



Boating in North Central Minnesota: *Status in 2008 and Trends Since 1985*



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BOATING IN NORTH CENTRAL MINNESOTA: STATUS IN 2008 AND TRENDS SINCE 1985



The 2008 North Central Boating Study was a cooperative research project of the Minnesota Department of Natural Resources Water Recreation Program and Boating Safety Program

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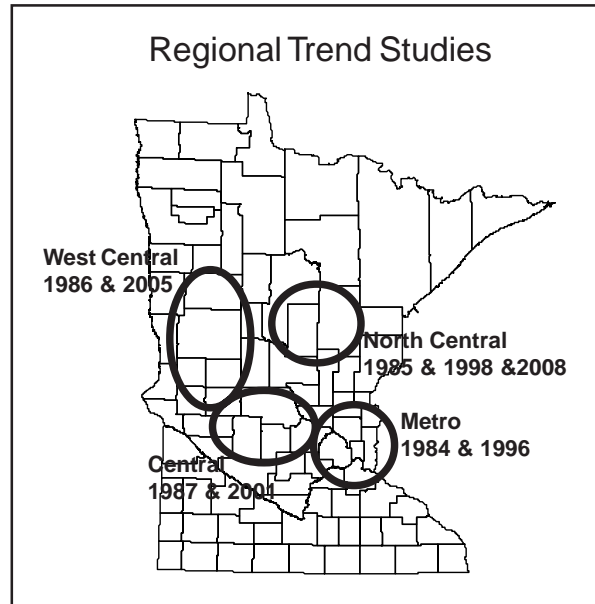
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SUMMARY

INTRODUCTION

The north central lake region is the first region to receive a second update study from the 1980s. Prior to the recent study in 2008, the region was examined in 1985 and 1998. Other update studies occurred in the Twin Cities metro, central, and west central lake regions. The update studies provide descriptions of how recreational boating is changing around Minnesota.

The north central lakes region is one of Minnesota's premier water-recreation tourist areas. The region supports numerous resorts, campgrounds, water accesses, and seasonal homes, all of which attest to the attractiveness of lakes in the area. It is the closeness lake-forest region to the Twin Cities metropolitan area, where half of Minnesota's 5.2 million residents live. In addition, the region supports a local population that is expected to grow at a relatively high rate for the next few decades, a rate of growth rate faster than the state as a whole.



This boating study has three broad goals: describe the many facets of the boating experience; measure the total number of boats on lakes and trace those boats to their means of access; and provide information to guide public access programs. The goals are accomplished through a combination of aerial observations and boater surveys with public access users, commercial access users and riparian residents. Specific study objectives are:

- Measure the total number of boats on lakes and tracing those boats to their means of access;
- Describe the boater's experience on the water, including trip satisfaction, on-water problems, and crowding;
- Describe the boater's perception of public accesses, including quality, use problems, improvements needed, and desire for additional access;
- Describe the boater's view of boating safety and enforcement concerns, including boating restrictions, enforcement presence, safety courses, beverages consumed on boats, and safety equipment;
- Describe the characteristics of the boating trip, including boating activities, travel distance, and boating equipment; and
- Describe the characteristics of boaters.

This study is an update of studies done in 1985 and 1998, and comparisons with previous studies are presented throughout the report. Two Minnesota DNR programs provided resources for this study: water recreation and boating safety.

One historical note: this boating study was conducted during the most severe economic recession since the 1930s, and gas prices stood at \$4.00 a gallon. These conditions created concerns over the results of the study, especially the quantity of boating use. In the end, however, boating use met expectations formed by the other regional boating studies, namely, that boating use has been stable since the 1980s.

BOAT NUMBERS AND SOURCES

The north central region has nearly 280,000 acres of boating water on 205 lakes. Mille Lacs comprises just under half of the total acres. These lakes are the major recreational boating and fishing waters of the region. They are the primary focus of shoreland development for tourist accommodations and residential housing. All of the lakes have permanent fish populations.

Most of the lakes (81%) are accessible through public access in 2008. This is up from 66 percent in 1985. Thirty-two lakes have received a public access since 1985, and five of those received an access since 1998. In 2008, 38 lakes did not have a public access. Public accesses serve over 90 percent of the water area of the boating lakes in the region.

For lakes other than Mille Lacs, the large lakes are used the most intensely in 2008, while lakes without public access are used the least intensely. Since 1985, overall boating use has not changed significantly, in spite of the growth in registered watercraft, shoreland homes, and population. Over this same period of time, the amount of Mille Lacs open-water fishing—which is the primary activity on the lake—varied a great deal from year to year, but the long-term trend is neither upward nor downward. Stable boating use is also evident in the other regional trend studies, none of which has a statistically significant change over time.

The north central and other rural lake regions (west central and central) have similar intensities of use, and are used some 3 to 4 times less intensely than Twin Cities metropolitan area lakes. These rural lake regions, however, have an intensity of use twice that of the more remote lake region in northern Minnesota (Itasca and northern Cass County).

For lakes other than Mille Lacs, the contribution of public access has steadily increased since 1985, commercial access has steadily decreased, and the remainder (mainly riparian residents) decreased from 1985 to 1998 and remained stable since. This same pattern of source change is found between studies in the west central and metro regions. The central region result is different. It showed very little source-contribution change between studies. Source changes were not estimated for Mille Lacs.

THE BOATING EXPERIENCE

Boaters place high importance on obtaining certain experiences while boating; attaining these experiences represents the underlying motivations for the trip. Of highest importance are relaxing with family/friends in an enjoyable and quiet natural setting that is away from crowds. Anglers—not surprisingly—rank the importance of “catching some fish” more highly than other boaters, but they still rank it below the experience of relaxing with family/friends, and about the same as the

experience of being in an enjoyable natural setting. These findings are close to those found in the Northern region in 2006, the only other study that included the motivation question.

Boater trip satisfaction is high in the north central region: at least half of all boaters report being “very satisfied” with their outing, while another 38 to 40 percent report being “satisfied”. Only 7 to 12 percent are “dissatisfied” to any extent. There is little change in boater satisfaction from 1998 to 2008 on lakes other than Mille Lacs. But there is a large increase in boater satisfaction on Mille Lacs, for whatever reason. The increase in Mille Lacs satisfaction places 2008 satisfaction levels at a similar level as that found for the other lakes in 1998 and 2008.

Trip satisfaction is contingent on the behavior of other boaters. When boaters encounter a “serious” or “very serious” problem with another boater, trip satisfaction drops. In addition, when people judge the number of boats on the lakes as “too many” their overall satisfaction drops.

In the survey, boaters are asked to judge whether they experienced problems with other boaters on their trip. Of the 13 potential problems, none is judged by a majority of boaters as a “moderate”, “serious” or “very serious” problem. Although not judged by a majority of boaters as a “moderate” or greater problem, one problem is clearly reported as the largest problem: “use of personal watercraft (jet skis).” The pattern of problem identification is largely shared across sources of boaters and lake classes. The pattern is also shared with the central, west central, northern, and metro lake regions. In all regions, the “use of personal watercraft (jet skis)” is the leading problem.

Most boaters (over 80%) in 2008 did not encounter congested or crowded conditions on their trip. Overall perceptions of congestion and crowding changed little from 1998 to 2008.

PUBLIC ACCESS FACILITIES

The use of public accesses has changed since 1985, and public accesses—it appears—are becoming more and more an asset that all lake interests take advantage of, including riparian residents and commercial boating-related interests. In 2008, riparian residents and resort-campground guests are estimated to account for 38 percent of traffic through the public accesses, up from 17 percent in 1985. This same pattern of change was experienced in the central and west central regions. The reason for change in the use of public accesses is unknown, but one hypothesis comes to mind: the increasing size of boats and motors (see section below on characteristics of the boating trip), and associated need to launch/land these boats at a well designed access facility.

Boaters give high marks to public access facilities. Positive ratings (“good” to “excellent”) comprise 81 to 84 percent of boater ratings. Few boaters give negative ratings of “poor” or “very poor.” On the lakes other than Mille Lacs, the ratings have been stable since 1998. The Mille Lacs ratings, however, have fallen since 1998, with most of the drop represented by a decrease in “excellent” ratings and an increase in “good” ratings.

There are problems in the use of the public access facilities. About a quarter of public access boaters (28%/22%, Mille Lacs/other lakes) indicate that they had some type of problem using the public access. And experiencing a problem significantly lowers boaters’ rating of access facilities.

The leading problems for both Mille Lacs and other lakes have to do with the perceived small size of many parts of the access facility: insufficient parking spaces, and insufficient number of launch lanes. None of the problems, however, is all that common. The top-ranked problem is identified by just over 10 percent of access users.

When asked what improvements are needed at access sites, boaters suggest improvements that solve their use problems. The top-ranked improvement by far for both Mille Lacs and other lakes is providing more parking spaces in the access lot (requested by 39% of Mille Lacs boaters, and 41% of boaters on other lakes). No other improvement is requested by a quarter or more of boaters.

The majority of boaters on Mille Lacs (64%) and other lakes (55%) use additional lakes near the lake where they were surveyed. This includes 39 percent of Mille Lacs riparian residents, and 47 percent of riparian residents on other lakes. Access to these additional lakes is dominated by public access (57% of launches for Mille Lacs, and 53% for other lakes), indicating that many more boaters than just those surveyed at public access have a stake in public access facilities.

A large portion of public access users (56%/51%, Mille Lacs/other lakes) have at some time in their past found a public access parking lot full on the lake they were surveyed. On average, this happened twice (median) in the last year. Most of them were able to find a way to boat that day. They either parked on the road, waited for a place in the lot to open up, or went to another access on the lake. Only 6 or 7 percent did not boat that day.

Full parking lots and congested facilities give boaters reasons to want additional public access facilities. This want, or perceived need, for additional public access was examined in the survey in two ways: (1) for the lake at which the boaters were surveyed, and (2) for any lake within 50 miles of the lake at which they were surveyed. Overall, from these perceived-need results, it appears that the majority of boaters, including a majority of public access boaters, feel well supplied by current public access facilities.

For Mille Lacs, 11 percent of boaters thought additional public access is needed, 65 percent did not think additional access is needed, and 24 percent are uncertain. Results are similar for other lakes: 13 percent thought additional public access is needed, 68 percent did not think additional access is needed, and 19 percent are uncertain. Public access boaters are more likely to indicate a need for additional access (25% on Mille Lacs and 22% on other lakes), but still most do not see a need for more access (50% Mille Lacs and 54% other lakes). Few riparian residents see a need for more access (10% or less). Results are similar for the perceived need for additional public accesses within 50 miles of the lake at which boaters were surveyed, except that more boaters are uncertain of the need in the 50-mile radius area (expressed in the more frequent “don’t know” responses). Overall, the pattern of these results is close to that found in the central, west central, and northern lake regions.

Access users were queried about four specific issues: power loading, the importance of various facilities and services at the access, the likelihood users would power-wash their boat at the access, and the adequacy of the access for boaters with disabilities (i.e., self-described disabilities).

Boaters do not judge the severity of problems caused by power loading as very severe. Similar responses to this question were found in the two other studies in which it was asked (west central and northern region studies).

When asked about six facilities/services, a dock to aid launching/landing is by far the most important, judged as “very important” by 68 percent of access users on Mille Lacs and 71 percent of users on other lakes. Docks are followed in importance by a lake map with boating restrictions, toilets, a lake map showing depth/hazards, emergency information, and a paved parking lot (as opposed to a gravel lot).

Most access users indicate they would be “slightly likely” or “very likely” to voluntarily use a power-wash at the access to help prevent the spread of aquatic invasive species. It should be noted that this question is probably biased to the “likely” end of the response spectrum, since the “likely” end of the spectrum is indicative of socially desirable behavior on the part of the boater, who wants to be seen as a responsible person. Thus, the likelihood of boaters actually using the power wash voluntarily would be less than indicated in these responses.

Few boaters responded they have a disability that affects when or where they boat (11 of 615 surveys). Although requested, only two boaters described the type of disability: bad knees, and a disabled veteran. A large portion of the boaters found the access inadequate. Although requested, only one boater described why the access was inadequate: rough ground. Overall, very little was learned from these questions about the adequacy of the access for boaters with disabilities.

BOATING SAFETY AND ENFORCEMENT

Special boating restrictions are uncommon on the sample lakes of the study. Thirteen of the 54 sample lakes have a boating restriction. The restrictions are limited to small geographic areas: speed/no wake in channel areas and selected bays or zones. When asked what special boating restrictions are needed for this lake, the most common response is “none” (42%/40%, Mille Lacs/other lakes)(Table 29). However, about a fifth of boaters would like to see more restrictions on personal watercraft (jet skis). This desire to restrict personal watercraft is one more indication of the opinion many boaters have of these craft.

Enforcement officers are seen by 19 percent of boaters on both Mille Lacs and other lakes. The percent of boaters who see and enforcement officer (19%) is little changed from 1998, when this figure stood at 21 percent.

Three percent of boaters report being checked by an enforcement officer on both Mille Lacs and other lakes. Boaters checked by an enforcement officer give high marks to the officer’s professional conduct. Positive ratings of “good” to “excellent” are reported by 80 percent of boaters. Few negative ratings (7%) are reported.

Formal boating safety courses have been completed by 20 percent of Mille Lacs boaters and nearly the same percent of boaters on other lakes (22%). These percents have changed little since 1998, when Mille Lacs was 19 percent and the other lakes was 20 percent. About the same portion of boaters have completed a safety course in the west central, northern, and central region (all are

18%). The Twin Cities lake region has a higher portion of boaters (32%) completing such a course.

When asked whether all boat operators should complete a safety course, 32 percent of Mille Lacs boaters respond “yes”, about the same as on other lakes (34%). Responses to this question have not changed a great deal since 1998.

Requiring an operator’s license for motorboat operators is not all that popular. It is supported by only 21 and 25 percent of Mille Lacs and other-lake boaters, respectively. Responses to this question have changed little since 1998.

Since the 1985 study, Minnesota enacted a law that makes it illegal to operate a motorboat after consuming too much alcohol, very much like the alcohol restrictions on driving an automobile. In 2008, 29 percent of Mille boaters and 31 percent of boaters on other lakes report having some type of alcoholic drinks on board during their trip. Few have only alcoholic drinks. Most boaters have no alcohol on the boat: either they have only non-alcoholic drinks on board, or have no drinks of any type. Riparian residents are more likely than boaters from public and commercial accesses to have no drinks on board. The portion of boaters with alcoholic drinks on board increased from 1998 to 2008. Similar results are found in the west central lake region between 1986 and 2005. In the central region, however, the prevalence of alcoholic drinks stayed virtually the same from 1987 to 2001.

Most boats in 2008 are equipped with some form of safety equipment other than personal flotation devices. Since 1998, the prevalence of safety equipment is basically stable to increasing. Lights, fire extinguishers and horns are the most common equipment types. The small portion of boats in 2008 without any safety equipment (4%/7%, Mille Lacs/other lakes) may not need any, because no safety equipment other than personal flotation devices is required for boats less than 16 feet long operated during daylight hours.

CHARACTERISTICS OF THE BOATING TRIP

There are two main activities on north central lakes: fishing and boat riding. The former is far larger than the latter for Mille Lacs, while the latter is slightly larger for the other lakes. Activities have changed since 1985. For lakes other than Mille Lacs, the major change is a drop in fishing and a rise in boat riding. On Mille Lacs, activity trends can only be assessed for riparian residents. The primary change found for riparian residents is a decrease in fishing and an increase in boat riding, the same change as found on the other lakes.

The activity changes found in this study are of a general nature, with similar results from the other three regional boating studies. All of the studies show an increase in boat riding, and all but one (Metro) show a drop in fishing.

The types of craft most used for boating in 2008 are runabouts and fishing boats, followed by pontoons (runabouts have a deck and windshield; fishing boats are open; a fishing boat is a type of craft, and is not related to the activity of fishing). Pontoons are more common among riparian residents, and fishing boats are more common among public and commercial access boaters. The

other craft types are comparatively uncommon. Craft types have changed since 1985: pontoons and runabouts increased, and fishing boats decreased. The increase in pontoons is driven by riparian residents. These craft changes are of a general nature, and are found in the central, west central, and metro regions.

Boat lengths now average 18 to 19 feet, and are in this range for all the sources of use. Motor sizes average over 100 horsepower for all sources on lakes other than Mille Lacs; on the Mille Lacs sizes average in the general range of 90 to 100 horsepower for all sources. Both craft length and motor sizes increased since 1985. Lengths are up two to three feet across the board, and motor sizes, too, are up across the board. These changes in the size and horsepower of boats are part of a general trend that is evident in the other regional boating studies.

The most common types of equipment on the boats are lights, fire extinguishers, and horns. Mille Lacs boaters—as compared with boaters on other lakes—have a greater prevalence of fishfinders and GPS units, probably a reflection of the high prevalence of fishing and a desire to navigate in a large body of water with few landmarks.

Boaters launching through public and commercial (e.g., resort) access are primarily long-distance travelers, most of whom are over 100 miles from home. Public accesses are mainly a tourist facility in this region, just as they are in the west central region. In all the other regions (central, northern, and metro), public access use is dominated by local boaters, the majority of whom are within a half-hour drive of home.

Most boating party sizes are three to four people. Adults comprise about three-fourths of boaters, while teens and children comprise the other one-fourth.

A typical boating trip lasts three to five hours. Boaters launching at public access have the longest trips, while riparian resident have the shortest trips.

BOATER CHARACTERISTICS

Boaters, as a group, are familiar with the lake at which they were surveyed. Half have been boating for 15 or more years on the lake, and at most only 8 percent were recent arrivals to the lake.

The origins of boaters are very similar for Mille Lacs and the other lakes. The large majority are Minnesotans. Most of the Minnesota boaters live in the seven-county Twin Cities metropolitan area, followed by the Central Region, where the north central lakes region is located.

North-central boaters have a median household income between \$75,000 and \$100,000, which is above the statewide median of about \$58,000.

For the purposes of getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. The predominant types of radio stations listened to are easy listening/lite, country, rock & roll. The Minnesota DNR website has been used by just over 40 percent of boaters to obtain boating-related information (42%/41%, Mille Lacs/other lakes).

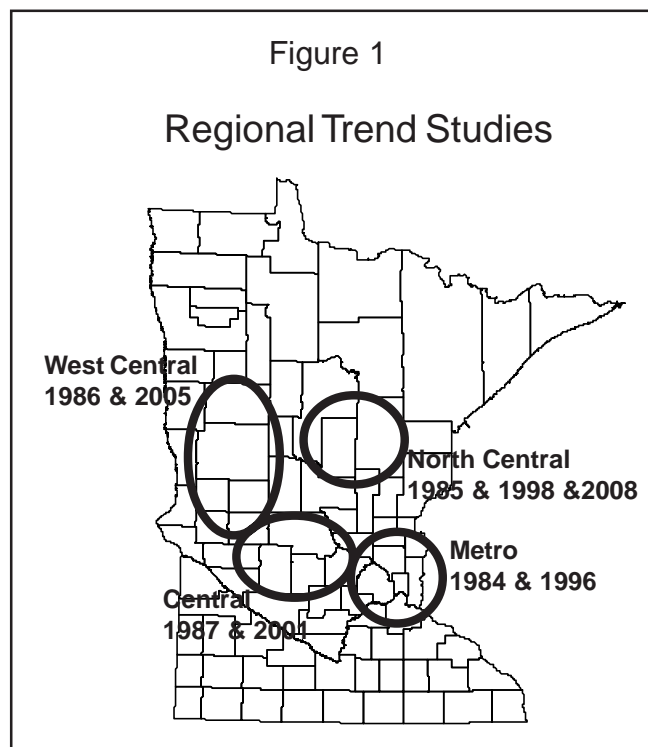
INTRODUCTION

The north central lake region is the first region to receive a second update study from the 1980s. Prior to the recent study in 2008, the region was examined in 1985 and 1998. Other update studies occurred in the Twin Cities metro region (MN DNR, 1997), central region (MN DNR, 2002), and west central region (MN DNR, 2006)(see Figure 1). The update studies provide descriptions of how recreational boating is changing around Minnesota. Distinctive boating trends were found in previous studies, and the current study will provide further evidence of the general nature of many of these boating trends.

The north central lakes region is one of Minnesota's premier water-recreation tourist areas. The region supports numerous resorts,

campgrounds, water accesses, and seasonal homes, all of which attest to the attractiveness of lakes in the area. It is the closeness lake-forest region to the Twin Cities metropolitan area, where half of Minnesota's 5.2 million residents live. In addition, the region supports a local population that is expected to grow at a relatively high rate for the next few decades, a rate of growth rate faster than the state as a whole (MDA-SDC, 2002). Since 2000, the three-county north central area is estimated to have grown some nine percent, well above the estimated state growth of six percent (USBOC, 2009).

This boating study has three broad goals: (1) describe the boating experience, which includes boating activities, perceptions of conditions on the water, and safety and enforcement concerns; (2) measure the total number of boats on lakes and trace those boats to their means of access; and (3) provide information to guide public access programs by assessing the use of these facilities and evaluating their quality through boater surveys. This study is an update of studies done in



1985 and 1998, and comparisons with previous studies are presented throughout the report.

The first goal of the study is to describe the boating experience and see to what extent it has changed. To ensure that boating remains an enjoyable and safe activity is the motivation underlying this aspect of the study. Boater surveys—which cover such topics as trip satisfaction, problems encountered on the water, and perceived crowding—provide an assessment of the boating experience from the boater’s perspective.

The second study goal is to measure the total number of boats on lakes and trace those boats to their means of access. Such measurements ensure that people can at least be reasonably well informed and share a common information base when addressing any boating concerns involving the number and source of boats on the water. Boaters gain access to lakes through their own lake homes, as well as through facilities provided at commercial sites, such as resorts and private campgrounds. The public sector also provides boating opportunities—primarily through free public accesses—for those who do not live on the water or avail themselves of the commercial opportunities.

As indicated above, the public sector provides boating opportunities through free public access. The third goal of this study is to provide information to guide public access programs by assessing the use of these facilities and evaluating their quality through boater surveys. Many levels of government—local, county, state and federal—manage free public accesses in the north central region.

This document is a general summary. For those wanting more detail on study results, technical documents, including survey tabulations with breakdowns, and data files are available from the Minnesota DNR.

In this document, boating status and trend findings are presented in six sections:

- Boat numbers and sources of boats;
- Perception of boating experience, including trip satisfaction, on-water problems, and crowding;
- Perception of public accesses, including quality, use problems, improvements needed, and desire for additional access;
- Boating safety and enforcement, including boating restrictions, enforcement presence, safety courses, beverages consumed on boats, and safety equipment;

Characteristics of the boating trip, including boating activities, and boating equipment; and
Boater characteristics.

Two Minnesota DNR programs provided resources for this study: water recreation and boating safety.

METHODOLOGY

The multiple goals of the north central boating study are accomplished with a variety of information collection techniques. Mille Lacs is examined separately because of its very large size and unique characteristics. Other lakes have been classified according to size and clarity, and whether the lake has a free public access. The lake classification based on size and clarity is the one developed by the public access program to prioritize lakes for access. The study covers those lake priority classes that incorporate the principal water recreation resource: lakes over 150 acres in size that support permanent fish populations (Figure 2). The five lake classes are:

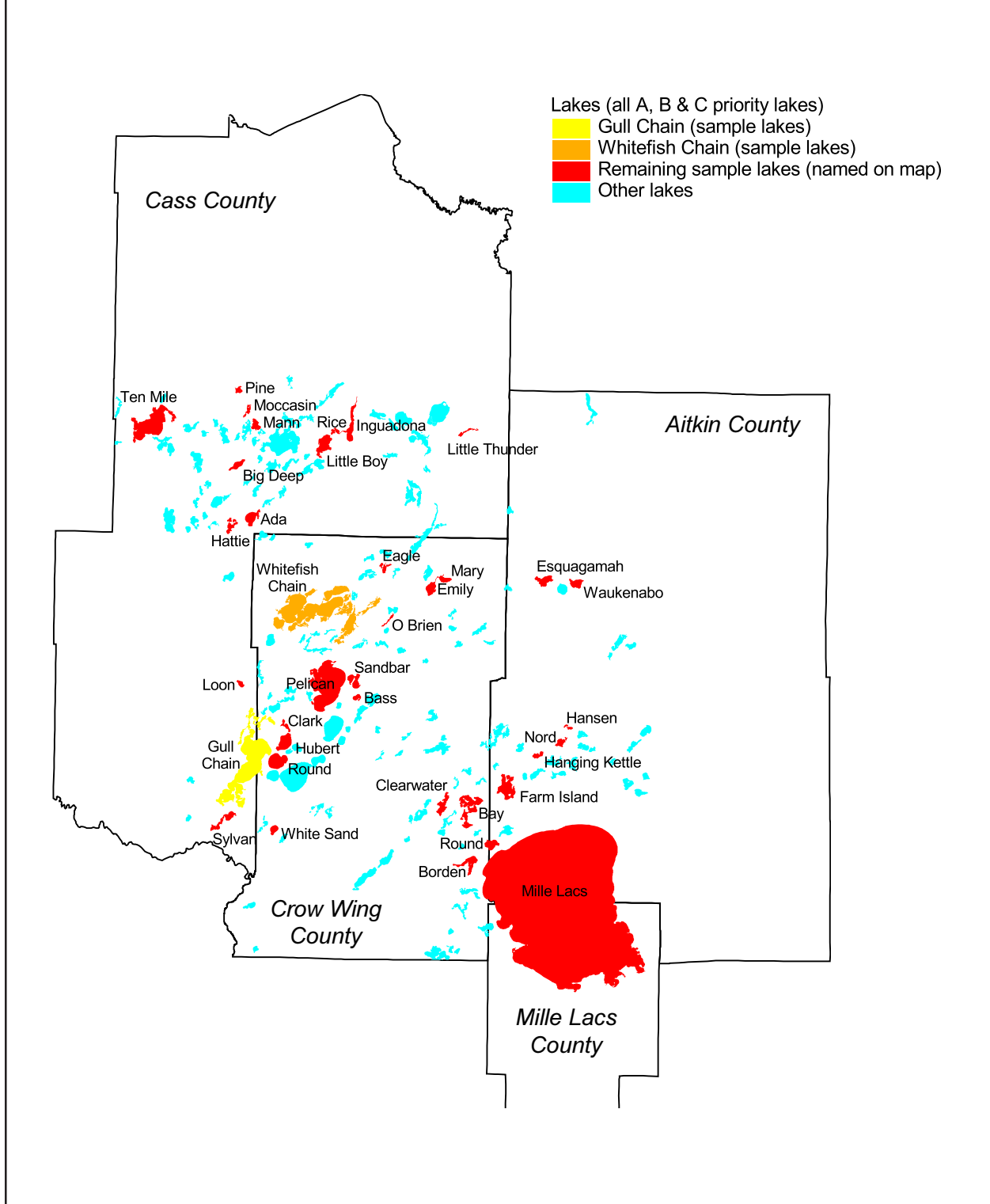
- Priority A large boating lakes (Gull and Whitefish chains, and Pelican; all these lakes have public access)
- Other priority A lakes with public access
- Priority B lakes with public access
- Priority C lakes with public access
- Lakes without public access (priorities A to C).

Priority A lakes are distinguished from B and C lakes by their larger size and greater clarity. Size and clarity progressively decrease from A to B to C lakes.

Within each class, a sample of the lakes (excluding Mille Lacs) is taken for study (see Appendix A for a listing of sample lakes, as well as the remaining lakes that comprised the principal water recreation resource). The 53 sample lakes in 2008 are the same ones studied previously. A complete census, however, of the large boating lakes is taken for the study. For each study lake, boats in use (including those anchored and beached) are counted and classified by type from the air. Boat counts are made at peak boating times: in the afternoon on weekend/holidays and early evening on weekdays. Aerial observation (including photographs) is also used to measure the contribution of different means of access to boating numbers

Figure 2

North Central Boating Study Lakes



(means of access are riparian residents, and public and commercial access). Aerial measurements made on sample lakes for a class are expanded to population estimates based on the water surface area of all the lakes in the class. No aerial observations were made of Mille Lacs in 2008.

For Mille Lacs, the portion of boating by means of access was obtained by combining results from the 2007 creel survey that assessed public and commercial access contributions to boating (MNDNR, 2008) with modeled results for the contribution from riparian residents, based on a 1996 Mille Lacs study (MCSR, 1996).

For the lakes other than Mille Lacs, the intent was to use the aerial observations of public accesses and flight-day contacts with commercial access managers at resorts/private campgrounds to measure the portion of boating by means of access (the public and commercial access amounts are subtracted from the number of boats observed on the water in the aerial flight to estimate the amount of boating from riparian residents). This effort, for the first time in all of the studies, produced unreliable information, and the reason why is unclear. But, the bottom line is that the data are not usable. To provide a rough estimate of the portion of boating by means of access, the 1998 contributions were updated based on changes between 1998 and 2008 in the number of public accesses (went up) and number of overnight-accommodation units (went down) (private accommodations data from EMT, 2009). The results produce a trend from 1998 to 2008 that is a continuation of the trend from 1985 to 1998, and is the same trend observed in other regional studies.

Boaters on the sample lakes (including Mille Lacs) are surveyed to gather information about their behavior and perceptions. In 2008, surveys were conducted using in-person, hand-off and mail-back surveys at public launch facilities and at commercial accesses (resorts and private campgrounds). Riparian residents on the sample lakes were surveyed by mail. Riparian resident names and addresses were gathered from property records. Surveys are conducted on both weekdays and weekends and holidays. To ensure that the opinions of one group of boaters are not over- or under-represented when combined with another group, survey results are weighted by the estimated contribution to total boating of a lake class (5 classes plus Mille Lacs), means of access (riparian residents, and public and commercial accesses), and day of week (weekend/holidays and weekdays).

On Mille Lacs, it appears that the sample of boaters at public and commercial accesses is biased towards social (non-angling) boaters; the reason for this is not

known. The creel studies consistently have a higher portion of anglers, and these higher portions are used to further weight the survey responses by boating activity (MNDNR , 2008). The activity of riparian residents should not be biased, and those results are used directly. Riparian residents are surveyed in waves during the summer, and they are asked to respond to the survey questions (including main activity) for their most recent boating trip.

In 2008, eight weekend/holiday flights and four weekday flights were conducted for the sample lakes (excluding Mille Lacs, which was not observed from the air) during the period from Memorial Day weekend to Labor Day (Table 1). Over the same summer period, 1910 surveys were completed, including 729 public access mail-back surveys, 390 commercial access mail-back surveys and 791 riparian resident mail surveys. In previous studies, there were fewer flights. The 1998 study conducted more surveys, and the 1985 study conducted fewer surveys.

<u>Item</u>	<u>1985 study</u>	<u>1998 study</u>	<u>2008 study</u>
BOAT-COUNT FLIGHTS			
Number of aerial boat-count flights			
Weekend/holiday flights	6	7	8
Weekday flights	<u>3</u>	<u>4</u>	<u>4</u>
Total flights	9	11	12
BOATER SURVEYS			
Survey method	In-person interview	Mail-back survey	Mail-back survey
Number of completed surveys			
Public access	207	991	729
Commercial access	143	930	390
Riparian resident	<u>554</u>	<u>1255</u>	<u>791</u>
Total completed surveys	904	3176	1910
Survey return rates			
Public access	(not applicable)	52%	61%
Commercial access	(not applicable)	48%	56%
Riparian resident	(not applicable)	<u>65%</u>	<u>66%</u>
Overall return rate	(not applicable)	55%	62%

The 2008 study attempted to produce comparable data with the 1985 and 1998 study for trend assessment purposes. In some instances, however, some particulars precluded comparability. These are noted in the text when they are encountered.

With respect of comparability, it is important to note that the 1985 boater information was obtained through in-person interviews, and this makes comparisons with 1998 and 2008 difficult for some question types. The major comparison difficulty is when the answer to the question would provide negative information about their boating experience (e.g., Did you have problems with other boaters on this trip?). In a face-to-face interview, respondents are hesitant to share bad news, so the results are biased in a positive way compared with a mail survey (Dillman et al., 2009).

For those wanting a more complete description of methodology, a technical document that presents the full methodology is available through the Minnesota DNR.

BOAT NUMBERS AND SOURCES

Amount and Intensity of Boating

The north central region has nearly 280,000 acres of boating water on 205 lakes (Table 2). Mille Lacs comprises just under half of the total acres. These lakes are the major recreational boating and fishing waters of the region. They are the primary focus of shoreland development for tourist accommodations and residential housing. All of the lakes have permanent fish populations. For lakes other than Mille Lacs, priority A lakes make up most (64%) of the resource. The remaining lakes are smaller and more numerous. Priority A lakes are distinguished from B and C lakes by their larger size and greater clarity. Size and clarity progressively decrease from A to B to C lakes.

Most of the lakes (81%) are accessible through public access in 2008 (Table 3). This is up from 66 percent in 1985. Thirty-two lakes have received a public access since 1985, and five of those received an access since 1998. In 2008, 38 lakes did not have a public access. Public accesses serve over 90 percent of the water area of the lakes.

Table 2

Boating Waters of the North Central Study Area
(water access priority classes A, B and C)

A. Excluding Mille Lacs		--- All A, B, C lakes ---		--- Sample A, B, C lakes ---	
<u>Category</u>	<u>Group</u>	<u>Number of lakes</u>	<u>Acres of lakes</u>	<u>Number of lakes</u>	<u>Acres of lakes</u>
	Priority A large lakes with public access:				
Cat 1	Gull Chain	7	10,906	7	10,906
Cat 1	Whitefish Chain	12	14,791	12	14,791
Cat 1	Pelican	1	8,468	1	8,468
Cat 2-PA	Other priority A lakes with public access	46	58,507	13	19,018
Cat 3-PA	Priority B lakes with public access	72	33,281	8	5,171
Cat 4-PA	Priority C lakes with public access	28	8,868	8	2,443
Cat 2,3,4-NPA	Priority A, B and C lakes without public access	<u>38</u>	<u>10,847</u>	<u>4</u>	<u>1,811</u>
Total		204	145,668	53	62,608

B. Mille Lacs		--- All A, B, C lakes ---		--- Sample A, B, C lakes ---	
<u>Category</u>	<u>Group</u>	<u>Number of lakes</u>	<u>Acres of lakes</u>	<u>Number of lakes</u>	<u>Acres of lakes</u>
Mille Lacs	Mille Lacs	1	132,516	1	132,516

Table 3

Changes in Public Access Status of Boating Waters in the North Central Study Area
(water access priority classes A, B and C)

	Year 1985		Year 1998		Year 2008	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Lakes with public access	135	66	162	79	167	81
Lakes without public access	<u>70</u>	<u>34</u>	<u>43</u>	<u>21</u>	<u>38</u>	<u>19</u>
Total	205	100	205	100	205	100

	Year 1985		Year 1998		Year 2008	
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
(a) Acres of Lakes						
Including Mille Lacs						
Lakes with public access	252,476	91	265,777	96	267,337	96
Lakes without public access	<u>25,708</u>	<u>9</u>	<u>12,407</u>	<u>4</u>	<u>10,847</u>	<u>4</u>
Total	278,184	100	278,184	100	278,184	100
Excluding Mille Lacs						
Lakes with public access	119,960	82	133,261	91	134,821	93
Lakes without public access	<u>25,708</u>	<u>18</u>	<u>12,407</u>	<u>9</u>	<u>10,847</u>	<u>7</u>
Total	145,668	100	145,668	100	145,668	100

Weekends/holidays are the popular time to participate in boating, as well as in most outdoor recreation pursuits. A weekend or holiday, on average, has about twice as much boating as a weekday. Since weekdays are more frequent than weekends/holidays, weekdays account for about half of 2008 boating (51%) and weekends/holidays the other half (49%). In 1985 and 1998, the split was closer to 45 percent on weekends/holidays and 55 percent on weekdays.

Comparisons of boating use between lake classes and over time are done for the weekends/holidays, when most of the boat counts are conducted. Too few weekday boat counts are conducted to assess changes.

The large lakes are used the most intensely in 2008, while lakes without public access are used the least intensely (note that the chart is “acres per boat”, which means that a shorter bar has a higher boating intensity) (see Figure 3).

Since 1985, overall boating use has not changed significantly, in spite of the growth in registered watercraft, shoreland homes, and population. For all lakes, none of the comparisons is statistically different (.05 significance level), nor are any of the lake class changes statistically different (Figure 4). Stable boating use over time is the conclusion. This conclusion extends to the other regional trend studies, none of which has a statistically significant change over time (Figure 5).

It is noteworthy on Figure 5 that the rural lake regions have similar intensities of use, and are used some 3 to 4 times less intensely than Twin Cities metropolitan area lakes. These rural lake regions, however, have an intensity of use twice that of the more remote lake region in northern Minnesota (Itasca and northern Cass County).

There is reason to believe that the stable boat numbers between studies may be indicative of overall boating-use declines. In all studies and all years, boat numbers are measured from the air in the afternoon. Social (non-fishing) boating has a daily peak in the afternoon when the aerial boat counts are made, while fishing from a boat peaks earlier in the day. Between study years (as shown later in this report) there has been a shift in boating from fishing to social boating, which concentrates more of the overall daily use in the afternoon measurement window. Since that concentration of boating use in the afternoon led to stable afternoon boat numbers, overall daily boating use must have declined. A rough estimate—based on the west central region studies—is that overall weekend/holiday daily boating use would have to decline 15 percent from 1986 to 2005 to

Figure 3

Average 2008 boating intensities on summer weekend/holiday afternoons

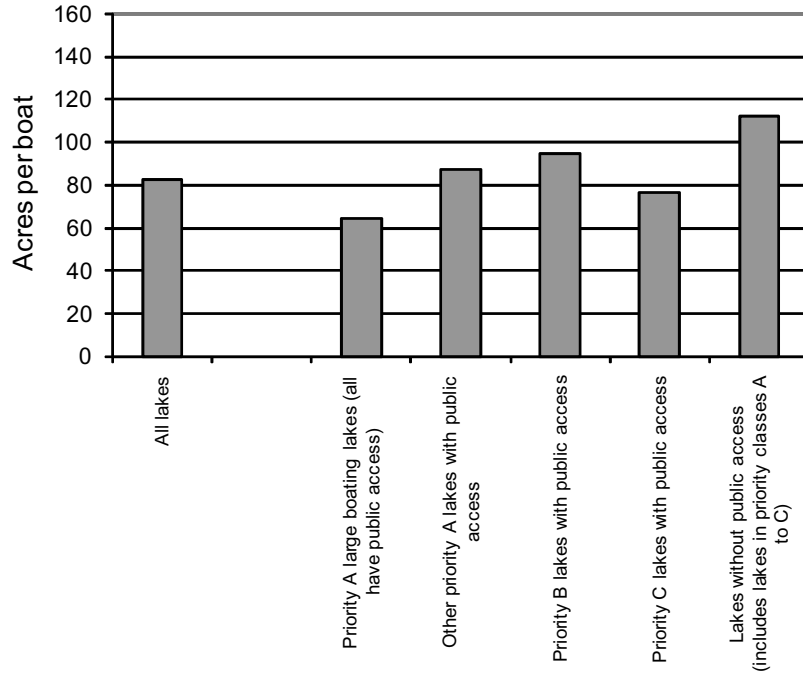
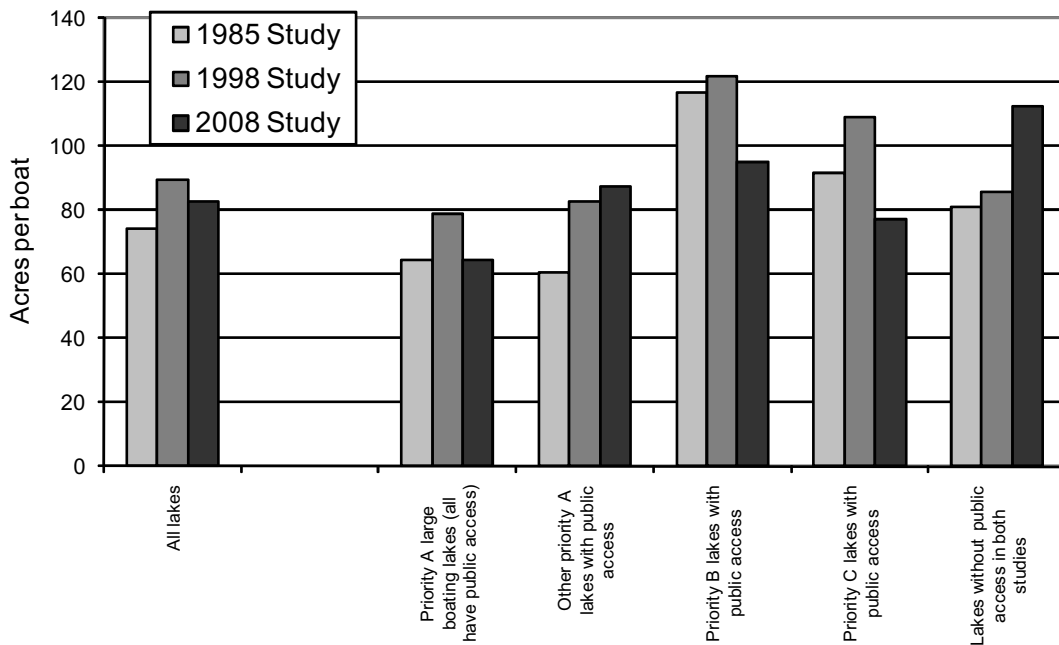
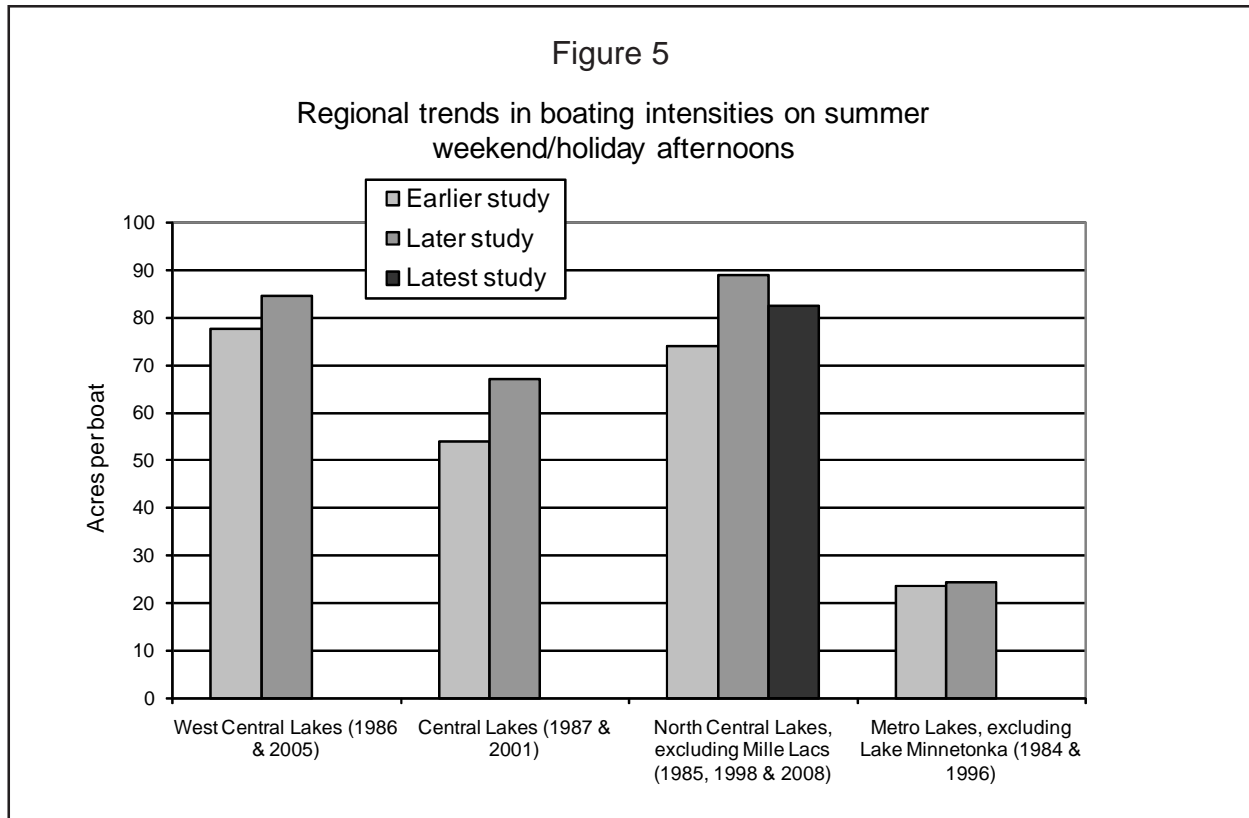


Figure 4

1985 to 2008 Comparison of boating intensities on summer weekend/holiday afternoons (excluding Mille Lacs)

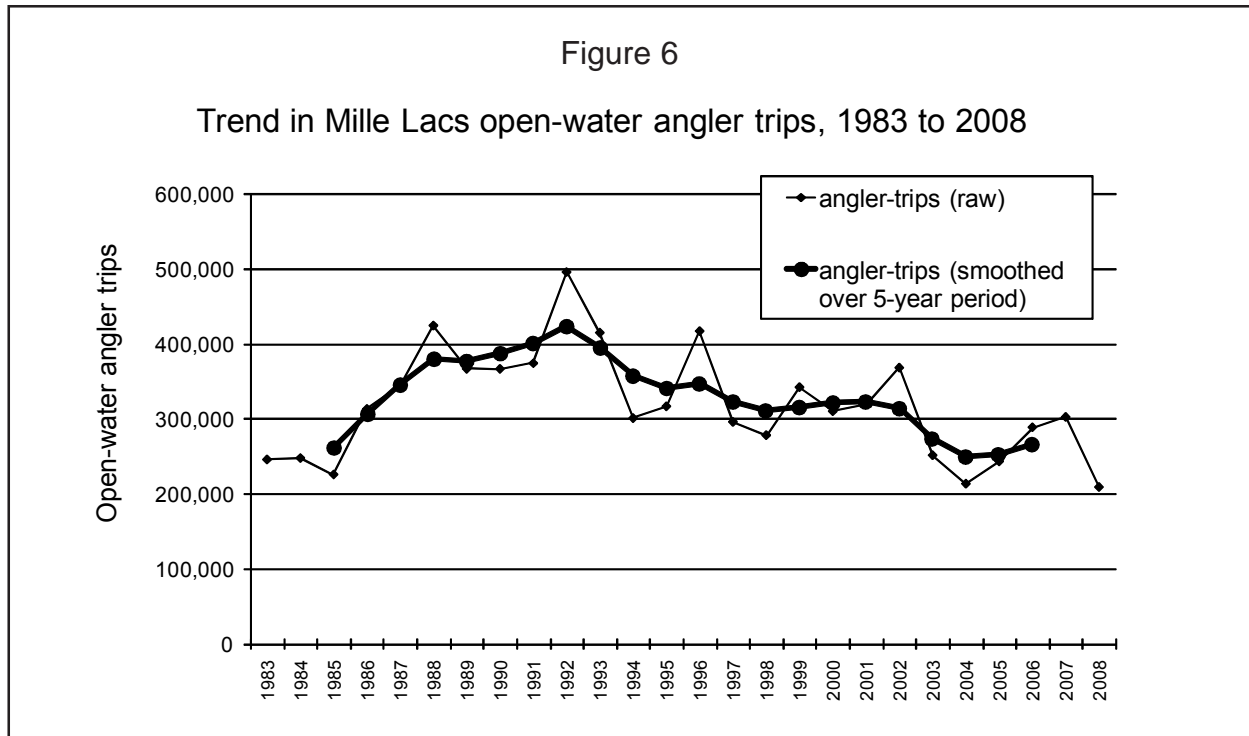




keep boat numbers the same in the afternoon measurement window, given the magnitude of the 1986-to-2005 shift in use from fishing to social boating. A similar shift in use from fishing was experienced in the north central region between 1985 and 2008.

Over this same period of time, the amount of Mille Lacs open-water fishing—which is the primary activity on the lake—has varied a great deal from year to year, but the long-term trend is neither upward nor downward (MNDNR, 2008) (see Figure 6). The Mille Lacs trend is assessed using linear regression, and the slope of the regression line is not statistically different than zero (i.e., trend line is flat).

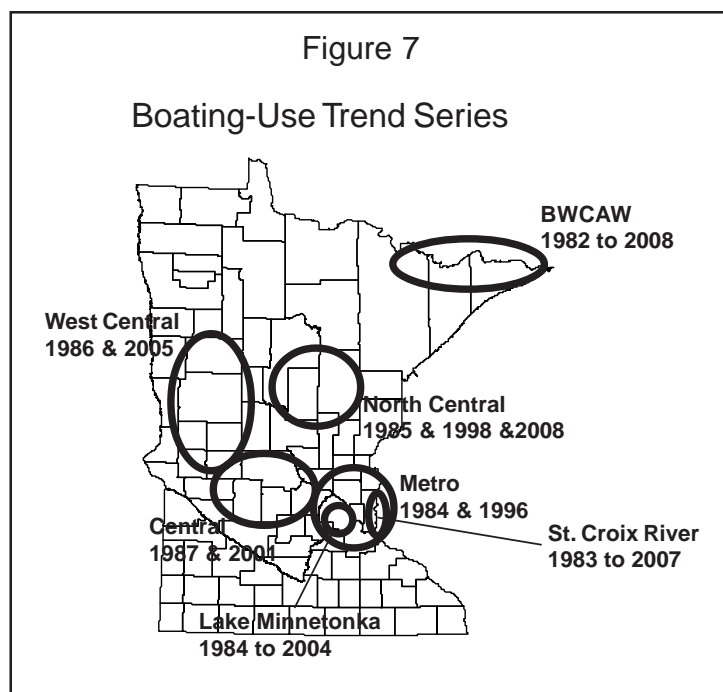
Intensity of use (acres per boat as shown on Figure 3 and 6) is one dimension of boating congestion. A second dimension is the movement of boats. Moving boats, in effect, consume more area and, thus, contribute more heavily to congestion than stationary boats. The portion of moving boats is 36 percent for north central lakes, a portion similar to that found in the non-metropolitan boating regions. The portion of moving boats is substantially higher in the Twin Cities metro area (about 60 percent are moving) a factor that—in conjunction with higher boat densities—adds to the congestion of metro waters.



General Boating-Use Trends in Minnesota

In addition to the North Central boating-use trend, six other use trends exist in Minnesota (Figure 7; see “Trend B” listing of studies in Reference section). And all of the trend series lead to the same general conclusion on the direction of boating-use: boating is stable to decreasing. The decreases are found on Lake Minnetonka and in the BWCAW, both showing decreases since the mid 1990s; all other studies show stable boating use over the indicated period of record.

All of the trend studies start in the 1980s and extend either into



the 1990s or the current decade. These trend studies cover a wide range of boating conditions in Minnesota. Two large, very intensely used boating resources are covered by the trend studies: Lake Minnetonka located in the western part of the Twin Cities metropolitan area, and the Lower St. Croix River located in the eastern part of the Twin Cities metropolitan area. Other Twin Cities boating lakes are covered in a separate regional boating study. More rural, less intensely used lakes are covered by three regional boating studies: one in central, one in north central, and one in the west central region of Minnesota. The more rural lake regions are used three of five times less intensely than typical Twin Cities' lakes. The final trend series comes from the Boundary Waters Canoe Area Wilderness (BWCAW), a formal wilderness area on the Canadian border in northeastern Minnesota.

The recent trend of stable to decreasing boating use occurred during a period when boat registrations were increasing rapidly: registrations increased some fifty percent since 1980 in Minnesota. The typical boat, it appears, is being used less over time. Boaters are apparently buying boats, but using each boat less over time. Leisure time may well be in shorter supply than income.

Since the boating use trend studies are occurring during a period of population growth, even stable boating use is declining on a per-capita basis. Boating is not alone in displaying per-capita decreases. Such decreases are pervasive across nature-based outdoor recreation activities that are reliably monitored (see "Trend A" listing of studies in Reference section). In Minnesota over the last ten years, declining per-capita trends are evident for fishing licenses, hunting licenses, state park attendance, and state bicycle trail use. For the U.S. over the last ten years, there are similar declining trends for fishing participation, hunting participation, national park attendance, and away-from-home wildlife watching participation ("away from home" is over one mile from home). For the U.S., the trend in boating use is not reliably monitored.

Source of Boating Use

Boaters gain access to water through three primary means:

- 1) public access-free public boat launches and associated parking areas.
- 2) commercial access-resorts, campgrounds, marinas and for-fee private accesses.
- 3) riparian residence-waterfront property owners.

As with boating use, comparisons over time of the source of boating use are done for the weekends/holidays, when most of the boat counts are conducted. Too few weekday boat counts are conducted to assess changes.

The source contributions vary greatly depending on the lake class, because of the presence or absence of public access, the number of resorts/private campgrounds, and the amount of residential development.

Since 1985, the contribution of public access has steadily increased, commercial access has steadily decreased, and the remainder (mainly riparian residents) decreased from 1985 to 1998 and remained stable since (Table 4).

This same pattern of source change is found between studies in the west central and metro regions. The central region result is different. It showed very little source-contribution change between studies.

A “public access” boater in this study may own a home on the lake or be a guest at a resort/private campground. Riparian residents commonly

move their boat from the lake on which they own a home to another lake (Table 5). When they launch back onto the lake on which they own a home, they mainly use public access (49%/57%, Mille Lacs/other lakes). Another one-fifth of residents launch through their own property and about the same portion launch at a private facility.

A large majority of boaters who are customers of resorts/private campgrounds/marinas bring their own boat from home (72%/71%, Mille Lacs/other lakes)(see Table 6). When they launch their boats, a sizable portion uses public access (37%/

<u>Means of access</u>	----- <i>Year of study</i> -----		
	1985 (percent)	1998 (percent)	2008 (percent)
Public access	17%	26%	30%
Commercial access*	23%	18%	16%
Remainder**	<u>61%</u>	<u>56%</u>	<u>55%</u>
Total	100%	100%	100%

* Resorts, private campgrounds, marinas
** Mainly riparian resident

34%, Mille Lacs/ other lakes), although a majority launch at a private facility (63%/ 59%, Mille Lacs/ other lakes).

More is said about public accesses boaters who are riparian residents and customers at private facilities in a later section on the use of public access facilities.

Table 5

Riparian resident questions on movement of boat from this to another lake

<u>Question</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● <i>Moved boat between this and another lake?</i> Percent that moved boat	36	38
● <i>(if moved boat between this and another lake)</i> <i>How many times did you move your boat(s)?</i> Median times moved boat	2	3
Mean times moved boat	4.3	4.1
● <i>(if moved boat between this and another lake)</i> <i>When you launched back into this lake, where did you do the launching?</i> Free public access	57	49
Through my property on this lake	19	20
Resort, marina or private site	18	23
Elsewhere	6	8
Total	100	100

Table 6

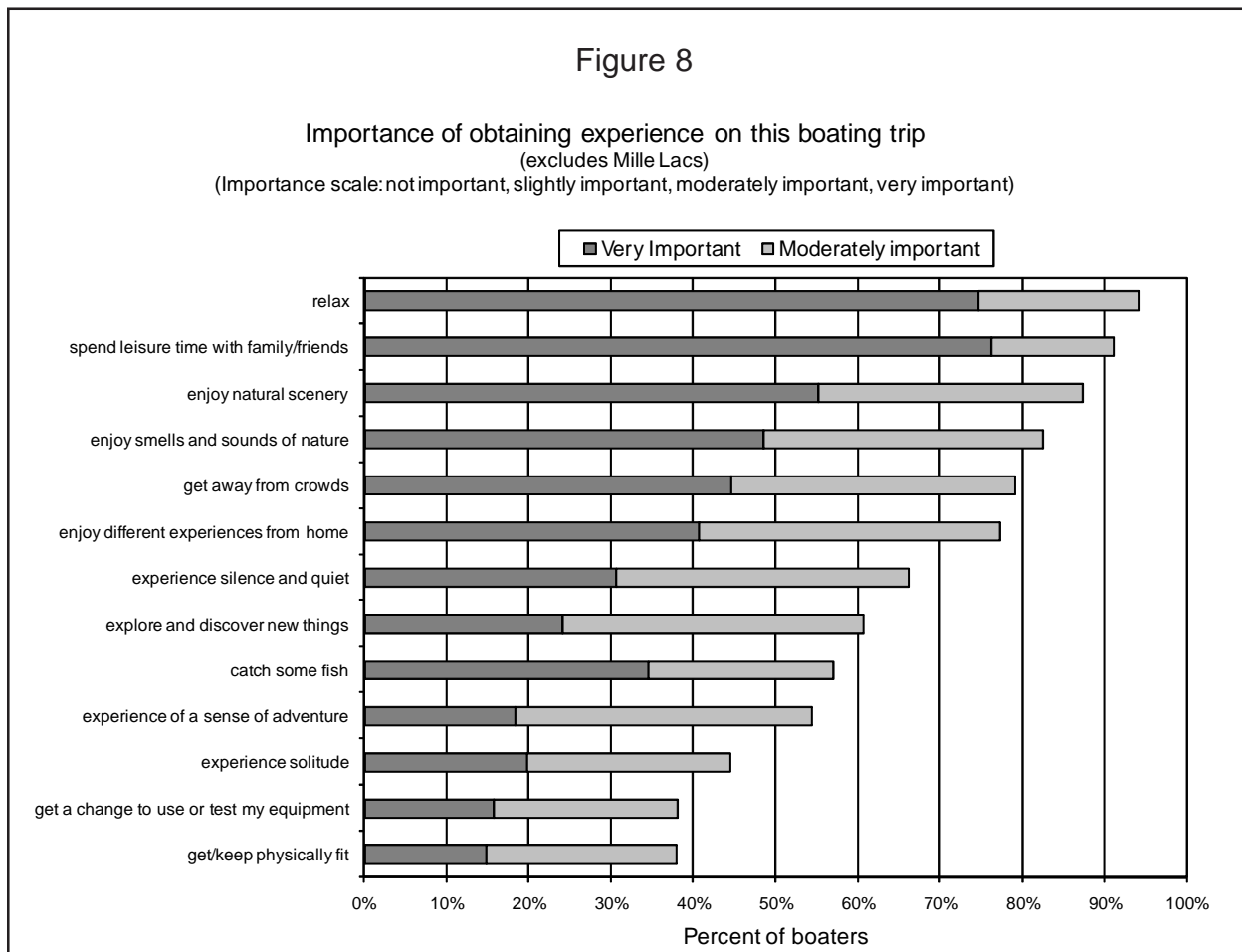
Use of own boat and launching of that boat by resort, private campground, or marina boaters

<u>Question</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● <i>On this boating trip, were you using your boat you brought from home?</i> "Yes" responses	71	72
● <i>(if brought boat from home) Where did you do the launching on this lake?</i> Resort, marina or private site	59	63
Free public access	34	37
Through property of friend or relative	2	0
Elsewhere	5	0
Total	100	100

THE BOATING EXPERIENCE

Motivations for the Boating Trip

Boaters place high importance on obtaining certain experiences while boating; attaining these experiences represents the underlying motivations for the trip. Of highest importance are relaxing with family/friends in an enjoyable and quiet natural setting that is away from crowds (Figure 4). Experiences that are of lowest importance are getting/keeping physically fit, testing/using my equipment, experiencing solitude, and experiencing a sense of adventure, and. The relative importance of these experiences is widely shared across sources of boaters and classes of lakes. Anglers—not surprisingly—rank the importance of “catching some fish” more highly than other boaters, but they still rank it below the experience of relaxing with family/friends, and about the same as the experience of being in an enjoyable natural setting.



The pattern shown on Figure 8 is very close to Mille Lacs in spite of the higher level of fishing on Mille Lacs. And the pattern is virtually the same as found in the Northern region in 2006, the only other study that included the motivation question.

Trip Satisfaction

Trip satisfaction tends to be high for recreators who willingly engage in an activity under conditions with which they are familiar. Boaters in this north central region study fit this profile for high trip satisfaction. Regarding familiarity, boaters, as a group, are familiar with the lakes at which they were surveyed. Half have been boating for 15 or more years on the lake, and at most 8 percent are recent arrivals to the lake (Table 7).

	<i>-- Lakes other than Mille Lacs --</i>		<i>----- Mille Lacs -----</i>	
	<u>Median years</u>	Percent new boaters (one year or less)	<u>Median years</u>	Percent new boaters (one year or less)
All boaters	15	8	17	4
<i>Source of boater:</i>				
Public access	11	9	12	4
Commercial access	7	20	20	2
Riparian resident	20	2	17	7

Boaters are relatively satisfied, too. At least half of all boaters report being “very satisfied” with their outing, while another 38 to 40 percent report being “satisfied” (Table 8). Only 7 to 12 percent are “dissatisfied” to any extent. High satisfaction is shared across sources of boaters (Figure 13).

There is little change in boater satisfaction from 1998 to 2008 on lakes other than Mille Lacs (Table 9). But there is a large increase in boater satisfaction on Mille Lacs, for whatever reason. The increase in Mille Lacs satisfaction places 2008 satisfaction levels at a similar level as that found for the other lakes in 1998 and 2008.

Trip satisfaction is contingent on the behavior of other boaters. In the survey, boaters are asked what problems they encountered with other boaters on their trip. When boaters encounter a “serious” or “very serious” problem with another boater, trip satisfaction drops (Table 10). The decline in satisfaction is mostly a reduction of 5 to 11 percent in “very satisfied” responses accompanied by a similar increase in “satisfied” responses. More is said about specific problems in the next section of this report.

Trip satisfaction is also affected by perceptions of congestion and crowding. When people judge the number of boats on the lakes as “too many” their overall satisfaction declines (Table 11). The decline in satisfaction is mostly a reduction of 16 to 19 percent in “very satisfied”

Table 8

Overall, how satisfied or dissatisfied were you with your boating experience on this trip?

<u>Response</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Very satisfied	52	52
Satisfied	40	38
Dissatisfied	4	5
Very dissatisfied	3	5
Don't know	<u>1</u>	<u>0</u>
Total percent	100	100

Table 9

Overall, how satisfied or dissatisfied were you with your boating experience on this trip?

A. Lakes other than Mille Lacs			
<u>Response</u>	1998 All boaters (percent)	2008 All boaters (percent)	1998 to 2008 Change in percent
Very satisfied	54	52	-1
Satisfied	37	40	3
Dissatisfied	7	4	-3
Very dissatisfied	1	3	2
Don't know	<u>0</u>	<u>1</u>	<u>0</u>
Total percent	100	100	0

B. Mille Lacs			
<u>Response</u>	1998 All boaters (percent)	2008 All boaters (percent)	1998 to 2008 Change in percent
Very satisfied	33	52	19
Satisfied	49	38	-11
Dissatisfied	13	5	-8
Very dissatisfied	5	5	0
Don't know	<u>1</u>	0	<u>-1</u>
Total percent	100	100	0

responses accompanied by a similar increase in “satisfied” responses. Crowding is discussed more fully below following the next section on problems encountered with other boaters.

Crowding and problems with other boaters definitely lower trip satisfaction, but it is important to keep one point in mind: satisfaction still exceeds dissatisfaction even for boaters who experience the crowded conditions and problems with other boaters.

Table 10

Effect on overall trip satisfaction of encountering a "serious" or "very serious" problem with other boaters on the lake during this trip

Note: There are 13 possible problem items in the survey. The problem-rating scale is: no problem, slight, moderate, serious, and very serious problem.

<u>Trip satisfaction</u>	<i>-- Lakes other than Mille Lacs -- Encountered a "serious" or "very serious" problem?</i>		<i>----- Mille Lacs ----- Encountered a "serious" or "very serious" problem?</i>	
	<i>"Yes" (percent)</i>	<i>"No" (percent)</i>	<i>"Yes" (percent)</i>	<i>"No" (percent)</i>
Very satisfied	44	55	48	53
Satisfied	47	38	41	38
Dissatisfied	7	3	7	5
Very dissatisfied	3	3	4	5
Don't know	0	1	0	0
Total	100	100	100	100

Table 11

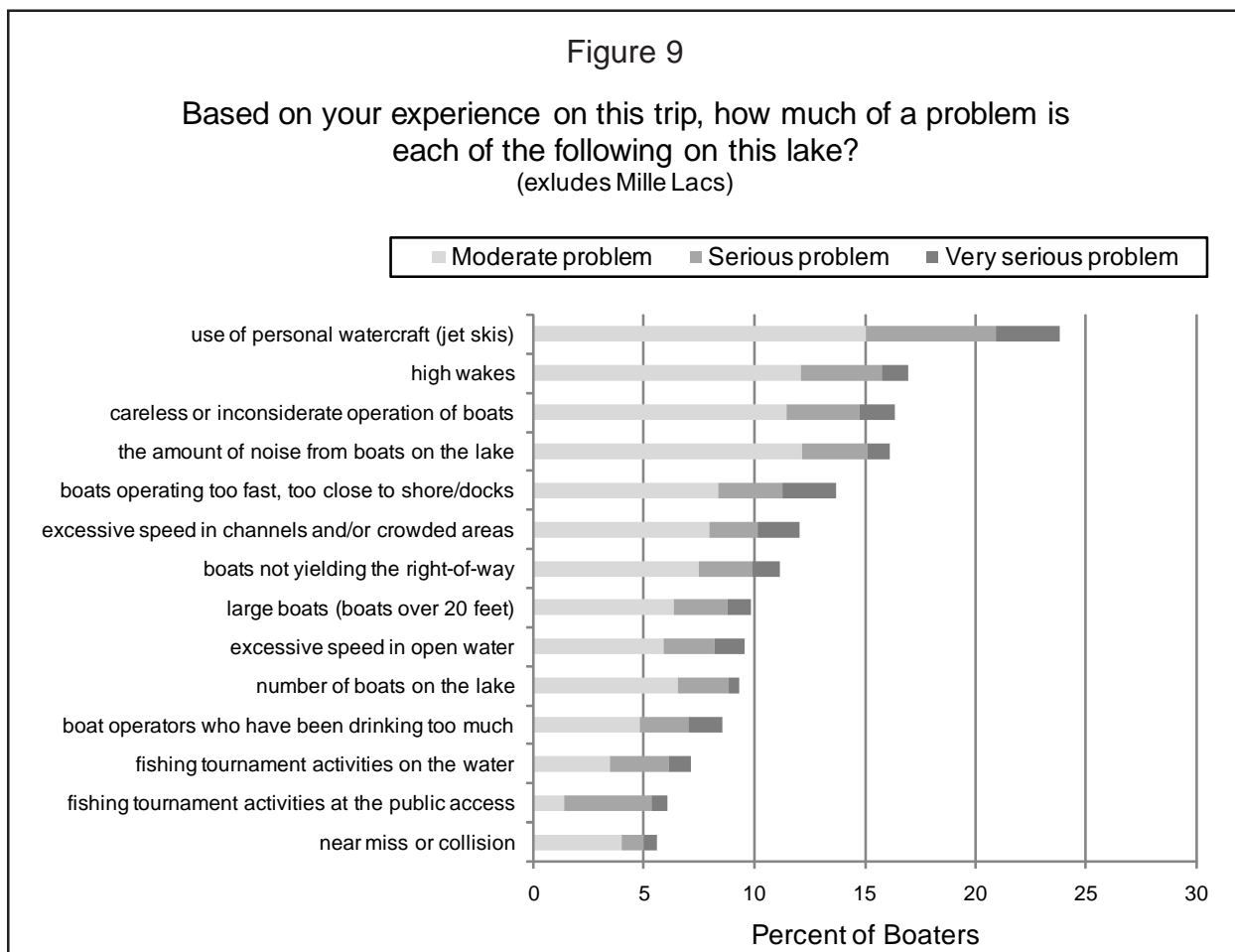
Effect on overall trip satisfaction on encountering "too many boats" on the lake during this trip

<u>Trip satisfaction</u>	<i>-- Lakes other than Mille Lacs -- Encounter "too many" boats?</i>		<i>----- Mille Lacs ----- Encounter "too many" boats?</i>	
	<i>"Yes" (percent)</i>	<i>"No" (percent)</i>	<i>"Yes" (percent)</i>	<i>"No" (percent)</i>
Very satisfied	36	55	37	53
Satisfied	53	39	58	39
Dissatisfied	6	3	5	5
Very dissatisfied	4	3	0	3
Don't know	1	0	0	0
Total	100	100	100	100

Problems with Other Boaters

In the survey, boaters are asked to judge whether they experienced problems with other boaters on their trip. Of the 13 potential problems, none is judged by a majority of boaters as a “moderate”, “serious” or “very serious” problem (Figure 9). Although not judged by a majority of boaters as a “moderate” or greater problem, one problem is clearly reported as the largest problem: “use of personal watercraft (jet skis).” It receives 24 percent “moderate” or more serious responses, and it is the only problem with elevated numbers of “serious” and “very serious” responses. The next most frequently indicated problem is high wakes, which is judged by fewer than 20 percent (17%) of boaters as a “moderate” or more serious problem.

The pattern of problem identification displayed on Figure 9 is largely shared with Mille Lacs boaters, and among the different sources of boaters (public access, commercial access and riparian resident) and across the different lake classes. The



pattern is also shared with the central, west central, northern, and metro lake regions. In all regions, the “use of personal watercraft (jet skis)” is the leading problem.

Crowding

As noted above, boaters have a good deal of familiarity with the lake on which they are boating. This familiarity gives boaters a sound basis for judging “usual” or “normal” boating conditions for the time they choose to boat. When asked to judge the number of boats encountered on their current trip against this “usual” number, the largest group (39% to 41%) indicates that the number is “about the same”, another 31 or 32 percent indicates either “slightly fewer”, and 25 to 26 percent indicates either “substantially fewer” or “substantially more” (Table 12). Overall, some 75 percent of boaters have their “usual” expectations largely met (“about the same” plus “slightly more/fewer” responses).

<u>Response</u>	<u>Lakes other than Mille Lacs (percent)</u>	<u>Mille Lacs (percent)</u>
Substantially fewer	20	21
Slightly fewer	17	19
About the same	39	41
Slightly more	15	12
Substantially more	6	4
Don't know/not sure	3	3
Total percent	100	100

A boater’s comparison of “usual” number of boats with boats encountered on this current trip has a definite influence on their perception of congestion and crowding on the lake (Table 13). When the number of boats encountered today versus usual is “substantially fewer” or “slightly fewer”, only a small portion of boaters indicate they encountered “too many boats” on the trip (6% to 9%), and an equally small portion indicate that the lake is “crowded” or “far too crowded” (4% to 5%). When the number encountered today rises to “slightly more” and “substantially more”, perceptions of congestion and crowding increase. A sizable portion of boater who encountered “substantially more” boats than usual find “too many boats” on the lake (70% to 73%) and “crowded” or “far too crowded” conditions (64% to 73%).

Table 13

Effect of "usual" boat-number expectations on perceptions of congestion and crowding

	----- Lakes other than Mille Lacs -----		----- Mille Lacs -----	
	Percent of boaters who encountered "too many" boats today	Percent of boaters who judged the number of boats as "crowded" or "far too crowded" today	Percent of boaters who encountered "too many" boats today	Percent of boaters who judged the number of boats as "crowded" or "far too crowded" today
All boaters	17	14	11	12
<i>Number of boats today versus usual?</i>				
Substantially fewer	5	1	3	0
Slightly fewer	4	4	3	4
About the same	12	11	11	13
Slightly more	51	34	31	27
Substantially more	70	64	73	73
Don't know	14	15	0	5

Most boaters (83% to 89%) in 2008 did not encounter “too many boats” on their trip, while the balance did (Table 14). The prevalence of encountering “too many boats” is higher for public access boaters, which may be due to the added potential for congestion at or near the public access ramp.

The pattern of 2008 responses described above for “too many boats” is largely the same as the pattern for 2008 “crowded” and “too crowded responses” (Table 15). Of the crowded responses, most are reported as “crowded” and few as “far too crowded.”

For lakes other than Mille Lacs, trends from 1998 in the perception of “too many” boats changes little for all sources (Table 14). In contrast for Mille Lacs, although the overall perception changed little, the trend for public access boaters is sharply upwards, moderately downwards for commercial access boaters, and stable for riparian residents. And largely this same 1998-to-2008 pattern occurs for perceptions of crowding (Table 15).

It should be noted that the increase in crowding perceptions between 1985 and 1998 may be due to the change from in-person interviews in 1985 to mail-back surveys in 1998 (Table 15). In a face-to-face interview, respondents are hesitant to share bad news (e.g., lake is “too crowded”), so the results are biased in a positive way compared with a mail survey (Dillman et al., 2009)

Table 14

Trends in perception of too many boats on the water: percent of boaters judging the number of boats as "too many"

(Note: This question was not asked in 1985)

A. Lakes other than Mille Lacs			
	1998 "Too many boats" (percent)	2008 "Too many boats" (percent)	Change in percent (1998 to 2008)
Overall	16	17	1
<i>Source of boater</i>			
Public access	27	24	-3
Commercial access	13	16	3
Riparian resident	12	13	1

B. Mille Lacs			
	1998 "Too many boats" (percent)	2008 "Too many boats" (percent)	Change in percent (1998 to 2008)
Overall	9	11	2
<i>Source of boater</i>			
Public access	5	21	16
Commercial access	14	7	-7
Riparian resident	8	7	-1

The reason why perceptions of congestion and crowding by public access boaters increased sharply on Mille Lacs is not known. What is known is that three accesses contributed some 60 percent of all such perceptions, while accounting for some 30 percent of survey respondents. The three accesses are Father Hennepin State Park (west), Wahkon, and Wealthwood.

Table 15

Trends in perception of crowding: percent of boaters judging conditions as 'crowded' or 'far too crowded'

A. Lakes other than Mille Lacs				
	1985 'Crowded' & 'Far too crowded' (percent)	1998 'Crowded' & 'Far too crowded' (percent)	2008 'Crowded' & 'Far too crowded' (percent)	Change in percent (1998 to 2008)
Overall	6	16	14	-2
<i>Source of boater</i>				
Public access	3	27	22	-5
Commercial access	3	13	13	0
Riparian resident	7	12	11	-1

B. Mille Lacs				
	1985 'Crowded' & 'Far too crowded' (percent)	1998 'Crowded' & 'Far too crowded' (percent)	2008 'Crowded' & 'Far too crowded' (percent)	Change in percent (1998 to 2008)
Overall	0	9	12	3
<i>Source of boater</i>				
Public access	0	2	20	18
Commercial access	0	13	8	-5
Riparian resident	0	10	10	0

Irrespective of their perception of the number of boats, the large majority of boaters would return to boat under the same conditions (Table 16). Virtually all boaters (99%) who did not encounter too many boats would return if the numbers would be the same. This return rate falls to 80 to 84 percent for boaters who encountered too many boats, leaving 16 to 20 percent who would think twice before returning.

Table 16

Would you boat again if you knew there were going to be about the same number of boats as on this trip?

<u>Boat again?</u>	<i>----- Lakes other than Mille Lacs -----</i>		<i>----- Mille Lacs -----</i>	
	Boaters who encountered too many boats (percent)	Boaters who did not encounter too many boats (percent)	Boaters who encountered too many boats (percent)	Boaters who did not encounter too many boats (percent)
Yes	80	99	84	99
No	9	1	9	1
Don't know	11	1	6	0
Total	100	100	100	100

PUBLIC ACCESS FACILITIES

Quality of Facilities

The large majority of boaters have launched before at the access where they were intercepted for the survey (79% on Mille Lacs and 81% on the other lakes). Thus, most are familiar with the facility.

Boaters give high marks to public access facilities. Positive ratings (“good” to “excellent”) comprise 81 to 84 percent of boater ratings (Table 17). Few boaters give negative ratings of “poor” or “very poor.” High ratings extend across the lake classes. On the lakes other than Mille Lacs, the ratings have been stable since 1998. The Mille Lacs ratings, however, have fallen since 1998, with most of the drop represented by a decrease in “excellent” ratings and an increase in “good” ratings.

There are problems in the use of the public access facilities. About a quarter of public access boaters (28%/22%, Mille Lacs/other lakes) indicate that they had some type of problem using the public access. These problems have a noticeable effect on access ratings (Table 18). Encountering a problem substantially lowers the positive ratings, and raises the middling and poor ratings.

Table 17

How would you rate this access for launching and landing a boat?

A. Lakes other than Mille Lacs			
<u>Response</u>	1998 Overall (percent)	2008 Overall (percent)	1998 to 2008 Change in percent
Excellent	35	33	-2
Good	45	51	5
Fair	12	12	0
Poor	1	3	2
Very poor	1	1	-1
Don't know	5	0	-5
Total percent	100	100	0

B. Mille Lacs			
<u>Response</u>	1998 Overall (percent)	2008 Overall (percent)	1998 to 2008 Change in percent
Excellent	39	24	-15
Good	40	57	17
Fair	16	13	-3
Poor	4	4	0
Very poor	1	3	1
Don't know	0	0	0
Total percent	100	100	0

Access users identified specific problems they encountered from a listing of 17 potential problems. The leading problems for both Mille Lacs and other lakes have to do with the perceived small size of many parts of the access facility: insufficient parking spaces, and insufficient number of launch lanes (Table 19). Access users may be feeling cramped for space. Perhaps, the increases in sizes of boats and motors contribute to these demands for more space (see following section on trends in equipment).

On Mille Lacs, one additional problem is identified by 20 percent or more of access users: no dock. For the other lakes, two additional problems are identified

Table 18

Effect of encountering a use problem on access rating for launching and landing a boat

Response	Overall (percent)	----- Had a problem using this access? -----	
		"Yes" (percent)	"No" (percent)
Excellent	33	30	39
Good	51	28	50
Fair	12	28	9
Poor	3	9	1
Very poor	1	4	0
Don't know	0	0	1
Total percent	100	100	100

Response	Overall (percent)	----- Had a problem using this access? -----	
		"Yes" (percent)	"No" (percent)
Excellent	24	26	29
Good	57	21	66
Fair	13	32	5
Poor	4	11	0
Very poor	3	11	0
Don't know	0	0	0
Total percent	100	100	100

by 20 percent or more of users: inadequate directional signs to access, and could not find the access from the lake after dark.

Table 19

Questions about problems using the public access

<u>Question</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● Did you have any particular problems using this access on this boating trip? "Yes" responses (percent)	22	28
● (IF YES) What was the problem(s)? (boaters could indicate more than one problem) <u>Responses (percent of boaters indicating a problem)</u>		
Not enough parking spaces	48	44
Insufficient number of launch lanes/ramps	28	44
Inadequate directional signs to access	20	6
Couldn't find the access from the lake after dark	20	1
Access parking lot being used by non-boaters	18	11
No dock	17	23
Ramp blocked by parked cars, campers etc.	15	11
Difficult to launch/land because of wind or waves	11	6
Access site in disrepair	9	16
Not enough maneuvering room on land near ramp for launch/landing	9	6
Not enough maneuvering room on water near ramp for launch/landing	6	0
Safety of entry to access area from road or highway	5	11
Water too shallow	5	6
People fishing from the dock at the access made it difficult to maneuver	3	0
Ramp slope too steep	2	1
Swimmers near ramp made it difficult to launch/land a boat	2	6
Ramp too short	0	0

Improvements to Facilities

When asked what improvements are needed at access sites, boaters suggest improvements that solve their use problems. The top-ranked improvement by far for both Mille Lacs and other lakes is providing more parking spaces in the access lot (Table 20). There is no other improvement for lakes other than Mille Lacs that is identified by 20 percent or more of users. Mille Lacs has two other improvements identified by at least 20 percent of users: better directional signs to access, and larger parking spaces in the access lot.

Table 20

Which of the following improvements do you feel are needed at this launch site?

(percent of public access boaters who requested an improvement; boaters could indicate more than one type of improvement)

<u>Potential improvement</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
More parking spaces in lot	41	39
Better directional signs to access	14	24
More launch lanes/ramps	13	15
Trash containers	12	17
Larger parking spaces in access lot	11	20
Protection from wind/waves in front of launch ramp	9	10
Beacon light visible from lake	9	10
Litter pickup	8	5
Toilets	8	11
Better lighting of access/parking area	7	7
A dock to aid launching	6	3
Better enforcement	5	3
Better informational signs at access	5	0
Toilet maintenance (if applicable)	4	4

Use of Facilities

In the past, nearly all public access users fit the profile of a traditional user: a boater who neither owned a home on the lake nor was a guest at a resort/private campground on the lake. Boaters who lived on the lake occasionally used the access to get their boat in and out of the water, especially to launch in spring and land in the fall. Boaters staying at resorts and private campgrounds generally were not large users of the access, because most resorts/campgrounds provided their own launch facilities.

The portion of traditional users has declined (Table 21). Between 1985 and 2008, traditional users decreased from 83 percent to 56 percent of the traffic through public accesses. Most of that decline occurred between 1985 and 1998, and the decline continued at a slower pace between 1998 and 2008. Accounting for more of the traffic between

1985 and 2008 are riparian residents and resort-campground guests. These latter two are now estimated to account for 44 percent of traffic through the accesses, up from 17 percent in 1985. Public access—it appears—is becoming more and more an asset that all lake interests take advantage of, including riparian residents and commercial boating-related interests.

	<i>--Percent of public access use--</i>		
	<u>1985</u>	<u>1998</u>	<u>2008</u>
Traditional user*	83	62	56
Riparian resident on this lake	14	25	21
Resort/campground guest on this lake	<u>3</u>	<u>13</u>	<u>23</u>
Total	100	100	100

* Someone who neither lives on the lake nor is not staying on the lake at a resort/private campground.

The decline in traditional public access users was also found in the central and west central lake regions. Apparently, it is a general pattern.

The reason for this change in the use of public accesses is unknown, but one hypothesis comes to mind: the increasing size of boats and motors (see later section on boating equipment), and associated need to launch/land these boats at a well designed access facility. If this hypothesis is true, and if the upward trend in

boat sizes and motors continues, public access facilities may become increasingly important to lakeshore residents and resorts/campgrounds on the lakes.

On a related topic, the majority of boaters on Mille Lacs (64%) and other lakes (55%) use additional lakes near the lake where they were surveyed (Table 22). This includes 39 percent of Mille Lacs riparian residents, and 47 percent of riparian residents on other lakes. Access to these additional lakes is dominated by public access (57% of launches for Mille Lacs, and 53% for other lakes), indicating that many more boaters than just those surveyed at public access have a stake in public access facilities.

<u>Question</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● In the last 12 months, did you boat on other lakes <i>within about 50 miles of this lake</i> ? "Yes" responses	55	64
● How do you gain access to these other lakes <i>within about 50 miles of this lake</i> ?		
Free public access launch site	53	57
Friend or relative's home/cabin	18	14
Resort, marina or private launch site	13	14
My home or cabin	9	5
Other	4	5
Road end/road right-of-way (unimproved site)	3	5

A large portion of public access users (56%/51%, Mille Lacs/other lakes) have at some time in their past found a public access parking lot full on the lake they were surveyed (Table 23). On average, this happened twice (median) in the last year. Most of them were able to find a way to boat that day. They either parked on the road, waited for a place in the lot to open up, or went to another access on the lake. Only 6 or 7 percent did not boat that day.

Table 23

Questions on finding the public access parking full
(responses of public-access boaters)

<u>Question</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● Have you ever tried to use free public access on this lake and found the access parking lot full? "Yes" responses (percent)	51	56
● (IF YES) How many times did you find the lot full in the past 12 months?		
Median times	2	2
Mean times	2.4	2.8
● (IF YES) What did you do when you found the parking lot full? (boaters could indicate more than one action) <u>Responses (percent)</u>		
Parked on the road	46	43
Waited for place in lot to open up	27	27
Went to another access on this lake	18	23
Other (e.g., parked at home)	17	17
Went to another lake	7	7
Didn't boat that day	6	7

Need for Additional Facilities

Full parking lots give boaters reasons to want additional public access facilities. This want, or perceived need, for additional public access is examined in the survey in two ways: (1) for the lake at which the boaters were surveyed, and (2) for any lake within 50 miles of the lake at which they were surveyed.

For the lake at which they were surveyed, 11 percent of all Mille Lacs boaters thought additional public access is needed, 65 percent did not think additional access is needed, and 24 percent are uncertain (Table 24). Results are similar for other lakes: 13 percent though additional public access is needed, 68 percent did not think additional access is needed, and 19 percent are uncertain. Public access boaters are more likely to indicate a need for additional access (25% on Mille Lacs and 22% on other lakes), but still most do not see a need for more access (50% Mille Lacs and 54% other lakes). Few riparian residents see a need for more access (10% or less).

Table 24

Questions on the need for more public accesses

A. Lakes other than Mille Lacs		----- Source of boater -----		
<u>Question</u>	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● Do you think an additional (or initial) public boat access is needed on this lake?				
<u>Response</u>				
"Yes"	13	22	8	10
"No"	68	54	52	83
"Don't know"	<u>19</u>	<u>24</u>	<u>39</u>	<u>7</u>
Total percent	100	100	100	100
● Do you know of a lake(s) within 50 miles of this lake that needs an additional (or initial) public boat access?				
<u>Response</u>				
"Yes"	10	15	8	8
"No"	52	55	41	54
"Don't know"	<u>37</u>	<u>29</u>	<u>50</u>	<u>38</u>
Total percent	100	100	100	100

B. Mille Lacs		----- Source of boater -----		
<u>Question</u>	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● Do you think an additional (or initial) public boat access is needed on this lake?				
<u>Response</u>				
"Yes"	11	25	5	7
"No"	65	50	63	78
"Don't know"	<u>24</u>	<u>25</u>	<u>32</u>	<u>15</u>
Total percent	100	100	100	100
● Do you know of a lake(s) within 50 miles of this lake that needs an additional (or initial) public boat access?				
<u>Response</u>				
"Yes"	13	25	11	6
"No"	45	44	38	52
"Don't know"	<u>42</u>	<u>31</u>	<u>50</u>	<u>43</u>
Total percent	100	100	100	100

Results are similar for the perceived need for additional public accesses within 50 miles of the lake at which boaters were surveyed, except that more boaters are uncertain of the need (expressed in the more frequent “don’t know” responses). Overall, some 10 to 13 percent of all boaters thought additional public access is needed on a lake within 50 miles of where they were surveyed, about half did not think additional access is needed, and some 40 percent are uncertain (Table 24).

Public access boaters are more likely to indicate a need for additional access (19% on Mille Lacs and 15% other lakes), but most do not see a need or are uncertain. Few riparian residents (under 10%) see a need for more access.

Overall, the pattern of these results is close to that found in the central, west central, and northern lake regions.

Specific access-related issues

Access users were queried about four specific issues: power loading, the importance of various facilities and services at the access, the likelihood users would power-wash their boat at the access, and the adequacy of the access for boaters with disabilities (i.e., self-described disabilities).

Power loading (driving the boat onto the trailer) can cause problems at public access, including scouring a hole and building a ridge off the end of the ramp. Power loading is a common practice; 39 percent of Mille Lacs boaters and 35 percent of other-lakes boaters indicated that they power loaded their boat.

Boaters do not judge the severity of problems caused by power loading as very severe (Table 25). The majority of public access boaters (including those who did not power load on this trip) indicate that this practice is “not a problem”. Few judge the problem as “serious” or “very serious”. Similar responses to this question were found in the two other studies in which it was asked (west central and northern region studies).

A second issue addressed to access boaters deals with the importance of various facilities and services at public accesses. When asked about six facilities/services, a dock to aid launching/landing is by far the most important, judged as “very important” by 68 percent of access users on Mille Lacs and 71 percent of users on other lakes (Table 26). Docks are followed in importance by a lake map with boating restrictions, toilets, a lake map showing depth/hazards, emergency information, and a paved parking lot (as opposed to a gravel lot).

Table 25

How large a problem to you were any effects of “power loading” at this launch site (“effects” include scouring a hole at the end of the ramp and building a ridge off the end of the ramp)?
(responses of public-access boaters)

A. Lakes other than Mille Lacs

Note: On this trip, 35% of boaters power-loaded their boat (that is, "drove" their boat onto their trailer).

Response	Overall (percent)	-- Power-loaded boat this trip? --	
		"Yes" (percent)	"No" (percent)
No problem	59	73	55
Slight problem	8	5	9
Moderate problem	7	10	6
Serious problem	10	6	10
Very serious problem	1	0	1
Don't know	<u>16</u>	<u>6</u>	<u>18</u>
Total	100	100	100

B. Mille Lacs

Note: On this trip, 39% of boaters power-loaded their boat (that is, "drove" their boat onto their trailer).

Response	Overall (percent)	-- Power-loaded boat this trip? --	
		"Yes" (percent)	"No" (percent)
No problem	61	75	54
Slight problem	9	11	14
Moderate problem	4	7	3
Serious problem	14	7	8
Very serious problem	0		0
Don't know	<u>11</u>	<u>0</u>	<u>22</u>
Total	100	100	100

Table 26

How important to public access users are the following items at public accesses?

Items	Mean Importance (value 1 to 4)*	Importance response					Total (percent)
		Not important (=1) (percent)	Slightly important (=2) (percent)	Moderately important (=3) (percent)	Very important (=4) (percent)	Don't know (percent)	
A. Lakes other than Mille Lacs							
Dock to aid launching/landing	3.4	10	9	10	71	1	100
Map of lake showing boating restrictions	3.2	7	14	28	51	1	100
Toilets	3.1	7	20	30	43	0	100
Map of the lake showing depth, hazards	2.9	14	17	30	38	1	100
Emergency information	2.8	13	27	25	34	1	100
Paved parking lot (as opposed to a gravel lot)	2.2	33	25	21	16	5	100
* Ignores "don't know" responses							
B. Mille Lacs							
Dock to aid launching/landing	3.3	14	5	13	68	0	100
Map of lake showing boating restrictions	3.3	6	13	26	53	1	100
Toilets	3.2	5	22	24	49	0	100
Map of the lake showing depth, hazards	3.0	10	23	26	41	0	100
Emergency information	3.0	11	24	23	42	0	100
Paved parking lot (as opposed to a gravel lot)	2.2	40	14	24	17	5	100
* Ignores "don't know" responses							

Most access users indicate they would be “slightly likely” or “very likely” to voluntarily use a power-wash at the access to help prevent the spread of aquatic invasive species (Table 27). It should be noted that this question is probably biased to the “likely” end of the response spectrum, since the “likely” end of the spectrum is indicative of socially desirable behavior on the part of the boater, who wants to be seen as a responsible person. Thus, the likelihood of boaters actually using the power wash voluntarily would be less than indicated in these responses.

Table 27

To help prevent the spread of aquatic invasive species, how likely or unlikely would you be to power-wash your boat at this access?
(responses of public-access boaters)

<u>Response</u>	<u>Lakes other than Mille Lacs (percent)</u>	<u>Mille Lacs (percent)</u>
Very likely	37	32
Slightly likely	22	25
Neither likely nor unlikely	9	16
Slightly unlikely	10	11
Very unlikely	15	13
Don't know	<u>7</u>	<u>3</u>
Total percent	100	100

Few boaters responded they have a disability that affects when or where they boat (11 of 615 surveys)(see Table 28). Although requested, only two boaters described the type of disability: bad knees, and 100 percent disabled veteran. A large portion of the boaters found the access inadequate. Although requested, only one boater described why the access was inadequate: rough ground. Overall, very little was learned from these questions about the adequacy of the access for boaters with disabilities.

Table 28

Questions on boater disabilities
(responses of public-access boaters)

<u>Question</u>	<u>Lakes other than Mille Lacs (percent)</u>	<u>Mille Lacs (percent)</u>
● Do you currently have a disability that affects when or where you boat?		
"Yes" (3 respondents other lakes; 8 respondents Mille Lacs)	1	5
"No"	<u>99</u>	<u>95</u>
Total percent	100	100
● (IF YES) Was this public access facility adequate for your needs?		
"Yes"	50	14
"No"	<u>50</u>	<u>86</u>
Total percent	100	100
● (IF YES) Did you park in a designated handicapped space at this access?		
"Yes"	0	17
"No"	<u>100</u>	<u>83</u>
Total percent	100	100

BOATING SAFETY AND ENFORCEMENT

Boating Restrictions

Special boating restrictions are uncommon on the sample lakes of the study. Thirteen of the 54 sample lakes have a boating restriction. The restrictions are limited to small geographic areas; speed/no wake in channel areas and selected bays or zones. Thus, boaters on lakes with restrictions may not travel into the restricted area. In the study, few boaters (15%) on lakes with restrictions indicate they are aware of the restrictions.

When asked what special boating restrictions are needed for this lake, the most common response is “none” (42%/40%, Mille Lacs/other lakes)(Table 29). However, about a fifth of boaters would like to see more restrictions on personal watercraft (jet skis). This desire to restrict personal watercraft is one more indication of the opinion many boaters have of personal watercraft use. As noted above, personal watercraft use is the leading problem boaters are having with other boaters. Beyond the personal watercraft issue, few boaters think various types of boating restrictions are needed.

Table 29

What special boating restrictions are needed for this lake?

(table entries are the percent of boaters who feel the restriction is needed)

<u>Type of restriction</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
None	40	42
Special restrictions for personal watercraft (jet skis)	22	19
Speed restrictions/quiet waters	13	12
Boat type and size restrictions	11	12
Horsepower restrictions	8	4
Time restrictions	7	5
Area of lake restrictions	5	3
Don't know/not sure	15	17
Other	2	1

Enforcement Presence

Enforcement officers are seen by 19 percent of boaters on both Mille Lacs and other lakes (Table 30). Public access boaters are the most likely to see an officer (32% /31%, Mille Lacs/other lakes) and riparian residents are the least likely (11%/12%, Mille Lacs/other lakes).

Table 30

Encountering an enforcement officer on this trip

<i>Question</i>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● <i>While you were on the lake on this trip, did you see an enforcement officer?</i> "Yes" responses	19	19
● <i>Were you checked by an enforcement officer on this trip?</i> "Yes" responses	3	3
● <i>(if checked) How would you rate the officer's professional conduct during this check?</i>		Note: Too few surveys (8) to summarize results
"Excellent"	27	
"Good"	53	
"Fair"	13	
"Poor" or "Very poor"	7	
Total percent	100	
<i>Number of rating surveys</i>	29	8

The percent of boaters who see and enforcement officer (19%) is little changed from 1998, when this figure stood at 21 percent.

Three percent of boaters report being checked by an enforcement officer on both Mille Lacs and other lakes. Most boaters who are checked are fishing (80%/65%, Mille Lacs/other lakes).

Boaters checked by an enforcement officer give high marks to the officer's professional conduct. Positive ratings of "good" to "excellent" are reported by 80 percent of boaters. Few negative ratings (7%) are reported.

Safety Courses

Formal boating safety courses have been completed by 20 percent of Mille Lacs boaters and nearly the same percent of boaters on other lakes (22%)(see Table 31). These percents have changed little since 1998, when Mille Lacs was 19 percent and the other lakes was 20 percent (Table 32). About the same portion of boaters

Table 31

Boating safety courses and operator's license

<i>Question</i>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
● <i>Have you taken a formal course in boating safety?</i>		
"Yes" responses	22	20
● <i>Should all boat operators (powered & unpowered) be required to complete a boating safety course?</i>		
"Yes" responses for all boaters	34	32
"Yes" responses for boaters having completed a safety course	65	54
● <i>Should all motorboat operators be required to obtain an operator's license?</i>		
"Yes" responses for all boaters	25	21
"Yes" responses for boaters having completed a safety course	38	34

have completed a safety course in the west central, northern, and central region (all are 18%). The Twin Cities lake region has a higher portion of boaters (32%) completing such a course.

When asked whether all boat operators should complete a safety course, 32 percent of Mille Lacs boaters respond “yes”, about the same as on other lakes (34%). Boaters having completed a formal safety course are more likely than other boaters to believe all boaters should be required to complete a safety course. Responses to this question have not changed a great deal since 1998 (Table 32).

Requiring an operator’s license for motorboat operators is not all that popular. It is supported by only 21 and 25 percent of Mille Lacs and other-lake boaters, respectively. Boaters having completed a safety course are more likely than other boaters to support this licensing requirement, although less than half of those having completed a safety course support the requirement. Responses to this question have changed little since 1998 (Table 32).

Table 32

Trends in having taken a boating safety course, and opinions about requirements for boating safety courses and operator's license

A. Lakes other than Mille Lacs	1998 study	2008 study	Change 1998 to 2008
● <i>Have you taken a formal course in boating safety?</i> "Yes" responses	20	22	2
● <i>Should all boat operators (powered & unpowered) be required to complete a boating safety course?</i> "Yes" responses	39	34	-5
● <i>Should all motorboat operators be required to obtain an operator's license?</i> "Yes" responses	27	25	-2

B. Mille Lacs	1998 study	2008 study	Change 1998 to 2008
● <i>Have you taken a formal course in boating safety?</i> "Yes" responses	19	20	1
● <i>Should all boat operators (powered & unpowered) be required to complete a boating safety course?</i> "Yes" responses	31	32	1
● <i>Should all motorboat operators be required to obtain an operator's license?</i> "Yes" responses	23	21	-2

Types of Beverages on Board

Since the 1985 study, Minnesota enacted a law that makes it illegal to operate a motorboat after consuming too much alcohol, very much like the alcohol restrictions on driving an automobile. In 2008, 29 percent of Mille boaters and 31 percent of boaters on other lakes report having some type of alcoholic drinks on board during their trip (Table 33). Few have only alcoholic drinks. Most boaters have no alcohol on the boat: either they have only non-alcoholic drinks on board, or have no drinks of any type. Riparian residents are more likely than boaters from public and commercial accesses to have no drinks on board.

The portion of boaters with alcoholic drinks on board increased from 1998 to 2008 (Table 33). Similar results are found in the west central lake region between 1986 and 2005. In the central region, however, the prevalence of alcoholic drinks stayed virtually the same from 1987 to 2001. In both the central and west central regions, the portion of boaters who report having alcoholic drinks on the boat is

Table 33

Percent of boaters having certain beverages on board

A. Lakes other than Mille Lacs			
	1998 study	2008 study	Change 1998 to 2008
Non-alcoholic drinks only	49	51	3
Mix of non-alcoholic and alcoholic drinks	23	27	4
Alcoholic drinks only	2	4	3
No beverages on board	26	17	-9
Total percent	100	100	0

B. Mille Lacs			
	1998 study	2008 study	Change 1998 to 2008
Non-alcoholic drinks only	66	60	-6
Mix of non-alcoholic and alcoholic drinks	22	27	5
Alcoholic drinks only	1	2	1
No beverages on board	11	12	0
Total percent	100	100	0

lower than in the north central region (21% and 22% in central and west central region, respectively).

Safety Equipment

Most boats in 2008 are equipped with some form of safety equipment other than personal flotation devices (Table 34). Lights, fire extinguishers and horns are the most common equipment types. The small portion of boats without any safety equipment (4%/7%, Mille Lacs/other lakes) may not need any, because no safety equipment other than personal flotation devices is required for boats less than 16 feet long operated during daylight hours.

Since 1998, the prevalence of safety equipment is basically stable to increasing. Large increases are reported for fire extinguishers and horns on lakes other than Mille Lacs.

Table 34

Percent of Boats with Various Types of Safety Equipment, Other than Personal Flotation Devices

A. Lakes other than Mille Lacs			
	1998 study	2008 study	Change 1998 to 2008
Fire extinguisher	68	83	15
Horn	60	75	16
Lights	81	87	7
Visual signal (flag, flare gun)	16	17	1
None of these	13	7	-6

B. Mille Lacs			
	1998 study	2008 study	Change 1998 to 2008
Fire extinguisher	79	81	2
Horn	66	74	8
Lights	94	93	-1
Visual signal (flag, flare gun)	22	18	-4
None of these	3	4	1

CHARACTERISTICS OF THE BOATING TRIP

Activity

There are two main activities on north central lakes: fishing and boat riding. The former is far larger than the latter for Mille Lacs, while the latter is slightly larger for the other lakes (Table 35). Fishing is the leading activity for each source of boating use on both Mille Lacs and other lakes, except for riparian residents on the other lakes, who participate more in boat riding (47% boat riding, 32% fishing).

Activities have changed since 1985. The major change is a drop in fishing and a rise in boat riding (Table 36). On lakes other than Mille Lacs, most of the fishing decline occurred between 1985 and 1998, with only a small decline since. Boating riding increased from 1985 to 1998. The 1998 to 2008 decrease in boat riding may be due to the inclusion of a new main-activity choice (swimming), much of which was probably reported as boat riding prior to 2008. Boat riding—as measured prior to 2008—may in fact have gone up since 1998, albeit at a slower rate than between 1985 and 1998.

On Mille Lacs, activity trends can only be assessed for riparian residents, because of suspicions that a biased sample was obtained for the other boater sources. The methodology used for riparians should produce unbiased results. The primary change found for riparian residents is a decrease in fishing and an increase in boat riding, the same change as found on the other lakes.

The activity changes experienced in this study are of a general nature, with similar results from the three other regional boating studies. All of the studies show an increase in boat riding, and all but one (Metro) show a drop in fishing. The metro region fishing change is small. The metro region—compared with the other three regions—has the least fishing and the most boat riding in both the earlier and later studies.

Activity	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Boat ride/sightseeing	40	16
Fishing	37	75
Swimming	7	3
Water skiing/tubing	5	1
Jet skiing	3	1
Sailing	2	0
Transportation to/from	1	0
Canoeing/kayaking	1	0
Other	6	2
Total percent	100	100

Table 36

Boater Activities in 1985, 1998 and 2008

A. Lakes other than Mille Lacs (all sources of boating use)				
	1985 study (percent)	1998 study (percent)	2008 study (percent)	Change (1985 to 2008)
Fishing	60	40	37	-23
Boat ride	27	43	40	13
Swimming	(not asked)	(not asked)	7	--
Water skiing	11	6	5	-6
Jet skiing	(not asked)	2	3	--
Transportation	1	2	1	0
Canoeing/kayaking	1	2	1	0
Sailing	1	1	2	1
Other	0	4	6	5
Total percent	100	100	100	

B. Mille Lacs (riparian resident boaters only)				
	1985 study (percent)	1998 study (percent)	2008 study (percent)	Change (1998 to 2008)
Fishing	too few surveys to breakdown (N=68)	73	51	-22
Boat ride/sightseeing		18	33	15
Swimming		(not asked)	6	--
Water skiing/tubing		3	2	-2
Jet skiing		0	2	2
Transportation to/from		2	1	-1
Canoeing/kayaking		1	0	-1
Sailing		1	1	0
Other		2	5	3
Total percent		--	100	100

Boating Equipment

The types of craft most used for boating in 2008 are runabouts and fishing boats, followed by pontoons (Table 37) (runabouts have a deck and windshield; fishing boats are open; a fishing boat is a type of craft, and is not related to the activity of fishing). Pontoons are more common among riparian residents, and fishing boats are more common among public and commercial access boaters. The other craft types are comparatively uncommon.

Craft types have changed since 1985. The primary changes are an increase in pontoons and runabouts (including cruisers, which were lumped with runabouts in 1985), and a decrease in fishing boats (Table 38). The increase in pontoons is driven by riparian residents. In 2008, just under one-third of riparian boating trips use a pontoon (30%/31%, Mille Lacs/other lakes). These craft changes are of a general nature, and have been found in the central, west central, and metro regions.

Most craft have motors. Few are non-motorized (2%/3%, Mille Lacs/other lakes).

Boat lengths now average 18 to 19 feet, and are in this range for all the sources of use (Table 39). Motor sizes average over 100 horsepower for all sources on lakes other than Mille Lacs; on the Mille Lacs sizes average in the general range of 90 to 100 horsepower for all sources.

<u>Type of craft</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Runabout (has windshield)	44	39
Fishing boat (no windshield)	23	39
Pontoon	22	16
Cruiser (has cabin or superstructure)	3	2
Personal watercraft (jet ski)	2	0
Canoe/kayak	1	1
Sailboat	1	0
Other	4	2
Total percent	100	100

Table 38
Trends in type of watercraft

A. Lakes other than Mille Lacs			
Type of craft	1985 study (percent)	2008 study (percent)	Change in percent 1985 to 2008
Runabout & cruiser (has windshield)	33	47	14
Pontoon	12	22	9
Fishing boat (no windshield)	52	23	-29
Canoe/kayak	1	1	0
Sailboat	1	1	0
Other*	1	6	5
Total percent	100	100	0

* Includes personal watercraft (jet skis) in 1998 (2%) and 2008 (2%); personal watercraft were not surveyed in 1985.

B. Mille Lacs			
Type of craft	1985 study (percent)	2008 study (percent)	Change in percent 1985 to 2008
Runabout & cruiser (has windshield)	29	41	11
Pontoon	7	16	9
Fishing boat (no windshield)	53	39	-13
Canoe/kayak	7	1	-6
Sailboat	0	0	0
Other*	4	3	-1
Total percent	100	100	0

* Includes personal watercraft (jet skis) in 1998 (0%) and 2008 (.1%); personal watercraft were not surveyed in 1985.

Table 39
Boat lengths and motor sizes

A. Lakes other than Mille Lacs				
	Average <u>feet</u>	Median <u>feet</u>	Average <u>horsepower</u>	Median <u>horsepower</u>
All boaters	19	18	114	90
<i>Source of boater:</i>				
Public access	18	18	125	115
Commercial access	18	18	112	90
Riparian resident	19	19	108	85

B. Mille Lacs				
	Average <u>feet</u>	Median <u>feet</u>	Average <u>horsepower</u>	Median <u>horsepower</u>
All boaters	18	18	95	80
<i>Source of boater:</i>				
Public access	18	18	94	83
Commercial access	18	18	88	65
Riparian resident	19	19	103	90

Both craft length and motor sizes increased since 1985 (Table 40). Lengths are up two to three feet across the board, and motor sizes, too, are up across the board. These changes in the size and horsepower of boats are part of a general trend that is evident in the other regional boating studies.

The most common types of equipment on the boats are lights, fire extinguishers, and horns (Table 41). Mille Lacs has a higher prevalence of fishfinders and GPS units, probably a reflection of the high prevalence of fishing and a desire to navigate in a large body of water with few landmarks.

Table 40

Boat lengths and motor sizes

A. Lakes other than Mille Lacs		1985 Average feet	2008 Average feet	Change in feet 1985 to 2008	1985 Average horsepower	2008 Average horsepower	Change in horsepower 1985 to 2008
All boaters		15.9	18.6	2.7	45	114	69
<i>Source of boater:</i>							
Public access		15.7	18.4	2.8	44	125	81
Commercial access		15.4	18.0	2.6	53	112	60
Riparian resident		16.1	18.9	2.8	43	108	65
B. Mille Lacs		1985 Average feet	2008 Average feet	Change in feet 1985 to 2008	1985 Average horsepower	2008 Average horsepower	Change in horsepower 1985 to 2008
All boaters		16.5	18.5	2.0	60	95	35
<i>Source of boater:</i>							
Public access		16.0	17.9	2.0	53	94	41
Commercial access		15.5	18.1	2.7	58	88	31
Riparian resident		17.4	19.2	1.9	66	103	37

Table 41
Type of equipment on board

<u>Type of equipment</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Lights	86	91
Fire extinguisher	82	79
Horn	75	72
Fishfinder	55	78
GPS unit	24	42
Visual signal (flag, flare gun)	17	18
Marine toilet	6	4
Underwater camera	5	4
None of these items	6	4

Other Trip Characteristics

Boaters launching through public and commercial (e.g., resort) access are primarily tourists, most of whom are over 100 miles from home (Table 42). The use of the accesses by local residents accounts of about 15 percent of total use (16%/14%, Mille Lacs/other lakes). Public accesses are mainly a tourist facility in this region, just as they are in the west central region. In all the other regions (central, northern, and metro), public access use is dominated by local boaters, the majority of whom are within a half-hour drive of home.

Table 42
Travel distance from permanent home to public and commercial accesses

	----- Lakes other than Mille Lacs -----		----- Lakes other than Mille Lacs -----	
	<u>Median miles</u>	Percent of boaters who are <i>within 25 miles of their permanent home</i>	<u>Median miles</u>	Percent of boaters who are <i>within 25 miles of their permanent home</i>
All public and commercial access	145	14	132	16
<i>Source of boater:</i>				
Public access	130	18	123	21
Commercial access	160	9	140	12

Most boating party sizes are three to four people (Table 43). Adults comprise about three-fourths of boaters, while teens and children comprise the other one-fourth. Among the sources, commercial access boaters have a higher portion of children and a lower portion of older adults, while riparian residents have the highest portion of older adults.

Table 43

Boating party sizes and ages

A. Lakes other than Mille Lacs		----- Party size -----					----- Percent of party members by age class -----				
	Mean		Median		Adults (55 or older)	Adults (18 to 54)	Teens (12 to 17)	Children (11 or younger)	Total percent		
All boating groups	3.8	3			29%	45%	9%	17%	100%		
<i>Source of boater:</i>											
Public access	3.8	3			23%	52%	12%	14%	100%		
Commercial access	4.5	4			22%	47%	11%	20%	100%		
Riparian resident	3.5	3			37%	39%	7%	17%	100%		

B. Mille Lacs		----- Party size -----		----- Percent of party members by age class -----				
	Mean	Median	Adults (55 or older)	Adults (18 to 54)	Teens (12 to 17)	Children (11 or younger)	Total percent	
All boating groups	3.6	3	30%	47%	7%	15%	100%	
<i>Source of boater:</i>								
Public access	3.7	4	25%	54%	7%	14%	100%	
Commercial access	4.1	3	28%	46%	8%	18%	100%	
Riparian resident	3.2	3	38%	43%	6%	13%	100%	

A typical boating trip lasts three to five hours (Table 44). Boaters launching at public access have the longest trips, while riparian residents have the shortest trips.

Table 44

Duration of boating trips

	Lakes other than Mille Lacs		Mille Lacs	
	----- Hours ----- mean	median	----- Hours ----- mean	median
All boating groups	3.5	3	4.4	4
<i>Source of boater:</i>				
Public access	5.0	5	5.6	5
Commercial access	4.0	3	5.1	4
Riparian resident	2.5	2	2.9	3

BOATER CHARACTERISTICS

Boaters, as a group, are familiar with the lake at which they were surveyed. Half have been boating for 15 or more years on the lake, and at most only 8 percent were recent arrivals to the lake (Table 45). In other studies, riparian residents have the longest boating history, and commercial access the shortest. That is the case for lakes other than Mille Lacs in this study, but for Mille Lacs the commercial access boaters have a longer history than riparian residents.

	<i>-- Lakes other than Mille Lacs --</i>		<i>----- Mille Lacs -----</i>	
	<u>Median years</u>	Percent new boaters (one year or less)	<u>Median years</u>	Percent new boaters (one year or less)
All boaters	15	8	17	4
<i>Source of boater:</i>				
Public access	11	9	12	4
Commercial access	7	20	20	2
Riparian resident	20	2	17	7

The origins of boaters are very similar for Mille Lacs and the other lakes. The large majority are Minnesotans (Table 46). Most of the Minnesota boaters live in the seven-county Twin Cities metropolitan area, followed by the Central Region, where the north central lakes region is located.

North-central boaters have a median household income between \$75,000 and \$100,000 (Table 47), which is above the statewide median of about \$58,000 (USBOC, 2008). Mille Lacs boaters have lower incomes than boaters on the other lakes. Riparian residents have the highest incomes, while public and commercial access boaters have the lower incomes that are comparable in size.

For the purposes of getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. The predominant types of radio stations listened to are easy listening/lite, county, rock & roll (Table 48). The Minnesota DNR website has been used by just over 40 percent of boaters to obtain boating-related information (42%/41%, Mille Lacs/other lakes) (Table 49).

Table 46

Origin of boaters

Origin state or <i>MN region</i>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Minnesota	87	91
<i>Metro, MN</i>	43	45
<i>Central, MN</i>	34	36
<i>Southwest, MN</i>	4	4
<i>Southeast, MN</i>	3	3
<i>Northwest, MN</i>	1	1
<i>Northeast, MN</i>	1	1
Iowa	3	2
Illinois	2	2
Wisconsin	1	0
All other origins	8	5
Total percent	100	100

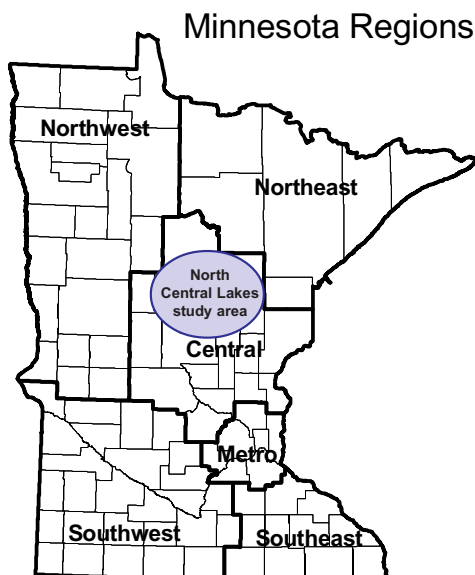


Table 47

Which category best describes your total household income before taxes last year?

<u>Income category</u>	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
under \$30,000	7	6
\$30,000 - \$39,999	6	5
\$40,000 - \$49,999	6	12
\$50,000 - \$74,999	17	20
\$75,000 - \$99,999	18	22
\$100,000 or more	45	35
Total percent	100	100

Table 48

What type of radio station do you primarily listen to?

Type of radio station	Lakes other than Mille Lacs (percent)	Mille Lacs (percent)
Easy listening/lite	23	18
Country	20	23
Rock & Roll	18	16
Classical	9	9
Sports	6	6
Talk	5	7
Public radio	3	5
Jazz	3	1
Religious radio	2	3
Other	9	13
Total percent	100	100

Table 49

Have you ever obtained boating-related information from the Minnesota DNR web page (www.mndnr.gov)?

	<i>Lakes other than Mille Lacs:</i> <u>"Yes" percent</u>	<i>Mille Lacs:</i> <u>"Yes" percent</u>
All boaters	41	42
Source of boater		
Public access	49	41
Commercial access	34	44
Riparian resident	40	41

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Trend A: Trend series on nature-based outdoor recreation activities other than boating:

National:

USFWS and U.S. Census Bureau. 2007. 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation.

National Park Service visitation records (www2.nature.nps.gov/stats/).

Minnesota:

Minnesota Department of Natural Resources data on certified licensed hunters and anglers from Division of Fish and Wildlife; and park visitation from Division of Parks and Recreation; and state bicycle trail information from Trails and Waterways Division.

Trend B: Trend series on Minnesota boating use:

Minnesota Department of Natural Resources boating studies: Twin Cities metro (1984 to 1996), north central region (1985, 1998 and 2008), west central region (1986 to 2005), and central region (1987 to 2001).

Minnesota Department of Natural Resources and Lake Minnetonka Conservation District. 2005. Boating Trends on Lake Minnetonka, 1984 to 2004.

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APPENDIX A

Lakes in the north central study area

<u>Topic</u>	<u>Page</u>
List of sample lakes	69
List of all other boating lakes	71

Sample Lakes in 1985, 1998 & 2008 Boating Studies

<u>Lake Number</u>	<u>Lake Name</u>	<u>1985 Category*</u>	<u>1998 Category*</u>	<u>2008 Category*</u>	<u>Chain</u>	<u>Acres</u>
480002	Mille Lacs	Mille Lacs	Mille Lacs	Mille Lacs		132,516
110305	Gull	Cat 1	Cat 1	Cat 1	Gull	9,541
110222	Margaret	Cat 1	Cat 1	Cat 1	Gull	230
180399	Nisswa	Cat 1	Cat 1	Cat 1	Gull	213
180398	Roy	Cat 1	Cat 1	Cat 1	Gull	306
110218	Upper Gull	Cat 1	Cat 1	Cat 1	Gull	345
180388	Love	Cat 1	Cat 1	Cat 1	Gull	88
110220	Ray	Cat 1	Cat 1	Cat 1	Gull	183
180310	Whitefish	Cat 1	Cat 1	Cat 1	Whitefish	7,969
180366	Arrowhead	Cat 1	Cat 1	Cat 1	Whitefish	285
180355	Bertha	Cat 1	Cat 1	Cat 1	Whitefish	353
180315	Big Trout	Cat 1	Cat 1	Cat 1	Whitefish	1,486
180356	Clamshell	Cat 1	Cat 1	Cat 1	Whitefish	238
180312	Cross	Cat 1	Cat 1	Cat 1	Whitefish	1,884
180271	Daggett	Cat 1	Cat 1	Cat 1	Whitefish	284
180269	Island	Cat 1	Cat 1	Cat 1	Whitefish	193
180266	Little Pine	Cat 1	Cat 1	Cat 1	Whitefish	384
180378	Lower Hay	Cat 1	Cat 1	Cat 1	Whitefish	720
180354	Pig	Cat 1	Cat 1	Cat 1	Whitefish	213
180311	Rush	Cat 1	Cat 1	Cat 1	Whitefish	782
180308	Pelican	Cat 1	Cat 1	Cat 1		8,468
110250	Ada	Cat 2-PA	Cat 2-PA	Cat 2-PA		1,044
180034	Bay	Cat 2-PA	Cat 2-PA	Cat 2-PA		2,435
10159	Farm Island	Cat 2-PA	Cat 2-PA	Cat 2-PA		2,025
180373	Round	Cat 2-PA	Cat 2-PA	Cat 2-PA		1,706
180251	Sandbar	Cat 2-PA	Cat 2-PA	Cat 2-PA		974
110304	Sylvan	Cat 2-PA	Cat 2-PA	Cat 2-PA		882
180020	Borden	Cat 2-NPA	Cat 2-PA	Cat 2-PA		1,038
180038	Clearwater	Cat 2-NPA	Cat 2-PA	Cat 2-PA		917
110120	Inguadona	Cat 2-NPA	Cat 2-PA	Cat 2-PA	Inguadona	935
110162	Rice	Cat 2-NPA	Cat 2-PA	Cat 2-PA	Inguadona	342
10204	Round	Cat 2-NPA	Cat 2-PA	Cat 2-PA		736
110413	Ten Mile	(new in '98)	Cat 2-PA	Cat 2-PA		4,640
180375	Hubert	(new in '98)	Cat 2-PA	Cat 2-PA		1,344
110277	Big Deep	(new in '98)	Cat 2-NPA	Cat 2-NPA		532

*Class codes are as follows:

- Mille Lacs: Mille Lacs
- Cat 1: Remaining large boating lakes (all have public access)
- Cat 2-PA: Priority A lakes with public access
- Cat 2-NPA: Priority A lakes without public access
- Cat 3-PA: Priority B lakes with public access
- Cat 3-NPA: Priority B lakes without public access
- Cat 4-PA: Priority C lakes with public access
- Cat 4-NPA: Priority C lakes without public access

Sample Lakes in 1985, 1998 & 2008 Boating Studies (cont'd)

<u>Lake Number</u>	<u>Lake Name</u>	<u>1985 Category*</u>	<u>1998 Category*</u>	<u>2008 Category*</u>	<u>Chain</u>	<u>Acres</u>
180374	Clark	Cat 3-PA	Cat 3-PA	Cat 3-PA		309
180203	Emily	Cat 3-PA	Cat 3-PA	Cat 3-PA	Emily	675
180185	Mary	Cat 3-PA	Cat 3-PA	Cat 3-PA	Emily	491
110167	Little Boy	Cat 3-PA	Cat 3-PA	Cat 3-PA		1,396
10117	Nord	Cat 3-PA	Cat 3-PA	Cat 3-PA		414
10136	Waukenabo	Cat 3-PA	Cat 3-PA	Cat 3-PA		819
10147	Esquagamah	Cat 3-NPA	Cat 3-PA	Cat 3-PA		808
110232	Hattie	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA		592
110296	Moccasin	Cat 3-NPA	Cat 3-PA	Cat 3-PA		259
180227	O Brien	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA		203
110282	Mann	(new in '98)	Cat 3-NPA	Cat 3-NPA		484
180296	Eagle	Cat 4-PA	Cat 4-PA	Cat 4-PA		356
10132	Hansen	Cat 4-PA	Cat 4-PA	Cat 4-PA		200
110009	Little Thunder	Cat 4-PA	Cat 4-PA	Cat 4-PA		264
110226	Loon	Cat 4-PA	Cat 4-PA	Cat 4-PA		220
180379	White Sand	Cat 4-PA	Cat 4-PA	Cat 4-PA		441
10170	Hanging Kettle	Cat 4-NPA	Cat 4-PA	Cat 4-PA		320
180256	Bass	Cat 4-NPA	Cat 4-PA	Cat 4-PA		386
110292	Pine	Cat 4-NPA	Cat 4-PA	Cat 4-PA		256

*Class codes are as follows:

Mille Lacs: Mille Lacs

Cat 1: Priority A large boating lakes (all have public access)

Cat 2-PA: Other priority A lakes with public access

Cat 2-NPA: Priority A lakes without public access

Cat 3-PA: Priority B lakes with public access

Cat 3-NPA: Priority B lakes without public access

Cat 4-PA: Priority C lakes with public access

Cat 4-NPA: Priority C lakes without public access

Remaining (non-sample) priority A, B and C lakes in north central boating study area

Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres	Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres
180225	Adney	Cat 2-PA	Cat 2-PA	Cat 2-PA	322	180305	Edward	Cat 2-PA	Cat 2-PA	Cat 2-PA	2,844
180060	Agate	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	203	10123	Elm Island	Cat 4-PA	Cat 4-PA	Cat 4-PA	656
110283	Baby	Cat 2-NPA	Cat 2-PA	Cat 2-PA	736	180009	Erskine	Cat 4-PA	Cat 4-PA	Cat 4-PA	186
110069	Bass	Cat 3-PA	Cat 3-PA	Cat 3-PA	224	110351	Five Point	Cat 3-PA	Cat 3-PA	Cat 3-PA	265
180306	Bass	Cat 3-PA	Cat 3-PA	Cat 3-PA	455	10104	French	Cat 3-PA	Cat 3-PA	Cat 3-PA	155
110308	Big Portage	Cat 2-PA	Cat 2-PA	Cat 2-PA	956	180320	Gilbert	Cat 3-PA	Cat 3-PA	Cat 3-PA	391
110073	Big Rice	Cat 3-PA	Cat 3-PA	Cat 3-PA	2,656	110174	Girl	Cat 3-PA	Cat 3-PA	Cat 3-PA	384
110412	Birch	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,262	180338	Gladstone	Cat 3-NPA	Cat 3-PA	Cat 3-PA	457
180140	Black Bear	Cat 3-PA	Cat 3-PA	Cat 3-PA	235	180226	Goodrich	Cat 3-NPA	Cat 3-PA	Cat 3-PA	398
110274	Black Water	Cat 2-PA	Cat 2-PA	Cat 2-PA	761	180110	Grave	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	177
180117	Blackhoof	Cat 4-PA	Cat 4-PA	Cat 4-PA	195	180287	Greer	Cat 4-PA	Cat 4-PA	Cat 4-PA	384
180211	Blue	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	185	10099	Gun	Cat 3-PA	Cat 3-PA	Cat 3-PA	735
110350	Bowen	Cat 3-NPA	Cat 3-PA	Cat 3-PA	185	180070	Hamlet	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	313
110366	Brookway	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	182	10161	Hammal	Cat 3-NPA	Cat 3-PA	Cat 3-PA	393
180014	Bull Dog	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	151	110242	Hand	Cat 3-PA	Cat 3-PA	Cat 3-PA	316
180231	Butterfield	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	225	110199	Hay	Cat 3-NPA	Cat 3-PA	Cat 3-PA	406
180018	Camp	Cat 2-NPA	Cat 2-PA	Cat 2-PA	537	10179	Hickory	Cat 4-PA	Cat 4-PA	Cat 4-PA	183
10209	Cedar	Cat 3-PA	Cat 3-PA	Cat 3-PA	788	10142	Hill	Cat 2-PA	Cat 2-PA	Cat 2-PA	898
110263	Child	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	295	180029	Holt	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	156
10093	Clear	Cat 2-PA	Cat 2-PA	Cat 2-PA	590	110358	Horseshoe	Cat 3-PA	Cat 3-PA	Cat 3-PA	245
180364	Clear	Cat 3-PA	Cat 3-PA	Cat 3-PA	242	110472	Howard	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	384
180041	Crooked	Cat 3-PA	Cat 3-PA	Cat 3-PA	462	110170	Hunter	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	181
180155	Crow Wing	Cat 3-PA	Cat 3-PA	Cat 3-PA	373	110102	Island	Cat 3-PA	Cat 3-PA	Cat 3-PA	390
10096	Dam	Cat 2-PA	Cat 2-PA	Cat 2-PA	633	180183	Island	Cat 4-PA	Cat 4-PA	Cat 4-PA	256
180314	Duck	Cat 3-PA	Cat 3-PA	Cat 3-PA	160	180415	Jail	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	190
180099	Eagle	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	249	180293	Kego	Cat 3-PA	Cat 3-PA	Cat 3-PA	299
180298	East Fox	Cat 3-PA	Cat 3-PA	Cat 3-PA	234	110262	Kid	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	167
180407	East Twin	Cat 3-PA	Cat 3-PA	Cat 3-PA	164	180361	Kimball	Cat 3-PA	Cat 3-PA	Cat 3-PA	186
180396	Edna	Cat 3-PA	Cat 3-PA	Cat 3-PA	156	110374	Larson	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	179
10213	Edna	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	272	110104	Laura	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,424

*Class codes are as follows:

Mille Lacs: Mille Lacs

Cat 1: Priority A large boating lakes (all have public access)

Cat 2-PA: Other priority A lakes with public access

Cat 2-NPA: Priority A lakes without public access

Cat 3-PA: Priority B lakes with public access

Cat 3-NPA: Priority B lakes without public access

Cat 4-PA: Priority C lakes with public access

Cat 4-NPA: Priority C lakes without public access

Remaining (non-sample) priority A, B and C lakes in north central boating study area (cont'd)

Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres	Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres
110053	Lawrence	Cat 3-PA	Cat 3-PA	Cat 3-PA	224	180371	Perch	Cat 3-PA	Cat 3-PA	Cat 3-PA	284
110367	Lind	Cat 3-PA	Cat 3-PA	Cat 3-PA	462	180186	Perry	Cat 4-NPA	Cat 4-NPA	Cat 4-PA	160
180340	Little Hubert	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	192	110320	Pillager	Cat 3-PA	Cat 3-PA	Cat 3-PA	213
180351	Little Pelican	Cat 3-PA	Cat 3-PA	Cat 3-PA	402	10157	Pine	Cat 2-PA	Cat 2-PA	Cat 2-PA	646
180139	Little Rabbit	Cat 3-NPA	Cat 3-PA	Cat 3-PA	153	180261	Pine	Cat 4-PA	Cat 4-PA	Cat 4-PA	391
110387	Little Webb	Cat 3-NPA	Cat 3-NPA	Cat 3-PA	249	110411	Pine Mountain	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,657
180416	Lizzie	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	384	180088	Platto	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,768
10125	Lone	Cat 3-PA	Cat 3-PA	Cat 3-PA	437	110383	Pleasant	Cat 2-PA	Cat 2-PA	Cat 2-PA	907
180372	Long	Cat 2-PA	Cat 2-PA	Cat 2-PA	6,178	180105	Pointon	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	193
110142	Long	Cat 2-PA	Cat 2-PA	Cat 2-PA	926	110234	Ponto	Cat 3-PA	Cat 3-PA	Cat 3-PA	380
180076	Long	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	196	180050	Portage	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	292
110258	Long	Cat 3-NPA	Cat 3-PA	Cat 3-PA	229	110476	Portage	Cat 3-PA	Cat 3-PA	Cat 3-PA	282
10089	Long	Cat 3-PA	Cat 3-PA	Cat 3-PA	433	180093	Rabbit	Cat 2-PA	Cat 2-PA	Cat 2-PA	840
180136	Long	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,389	10091	Rabbit	Cat 3-PA	Cat 3-PA	Cat 3-PA	210
180342	Lougee	Cat 3-NPA	Cat 3-PA	Cat 3-PA	217	180145	Rice	Cat 4-PA	Cat 4-PA	Cat 4-PA	434
180403	Lower Cullen	Cat 3-NPA	Cat 3-PA	Cat 3-PA	469	10146	Ripple	Cat 3-NPA	Cat 3-PA	Cat 3-PA	676
180243	Lower Mission	Cat 2-PA	Cat 2-PA	Cat 2-PA	739	110324	Rock	Cat 3-PA	Cat 3-PA	Cat 3-PA	249
110129	Lower Trelpe	Cat 3-PA	Cat 3-PA	Cat 3-PA	592	180016	Rock	Cat 4-NPA	Cat 4-PA	Cat 4-PA	210
180126	Mahmonen	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	468	180184	Rogers	Cat 3-NPA	Cat 3-NPA	Cat 3-PA	249
110261	Mc Keown	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	171	110043	Roosevelt	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,561
180377	Middle Cullen	Cat 3-PA	Cat 3-PA	Cat 3-PA	405	180165	Ross	Cat 3-NPA	Cat 3-NPA	Cat 3-PA	504
180294	Mitchell	Cat 3-PA	Cat 3-PA	Cat 3-PA	460	10137	Round	Cat 2-PA	Cat 2-PA	Cat 2-PA	645
10212	Moulton	Cat 4-PA	Cat 4-PA	Cat 4-PA	282	180212	Ruth	Cat 2-PA	Cat 2-PA	Cat 2-PA	623
110200	Mule	Cat 2-PA	Cat 2-PA	Cat 2-PA	501	110361	Sanburn	Cat 3-PA	Cat 3-PA	Cat 3-PA	224
180104	Nokay	Cat 2-PA	Cat 2-PA	Cat 2-PA	782	180033	Scott	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	178
110307	Norway	Cat 4-PA	Cat 4-PA	Cat 4-PA	498	180161	Sebie	Cat 4-PA	Cat 4-PA	Cat 4-PA	180
180352	Ossawinnamakee	Cat 2-PA	Cat 2-PA	Cat 2-PA	739	10120	Section 12	Cat 4-NPA	Cat 4-PA	Cat 4-PA	167
180288	Ox	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	258	180090	Serpent	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,154
110355	Ox Yoke	Cat 3-PA	Cat 3-PA	Cat 3-PA	199	180072	Shirt	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	220
180048	Partridge	Cat 3-PA	Cat 3-PA	Cat 3-PA	185	180404	Sibley	Cat 4-NPA	Cat 4-PA	Cat 4-PA	412

*Class codes are as follows:

Mille Lacs: Mille Lacs

Cat 1: Priority A large boating lakes (all have public access)

Cat 2-PA: Other priority A lakes with public access

Cat 2-NPA: Priority A lakes without public access

Cat 3-PA: Priority B lakes with public access

Cat 3-NPA: Priority B lakes without public access

Cat 4-PA: Priority C lakes with public access

Cat 4-NPA: Priority C lakes without public access

Remaining (non-sample) priority A, B and C lakes in north central boating study area (cont'd)

Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres	Lake Number	Lake Name	1985 Category*	1998 Category*	2008 Category*	Acres
180239	Silver	Cat 3-PA	Cat 3-PA	Cat 3-PA	213	180096	Upper Long	Cat 2-PA	Cat 2-PA	Cat 2-PA	793
10129	Sissabagamah	Cat 4-PA	Cat 4-PA	Cat 4-PA	386	180242	Upper Mission	Cat 2-PA	Cat 2-PA	Cat 2-PA	895
180028	Smith	Cat 2-NPA	Cat 2-NPA	Cat 2-NPA	486	110105	Upper Treilpe	Cat 3-PA	Cat 3-PA	Cat 3-PA	426
10178	Spirit	Cat 2-PA	Cat 2-PA	Cat 2-PA	523	180284	Velvet	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	167
180359	Star	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	153	110171	Wabede	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,272
180169	Stark	Cat 3-PA	Cat 3-PA	Cat 3-PA	228	110059	Washburn	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,768
180367	Stewart	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	254	110311	Webb	Cat 2-PA	Cat 2-PA	Cat 2-PA	619
110371	Stony	Cat 2-PA	Cat 2-PA	Cat 2-PA	523	180297	West Fox	Cat 2-NPA	Cat 2-NPA	Cat 2-NPA	510
10087	Sugar	Cat 4-PA	Cat 4-PA	Cat 4-PA	466	180387	Whipple	Cat 3-NPA	Cat 3-PA	Cat 3-PA	345
10092	Swamp	Cat 4-PA	Cat 4-PA	Cat 4-PA	276	180001	Whitefish	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	760
10174	Thornton	Cat 4-NPA	Cat 4-NPA	Cat 4-NPA	186	110273	Widow	Cat 3-PA	Cat 3-PA	Cat 3-PA	197
110177	Three island	Cat 3-PA	Cat 3-PA	Cat 3-PA	168	10102	Wilkins	Cat 3-PA	Cat 3-PA	Cat 3-PA	366
110062	Thunder	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,316	110502	Williams	Cat 3-PA	Cat 3-PA	Cat 3-PA	188
180376	Upper Cullen	Cat 3-NPA	Cat 3-NPA	Cat 3-NPA	459	10115	Wladimiraf	Cat 4-NPA	Cat 4-PA	Cat 4-PA	440
180170	Upper Dean	Cat 4-PA	Cat 4-PA	Cat 4-PA	263	110201	Woman	Cat 2-PA	Cat 2-PA	Cat 2-PA	5,360
180412	Upper Hay	Cat 2-PA	Cat 2-PA	Cat 2-PA	640						

*Class codes are as follows:

- Mille Lacs: Mille Lacs
- Cat 1: Priority A large boating lakes (all have public access)
- Cat 2-PA: Other priority A lakes with public access
- Cat 2-NPA: Priority A lakes without public access
- Cat 3-PA: Priority B lakes with public access
- Cat 3-NPA: Priority B lakes without public access
- Cat 4-PA: Priority C lakes with public access
- Cat 4-NPA: Priority C lakes without public access