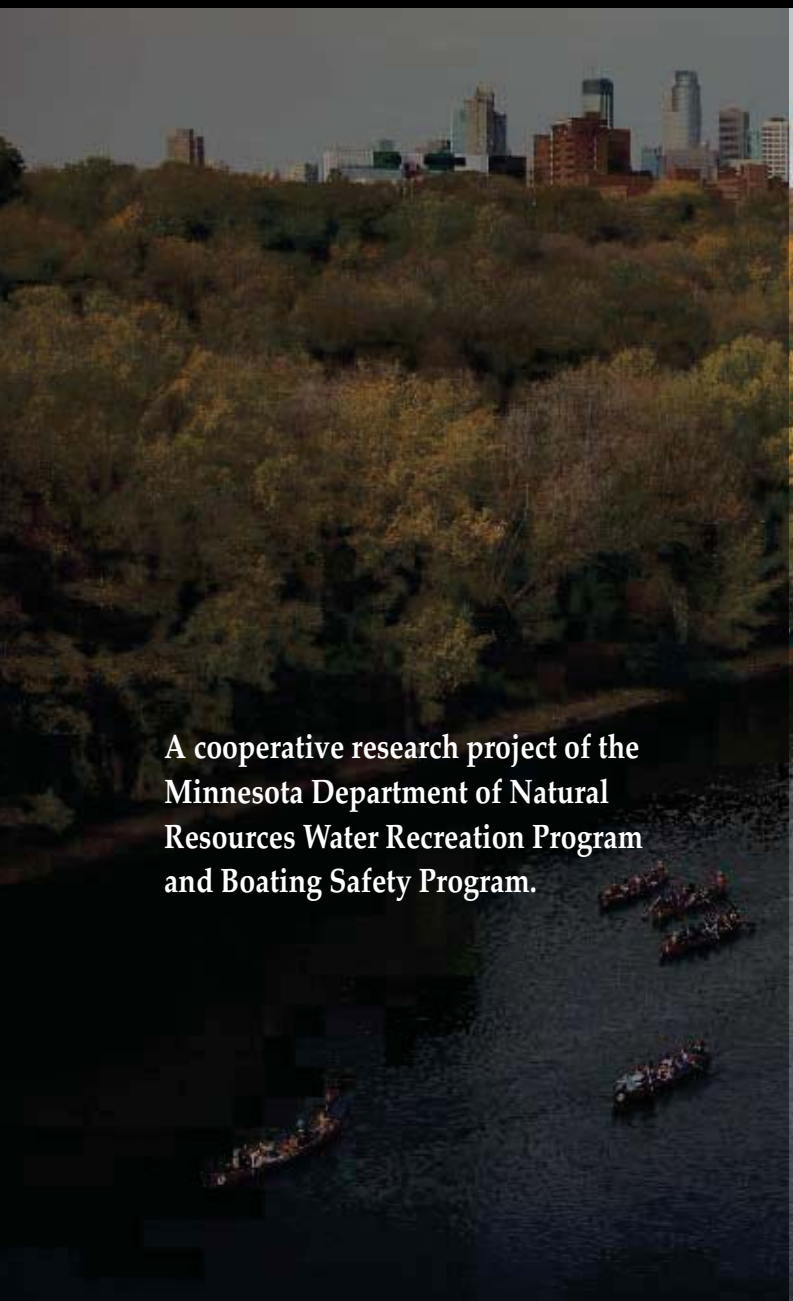
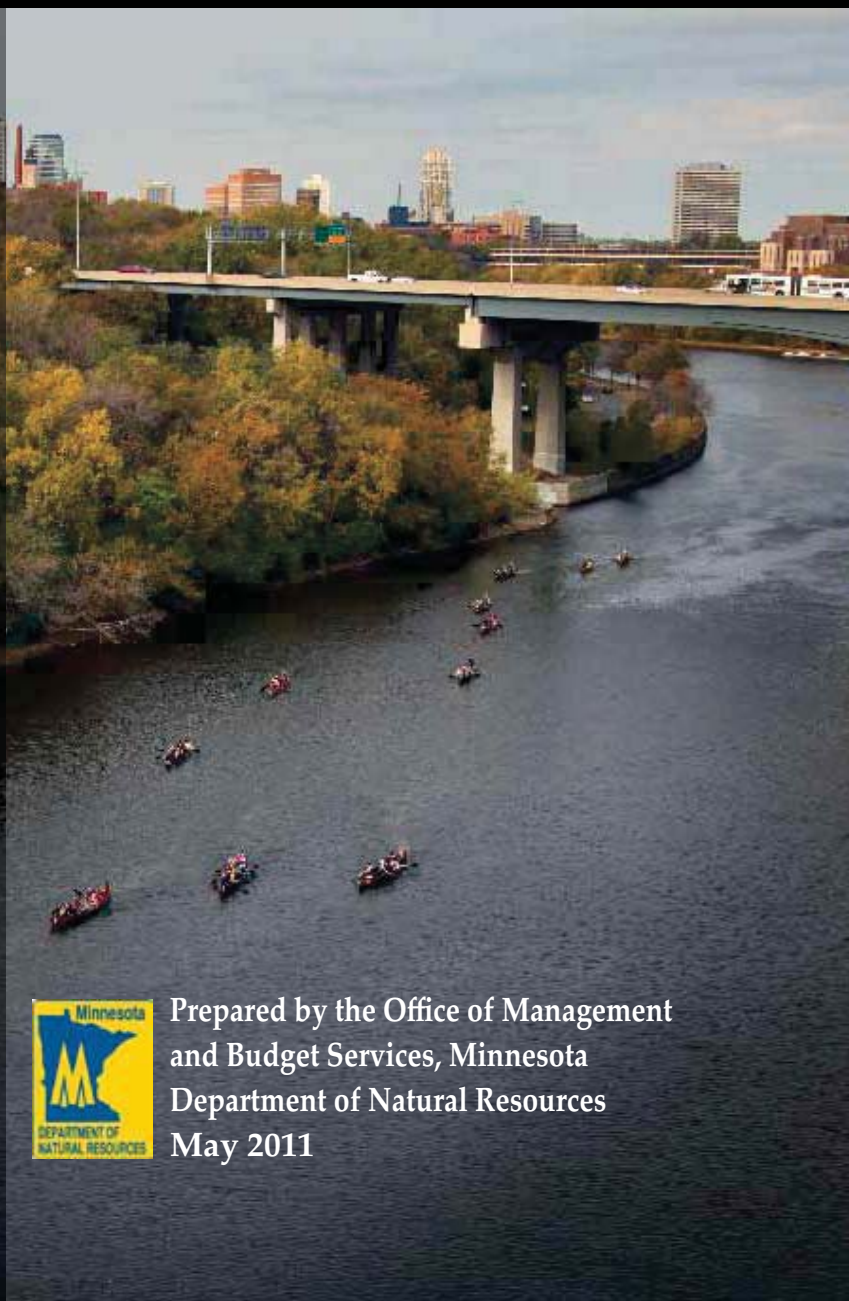
Boating in the Twin Cities Metropolitan Area:

Status in 2009 and Trends from 1984



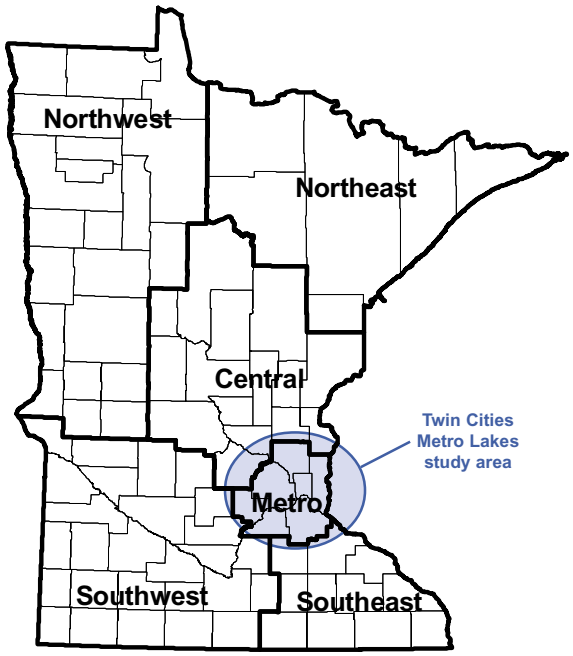


A cooperative research project of the Minnesota Department of Natural Resources Water Recreation Program and Boating Safety Program.

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

May 2011

BOATING IN TWIN CITIES METROPOLITAN AREA: STATUS IN 2009 AND TRENDS FROM 1984



The 2009 Twin Cities Boating Study was a cooperative research project of the Minnesota Department of Natural Resources Water Recreation Program and Boating Safety Program

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May 2011

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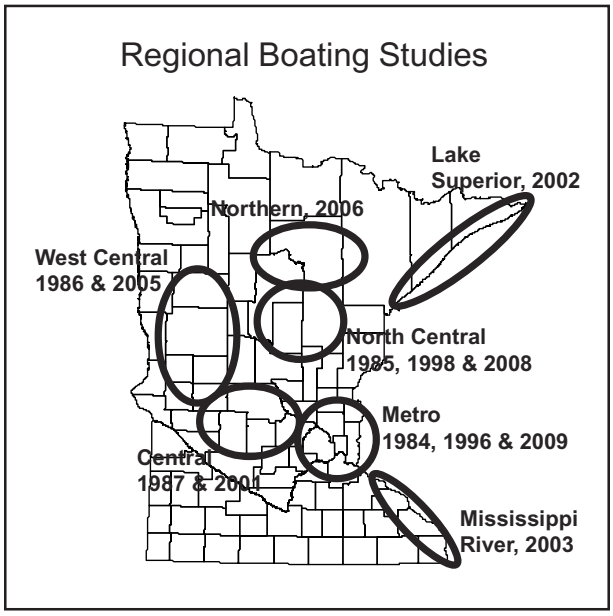
SUMMARY

INTRODUCTION

Minnesotans are avid boaters, as evidenced by the state having the highest per-capita boat ownership in the nation. About half of Minnesota's boaters live in the Twin Cities metropolitan area. Twin Cities' boaters find the nearby lakes and rivers convenient and enjoyable places for after-work and weekend outings. Boating on Twin Cities' waters, however, is different than boating in other parts of the state. It is more congested and, as a result, more regulated. In short, the experience of boating in the metropolitan area is distinctive.



The Twin Cities metropolitan area is the location of one of several regional boating studies. It has been studied twice in the past (1984 and 1996). The regional studies provide descriptions of how recreational boating varies from region to region, and is changing over time. Specific boating trends were found in previous studies, and the current study will provide further evidence of the general nature of many of these trends.

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

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

This study is an update of studies done in 1984 and 1996, and comparisons with previous studies are presented throughout the report. Two Minnesota DNR programs provided resources for this study: water recreation and boating safety.

BOAT NUMBERS AND SOURCES

Prior to the discussion on boat numbers and sources, it is important to put the lake levels of the studies into perspective, because they may have had an effect on the results of the 2009 study.

In the first two studies of 1984 and 1996, lake levels are generally near or above normal. In contrast, levels are anomalously low in 2009. For the six study lakes with 30 years of record, 2009 is the lowest year for the lakes combined. Particularly low are lakes in the eastern part of the metro area. Minnetonka is low, but not exceptionally low compared with the other lakes.

There are two results of the 2009 study that lake levels may have influenced: (1) the contribution of public accesses to total boating fell from 1996 to 2009 for lakes other than Minnetonka, and (2) total boating fell from 1996 to 2009 for lakes other than Minnetonka. It is known from study field staff and from public-access boater surveys that launching was difficult at some accesses in 2009. To what extent this affected overall public access use, however, is not known. Nor is it known whether poor public access launch conditions deterred some boaters from using metro lakes and resulted in lower overall boating levels. Thus, the two conclusions noted above are stated as "tentative."

The Twin Cities region has nearly 58,000 acres of boating water on 102 lakes. These lakes are the major recreational boating and fishing waters of the region. The larger lakes (e.g., Minnetonka, other large boating lakes) tend to have a higher intensity of boating than the smaller lakes, and urban lakes are used more intensely than rural lakes. Lakes without public access are used the least intensively. Overall, lakes in the Twin Cities are used 3 to 10 times more intensely than lakes in the other regions, which are less urban and more rural in character.

Most of the lakes (85%) are accessible through public access in 2009. This is up from 72 percent in 1984. Twelve lakes have received a public access since 1984. In 2009, 15 lakes did not have a public access. Public accesses serve over 90 percent of the water area of the lakes.

Over time, the trend has been to lower boating intensities both on Lake Minnetonka and on other metro lakes. Minnetonka first experienced a statistically significant drop in boating use from the 1980s in 2004, and the 2009 study corroborated those results. For other metro lakes, the overall trend from 1984 to 2009 is a statistically significant decline, but the shorter-term trends (1984 to 1996, and 1996 to 2009) are not. As noted above in the lake-level discussion, this decline on lakes other than Minnetonka is tentative, because it may have been affected by low lake levels.

In addition to the Twin Cities boating-use trends, five other use trends exist in Minnesota. And all of the trend series lead to the same general conclusion on the direction of boating-use: boating is stable to decreasing.

The public access contribution to total boating on Lake Minnetonka increased since the 1980s. On lakes other than Minnetonka, the portion of boats from public access increased from 1984 to 1996 and decreased from 1996 to 2009. The decrease was unexpected. In other regional boating studies, public access contribution is stable to increasing, similar to what is found on Lake

Minnetonka and other Twin Cities lakes between 1984 and 1996. As noted previously, low lake levels in 2009 may have affected public access use. Because of these low lake levels, the public access decrease from 1996 to 2009 is judged as tentative.

THE BOATING EXPERIENCE

Boaters place high importance on obtaining certain experiences while boating. Attaining these experiences represents the underlying motivations for the trip. Of highest importance are relaxing with family/friends in an enjoyable natural setting that is away from crowds. Anglers—not surprisingly—rank the importance of "catching some fish" more highly than other boaters, and it is ranked just above relaxing with family and friends. These results are virtually the same as found in the Northern and North Central regions, which are the two other studies that included this motivation question.

Boater trip satisfaction is high in the Twin Cites: about half (48%) of all boaters report being "very satisfied" with their outing, while another 44 percent report being "satisfied". Only 8 percent are "dissatisfied" to any extent. Lake Minnetonka boaters report the highest satisfaction, well above boaters on the other metro lakes. Boater trip satisfaction increased from 1996 to 2009, led upward largely by the satisfaction increase on Minnetonka. Satisfaction changed little on other Twin Cities lakes. In 1996, trip satisfaction levels were more similar for Minnetonka and other metro lakes.

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

In the survey, boaters are asked to judge whether they experienced problems with other boaters on their trip. Of the 13 potential problems shared between the Minnetonka study in 2004 and this 2009 study for other Twin Cities lakes, none is judged by a majority of boaters as a "moderate", "serious" or "very serious" problem. Although not judged by a majority of boaters as a "moderate" or greater problem, three problems are clearly reported as the most severe: "careless or inconsiderate operation of boats", "high wakes", and "use of personal watercraft (jet skis)." All three receive just over 25 percent "moderate" or more serious responses. Minnetonka has one additional leading problem: "boats operating too fast, too close to shore/docks."

The pattern of problem identification changed from 1996. In 1996, "use of personal watercraft (jet skis)" was by far the leading problem. Over time it decreased in problem severity, while today's two other leading problems ("careless or inconsiderate operation of boats" and "high wakes") rose in severity. In all the other regional boating studies, the "use of personal watercraft (jet skis)" is the leading problem.

Most boaters (78%) did not encounter "too many boats" on their trip, while 20 percent did. The prevalence of encountering "too many boats" is higher for the more intensely used lakes: Lake Minnetonka and the remaining large lakes. Overall perceptions of "too many boats" have not changed a great deal since 1996, except on Lake Minnetonka, where perceptions decreased considerably. Perhaps this decrease is related to the drop in number of boats on the water.

PUBLIC ACCESS FACILITIES

Boaters generally give high marks to public access facilities. Overall, positive ratings ("good" to "excellent") comprise nearly 80 percent (78%) of boater ratings. Lake Minnetonka ratings are well above the other lake classes, and these other classes have a relatively high proportion (over 25%) of mediocre to poor ratings.

Minnetonka ratings have increased sharply since 1996, while ratings on the other lakes have not changed markedly. Many boaters on these other Twin Cities lakes had problems with low water levels in 2009, and experiencing a problem lowers ratings considerably. The Lake Minnetonka rating increase actually occurred between a 2000 and 2004 study. The reason for the timing of this sharp increase in Minnetonka ratings is not fully known, but the increase is probably due — in large measure — to the opening of the large Grays Bay Access in 2003 and closing of two smaller accesses on the same part of the Lake. The Grays Bay Access is a well-designed facility that can accommodate the large boats that access users are trailering today. In 2000 and prior studies, public access ratings on Lake Minnetonka are more similar to other metro lakes.

Nearly 30 percent of boaters (28% to 29%) reported that they had a problem in the use of the access facility. The specific problem boaters identified on metro lakes other than Minnetonka is primarily due to low water levels; one in five boaters had a problem with shallow water. The next most frequently identified problem was "not enough parking spaces." On Minnetonka, parking spaces is by far the leading problem. No other problem on Minnetonka or on the other lakes is indicated by 5 percent or more of access users.

When public access boaters were asked what improvements are needed at the facilities, the top-ranked improvement is a high-ranked use problem: providing more parking spaces in the access lot. This is followed by the provision of trash containers. There is no other improvement for Minnetonka or other metro lakes that is identified by 20 percent or more of users.

Nearly all public access users on Lake Minnetonka and other metro lakes (97% to 99%, depending on lake class) fit the profile of a traditional user: a boater who neither owns a home on the lake nor is a guest at a resort/private campground on the lake. In other regional boating studies, the traditional user is not nearly as dominant.

A large portion of public access users (57% overall) have at some time in their past found a public access parking lot full on the lake they were surveyed. On average, this happened two to three times (median) in the last year. Most of them were able to find a way to boat that day. They either went to another lake, parked on the road, waited for a place in the lot to open up, or went to another access on the lake. However, 15 percent indicate there are occasions when they did not boat that day, which is a higher percent than found in other studies (e.g., is 6% in 2008 North Central study, and 2% in 2005 West Central study).

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

were surveyed. Overall, from these perceived-need results, it appears that the majority of boaters, including a majority of public access boaters, feel well supplied by current public access facilities.

For the lake at which they were surveyed, 13 percent of all Lake Minnetonka and other metro lake boaters think more public access is needed, while a majority (73% to 77%) do not. Public access boaters are more likely to indicate a need for additional access (27% on Lake Minnetonka and 17% other metro lakes), but still most do not see a need for more access (60% Minnetonka and 71% other metro lakes). Few riparian residents see a need for more access (under 5%).

Results are similar for the perceived need for additional public accesses within 50 miles of the lake at which boaters were surveyed, except that more boaters are uncertain of the need (expressed in the more frequent "don't know" responses). Overall, some 17 percent of all boaters on lakes other than Minnetonka thought additional public access is needed on a lake within 50 miles of where they were surveyed, 46 percent did not think additional access is needed, and 31 percent are uncertain. Public access boaters are more likely to indicate a need for additional access (24%), but most do not see a need or are uncertain. Few riparian residents (under 5%) see a need for more access. Overall, the pattern of these results is close to that found in the North Central, Central, West Central, and Northern lake regions.

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

Power loading (driving the boat unto the trailer) can cause problems at public accesses, including scouring a hole and building a ridge off the end of the ramp. Boaters do not judge the severity of problems caused by power loading as very severe. The majority (including those who did not power load on this trip) indicate that this practice is "not a problem". Similar responses to this question are found in the three other studies in which it was asked (North Central, West Central, and Northern lake region studies).

When asked about the importance of nine facilities/services at public accesses, three are of highest importance: a dock to aid launching/landing, toilets, and a lake map with boating restrictions. For all three of these, a majority of boaters judge the item as "very important."

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

Few public-access boaters (3% overall) responded they have a disability that affects when or where they boat. Reported disabilities include: artificial limb and joint, bad back, low lung capacity, poor circulation, hearing impaired, and a boating party member with limited mobility. Most (73%) found the access adequate for their needs, though some did not (27%). Of the six boaters who

judged the access inadequate for their needs, three gave these reasons: a handicapped parking spot was not available, and (for two surveys) it was too long a walk from the parking spot to the launch site. These latter two boaters did not park in a handicapped spot; one boater wrote in that he/she did not have a handicapped sticker.

BOATING SAFETY AND ENFORCEMENT

Special boating restrictions are common on the sample lakes of the study. Eighteen of the 29 sample lakes (62% of the lakes) have a restriction. The most common type of restriction is slow-no wake/speed. Boater awareness of this most common restriction is high on Lake Minnetonka, and substantially lower on the other metro lakes.

When asked what special boating restrictions are needed for the lake, responses vary considerably by boating resource. On Lake Minnetonka, most boaters (66%) think that speed restrictions/quiet waters are needed, and a nearly half (47%) think there should be special restrictions for personal watercraft (jet skis). In contrast, for the other metro lakes, the most common response was "none" for special restrictions needed. Following "none", the highest-ranked restrictions needed on other metro lakes are for personal watercraft (jet skis) and speed restrictions/quiet waters.

Enforcement officers are seen by 46 percent of boaters on Lake Minnetonka and 20 percent on other metro lakes. These are up since 1996, when 34 percent of boaters saw and officer on Minnetonka and 15 percent saw an officer on other metro lakes.

Between 1 and 2 percent of boaters report being checked by an enforcement officer. Boaters checked by an enforcement officer give high marks to the officer's professional conduct. Positive ratings of "good" to "excellent" are reported by 89 to 98 percent of boaters. Few negative ratings (3% to 11%) are reported.

Formal boating safety courses have been completed by 40 percent of Lake Minnetonka boaters and 26 percent of boaters on other metro lakes. In other boating regions, the percent having completed such a course tends to be lower (18% to 22% for North Central, West Central, Northern, and Central regions). Metro boaters today are no more likely to have completed a boating safety course than boaters in the past, extending back to 1984.

When asked whether all motorboat operators should complete a safety course, 40 to 49 percent respond "yes". Some three-fourths of boaters having completed a formal safety course believe motorboaters should be required to complete such a course.

Since the 1984 Twin Cities study, Minnesota enacted a law that makes it illegal to operate a motorboat after consuming too much alcohol, very much like the alcohol restrictions on driving an automobile. In 2004-09 period, 46 percent of Minnetonka boaters and 23 percent of boaters on other metro lakes report having some type of alcoholic drinks on board during their trip. Most boaters have no alcohol on the boat: either they have only non-alcoholic drinks on board, or have

no drinks of any type. Riparian residents are more likely than boaters from public and commercial accesses to have no drinks on board.

The portion of boaters with alcoholic drinks on board increased from 1996 on Lake Minnetonka (35% to 46%), and stayed the same on other metro lakes (23% in both study years). The Minnetonka results are high relative to other boating regions, while the results for other metro lakes are more similar. The portion of boaters in the Central region with alcohol on board is 21 percent, in the West Central region is 22 percent, in the Northern region is 27 percent, and in the North Central region is 31 percent.

CHARACTERISTICS OF THE BOATING TRIP

There are two main activities on Twin Cities lakes: boating ride/swimming, and fishing. The former is the larger overall and on Lake Minnetonka, while the latter is larger on other metro lakes. Activities have changed since 1984. The major changes are a rise in boat ride/swimming and a drop in tubing/water skiing. Also decreasing are the two predominate non-motorized activities: sailing and canoeing/kayaking.

The increase in boat ride/swimming is of a general nature, with similar results in the three other regional boating studies. Two of the three other regional studies show a modest decrease in tubing/water skiing; the remaining study has no change in tubing/water skiing. The other regional studies, however, show a sizable decrease in fishing since the 1980s, which is not found in the Twin Cities region. In the 1980s, The Twin Cities region had substantially less fishing as a percent of boating than the other regions. Although the between-region fishing gap has closed, the Twin Cities still has the least fishing.

The types of craft most used for boating are runabouts and fishing boats, followed by pontoons and cruisers (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. Cruisers are only common on Lake Minnetonka, and non-motorized craft (canoe/kayak, sailboat) are most common on built-up area lakes, some of which are zoned non-motorized.

Craft types have changed since 1996. The primary changes are an increase in runabouts and a decrease in fishing boats. Smaller changes are evident for the other craft types. These craft changes are of a general nature, and are found in the other regional boating studies.

Boat lengths now average 19 to 20 feet. Average lengths are nearly 23 feet on Lake Minnetonka, and 17 to 18 feet on other metro lakes. Motor sizes average over 100 horsepower and are nearly 200 horsepower on Lake Minnetonka. Both craft length and motor sizes have increased. Lengths are up nearly two feet since 1996, and motor sizes are up 36 horsepower since 1996 (60 horsepower since 1984). These changes in the length and horsepower of boats are part of a general trend that is evident in the other regional boating studies.

Boaters launching through public access are primarily locals, nearly 90 percent of whom (88%) are within 25 miles of home. The use of the accesses by long-distance travelers is rare. Similarly, public accesses are mainly a local-use facility in the Central and Northern region. Public accesses, however, are primarily a tourist facility in the North Central and West Central region, which are two of Minnesota's major water-related tourist destination areas.

Most boating party sizes are three to four people, and are largest on Lake Minnetonka. On lakes other than Minnetonka, adults comprise 70 to 75 percent of boaters, while teens and children comprise 25 to 30 percent. Riparian resident boaters tend to be older than public access boaters, especially in the 55 and over age bracket.

A typical boating trip lasts 2.5 to 4 hours. Boaters launching at public access have longer trip lengths: median length of a public access trip is 4 hours, and is 2 to 2.5 hours for riparian residents.

BOATER CHARACTERISTICS

Boaters, as a group, are familiar with the lake at which they were surveyed. Overall, half have been boating for 10 or more years on the lake, and only 11 percent were recent arrivals to the lake. Riparian residents have a longer boating history (median of near 20 years) than public access boaters (median of 5 to 10 years).

Most Twin Cities boaters (91%) live in the seven-county metropolitan area. Few are from out of state.

Boaters on lakes other than Minnetonka report a median annual household income between $75,000 and $100,000 , which is above the statewide median of about $55,000. Minnetonka boaters have a median income above $100,000. Riparian resident boaters have the higher incomes than public access boaters.

For the purposes of getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. The predominant type of radio station listened to is rock and roll, followed by talk, country, public radio, and easy listening/lite. Overall, the Minnesota DNR website has been used by a majority of boaters to obtain boating-related information. Public access boaters are more likely than riparian resident boaters to use the website (62% versus 48%, respectively).

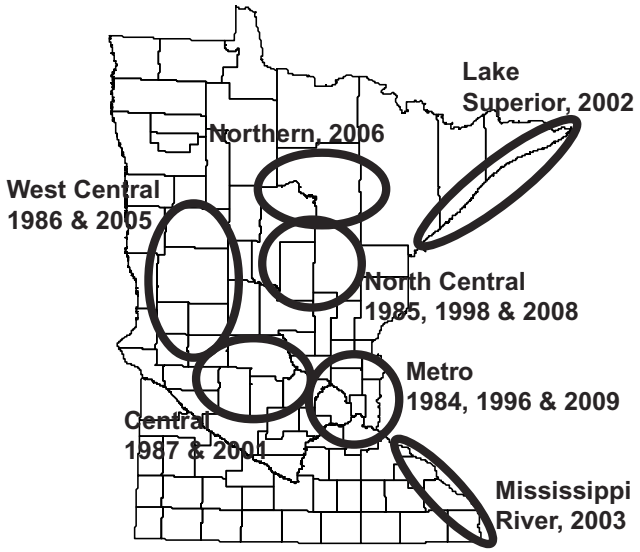
INTRODUCTION

Minnesotans are avid boaters, as evidenced by the state having the highest per-capita boat ownership in the nation (USCG, 2010; USBOC, 2010). About half of Minnesota's boaters live in the Twin Cities metropolitan area (MNDNR, 2005a). Twin Cities' boaters find the nearby lakes and rivers convenient and enjoyable places for after-work and weekend outings. Boating on Twin Cities' waters, however, is different than boating in other parts of the state. The primary difference is the large number of Twin Cities' boaters compared with the size of the water resource. Lake and river boating in the metropolitan area is more congested and, as a result, more regulated than in other parts of the state. In short, the experience of boating in the metropolitan area is distinctive. A principal goal of this 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.

The Twin Cities metropolitan area is the location of one of several regional boating studies (Figure 1 — for study references, see "Regional Boating Studies" in Reference section). It has been studied twice in the past (1984 and 1996). Only one other region (North Central) has been studied three times. The regional studies provide descriptions of how recreational boating varies from region to region, and is changing over time. Specific boating trends were found in previous studies, and the current study will provide further evidence of the general nature of many of these boating trends.

Figure 1

Regional Boating Studies



This boating study has three broad goals: (1) describe the boating experience, which includes boating activities, perceptions of conditions on the water, and safety and enforcement concerns; (2) measure the total number of boats on lakes

and trace those boats to their means of access; and (3) provide information to guide public access programs by assessing the use of these facilities and evaluating their quality through boater surveys. This study is an update of studies done in 1984 and 1996, and comparisons with previous studies are presented throughout the report.

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

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

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

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

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

- Boat numbers and sources of boats;
- Perception of boating experience, including trip satisfaction, on-water problems, and crowding;
- Perception of public accesses, including quality, use problems, improvements needed, and desire for additional access;

- Boating safety and enforcement, including boating restrictions, enforcement presence, safety courses, beverages consumed on boats, and safety equipment;
- Characteristics of the boating trip, including boating activities, and boating equipment; and
- Boater characteristics.

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

METHODOLOGY

The multiple goals of the metropolitan boating study are accomplished with a variety of information collection techniques. Lakes in the Twin Cities area have been classified according to resource size, location with respect to settlement patterns (built-up or rural areas), and whether the lake has a free public access. The five classes are:

Lake Minnetonka (has public access)
Remaining large (high-use) boating lakes (all have public access)
Lakes with public access in the densely settled built-up portion of the Twin Cities (approximated by the urbanized area on Figure 2)
Rural area lakes with public access (near fringe or outside the urbanized area on Figure 2)
Lakes without public access (both in built-up and rural areas).

Within most classes, a sample of the lakes is taken for study (see Appendix A for a listing of sample lakes, as well as the remaining lakes that comprised the principal water recreation resource). A complete census, however, of the large boating lakes is taken for the study (Table 1). The 2009 and 1996 studies have the same sample lakes. For each sample lake, boats in use (including those anchored and beached) are counted and classified by type from the air. Boat counts are made at peak boating times: in the afternoon on weekend/holidays and early evening on weekdays. Aerial observation (including photographs) is also used to measure the contribution of different means of access to boating numbers (means of access are riparian residents, and public and commercial access). Aerial measurements made on sample lakes for a class are expanded to population estimates based on the water surface area of all the lakes in the class.

Figure 2

Metro Boating Study Lakes & Rivers

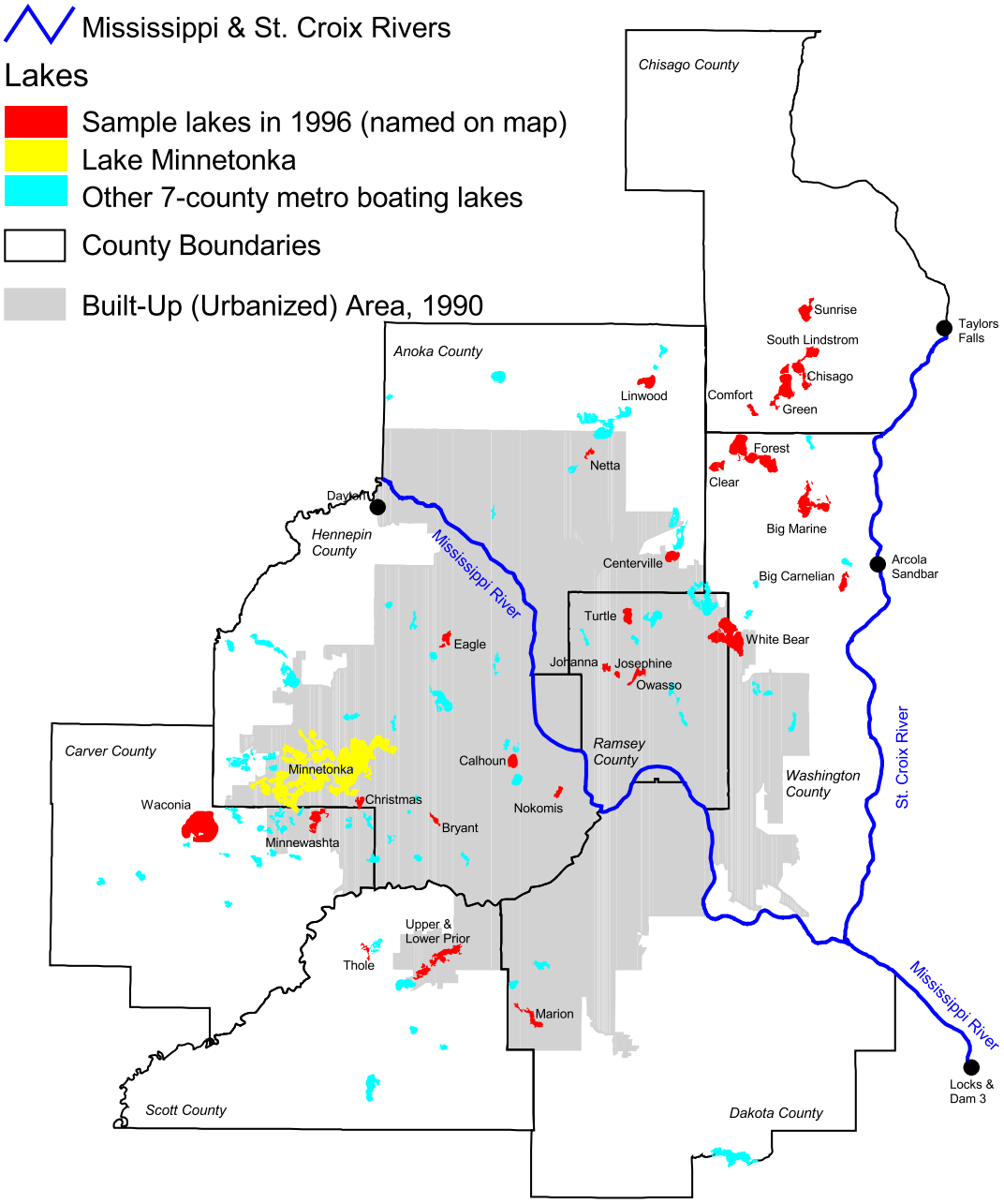


Table 1

Boating waters of the Twin Cities metro area for 2009 (and 1996) study
(includes 100+ acre metro lakes and five sample lakes in southern Chisago County)

Lake category	*Sample lakes* Number	*Sample lakes* Acres	*Total lakes* Number	*Total lakes* Acres
● Lake Minnetonka	1	14,034	1	14,034
● Remaining large boating lakes (all have public access)	5	5,896	5	5,896
● Built-up area lakes with public access	9	2,683	35	9,209
● Rural area lakes with public access	12	11,541	45	24,585
● Lakes without public access	2	972	16	3,962
Total	29	35,126	102	57,686

To save money on the 2009 study, some data from a recent 2004 Minnetonka boating study (MNDNR, 2005b) is used with 2009 information for other metro lakes. All the Minnetonka boater surveys come from 2004, and weekday flights were not conducted in 2009. The only item updated for Minnetonka in 2009 is the weekend/holiday boat counts. The 2004 Minnetonka weekend/holiday boat counts were statistically lower than in previous years, and the 2009 counts are conducted to provide a check on those results.

Also to save money, the commercial source of boaters (marinas and private accesses) were not studied on lakes other than Minnetonka, because they are a small source of boaters (some 10 percent in 1996).

In 2009, 8 weekend/holiday and 4 weekday flights were conducted; as noted above, weekday flights were not conducted on Minnetonka (Table 2). Nearly 1000 surveys were collected for public access and riparian resident boaters in 2004 (Minnetonka) and 2009 (other metro lakes).

All of the surveys are self-administered mail surveys. At public accesses on the sample lakes, surveys are conducted using in-person, hand-off and mail-back surveys. When intercepted, the public access boater is asked for a name and address, which is used for a second mailing to non-respondents.

Table 2

Boat-count flights and boater surveys in studies during the period from Memorial Day weekend to Labor Day

Item	1984 study	1996 study (only lake data)	2009 study
BOAT-COUNT FLIGHTS			
Number of aerial boat-count flights			
Weekend/holiday flights	4 to 6 (depending on lake)	12 Minnetonka; 7 other lakes	8
Weekday flights	3	8 Minnetonka; 7 other lakes	0 Minnetonka; 4 other lakes
Total flights	7 to 9 (depending on lake)	20 Minnetonka; 14 other lakes	8 Minnetonka; 12 other lakes
BOATER SURVEYS			
Survey method			*(2004 surveys for Minnetonka)*
Public access boaters	In-person interview	In-person interview	Mail-back survey
Commercial access boaters	In-person interview	In-person interview	Mail-back survey (only Minnetonka)
Municipal docks	(not surveyed)	(not surveyed)	Mail-back survey (only Minnetonka)
Riparian residents	In-person interview	Mail-back survey	Mail-back survey
Number of completed surveys			
Public access	1279	1139	970
Commercial access	81	755	291
Municipal docks	-----	-----	276
Riparian resident	691	1088	972
Total completed surveys	2051	2982	2509
Survey return rates			
Public access	(not applicable)	(not applicable)	60%
Commercial access			52% (no second mailing)
Municipal docks			61%
Riparian resident		63%	61%
Overall return rate		63%	60%

Riparian residents on the sample lakes are surveyed by mail. Riparian resident names and addresses are gathered from property records. Municipal dock boater names and addresses are obtained from the cities with such docks (Minnetonka only). And marina boaters are reached in one of two ways (Minnetonka only). Some marina owners are provided prepackaged, pre-stamped surveys — absent only a mailing label — to distribute to their members. Marina operators add a mailing label and drop the surveys in the mail. Other marina operators provide mailing labels with the members' names and addresses.

Survey return rates are near 60 percent for all efforts, except marina boaters. Marina boaters had just one mailing, while other boaters had a second mailing to non-respondents.

Surveys are conducted on both weekdays and weekends and holidays. To ensure that the opinions of one group of boaters are not over- or under-represented when combined with another group, survey results are weighted by the estimated contribution to total boating of a lake classes, means of access (public access, riparian residence, municipal dock, and commercial access), and day of week (weekend/holidays and weekdays).

The 2009 study attempted to produce comparable data with the 1984 and 1996 study for trend assessment purposes. In some instances, however, some particulars precluded comparability. These are noted in the text when they are encountered.

With respect of comparability, it is important to note that the 1984 and some of the 1996 boater information were obtained through in-person interviews (Table 2), and this makes comparisons with 2009 difficult for certain question types. The major comparison difficulty is when the answer to the question would provide negative information about their boating experience (e.g., Did you have problems with other boaters on this trip?). In a face-to-face interview, respondents are hesitant to share bad news, so the results are biased in a positive way compared with a mail survey (Dillman et al., 2009).

Lake Minnetonka has been studied more frequently than other lakes in the Twin Cities area, and all of these studies are used at times to depict boating trends (Table 3).

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

Table 3

Lake Minnetonka Recreational Boating Studies
(all studies extend from Memorial Day weekend to Labor Day)

Year	Aerial Boat Counts	Boater Surveys	Funder*	Comments
1984	Weekend/holiday and weekday counts	Surveys of boaters from public access, commercial access, and lake homes	MNDNR	Part of a larger Twin Cities boating study
1986	Weekend/holiday counts		LMCD	
1987	Weekend/holiday counts		LMCD	
1992	Weekend/holiday and weekday counts	Surveys of boaters from public access, commercial access, and lake homes	LMCD & MNDNR	
1994	Weekend/holiday counts		LMCD & MNDNR	
1996	Weekend/holiday and weekday counts	Surveys of boaters from public access, commercial access, and lake homes	LMCD & MNDNR	Coordinated with a larger Twin Cities boating study
1998	Weekend/holiday counts		LMCD & MNDNR	
2000	Weekend/holiday and weekday counts	Surveys of boaters from public access, commercial access, and lake homes	LMCD & MNDNR	
2004	Weekend/holiday and weekday counts	Surveys of boaters from public access, commercial access, lake homes, and municipal docks	LMCD & MNDNR	
2009	Weekend/holiday counts	No surveys	MNDNR	Aerial counts part of larger Twin Cities boating study

*MN DNR: Minnesota Department of Natural Resouces
LMCD: Lake Minnetonka Conservation District

BOAT NUMBERS AND SOURCES

Lake Levels in the Boating Studies

Prior to the discussion on boat numbers and sources, it is important to put the lake levels of the studies into perspective, because they may have had an effect on the results of the 2009 study.

In the first two studies of 1984 and 1996, lake levels are generally near or above normal (Table 4 — MN DNR, 2010). In contrast, levels are anomalously low in 2009. For the six study lakes with 30 years of record, 2009 is the lowest year for the lakes combined. Particularly low are lakes in the eastern part of the metro area (Owasso, Josephine, Turtle and White Bear — see Figure 2 for lake locations). Minnetonka is low, but not exceptionally low compared with the preceding four lakes. And or what ever reason, Johanna is out of sync with the other lakes in all study years.

Table 4

July lake-surface elevations during study years in 1984 1996, and 2009
(based on the six study lakes -- out of 29 study lakes -- with 30 years of July lake-elevation information from 1980 to 2009)

Lake ID	Name	1984 Study year elevation (feet)	-- *Departure from normal* -- Elevation (feet)	Standard deviations	1996 Study year Elevation (feet)	-- *Departure from normal* -- Elevation (feet)	Standard deviations	2009 Study year Elevation (feet)	-- *Departure from normal* -- Elevation (feet)	Standard deviations
270133	Minnetonka	929.6	0.6	0.7	929.3	0.3	0.4	928.0	-1.0	-1.1
620056	Owasso	887.4	0.6	1.2	886.8	-0.1	-0.1	885.2	-1.7	-3.3
620057	Josephine	884.5	0.2	0.4	884.2	0.0	0.0	883.0	-1.2	-2.5
620061	Turtle	892.1	0.6	0.8	892.0	0.5	0.7	889.3	-2.2	-2.9
620078	Johanna	877.1	-0.3	-0.5	877.1	-0.3	-0.6	877.7	0.3	0.5
820167	White Bear	924.9	1.3	0.9	924.9	1.4	0.9	920.3	-3.3	-2.2
Combined		899.3	0.5	0.7	899.1	0.3	0.4	897.2	-1.5	-2.0

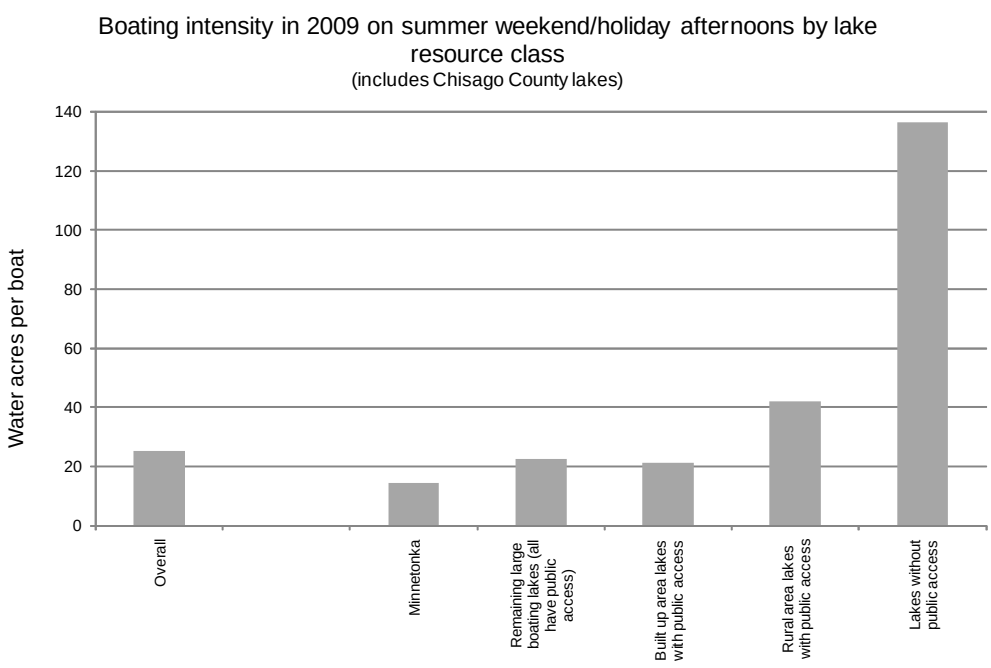
There are two results of the 2009 study that lake levels may have influenced: (1) the contribution of public accesses to total boating fell from 1996 to 2009 for lakes other than Minnetonka, and (2) total boating fell from 1996 to 2009 for lakes other than Minnetonka. It is known from study field staff and from public-access boater surveys that launching was difficult at some accesses in 2009. To what extent this affected overall public access use, however, is not known. Nor is it known whether poor public access launch conditions deterred some boaters from using metro lakes and resulted in lower overall boating levels. Thus, the

two conclusions noted above are stated as "tentative." In the discussion that follows, this conclusion is repeated when the information is presented.

Amount and Intensity of Boating

The Twin Cities region has nearly 58,000 acres of boating water on 102 lakes (Table 1). These lakes are the major recreational boating and fishing waters of the region. The larger lakes (e.g., Minnetonka, other large boating lakes) tend to have a higher intensity of boating than the smaller lakes, and urban lakes are used more intensely than rural lakes (Figure 3). Lakes without public access are used the least intensively.

Figure 3



Most of the lakes (85%) are accessible through public access in 2009 (Table 5). This is up from 72 percent in 1984. Twelve lakes have received a public access since 1984. In 2009, 15 lakes did not have a public access. Public accesses serve over 90 percent of the water area of the lakes.

Weekends/holidays are the popular time to participate in boating, as well as in most outdoor recreation pursuits. A weekend or holiday, on average, has about

Table 5

Changes in public access status of boating waters in the seven-county Twin Cities metropolitan area

(excludes five lakes in southern Chisago County)

(a) Number of Lakes

	Year 1984		*Year 1996*		*Year 2009*	
	Number	Percent	Number	Percent	Number	Percent
Lakes with public access	70	72	82	85	82	85
Lakes without public access	27	28	15	15	15	15
Total	97	100	97	100	97	100

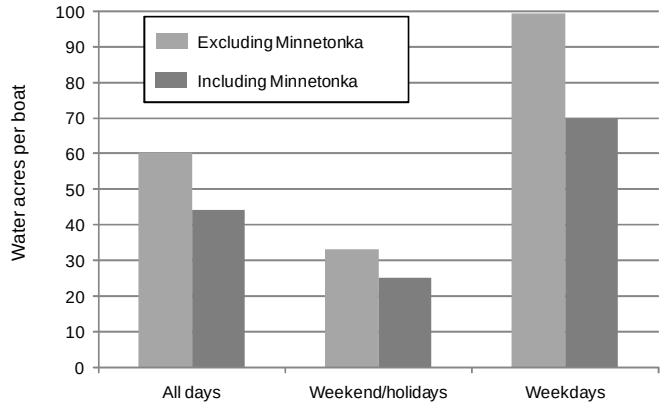
(b) Acres of Lakes

	Year 1984		*Year 1996*		*Year 2009*	
	Acres	Percent	Acres	Percent	Acres	Percent
Lakes with public access	47,127	89	50,080	94	50,080	94
Lakes without public access	6,105	11	3,152	6	3,152	6
Total	53,232	100	53,232	100	53,232	100

2.5 to 3 times as much boating as a weekday (Figure 4). Since weekdays are more frequent than weekends/holidays, weekdays end up accounting for about 40 to 45 percent of total boating and weekends/holidays for 55 to 60 percent.

Figure 4

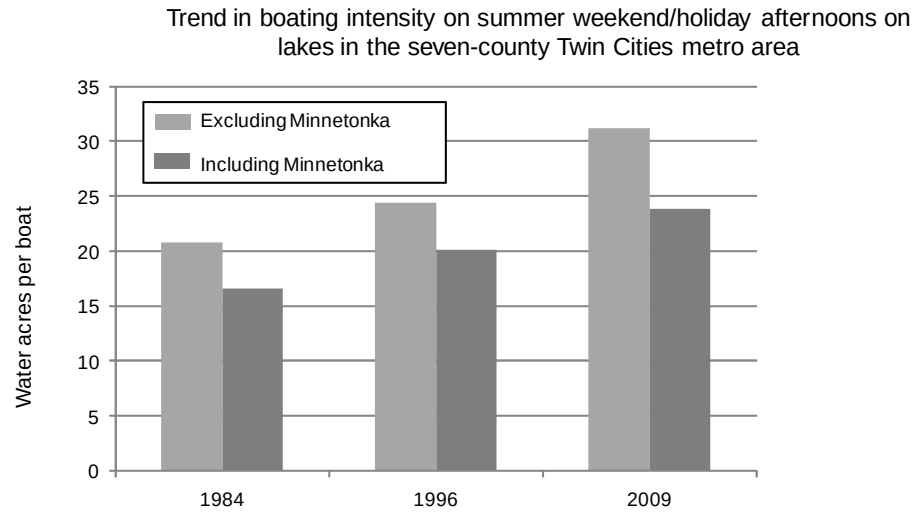
Summer boating intensity in 2009 by day of week on lakes in the Twin Cities metro area, including southern Chisago County



Boating-Use Trends on Twin Cities Lakes

Over time, the trend has been to lower boating intensities both on Lake Minnetonka and on other metro lakes (Figure 5) (note: comparisons of boating use over time are done for the weekends/holidays, when most of the boat counts are conducted; too few weekday boat counts are conducted to assess changes). Minnetonka first experienced a statistically significant drop in boating use from the 1980s in 2004 (.05 statistical probability level), and the 2009 study corroborated those results (Figure 6—the statistical significance of the Minnetonka trend is assessed through regression as shown on Figure 6, and through difference of means tests between the 1980s, 1990s, the most recent decade). For other metro lakes, the overall trend from 1984 to 2009 is a statistically significant decline, but the shorter-term trends (1984 to 1996, and 1996 to 2009) are not. As noted above in the lake-level discussion, this decline on lakes other than Minnetonka is tentative, because it may have been affected by low lake levels.

Figure 5



Although boating numbers changed since the 1980s, the relative distribution of boats among lake classes is largely stable, indicating that the trends are of a general nature (Table 6). The drop after 1984 in the portion of boating use on lakes without public access is due in part to the expansion of public access to more lakes in the metro region (the number of lakes without public access fell 44% between 1984 and 1996/2009).

Figure 6

Boat-number trend on Lake Minnetonka on summer weekend/holiday afternoons, 1984 to 2009

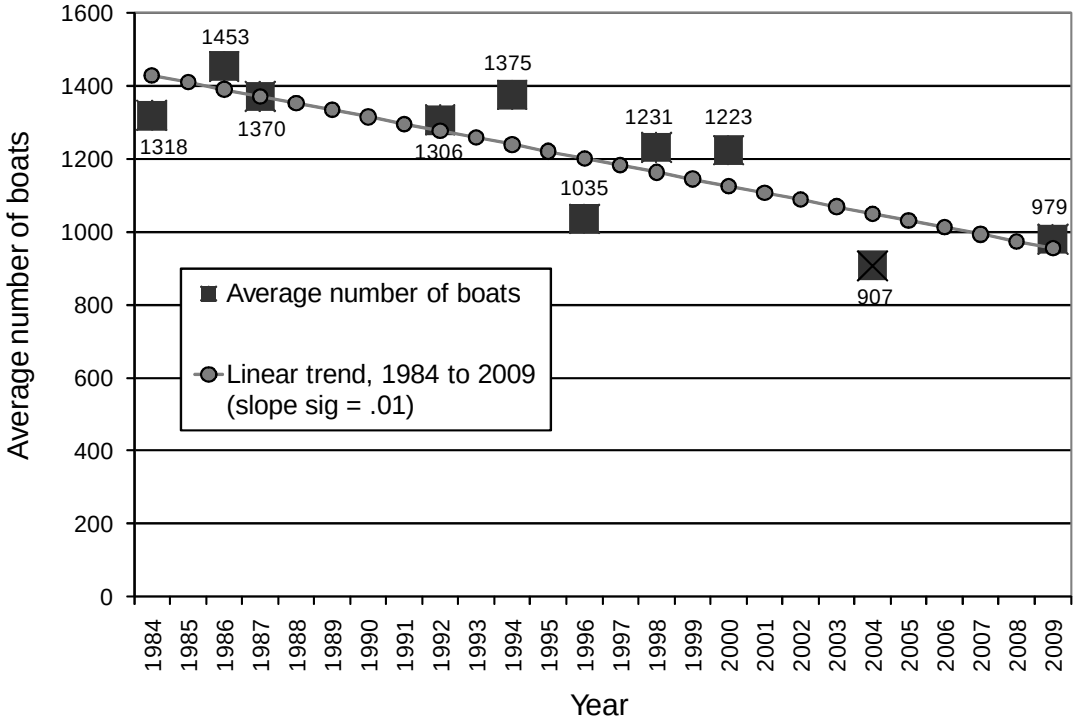


Table 6

Distribution of boating use by lake resource class on summer weekend/holiday afternoons in the seven county Twin Cities metro area

	Percent of total boating use			
Lake class	1984 study	1996 study	2009 study	Average
● Minnetonka	41%	39%	44%	41%
● Remaining large boating lakes (all have public access)	12%	14%	12%	13%
● Built up area lakes with public access	18%	16%	20%	18%
● Rural area lakes with public access	24%	29%	24%	26%
● Lakes without public access	5%	1%	1%	2%
Total	100%	100%	100%	100%

It is known that warmer days tend to produce more boating use. For that reason, the possibility that the warmth of a summer may have affected these boating trends is examined here. For Minnetonka, the summers for study years in the most recent decade are cooler than most in the last 100 years, but they are similar to summers in the 1980s and 1990s, when boat counts are higher (Table 7). Also, the temperatures on flight dates in the most current decade are as warm as many of the previous studies. Similarly, there is little evidence that summer warmth or temperatures on flight dates affected the boating trends on other metro lakes (Table 8).

Table 7

Lake Minnetonka: Weather for study years and weekend/holiday boat-count flight dates*

		Warmness of summer (cooling degree days in June, July, August)		*Warmness of weekend/holiday boat-count dates*	
Study year	Average number of boats on summer weekend/holiday afternoons	Number of CDDs**	Rank in last 100 years (1=warmest)	Average daily maximum temperature (^{o}F)	Median daily maximum temperature (^{o}F)
1984	1318	672	42	77.2	80.0
1986	1453	549	69	79.2	77.0
1987	1370	760	26	83.2	83.0
1992	1306	248	100	75.1	75.0
1994	1375	476	84	80.9	80.0
1996	1035	491	79	79.9	80.0
1998	1231	566	67	80.2	81.0
2000	1223	588	60	80.0	82.0
2004	907	418	92	79.1	81.0
2009	979	495	77	80.5	79.5

*Source: Twin Cities weather data from Minnesota Climatology Working Group (MN DNR and University of MN); data at http://climate.umn.edu/doc/twin_cities/twin_cities.htm .

** CDD is cooling degree days, and is computed daily from the average daily temperature less 65 ^{o}F; the minimum daily CDD value is 0.

Table 8

Other metro lakes: Weather for study years and weekend/holiday boat-count flights for seven-county Twin Cities metro area lakes*

Study year	Average number of boats on summer weekend/holiday afternoons, excluding Minnetonka and Chisago County lakes	*Warmness of summer (cooling degree days in June, July, August)*		*Warmness of weekend/holiday boat-count dates*	
		Number of CDDs**	Rank in last 100 years (1=warmest)	Average daily maximum temperature (^{o}F)	Median daily maximum temperature (^{o}F)
1984	1883	672	42	77.2	80.0
1996	1607	491	79	78.9	82.0
2009	1256	495	77	77.8	78.0

*Source: Twin Cities weather data from Minnesota Climatology Working Group (MN DNR and University of MN); data at http://climate.umn.edu/doc/twin_cities/twin_cities.htm .

** CDD is cooling degree days, and is computed daily from the average daily temperature less 65 ^{o}F; the minimum daily CDD value is 0.

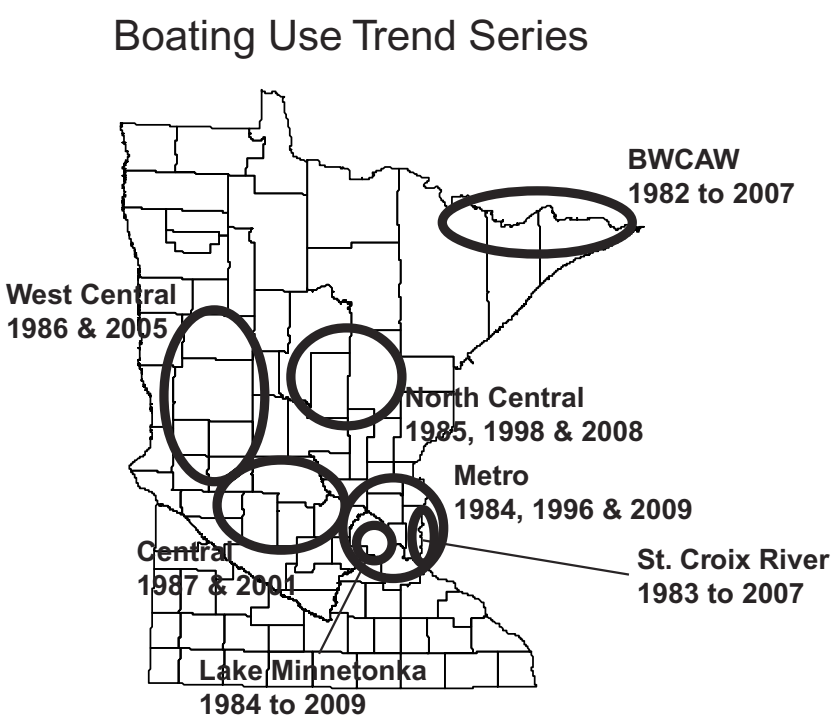
General Boating-Use Trends in Minnesota

In addition to the Twin Cities boating-use trends, five other use trends exist in Minnesota (Figure 7; see "Trend B" listing of studies in Reference section). And all of the trend series lead to the same general conclusion on the direction of boating-use: boating is stable to decreasing. The decreases are found on Lake Minnetonka and in the BWCAW, both showing decreases since the mid 1990s; all other studies show stable boating use over the indicated period of record. As noted previously, the trend on Twin Cities lakes other than Minnetonka is downward, but the trend is tentative due to low lake levels in 2009.

All of the trend studies start in the 1980s and extend into the most recent 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 this 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 (Figure 8). The final trend series comes from the Boundary Waters Canoe Area Wilderness (BWCAW), a formal wilderness area on the Canadian border in northeastern Minnesota.

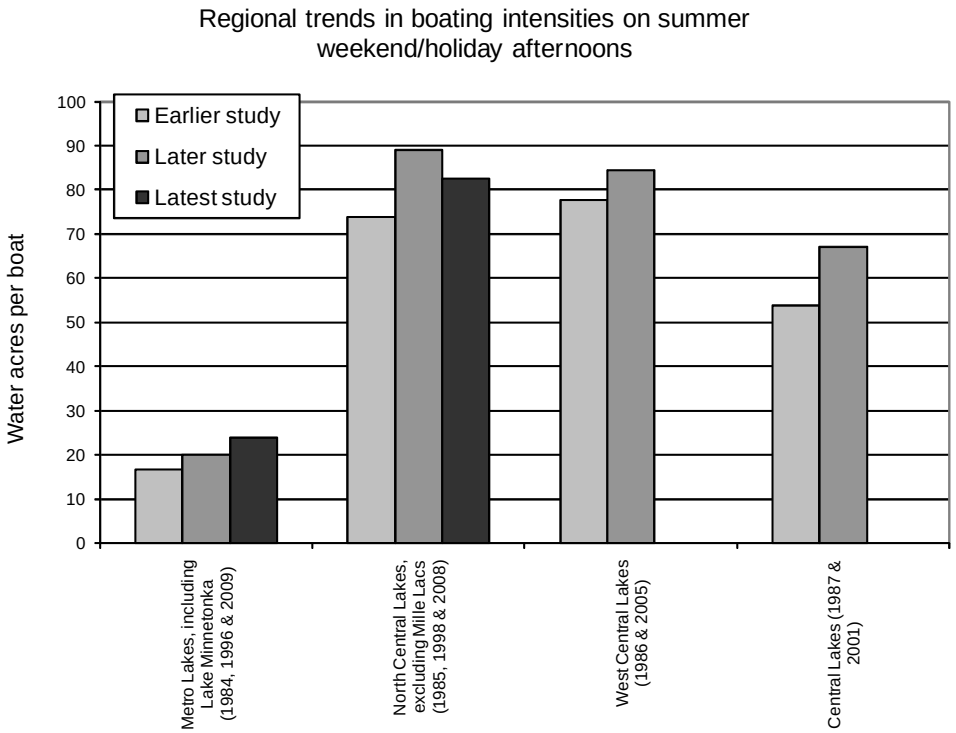
Figure 7



The recent trends of stable to decreasing boating use are occurring during a period when boat registrations increased rapidly: registrations increased some 40 percent since 1980 in Minnesota. The typical boat, it appears, is being used less over time. Boaters are apparently buying boats, but using each boat less over time. Leisure time may well be in shorter supply than income.

Since the boating use trend studies are occurring during a period of population growth, even stable boating use is declining on a per-capita basis. Boating is not alone in displaying per-capita decreases. Such decreases are pervasive across nature-based outdoor recreation activities that are reliably monitored (see "Trend A" listing of studies in Reference section). In Minnesota over the last ten years from the mid 1990s to mid 2000s, declining per-capita trends are evident for fishing licenses, hunting licenses, state park attendance, and state bicycle trail use. For the U.S. over this same period, 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.

Figure 8



Source of Boating Use

Boaters gain access to water through four primary means:

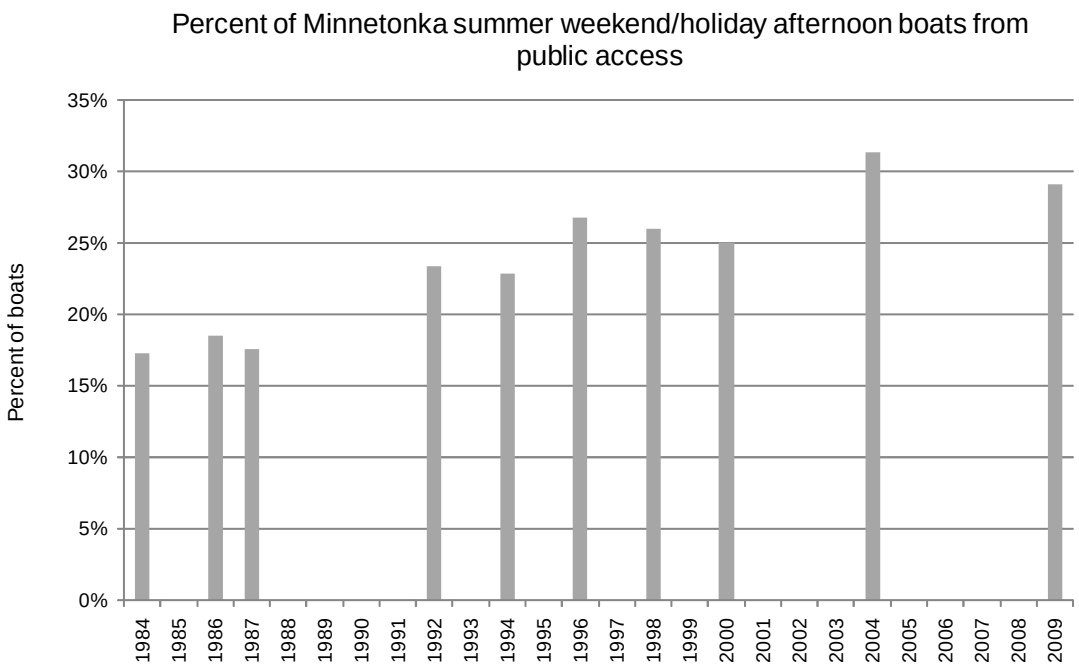
1) public access—free public boat launches and associated parking areas.
2) commercial access—resorts, campgrounds, marinas and for-fee private accesses.
3) riparian residences—waterfront property owners and homeowner associations with riparian access.
4) municipal docks (assessed for Lake Minnetonka)—docks provided by lakeshore municipalities for rent by city residents.

The 2009 study only assessed the contribution of public access to total boating, and not the other sources. For Lake Minnetonka, 2004 is the most recent study with estimates of the contribution of all sources to total boating use. In 2004, the source contributions are approximately as follows: public access—30%, commercial access—35%, municipal docks—10%, and riparian residents—25%. For

Twin Cities lakes other than Minnetonka, 1996 is the most recent study with full source estimates. In 1996, the source contributions are approximately as follows: public access—60%, commercial access—10%, and riparian residents—30%.

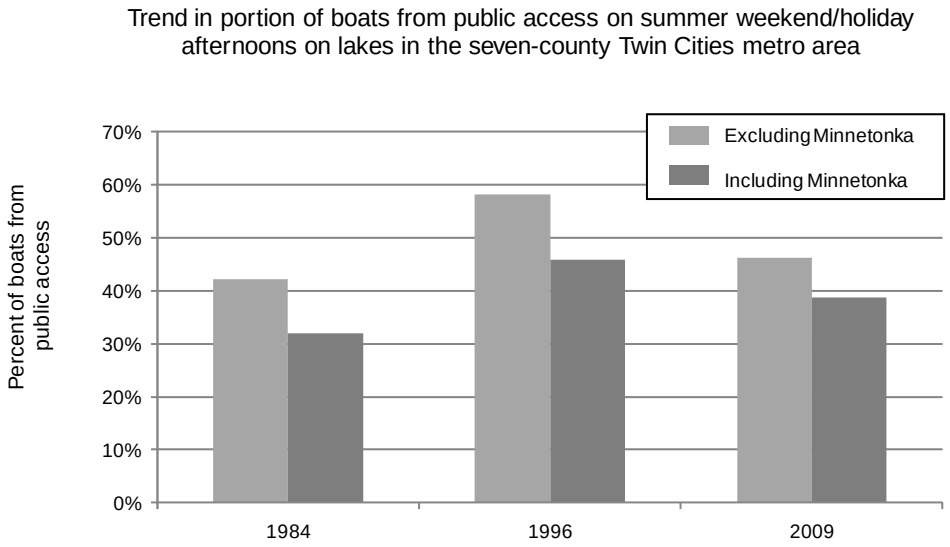
The public access contribution to total boating on Lake Minnetonka increased since the 1980s (Figure 9). Most of the increase is due to relatively stable public access launches coupled with falling overall boating numbers. Public accesses contributed some 250 boats per day to summer weekend/holiday boat numbers in the 1980s. This rose to around 300 boats in the 1990s, and is in the 280 to 290 range for the most recent decade.

Figure 9



On lakes other than Minnetonka, the portion of boats from public access increased from 1984 to 1996 and decreased from 1996 to 2009 (Figure 10). The decrease was unexpected. In other regional boating studies, public access contribution is stable to increasing, similar to what is found on Lake Minnetonka and other Twin Cities lakes between 1984 and 1996. As noted previously, low lake levels in 2009 may have affected public access use. Because of these low lake levels, the public access decrease from 1996 to 2009 is judged as tentative.

Figure 10

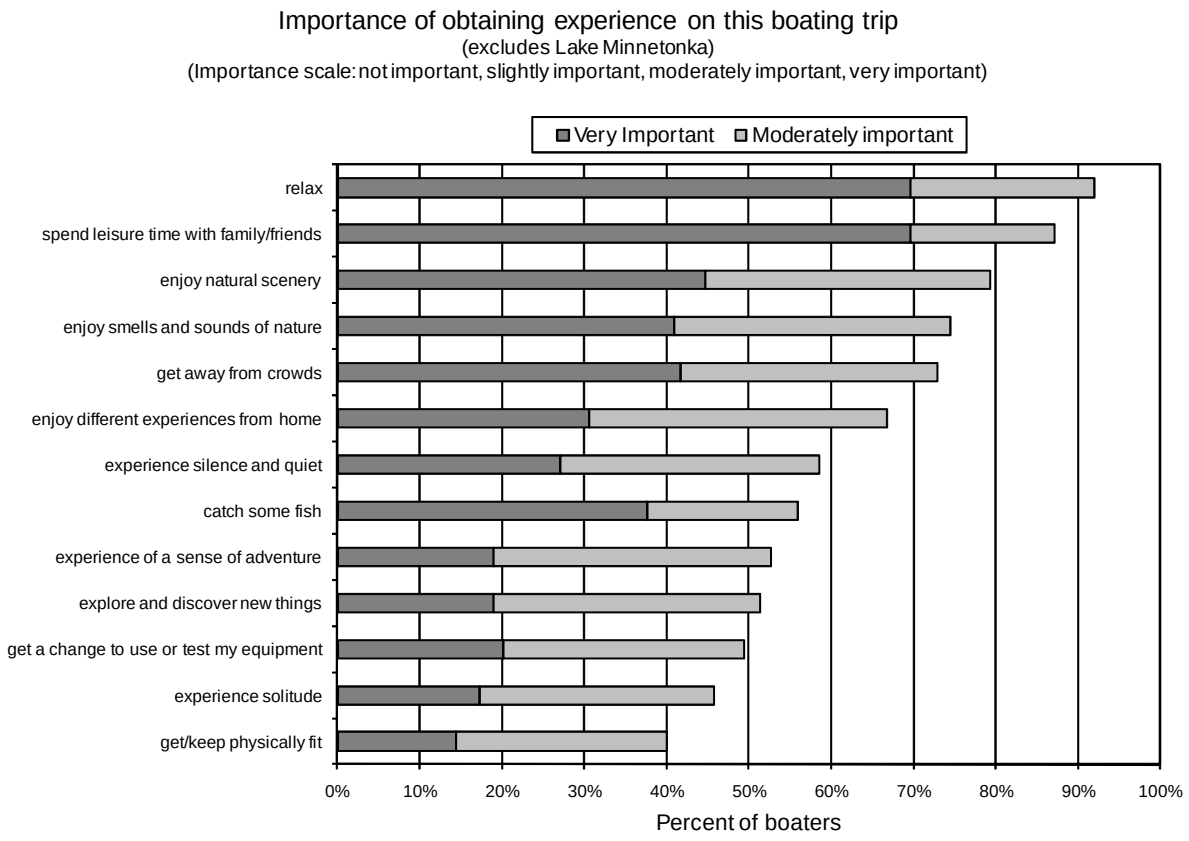

Trend in portion of boats from public access on summer weekend/holiday afternoons on lakes in the seven-county Twin Cities metro area
Percent of boats from public access
70%
60%
50%
40%
30%
20%
10%
0%
1984
1996
2009
Excluding Minnetonka
Including Minnetonka

THE BOATING EXPERIENCE

Motivations for the Boating Trip

Boaters place high importance on obtaining certain experiences while boating. Attaining these experiences represents the underlying motivations for the trip. Of highest importance are relaxing with family/friends in an enjoyable natural setting that is away from crowds (Figure 11). Experiences that are of lowest importance are getting/keeping physically fit, experiencing solitude, testing/using my equipment, explore/discover new things, and experiencing a sense of adventure. 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, and it is ranked just above relaxing with family and friends.

Figure 11



The pattern shown on Figure 11 is virtually the same as found in the Northern and North Central regions, which are the two other studies that included this motivation question.

Trip Satisfaction

Trip satisfaction tends to be high for recreators who willingly engage in an activity under conditions with which they are familiar. Boaters in this Twin Cities 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 10 or more years on the lake, and at most 16 percent are recent arrivals to the lake (Table 9).

Table 9

How many years have you been boating on this lake?
("this lake" is the lake at which the boater received the survey)

		*Boating resource**			
Measure	All boaters (percent)	Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Median years boated	10	15	11	10	10
Percent new boaters (boated one year or less)	11%	5%	10%	13%	16%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Boaters are relatively satisfied, too. On average, about half (48%) of all boaters report being “very satisfied” with their outing, while another 44 percent report being “satisfied” (Table 10). Only 8 percent are “dissatisfied” to any extent. Lake Minnetonka boaters report the highest satisfaction, well above boaters on the other metro lakes.

Boater trip satisfaction increased from 1996 to 2009, led upward largely by the satisfaction increase on Minnetonka. Satisfaction changed little on other Twin Cities lakes. In 1996, trip satisfaction levels were more similar for Minnetonka and other lakes.

Table 10

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

Response	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Boating resource*: Remaining large lakes (percent)	Boating resource*: Built-up area lakes (percent)	Boating resource*: Rural area lakes (percent)
Very satisfied	48%	59%	43%	45%	39%
Satisfied	44%	37%	48%	44%	52%
Dissatisfied	5%	3%	6%	7%	6%
Very dissatisfied	3%	1%	4%	4%	3%
Don't know	0%	0%	0%	0%	0%
Total percent	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

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

Trip satisfaction is also affected by perceptions of congestion and crowding. When people judge the number of boats on the lakes as “too many” their overall satisfaction declines (Table 12). Similar to the preceding on problems with other boaters, the decline in satisfaction is mostly a reduction in “very satisfied” responses accompanied by an increase in “satisfied” and “dissatisfied” responses. Crowding is discussed more fully below following the next section on problems encountered with other boaters.

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

Table 11

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

(Minnetonka boater data for 2004; other boater data for 2009)

Note: There are 15 possible problem items in the survey for Minnetonka boaters and 13 for boaters on other lakes. The problem-rating scale is: no problem, slight, moderate, serious, and very serious problem.

	Encountered a "serious" or "very serious" problem?		
Trip satisfaction response	"Yes" (percent)	"No" (percent)	All boaters (percent)
Very satisfied	37%	54%	48%
Satisfied	51%	40%	44%
Dissatisfied	9%	3%	5%
Very dissatisfied	4%	3%	3%
Don't know	0%	0%	0%
Total	100%	100%	100%

Table 12

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

(Minnetonka boater data for 2004; other boater data for 2009)

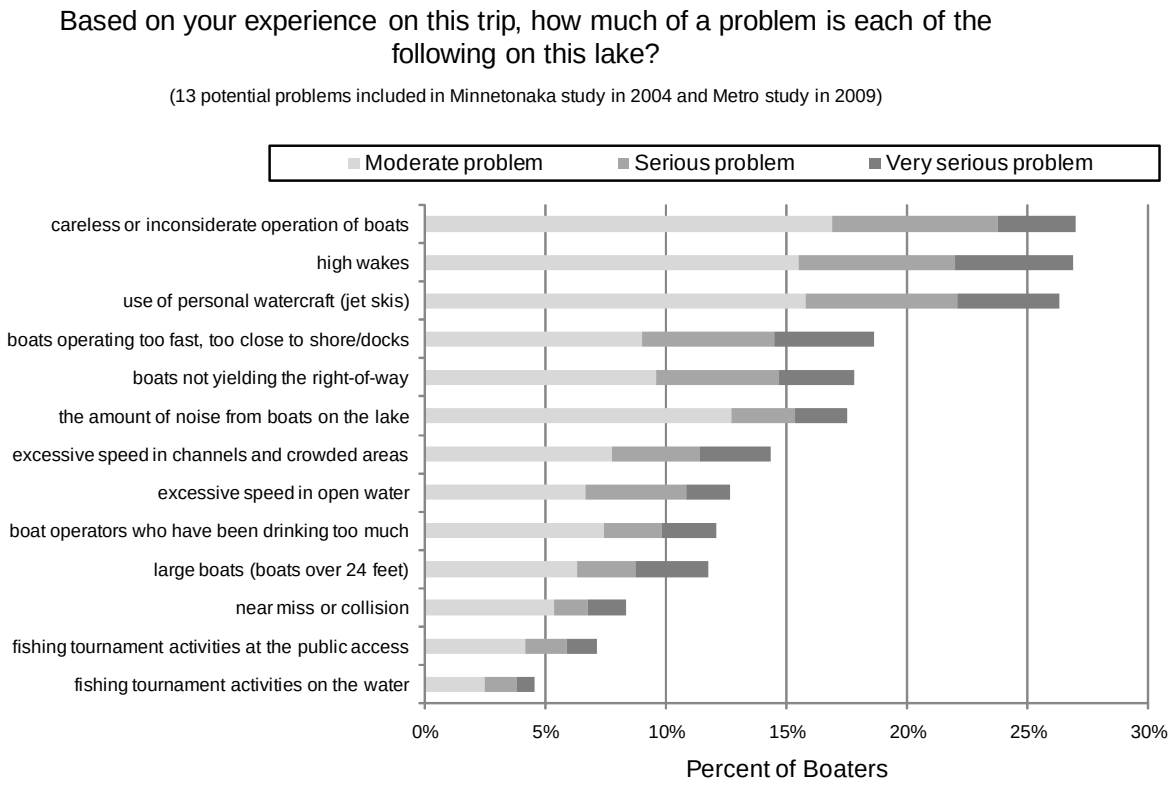
	Encounter "too many" boats?		
Trip satisfaction response	"Yes" (percent)	"No" (percent)	All boaters (percent)
Very satisfied	31%	52%	48%
Satisfied	55%	42%	44%
Dissatisfied	11%	3%	5%
Very dissatisfied	3%	3%	3%
Don't know	0%	0%	0%
Total	100%	100%	100%

Problems with Other Boaters

In the survey, boaters are asked to judge whether they experienced problems with other boaters on their trip. Of the 13 potential problems shared between the Minnetonka study in 2004 and this 2009 study for other Twin Cities lakes, none is judged by a majority of boaters as a "moderate", "serious" or "very serious" problem (Figure 12). Although not judged by a majority of boaters as a "moderate" or greater problem, three problems are clearly reported as the most severe: "careless or inconsiderate operation of boats", "high wakes", and "use of personal watercraft (jet skis)." All three receive just over 25 percent "moderate" or more serious responses. Minnetonka has one additional leading problem: "boats operating too fast, too close to shore/docks."

The pattern of problem identification changed from 1996. In 1996, "use of personal watercraft (jet skis)" was by far the leading problem. Over time it decreased in problem severity, while today's two other leading problems ("careless or inconsiderate operation of boats" and "high wakes") rose in severity. In all the

Figure 12



other regional boating studies, the “use of personal watercraft (jet skis)” is the leading problem.

Crowding

As noted above, boaters have a good deal of familiarity with the lake on which they are boating. This familiarity gives boaters a sound basis for judging “usual” or “normal” boating conditions for the time they choose to boat. When asked to judge the number of boats encountered on their current trip against this “usual” number, the largest group (41%) indicates that the number is “about the same”, another 30 percent indicates either “slightly fewer” or “slightly more”, and 25 percent indicates either “substantially fewer” or “substantially more” (Table 13). Overall, some 71 percent of boaters have their “usual” expectations largely met (“about the same” plus “slightly more/fewer” responses).

Table 13

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?

(excludes boaters who haven't boated on the lake before; Minnetonka boater data for 2004; other boater data for 2009)

Response	Percent of boaters
Substantially fewer	16%
Slightly fewer	19%
About the same	41%
Slightly more	11%
Substantially more	9%
Don't know/not sure	3%
Total percent	100%

A boater’s comparison of “usual” number of boats with boats encountered on this current trip has a definite influence on their perception of congestion and crowding on the lake (Table 14). When the number of boats encountered today versus usual is “substantially fewer” or “slightly fewer”, only a small portion of boaters indicate they encountered “too many boats” on the trip (3% to 8%). When the number encountered today rises to “slightly more” and “substantially more”, perceptions of congestion and crowding increase. A sizable portion of boaters who encountered “substantially more” boats than usual report “too many boats” on the lake (68%).

Most boaters (78%) did not encounter “too many boats” on their trip, while 20 percent did (Table 15). The prevalence of encountering “too many boats” is higher for the more intensely used lakes: Lake Minnetonka and the remaining large lakes.

Table 14

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

(Minnetonka boater data for 2004; other boater data for 2009)

	Percent of boaters who encountered "too many" boats today
All boaters	20%
Number of boats today versus usual?	
Substantially fewer	3%
Slightly fewer	8%
About the same	18%
Slightly more	34%
Substantially more	68%
Don't know	18%

Overall perceptions of “too many boats” have not changed a great deal since 1996, except on Lake Minnetonka, where perceptions decreased considerably (Table 16). Perhaps this decrease is related to the drop in number of boats on the water. And the decrease may be related to the increase in Minnetonka boater satisfaction over these same years.

Irrespective of their perception of the number of boats, the large majority of

Table 15

On this trip, did you travel through parts of the lake where you thought there were too may boats?

		*Boating resource**			
Response	All boaters (percent)	Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Yes	20%	28%	21%	15%	13%
No	78%	68%	77%	84%	86%
Don't know	2%	4%	2%	1%	2%
Total percent	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Table 16

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

(Note: This question was not asked in 1984)

Lake resource of boater	1996 "Too many boats" (percent)	2004 or 2009 "Too many boats" (percent)	Change in percent (1996 to 2004-09)
All lakes and boaters	22%	20%	-2%
*Boating resource**			
Lake Minnetonka	41%	28%	-13%
Remaining large lakes	20%	21%	1%
Built-up area lakes	14%	15%	2%
Rural area lakes	9%	13%	4%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

boaters would return to boat under the same conditions (Table 17). 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 76 percent for boaters who encountered too many boats, leaving 24 percent who would think twice before returning.

Table 17

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

(Minnetonka boater data for 2004; other boater data for 2009)

Boat again?	Boaters who encountered too many boats (percent)	Boaters who did not encounter too many boats (percent)	All boaters (percent)
Yes	76%	98%	94%
No	12%	1%	3%
Don't know	12%	1%	4%
Total	100%	100%	100%

PUBLIC ACCESS FACILITIES

Quality of Facilities

The large majority of boaters have launched before at the access where they were intercepted for the survey (88% to 93%, depending on lake class). Thus, most are familiar with the facility.

Boaters generally give high marks to public access facilities. Overall, positive ratings ("good" to "excellent") comprise nearly 80 percent (78%) of boater ratings (Table 18). Lake Minnetonka ratings are well above the other lake classes, and these other classes have a relatively high proportion (over 25%) of mediocre to poor ratings ("fair", "poor", and "very poor").

Minnetonka ratings have increased sharply since 1996, while ratings on the other lakes have not changed markedly. As will be discussed below, many boaters on these other Twin Cities lakes had problems with low water levels in 2009, and experiencing a problem lowers ratings considerably (Table 19). The Lake Minnetonka rating increase actually occurred between a 2000 and 2004 study.

Table 18

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

		*Boating resource**			
Response	All boaters (percent)	Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Excellent	39%	71%	22%	16%	25%
Good	39%	23%	49%	48%	47%
Fair	15%	5%	17%	24%	19%
Poor	4%	0%	6%	6%	5%
Very poor	3%	1%	5%	3%	3%
Don't know	1%	0%	0%	2%	1%
Total percent	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Table 19

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

(Minnetonka data for 2004; other data for 2009)

Response	Overall (percent)	----- *Had a problem using this access?* ----- "Yes" (percent)	"No" (percent)
Excellent	39%	27%	44%
Good	39%	29%	43%
Fair	15%	26%	11%
Poor	4%	11%	1%
Very poor	3%	7%	1%
Don't know	1%	0%	1%
Total percent	100%	100%	100%

The reason for the timing of this sharp increase in Minnetonka ratings is not fully known, but the increase is probably due — in large measure — to the opening of the large Grays Bay Access in 2003 and closing of two smaller accesses on the same part of the Lake. The Grays Bay Access is a well-designed facility that can accommodate the large boats that access users are trailering today; about one-third of all Minnetonka public access launches are through Grays Bay. In 2000 and prior studies, public access ratings on Lake Minnetonka are more similar to other metro lakes.

Nearly 30 percent of boaters (28% to 29%) reported that they had a problem in the use of the access facility (Table 20). The specific problem boaters identified on metro lakes other than Minnetonka were primarily due to low water levels; one in five boaters had a problem with shallow water. The next most frequently identified problem was “not enough parking spaces.” On Minnetonka, parking spaces is by far the leading problem. No other problem on Minnetonka or on the other lakes is indicated by 5 percent or more of access users.

Table 20

Percent of public access boaters indicating problems using the public access
(boaters could indicate more than one problem)

	Lakes other than Minnetonka, 2009 (percent)	Minnetonka 2004 (percent)
Percent of boaters indicating a problem of any type	*28%*	*29%*
Specific problem indicated		
Water too shallow	20%	1%
Not enough parking spaces	9%	19%
Access parking lot being used by non-boaters	4%	---
People fishing from the dock at the access made it difficult to maneuver	4%	---
Ramp too short	3%	---
Not enough maneuvering room on water near ramp for launch/landing	3%	2%
Not enough maneuvering room on land near ramp for launch/landing	3%	4%
Difficult to launch/land because of wind or waves	3%	1%
Insufficient number of launch lanes/ramps	2%	2%
Access site in disrepair	2%	1%
Swimmers near ramp made it difficult to launch/land a boat	1%	---
No dock	1%	1%
Ramp blocked by parked cars, campers etc.	1%	2%
Couldn't find the access from the lake after dark	1%	1%
Inadequate directional signs to access	1%	2%
Safety of entry to access area from road or highway	0%	0%
Ramp slope too steep	2%	---
Ramp slope not steep enough	---	1%

Improvements to Facilities

Boaters were asked what improvements are needed at the access facility. The top-ranked improvement is a high-ranked use problem: providing more parking spaces in the access lot (Table 21). This is followed by the provision of trash containers. There is no other improvement for Minnetonka or other metro lakes that is identified by 20 percent or more of users.

Use of Facilities

Nearly all public access users on Lake Minnetonka and other metro lakes (97% to 99%, depending on lake class) fit the profile of a traditional user: a boater who neither owns a home on the lake nor is a guest at a resort/private campground on the lake. In other regional boating studies, the traditional user is not nearly as

Table 21

Percent of public access boaters requesting specific improvements at the public access

(boaters could indicate more than one improvement)

Potential improvement	Lakes other than Minnetonka, 2009 (percent)	Minnetonka 2004 (percent)
More parking spaces in lot	36%	49%
Trash containers	27%	20%
Larger parking spaces in access lot	14%	---
Toilet maintenance (if applicable)	13%	12%
Toilets	13%	10%
More launch lanes/ramps	13%	12%
Litter pickup	11%	12%
Boat-wash facility	---	12%
Beacon light visible from lake	10%	10%
A dock to aid launching	9%	4%
Better lighting of access/parking area	8%	4%
Better enforcement	6%	16%
Better directional signs to access	5%	4%
Protection from wind/waves in front of launch ramp	5%	3%
Better informational signs at access	3%	11%
Supply of loaner life jackets for children	0.3%	---
Longer ramp/deeper water for launching	---	2%

dominant. For example, in the 2008 North Central study, 44 percent of public access launches are by riparian residents and resort/private campground guests. In the 2005 West Central study, 30 percent of access launches come from these non-traditional sources.

On a related topic, the majority of riparian resident boaters (56%) on Twin Cities lakes have used a Minnesota public access in the last 12 months (Table 22 — question not asked in Minnetonka study). And public access is by far the most frequent means of access for boaters—including riparian resident boaters—who use other lakes within 50 miles of where they were surveyed in this study.

A large portion of public access users (57% overall) have at some time in their past found a public access parking lot full on the lake they were surveyed (Table 23 — question not asked in Minnetonka study). On average, this happened two to three times (median) in the last year. Most of them were able to find a way to boat that day. They either went to another lake, parked on the road, waited for a

Table 22

Questions on public access use
(boater responses for metro lakes other than Minnetonka, 2009)

Question	Overall (percent)	------ *Source of boater* ------ Public 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	84%	100%	56%
● In the last 12 months, did you boat on other lakes *within about 50 miles of this lake*?			
"Yes" responses	71%	91%	27%
● How do you gain access to these other lakes *within about 50 miles of this lake*?			
Free public access launch site	76%	78%	59%
Resort, marina or private launch site	10%	9%	10%
Friend or relative's home/cabin	5%	4%	19%
My home or cabin	2%	2%	5%
Road end/road right-of-way (unimproved site)	2%	2%	2%
Other	5%	5%	5%

Table 23

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

Question	Metro lakes other than Minnetonka (percent)	---------- *Boating resource** ---------- Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
● Have you ever tried to use free public access on this lake and found the access parking lot full?				
"Yes" responses (percent)	57%	70%	52%	54%
● (IF YES) How many times did you find the lot full in the past 12 months?				
Median times	2	3	2	2
Mean times	4.9	6.0	4.9	4.3
● (IF YES) What did you do when you found the parking lot full? (boaters could indicate more than one action)				
Responses (percent)				
Went to another lake	37%	28%	39%	41%
Parked on the road	37%	47%	30%	35%
Waited for place in lot to open up	20%	20%	20%	21%
Went to another access on this lake	10%	15%	0%	12%
Other (e.g., parked at home)	10%	13%	16%	6%
Didn't boat that day	15%	18%	13%	14%

* Data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

place in the lot to open up, or went to another access on the lake. However, 15 percent indicate there are occasions when they did not boat that day, which is a higher percent than found in other studies (e.g., is 6% in 2008 North Central study, and 2% in 2005 West Central study).

Need for Additional Facilities

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

For the lake at which they were surveyed, 13 percent of all Lake Minnetonka and other metro lake boaters think more public access is needed, while a majority (73% to 77%) do not (Table 24). Public access boaters are more likely to indicate a need for additional access (27% on Lake Minnetonka and 17% other metro lakes), but still most do not see a need for more access (60% Minnetonka and 71% other metro lakes). Few riparian residents see a need for more access (under 5%).

Results are similar for the perceived need for additional public accesses within 50 miles of the lake at which boaters were surveyed, except that more boaters are uncertain of the need (expressed in the more frequent “don’t know” responses). Overall, some 17 percent of all boaters on lakes other than Minnetonka thought additional public access is needed on a lake within 50 miles of where they were surveyed, 46 percent did not think additional access is needed, and 31 percent are uncertain (Table 24 — question not asked of Minnetonka boaters). Public access boaters are more likely to indicate a need for additional access (24%), but most do not see a need or are uncertain. Few riparian residents (under 5%) see a need for more access.

Overall, the pattern of these results is close to that found in the North Central, Central, West Central, and Northern lake regions.

Table 24

Questions on the need for more public accesses

Metro lakes other than Lake Minnetonka

Question	All boaters (percent)	Source of boater: Public access (percent)	Source of boater: Riparian residence (percent)
● Do you think an additional (or initial) public boat access is needed on this lake?			
Response			
"Yes"	13%	17%	4%
"No"	77%	71%	90%
"Don't know"	10%	12%	6%
Total percent	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"	17%	24%	3%
"No"	51%	46%	62%
"Don't know"	32%	31%	35%
Total percent	100%	100%	100%

Lake Minnetonka

	All boaters (percent)	Source of boater: Public access (percent)	Marina (percent)	Municipal dock (percent)	Riparian resident (percent)
● Do you think an additional public boat access is needed on this lake?					
Response					
"Yes"	13%	27%	8%	8%	4%
"No"	73%	60%	75%	80%	84%
"Don't know"	14%	12%	17%	12%	13%
Total percent	100%	100%	100%	100%	100%

Specific access-related issues

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

Power loading (driving the boat unto the trailer) can cause problems at public access, including scouring a hole and building a ridge off the end of the ramp. Power loading is done by just over one-quarter (26%) of public-access boaters on metro lakes other than Minnetonka (Table 25 — power loading questions not asked of Minnetonka boaters).

Boaters do not judge the severity of problems caused by power loading as very severe (Table 25). The majority of public access boaters (including those who did not power load on this trip) indicate that this practice is "not a problem". Few judge the problem as "serious" or "very serious". Similar responses to this question are found in the three other studies in which it was asked (North Central, West Central, and Northern lake region studies).

A second issue addressed to access boaters deals with the importance of various facilities and services at public accesses. When asked about nine facilities/services, three are of highest importance: a dock to aid launching/landing, toilets, and a lake map with boating restrictions (Table 26 — this question not asked of Minnetonka boaters). For all three of these, a majority of boaters judge the item as "very important." In a middle-importance group, four facilities/services are judged by a majority of boaters as "moderately important" or "very important": map of the lake showing depth, hazards, paved parking lot (as opposed to a gravel lot), emergency/boating safety information, and fishing information for this lake. For anglers, fishing information is at the top of this middle-importance group. Of least importance are a description of natural history of this lake, and information on where to buy boat gas and other boating supplies.

Most access users indicate they would be "slightly likely" or "very likely" to voluntarily use a power-wash at the access to help prevent the spread of aquatic invasive species (Table 27 — this question not asked of Minnetonka boaters). It should be noted that this question is probably biased to the "likely" end of the response spectrum, since the "likely" end of the spectrum is indicative of socially desirable behavior on the part of the boater, who wants to be seen as a responsible

Table 25

Questions on "power loading" of boats at public accesses
(responses of public-access boaters, 2009)

Question	Metro lakes other than Minnetonka (percent)	*Boating resource* — Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)	*-- Power-loaded boat this trip? --* "Yes" (percent)	"No" (percent)
● When you landed your boat today, did you "power load" the boat onto your trailer?						
"Yes" responses (percent)	26%	23%	13%	33%	100%	0%
● 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)?						
No problem	64%	53%	58%	71%	75%	61%
Slight problem	11%	16%	9%	10%	14%	11%
Moderate problem	5%	7%	1%	6%	4%	6%
Serious problem	4%	6%	5%	2%	2%	4%
Very serious problem	3%	5%	6%	0%	0%	4%
Don't know	14%	13%	20%	12%	5%	14%
Total	100%	100%	100%	100%	100%	100%

Table 26

How important to public access users are the following items at public accesses?
(public-access boater responses for metro lakes other than Minnetonka, 2009)

Items	Mean Importance) (value 1 to 4)*	*Importance response* Not important (=1) (percent)	Slightly important (=2) (percent)	Moderately important (=3) (percent)	Very important (=4) (percent)	Don't know (percent)	Total (percent)
Dock to aid launching/landing	3.4	11%	6%	15%	68%	0%	100%
Toilets	3.3	5%	13%	29%	53%	0%	100%
Map of lake showing boating restrictions	3.3	5%	12%	30%	53%	0%	100%
Map of the lake showing depth, hazards	2.8	14%	23%	30%	34%	0%	100%
Paved parking lot (as opposed to a gravel lot)	2.7	22%	20%	26%	31%	1%	100%
Emergency/boating safety information	2.6	15%	34%	29%	22%	1%	100%
Fishing information for this lake	2.6	22%	23%	29%	26%	0%	100%
Description of natural history of this lake	2.0	40%	30%	21%	9%	0%	100%
Information on where to buy boat gas and other boating supplies	1.7	52%	28%	15%	5%	0%	100%

* Ignores "don't know" responses

Table 27

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

(responses of public-access boaters, 2009)

		Boating resource		
Response	Metro lakes other than Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Very likely	45%	50%	42%	44%
Slightly likely	18%	16%	13%	20%
Neither likely nor unlikely	8%	10%	8%	8%
Slightly unlikely	6%	7%	9%	5%
Very unlikely	18%	14%	23%	16%
Don't know	6%	4%	6%	6%
Total percent	100%	100%	100%	100%

person. Thus, the likelihood of boaters actually using the power-wash voluntarily would be less than indicated in these responses.

Few public-access boaters (3% overall) responded they have a disability that affects when or where they boat (Table 28). Reported disabilities include: artificial limb and joint, bad back, low lung capacity, poor circulation, hearing impaired, and a boating party member with limited mobility. Most (73%) found the access adequate for their needs, though some did not (27%). Of the six boaters who judged the access inadequate for their needs, three gave these reasons: a handicapped parking spot was not available, and (for two surveys) it was too long a walk from the parking spot to the launch site. These latter two boaters did not park in a handicapped spot; one boater wrote in that he/she did not have a handicapped sticker. About one-third (31%) of boaters reporting a disability parked in a handicapped spot.

Table 28

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

Question	All boaters (percent)	Minnetonka 2004 (percent)	Lakes other than Minnetonka, 2009 (percent)
● Do you currently have a disability that affects when or where you boat?			
"Yes"	3%	4%	2%
"No"	97%	96%	98%
Total percent	100%	100%	100%
● (IF YES) Was this public access facility adequate for your needs?			
"Yes"	73%	79%	71%
"No"	27%	21%	30%
Total percent	100%	100%	100%
● (IF YES) Did you park in a designated handicapped space at this access?			
"Yes"	31%	26%	33%
"No"	69%	74%	67%
Total percent	100%	100%	100%

BOATING SAFETY AND ENFORCEMENT

Boating Restrictions

Special boating restrictions are common on the sample lakes of the study. Eighteen of the 29 sample lakes (62% of the lakes) have a restriction (Table 29). The most common type of restriction is slow-no wake/speed.

Table 29

Existing Boating Restrictions on Sample Lakes
(for Lake Minnetonka and other metro lakes)

Type of restriction	Number of lakes
Slow-no wake and/or speed*	15
Electric motors only (inner city lakes)	2
Other local restrictions	1
No local restrictions	11
Total lakes	29

* In a few cases, also includes area and time restrictions

Boater awareness of the most common restriction (slow-no wake/speed) is high on Lake Minnetonka, and substantially lower on the other metro lakes (Table 30).

Table 30

Awareness of slow-no wake and/or speed restrictions
(responses of boaters on lakes with these restrictions)

	*Boating resource**	
Response	Lake Minnetonka (percent)	Metro lakes other than Minnetonka (percent)
Boaters indicating that "speed/quiet waters restricions" exist on lake	95%	41%

* Minnetonka data for 2004; other data for 2009.

When asked what special boating restrictions are needed for the lake, responses vary considerably by boating resource (Table 31). On Lake Minnetonka, most boaters (66%) think that speed restrictions/quiet waters are needed, and a nearly half (47%) think there should be special restrictions for personal watercraft (jet skis). In contrast, for the other metro lakes, the most common response was “none” for special restrictions needed. Following “none”, the highest-ranked restrictions needed on other metro lakes are for personal watercraft (jet skis) and speed restrictions/quiet waters. These responses from boaters on other metro lakes are similar

Table 31

What special boating restrictions are needed for this lake?
(boaters could indicate more than one type of restriction)

Response	All boaters (percent)	*Boating resource** Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
None	27%	4%	40%	35%	46%
Speed restrictions/quiet waters	35%	66%	21%	19%	13%
Special restrictions for personal watercraft (jet skis)	32%	47%	26%	23%	23%
Boat type and size restrictions	14%	27%	6%	9%	5%
Area of lake restrictions	12%	25%	7%	3%	4%
Horsepower restrictions	9%	17%	6%	7%	4%
Time restrictions	7%	9%	4%	11%	3%
Other	12%	16%	8%	14%	8%
Don't know/not sure	10%	5%	14%	13%	13%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

to the boater responses in other lake regions (e.g., North Central, and West Central).

Enforcement Presence

Enforcement officers are seen by 46 percent of boaters on Lake Minnetonka and 20 percent on other metro lakes (Table 32). This is up since 1996, when 34 percent of boaters saw and officer on Minnetonka and 15 percent saw an officer on other metro lakes. The 20 percent seeing an officer on other metro lakes is similar to that found in the North Central region study (19%), and is above that found in the West Central region study (8%).

Between 1 and 2 percent of boaters report being checked by an enforcement officer (Table 32). Boaters checked by an enforcement officer give high marks to the officer's professional conduct. Positive ratings of "good" to "excellent" are reported by 89 to 98 percent of boaters (Table 32). Few negative ratings (3% to 11%) are reported.

Table 32

Encountering an enforcement officer on this trip

Question	*Boating resource** Lake Minnetonka (percent)	Metro lakes other than Minnetonka (percent)
● *While you were on the lake on this trip, did you see an enforcement officer?*		
"Yes" responses	46%	20%
● *Were you checked by an enforcement officer on this trip?*		
"Yes" responses	1.6%	1.5%
● *(if checked) How would you rate the officer's professional conduct during this check?*		
"Excellent"	40%	53%
"Good"	49%	45%
"Fair"	0%	3%
"Poor" or "Very poor"	11%	0%
Total percent	100%	100%
Number of rating surveys	*16*	*18*

* Minnetonka data for 2004; other data for 2009.

Safety Courses

Formal boating safety courses have been completed by 40 percent of Lake Minnetonka boaters and 26 percent of boaters on other metro lakes (Table 33). In other boating regions, the percent having completed such a course tends to be lower (18% to 22% for North Central, West Central, Northern, and Central regions).

Boaters today are no more likely to have completed a boating safety course than boaters in the past, extending back to 1984. This applies to both Lake Minnetonka boaters and boaters on other metro lakes.

When asked whether all motorboat operators should complete a safety course, 40 to 49 percent respond "yes" (Table 33). Boaters having completed a formal safety course are far more likely than other boaters to believe motorboaters should be required to complete a safety course (72% to 77%). A similar pattern of responses to this question is found in the other regional boating studies.

Table 33

Boating safety courses

Question	*Boating resource** Lake Minnetonka (percent)	Metro lakes other than Minnetonka (percent)
● *Have you taken a formal course in boating safety?* "Yes" responses	40%	26%
● *Should all motorboat operators be required to complete a boating safety course?* (Note: for Minnetonka, wording is "boat operators" instead of "motorboat" operators) "Yes" responses for all boaters	49%	40%
"Yes" responses for boaters having completed a safety course	77%	72%

Types of Beverages on Board

Since the 1984 Twin Cities study, Minnesota enacted a law that makes it illegal to operate a motorboat after consuming too much alcohol, very much like the alcohol restrictions on driving an automobile. In 2004-09 period, 46 percent of Minnetonka boaters and 23 percent of boaters on other metro lakes report having some type of alcoholic drinks on board during their trip (Table 34). Few have only alcoholic drinks. Most boaters have no alcohol on the boat: either they have only non-alcoholic drinks on board, or have no drinks of any type. Riparian residents are more likely than boaters from public and commercial accesses to have no drinks on board.

The portion of boaters with alcoholic drinks on board increased from 1996 on Lake Minnetonka (35% to 46%), and stayed the same on other metro lakes (23% in both study years). The Minnetonka results are high relative to other boating regions, while the results for other metro lakes are more similar. The portion of boaters in the Central region with alcohol on board is 21 percent, in the West Central region is 22 percent, in the Northern region is 27 percent, and in the North Central region is 31 percent.

Table 34

Percent of boaters having certain beverages on board

Question	*Boating resource** Lake Minnetonka (percent)	*Boating resource** Metro lakes other than Minnetonka (percent)
Non-alcoholic drinks only	43%	61%
Mix of non-alcoholic and alcoholic drinks	41%	21%
Alcoholic drinks only	5%	2%
No beverages on board	12%	15%
Total percent	100%	100%

* Minnetonka data for 2004; other data for 2009.

Awareness of Boating Safety Advertisements

A sizable portion of metro boaters (just over 40%) have heard on the radio or seen on television a boating safety advertisement in the last 12 months (Table 35). Awareness is largely the same across lake classes.

Table 35

Hear or see a boating safety advertisement?

(responses from metro boaters on lakes other than Minnetonka, 2009)

Question	All boaters (percent)	*Boating resource** Remaining large lakes (percent)	*Boating resource** Built-up area lakes (percent)	*Boating resource** Rural area lakes (percent)
● *In the last 12 months, did you hear a boating safety advertisement on the radio?* "Yes" responses	42%	43%	39%	43%
● *In the last 12 months, did you see a boating safety advertisement on television?* "Yes" responses	43%	46%	39%	45%

* "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

CHARACTERISTICS OF THE BOATING TRIP

Activity

There are two main activities on Twin Cities lakes: boating ride/swimming, and fishing. The former is the larger overall and on Lake Minnetonka, while the latter is larger on other metro lakes (Table 36). Public access boaters primarily boat ride/swimming on Lake Minnetonka, and primarily fish on other metro lakes. Riparian residents mainly boat ride/swimming on both Minnetonka and other metro lakes.

Table 36

Primary boating activity

Primary activity	All boaters (percent)	*Boating resource** Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Boat ride/swimming	41%	62%	36%	26%	27%
Fishing	32%	10%	41%	36%	52%
Tubing/water skiing	10%	5%	10%	14%	14%
Sailing	5%	6%	3%	10%	1%
Canoeing/kayaking	2%	0%	2%	8%	1%
Transportation to/from	2%	5%	1%	1%	0%
Jet skiing	1%	1%	1%	3%	1%
Other	7%	11%	6%	4%	4%
Total percent	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Activities have changed since 1984. The major changes are a rise in boat ride/swimming and a drop in tubing/water skiing (Table 37). Also decreasing are the two predominate non-motorized activities: sailing and canoeing/kayaking.

The increase in boat ride/swimming is of a general nature, with similar results in the three other regional boating studies. Two of the three other regional studies show a modest decrease in tubing/water skiing; the remaining study has no change in tubing/water skiing.

Table 37

Trends in primary boating activity*

Primary activity	1984 (percent)	1996 (percent)	2004 or 2009** (percent)	Change in percent (1984 to 2004-09)
Boat ride/jet skiing/swimming	29%	41%	45%	16%
Fishing	35%	38%	35%	0%
Tubing/water skiing	22%	12%	11%	-11%
Sailing	8%	4%	4%	-4%
Transportation to/from	3%	4%	2%	0%
Canoeing/kayaking	4%	2%	2%	-2%
Total	100%	100%	100%	0%

* To compare over time, the commerical boating source is not included because it was poorly covered in 1984; 2004-09 "jet skiing" (not asked prior) is combined with "boat ride"; and 2004-09 "other" (not asked prior) is eliminated.

** Minnetonka data for 2004; other data for 2009.

The other regional studies, however, show a sizable decrease in fishing since the 1980s, which is not found in the Twin Cities region. In the 1980s, The Twin Cities region had substantially less fishing as a percent of boating than the other regions. Although the between-region fishing gap has closed, the Twin Cities still has the least fishing. Compared with the Twin Cities overall portion of boating that is fishing (32%), the North Central region has 37 percent fishing, the West Central region 47 percent, and the Central region 51 percent. The metro lakes other than Minnetonka are similar to the other regions in terms of the portion of boating that is fishing.

Boating Equipment

The types of craft most used for boating are runabouts and fishing boats, followed by pontoons and cruisers (Table 38 — 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. Cruisers are only common on Lake Minnetonka, and non-motorized craft (canoe/kayak, sailboat) are most common on built-up area lakes, some of which are zoned non-motorized.

Craft types have changed since 1996. The primary changes are an increase in runabouts and a decrease in fishing boats (Table 39). Smaller changes are evident for the other craft types. These craft changes are of a general nature, and have been found in the North Central. Central, and West Central regions.

Boat lengths now average 19 to 20 feet. Average lengths are nearly 23 feet on Lake Minnetonka, and 17 to 18 feet on other metro lakes (Table 40). Motor sizes average over 100 horsepower and are nearly 200 horsepower on Lake Minnetonka. Boats launched by Minnetonka public access boaters average 21.2 feet in length and average 186 for horsepower, while on other metro lakes the average length of public access boats is 16.7 feet and average horsepower is 98.

Both craft length and motor sizes have increased (Table 41). Lengths are up nearly two feet since 1996, and motor sizes are up 36 horsepower since 1996 (60 horsepower since 1984). These changes in the length and horsepower of boats are part of a general trend that is evident in the other regional boating studies.

Table 38

Watercraft used on trip

Watercraft type	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Boating resource*: Remaining large lakes (percent)	Boating resource*: Built-up area lakes (percent)	Boating resource*: Rural area lakes (percent)
Cruiser (has cabin or superstructure)	12%	32%	1%	0%	1%
Runabout (has windshield)	40%	45%	46%	33%	36%
Fishing boat (no windshield)	21%	6%	31%	26%	33%
Jet ski	1%	1%	1%	3%	2%
Pontoon	13%	7%	14%	16%	19%
Canoe/kayak	3%	0%	2%	8%	2%
Sailboat	5%	6%	3%	10%	1%
Other	5%	4%	5%	6%	7%
Total percent	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Table 39

Trends in type of watercraft

Watercraft type	1996 (percent)	2004 or 2009** (percent)	Change in percent (1996 to 2004-09)
Cruiser (has cabin or superstructure)	9%	12%	3%
Runabout (has windshield)	33%	40%	7%
Fishing boat (no windshield)	35%	21%	-14%
Pontoon	11%	13%	2%
Canoe/kayak	2%	3%	1%
Sailboat	3%	5%	2%
Other*	7%	7%	0%
Total percent	100%	100%	0%

* Includes jet skis.

** Minnetonka data for 2004; other data for 2009.

Table 40

Boat lengths and motor sizes

Measure	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Average length (feet)	19.5	22.7	17.9	16.9	17.8
Average horsepower	136	198	113	91	100

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Table 41

Trends in boat lengths and motor sizes

Measure	1984 (value)	1996 (value)	2004 or 2009** (value)	Change in value (1996 to 2004-09)
Average length (feet)	(not asked)	17.7	19.5	1.8
Average horsepower	76	100	136	36

** Minnetonka data for 2004; other data for 2009.

Other Trip Characteristics

Boaters launching through public access are primarily locals, nearly 90 percent of whom (88%) are within 25 miles of home; half are within 10 miles of home (Table 42). The use of the accesses by long-distance travelers is rare. Similarly, public accesses are mainly a local-use facility in the Central and Northern region. Public accesses, however, are primarily a tourist facility in the North Central and West Central region, which are two of Minnesota's major water-related tourist destination areas.

Table 42

Travel distance from permanent home to public accesses

		*Boating resource**			
Measure	All boaters (percent)	Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Median miles	10	10	10	6	15
Percent of boaters who are *within* 25 miles of their permanent home	88%	93%	86%	94%	78%
Percent of boaters who are *over* 100 miles of their permanent home	1%	0%	0%	2%	1%

* Minnetonka data for 2004; other data for 2009.

Most boating party sizes are three to four people, and are largest on Lake Minnetonka (Table 43). On lakes other than Minnetonka, adults comprise 70 to 75 percent of boaters, while teens and children comprise 25 to 30 percent. Riparian resident boaters tend to be older than public access boaters, especially in the 55 and over age bracket.

Boating party size has steadily increased from an average of 2.9 boaters per boat in 1984 to 3.2 in 2009. Perhaps this increase is a reflection of the trend to larger boats, which tend to have more boaters on board.

Table 43

Boating party sizes and ages

Measure	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Average party size	3.2	3.7	3.0	2.8	3.1
Percent of boaters by age:					
Adults 55 or older		age class information not asked	21%	25%	23%
Adults 18 to 54			53%	46%	51%
Teens (12 to 17)			9%	14%	11%
Children (11 or younger)			16%	15%	16%
Total percent			100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

A typical boating trip lasts 2.5 to 4 hours (Table 44). Boaters launching at public access have trip lengths 1.5 to 2 hours longer than riparian residents. The median length of a public access trip is 4 hours, and is 2 to 2.5 hours for riparian residents.

Table 44

Duration of boating trips

Meaure	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Average trip hours	3.6	3.8	4.1	2.8	3.9
Median trip hours	3.0	3.0	4.0	2.5	4.0

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

BOATER CHARACTERISTICS

Boaters, as a group, are familiar with the lake at which they were surveyed. Overall, half have been boating for 10 or more years on the lake, and only 11 percent were recent arrivals to the lake (Table 45). Riparian residents have a longer boating history (median of near 20 years) than public access boaters (median of 5 to 10 years).

Table 45

How many years have you been boating on this lake?
("this lake" is the lake at which the boater received the survey)

		*Boating resource**			
Measure	All boaters (percent)	Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Median years boated	10	15	11	10	10
Percent new boaters (boated one year or less)	11%	5%	10%	13%	16%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Most Twin Cities boaters live in the seven-county metropolitan area (Table 46). Few are from out of state. Rural area lakes draw a sizable portion of boaters from the central region, where some of these lakes are located.

Boaters on lakes other than Minnetonka report a median annual household income between $75,000 and $100,000 (Table 47), which is above the statewide median of about $55,000 (USBOC, 2010). Minnetonka boaters have a median income above $100,000. Riparian resident boaters have the higher incomes than public access boaters.

For the purposes of getting information to boaters, the survey asked about radio listening habits and Minnesota DNR website use. The predominant type of radio station listened to is rock and roll, followed by talk, country, public radio, and easy listening/lite (Table 48).

Overall, the Minnesota DNR website has been used by a majority of boaters to obtain boating-related information. Only on Lake Minnetonka is the portion that used the website under 50 percent (Table 49). Public access boaters are more likely than riparian resident boaters to use the website (62% versus 48%, respectively).

Table 46

Origin of boaters

("this lake" is the lake at which the boater received the survey)

Origin	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Remaining large lakes (percent)	Built-up area lakes (percent)	Rural area lakes (percent)
Minnesota	99%	100%	99%	99%	99%
Metro,MN	*91%*	*98%*	*95%*	*99%*	*74%*
Central, MN	*8%*	*2%*	*3%*	*0%*	*22%*
All other regions, MN	*1%*	*0%*	*2%*	*0%*	*3%*
Out of state	1%	0%	1%	2%	1%
Total	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

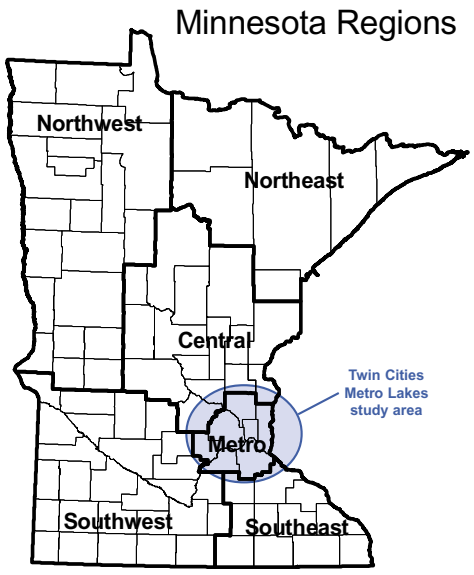


Table 47

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

(Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.)

A. Lakes other than Minnetonka

Income category	All boaters (percent)	Boating resource: Remaining large lakes (percent)	Boating resource: Built-up area lakes (percent)	Boating resource: Rural area lakes (percent)
under $30,000	5%	3%	6%	6%
$30,000 - $39,999	6%	6%	3%	7%
$40,000 - $49,999	7%	7%	7%	8%
$50,000 - $74,999	19%	20%	19%	18%
$75,000 - $99,999	22%	21%	26%	21%
$100,000 or more	40%	44%	40%	39%
Total percent	100%	100%	100%	100%

B. Lake Minnetonka

Income category	All boaters (percent)
under $30,000	1%
$30,000 - $39,999	2%
$40,000 - $59,999	6%
$60,000 - $79,999	11%
$80,000 - $99,999	8%
$100,000 or more	71%
Total percent	100%

Table 48

What type of radio station do you primarily listen to?

Type of radio station	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Boating resource*: Remaining large lakes (percent)	Boating resource*: Built-up area lakes (percent)	Boating resource*: Rural area lakes (percent)
Rock & Roll	25%	24%	26%	23%	27%
Talk	15%	14%	18%	17%	15%
Country	13%	7%	17%	8%	20%
Public radio	12%	13%	9%	20%	8%
Easy listening/lite	11%	15%	12%	9%	8%
Sports	5%	4%	5%	5%	7%
Religious radio	4%	5%	4%	3%	5%
Classical	4%	6%	2%	5%	3%
Jazz	4%	7%	1%	2%	1%
Other	6%	4%	7%	7%	6%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

Table 49

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

Response	All boaters (percent)	Boating resource*: Lake Minnetonka (percent)	Boating resource*: Remaining large lakes (percent)	Boating resource*: Built-up area lakes (percent)	Boating resource*: Rural area lakes (percent)
Yes	56%	47%	64%	61%	61%
No	42%	52%	35%	36%	37%
Don't know	2%	2%	2%	3%	2%
Total	100%	100%	100%	100%	100%

* Minnetonka data for 2004; other data for 2009. "Rural lakes" covers the small amount of boating (1%) from lakes without public accesses, two-thirds of which are in rural areas.

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National Park Service visitation records (http://www.nature.nps.gov/stats/).

Minnesota:

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Trend B: Trend series on Minnesota boating use:

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APPENDIX A

Boating lakes in the Twin Cities study area

Sample lakes in 1984, 1996 and 2009 boating studies

Lake Number	Lake Name	Class 2009*	Class in 1996*	Class in 1984*	Lake Acres
Seven-County Twin Cities Area Lakes					
270133	Minnetonka	Minnetonka	Minnetonka	Minnetonka	14,034
100009	Minnewashta	Cat 1	Cat 1	Cat 1	763
700026 & 700072	L & U Prior	Cat 1	Cat 1	Cat 1	1,146
820052	Big Marine	Cat 1	Cat 1	Cat 1	1,577
820167	White Bear	Cat 1	Cat 1	Cat 1	2,410
620057	Josephine	Cat 2-PA	Cat 2-PA	Cat 2-no PA	110
270137	Christmas	Cat 2-PA	Cat 2-PA	Cat 2-no PA	274
620061	Turtle	Cat 2-PA	Cat 2-PA	Cat 2-no PA	444
270031	Calhoun	Cat 2-PA	Cat 2-PA	Cat 2-PA	416
270019	Nokomis	Cat 2-PA	Cat 2-PA	Cat 2-PA	199
270067	Bryant	Cat 2-PA	Cat 2-PA	Cat 2-PA	199
270111	Eagle	Cat 2-PA	Cat 2-PA	Cat 2-PA	470
620078	Johanna	Cat 2-PA	Cat 2-PA	Cat 2-PA	211
620056	Owasso	Cat 2-PA	Cat 2-PA	Cat 2-PA	360
20052	Netta	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	162
820163	Clear	Cat 3-PA	Cat 3-PA	Cat 3-no PA	400
700120	Thole	Cat 3-PA	Cat 3-PA	Cat 3-no PA	131
820049	Big Carnelian	Cat 3-PA	Cat 3-PA	Cat 3-PA	444
20006	Centerville	Cat 3-PA	Cat 3-PA	Cat 3-PA	464
820159	Forest	Cat 3-PA	Cat 3-PA	Cat 3-PA	2,206
20026	Linwood	Cat 3-PA	Cat 3-PA	Cat 3-PA	567
190026	Marion	Cat 3-PA	Cat 3-PA	Cat 3-PA	489
100059	Waconia	Cat 3-PA	Cat 3-PA	Cat 3-PA	3,196
Chisago County Lakes					
130031	Sunrise	Cat 3-no PA	Cat 3-no PA	n/a	810
130012 & 130028	Chisago & S Lindstrom	Cat 3-PA	Cat 3-PA	n/a	1,594
130041	Green	Cat 3-PA	Cat 3-PA	n/a	1,830
130053	Comfort	Cat 3-PA	Cat 3-PA	n/a	220

* Class codes are as follows:

Minnetonka: Lake Minnetonka

Cat 1: Remaining large (high-use) boating lakes (all have public access)

Cat 2-PA: Built-up area lakes with public access

Cat 2-no PA: Built-up area lakes without public access

Cat 3-PA: Rural area lakes with public access

Cat 3-no PA: Rural area lakes without public access

+ Notes: Cedar (270039) and Lake of the Isles (270040) use Calhoun public access;
Gervais (620007) uses Keller public access; and
Olson (820103) uses DeMontreville public access.

Other seven-county Twin Cities boating lakes

Lake Number	Lake Name	Class 2009*	Class in 1996*	Class in 1984*	Lake Acres
100012	Ann	Cat 2-PA	Cat 2-PA	Cat 2-no PA	120
100044	Auburn	Cat 3-PA	Cat 3-PA	Cat 3-PA	356
620002	Bald Eagle	Cat 2-PA	Cat 2-PA	Cat 2-PA	1,046
270098	Bass	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	175
100019	Bavaria	Cat 3-PA	Cat 3-PA	Cat 3-PA	201
820054	Bone	Cat 3-PA	Cat 3-PA	Cat 3-PA	206
100084	Burandt	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	138
270047	Bush	Cat 2-PA	Cat 2-PA	Cat 2-PA	207
190006	Byllesby	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,480
270039	Cedar+	Cat 2-PA	Cat 2-PA	Cat 2-PA	167
700091	Cedar	Cat 3-PA	Cat 3-PA	Cat 3-PA	749
20042	Coon	Cat 3-PA	Cat 3-PA	Cat 3-PA	1,507
20084	Crooked	Cat 2-PA	Cat 2-PA	Cat 2-PA	130
190027	Crystal	Cat 2-PA	Cat 2-PA	Cat 2-PA	290
820101	DeMontreville	Cat 2-PA	Cat 2-PA	Cat 2-PA	156
270181	Dutch	Cat 2-PA	Cat 2-PA	Cat 2-PA	170
100121	Eagle	Cat 3-PA	Cat 3-PA	Cat 3-PA	230
20133	East Twin	Cat 3-PA	Cat 3-PA	Cat 3-PA	116
820106	Elmo	Cat 3-PA	Cat 3-PA	Cat 3-PA	317
270118	Fish	Cat 2-PA	Cat 2-PA	Cat 2-no PA	221
700069	Fish	Cat 3-PA	Cat 3-PA	Cat 3-PA	175
20091	George	Cat 3-PA	Cat 3-PA	Cat 3-PA	542
620007	Gervais+	Cat 2-PA	Cat 2-PA	Cat 2-PA	234
270095	Gleason	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	167
270093	Glen	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	180
20053	Ham	Cat 3-PA	Cat 3-PA	Cat 3-PA	193
270016	Harriet	Cat 2-PA	Cat 2-PA	Cat 2-PA	337
100088	Hydess	Cat 3-PA	Cat 3-PA	Cat 3-PA	212
270176	Independence	Cat 3-PA	Cat 3-PA	Cat 3-PA	828
20022	Island	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	100
270081	Island	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	163
820104	Jane	Cat 2-PA	Cat 2-PA	Cat 2-PA	159
620010	Keller	Cat 2-PA	Cat 2-PA	Cat 2-PA	72
270040	Lake of the Isles+	Cat 2-PA	Cat 2-PA	Cat 2-PA	157
270182	Langdon	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	168
620067	Long	Cat 2-PA	Cat 2-PA	Cat 2-PA	184
270179	Long	Cat 3-PA	Cat 3-PA	Cat 3-no PA	104

* Class codes are as follows:
Minnetonka: Lake Minnetonka
Cat 1: Remaining large (high-use) boating lakes (all have public access)
Cat 2-PA: Built-up area lakes with public access
Cat 2-no PA: Built-up area lakes without public access
Cat 3-PA: Rural area lakes with public access
Cat 3-no PA: Rural area lakes without public access

+ Notes: Cedar (270039) and Lake of the Isles (270040) use Calhoun public access;
Gervais (620007) uses Keller public access; and
Olson (820103) uses DeMontreville public access.

Other seven-county Twin Cities boating lakes (coninuted)

Lake Number	Lake Name	Class 2009*	Class in 1996*	Class in 1984*	Lake Acres
270160	Long (Little)	Cat 2-PA	Cat 2-PA	Cat 2-PA	279
100006	Lotus	Cat 2-PA	Cat 2-PA	Cat 2-no PA	254
100007	Lucy	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	137
20034	Martin	Cat 3-PA	Cat 3-PA	Cat 3-PA	218
700050	McMahon	Cat 3-PA	Cat 3-PA	Cat 3-PA	136
270104	Medicine	Cat 2-PA	Cat 2-PA	Cat 2-PA	924
100029	Miller	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	145
270070	Mitchell	Cat 2-PA	Cat 2-PA	Cat 2-no PA	116
700095	O'Dowd	Cat 3-PA	Cat 3-PA	Cat 3-PA	256
820103	Olson+	Cat 2-PA	Cat 2-PA	Cat 2-PA	100
190031	Orchard	Cat 3-PA	Cat 3-PA	Cat 3-PA	243
20003	Otter	Cat 2-PA	Cat 2-PA	Cat 2-PA	338
100042	Parley	Cat 3-PA	Cat 3-PA	Cat 3-PA	470
20004	Peltier	Cat 3-PA	Cat 3-PA	Cat 3-PA	483
620013	Phalen	Cat 2-PA	Cat 2-PA	Cat 2-no PA	193
100053	Piersons	Cat 3-PA	Cat 3-PA	Cat 3-PA	340
820122	Pine Tree	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	174
620046	Pleasant	Cat 2-no PA	Cat 2-no PA	Cat 2-no PA	585
20015	Randeau	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	594
270192	Rebecca	Cat 3-PA	Cat 3-PA	Cat 3-PA	290
100052	Reitz	Cat 3-PA	Cat 3-PA	Cat 3-PA	111
100002	Riley	Cat 3-PA	Cat 3-PA	Cat 3-PA	296
270191	Sarah	Cat 3-PA	Cat 3-PA	Cat 3-no PA	586
100018	Schutz	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	140
620073	Snail	Cat 2-PA	Cat 2-PA	Cat 2-PA	195
700054	Spring	Cat 3-PA	Cat 3-PA	Cat 3-PA	690
820046	Square	Cat 3-PA	Cat 3-PA	Cat 3-PA	193
270078	Starring	Cat 2-PA	Cat 2-PA	Cat 2-PA	155
100045	Steiger	Cat 3-PA	Cat 3-PA	Cat 3-PA	281
820153	Sunset	Cat 3-no PA	Cat 3-no PA	Cat 3-no PA	124
270042	Upper Twin	Cat 2-PA	Cat 2-PA	Cat 2-PA	201
100015	Virginia	Cat 2-PA	Cat 2-PA	Cat 2-PA	121
100048	Wasserman	Cat 3-PA	Cat 3-PA	Cat 3-PA	277
270117	Weaver	Cat 3-PA	Cat 3-PA	Cat 3-PA	155
270184	Whaletail	Cat 3-PA	Cat 3-PA	Cat 3-PA	582
100041	Zumbra	Cat 3-PA	Cat 3-PA	Cat 3-PA	221

* Class codes are as follows:

Minnetonka: Lake Minnetonka

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Cat 2-no PA: Built-up area lakes without public access

Cat 3-PA: Rural area lakes with public access

Cat 3-no PA: Rural area lakes without public access

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