



Boating Pressure on Wisconsin's Lakes and Rivers

Results of the 1989-1990 Wisconsin Recreational Boating Study,
Phase 1

Technical Bulletin No. 174
Department of Natural Resources
Madison, Wisconsin
1991

ABSTRACT

In 1989, the Wisconsin Department of Natural Resources (DNR) Bureau of Law Enforcement initiated an intensive study of recreational boating in Wisconsin. Objectives were to provide information on boaters' activities and experiences that could be applied to work-load analysis, boater education programs, and recreational planning.

The DNR Bureau of Research designed and implemented the study, which was conducted in 2 phases. The objectives of Phase 1 of the study were to determine boating pressure by county and to obtain information on types and sizes of boats used, boating activities, boaters' perceptions of the quality of their boating experience and crowding on the water, and boating-related expenditures. This phase of the study utilized a mailed survey of over 58,000 licensed boaters in Wisconsin and in adjoining counties in Illinois, Iowa, and Minnesota throughout a 7-month boating season in 1989-90. Eighty-one percent of the Wisconsin resident licensed boaters returned the questionnaire. Nonresident response ranged from 54-62%. The overall response rate was 74%. Data were analyzed for statewide results and also by DNR district and by county.

Statewide results showed over 6.1 million boater days on Wisconsin's inland waters and over 620,000 boater days on the Great Lakes off of Wisconsin's shores during the 7-month study period. Greatest boating pressure was seen in July, followed by August and June, respectively, while the lowest boating pressure was in April. Boats were primarily motorboats, with an average motor size of 55 hp. Horsepower ratings ranged from a high of 86.5 hp in the Southeast District to a low of 40.4 hp in the Northwest District. The Northwest District had the highest concentration of outboard motorboats, while the Southeast District had the highest concentration of inboard motorboats. The highest concentration of sailboats was also found in the Southeast District.

The vast majority of the boaters statewide engaged in fishing while boating. Participation in this activity ranged from 80% of all boaters in the Northwest District to 47% of all boaters in the Southeast District. Cruising or sailing to a destination was most popular in the Southeast District (44% of all boaters) and least popular in the Northwest District (29%). Water skiing ranged from 18% of all boaters in the Southeast District to 10% in the Northwest District, and swimming ranged from 19% of all boaters in the Southeast and Western districts to 9% in the Northwest District.

Boaters spent over \$203 million in Wisconsin during the study period on purchases directly and indirectly related to their boating trips. Food and restaurant purchases made up the highest percentage of the purchases, ranging from 45% of all expenditures in the Northwest District to 33% of all expenditures in the Lake Michigan District. Expenditures for amusements and sporting goods ranged from 23% in the Lake Michigan District to 13% in the Northwest District. Auto expenses ranged from 15% in the Lake Michigan District to 11% in the Southeast District. Clothing, gift, and souvenir purchases combined ranged from 18% in the Southeast District to 9% in the Western District. Lodging ranged from 16% in the North Central District to 9% in the Southeast District.

Most boaters in Wisconsin were satisfied with their boating experience. Highest ratings for quality of experience were found in the Northwest District, and lowest ratings were found in the Southeast District. Boaters did not generally feel that they were crowded while on the water, although a number of negative factors, largely related to conflicting uses of the resource, were identified. The lowest perceived crowding levels were found in the Northwest District, while the highest levels were found in the Southeast District.

Management implications of this research include the need to reduce perceived crowding and user conflicts on the more heavily used water bodies throughout the state. Increased boater education, possible imposition of speed or horsepower limits on the more heavily used or crowded water bodies, increased enforcement of existing regulations, and improved public access on some water bodies are suggested.

Results provided in this report include statewide and district-level data on boating pressure. Some county-level data are provided in an appendix. Detailed county-level data and brochures on survey results for 10 of the most frequently boated water bodies can be obtained from the DNR Bureau of Law Enforcement. Results from Phase 2 of the research, which focused on boater attitudes and experiences, will be reported in a separate Technical Bulletin.

Key Words: boating pressure, boating activities, recreational boating, boat types, expenditures, recall bias, crowding, quality of experience, recreational interference, use conflicts.

Boating Pressure on Wisconsin's Lakes and Rivers

Results of the 1989-1990 Wisconsin Recreational Boating Study, Phase 1

by Linda J. Penaloza

Technical Bulletin No. 174
Department of Natural Resources
P.O. Box 7921, Madison, Wisconsin 53707
1991

CONTENTS

5 INTRODUCTION

7 RESEARCH METHODS

- Overview, 7
- Sampling, 7
- The Questionnaire, 9
- Mailing, 9
- Data Analysis, 10

11 SURVEY RESULTS

- Statewide Summary, 11
- DNR District Summaries, 14

26 DISCUSSION

- Boating Pressure, 26
- Boat Types, 28
- Activities, 30
- Quality of Experience, 31
- Perceived Crowding and Recreational Use Conflicts, 32
- Expenditures, 36
- Historical Perspectives on Boating Pressure and Boat Types, 37

39 SUMMARY AND MANAGEMENT IMPLICATIONS

41 APPENDIXES

- A. Sample Correspondence and Survey Questionnaire, 41
- B. Selected Survey Results by County, 47
- C. Recreational Use Conflicts Identified by Respondents, 49
- D. Glossary of Terms Used in This Report, 51

52 LITERATURE CITED

LIST OF TABLES

| | |
|---|----|
| Table 1. Sample size and composition. | 9 |
| Table 2. Weighting factors. | 10 |
| Table 3. Response rates by study period. | 11 |
| Table 4. Response rates by sample group. | 11 |
| Table 5. Most-visited inland waters, statewide. | 12 |
| Table 6. Boater days by month, statewide. | 12 |
| Table 7. Average daily distribution of boating pressure, statewide. | 12 |
| Table 8. Hourly distribution of boating pressure, statewide. | 12 |
| Table 9. Number of hours spent on the water, statewide. | 12 |
| Table 10. Hull types, statewide. | 13 |
| Table 11. Propulsion types, statewide. | 13 |
| Table 12. Horsepower of primary motors, statewide. | 13 |
| Table 13. Activities by month, statewide. | 13 |
| Table 14. Total expenditures, statewide. | 13 |
| Table 15. Most-visited inland waters, Lake Michigan District. | 14 |
| Table 16. Boater days by month, Lake Michigan District. | 14 |
| Table 17. Average daily distribution of boating pressure, Lake Michigan District. | 15 |
| Table 18. Hull types, Lake Michigan District. | 15 |
| Table 19. Propulsion types, Lake Michigan District. | 15 |
| Table 20. Activities by month, Lake Michigan District. | 15 |
| Table 21. Total expenditures, Lake Michigan District. | 15 |
| Table 22. County of residence for boaters in the Lake Michigan District. | 15 |
| Table 23. Most-visited inland waters, North Central District. | 16 |
| Table 24. Boater days by month, North Central District. | 16 |
| Table 25. Average daily distribution of boating pressure, North Central District. | 17 |
| Table 26. Hull types, North Central District. | 17 |
| Table 27. Propulsion types, North Central District. | 17 |
| Table 28. Activities by month, North Central District. | 17 |
| Table 29. Total expenditures, North Central District. | 17 |
| Table 30. County of residence for boaters in the North Central District. | 17 |
| Table 31. Most-visited inland waters, Northwest District. | 18 |
| Table 32. Boater days by month, Northwest District. | 18 |
| Table 33. Average daily distribution of boating pressure, Northwest District. | 19 |

LIST OF TABLES *(continued)*

| | |
|---|----|
| Table 34. Hull types, Northwest District. | 19 |
| Table 35. Propulsion types, Northwest District. | 19 |
| Table 36. Activities by month, Northwest District. | 19 |
| Table 37. Total expenditures, Northwest District. | 19 |
| Table 38. County of residence for boaters in the Northwest District. | 19 |
| Table 39. Most-visited inland waters, Southeast District. | 20 |
| Table 40. Boater days by month, Southeast District. | 20 |
| Table 41. Average daily distribution of boating pressure, Southeast District. | 21 |
| Table 42. Hull types, Southeast District. | 21 |
| Table 43. Propulsion types, Southeast District. | 21 |
| Table 44. Activities by month, Southeast District. | 21 |
| Table 45. Total expenditures, Southeast District. | 21 |
| Table 46. County of residence for boaters in the Southeast District. | 21 |
| Table 47. Most-visited inland waters, Southern District. | 22 |
| Table 48. Boater days by month, Southern District. | 22 |
| Table 49. Average daily distribution of boating pressure, Southern District. | 23 |
| Table 50. Hull types, Southern District. | 23 |
| Table 51. Propulsion types, Southern District. | 23 |
| Table 52. Activities by month, Southern District. | 23 |
| Table 53. Total expenditures, Southern District. | 23 |
| Table 54. County of residence for boaters in the Southern District. | 23 |
| Table 55. Most-visited inland waters, Western District. | 24 |
| Table 56. Boater days by month, Western District. | 24 |
| Table 57. Average daily distribution of boating pressure, Western District. | 25 |
| Table 58. Hull types, Western District. | 25 |
| Table 59. Propulsion types, Western District. | 25 |
| Table 60. Activities by month, Western District. | 25 |
| Table 61. Total expenditures, Western District. | 25 |
| Table 62. County of residence for boaters in the Western District. | 25 |
| Table 63. Boat length nationwide, 1969-89. | 38 |
| Table 64. Average boat horsepower nationwide, 1941-82. | 38 |
| Appendix Table B. Boater days by county. | 47 |

LIST OF FIGURES

| | |
|---|----|
| Figure 1. Study area: Wisconsin and counties in neighboring states from which the survey sample was drawn. | 8 |
| Figure 2. Activities, statewide. | 13 |
| Figure 3. Perceived crowding, statewide. | 13 |
| Figure 4. Quality of experience, statewide. | 13 |
| Figure 5. Activities, Lake Michigan District. | 15 |
| Figure 6. Perceived crowding, Lake Michigan District. | 15 |
| Figure 7. Quality of experience, Lake Michigan District. | 15 |
| Figure 8. Activities, North Central District. | 17 |
| Figure 9. Perceived crowding, North Central District. | 17 |
| Figure 10. Quality of experience, North Central District. | 17 |
| Figure 11. Activities, Northwest District. | 19 |
| Figure 12. Perceived crowding, Northwest District. | 19 |
| Figure 13. Quality of experience, Northwest District. | 19 |
| Figure 14. Activities, Southeast District. | 21 |
| Figure 15. Perceived crowding, Southeast District. | 21 |
| Figure 16. Quality of experience, Southeast District. | 21 |
| Figure 17. Activities, Southern District. | 23 |
| Figure 18. Perceived crowding, Southern District. | 23 |
| Figure 19. Quality of experience, Southern District. | 23 |
| Figure 20. Activities, Western District. | 25 |
| Figure 21. Perceived crowding, Western District. | 25 |
| Figure 22. Quality of experience, Western District. | 25 |
| Figure 23. Boater days, statewide. | 27 |
| Figure 24. Average horsepower, statewide. | 28 |
| Figure 25. Mean boater satisfaction, statewide. | 31 |
| Figure 26. Mean perceived crowding, statewide. | 32 |
| Figure 27. Average expenditures, statewide. | 36 |
| Figure 28. Number of boats licensed in Wisconsin, 1968-89. | 38 |
| Appendix Figure B.1. Counties of residence of survey respondents. | 48 |



PHOTO: BOB QUEEN



PHOTO: LARRY NIELSON



PHOTO: DAVE CREHORE

INTRODUCTION

According to the Outdoor Recreation Resources Review Commission's report to the President in 1962(4), "Water is a focal point of outdoor recreation. Most people seeking outdoor recreation want water—to sit by, to swim and to fish in, to ski across, to dive under, and to run their boats over." This statement is as true today as it was in 1962, with even more people participating in water-based recreation.

Wisconsin has over 14,000 inland lakes, with approximately one million acres of surface water. Of these lakes, over 5,700 are large enough or significant enough to be

named. Many of these are very large, with the 70 largest lakes accounting for about 50% of the state's lake acreage. Including the Mississippi River, there are also approximately 50,000 miles of stream shoreline and about 3,000 named streams. Finally, Wisconsin has over 800 miles of Great Lakes shoreline within its borders (Wis. Dep. Nat. Resour. 1986a). With all the available surface water in the state, it is not surprising that recreational boating is a major part of Wisconsin outdoor recreational activities, as well as a significant part of the state's economy and tourism industry.

There have been numerous studies of recreational boaters during the last 20 years. National studies include looks at trends in recreational boating behavior and user conflicts (U.S. Coast Guard 1978, Lindsay 1980, Marmo 1980, Rounds 1985). Regional studies include investigations of recreational boating on the Great Lakes (Great Lakes Basin Comm. 1975, Lime et al. 1989) and the Mississippi River (McAvoy et al. 1990), as well as studies of water-based recreation in Wisconsin (Wis. Dep. Nat. Resour. 1986a, 1986b).

Field and Martinson (1986) reviewed the field of water-based recreation participation research, and Graefe (1986) reviewed the field of recreational boating research for the President's Commission on Americans Outdoors. Both reports showed that outdoor recreation is dominated by recreation taking place either on or near water. Recreational boating is one of the nation's most popular outdoor recreational activities. Research on recreational boating has focused on frequency and distribution of use; boater characteristics; and boater activities, motives, values, and behavior; as well as either the demand for or supply of recreational boating facilities. Gaps in the research were identified as a lack of consistent data bases by which change in recreation demand can be assessed over time, careful assessments of recreation demand and supply, and clear information on conflicting resource use and the management of resources for diverse users.



PHOTO: WILHEM STITES

In 1989, the Bureau of Law Enforcement of the Wisconsin Department of Natural Resources (DNR) identified the need for broad-based information about recreational boating in Wisconsin. This information was needed for planning future law enforcement initiatives, including work towards improved boating legislation, increased emphasis on boater education and boating safety, and law enforcement work-load analysis. The foremost issue facing the bureau regarding recreational boating is public safety. As more people own more and larger boats, the potential for injury to property and injury or death to boaters and other water-sports participants increases. Crowding, over and above the safety issue, will eventually require public policy and attendant regulations in order to preserve the water resource base for future use. Increased boating education, then, is an important potential area for future management action.

The Bureau also wanted to know what factors interfere with enjoyable boating recreation in the state. Therefore, law enforcement personnel needed solid sociological data on the people who boat in Wisconsin, the types of boats they use, the distribution of boating throughout the state and throughout the boating season, and the issues and concerns that are important to boaters about their use of Wisconsin waters.

The Bureau of Law Enforcement contacted the Bureau of Research in 1989 to help design and conduct a study of recreational boating on Wisconsin's inland waters and the surrounding Great Lakes. A survey was designed by the Bureau of Research to address objectives developed by the research team and a steering committee; this survey was conducted in 1989-90 through a series of mailed questionnaires. The research effort was divided into 2 phases—in effect 2 separate research projects, each designed to address a different set of study objectives. Phase 1, the Boating Pressure Survey, was designed to address those objectives most susceptible to recall decay (where the ability to remember details of minor or routine activities decreases as the time since the event increases). Phase 2, the Boater Issues Survey, concerned those study questions that were less changeable or fluid, such as general attitudes and opinions of the boating population. These attitudes and opinions are less likely to be forgotten than are details of specific boating events; thus they are less susceptible to recall decay. Because of this difference in the types of objectives and information sought, the 2 phases of the survey were conducted separately and with somewhat different methodologies.

Phase 1 research used state-of-the-art survey techniques to provide very detailed and accurate data about boating pressure, in such a way that results can be used not only at the statewide level but also at the county level. In many cases, the sample size and response rate was such that specific answers to management questions can be answered for specific water bodies. The study objectives for the Boating Pressure survey were to:

- determine, by county, the boating pressure on Wisconsin's inland lakes and streams and on Wisconsin's Great Lakes coastal waters;
- determine times of peak boating pressure, including information on most popular months, weeks, days, and hours;
- determine types and sizes of boats used in each county, including motor size (horsepower);
- describe boating activities;
- determine the number of people in boating parties and residence of boat operators;
- identify boaters' perceptions of the quality of their boating experience and of crowding on the water;
- determine the amount of money recreational boaters in the state are spending in the course of participating in their sport; and
- identify issues of interference and conflicting recreational uses of water resources, as well as biases or prejudices between conflicting users.

In addition to these specific objectives, Phase 1 objectives were designed to provide preliminary information for defining the categories to be used in the Phase 2 survey. The study objectives of Phase 2 of our research focused on getting more in-depth information on Wisconsin resident boaters: their demographic characteristics, their experiences while on the water, their knowledge of boating safety topics, their attitudes towards a variety of possible legislative changes in boating regulations, and any problems they may have encountered while boating in Wisconsin. Thus, although there was some overlap in the questions asked in the 2 surveys, they employed different methodologies and focused on different management questions.

Together, Phase 1 and Phase 2 research projects provide some ground-breaking work in recreational research. While the idea of surveying recreational users is nothing new, it is unusual to conduct a study of this magnitude. Also, we were able to use the best possible survey

techniques, despite the large size of the sample population. In scope and context, these research projects cover a wide range of issues and behaviors that have a significant impact on water-based recreation in Wisconsin.

The purpose of this report is to summarize the results of Phase 1 of this study, highlighting the significant trends in boating in Wisconsin derived from the statewide and district data. This report compares results from those who boated on the Great Lakes with results from those who boated inland lakes and rivers and also examines differences between boaters who live in Wisconsin and boaters who come to Wisconsin as tourists to enjoy the water resources. An appendix provides information on variation between counties. A comprehensive county-level report and brochures on survey results for 10 of the most frequently boated water bodies are available from the DNR Bureau of Law Enforcement. Phase 2 of this study has been completed, and results will be published in a forthcoming Technical Bulletin.

RESEARCH METHODS

Overview

Boat owners throughout Wisconsin and from selected counties in 3 neighboring states (Fig. 1) were asked to participate in this survey by responding to a 4-page questionnaire (Append. A) covering the following topics:

- type of boat
- the counties in which the respondent boated
- lakes or rivers on which the respondent boated
- type of boating activities
- interference or other problems encountered
- quality of experience and perceived crowding
- times of most frequent boating (days of the week, hours of the day)
- size of the boating party
- expenditures
- county of residence

Respondents to the survey were asked only about their boating experiences for the 2 weeks prior to receiving the questionnaire. There were 14 of these 2-week study periods covering a 7-month boating season, from May 1989 through October 1989, plus April 1990. For the purposes of analyzing results, we assumed that this total study period represented an uninterrupted 7-month boating season, from April through October.

Sampling

We drew a random sample of 42,000 names and addresses from the DNR file of licensed boats. There were 506,008 names in this file, of which 482,336 were currently licensed in 1989. We sampled only people with currently licensed boats so that we would contact active boaters instead of those who were not using their boats or had sold them. DNR's master file consisted primarily of motorboats (96%), with only 3% sailboats and 1% canoes. In order to make sure that our study would include the views of people who use nonmotorized boats, we sampled sailboaters and canoeists separately, including 7,000 names from each of these groups. Thus, the proportions of the sample were 66.7% motorboaters, 16.7% sailboaters, and 16.7% canoeists.¹



PHOTO: BOB QUEEN

¹While Wisconsin currently licenses all motorboats and sailboats over 12 ft in length, canoes or rowboats without motors are not required to be licensed. However, some people license their canoes in Wisconsin. The primary reason for licensing a canoe is that it has a motor attached; another reason is that Minnesota requires licensing of canoes, so Wisconsin residents wishing to take their canoes to Minnesota may license them in Wisconsin to meet that requirement. Thus the sample of canoes obtained from the DNR license files is not representative of all canoes owned in Wisconsin, but we felt that it was the best available listing of canoes in the state. The license file for canoeists also included other types of nonmotorized boats, such as rowboats and kayaks.

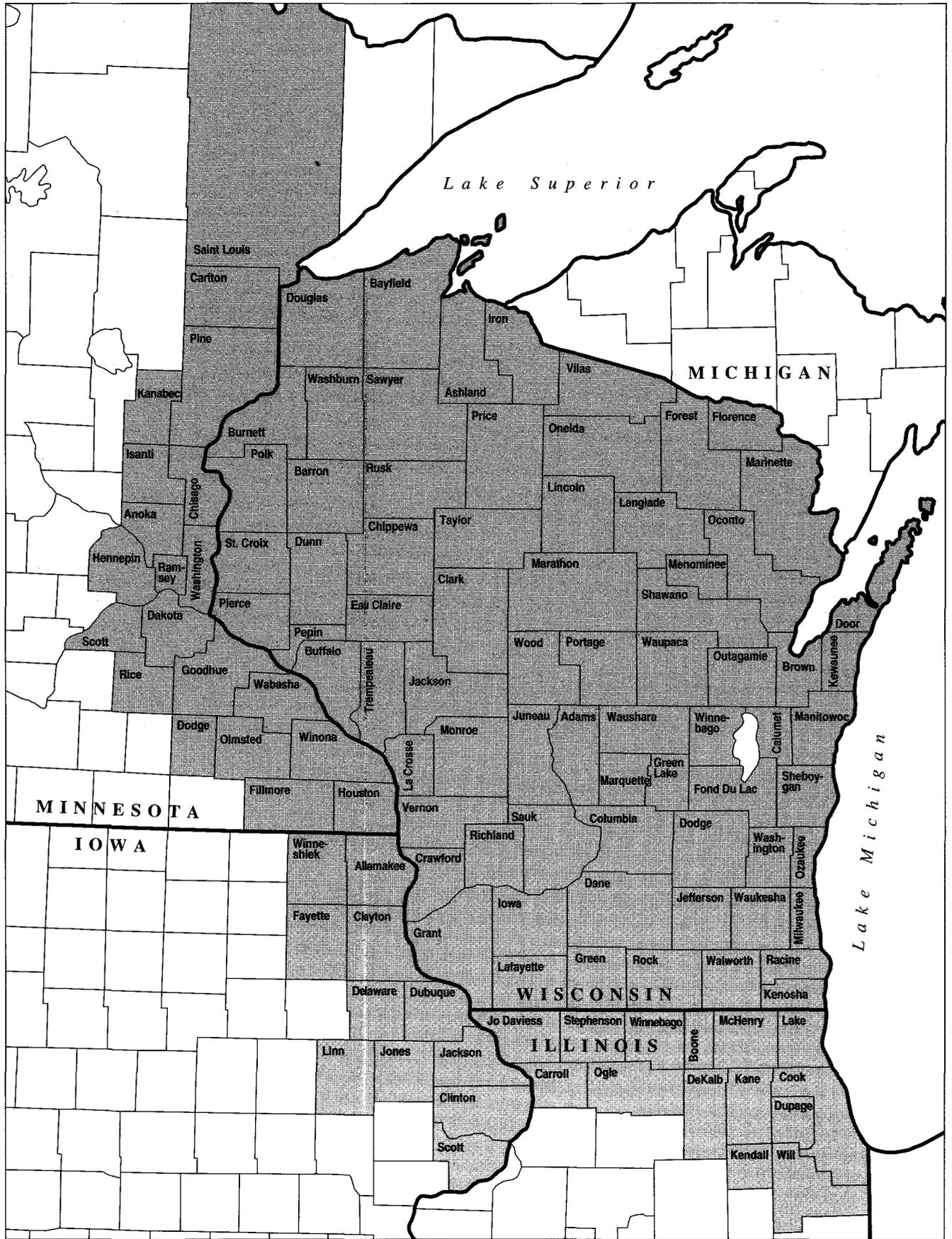


Figure 1. Study area: Wisconsin and counties in neighboring states from which the survey sample was drawn.

The Law Enforcement Steering Committee decided to exclude boat rentals from this study on the assumption that boating pressure from privately owned boats would provide a reliable indicator of overall boating pressure in an area—that is, that an area popular for rental boating would also be popular for private boating. For some specific water bodies, rental use may have a greater impact than assumed, but these lakes would require study beyond a statewide survey of this kind.

Our study was designed primarily to find out where Wisconsin resident boaters were boating in the state and how often they boated, but we also saw the opportunity to learn something about the use patterns of some non-resident boaters in Wisconsin. We drew a sample of 5,600 boaters each from the licensing records of Illinois, Iowa, and Minnesota; these names were selected only from counties bordering Wisconsin, from counties that are one county away from Wisconsin's border, and from the Chicago area. We wanted to find out how often and how many boat owners from these neighboring areas made use of the water recreation opportunities Wisconsin offers.

The resident and nonresident samples combined totaled 58,800 names; this sample was then broken into 14 equally sized groups, one for each 2-week period of the boating season (Table 1).

About 6% of the surveys were returned as undeliverable; approximately another 3% were duplicates or names of businesses (universities, yacht clubs, motels, etc.) rather than individuals. Once these were deleted, the final sample size was 53,559.

Table 1. *Sample size and composition.*

| Sample Group | Total | Per 2-week Period |
|------------------------|--------|-------------------|
| Wisconsin motorboaters | 28,000 | 2,000 |
| Wisconsin sailboaters | 7,000 | 500 |
| Wisconsin canoeists | 7,000 | 500 |
| Illinois boaters | 5,600 | 400 |
| Iowa boaters | 5,600 | 400 |
| Minnesota boaters | 5,600 | 400 |
| Total | 58,800 | 4,200 |

The Questionnaire

The questionnaire asked boat owners about their boating experiences for the preceding 2-week period. To aid this process, we prepared 14 separate survey documents, each with a calendar of the specific 2-week period of concern. The format, appearance, and content were identical among these 14 separate surveys; only the calendar dates were different (see the sample questionnaire in Appendix A). We asked respondents about their boating patterns and experiences for the preceding 2-week period only.

We designed the survey in this way because studies in survey research, especially as related to outdoor recreation, indicate that the longer the span of time between an event and a survey, the greater the errors in reporting

that event. According to a recent study of recall bias in recreation surveys (Westat, Inc. 1989), the longer the recall period, the less accurate the survey results. People tend to over-report participation in an event that was large or nonroutine, and they tend to under-report participation in a small, frequent event. The Westat, Inc., report recommended that for recreational activities that occur with great frequency (such as boating or fishing) shorter recall periods should be employed. In addition to shortening the recall period, the study indicated that providing memory aids to the respondent (such as calendars to help fix dates of activities or maps to help identify the location of activities) also helps to combat recall error.

For this study, by shortening the time period for which respondents were to report—and thus shortening the time between the activities and response to questions—we hoped to reduce the error in reporting caused by memory or recall bias. In addition to the calendars on the questionnaire showing the 2-week period we were asking about, we included a map of Wisconsin identifying counties, major population centers, and some of the larger water bodies.

Mailing

For results of survey research to be most accurate, it is important to achieve high response rates. A key component of a quality survey research project is the handling of the mailing in such a way as to not make the survey look "mass produced" and impersonal.

The implementation of this study followed a modified version of the Total Design Method (TDM) developed by Don A. Dillman (1978). The TDM is a survey procedure that has been used in numerous mailed surveys, and it is designed to elicit the highest possible response rate. The principles of the TDM involve making the survey and the mailing package as personalized and unimposing as possible. This is achieved through personalization of all letters to the individuals in the sample, use of first class postage stamps instead of metered mail on outgoing envelopes, use of first class postage stamps on return envelopes instead of business reply mail, and multiple contacts.

According to Dillman (1983), studies of mailing procedures in a variety of settings showed that personalized procedures increased response rates 7-8%. First class mail is always used, for several reasons. Bulk rate mailing always signals to the contact that they are receiving a mass mailing, which is therefore not important. First class postage signals the importance of the piece of mail, since it has a high handling priority for the U.S. Postal Service, including forwarding when necessary. According to a study by Armstrong and Lusk (1987), the use of business reply mail for return envelopes is seldom cost effective, because first class postage yields an additional 9% average return for the study, reducing the cost per returned questionnaire and reducing nonresponse bias. A study by Fox et al. (1988) showed that a pre-notification letter (advance letter) increased response rates by an

average of 7.7%. Follow-up mailings to nonrespondents have been found to increase response rates about 3.5% (Fox et al. 1988). The combined effect of all these techniques can increase response rates by as much as 30%.

This study employed all of these techniques. Each boat owner sampled was contacted 3 times. First, boaters were sent a personalized advance letter explaining the purpose of the study and informing them that they would be receiving a questionnaire in the mail. This letter was designed to alert the boaters to the study and to get them thinking about their recent boating experiences. It also served the purpose of legitimizing the study. They then received the questionnaire with a personalized cover letter. This survey included a pre-printed return envelope with appropriate postage affixed. One week after the mailing of the survey, we mailed a second copy of the questionnaire to all those who had not yet responded to the first mailing (see Appendix A for examples of letters sent). The cover letter in this mailing informed them that, as of the date of mailing, we had not yet received their questionnaire. They were asked to complete and return the replacement questionnaire in the return envelope. More than 20% of the total 53,559 responses in this study were the replacement questionnaires from this second mailing.

Data Analysis

Answers from completed questionnaires were keyed into a computer, and data were analyzed, using SAS (SAS Inst. 1987), by dividing the sample according to the counties and districts where the respondents had boated. Summary statistics were compiled for the entire sample, but the majority of the analysis was done on the district and county level. This report covers the district analyses and the statewide analyses, and compares across districts. Comprehensive results on county-level boating pressure are available from the DNR Bureau of Law Enforcement.

Weighting Factors. Since the list of contacts was generated through a weighted random sample, the responses were weighted for analysis based on the number of boat types in the population from which the samples were drawn. By giving each response the appropriate weight, we were able to generalize results from the study group to the general population of boaters in Wisconsin. The weights used for the analysis are given in Table 2.

For example, for each period we sampled 2,000 motorboats. There were 485,041 motorboat licenses in the file from which we drew the sample. Therefore, the weight for each motorboat in the sample was $485,041 / 2,000 = 242.5205$. Therefore, in order to generalize from the responses of our total sample of 28,000 motorboats back to the general population of motorboats in Wisconsin, each response was given a weight of 242.5205. Thus, if a motorboat respondent boated for one day in Polk County on June 2, the statistics would show that 242.5205 (rounded

to 243) motorboats were out in Polk County on that day. Similarly, if the boat was a sailboat, the statistics would show that 27.576 (28) sailboats were out that day.

The same weighing factors were used for all pertinent aspects of data analysis, including expenditure data.

Boater Days. Boater days are a convenient measure of the number of boats actually out and in use at any given time. A boater day is equal to one licensed boat out on the water for one day or part of one day. If one boat were out on the water for 3 days, it would count as 3 boater days. This statistic is a good measure of participation rates for all licensed boats in the state.

Quality of Experience and Perceived Crowding. To measure the quality of the recreational experience for Wisconsin boaters, we asked respondents to rate the quality of their boating experience on a specific day (the last day they boated during the 2-week study period) on a 6-point "quality" scale ranging from "poor" to "perfect." In this way, respondents were "grading" a specific boating experience by assigning a numerical score to a subjective experience.

We also asked respondents to rate their perceived crowdedness for that day on a 9-point scale, ranging from 1 ("not at all crowded") to 9 ("extremely crowded"). For this analysis, those respondents who indicated a score of 3-9 (slightly to extremely crowded) were considered crowded, while those who indicated a score of 1-2 (not at all crowded) were considered not crowded.

In gathering information about boater attitudes and experiences regarding quality and crowding, we are measuring subjective and intangible perceptions. However, such measures are increasingly used to gauge levels of recreational pressure on an area and to highlight "hot spots" of discontent. While perceptions can vary from person to person, even in the same setting, aggregate data concerning quality of experience can be very useful in understanding general boater attitudes.

In addition to "scoring" the quality of their experience and their perceived crowdedness, respondents were asked to directly describe unsatisfactory boating experiences when others on the water interfered with boating activities.

Table 2. Weighting factors.

| Sample Group | Population Size | Sample Size | Weight* |
|------------------------|-----------------|-------------|----------|
| Wisconsin motorboaters | 485,041 | 2,000 | 242.5205 |
| Wisconsin sailboaters | 13,788 | 500 | 27.5760 |
| Wisconsin canoeists | 7,051 | 500 | 14.1020 |
| Illinois boaters | 136,945 | 400 | 342.3625 |
| Iowa boaters | 45,706 | 400 | 114.2650 |
| Minnesota boaters | 330,985 | 400 | 827.4625 |

*Determined by dividing population size by sample size.

SURVEY RESULTS

A total of 39,839 usable surveys were returned for an overall response rate of 74%. Response rates by 2-week period ranged from 71-77% (Table 3) and by sample group from 54-81% (Table 4).

Due to the large size of the sample, the sampling methods, and the high response rate, we calculated that results reported here are accurate by $\pm 1-4\%$. For the number of boaters out on the water during the boating season, results are accurate by $\pm 1\%$.



Statewide Summary

Number of Boaters and Where They Boated. Based on responses for each 2-week period, an average of 26% of the survey respondents boated in Wisconsin during any given 2-week study period. Expanding boater participation to the total number of licensed boats in the sample, an estimated 53% of all licensed boats were in use during the 7-month boating season.

Of the total number of respondents who boated during the study period, 89% boated on inland lakes or rivers, representing 6,177,871 boater days; 9% boated on Lake Michigan or Lake Superior, representing 620,860 boater days; and 2% boated on both inland waters and Great Lakes, representing 138,750 boater days. When asked which inland water body they used the most, respondents listed 972 different bodies of water. These ranged from the largest water bodies in the state to ponds of only a few acres or less. The most frequently mentioned inland water body was the Mississippi River. Respondents boated this mighty river from every Wisconsin county it touches (Pierce, Pepin, Buffalo, Trempealeau,

Table 3. Response rates by study period.

| Period | Date | Response Rate (%) |
|---------|--------------------|-------------------|
| 1 | 6 May-19 May 1989 | 71 |
| 2 | 20 May-2 Jun 1989 | 72 |
| 3 | 3 Jun-16 Jun 1989 | 71 |
| 4 | 17 Jun-30 Jun 1989 | 73 |
| 5 | 1 Jul-14 Jul 1989 | 74 |
| 6 | 15 Jul-28 Jul 1989 | 76 |
| 7 | 29 Jul-11 Aug 1989 | 77 |
| 8 | 12 Aug-25 Aug 1989 | 76 |
| 9 | 26 Aug-8 Sep 1989 | 77 |
| 10 | 9 Sep-22 Sep 1989 | 76 |
| 11 | 23 Sep-6 Oct 1989 | 76 |
| 12 | 7 Oct-20 Oct 1989 | 76 |
| 13 | 7 Apr-20 Apr 1990 | 73 |
| 14 | 21 Apr-4 May 1990 | 73 |
| Overall | | 74 |

Table 4. Response rates by sample group.

| Sample Group | Response Rate (%) |
|--|-------------------|
| Wisconsin motorboaters and sailboaters | 81 |
| Wisconsin canoeists | 80 |
| Illinois boaters | 54 |
| Iowa boaters | 56 |
| Minnesota boaters | 62 |

La Crosse, Vernon, Crawford, and Grant counties). Also popular were Lake Winnebago (Winnebago, Fond du Lac, and Calumet counties), the Wisconsin River (Vilas, Oneida, Lincoln, Marathon, Portage, Wood, Adams, Juneau, Columbia, Sauk, Dane, Iowa, Richland, Crawford, and Grant counties), Lake Geneva (Walworth County), and Lake Mendota (Dane County). Table 5 shows the percentages of boaters who indicated they used these water bodies the most.²

When They Boated. The majority (62%) of the boating statewide was done in the months of June, July, and August; July was the busiest month for boating overall, with 24% of all boater days (Table 6).

Most boating occurred on weekends; 44% of the boaters boated on Saturdays, and 42% boated on Sundays (Table 7). Wednesdays and Thursdays were the least popular days for boating, with only 16% of the boaters out on each of those days. Mondays and Fridays, probably because they are frequently used to extend the weekend, were the most popular weekdays (19% and 20%, respectively). The majority of the

² The reported use of water bodies that border Wisconsin (such as the Mississippi River or the St. Croix River) may be understated, primarily because those who boated on these water bodies may have thought they were boating in a neighboring state. For this reason, we feel that estimates from this study of boating on Wisconsin border waters (excepting the Great Lakes) are lower than was actually the case.

boaters were out of the water between the hours of 11:00 a.m. and 4:30 p.m. (Table 8). Fewer than 10% of the boaters got out on the water before 6:00 a.m., and fewer than one third went out before 9:00 a.m. The majority of the boaters completed their boating trips before 6:00 p.m. Boaters spent an average of 5.4 hours/day on the water, with the greatest proportion boating 3-4 hours/day (Table 9). About 7% of the boaters spent more than 10 hours/day boating.

Boat Descriptions. Four fifths of the boats owned by respondents were open-hulled, and 71% had outboard motors (Tables 10, 11). Ten percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 11% of the statewide total, and canoes and other nonpowered boats, such as rowboats and kayaks, made up 6%. Boat length averaged 16 ft. The average size of the primary motor was 55 hp (Table 12). Outboards averaged less than 40 hp, while larger inboard and inboard/outboard motors averaged nearly 5 times that size.

Activities. The most popular activity was fishing (Fig. 2). Two thirds of all respondents reported fishing while boating. Over one third (37%) of the respondents reported cruising or sailing, 14% water skied, and 14% swam. The popularity of these activities varied throughout the boating season (Table 13). Fishing was most popular in April, when nearly 80% of the boaters were participating in this activity. August and September were the slowest months for fishing, when participation rates dropped to 64% and 63%, respectively. Cruising or sailing was most popular from July through August, with 42% and 40% of all boaters, respectively, participating. There were lower participation rates for skiing and swimming in the early and late parts of the season: 5% or less of all participants went skiing or swimming in April, May, and October. The highest participation rates for these activities were in the warmest months, July and August (Natl. Ocean. Atmos. Admin. 1989, 1990)

Perceived Crowding and Recreational Use Conflicts. Respondents reported low levels of crowding overall (Fig. 3). Fifty-nine percent of all the respondents indicated they felt not at all crowded while boating on Wisconsin waters, while only 5% indicated they felt extremely crowded. When asked if others on the water interfered with their activity in any way, 8% of the respondents answered yes.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 4). About 57% of the respondents indicated that their boating experience was excellent or perfect. Another 36% indicated that it was good or very good. Only 7% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in Wisconsin spent nearly \$204 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 14). Proportionately, the largest amount (nearly \$80 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Sporting goods and amusements accounted for nearly \$33 million, automobile expenses for over \$26 million, and lodging for over \$25.5 million.

Table 5. Most-visited inland waters, statewide.

| Inland Water Body | No. Boaters | Percent (%) Total Pressure |
|-------------------|-------------|----------------------------|
| Mississippi River | 423 | 4.6 |
| Lake Winnebago | 363 | 4.0 |
| Wisconsin River | 277 | 3.0 |
| Lake Geneva | 211 | 2.3 |
| Lake Mendota | 206 | 2.3 |

Table 6. Boater days by month, statewide.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 245,325 |
| May | 936,915 |
| June | 1,251,969 |
| July | 1,692,314 |
| August | 1,326,508 |
| September | 919,134 |
| October | 565,316 |
| Total | 6,937,481 |

Table 7. Average daily distribution of boating pressure, statewide. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 42 |
| Monday | 19 |
| Tuesday | 17 |
| Wednesday | 16 |
| Thursday | 16 |
| Friday | 20 |
| Saturday | 44 |

Table 8. Hourly distribution of boating pressure, statewide.

| Time of Day | Started (%) | Ended (%) |
|-----------------------------------|-------------|-----------|
| Before 6:00 a.m. | 8.7 | 3.8 |
| 6:00 a.m.-8:59 a.m. | 23.6 | 0.9 |
| 9:00 a.m.-11:59 a.m. | 29.5 | 9.6 |
| Noon-2:59 p.m. | 19.1 | 16.7 |
| 3:00 p.m.-5:59 p.m. | 13.2 | 31.7 |
| 6:00 p.m.-8:59 p.m. | 5.9 | 28.7 |
| 9:00 p.m.-midnight | 0.0 | 8.8 |
| Average starting time: 11:00 a.m. | | |
| Average ending time: 4:30 p.m. | | |

Table 9. Number of hours spent on the water, statewide.

| No. Hours | Percent (%) of Total |
|-----------|----------------------|
| 1-2 | 14.5 |
| 3-4 | 30.9 |
| 5-6 | 25.0 |
| 7-8 | 14.2 |
| 9-10 | 8.0 |
| 11-12 | 4.1 |
| 13-14 | 2.6 |
| 15+ | 0.7 |
| Average | 5.4 |

Table 10. Hull types, statewide.

| Hull Type | Percent (%) of Total |
|----------------------------|----------------------|
| Open | 81 |
| Cabin | 6 |
| Pontoon | 5 |
| Other | 8 |
| Average length: 16.0 ft | |
| Average beam width: 5.3 ft | |

Table 11. Propulsion types, statewide.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 71 |
| Inboard/outboard | 7 |
| Inboard | 3 |
| Other (powered) | 2 |
| Sail | 9 |
| Sail with power | 2 |
| Other (nonpowered) | 6 |

Table 12. Horsepower of primary motors, statewide.

| Horsepower | Overall(%) | Outboard(%) | Inboard or Inboard/Outboard(%) |
|---------------------|------------|-------------|--------------------------------|
| 0-4 | 8.5 | 9.4 | 1.2 |
| 5-9 | 17.7 | 19.9 | 1.7 |
| 10-19 | 15.7 | 17.7 | 1.8 |
| 20-40 | 22.3 | 25.0 | 2.9 |
| 41-75 | 14.4 | 16.1 | 2.8 |
| 76-115 | 8.1 | 8.8 | 3.6 |
| 116-150 | 5.8 | 2.5 | 29.0 |
| 151+ | 7.6 | 0.6 | 57.0 |
| Average horsepower: | 55.0 hp | 36.2 hp | 188.9 hp |

Table 13. Activities by month, statewide. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|---|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 79 | 77 | 68 | 65 | 64 | 63 | 65 |
| Cruising | 26 | 31 | 37 | 42 | 40 | 41 | 33 |
| Water skiing | 2 | 5 | 15 | 22 | 18 | 15 | 4 |
| Swimming | 1 | 3 | 15 | 25 | 19 | 15 | 4 |
| Average boating party size: 3.06 people | | | | | | | |

Table 14. Total expenditures, statewide.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$49,039,897 |
| Restaurants | 30,581,067 |
| Auto | 26,456,640 |
| Clothing, gifts, souvenirs, miscellaneous other | 24,680,948 |
| Lodging | 25,599,604 |
| Package liquor, wine, beer | 11,663,781 |
| Sporting goods, amusements | 32,700,642 |
| Temporary slip, mooring rental | 3,102,284 |
| Total | \$203,824,863 |

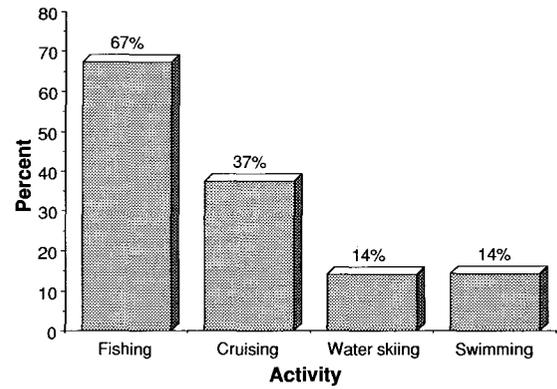


Figure 2. Activities, statewide.

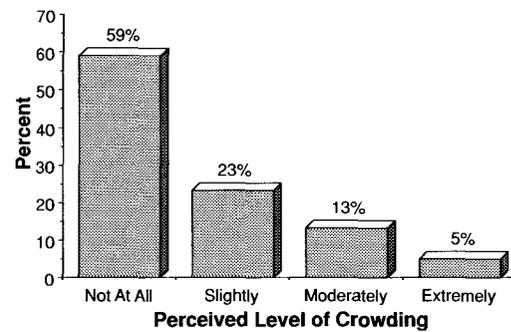


Figure 3. Perceived crowding, statewide.



Figure 4. Quality of experience, statewide.



DNR District Summaries Lake Michigan District

Number of Boaters and Where They Boated. Fifteen percent of the respondents who boated in Wisconsin boated on inland waters in this district, representing 1,010,531 boater days from April through October. Five percent of the respondents boated on Lake Michigan waters bordering this district, representing 331,926 boater days from April through October. When asked which inland water body in this district they used the most, respondents were most likely to mention Lake Winnebago. Other popular water bodies were the Wolf River and Shawano Lake (Table 15).

When They Boated. The majority of boater days (62%) in this district were in June, July, and August; July was the busiest month (26% of all boater days) (Table 16). Most boating occurred on the weekends (Table 17). Forty-five percent of the boaters boated on Saturdays, and 42% boated on Sundays. Wednesdays and Thursdays were the least popular days for boating, with only 15% of the boaters going out on each of those days. Mondays were the most popular weekdays, with 19% boating participation.

Boat Descriptions. Nearly four fifths of the boats used by respondents in this district were open-hulled, and 72% had outboard motors (Tables 18, 19). Fourteen percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 10% of the total, and nonpowered boats such as canoes, rowboats, and kayaks, made up only 2%. Boat length averaged just under 17 ft. The average motor size for primary motors was 63 hp. Motors used on inland waters averaged 51 hp, while motors used on Lake Michigan averaged 103 hp.

Activities. The most popular activity was fishing (Fig. 5). Seventy-one percent of all boaters in this district reported fishing while boating. Nearly 40% reported cruising or sailing, 13% water skied, and 17% swam. The popularity of these activities varied throughout the boating season (Table 20). Fishing was most popular in April, when 85% of the boaters in this district participated in this activity. September and October were the slowest months for fishing, when participation rates dropped to 64% and 65%, respectively. Cruising or sailing was most popular from June through September, with the greatest participation in September (46%). There were lower participation rates for skiing and swimming in the early and late parts of the season (5% or less of all participants went skiing or swimming in April, May, and October), and the highest participation rates were in the warmest month, July.

Perceived Crowding. Respondents reported fairly low levels of crowding overall (Fig. 6). Fifty-eight percent of all the respondents indicated they felt not at all crowded while boating in this district, while only 4% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 7). Over one half (54%) of the respondents indicated that their boating experience was excellent or perfect. Another 39% indicated that it was good or very good. Only 8% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the Lake Michigan District spent over \$41.6 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 21). Proportionately, the largest amount (over \$13 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Sporting goods and amusements accounted for nearly \$10 million, automobile expenses for over \$6 million, and lodging for over \$4.5 million.

County of Residence. Table 22 shows the counties of residence for those respondents who boated in the Lake Michigan District. Nearly one half of all those who boated in this district came from 3 counties: Brown, Winnebago, and Outagamie. Seven percent of those who boated in this district were not Wisconsin residents.

Table 15. Most-visited inland waters, Lake Michigan District.

| Inland Water Body | No. Boaters | Percent (%) of Total |
|----------------------|-------------|----------------------|
| Lake Winnebago | 299 | 19 |
| Wolf River | 133 | 8 |
| Shawano Lake | 110 | 7 |
| Fox River | 68 | 4 |
| Lake Poygan | 56 | 3 |
| Menominee River | 48 | 3 |
| High Falls | 41 | 3 |
| Lake Butte des Morts | 34 | 2 |

Table 16. Boater days by month, Lake Michigan District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 56,353 |
| May | 159,349 |
| June | 230,437 |
| July | 351,593 |
| August | 256,261 |
| September | 195,066 |
| October | 93,398 |
| Total | 1,342,457 |

Table 17. Average daily distribution of boating pressure, Lake Michigan District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 42 |
| Monday | 19 |
| Tuesday | 17 |
| Wednesday | 15 |
| Thursday | 15 |
| Friday | 17 |
| Saturday | 45 |

Table 18. Hull types, Lake Michigan District.

| Hull Type | Percent (%) of Total |
|-----------|----------------------|
| Open | 79 |
| Cabin | 11 |
| Pontoon | 5 |
| Other | 5 |

Average length: 16.8 ft
Average beam width: 5.9 ft

Table 19. Propulsion Types, Lake Michigan District.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 72 |
| Inboard/outboard | 10 |
| Inboard | 4 |
| Other (powered) | 2 |
| Sail | 6 |
| Sail with power | 4 |
| Other (nonpowered) | 2 |

Average horsepower: 63.3 hp

Table 20. Activities by month, Lake Michigan District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 85 | 82 | 73 | 70 | 69 | 64 | 65 |
| Cruising | 28 | 27 | 41 | 42 | 39 | 46 | 35 |
| Water skiing | 1 | 3 | 13 | 22 | 16 | 15 | 3 |
| Swimming | 0 | 5 | 16 | 32 | 21 | 17 | 4 |

Average boating party size: 3.0 people

Table 21. Total expenditures, Lake Michigan District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$7,388,475 |
| Restaurants | 6,434,902 |
| Auto | 6,297,052 |
| Clothing, gifts, souvenirs, miscellaneous other | 4,104,501 |
| Lodging | 4,555,444 |
| Package liquor, wine, beer | 2,121,751 |
| Sporting goods, amusements | 9,648,445 |
| Temporary slip, mooring rental | 1,143,107 |
| Total | \$41,693,677 |

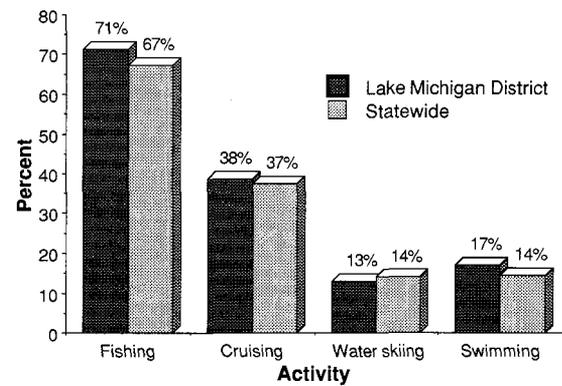


Figure 5. Activities, Lake Michigan District.

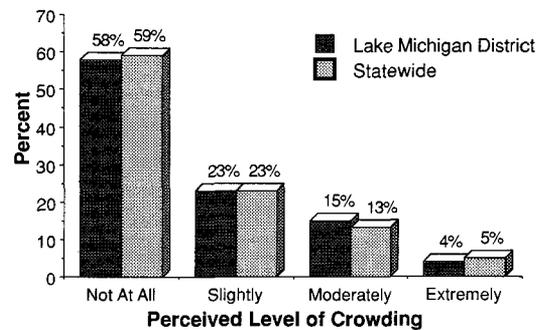


Figure 6. Perceived crowding, Lake Michigan District.

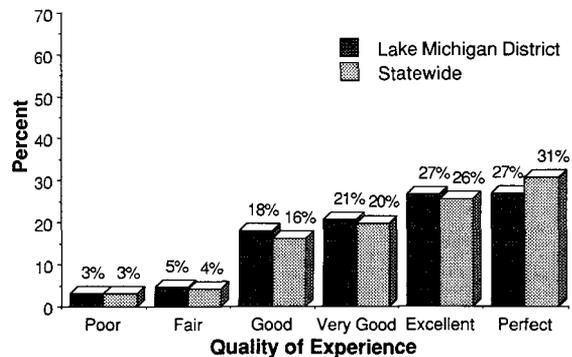


Figure 7. Quality of experience, Lake Michigan District.

Table 22. County of residence for boaters in the Lake Michigan District.

| County | Percent (%) of Total | County | Percent (%) of Total |
|-----------|----------------------|-------------|----------------------|
| Brown | 17 | Marinette | 4 |
| Winnebago | 15 | Shawano | 4 |
| Outagamie | 13 | Waukesha | 4 |
| Milwaukee | 6 | Calumet | 3 |
| Manitowoc | 5 | Oconto | 3 |
| Waupaca | 5 | | |
| Door | 4 | All Others* | 17 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.



North Central District

Number of Boaters and Where They Boated. Twenty-two percent of the respondents who boated in Wisconsin boated in this district, representing 1,514,675 boater days from April through October. When asked which water body in this district they used the most, respondents were most likely to mention the Wisconsin River. This was mentioned at least 3 times more frequently than any other water body (Table 23).

When They Boated. The majority of boater days (60%) in this district were in June, July, and August. July was the busiest month (23% of all boater days) (Table 24). Most boating occurred on the weekends; 47% of the boaters boated on Saturdays, and 45% boated on Sundays (Table 25). Wednesdays were the least popular days for boating, with only 19% of the boaters going out on those days. Mondays and Fridays were the most popular weekdays (24% of the boaters were out on each of those days).

Boat Descriptions. Nearly 9 out of 10 boats used by respondents in this district were open-hulled, and 81% had outboard motors (Tables 26, 27). Eight percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 6% of the total, and nonpowered boats such as canoes, rowboats, and kayaks, made up only 3%. Boat length averaged under 16 ft. The average motor size for primary motors was 46 hp.

Activities. The most popular activity was fishing (Fig. 8). Seventy-seven percent of all boaters in this district reported fishing while boating. Thirty-four percent reported cruising or sailing, 14% water skied, and 11% swam. The popularity of these activities varied throughout the boating season (Table 28). Fishing was most popular in April and May, when 88% and 85%, respectively, of all the boaters in this district participated in this activity. August was the slowest month for fishing, when the participation rate dropped to 72%. Cruising or sailing was popular primarily from May through September, with the greatest participation in July (43%). There were lower participation rates for skiing and swimming in the early and late parts of the season (5% or less of all participants went skiing or swimming in April, May, and October); these activities had the highest participation rates in the warmest months, July and August.

Perceived Crowding. Respondents reported low levels of crowding overall (Fig. 9). Sixty-seven percent of all the respondents indicated they felt not at all crowded while boating in this district, while only 1% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 10). Sixty percent of the respondents indicated that their boating experience was excellent or perfect. Another 32% indicated that it was good or very good. Only 6% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the North Central District spent over \$47 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 29). Proportionately, the largest amount (over \$18 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Lodging accounted for over \$7.5 million, sporting goods and amusements accounted for nearly \$6.5 million, and automobile expenses for over \$6 million.

County of Residence. Table 30 shows the counties of residence for those respondents who boated in the North Central District. One fourth of all those who boated in this district came from 2 counties: Marathon and Oneida. Nearly 12% of those who boated in this district were not Wisconsin residents.

Table 23. Most-visited inland waters, North Central District.

| Water Body | No. of Boaters | Percent (%) of Total |
|------------------|----------------|----------------------|
| Wisconsin River | 176 | 9 |
| Castle Rock Lake | 58 | 3 |
| Tomahawk Lake | 49 | 2 |
| Lake Nokomis | 42 | 2 |
| Minocqua Lake | 38 | 2 |
| Pelican Lake | 31 | 2 |
| Three Lakes | 31 | 2 |

Table 24. Boater days by month, North Central District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 39,584 |
| May | 220,817 |
| June | 251,771 |
| July | 341,825 |
| August | 315,562 |
| September | 224,633 |
| October | 120,483 |
| Total | 1,514,675 |

Table 25. Average daily distribution of boating pressure, North Central District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 45 |
| Monday | 24 |
| Tuesday | 20 |
| Wednesday | 19 |
| Thursday | 20 |
| Friday | 24 |
| Saturday | 47 |

Table 26. Hull types, North Central District.

| Hull Type | Percent (%) of Total |
|-----------|----------------------|
| Open | 86 |
| Cabin | 2 |
| Pontoon | 7 |
| Other | 5 |

Average length: 15.5 ft
Average beam width: 5.2 ft

Table 27. Propulsion types, North Central District.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 81 |
| Inboard/outboard | 5 |
| Inboard | 3 |
| Other (powered) | 2 |
| Sail | 6 |
| Sail with power | <1 |
| Other (nonpowered) | 3 |

Average horsepower: 45.6 hp

Table 28. Activities by month, North Central District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 88 | 85 | 78 | 74 | 72 | 76 | 79 |
| Cruising | 19 | 30 | 31 | 43 | 37 | 36 | 22 |
| Water skiing | 1 | 2 | 15 | 23 | 21 | 16 | 3 |
| Swimming | 0 | 2 | 10 | 19 | 14 | 12 | 5 |

Average boating party size: 2.9 people

Table 29. Total expenditures, North Central District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$11,012,987 |
| Restaurants | 7,104,655 |
| Auto | 6,137,795 |
| Clothing, gifts, souvenirs, miscellaneous other | 5,916,224 |
| Lodging | 7,578,781 |
| Package liquor, wine, beer | 2,765,822 |
| Sporting goods, amusements | 6,433,815 |
| Temporary slip, mooring rental | 154,115 |
| Total | \$47,104,194 |

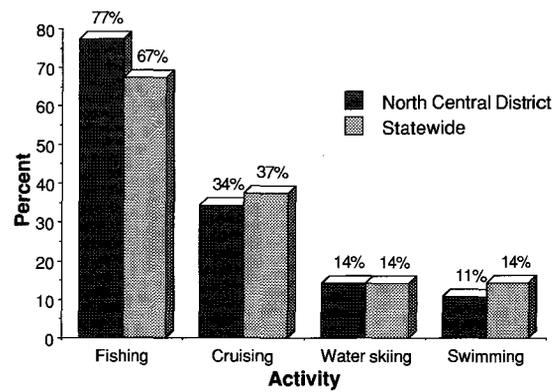


Figure 8. Activities, North Central District.

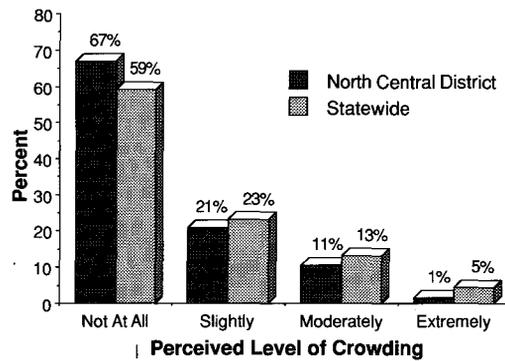


Figure 9. Perceived crowding, North Central District.

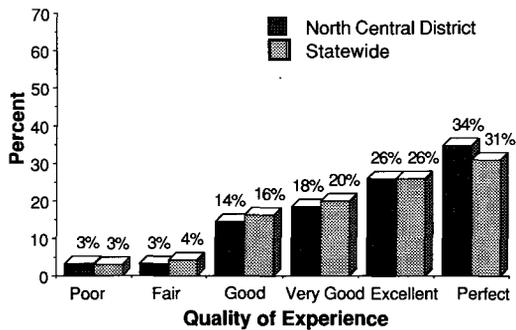
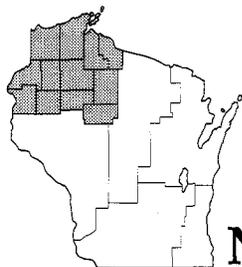


Figure 10. Quality of experience, North Central District.

Table 30. County of residence for boaters in the North Central District.

| County | Percent (%) of Total |
|-------------|----------------------|
| Marathon | 14 |
| Oneida | 11 |
| Vilas | 9 |
| Milwaukee | 9 |
| Waukesha | 6 |
| Portage | 6 |
| Wood | 5 |
| All others* | 40 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.



Northwest District

Number of Boaters and Where They Boated. Twenty percent of the respondents who boated in Wisconsin boated inland waters in this district, representing 1,376,518 boater days from April through October. One percent of the respondents boated on Lake Superior in this district, representing 97,193 boater days from April through October. There was little consensus among boaters about what inland water bodies were most popular. When asked which inland water body in this district they used the most, 4% of the respondents mentioned Long Lake, 3% mentioned Lake Chippewa, and 3% mentioned Balsam Lake (Table 31).

When They Boated. The majority of boater days (63%) in this district were in June, July, and August; July was the busiest month (28% of all boater days) (Table 32). Most boating occurred on the weekends; 45% of the boaters boated on Saturdays, and 44% boated on Sundays (Table 33). Thursdays were the least popular days for boating, with only 19% of the boaters going out on those days. Mondays and Fridays were the most popular weekdays (24% of the boaters were out on each of those days).

Boat Descriptions. Four fifths of the boats used by respondents in this district were open-hulled, and 85% had outboard motors (Tables 34, 35). Six percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 4% of the total, and nonpowered boats such as canoes, rowboats, and kayaks, made up only 3%. Boat length averaged just under 16 ft. The average motor size for primary motors was 40 hp. Motors used on inland waters averaged 38 hp, while motors used on Lake Superior averaged 76 hp.

Activities. The most popular activity was fishing (Fig. 11). Eighty percent of all boaters in this district reported fishing while boating. Nearly 30% reported cruising or sailing, 10% water skied, and 9% swam. The popularity of these activities varied throughout the boating season (Table 36). Fishing was most popular in May and June, when 88% and 85%, respectively, of all the boaters in this district participated in this activity. April and September were the slowest months for fishing, when participation rates dropped to 73% and 75%, respectively. Cruising or sailing was most popular from July through September, with the greatest participation in September (36%). There were lower participation rates for skiing and swimming in the early and late parts of the season (less than 5% of all participants went skiing or swimming in April, May, and October), and the highest participation rates were in the warmest months, July and August.

Perceived Crowding. Respondents reported low levels of crowding overall (Fig. 12). Seventy-one percent of all the respondents indicated they felt not at all crowded while

boating in this district, while only 2% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 13). Two thirds (64%) of the respondents indicated that their boating experience was excellent or perfect. Another 29% indicated that it was good or very good. Only 7% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the Northwest District spent over \$53 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 37). Proportionately, the largest amount (more than \$24 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Sporting goods and amusements accounted for over \$7 million, lodging for over \$7 million, and automobile expenses for over \$6 million.

County of Residence. Table 38 shows the counties of residence for those respondents who boated in the Northwest District. One third of all those who boated in this district came from 4 counties: Barron, Douglas, Polk, and Sawyer. Nearly 26% of those who boated in this district were not Wisconsin residents.

Table 31. Most-visited inland waters, Northwest District.

| Inland Water Body | No. of Boaters | Percent (%) of Total |
|--------------------------|----------------|----------------------|
| Long Lake | 63 | 4 |
| Lake Chippewa | 57 | 3 |
| Balsam Lake | 46 | 3 |
| Namekagon Lake and River | 36 | 2 |
| Lake Chetek | 35 | 2 |
| St. Croix River | 31 | 2 |
| Bone Lake | 30 | 2 |
| Round Lake | 26 | 2 |

Table 32. Boater days by month, Northwest District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 32,390 |
| May | 212,256 |
| June | 249,634 |
| July | 406,922 |
| August | 276,855 |
| September | 167,050 |
| October | 128,604 |
| Total | 1,473,711 |

Table 33. Average daily distribution of boating pressure, Northwest District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) | |
|-------------|---------------------------|--|
| | Respondents Participating | |
| Sunday | 44 | |
| Monday | 24 | |
| Tuesday | 20 | |
| Wednesday | 20 | |
| Thursday | 19 | |
| Friday | 24 | |
| Saturday | 45 | |

Table 34. Hull types, Northwest District.

| Hull Type | Percent (%) of Total |
|-----------|----------------------|
| Open | 81 |
| Cabin | 3 |
| Pontoon | 11 |
| Other | 5 |

Average length: 15.9 ft
Average beam width: 5.3 ft

Table 35. Propulsion types, Northwest District.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 85 |
| Inboard/outboard | 4 |
| Inboard | 2 |
| Other (powered) | 2 |
| Sail | 3 |
| Sail with power | 1 |
| Other (nonpowered) | 3 |

Average horsepower: 40.4 hp

Table 36. Activities by month, Northwest District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 73 | 88 | 85 | 78 | 77 | 75 | 80 |
| Cruising | 30 | 24 | 25 | 32 | 31 | 36 | 26 |
| Water skiing | 1 | 4 | 9 | 17 | 17 | 8 | 3 |
| Swimming | 0 | 1 | 6 | 19 | 13 | 10 | 2 |

Average boating party size: 2.9 people

Table 37. Total expenditures, Northwest District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$17,575,790 |
| Restaurants | 6,592,607 |
| Auto | 6,185,470 |
| Clothing, gifts, souvenirs, miscellaneous other | 5,458,479 |
| Lodging | 7,105,679 |
| Package liquor, wine, beer | 2,898,482 |
| Sporting goods, amusements | 7,134,557 |
| Temporary slip, mooring rental | 322,353 |
| Total | \$53,273,417 |

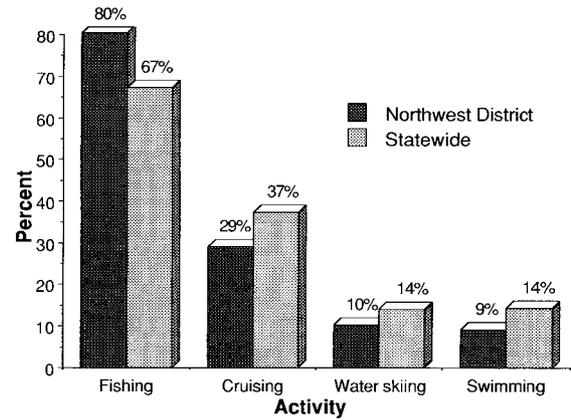


Figure 11. Activities, Northwest District.

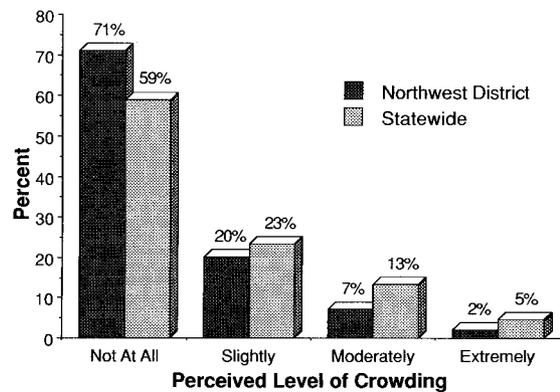


Figure 12. Perceived crowding, Northwest District.

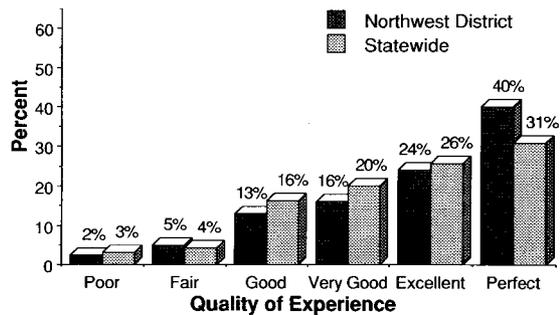


Figure 13. Quality of experience, Northwest District.

Table 38. County of residence for boaters in the Northwest District.

| County | Percent (%) of Total | County | Percent (%) of Total |
|------------|----------------------|-------------|----------------------|
| Barron | 10 | Burnett | 5 |
| Douglas | 8 | St. Croix | 4 |
| Polk | 8 | Chippewa | 3 |
| Sawyer | 7 | Price | 3 |
| Eau Claire | 6 | Rusk | 3 |
| Bayfield | 5 | Taylor | 3 |
| Washburn | 5 | All Others* | 30 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.



Southeast District

Number of Boaters and Where They Boated. Thirteen percent of the respondents who boated in Wisconsin boated inland waters in this district, representing 901,415 boater days from April through October. Three percent of the respondents boated on Lake Michigan in this district, representing 191,741 boater days from April through October. When asked which inland water body in this district they used the most, respondents were most likely to mention Lake Geneva or Pewaukee Lake (Table 39).

When They Boated. The majority of boater days in this district (65%) were in June, July, and August; July was the busiest month (23% of all boater days) (Table 40). Most boating occurred on the weekends; 46% of the boaters boated on Saturdays, and 46% boated on Sundays (Table 41). Tuesdays and Thursdays were the least popular days for boating, with only 14% and 13% of the boaters, respectively, going out on those days. Fridays were the most popular weekdays, with 17% boating participation.

Boat Descriptions. Two thirds of the boats used by respondents in this district were open-hulled, and 53% had outboard motors (Tables 42, 43). Twenty percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 24% of the total, and non-powered boats such as canoes, rowboats, and kayaks made up only 2%. Boat length averaged just over 18 ft. The average motor size for primary motors was 86.5 hp. Motors used on inland waters averaged 74 hp, while motors used on Lake Michigan averaged 138 hp.

Activities. The most popular activity was fishing, followed closely by cruising or sailing (Fig. 14). Forty-seven percent of all boaters in this district reported fishing while boating, 44% reported cruising or sailing, 18% water skied, and 19% swam. The popularity of these activities varied throughout the boating season (Table 44). Fishing was most popular in April, when 68% of all the boaters in this district participated in this activity. July and September were the slowest months for fishing, when participation rates dropped to 41% and 42%, respectively. Cruising or sailing was most popular from July through September, with the greatest participation in September (47%). There were lower participation rates for skiing and swimming in the early and late parts of the season (less than 10% of all participants went skiing or swimming in April, May, and October), and the highest participation rates were in the warmest month, July.

Perceived Crowding. Respondents reported moderate levels of crowding overall (Fig. 15). Forty-four percent of all the respondents indicated they felt not at all crowded while boating in this district, while 9% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were generally satisfied with the quality of their boating experience (Fig. 16). Nearly one half (48%) of the respondents indicated that their boating experience was excellent or perfect. Another 42% indicated that it was good or very good. Only 9% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the Southeast District spent over \$23.5 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 45). Proportionately, the largest amount (nearly \$9 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Clothing, gifts, souvenirs, and miscellaneous other tourist-related purchases accounted for over \$4 million, sporting goods and amusements accounted for over \$3 million, automobile expenses for over \$2.5 million, and lodging for over \$2 million.

County of Residence. Table 46 shows the counties of residence for those respondents who boated in the Southeast District. Over one half of all those who boated in this district came from 2 counties: Waukesha and Milwaukee. Twenty percent of those who boated in this district were not Wisconsin residents.

Table 39. Most-visited inland waters, Southeast District.

| Inland Water Body | No. of Boaters | Percent (%) of Total |
|-------------------|----------------|----------------------|
| Lake Geneva | 211 | 13 |
| Pewaukee Lake | 127 | 8 |
| Nagawicka Lake | 71 | 5 |
| Okauchee Lake | 70 | 4 |
| Big Cedar Lake | 44 | 3 |
| Delavan Lake | 44 | 3 |
| Lake Beulah | 48 | 3 |
| Lauderdale Lakes | 47 | 3 |
| Silver Lake | 44 | 3 |
| Browns Lake | 32 | 2 |
| Lac la Belle | 38 | 2 |
| Whitewater Lake | 29 | 2 |

Table 40. Boater days by month, Southeast District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 26,571 |
| May | 122,903 |
| June | 221,070 |
| July | 253,119 |
| August | 238,009 |
| September | 145,772 |
| October | 85,712 |
| Total | 1,093,156 |

Table 41. Average daily distribution of boating pressure, Southeast District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 46 |
| Monday | 16 |
| Tuesday | 14 |
| Wednesday | 16 |
| Thursday | 13 |
| Friday | 17 |
| Saturday | 46 |

Table 42. Hull types, Southeast District.

| Hull Type | Percent (%) of Total |
|----------------------------|----------------------|
| Open | 68 |
| Cabin | 17 |
| Pontoon | 9 |
| Other | 6 |
| Average length: 18.4 ft | |
| Average beam width: 6.4 ft | |

Table 43. Propulsion types, Southeast District.

| Propulsion Type | Percent (%) of Total |
|-----------------------------|----------------------|
| Outboard | 53 |
| Inboard/outboard | 14 |
| Inboard | 6 |
| Other (powered) | 1 |
| Sail | 15 |
| Sail with power | 9 |
| Other (nonpowered) | 2 |
| Average horsepower: 86.5 hp | |

Table 44. Activities by month, Southeast District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 68 | 57 | 49 | 41 | 44 | 42 | 49 |
| Cruising | 29 | 39 | 42 | 46 | 46 | 47 | 43 |
| Water Skiing | 3 | 9 | 20 | 27 | 19 | 16 | 8 |
| Swimming | 2 | 4 | 18 | 31 | 25 | 19 | 5 |
| Average boating party size: 3.4 people | | | | | | | |

Table 45. Total expenditures, Southeast District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$4,669,017 |
| Restaurants | 4,217,632 |
| Auto | 2,659,014 |
| Clothing, gifts, souvenirs, miscellaneous other | 4,163,252 |
| Lodging | 2,184,073 |
| Package liquor, wine, beer | 1,396,214 |
| Sporting goods, amusements | 3,381,446 |
| Temporary slip, mooring rental | 893,449 |
| Total | \$23,564,097 |

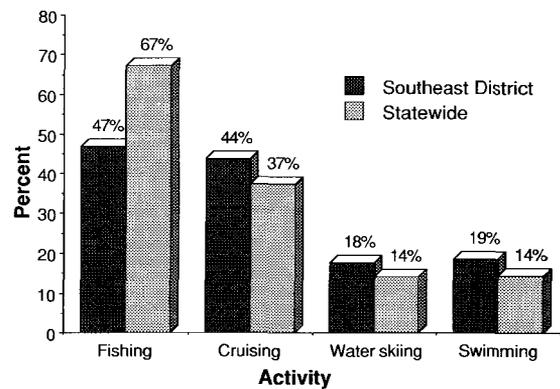


Figure 14. Activities, Southeast District.

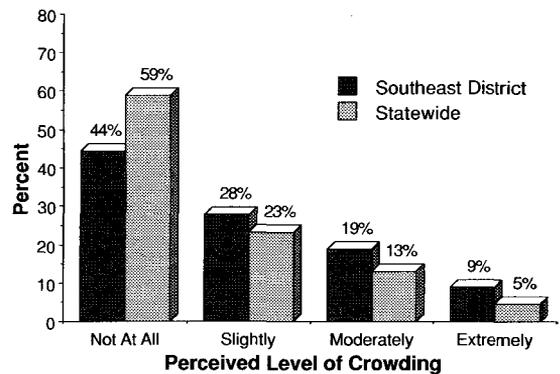


Figure 15. Perceived crowding, Southeast District.

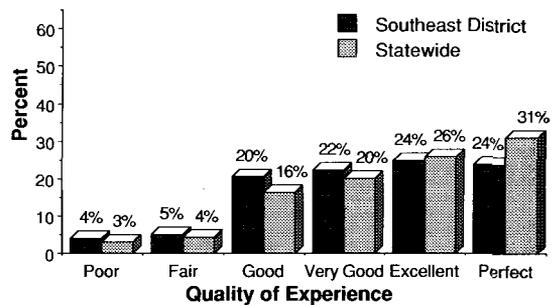


Figure 16. Quality of experience, Southeast District.

Table 46. County of residence for boaters in the Southeast District.

| County | Percent (%) of Total |
|-------------|----------------------|
| Waukesha | 31 |
| Milwaukee | 24 |
| Racine | 10 |
| Walworth | 9 |
| Kenosha | 7 |
| Washington | 6 |
| Sheboygan | 5 |
| All Others* | 8 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.



Southern District

Number of Boaters and Where They Boated. Thirteen percent of the respondents who boated in Wisconsin boated in this district, representing 896,763 boater days from April through October. When asked which inland water body in this district they used the most, respondents were most likely to mention Lakes Mendota or Monona (Table 47).

When They Boated. The majority of the boater days in this district (57%) were in June, July, and August; July was the busiest month (21% of all boater days) (Table 48). Most boating occurred on the weekends; 42% of the boaters boated on Saturdays, and 40% boated on Sundays (Table 49). Thursdays were the least popular days for boating, with only 12% of the boaters going out on those days. Fridays were the most popular weekdays, with 16% participation.

Boat Descriptions. Four fifths of the boats used by respondents in this district were open-hulled, and 70% had outboard motors (Tables 50, 51). Twelve percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up 12% of the total, and nonpowered boats such as canoes, rowboats, and kayaks made up only 4%. Boat length averaged just over 16 ft. The average motor size for primary motors was 60 hp.

Activities. The most popular activity was fishing (Fig. 17). Sixty-three percent of all boaters in this district reported fishing while boating. Nearly 40% reported cruising or sailing, 15% water skied, and 15% swam. The popularity of these activities varied throughout the boating season (Table 52). Fishing was most popular in April, when 80% of all the boaters in this district participated in this activity. October was the slowest month for fishing, when participation dropped to 57%. Cruising or sailing was most popular from June through August, with the greatest participation in June (44%). There were lower participation rates for skiing and swimming in the early and late parts of the season (less than 10% of all participants went skiing or swimming in April, May, and October), and the highest participation rates were in the warmest month, July.

Perceived Crowding. Respondents reported fairly low levels of crowding overall (Fig. 18). Fifty-six percent of all the respondents indicated they felt not at all crowded while boating in this district, while only 4% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 19). Over one half (54%) of the respondents indicated that their boating experience was excellent or perfect. Another 39% indicated that it was good or very good. Only 6% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the Southern District spent over \$23.5 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 53). Proportionately, the largest amount (nearly \$9 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Sporting goods and amusements accounted for nearly \$4 million; clothing, gifts, souvenirs, and miscellaneous other tourist-related goods accounted for over \$3.5 million; automobile expenses accounted for over \$3 million; and lodging for over \$2 million.

County of Residence. Table 54 shows the counties of residence for those respondents who boated in the Southern District. Four out of 10 of all those who boated in this district came from 2 counties: Dane and Milwaukee. Fifteen percent of those who boated in this district were not Wisconsin residents.

Table 47. Most-visited inland waters, Southern District.

| Inland Water Body | No. of Boaters | Percent (%) of Total |
|--------------------|----------------|----------------------|
| Lake Mendota | 206 | 12 |
| Lake Monona | 111 | 7 |
| Green Lake | 100 | 6 |
| Wisconsin River | 100 | 6 |
| Lake Winnebago | 88 | 5 |
| Lake Wisconsin | 85 | 5 |
| Rock River | 85 | 5 |
| Mississippi River | 81 | 5 |
| Fox Lake and River | 78 | 5 |
| Lake Waubesa | 54 | 3 |
| Lake Koshkonong | 46 | 3 |

Table 48. Boater days by month, Southern District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 54,567 |
| May | 129,975 |
| June | 169,538 |
| July | 190,690 |
| August | 149,573 |
| September | 127,482 |
| October | 74,938 |
| Total | 896,763 |

Table 49. Average daily distribution of boating pressure, Southern District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 40 |
| Monday | 14 |
| Tuesday | 14 |
| Wednesday | 14 |
| Thursday | 12 |
| Friday | 16 |
| Saturday | 42 |

Table 50. Hull types, Southern District.

| Hull Type | Percent (%) of Total |
|-----------|----------------------|
| Open | 82 |
| Cabin | 6 |
| Pontoon | 5 |
| Other | 7 |

Average length: 16.3 ft
Average beam width: 5.5 ft

Table 51. Propulsion types, Southern District.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 70 |
| Inboard/outboard | 9 |
| Inboard | 3 |
| Other (powered) | 2 |
| Sail | 10 |
| Sail with power | 2 |
| Other (nonpowered) | 4 |

Average horsepower: 59.7 hp

Table 52. Activities by month, Southern District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 80 | 68 | 61 | 61 | 64 | 60 | 57 |
| Cruising | 25 | 32 | 44 | 41 | 43 | 38 | 37 |
| Water skiing | 3 | 8 | 17 | 23 | 18 | 19 | 5 |
| Swimming | 0 | 4 | 16 | 28 | 18 | 20 | 4 |

Average boating party size: 3.0 people

Table 53. Total expenditures, Southern District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$4,893,912 |
| Restaurants | 4,079,449 |
| Auto | 3,137,561 |
| Clothing, gifts, souvenirs, miscellaneous other | 3,692,813 |
| Lodging | 2,348,624 |
| Package liquor, wine, beer | 1,414,409 |
| Sporting goods, amusements | 3,847,541 |
| Temporary slip, mooring rental | 261,210 |
| Total | \$23,675,519 |

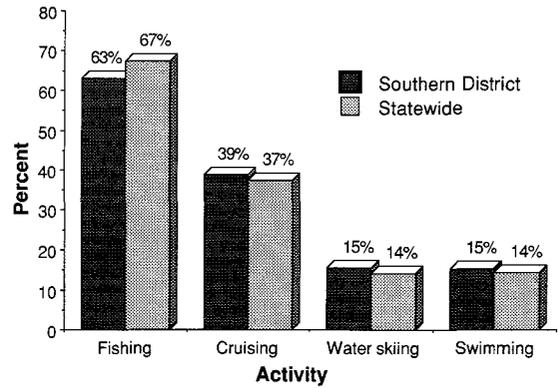


Figure 17. Activities, Southern District.

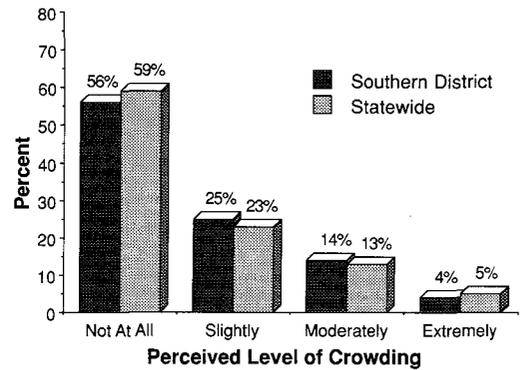


Figure 18. Perceived crowding, Southern District.

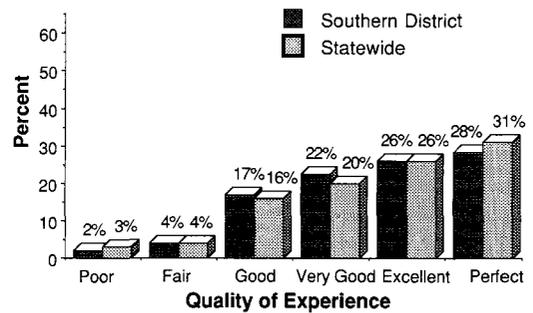


Figure 19. Quality of experience, Southern District.

Table 54. County of residence for boaters in the Southern District.

| County | Percent (%) of Total | County | Percent (%) of Total |
|-------------|----------------------|-------------|----------------------|
| Dane | 31 | Sauk | 5 |
| Milwaukee | 10 | Columbia | 5 |
| Rock | 8 | Jefferson | 5 |
| Fond du Lac | 7 | Waukesha | 4 |
| Dodge | 5 | All Others* | 20 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.



Western District

Number of Boaters and Where They Boated. Nine percent of the respondents who boated in Wisconsin boated in this district, representing 616,719 boater days from April through October. When asked which inland water body in this district they used the most, respondents were most likely to mention the Mississippi River (Table 55).

When They Boated. The majority of boater days in this district (60%) were in May, June, and July; July was the busiest month (24% of all boater days) (Table 56). Most boating occurred on the weekends; 44% of the boaters boated on Saturdays, and 41% boated on Sundays (Table 57). Wednesdays and Thursdays were the least popular days for boating, with only 14% of the boaters going out on each of those days. Fridays and Mondays were the most popular weekdays (19% and 18% participation, respectively).

Boat Descriptions. Four fifths of the boats used by respondents in this district were open-hulled, and 76% had outboard motors (Tables 58, 59). Fourteen percent were either inboards or inboard/outboards. Sailboats and sailboats with auxiliary motors made up only 4% of the sample, and other nonpowered boats such as canoes, rowboats, and kayaks made up another 4%. Boat length averaged over 16 ft. The average motor size for primary motors was 67 hp.

Activities. The most popular activity was fishing (Fig. 20). Seventy-two percent of all boaters in this district reported fishing while boating, 38% reported cruising or sailing, 15% water skied, and 19% swam. The popularity of these activities varied throughout the boating season (Table 60). Fishing was most popular in May, when 81% of all the boaters in this district participated in this activity. August was the slowest month for fishing, when participation dropped to 65%. Cruising or sailing was most popular in July and August, with the greatest participation in July (48%). There were lower participation rates for skiing and swimming in the early and late parts of the season (6% or less of all participants went skiing or swimming in April, May, or October), and the highest participation rates were in the warmest month, July.

Perceived Crowding. Respondents reported fairly low levels of crowding overall (Fig. 21). Fifty-four percent of all the respondents indicated they felt not at all crowded while boating in this district, while 7% indicated they felt extremely crowded.

Quality of Experience. Respondents also indicated they were satisfied with the quality of their boating experience (Fig. 22). Over one half (56%) of the respondents indicated that their boating experience was excellent or perfect. Another 36% indicated that it was good or very good. Only 7% of the boaters said their experience was poor or fair.

Expenditures. Expanding results to the total sample of licensed boats, we estimate that boaters in the Western District spent over \$14.5 million on expenses directly or indirectly related to their boating experience during the 7-month boating season (Table 61). Proportionately, the largest amount (over \$5.5 million) was spent on food—groceries and other packaged foods as well as eating at restaurants. Sporting goods and amusements accounted for over \$2 million, automobile expenses for over \$2 million, and lodging for nearly \$2 million.

County of Residence. Table 62 shows the counties of residence for those who boated in the Western District. Nearly one half of all those who boated in this district came from 3 counties: La Crosse, Chippewa, and Eau Claire. Nearly 14% of those who boated in this district were not Wisconsin residents.

Table 55. Most-visited inland waters, Western District.

| Inland Water Body | No. Boaters | Percent (%) of Total |
|-------------------|-------------|----------------------|
| Mississippi River | 310 | 33 |
| Lake Wissota | 72 | 8 |
| St. Croix River | 51 | 5 |
| Black River | 43 | 5 |
| Holcombe Flowage | 40 | 4 |
| Chippewa Falls | 34 | 4 |

Table 56. Boater days by month, Western District.

| Month | No. Boater Days |
|-----------|-----------------|
| April | 35,860 |
| May | 91,615 |
| June | 129,519 |
| July | 148,165 |
| August | 90,248 |
| September | 59,131 |
| October | 62,181 |
| Total | 616,719 |

Table 57. Average daily distribution of boating pressure, Western District. Responses may reflect boating on more than one day.

| Day of Week | Percent (%) Respondents Participating |
|-------------|---------------------------------------|
| Sunday | 41 |
| Monday | 18 |
| Tuesday | 15 |
| Wednesday | 14 |
| Thursday | 14 |
| Friday | 19 |
| Saturday | 44 |

Table 58. Hull types, Western District.

| Hull Type | Percent (%) of Total |
|-----------|----------------------|
| Open | 83 |
| Cabin | 7 |
| Pontoon | 3 |
| Other | 7 |

Average length: 16.4 ft
Average beam width: 5.6 ft

Table 59. Propulsion types, Western District.

| Propulsion Type | Percent (%) of Total |
|--------------------|----------------------|
| Outboard | 76 |
| Inboard/outboard | 11 |
| Inboard | 3 |
| Other (powered) | 2 |
| Sail | 3 |
| Sail with power | 1 |
| Other (nonpowered) | 4 |

Average horsepower: 67.4 hp

Table 60. Activities by month, Western District. Respondents may have participated in more than one activity.

| Activity | Percent (%) Respondents Participating | | | | | | |
|--------------|---------------------------------------|-----|-----|-----|-----|-----|-----|
| | Apr | May | Jun | Jul | Aug | Sep | Oct |
| Fishing | 78 | 81 | 75 | 69 | 65 | 68 | 71 |
| Cruising | 22 | 33 | 35 | 48 | 44 | 38 | 29 |
| Water skiing | 3 | 6 | 20 | 28 | 14 | 19 | 5 |
| Swimming | 3 | 6 | 20 | 37 | 21 | 19 | 3 |

Average boating party size: 3.2 people

Table 61. Total expenditures, Western District.

| Items Purchased | Total Expenditures |
|---|--------------------|
| Food (groceries, etc.) | \$3,499,716 |
| Restaurants | 2,151,822 |
| Auto | 2,039,748 |
| Clothing, gifts, souvenirs, miscellaneous other | 1,345,679 |
| Lodging | 1,827,003 |
| Package liquor, wine, beer | 1,067,103 |
| Sporting goods, amusements | 2,254,838 |
| Temporary slip, mooring rental | 328,050 |
| Total | \$14,513,959 |

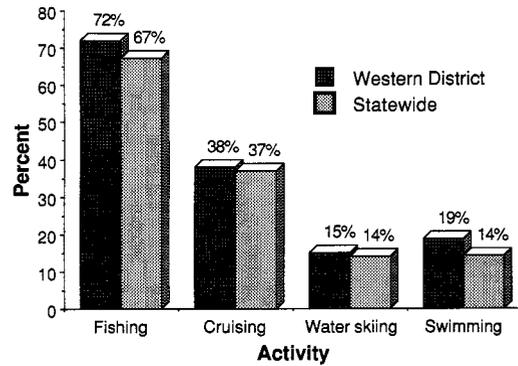


Figure 20. Activities, Western District.

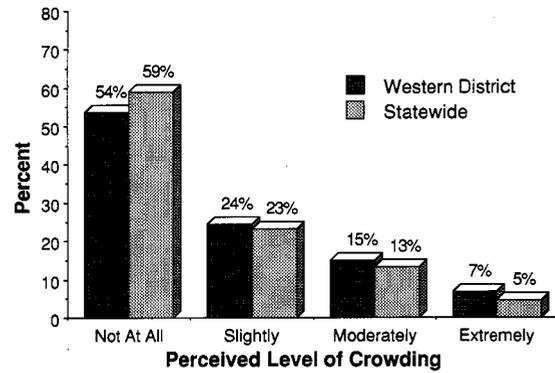


Figure 21. Perceived crowding, Western District.

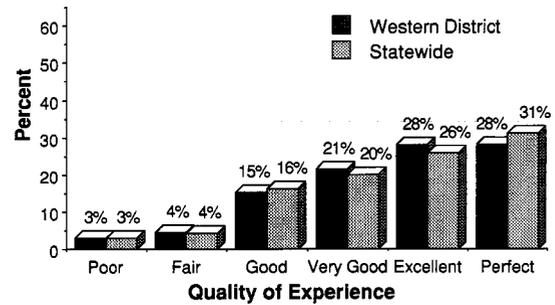


Figure 22. Quality of experience, Western District.

Table 62. County of residence for boaters in the Western District.

| County | Percent (%) of Total |
|-------------|----------------------|
| La Crosse | 20 |
| Chippewa | 15 |
| Eau Claire | 14 |
| St. Croix | 6 |
| Trempealeau | 4 |
| Dunn | 4 |
| All Others* | 37 |

* Out-of-state or Wisconsin counties in which only 1 or 2 respondents resided.

DISCUSSION

Boating Pressure

Overall, there were nearly 7 million boater days in Wisconsin during the 7-month study period, 89% on inland waters, 9% on Great Lakes, and 2% on both. The DNR district with the greatest number of boater days was the North Central District (over 1.5 million boater days), while the Western District had the fewest boater days (less than 620,000). The number of boats out on the water varied greatly from county to county. Boater days ranged from a high of 508,510 in Vilas County to a low of 1,696 in Richland County (Append. Table B). Boater days on the Great Lakes ranged from 206,919 days off Door County to 4,179 days off Iron County. The counties with the greatest densities of boater days—and therefore greater boating pressure—were primarily in the southeast corner and the northern third of the state (Fig. 23). Moderate boating participation rates were in northeast and northwest Wisconsin. The rest of the state showed lower boating participation rates throughout the boating season.

The greatest boating pressure (24% of all boater days) was found in July, while August and June accounted for 19% and 18%, respectively. April showed the lowest boating pressure, with only 4% of all boater days, and October accounted for only 8%. The districts that showed the highest and lowest percentages of boating pressure statewide each month were as follows:

April: 6% of all boating in the Southern District (highest percentage), 2% of all boating in the Northwest District (lowest percentage).

May: 15% of all boating in the Western District, 11% of all boating in the Southeast District.

June: 21% of all boating in the Western District, 17% of all boating in the North Central District.

July: 28% of all boating in the Northwest District, 21% of all boating in Southern District.

August: 22% of all boating in the Southeast District, 15% of all boating in the Western District.

September: 15% of all boating in the North Central District, 11% of all boating in the Northwest District.

October: 10% of all boating in the Western District, 7% of all boating in the Lake Michigan District.

Comparing boating pressure month by month on some of the more popular inland water bodies shows that the following water bodies showed the highest percentages of pressure:

April: 16% of all boating on the Wolf River, 14% of all boating on the Rock River.

May: 23% of all boating on the Wolf River, 21% of all boating on Lake Wisconsin.

June: 29% of all boating on the St. Croix River, 27% of all boating on the Madison lakes.

July: 30% of all boating on Pewaukee Lake, 26% of all boating on Lake Winnebago, 26% of all boating on the St. Croix River.

August: 20% of all boating on Lake Geneva, 19% of all boating on the Madison lakes, 19% of all boating on Lake Winnebago, 19% of all boating on Pewaukee Lake.

September: 15% of all boating on the Rock River, 14% of all boating on the Madison lakes, 14% of all boating on the Wisconsin River.

October: 16% of all boating on Lake Wisconsin, 15% of all boating on Pewaukee Lake.

Comparing boating pressure on inland waters with boating pressure on the Great Lakes of Wisconsin, we see only small variations by month of the boating season:

April: 4% of inland boating, 4% of Great Lakes boating.

May: 14% of inland boating, 8% of Great Lakes boating.

June: 18% of inland boating, 17% of Great Lakes boating.

July: 24% of inland boating, 25% of Great Lakes boating.

August: 18% of inland boating, 25% of Great Lakes boating.

September: 13% of inland boating, 14% of Great Lakes boating.

October: 8% of inland boating, 8% of Great Lakes boating.

A comparison of Wisconsin resident boaters and non-resident boaters showed some slight variation in when they boated:

April: 4% of resident boating, 3% of nonresident boating.

May: 14% of resident boating, 11% of nonresident boating.

June: 18% of resident boating, 17% of nonresident boating.

July: 23% of resident boating, 28% of nonresident boating.

August: 19% of resident boating, 18% of nonresident boating.

September: 13% of resident boating, 14% of nonresident boating.

October: 8% of resident boating, 9% of nonresident boating.

There were some variations in boating pressure between types of boats. Motorboats (inboard, outboard, and inboard/outboard motors) were all most likely to be on the water in July. Twenty-six percent of all outboards, 24% of all inboards, and 27% of all inboard/outboards were out in July. Thirty-six percent of all nonmotorized sailboats were out in July, and 35% of all sailboats with motors were out in August. Canoes, rowboats, and other nonpowered boats were most likely to be out in October, however, with 24% of this boat type out in October, 22% in August, and only 12% out in July—the busiest time for motorboats.

The average party size varied from a low of 2.6 persons in canoes up to 4.4 persons in boats with inboard or inboard/outboard motors. Party size on boats with out-

boards averaged 2.9 persons; on sailboats, the average was 2.8 persons. The average number of people on the boat for nonresidents was 3.4 persons, while for residents it was 3.0 persons.

The average boater in this study spent 5.4 hours on the water during a boating day. On weekends, this average went up to 5.6 hours, and on weekdays the average was 4.8 hours. Those with boats with outboards spent the most time on the water (an average of 5.6 hours). Those with inboards or inboard/outboards spent on average 5.5 hours on the water, while those with canoes spent an average of 4.8 hours on the water and those with sailboats spent an average of 4.1 hours on the water.

Eighty percent of all boaters were on the water on a weekend, and 66% were on the water on a weekday. Those with canoes, outboards, and sailboats had nearly identical weekend participation (80%, 79%, and 80%, respectively), and those with inboards were the most likely to be on the water on a weekend (88%). Canoeists were the least likely to be on the water on a weekday (56%), 63% of those with sailboats and those with inboards were on the water on a weekday, and those with outboards were the most likely to be out on a weekday (67%).

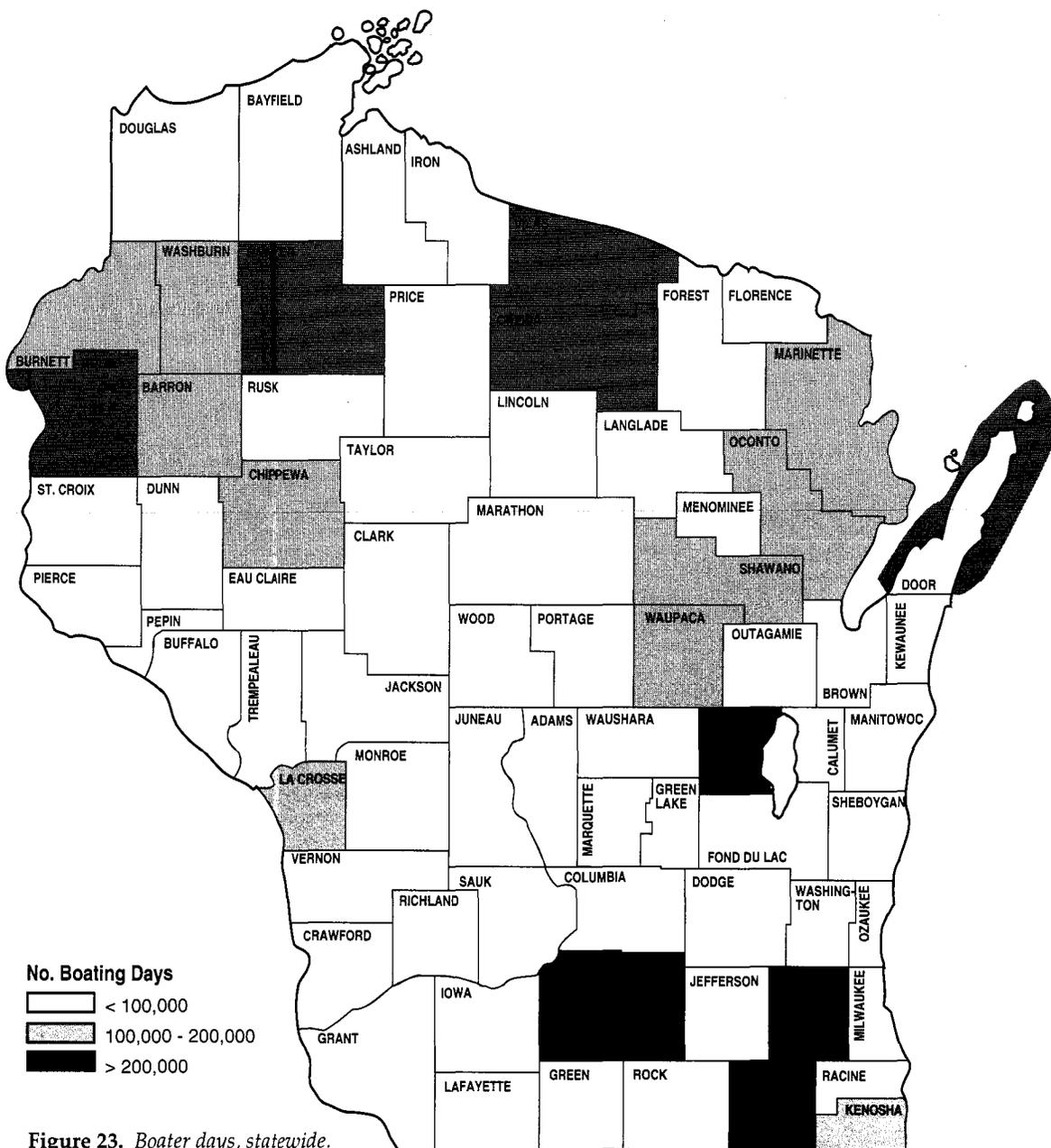


Figure 23. Boater days, statewide.

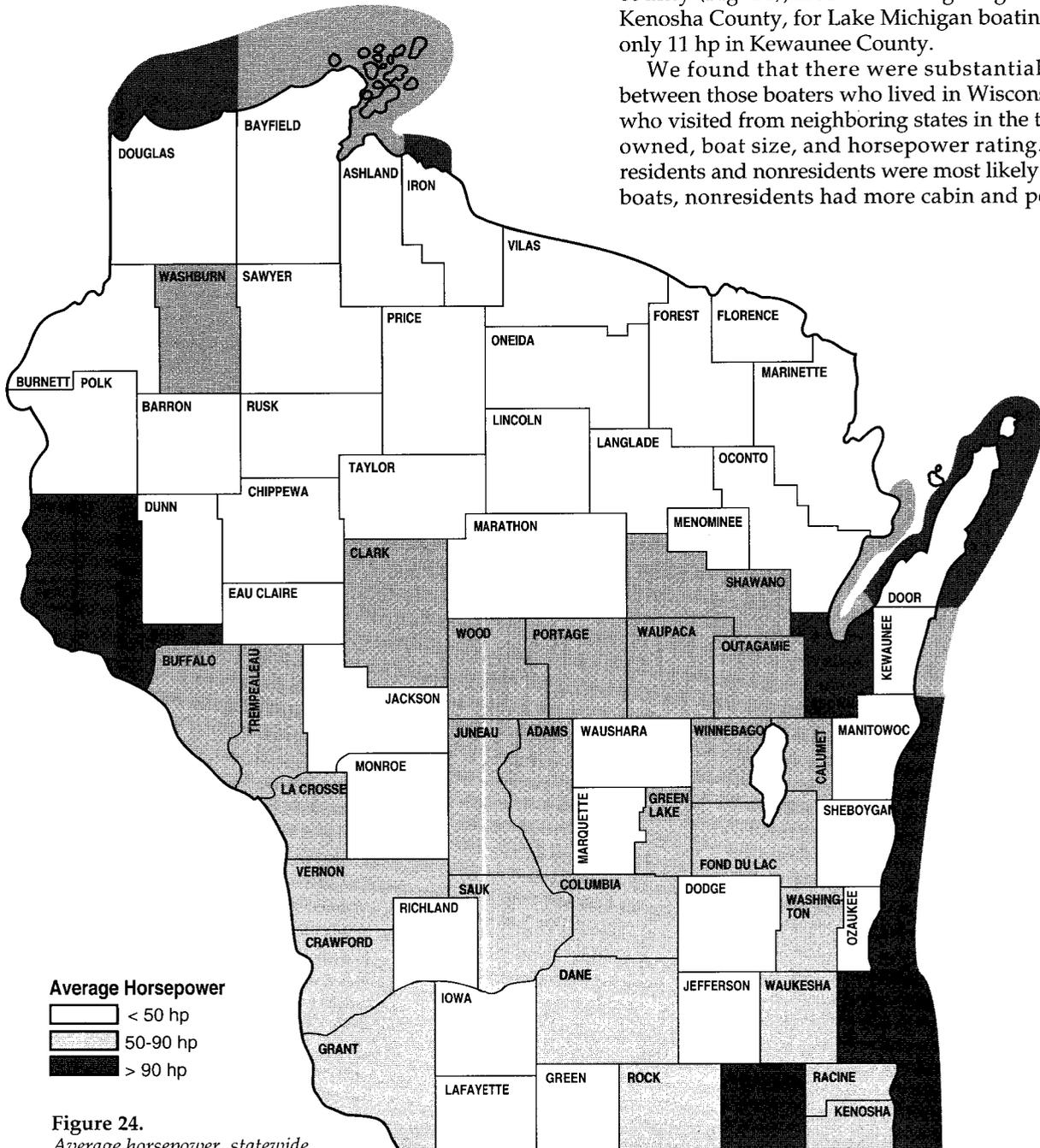
Boat Types

The majority of the respondents statewide (83%) reported owning motorboats. Boats with outboards were smaller, averaging 15.7 ft in length, while those with inboards or inboard/outboards averaged 20.8 ft in length. The remaining 17% were either sailboats, canoes, kayaks, or rowboats. The percentages of motorboats and nonmotorized boats varied between districts and counties. The Northwest District had the highest percentage of motorboats (93%), compared with the Southeast District, which had the lowest percentage of motorboats (74%). The county with the lowest percentage of motorboats was Milwaukee County (51%). All the boats in Richland,

Buffalo, Kewaunee, and Ashland counties were motorboats, and all the boats in Iron County for Lake Superior boating were motorboats.

The average horsepower for the entire state was 55 hp. It is important to note that all Lake Superior and Lake Michigan boats exceeded this average, often by nearly double or more. Motors used for inland boating averaged 54 hp, while those used for Great Lakes boating averaged 112 hp. The average outboard motor was 36.2 hp, while the average inboard or inboard/outboard motor was 188.9 hp. The district with the highest average horsepower was the Southeast District (86.5 hp), while the Northwest District had the lowest average horsepower (40.4). Motorboats ranged widely in horsepower from county to county (Fig. 24), from an average high of 226.9 hp in Kenosha County, for Lake Michigan boating, to a low of only 11 hp in Kewaunee County.

We found that there were substantial differences between those boaters who lived in Wisconsin and those who visited from neighboring states in the types of boats owned, boat size, and horsepower rating. While both residents and nonresidents were most likely to have open boats, nonresidents had more cabin and pontoon boats



than did residents. Twelve percent of nonresident boaters had cabin cruisers, compared with 7% of resident boaters, and 10% of nonresident boaters had pontoon boats, compared with 7% resident boaters. Both groups favored outboards, but 10% more residents than nonresidents had outboards (64% nonresident, 74% resident). Nearly twice as many nonresidents as residents had inboards (6% nonresident, 3% resident) and inboard/outboard motors (14% nonresident, 8% resident). Nonresident boaters had boats with higher average horsepower (82 hp) than the boats of residents (average 55 hp). Boats used by nonresidents were larger, as well, averaging 17.8 ft, compared with 16.5 ft for boats used by residents.

There were differences in boating location between those with outboards, those with inboards or inboard/outboards, those with sailboats, and those with canoes. Those respondents with canoes were most likely to boat the inland lakes or rivers (96%). Only 2% of those with canoes indicated that they boated on one of the Great Lakes. Those with outboards primarily boated on inland lakes or rivers (91%) and only rarely ventured onto one of the Great Lakes (6%). Seventy-three percent of the sailboaters boated on inland waters, and 25% boated on the Great Lakes. Of those with inboard or inboard/outboard motors, 74% boated on inland waters, and 23% boated on the Great Lakes.

Those who boated inland waters tended to have 16-ft open-hulled boats (82%), with outboard motors (75%) and an average of 54 hp. Boats that were used on the Great Lakes were evenly divided among open-hulled (49%) and cabin boats (45%). About one third (39%) had outboards, another third had inboards or inboard/outboard motors (29%), and one third were sailboats (31%). The average horsepower on the Great Lakes was 112 hp, and the boats were on average larger (21.5 ft). Those who boated both inland waters and the Great Lakes primarily had 17-ft open-hulled boats (80%); 71% had outboard motors and 21% had inboard or inboard/outboards, with an average of 88 hp.

This relationship between boating location and boat size and type is supported by another study of boater participation and activities on the Great Lakes. The Great Lakes Basin Framework Study (Great Lakes Basin Comm. 1975) found that boating on Lake Superior was limited largely to protected bays because of cold temperatures, inclement weather, steep rocky shoreline, the lack of adequate harbor facilities, and fog. Boating on Lake Michigan generally required a larger and more powerful boat than those used on inland lakes and streams, and canoeing there was not an option. In fact, much of the Great Lakes water was not used by small craft because of the general lack of access and the hazards associated with open-lake use.



PHOTO: BOB QUEEN

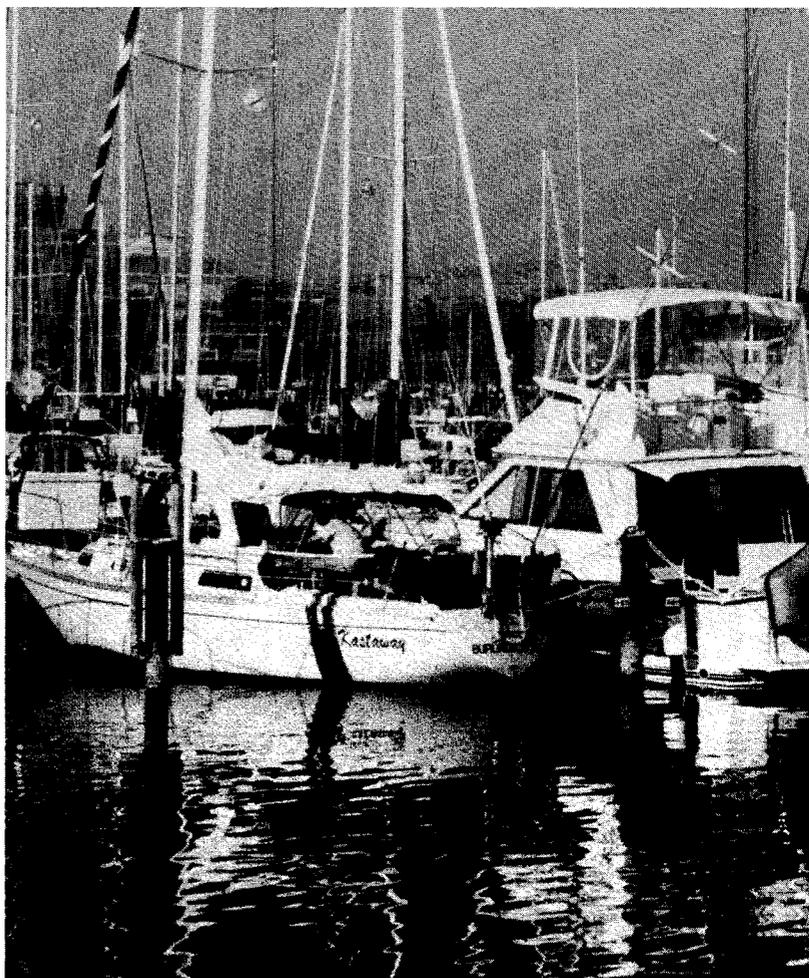


PHOTO: BOB QUEEN

Activities

In our study, we found that by far the most popular activity among the boaters in Wisconsin was fishing. Throughout the 7-month study period, a total of 67.3% of the respondents reported fishing as part of their boating activities. The DNR district with the highest fishing participation was the Northwest District (80.4%), and the district with the lowest fishing participation was the Southeast District (46.9%).

Those with outboards were most likely to fish (82%), and those with sailboats were least likely to fish (4%). Sixty-five percent of those with inboards or inboard/outboards and 63% of those with sailboats participated in pleasure cruising or sailing, while only 14% of canoeists did that. Forty-one percent of those with inboards or inboard/outboards water skied, while only 12% of those with outboards skied.

Those who boated both on inland waters and on the Great Lakes were the most likely to participate in fishing (75%), followed by those boating only on inland waters (69%). Little more than one half (53%) of those boating the Great Lakes fished. Great Lakes boaters were most active in pleasure cruising or sailing (48%), followed by those who boated both Great Lakes and inland waters (45%) and those who boated inland waters only (36%). Those who boated both inland waters and the Great Lakes were more likely to ski (27%) than either inland

waters boaters (15%) or Great Lakes boaters (6%), and they were more likely to swim (32%) than either inland waters boaters (14%) or Great Lakes boaters (12%).

Those activities in which nonresidents participated most were somewhat different than those in which residents participated most. Residents were more likely to report fishing as a part of their boating experience (69% resident, 58% nonresident), while nonresidents were more likely to cruise (45% nonresident, 36% resident), ski (20% nonresident, 13% resident) or swim (18% nonresident, 14% resident).

In other studies of recreational boating, fishing was also found to be the most popular boating-related activity, followed by pleasure cruising and water skiing. A 1976 survey of boating households in the United States indicated that boaters engaged in the following activities: fishing (76.7%), pleasure cruising or sailing (62.5%), and water skiing (37.7%) (U.S. Coast Guard 1978). This Coast Guard survey showed that boating households in 1976 were also active in nonboating recreational activities, including camping, fishing, hunting, athletic sports, and other outdoor recreation. Over 98% of all boating households participated in one or more of these activities. Recreational fishing had the highest percentage of participants (88.4%).

The National Association of Engine and Boat Manufacturers has been collecting data on boat owners since 1953, and in every study fishing was the most popular reason given for purchasing outboard equipment in the Great Lakes area, including Wisconsin (Great Lakes Basin Comm. 1975). These studies showed that although cruising and skiing have increased in importance since the early 1960's, fishing has steadily maintained its lead in popularity. In 1965, 78% of outboard purchasers mentioned fishing as their intended use of the equipment, 35% mentioned cruising, and 27% mentioned skiing.

The Recreational Water Access Study for Wisconsin (Wis. Dep. Nat. Resour. 1986a) showed that 50% of Wisconsin residents participated in outdoor recreational activities on Wisconsin's inland lakes. Of these, 55% went fishing, 48% swam, 38% boated, and 9% canoed.

According to a 1988 study of boating in Minnesota (Lime et al. 1989), about one third of Minnesota's boat owners engaged in recreational boating on Lake Superior during 1983-87. Those living closer to the Lake were more likely to boat and boated more frequently. Fishing was again the most common activity, mentioned by 55% of the respondents.



PHOTO: BOB QUEEN



PHOTO: BOB QUEEN



PHOTO: BOB QUEEN

(slightly crowded). By county, responses ranged from average lows of 1.25 in Richland County and 1.86 in Monroe County (not at all crowded) to a high of 4.12 in Walworth County (moderately crowded).

There were some differences in perceptions of crowding associated with boat type. Those with inboards or inboard/outboards expressed an average crowdedness level of 3.44, while those with sailboats had an average level of 3.02, those with outboards averaged 2.86 (all slightly crowded ratings); those with canoes reported a level of 2.25 (not at all crowded). These levels of perceived crowdedness may be related to the amount of space each boat type requires while boating—larger boats require a larger amount of surface water, especially for skiing or cruising, while canoes require the least amount of space in order to participate effectively. However, other factors may be involved, such as site preferences, expectations of crowding, and interest in associated activities (e.g., swimming, fishing, or water skiing).

There were slight differences in the levels of perceived crowding on the water depending on whether the respondent boated inland waters or the Great Lakes. Those who boated the Great Lakes expressed the lowest level of crowdedness (an average rating of 2.70), while those who boated inland waters averaged 2.92 (both slightly crowded). Those who boated both Great Lakes and inland waters reported the highest average level of crowdedness (3.48, slightly crowded).

Nonresidents and residents reported nearly identical perceptions of crowding. Wisconsin residents reported an average level of crowdedness of 2.92, while nonresidents reported an average level of 2.94 (both slightly crowded).

According to a comparison of a variety of recreational research studies by Shelby et al. (1989), 4 factors affect the level of perceived crowding in outdoor recreation: time, resource availability, accessibility or convenience, and resource management policies. Factors that do not affect crowding are regional differences, consumptive vs. nonconsumptive resource use, and the methodology used to the study the population. This report states that “when people evaluate an area as being crowded, they have at least implicitly compared the impact that they experienced with their perception of a standard (a personal or social norm or some combination thereof)” (275). Shelby et al. showed that the crowding scale commonly used (and the one used in our study) gives a good single measure of the carrying capacity of a recreational setting.

In this article, Shelby et al. suggest that there are 5 distinct levels of carrying capacity based on levels of perceived crowding: suppressed crowding, low-normal, high-normal, more than capacity, and much more than capacity. Since only 41% of the boaters in our study reported some level of crowding (ranging from slightly crowded to extremely crowded), recreational boating in Wisconsin places in the “low-normal” category for perceived crowding and carrying capacity. According to Shelby et al., “[in the] low-normal category, visitors are



not likely to be experiencing access, displacement, or crowding problems” (285). For recreational activities with an overall low-normal rating, a “problem situation does not exist at this time [and the situation] may offer unique low-density experiences” (285). While this is encouraging, some attention should be paid to carrying capacity on Wisconsin water bodies, especially if increased use is expected; management would then be able to anticipate problems that might arise from operating right at or close to capacity on the water.

Another recent Wisconsin outdoor recreation study shows a trend toward crowded conditions on Wisconsin waters. The 1990 Wisconsin Outdoor Recreation Study

found that anglers identified crowding by other anglers and non-anglers as one of the top 10 problems with fishing in the state (Wis. Dep. Nat. Resour. 1991). The study also found that almost half (46%) of the swimmers and boaters surveyed identified crowding by others doing the same activity as a problem encountered in their recreational activity, and 24% identified crowding by others doing different activities as a problem.





PHOTO: BOB QUEEN

Recreational Use Conflicts. Conflict in outdoor recreation is defined as “any physical, social or psychological obstruction arising within or between participants and their recreation goals” (Lindsay 1980:215). Conflict can arise out of competing goals and expectations or differing values about the recreational environment. Rounds (1985:59) states that “the baby boom generation fits almost to a tee the profile of the American boating consumer, in age levels, income brackets, home ownership, marital status, family size, etc. . . . Growth and the ‘me-generation’ baby boomers’ expectations are going to collide with the finite waterfront available to them—whether for boating, beaching, surfing, fishing, sunning, sunset-watching, or living.”

Lindsay (1980) identifies 4 types of recreational conflict:

1. Conflict between or within groups engaging in outdoor recreation. This conflict is directly related to the quality of the outdoor recreational experience, which in turn determines the social and psychological carrying capacity of the recreational environment.
2. Physical conflict, in which use of a recreation site results in various impacts on the natural environment.
3. Political conflict, in which opposing factions have vested interests involving land-use allocation that affects outdoor recreation. These conflicts may involve nonrecreational interests, such as timber or mining companies.
4. Philosophical conflict between the philosophies and practices of natural resource owners and managers and the attitudes and behaviors of those seeking the recreational experience.

According to Lindsay (1980), management steps that can effectively reduce or prevent these conflicts include displacing activities, reducing the number of participants

at any one time, getting participants to lower their threshold of sensitivity to other users, increasing education efforts, eliminating (forbidding) undesirable uses, zoning areas of recreational conflict by activity and experience level, and using effective signs. Rounds (1985) also proposed limited restrictions on hours of operation, speed limits, and zoning; opening additional waters to the recreating public for all uses; and increasing the number of access sites.

In our study, 8% of the respondents told us of something that adversely affected their boating experience. The greatest number of these reports concerned conflicts between groups such as anglers and water skiers, those wishing to cruise in power boats and those wishing to sail, and personal watercraft users and pleasure cruisers. Complaints often focused on perceptions of illegal or unsafe operation by other boaters, although over-crowded conditions also appeared to be a frequent contributing factor to complaints. In a related survey of anglers, unsafe boating practices by others were cited by 27% of surveyed Wisconsin anglers as a problem that diminished their enjoyment (Wis. Dep. Nat. Resour. 1991). Selected comments on user conflicts gathered from our survey are grouped into 33 categories in Appendix C at the end of this report.

A number of the respondents reported that they had changed their use patterns as a result of conflict. That is, they changed the days, times, or locations of their boating in order to avoid conflicts with other users. This “solution” to user conflicts demonstrates how boaters tend to be displaced and therefore modify their behavior to compensate for less-than-optimal recreational conditions. This pattern is likely to be far more common than is suggested by the results of this study, since respondents were not directly asked about recreational displacement. It is possible that a direct question about displacement

would reveal a substantial proportion of recreationally displaced persons.

Although we did not ask respondents to provide us with solutions, many did suggest possible remedies for these use conflicts. The suggestion most often volunteered was to enact and enforce speed and horsepower limits on waterways. Greater enforcement of existing restrictions and regulations was another frequently mentioned solution to recreational interference concerns. Other suggested solutions included more boater education, mandatory education for boat operators, and boat operator licenses. Finally, some respondents requested improvements in existing facilities or more facilities. They mentioned improvements needed at access points, parking lots, and public piers.

Phase 2 of the recreational boating research study dealt with the issue of recreational use conflicts in more detail. Using answers given by respondents in the Phase 1 survey, we provided a list of types of interference and asked respondents to check which ones applied to them. The Phase 2 survey also asked participants to indicate how serious certain problems were and how they felt about possible solutions. Thus, Phase 2 results expand upon and quantify results presented here in the Phase 1 report.

Most other recreational boating studies have also looked at conflict between or within groups competing for the same recreational space, because it is an issue of great interest to managers of surface water recreation areas. Numerous sociological studies have focused on conflicts and their management at recreational areas and water-based recreational areas. These studies have shown that conflicts are complex and involve several dimensions, since recreationists at times find themselves competing for the same physical, social, and psychological space. Space is the primary issue here, as it cannot be significantly increased to meet the steadily increasing demand: "Based on numbers of participants, limited space and competing activities, the potential for outdoor recreation conflict both within and between recreation groups is substantial" (Lindsay 1980:217).

Lucas (1964:16) reported conflicts between people in motorboats and canoeists in the Quetico-Superior wilderness area of Minnesota. He found that canoeists "usually wanted no motorboats [on the waterway]" and felt crowded by them. Conversely, motorboaters were undisturbed by the canoeists. These 2 groups of users have significant differences in perceptions, attitudes, and behaviors, and both groups are increasing steadily. Thus it is not only the finite amount of space that is at issue, but also the mere presence of a competing recreational use.

A 1988 study of recreational boaters in Minnesota (McAvoy et al. 1990) showed that the

most severe problems boaters encountered involved the behavior of other boaters (mentioned by 80% of the respondents). This was followed by problems with stream-bank and lake-shore erosion (68%) and problems with the number of other boats on the water (68%). Interestingly, sailboaters (especially those with boats over 20 ft in length) were more likely to perceive problems with the number of other boaters and with the overall management of recreational boating than other groups of boaters. The number of other boaters was mentioned as a problem more often by those living in urban areas than by residents of other parts of the state.

McAvoy et al. (1990) found that among Minnesota boaters the most popular suggestions (those supported by over 50% of the respondents) for reducing recreational conflicts were to restrict the speed of boats on heavily used lakes and rivers, restrict certain types of boating to specific parts of heavily used lakes and rivers, enforce safety regulations more aggressively, increase penalties for safety violations, and provide protected harbors on large lakes such as Lake Superior. Fewer respondents favored restricting the number of people using the lake or river at any one time on heavily used lakes or rivers. The report states that "Minnesota boat owners are in favor of management actions to improve boating on heavily used lakes and rivers, but they are generally not supportive of regulations that would restrict their overall opportunity to boat" (3).

The Wisconsin SCORP Recreational Water Access Study (Wis. Dep. Nat. Resour. 1986a) asked what problems boaters associated with recreational activities on the Great Lakes. Respondents cited littering, water pollution, crowding, and user conflicts. About one third of those who used inland lakes for recreation indicated problems associated with their activities. These were listed as: littering, boater behavior, crowding, water quality (weeds or algae), lack of law enforcement, poor quality access points, and landowner/user conflicts. The SCORP Motorboat User Study (Wis. Dep. Nat. Resour. 1986b) identified boater behavior, overcrowding, lack of quality access, and water quality as the primary problems identified by motorboaters.



PHOTO: BOB QUEEN

Expenditures

Reports of expenditures are most prone to recall/memory bias in a mailed survey; expenditure data is most affected by what is called memory decay—the inability to recall an event in the past, creating the error of omission (Westat, Inc. 1989). This recall bias is especially apparent for items that don't cost much or are not particularly memorable, such as food, and the bias increases substantially as the recall period becomes greater. While recall bias with respect to expenditure data is important to keep in mind, in this study the effects of this bias have been substantially reduced by shortening the time between the event (expenditure for item or service) and the reporting (the survey questionnaire). However, by gathering data

from each respondent for only the most recent 2-week period in order to counteract recall bias, information on large one-time boating expenditures (such as slip/mooring rentals) is not always obtained. Since this type of information can easily be gathered through conventional methods, this study was designed to focus instead on expenditure information that is typically harder to quantify.

There can be no doubt that boaters in Wisconsin contribute significantly to the tourism and service industries. We estimate that during the 7-month study period, boat owners spent nearly \$204 million to boat in Wisconsin. The DNR district that benefited the most from this outlay of boating-related monies was the Northwest District (at over \$53 million), while the Western District brought in the least (\$14.5 million). There were wide variations in expenditures from county to county (Fig. 27). Vilas County alone brought in \$21.2 million, over a thousand times more than that brought in by Richland County (\$15,505).

Statewide, boating parties spent an average of \$29 per day. Boating parties in the Northwest District spent an average of \$36, while boating parties in the Southeast

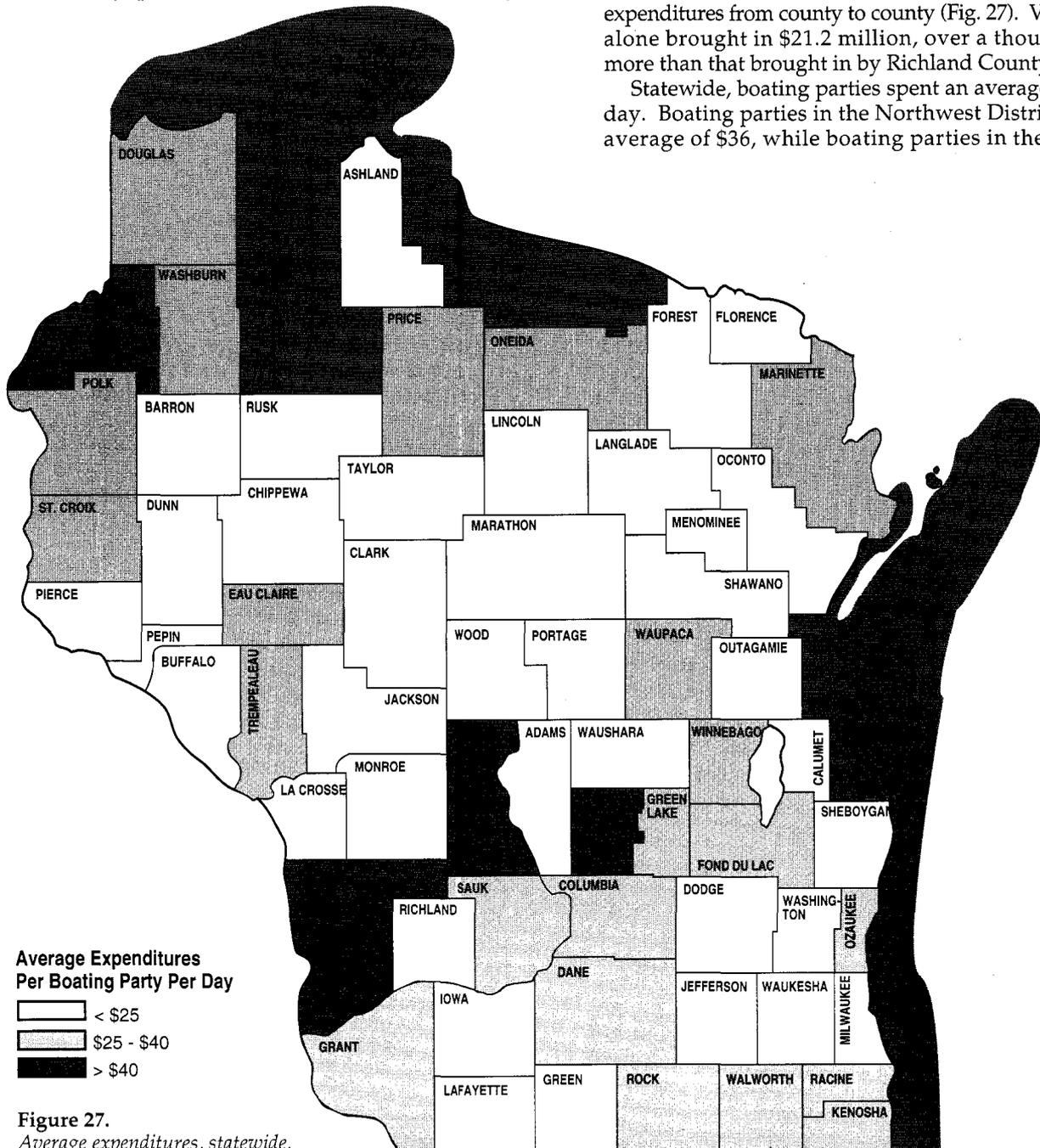


Figure 27. Average expenditures, statewide.

District spent on average only \$22. Counties with the highest average expenditure per boating party per day were: Vernon (\$93), Brown (\$67), Burnett (\$67), Manitowoc (\$60), and Kewaunee (\$52). Counties with a low average expenditure per boating party per day were: Calumet (\$9), Monroe (\$9), Richland (\$9), Buffalo (\$10), Washington (\$11), Pierce (\$12), Waukesha (\$12), Dunn (\$13), La Crosse (\$14), Marathon (\$14), and Portage (\$14).

There were differences in the average amount of money spent by owners of different boat types per day of boating. Those with inboards or inboard/outboards averaged the most (\$100 per day). Those with outboards averaged \$81, canoeists averaged \$66, and sailboaters averaged \$58 per day. For all groups, the most money was spent on packaged food and groceries: inboards \$24, outboards \$19, canoes \$16, and sailboats \$13 per day. Those with inboards spent much more in restaurants than did any other group: inboards \$21, outboards \$11, sailboats \$10, canoes \$8 per day. Finally, those with outboards spent more on sporting goods than did the other groups: outboards \$12, inboards \$9, canoes \$6, sailboats \$1 per day.

Those who boated on both inland waters and the Great Lakes tended to spend the most money on their boating experience. These respondents spent an average of \$166 per party per boating day, primarily for sporting goods (\$54), restaurants (\$24), auto expenses (\$21), packaged food and groceries (\$19), and lodging (\$16). Boaters on the Great Lakes spent an average of \$90 per party per boating day, primarily on packaged food and groceries (\$18), restaurants (\$17), auto expenses (\$10), and sporting goods (\$10). Those who boated inland waters spent an average of \$79 per party per boating day, primarily on packaged food and groceries (\$19), restaurants (\$11), and auto expenses (\$11).

Nonresidents spent more than twice the amount of money per party while boating than did Wisconsin residents. Nonresidents averaged \$148 per party per boating day, while residents averaged \$66. The greatest expenditure for both groups per party per boating day was for food (\$40 for nonresidents, \$14 for residents), while nonresidents spent much more in restaurants (\$28, compared with \$9 for residents) and for lodging (\$19 compared with \$7 for residents). They also had more auto-related expenses (\$19, compared with \$9 for residents). Residents and nonresidents each spent \$10 on sporting goods per party per day.

Historical Perspectives on Boating Pressure and Boat Types

In 1947, there were approximately 2.4 million recreational boats in use in the United States. That number had doubled little more than 5 years

later. From 1958 to 1978 the number of boats in the U.S. more than doubled again. In 1976, one out of every 5 households in the U.S. had at least one boat operator; 9.6 million households owned one or more recreational boats, and 21.1% of boat-owning households owned more than one boat (U.S. Coast Guard 1978). The U.S. Coast Guard and the boating industry estimated that by the mid-1980s about 25% of the U.S. population participated in boating (Graefe 1986). In 1989 nationwide, 73,287,000 people participated in recreational boating (Natl. Mar. Manuf. Assoc. 1990a). In the same year, the Coast Guard reported 10,773,000 boats registered or licensed throughout the United States (U.S. Coast Guard 1990). Boats in Wisconsin account for 4.48% of that total (Natl. Mar. Manuf. Assoc. 1990b). This amounts to one boat per 10.1 persons in the state.

The growth in the popularity of boating has been in large part attributed to post-war technological advances in materials and building/assembly techniques (primarily fiberglass production), which brought down the cost of boat ownership, as well as improvements in outboard motors, electrical starters, and boat trailers (which increased boater mobility). Increased access created the opportunity for more people to join in the fun. Other factors that contributed to the increase in boat ownership were increasing population, increasing mobility, rising incomes, more active lifestyles, greater average health, better highways, the development of interstate highways (providing access to shorelines), longer vacations, and more holidays (Marmo 1980, Graefe 1986).

Table 63 shows the changes in boat length from 1969 to 1989. It shows that smaller boats (those less than 16 ft) are still the predominant boats in use. The percentage of smaller boats dropped nearly 14%, however, during the 2 decades from 1969-89, declining from 66.3% to 52.6% of all boats in the U.S. This decrease was offset by a similar increase in boats 16-25 ft in length (30.0% in 1969, 43.6% in 1989). The percentage of boats 25 ft and larger changed no more than a few tenths of a percent during the same period, making up less than 4% of all boats.



DNR HISTORICAL PHOTO

Table 63. Boat length nationwide, 1969-89*

| Length | Percent (%) of Total by Year | | | | | | | | | | |
|----------|------------------------------|------|------|------|------|------|------|------|------|------|------|
| | 1969 | 1971 | 1973 | 1975 | 1977 | 1979 | 1981 | 1983 | 1985 | 1987 | 1989 |
| <16 ft | 66.3 | 64.5 | 65.2 | 65.6 | 63.7 | 61.9 | 62.3 | 60.4 | 58.7 | 55.3 | 52.6 |
| 16-25 ft | 30.0 | 31.9 | 31.4 | 31.5 | 33.3 | 35.0 | 34.7 | 36.2 | 37.6 | 41.1 | 43.6 |
| 26-39 ft | 3.4 | 3.2 | 3.0 | 2.6 | 2.7 | 2.7 | 2.6 | 3.1 | 3.3 | 3.1 | 3.3 |
| 40-65 ft | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.4 | 0.5 | 0.4 |

*U.S. Coast Guard 1978, 1980, 1982, 1984, 1985, 1987, 1988, 1989.

Changes in boat size among Wisconsin's licensed boats from 1968 to 1989 has followed this national trend. Those boats under 16 ft made up 80% of the licensed boats in Wisconsin in 1968, but by 1989 they made up only 64%, while 16-39 ft boats increased from 18% in 1968 to 34% in 1989. The largest boats (40 ft and over) consistently made up less than 1% of all boats during the same 20-year period (Wis. Dep. Nat. Resour., Law Enforc., unpubl. data).

Another interesting nationwide trend is the steadily increasing size of boat motors. As Table 64 shows, there were significant increases in the average horsepower of boat motors sold nationwide from 1941 to 1982 (Clawson and Van Doren 1984). In 40 years, the average horsepower increased from 3.6 hp to 43.3 hp, a 12-fold increase. The greatest increases occurred in the first 15 years following World War II, when the average horsepower climbed to 27.4. With each decade, horsepower has steadily increased.

Figure 28 shows the total boats licensed in Wisconsin from 1968 to 1989 by type of propulsion: outboard, inboard, and sail. The total number of boats licensed increased from 302,957 in 1968 to 482,336 in 1989 (a 63% increase). The number of sailboats nearly doubled during this time, from 6,760 in 1968 (making up 2% of all boats licensed) to 12,260 in 1989 (3% of all boats licensed). The number of outboards climbed from 290,157 in 1968 (96% of all boats licensed) to 424,707 in 1989 (down to 88% of all boats licensed). The number of inboards showed the greatest increase, 750%, rising from 6,040 in 1968 (2% of all licensed boats) to 45,369 in 1989 (9% of all boats licensed). The most dramatic increase occurred in 1986-87, when the number of licensed inboard boats increased nearly 4-fold. This dramatic jump included a 611% increase in 16-26 ft fiberglass boats, which reflects the increased availability of relatively inexpensive boats of this type during this period (Wis. Dep. Nat. Resour., Law Enforc., unpubl. data). While outboards still make up the majority of all boats licensed in the state of Wisconsin, inboards appear to be steadily increasing in overall percentage of boats licensed.

Table 64. Average boat horsepower nationwide, 1941-82.

| Year | Average horsepower | Year | Average horsepower |
|------|--------------------|------|--------------------|
| 1941 | 3.6 | 1970 | 31.0 |
| 1950 | 6.9 | 1975 | 40.3 |
| 1955 | 12.9 | 1980 | 37.7 |
| 1960 | 27.4 | 1981 | 41.5 |
| 1965 | 28.2 | 1982 | 43.3 |

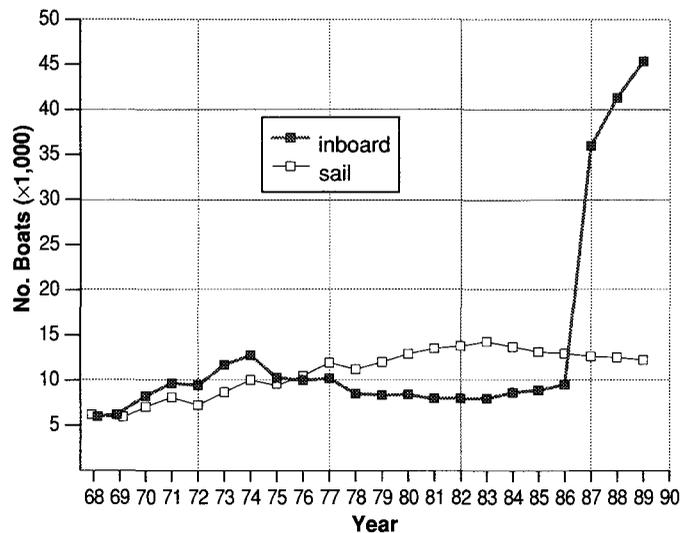
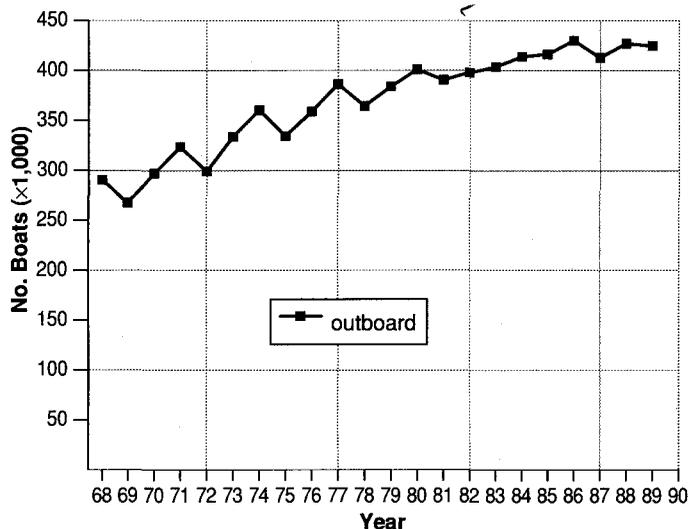


Figure 28. Number of outboards, inboards, and sailboats licensed in Wisconsin, 1968-89.

SUMMARY AND MANAGEMENT IMPLICATIONS

The 1989-1990 Recreational Boating Survey was the largest of its kind ever done in Wisconsin. Phase 1 of this study provides information on statewide recreational boating pressure for the study period (May-October 1989 and April 1990), analyzed by DNR district and by county. This report summarizes results statewide and for DNR districts. The comprehensive report, including complete results by county, is available from the DNR Bureau of Law Enforcement. Brochures on survey results for 10 of the most frequently boated water bodies are also available from Law Enforcement. Results of Phase 2 of the study, which focused on boater attitudes and experiences, will be reported in a forthcoming Technical Bulletin.

Boating pressure was greatest in July and lowest in April. Statewide, 24% of all the boats out on the water were out during the month of July. The proportion of boats out in July was highest in the Northwest District (28%) and lowest in the Southern District (21%). Statewide, only 4% of all boating was done in April. April boating ranged from a low of 2% in the Northwest District to a high of 6% in the Southern District.

Eighty-one percent of all the boats on the water were open-hulled, ranging from a low of 68% in the Southeast District to a high of 86% in the North Central District. Statewide, 6% of all boats were cabin boats, though these seemed to be concentrated in the Southeast District (17% of all the boats there had cabins) and Lake Michigan District (11% of all boats); they were much less frequently seen in the North Central District (2%) and Northwest District (3%). Statewide, 5% of all boats were pontoon boats, most prevalent in the Northwest District (11%) and least prevalent in the Western District (3%).

The majority (85%) of the boats in the study were motorized. Only 9% were sailboats without motors, and 6% were canoes, rowboats, or kayaks. The Southeast District had the highest proportion of nonpowered sailboats (15%), while the Northwest and Western districts had only 3% nonpowered sailboats. The average horsepower throughout the state was 55.0 hp. This ranged from a high of 86.5 hp in the Southeast District to a low of 40.4 hp in the Northwest District.

Eighty-two percent of all the boats on inland waters were open-hulled, while only 49% of the boats on the Great Lakes were open-hulled. Only 4% of the boats on inland waters had cabins, compared with 45% of the boats on the Great Lakes. Great Lakes boats were much more likely than inland waters boats to have inboard or inboard/outboard motors, and they were somewhat more likely to be sailboats. Boats on inland waters were more likely to have outboard motors. The average horsepower on the Great Lakes was 112 hp, compared with 54 hp for boats on inland waters. Essentially all canoes, rowboats, and kayaks were found on inland waters.

Inland waters boaters were more likely than were boaters on the Great Lakes to fish (69% compared with 53%), water ski (15% compared with 6%), and swim (14%

compared with 12%), while Great Lakes boaters were more likely than boaters on inland waters to cruise or sail to their destination (48% compared with 36%).

Great Lakes boaters reported slightly higher quality in their boating experiences than inland boaters: 95% of all Great Lakes boaters said their boating experience was good to perfect, while 92% of all inland waters boaters reported the same. Great Lakes boaters reported somewhat lower levels of crowding on the water than did inland waters boaters: 63% of all Great Lakes boaters indicated that they were not at all crowded on the water, while 59% of all inland waters boaters reported the same.

Statewide, we estimate that recreational boaters spent nearly \$204 million during the 7-month boating season on purchases related to their boating trips, ranging from over \$53 million in the Northwest District to \$14.5 million in the Western District, with wide variation in expenditures from county to county. Statewide, boating parties spent an average of \$29 per day, ranging from \$36 in the Northwest District to \$22 in the Southeast District. Boating parties using inboards or inboard/outboard motorboats spent an average of \$100 per day, those with outboards averaged \$81, canoeists averaged \$66, and sailboaters averaged \$58. For all these groups, highest expenditures were on food and groceries. Those who boated on both inland waters and the Great Lakes sent an average of \$166 per party per boating day, primarily for sporting goods. Great Lakes boating parties averaged \$90 per day and inland boaters averaged \$79, both primarily on food and groceries. Nonresidents spent more than twice the money per party per day than Wisconsin residents (\$148 average vs. \$66 average). The greatest expenditure for both groups was for food.

While there were many differences between districts and between counties in the kinds of boating activities and experiences, we can get an idea of what the "average" Wisconsin boater did. This "average" boater was most likely to:

- boat on the inland waters.
- have a 16-ft open-hulled boat with a 55-hp outboard motor.
- go out about 11 a.m. and return to dock by 4:30 p.m.
- boat on a weekend (usually Saturday).
- spend about \$29 a day, with others in the boating party, on goods and services associated with the boating trip.
- spend much of the time fishing with 2 other people.
- rate the boating experience as excellent or perfect.
- not feel at all crowded on the water.

Primary uses for the data in this study include matching DNR law enforcement personnel work hours and equipment with areas and times of highest use throughout the state, identifying needs for boating safety education, and identifying boater needs and boating trends. This study

identified the number of boats on the water in each Wisconsin county during each month of the boating season, as well as what days of the week were likely to have the most boaters. Law enforcement patrol can then be assigned according to when and where the most boating is likely to occur. The most frequently boated inland water bodies are also provided for each county to assist this work-load management, and areas where crowding is a problem have been identified. Issues of boating safety, which can be addressed by boating safety education efforts, have also been identified.

Also of importance to managers of Wisconsin's water-based resources are the descriptions of the boats out on the water. With this study providing baseline data, we can in the future watch trends in boat types and uses from year to year and thus get some idea of growth areas both in the boating industry and in recreational boating activities. These trends include horsepower, boat size, new water sports on the scene, and the proportion of boaters who participate in boating-related activities such as fishing or skiing.

Managers can be heartened by much of what came out of this study. Boaters in Wisconsin are generally quite pleased with their experiences and do not generally feel overcrowded on the water. But the data from this study did show that in those counties where perceived crowding was high, the quality of the boating experience was rated significantly lower than elsewhere. Low quality ratings were frequently coupled with high levels of perceived crowding, as well as with user conflicts and concerns about boating safety.

Factors that interfered with boaters' enjoyment of their boating experiences primarily involved conflicts with

other users of the resource. Respondents told us of other boaters who came too close, traveled too fast, or otherwise behaved in a manner that seemed unsafe or rude. Many conflicts involved incompatible activities (such as water skiing and fishing), the use of personal watercraft in what was considered to be an unsafe or annoying fashion, or situations stemming from overcrowded conditions. Other factors which interfered with the recreational enjoyment of the resource included insufficient or in ill-repaired boat landings, weeds in the water, and low water levels.

Thus the results of this survey tell us that a need exists for reducing the use conflicts created by changing trends in boat size and design. The trends are toward bigger, faster, and noisier boats, as well as specialty craft that have augmented traditional uses of surface water. Public use of surface water has shifted to an increasing number of water sport activities. Even in the more "traditional" use of fishing, fishing boats are much faster and larger now. Each one of these trends means that more surface water space is required for each boat, while at the same time more boaters are out on the water. All these factors lead to increased use conflicts.

In those places where crowding and user conflicts are highest, managers should consider the remedies suggested by boating participants: 1) boater education, 2) speed or horsepower limits on the more heavily used or crowded water bodies, 3) increased enforcement of existing regulations, and 4) improved public access on some water bodies. The Department's responsibility to protect the public use of the water for all persons can be accomplished in large part through increased education, increased public relations, and increased law enforcement.



PHOTO: BOB QUEEN

Appendix A. Sample Correspondence and Survey Questionnaire

Advance Letter



Carroll D. Besadny
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-267-3579
TDD 608-267-6897

April 23, 1990

John Doe
123 West Main St.
Madison, WI 53700

Dear John Doe,

Spring is finally here, and for many of us that means boating season is just beginning. Although it is still early, you may already have done some boating or you may be looking forward to some boating later this year.

That's why I am writing you. I'm interested in the experiences of people like you who boat. That is, I'd like to know how often you boat, where you boat, and what kinds of experiences you have while boating.

IN THE NEXT TWO WEEKS you will be getting a questionnaire in the mail asking you about your early spring boating experiences. You are one of a small group of people who have been scientifically selected from boat registration records to represent Wisconsin's boaters.

Your answers are very important to this study. The information you share with us about your boating gives us valuable insights into the experiences of those who boat in Wisconsin. You will be helping us better understand the needs and preferences of Wisconsin boaters, and help us to better allocate our scarce funds where they are needed most.

This is one part of an ongoing research project studying boating from early spring through late fall. Even if you haven't boated at all this year, I still need to hear from you. When you receive your survey in the mail, I hope that you will take the time to let me know about your recent boating.

Sincerely,
William Engfer
Boating Safety Administrator



Carroll D. Besadny
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2621
TELEFAX 608-267-3579
TDD 608-267-6897

May 2, 1990

Mary Smith
555 South 1st St.
Green Bay, WI 54444

Dear Mary Smith,

Here's the questionnaire that I told you about in my previous letter. Boaters who have filled it out tell me it takes about 5 minutes to complete (sometimes more, sometimes less). I hope you can sit down and fill it out as soon as possible, while your boating experiences are still fresh in your mind.

The purpose of the study is to find out about the experiences and concerns of those who boat on Wisconsin's lakes and rivers. This is one part of an extensive study which spans the entire boating season - from the early spring through the late fall. Your answers to this survey will help us to better understand your needs and to improve the state's boating.

We know that it is still early in the season. However, many people have been out on the lakes already. Your answers are important to us, even if you have not been out during the past two weeks. You are part of a special group scientifically selected to represent all boaters during this time period.

Some folks own more than one boat. For the purposes of this study, however, we are only interested in the boating that you did with the following boat:
WI33333

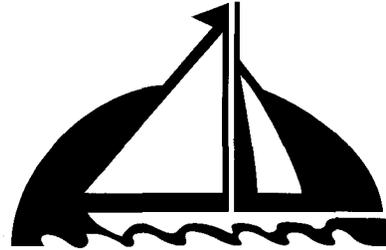
PLEASE ANSWER THE QUESTIONNAIRE WITH THIS BOAT IN MIND.

I've tried to make the questionnaire interesting and easy for you to fill out. Your answers are completely confidential and will be used for research only. I hope that you'll take the time to let me know about your recent boating experiences. No postage is necessary.

Thanks for your help.

William Engfer, Boating Safety Administrator

Special Recreational Boating Study



For this study, we are interested only in your personal experience with the boat mentioned in the cover letter. Please answer all questions with that boat in mind.

1. What type of hull does this boat have?

(Circle one)

- Open.....1
- Cabin.....2
- Pontoon.....3
- Other (Please specify _____).....4

2. What type of propulsion does it have?

(Circle one)

- Inboard.....1
- Outboard.....2
- Inboard/outboard.....3
- Other powered (Specify _____).....4
- Sail.....5
- Sail with power.....6
- Other non-powered (Specify _____).....7

If this boat has a gasoline motor, what is the horsepower of the primary motor on this boat?
_____ horsepower

3. Please describe this boat: Overall length: _____ feet
Beam (width): _____ feet

4. Did you use this boat at any time from April 21 (Saturday) through May 4 (Friday) in Wisconsin?

(Circle one)

- Yes.....1
- No...(PLEASE STOP AND SEND THE QUESTIONNAIRE BACK TO US).....2

5. Here is a calendar showing this 2-week boating period. On which days, if any, from April 21 through May 4 did you use the boat mentioned in our letter? Please circle all the days that you boated.

| April 21-May 4 | | | | | | |
|----------------|-----|------|-----|------|-----|-----|
| Sun | Mon | Tues | Wed | Thur | Fri | Sat |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 1 | 2 | 3 | 4 | |

6. Now think about all the gasoline that you used in this boat from April 21 through May 4. How many gallons of gasoline did you use? (Make an estimate but please be as accurate as possible.)

I used _____ gallons of gasoline in this boat from April 21 through May 4.

About how much money did you spend on gasoline for this boat during this time?
I spent \$ _____ on gasoline.

7. Did you use this boat on any inland lakes, rivers, or streams in Wisconsin from April 21 through May 4?

(Circle one)

Yes1
No...(PLEASE GO TO QUESTION 9)2

8. In the spaces below, name the Wisconsin counties (cities or towns if you don't know the counties) where you used this boat on inland lakes, rivers, and streams during the past 2 weeks. Also record the number of days you boated in each county during this 2-week period (if you only boated part of a day, count that as a full day). Refer to the map on the back of the cover letter.

| Name of county (city or town) | Number of days this boat was used on Wisconsin INLAND waters |
|-------------------------------|---|
| County 1 _____ | _____ |
| County 2 _____ | _____ |
| County 3 _____ | _____ |

What is the name of the lake, river, or stream on which you did most of your boating during this time?
_____ (water where I boated the most)

9. Did you use this boat along any of the Wisconsin sections of Lake Michigan or Lake Superior coastline during this 2-week period?

(Circle one)

Yes1
No...(PLEASE GO TO QUESTION 11)2

10. In the spaces below, name the Wisconsin counties (cities or towns if you don't know the counties) off whose Great Lakes shores you used this boat during the past 2 weeks. Also record the number of days you boated off each county during this 2-week period (if you only boated part of a day, count that as a full day). Refer to the map on the back of the cover letter.

| Name of county (city or town) | Number of days this boat was used on Wisconsin Great Lakes waters |
|-------------------------------|--|
| County 1 _____ | _____ |
| County 2 _____ | _____ |
| County 3 _____ | _____ |

11. Here is a list of activities that you may have been involved in while boating. For the past 2-week period, please circle the number next to those activities which were a part of your boating experience.

(Circle all that apply)

- A. Fishing from boat1
- B. Cruising/sailing to destination2
- C. Water skiing.....3
- D. Swimming.....4
- E. Other enjoyment boating (other than above).....5
- F. Something else? (Specify _____)6

Please write the letter of the activity from question 11 which you spent the most time on during this 2-week period: _____ (activity I spent the most time on)

12. While you were boating did you have contact with any DNR warden or other local boating law enforcement official?

(Circle all that apply)

- | | Warden | Local Official |
|-----------|--------|----------------|
| Yes | 1 | 1 |
| No..... | 2 | 2 |

13. Did others on the water interfere with your activity in any way? Please tell us what happened (use an extra sheet of paper if necessary):

NOW THINK ABOUT YOUR BOATING EXPERIENCES FOR THE LAST DAY THAT YOU BOATED DURING THIS 2-WEEK PERIOD. The following questions should be answered with this day in mind.

14. On the last day you boated from April 21 through May 4, how crowded did you feel while boating?

- | | | | | | | | | |
|------------|----------|------------|-----------|--------|--------|--------|--------|--------|
| 1..... | 2..... | 3..... | 4..... | 5..... | 6..... | 7..... | 8..... | 9..... |
| Not at all | Slightly | Moderately | Extremely | | | | | |
| crowded | crowded | crowded | crowded | | | | | |

15. How satisfied were you with your boating on this day?

(Circle one)

- Poor1
- Fair, things didn't work out very well2
- Good, but a number of things could have been better3
- Very good, but some things could have been better4
- Excellent, only minor problems5
- Perfect6

16. On this day of boating, during what hours were you on the water?

Started: _____am/pm Finished: _____am/pm

17. Including yourself, how many people were in your boating party?

There were _____ people in my boating party.

18. About how much did you and ALL members of your group spend on the following items (including all money spent preparing for the occasion as well as during it)?

| | |
|----------------------------------|--------------------------------------|
| _____ Food (groceries, etc.) | _____ Lodging |
| _____ Restaurants | _____ Package liquor, wine, beer |
| _____ Auto | _____ Amusements |
| _____ Clothing and related goods | _____ Sporting goods |
| _____ Gifts/souvenirs | _____ Temporary slip, mooring rental |
| _____ Other (Describe _____) | |

19. In what state and county do you live?

_____ state _____ county

What is your zip code? _____

Sometimes we need to follow up on questionnaires to get more information. If we need to follow up, what number should we dial and who should we ask for?

_____ Area Code/Phone #

_____ First name

Thank you for taking the time to complete this survey. Please fold it so our address appears on the outside and return it to us right away. No postage is needed.

Have a safe and enjoyable boating season!

This study is being conducted by the
Wisconsin Department of Natural Resources
Bureau of Research

**SPECIAL RECREATIONAL BOATING SURVEY RS/4
Wisconsin Department of Natural Resources
P.O. Box 7921
Madison, WI 53707**

APPENDIX B. Selected Survey Results by County

Total boater days statewide: Inland 6,316,621
Great Lakes 620,860

Table B.1. Boater days, Lake Michigan District.

| County | No. Boater Days | |
|--------------|------------------|----------------|
| | Inland Waters | Lake Michigan |
| Brown | 26,440 | 45,074 |
| Calumet | 28,758 | — |
| Door | 23,762 | 206,919 |
| Florence | 44,291 | — |
| Kewaunee | 4,395 | 26,102 |
| Manitowoc | 31,047 | 24,955 |
| Marinette | 117,169 | 14,356 |
| Menominee | 19,098 | — |
| Oconto | 124,603 | 14,520 |
| Outagamie | 26,901 | — |
| Shawano | 104,167 | — |
| Waupaca | 123,930 | — |
| Waushara | 83,119 | — |
| Winnebago | 252,851 | — |
| Total | 1,010,531 | 331,926 |

Table B.2. Boater days, North Central District.

| County | No. Boater Days |
|--------------|------------------|
| Adams | 74,485 |
| Forest | 92,930 |
| Juneau | 51,459 |
| Langlade | 71,052 |
| Lincoln | 99,061 |
| Marathon | 56,597 |
| Oneida | 473,610 |
| Portage | 56,817 |
| Vilas | 508,510 |
| Wood | 30,154 |
| Total | 1,514,675 |

Table B.3. Boater days, Northwest District.

| County | No. Boater Days | |
|--------------|------------------|---------------|
| | Inland Waters | Lake Superior |
| Ashland | 15,748 | 17,818 |
| Barron | 147,656 | — |
| Bayfield | 91,017 | 43,542 |
| Burnett | 170,883 | — |
| Douglas | 74,924 | 31,654 |
| Iron | 66,294 | 4,179 |
| Polk | 237,230 | — |
| Price | 61,806 | — |
| Rusk | 56,271 | — |
| Sawyer | 271,443 | — |
| Taylor | 21,422 | — |
| Washburn | 161,824 | — |
| Total | 1,376,518 | 97,193 |

Table B.4. Boater days, Southeast District.

| County | No. Boater Days | |
|--------------|-----------------|----------------|
| | Inland Waters | Lake Michigan |
| Kenosha | 107,212 | 25,820 |
| Milwaukee | 3,866 | 74,364 |
| Ozaukee | 1,735 | 17,757 |
| Racine | 62,651 | 56,079 |
| Sheboygan | 30,674 | 17,721 |
| Walworth | 283,755 | — |
| Washington | 72,821 | — |
| Waukesha | 338,701 | — |
| Total | 901,415 | 191,741 |

Table B.5. Boater days, Southern District.

| County | No. Boater Days |
|--------------|-----------------|
| Columbia | 87,418 |
| Dane | 219,751 |
| Dodge | 75,881 |
| Fond du Lac | 64,444 |
| Grant | 46,033 |
| Green | 5,800 |
| Green Lake | 94,213 |
| Iowa | 21,167 |
| Jefferson | 73,814 |
| Lafayette | 8,173 |
| Marquette | 58,182 |
| Richland | 1,696 |
| Rock | 55,238 |
| Sauk | 84,953 |
| Total | 896,763 |

Table B.6. Boater days, Western District.

| County | No. Boater Days |
|--------------|-----------------|
| Buffalo | 62,327 |
| Chippewa | 121,260 |
| Clark | 12,977 |
| Crawford | 36,697 |
| Dunn | 25,261 |
| Eau Claire | 22,383 |
| Jackson | 19,721 |
| La Crosse | 118,885 |
| Monroe | 6,088 |
| Pepin | 27,656 |
| Pierce | 37,092 |
| St Croix | 79,452 |
| Trempealeau | 23,252 |
| Vernon | 23,668 |
| Total | 616,719 |

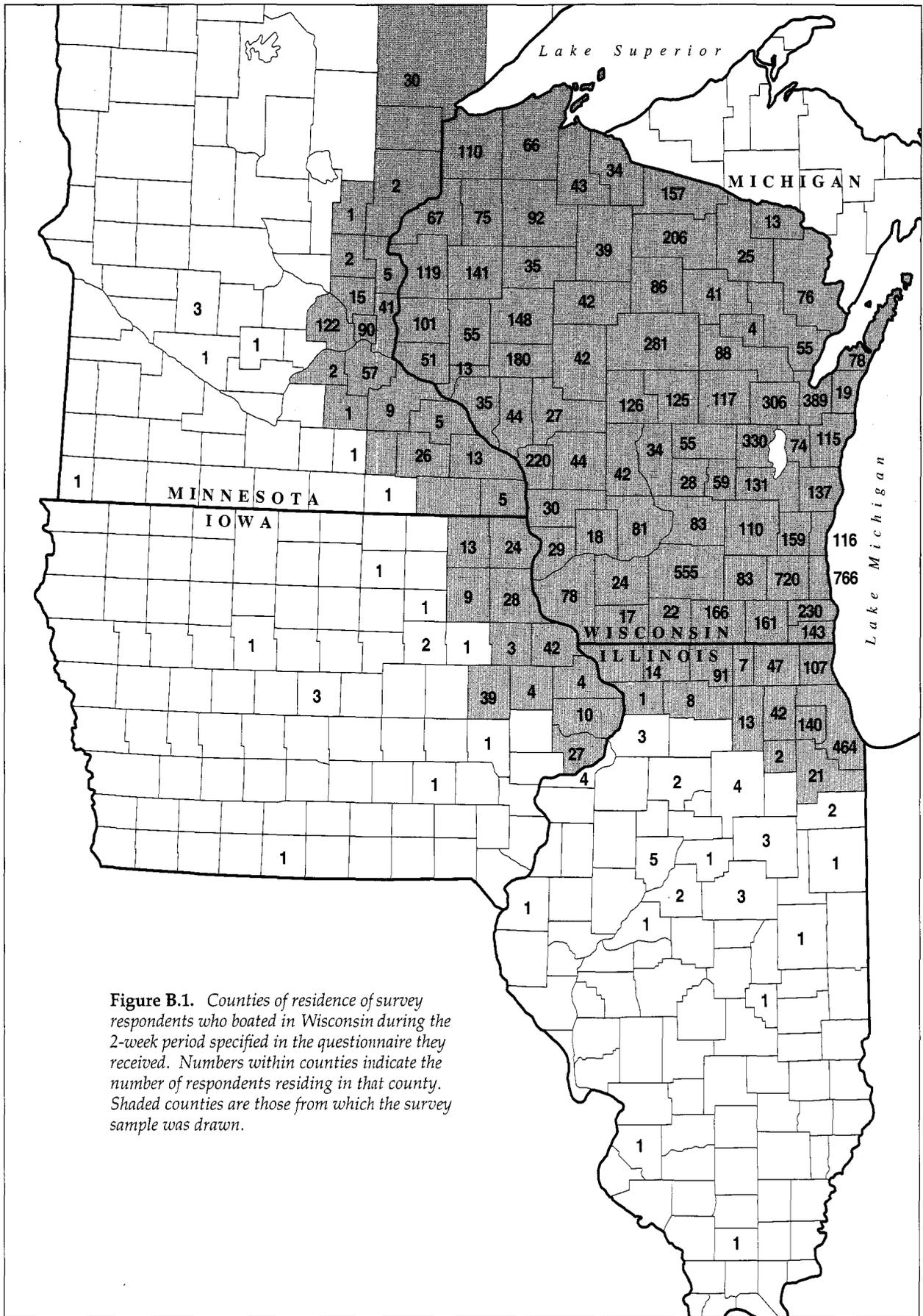


Figure B.1. Counties of residence of survey respondents who boated in Wisconsin during the 2-week period specified in the questionnaire they received. Numbers within counties indicate the number of respondents residing in that county. Shaded counties are those from which the survey sample was drawn.

Appendix C. Recreational Use Conflicts Identified by Respondents

Respondents were asked to describe any situation where others on the water interfered with their activity in any way. This question was designed to elicit those negative factors which are brought about by conflicting uses of the resource. This kind of qualitative data provides good descriptions of what concerns boaters have and whether they are issues concerning safety, incompatible uses of the resource, or unhappiness with the quality of the boating experience in general. Managers will be able to discern those topics that are likely to cause the most concern among users of a given resource and be prepared to address these issues for particular lakes or rivers. Phase 2 survey results provide a more comprehensive picture of recreational use conflicts and quantify the following problems.

Following are 33 categories of concern identified by the respondents to the Phase 1 survey. They are arranged from the most frequently cited issues to the least cited, with the number of complaints given in parentheses. With each category are sample quotes to illustrate the concern. Miscellaneous comments or comments which did not directly address the issue of recreational interference have been excluded from this list.

1. **(772) Complaints about wake from power boats, water skiers, and jet skis:**

Many larger boats would pass at a close distance at a speed that caused a large wake.

On several occasions large power boats pulled skiers dangerously close so that water was thrown on me and my boat by the water skier.

Jet skis and high speed boats created waves that threatened to swamp my boat.
2. **(755) Complaints about boating safety—too close or reckless boating, violations of boating regulations, speed:**

My greatest complaint is the high powered boats. . . . They travel at such high speeds that it is not safe to be on the water.

While fishing on the river many boaters seem to have little consideration for which side of the boat they pass on.

Too much horsing around with high speed boats. Too close to fishing boats.
3. **(742) Angler complaints:**

Pleasure boaters and water skiers made it impossible to fish.

It is no use to fish. The big boats drive you off the lake.

I can only fish early in the morning or late in the evening because speed boaters, jet skiers, and water skiers tear up the lake.
4. **(542) Complaints about water skiers:**

The water skiers are skiing too close to other boats and have no courtesy.

My only complaint is water skiers coming on the lake early (6:30 am) and skiing after 6:30 pm.
5. **(342) Personal watercraft complaints:**

The ski doos, or personal watercraft, present a problem for traditional boaters. We cannot tell how or when they are going to move or change direction.

Rental jet skis were obnoxious.

I hate these new noisy self-powered jet skis.
6. **(329) Complaints about heavy traffic, too many boats on waterways:**

There are too many big cabin cruisers plowing too big of a wake on the Mississippi River for my little speed boat on weekends.

I had a lot of trouble getting my boat on the water because of crowded boat landings.

The lake is overcrowded on weekends. Skiing is very dangerous if not impossible on weekends.
7. **(200) Sailboater complaints:**

Discourteous speed boats cutting off path of sailing at high speeds.

On several occasions, power boats would not yield right of way to my sailboat.
8. **(199) Lake or river too small for water skiing or boating activities; suggested horsepower limits or other limits:**

Aggressive use of high powered boats. Too much power for lake.

For the size of Little Elkhart Lake, there should be a limit on size boats and motors.
9. **(182) Warden and law enforcement complaints/comments:**

River is very busy. At times dangerous. No enforcement.

I was stopped for safety inspections by the Coast Guard four times.
10. **(165) Environmental problems and concerns:**

Reason for not using boat is that we hear fish taken from Green Bay is not edible.

The river banks are eroding from wave action. Gravel spawning areas are being covered with silt.
11. **(162) Complaints about anglers:**

Fishing boats park in the path of water skiers on Crystal Lake.

Trolling fishermen cutting in front of our path, floating illegal fishing nets in our path.
12. **(148) The need for better boat landings:**

There were too many people and boats at the landing. There were not enough ramps available.

Boat landings on public access to many lakes are inadequate. Little parking, shallow landings, not well marked for easy location.

13. (121) Lack of boating knowledge:

The most problems we encounter is the lack of knowledge on the part of boat owners and rental people of rules of the road and common courtesy toward other boaters.

I feel that all boaters should be licensed of some sort. Many times I see people operating vessels with no knowledge of proper and safe boating.

14. (107) Noise:

Resort has air boat rides—very objectionable noise. Jet ski units are noisy.

15. (77) Spear-fishing controversy:

I did not buy a Wisconsin fishing license this year because of the Indian problems.

I will not boat or fish in Wisconsin until I am afforded the same rights as Indians.

16. (75) Weeds:

Too much sea weed in lake. This year is the worst in 20 years. Also quality of water has deteriorated.

Lake is very weedy, hard to navigate and fish.

17. (75) Complaints from power boaters/water skiers:

Due to speed limits in the channels we have lost our desire to boat.

Water ski tow line was cut by another boat.

18. (60) Not enough boat launches/access points:

I would like to see the DNR acquire land for public access on lakes that do not have any yet.

More public launches need to be opened on more lakes.

19. (59) Drunk boaters:

Fast, drunk power boaters.

I quit major boating years ago. Too many drunks on the water.

20. (59) No fish:

I went to Canada because they give people more fish to fish for. There are no fish in Wisconsin.

21. (59) Water levels:

The lake has been too low to boat.

Lake level is now so low that I am unable to get my boat out of the boat house.

22. (46) Canoeist complaints/comments:

Motor boats do not observe power right of way to sail or canoe.

Water skiers have tried to swamp us in our canoe on inland lakes in the past.

23. (44) Complaints about boaters from out-of-state by Wisconsin resident boaters:

Out of state boaters do not follow the rules of the road for boating.

Too many other boaters with 30 hp engines flying by, ruining the fishing (mostly Illinois boaters).

24. (43) Motor trolling:

Bass boats always operate their boats too close to anchored or trolling units.

I do not fish Wisconsin lakes anymore because I am not permitted to use an electric trolling motor while fishing.

25. (43) Swimmer complaints/comments:

Our neighbors have no respect for swimmers. They water ski between our floating raft and docked boat.

Boaters did not stay 100 feet off shore, especially in swimming areas.

26. (39) Boat registration complaints:

I wanted to use boat but boat registration was so slow I waited almost 2 months from time I applied.

How can I use my boat if you don't send me my registration papers and license?

27. (32) Complaints about Wisconsin from nonresident boaters:

We don't come to your state anymore because of your sky high park user's fees.

When we show or use our Illinois registered boat many times people get surly and rude because we are from Illinois.

28. (29) More parking needed at boat landings:

Please, boat launching and parking on local lakes are either non-existent or bad.

Extremely crowded boat landing. No parking left by 6:30 a.m.

29. (26) Dams/locks:

Too many commercial barges on river at the same place waiting at lock and dam.

Large cruisers, leaving locks, almost swamped us and others due to acceleration out of lock; consider a law having large craft (over 25 foot) remain in lock until small craft are away.

30. (24) Boat launch fees:

Should raise launch fee to \$10 to reduce the number of boats and personal water craft.

The launch fee of \$10 at the lower Wisconsin lakes is too high.

31. (23) Complaints about sailboaters:

Sailboats interfered with fishing off the Neenah.

Not sure how to use lake when sailboat races are going on.

32. (12) Complaints from scuba divers:

People did not respect diving area. Flag was up but they buzzed us anyway.

I do quite a bit of scuba diving and I have had water skiers hit my dive flag!

33. (10) Complaints about swimmers:

People have bothered us by swimming and camping at the boat landing.

Swimmers out in marked boat channel.

Appendix D. Glossary of Terms Used in This Report

BOATER DAY: A unit of measurement indicating one boat on the water for one day or part of one day.

BOATING PRESSURE: the amount of recreational boating in a given area (water body, county, or district) throughout the boating season.

BOATING SAFETY: The safe operation and handling of boats, as well as the knowledge of laws concerning boating and the consequences of illegal operation.

BOATING SEASON: For the purposes of this study, the boating season ran from April through October. Different parts of Wisconsin have different lengths of boating seasons, and some lakes are not navigable as early as April, while other may be navigable even earlier.

CABIN MOTORBOAT: Motorboats with a cabin that can be completely closed by means of doors or hatches. In this study, yachts were considered to be cabin motorboats.

INBOARD: Where the primary propulsion is an engine located within and permanently attached to the hull (can be diesel or gasoline).

INBOARD-OUTBOARD: The power unit is located inside the boat and the drive unit is on the outside of the boat.

INLAND WATER BODY: Those lakes, rivers, and streams located within or on the boundaries of Wisconsin, including the Mississippi River and the St. Croix River, but excluding Lakes Superior and Michigan.

MOTORBOAT: Any vessel (except a sailboat) equipped with propulsion machinery.

OPEN-HULLED BOAT: Craft of open construction specifically built for operating with a motor, including boats canopied or fitted with temporary partial structures.

OUTBOARD: An engine not permanently affixed to the structure of the craft, regardless of the method or location used to mount the engine, e.g., motor wells, "kicker pits," motor pockets, etc.

PERCEIVED CROWDING: A subjective measure based on how comfortable the individual recreationist feels with the presence of other recreationists in the vicinity.

PERSONAL WATERCRAFT (PWC): A motorboat that uses an inboard motor powering a water jet pump as its primary source of motive power and that is designed to be operated by a person standing on, kneeling on, or sitting astride the watercraft.

QUALITY OF EXPERIENCE: A subjective measure of the caliber of the recreational experience, on a scale ranging from poor to perfect.

RECALL DECAY: A response error caused by the inability of the respondent to recall all of the relevant events occurring in the past.

RECREATIONAL BOATING: Boating activities not associated with commercial or occupational use of the waterways.

RECREATIONAL INTERFERENCE: Conflicts between competing users for a limited recreational resource. This measure refers to subjective feelings of crowding and dissatisfaction due to the presence or behavior of others in the recreational setting as well as natural or human-made obstructions to recreational enjoyment of the resource.

RESPONSE RATE: The number of usable returned surveys divided by the number of surveys mailed, less those considered undeliverable.

ROWBOAT OR CANOE: Craft of open construction designed primarily to be propelled manually.

SAILBOAT OR AUXILIARY SAILBOAT: Craft intended to be propelled primarily by sail, regardless of size or type.

LITERATURE CITED

- Armstrong, J. Scott and Edward J. Lusk
1987. Return postage in mail surveys: a meta-analysis. *Public Opin. Q.* 51:233-48.
- Clawson, Marion and Carlton S. Van Doren, eds.
1984. Statistics on outdoor recreation. Resources for the Future, Inc., Washington, D.C. 368 pp.
- Dillman, Don A.
1978. Mail and telephone surveys. John Wiley & Sons, New York. 199 pp.
1983. Mail and other self-administered questionnaires. pp. 359-77 in *Handbook of survey research*. Peter H. Rossi et al., eds. Academic Press, Inc., New York. 755 pp.
- Field, Donald R. and Kristen Martinson
1986. Water-based recreation participation. Activities 49-58 in *A literature review: the President's Commission on Americans Outdoors*. 907 pp.
- Fox, Richard J., Melvin R. Crask, and Jonghoon Kim
1988. Mail survey response rate: a meta-analysis of selected techniques for inducing response. *Public Opin. Q.* 52:467-91.
- Graefe, Alan R.
1986. Recreational boating. Activities 99-106 in *A literature review: the President's Commission on Americans Outdoors*. 907 pp.
- Great Lakes Basin Commission
1975. Appendix R9: recreational boating. Great Lakes Basin Framework Study. Great Lakes Basin Comm., Public Inf. Off., Ann Arbor, Mich. 144 pp.
- Lime, David W., Leo H. McAvoy, Curtis Schatz, and David G. Pitt
1989. Recreational boating on Lake Superior. *Univ. Minn.-Ext. Tour. Cent. Res. Summ. No. 5.* 6 pp.
- Lindsay, John J.
1980. Trends in outdoor recreation activity conflicts. pp. 215-21 in *Proc. 1980 Natl. Outdoor Recreat. Trends Conf.* U.S. Dep. Agric., Northeast For. Exp. Stn., Broomall, Penn. Gen. Tech. Rep. NE-57. 251 pp.
- Lucas, Robert C.
1964. The recreational capacity of the Quetico-Superior area. U.S. Dep. Agric. For. Serv., Lake States For. Exp. Stn., St. Paul, Minn. Res. Pap. LS-15. 34 pp.
- Marmo, Albert J.
1980. National boating trends. pp. 135-45 in *Proc. 1980 Natl. Outdoor Recreat. Trends Conf.* U.S. Dep. Agric., Northeast For. Exp. Stn., Broomall, Penn. Gen. Tech. Rep. NE-57. 251 pp.
- McAvoy, Leo H., David W. Lime, Curtis Schatz, and David G. Pitt
1990. Management of boating in Minnesota: problems and actions. *Univ. Minn.-Ext. Tour. Cent. Res. Summ. No. 7.* 5 pp.
- National Marine Manufacturers Association
1990a. Boating 1990: a statistical report on America's top family sport. *Natl. Mar. Manuf. Assoc.* 8 pp.
1990b. Boating registration statistics, 1989. *Natl. Mar. Manuf. Assoc.* 24 pp.
- National Oceanic and Atmospheric Administration
1989. Climatological data: Wisconsin 94(5-10). U.S. Dep. Commer., Natl. Ocean. and Atmos. Admin., Environ. Data and Info. Serv. Natl. Clim. Cent., Asheville, N.C.
1990. Climatological data: Wisconsin 95(4). U.S. Dep. Commer., Natl. Ocean. and Atmos. Admin., Environ. Data and Info. Serv. Natl. Clim. Cent., Asheville, N.C.
- Outdoor Recreation Resources Review Commission
1962. Outdoor recreation in America: the report of the Outdoor Recreation Resources Review Commission to the President and the Congress. U.S. Govt. Print. Off., Washington, D.C. 246 pp.
- Rounds, George R.
1985. Boating: the dream and the challenge. pp. 58-65 in *Proc. 1985 Natl. Outdoor Recreat. Trends Symp. II.* Clemson Univ., Dep. Parks, Recreat. and Tour. Manage., Myrtle Beach, N.C. 381 pp.
- SAS Institute
1987. SAS user's guide, version 5.18. SAS Institute, Cary, N.C.
- Shelby, Bo, Jerry J. Vaske, and Thomas A. Heberlein
1989. Comparative analysis of crowding in multiple locations: results from fifteen years of research. *Leis. Sci.* 11:269-91.
- United States Coast Guard
1978. Recreational boating in the continental United States in 1973 and 1976: the nationwide boating survey. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 121 pp.
1980. Boating statistics 1979. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 35 pp.
1982. Boating statistics 1981. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 36 pp.
1984. Boating statistics 1983. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 33 pp.
1985. Boating statistics 1984. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 33 pp.
1987. Boating statistics 1986. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 36 pp.
1988. Boating statistics 1987. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 35 pp.
1989. Boating statistics 1988. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 36 pp.
1990. Boating statistics 1989. U.S. Dep. Transp., U.S. Coast Guard, Washington, D.C. 36 pp.
- Westat, Inc.
1989. Investigation of possible recall/reference period bias in national surveys of fishing, hunting and wildlife-associated recreation. U.S. Fish and Wildl. Serv., Washington, D.C. 253 pp.
- Wisconsin Department of Natural Resources
1986a. Recreational water access study. *Wis. Dep. Nat. Resour. Statew. Compr. Outdoor Recreat. Plan VI.* 69 pp.
1986b. Motorboat user study. *Wis. Dep. Nat. Resour. Statew. Compr. Outdoor Recreat. Plan VII.* 42 pp.
1991. Statewide comprehensive outdoor recreation plan 1991-1996. *Wis. Dep. Nat. Resour.* 312 pp.

Acknowledgments

The author wishes to thank Ed Nelson and Gene Lange for their work on the study design and planning, and for their moral support with this project in all of its overwhelming and confusing phases. Thanks also to the Recreational Boating Study Steering Committee, as well as to Dale Morey, Bureau of Law Enforcement (retired), and Kim Peterson of Land Use Research Associates, for their insights and thoughtful input into the study design. I also wish to express my appreciation to Katherine Fitzhugh, Julie Livermore, and Michael Krueger, for their preparation of over 117,000 surveys for mailing, for handling the avalanche of returns, and for keying the data. Special thanks to the folks in the DNR mailroom for their help and sense of humor with it all.

A final word of thanks goes to the nearly 40,000 boat owners who (for the most part) took our survey seriously and took the time to answer it and to tell us about their boating experiences. This project certainly could not have been done without them.

This project was funded by the Wallop/Breaux Trust Fund, a U.S. Coast Guard grant.

Steering Committee

William G. Engfer, Bureau of Law Enforcement, Madison
James Blankenheim, North Central District, Rhinelander
Jack Daniel, Bureau of Law Enforcement, Madison
Robert Tucker, North Central District, Rhinelander
Dennis Jameson, Southern District, Baraboo
David Rasmussen, Western District, Eau Claire Area
Tom Thoreson, Administration, Madison

About the Author

Linda J. Penaloza conducted research on the leisure and recreational interests of Wisconsin's residents from 1985 to 1991, working as a natural resources sociologist for the Wisconsin DNR Bureau of Research. The recreational interest studies she has conducted include a study of Wisconsin campers in both state parks and private campgrounds, visitor studies of state park users, and a statewide survey of Wisconsin resident patterns of leisure and recreational behaviors. She is currently Associate Director of the Wisconsin Survey Research Laboratory, University of Wisconsin-Extension, Madison.

Production Credits

Betty Les, Managing Editor
Wendy McCown, Technical Editor and Copy Editor
Michelle Jesko, Layout and Production
Michelle Jesko and Katherine Fitzhugh, Figure Preparation
Central Office Word Processing

TECHNICAL BULLETINS (1984-1991)

- No. 148** An 8-inch length limit on smallmouth bass: effects on the sport fishery and population of smallmouth bass and yellow perch in Nebish Lake, Wisconsin. (1984) Steven L. Serns
- No. 149** Food habits of adult yellow perch and smallmouth bass in Nebish Lake, Wisconsin. (1984) Steven L. Serns and Michael Hoff
- No. 150** Aquatic organisms in acidic environments: a literature review. (1984) Joseph M. Eilers, Gregory J. Lien, and Richard G. Berg
- No. 151** Ruffed grouse habitat relationships in aspen and oak forests of central Wisconsin. (1984) John F. Kubisiak
- No. 152** Distribution and relative abundance of fishes in Wisconsin. V. Grant & Platte, Coon & Bad Axe, and LaCrosse river basins. (1985) Don Fago
- No. 153** Phosphorus reduction via metalimnetic injection in Bullhead Lake, Wisconsin. (1985) Richard P. Narf
- No. 154** Sexual maturity and fecundity of brown trout in central and northern streams. (1985) Ed. L. Avery
- No. 155** Distribution and relative abundance of fishes in Wisconsin. VI. Sheboygan, Manitowoc, and Twin river basins. (1985) Don Fago
- No. 156** Aquatic community interactions of submerged macrophytes. (1985) Sandy Engel
- No. 157** An evaluation of beach nourishment on the Lake Superior shore. (1985) John W. Mason, Melvin H. Albers, and Edmund M. Brick
- No. 158** Distribution and movement of Canada geese in response to management changes in east central Wisconsin, 1975-1981. (1986) Scott R. Craven, Gerald A. Bartelt, Donald H. Rusch, and Robert E. Trost
- No. 159** Distribution and relative abundance of fishes in Wisconsin. VII. St. Croix River basin. (1986) Don Fago
- No. 160** Population dynamics of stocked adult muskellunge (*Esox masquinongy*) in Lac Court Oreilles, Wisconsin, 1961-1977. (1986) John Lyons and Terry Margenau
- No. 161** Fish species assemblages in southwestern Wisconsin streams with implications for smallmouth bass management. (1988) John Lyons, Anne M. Forbes, and Michael D. Staggs
- No. 162** A compendium of 45 trout stream habitat development evaluations in Wisconsin during 1953-1985. (1988) Robert L. Hunt
- No. 163** Mercury levels in walleyes from Wisconsin lakes of different water and sediment chemistry characteristics. (1989) Richard C. Lathrop, Katherine C. Noonan, Paula M. Guenther, Therese L. Brasino, and Paul W. Rasmussen
- No. 164** Water quality and restoration of the lower Oconto River, Oconto County, Wisconsin. (1989) Richard A. Rost
- No. 165** Population dynamics of smallmouth bass (*Micropterus dolomieu*) in the Galena (Fever) River and one of its tributaries. (1989) Anne M. Forbes
- No. 166** Bibliography of fishery investigations on large salmonid river systems with special emphasis on the Bois Brule River, Douglas County, Wisconsin. (1989) Robert B. DuBois
- No. 167** Wisconsin recreation survey-1986. (1989) Linda J. Penalzo
- No. 168** A postglacial vegetational history of Sauk County and Caledonia Township, Columbia County, South Central Wisconsin. (1990) Kenneth I. Lange
- No. 169** A review of fisheries habitat improvement projects in warmwater streams, with recommendations for Wisconsin. (1990) John Lyons and Cheryl Courtney
- No. 170** Ecosystem responses to growth and control of submerged macrophytes: a literature review. (1990) Sandy Engel
- No. 171** The sport fishery for, and selected population characteristics of, smallmouth bass in Pallette Lake, Wisconsin, 1956-1984. (1990) Michael H. Hoff and Steven L. Serns
- No. 172** Restoration of canvasback migrational staging habitat in Wisconsin: a research plan with implications for shallow lake management. (1991) Rich Kahl
- No. 173** Evaluation of a catch and release fishery for brown trout regulated by an unprotected slot length. (1991) Robert L. Hunt
- No. 174** Boating pressure on Wisconsin's lakes and rivers: results of the 1989-1990 Wisconsin recreational boating study, phase 1. (1991) Linda J. Penalzo



Printed on recycled paper.

Copies of the above publications and a complete list of all technical bulletins in the series are available from the Bureau of Research, Department of Natural Resources, Box 7921, Madison, WI 53707.

PUBL-RS-174-91

DO NOT FORWARD
ADDRESS CORRECTION REQUESTED
RETURN POSTAGE GUARANTEED

Department of Natural Resources
RS/4
Box 7921
Madison, WI 53707

BULK RATE
U.S. POSTAGE
PAID
MADISON, WI
PERMIT 906