



Minnesota Canoe and Kayak Study

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

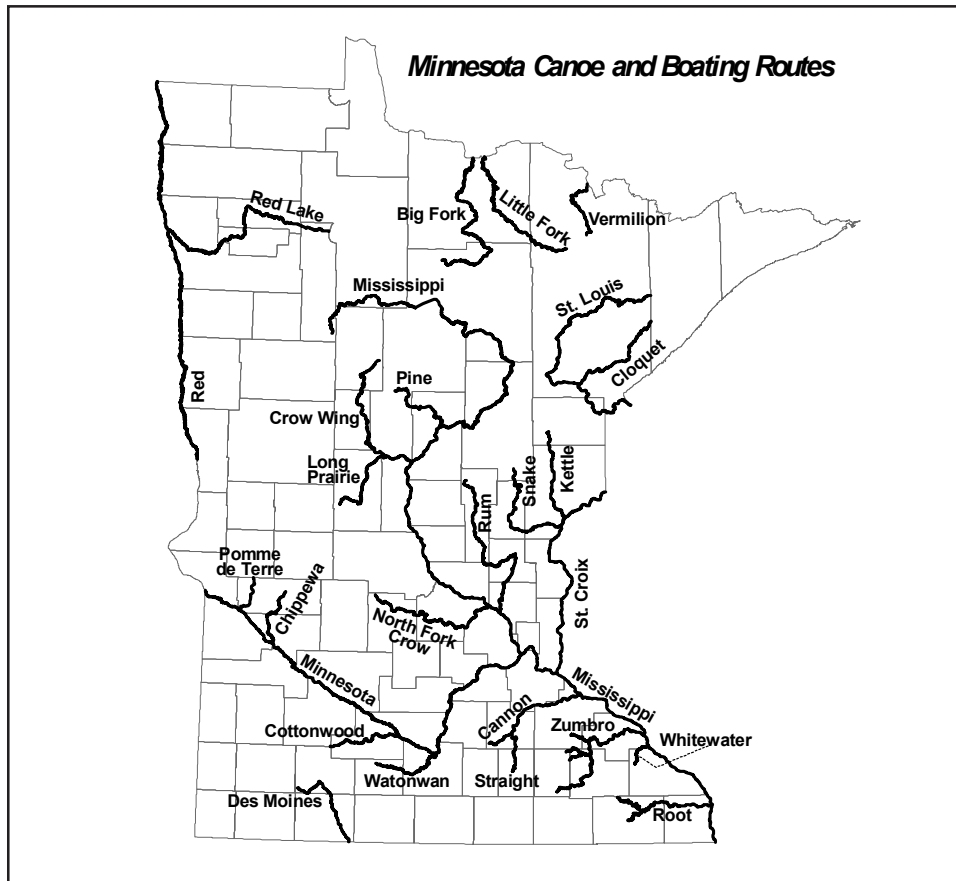
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MINNESOTA CANOE AND KAYAK STUDY



The canoe and kayak study was a cooperative research project of the Minnesota Department of Natural Resources Trails and Waterways Division, and Boating Safety Program

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SUMMARY

INTRODUCTION

Recreational boating—which includes fishing from a boat—is one of the largest outdoor activities in Minnesota. It is ranked second only to walking as an outdoor pursuit among Minnesota adults. Most of Minnesota boating is motorized, but an important segment of the boating market is human-powered. Currently, one-in-five registered boats in Minnesota is a canoe or kayak, and canoes and kayaks have maintained their share of all boats during the sizable increase in boat numbers over the last 25 years. The number of registered canoes and kayaks reached 172,442 in 2004. Paddlers of canoes and kayaks are a common sight on Minnesota lakes and streams.

To gain a better understanding of canoeing and kayaking in Minnesota, the DNR conducted this study, which has two major goals. One goal is to provide a general understanding of the nature and direction of canoeing/kayaking in Minnesota, and the second goal is to provide information to help guide Minnesota's Canoe and Boating Route (CBR) Program. A primary target market of the CBR Program is canoers and kayakers. The CBR Program was established by the Minnesota Legislature in 1963. To date, 26 rivers, totaling 3400 river miles, have been designated as part of the CBR Program.

Boat registration and boating-use trends are examined as part of this first goal. For both goals, Minnesota canoe and kayak owners are queried in a statewide survey about many aspects of their paddling activity, including reasons for canoeing/kayaking, barriers to river paddling, opinions on potential paddling-related management actions, evaluations of the importance and performance of river facilities and services for paddlers, and boating-safety issues. Survey respondents were owners of Minnesota-registered canoes and kayaks. The survey did not cover canoers/kayakers who rent craft from outfitters.

NATURE AND DIRECTION OF CANOEING/KAYAKING IN MINNESOTA

Status and trends in registrations and use of canoes/kayaks

Overall boat registrations have increased substantially (about 50%) over the last 25 years. Since 1980, canoes and kayaks have maintained their share (20%) of all boat registrations. The mix between canoes and kayaks, however, is changing rapidly. Since 2000, canoe registrations have been stable, while kayak registrations have doubled. It should be noted that these boat-registration trends do not capture trends in non-motorized craft nine feet in length or less, which are not required to be registered in Minnesota. Trends in the number of these smaller non-motorized craft are not available.

The majority of canoeing/kayaking occurs on lakes, with a smaller portion on rivers and streams. Rivers and streams—though used less than lakes—have a positive image for canoers and kayakers.

In spite of boat registration increases, a series of boating studies found that overall boating use is stable, with no increase or decrease since the 1980s. The typical boat, it appears, is being used less over time. In these boating studies, canoeing and kayaking is a small portion of use and cannot be tracked separately from overall boating use. As a result, the direction of canoeing/kayaking use in Minnesota is not well known. There are some indications, however, that canoeing/kayaking use is more or less stable, much like boating overall. These indications are from data on perceived per-craft use rates, and from boating indicators in two areas in the state that are largely devoted to non-motorized boating use: Boundary Waters Canoe Area Wilderness (BWCAW), and Federal-managed area of the lower St. Croix River.

Experience canoeing/kayaking

Canoe and kayak owners have a good deal of experience in their activity, and this is especially true of canoers. Canoe owners have a median of 30 years of experience in Minnesota. Kayak owners have less experience, probably due to the fact that kayaks have only recently become popular.

Reasons for canoeing/kayaking

Primary reasons involve enjoying nature and escaping a hectic lifestyle (especially the reason “experience silence and quiet”). Paddling also shows itself to be a social activity; being with family and friends is an important reason for participating.

Kayakers have two major differences from canoers: kayakers are far more interested in exercise/feeling healthier and far less interested in catching/harvesting game and fish. For kayakers, this exercise/feeling healthier reason is a top-ranked motivation for participation, while catching/harvesting game and fish is a bottom-ranked motivation. For canoers, both of these motivations are medium-ranked.

Water-surface zoning to enhance canoeing/kayaking

Canoers and kayakers were asked how much they agreed/disagreed with four statements concerning water-surface zoning that restricts motorized boating. The overall results indicate that paddlers are largely ambivalent about each water-surface zoning option. However, the overall results mask a strong difference that depends on whether the paddler has a motorized boat in the household. For those paddlers who do not have a motorboat at home, each zoning statement is agreed to far more than if the paddler is in a motorized boating household. Having a motorboat in the household makes motorized restrictions less attractive to paddlers. Overall, nearly 60 percent (57%) of paddlers have a motorboat at home.

Boating safety

Canoers and kayakers were asked about selected boating-safety topics, including formal boating-safety training, use of life vests, and type of beverages that they take on an outing.

In terms of safety training, canoe/kayak owners are typical of most boaters. About one-quarter

have completed a formal safety course. Kayak owners are more likely to have completed such as course than canoe owners (32% versus 22%, respectively).

The large majority of paddlers (86%) wear life vests, well above the typical portion wearing a life (40%-50%) found in the regional boating studies. The typical boat in the regional studies is in a motorboat, which probably provides a greater sense of water safety than a canoe or kayak. As a general rule, the larger the boat, the less likely the boater will be wearing a life vest.

The percent of paddlers with alcoholic beverages on board is on the low side compared with the typical boater in the regional studies, while the percent without beverages of any kind is on the high side. The lack of beverages of any kind may be due to the shorter length of time paddlers are on the water, and to the active nature of the paddling activity that makes managing beverages more cumbersome in the canoe or kayak.

Characteristics of canoe and kayak owners

Several characteristics of canoe and kayak owners were collected in the survey, including: experience with canoeing/kayaking, prevalence of having a motorboat in the household, ownership of shoreland residences, use of MN DNR website, radio listening habits, and demographics (age, gender, race, ethnicity, education, income, and household size).

MINNESOTA'S CANOE AND BOATING ROUTE (CBR) PROGRAM

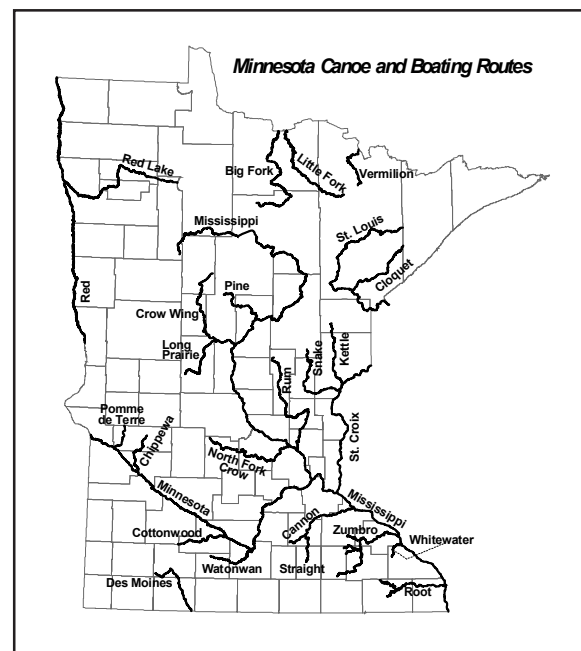
Awareness of CBR river program

A large majority of canoers and kayakers have little if any awareness of the CBR Program. Thus, when communicating with most paddlers about river-related topics, referencing the CBR Program is probably not very useful at present.

Use of CBR rivers

Although largely unaware of the “CBR Program,” some two-thirds of owners report using a CBR river sometime in the past. Around one-third report have camped from a canoe/kayak on a CBR river sometime in the past.

In the last 12 months, about one-third report using a CBR river and just over 10 percent report camping from a canoe/kayak on a CBR river.



Interest in more CBR use and barriers to more use

About one-third (35%) of canoers/kayakers used a CBR river in the last 12 months. Most (68%), however, would like to use CBR rivers more often, indicating that river use is generally viewed in a positive light.

For those who have an interest in using CBR rivers more, the major barrier to more river use is a lack of time; time constraints are a universal barrier to more participation in of just about any outdoor pursuit. This lack-of-time barrier is followed by the more specific barriers of arranging shuttling, lack of prior knowledge of water levels, and expectations that motorized watercraft will interfere with the enjoyment of their outing.

Interest in more camping from a canoe/kayak on CBR rivers and barriers to more camping

While just 12 percent of canoers/kayakers camped from a canoe/kayak on a CBR river in the last 12 months, nearly half (49%) would like to do this type of camping more often.

For those who have an interest in camping more, the leading barriers are related to the availability of campsites: guarantee of a site, too few campsites, and campsites too full. These same “availability of campsites” items are leading barriers to sea-kayaker use of water-accessible campsites along the North Shore of Lake Superior.

Importance and performance of CBR facilities/services for an enjoyable outing

Canoers and kayakers who have used CBR rivers in the past were asked about the importance and quality of various facilities and services offered on CBR rivers. The most important items for an enjoyable outing are CBR accesses and river maps. These are followed by river-level reporting and MN DNR website info. Other items (such as campsites, rest areas and obstacle removal) are of lesser importance overall.

For those who judge a facility or service “very” or “moderately” important for their enjoyment, satisfaction is higher for some facilities/services than others. Accesses and maps—which have the highest importance ratings—have the highest satisfaction levels (60%-70% “very satisfied” or “satisfied” responses). Of the facilities/services evaluated, accesses and maps are the main successes, and efforts should be made to ensure their continued success. For the next two most important facilities/services (river-level reporting and MNDNR website info) satisfaction levels are lower, with about 50 percent “satisfied” or “very satisfied”. These are candidates for additional attention.

The lowest satisfaction rates are for camping related items (30% to 40% “satisfied” or “very satisfied”), and include the number and maintenance of campsites. These low satisfaction rates are a clear indication that campers do not believe the program is working well for their interests. As noted above, these camping items are of medium importance to CBR canoers/kayakers overall, which is consistent with the fact that many CBR canoers/kayakers are not campers on CBR rivers.

Two other medium-importance facilities/services to CBR paddlers are portages and obstacle removal. The former has a medium satisfaction rate, and the latter has a low satisfaction rate; both—and especially obstacle removal—would warrant receiving additional resources to boost satisfaction rates. The remaining two facilities/services (rest areas and informational signage) are of the lowest importance, and each has a medium satisfaction rate.

Potential management actions on CBR rivers

Canoers and kayakers who have used CBR rivers in the past were asked about their views on 13 possible management actions on CBR rivers.

In summary, CBR river users support management actions that provide them with additional opportunities or information (e.g., more access or camping), and oppose actions that would restrict their behavior (e.g., prohibit wood fires). And they want the setting for paddling to be as natural as possible, with little interference from other recreation activities that would modify the “naturalness” of the setting (e.g., off-road vehicles).

High priority CBR river topics for canoers/kayakers

Several topics are identified—through the survey results—to be of high priority to river canoers/kayakers. The topics cover boating facilities, services, and issues. A topic becomes high priority if it meets one or more of these conditions: (i) the topic has high importance to the enjoyment of river use, (ii) the topic represents a high-ranking barrier to more river use, or (iii) the topic is a management option that receives large support. Putting effort into these high-priority topics would appear—from the survey results—to make sense to canoers/kayakers.

- **Accesses along CBR rivers:** Along with maps, access is ranked at the top in terms of importance to canoers/kayakers, and has one of the highest satisfaction rates, which makes it a leading program success at present. Efforts to ensure this continues to be a success would make sense to canoers/kayakers.
- **Maps of CBR rivers:** Along with access, maps are ranked at the top in terms of importance to canoers/kayakers, and have one of the highest satisfaction rates, which makes them a leading program success at present. Efforts to ensure this continues to be a success would make sense to canoers/kayakers.
- **River-level reporting:** When asked about the importance of various facilities/services that make a CBR outing enjoyable, canoers/kayakers rank river-level reporting as number three, after river accesses and river maps. For those who think river-level reporting is important to their outing, satisfaction with the current river-level reporting is not particularly high. There is a lot of room for improvement in this relatively important information service, and efforts to improve it would make sense to canoers/kayakers.
- **Shuttling back upstream after a CBR river outing:** As a barrier to more CBR river use, arranging a shuttle back upstream after a river trip is ranked number two, after lack of time (a universal

barrier). It is ranked ahead of river-level reporting. Shuttling is an inherent problem of river paddling and is something users need to plan for. Maps and accesses (two topics above) are critical to canoers/kayakers who need to plan how to shuttle their craft back upstream after a river trip. And the MN DNR website (a topic below) could conceivably offer valuable advice on how to find services that provide shuttle arrangements.

- Camping from a canoe/kayak on a CBR river: Providing more campsites is strongly supported by canoers/kayakers. The major barriers to more camping relate to the availability of campsites: guarantee of a site, too few campsites, and campsites too full. These same “availability of campsites” items are leading barriers to sea-kayaker use of water-accessible campsites along the North Shore of Lake Superior.

Camping-related items (number and maintenance of campsites) received the lowest satisfaction marks of any of the facilities/services evaluated in the survey by canoers/kayakers. To make camping more than a marginal performer among CBR river facilities/services, it appears, would require a fair amount of additional effort.

- Conflicts with motorboats on CBR rivers: A high-ranked barrier to more CBR river use (equal to not knowing water levels prior to the trip) is the expectation that motorized watercraft will interfere with the enjoyment of the outing. This barrier could be addressed with water-surface zoning, access planning (e.g., providing carry-in accesses only), and with information on river reaches that are known to be largely free of motorized craft.
- MN DNR website information on CBR rivers: When asked about the importance of various facilities/services that make a CBR outing enjoyable, canoers/kayakers rank the MN DNR website information as number four, after river accesses, maps, and river-level reporting. For those who think website information is important to their outing, satisfaction with the current website information is not particularly high (only about half are satisfied). There is a lot of room for improvement in this relatively important information-access service, and efforts to improve it would make sense to canoers/kayakers.

The MN DNR website is a good location for information on many of the preceding high-priority topics: river accesses, river maps, and river-level conditions. It could also be place to provide information on rivers with little motorboat traffic (i.e., where to avoid conflicts with motorboats), and to set expectations about campsite maintenance standards. The website could conceivably offer valuable advice on how to find services that provide shuttle arrangements and where to look for near-river campgrounds that accept reservations.

INTRODUCTION

Recreational boating—which includes fishing from a boat—is one of the largest outdoor activities in Minnesota. It is ranked second only to walking as an outdoor pursuit among Minnesota adults (Reference 1). Most of Minnesota boating is motorized, but an important segment of the boating market is human-powered. Currently, one-in-five registered boats in Minnesota is a canoe or kayak, and canoes and kayaks have maintained their share of all boats during the sizable increase in boat numbers over the last 25 years. The number of registered canoes and kayaks reached 172,442 in 2004. Paddlers of canoes and kayaks are a common sight on Minnesota lakes and streams.

To gain a better understanding of canoeing and kayaking in Minnesota, the DNR conducted this study, which has two major goals. One goal is to provide a general understanding of the nature and direction of canoeing/kayaking in Minnesota. Boat registration and boating-use trends are examined as part of this first goal. In addition, canoe and kayak owners are queried in a survey about their reasons for canoeing/kayaking and opinions on general lake and river management actions that might enhance their paddling activity. They are also asked in the survey about various boating-safety concerns. The survey—as noted—covered owners of Minnesota-registered canoes and kayaks; it did not cover canoers/kayakers who rent craft from outfitters.

The second goal is to provide information to help guide Minnesota's Canoe and Boating Route (CBR) Program, which was established by the Minnesota Legislature in 1963. To date, 26 rivers, totaling 3400 river miles, have been designated as part of the Program. The CBR Program facilitates boating on designated Minnesota rivers by mapping, signing and developing river-use facilities, such as accesses, campsites portages, and rest areas. A primary target market of the CBR Program is canoers and kayakers. As part of the survey mentioned above, canoers/kayakers were asked about their awareness of the Program, their use of CBR rivers, and about the barriers that limit their use of CBR rivers. In addition, they were asked to evaluate the importance and quality of CBR facilities and services, and to provide their opinions on potential management direction for the rivers.

The report is presented—after a brief discussion of the canoer/kayaker survey methodology—as follows:

Nature and direction of canoeing/kayaking in Minnesota

Status and trends in registrations and use of canoes/kayaks

Experience canoeing/kayaking

Reasons for canoeing/kayaking

Water-surface zoning to enhance canoeing/kayaking

Boating safety

Characteristics of canoe and kayak owners

Minnesota's Canoe and Boating Route (CBR) Program

Awareness of CBR river program

Use of CBR rivers

Interest in more CBR use and barriers to more use

Interest in more camping from a canoe/kayak on CBR rivers and barriers to more camping

Importance and performance of CBR facilities/services for an enjoyable outing

Potential management actions on CBR rivers

High priority CBR river topics for canoers/kayakers

METHODOLOGY

For the survey, a sample was taken of registered canoe and kayak owners in Minnesota in September of 2004 (Reference 2). The sample size is designed to provide regional results for canoers and kayakers combined, and statewide results for canoers and kayakers separately (Table 1). The regions are the four DNR

Region	--- Sample sizes for survey ---			-- 2004 "Pleasure" registrations from MN --		
	Canoe	Kayak	Total	Canoe	Kayak	Total
Northwest	165	60	225	13,164	1,566	14,730
Northeast	165	60	225	25,613	3,347	28,960
Southwest	165	60	225	8,621	1,295	9,916
Souteast	165	60	225	9,936	1,507	11,443
Central-outside metro	165	60	225	15,850	1,735	17,585
Metro area (7 county)	<u>275</u>	<u>125</u>	<u>400</u>	<u>59,370</u>	<u>11,639</u>	<u>71,009</u>
Total	1,100	425	1,525	132,554	21,089	153,643

regions, with the seven-county metro region broken out of the Central Region, and the Southern Region divided into its two former parts (Figure 1). The metro region is allocated more surveys than other regions, because it has so many of Minnesota’s canoes and kayaks. Only Minnesotans are included in the survey, and only “pleasure” (non-business, non-government) registrations are included.

Within each region and craft type, registration records were sorted by zip code and last name of the owner, and every nth record was selected to get the requisite sample. Selecting the sample in this

fashion assures a geographically representative sample and reduces the odds that a single owner will be selected more than once for the survey.

After three mailings in the Fall of 2004, the survey achieved an overall return rate of 66 percent (Table 2). The return rate is high enough to allay concerns about any material effects of non-response bias.

To ensure that the survey results are representative of the Minnesota distribution of canoes/kayaks, the survey returns are weighted by the combination of craft type (canoe, kayak) and region (six regions). This sample

weighting ensures that any disproportionate representations in the survey returns by craft type or region are removed before the survey results are presented.

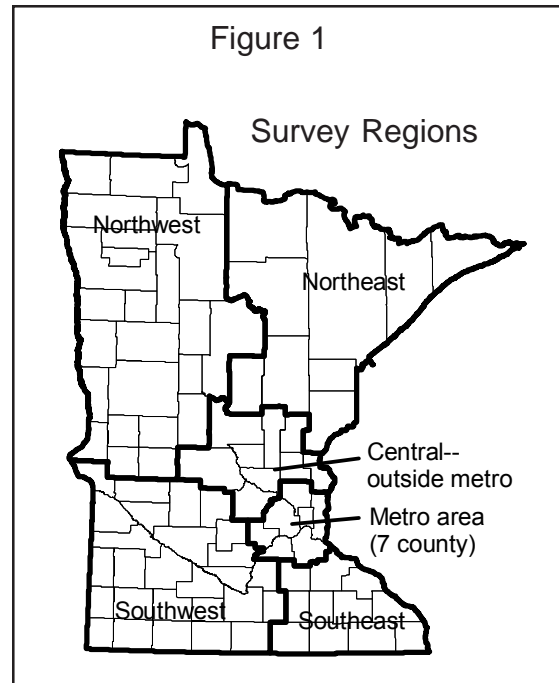


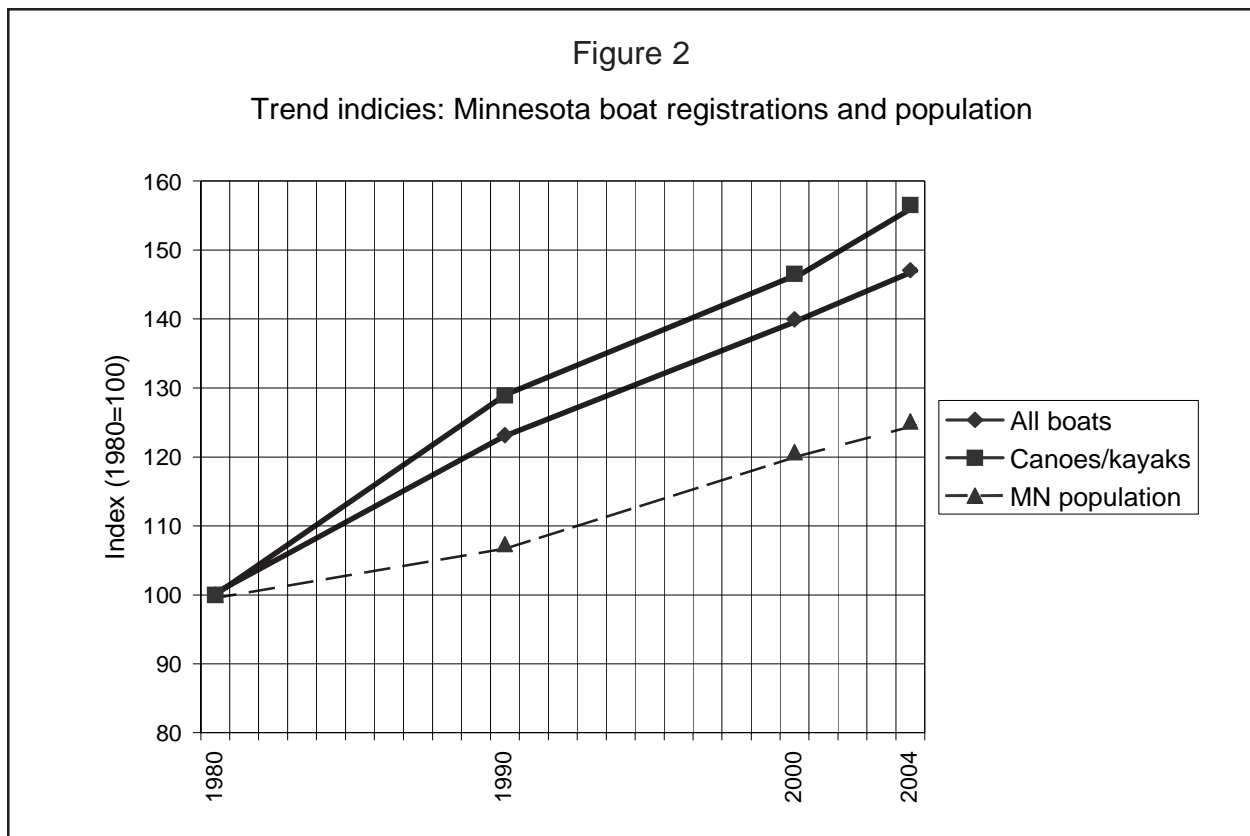
Table 2
Canoe/kayak survey returns
(final as of 1/12/05)

	<u>Number returned</u>	<u>Return rate</u>
Overall	944	66%
By craft type		
Canoe	698	67%
Kayak	246	63%
By region of owner (see map)		
Northwest	153	72%
Northeast	132	65%
Southwest	149	71%
Southeast	134	64%
Central (outside metro)	135	63%
Metro (seven county area)	241	63%

NATURE AND DIRECTION OF CANOEING/KAYAKING IN MINNESOTA

Status and trend in registrations and use of canoes/kayaks

Overall boat registrations have increased substantially (about 50%) over the last 25 years (Figure 2). In the 1980s, boat registrations were growing much faster than the Minnesota population (Reference 3). Following the 1980s, boat registration growth slowed to a rate comparable to the rate of population growth.



Canoe and kayak registrations have largely followed the same path as total boat registrations (Figure 2). Since 1980, canoes and kayaks have maintained their share (20%) of all boat registrations (Table 3). The mix between canoes and kayaks, however, is changing rapidly. Since 2000, canoe registrations have been stable, while kayak registrations have doubled. Kayaks now comprise 13 percent of all canoe/kayak registrations, up from 7 percent just four years earlier. It should be noted that these boat-registration trends do not capture trends in non-motorized craft nine feet in length or less, which are not required to be registered in Minnesota. Trends in the number of these smaller non-motorized craft are not available.

Table 3

Minnesota boat registration trends

(includes craft registered in MN for all purposes by Minnesotans and nonresidents)

<u>Year</u>	<u>Total boats registered</u>	<u>Canoes registered</u>	<u>Kayaks registered</u>	<u>Canoes/kayaks as a percent of total registrations</u>
1980	580,394	110,160	(no data)	19%
1990	714,802	139,489	2,507	20%
2000	812,247	149,838	11,619	20%
2004	853,573	149,552	22,890	20%

Although canoes and kayaks comprise 20 percent of all boat registrations, they comprise a smaller portion of all boating use (7%)(see Table 4). As a craft, canoes and kayaks are used less frequently than motorboats. It is common in boating households to have a motorboat owned in conjunction with a canoe or kayak, and to have the canoe/kayak relegated to a secondary boating-use role.

As shown in Table 4, the majority of canoeing/kayaking occurs on lakes, with a smaller portion on rivers and streams. The distribution of use by type of water resource comes from the canoer/kayaker survey, which is discussed below (see Table 6 for survey results on this topic).

Table 4

Estimates of recreational boating by adult Minnesotans in MN and elsewhere

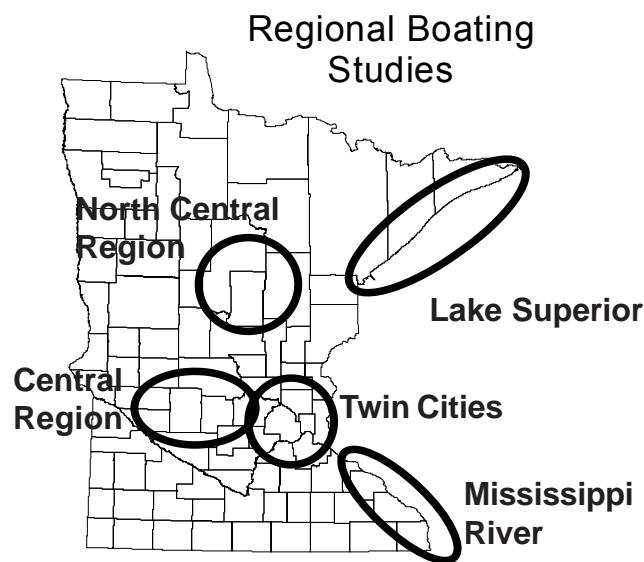
<u>Type of boating</u>	<u>Boater-days per year (000's)</u>	<u>Relative size</u>
All recreational boating by MNs	29,617	100
Motorboating	27,111	92
Non-motorized boating	2,505	8
Canoeing/kayaking	2,123	7
on lakes	1,553	5
on rivers and streams	570	2

Note: The canoe/kayak survey provides the breakdown by resource type (lakes, rivers and streams); all other data from MN DNR, 2004 Outdoor Recreation Participation Survey of Minnesotans.

Table 5

Prevalence of non-motorized watercraft in Minnesota regional boating studies

<u>Regional study</u>	<u>Percent of in-use watercraft nonmotorized</u>
Twin Cities Metro Region, 1996	13%
North Central Region, 1998	4%
Central Region, 2001	2%
Lake Superior, MN portion, 2002	6%
Mississippi River, Pool 4 to 9, 2003	2%



Consistent with this use pattern, the large majority of boating found in Minnesota’s regional boating studies is motorized (Table 5)(Reference 4). The only regional study with an elevated portion of non-motorized boating is the Twin Cities metro study, where 13 percent of all boating was non-motorized (canoeing, kayak, sailing, etc.). The higher non-motorized boating in the Twin Cities is probably due to restrictive water-surface zoning on some city lakes, where the zoning limits motorized boating and facilitates non-motorized boating. As a result of this Twin Cities pattern, canoers and kayakers were questioned in the study survey about options to use water-surface zoning to enhance their activity. More is said on the survey results later, but one short observation is made here. The fact that canoes and kayaks are frequently owned in conjunction with motorboats in a household makes any type of motorized boating restrictions less attractive, since they would limit the use of the household’s motorized craft.

In terms of resources used, canoes and kayaks are paddled mainly on lakes in Minnesota (73% of use), and less frequently on rivers and streams (27% of use)(see Table 6). This pattern of use is similar for both canoes and kayaks, and is similar across the regions. The Southeast Region is somewhat different (with a higher portion of river/stream use), but a majority of the use still occurs on lakes.

Most Minnesota canoers and kayakers do use rivers, although—as shown above—less frequently than lakes. When asked what resources they mainly use, a large portion of canoers/kayakers indicate lakes (43%), a similarly large portion indicate both lakes and rivers (42%), while a much smaller portion indicate rivers (14%)(see Table 6). The Southeast Region stands out once again as being more river oriented.

Although used less than lakes, rivers have a positive image for canoers and kayakers. The large majority agrees that rivers are good places to paddle and are as enjoyable as lakes (Table 7). They do not prefer rivers over lakes, however; they are ambivalent in their river versus lake preference.

Much of canoeing/kayaking (as well as the bulk of all types of outdoor recreation) occurs near home (Table 6). Nearly 60 percent (57%) of all canoeing/kayaking occurs within an hours drive of home, and over 90 percent occurs in Minnesota. Metro canoers/kayakers tend to travel further, which is consistent with their general outdoor recreation travel behavior. When canoe/kayak owners paddle, they overwhelmingly use their own craft, which is not surprising.

Although boat registrations have increased, overall boating use appears stable, with no increase or decrease since the 1980s. The typical boat, it appears, is being used less over time. The conclusion about stable boat numbers since the 1980s come from a series of studies that cover a range of boating conditions in Minnesota (see Appendix A for the detailed data from these studies). Two large, very intensely used boating resources are covered by the 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). Other Twin Cities boating lakes are covered in a separate regional boating study. More rural, less intensely used lakes are covered by two regional boating studies: one in Central and one in North Central Minnesota. The more rural lake regions are used three of five times less intensely than typical Twin Cities' lakes.

Table 6

Canoe/kayak use statistics
(all "day" figures are "boat-days")

Item	Overall	Type of craft		Region of craft owner					
		Canoes	Kayaks	Northwest	Northeast	Southwest	Southeast	Central	Metro
Number of craft	153,643	132,554	21,089	14,730	28,960	9,916	11,443	17,585	71,009
Water resource craft used on									
Percent of days on a lake	73%	73%	75%	67%	79%	76%	57%	65%	77%
Percent of days on a river or stream	27%	27%	25%	33%	21%	24%	43%	35%	23%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%
Water resource owner mainly canoes/kayaks on									
Percent of owners who mainly use lakes	43%	42%	51%	42%	49%	46%	27%	35%	46%
Percent of owners who mainly use rivers	14%	14%	13%	17%	15%	11%	23%	22%	10%
Percent of owners who use both lakes and rivers	42%	43%	37%	41%	36%	43%	49%	43%	44%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%
Geography of use									
Percent of craft-days within one-hour drive of home	57%	55%	66%	79%	59%	61%	56%	60%	47%
Percent of owner-days in Minnesota	92%	92%	91%	95%	93%	95%	87%	89%	91%
Percent of time owner uses these canoes/kayaks:									
Canoe/kayak owned by you or household	93%	93%	94%	90%	93%	91%	92%	94%	93%
Canoe/kayak owned by friend or relative	4%	4%	3%	6%	4%	5%	4%	3%	3%
Canoe/kayak owned by organization to which you belong	0%	0%	1%	0%	1%	0%	0%	0%	1%
Canoe/kayak rented from an outfitter or business	3%	3%	2%	3%	2%	3%	4%	2%	3%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 7

Image of rivers as places to canoe/kayak in Minnesota
(canoers/kayakers responses to the indicated statements)

Statement	Mean agree/ disagree value* (scale 1 to 5)	Strongly disagree (=1) (percent)	Mildly disagree (=2) (percent)	Neutral (=3) (percent)	Mildly agree (=4) (percent)	Strongly agree (=5) (percent)	Don't Know (percent)	Total (percent)
● Rivers in Minnesota are good places to canoe and kayak.	4.3	1%	1%	15%	30%	45%	8%	100%
● Rivers are as enjoyable as lakes for canoeing/kayaking in Minnesota.	4.2	3%	6%	12%	23%	48%	8%	100%
● I prefer rivers over lakes for canoeing/kayaking.	3.1	11%	17%	36%	17%	14%	5%	100%

* Excludes "don't know" responses.

In these boating studies, canoeing and kayaking is a small portion of use and cannot be tracked separately from overall boating use. As a result, the direction of canoeing/kayaking use in Minnesota is not well known. There are some indications, however, that canoeing/kayaking use is more or less stable, much like boating overall. These indications are from survey data on perceived per-craft use rates, and from boating-use indicators in two areas in the state that are largely devoted to non-motorized boating: Boundary Waters Canoe Area Wilderness (BWCAW), and Federal-managed area of the lower St. Croix River.

In terms of perceived per-craft use rates, the indication from the canoer/kayaker survey is that craft are being used less (on balance) than they were five years ago (Table 8). Owner's reports of decreasing use outweigh reports of increasing use. Such decreases in craft-use over time diminish the effect of increasing registrations on boating use. A similar downward trend in per-craft use rates is believed to have occurred for boat types overall, and to be the main reason why increasing boat registrations have not translated into increasing boating use since the 1980s in the boating studies cited above.

The two areas that are largely devoted to non-motorized boating come from far different recreation settings. The Federal-managed reach of the lower St. Croix River is within the Twin Cities metropolitan area and the Boundary Waters Canoe Area Wilderness (BWCAW) is a formal wilderness on the Canadian border in northeastern Minnesota. For the former area, boating numbers and craft type were monitored through aerial observation from 1983 to 1999 (see Appendix A for the detailed data from the St. Croix River studies). The aerial observations covered the entire lower St. Croix from its mouth to Stillwater (State-managed reach) and upstream from Stillwater to St. Croix Falls (Federal-managed reach). For the entire reach, as well as for the State- and Federal-managed reaches, overall boat numbers were stable over the 1983-1999 period. In the Federal-managed reach, which is shallower and less conducive to motorized boating than the State-managed reach, about half of all boats were consistently reported as canoes over the 1983-1999 period. Thus, there was no upward nor downward indication of canoeing on the Federal-managed reach over the period. The indication is stable canoeing use.

For the BWCAW the indicator of boating trends is yearly May-September overnight group quota permits since 1982, when standard reporting of these permit data began (Reference 5). The BWCAW is a formal wilderness, and quotas are established to limit use and maintain a wilderness experience for

Table 8

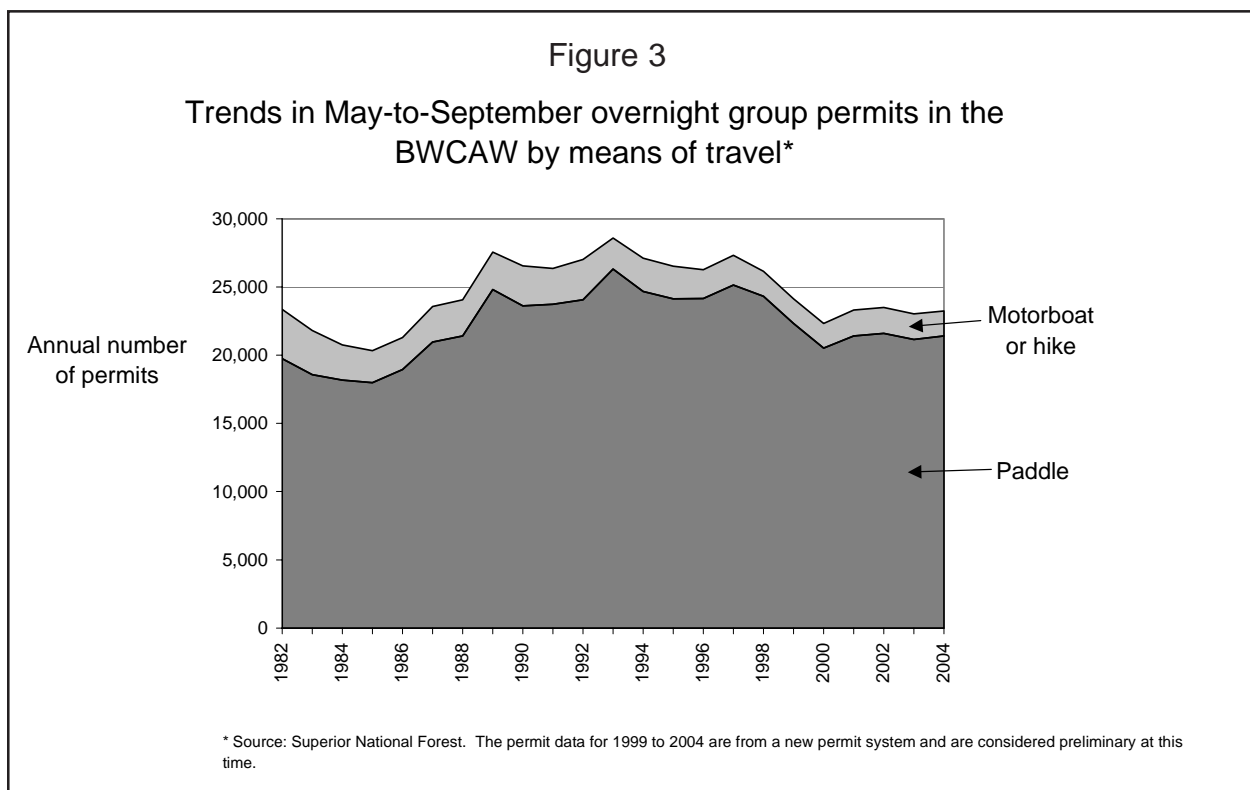
Canoe/kayak use statistics
(all "day" figures are "boat-days")

Item	Overall	Type of craft -----		Region of craft owner -----					Metro
		Canoes	Kayaks	Northwest	Northeast	Southwest	Southeast	Central	
Number of craft	153,643	132,554	21,089	14,730	28,960	9,916	11,443	17,585	71,009
Days used in last 12 months									
Zero	26%	28%	13%	23%	31%	27%	23%	23%	25%
1 to 5	31%	32%	23%	27%	26%	36%	32%	31%	33%
6 to 10	21%	20%	29%	20%	19%	18%	24%	15%	24%
11 to 20	14%	13%	20%	16%	14%	12%	17%	20%	12%
21 to 50	6%	5%	13%	9%	8%	5%	4%	10%	4%
51+	2%	2%	2%	4%	1%	2%	0%	1%	1%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%
Mean days in last 12 months	8.2	7.6	12.6	12.5	8.7	7.9	6.7	9.1	7.3
Median days in last 12 months	4	4	10	5	4	4	4	5	4
Total days in last 12 months	1,267,042	1,001,489	265,553	183,645	252,679	78,328	76,527	159,814	516,050
Percent of days with a motor attached	6%	7%	0%	1%	7%	4%	6%	5%	8%
Perceived craft-use change over last 5 years									
Increased	12%	11%	22%	12%	14%	14%	10%	17%	11%
Stayed about the same	48%	49%	41%	52%	49%	44%	46%	42%	50%
Decreased	37%	38%	30%	34%	36%	36%	40%	37%	38%
Don't know	2%	2%	7%	2%	1%	6%	3%	4%	2%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%

visitors. Group quotas are managed through the permit system. The large majority of the BWCAW annual use (in terms of recreational visitor days) is connected to these May-September overnight permits. Permits specify the means of travel of the group (paddle, motorboat, hike).

Total overnight group permits, as well as paddle permits, at first decreased in the early 1980s, then rose to the late 1980s, after which they stayed relatively constant for about 10 years until the latter part of the 1990s (Figure 3). Permits numbers then fell and have remained stable over the last few years (the permit data for 1999 to 2004 are from a new permit system and are considered preliminary at this time; some revisions may be made in the near future). The relatively constant period from the late 1980s through the latter part of the 1990s occurred during the sizable drop (27% decrease) between 1993 and 1994 in the number of May-September overnight quota permits. At present, just over half (54%) of the available May-September overnight permit quota is used.

Since 1994 when the current May-September overnight quotas were implemented, total and paddle permits have decreased some 13-14 percent. Over a longer period, extending back 15 to 20 years, permits have neither shown neither a net increase nor net decrease. They have been more or less stable.



To recapitulate, the general indication for canoeing/kayaking (which is consistent with boating overall), is stable use since the 1980s, in spite of increasing craft registration numbers. It appears that the typical craft (whether canoe, kayak or other boat type) is being used less over time. Decreasing craft use rates over time may indicate that leisure time is in shorter supply than income in Minnesota. Buying a boat requires income, while using it requires leisure time.

Experience canoeing and kayaking

Canoe and kayak owners have a good deal of experience in their activity, and this is especially true of canoers. Canoe owners have a median of 30 years of experience in Minnesota (Table 9). Kayak owners have less experience, probably due to the fact that kayaks have only recently become popular. Kayak owners have a median of 15 years experience in the activity, 10 of which years in Minnesota.

When reading the survey results that follow, it is important to keep in mind the depth of experience the respondents possess when answering the survey questions.

	Years anywhere (median)	Years in MN (median)
All canoe/kayak owners	30	28
By craft type of owner		
Canoe	30	30
Kayak	15	10
By region of owner		
Northwest	30	28
Northeast	30	30
Southwest	25	22
Southeast	25	25
Central (outside metro)	25	25
Metro (seven county area)	30	25

Reasons for canoeing/kayaking

There are common reasons people participate in canoeing/kayaking, and these are widely shared by canoers and kayakers, and across the regions of the state (Table 10). Primary reasons involve enjoying nature and escaping a hectic lifestyle (especially the reason “experience silence and quiet”). Paddling also shows itself to be a social activity; being with family and friends is an important reason for participating.

Table 10

What are your most important reasons for canoeing and/or kayaking?
(percent indicating reason)

<u>Category</u>	<u>Reason</u>	<u>Overall</u>	<u>Canoeers</u>	<u>Kayakers</u>
Enjoy nature				
	Enjoy natural scenery	89%	88%	93%
	View wildlife	66%	66%	68%
	Enjoy smells and sounds of nature	62%	61%	69%
Escape personal, social and physical pressures				
	Experience silence and quiet	71%	70%	73%
	Get away from life's usual demands	62%	60%	76%
	Get away from crowds	54%	52%	64%
	Experience fresh clean air	53%	51%	60%
	Experience solitude	50%	49%	58%
	Rest mentally	43%	42%	51%
Be with family and friends				
	Spend leisure time with family	65%	66%	54%
	Be with members of my group	21%	21%	17%
Feel connected to nature				
	Experience a feeling of wildness	50%	50%	51%
	Feel connected to nature	50%	49%	55%
	Experience dark night skies (no artificial lights)	24%	23%	29%
Catch/harvest game or fish				
	Catch or harvest some game or fish	46%	51%	18%
Exercise and feel healthier				
	Get/keep physically fit	45%	40%	77%
	Feel healthier	40%	37%	58%
Experience adventure and risks				
	Experience a sense of adventure	40%	39%	46%
	Take some risks	18%	17%	24%
Learn and explore				
	Explore and discover new things and areas	37%	36%	46%
	Enjoy different experiences from home	29%	29%	33%
	Learn more about nature	28%	27%	31%
	Experience a sense of history	17%	17%	18%
Be introspective				
	Experience spiritual renewal	29%	28%	37%
Teach others				
	Help others develop their outdoor skills	28%	29%	22%
Achieve and be stimulated				
	Develop my skills and abilities	24%	21%	41%
	Feel exhilarated	19%	17%	28%
	Feel more self-confident	15%	13%	21%
Use equipment				
	Get a chance to use or test my equipment	17%	16%	29%
Be creative				
	Do something creative	10%	10%	11%
Meet new people				
	Talk to new and varied people	9%	9%	11%

Kayakers have two major differences from canoers: kayakers are far more interested in exercise/feeling healthier and far less interested in catching/harvesting game and fish. For kayakers, this exercise/feeling healthier reason is a top-ranked motivation for participation, while catching/harvesting game and fish is a bottom-ranked motivation. For canoers, both of these motivations are medium-ranked.

In addition to their reasons for participating, canoers/kayakers were asked about activities—in conjunction with paddling—that are important to the enjoyment of their outing. The relative importance of these other activities is widely shared by canoers and kayakers, and across the regions of the state, with two exceptions: fishing and hunting—as noted above—are less important to kayakers than canoers.

The leading other activity is nature observation, followed by fishing and camping (Table 11). Activities such as hiking, picnicking and swimming are of lesser importance, and the majority of paddlers judge them as “not important” to “slightly important.”

It is notable for all these other activities that none is all that important for large numbers of canoers/kayakers. The most important activity has a mean rank just below “moderately important.” This probably indicates that paddling is the primary activity, with other activities being secondary.

Water-surface zoning to enhance canoeing/kayaking

The regional boating study done in the Twin Cities metropolitan area found a higher portion of non-motorized boating than the other regional studies. The higher portion is probably due to restrictive water-surface zoning on some city lakes, where the zoning limits motorized boating and facilitates non-motorized boating. As a result of this Twin Cities pattern, canoers and kayakers were questioned in the study survey about options to use water-surface zoning to enhance their activity.

Canoers and kayakers were asked how much they agreed/disagreed with four statements concerning water-surface zoning that restricts motorized boating (Table 12). The *overall* results indicate that paddlers are largely ambivalent about each water-surface zoning option. However, the overall results mask a strong difference that depends on whether the paddler has a motorized boat in the

Table 11

When you go canoeing/kayaking, how important are other activities to the enjoyment of your canoe/kayak outing?

Activity	Mean importance value* (scale 1 to 4)	Not Important (=1) Important (=2) Moderately Important (=3) Very Important (=4)					Total (percent)
		(percent)	(percent)	(percent)	(percent)	(percent)	
● Viewing, identifying, or photographing birds and other wildlife	2.8	18%	18%	30%	32%	1%	100%
● Fishing	2.7	24%	17%	26%	32%	1%	100%
● Camping (at any kind of campground)	2.5	29%	16%	27%	27%	1%	100%
● Viewing, identifying or photographing wildflowers, trees or other natural vegetation	2.5	25%	21%	29%	24%	1%	100%
● Camping at a water-accessible-only campsite	2.5	33%	14%	22%	30%	1%	100%
● Hiking	2.2	38%	20%	27%	14%	1%	100%
● Picnicking	2.2	36%	23%	29%	12%	1%	100%
● Swimming	2.0	42%	26%	22%	9%	1%	100%
● Challenging (e.g., whitewater) canoeing/kayaking	1.5	64%	20%	12%	3%	1%	100%
● Hunting	1.5	74%	7%	10%	8%	1%	100%
● Wild-rice harvesting	1.1	91%	4%	2%	2%	2%	100%
● Trapping	1.1	93%	2%	2%	1%	2%	100%

* Excludes "don't know" responses.

Table 12

Canoe/kayak owner agreement/disagreement with water-surface zoning statements

Statement	Mean agree/ disagree value* (scale 1 to 5)	Strongly disagree (=1) (percent)	Mildly disagree (=2) (percent)	Neutral (=3) (percent)	Mildly agree (=4) (percent)	Strongly agree (=5) (percent)	Don't Know (percent)	Total (percent)
Statement & boats in household								
<i>There should be more areas on lakes and rivers designed for non-motorized boating only.</i> All canoe/kayak households	3.3	14%	12%	22%	22%	25%	5%	100%
No motorboat in household	3.8	7%	7%	21%	27%	33%	5%	100%
Motorboat in household	3.0	19%	16%	23%	19%	19%	5%	100%
<i>More lakes and rivers near where I live should be designed for no-motors (or electric motors only) to make my near-home canoeing/kayaking more enjoyable.</i> All canoe/kayak households	3.2	14%	13%	28%	15%	22%	7%	100%
No motorboat in household	3.6	8%	9%	28%	16%	31%	9%	100%
Motorboat in household	2.9	18%	17%	27%	15%	16%	7%	100%
<i>There should be times on more lakes and rivers when only non-motorized boating is permitted.</i> All canoe/kayak households	3.2	16%	12%	26%	17%	23%	5%	100%
No motorboat in household	3.6	9%	10%	23%	20%	32%	6%	100%
Motorboat in household	2.9	22%	14%	28%	15%	17%	4%	100%
<i>Limiting motorized boating on lakes/rivers where I canoe/kayak would increase my canoeing/kayaking on those waters.</i> All canoe/kayak households	2.9	19%	17%	24%	16%	16%	8%	100%
No motorboat in household	3.4	10%	12%	24%	23%	22%	9%	100%
Motorboat in household	2.6	26%	20%	24%	11%	12%	7%	100%

* Excludes "don't know" responses.

household. For those paddlers who do not have a motorboat at home, each zoning statement is agreed to far more than if the paddler is in a motorized boating household. Having a motorboat in the household makes motorized restrictions less attractive to paddlers. Overall, nearly 60 percent (57%) of paddlers have a motorboat at home (Table 13). The percent is lower for kayak owners (50%) and higher for canoe owners (59%). Only in the Southeast Region does the percent fall below half.

The one zoning option that receives the most support is having areas on lakes/ rivers designed for non-motorized boating only (Table 12). A majority of paddlers (60%) without motorized boats in household agree with that option, and few disagree (14%); paddlers with motorboats in the household are almost exactly on the fence, with nearly as many agreeing (38%) as disagreeing (35%).

	Households with motorboats (%)
All canoe/kayak owners	57%
By craft type of owner	
Canoe	59%
Kayak	50%
By region of owner	
Northwest	68%
Northeast	64%
Southwest	52%
Southeast	42%
Central (outside metro)	55%
Metro (seven county area)	55%

Boating safety

Canoers and kayakers were asked about selected boating-safety topics, including formal boating-safety training, use of life vests, and type of beverages that they take on an outing.

In terms of safety training, canoe/kayak owners are typical of most boaters (Table 14). About one-quarter have completed a formal safety course. Kayak owners are more likely to have completed such as course than canoe owners (32% versus 22%, respectively).

The large majority of paddlers (86%) wear life vests, well above the typical portion wearing a life (40%-50%) found in the regional boating studies. The typical boat in the regional studies is in a motorboat, which probably provides a greater sense of water safety than a canoe or kayak. As a general rule, the larger the boat, the less likely the boater will be wearing a life vest.

Table 14

Responses of canoe/kayak owners to questions related to boating safety

<u>Question and response</u>	<u>Type of craft</u>		<u>Region of craft owner</u>						
	<u>Overall (percent)</u>	<u>Canoes (percent)</u>	<u>Kayaks (percent)</u>	<u>Northwest (percent)</u>	<u>Northeast (percent)</u>	<u>Southwest (percent)</u>	<u>Southeast (percent)</u>	<u>Central (percent)</u>	<u>Metro (percent)</u>
Have you taken a formal course in boating safety? Percent "yes"	24%	22%	32%	27%	27%	18%	24%	19%	24%
On your last outing, how many canoers/kayakers wore life vests?									
Percent of adults wearing life vest	82%	81%	83%	87%	90%	85%	75%	81%	79%
Percent of teens (13 to 17)	93%	94%	87%	83%	100%	100%	98%	98%	93%
Percent of children (12 or younger)	99%	99%	100%	96%	100%	95%	100%	100%	100%
Percent of all party members	86%	86%	85%	87%	92%	88%	81%	86%	84%
On your last outing, what kinds of beverages did you have with you in the canoe/kayak?*									
Percent with non-alcoholic beverages	85%	85%	85%	85%	83%	88%	84%	88%	83%
Percent with alcoholic beverages	19%	20%	16%	14%	21%	15%	22%	18%	22%
Percent with no beverages	14%	14%	14%	14%	16%	11%	15%	12%	14%

* More than one kind of beverage can be specified.

The percent of paddlers with alcoholic beverages on board is on the low side compared with the typical boater in the regional studies, while the percent without beverages of any kind is on the high side. The lack of beverages of any kind may be due to the shorter length of time paddlers are on the water, and to the active nature of the paddling activity that makes managing beverages more cumbersome in the canoe or kayak.

Characteristics of canoe/kayak owners

Some of the characteristics of canoe and kayak owners have appeared in other previous parts of the report, including years of experience with canoeing/kayaking, and prevalence of having a motorboat in the household (Table 15).

The survey collected other characteristics of the owners as well:

- Many have a shoreland residence (permanent or seasonal).

- The majority of owners have visited the DNR website.

- The largest group listens to public radio, followed by rock and roll.

- Most of the owners are male.

- Owners are older, with median ages of around 50.

- Owners are more white, non-Hispanic than the general Minnesota population, which was 88 percent white, non-Hispanic in 2000.

- Owners have more formal education and higher incomes than the general Minnesota population. For the general Minnesota population in 2000, 27 percent held a four-year college degree (BA, BS or higher), and the median annual household income was about \$50,000.

- Household sizes are typical of the general Minnesota household, which averaged 2.6 people in 2000.

Table 15

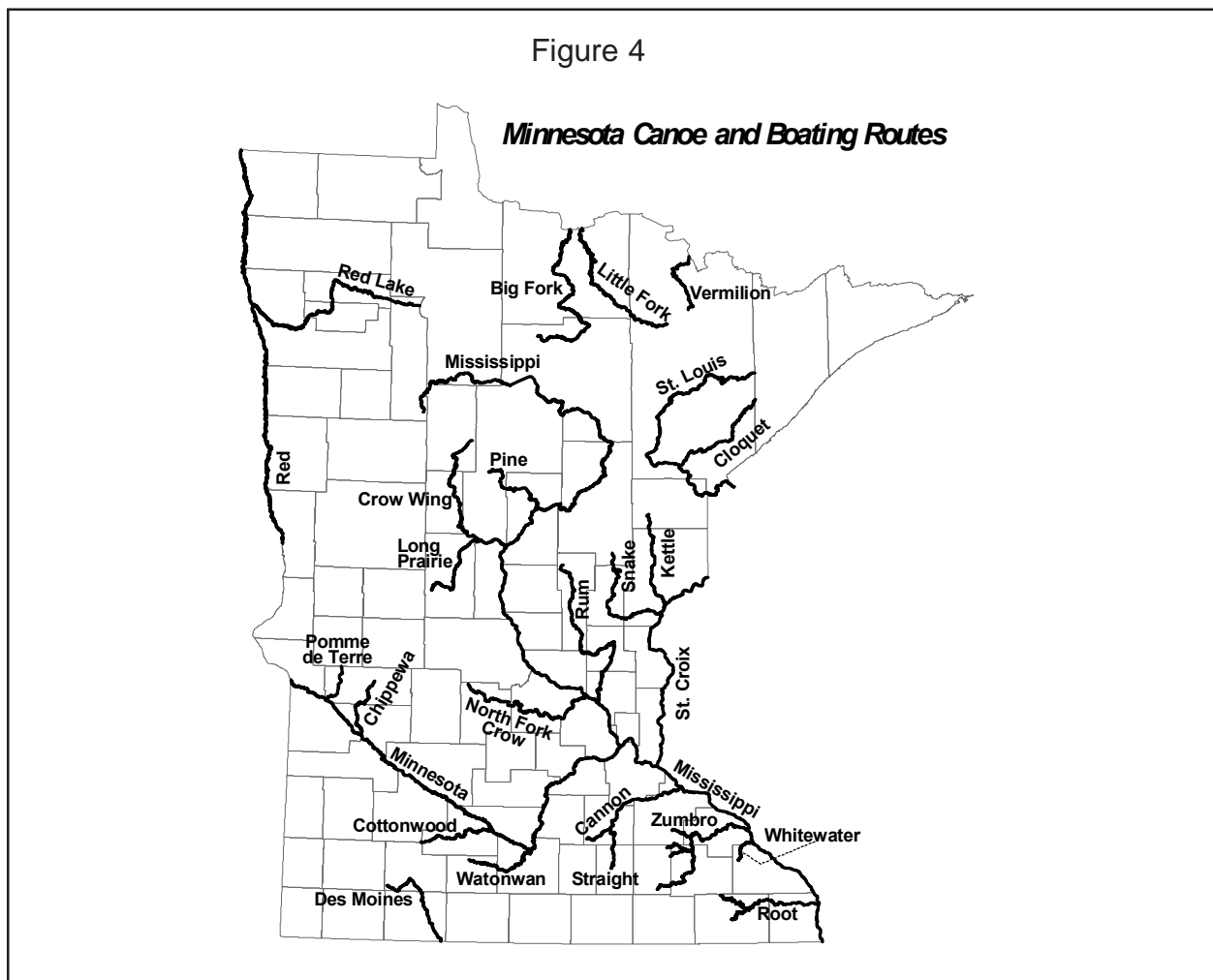
Characteristics of canoe/kayak owners

Characteristic	Overall	--- Type of craft ---		----- Region of craft owner -----					
		Canoes	Kayaks	Northwest	Northeast	Southwest	Southeast	Central	Metro
Experience canoeing/kayaking									
Median years anywhere	30	30	15	30	30	25	25	25	30
Median years in MN	28	30	10	28	30	22	25	25	25
Motorboat in household?									
Percent "yes"	57%	59%	50%	68%	64%	52%	42%	55%	55%
Percent of canoe/kayak owners who have a . . .									
. . . permanent or second home on a lake or river	45%	45%	44%	57%	49%	37%	25%	46%	44%
. . . permanent home on a lake or river	23%	23%	23%	47%	36%	24%	13%	33%	12%
. . . second (vacation) home on a lake or river	27%	27%	26%	18%	20%	19%	16%	19%	36%
Have you ever visited the Minnesota DNR website (www.dnr.state.mn.us)?									
Percent "yes"	56%	55%	61%	50%	48%	48%	49%	61%	62%
Percent who primarily listen to this type of radio station:									
public radio	26%	26%	28%	25%	23%	20%	27%	25%	29%
rock & roll	16%	14%	23%	19%	16%	20%	12%	21%	13%
easy listening/lite	13%	13%	12%	15%	19%	14%	21%	8%	10%
country	13%	14%	6%	28%	17%	17%	14%	14%	6%
talk	12%	13%	11%	6%	12%	14%	12%	14%	14%
religious radio	7%	7%	4%	2%	3%	4%	2%	4%	11%
classical	5%	5%	6%	2%	5%	2%	5%	0%	7%
sports	2%	2%	1%	1%	3%	1%	1%	3%	3%
jazz	1%	0%	4%	0%	0%	1%	1%	3%	1%
other (please specify)	5%	5%	5%	1%	3%	7%	4%	9%	5%
Gender of canoe/kayak owner (%)									
Male	78%	80%	68%	79%	78%	84%	81%	78%	78%
Female	22%	20%	32%	21%	22%	16%	19%	22%	22%
How old are you? (%)									
34 or younger	5%	4%	12%	7%	5%	11%	6%	5%	5%
35 to 44	17%	16%	24%	16%	13%	18%	21%	26%	17%
45 to 54	36%	35%	40%	34%	39%	23%	32%	37%	37%
55 to 64	26%	28%	18%	26%	24%	25%	24%	23%	28%
65 or older	15%	17%	6%	17%	20%	23%	17%	9%	13%
Median age	52	53	48	52	53	53	50	50	52
Race/ethnicity (%)									
White/non-Hispanic	98%	98%	97%	98%	96%	99%	99%	99%	97%
Non-white and/or Hispanic	2%	2%	3%	2%	4%	1%	1%	1%	3%
What is the highest level of education you have completed? (%)									
Some high school	1%	1%	2%	1%	1%	1%	1%	2%	1%
Graduated from high school or GED	10%	10%	5%	10%	8%	17%	16%	15%	7%
Some vocational or technical school	5%	5%	3%	7%	5%	5%	6%	5%	4%
Graduated from vocational or technical school	11%	11%	10%	12%	13%	13%	10%	13%	9%
Some college or AA college degree	20%	19%	22%	20%	26%	20%	15%	15%	19%
BA, BS college degree	22%	22%	26%	18%	14%	13%	24%	25%	27%
Some postgraduate study or postgraduate degree	31%	31%	32%	31%	32%	31%	29%	26%	32%
Including you, how many adults, teens, and children live in your household?									
Total people (mean number)	2.7	2.7	2.7	2.5	2.7	2.5	2.9	2.7	2.7
Adults (mean number)	2.0	2.0	2.0	2.0	2.1	1.9	2.1	2.0	1.9
Teens (mean number)	0.4	0.3	0.4	0.3	0.4	0.2	0.4	0.4	0.4
Children (mean number)	0.3	0.3	0.3	0.2	0.3	0.4	0.4	0.3	0.4
Please indicate below your total household income before taxes last year. (%)									
Under \$30,000	9%	9%	6%	14%	16%	9%	5%	8%	5%
\$30,000 - \$39,999	7%	7%	6%	8%	10%	14%	12%	4%	5%
\$40,000 - \$49,999	11%	12%	7%	14%	19%	12%	8%	17%	6%
\$50,000 - \$59,999	11%	11%	9%	17%	6%	23%	11%	16%	8%
\$60,000 - \$74,999	18%	18%	16%	25%	13%	19%	21%	18%	17%
\$75,000 - \$99,999	18%	18%	16%	12%	16%	15%	26%	17%	20%
Over \$100,000	27%	25%	40%	10%	20%	8%	18%	20%	38%

MINNESOTA'S CANOE AND BOATING ROUTE PROGRAM

One of the major purposes of this study is to provide information to help guide Minnesota's Canoe and Boating Route (CBR) Program. The CBR Program facilitates boating on designated Minnesota rivers by mapping, signing and developing river-use facilities, such as accesses, campsites, portages, and rest areas (see Figure 4 for CBR rivers). A primary target market of the CBR Program is canoers and kayakers.

The CBR Program was established by the Minnesota Legislature in 1963. Legislation was passed in 1972 requiring registration of canoes and kayaks. Registration fees are paid into a dedicated account for acquisition, development, and operation of recreation sites. In 1978, the Legislature authorized land acquisition for recreation sites. To date, 26 rivers, total 3400 river miles, have been designated as part of the CBR Program.



Awareness of CBR river Program

A large majority of canoers and kayakers have little if any awareness of the CBR Program (Table 16). Over 70 percent of canoers and kayakers have either “never heard of the Program before” or “didn’t know very much” about it. Awareness is low for both canoers and kayakers and across the regions.

Thus, when communicating with most paddlers about river-related topics, referencing the CBR Program is probably not very useful at present.

Use of CBR rivers

Although paddlers may not be aware of the “CBR Program,” some two-thirds of owners report using a CBR river sometime in the past (Table 17). Around one-third report have camped from a canoe/kayak on a CBR river sometime in the past.

In the last 12 months, about one-third report using a CBR river and just over 10 percent report camping from a canoe/kayak on a CBR river. Recent (last 12 months) CBR river use rates tend to be higher for kayakers. Of the regions, the Central Region has the highest use rates.

Around one-in-six CBR use days is associated with camping (see “users and nonusers” data). A typical user canoes/kayaks 4.7 days per year, while a typical camper camps 2.6 nights per year (see “user” data).

Table 16

Prior to receiving this survey, how much did you know about the Canoe and Boating Route Program on the Minnesota rivers shown on the map below [the Canoe and Boating Route Program facilitates boating on designated Minnesota rivers by mapping, signing and developing river-use facilities, such as accesses, campsites, portages, and rest areas]?

"Response"	----- Type of craft -----		----- Region of craft owner -----						
	Overall (percent)	Canoes (percent)	Kayaks (percent)	Northwest (percent)	Northeast (percent)	Southwest (percent)	Southeast (percent)	Central (percent)	Metro (percent)
"never hear of this program before"	51%	52%	47%	44%	57%	52%	47%	48%	52%
"didn't know very much"	21%	21%	25%	26%	17%	24%	25%	16%	23%
"knew a few things"	22%	22%	24%	23%	24%	20%	25%	34%	19%
"knew a lot"	5%	5%	5%	7%	2%	4%	3%	2%	6%
Total percent	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 17

Use of CBR rivers by canoe/kayak owners

	----- Type of craft -----		----- Region of craft owner -----						
	Overall	Canoes	Kayaks	Northwest	Northeast	Southwest	Southeast	Central	Metro
Percent used ever for . . .									
. . . canoeing/kayaking	68%	68%	70%	65%	68%	59%	69%	86%	66%
. . . camping from a canoe/kayak	34%	34%	34%	32%	34%	31%	36%	60%	30%
Percent used in last 12 months for . . .									
. . . canoeing/kayaking	35%	33%	49%	44%	26%	31%	43%	60%	30%
. . . camping from a canoe/kayak	12%	11%	19%	17%	9%	6%	17%	33%	7%
Mean days/nights used in last 12 months per . . .									
. . . user and nonuser (all owners)	1.7	1.4	3.3	2.6	0.8	1.0	3.0	2.1	1.6
mean days of use	0.3	0.3	0.6	0.6	0.2	0.1	0.4	0.7	0.2
mean nights camped									
. . . user									
mean days of use	4.7	4.3	6.8	6.0	3.0	3.2	7.0	3.5	5.4
mean nights camped	2.6	2.5	3.1	3.5	2.4	1.8	2.5	2.1	2.6

Interest in more CBR river use and barriers to more use

About one-third (35%) of canoers/kayakers used a CBR river in the last 12 months. Most (68%), however, would like to use CBR rivers more often, indicating that river use is generally viewed in a positive light (Table 18). Those that do not want to use the CBR rivers more, or are not sure, tend to be mainly lake users with little if any CBR river experience.

Table 18

Would you like to canoe/kayak (or canoe/kayak more often) on Minnesota's Canoe and Boating Route rivers?

"Response"	Overall (percent)	----- Type of craft -----		----- Region of craft owner -----					
		Canoes (percent)	Kayaks (percent)	Northwest (percent)	Northeast (percent)	Southwest (percent)	Southeast (percent)	Central (percent)	Metro (percent)
"Yes"	68%	66%	76%	70%	58%	71%	72%	76%	68%
"No"	10%	11%	7%	8%	17%	6%	11%	5%	10%
"Not sure/ don't know"	<u>22%</u>	<u>23%</u>	<u>17%</u>	<u>22%</u>	<u>25%</u>	<u>24%</u>	<u>17%</u>	<u>19%</u>	<u>22%</u>
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

For those who have an interest in using CBR rivers more, the major barrier to more river use is a lack of time; time constraints are a universal barrier to more participation in of just about any outdoor pursuit (Table 19). This lack-of-time barrier is followed by the more specific barriers of arranging shuttling, lack of prior knowledge of water levels, and expectations that motorized watercraft will interfere with the enjoyment of their outing. Next most important is intervening opportunities and lack of knowledge about CBR river canoeing/kayaking. No other barrier is indicated by over one-quarter of these canoers/kayakers.

It is important to note that many of the items offered as potential barriers are indicated by few people.

The prevalence of these barriers is widely shared by canoers and kayakers, and across the regions.

Table 19

Barriers to canoeing/kayaking more on CBR rivers

(percent of respondents, who would like to use CBR rivers more, agreeing that the item is a barrier to more use)

<u>Potential barrier</u>	<u>Percent agreeing "potential" is a barrier</u>
● I don't have enough time to canoe/kayak as much as I would like on CBR rivers	82%
● it is too hard to arrange a shuttle back upstream to the launch site after a canoe/kayak trip on CBR rivers	40%
● prior to a canoe/kayak outing, I don't know what kind of water levels and river conditions I'll encounter on CBR rivers	34%
● I expect motorized watercraft will interfere with the enjoyment of my canoeing/kayaking on CBR rivers	34%
● there are good places to canoe/kayak closer to home than CBR rivers	32%
● I don't know enough about canoeing/kayaking on CBR rivers	31%
● I can't find others to go canoeing/kayaking with me on CBR rivers	24%
● there are too many outdoor pests, such as mosquitos, on CBR rivers	18%
● the water quality is poor on CBR rivers	18%
● suitable canoe/kayak camping sites that are accessible only by water are lacking on CBR rivers	17%
● the CBR river shorelines are too developed	17%
● I expect I will encounter too many other people on CBR rivers	15%
● a good way to get on the water is lacking for CBR rivers	10%
● it is too difficult to load my canoe/kayak on my vehicle for a trip to a CBR river	9%
● I already canoe/kayak enough on CBR rivers	9%
● I only like to canoe/kayak on lakes, and not on rivers like the CBR rivers	9%
● there are too many dams on CBR rivers	9%
● I lack the skills needed to canoe/kayak on CBR rivers	6%
● the fishing is poor on CBR rivers	6%
● weather is too unpredictable for canoe/kayak trips on CBR rivers	4%
● I don't like canoeing/kayaking on the flowing water of CBR rivers	3%
● it's too remote on CBR rivers (not enough other people around)	3%
● it's too dangerous to canoe/kayak on CBR rivers	2%
● it's too expensive to canoe/kayak on CBR rivers	1%

Interest in more camping from a canoe/kayak on CBR rivers and barriers to more camping

While just 12 percent of canoers/kayakers camped from a canoe/kayak on a CBR river in the last 12 months, nearly half (49%) would like to do this type of camping more often (Table 20). Those that do not want to camp more, or are not sure, tend to be mainly lake users with little if any CBR river-camping experience. In addition, many who do not want to camp more simply do not like camping of this or any type, and many do not know enough about this type of camping to indicate an interest in doing it more.

Table 20

Would you like to camp from a canoe/kayak (or camp more often from a canoe/kayak) on Minnesota’s Canoe and Boating Route rivers?

"Response"	Overall (percent)	---- Type of craft ----		----- Region of craft owner -----					
		Canoes (percent)	Kayaks (percent)	Northwest (percent)	Northeast (percent)	Southwest (percent)	Southeast (percent)	Central (percent)	Metro (percent)
"Yes"	49%	48%	54%	56%	45%	52%	52%	55%	46%
"No"	25%	24%	27%	17%	21%	20%	22%	22%	29%
"Not sure/ don't know"	<u>27%</u>	<u>28%</u>	<u>19%</u>	<u>27%</u>	<u>33%</u>	<u>27%</u>	<u>26%</u>	<u>23%</u>	<u>25%</u>
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

For paddlers who have an interest in camping more, the leading barriers are related to the availability of campsites: guarantee of a site, too few campsites, and campsites too full (Table 21). These same “availability of campsite” items are leading barriers to sea-kayaker use of water-accessible campsites along the North Shore of Lake Superior (Reference 6).

Another leading barrier is lack of knowledge about this type of camping. Note that “having enough time” was not offered as a potential camping barrier. If it had, it would probably be a leading barrier.

Table 21

Barriers to camping from a canoe/kayak on CBR rivers

(percent of respondents, who would like to camp on CBR rivers more, agreeing that the item is a barrier to more camping)

Potential barrier	Percent agreeing "potential" is a barrier
● there is no way to guarantee (such as through a reservation) that a CBR water-accessible campsite will be available for my use	31%
● I don't know enough about camping from a canoe/kayak on CBR rivers	26%
● CBR water-accessible campgrounds are too few in number	25%
● there are too many outdoor pests, such as mosquitos, at CBR water-accessible campgrounds	15%
● existing CBR water-accessible campgrounds are too full	14%
● the canoe/kayak campgrounds on CBR rivers are not remote enough (that is, there is too much human development around)	13%
● I already camp enough from a canoe/kayak on CBR rivers	8%
● I don't want to take the risk of getting stranded by bad weather when canoe/kayak camping on CBR rivers	6%
● the facilities at canoe/kayak campgrounds on CBR rivers are too rustic (that is, pit toilets and no running water)	5%
● I don't feel safe in the canoe/kayak campgrounds on CBR rivers	3%
● I don't like camping from a canoe/kayak	2%
● I don't like camping of any kind	1%
● the canoe/kayak campgrounds on CBR rivers are too remote (not enough other people around)	1%

It is important to note that many of the items offered as potential barriers are indicated by few people.

The prevalence of these barriers is widely shared by canoers and kayakers, and across the regions.

Importance and performance of CBR facilities/services for an enjoyable outing

Canoers and kayakers who have used CBR rivers in the past were asked about the importance and quality of various facilities and services offered on CBR rivers. The comparison of importance and quality ratings provides customer evaluations on the current status of facilities/services and offers guidance on allocation of additional resources to facilities/services to meet customer needs. As a general rule, facilities/services that are of high importance and high quality to customers are the programs current successes, and efforts should be made to ensure their continued success. Facilities/services that are of high importance and lower quality to customers are priority candidates for additional resources to boost quality. Facilities/services of low importance should only receive additional resources once higher importance items are adequately addressed.

The most important items for an enjoyable outing are CBR accesses and river maps (Figure 5). These are followed by river-level reporting and MN DNR website information. Other items (such as campsites, rest areas and obstacle removal) are of lesser importance overall. The ranking of these items is widely shared by canoers and kayakers, and across the regions.

For CBR paddlers who judge a facility or service “very” or “moderately” important for their enjoyment, satisfaction is higher for some facilities/services than others. Accesses and maps have the highest satisfaction levels, and have 60%-70% “very satisfied” or “satisfied” responses (Figure 6). Of the facilities/services evaluated, these are the main successes. Although these are the main successes, it should be noted that the satisfaction levels are not particularly high, indicating that there is a fair amount of room for improvement. Minnesota State Park visitors, for example, give much higher satisfaction rates (commonly over 90% “very satisfied” or “satisfied”) to their key items for an enjoyable park visit (Reference 7).

For the next two most important facilities/services (river-level reporting and MNDNR website information), satisfaction levels are lower, with about 50 percent “satisfied” or “very satisfied”. These are candidates for additional attention.

The lowest satisfaction rates are for camping related items (30% to 40% “satisfied” or “very satisfied”), and include the number and maintenance of campsites. These low satisfaction rates are a clear indication that campers do not believe the

Figure 5

Importance of item in making CBR canoe/kayak outing enjoyable

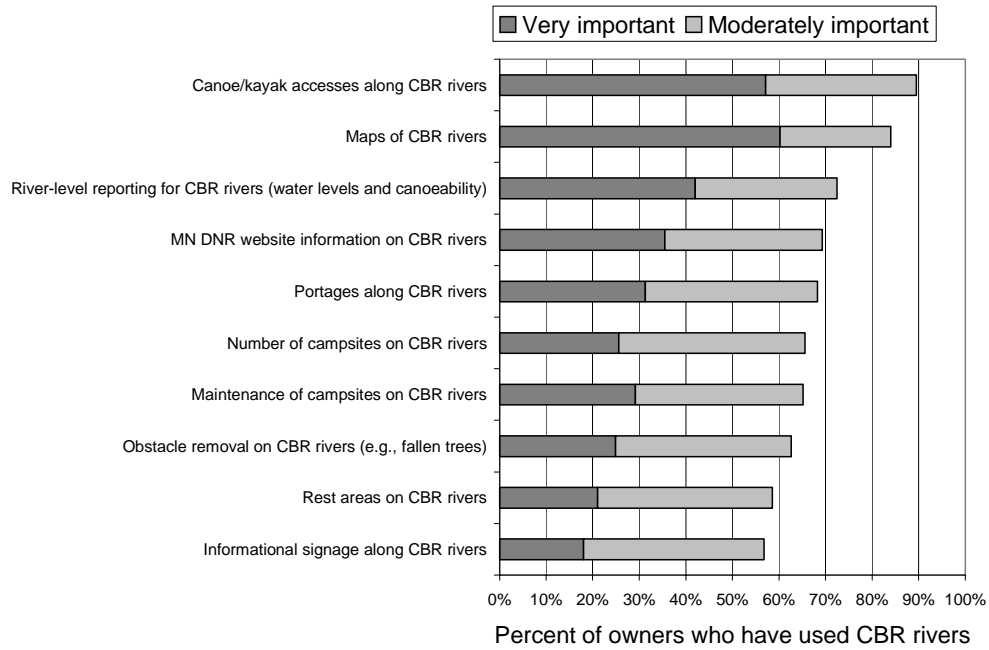
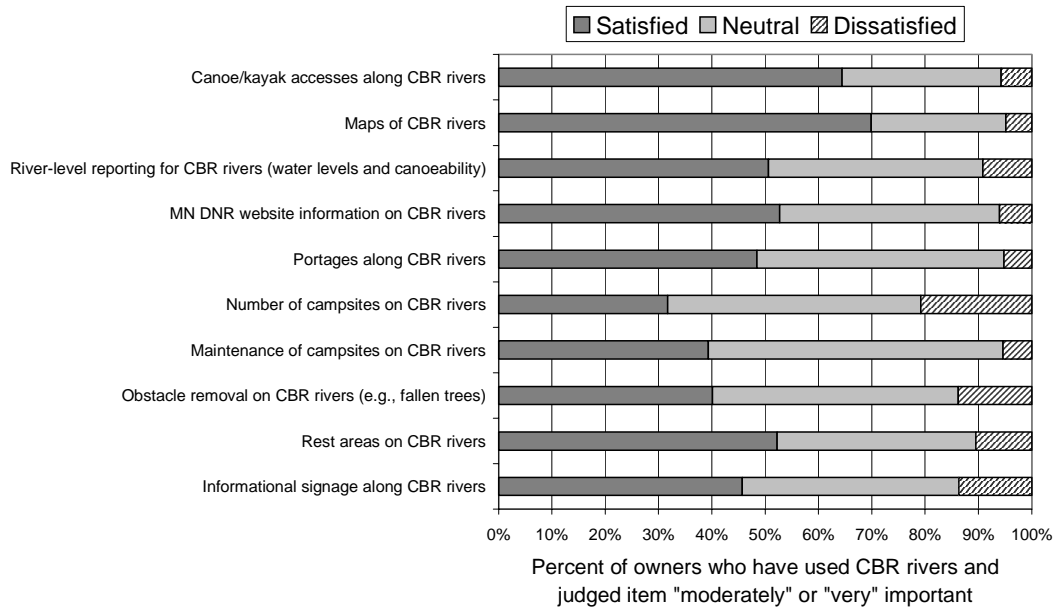


Figure 6

Satisfaction with item judged "moderately" or "very" important for making CBR canoe/kayak outing enjoyable



program is working well for their interests. As noted above, these camping items are of medium importance to CBR canoers/kayakers overall, which is consistent with the fact that many CBR canoers/kayakers are not campers on CBR rivers.

Two other medium-importance facilities/services to CBR paddlers are portages and obstacle removal. The former has a medium satisfaction rate, and the latter has a low satisfaction rate; both—and especially obstacle removal—would warrant receiving additional resources to boost satisfaction rates. The remaining two facilities/services (rest areas and informational signage) are of the lowest importance, and each has a medium satisfaction rate.

Potential management actions on CBR rivers

Canoers and kayakers who have used CBR rivers in the past were asked about their views on possible management actions on CBR rivers. The responses they gave are widely shared by canoers and kayakers, and across the regions.

CBR river users strongly support keeping the river corridors as undeveloped as possible (Table 22). Additionally, they strongly support providing more access (and access parking), and camping and hiking opportunities along the river. They also strongly support keeping off-road vehicles away from the rivers.

Users are more ambivalent about a number of actions, including providing distance markers, providing more information on nature and wildlife, providing more rest areas, and providing more enforcement-officer patrols. For the first three of these items, users definitely lean toward support, but not as strongly as with the top-supported actions.

Users strongly oppose some actions, including restrictions on the number of river users, prohibiting wood fires at campsites, and prohibiting camping.

Table 22

Below are several statements that describe possible management actions on Canoe and Boating Route (CBR) rivers in Minnesota. Please indicate how much you support or oppose each possible management action being taken.

(responses of canoers/kayakers who have used CBR rivers in the past)

Possible management action	Mean support/oppose value* (scale 1 to 5)	Strongly oppose (=1) (percent)	Mildly oppose (=2) (percent)	Neutral (=3) (percent)	Mildly support (=4) (percent)	Strongly support (=5) (percent)	Don't know (percent)	Total (percent)
Support strongly (>3.5)								
● Keep the CBR river corridors as undeveloped as possible	4.4	1%	2%	11%	23%	61%	3%	100%
● Provide more canoe/kayak access to CBR rivers	4.0	2%	5%	20%	32%	37%	3%	100%
● Prohibit off-road vehicles along CBR rivers	3.9	10%	6%	14%	16%	50%	3%	100%
● Provide more water-accessible campsites on CBR rivers	3.9	2%	5%	25%	34%	31%	2%	100%
● Provide more parking at accesses to CBR rivers	3.7	2%	6%	35%	31%	22%	4%	100%
● Develop more hiking trails near CBR rivers that are accessible to canoers and kayakers	3.7	3%	5%	31%	37%	19%	4%	100%
Ambivalent (2.5 to 3.5)								
● Provide distance markers along CBR rivers	3.4	7%	9%	31%	35%	16%	3%	100%
● Provide more information on nature and wildlife along CBR rivers (e.g., nature guides)	3.4	5%	8%	43%	30%	11%	3%	100%
● Provide more rest areas on CBR rivers	3.3	4%	8%	46%	31%	6%	5%	100%
● Provide more enforcement-officer patrols on CBR rivers	3.1	7%	9%	55%	15%	9%	5%	100%
Oppose strongly (<2.5)								
● Restrict the number of people using CBR rivers	2.3	27%	28%	26%	12%	3%	5%	100%
● Prohibit wood fires at CBR campsites	2.1	37%	30%	21%	4%	4%	3%	100%
● Prohibit camping on CBR rivers	1.7	52%	27%	13%	4%	1%	4%	100%

* Excludes "don't know" responses.

In summary, CBR river users support management actions that provide them with additional opportunities or information (e.g., more access or camping), and oppose actions that would restrict their behavior (e.g., prohibit wood fires). And they want the setting for paddling to be as natural as possible, with little interference from other recreation activities that would modify the “naturalness” of the setting (e.g., off-road vehicles).

High priority CBR river topics for canoers/kayakers

Several topics are identified—through the survey results—to be of high priority to river canoers/kayakers. The topics cover boating facilities, services, and issues. A topic becomes high priority if it meets one or more of these conditions: (i) the topic has high importance to the enjoyment of river use, (ii) the topic represents a high-ranking barrier to more river use, or (iii) the topic is a management option that receives large support. Putting effort into these high-priority topics would appear—from the survey results—to make sense to canoers/kayakers.

● Topic: Accesses along CBR rivers

Along with maps, access is ranked at the top in terms of importance to canoers/kayakers, and has one of the highest satisfaction rates, which makes it a leading program success at present. Efforts to ensure this continues to be a success would make sense to canoers/kayakers. Providing more river access is a highly supported management option. Accesses and maps are critical to canoers/kayakers who need to shuttle their craft back upstream after a river trip. The difficulty of arranging a shuttle is the second-ranked barrier to more river use after lack of time (a universal barrier).

● Topic: Maps of CBR rivers

Along with access, maps are ranked at the top in terms of importance to canoers/kayakers, and have one of the highest satisfaction rates, which makes them a leading program success at present. Efforts to ensure this continues to be a success would make sense to canoers/kayakers. Maps and accesses are critical to canoers/kayakers who need to shuttle their craft back upstream after a river trip. The difficulty of arranging a shuttle is the second-ranked barrier to more river use after lack of time (a universal barrier).

● Topic: River-level reporting

When asked about the importance of various facilities/services that make a CBR outing enjoyable, canoers/kayakers rank river-level reporting as number three, after river accesses and river maps. For those who think river-level reporting is important to their outing, satisfaction with the current river-level reporting is not particularly high (only half are satisfied). Furthermore, one of the leading barriers to more CBR river use is not knowing the water level and river conditions prior to the outing. This barrier is ranked number three, after lack of time (a universal barrier) and difficulty of arranging a shuttle back up stream after the outing.

There is a lot of room for improvement in this relatively important information service, and efforts to improve it would make sense to canoers/kayakers.

● Topic: Shuttling back upstream after a CBR river outing

As a barrier to more CBR river use, arranging a shuttle back upstream after a river trip is ranked number two, after lack of time (a universal barrier). It is ranked ahead of river-level reporting. Shuttling is an inherent problem of river paddling and is something users need to plan for. Providing assistance with shuttle planning is an aspect of other topics here. Maps and accesses (two topics above) are critical to canoers/kayakers who need to plan how to shuttle their craft back upstream after a river trip. And the DNR website (a topic below) could conceivably offer valuable advice on how to find services that provide shuttle arrangements.

● Topic: Camping from a canoe/kayak on a CBR river

Although few (12%) camped along a CBR river in the last 12 months, about half of canoers/kayakers would like to camp more often on CBR rivers. The major barriers to more camping relate to the availability of campsites: guarantee of a site, too few campsites, and campsites too full. These same “availability of campsite” items are leading barriers to sea-kayaker use of water-accessible campsites along the North Shore of Lake Superior. Providing more campsites is strongly supported by canoers/kayakers, although simply providing more may not be sufficient to overcome the barrier of a guarantee of a site.

Consistent with this “availability” theme, canoers/kayakers who think camping is important gave low satisfaction marks to the *number* of campsites along CBR rivers. They also gave low marks to the *maintenance* of these campsites, which raises the question of how maintenance expectations could be better managed. Camping items, overall, receive the lowest satisfaction marks of any of the

facilities/services evaluated in the survey by canoers/kayakers. To make camping more than a marginal performer among CBR river facilities/services, it appears, would require a fair amount of additional effort.

● Topic: Conflicts with motorboats on CBR rivers

A high-ranked barrier to more CBR river use (equal to not knowing water levels prior to the trip) is the expectation that motorized watercraft will interfere with the enjoyment of the outing. This barrier could be addressed with water-surface zoning, access planning (e.g., providing carry-in accesses only), and with information on river reaches that are known to be largely free of motorized craft. As shown in the survey, water-surface zoning that restricts motorized boating is not always supported strongly by canoers/kayakers, especially by those who have motorboats in the household.

● Topic: MN DNR website information on CBR rivers

When asked about the importance of various facilities/services that make a CBR outing enjoyable, canoers/kayakers rank the MN DNR website information as number four, after river accesses, maps, and river-level reporting. For those who think website information is important to their outing, satisfaction with the current river-level reporting is not particularly high (only about half are satisfied). There is a lot of room for improvement in this relatively important information-access service, and efforts to improve it would make sense to canoers/kayakers.

The MN DNR website is a good location for information on many of the preceding high-priority topics: river accesses, river maps, and river-level conditions. It could also be place to provide information on rivers with little motorboat traffic (i.e., where to avoid conflicts with motorboats), and to set expectations about campsite maintenance standards. The website could conceivably offer valuable advice on how to find services that provide shuttle arrangements and where to look for near-river campgrounds that accept reservations.

The MN DNR website is familiar to the majority of canoers/kayakers. Over half (56%) indicate they have used the website in the past, and website use should only be expected to increase in the future.

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APPENDIX A
BOATING TREND DATA

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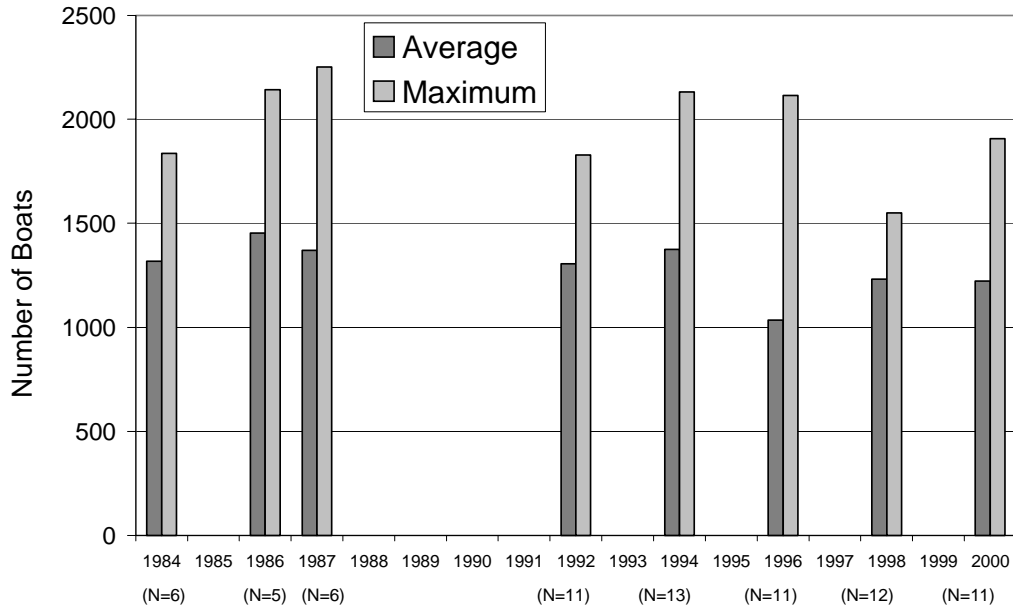
General boating trends

Five recreational boating studies have been conducted from the 1980s into recent years. All five lead to the same conclusion regarding trends: the number of boats on the water has neither increased nor decreased significantly (changes are assessed statistically at the .05 level). In the studies, boats are counted from aircraft on summer weekend/holiday afternoons.

The studies cover a range of boating conditions in Minnesota. Two large, very intensely used boating resources are covered by the studies (Lake Minnetonka located in the western part of the Twin Cities metropolitan area—Figure A-1, and the Lower St. Croix River located in the eastern part of the Twin Cities—Figure A-2). Other Twin Cities boating lakes are covered in a separate regional boating study (Figure A-3). More rural, less intensely used lakes are covered by two regional boating studies: one in Central and one in North Central Minnesota (Figure A-3). The more rural lake regions are used three to five times less intensely than typical Twin Cities' lakes.

Figure A-1

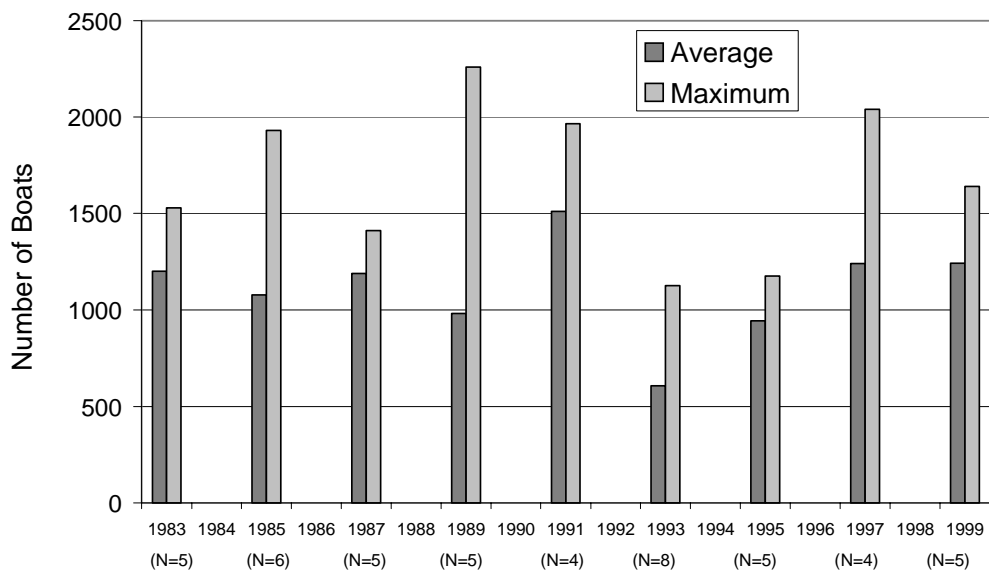
Lake Minnetonka Weekend/Holiday Afternoon Aerial Boat Counts*



* excludes 4 inclement weather counts between 1984 and 2000

Figure A-2

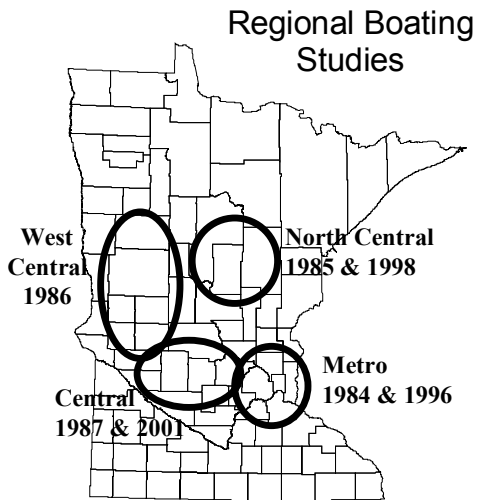
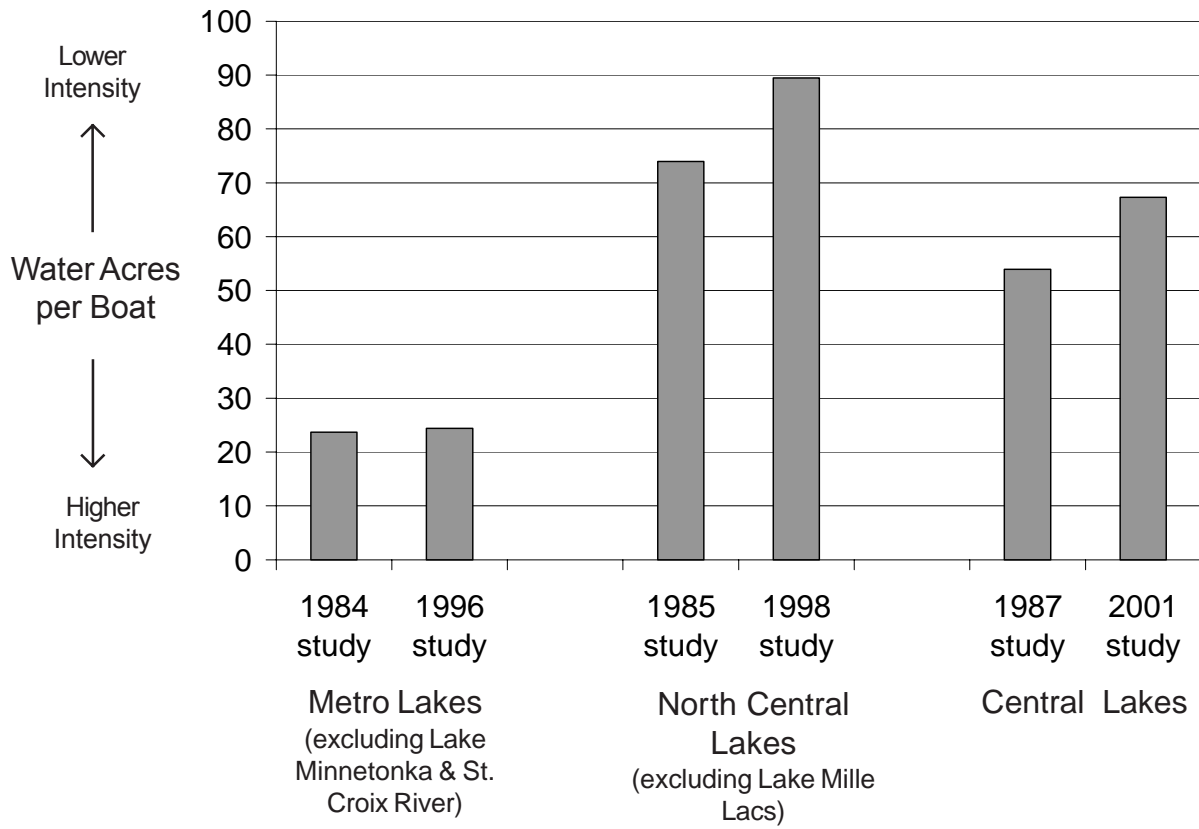
Lower St. Croix River Weekend/Holiday Afternoon Aerial Boat Counts*



*counts beginning between noon and 6 p.m. Source of data is MWBAC, 1983 to 1999.

Figure A-3

Trends in boating intensities on summer weekend/holiday afternoons



Lower St. Croix River canoeing trend on the federal-managed reach

Boating numbers and craft type were monitored through aerial observation from 1983 to 1999. The aerial observations covered the entire lower St. Croix from its mouth to Stillwater (State-managed reach) and upstream from Stillwater to St. Croix Falls (Federal-managed reach). For the entire reach, overall boat numbers were stable over the 1983-1999 period for the time period used to establish trends (weekend/holiday summer afternoons) (see Figure A-2). The portion of boating use in the State- and Federal-managed reaches has remained nearly the same since 1983 (Figure A-4). In the Federal-managed reach, which is shallower and less conducive to motorized boating than the State-managed reach, about half of all boats were consistently reported as canoes over the 1983-1999 period (Figure A-5). Thus, there was no upward nor downward indication of canoeing on the Federal-managed reach over the period. The indication is stable canoeing use.

Figure A-4

Lower St. Croix River distribution of watercraft between the Federal and State Areas of the River

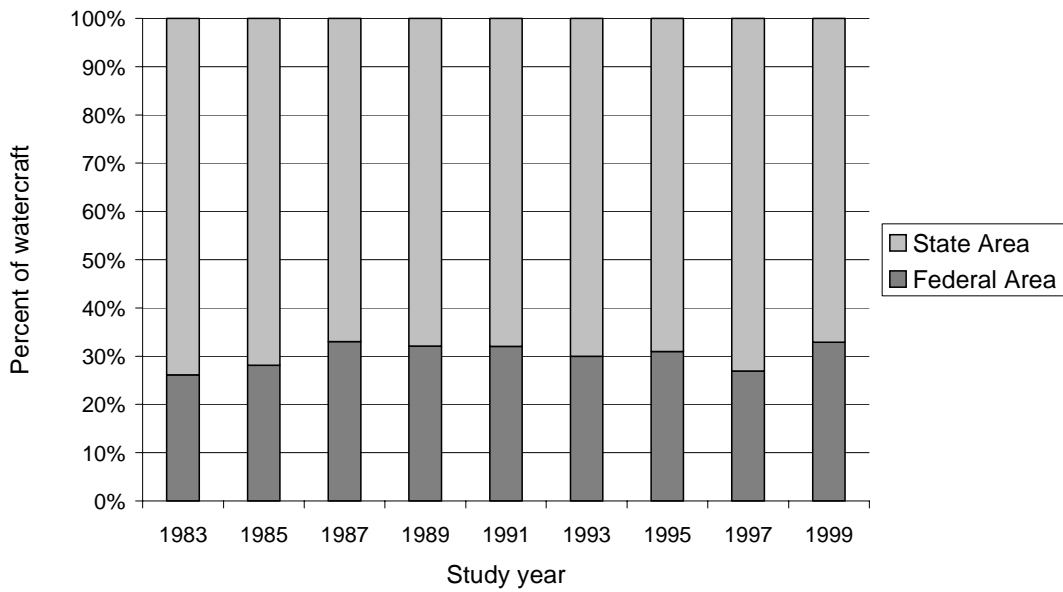
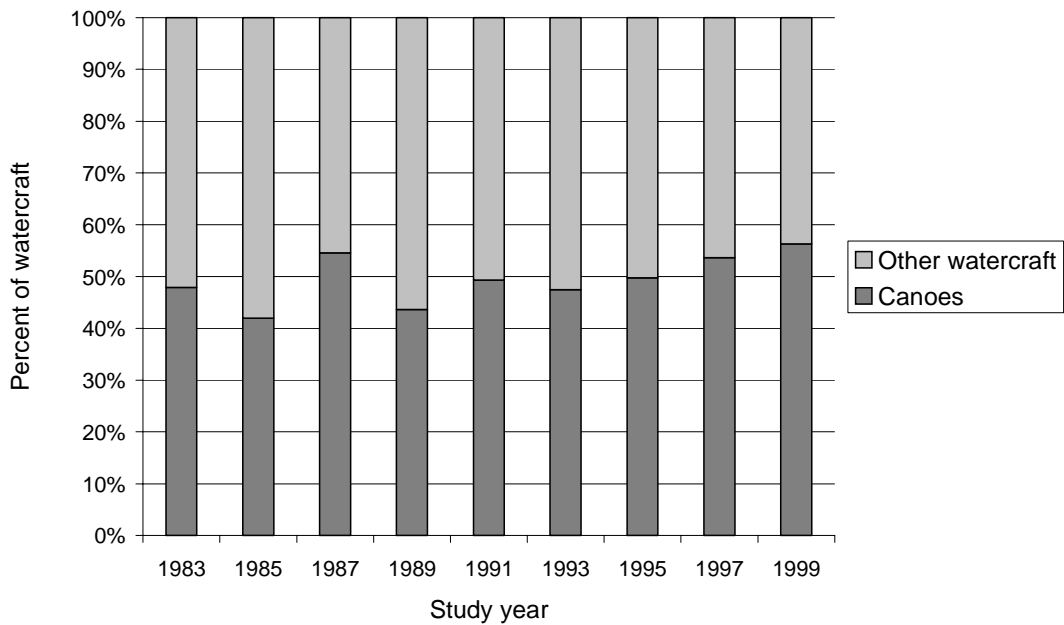


Figure A-5

Type of watercraft observed in Federal Area of Lower St. Croix River



Boundary Waters Canoe Area Wilderness (BWCAW)

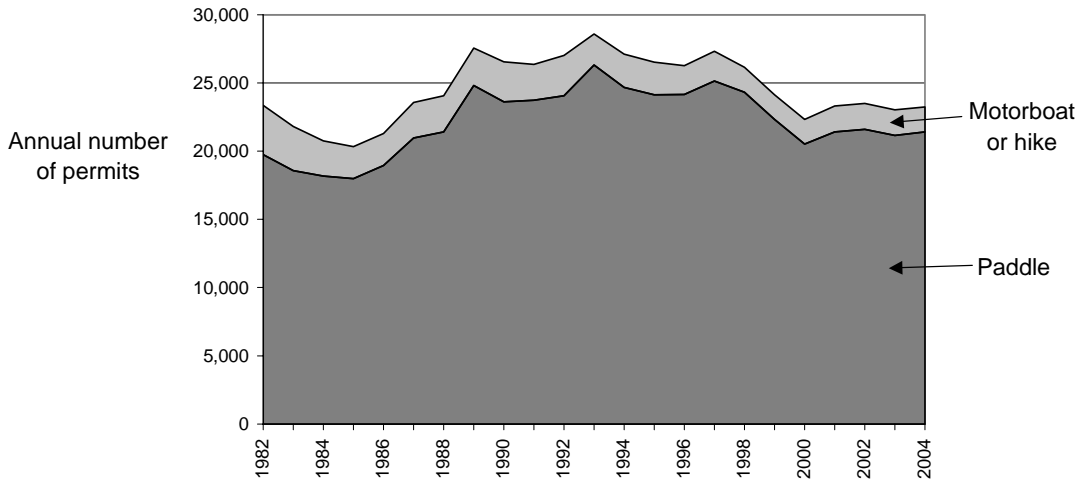
For the BWCAW—a lake-based wilderness area on the Canadian border in northeastern Minnesota—the indicator of boating trends is yearly May-September overnight group quota permits since 1982, when standard reporting of these permit data began. The BWCAW is a formal wilderness, and quotas are established to limit use and maintain a wilderness experience for visitors. Group quotas are managed through the permit system. The large majority of the BWCAW annual use (in terms of recreational visitor days) is connected to these May-September overnight permits. Permits specify the means of travel of the group (paddle, motorboat, hike).

Total overnight group permits, as well as paddle permits, at first decreased in the early 1980s, then rose to the late 1980s, after which they stayed relatively constant for about 10 years until the latter part of the 1990s (Figure A-6). Permits numbers then fell and have remained stable over the last few years (the permit data for 1999 to 2004 are from a new permit system and are considered preliminary at this time; some revisions may be made in the near future). The relatively constant period from the late 1980s through the latter part of the 1990s occurred during the sizable drop (27% decrease) between 1993 and 1994 in the number of May-September overnight quota permits. At present, just over half (54%) of the available May-September overnight permit quota is used.

Since 1994 when the current May-September overnight quotas were implemented, total and paddle permits have decreased some 13-14 percent. Over a longer period, extending back 15 to 20 years, permits have neither shown neither a net increase nor net decrease. They have been more or less stable.

Figure A-6

Trends in May-to-September overnight group permits in the BWCAW by means of travel*



* Source: Superior National Forest. The permit data for 1999 to 2004 are from a new permit system and are considered preliminary at this time.

References for boating trend information

Minnesota Department of Natural Resources:

1997. Boating in the Twin Cities Metropolitan Area: Current Status (1996) and Trends Since 1984.

1999. Boating in North Central Minnesota: Status in 1998 and Trends Since 1985.

2001. Boating Trends on Lake Minnetonka, 1984 to 2000. Boating studies are done in cooperation with the Lake Minnetonka Conservation District.

2002. Boating in Central Minnesota: Status in 2001 and Trends Since 1987.

Minnesota-Wisconsin Boundary Area Commission:

Recreational boating studies (ever two years from 1983 to 1999) of the Lower St. Croix National Scenic Riverway.

U.S. Department of Agriculture, Forest Service, Superior National Forest:

Historical May-September overnight permit data for the Boundary Waters Canoe Area Wilderness, 1982 to 2004.