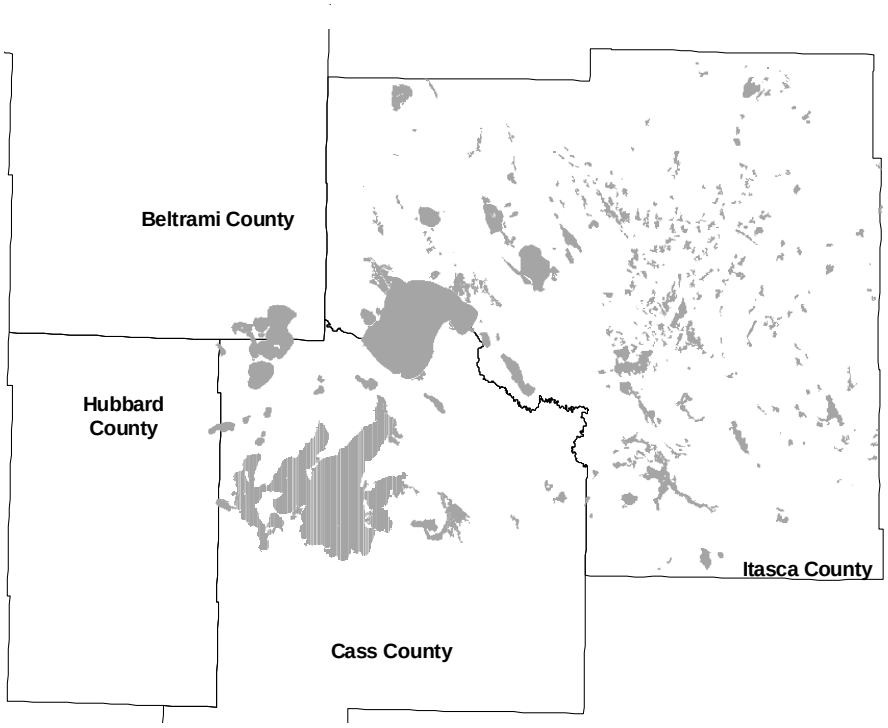
Boating in Northern Minnesota: Summer 2006

Prepared by the Office of Management and Budget Services, Minnesota Department of Natural Resources

December 2007

A cooperative research project of the Minnesota Department of Natural Resources Boating Safety Program, Trails and Waterways Division and Fish and Wildlife Division

BOATING IN NORTHERN MINNESOTA, SUMMER 2006



The 2006 Northern Boating Study was a cooperative research project of the Minnesota Department of Natural Resources Boating Safety Program, Trails and Waterways Division, and Fish and Wildlife Division

Report prepared by:
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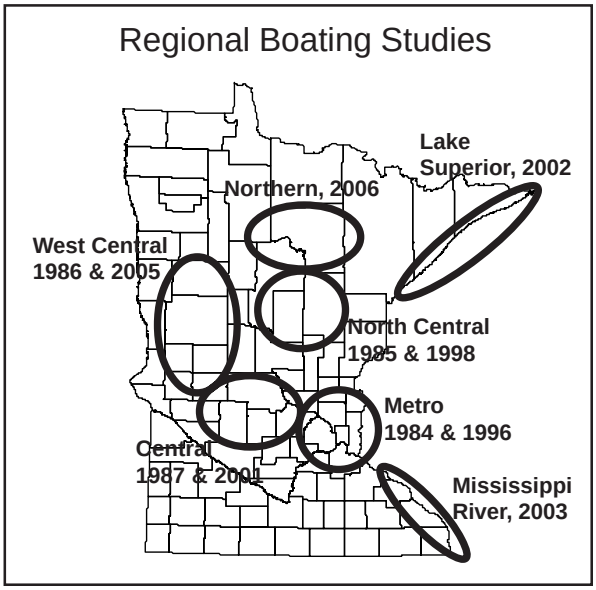
The northern lake region study is the latest in a series of regional boating studies conducted by the Minnesota DNR since the mid 1980s. The northern lake region is the most remote of the lake regions from Minnesota's main population concentration, which is in and about the Twin Cities Metropolitan Area. And this remoteness—and associated lower boating intensities in more natural, less developed settings—is a leading attraction of the region to boaters.



The northern lakes region is one of Minnesota's major 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.

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 motivations, 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; and
- Describe the characteristics of the boating trip, including boating activities, boating equipment, and boater characteristics.

To draw out the distinctiveness of boating in the northern region, the region is compared with other lake regions. The northern region study, however, covered a broader range of lakes than the other studies. It has some very large lakes (e.g., Leech, Winnibigoshish) and numerous small boating lakes under 150 acres in size. For comparisons with the other studies, these very large lakes and small lakes are eliminated. Thus, the results presented in this report are for the range of boating lakes from 150 acres in size to Cass, which is just under 30,000 acres.

Three Minnesota DNR programs provided resources for this study: water recreation, boating safety, and fisheries. In addition, staff from the Chippewa National Forest assisted with the study design and review of results.

BOAT NUMBERS AND SOURCES

As noted in the introduction, the northern lake region is the most remote of the lake regions from Minnesota's main population concentration, which is in and about the Twin Cities Metro Area. And this remoteness—and associated lower boating intensities in more natural, less developed settings—is a leading attraction of the region to boaters.

The lower boating intensity of the northern region is evident in the inter-regional comparisons. The boating intensity (summer boat-hours/acre of lake) in the northern region is less than half that of other rural regions (e.g., north central and west central) and is an even smaller fraction of the Twin Cities metro region, which contains Lake Minnetonka. Arguably the busiest boating lake in the state, Lake Minnetonka's 14,000 acres has about as much boating traffic as all of these lakes in the northern region.

Since this is the first time the northern lakes region has been studied, there are no previous studies from which to assess trends. However, Minnesota has seven boating-use trend studies. And all of the trend studies lead to the same general conclusion on the direction of boating-use: boating is stable to decreasing. Due to this consistent conclusion, it is likely, although not certain, that this stable to declining trend is occurring in the northern region.

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 both in Minnesota and across the nation.

Similar to other rural lake regions, the leading source of boating in the northern region is from riparian residents, which account for about half of all use. The next leading source is public accesses, which account for some 35 to 40 percent of use, with commercial accesses (e.g., resorts, private campgrounds and marinas) accounting for the remaining 10 to 15 percent of use.

THE BOATING EXPERIENCE

Northern 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 common top-rated experiences of relaxing with family/ friends in an enjoyable natural setting.

Boating trip satisfaction is high in the northern region: 42 percent of all boaters report being "very satisfied" with their outing, while another 52 percent report being "satisfied." Only 5 percent are "dissatisfied" to any extent.

Anglers as a group report lower levels of satisfaction with their trips than other boaters. Some of the dimensions of angler satisfaction were measure in the survey. Although the majority of anglers are satisfied overall with their fishing experiences, only a minority is satisfied with the size and number of fish caught. Many anglers (some 30 to 40%) are dissatisfied with size and number of fish. At the other extreme, there is little dissatisfaction with the behavior of, and crowding from other anglers.

When boaters were asked to judge whether they experienced 13 potential problems with other boaters on their trip, none of the 13 was 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 was clearly reported as the largest problem: "use of personal watercraft (jet skis)." The use of personal watercraft—in this and the other lake regions—is far and away the leading problem.

Most boaters (90%) did not encounter "too many boats" on their trip, while 9 percent did. Compared with other rural lake regions (west central and north central), the northern region is similar in terms of perceived crowding and congestion.

PUBLIC ACCESS FACILITIES

Boaters give high marks to public access facilities for launching and landing a boat. Positive ratings ("good" to "excellent") comprise about 73 percent of boater ratings. Few boaters give negative ratings of "poor" or "very poor."

There are problems, however, in the use of the public access facilities. Twenty-one percent of public access boaters indicate that they had some type of problem using the public access. The leading problem has to do with shallow water, which is identified by some 9 percent of public access boaters. The next ranked problems are related to the perceived small size of many parts of the access facility: insufficient parking spaces, not enough maneuvering room on land/water near the ramp, insufficient number of launch lanes, and ramp too short. The perceived smallness of facilities is a common problem across the boating studies, and is likely related to the growing size of boats and motors public access users are trying to launch.

When asked what improvements are needed at access sites, boaters ranked trash containers (the top-ranked improvement, requested by 26% of users) and toilets (19% of users) at the top. Other

leading improvements have to do with expanding the size of the facility: more parking spaces in the lot (18% of users) and more launch lanes/ramps (12% or users).

A large portion of public access users (40%) 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, went to another access on the lake, went to another lake, or waited for a place in the lot to open up. Only 6 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. Similar results have been found in the other regional boating studies.

For the lake at which they were surveyed, some 8 percent of all northern boaters think additional public access was needed, 82 percent did not think additional access is needed, and 10 percent are uncertain. Public access boaters are more likely to indicate a need for additional access (12%), but still a majority (78%) does not see a need for more access. Few riparian residents see a need for more access (6%). 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).

There are a large number (100) of small boating lakes in the northern region (average size about 75 acres) that have no public access. These lakes are lightly developed and lightly used. Boaters were asked in the surveys about providing additional access to these lakes.

Boaters are ambivalent about whether there is little need for more access on these small lakes. One-third of boaters disagree that "there is little need to provide more boat access of any type to more of these lakes," 30 percent agree, and the remainder are on the fence or didn't know. In terms of the type of access to provide, a carry-in access (for canoes/kayaks) is preferred over a undeveloped ramp access (for small boats), which in turn is preferred over a concrete-plank ramp access (for any trailerable boat). Nearly 40 percent of boaters (38%) disagree with the concrete-plank ramp access. If access is provided, boaters are more likely to agree to motor size restrictions, and less likely to agree with the non-motorized option. Nearly half of boaters (46%) disagree with the non-motorized option.

BOATING SAFETY AND ENFORCEMENT

Special boating restrictions are uncommon on northern region lakes. Existing restrictions—on the sample lakes surveyed in the study—are a small number of speed/no wake restrictions in channel areas between lake basins.

A majority of boaters believe this general lack of boating restrictions is appropriate. However, a sizable portion of boaters (29%) 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. Beyond the personal watercraft issue, few boaters think various types of boating restrictions are needed.

Enforcement officers are more likely to be seen by public and commercial access boaters, and are less likely to be seen by riparian boaters. Overall, 8 percent of boaters report seeing an officer, the same percentage as in the west central boating study. About 2 percent of boaters report being checked by an enforcement officer, again the same percent as in the west central study. Boaters checked by an enforcement officer give high marks to the officer's professional conduct. Seventy-two percent of boaters rate that conduct "excellent" and another 18 percent rate the conduct "good."

Formal safety courses have been completed by 18 percent of all boaters, very much the same as in the west central lakes region (18%) and north central lake region (20%), but lower than the portion in the Twin Cities lake region (32%). Boaters having completed a formal safety course are more likely than other boaters (64% compared with 15%) to believe all boaters should be required to complete a safety course. Overall, 24 percent believe all boaters should be required to complete such a course.

Minnesota has 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 this study, 27 percent of boaters report having some type of alcoholic drinks on board during their trip. Few have only alcoholic drinks (2%). Most boaters have no alcohol on the boat: either they have only non-alcoholic drinks on board (59%), or have no drinks of any type (14%). The percentage with some type of alcoholic drinks on board (27%) is just above that reported for the west central lake region (22%) and north central lake region (24%).

Most boats are equipped with some form of safety equipment other than personal flotation devices. Lights, fire extinguishers and horns are the most common equipment types. The small portion of boats without any safety equipment (8%) may not need any, because no safety equipment other that personal flotation devices is required for boats less that 16 feet long operated during daylight hours.

Boaters report that life vests (personal flotation devices) are worn by a majority of boaters. Children are the most like to wear a life vest, and adults from 18 to 54 are the least likely. These life-vest wear rates are self-reported and, thus, may be subject to the bias of reporting of socially desirable behaviors (e.g., "of course I practice safe boating and wear my life vest"). This last summer (2007), an observational study of life-vest wear rates was conducted in the Twin Cities metropolitan area. The results from this study (available in 2008) will provide the information to judge whether the self-reported wear rates are biased.

CHARACTERISTICS OF THE BOATING TRIP

There are two main activities on northern lakes: fishing and boat riding (pleasure boating). The former is larger than the latter for each source of boater. Public and commercial access boaters primarily fish, while riparian resident boaters have a more even mix of fishing and boat riding. The activity mix on northern lakes is roughly similar to the west central and north central lakes. In both the north central and west central lake regions, the trend has been away from fishing and toward boat riding.

The types of craft most used for boating in the northern region are fishing boats, followed by runabouts and 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 access boaters. Other craft types are comparatively uncommon. The mix of boating equipment in the northern region is different than in the north central and west central lake regions. In the latter two regions, runabouts are more common than fishing boats. In both of these regions there has been a definite trend away from fishing boats and toward runabouts.

Boat lengths average 17.5 feet, and are relatively constant across sources of boaters and lake classes. Motor sizes average 80 horsepower; the median is lower at 60 horsepower. Boat lengths and motor sizes are somewhat smaller than those found in the west central and north central regions, where average boat lengths are close to 18 feet and average horsepowers between 90 and 100. Most craft have motors. Only about 3 percent are non motorized. In the north central and west central lake regions, the trend has been to larger, more powerful craft.

Boaters, as a group, are familiar with the lake at which they were surveyed. The median length of use of the lake is 15 years, and is larger for riparian residents than for public and commercial access boaters. New boaters, who have started boating in the last year on the lake they were surveyed, are not all that common overall (8% of all boaters), but are more common for public and commercial access boaters (11% to 18% of all boaters).

The public and commercial accesses serve two geographic markets. Public accesses predominately serve a local market, while commercial accesses predominately serve a distant “tourist” market. In contrast, both public and commercial access mostly serve a “tourist” market in the west central and north central lake regions.

Tourist boaters using commercial accesses primarily come from the Twin Cities metro area, central Minnesota, and out of state. The non-permanent (seasonal) riparian residents mainly come from these same origins.

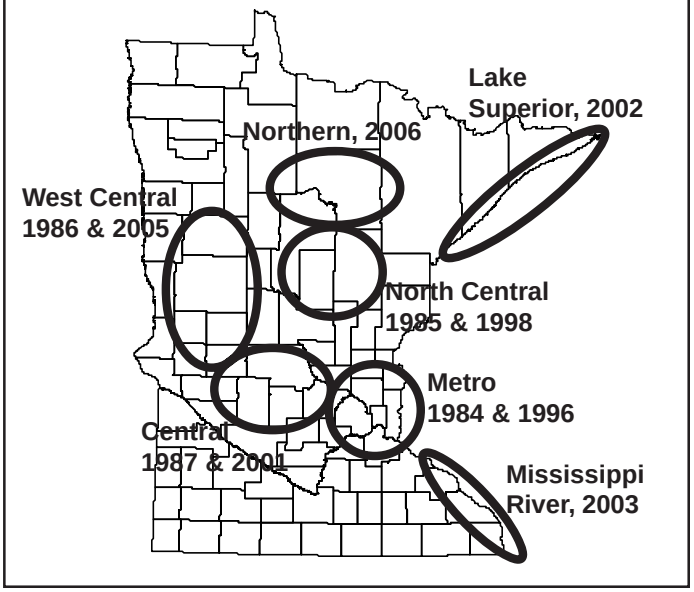
For purposes to getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. Predominant radio stations listened to are country, rock & roll, public radio, and easy listening/lite. The Minnesota DNR website has been used by just over 40 percent (42%) of boaters to obtain boating-related information. Public access boaters are the most likely to use the website.

INTRODUCTION

The northern lake region study is the latest in a series of regional boating studies conducted by the Minnesota DNR since the mid 1980s (Figure 1; see Reference 1). The northern lake region is the most remote of the lake regions from Minnesota's main population concentration, which is in and about the Twin Cities Metropolitan Area. And this remoteness—and associated lower boating intensities in more natural, less developed settings—is a leading attraction of the region to boaters.

Figure 1

Regional Boating Studies



The northern lakes region is one of Minnesota's major 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. In addition, the region supports a local population that is expected to continue to grow at a relatively high rate for the next few decades, a rate of growth faster than the state as a whole. The two counties in the region (Cass and Itasca) are projected to grow nearly 40 percent (39%) between 2000 and 2030, while the state is projected to grow 27 percent over this same period (Reference 2). Population growth and tourist demands, however, may not lead to an increase in boating pressure on northern lakes. Additional factors influence boating use. Trends in boating use around Minnesota—even in population growth areas—are mostly stable, with some declines (see later section on this topic).

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 interviews.

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 lakehomes, 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 interviews. Many levels of government — local, county, state and federal — manage free public accesses in the northern region.

To draw out the distinctiveness of boating in the northern region, the region is compared with other lake regions. The northern region study, however, covered a broader range of lakes than the other studies. It has some very large lakes (e.g., Leech, Winnibigoshish) and numerous small boating lakes under 150 acres in size. For comparisons with the other studies, these very large lakes and small lakes are eliminated. Thus, the results presented in this report are for the range of boating lakes from 150 acres in size to Cass, which is just under 30,000 acres. Results for the very large and small lakes are available from the Minnesota DNR.

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, findings are presented in five sections:

- Boat numbers and sources of boats;
- Perception of boating experience, including trip motivations, 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; and
- Characteristics of the boating trip, including boating activities, boating equipment, and boater characteristics.

Study results for lakes are presented for lake classes (groupings of lakes), not individual lakes, because the studies were not designed for lake-by-lake results. Lake classes are defined in the next section on methodology. If one is interested in how a particular lake looks according to the information presented in this report, find the class of the lake in Appendix A.

Three Minnesota DNR programs provided resources for this study: water recreation, boating safety, and fisheries. In addition, staff from the Chippewa National Forest assisted with the study design and review of results.

METHODOLOGY

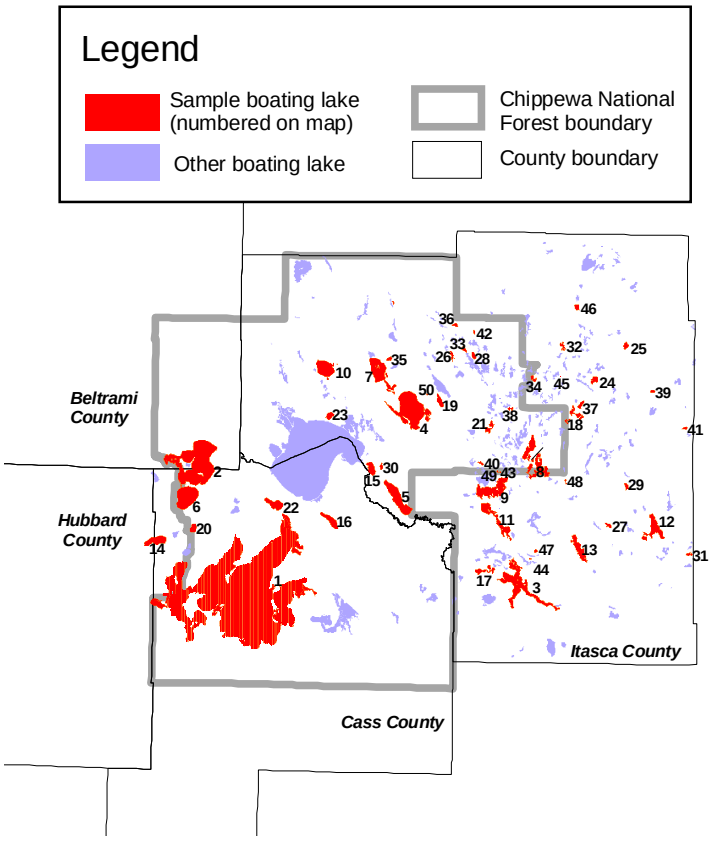
The multiple goals of the northern boating study are accomplished with a variety of information collection techniques. Lakes have been classified according to size and clarity, and whether the lake has a free public access. The lake classification based on size and clarity is the one developed by the public access program to prioritize lakes for access. The study covers those lake priority classes A, B and C that incorporate the principal water recreation resource of the region (Figure 2). 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. The seven lake classes are shown in Table 1.

Within each class, a sample of the lakes is taken for study (Figure 2). 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

Figure 2

Northern Boating Study Lakes

(all A to C priority lakes)



Sample boating lakes (numbered on map)

Map number	Lake Name(s)	Lake ID(s)
1	LEECH	110203
2	CASS	40030
3	POKEGAMA	310532
4	BOWSTRING	310813
5	BALL CLUB	310812
6	PIKE BAY	110415
7	SAND/PORTAGE/BIRDS EYE	310826 / 310824 /310834
8	WABANA/TROUT/ BLUE WATER/LITTLE TROUT	310392 /310410 310395/310394
9	DEER	310719
10	ROUND /ALICE	310896 /310874
11	BASS	310576
12	SWAN	310067
13	TROUT	310216
14	STEAMBOAT	110504
15	LITTLE WINNIBIGOSHISH	310850
16	SIX MILE	110146
17	RICE	310717
18	BALSAM /SCRAPPER	310259 /310345
19	LITTLE JESSIE	310784
20	THIRTEEN	110488
21	GRAVE	310624
22	PORTAGE	110204
23	PIGEON DAM	310894
24	ROUND	310268
25	BEAR	310157

Map number	Lake Name(s)	Lake ID(s)
26	BIG TOO MUCH	310793
27	TWIN LAKES	310190
28	MAPLE	310773
29	BIG SUCKER	310124
30	LITTLE BALL CLUB	310822
31	HELEN	310023
32	ANDERSON	310350
33	HATCH	310771
34	FOX	310463
35	CEDAR	310829
36	GUNDERSON	310782
37	KING	310258
38	EAST SMITH	310616
39	O'LEARY	310070
40	COTTONWOOD	310594
41	LONG	310043
42	JINGO	310764
43	NOMA	310837
44	FOREST	310374
45	NICKEL	310470
46	COON	310318
47	MCKINNEY	310370
48	IMKEY	310240
49	OTTER	310608
50	ELBOW	310783

Table 1

Boating Lakes of the Northern Study Area
(water access priority classes A, B, and C)

Class/lake	----- *Total lakes* ----- Number of lakes	Lake acres	-- *Study sample lakes* -- Number of lakes	Lake acres
Very large individual lakes:				
Winnibigoshish (including Cut Foot and Sugar); being done in Fishery's creel study	1	74,628	0	0
Leech	1	109,415	1	109,415
Cass	1	29,775	1	29,775
Class 1: Large lakes, excluding those very large lakes above; all have trailer public access with concrete or earth ramp (priority A lakes over 2500 acres in size)	10	55,712	10	55,712
Class 2: Remaining priority A lakes; all have trailer public access with concrete or earth ramp.	19	20,689	9	9,702
Class 3: Priority B & C lakes over 150 acres in size that have a trailer public access with a concrete or earth ramp.	77	35,187	10	3,974
Class 4: Priority B & C lakes over 150 acres in size that do not have a public access now, but, if the lake received an access, the access would be a trailer access with a concrete or earth ramp.	13	2,884	5	1,115
Class 5: Priority B & C lakes (from 10 to 250 or so acres in size) that have a carry-in public access or a small-boat earth-ramp public access.	96	10,554	9	941
Class 6: Priority B & C lakes (from 10 to 250 or so acres in size) that do not have a public access now, but, if the lake received an access, the access would be a carry-in or small-boat earth-ramp access.	100	7,700	5	553
Total	318	346,544	50	211,187

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.

Aerial observation (including photographs) is also used to measure the contribution of different means of access to boating numbers. 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.

The contributions of pubic access is estimated directly during the aerial flights. The contribution from commercial accesses is based on boating reports on the

days of the aerial flights from operators of the commercial establishments. These two contributions are subtracted from the total number of boats on the water—also counted during the aerial flight—to compute a remainder, or boats from unaccounted for sources. Nearly all of the remainder is believed to derive from riparian residents. Attempts in the metro lakes region to find any significant nonriparian sources in this remainder were not successful.

Boaters on the sample lakes are surveyed to gather information about their behavior and perceptions. Surveys are 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 are 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 contribution of each group to boating use. Survey results are weighted by the combination of lake class (including each of the three individual very large lakes as a separate class) and means of access (public access, commercial access and riparian resident).

In 2006, seven weekend/holiday flights and four weekday flights were conducted for the sample lakes during the period from Memorial Day weekend to Labor Day. Over the same summer period, 1462 surveys were completed, including 542 public access mail-back surveys, 267 commercial access mail-back surveys, and 653 riparian resident mail surveys (Table 2).

Table 2

Survey administration statistics

Survey	Surveys delivered	Surveys returned	Return rate
Public Access	1050	542	52%
Riparian	1046	653	62%
Resort/private campground	459	267	58%
Total	2555	1462	57%

Information for Lake Winnibigoshish was obtained differently that for the other lakes. Boating use estimates for public access and commercial access boaters were obtained from a 2006 Minnesota DNR Fisheries creel survey. Riparian boating use was modeled based on per-dwelling riparian use of Lake Mille Lacs, which was part of the 1998 north central boating study. Relative boating-use source estimates are as follows: riparian homes—5%, public access—22%, and commercial access—73%.

On Winnibigoshish, recruitment of public access and commercial access (e.g., resorts) boaters was done as part of the Minnesota DNR Fisheries creel survey. Riparian resident names and addresses were gathered in the usual way from county property records.

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

BOAT NUMBERS AND SOURCES

Amount and Intensity of Boating

As noted in the introduction to this report, the northern lake region is the most remote of the lake regions from Minnesota's main population concentration, which is in and about the Twin Cities Metro Area. And this remoteness—and associated lower boating intensities in more natural, less developed settings—is a leading attraction of the region to boaters.

The lower boating intensity of the northern region is evident in the inter-regional comparisons (Table 3—the boating-use for the northern region in this table covers the range of lakes that are most comparable to the other regions; the very large lakes and small lakes are excluded). The boating intensity (summer boat-hours/ acre of lake) in the northern region is less than half that of other rural regions (e.g., north central and west central) and is an even smaller fraction of the Twin Cities metro region, which contains Lake Minnetonka. Arguably the busiest boating lake in the state, Lake Minnetonka's 14,000 acres has about as much boating traffic as all of these lakes in the northern region.

As a result of this lower intensity of boating, each northern-region boat has more space on summer weekend/holiday afternoons that in the other regions (Table 4).

Table 3

Regional comparisons of total boating water, boating use, and boating intensity

Study location	Total boating water acres	Total summer boat-hours	Summer boat-hours/acre
● **Northern lakes region in MN, 2006**			
Cass to Class 4 lakes	144,247	495,203	3.4
Class 1 to Class 4 lakes	114,472	401,125	3.5
● West lakes region in MN, 2005	198,804	1,603,662	8.1
● Mississippi River, Pools 4 to 9, 2003	129,110	1,118,189	8.7
● North Central lakes region in MN, 1998 (excluding Mille Lacs)	145,668	1,067,106	7.3
● Central lakes region in MN, 2001	89,307	693,789	7.8
● MN waters of Lake Superior, 2002	----	140,758	----
● Twin Cities metro-area lake region in MN, 1996	73,851	1,851,152	25.1
● Lake Minnetonka in Minnesota, 2004	14,034	474,179	33.8

Table 4

Regional comparisons of boating intensity on summer weekend/holiday afternoons

Study location	Lake acres per boat (average)	Lake acres
● Northern lakes region in MN, 2006		
Cass to Class 4 lakes	256	144,247
Class 1 to Class 4 lakes	246	114,472
● West lakes region, 2005	85	198,804
● North Central lakes region, 1998 (excluding Mille Lacs)	89	145,668
● Central lakes region, 2001	67	89,307
● Twin Cities metro-area lakes, excluding Lake Minnetonka and Mississippi and St. Croix River, 1996	24	43,652
● Lake Minnetonka in Minnesota, 2004	15	14,034

A northern-region boat has some three times more space than in other rural lake regions (e.g., north central and west central) and ten times more than in the Twin Cities metro region. Within the northern region, Class 2 lakes are the most intensely used on weekend/holiday afternoons, and Class 4 lakes the least intensely used (Table 5). Class 2 lakes have public access and are the smaller priority A lakes (average size about 1000 acres). Class 4 lakes are the priority B and C lakes without public access (average size around 200 acres).

The northern region is most similar to the north central region in terms of boating use by day of week (Table 6). Weekday use is larger than weekend/holiday use. And

Table 5

Boating intensity by lake class on summer weekend/holiday afternoons

Class/lake	Lake acres per boat (average)	Lake acres
Cass	303	29,775
Class 1	270	55,712
Class 2	210	20,689
Class 3	232	35,187
Class 4	390	2,884
Total	256	144,247

Table 6

Regional comparisons of boating use by day of week during the summer

Study location	*Percent of boating use* Weekends/holidays	Weekdays	All days
● Northern lakes region in MN, 2006			
Cass to Class 4 lakes	43%	57%	100%
Class 1 to Class 4 lakes	43%	57%	100%
● West lakes region, 2005	54%	46%	100%
● North Central lakes region, 1998 (excluding Mille Lacs)	46%	54%	100%
● Central lakes region, 2001	68%	32%	100%
● Twin Cities metro-area lakes, excluding Lake Minnetonka and Mississippi and St. Croix River, 1996	51%	49%	100%
● Lake Minnetonka in Minnesota, 2004	53%	47%	100%
● Mississippi River, Pools 4 to 9, 2003	60%	40%	100%
● MN waters of Lake Superior, 2002	50%	50%	100%

weekdays are consistently larger for Cass and across the lake classes.

Intensity of use (acres per boat as shown on Table 5) 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 about 30 percent for northern lakes, a portion similar to that found in the north central region (Table 7). 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.

Table 7

Regional comparisons of the activity status of boats in summer
(based on aerial boat observations)

Study location	Active (has wake) (percent)	Inactive (no wake) (percent)	Total (percent)
● Northern lakes region in MN, 2006			
Cass to Class 4 lakes	31%	69%	100%
Class 1 to Class 4 lakes	29%	71%	100%
● West lakes region, 2005	36%	64%	100%
● North Central lakes region, 1998 (excluding Mille Lacs)	31%	69%	100%
● Central lakes region, 2001	36%	64%	100%
● Twin Cities metro-area lake region in MN, 1996	59%	41%	100%

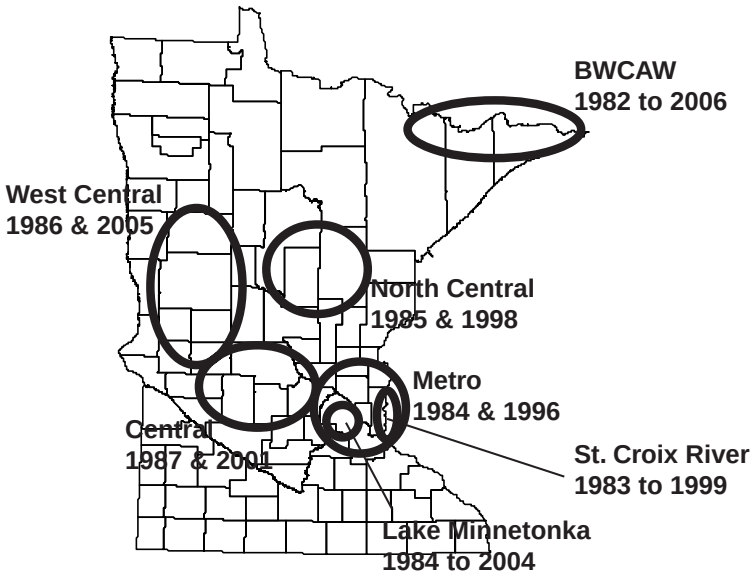
Boating-Use Trends

Since this is the first time the northern lakes region has been studied, there are no previous studies from which to assess trends. However, Minnesota has seven boating-use trend studies (Figure 3; see Reference 3). And all of the trend studies 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. Due to this consistent conclusion, it is likely, although not certain, that this stable to declining trend is occurring in the northern region.

Figure 3

Boating-Use Trend Series



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 (Reference 4). 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 (Reference 5). 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.

The contributions of pubic access is estimated directly during the aerial flights. The contribution from commercial accesses is based on boating reports on the days of the aerial flights from operators of the commercial establishments. These two contributions are subtracted from the total number of boats on the water—also counted during the aerial flight—to compute a remainder, or boats from unaccounted for sources. Nearly all of the remainder is believed to derive from riparian residents. Attempts in the metro lakes region to find any significant nonriparian sources in this remainder were not successful.

Similar to other rural lake regions, the leading source of boating in the northern region is from riparian residents (remainder), which account for about half of all use (Table 8). The next leading source is public accesses, which account for some 35 to 40 percent of use, with commercial accesses accounting for the remaining 10 to 15 percent of use.

Table 8

Regional comparisons of source of boating use in summer

Study location	Public access (percent)	Commercial access* (percent)	Remainder** (percent)	Total (percent)
● Northern lakes region in MN, 2006				
Cass to Class 4 lakes	34%	13%	53%	100%
Class 1 to Class 4 lakes	37%	10%	52%	100%
● West lakes region, 2005	37%	19%	45%	100%
● North Central lakes region, 1998 (excluding Mille Lacs)	28%	23%	49%	100%
● Central lakes region, 2001	47%	6%	47%	100%
● Twin Cities metro-area lakes, excluding Lake Minnetonka and Mississippi and St. Croix River, 1996	60%	10%	30%	100%
● Lake Minnetonka in Minnesota, 2004	30%	35%	35%	100%
● Mississippi River, Pools 4 to 9, 2003	45%	38%	17%	100%
● MN waters of Lake Superior, 2002	48%	49%	3%	100%

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

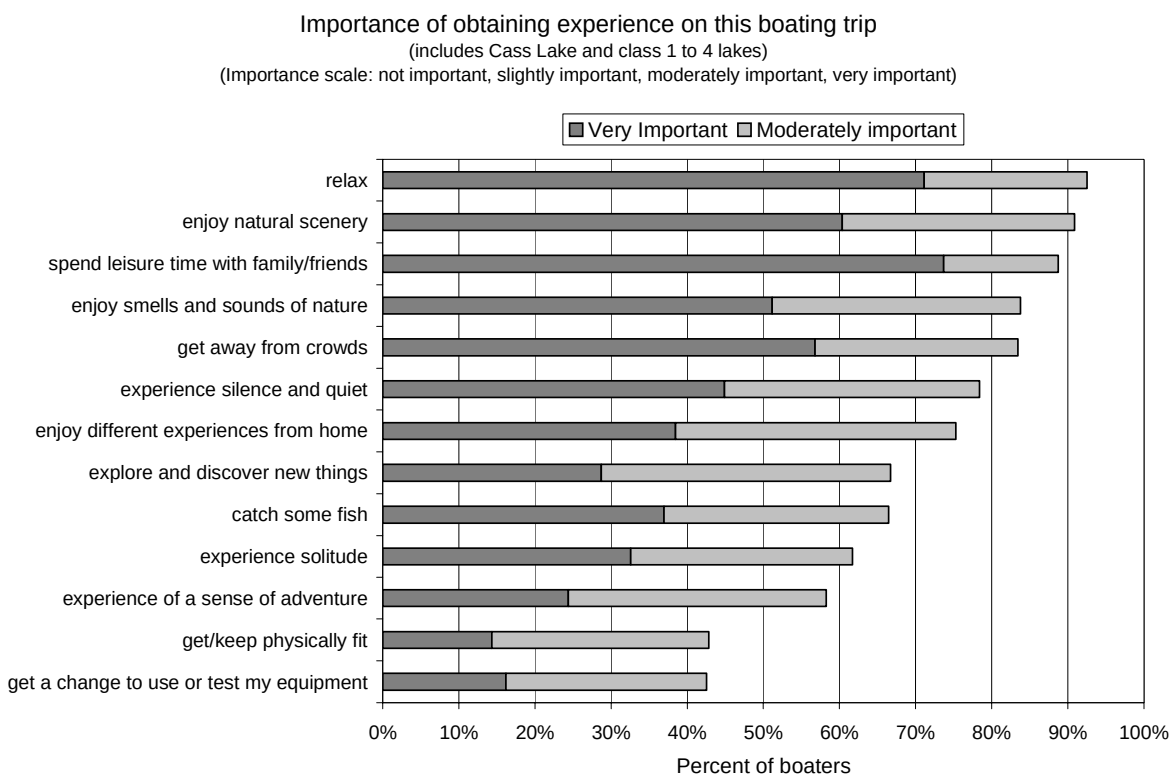
THE BOATING EXPERIENCE

Motivations for the Boating Trip

Northern 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, experiencing a sense of adventure, and testing/using my equipment. 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 common top-rated experiences of relaxing with family/friends in an enjoyable natural setting.

On a related aspect of the lake setting, boaters were asked about the importance of undeveloped shoreline to their boating enjoyment. Nearly half of boaters (45%)

Figure 4



think it was “very important” and another 20% percent think it “moderately important” (Table 9). It is evident that the one of the key draws for boaters using commercial access (e.g., resort guests) is undeveloped shoreline. Two-thirds (65%) of commercial access users rate undeveloped shoreline as “very important.”

Table 9

How important to your boating enjoyment is experiencing undeveloped shoreline?

(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Response	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
Not important	13	12	13	14
Slightly important	19	23	8	18
Moderately important	20	23	14	20
Very important	45	39	65	44
Don't know	3	3	0	3
Total percent	100	100	100	100

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 northern 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 only 8 percent were recent arrivals to the lake (Table 10).

Table 10

How many years have you been boating on this lake?
("this lake" is the lake at which the boater received the survey)
(includes Cass Lake and class 1 to 4 lakes)

	Median years	Percent new boaters (one year or less)
All boaters	15	8
Source of boater:		
Public access	10	18
Commercial access	12	11
Riparian resident	22	2

Boaters are relatively satisfied, too. Some 42

percent of all boaters report being “very satisfied” with their outing, while another 52 percent report being “satisfied” (Table 11). Only 5 percent are “dissatisfied” to any extent. Riparian residents exhibit the highest levels of satisfaction among the sources of boaters, and seasonal residents have the same satisfaction levels as permanent residents.

Table 11

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

(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Response	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
Very dissatisfied	2	3	1	1
Dissatisfied	3	3	1	4
Satisfied	52	61	58	45
Very satisfied	42	32	39	49
Don't know	0	0	0	0
Total percent	100	100	100	100

The lower satisfaction found for public and commercial access boaters—as compared with riparian residents—is associated with a higher prevalence of angling for these sources of boaters, coupled with the fact that anglers as a group report lower levels of satisfaction with their trips than other boaters. For example, 32 percent of anglers report being “very satisfied” with their trip, while 56 percent of pleasure boaters report this highest level of satisfaction. The lower level of angler trip satisfaction is a common finding in the regional boating studies.

Some of the dimensions of angler satisfaction were measure in the survey. Although the majority of anglers are satisfied overall with their fishing experiences, only a minority is satisfied with the size and number of fish caught. Many anglers (some 30 to 40%) are dissatisfied with size and number of fish (Table 12). At the other extreme, there is little dissatisfaction with the behavior of, and crowding from other anglers. Compared with results from a statewide angler survey, northern anglers captured in this survey tend to be more dissatisfied with

Table 12

If you fished on this trip, how satisfied or dissatisfied were you with each of the following fishing-related items?

(includes Cass Lake and class 1 to 4 lakes)

(Satisfaction scale: 1=very dissatisfied, 2=dissatisfied, 3=neutral, 4=satisfied, 5=very satisfied)

		Satisfied/dissatisfied response						
Fishing-related item	Average satisfaction* (mean value)	Very dissatisfied(=1) (percent)	Dissatisfied(=2) (percent)	Neutral(=3) (percent)	Satisfied(=4) (percent)	Very Satisfied(=5) (percent)	Don't know (percent)	Total (percent)
The overall fishing experience you had	3.5	7	11	20	47	15	1	100
The size of the fish you caught	3.1	10	20	24	37	8	2	100
The number of fish you caught	2.9	12	29	27	26	6	1	100
Crowding from other anglers	4.1	2	5	18	37	37	2	100
The behavior of other anglers	4.1	3	4	12	37	41	3	100

* Ignores "don't know" responses

the overall fishing experience (mean satisfaction of 3.5 versus 3.7 statewide), and the size (3.1 versus 3.3) and number (2.9 versus 3.2) of fish caught; they are more satisfied with the behavior of other anglers (4.1 versus 3.3) (see Reference 6). The angler crowding question was not asked in the statewide survey.

Additionally, trip satisfaction is contingent on encountering a problem with other boaters. Of the 13 possible problems asked of boaters, if at least one was rated "serious" or "very serious", trip satisfaction fell, although the drop is not sharp (Table 13). More is said about specific problems in the next section of this report.

Table 13

Effect on overall trip satisfaction of encountering a "serious" or "very serious" problem* with other boaters on the lake during this trip
(includes Cass Lake and class 1 to 4 lakes)

	Encountered a "serious" or "very serious" problem?		
Trip satisfaction response	"Yes" (percent)	"No" (percent)	All boaters (percent)
Very dissatisfied	1	2	2
Dissatisfied	7	3	3
Satisfied	63	50	52
Very satisfied	30	45	43
Don't know	0	0	0
Total	100	100	100

* There are 13 possible problems

Trip satisfaction is also affected by perceptions of crowding. When people judge the number of boats on the lakes as "too many" their overall satisfaction declines sharply (Table 14). 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 out weighs dissatisfaction even for boaters who experience these crowded conditions and problems with other boaters.

Table 14

Effect on overall trip satisfaction on encountering "too many boats" on the lake during this trip
(includes Cass Lake and class 1 to 4 lakes)

	---- *Encounter "too many boats"?* ----		
Trip satisfaction response	"Yes" (percent)	"No" (percent)	All boaters (percent)
Very dissatisfied	3	2	2
Dissatisfied	11	3	3
Satisfied	79	49	52
Very satisfied	8	46	43
Don't know	0	0	0
Total	100	100	100

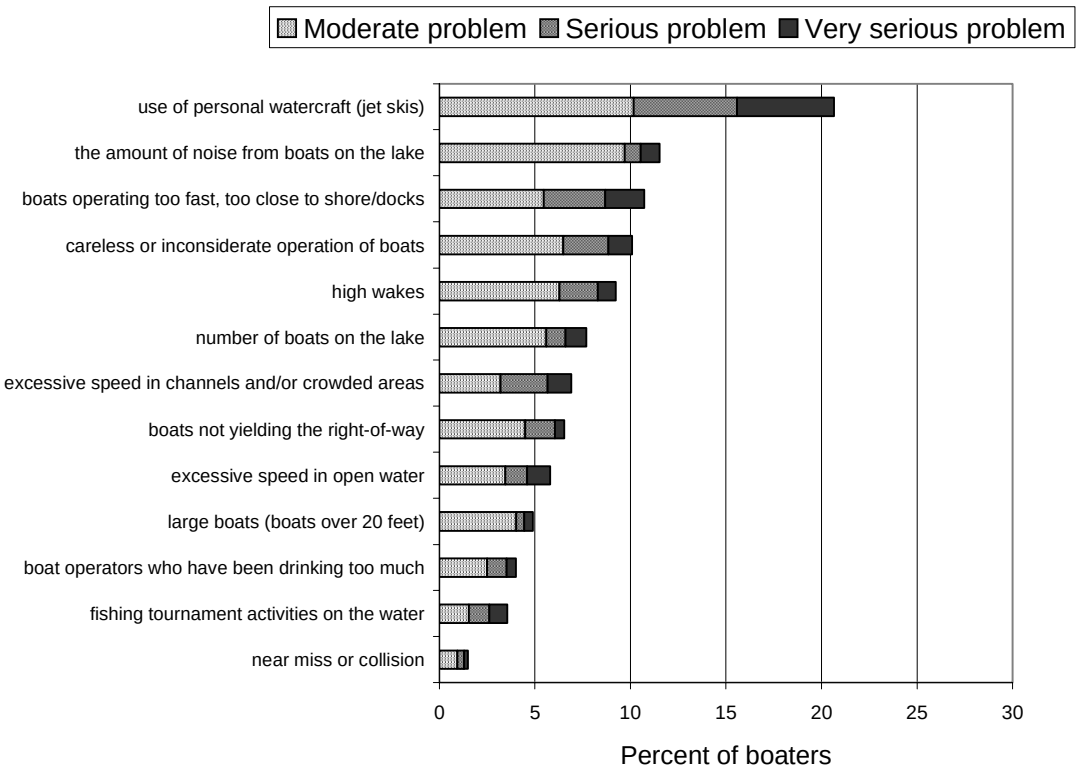
Problems with Other Boaters

Boaters were asked to judge whether they experienced problems with other boaters on their trip. Of the 13 potential problems, none is judged by even a quarter of boaters as a “moderate”, “serious” or “very serious” problem (Figure 5). Although not judged by a quarter 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 20 percent “moderate” or more serious responses, and it is the only problem with at least 10 percent of responses in the “serious” to “very serious” range. Problems with jet skis is a perennial leading problem in the regional boating studies.

Riparian residents rank some problems higher than other boaters, including “use of personal watercraft (jet skis)”, “boats operating too fast, too close to shore/ docks”, and “the amount of noise from boats on the lake.” Although ranked higher, none of these is ranked by over 25 percent of residents in the “moderate”, “serious” or “very serious” range.

Figure 5

Problems judged by boaters as "moderate", "serious", or "very serious"
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)



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 (48%) indicate the number is "about the same", another 26 percent indicate either "slightly fewer" (11%) or "slightly more" (15%), and 22 percent indicate either "substantially fewer" (13%) or "substantially more" (9%) (see Table 15). Overall, some three-fourths (74%) of boaters have their "usual" expectations largely met ("about the same" plus "slightly more/fewer" responses).

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 16). When the number of boats encountered today

Table 15

How does the number of boats you encountered on this trip compare to the number of boats you have seen on other trips on this same part of the lake?*

(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Response	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
substantially fewer	13	12	5	15
slightly fewer	11	14	3	11
about the same	48	32	49	56
slightly more	15	18	24	11
substantially more	9	16	18	3
don't know/not sure	4	7	0	3
Total percent	100	100	100	100

* Excludes the 3% of boaters who haven't boating on this lake before.

Table 16

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

(includes Cass Lake and class 1 to 4 lakes)

	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	9	9
Number of boats today versus usual?		
Substantially fewer	1	0
Slightly fewer	4	4
About the same	4	4
Slightly more	16	16
Substantially more	49	37
Don't know	1	1

versus usual is “substantially fewer” or “slightly fewer”, only a small portion of boaters indicate they encountered “too many boats” on the trip (1 to 4%), and an equally small portion indicate that the lake is “crowded” or “far too crowded” (0 to 4%). 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 (49%) and “crowded” or “far too crowded” conditions (37%).

Most boaters (90%) did not encounter “too many boats” on their trip, while 9 percent did (Table 17). The higher prevalence for public and commercial access boaters is likely due to the added potential of congestion at or near the launch ramps.

Table 17

On this trip, did you travel through any parts of the lake where you thought there were "too many" boats?
(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Response	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
Yes, too many boats	9	12	19	6
No	90	88	81	93
Don't know	1	0	0	2
Total percent	100	100	100	100

The pattern of responses described above for “too many boats” is largely the same as the pattern for “crowded” and “too crowded responses” (Table 18). Of the crowded responses, most are reported as “crowded” and few as “far too crowded.”

Compared with other rural lake regions (west central and north central), the northern region is similar in terms of perceived crowding and congestion.

Table 18

From a safety standpoint, how do you feel about the number of boats on the lake on this trip?

(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Response	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
Few boats here	34	28	14	43
About right	54	57	66	49
Crowded	8	12	11	5
Far too crowded	0	1	0	0
Don't know	3	2	8	3
Total percent	100	100	100	100

Irrespective of their perception of the number of boats, the large majority of boaters would return to boat under the same conditions (Table 19). Virtually all boaters (98%) who did not encounter too many boats would return if the numbers would be the same. This return rate falls to 71 percent for boaters who encountered too many boats, leaving 19 percent who would think twice before returning, and 9 percent who would not return.

Table 19

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

(includes Cass Lake and class 1 to 4 lakes)

	All boaters (percent)	Boaters who encountered "too many boats" (percent)	Boaters who did not encountered "too many boats" (percent)
Yes	95	71	98
No	2	9	1
Don't Know	3	19	1
Total	100	100	100

PUBLIC ACCESS FACILITIES

Quality of Facilities

Boaters give high marks to public access facilities. Positive ratings ("good" to "excellent") comprise about 73 percent of boater ratings (Table 20). Few boaters give negative ratings of "poor" or "very poor." High ratings extend across the lake classes. Although high, these ratings are below those for the north central and west central regions (84% and 77% positive ratings, respectively).

Table 20

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

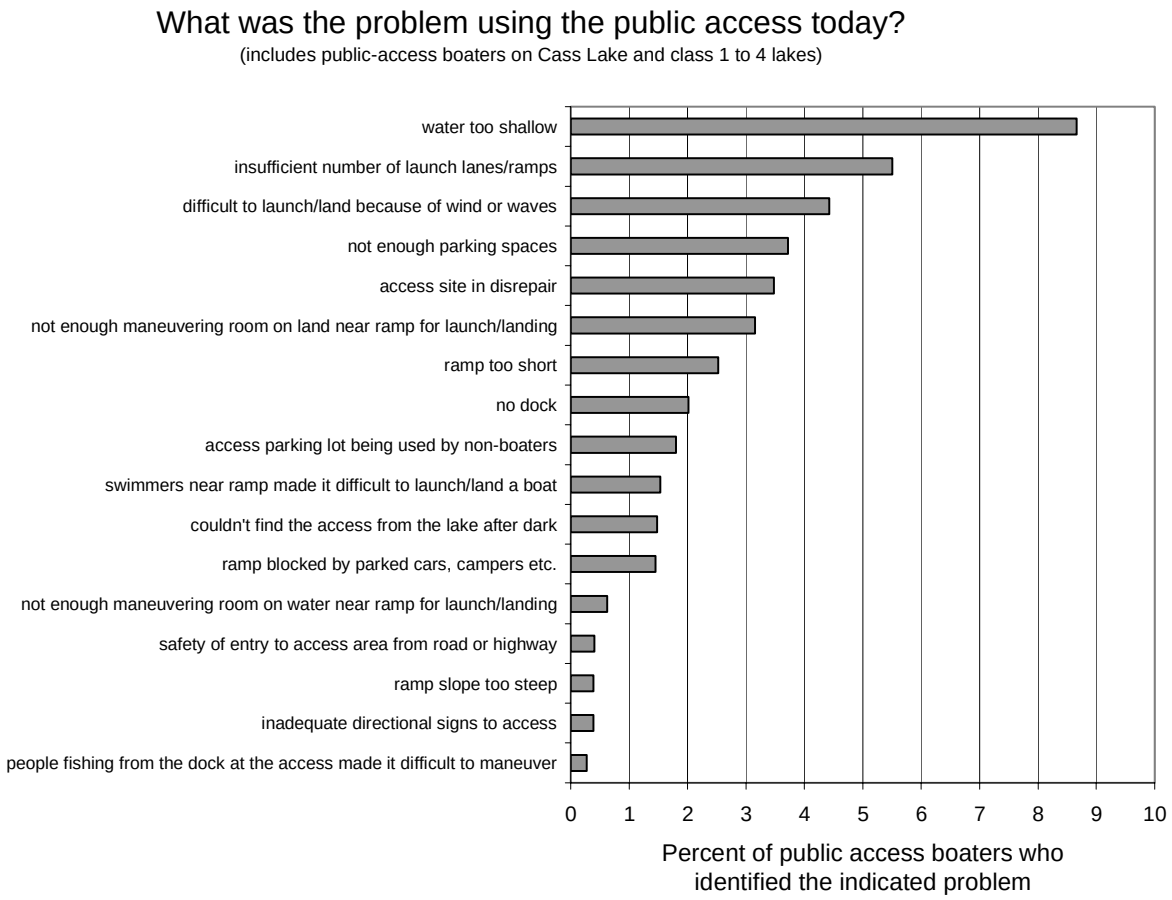
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)

		----- *Had a problem using this access?* -----	
Response	Overall (percent)	"Yes" (percent)	"No" (percent)
Excellent	29	6	35
Good	44	34	46
Fair	23	48	16
Poor	4	9	2
Very poor	1	3	0
Don't know	0	0	0
Total percent	100	100	100

There are problems, however, in the use of the public access facilities. Twenty-one percent of public access boaters indicate that they had some type of problem using the public access. These problems have a noticeable effect on access ratings (Table 20). Encountering a problem substantially lowers the positive ratings, and raises the middling and poor ratings.

Access users identified specific problems. The leading problem has to do with shallow water, which is identified by some 9 percent of public access boaters (Figure 6). The next ranked problems are related to the perceived small size of many parts of the access facility: insufficient parking spaces, not enough maneuvering room on land/water near the ramp, insufficient number of launch

Figure 6



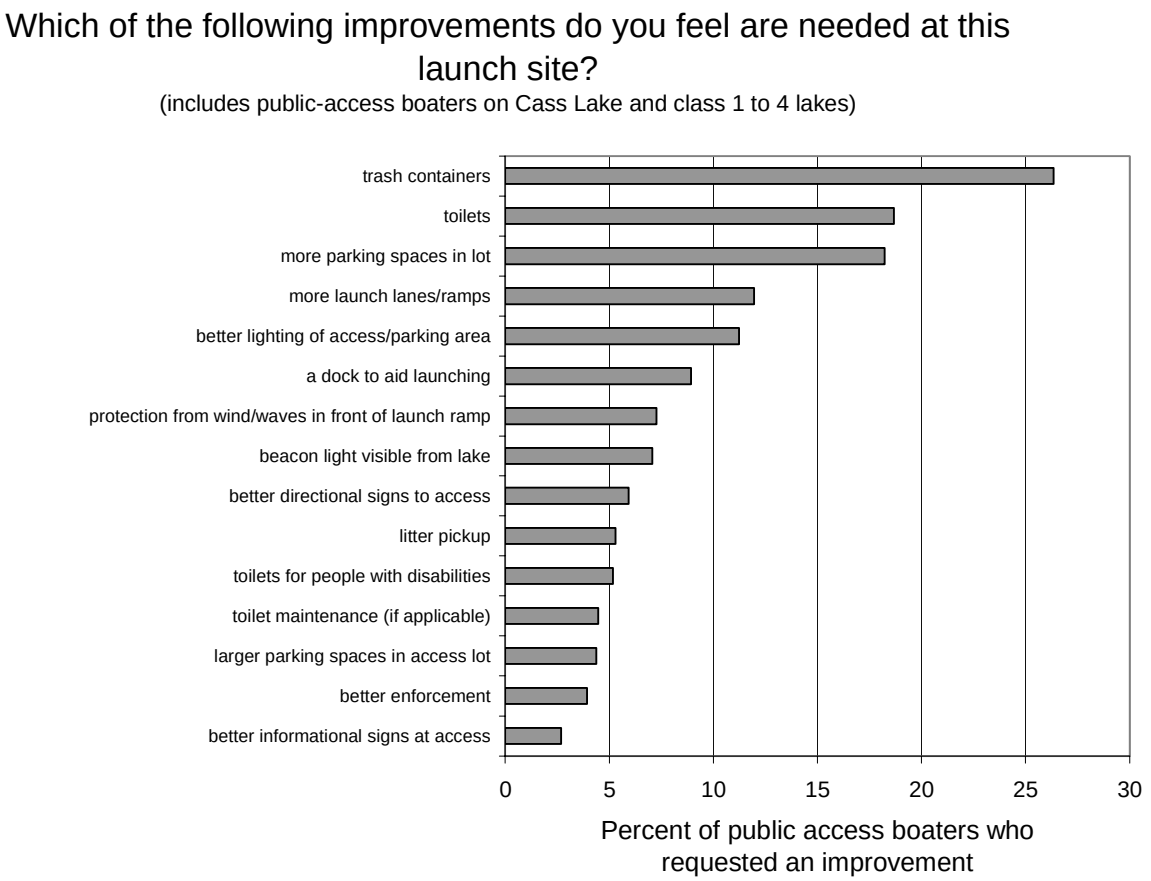
lanes, and ramp too short. The perceived smallness of facilities is a common problem across the boating studies, and is likely related to the growing size of boats and motors public access users are trying to launch (see following section on boating equipment).

Additional high-ranked problems have to do with the difficulty of launching/ landing because of wind and waves, and maintenance needed at the access site (i.e., “access site in disrepair”).

Improvements to Facilities

The leading requested improvements concerns trash containers (the top-ranked improvement, requested by 26% of users) and toilets (19% of users). Other leading improvements have to do with expanding the size of the facility: more parking spaces in the lot (18% of users) and more launch lanes/ramps (12% or users) (see Figure 7). Only one other improvement is requested by 10% of more of users: better lighting of access/parking area.

Figure 7



Use of Facilities

Most of the public access users are repeat users of the launch facility where they were surveyed. Close to nine out of ten users (87%) had used the public access some time in the past (Table 21).

Nearly all public access users (89%) fit the profile of a traditional user: someone who trailers their boat to the access, launches/lands the boat at the access, and uses the access lot for parking their vehicle-trailer while they are on the water (Table 22). Boaters who lived on the lake occasionally use the access to get their boat in and out of the water, especially to launch in spring and land in the fall. People staying at resorts and private campgrounds generally are not large users of the access, because most resorts/campgrounds provide their own launch facilities.

Table 21

Have you ever used this public access before?
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)

Response	Overall (percent)
Yes	87
No	13
Don't know/not sure	0
Total percent	100

Table 22

Who are the users of public access?
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)

Type of user	Overall (percent)
Traditional user*	89
Riparian resident on this lake	7
Resort/campground guest on this lake	4
Total	100

* Someone who does not live on the lake or is not staying on the lake at a resort/campground.

In the other rural lake region studies, traditional users were a smaller percent of total use, and lakehome owners and resort-campground guests were corresponding a larger percent. In the north central region, traditional users comprised just 62 percent of public access; in the west central region, traditional users comprised 70 percent of access use. Both the north central and west central

regions had percents of traditional users similar to the northern region in the 1980s, but have since declined. The decline is thought to be connected to increasing size of boats and motors, and associated need to launch/land these boats at a well designed access facility.

On a related topic, the large majority of all northern boaters (78%) use public access facilities in Minnesota (Table 23). This includes two-thirds (67%) of riparian residents. Additionally, most boaters use other lakes with 50 miles of the lake where they were surveyed, and the primary means of access to these other lakes is public access (Table 23).

Table 23

Questions on boating on other lakes within about 50 miles of this lake
(includes Cass Lake and class 1 to 4 lakes)

Question	Overall (percent)	*Source of boater* — Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● In the last 12 months, did you use a free public access to launch a boat onto a Minnesota lake or river?				
"Yes" responses	78	100	66	67
● In the last 12 months, did you boat on other lakes *within about 50 miles of this lake*?				
"Yes" responses	57	85	38	45
● How do you gain access to these other lakes *within about 50 miles of this lake*? (boaters could indicate more than one means of access)				
Free public access launch site	89	97	91	78
Resort, marina or private launch site	21	18	56	17
Friend or relative's home/cabin	12	8	26	13
My home or cabin	11	10	4	12
Road end/road right-of-way (unimproved site)	5	4	3	6
Other	1	0	3	2

A large portion of public access users (40%) have at some time in their past found a public access parking lot full on the lake they were surveyed (Table 24). 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, went to another

access on the lake, went to another lake, or waited for a place in the lot to open up. Only 6 percent did not boat that day.

Table 24

Questions on finding the public access parking full
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)

Question	Response value
● Have you ever tried to use free public access on this lake and found the access parking lot full?	
"Yes" responses (percent)	40%
● (IF YES) How many times did you find the lot full in the past 12 months?	
Median times	2
Mean times	2.8
● (IF YES) What did you do when you found the parking lot full? (boaters could indicate more than one action)	
Responses (percent)	
Parked on the road	54%
Went to another access on this lake	23%
Went to another lake	16%
Other (e.g., parked at home)	8%
Waited for place in lot to open up	7%
Didn't boat that day	6%

Need for Additional Facilities

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.

For the lake at which they were surveyed, some 8 percent of all boaters think additional public access was needed, 82 percent did not think additional access is

needed, and 10 percent are uncertain (Table 25). Public access boaters are more likely to indicate a need for additional access (12%), but still a majority (78%) does not see a need for more access. Few riparian residents see a need for more access (6%). Overall, the pattern of these results is similar to that found in the west central and north central lake regions.

Results are largely the same 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) (see Table 25). Overall, some 12 percent of all boaters think additional public access is needed on a lake within 50 miles of where they were surveyed, 59 percent did not think additional access is needed, and 29 percent are uncertain (Table 25). Public access boaters are more likely to indicate a need for additional access on a lake within 50 miles (24%), but still a majority (54%) does not see a need, and 22 percent are uncertain. Few riparian residents see a need for more access on a lake within 50 miles (8%).

Table 25

Questions on the need for more public accesses
(includes Cass Lake and class 1 to 4 lakes)

Question	Overall (percent)	*Source of boater* — Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● Do you think an additional (or initial) public boat access is needed on this lake?				
Response				
"Yes"	8	12	3	6
"No"	82	78	75	87
"Don't know"	10	10	22	7
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?				
Response				
"Yes"	12	24	1	8
"No"	59	54	62	61
"Don't know"	29	22	37	32
Total percent	100	100	100	100

From these demand results, it appears that the majority of boaters, including a majority of public access boaters, feel well supplied by current public access facilities. The portion of public access users who believe additional facilities are needed on the lake at which they were surveyed is 12 percent, and on lakes within 50 miles of where they were surveyed is 24 percent.

Boater Opinions on Managing Access Additions on Small Boating Lakes

There are a large number (100) of small boating lakes in the northern region (average size about 75 acres) that have no public access. These lakes are lightly developed and lightly used. As part of this study, aerial boating counts were made on a sample of five of these lakes. For the eleven aerial flights, seven found no boats on any of the five sample lakes, two found a total of two boats, and two found a total of five boats. In the survey, boaters were asked whether there is a need to provide more access to these lakes, their preferences on type of access to provide to these lakes, and—if access is provided—whether motor restrictions should accompany the access.

Boaters are ambivalent about whether there is little need for more access on these lakes. One-third of boaters disagree that "there is little need to provide more boat access of any type to more of these lakes," 30 percent agree, and the remainder are on the fence or didn't know (Table 26).

In terms of the type of access to provide, a carry-in access (for canoes/kayaks) is preferred over a undeveloped ramp access (for small boats), which in turn is preferred over a concrete-plank ramp access (for any trailerable boat). Nearly 40 percent of boaters (38%) disagree with the concrete-plank ramp access.

If access is provided, boaters are more likely to agree to motor size restrictions, and less likely to agree with the non-motorized option. Nearly half of boaters (46%) disagree with the non-motorized option.

Public access boaters are more likely than riparian resident boaters to see a need for more access to these lakes, more likely to prefer more developed access (especially the concrete-plank ramp access), and less likely to agree to motor restrictions of any type (Table 27).

Table 26

There are numerous small lakes (smaller than 250 acres or ¾ mile across) in this part of Minnesota that have no public boat access at the present time. Please tell us how much you agree or disagree with each of the following public management actions for these small lakes without boat access.

(includes Cass Lake and class 1 to 4 lakes)

(Agreement scale: 1=strongly disagree, 2=mildly disagree, 3=neither agree nor disagree, 4=mildly agree, 5=strongly agree)

Management action	Average agree/disagree* (mean value)	*Agree/disagree response* Strongly disagree(=1) (percent)	Mildly disagree(=2) (percent)	Neither agree nor disagree(=3) (percent)	Mildly agree(=4) (percent)	Strongly agree(=5) (percent)	Don't know (percent)	Total (percent)
Need more boat access?								
● there is little need to provide more boat access of any type to more of these lakes	3.0	13	20	23	16	14	13	100
Type of boat access to provide?								
● carry-in access (for canoes/kayaks) should be provided to more of these lakes	3.5	7	7	26	26	18	16	100
● undeveloped ramp access (for small boats) should be provided to more of these lakes	3.3	11	13	20	27	18	12	100
● concrete-plank ramp access (for any trailerable boat) should be provided to more of these lakes	2.8	21	17	20	17	13	11	100
Motor restrictions?								
● if boat access is provide to more of these lakes, the lakes should be restricted to electric motors and/or small motors (10 horsepower or less)	3.1	18	12	20	19	20	11	100
● if boat access is provided to more of these lakes, no motors should be allowed	2.6	23	23	20	11	11	12	100

* Ignores "don't know" responses

Table 27

There are numerous small lakes (smaller than 250 acres or ¾ mile across) in this part of Minnesota that have no public boat access at the present time. Please tell us how much you agree or disagree with each of the following public management actions for these small lakes without boat access.

(includes Cass Lake and class 1 to 4 lakes)

NOTE: Table entries are average agree/disagree values*: scale: 1=strongly disagree, 2=mildly disagree, 3=neither agree nor disagree, 4=mildly agree, 5=strongly agree.

		Source of boaters		
Management action	All boaters (mean value)	Public access (mean value)	Commercial access (mean value)	Riparian resident (mean value)
Need more boat access?				
● there is little need to provide more boat access of any type to more of these lakes	3.0	2.5	3.0	3.3
Type of boat access to provide?				
● carry-in access (for canoes/kayaks) should be provided to more of these lakes	3.5	3.6	3.1	3.5
● undeveloped ramp access (for small boats) should be provided to more of these lakes	3.3	3.6	3.0	3.2
● concrete-plank ramp access (for any trailerable boat) should be provided to more of these lakes	2.8	3.3	3.0	2.4
Motor restrictions?				
● if boat access is provide to more of these lakes, the lakes should be restricted to electric motors and/or small motors (10 horsepower or less)	3.1	2.8	2.7	3.4
● if boat access is provided to more of these lakes, no motors should be allowed	2.6	2.3	2.2	2.9

* Ignores "don't know" responses

Power Loading: A Recognized Problem at a Public Accesses?

Power loading (driving the boat unto the trailer) can cause problems at public access, including scouring a hole at the end of the ramp and building a ridge off the end of the ramp. Power loading is a common practice; about half of public access boats (46%) indicate that they power loaded their boat unto the trailer at the conclusion of their trip.

The severity of problems created by power loading is not currently judged as very severe (Table 28). The majority of public access boaters (including those who did not power load on this trip) indicate that it is “not a problem’, and the next largest group indicate in is a “slight problem”. Few judge the problem as “serious” or “very serious”. Similar results were found in the west central lakes study, where this question was first asked.

Table 28

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)?
(includes public-access boaters on Cass Lake and class 1 to 4 lakes)

Note: On this trip, 46% of boaters power-loaded their boat (that is, "drove" their boat onto their trailer).

		-- Power-loaded boat this trip? --	
Response	Overall (percent)	"Yes" (percent)	"No" (percent)
No problem	71	81	61
Slight problem	11	8	13
Moderate problem	3	3	4
Serious problem	2	0	3
Very serious problem	0	0	0
Don't know	13	7	19
Total	100	100	100

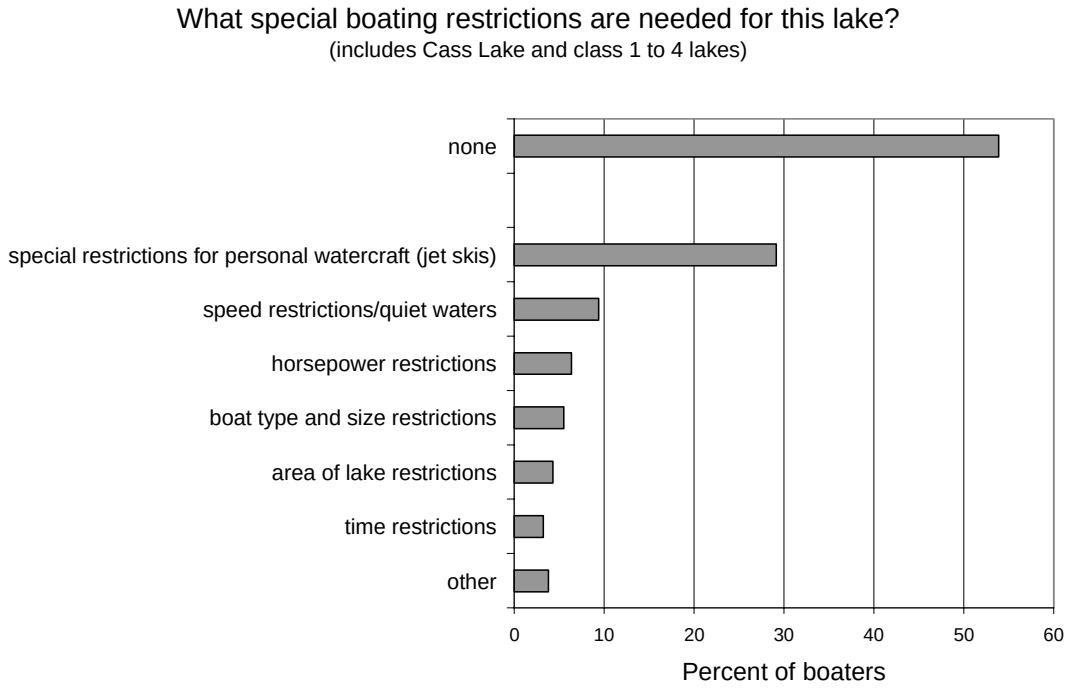
BOATING SAFETY AND ENFORCEMENT

Boating Restrictions

Special boating restrictions are uncommon on the sample lakes of the study. Only 3 of the 50 sample lakes (or lake chains) had a boating restriction, and these restrictions are limited to small geographic areas; the restrictions are speed/no wake in channel areas between lake basins.

A majority of boaters believe this general lack of boating restrictions is appropriate (Figure 8). However, a sizable portion of boaters (29%) 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.

Figure 8



Enforcement Presence

Enforcement officers are more likely to be seen by public and commercial access boaters (Table 29). They are less likely to be seen by riparian residents and on lakes without public access (which are used mainly by riparian resident boaters). Overall, 8 percent of boaters report seeing an officer, the same percentage as in the west central boating study.

About 2 percent of boaters report being checked by an enforcement officer, again the same percent as in the west central study (Table 29). Boaters checked by an enforcement officer give high marks to the officer's professional conduct. Seventy-two percent of boaters rate that conduct "excellent" and another 18 percent rate the conduct "good." Only 11 percent give less than a positive rating of "excellent" or "good."

Table 29

Encountering an enforcement officer on this trip
(includes Cass Lake and class 1 to 4 lakes)

Question	Overall (percent)	*Source of boater* — Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● *While you were on the lake on this trip, did you see an enforcement officer?*				
"Yes" responses	8	12	16	4
● *Were you checked by an enforcement officer on this trip?*				
"Yes" responses	2	2	5	2
● *(if checked) How would you rate the officer's professional conduct during this check?*				
"Excellent	72	44	91	75
"Good"	18	56	9	0
"Fair"	11	0	0	25
"Poor" or "Very poor"	0	0	0	0
Total percent	100	100	100	100
Number of rating surveys	*31*	*10*	*11*	*10*

Safety Courses

Formal safety courses have been completed by 18 percent of all boaters, very much the same as in the west central lakes region (18%) and north central lake region (20%), but lower than the portion in the Twin Cities lake region (32%) (Table 30). The percentage having taken a safety course varies little by source of boater.

Boaters having completed a formal safety course are more likely than other boaters (64% compared with 15%) to believe all boaters should be required to complete a safety course (Table 30). Overall, 24 percent believe all boaters should be required to complete such a course.

Table 30

Boating safety course questions
(includes Cass Lake and class 1 to 4 lakes)

Question	Overall (percent)	*Source of boater* — Public access (percent)	Commercial access (percent)	Riparian residence (percent)
● *Have you taken a formal course in boating safety?*				
"Yes" responses	18	18	15	18
● *Should all boat operators (powered & unpowered) be required to complete a boating safety course?*				
"Yes" responses for all boaters	24	25	18	25
"Yes" responses for boaters having completed a safety course	64	66	77	59

Types of Beverages on Board

Minnesota has 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 this study, 27 percent of boaters report having some type of alcoholic drinks on board during their trip (Figure 9). Few have only alcoholic drinks (2%). Most boaters have no alcohol on the boat: either they have only

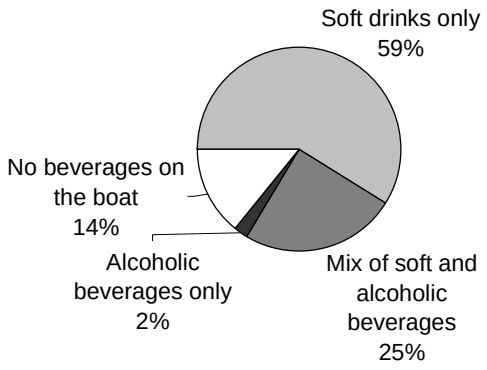
non-alcoholic drinks on board (59%), or have no drinks of any type (14%). Boaters from commercial accesses (e.g., resorts, private campgrounds) are the most likely to have alcoholic drinks on board. Riparian residents are the most likely to have no beverages on board.

The percentage with some type of alcoholic drinks on board (27%) is just above that reported for the west central lake region (22%) and north central lake region (24%).

Figure 9

Beverages on board

(percent of boaters on Cass Lake and class 1 to 4 lakes)



Safety Equipment

Most boats are equipped with some form of safety equipment other than personal flotation devices (Table 31). Lights, fire extinguishers and horns are the most common equipment types. The small portion of boats without any safety

Table 31

Which of the following types of equipment do you have on your boat?
(includes Cass Lake and class 1 to 4 lakes)

		Source of boater		
Type of equipment	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
Lights	87	94	91	83
Fire extinguisher	72	80	88	63
Fishfinder	71	87	82	59
Horn	64	65	68	62
GPS unit	29	43	48	17
Visual signal (flag, flare gun)	19	21	22	17
Underwater camera	5	10	1	2
Marine toilet	4	3	2	5
None of these items	8	3	1	13

equipment (8%) may not need any, because no safety equipment other that personal flotation devices is required for boats less that 16 feet long operated during daylight hours.

Boaters report that life vests (personal flotation devices) are worn by a majority of boaters (Table 32). Children are the most like to wear a life vest, and adults from 18 to 54 are the least likely. In terms of source of boater, public access boaters are the most likely to wear a life vest and riparian residents are the least likely, although the differences among the sources is not large.

Table 32

Percent of boaters wearing life vests on this trip
(includes Cass Lake and class 1 to 4 lakes)

		Source of boater		
Age class	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
All ages	60	63	61	58
Adults 55 or older	58	72	69	52
Adults 18 to 54	40	47	31	38
Teens (12 to 17)	82	78	85	83
Children (11 or younger)	100	100	100	99

These life-vest wear rates are self-reported and, thus, may be subject to the bias of reporting of socially desirable behaviors (e.g., “of course I practice safe boating and wear my life vest”). This last summer (2007), an observational study of life-vest wear rates was conducted in the Twin Cities metropolitan area. The results from this study (available in 2008) will provide the information to judge whether the self-reported wear rates are biased.

CHARACTERISTICS OF THE BOATING TRIP

Activity

There are two main activities on northern lakes: fishing and boat riding (pleasure boating) (see Table 33). The former is larger than the latter for each source of boater. Public and commercial access boaters primarily fish, while riparian resident boaters have a more even mix of fishing and boat riding.

The activity mix on northern lakes is roughly similar to the west central and north central lakes. The northern region has more fishing (57% versus 47% and 48% for the other regions) and less boat riding (28% versus 38% for the other regions). In both the north central and west central lake regions, the trend has been away from fishing and toward boat riding. The northern region activity mix is quite similar to the north central region in the mid 1980s, when fishing was well above boating riding (61% fishing, 26% boat riding).

Table 33

Primary boating activity
(includes Cass Lake and class 1 to 4 lakes)

		Source of boater		
Activity	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
Fishing	56.7%	70.2%	69.1%	45.5%
Boat ride/sightseeing	27.5%	17.4%	9.7%	37.8%
Water skiing/tubing	5.1%	5.9%	2.4%	5.2%
Transportation to/from	4.2%	1.1%	8.0%	5.2%
Swimming	4.1%	3.8%	9.4%	3.0%
Canoeing/kayaking	1.6%	1.3%	0.0%	2.1%
Sailing	0.5%	0.0%	1.4%	0.6%
Jet skiing	0.3%	0.4%	0.0%	0.4%
Total percent	100.0%	100.0%	100.0%	100.0%

Boating Equipment

The types of craft most used for boating in the northern region are fishing boats, followed by runabouts and pontoons (Table 34) (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 access boaters. Other craft types are comparatively uncommon.

Table 34

Watercraft used on trip
(includes Cass Lake and class 1 to 4 lakes)

Type of craft	Overall (percent)	*Source of boater* — Public access (percent)	Commercial access (percent)	Riparian residence (percent)
Fishing boat (no windshield)	43	58	45	34
Runabout (has windshield)	34	34	42	32
Pontoon	18	5	10	28
Canoe/kayak	2	1	0	3
Cruiser (has cabin or superstructure)	1	1	0	1
Sailboat	0	0	1	1
Personal watercraft (jet ski)	0	0	0	0
Other	1	0	0	1
Total percent	100	100	100	100

The mix of boating equipment in the northern region is different than in the north central and west central lake regions. In the latter two regions, runabouts are more common than fishing boats. In both of these regions there has been a definite trend away from fishing boats and toward runabouts. Back in the mid 1980s fishing boats were more common that runabouts in both these regions, as is the case now in the northern region.

Boat lengths average 17.5 feet, and are relatively constant across sources of boaters and lake classes (Table 35). Motor sizes average 80 horsepower; the median is lower at 60 horsepower. Boat lengths and motor sizes are somewhat smaller than those found in the west central and north central regions, where

Table 35

Boat lengths and motor sizes
(includes Cass Lake and class 1 to 4 lakes)

	Average feet	Median feet	Average horsepower	Median horsepower
All boaters	17.5	17	80	60
Source of boater:				
Public access	17.2	17	86	75
Commercial access	17.6	17	84	60
Riparian resident	17.7	18	74	50

average boat lengths are close to 18 feet and average horsepowers between 90 and 100. In the north central and west central lake regions, the trends has been to larger, more powerful craft.

Most craft have motors (Table 36). Only about 3 percent are non motorized. The most common craft has one gas-burning motor. Craft with two motors are not uncommon, however, and represent 22 percent of all boats.

Table 36

Type and mix of motors on boats
(includes Cass Lake and class 1 to 4 lakes)

		Source of boater		
	Overall (percent)	Public access (percent)	Commercial access (percent)	Riparian residence (percent)
One motor				
Gas	74	61	79	81
Electric	2	1	0	2
Two motors				
Gas & electric	22	37	21	13
No motors	3	1	0	4
Total	100	100	100	100

Boater Characteristics

Boaters, as a group, are familiar with the lake at which they were surveyed. The median length of use of the lake is 15 years, and is larger for riparian residents than for public and commercial access boaters (Table 37). New boaters, who have started boating in the last year on the lake they were surveyed, are not all that common overall (8% of all boaters), but are more common for public and commercial access boaters (11% to 18% of all boaters). The percentage of new boaters among riparian residents is small (2%).

Table 37

How many years have you been boating on this lake?
("this lake" is the lake at which the boater received the survey)
(includes Cass Lake and class 1 to 4 lakes)

	Median years	Percent new boaters (one year or less)
All boaters	15	8
Source of boater:		
Public access	10	18
Commercial access	12	11
Riparian resident	22	2

The public and commercial accesses serve two geographic markets. Public accesses predominately serve a local market, while commercial accesses predominately serve a distant "tourist" market (Table 38). In contrast, both public and commercial access mostly serve a "tourist" market in the west central and north central lake regions.

Table 38

Travel distance from permanent home to public and commercial accesses
("this lake" is the lake at which the boater received the survey)
(includes Cass Lake and class 1 to 4 lakes)

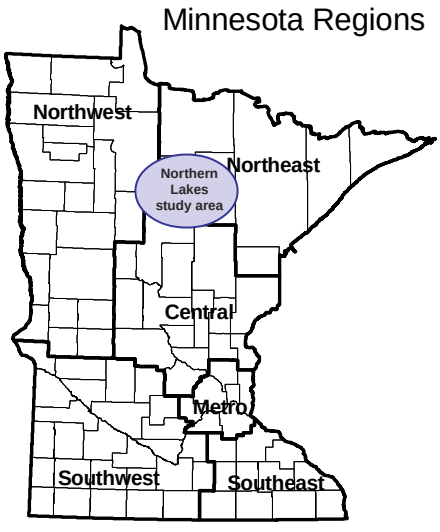
	Median miles	Percent of boaters who are *within* 25 miles of their permanent home	Percent of boaters who are *over* 100 miles of their permanent home
All public and commercial access boaters	42	45	40
Source of boater:			
Public access	20	58	25
Commercial access	175	11	78

Tourist boaters using commercial accesses primarily come from the Twin Cities metro area, central Minnesota, and out of state (Table 39). The non-permanent (seasonal) riparian residents mainly come from these same origins.

Table 39

Origin of boaters
(includes Cass Lake and class 1 to 4 lakes)

Origin state or *MN region*	All boaters (percent)	*Source of boaters* — Public access (percent)	Commercial access (percent)	Riparian resident (percent)
Minnesota	85	97	65	82
Northeast, MN	*47*	*69*	*10*	*41*
Metro,MN	*19*	*14*	*15*	*22*
Northwest, MN	*8*	*7*	*7*	*9*
Central, MN	*7*	*2*	*29*	*5*
Southeast, MN	*3*	*3*	*1*	*3*
Southwest, MN	*3*	*3*	*3*	*2*
Iowa	2	0	11	2
Colorado	2	1	9	1
Illinois	2	0	1	3
Arizona	2	0	9	1
North Dakota	1	1	4	1
Wisconsin	1	1	1	2
All other origins	5	1	0	8
Total percent	100	100	100	100



A typical west-central boating trip lasts 3 to 4 hours (Table 40). Trip duration (not surprisingly) is shortest for riparian residents and longest for public access boaters.

Table 40

Duration of boating trips
(includes Cass Lake and class 1 to 4 lakes)

	----- *Hours* ----- mean	median
All boating groups	3.5	3
Source of boater:		
Public access	5.0	5
Commercial access	4.3	4
Riparian resident	2.5	2

Most boating party sizes are 3 to 4 people (Table 41). Adults comprise 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, while riparian residents have the highest portion of older adults.

Table 41

Boating party sizes and ages
(includes Cass Lake and class 1 to 4 lakes)

	----- *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	3.2	3	32%	43%	8%	16%	100%
Source of boater:							
Public access	2.9	2	21%	56%	10%	13%	100%
Commercial access	3.6	3	24%	43%	11%	22%	100%
Riparian resident	3.3	2	40%	37%	7%	16%	100%

Northern boaters have a median household income around $70,000 (Table 42), which is above the statewide median of about $56,000 (Reference 7). Public and commercial access boaters have lower incomes than riparian resident boaters. Seasonal riparian residents report higher incomes that permanent residents.

Table 42

Which category best describes your total household income before taxes last year?
(includes Cass Lake and class 1 to 4 lakes)

		Source of boaters		
Income category	All boaters (percent)	Public access (percent)	Commercial access (percent)	Riparian resident (percent)
under $30,000	12	15	11	10
$30,000 - $39,999	6	7	12	4
$40,000 - $49,999	9	10	2	11
$50,000 - $74,999	29	32	37	24
$75,000 - $99,999	21	16	31	21
$100,000 or more	23	20	7	29
Total percent	100	100	100	100

For purposes to getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. Predominant radio stations listened to are county, rock & roll, public radio, and easy listening/lite (Table 43). A sizable portion of commercial access boaters listens to sports and classical radio stations. The Minnesota DNR website has been used by just over 40 percent (42%) of boaters to obtain boating-related information (Table 44). Public access boaters are the most likely to use the website.

Table 43

What type of radio station do you primarily listen to?
(includes Cass Lake and class 1 to 4 lakes)

Type of radio station	All boaters (percent)	Source of boaters: Public access (percent)	Source of boaters: Commercial access (percent)	Source of boaters: Riparian resident (percent)
Country	33	36	40	29
Rock & Roll	19	30	7	15
Public radio	12	8	1	18
Easy listening/lite	11	7	4	14
Talk	9	6	11	10
Sports	7	4	18	5
Classical	6	2	17	6
Religious radio	2	2	0	2
Jazz	1	2	0	1
Other	1	3	0	1
Total percent	100	100	100	100

Table 44

Have you ever obtained boating-related information from the Minnesota DNR web page (www.dnr.state.mn.us)?

(includes Cass Lake and class 1 to 4 lakes)

	Percent "Yes"
All boaters	42
Source of boater	
Public access	47
Commercial access	40
Riparian resident	39

REFERENCES

1. The regional boating studies are posted on the Minnesota Department of Natural Resources website at www.dnr.state.mn.us/aboutdnr/reports/index.html:
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   b. Boating in North Central Minnesota: Status in 1998 and Trends Since 1985.
   c. Boating in Central Minnesota: Status in 2001 and Trends Since 1987.
   d. Boating on the Minnesota Portion of Lake Superior, Summer 2002.
   e. Recreational Boating Study of the Mississippi River, Pools 4 to 9, Summer 2003. Study done in cooperation with Wisconsin DNR, USFWS, and USACE.
   f. Boating Trends on Lake Minnetonka, 1984 to 2004. Minnesota Department of Natural Resources, Office of Management and Budget Services. Study done in cooperation with the Lake Minnetonka Conservation District.
   g. Boating in West Central Minnesota: Status in 2005 and Trends Since 1986.

2. Minnesota Department of Administration, Minnesota Planning, State Demographic Center (MDA-SDC). 2002. Minnesota Population Projections 2000 to 2030.

3. Boating trend series:
   See reference 1, studies a, b, c, f, and g.
   Minnesota-Wisconsin Boundary Area Commission: Recreational boating studies (ever two years from 1983 to 1999) of the Lower St. Croix National Scenic Riverway.
   U.S. Department of Agriculture, Forest Service, Superior National Forest. Historical (1982 to present) May-September overnight permit data for the Boundary Waters Canoe Area Wilderness.

4. Minnesota Department of Natural Resources, License Bureau. Historical information on recreational boat registrations.

5. Trend series on nature-based outdoor recreation activities other than boating:
   National:
   USFWS and U.S. Census Bureau. National Survey of Fishing, Hunting and Wildlife-Associated Recreation. 2006 data are preliminary at this time (6/14/07).
   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; trail series are Gateway (1997 to 2003) and preliminary data for Paul Bunyan (1996 to 2007) and Heartland (1998 to 2007).

6. Schroeder, S. & Fulton D. C. 2005. Fishing in Minnesota: A Study of Angler Participation and Activities. University of Minnesota, Minnesota Cooperative Fish and Wildlife Research Unit, Department of Fisheries, Wildlife, and Conservation Biology.

7. U. S. Department of Commerce, Bureau of the Census (USBOC). Median household income estimate is a two year average for 2005-2006 and is expressed in 2006 dollars. See: www.census.gov/hhes/www/income/income06/statemhi2.html

APPENDIX A

Lakes in the Northern Study Area

Boating Lakes in the Northern Region (Priority A, B and C lakes)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
Very large individual lakes (all are Class 1)							
1	A	Cass	110203	LEECH	109,415	109415	Yes
1	A	Cass	110147 /310857/310926	WINNIBIGOSHISH/CUT FOOT/SUGAR	74,628	69821/ 3222/1585	(Fisheries creel)
1	A	Beltrami	40030	CASS	29,775	29775	Yes
Class 1: Large lakes, excluding those very large lakes above; all have trailer public access with concrete or earth ramp (priority A lakes over 2500 acres in size)							
1	A	Itasca	310532	POKEGAMA	15,600	15600	Yes
1	A	Itasca	310813	BOWSTRING	8,900	8900	Yes
1	A	Itasca	310812	BALL CLUB	4,951	4951	Yes
1	A	Cass	110415	PIKE BAY	4,820	4820	Yes
1	A	Itasca	310826 / 310824 /310834	SAND/PORTAGE/BIRDS EYE	4,680	3785 / 756 /139	Yes
1	A	Itasca	310392 /310410/310395/310394	WABANA/TROUT/BLUE WATER/LITTLE TROUT	4,372	2146 /1792/356/78	Yes
1	A	Itasca	310719	DEER	3,926	3926	Yes
1	A	Itasca	310896 /310874	ROUND /ALICE	3,004	2959 /45	Yes
1	A	Itasca	310576	BASS	2,844	2844	Yes
1	A	Itasca	310067	SWAN	2,615	2615	Yes
Class 2: Remaining priority A lakes; all have trailer public access with concrete or earth ramp.							
2	A	Itasca	310725	TURTLE	2,066	2066	
2	A	Itasca	310216	TROUT	1,953	1953	Yes
2	A	Itasca	310334	DEER	1,891	1891	
2	A	Cass	110504	STEAMBOAT	1,761	1761	Yes
2	A	Itasca	310554	SISEEBAKWET	1,350	1350	
2	A	Itasca	310850	LITTLE WINNIBIGOSHISH	1,287	1287	Yes
2	A	Itasca	310538	SPIDER	1,266	1266	
2	A	Cass	110146	SIX MILE	1,232	1232	Yes
2	A	Itasca	310722	MOOSE	1,140	1140	
2	A	Itasca	310717	RICE	959	959	Yes
2	A	Itasca	310653	NORTH STAR	907	907	
2	A	Itasca	310259 /310345	BALSAM /SCRAPPER	807	651 /156	Yes
2	A	Cass	110026	SUGAR	711	711	
2	A	Itasca	310784	LITTLE JESSIE	613	613	Yes
2	A	Itasca	310524	COON	595	595	
2	A	Cass	110488	THIRTEEN	552	552	Yes
2	A	Itasca	310084	SHALLOW	544	544	
2	A	Itasca	310624	GRAVE	538	538	Yes
2	A	Cass	110505	LITTLE WOLF	517	517	

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
Class 3: Priority B & C lakes over 150 acres in size that have a trailer public access with a concrete or earth ramp.							
3	B	Cass	110143	BOY	3,404	3404	
3	B	Itasca	310913	ISLAND	2,920	2920	
3	B	Itasca	310786	JESSIE	1,782	1782	
3	B	Cass	110204	PORTAGE	1,381	1381	Yes
3	B	Itasca	310852	LITTLE CUTFOOT SIOUX	1,357	1357	
3	B	Itasca	310353	SPLIT HAND	1,352	1352	
3	B	Itasca	310384	PRAIRIE	1,279	1279	
3	B	Itasca	310565 /310561	JAY GOULD/BLACKWATER	1,129	455 /674	
3	B	Cass	110493 /110494	WELSH/CROOKED	741	191 /550	
3	B	Cass	110313	SUCKER	598	598	
3	C	Itasca	310231 /310238	LAWRENCE/LOWER LAWRENCE	539	382 /157	
3	C	Itasca	310894	PIGEON DAM	511	511	Yes
3	B	Itasca	310726	BELLO	492	492	
3	B	Itasca	310339 /310197	PICKEREL/BATTLE	489	230 /259	
3	B	Itasca	310882	DORA	477	477	
3	B	Itasca	310779	LITTLE TURTLE	470	470	
3	B	Itasca	310843	WHITEFISH	461	461	
3	B	Itasca	310069	BUCK	459	459	
3	B	Itasca	310533	BLANDIN (MISS R RESEVOIR)	455	455	
3	B	Itasca	310586	JOHNSON	437	437	
3	B	Itasca	310268	ROUND	437	437	Yes
3	C	Itasca	310193	CROOKED	423	423	
3	B	Itasca	310051	STINGY	422	422	
3	B	Cass	110029	VERMILLION	408	408	
3	B	Cass	110086	GRAVE	400	400	
3	B	Itasca	310898	MOOSE	373	373	
3	B	Itasca	310480	GUNN	347	347	
3	C	Itasca	310157	BEAR	328	328	Yes
3	B	Itasca	310158	THISTLEDEW	317	317	
3	C	Itasca	310758	LITTLE BOWSTRING	314	314	
3	B	Itasca	310219 /310218 /310217	O'REILLEY/SHAMROCK/ISLAND	308	198 /52/ 58	
3	B	Itasca	310020	HART	303	303	
3	B	Itasca	310832	RUSH ISLAND	294	294	
3	C	Itasca	310893	LOWER PIGEON	293	293	
3	B	Itasca	310349 /310261	ANTLER/BEAVER	290	233 /57	
3	B	Itasca	310793	BIG TOO MUCH	280	280	Yes
3	B	Itasca	310613	LITTLE LONG	274	274	
3	B	Itasca	310413	BURROWS	272	272	
3	B	Itasca	310154	HARTLEY	271	271	
3	B	Itasca	310454	EAGLE	261	261	
3	B	Itasca	310610	LITTLE MOOSE	259	259	
3	B	Itasca	310141	SHOAL	259	259	
3	C	Itasca	310754	ISLAND	256	256	
3	B	Itasca	310190	TWIN LAKES	250	250	Yes
3	B	Itasca	310292	OWEN	248	248	
3	B	Itasca	310585	MCAVITY	247	247	

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
3	B	Itasca	310112	PANASA	247	247	
3	B	Itasca	310540	CLUBHOUSE	244	244	
3	B	Itasca	310341	LITTLE SPLIT HAND	243	243	
3	B	Itasca	310266	LONG	238	238	
3	B	Itasca	310530	BUSTIES	237	237	
3	B	Itasca	310773	MAPLE	235	235	Yes
3	B	Itasca	310656	BIG DICK	234	234	
3	B	Itasca	310775	NO-TA-SHE-BUN	232	232	
3	B	Itasca	310620	CARIBOU	222	222	
3	B	Itasca	310853	LITTLE SAND	222	222	
3	B	Itasca	310671	BIG ISLAND	220	220	
3	B	Itasca	310571	LOON	220	220	
3	B	Itasca	310422	RUBY	219	219	
3	C	Itasca	310028	BEAUTY	211	211	
3	B	Itasca	310124	BIG SUCKER	211	211	Yes
3	C	Itasca	310003	SOUTH STURGEON	209	209	
3	B	Itasca	310284	RADDISON	203	203	
3	C	Itasca	310093	LITTLE SAND	201	201	
3	C	Itasca	310111	UPPER PANASA	197	197	
3	C	Itasca	310032	O'BRIEN RESERVOIR	193	193	
3	B	Itasca	310317	LARSON	190	190	
3	C	Itasca	310822	LITTLE BALL CLUB	184	184	Yes
3	C	Itasca	310791	PETERSON	180	180	
3	B	Itasca	310424	BURNT SHANTY	174	174	
3	C	Itasca	310892	MIDDLE PIGEON	173	173	
3	B	Itasca	310438	SAND	172	172	
3	B	Itasca	310654	BURNS	171	171	
3	C	Itasca	310152	WOLF	168	168	
3	B	Itasca	310575	LITTLE BASS	158	158	
3	B	Itasca	310023	HELEN	157	157	Yes
3	B	Itasca	310150	SCOOTY	155	155	
Class 4: Priority B & C lakes over 150 acres in size that do not have a public access now, but, if the lake received an access, the access would be a trailer access with a concrete or earth ramp.							
4	C	Cass	110133	SWIFT	339	339	
4	C	Itasca	310350	ANDERSON	284	284	Yes
4	B	Itasca	310739	LEIGHTON	265	265	
4	B	Itasca	310771	HATCH	245	245	Yes
4	B	Itasca	310247	LOWER BALSAM	237	237	
4	B	Itasca	310463	FOX	233	233	Yes
4	C	Itasca	310839	BASS	202	202	
4	B	Itasca	310473	MARY	197	197	
4	B	Itasca	310597	AMEN	186	186	
4	C	Itasca	310829	CEDAR	181	181	Yes
4	B	Itasca	310490	ELIZABETH	180	180	
4	B	Itasca	310782	GUNDERSON	172	172	Yes
4	B	Itasca	310137	KENNEDY	163	163	

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
Class 5: Priority B & C lakes (from 10 to 250 or so acres in size) that have a carry-in public access or a small-boat earth-ramp public access.							
5	B	Itasca	310921	DIXON	666	666	
5	C	Itasca	310818	FIRST RIVER	401	401	
5	B	Itasca	310657	JACK THE HORSE	323	323	
5	C	Cass	110317	SUCKER	290	290	
5	B	Itasca	310687	JOHNSON	288	288	
5	C	Itasca	310258	KING	284	284	Yes
5	C	Itasca	310904	DUNBAR	273	273	
5	B	Itasca	310542	THREE ISLAND	227	227	
5	B	Itasca	310183	FIVE ISLAND	219	219	
5	B	Itasca	310670	BIG OLE	185	185	
5	B	Itasca	310749	CHASE	181	181	
5	B	Itasca	310650	SMITH	181	181	
5	C	Itasca	310555	SOUTH SUGAR	173	173	
5	B	Itasca	310255	SNAPTAIL	156	156	
5	B	Itasca	310616	EAST SMITH	146	146	Yes
5	B	Itasca	310227	HOLMAN	146	146	
5	B	Itasca	310192	NASHWAUK	146	146	
5	C	Itasca	310108	SNOWBALL	144	144	
5	C	Itasca	310156	LITTLE BEAR	142	142	
5	C	Itasca	310290	NAPOLEON	142	142	
5	B	Itasca	310566	LITTLE JAY GOULD	138	138	
5	C	Itasca	310845	CLEAR	137	137	
5	C	Itasca	310788	LA CROIX	137	137	
5	C	Itasca	310026	TWIN	131	131	
5	C	Itasca	310265	BLUEBILL	130	130	
5	B	Itasca	310805	ARROWHEAD	129	129	
5	C	Itasca	310373	HALE	127	127	
5	C	Itasca	310070	O'LEARY	124	124	Yes
5	B	Itasca	310781	LONG	121	121	
5	B	Itasca	310058	BEATRICE	119	119	
5	C	Itasca	310361	HALE	119	119	
5	B	Itasca	310570	LONG	117	117	
5	C	Itasca	310727	GRASS	116	116	
5	B	Itasca	310106	OX HIDE	114	114	
5	C	Itasca	310082	SAND	114	114	
5	C	Itasca	310602	PUGHOLE	113	113	
5	B	Itasca	310316	BASS	112	112	
5	C	Itasca	310120	MCCARTHY	112	112	
5	B	Itasca	310594	COTTONWOOD	109	109	Yes
5	B	Itasca	310803	TRESTLE	105	105	
5	B	Itasca	310543	CROOKED	103	103	
5	B	Itasca	310160	MIRROR	102	102	
5	C	Itasca	310417	NOSE	102	102	
5	C	Itasca	310481	HIGHLAND	98	98	
5	C	Itasca	310455	MINK	98	98	
5	C	Itasca	310622	DEAD HORSE	96	96	

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
5	B	Itasca	310587	ORANGE	96	96	
5	C	Itasca	310209	ROUND (CLEAR)	92	92	
5	C	Itasca	310798	EAST	92	92	
5	C	Itasca	310043	LONG	90	90	Yes
5	B	Itasca	310802	LAC-A-ROY	89	89	
5	C	Itasca	310175	BUTTON BOX (LONG)	86	86	
5	C	Itasca	310569	SNELLS	86	86	
5	C	Itasca	310289	LOST	85	85	
5	B	Itasca	310278	BARWISE	84	84	
5	C	Itasca	310605	LONG	81	81	
5	B	Itasca	310535	MOORE	81	81	
5	B	Itasca	310664	RANIER	81	81	
5	C	Itasca	310713	BUSTIC	78	78	
5	C	Itasca	310267	GUNNY SACK	78	78	
5	C	Itasca	310764	JINGO	78	78	Yes
5	B	Itasca	310162	LITTLE MOOSE	76	76	
5	C	Itasca	310544	CAMERON	73	73	
5	C	Itasca	310800	DAVID	73	73	
5	C	Itasca	310007	NEW	66	66	
5	B	Itasca	310645	KREMER	64	64	
5	C	Itasca	310096	LEMONADE	64	64	
5	C	Itasca	310912	WAGNER	63	63	
5	C	Itasca	310299	KELLY	62	62	
5	C	Itasca	310506	LAKE OF ISLES	62	62	
5	C	Itasca	310407	HAY	59	59	
5	C	Itasca	310837	NOMA	59	59	Yes
5	C	Itasca	310751	LITTLE DEER	57	57	
5	C	Itasca	310402	CLEARWATER (TADPOLE)	57	57	
5	C	Itasca	310017	BENGAL	51	51	
5	C	Itasca	310604	LAWRENCE	50	50	
5	B	Itasca	310866	SUNKEN	48	48	
5	C	Itasca	310637	DAY	46	46	
5	C	Itasca	310551	DINNER PAIL	46	46	
5	B	Itasca	310861	MOSOMO	44	44	
5	C	Itasca	310600	HILL	42	42	
5	B	Itasca	310372	CRYSTAL (ICE)	41	41	
5	C	Itasca	310374	FOREST	38	38	Yes
5	B	Itasca	310588	LITTLE HORN	38	38	
5	C	Itasca	310598	BIG HORN	30	30	
5	B	Itasca	310578	CLARKE	28	28	
5	C	Itasca	310649	DOCK	28	28	
5	C	Itasca	310437	SUNRISE	28	28	
5	B	Itasca	310804	HOLLAND	24	24	
5	C	Itasca	310444	MOONSHINE	24	24	
5	B	Itasca	310642	ADELE	22	22	
5	C	Itasca	310646	SURPRISE	22	22	
5	B	Itasca	310863	GREELEY	17	17	
5	B	Itasca	310599	LITTLE BEAR	13	13	
5	B	Itasca	310603	LUCKY	13	13	
5	B	Itasca	310470	NICKEL	13	13	Yes

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
Class 6: Priority B & C lakes (from 10 to 250 or so acres in size) that do not have a public access now, but, if the lake received an access, the access would be a carry-in or small-boat earth-ramp access.							
6	B	Itasca	310281	WASSON	404	404	
6	B	Cass	110490	PORTAGE	352	352	
6	B	Itasca	310318	COON	310	310	Yes
6	B	Itasca	310429	CUTAWAY	306	306	
6	B	Itasca	310696	HORSESHOE	267	267	
6	B	Itasca	310460	EAST	179	179	
6	B	Itasca	310609	FAWN	174	174	
6	B	Itasca	310147	BRAY	161	161	
6	B	Itasca	310514	BRUSH SHANTY	151	151	
6	C	Itasca	310260	WHITE SWAN	142	142	
6	C	Itasca	310797	LITTLE SPRING	139	139	
6	C	Itasca	310716	LITTLE RICE	137	137	
6	C	Itasca	310346	UPPER HANSON	133	133	
6	B	Itasca	310710	CONNORS	131	131	
6	C	Itasca	310789	SPRING	121	121	
6	B	Itasca	310230	BASS	118	118	
6	B	Itasca	310738	SPRING	115	115	
6	B	Itasca	310630	SHELLY	111	111	
6	B	Itasca	310196	POPLAR	110	110	
6	B	Itasca	310502	SLAUSEN	110	110	
6	C	Itasca	310022	LITTLE ISLAND	109	109	
6	B	Itasca	310704	BATSON	107	107	
6	C	Itasca	310370	MCKINNEY	104	104	Yes
6	C	Itasca	310416	BLACK ISLAND	103	103	
6	B	Itasca	310399	LITTLE WABANA	99	99	
6	C	Itasca	310048	LIBBY	96	96	
6	C	Itasca	310305	ANN	93	93	
6	B	Itasca	310484	BLANDIN	93	93	
6	C	Itasca	310531	MOUNTAIN ASH	93	93	
6	C	Itasca	310809	CROOKED	90	90	
6	C	Itasca	310750	LILLIAN	87	87	
6	C	Itasca	310908	UPPER PIGEON	86	86	
6	B	Itasca	310572	CAVANAUGH	84	84	
6	B	Itasca	310536	DOAN	84	84	
6	C	Itasca	310689	ISAAC	81	81	
6	C	Itasca	310127	TRESTLE	78	78	
6	B	Itasca	310513	GALE	73	73	
6	B	Itasca	310778	LITTLE TOO MUCH	73	73	
6	B	Itasca	310296	LONG	71	71	
6	B	Itasca	310621	LITTLE DEAD HORSE	70	70	
6	C	Itasca	310768	BIG ROSE	69	69	
6	B	Itasca	310155	HORSEHEAD	68	68	
6	C	Itasca	310240	IMKEY	65	65	Yes
6	C	Itasca	310478	PINE	65	65	
6	C	Itasca	310721	HANSEN	64	64	
6	B	Itasca	310344	HANSON	61	61	
6	B	Itasca	310459	LITTLE EAST	61	61	
6	B	Itasca	310720	POVERTY	60	60	

Boating Lakes in the Northern Region (Priority A, B and C lakes)(continued)

Lake Class	Water Access Priority Rating	County	Lake ID(s)	Lake Name(s)	Lake Acres (Total)	Lake Acres (Parts)	Sample Lake?
6	B	Itasca	310906	VIRGIN	58	58	
6	C	Itasca	310590	BEAVER	53	53	
6	C	Itasca	310686	BEVO	53	53	
6	C	Itasca	310456	ERWIN	53	53	
6	C	Itasca	310306	LITTLE ANTLER	53	53	
6	C	Itasca	310471	WHISKEY	53	53	
6	C	Itasca	310528	ROUND	52	52	
6	C	Itasca	310123	LITTLE MCCARTHY	51	51	
6	C	Itasca	310507	MARIE	49	49	
6	C	Itasca	310660	LITTLE RANIER	48	48	
6	C	Itasca	310487	LUM	48	48	
6	C	Itasca	310304	LYNX	48	48	
6	C	Itasca	310851	SCHOOL HOUSE	48	48	
6	C	Itasca	310412	WILLEYS	48	48	
6	C	Itasca	310608	OTTER	47	47	Yes
6	B	Itasca	310911	HAMREY	46	46	
6	C	Itasca	310767	LITTLE ROSE	46	46	
6	C	Itasca	310398	PICKEREL	43	43	
6	B	Itasca	310759	MAKI	41	41	
6	C	Itasca	310050	MONSON	41	41	
6	C	Itasca	310019	NAMELESS	39	39	
6	B	Itasca	310808	CRANE	38	38	
6	C	Itasca	310328	ELBOW	37	37	
6	C	Itasca	310140	HARRISON	34	34	
6	C	Itasca	310848	BEAVER	32	32	
6	C	Itasca	310936	LITTLE DIXON	31	31	
6	C	Itasca	310679	LITTLE SMITH	31	31	
6	B	Itasca	310188	LORRAINE	31	31	
6	C	Itasca	310537	CHARLOTTE	30	30	
6	C	Itasca	310663	FOREST	29	29	
6	C	Itasca	310760	MCDONALD	29	29	
6	C	Itasca	310539	COPENHAGEN	28	28	
6	C	Itasca	310612	DOAM	27	27	
6	C	Itasca	310783	ELBOW	27	27	Yes
6	C	Itasca	310479	LITTLE CLUBHOUSE	27	27	
6	C	Itasca	310623	BOY	26	26	
6	C	Itasca	310677	HOLE IN WALL	22	22	
6	B	Itasca	310171	CRUM	21	21	
6	C	Itasca	310607	GREEN	21	21	
6	B	Itasca	310254	ISAAC'S	20	20	
6	C	Itasca	310648	ROLAND	20	20	
6	C	Itasca	310628		20	20	
6	C	Itasca	310647	CIRCLE	18	18	
6	B	Itasca	310195	POTATO	18	18	
6	C	Itasca	310695	PELTON	17	17	
6	C	Itasca	310092	PUMP	17	17	
6	B	Itasca	310182	BLUE RIDGE	15	15	
6	C	Itasca	310638	BEAVER	13	13	
6	C	Itasca	310584	PERCH	13	13	
6	C	Itasca	310933	NORTH UPPER TWIN	11	11	
6	C	Itasca	310006		11	11	
6	B	Itasca	310338	LORRAINE	10	10	