ESO-2389

AN ANALYSIS OF BOATERS AT RECENTLY CONSTRUCTED ODNR BOAT RAMPS IN OHIO

By

Kythrie Silva
Kristyn Pisor
Fred J. Hitzhusen

ESO 2389
ODNR Pilot Project
November 1997

Department of Agricultural Economics
The Ohio State University
Columbus, OH 43210

Table of Contents

List of Tables

INTRODUCTION

The Ohio Department of Natural Resources (ONDR) Division of Watercraft is seeking to obtain information that will aid in the allocation of funds toward new boat ramp construction in Ohio. The current system of funding lacks a well-defined economic model for selecting the most beneficial boat ramps or other projects to fund. Therefore, boat ramps may not be constructed in the most ideal locations or may be built when other forms of investment are more beneficial. In some instances, decisions to build boat ramps in a given community are influenced by political factors. Often the instigators of new boat ramp construction endorse the promise of increased economic activity in a given region.

The boat ramp construction program that the Division of Watercraft funds involves a funding agreement with political subdivisions in Ohio. The Division of Watercraft will often provide 50% of the initial capital fees while the applicant provides the remaining fees. While these percentages may change, the qualifications for applicants are standard. The ODNR requires a development study of the project to be conducted. The political subdivision must define the following: a statement of need, sources of local funding, a plan of the proposed development, operation and maintenance provisions, site suitability, handicapped and minority access, performance on previous ODNR projects, site accessibility and cost breakdown, the cost per boater served, an ODNR priority project, any unique considerations, the Primary Metropolitan Statistical Area (PMSA), and any unresolved adverse impacts. One of the motivating factors for local government agencies is the expectation that a new boat ramp will boost the local economy. Therefore, the purpose of this study is to provide further insight into the allocation of funds

through an analysis of boaters at newly constructed boat ramps in Ohio.

OBJECTIVES

I. To summarize information collected in the survey of Ohio boaters, including boaters characteristics, equipment, and participation at selected boat ramps

II. To provide a descriptive evaluation of each sample ramp site and available amenities

III. To provide estimates of economic benefits at selected ramp sites.

METHODOLOGY

During the months of April through September 1996, Ohio boaters were surveyed at selected boat ramps designated by the Ohio Department of Natural Resources, Division of Watercraft. Nine ramps were chosen on the basis of several criteria. These criteria are:

1. The ramps should be new (operational for no more than five seasons) for that location not renovations of old facilities. This allows us to ask boaters why they have changed to boating at this location.
2. Some of the funds used to build the ramp should have been provided by the state.
3. From the ramps that fit these requirements it would be necessary to pick a representative sample of different types of locations, such as inland lakes, inland rivers, Ohio river access, and Lake Erie. Also, ramps were to be selected from the group that showed a range of user fees.

After finding a group of ramps that fit criterion one and two it was noted that none of these new ramps charged fees, so two older ramps were added that charge user fees. However, it can not be

assumed that this group of nine ramps is a representative sample of Ohio boat ramps.

To obtain information about ramp usage, a questionnaire was developed by Kythrie Silva, Kristyn Pisor, and Professor Fredrick Hitzhusen, and was reviewed by the staff of ODNR, Division of Watercraft. The questionnaire was pretested at a recently constructed boat ramp at Alum Creek Reservoir, which was not included in the final sample set. The purpose of pretesting the questionnaire was to determine the accuracy of response to the questions posed. The questionnaire was subsequently reformatted and approved by ODNR, Division of Watercraft. An example of the survey used in this study can be found in Appendix A.

The method of administering the questionnaire was by personal interview, where the direction of the questions could be presented consistently. Each interview lasted approximately ten minutes. In between interviews, an extensive survey was conducted of the available amenities at each boat ramp. Photographs were subsequently taken at each site to capture the structural characteristics of each ramp for future reference.

Approximately sixty questionnaires were collected from each site during spring and summer visits, with additional surveys being administered when deemed necessary. The Belpre site was the only since exception flooding in the spring and cool weather on the day of our late summer visit resulted in only 46 surveys being collected. A total of 346 surveys were collected and were used in the statistical analysis of the data. The boat ramps selected are representative of boater experiences in Ohio, within the confines of the original parameters. A total of three boat ramps were removed from the original survey including Lake Lima, Chilicothe (Scioto River), and Forked Run State Park. These boat ramps met the original parameters set by ODNR, but lacked

boater traffic. This made it impossible to collect surveys in a cost effective manner. The following list reflects the boat ramps included in this survey, along with their location and the number of surveys collected:

1. Atwood Lake	(Inland Lake)	(58)
2. Avon Lake	(Lake Erie)	(60)
3. Belpre	(Ohio River)	(45)
4. Buckeye Lake	(Inland Lake)	(60)
5. Mazurik	(Lake Erie)	(59)
6. Sandusky	(Lake Erie)	(59)

RESULTS

POPULATION

Each of the boat ramps included in the survey is located in a Primary Metropolitan Statistical Area (PMSA) with the exception of the Sandusky boat ramp (Appendix B). The metropolitan area boundaries and names were defined by the Federal Office of Management and Budget on June 30, 1993. The PMSA is derived from census data with regard to population densities. The Sandusky boat ramp is located in a place of 25,000 to 49,999 inhabitants. Therefore, all the boat ramps included in the survey should potentially have an equal amount of visitors from the area population.

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Personal and family characteristics were collected from the boaters surveyed to help determine if these boaters were typical for Ohio. The information collected in this survey was compared to a larger and more detailed survey of Ohio boaters (1993) conducted by Ted Napier, Ph.D., of the Ohio State University, in conjunction with the Ohio Department of Natural

Resources, Division of Watercraft. This study conducted by Napier involved a random sampling of registered boaters across Ohio; therefore his survey's socio-demographic characteristics define the typical Ohio boater. The socio-demographic characteristics of the current study group are presented in Table 1.

Table 1: Socio-demographic Characteristics of Boaters

Characteristics	Atwood Lake	Avon Lake	Belpre	Buckeye Lake	Mazurik	Sandusky	total
Gender:							
% Male	100	98.3	91.3	95	93.7	98.3	96.3
Mean Age	43	40	39	38	46	40	41
S.D.	13	13	8.3	13	13	13	12
Employment Status:							
% Full	85	90	93.5	93.3	84.1	89.8	88.2
% Part	0	1.7	2.2	1.7	1.6	0	1.1
% Unemployed	3.3	1.7	0	0	1.6	1.7	1.4
% Retired	11.7	6.7	4.4	5	12.7	8.5	8.3
% Self Employed	6.7	13.3	10.9	21.7	20.1	27.1	17
Mean Education (yrs)	13	13.8	14.2	13.5	13.4	13.6	13.5
S.D.	2.8	2.3	2.2	2.9	3.4	2.4	2.7
Marital Status:							
% Married	73.3	66.7	84.8	73.3	84.1	69.5	74.1
% Single	20	21.7	8.7	15	7.9	27.1	17
% Divorced	6.7	11.7	6.5	11.7	7.9	3.4	8
Mean Household Size	2.8	3.3	3.2	3.1	3	2.9	3
S.D.	1.6	1.4	1	1.3	1.2	1.5	1.4
Race							
% White	98.3	95	100	93.3	98.4	94.9	96.6
% Black	1.7	3.3	0	5	1.6	5.1	2.9
% Asian	0	1.7	0	1.7	0	0	0.6

S.D. is Standard Deviation

Of the boaters surveyed, 96.3% of the study group were male. Boaters at Atwood Lake were composed of 100% male boaters at the time of the survey. This percentage is high because

the genders of the entire party were not taken into account. Generally, the individual interviewed was the owner of a boat using the ramp.

The mean age of the study sample was found to be 41 years. This figure is somewhat lower than previous studies of Ohio boaters conducted in 1986, 1991, and 1993. In the previous studies, the mean age of the primary income earner of registered boaters was found to be 46.5, 48.6, and 49.3 years, respectively (Napier, 1993). These differences found may be due to a variety of factors. For instance, Dr. Napier's study targeted the family's primary income earner while the boaters in our study group may not be the primary income earner for the household. Another reason may be that Dr. Napier's study reveals the average age of all registered Ohio boaters, but younger boaters may tend to boat more often and our sampling method would be more likely capture their responses. Finally, the mean age of the study group may not be statistically different then the previous studies. The standard deviation of the study group was 12 years. Because the standard deviation of the previous studies is not available, an accurate conclusion can not be drawn.

Of the total survey sample, 88.2% of boaters were fully employed. Employment status for part-time, unemployed and retired boaters was also collected, but these comprised significantly less of the boaters surveyed. Also within the survey sample, 17% of boaters were self-employed. Information on family income was not included in the survey but previous studies reveal that approximately 63.1% of registered Ohio boaters reported incomes of $35,000 and over, in 1993. Census data from 1990 revealed that comparable data for Ohio households was 39.8%. On average, Ohio boaters have higher incomes than the average Ohio household (Napier, 1993).

The mean education of the study sample was found to be 13.5 years of formal education. This educational achievement indicates that the study sample, on average, has achieved approximately 1.5 years of college education. This figure reflects previous studies where Ohio boaters achieved on average 1.5 years of college education. The conclusion drawn from the previous study is that Ohio boaters are very well educated in comparison to the population of Ohio (Napier, 1993).

Of the study sample, it was found that 74.7% of the respondents were married. Single, never married, respondents comprised 17% of the study sample. Finally, 8% of the respondents indicated that they were divorced. Marital status information regarding widow/widower was included on the survey but was never indicated by any of the respondents. The average household size for the boaters surveyed was 3 people. This figure is slightly lower than the state mean family size of 3.1 people in the 1990 Census data (Napier, 1993).

Information on race was also included in the survey and 96.6% of the respondents were white. These results were based on observation alone and did not include all members of the party. Only 2.9% of the respondents appeared to be African American, and only 0.6% of the respondents appeared to be of Asian decent in the study sample.

BOATING EQUIPMENT

Of the boaters surveyed, 97.7% owned a registered boat (Table 2). When asked to indicate the type of boat owned, 87.9% replied that they owned an open motor boat. The next

most common type of boat specified was the wave runner with 7.8% of respondents. Other types of boats indicated by respondents were cabin boats, sailboats, pontoons and canoes, but each of these boat types made up less than 1% of the response. There were no rowboats documented in the survey.

The mean length of the boats in the survey was 18 feet with a standard deviation of 4.1. This figure is closely correlated with the 1993 study by Napier in which the mean length of boats owned by Ohio boaters was 18.0 feet with a standard deviation of 5.3. The mean age of boats in the survey sample was 11.1 years. Belpre has the lowest average age with 5.7 years. The mean horsepower of the survey sample was 111.7. This figure was made lower by Atwood lake which has a horsepower limit of 20.

Table 2: Boat Characteristics

	Atwood Lake	Avon Lake	Belpre	Buckeye Lake	Mazurik	Sandusky	Total
% Own Boat	100	95	97.8	100	96.8	96.6	97.7
% Type:							
Open Motor Boat	91.6	85	93.5	93.3	95.1	69.5	87.9
Cabin	0	3.3	0	0	1.6	0	0.9
Row	0	0	0	0	0	0	0
Sail	1.7	0	0	0	0	3.4	0.9
Pontoon	3.3	0	2.2	0	0	0	0.9
Canoe	1.7	0	0	0	0	0	0.3
Waverunner	1.7	8.3	4.3	6.7	0	25.4	7.8
Mean Length	15.1	17.7	18.6	17.3	19.7	19.9	18
S.D.	1.7	3.8	3.8	2.7	2.8	6.5	4.1
Mean Age of Boat (yr)	12.5	14.4	5.7	10.7	13.1	9.1	11.1
S.D.	10.7	13.6	4.5	9.7	11.9	8.3	10.6
Mean Horsepower	15.3	102.6	131.4	109.4	148.8	167.1	111.7
S.D.	7.9	84.1	49.9	84.1	68.3	167.1	103.6

S.D. is Standard Deviation

BOATING PARTICIPATION IN OHIO

Within the survey sample, it was found that the average number of years of boating experience was 18.8 years (Table 3). The Belpre boat ramp appears to significantly deviate from the mean with an average of 13.2 years of boater experience in Ohio. During the survey, it was repeatedly stated that the area around the city of Belpre and Parkersburg, West Virginia, had lacked any boat facilities prior to the construction of the Belpre boat ramp. Therefore, this lack of convenient boat facilities could severely inhibit past boater participation. Another reason for the lower boater experience at the Belpre ramp may be due to the residence of the survey respondents. Approximately 37% of the respondents indicated that they reside in West Virginia. The survey conducted specifically asks for the number of years of boating experience in Ohio only. Therefore, respondents may have less experience boating in Ohio.

Boaters were asked to indicate the number of launches made at the particular boat ramp during the 1995 boating season. This information helps to indicate the frequency of boater participation at individual ramps. The average number of launches at the study ramps in 1995 for all boaters surveyed was 15. The individual boat ramps had comparable averages with only Mazurik boat ramp having a mean somewhat less with 11.2 launches in 1995.

To identify changes in respondents launch patterns with the construction of new boat ramps, boaters were asked to indicate the number of launches per year in Ohio prior to awareness of a particular boat ramp. While the number of launches varied considerably at each ramp, the average was found to be 35.2 launches. Of these respondents, 26.1% claimed to have changed the number of launches per year now that they were aware of the newly constructed boat ramp

(refer to Spending Patterns for further analysis). This impacted boater population now launches their boats more often and are therefore spending more for the increased recreation. The surveys at the Avon Lake and Belpre ramps revealed the greatest impact with approximately 35% of boaters claiming they had increased the number of launches per year. This information is important in evaluating the benefits derived from the new boat ramp construction and for determining how the boater population is impacted.

Table 3: Historical Patterns of Boaters in Ohio

	Atwood Lake	Avon Lake	Belpre	Buckeye Lake	Mazurik	Sandusky	Total
Mean years boating in Ohio	21.4	19.8	13.2	18.3	18.6	20.6	18.8
S.D.	13.2	12.4	10.3	15.1	16.8	13.1	13.9
Mean # launches at the sample ramp in 1995	13.9	17.9	19.2	15.2	11.2	13.8	15
S.D.	17.9	21.2	19.7	27.3	14.8	20.4	20.6
Mean # of total launches/year before aware	39.3	28.4	40.9	38.2	29.3	36	35.2
S.D.	40.3	32.7	48.3	42.5	34.9	41	40
% of boaters who have increased now that aware	30	35	34.8	18.3	15.9	25.4	26.1

S.D. is Standard Deviation

RECREATIONAL FISHING

Of the total boaters surveyed, 69.8% indicated that they were employing the ramp facilities for fishing purposes (Table 4). At the time of the survey, the Atwood Lake and Sandusky boat ramps were having a crappie and bass tournament, respectively. Therefore, the presence of a tournament may have positively influenced this percentage. While most of the boat ramps revealed higher percentages of boaters engaged in fishing activities, anywhere from 54.2%

to 86.7%, the Belpre boat ramp had only 47.8%. This figure indicates that fishing may not be what is motivating people to use the Belpre ramp.

Table 4: Profile of Fishermen

	Atwood Lake	Avon Lake	Belpre	Buckeye Lake	Mazurik	Sandusky	Total
Respondent #	60	60	46	60	63	59	348
Fisherman #	52	44	22	36	57	32	243
% Boaters fishing	86.7	73.3	47.8	60	90.5	54.2	69.8

INDEX OF BOAT RAMP FACILITIES

During each survey, an evaluation of the boat ramp facilities was conducted to categorize and compare each boat ramp (Table 5). Characteristics such as handicap accessibility, adequate trailer parking and good lighting appeared to be consistent throughout the boat ramps. A list was compiled of positive characteristics of boat ramps through personal interview and through evaluation of the ramps. Characteristics of particular concern were found to be security measures, courtesy docks and the number of boat launch lanes.

Security measures were found at boat ramps that charged a launch fee, including Avon Lake and Sandusky, where an individual was present during ramp hours. This appears to deter theft from parked vehicles. Also mentioned was the fact that someone would be aware if a boat did not make it back to the ramp. This is an important factor on Lake Erie where unexpected storms are common and are often dangerous. During the survey, respondents often stated that they would pay a fee if these security measures were taken.

Table 5: Index of Ramp Facilities

	Atwood Lake	Avon Lake	Belpre	Buckeye Lake	Mazurik	Sandusky
Restroom	0	1	1	1	0	1
Courtesy Dock	0	0	0	1	0	1
Phone	0	1	1	1	0	1
Food/Beverages	0	1	1	0	0	1
Automobile Parking	0	1	1	1	1	1
Adequate Trailer Parking*	1	1	1	1	1	1
Picnic Table/Grills	0	1	0	1	0	1
Security Measures**	0	1	0	0	0	1
Handicap Accessible	1	1	1	1	1	1
Good Lighting	1	1	1	1	1	1
Boat Launches Lanes	2	2	3	2	4	2
Totals	5	11	10	10	8	12

* Refers to lots with greater than 60 spaces for trailer parking
** Refers to an individual present during normal hours

Another characteristic of particular concern was the installation of courtesy docks. A courtesy dock serves as a convenient access for boaters to trailers, restroom, etc. without disrupting the boat launch area. The boat launch area is a concern for boaters because their priority is on launching the boat as quick as possible without the traffic build-up. Therefore, the presence of a courtesy dock as well as the number of launch sites are important factors in developing boat ramp sites.

With the creation of the index, it was found that the ramps that had the highest rating were also the ramps that charged fees (Avon Lake and Sandusky). Therefore, because boat ramps that charge fees can offer extra facilities, it cannot be automatically assumed that boat ramps that charge fees will result in lower boater participation.

SPENDING PATTERNS

Of the boaters within the survey, 23.3% purchase gas and oil near the boat ramp on a typical boat trip (Table 6), and 42.5% purchase meals, snacks and bait near the ramp. Also recorded in the survey was an approximate amount spent for each of these items on a typical boating trip. The survey requested that the total party was to be taken into account when estimating these figures. These per trip costs where then multiplied by each respondent's reported number of launches at the study ramp for the 1995 boating season (Table 7).

Table 6: % of Spending Locations of Boaters

	All Ramps
Gas:	
% near the ramp	23.3
% near home	61.8
% both	14.4
Food, Beverages and Bait:	
% near the ramp	42.5
% near home	43.4
% both	12.6

These calculations reveal that the 348 respondents spent approximately $201,156 during the 1995 season on gas, meals, snacks, and bait or $578.03 per boater. Of this $578.03 the respondents indicated that approximately $233.40 was spent near boat ramps. However, some portion of the above amounts are simply transfers (money that was spent near other ramp(s) prior to construction of the new ramp) not economic benefits of the new ramp.

Table 7: Boaters Expenditures 1995

	$ spent on Gas near the ramp	$ spent on Gas near home	$ spent on Gas near both	$ spent on Food, Drinks, Etc. near the ramp	$ spent on Food, Drinks, Etc. near home	$ spent on Food, Drinks, Etc. near both	Total
Atwood Lake	447.50	4,857	528	3,244	7,022	1,538	17,636.50
Avon Lake	4,192	13,441.50	5,199	3,354	7,635	4,899	38,720.50
Belpre	5,040	11,445	2,240	7,370	4,506.50	366.50	30,968
Buckeye Lake	7,629	13,935.50	961	14,237.25	4,267	5,360	46,389.75
Mazurik	3,903	5,223.50	6,218	9,355	2,313.50	1,545	28,558
Sandusky	9,908.50	6,506	7,745	4,553.50	6,830	3,340	38,883
Totals	31,120	55,408.50	22,891	42,113.75	32,574	17,048.50	201,155.75

In order to estimate the additional spending by boaters at the newly constructed boat ramps, we asked boaters to indicate whether they had increased boating now that they are aware of the new boat ramp. Responses indicating precise numbers of additional trips were not easily recalled, therefore low, mean, and high values will be given (see Appendix C). Of the 348 respondents, 26.1% claimed to increase boating an average of 4 additional times a year due to the construction of the new boat ramp. This indicates total economic benefits of $13,861.20 from these boaters for all six ramps. If we extrapolate these figures with an estimate of the total number of boaters at these ramps in a year, we can get a rough estimate of the total economic benefits to boaters (Table 8).

Table:8 Estimated Benefits of New Boat Ramps

	Estimated # of visits	% of boaters that increased visits	Average per boater expenditures for 4 additional visits	Total estimated annual benefits
Atwood Lake	3,049	30	$83.89	$76,734
Avon Lake	3,234	35	$141.78	$160,481
Belpre	3,003	34.8	$144.75	$151,270
Buckeye Lake	2,772	18.3	$156.91	$79,597
Mazurik	4,620	15.9	$253.80	$186,436
Sandusky	4,620	25.4	$186.27	$218,584
Total				$873,102

When calculating these estimates, every attempt was made to make them conservative and yet they remain impressive. These six boat ramps in one year have produced approximately $873,102 in new economic benefits.

Some portion of this economic development is being spent in the immediate vicinity of the ramp. We can estimate this amount by using only the figures given by respondents who stated that they typically buy gas, meals, snacks, and bait near the ramp. However, some percentage of expenditures made by boaters who indicated that they purchase their supplies both near the ramp and at home during the year should be included in these estimates. Since they stated that they have no typical spending location, 50% of these figures will be used (Table 9).

Table 9: Estimated Local Benefits of New Boat Ramps

	Estimated # of visits	% of boaters that increased visits	Average per boater expenditures near the ramp for 4 additional visits	Total estimated annual benefits	% of benefits spent near the ramp
Atwood Lake	3,049	30	$22.56	$20,635	27
Avon Lake	3,234	35	$62.38	$70,608	44
Belpre	3,003	34.8	$80.25	$83,864	55.4
Buckeye Lake	2,772	18.3	$88.18	$44,732	56.2
Mazurik	4,620	15.9	$126.90	$93,218	50
Sandusky	4,620	25.4	$58.80	$69,001	31.6
Total				$382,058	43.8

These figures show that 43.8% of the total estimated expenditures were made near the ramps. Boat ramps with lower percentages may not have as many establishments conveniently located near the ramp. This is certainly the case for the Atwood Lake ramp; the ramp that shows the lowest percentage of benefits spent near the ramp with only 27%. The increased annual spending near the newly constructed ramps may help existing businesses, but may not be large enough to significantly effect employment or encourage new business.

CASE STUDY: ATWOOD LAKE

Detailed cost information was collected for the Atwood Lake boat ramp so that a complete cost/benefit analysis could be done. Cost/benefit analysis of a project gives us an appraisal of the investment's efficiency. A time horizon of 25 years was chosen for this analysis and is typical for a project of this type. The estimated cost and benefit streams will be discounted at a rate of 10%. The benefit/cost ratio and internal rate of return criteria were used to evaluate the investments efficiency and their formulas are as follows.

Benefit/cost Ratio

$$\frac{DPV\ of\ Benefits}{DPV\ of\ Costs} = \frac{\sum_{t=1}^{T} \frac{B_t}{(1+i)^t}}{\sum_{t=1}^{T} \frac{O_t}{(1+i)^t} + K}$$

where,
DPV = Discounted Present Value
T = Time horizon (25 years)
B_t = Benefits for year t
O_t = Operating costs for year t
K = Initial capital outlay
i = Discount rate (10%)

A value of 1 or greater indicates that the investment is efficient, or in other words the benefits are equal to or greater than the costs over the life of the project.

Internal Rate of Return

$$K = \sum_{t=1}^{T} \frac{(B_t - O_t)}{(1+r)^t}$$

where K, T, B_t, O_t, are defined above, and
r = Internal rate of Return (unknown)

This criterion allows one to pick the investment with the highest return by comparing each investments rate of return.

All cost/benefit analyses of projects with lengthy time horizons carry a measure of risk and uncertainty. Risks and uncertainties surrounding this boat ramp could include the discontinuation of maintenance making it unusable, natural disasters, changes in the boating population, changes in boating opportunities in the region, etc. In any event the cost and benefit streams will probably not remain constant over the life of the ramp. Since these changes can not be predicted, please note that the following benefit/cost ratio will use the 1995 estimated annual costs and benefits for each year of the 25 year time horizon.

The following is a list of all applicable costs and benefits.

Annual maintenance and operation costs:

Trash removal	$ 750.00
Mowing	800.00
Portable rest rooms	1,200.00
Repairs	0.00
Electric	600.00
Dock removal and installation	400.00
Total annual costs	**3,750.00**

Original capital outlay: $425,000($250,000 Waterway Safety Fund grant)

Estimated annual benefits: $76,734

The results of the benefit/cost ratio are as follows:

25 year Time Horizon: $\frac{DPV\ of\ Benefits}{DPV\ of\ Costs} = \frac{773,253.4}{37,788.9 + 425,000} = 1.67$

This is a relatively high benefit/cost ratio, so a sensitivity analysis was conducted (Table 10). The Muskingum Watershed Conservancy District is planning to improve the site by adding a courtesy dock and restroom facilities and has applied for assistance from the Waterway Safety Fund, but even with an additional investment of $450,000 the benefit/cost ratio will still be 1.00.

Table 10: Sensitivity Analysis of Benefit/Cost Ratio

Figure Adjusted	Benefit/cost ratio value
Best estimate	1.67
Lower annual benefits by 25%	1.25
Raise annual costs by 50%	1.61
Additional $450,000 investment in year 4, which will raise total costs by 60%	1.00
Lower annual benefits by 25% and raise annual costs by 50%	1.20

The results of the internal rate of return are as follows:

25 year Time Horizon: $r = 17\%$

The value given by the internal rate of return criterion is also relatively high. This value demonstrates the rate of return on the Atwood Lake boat ramp investment, but again please note that this was calculated using the 1995 estimated annual costs and benefits for each year of the 25 year time horizon.

CONCLUSION

Through the analysis of respondents from six recently constructed boat ramps in Ohio, characteristics of boat ramp usage have been identified. These characteristics include socio-demographic factors, boating equipment owned, historical patterns of boaters in Ohio,

recreational fishing and site facilities available at each boat ramp. This information has revealed some interesting conclusions on the patterns of boaters at recently constructed boat ramps. The Belpre ramp appeared to have the greatest impact, mainly because there is no substitute site within the immediate vicinity. The Belpre ramp reflected the lowest average age of boats (5.7 years), the lowest average number of years of boating experience among boaters (13.2 years) and the second greatest impact to the number of launches per year (34.8%).

The historical analysis of the data revealed that approximately 26.1% of boaters have claimed to have increased the number of launches per year due to the construction of a boat ramp funded by the Ohio Department of Natural Resources. The spending pattern of boaters near the ramp can be used in the assessment of local benefits derived from the boat ramp construction. This survey revealed that 23.3% of boaters purchased their gas near the ramp while 42.5% claimed that they purchased their food and beverages near the ramp.

Total estimated annual economic benefits of the new ramps were an impressive $873,102. While an estimated 43.8% of the benefits ($382,058) were spent near the ramps. A more detailed analysis of the Atwood Lake boat ramp revealed that this ramp was an efficient use of Ohio taxpayer's money. In the future a more detailed benefit/cost analysis of the other 5 ramps needs to be done to determine if similar or different patterns exist. Boat ramps such as Lake Lima, Chilicothe (Scioto River), and Forked Run State Park, the three ramps that were removed from the study sample, may show very different results and should be examined thoroughly.

Literature Cited

Napier, Ted L. Watercraft Planning Study: 1994. Ohio Department of Natural Resources, Division of Watercraft.

U.S. Department of Commerce, Economics and Statistics Administration. Bureau of the Census, 1990.

Mishan, E.J. Cost-Benefit Analysis. Unwin Hyman Ltd., London, 1988

Appendix A
Boater Access Satisfaction Survey

Boater Access
Satisfaction Survey

Hi, I'm _____ a student at O.S.U. conducting an economic survey for Ohio Department of Natural Resources Division of Watercraft. The purpose of the survey is to collect information that will help administrators plan for future facilities. This is an opportunity for you to provide input on launch ramp usage. It should only take about 3-5(?) minutes. Will you participate?

1. How many years have you boated in Ohio, including as a passenger? _____

2. How many times did you launch your boat at this ramp during the 1995 boating season? _____

3. How many years have you visited this ramp? _____ 4. Do you own your own boat? _____Yes _____No

4a. Type of boat? Open motorboat___ Cabin___ Row___ Sail___ Pontoon___ Canoe/Kayak___ Wave Runner___

4b. Length of boat in feet? _____ hp of motor? _____ 4c. How old is your boat? _____years age of motor?_____

5. Before you were aware of this ramp, how many times a year did you launch your boat? _____
and how many different ramps did you use? _____(refer to map!)

6. Has the number of times a year you launch your boat changed now that you are aware of this ramp? _____
and how many different ramps do you use? _____(refer to map!)

7. Do you purchase gas and/or oil near the ramp you are visiting or near your home on your typical boating trip?

Near the ramp_____ Near home_____ Both_____

8. How much do you spend on gas and/or oil for your typical boating trip? (remember to keep in mind how your expenses might change during the summer, when you are out on the water longer or bring the whole family)
Near the ramp $_____ Near home $_____

9. Do you purchase meals, snacks and/or bait near the ramp you are visiting or near home on your typical boating trip?
Near the ramp_____ Near home_____ Both_____

10. How much do you spend on meals, snacks and/or bait for your typical boating trip?
Near the ramp $_____ Near home $_____

11. If it were necessary to charge a fee on select ramps to improve maintenance and a launch fee of __ per use was placed on this ramp would that effect how often you visit this ramp? _____
_____At what fee amount would you stop using this ramp? _____

12. Why do you use this boat ramp? (prompt: better facilities, less crowded, closer to home, better fishing) _____
_____
_____

13. Do you visit Lake Erie to fish? ____Yes ___No 13a. For what species? _____

13b. How many do you expect to catch_____ in how many hours?_____ (e.g. I expect to catch 3 fish in 3 hours.)

14. What is your current employment status?
a. self employed b. employed full -time c. employed part-time d. retired e. unemployed

15. What is your occupation? If RETIRED, what was your occupation before retirement?_____

16. What is your age? _____

Observe: gender? ___Male ___Female race? ___White ___Black ___Asian # in party?_____

17. How many years of formal education have you completed? _____

18. What is your marital status?
a. Single, never married b. Married c. Widowed d. Divorced

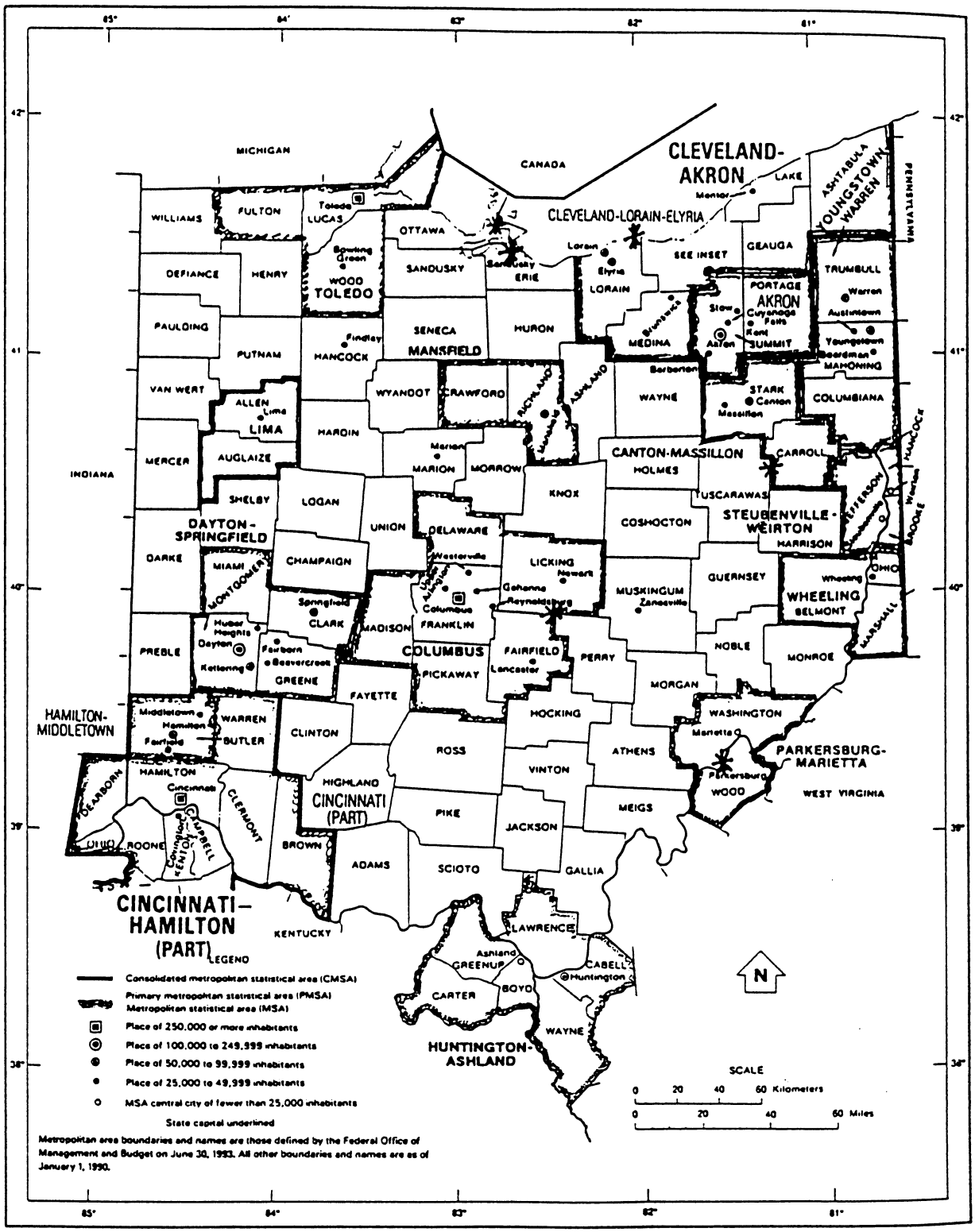
19. How many people, including yourself, reside in your household? _____

20. Where is your current residence? City_____ State____ Zip_____ # of miles from home_____

Thank you for taking the time to complete this survey.

Appendix B
Primary Metropolitan Statistical Area of Ohio

OHIO - Metropolitan Areas, Counties, and Selected Places



U.S. DEPARTMENT OF COMMERCE Economics and Statistics Administration Bureau of the Census

Appendix C
Additional Spending by Boaters

Additional Spending for 1 Trip

	$ spent on Gas near the ramp	$ spent on Gas near home	$ spent on Gas near both	$ spent on Food, Drinks, Etc. near the ramp	$ spent on Food, Drinks, Etc. near home	$ spent on Food, Drinks, Etc. near both	Total
Atwood Lake	2.50	96	9	53	134	83	377.50
Avon Lake	170	186.80	75	80	152.50	80	744.30
Belpre	128	200	15	185.50	50.50	0	579
Buckeye Lake	40	130	20	192.50	49	0	431.50
Mazurik	72	155	32	158	75	142.50	634.50
Sandusky	60	282	80	70.50	106	100	698.50
Totals	472	1,049.80	231	739.50	567	405.50	3,465.30

Additional Spending for 4 Trips
(4 is the mean number of trips reported)

	$ spent on Gas near the ramp	$ spent on Gas near home	$ spent on Gas near both	$ spent on Food, Drinks, Etc. near the ramp	$ spent on Food, Drinks, Etc. near home	$ spent on Food, Drinks, Etc. near both	Total
Atwood Lake	10	384	36	212	536	332	1,510
Avon Lake	680	747.20	300	320	610	320	2,977.30
Belpre	512	800	60	742	202	0	2,316
Buckeye Lake	160	520	80	770	196	0	1,726
Mazurik	288	620	128	632	300	570	2,538
Sandusky	240	1,128	320	282	424	400	2,794
Totals	1,888	4,199.20	924	2,958	2,268	1,622	13,861.20

Appendix C
Additional Spending by Boaters

Additional Spending for10 Trips

	$ spent on Gas near the ramp	$ spent on Gas near home	$ spent on Gas near both	$ spent on Food, Drinks, Etc. near the ramp	$ spent on Food, Drinks, Etc. near home	$ spent on Food, Drinks, Etc. near both	Total
Atwood Lake	25	960	90	530	1,340	830	3,775
Avon Lake	1,700	1,868	750	800	1,525	800	7,443
Belpre	1,280	2,000	150	1,855	505	0	5,790
Buckeye Lake	400	1,300	200	1,925	490	0	4,315
Mazurik	720	1,550	320	1,580	750	1,425	6,345
Sandusky	600	2,820	800	705	1,060	1,000	6,985
Totals	4,720	10,498	2,310	7,395	5,670	4,055	34,653