The LAC system provides a framework for establishing acceptable and appropriate resource and social conditions in recreational settings. The LAC process can be applied to identify desired resource management conditions and identify resource indicators and standards to meet these desired conditions. The overall goal for the management of Deep Creek Lake is “to work toward a reasonable balance preserving an acceptable quality of recreational experience on Deep Creek Lake, while at the same time providing for the greatest use of the lake consistent with a quality experience and safety of all users of the lake.”

Based on this overall management goal for Deep Creek Lake, we identified various resource indicators that can provide the means to assess whether additional management related actions should be pursued to maintain the desired conditions. These potential resource indicators include the following:

Quality of Recreational Experience

- Establish and monitor the minimum acceptable percentage of visitors to the lake that indicate that they will probably and certainly return for another visit.
Recommended Metric – minimum 90% of visitors indicate that they will probably or certainly will return for another visit.

Response if Metric Is Not Met – survey visitors to better understand reasons for not wanting to return and take appropriate corrective action.

Boating Use Levels

- Establish criteria and monitor the acceptable length of wait to launch a boat at the Deep Creek Lake boat ramp.

Recommended Metric – maximum of a 15-minute wait on holiday weekends

Response if Metric Is Not Met – provide staff at boat ramp on holiday weekends to expedite boat launching and minimize wait.

- Establish and monitor lake carrying capacity (including boat mix) by continuing MDNR aerial boat counts on weekends and holidays between 4th of July and Labor Day weekends.

Recommended Metric – do not exceed 450 BAOT more than two weekends a summer.

Response if Metric Is Not Met – see discussion below

- **Boating Safety**

Monitor reported boating accidents at Deep Creek Lake.

Recommended Metric – to be determined.

- **Boating Noise**

- Establish and monitor boating noise levels along the shoreline in residential areas, if needed based on the recommended noise study described above.

Recommended Metric – to be determined.

Shoreline Erosion

- Evaluate and monitor shoreline erosion conditions at key locations if needed based on the recommended shoreline erosion study described above.

Recommended Metric – to be determined.

8.3 Recommendations

Based on our analysis of the spot counts, aerial photographs, and contact and waterfront resident survey responses, we make the following recommendations:

1. Provide increased law enforcement on days when lake carrying capacity may be exceeded, especially in bottleneck areas near the bridges and Turkey Neck to insure a safe and enjoyable boating experience.
2. More strictly enforce the Maryland Boaters Safety Education Act requirements to insure that boat operators possess a valid certificate of boating safety.

3. Consider prohibiting special boating events during peak use hours on holiday weekends, especially in the more crowded northern and central lake zones.
4. Do not expand the Deep Creek Lake Boat Launch parking area – this will only result in increasing the probability of exceeding lake carrying capacity.
5. Consider providing a small cartop boat put-in for canoes and kayaks on one of the coves in the northern or southern lake zones to provide improved access for non-motorized watercraft.
6. Limit commercial uses adjacent to or on Deep Creek Lake to those consistent with a rural outdoor recreational experience. Other more commercialized uses, such as those included in this study's surveys, are inconsistent with the natural setting and type of recreational experience visitors and residents are seeking.
7. Conduct a study to evaluate the severity and causes of noise and shoreline erosion at Deep Creek Lake.
8. Implement a Limits of Acceptable Change monitoring program (see discussion in Section 8.2).

This study found that current recreational use exceeds the recommended boat carrying capacity at Deep Creek Lake, on average, approximately one day per summer, usually during good weather on a holiday weekend. As discussed above, we recommend increased law enforcement and prohibition of special events during peak use hours on holiday weekends, at least in the more congested northern and central lake zones, to mitigate the effects of these occasional peak use periods.

Current growth of up to 16% in peak boating use by the year 2003 is projected to result in both an increase in the magnitude of the annual peak BAOT as well as the frequency at which the boat carrying capacity is exceeded. As recommended above in the Limits of Acceptable Change, if the carrying capacity is exceeded more than two weekends a summer, we recommend that MDNR consider implementing management actions.

It is difficult to control boating levels on lakes, especially at lakes with so many waterfront residences. The survey responses indicated little to no support from visitors, commercial operators, and even waterfront residents for decreasing boat horsepower capacity, establishing speed limits, or expanding no wake zones. Most of these measures more directly address boating safety rather than carrying capacity anyway.

Therefore, we recommend MDNR consider the following actions to address boat carrying capacity if use levels exceed the LAC metrics:

- Prohibit waterskiing from 11 am to 4 pm on the Saturday, Sunday and holiday of Memorial Day weekend and the Saturdays, Sundays, and holidays from July 1 through Labor Day. This measure would parallel the current regulations for personal watercraft. It would remove the boating use that has the highest use factor (12 acres per boat) and which poses the greatest safety risk in congested boating areas.

- When boat levels exceed the recommended lake carrying capacity (based on MDNR aerial boat counts or the judgment of Maryland Natural Resource Police), MDNR may limit access to Deep Creek Lake from the Deep Creek Lake State Park boat launch and from commercial boat rental businesses. Additional boats would only be launched or rented to replace boats returning from the lake. The Maryland Natural Resource Police would authorize the State Park and boat rental businesses to resume normal operations when they determine boating levels have dropped below 450 boats. These measures primarily affect visitors to Deep Creek Lake. The only ways to effectively limit access to Deep Creek Lake by waterfront residents would be to implement a mandatory lake use permit system. The feasibility of a similar proposal was evaluated in 1994 by MDNR and was determined to be impractical (MDNR, 1994). The survey responses from this study indicate a certain degree of self-regulation on the part of waterfront residents. This self-regulation, combined with the active management of visitor use by the measures described above, would reasonably distribute the burden of limiting lake access to all affected parties.

Most of the predicted future increase in boating use at Deep Creek Lake is attributable to residential growth in the Deep Creek Lake market area (see Section 5). Respondents to both the waterfront resident and contact survey supported limiting residential development in the area. Although MDNR does not have the authority to directly manage residential growth (this lies with Garrett County, which has a growth management study underway), it does have the authority to limit the granting of new buffer strip use permits (e.g., pier or common dock permits). This authority could be exercised by MDNR to help control the increase in boating use at Deep Creek Lake. We believe that the other measures recommended above are better focused on addressing boating levels on peak use days. Prohibiting new buffer strip use permits will not necessarily eliminate the need to implement the other measures described above. Garrett County may determine that additional growth management measures are warranted in order to preserve the rural character of Deep Creek Lake, to protect water quality, or for other reasons, but we do not believe restricting the issuance of new buffer strip use permits is justified simply to limit boating on a few peak use days.

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Appendix A: User Contact Survey

12. We would like to know whether you have encountered certain conditions at Deep Creek Lake that interfered with your recreation experience *today*. Please check whether each of the following was a big, moderate, slight, or not a problem on your trip *today*.

	<u>Not a Problem</u>	<u>Slight Problem</u>	<u>Moderate Problem</u>	<u>Big Problem</u>
Boat wakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many people along the shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many watercraft on this lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improper disposal of litter, trash, or toilet paper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conflicts with other recreation users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loud, rude or inconsiderate behavior by other users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boating hazards (e.g., stumps, shallow areas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tree cutting along the shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bulkheads/rip-rapped shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muddy water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eroding shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability of public sanitary facilities or port-a-johns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. We would like to know whether you have encountered certain noise-related effects while using Deep Creek Lake. Please indicate if these conditions have been a big problem, moderate problem, slight problem, or not a problem.

	<u>Not a Problem</u>	<u>Slight Problem</u>	<u>Moderate Problem</u>	<u>Big Problem</u>
Noise from powerboats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from personal watercraft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from airboats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from on-shore activities during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from on-shore activities during the night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from other recreational users on the lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any other comments regarding noise at Deep Creek Lake?

THE FOLLOWING QUESTIONS RELATE TO YOUR GENERAL EXPERIENCE AT DEEP CREEK LAKE, BUT ARE NOT LIMITED TO TODAY.

14. Do you plan to keep a boat with you, either in the water or on a trailer, overnight at any point during your stay?

Yes No

15. If you answered yes, will you dock at a private, commercial, or community dock?

Private dock Commercial dock Community dock

16. If you answered yes to either of the above questions, how many nights (total) will you keep a boat with you during your visit at Deep Creek Lake? _____ total nights at a private dock _____ total nights at a commercial dock

_____ total nights at a community dock _____ total nights on a trailer off the lake

17. Are there any other activities or services that are currently not available, but that would improve your recreational experience?

18. How long are you willing to wait to launch your boat at the Deep Creek Lake State Park boat ramp?

0-5 minutes___ 6-10 minutes___ 11-15 minutes___ 16-20 minutes___ more than 20 minutes___

19. Please look at the pictures provided to you by the survey technician to answer the three questions below.

Which of the photographs reflect your preferred boating use level?

Photo A___ Photo B___ Photo C___ Photo D___ Photo E___ None___

Is there any use level shown that is so high that you would not boat on Deep Creek Lake?

Photo A___ Photo B___ Photo C___ Photo D___ Photo E___ None___

Is there any use level shown that is so high that some type of management action should be taken? (*understanding that these measures or activities could potentially affect or restrict your personal use of the lake at certain times of the year, should they be implemented*)

Photo A___ Photo B___ Photo C___ Photo D___ Photo E___ None___

20. Please indicate how strongly you would support or oppose implementation of each of the following potential management actions or uses at Deep Creek Lake by circling your answers in the appropriate column below (*understanding that these measures or activities could potentially affect or restrict your personal use of the lake at certain times of the year, should they be implemented*). For those actions you would support, please indicate the location(s) where you would like to see these measures implemented.

	Strongly Oppose	Oppose	Neutral	Support	Strongly Support	Comments
Institute expanded/new no wake zones	-2	-1	0	+1	+2	Where?
Institute lower speed limits or new speed zones	-2	-1	0	+1	+2	Where?
Limit the amount of residential development around Deep Creek Lake	-2	-1	0	+1	+2	
Limit the amount of commercial development around Deep Creek Lake	-2	-1	0	+1	+2	
Special areas for non-motorized vessels	-2	-1	0	+1	+2	Where?
Stricter boat noise restrictions	-2	-1	0	+1	+2	What type of restriction?
Require prior reservations or permits to use the lake or public facilities adjacent to the lake	-2	-1	0	+1	+2	
Provide a greater law enforcement presence on the lake	-2	-1	0	+1	+2	
Charge or increase fees to use the lake or public facilities adjacent to the lake	-2	-1	0	+1	+2	
Decrease the maximum allowable horsepower for boat motors	-2	-1	0	+1	+2	What should be the maximum allowable horsepower?
Allow water taxis	-2	-1	0	+1	+2	
Allow musical performances on the lake or along the shoreline	-2	-1	0	+1	+2	
Allow food vending by boat	-2	-1	0	+1	+2	
Allow commercial SCUBA diving services	-2	-1	0	+1	+2	
Allow boat races	-2	-1	0	+1	+2	
Allow parasailing	-2	-1	0	+1	+2	
Permit larger tour boats	-2	-1	0	+1	+2	
Permit additional tour boats	-2	-1	0	+1	+2	
Other _____ _____						

21. Do you have any other comments regarding your recreation experiences at Deep Creek Lake?

Appendix B: Resident Mail-back Survey

7. We would like to know whether you have encountered certain conditions at Deep Creek Lake that interfered with your recreation experience. Please check whether each of the following is a big, moderate, slight, or not a problem.

	<u>Not a Problem</u>	<u>Slight Problem</u>	<u>Moderate Problem</u>	<u>Big Problem</u>
Boat wakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many people along the shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many watercraft on this lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improper disposal of litter, trash, or toilet paper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conflicts with other recreation users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loud, rude or inconsiderate behavior by other users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boating hazards (e.g., stumps, shallow areas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tree cutting along the shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bulkheads/rip-rapped shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Muddy water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eroding shoreline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability of public sanitary facilities or port-a-johns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. We would like to know whether you have encountered certain noise-related effects while using Deep Creek Lake. Please indicate if these conditions have been a big problem, moderate problem, slight problem, or not a problem.

	<u>Not a Problem</u>	<u>Slight Problem</u>	<u>Moderate Problem</u>	<u>Big Problem</u>
Noise from powerboats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from personal watercraft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from airboats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from on-shore activities during the day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from on-shore activities during the night	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Noise from other recreational users on the lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any other comments regarding noise at Deep Creek Lake?

9. Please circle below the type and number of watercraft that you keep at your lakefront home. If you keep more than three watercraft at your lakefront home, please write in the number in the space provided.

Powerboats 0 1 2 3 ____ Canoe/kayaks/rowboats 0 1 2 3 ____
 Personal Watercrafts/jet skis 0 1 2 3 ____ Sailboats/boards 0 1 2 3 ____

10. Approximately how many days from June 1st through September 30th do you keep transient watercraft (watercraft owned by someone other than a member of your household) in the water or at your dock at your lakefront home? _____ days

11. What is your age? less than 18 18-21 22-45 46-65 over 65
 Are you male _____ or female _____?

12. Please look at the pictures provided to you by the survey technician to answer the three questions below.

Which of the photographs reflect your preferred boating use level?

Photograph A____ Photograph B____ Photograph C____ Photograph D____ Photograph E____ None____

Is there any use level shown that is so high that you would not come to Deep Creek Lake?

Photograph A____ Photograph B____ Photograph C____ Photograph D____ Photograph E____ None____

Is there any use level shown that is so high that some type of management action should be taken? (*understanding that these measures or activities could potentially affect or restrict your personal use of the lake at certain times of the year, should they be implemented*)

Photograph A____ Photograph B____ Photograph C____ Photograph D____ Photograph E____ None____

13. Please indicate how strongly you would support or oppose implementation of each of the following potential management actions or uses at Deep Creek Lake by circling your answers in the appropriate column below (*understanding that these measures or activities could potentially affect or restrict your personal use of the lake at certain times of the year, should they be implemented*). For those actions you would support, please indicate the location(s) where you would like to see these measures implemented.

	Strongly Oppose	Oppose	Neutral	Support	Strongly Support	Comments
Institute expanded/new no wake zones	-2	-1	0	+1	+2	Where?
Institute lower speed limits or new speed zones	-2	-1	0	+1	+2	Where?
Limit the amount of residential development around Deep Creek Lake	-2	-1	0	+1	+2	
Limit the amount of commercial development around Deep Creek Lake	-2	-1	0	+1	+2	
Special areas for non-motorized vessels	-2	-1	0	+1	+2	Where?
Stricter boat noise restrictions	-2	-1	0	+1	+2	What type of restriction?
Require prior reservations or permits to use the lake or public facilities adjacent to the lake	-2	-1	0	+1	+2	
Provide a greater law enforcement presence on the lake	-2	-1	0	+1	+2	
Charge or increase fees to use the lake or public facilities adjacent to the lake	-2	-1	0	+1	+2	
Decrease the maximum allowable horsepower for boat motors	-2	-1	0	+1	+2	What should be the maximum allowable horsepower?
Allow water taxis	-2	-1	0	+1	+2	
Allow musical performances on the lake or along the shoreline	-2	-1	0	+1	+2	
Allow food vending by boat	-2	-1	0	+1	+2	
Allow commercial SCUBA diving services	-2	-1	0	+1	+2	
Allow boat races	-2	-1	0	+1	+2	
Allow parasailing	-2	-1	0	+1	+2	
Permit larger tour boats	-2	-1	0	+1	+2	
Permit additional tour boats	-2	-1	0	+1	+2	
Other _____						

14. Do you have any other comments regarding your recreation experiences at Deep Creek Lake?

Appendix C: Summary of Primary Responses to Contact and Resident Surveys

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
Question1 - Where are you staying?	Percentage of Total			
day only	2.38%	8.00%	0.00%	1.75%
perm. residence	11.11%	24.00%	9.09%	7.02%
vacation home	25.40%	40.00%	31.82%	14.04%
friends house	7.94%	0.00%	2.27%	15.79%
house near lake	13.49%	12.00%	15.91%	12.28%
renting lakefront	5.56%	4.00%	13.64%	0.00%
hotel/motel	19.05%	4.00%	9.09%	33.33%
tent	6.35%	4.00%	6.82%	7.02%
trailer/RV	7.14%	0.00%	9.09%	8.77%
other	1.59%	4.00%	2.27%	0.00%
Question 2 - Place of residence	Percentage of Total			
lakefront	34.69%	47.62%	29.41%	18.18%
Garrett Co	4.08%	9.52%	0.00%	0.00%
Maryland	18.37%	19.05%	23.53%	9.09%
outside MD	42.86%	23.81%	47.06%	72.73%
Zip/Place of residence	N/A	N/A	N/A	N/A
Question 3 - What is your age and sex?	Percentage of Total			
under 18	4.71%	0.00%	3.45%	10.00%
18-30	7.06%	15.38%	3.45%	3.33%
31-45	20.00%	23.08%	17.24%	20.00%
46-65	57.65%	53.85%	68.97%	50.00%
over 65	10.59%	7.69%	6.90%	16.67%
male	49.65%	69.57%	50.00%	42.19%
female	50.35%	30.43%	50.00%	57.81%
Question 4 - Participated activities	Percentage of Total			
motor boating	21.62%	17.32%	22.10%	24.28%
boat fishing	10.81%	8.66%	13.26%	9.83%
bank fishing	5.20%	3.15%	6.63%	5.20%
canoeing/kayaking	2.91%	3.15%	2.21%	3.47%
swimming	12.06%	12.60%	12.71%	10.98%
waterskiing	9.56%	11.81%	10.50%	6.94%
windsurfing	0.83%	1.57%	0.55%	0.58%
picnicing	6.65%	3.94%	6.08%	9.25%
camping	3.95%	2.36%	4.97%	4.05%
sun bath	8.94%	10.24%	7.73%	9.25%
sailing	1.25%	2.36%	0.00%	1.73%
hiking	5.61%	8.66%	4.42%	4.62%
personal watercraft	10.19%	14.17%	7.73%	9.83%
other	0.42%	0.00%	1.10%	0.00%
Question 5 (Fill in the blank survey responses)	Percentage of Total			
Boat Fishing	8.47%			
Boating	20.34%			
Camping	1.69%			
Canoeing	1.69%			
Fishing	10.17%			
Jet skiing/ personal watercraft	11.86%			
Motor Boating	25.42%			
Picnic	1.69%			
Water skiing/ wakeboarding	4.24%			
Question 6 - How many in your group?	Percentage of Total			

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
18 up	3.30	3.19	3.32	3.34
under 18	1.20	0.89	1.64	0.95
Question 7 - Length of stay	Average Stay (days)			
day/hours	4.72	4.40	6.10	3.83
overnight/nights	6.08	9.50	7.52	3.15
percent of day users	43.48%	38.46%	42.00%	46.77%
percent of overnight users	56.52%	61.54%	58.00%	53.23%
Question 8 - Type of watercraft	Percentage of Total			
Powerboats	60.61%	48.94%	65.38%	65.15%
personal/jet ski	24.85%	31.91%	25.00%	19.70%
canoe/kayaks/row	9.09%	12.77%	7.69%	7.58%
sailboats/boards	5.45%	6.38%	1.92%	7.58%
Question 9 - How crowded was the lake	Average ranking			
Average ranking	2.71	2.00	2.35	3.22
Question 10 - Describe number of people at lake	Percentage of Total			
too many	10.64%	10.00%	12.50%	9.09%
just right	80.85%	70.00%	87.50%	90.91%
too few	8.51%	20.00%	0.00%	0.00%
Question 11 - Will you return?	Percentage of Total			
certainly	88.89%	89.47%	86.67%	90.91%
probably	11.11%	10.53%	13.33%	9.09%
probably not	0.00%	0.00%	0.00%	0.00%
certainly not	0.00%	0.00%	0.00%	0.00%
Question 12 - Interfering conditions	Average Ranking (1-4)			
boat wakes	1.57	1.89	1.36	1.27
too many on shoreline	2.84	1.77	2.89	3.26
too many watercraft	2.65	2.04	2.72	2.84
too much trash/litter...	2.92	2.00	2.95	3.27
conflicts with others	2.95	1.85	3.00	3.38
loud/rude/others	2.95	1.92	2.98	3.35
boat hazards	2.86	1.55	2.95	3.24
tree cutting on shoreline	1.11	1.05	1.29	1.00
bulkheads	1.09	1.06	1.14	1.09
muddy water	1.25	1.26	1.36	1.09
eroding	1.30	1.63	1.08	1.00
port-a-john	2.95	2.15	2.91	3.32
Question 13 - Noise impacts	Average Ranking (1-4)			
powerboats	1.33	1.42	1.27	1.27
watercraft	1.11	1.11	1.07	1.18
airboats	1.09	1.21	1.00	1.00
on-shore activities-day	1.04	1.00	1.13	1.00
on-shore activities-night	1.11	1.11	1.20	1.00
recreation on lake	1.05	1.06	1.07	1.00
comments	N/A			
Question 14 - Keep boat overnight?	Percentage of Total			
yes	55.12%	77.27%	69.05%	38.10%
no	44.88%	22.73%	30.95%	61.90%
Question 15 - What type of dock?	Percentage of Total			
private	92.54%	94.12%	100.00%	82.61%
commercial	2.99%	0.00%	0.00%	8.70%
community	4.48%	5.88%	0.00%	8.70%

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
Question 16 - How many nights keep a boat				
private dock	20.07	48.07	14.62	5.35
community dock	1.00	0.00	0.00	0.00
commercial dock	0.00	0.00	0.00	0.00
on trailer	1.75	1.00	3.00	1.50
Question 17 N/A				
Question 18 - willing to wait for launch?				
	Percentage of Total			
0-5	3.03%	0.00%	9.09%	0.00%
6-10	39.39%	61.54%	18.18%	33.33%
11-15	36.36%	23.08%	36.36%	55.56%
16-20	18.18%	7.69%	36.36%	11.11%
20-more	3.03%	7.69%	0.00%	0.00%
Question 19 - Which reflects preferred boat use level?				
	Percentage of Total			
Photo A	32.56%	21.05%	30.77%	54.55%
Photo B	18.60%	15.79%	23.08%	18.18%
Photo C	37.21%	52.63%	23.08%	27.27%
Photo D	11.63%	10.53%	23.08%	0.00%
Photo E	0.00%	0.00%	0.00%	0.00%
None	0.00%	0.00%	0.00%	0.00%
Question 19 - Which reflects too high of level				
	Percentage of Total			
Photo A	2.17%	3.70%	0.00%	3.13%
Photo B	1.45%	0.00%	2.13%	1.56%
Photo C	9.42%	7.41%	10.64%	9.38%
Photo D	26.09%	11.11%	46.81%	17.19%
Photo E	37.68%	40.74%	29.79%	42.19%
None	23.19%	37.04%	10.64%	26.56%
Question 19 - Which reflects need for management?				
	Percentage of Total			
Photo A	0.00%	0.00%	0.00%	0.00%
Photo B	0.00%	0.00%	0.00%	0.00%
Photo C	4.76%	5.26%	8.33%	0.00%
Photo D	7.14%	0.00%	8.33%	18.18%
Photo E	38.10%	21.05%	50.00%	54.55%
None	50.00%	73.68%	33.33%	27.27%
Question 20				
	Percentage of Total			
no wake zone				
Oppose -2	11.38%	30.77%	12.20%	1.79%
-1	4.07%	3.85%	7.32%	1.79%
0	61.79%	38.46%	58.54%	75.00%
1	12.20%	15.38%	7.32%	14.29%
Support 2	10.57%	11.54%	14.63%	7.14%
Where?				
lower speed limits				
Oppose -2	11.38%	36.00%	9.76%	1.75%
-1	8.94%	12.00%	17.07%	1.75%
0	60.16%	40.00%	51.22%	75.44%
1	13.82%	4.00%	9.76%	21.05%
Support 2	5.69%	8.00%	12.20%	0.00%
Where?				
limit residential development				
Oppose -2	15.91%	26.32%	7.14%	9.09%
-1	11.36%	15.79%	14.29%	0.00%

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
0	31.82%	31.58%	28.57%	36.36%
1	20.45%	0.00%	35.71%	36.36%
Support 2 Comment	20.45%	26.32%	14.29%	18.18%
limit commercial development				
Oppose -2	16.28%	26.32%	7.69%	9.09%
-1	16.28%	21.05%	23.08%	0.00%
0	23.26%	21.05%	15.38%	36.36%
1	32.56%	26.32%	38.46%	36.36%
Support 2 Comments	11.63%	5.26%	15.38%	18.18%
establish non-motorized areas				
Oppose -2	14.75%	40.00%	12.50%	5.26%
-1	7.38%	16.00%	10.00%	1.75%
0	51.64%	24.00%	47.50%	66.67%
1	12.30%	16.00%	12.50%	10.53%
Support 2 Where?	13.93%	4.00%	17.50%	15.79%
stricter boat noise restrictions				
Oppose -2	13.68%	32.00%	9.76%	3.45%
-1	9.47%	8.00%	9.76%	10.34%
0	58.95%	36.00%	60.98%	75.86%
1	12.63%	16.00%	14.63%	6.90%
Support 2 Type?	5.26%	8.00%	4.88%	3.45%
require reservations or permits				
Oppose -2	35.21%	57.89%	64.29%	13.16%
-1	16.90%	21.05%	21.43%	13.16%
0	39.44%	15.79%	14.29%	60.53%
1	5.63%	0.00%	0.00%	10.53%
Support 2 Comments	2.82%	5.26%	0.00%	2.63%
greater law enforcement				
Oppose -2	31.82%	47.37%	7.14%	36.36%
-1	9.09%	10.53%	14.29%	0.00%
0	38.64%	26.32%	42.86%	54.55%
1	9.09%	10.53%	7.14%	9.09%
Support 2 Comments	11.36%	5.26%	28.57%	0.00%
increase fees				
Oppose -2	56.82%	68.42%	57.14%	36.36%
-1	9.09%	0.00%	21.43%	9.09%
0	22.73%	26.32%	7.14%	36.36%
1	4.55%	0.00%	7.14%	9.09%
Support 2 Comments	6.82%	5.26%	7.14%	9.09%
decrease max horsepower boats				
Oppose -2	27.66%	48.00%	27.50%	10.34%
-1	5.32%	8.00%	7.50%	0.00%
0	53.19%	36.00%	47.50%	75.86%
1	7.45%	4.00%	7.50%	10.34%

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
Support 2	6.38%	4.00%	10.00%	3.45%
allow water taxis				
Oppose -2	9.86%	26.32%	7.14%	2.63%
-1	4.23%	0.00%	14.29%	2.63%
0	53.52%	36.84%	28.57%	71.05%
1	18.31%	26.32%	14.29%	15.79%
Support 2	14.08%	10.53%	35.71%	7.89%
Comments				
allow musical performances lake/shore				
Oppose -2	11.36%	15.79%	14.29%	0.00%
-1	4.55%	5.26%	7.14%	0.00%
0	22.73%	21.05%	28.57%	18.18%
1	27.27%	31.58%	14.29%	36.36%
Support 2	34.09%	26.32%	35.71%	45.45%
allow vending boat				
Oppose -2	27.27%	31.58%	28.57%	18.18%
-1	11.36%	5.26%	14.29%	18.18%
0	18.18%	21.05%	21.43%	9.09%
1	18.18%	15.79%	21.43%	18.18%
Support 2	25.00%	26.32%	14.29%	36.36%
allow SCUBA				
Oppose -2	15.91%	26.32%	14.29%	0.00%
-1	11.36%	10.53%	7.14%	18.18%
0	27.27%	26.32%	28.57%	27.27%
1	25.00%	21.05%	28.57%	27.27%
Support 2	20.45%	15.79%	21.43%	27.27%
allow boat races				
Oppose -2	36.36%	36.84%	42.86%	27.27%
-1	4.55%	0.00%	7.14%	9.09%
0	29.55%	21.05%	28.57%	45.45%
1	22.73%	31.58%	21.43%	9.09%
Support 2	6.82%	10.53%	0.00%	9.09%
Comment				
allow parasailing				
Oppose -2	18.60%	21.05%	23.08%	9.09%
-1	18.60%	10.53%	23.08%	27.27%
0	32.56%	31.58%	23.08%	45.45%
1	18.60%	26.32%	15.38%	9.09%
Support 2	11.63%	10.53%	15.38%	9.09%
allow larger tour boats				
Oppose -2	32.56%	36.84%	38.46%	18.18%
-1	20.93%	26.32%	23.08%	9.09%
0	25.58%	15.79%	30.77%	36.36%
1	11.63%	10.53%	0.00%	27.27%
Support 2	9.30%	10.53%	7.69%	9.09%
Comments				
allow additional tour boats				
Oppose -2	23.26%	31.58%	30.77%	0.00%
-1	11.63%	15.79%	7.69%	9.09%
0	34.88%	26.32%	38.46%	45.45%
1	18.60%	15.79%	7.69%	36.36%

Ramp Survey Only

Ramp Survey	n=150	n=28	n=57	n=65
	Total	Weekday	Weekend	Holiday
Support 2 Comments other	11.63%	10.53%	15.38%	9.09%

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
Question1 - Where are you staying?				
	Percentage of Total			
day only	6.80%	4.00%	9.76%	5.41%
perm. residence	9.71%	8.00%	14.63%	5.41%
vacation home	30.10%	16.00%	31.71%	37.84%
friends house	4.85%	4.00%	7.32%	2.70%
house near lake	4.85%	12.00%	2.44%	2.70%
renting lakefront	16.50%	24.00%	9.76%	18.92%
hotel/motel	3.88%	8.00%	2.44%	2.70%
tent	10.68%	4.00%	4.88%	21.62%
trailer/RV	5.83%	8.00%	9.76%	0.00%
other	6.80%	12.00%	7.32%	2.70%
Question 2 - Place of residence				
	Percentage of Total			
lakefront	16.04%	16.67%	22.50%	9.52%
Garrett Co	2.83%	0.00%	7.50%	0.00%
Maryland	26.42%	29.17%	27.50%	23.81%
outside MD	54.72%	54.17%	42.50%	66.67%
Zip/Place of residence	N/A	N/A	N/A	N/A
Question 3 - What is your age and sex?				
	Percentage of Total			
under 18	0.00%	0.00%	0.00%	0.00%
18-30	15.22%	13.33%	14.63%	16.67%
31-45	41.30%	40.00%	39.02%	44.44%
46-65	40.22%	40.00%	41.46%	38.89%
over 65	3.26%	6.67%	4.88%	0.00%
male	76.77%	84.21%	79.41%	71.74%
female	23.23%	15.79%	20.59%	28.26%
Question 4 - Participated activities				
	Percentage of Total			
motor boating	24.86%	32.14%	26.36%	21.23%
boat fishing	14.64%	28.57%	10.85%	12.85%
bank fishing	4.14%	5.36%	3.10%	4.47%
canoeing/kayaking	3.59%	1.79%	4.65%	3.35%
swimming	12.15%	12.50%	14.73%	10.06%
waterskiing	9.39%	7.14%	12.40%	7.82%
windsurfing	0.83%	1.79%	0.00%	1.68%
picnicing	3.59%	0.00%	3.88%	5.03%
camping	4.14%	0.00%	3.88%	5.59%
sun bath	8.29%	0.00%	7.75%	11.17%
sailing	1.66%	0.00%	2.33%	1.68%
hiking	6.35%	5.36%	6.20%	6.70%
personal watercraft	4.14%	1.79%	2.33%	6.15%
other	2.21%	3.57%	1.55%	2.23%
Question 5 Primary reason for visiting (fill in the blank by people surveyed)				
Motor boating	35.85%			
fishing	13.21%			
boating	12.26%			
boat fishing	8.49%			
Camping	3.77%			
Swimming	3.77%			
Sunning	1.89%			
Kayaking	2.83%			
Misc (only one response per grouping)	17.92%			
Question 6 - How many in your group?				
	Average group size			

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
18 up	4.45	2.52	3.58	6.26
under 18	1.26	0.92	1.38	1.35
Question 7 - Length of stay	Average Stay (days)			
day/hours	6.87	4.83	7.81	6.86
overnight/nights	4.12	5.33	3.83	3.64
percent day users	24.53%	25.00%	35.14%	15.56%
percent overnight users	75.47%	75.00%	64.86%	84.44%
Question 8 - Type of watercraft	Percentage of Total			
Powerboats	67.96%	87.50%	72.97%	58.00%
personal/jet ski	12.62%	0.00%	8.11%	20.00%
canoe/kayaks/row	11.65%	6.25%	8.11%	16.00%
sailboats/boards	7.77%	6.25%	10.81%	6.00%
Question 9 - How crowded was the lake	Average ranking			
Average ranking	2.29	1.75	2.27	2.67
Question 10 - Describe number of people at lake	Percentage of Total			
too many	20.79%	8.33%	19.51%	30.56%
just right	73.27%	79.17%	75.61%	66.67%
too few	5.94%	12.50%	4.88%	2.78%
Question 11 - Will you return?	Percentage of Total			
certainly	84.00%	80.00%	92.50%	77.14%
probably	14.00%	16.00%	5.00%	22.86%
probably not	2.00%	4.00%	2.50%	0.00%
certainly not	1.00%	4.00%	0.00%	0.00%
Question 12 - Interfering conditions	Average Ranking (1-4)			
boat wakes	2.01	2.09	1.83	2.13
too many on shoreline	1.58	1.91	1.08	1.85
too many watercraft	1.93	2.23	1.50	2.18
too much trash/litter...	1.68	2.00	1.25	1.91
conflicts with others	1.67	2.22	1.15	1.86
loud/rude/others	1.74	2.22	1.23	1.95
boat hazards	1.70	2.04	1.25	1.93
tree cutting on shoreline	1.41	2.11	1.23	1.13
bulkheads	1.34	2.09	1.05	1.16
muddy water	1.44	2.17	1.18	1.24
eroding	1.64	2.04	1.55	1.45
port-a-john	1.92	2.43	1.53	2.03
Question 13 - Noise impacts	Average Ranking (1-4)			
powerboats	1.65	2.08333333	1.59	1.42
watercraft	1.67	2.20833333	1.61	1.36
airboats	1.23	1.0625	1.30	1.22
on-shore activities-day	1.36	2.125	1.10	1.12
on-shore activities-night	1.35	2.125	1.10	1.09
recreation on lake	1.35	2	1.13	1.13
comments	N/A	N/A	N/A	N/A
Question 14 - Keep boat overnight?	Percentage of Total			
yes	66.99%	82.61%	65.79%	58.14%
no	33.01%	17.39%	34.21%	41.86%
Question 15 - What type of dock?	Percentage of Total			
private	78.69%	82.35%	65.22%	87.50%
commercial	9.84%	11.76%	17.39%	4.17%
community	11.48%	5.88%	17.39%	8.33%

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
Question 16 - How many nights keep a boat				
private dock	39.53	12.91	51.73	50.44
community dock	55.78	48.00	62.20	47.50
commercial dock	81.33	47.00	150.00	0.00
on trailer	2.67	0.00	2.50	3.00
Question 17 N/A				
Question 18 - willing to wait for launch?				
	Percentage of Total			
0-5	13.79%	0.00%	17.39%	17.39%
6-10	20.69%	16.67%	21.74%	21.74%
11-15	22.41%	8.33%	26.09%	26.09%
16-20	10.34%	16.67%	4.35%	13.04%
20-more	32.76%	58.33%	30.43%	21.74%
Question 19 - Which reflects preferred boat use level?				
	Percentage of Total			
Photo A	47.25%	41.18%	56.10%	38.24%
Photo B	41.76%	41.18%	36.59%	47.06%
Photo C	8.79%	17.65%	4.88%	8.82%
Photo D	0.00%	0.00%	0.00%	2.94%
Photo E	2.20%	0.00%	2.44%	2.94%
None	0.00%	0.00%	0.00%	0.00%
Question 19 - Which reflects too high of level				
	Percentage of Total			
Photo A	0.90%	0.00%	0.00%	2.22%
Photo B	1.80%	0.00%	4.76%	0.00%
Photo C	12.61%	40.00%	4.76%	4.44%
Photo D	29.73%	25.00%	28.57%	35.56%
Photo E	43.24%	30.00%	47.62%	44.44%
None	11.71%	5.00%	14.29%	13.33%
Question 19 - Which reflects need for management?				
	Percentage of Total			
Photo A	0.00%	0.00%	0.00%	0.00%
Photo B	0.00%	0.00%	0.00%	0.00%
Photo C	5.56%	0.00%	7.69%	5.88%
Photo D	26.67%	35.29%	25.64%	23.53%
Photo E	43.33%	41.18%	43.59%	44.12%
None	24.44%	23.53%	23.08%	26.47%
Question 20				
	Percentage of Total			
no wake zone				
Oppose -2	10.48%	4.35%	12.50%	11.90%
-1	9.52%	8.70%	17.50%	2.38%
0	35.24%	39.13%	30.00%	38.10%
1	28.57%	30.43%	25.00%	30.95%
Support 2	16.19%	17.39%	15.00%	16.67%
Where?				
lower speed limits				
Oppose -2	9.43%	4.35%	12.50%	9.30%
-1	17.92%	13.04%	17.50%	20.93%
0	35.85%	30.43%	42.50%	32.56%
1	30.19%	47.83%	22.50%	27.91%
Support 2	6.60%	4.35%	5.00%	9.30%
Where?				
limit residential development				
Oppose -2	4.72%	0.00%	5.00%	6.98%
-1	9.43%	0.00%	15.00%	9.30%

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
0	18.87%	21.74%	20.00%	16.28%
1	39.62%	43.48%	32.50%	44.19%
Support 2 Comment	27.36%	34.78%	27.50%	23.26%
limit commercial development				
Oppose -2	4.72%	0.00%	5.00%	6.98%
-1	9.43%	13.04%	10.00%	6.98%
0	24.53%	21.74%	35.00%	16.28%
1	32.08%	30.43%	20.00%	44.19%
Support 2 Comments	29.25%	34.78%	30.00%	25.58%
establish non-motorized areas				
Oppose -2	10.31%	4.35%	12.20%	12.12%
-1	13.40%	4.35%	14.63%	18.18%
0	28.87%	34.78%	29.27%	24.24%
1	37.11%	39.13%	41.46%	30.30%
Support 2 Where?	10.31%	17.39%	2.44%	15.15%
stricter boat noise restrictions				
Oppose -2	9.38%	0.00%	12.50%	12.12%
-1	14.58%	17.39%	17.50%	9.09%
0	48.96%	47.83%	50.00%	48.48%
1	16.67%	26.09%	7.50%	21.21%
Support 2 Type?	10.42%	8.70%	12.50%	9.09%
require reservations or permits				
Oppose -2	16.84%	13.04%	23.08%	12.12%
-1	34.74%	34.78%	38.46%	30.30%
0	33.68%	30.43%	30.77%	39.39%
1	12.63%	17.39%	7.69%	15.15%
Support 2 Comments	2.11%	4.35%	0.00%	3.03%
greater law enforcement				
Oppose -2	7.29%	8.70%	7.50%	6.06%
-1	17.71%	21.74%	15.00%	18.18%
0	35.42%	30.43%	45.00%	27.27%
1	26.04%	26.09%	17.50%	36.36%
Support 2 Comments	13.54%	13.04%	15.00%	12.12%
increase fees				
Oppose -2	23.16%	36.36%	22.50%	15.15%
-1	38.95%	31.82%	50.00%	30.30%
0	18.95%	13.64%	20.00%	21.21%
1	16.84%	18.18%	5.00%	30.30%
Support 2 Comments	2.11%	0.00%	2.50%	3.03%
decrease max horsepower boats				
Oppose -2	11.65%	4.76%	7.32%	19.51%
-1	20.39%	19.05%	21.95%	19.51%
0	32.04%	47.62%	34.15%	21.95%
1	26.21%	28.57%	26.83%	24.39%

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
Support 2	9.71%	0.00%	9.76%	14.63%
allow water taxis				
Oppose -2	4.21%	0.00%	2.50%	9.09%
-1	18.95%	13.64%	17.50%	24.24%
0	36.84%	40.91%	40.00%	30.30%
1	35.79%	40.91%	37.50%	30.30%
Support 2	4.21%	4.55%	2.50%	6.06%
Comments				
allow musical performances lake/shore				
Oppose -2	4.12%	0.00%	4.88%	6.06%
-1	12.37%	21.74%	9.76%	9.09%
0	17.53%	21.74%	14.63%	18.18%
1	53.61%	56.52%	56.10%	48.48%
Support 2	12.37%	0.00%	14.63%	18.18%
allow vending boat				
Oppose -2	18.75%	21.74%	17.50%	18.18%
-1	28.13%	26.09%	22.50%	36.36%
0	21.88%	21.74%	25.00%	18.18%
1	21.88%	30.43%	20.00%	18.18%
Support 2	9.38%	0.00%	15.00%	9.09%
allow SCUBA				
Oppose -2	8.99%	0.00%	5.00%	18.18%
-1	19.10%	12.50%	22.50%	18.18%
0	33.71%	31.25%	32.50%	36.36%
1	31.46%	56.25%	32.50%	18.18%
Support 2	6.74%	0.00%	7.50%	9.09%
allow boat races				
Oppose -2	25.56%	12.50%	26.83%	30.30%
-1	36.67%	43.75%	36.59%	33.33%
0	14.44%	6.25%	14.63%	18.18%
1	21.11%	37.50%	19.51%	15.15%
Support 2	2.22%	0.00%	2.44%	3.03%
Comment				
allow parasailing				
Oppose -2	20.00%	18.75%	17.07%	24.24%
-1	37.78%	37.50%	39.02%	36.36%
0	24.44%	12.50%	26.83%	27.27%
1	14.44%	31.25%	14.63%	6.06%
Support 2	3.33%	0.00%	2.44%	6.06%
allow larger tour boats				
Oppose -2	19.10%	0.00%	17.07%	30.30%
-1	38.20%	60.00%	39.02%	27.27%
0	30.34%	26.67%	26.83%	36.36%
1	10.11%	13.33%	12.20%	6.06%
Support 2	2.25%	0.00%	4.88%	0.00%
Comments				
allow additional tour boats				
Oppose -2	16.67%	9.09%	9.76%	30.30%
-1	35.42%	31.82%	43.90%	27.27%
0	34.38%	40.91%	26.83%	39.39%
1	11.46%	18.18%	14.63%	3.03%

Boat Survey only

	n=113	n=24	n=41	n=48
	Total	Weekday	Weekend	Holiday
Support 2 Comments other	2.08%	0.00%	4.88%	0.00%

Resident Survey Results Summary

Month		
	june	41.71%
	july	19.65%
	aug	38.64%

days		
	0-5	15.10%
	6-10	23.63%
	11-20	28.77%
	21-30	32.49%

Overnight Stay			
1	adult		2.88
	child		2.33
2	adult		2.96
	child		2.48
3	adult		3.09
	child		2.53
4	adult		3.16
	child		2.54
5	adult		3.12
	child		2.54
6	adult		3.03
	child		2.56
7	adult		2.81
	child		2.45
8	adult		2.84
	child		2.74
9	adult		2.91
	child		2.79
10	adult		2.80
	child		2.68
11	adult		2.77
	child		2.77
12	adult		2.84
	child		2.59
13	adult		2.83
	child		2.45
14	adult		2.81
	child		2.38
15	adult		2.81
	child		2.34
16	adult		3.01
	child		2.36
17	adult		2.84
	child		2.42
18	adult		2.78
	child		2.31
19	adult		2.81
	child		2.37
20	adult		2.76
	child		2.35

Overnight Stay (cont)

21	adult	2.79
	child	2.33
22	adult	2.80
	child	2.43
23	adult	2.90
	child	2.51
24	adult	2.82
	child	2.49
25	adult	2.79
	child	2.30
26	adult	2.77
	child	2.31
27	adult	2.86
	child	2.41
28	adult	2.78
	child	2.32
29	adult	2.87
	child	2.36
30	adult	2.99
	child	2.42
31	adult	3.05
	child	2.88

motor boat	adult	7.65
	child	6.59
boat fishing	adult	4.80
	child	3.42
canoe/kayak	adult	3.94
	child	7.55
swim	adult	7.89
	child	5.39
personal watercraft	adult	5.23
	child	5.48
water ski	adult	5.16
	child	0.88
windsurf	adult	0.44
	child	3.01
sail	adult	2.08
	child	0.86
other	adult	4.53
	child	1.45

Rankings 1-4

Weeks rented out	3.79
Sat/Sun crowding	2.32
Weekday crowding	2.94

Rec interference (Rankings 1-4)

boat wakes	2.94
too many people	1.33
too many watercraft	2.89
litter etc.	1.79
conflicts w/others	1.77
loud/rude	2.00
boating hazards	1.54
tree cutting on shore	1.34
bulkheads/riprap	1.32
muddy water	2.08
eroding shoreline	2.53
public sanitary fac.	1.42

Noise

powerboats	2.47
personal watercraft	2.61
airboats	1.80
on-shore activities/day	1.29
on-shore activities/night	1.76
others on lake	1.56

Comments re: noise N/A

Watercraft at lakefront home

powerboats	44.14%
personal watercraft/jet ski	13.67%
canoe/kayak/rowboat	30.42%
sailboat/board	11.76%
Transient watercraft	5.10

Age/Sex

under 18	0.22%
18-21	0.00%
22-45	14.53%
46-65	56.62%
over 65	28.63%
male	72.27%
female	27.73%

Preferred Use

Photo A	38.71%
Photo B	42.98%
Photo C	14.91%
Photo D	1.86%
Photo E	0.99%
None	

Too Busy (high) to come

Photo A	0.00%
Photo B	0.58%
Photo C	9.34%
Photo D	32.82%
Photo E	37.54%
None	

Too Busy, Management Action needed	
Photo A	0.00%
Photo B	0.80%
Photo C	9.20%
Photo D	33.20%
Photo E	42.00%
None	14.80%
no wake zone	
Oppose -2	11.43%
-1	11.19%
0	32.25%
1	21.90%
Support 2	23.23%
Where?	
lower speed limits	
Oppose -2	11.86%
-1	13.08%
0	29.42%
1	23.00%
Support 2	22.64%
Where?	
limit residential development	
Oppose -2	5.71%
-1	4.90%
0	9.56%
1	21.91%
Support 2	57.58%
Comment	
limit commercial development	
Oppose -2	6.43%
-1	6.19%
0	14.95%
1	24.07%
Support 2	48.36%
Comments	
establish non-motorized areas	
Oppose -2	17.61%
-1	12.68%
0	43.43%
1	15.14%
Support 2	11.15%
Where?	
stricter boat noise restrictions	
Oppose -2	6.74%
-1	5.00%
0	21.05%
1	25.47%
Support 2	41.74%
Type?	

require reservations or permits		
Oppose -2		18.10%
-1		13.98%
0		34.90%
1		19.98%
Support 2		12.93%
Comments		
greater law enforcement		
Oppose -2		6.95%
-1		9.04%
0		27.46%
1		29.20%
Support 2		27.35%
Comments		
increase fees		
Oppose -2		16.55%
-1		13.83%
0		32.62%
1		19.50%
Support 2		17.38%
Comments		
decrease max horsepower boats		
Oppose -2		17.56%
-1		11.27%
0		29.77%
1		20.28%
Support 2		21.00%
allow water taxis		
Oppose -2		32.79%
-1		11.32%
0		29.99%
1		18.20%
Support 2		7.70%
Comments		
allow musical performances lake/shore		
Oppose -2		19.32%
-1		12.46%
0		24.10%
1		26.43%
Support 2		17.69%
allow vending boat		
Oppose -2		50.57%
-1		17.82%
0		13.68%
1		9.43%
Support 2		8.51%
allow SCUBA		
Oppose -2		32.36%
-1		16.30%
0		32.71%
1		12.78%
Support 2		5.86%

allow boat races		
Oppose -2		56.06%
-1		13.87%
0		14.22%
1		8.62%
Support 2		7.23%
Comment		
allow parasailing		
Oppose -2		50.53%
-1		16.45%
0		18.45%
1		8.81%
Support 2		5.76%
allow larger tour boats		
Oppose -2		58.84%
-1		15.61%
0		14.80%
1		6.47%
Support 2		4.16%
Comments		
allow additional tour boats		
Oppose -2		49.29%
-1		14.34%
0		22.63%
1		9.36%
Support 2		4.38%

Appendix D: Survey of Commercial Boat Rental Operators and Responses

How would describe your business? (retail, rental, full service marina, etc.)	How long has this business existed (including prior to your ownership)?	Is this business locally owned?	How many powerboats do you have available for rent?	How many non-motorized craft do you have available for rent?	What types of non-motorized craft do you rent? (kayaks, canoes, paddleboats, etc.)	How many personal watercraft do you have available for rent?	How many people are in an average-sized rental party?
Full service marina	20 years	yes	26	0		0	4
full service marina	Over 25 years	yes	65	3	canoes	0	6
retail, rental, marina--full service	45 years	no	71	0		0 sales only	5 to 6
Retail w rentals	1987	yes	0	20	kayaks	0	2
rental	26 years	yes	55	4 canoes, 3 paddleboats	canoes and paddleboats	0	6 (pontoon 12)
Rental service and sales of rv	10 years	yes	2	0		30	2
full service marina , retail	since 1966	yes	10 this year, will have 27 next summer	0		0	pontoons 8, 4 other boats
rent and retail	7	yes	24				4-6, 8-10

Do you allow privately-owned boats to be launched at your facility?	If yes, approximately how many privately-owned boats launch at your facility per week between Memorial Day and Labor Day during a typical summer?	How many boat rentals do you process on a typical summer weekday?	How many boat rentals do you process on a typical summer weekend day?	Do you rent slips? For how long a period of time? (Weekly, monthly, etc.)	How many slips do you have for rent?	How many slips were rented during 2003?
2	1	10	15	1, by season	30	30
2		30	30	seasonal	2	2
1 \$10 in, \$10 out	7-10 per week	most rentals weekly 20-30 contracts per day for daily rentals. Weekly 40 contracts	50	0 at Bills; 22 at Glendale Shores, 14 at Outdoor Center seasonal basis(yearly)	36	all
2		0-20	weekends less due to crowding--if crowding don't let kayaks out--follow jet rules	1, most by season agents for landlord	74	74
2		25	30	2		
2		2	2	2		
2		mostly weekly rentals 2/ day avg(all rboats)	10	1, by season have dry dock system	22 now, permit for 65	22 in water
no		20	20	yes	4	

For columns AE through : -2=Strongly disag

What percentage of your total annual business do you do during June?	What percentage of your total annual business do you do during July?	What percentage of your total annual business do you do during August?	Are you open Year round?	If not, when?	What are your daily operating hours?	Are your facilities fully functional at all water levels 1=yes, 2=no	If not, which facilities are affected, and at what water levels? 1=high water, 2=low water	Institute expanded or new no-wake zones	Institute lower speed limits or new speed zones
25	50	25	1		5-Sep	1		-1	-2
20	30	30	1		9-6, summer 8-8	2	2, docks when exceptionally low hard to get boats out of water (rarely)	-2	-2
for rentals 23	rentals 25	rentals 25	1		summer 8-6, 9-5	2	1, Carniel Cove can't get under State Park bridge and shoreline erosion, 2 more damaged props and grass tangles in motor then over heats. Docks and ramps ok	0	-1
10%	8%	10-15%	1		9-6, 7 days	2	2 late october some dock not usable due to low water	-1	don't need new low wake zones, would like to see lower speed limits
10	40	45	2	May-Sept	8am to 7 pm	1		2	2
25%	35%	40%	1		Summer 9-8, winter closed Sun and Mon.	1		-2	-2
25	35	25	1		9-5, 7 days during summer, winter closed Sun and Weds.	1		1	1
15	40	40	no	May-Sept	5-Sep	yes		1	-1

ree, -1=Disagree, 0=Neutral, 1=Support, 2=Strongly support

Limit the amount of residential development around Deep Creek Lake	Limit the amount of commercial development around Deep Creek Lake	Special areas for non-motorized vessels	Stricter boat noise restrictions	Require prior reservations or permits to use the lake or public facilities adjacent to the lake	Provide a greater law enforcement presence on the lake	Charge or increase fees to use the lake or public facilities adjacent to the lake	Decrease the maximum allowable horsepower for boat motors
-2	-2	-1	-2	-2	2	-1	-2
-1	-2	-1	-1	-1	-1	-1	-1
-1	-1	0	-1	-2	1	0	-2
0, would like to see planned development	-2	-1	0	-1	0	day users not paying fair share compared to annual users	0
2	2	0	1	-1	0	1	2
-2	-2	-2	-2	0	0	-1	-2
-1	-2	-2	2	-2	-2	-2	-2
1-uniformly	-1	-1	-1	0	2	2	2

What should be the maximum allowable horsepower?	Allow water taxis	Allow musical performances on the lake or along the shoreline	Allow food vending by boat	Allow commercial SCUBA diving services	Allow boat races parasailing	Permit larger four boats	Permit additional four boats	Comments
no limit	1	-1	1	1	1	-1	1	Like the regulations as they stand- just need to enforce existing regulations . Education a problem because lake users are so spread out--hard to get together to work out issues. Lake only crowded four days a year--good relations w DNR and lake manager. People with huge horsepower high performance boats don't come to Deep Creek because boats don't perform as well at the altitude. Also only a few people bring 30' or larger boats--not practical, so need to regulate. Boat races might be fun, but too much impact/noise complaints from residences.
no change	2	2	2	1	0	2	0	more businesses on lake
500 hp	1	1	1	1	-1	-1	-1	Personal watercraft restrictions 7 days a week July 4 through labor day
depends on size of vessel	1	2	0	1	1	2	1	
115 hp outboards, 140 inboard	0	0	2	-2	-2	-2	-1	
no limit	0	0	0	-2	2	0	0	11-4 restriction is illegal and needs to be lifted--DNR code prevents discrimination on type of vessel since now State lake. Need to address this issue. All vehicles should be treated equally on the state waters.
	0	2	2	2	-1	1	1	Too much water policing--too picky on violations.
	0	1	2	-1	1	-1	0	stronger police presence at Arrowhead Cove

Appendix E: Predicted User Occasions through 2020 by Boating Type

APPENDIX E

User Occasion Analysis User Occasion Assessment - 2000 Baseline

Activity	2000 Household Population ¹	Individual Participation Rate ²	Frequency of Participation per Person ²	User Occasions to accommodate those participating in each activity
Swimming at Beach/ River/Lake	29,229	54.5%	6.64	105,773.91
Powerboating	29,229	15.6%	6.31	28,771.86
Canoeing	29,229	5.2%	3.63	5,517.27
Waterskiing	29,229	3.5%	4.8	4,910.47
Sailing	29,229	3.0%	3.97	3,481.17
Kayaking	29,229	8.0%	9.44	22,073.74
Fishing from Shore/Bank	29,229	22.4%	7.51	49,170.19
Fishing from Boat	29,229	13.1%	8.98	34,384.41
Fishing from Pier	29,229	6.6%	8.15	15,722.28
Cross-Country Skiing	29,229	1.0%	8.64	2,525.39
Hiking	29,229	30.1%	6.81	59,913.90
Nature Walks	29,229	4.9%	5.65	8,092.05
Tent Camping	29,229	15.9%	3.88	18,031.95
Cabin Camping	29,229	1.7%	8.37	4,158.99
Picnicking	29,229	47.8%	3.96	55,326.99

¹ Source: MDP, 2003.

² Source: Norris, et al., 2003.

User Occasion Assessment - 2005 Projections

Activity	2005 Est. Household Population ¹	Individual Participation Rate ²	Frequency of Participation per Person ²	User Occassions to accommodate those participating in each activity
Swimming at Beach/River/Lake	30,114	54.5%	6.64	108,976.54
Powerboating	30,114	15.6%	6.31	29,643.02
Canoeing	30,114	5.2%	3.63	5,684.32
Waterskiing	30,114	3.5%	4.8	5,059.15
Sailing	30,114	3.0%	3.97	3,586.58
Kayaking	30,114	8.0%	9.44	22,742.09
Fishing from Shore/Bank	30,114	22.4%	7.51	50,658.98
Fishing from Boat	30,114	13.1%	8.98	35,425.51
Fishing from Pier	30,114	6.6%	8.15	16,198.32
Cross-Country Skiing	30,114	1.0%	8.64	2,601.85
Hiking	30,114	30.1%	6.81	61,727.98
Nature Walks	30,114	4.9%	5.65	8,337.06
Tent Camping	30,114	15.9%	3.88	18,577.93
Cabin Camping	30,114	1.7%	8.37	4,284.92
Picnicking	30,114	47.8%	3.96	57,002.19

¹ Source: MDP, 2003.

² Source: Norris, et al., 2003.

User Occasion Assessment - 2010 Projections

Activity	2010 Est. Household Population ¹	Individual Participation Rate ²	Frequency of Participation per Person ²	User Occasions to accommodate those participating in each activity
Swimming at Beach/River/Lake	30,841	54.5%	6.64	111,607.41
Powerboating	30,841	15.6%	6.31	30,358.65
Canoeing	30,841	5.2%	3.63	5,821.55
Waterskiing	30,841	3.5%	4.8	5,181.29
Sailing	30,841	3.0%	3.97	3,673.16
Kayaking	30,841	8.0%	9.44	23,291.12
Fishing from Shore/Bank	30,841	22.4%	7.51	51,881.96
Fishing from Boat	30,841	13.1%	8.98	36,280.74
Fishing from Pier	30,841	6.6%	8.15	16,589.37
Cross-Country Skiing	30,841	1.0%	8.64	2,664.66
Hiking	30,841	30.1%	6.81	63,218.19
Nature Walks	30,841	4.9%	5.65	8,538.33
Tent Camping	30,841	15.9%	3.88	19,026.43
Cabin Camping	30,841	1.7%	8.37	4,388.37
Picnicking	30,841	47.8%	3.96	58,378.31

¹ Source: MDP, 2003.

² Source: Norris, et al., 2003.

User Occasion Assessment - 2015 Projections

Activity	2015 Est. Household Population ¹	Individual Participation Rate ²	Frequency of Participation per Person ²	User Occasions to accommodate those participating in each activity
Swimming at Beach/River/Lake	31,444	54.5%	6.64	113,789.55
Powerboating	31,444	15.6%	6.31	30,952.22
Canoeing	31,444	5.2%	3.63	5,935.37
Waterskiing	31,444	3.5%	4.8	5,282.59
Sailing	31,444	3.0%	3.97	3,744.98
Kayaking	31,444	8.0%	9.44	23,746.51
Fishing from Shore/Bank	31,444	22.4%	7.51	52,896.35
Fishing from Boat	31,444	13.1%	8.98	36,990.09
Fishing from Pier	31,444	6.6%	8.15	16,913.73
Cross-Country Skiing	31,444	1.0%	8.64	2,716.76
Hiking	31,444	30.1%	6.81	64,454.23
Nature Walks	31,444	4.9%	5.65	8,705.27
Tent Camping	31,444	15.9%	3.88	19,398.43
Cabin Camping	31,444	1.7%	8.37	4,474.17
Picnicking	31,444	47.8%	3.96	59,519.72

¹ Source: MDP, 2003.

² Source: Norris, et al., 2003.

User Occasion Assessment - 2020 Projections

Activity	2020 Est. Household Population ¹	Individual Participation Rate ²	Frequency of Participation per Person ²	User Occasions to accommodate those participating in each activity
Swimming at Beach/River/Lake	31,988	54.5%	6.64	115,758.17
Powerboating	31,988	15.6%	6.31	31,487.71
Canoeing	31,988	5.2%	3.63	6,038.05
Waterskiing	31,988	3.5%	4.8	5,373.98
Sailing	31,988	3.0%	3.97	3,809.77
Kayaking	31,988	8.0%	9.44	24,157.34
Fishing from Shore/Bank	31,988	22.4%	7.51	53,811.49
Fishing from Boat	31,988	13.1%	8.98	37,630.04
Fishing from Pier	31,988	6.6%	8.15	17,206.35
Cross-Country Skiing	31,988	1.0%	8.64	2,763.76
Hiking	31,988	30.1%	6.81	65,569.32
Nature Walks	31,988	4.9%	5.65	8,855.88
Tent Camping	31,988	15.9%	3.88	19,734.04
Cabin Camping	31,988	1.7%	8.37	4,551.57
Picnicking	31,988	47.8%	3.96	60,549.45

¹ Source: MDP, 2003.

² Source: Norris, et al., 2003.

