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The Recreational Demand for Development of
Harbors of Refuge in Western Lake Superior

The Recreational Demand for Development of
Harbors of Refuge in Western Lake Superior

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University of Minnesota - 1981

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ABSTRACT

This study considered recreational demand for additional harbors of refuge on Minnesota's North Shore of Western Lake Superior. The methods employed to determine demand were observations of current boating use and interviews with current boaters to obtain their opinions on the need for additional harbor facilities.

The analysis of the data collected points to an existing demand for additional small boat harbors and for additional facilities in existing harbors. There is little transient movement along the North Shore from one harbor to another because there are few harbors and the facilities within some harbors are inadequate. Most boaters interviewed said they would boat more frequently, stop at other harbors more frequently, and enjoy their boating experience more if there were more small boat harbors along the shore. A majority of the boaters would be willing to pay to have more small boat harbors on the North Shore, although they generally objected to paying for each time they ramp launch.

The demand by the boaters interviewed was for small, protected harbors that provide ramp launch facilities, docks to tie up large and small boats, restroom facilities, and camping opportunities. There was little expressed demand for additional permanent berthing facilities in the study area.

CONCLUSIONS/APPLICATIONS

This study considered the recreational demand for additional harbors of refuge on Minnesota's North Shore of Western Lake Superior. The methods employed to determine that demand were observations of current boating use and interviews with current boaters to obtain their opinions about the need for additional harbor facilities.

Typical North Shore boaters are characterized as males, thirty to fifty-four years of age, residing in the North Shore/Duluth area or the Minneapolis/St. Paul area. Most own their boats and tend to use the boat at least weekly, if not more often. They usually gain access to the Lake through a launch ramp and have a trailerable open boat with one to three persons in each party.

The analysis of the data collected points to an existing demand for additional small boat harbors and for additional facilities in existing harbors. There is little transient movement along the North Shore from one harbor to another because there are few harbors and the facilities within some harbors are inadequate. Most boaters said they would boat more frequently, stop at other harbors more frequently, and enjoy their boating experience more if there were more small boat harbors along the shore. A majority of the boaters would be willing to pay to have more small boat harbors on the North Shore, although they generally objected to paying for each time they ramp launch.

The demand by the boaters interviewed was for small, protected harbors that provide ramp launch facilities, docks to tie up large and small boats, restroom facilities, and camping opportunities. There was little expressed demand for additional permanent berthing facilities in this study area.

The current use patterns for boating in this section of the North Shore indicate that most boaters use fourteen-to twenty-foot open boats with outboard motors, although there is a significant proportion of larger crafts. The main method of access to the water is through a launch ramp. Boat trips are short, typically less than one day; boaters usually stay within four miles of shore; and they usually return to the harbor of origin. There is little overnight boat use even though at least 25 percent of the boats have sleeping and restroom accommodations on board. The purpose of the boating trip is usually for fishing, with cruising being next in importance. The boaters averaged about twenty-five dollars per party each trip. The cost and availability of fuel has had little effect on the use patterns of the boaters.

The boating season extends from early June until late September with some boaters using the Lake for a more extended season. The boating use observed in the target harbors, and determined through the

interviews, was mainly on weekends and holidays. Of the boating occasions observed, 84 percent occurred on weekends and holidays and 16 percent on weekdays.

Projections of the growth of outdoor recreation in general, and more specifically, the growth of boating on Western Lake Superior, point to an increasing demand in the future for more boating facilities such as small boat harbors and related harbor facilities. This study builds on those conducted previously and indicates a need for additional harbors of refuge on the Minnesota North Shore and additional facilities within existing harbors.

MATERIALS/METHODS

Statement of Purpose

The purpose of this study was to identify boating use patterns for berthed, ramp launched, and transient boats at four harbors of refuge along the North Shore of Lake Superior. These use patterns could be utilized by resource planners in determining recreational demand for harbor of refuge facility development along Minnesota's Lake Superior shoreline.

Focusing on four harbor of refuge areas for study -- Knife River, Two Harbors, Silver Bay, and Grand Marais -- the specific research objectives of this study were:

1. to determine recreational boating use patterns for ramp launched, berthed, and transient boats;
2. to determine boating user satisfaction levels with existing harbor facilities and demand for future facility development;
3. to determine recreational needs of boaters which may be satisfied by development of nearby facilities by local and state agencies such as Department of Natural Resources;
4. to determine boating user demographic information;
5. to determine recreational use, other than boating, taking place at the harbors, (for example, fishing, picnicking, etc.);
6. to examine the impact recent boating facility developments on the North Shore have had on recreational boating patterns.

Background

Recreational boating on Western Lake Superior is significant and increasing. This has been indicated in previous studies (referred below) and by the recent development of new and expanded boating facilities in the area.

The population of the Western Lake region, and the majority of the boating facilities, are concentrated in the Duluth/Superior area. The south shore of the Lake, Wisconsin Shore, has a series of small harbors of refuge located approximately thirty miles apart along the entire lake shore. These small protected harbors all offer access to the Lake for trailered boats, and protection

from Lake storms. Some offer berthing for larger boats.

The North Shore has few of these harbors, for a number of reasons, including the former lack of boating use in the area and the small year-round population. Probably the most important reason is the geological makeup of the area. The North Shore is characterized by steep rock bluffs and outcrops and few natural harbor areas. This, and the lack of natural estuaries from major rivers, makes harbor development very expensive. The result of these factors is that instead of having a harbor of refuge every thirty miles, there are long stretches of the North Shore without any such facilities (Two Harbors to Grand Marais, eighty-four miles; Grand Marais to Grand Portage, fifty miles). (Please refer to Figure 1).

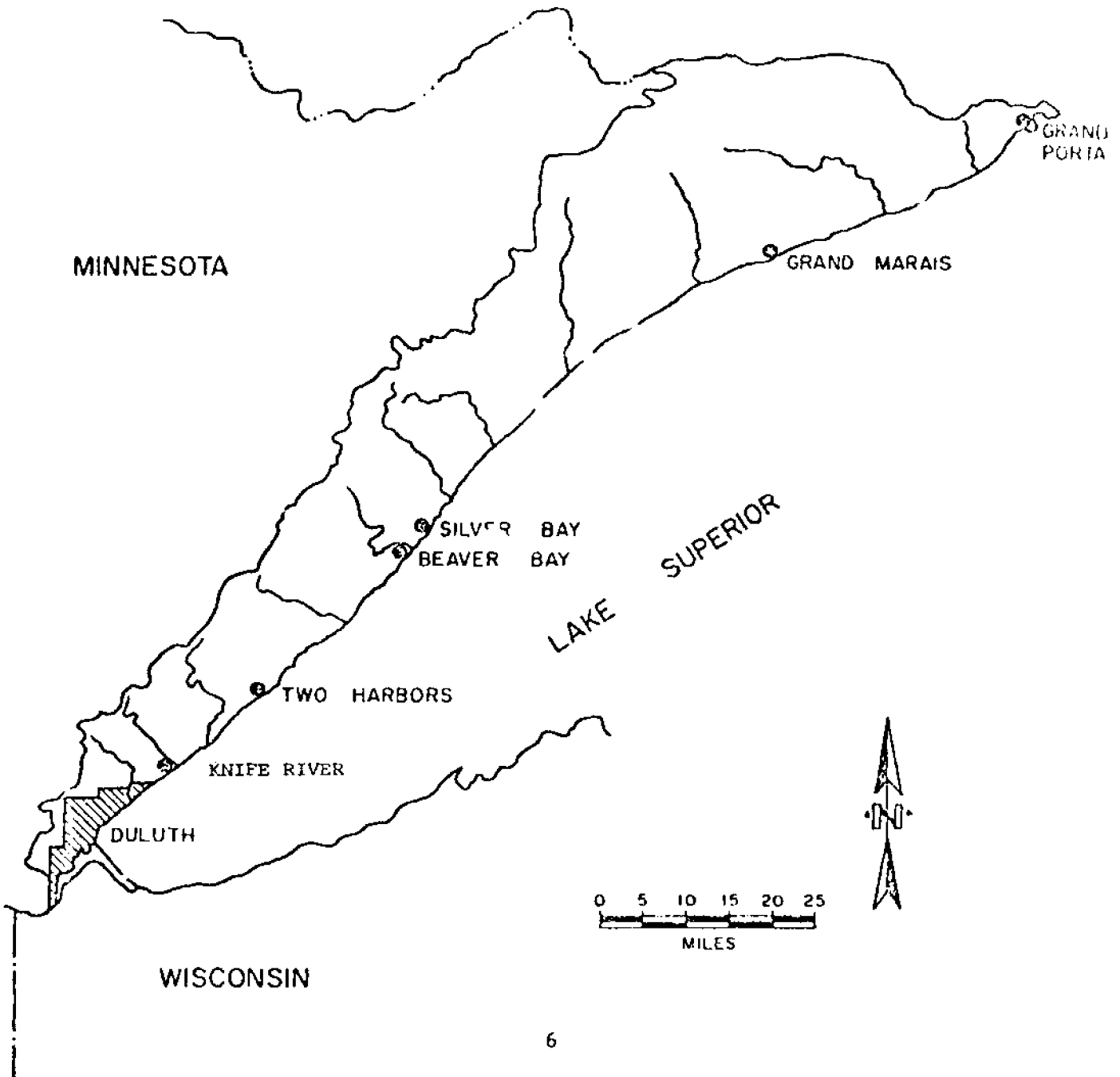
The two governmental agencies responsible for the provision of recreational boating-related facilities in the area are the U.S. Army Corps of Engineers (Corps) and the Minnesota Department of Natural Resources (DNR). Both agencies have plans for harbor facility development on the North Shore. The Corps has plans for harbor of refuge construction in the Silver Bay and the Schroeder areas in addition to expansion of facilities at Grand Portage. But, funding for these projects has received low priority in the past, leaving the funding up to the local communities. These communities have not been able to acquire the needed funding for complete harbor development.

In the interim, the town of Schroeder has installed a boat ramp facility (without a breakwall) and the DNR has installed a boat ramp (without a breakwall) at Silver Bay. Both of these developments took place in the summer of 1980 and both point to a perceived need on the part of local officials to provide at least some access to and from the lake. There was a need for updated research to analyze the recreational boating use patterns on the North Shore of the lake and to assess the need for additional harbor facilities.

Figure 1.

MINNESOTA COAST

LAKE SUPERIOR NORTH SHORE



Description of Study Area

Figure 1 illustrates the North Shore area and shows the relative locations of the four study sites of Knife River, Two Harbors, Silver Bay, and Grand Marais. Of these four, only Knife River, Two Harbors, and Grand Marais are actual harbors of refuge which offer a breakwater for protection from wave action on the Lake. The only other harbor of refuge on the shore is Grand Portage.

Knife River:

The Knife River site consists of a breakwater which forms a protected harbor and a developed marina facility which includes boat moorage, launch ramp, boat repair and sales, dry storage, and a hoist launching facility for boats of any size. The ninety-three slip mooring capacity makes Knife River Marina the largest such facility on the North Shore, outside of Duluth.

The marina at Knife River opened in 1974 and filled immediately. The general proportions of users of the marina, according to the marina operator, are approximately thirty percent people from the North Shore area, thirty-five percent from Duluth, and thirty-five percent from the Minneapolis-St. Paul area. There is a three-year waiting list for permanent mooring spaces at the marina. The marina and small harbor receive high use, especially on community festival days when people are lined up trying to launch trailerable boats. The harbor is small, creating a great deal of congestion during high use times, such as at a fishing derby in July when more than 350 boats launched at Knife River over a two day period.

The surrounding land uses would allow for further expansion of the harbor facilities. There are picnicking facilities but no camping, lodging, or food facilities on the site.

Two Harbors:

The study area at Two Harbors was on the site known as Agate Bay located on the northeastern side of the harbor. The site is within the breakwater and located close to a U.S. Coast Guard facility. The site consists of a single cement ramp for boat launching and a short dock. It is in the heart of the old fishing village and is surrounded by old boat houses. There is a large flat area used for parking but there are no other facilities on the site.

The Agate Bay site has been observed in the past to have heavy use by trailer-launched fishing boats. During certain heavy use periods waiting time to use the narrow ramp was more than one hour.

The site is well-protected from wave action from all directions but the southwest. A southwest wind coming across the large harbor can create a great deal of wave action in the launch site.

There is another access site in Two Harbors located .5 miles northeast of Agate Bay -- the Burlington Bay site adjacent to a city campground. After observation, the Agate Bay site was chosen for this study because boating use at the Burlington Bay site was very low. The Burlington Bay site has no protection from wave action, is completely open to the Lake, consists solely of a launch ramp (without dock), and is usually covered with up to two feet of beach gravel that has accumulated on the ramp as a result of wave action.

The City of Two Harbors has shown an interest in developing more extensive recreational boating facilities. The city, with the assistance of a planning firm, has made development plans for such facilities. The location of new development is clouded by the fact that the Agate Bay site (or at least the parts needed for expansion) is privately owned. The alternative development plans explored were to purchase land near Agate Bay and develop a marina facility there, or to dredge a marina site near the present Burlington Bay area.

There are no marina facilities in Two Harbors. The ramp launch at Agate Bay is small, single lane, steep, and unprotected from waves and wind generated in the large harbor area. It is listed as a harbor of refuge solely because protection from the open lake is offered to boats within the busy commercial harbor area breakwater. The harbor is used extensively by large Lake freighters.

Silver Bay:

The Silver Bay/Beaver Bay sites are within one mile of each other. When the study began, Beaver Bay was chosen for study because the Silver Bay site was not yet completed. After the first few study days the Silver Bay site was opened and so the study team moved to that site. Beaver Bay is a private dock and boat launch, charging a fee for use. It is also exposed to wave action, is difficult to reach, offers little parking, and is surrounded by unmarked shallow areas, making it difficult to use by those unfamiliar with the locations of shallows.

The public Silver Bay site was opened in July, 1980 and consists of a double boat launch ramp, dock, parking area, picnic sites, and restroom. The facility was developed by the Minnesota Department of Natural Resources (DNR) on the site planned for a future harbor of refuge by the U.S. Army Corps of Engineers (CORPS). The Corps' plan included a breakwater and mooring dock

for large boats, but the DNR facility does not have these developments. The site does, however, offer some natural rock outcrop protection from wave action.

The Silver Bay site was being used even before it was completed; and after completion, the use levels continued to increase, indicating local interest in the development of the facility. The site has space available for possible future expansion. This area of the Lake has received limited boating use in the past because of lack of public access to the Lake for boaters.

In this report the cases from Beaver Bay and Silver Bay have been combined. An analysis on the data from these two sites was completed and showed no significant differences between the responses from the two sites, except in the area of boater satisfaction with harbor facilities. (When this section of the data is reported later in this report the cases were divided into Silver Bay cases and Beaver Bay cases.)

Grand Marais:

The harbor area at Grand Marais is relatively large for the North Shore. Two breakwaters provide protection for a large harbor located in front of the community of Grand Marais. The community offers a wide range of facilities and services within walking distance of the harbor: camping, lodging, food, medical services, repairs and supplies, and community recreational opportunities.

The city of Grand Marais operates a marina facility located adjacent to the city campgrounds. This facility consists of four docks protected by a small breakwater (inside the larger harbor breakwater). The docks offer moorage space for boats of any size. Approximately ten to twelve berths are available. Two of the docks are seventy-two feet in length and two are twenty-eight feet. Power boats and sailboats, and both permanently berthed and transient boats use the docks. The marina offers water and electricity hook-ups. Shower, water and restroom facilities are available in the adjacent campground. There is no dry winter storage available for boats at the marina.

A ramp launch facility is located adjacent to the marina along with a parking area. The ramp is used extensively by small boats and it was at this ramp and marina that this study was conducted.

There is another ramp launch facility located a quarter mile from the marina just inside the south breakwater. This ramp is used by small boats, but since it was too far from the marina to cover in this study, the study was limited to the marina area. The non-marina ramp receives a small proportion of the harbor use according

to local officials, and according to observations made during this study. It is used primarily by local residents. Interviews with local officials before the study began revealed a great deal of community interest in the boating use of the harbor and in the possibility of expanding boating-related facilities in the harbor. These interviews also revealed that the harbor receives some amount of transient boater use, serving sailboats and power boats from Duluth, Bayfield (Wisconsin), and Thunder Bay (Ontario). This is understandable because Grand Marais offers the only harbor of refuge with any marina facilities on the 144-mile coastline between Knife River and Grand Portage.

PREVIOUS RESEARCH

The two most pertinent research studies of recreational demand on Western Lake Superior are the U.S. Army Corps of Engineers' "Water Oriented Recreational Demand and Projection: Calculations for Western Lake Superior" (Weston, 1978) and the Minnesota Advisory Service (MMAS) "Boating Survey, Recreational Boating on Western Lake Superior" (Murray and Laundergan, 1977).

The Corps' study attempted to project latent demand for berthing facilities. Conducted in 1977, the survey was mailed to randomly selected boat owners in three states. It concentrated mainly on boaters who were seeking permanent berthing at a marina. The survey did not identify use patterns, user satisfaction levels, user demographics, or recreational development attitudes of users for the specific harbors of refuge targeted for the present study.

Another component of the Corps' study involved four plane over-flights of North Shore harbor facilities during the study period (late July-early September 1977) as well as time-lapse photography at two sites (Two Harbors and Knife River). The Corps' study did not include contacting the users of the launch ramps to obtain user data, nor did it include the recording of other boating uses in the harbor by transient or berthed boats. The Corps' study also did not include observation of other recreational uses of the harbor.

The MMAS study was a mailed survey conducted in 1976 and sent only to those owners with boats permanently berthed on Western Lake Superior or members of area boating clubs. It did not include owners of trailered boats who used launch ramps to gain lake access. The Corps' study, however, has shown that ramp usage is substantial in the Western Lake Superior area, so the sample generated by the MMAS study was suspected to be atypical of the majority of users in the area.

The Corps' study of ramp usage covered the period of late July through early September. The MMAS study indicated, however, that

the boating season on the Lake extends from June through September.

There is a scarcity of information on North Shore boaters' recreational needs that could be satisfied by the DNR through ten state parks in the area. The MMAS study only provides data for permanently berthed boaters. The Corps attempted to establish day use and camping demand through data collected in a 1972 Upper Great Lakes Regional Commission study of a nine state area. The assumptions based on these data are tenuous because the demand data for this UGLRC study are presented in multi-county zones, and the North Shore area was included in three different zones. The Minnesota DNR 1977 "North Shore Recreation Study" includes an inventory and estimate of demand for North Shore recreation, but no original data were collected for that study.

Other studies consulted in the conceptualization of the study included Ditton, (1975); McCool, (1978); Murphy, (1975); Brown and Wilkins, (1975); and Cheek, (1977).

METHODOLOGY

The general research method utilized in this study was to choose target research geographic areas and then to study the recreational boating patterns of the target areas. The primary method used was a personal interview with recreational boaters conducted on the site. Other methods included use observation and general document research into the past use and development patterns of the selected sites.

The four harbor sites selected for the study were chosen to represent a variety of geographic locations and harbor development levels. Geographically the four sites are spread along Minnesota's Lake Superior shoreline. Knife River is within twenty-five miles of Duluth, the main population center on the lake; and Grand Marais is within fifty miles of the Canadian border. Knife River and Grand Marais both have mooring facilities for large boats; Two Harbors has little recreational development but has a large protected harbor area; and Silver Bay consists of a small boat launching ramp and has no capacity for large boats. This diversity of target research sites was designed to include a representation in the sample of a variety of recreational boating patterns and requirements.

The method of choosing sampling sites and then contacting recreational users at these sites is an accepted technique in recreation research where the subjects are entering and leaving a water-based recreation resource. This method has been employed in both river-based research (Becker, 1979; McAvoy, 1980; Merriam, 1979) as well as in researching large lakes and coastal areas (McCool, 1978; and Ditton, 1975).

The study was conducted in the summer boating season of 1980. Sampling

dates and times were chosen to represent use throughout the season, different times of the week, and different times of the day. The sampling days and times for respective sites are available from the author. The sampling dates and times covered the anticipated primary boating season of June 15-September 15 (as determined by the MMAS study). The MMAS study also had shown that 60 percent of boating use was on the weekend. The sampling dates reflected that same proportion of week-day and weekends. The Fourth of July holiday weekend and Labor Day weekend were included in the sampling. All daylight hours were equally represented. Thirteen sampling periods (days) were chosen for each site. Researchers were on-site each of the thirteen chosen dates for a ten-hour period.

The researchers on-site were all trained in the research techniques to be used. This training and the written instructions were attempting to ensure uniformity in the data collection phase of the project.

Boating use patterns data were collected by the researchers on-site, through observation and personal interview. The researchers observed and recorded all recreational boating use in the harbor area. (Contact author for a copy of the observation form used.) Observation data also included weather information and recording of non-boating recreational activity in the harbor area.

The researchers personally contacted each boat operator who launched or retrieved a boat at the site during the sampling period. Each operator was interviewed using the interview schedule developed for the study. The interview instrument was designed to yield data from the boaters that could be used to accomplish the objectives of the study regarding boating patterns. The instrument was also designed to build upon the study conducted by Murray and Laundergan and the one by the U.S. Army Corps of Engineers. Therefore, many of the questions used in these previous studies were incorporated into the present study.

These research methods resulted in 2,282 recorded observations of boating use in the selected harbors, and completed personal interviews with 417 Lake Superior North Shore recreational boaters.

The data from the observation forms and the interview schedules were coded and entered into computer files. The data were analyzed using an integrated statistical system titled the Statistical Package for the Social Sciences (SPSS). The analysis resulted in frequencies for all data categories and cross-tabulation of critical variables.

RESULTS AND DISCUSSION

Results of Interviews and Observations - An Introduction

A major objective of this study was to contact Lake Superior boaters on-site at four different locations along the North Shore, and to interview these boaters with the interview instrument developed. Using the sampling and contact techniques explained in the Methodology section of this report, 417 individual boat operators were contacted and interviews were completed with each operator. No operators refused to be interviewed.

The methodology for the project called for researchers to be present at the four survey sites during the selected sampling days and times. Each site was observed for thirteen days, ten hours each day, from June 15-September 15, 1980. In addition to interviewing all of the boat operators, whenever possible, the researchers observed and recorded the boats entering or leaving the boat launches or slips in each harbor site. Boaters were interviewed only once during the project, so each subsequent time they used the facility their use was observed and recorded. In addition, at some heavy use times in some of the harbors it was impossible to interview every boater. During such times a systematic selection process was used to select operators to be interviewed, and other boat use was recorded. This process resulted in observation of 2,282 boating occasions during the sampling period.

In the following report, two categories of data are presented in some instances, since there were data collected from both an observation process and an interview process. The following discussion will give data on the observed boating patterns at the harbors, as well as similar data gathered through interviewing boaters. The comparison of these two data sets can serve to validate the sample as being representative since many of the interview sample characteristics are very similar to the use pattern characteristics observed on the site.

The following is the report of the data collected through boat operator interviews and observations. This sample of boaters was obtained through a proven sampling method which included a variety of contact times and dates throughout the boating season of June 15-September 15, 1980 from four different locations along the North Shore. Therefore, the sample drawn can be considered a representative sample of those boaters who use the North Shore of Lake Superior and who either begin, end, or interrupt their boating experience at one of the primary public harbor/access sites along the shore.

There was no intent in this study to survey boaters at Duluth or at Grand Portage because these areas have been studied by

others (Corps, 1978; Murray and Laundergan, 1977). Nor was there an intent to survey the approximately six other public and private ramp launch sites along the Shore because other research (Corps, 1978) and preliminary observation for this project indicated relatively little use at these sites compared to the target sites for the study.

Boating Distributions

In this study, 2,282 boating occasions were observed in the target harbor areas. A boating occasion is defined as a boat either being launched or retrieved at a boat ramp, entering or leaving a berth, or coming up to or leaving a dock during the sample time. The distribution of this boating activity gives a relative distribution of the boating activity along the Shore. Of the 2,282 boating occasions, 49 percent (1,113) were at Knife River; 18 percent (422) at Two Harbors; 14 percent (326) at Silver Bay; and 19 percent (434) at Grand Marais.

A total of 417 interviews was obtained at the four sampling sites. The distribution of those interviews was: Knife River 34 percent (139); Two Harbors 21 percent (eighty-eight); Silver Bay 21 percent (eighty-six); Grand Marais 24 percent (102).

The sample obtained for interviews is not distributed in the exact same proportion as the use of the individual harbor areas as determined by observation. The interview sample is less heavily weighted to Knife River and more weighted to the other three harbors. This is because many of the Knife River users are permanently berthed for the season and therefore were interviewed only once, but observed more often.

The sample represents a fairly consistent distribution along the North Shore however, and there are adequate numbers of cases in each site to allow for further analysis.

Launch Types

The type of boating activity within the small harbors was observed to be mainly of the ramp launch/retrieve type, 59 percent (1,340). Other types of activity observed were pulling into or out of a slip, 17 percent (392); coming up to or leaving a dock, 23 percent (528); and other activity, such as beaching a boat, 1 percent (22).

The types of contact for the sample of boaters interviewed also indicate that the sample was distributed across the scale of launching types, with the ramp launched contact types composing the greatest proportion of the sample. The types of contact (when the boater was contacted for the interview) were: either launching or retrieving a boat at a ramp 68 percent (284); pulling into or away from a

slip 16 percent (69); at a dock 14 percent (58); and other (beaching, etc.) 2 percent (6). This indicates that the sample closely resembled the actual boating activity types observed in the harbors.

Boat Type

In the sample period, 2,282 boats were observed using the target harbors. The boat types observed are shown in Table 1.

Table 1 Observed Boat Types

	%	f
Sailboat	6	147
Open Boat (outboard)	60	1374
Open Boat (inboard)	19	431
Motorized Cruiser/houseboat	13	301
Canoe	1	18
Other	1	7
	100%	N=2282

Table 2, below, indicates the general distribution of boat types from site to site.

Table 2 Observed Boat Types by Site

	Sail	Outboard	Inboard	Motorized			Totals
				Cruiser	Canoe	Other	
Knife River	118	470	299	224	1	1	1113 (49%)
Two Harbors	8	323	72	19	0	0	422 (18%)
Silver Bay	2	252	23	47	0	2	326 (14%)
Beaver Bay							
Grand Marais	32	334	35	12	17	4	424 (19%)
Totals	160	1374	431	301	18	7	N=2282
	6%	60%	19%	13%	1%	1%	100%

Some general summaries of Table 2 include:

- 34% of all outboards were at Knife River;
- 24% of all outboards were at Two Harbors;
- 18% of all outboards were at Beaver/Silver Bay;
- 24% of all outboards were at Grand Marais.

- Also, 74% of all sailboats were at Knife River;
- 70% of all inboards were at Knife River; and
- 74% of all motorized cruisers were at Knife River.

The type of boats used by those interviewed in this study indicates that the boat types represented in the interviews closely resemble the types used along the North Shore.

Table 3 Interview Boat Types

	(f)	(%)
Sail (no motor)	1	.2
Sail (outboard)	20	4.8
Sail (inboard)	16	3.9
Open Boat (outboard motor)	262	63.4
Open Boat (inboard motor)	67	16.2
Motorized cruiser/houseboat	43	10.4
Canoe	4	1
Missing	4	0
	N=417	100%

Boaters interviewed, identified by types of boats, are presented in Table 4 by the site where the boater was contacted.

Table 4 Interviewed Boat Type by Site

<u>Site</u>	<u>Boat type</u>					<u>totals</u>
	<u>sail</u>	<u>outboard</u>	<u>inboard</u>	<u>cruiser houseboat</u>	<u>canoe</u>	
Knife River	20	63	34	21	0	139 (33.4%)
Two Harbors	2	67	13	6	0	88 (21.3%)
Silver Bay	2	64	9	10	1	86 (20.8%)
Beaver Bay						
Grand Marais	13	68	11	6	3	101 (24.5%)
Totals	37	262	67	43	4	N=413
	(8.9%)	(63.4%)	(16.2%)	(10.4%)	(1%)	(100%)

Boat Length:

The boat lengths of those surveyed in the project ran from four to seventy-six feet; but since most of those observed and most boats of those interviewed were ramp launched, the main size was that of a trailerable boat. The median boat length of the sample was seventeen and one-half feet, with 80 percent of all boats surveyed measuring less than twenty-three feet. The largest percentage of boats at any one length was 27 percent at sixteen feet. Seventy-one percent of all boats surveyed were in the fourteen-to twenty-foot range, indicating boat size most frequently encountered.

The sailboats encountered in the survey were mainly (89 percent) in the twenty-one to thirty-six foot range; the inboards (90 percent) in the seventeen-to thirty-foot range, and the motorized cruisers (75 percent) in the seventeen-to thirty-foot range.

Boat Accommodations

Of the 417 boats surveyed, 25 percent had sleeping quarters and head (restroom) facilities on board. A cross-tabulation of the variables of boat type and sleeping/head facilities indicated that along the North Shore 89 percent of the sailboats, 67 percent of the motorized cruisers, 55 percent of the inboard equipped boats, and only 3 percent of the outboard equipped boats had such facilities.

These data do indicate that at least 25 percent of the boats have accommodation facilities that would allow extended off-shore trips.

Launch Method:

Boaters were asked to indicate how they launched their boat for the sampled trip and how they normally launched their boats for trips. The responses to these two questions were approximately the same, so the normal launching method is reported here. Of these sampled, 74 percent (310) were ramp launched, 22 percent (ninety-three) were launched from a berth at a dock, 2 percent (seven) were transient boats (moving along the Shore from another harbor), and 2 percent (seven) were other launch types (such as from a beach).

When analyzing launch method by boat type, 85 percent of the sailboats were berthed, 95 percent of the outboards were ramp launched, and the inboards and motorized cruisers were evenly divided between ramp launched and berthed.

Boater Characteristics: Age/Sex Distribution:

A total of 6,256 boaters was observed in the harbors during this study. Table 3 gives the age/sex categories of these observed boaters (every person in the boat that was visible to an observer on the shore).

As Table 5 indicates, 80 percent (5,011) of all boaters observed were male, and the predominant age group of boaters was 30-54.

Table 5 Boater Age and Sex Distribution

<u>Sex/age</u>	<u>f</u>	<u>% of persons observed</u>
Male 0-19	671	11%
Female 0-19	198	3%
Male 20-29	883	14%
Female 20-29	228	4%
Male 30-54	2929	47%
Female 30-54	693	11%
Male 55+	528	8%
Female 55+	126	2%
	<u>N=6256</u>	<u>100%</u>

The age/sex distribution of the boaters interviewed was in the same age/sex proportions as those shown in Table 5.

Party Size:

The party size of those observed on boats in the harbors is shown in Table 6. The main party size was two persons per boat, (43 percent). A large majority of parties (76 percent) was in the one to three person range.

Table 6 Party Size

<u># persons</u>	<u>f</u>	<u>%</u>	
1	177	8	Median party size for boats with outboard motors=2 persons
2	983	43	
3	570	25	Median party size for sailboats=3 persons
4	384	17	
5	103	5	
6	41	2	Median party size for cruiser/houseboats=3 persons
Other	13	1	
	<u>N=2282</u>	<u>100%</u>	

Size of parties on boats on which respondents were interviewed for the study was approximately in the same size distribution as in Table 6.

Residence of Boaters:

Residence data in the form of zip codes were obtained from 318 boaters contacted on the sampling days. Table 7 gives a representation of the residence data of the boaters contacted. Although residence data were not obtained from all interviewed, the resultant proportions as shown in Table 7 match the general proportions observed by researchers on the sites in their informal conversations with boaters. Table 7 shows that the majority of North Shore boaters are local residents.

Table 7 Residence Areas of North Shore Boaters

<u>Residence Area of Boaters</u>	<u>% of boaters</u>	<u>f</u>
North Shore Area	67%	213
(Shore communities 33%)		(105)
(Duluth 28%)		(89)
(Other N.E. Minn. Communities 6%)		(20)
Minneapolis/St. Paul Metro Area	28%	89
Other Minnesota Areas	2%	6
Out of Minnesota	3%	10
	<u>100%</u>	<u>N=318</u>

An analysis of the residence of boaters by the variable of launch type indicated that there were significant differences according to this variable. Berthed boaters are most likely to reside in the Minneapolis/St. Paul area (40 percent) and in the Duluth area (35 percent), and only 13 percent reside in communities along the North Shore. Ramp launched boaters, however, are more likely to reside in North Shore communities (42 percent) with those residing in Duluth (28 percent) and in the Minneapolis/St. Paul area (23 percent) at similar proportions.

Boat Ownership:

Of the boaters contacted in the survey, the largest proportion (92 percent) owned their boats. Others were renting (1 percent), using a boat belonging to a friend or relative (6 percent), or chartering a boat (1 percent).

Home Port

The home ports of the boaters interviewed are shown in Table 8. The boaters who listed no home port were ramp launching in small boats that were stored on trailers and used in a variety of launch sites up and down the shore.

Table 8 Home Port of Boats

<u>Home Port</u>	<u>% of boats contacted</u>	<u>f</u>
No home port	30%	124
Knife River	20%	83
Two Harbors	14%	59
Silver Bay/Beaver Bay	12%	51
Duluth-Superior	11%	46
Grand Marais	11%	43
Bayfield, Wi.	2%	9
	100%	N=415

The presence of boats with Duluth/Superior listed as home port was interesting because it not only represented some travel along the Lake by berthed boats going to Knife River and Grand Marais, but it also represented some boaters who trailer their boats up the shore from Duluth to Two Harbors to be able to launch their boats free of charge at the Two Harbors site. This is because of the more attractive fishing in the vicinity and because Knife River Marina charges for use of its launch facility.

Berth Requests

Few of the boaters surveyed (4 percent) have been unable to obtain a permanent berth in their home port if they wanted one. Of those

who were unable to obtain a berth, seven were denied a berth at Knife River and four at Grand Marais. Respondents were also asked if they would want a berth if one was available. Of the respondents, 23 percent (ninety-three) stated that they presently have a berth; 70 percent (285), that they did not desire a berth; and 7 percent (thirty), would like a berth if one were available.

Boating Expenditures:

Boaters contacted in the survey were asked to report total trip expenditures for their entire party. Expenditures were to include fuel for boat, food, lodging, and transportation but were not to include the cost of the boat. The median party expenditure for the 417 sampled boaters was \$25. A closer examination showed that 31 percent spent \$10 or less, 61 percent spent \$50 or less, and 73 percent spent \$100 or less. Only 13 percent of the boating parties spent more than \$200 for the trip during which they were contacted.

A cross-tabulation analysis of the cost per trip by the variable of launch type (ramp launched, berthed, or transient) revealed that the boaters with berthed boats spent a significantly greater amount for their trips. While 38 percent of the boaters with ramp launched boats spent less than \$10 per trip and 58 percent spent less than \$20; the majority (78 percent) of boaters with berthed boats spent between \$20-\$500. Table 9 gives an indication of the cost proportions for each launch type. The amount spent for the typical berthed boat trip is close to \$100 while the typical amount for the ramp launched boat trip is closer to \$20.

Table 9 Launch Type and Cost
Cost in Dollars

<u>Launch Type</u>	<u>\$0-10</u>	<u>\$11-20</u>	<u>\$21-50</u>	<u>\$51-100</u>	<u>\$101-200</u>	<u>\$201-500</u>	<u>\$700-10,000</u>
Berthed	10%(9)	4%(4)	18%(16)	21%(19)	21%(19)	18%(16)	9%(8) 24%(91)
Ramp Launched	38%(111)	20%(58)	14%(40)	8%(24)	13%(37)	7%(19)	-(1) 75%(290)
Transient	-	-	-	33%(1)	33%(1)	33%(1)	- 100%
							N=384

Boating Frequency:

North Shore boaters tend to use their boats often. When asked to indicate normal frequency of use of their boat on Lake Superior, 47 percent (191) indicated they use the Lake for boating two or more times a week; 22 percent (eighty-nine) indicated they boat at least weekly (eleven to fourteen times a season); 17 percent (seventy), occasionally (five to ten times a season); 10 percent (forty), monthly (three to four times a season); and 4 percent (eighteen), seldom (one to two times a season).

Effect of Fuel Cost and Availability on Boating

The respondents were asked to indicate if the cost and/or availability of fuel affected their boating trips on the North Shore. As Table 10 shows, fuel-related issues are having little effect on boating. Sixty-seven percent of the boaters felt that the fuel issue either had no effect or little effect on their boating patterns.

Table 10 Effect of Fuel Cost on Boating

<u>Effect on Boating</u>	<u>% of respondents listing effect</u>	
		<u>f</u>
No effect	53%	(222)
Little effect	14%	(59)
Affects frequency of trips	19%	(81)
Affects length of trips	11%	(47)
Affects money available for other activities	10%	(40)
Affects boat speed (go slower)	4%	(16)

N=417

(Note: figures do not total 100% because respondents could choose more than one category.)

Boating Season of Use:

Boaters were asked to indicate when they thought the boating season normally began on the lake and when it ended. The responses showed a wide range of opinions. Some felt it began as early as April 1 (4 percent) and some felt it lasted as long as late November (4 percent). A small number of boaters said they boated on the Lake all year - although in some years ice prevents all-year use. Table 11 illustrates this range of opinion on boating season. The largest proportion of users (30 percent) named the June 1-15 period for opening, and (26 percent) September 16-30 for closing the season.

It is interesting to note that 55 percent of the boaters indicated that the boating season began prior to June 1, and that 53 percent felt that the season closed after September 16. This differs from the shorter boating seasons reported in previous studies, and indicates that the Lake is being used for boating for a longer season than was considered by planning agencies. The local character of the users may be accounting for use at times other than the traditional North Shore tourist season, which extends from approximately June 15-Labor Day weekend in early September.

Table 11 Boating Season

<u>Season Begins</u>			<u>Season Ends</u>		
	<u>f</u>	<u>%</u>		<u>f</u>	<u>%</u>
April 1-15	17	4	August 1-15	9	2
April 16-31	19	5	August 16-31	50	12
May 1-15	85	20	Sept. 1-15	82	20
May 16-31	65	16	Sept. 16-30	108	26
June 1-15	124	30	Oct. 1-15	69	17
June 16-31	28	7	Oct. 16-31	42	10
July 1-15	46	11	Nov. 1-15	22	5
July 15-31	15	4	Nov. 16-31	18	4
Other	18	4	Other	17	4
	<hr/>	<hr/>		<hr/>	<hr/>
	N=417	100%		N=417	100%

Trip Duration and Distance

When asked to indicate how long their trips normally are on the Lake, 93 percent of the boaters responded, one day or less. The largest proportion (46 percent) of trip duration times fell in the four-to-six hour period. The median trip duration for all respondents was five and one-half hours. When the trip duration was examined in relation to the four sites surveyed, the average trip length was greatest at Knife River. This is logical since most of the large boats in the survey were berthed at Knife River.

Another indication of trip duration is how many "overnights" (on the boat) a boater goes on during a season. In this study, 78 percent of the respondents did not go on overnight boating trips; 7 percent went on trips from one to five nights; 6 percent, six to ten nights; and 9 percent, more than eleven nights. Of all the boats used for at least one overnight boating trip, 70 percent were berthed boats.

North Shore boaters do not venture far off-shore in their trips. In this study, 75 percent of the boaters stayed within four miles of shore. The median distance off-shore for all boaters was one and nine-tenths miles. The distance travelled off-shore by the largest group of boaters was one to two miles (39 percent). Trips of more than ten miles off-shore were experienced by only 8 percent of the boaters interviewed.

Overnight Accommodations Used

The boaters on the North Shore use a number of resources for accommodations when their use of the Lake necessitates staying overnight. Forty-two percent (176) of the boaters do not use overnight accommodations because they live in the vicinity of the harbor. This is

consistent with the residence data explained above.

The type of overnight facilities used by boaters are: camping, 19 percent (eighty); on board their boat, 17 percent (seventy-two); in private accommodations (own cabin or friend's house), 17 percent (seventy-two); motel, 3 percent (twelve); and other, 2 percent (five).

Days and Times of Boating

Boating use observed in the target harbors on the North Shore was primarily on weekends and holidays. Of the 2,282 boating occasions observed in the study period, 84 percent occurred on weekends or holidays and 16 percent on weekdays. The sampling times were established on a 60 percent weekend, 40 percent weekday pattern based on the MMAS study. Therefore, the current study indicates that overall boating on the North Shore is significantly more concentrated on the weekends than was found in the MMAS study.

The times of boating activity observed in this study ranged from 6 A.M. to 9 P.M., with main use concentration during the noon to 2 P.M. time period, which accounted for 43 percent of all observed use. The time from 6 A.M. to 8 A.M. had 8 percent of the use; 8 A.M. to noon, 24 percent; noon to 2 P.M., 43 percent; 2 P.M. to 5 P.M., 17 percent; and 5 P.M. to 9 P.M., 8 percent. The median time of use was 12:55 P.M.

Use Density of Study Harbors

There was no intent in this study to determine precise boating use figures for the four target harbors, nor for the North Shore in general. This was impossible because of the limited number of sample days, times, and sampling season on the sites. The main purpose was to determine boating patterns, which have been discussed above in relation to observation and interview data.

There was, however, an opportunity to observe the amount of boating use in the target harbors on the sample days. These boating use figures may be used to derive estimates of total seasonal use of specific harbors, and of the North Shore area included in the study. The estimates derived from these sample use figures must be regarded with caution because each site was only observed for thirteen ten-hour time periods throughout the summer boating period. The use levels at each harbor varied greatly (sometimes dramatically) with the weather, the fishing success, and local community festivals.

The use figures are presented below for each of the four sampled harbors along with comments relative to use patterns specific to each harbor. The figures given represent the number of boating occasions observed, with occasions defined as launching or retrieving a boat at a ramp, or pulling up to or away from a dock or pier.

Knife River: A regular weekend day at Knife River during the June to September period saw sixty-two to eighty-four boating occasions. That daily figure rose to 213 on the July 4th weekend, and to 452 a day on the second weekend in July during a festival. This is an extremely high concentration of use in a small harbor area. The weekday use figures ranged from zero on a very stormy day, to twenty on a cool day, to sixty on a sunny weekday in July.

Two Harbors: This site also experienced varying use rates. Weekend use in July was forty-three and seventy-one a day on the two days observed; weekday use was sixteen and thirty-two. Only weekends were observed in August and the use ranged from a high of 124 a day and sixty-six a day, to twenty-one a day during bad weather. The weekend use extended into September with thirty-two a day observed then. On heavy use days, such as when there are 124, or seventy-one or sixty-four boating occasions, the one small launch ramp is extremely crowded with more than an hour wait to get the boats into or out of the Lake.

Silver Bay: The new Silver Bay boat launch received immediate use after opening. July weekend use was sixty, twenty-seven and thirty-four with weekday use observed as forty-one. August weekend and weekday use followed this same pattern with forty to fifty occasions on a good weather weekend day and the same for a weekday. Poor weather lowered the weekend use to twenty-two. Use dropped quickly after September.

Grand Marais: The use of this site was low during June with thirteen occasions cited on a weekend day and only four on a weekday. The use increased during late June and early July and continued through August. The weekend use during July and August ranged from sixty to eighty on a good weather day and about thirty during poor weather. The weekday use during July and August was approximately the same as weekend use. The use dropped dramatically after Labor Day weekend in early September.

Purpose of Trip

Boaters were asked to indicate the most common purpose for boat use, and were asked to indicate the purpose of the trip on the day of contact. The responses for normal use and current use were very similar. The data presented here are for normal use.

The most common purpose for boat use was fishing, followed by cruising. Other categories noted were business, racing, charter, and others. Table 12 shows that fishing was the predominant purpose for most boaters (83 percent), and that after cruising (15 percent), the other purposes were noted by only a small number of boaters.

Table 12 Purpose of Boat Use

<u>Type of Use</u>	<u>First Priority Use</u>	<u>First or Second Priority Use</u>
Fishing	82.9% (346)	87.1% (363)
Cruising	15.2% (63)	20.8% (87)
Racing	.2% (1)	.2% (1)
Business	.2% (1)	.4% (2)
Charter	.2% (1)	.2% (1)
Other	1.3% (5)	1.7% (7)
	100% N=417	(Note: does not total 100% because respondents could choose more than one response)

Origin and Destination of Trips

A purpose of this study was to determine the extent of boating along the North Shore area and to document any trips that included traveling along the shore by boat from one harbor to another. A prior section of this report indicated that the trip times are usually less than one day, and that few boaters go on overnight boat trips.

Each boater was also asked to indicate origin and destination harbors for the boat trip during the day contacted by the interviewer. In keeping with the short-trip characteristics found above, the large majority (89 percent) of North Shore boat trips begin and end in the same harbor facility. There is little movement from one harbor to another along the North Shore.

Of the trips where origin and destination were two different sites, Grand Marais, Bayfield, Knife River, and Duluth had the largest numbers of extended (different destination) trips. Where Grand Marais was the origin, the destinations noted were Bayfield (four), Isle Royale (two), and Grand Portage (one). Where Bayfield was the origin, the destination noted was Grand Marais (two). Where Knife River was the origin, the destinations were Isle Royale (one), Thunder Bay (one), and Bayfield (one). Where Duluth was the origin, destinations noted were Knife River (five), Grand Marais (one), Isle Royale (one), and Thunder Bay (one).

Factors Preventing More Boating on Lake:

Each respondent was asked to indicate why he or she does not go on extended boating trips (overnight) along the North Shore. The responses presented in Table 13 indicate that boat size is the

primary reason for a majority of boaters to limit their trips. This seems logical since much of the boating along the North Shore is in open fourteen-to-eighteen foot fishing boats.

Table 13 Reasons for No Extended Trips

<u>Reason</u>	<u>% of respondents citing each reason</u>	
Boat too small	51%	223
Lake too large and unpredictable	11%	48
Few harbor facilities	9%	37
Not interested in long trips	8%	34
Not enough time available	8%	33
Too costly	2%	9
Does not apply (go on extended trips)	9%	39
Other	1%	6

(Note: does not equal 100% because respondents could choose more than one reason)

The reasons for few extended trips were analyzed by the variable of launch type to see if there were significant differences between berthed and ramp launched boats. There were significant differences noted. The ramp launched boaters' reasons were similar to the aggregate proportions as shown in Table 11 above. Of respondents with seventy berthed boats, 40 percent (twenty-eight) did go on extended trips; 17 percent (twelve) felt their boat was too small; 13 percent (nine) felt they did not have enough time; 9 percent (six) were not interested; 7 percent (five) noted lack of harbor facilities; 6 percent (four) felt it was too costly; and 3 percent (two) indicated that the Lake was too large and unpredictable.

In another attempt to determine reasons limiting the possible expansion of boating activity along the North Shore, all boat operators in the study were asked to respond to the question "Would you like to boat more on the North Shore?" The responses indicated that a large proportion, 81 percent (337), of the respondents would like to boat more often; 15 percent (sixty-one) stated they would not like to boat more often; 3 percent (eleven) were unsure; and 1 percent (four) did not respond.

The 81 percent (337) of the respondents who stated they would like to boat more often on the North Shore were then asked to identify the reason or reasons why they did not boat more frequently. The responses are shown in Table 14. Respondents could indicate more than one reason, so the percentages total more than 100%. Table 14 indicates that the primary reason for boating more on Lake Superior is lack of adequate time, followed by lack of harbor facilities, smallness of boat, cost, and distance of harbor from residence.

Table 14 Reasons For Not Boating More

<u>Reason</u>	<u>% of Respondents Checking as a Reason</u>	<u>f</u>
Lack of adequate time	53%	178
Lack of harbor facilities	23%	79
Boat too small	14%	48
Other (not enough fish, weather, health, family responsibilities)	13%	43
Too expensive	12%	40
Harbor too far from residence	10%	33
Lake too large	3%	10

N=337 (Respondents who stated they would like to boat more on the lake)

Perceived Need for Additional Harbors

Those interviewed were asked if they thought there were adequate small boat harbor facilities on the North Shore. A large majority, 71 percent (289), indicated that there were not an adequate number of such harbors; 26 percent (108) indicated there were enough harbors; and 3 percent (twelve) were unsure.

Respondents were asked to indicate where along the shore additional harbor facilities were needed. Table 15 shows that there is a wide-spread need for facilities all along the shore area, according to boaters currently using that area. Boaters could name more than one area in Table 15, so the figures represent the percentage of the interview sample of 417 that indicated a need in each area category. The locations named by the larger proportions of respondents were: all along the shore in all locations, Silver Bay, Tofte/Schroeder, Two Harbors, between Duluth and Knife River, and at Beaver Bay.

Table 15 Locations Needing Additional Harbor Facilities

<u>Location</u>	<u>% of respondents identifying location</u>	
All along the shore	21%	(86)
Silver Bay	21%	(87)
Tofte/Schroeder	19%	(78)
Two Harbors	18%	(73)
Duluth to Knife River	12%	(50)
Beaver Bay	11%	(44)
Duluth/Superior	8%	(35)
Knife River	6%	(24)

Table 15 (continued)

<u>Location</u>	<u>% of respondents identifying location</u>	
Grand Marais	6%	(25)
Grand Portage	5%	(20)
Enough facilities	26%	(108) N=417
Not sure	3%	(12)

(Note: figures do not equal 100% because respondents could choose more than one response.)

The responses regarding the location of needed facilities were analyzed by a cross-tabulation with the variable of launch type. The only significant differences observed were that the respondents with berthed boats named Grand Marais, Grand Portage, Tofte/Schroeder and Silver Bay more often than did those with ramp launched boats, indicating a particular need for additional harbor facilities in those areas for berthed boats.

In an attempt to assess the boaters' perceived needs for additional harbors on the North Shore, each boater was asked if he or she would boat more often if there were more harbors along the shore. Table 16 shows that two-thirds of the boaters would boat more often, stop more often, or enjoy their boating experience more if there were more harbors along the shore.

Table 16 Boat More If More Harbors

<u>Response</u>	<u>% of boaters</u>	<u>f</u>
Boat more often	48%	200
Stop more often	11%	49
Enjoy more	4%	15
No effect	33%	139
No response	4%	14
	<u>100%</u>	<u>N=417</u>

Not only would a majority of North Shore boaters boat more often, stop more often, and enjoy the experience more if there were additional harbors, but they would also be willing to pay more money in order to have such harbor facilities available. When asked if they would be willing to pay more money to have more harbor facilities, 61 percent (255) replied yes; 26 percent (108) replied no; 10 percent (forty) were unsure; and 3 percent (fourteen) did not respond to the question.

Satisfaction With Existing Harbor Facility

The boaters surveyed were asked if they were satisfied with the harbor facilities at the specific site where they were contacted for the interviews. A large proportion, 73 percent (306) of the boaters interviewed were satisfied with the existing facilities at the individual harbor sites. Of those who were not satisfied with the harbor facilities, the reasons given for dissatisfaction were: difficulty of the launch ramp, 13 percent; inadequate ancillary facilities, 13 percent; and too crowded harbor, 10 percent. The percentage given indicates the percentage of the total population of 417 that mentioned each problem area. Totals are not equal to 100 percent because respondents could list more than one reason.

The variable concerning satisfaction with harbor facilities was analyzed through cross-tabulation with the variables of site location and launch type to determine if significant differences occurred according to these two variables. In this analysis the Silver Bay-Beaver Bay cases were separated because there were anticipated differences in these two sites.

There was a significant difference in boater satisfaction responses from one site to another. Knife River, Silver Bay, and Grand Marais all were given a satisfactory rating by more than 85 percent of the boaters using those sites. The Two Harbor site and the Beaver Bay site were rated as satisfactory by 54 percent and 33 percent, respectively, of boaters at those sites.

The problems noted at the Beaver Bay site were the difficulty of using the launch ramp and the lack of restroom and other facilities on the site. This should be viewed with caution, however, because many of the Beaver Bay users who were dissatisfied with the Beaver Bay site probably are now using the Silver Bay site instead, and so their dissatisfactions were probably remedied with the opening of the new Silver Bay site in mid-summer 1980. Table 17 gives the percentage of respondents, by site, and their response in the satisfaction question including the percentage at each site that named each reason for dissatisfaction.

Table 17 Satisfaction With Facilities by Site

<u>Response</u>	<u>Knife River</u>	<u>Two Harbors</u>	<u>Beaver Bay</u>	<u>Silver Bay</u>	<u>Grand Marais</u>	<u>Totals</u>
Satisfied	86% (120)	54% (44)	33% (16)	87% (33)	91% (93)	306
Too crowded	4% (6)	31% (26)	10% (5)	-	5% (5)	42
Lack of facilities	4% (6)	38% (31)	23% (11)	8% (3)	4% (4)	55
Location of harbor	-	5% (4)	.5% (1)	-	1% (1)	6

Table 17(Continued)

Response	Knife River	Two Harbors	Beaver Bay	Silver Bay	Grand Marais	Totals
Too expensive	9% (12)	3% (2)	-	-	1% (1)	15
Difficult to launch	1% (2)	34% (28)	48% (23)	8% (3)	-	56
Dislike personnel	.1% (2)	1% (1)	-	-	-	3
Other	.5% (1)	3% (2)	10% (5)	6% (2)	2% (2)	12
	N=139	N=82	N=48	N=38	N=102	N=409

(Note: percentages do not total 100% because boaters could choose more than one response.)

Besides the Beaver Bay site, the Two Harbors site generated the most dissatisfaction with current users. This dissatisfaction stems from a launch site that is difficult to use (34 percent of boaters) because of wave and wind action, and the fact that it is composed of a single lane ramp on a steep grade. Other problems in evidence at the Two Harbors site are lack of any ancillary facilities (cited by 38 percent of boaters) such as restroom, drinking water, and camping/picnicking areas. The other reason noted (by 31 percent of boaters) was crowding at the site. The wait at the site to launch or retrieve a boat was more than an hour on high use days.

When the satisfaction response was analyzed according to launch type, boaters using a ramp launch were significantly more dissatisfied with harbor facilities than were boaters whose boats were berthed. Fifty-seven percent of the boaters using ramp launch were satisfied with facilities as compared to 78 percent of those whose boats were berthed. Boaters using a ramp launch were disproportionately more dissatisfied with ancillary facilities, launch facilities, and crowding than were boaters using berth facilities.

The relative satisfaction is not surprising since most boaters whose vessels were berthed were contacted at Knife River, a site that has extensive harbor facilities and where satisfaction levels were high. It is also not surprising that there were significant differences in the difficulty of launch category because berthed boats do not need a ramp launch.

The one problem area that ramp launched boats seem to have to endure more than berthed boats is that of crowding. This relates to the waits necessary to use the boat launch at sites such as Two Harbors Knife River, and Grand Marais.

Preferred Additional Harbor Boating Facilities

Respondents were asked to identify additional boating related facility developments they would prefer at the specific harbor site where they were interviewed. A total of 46 percent of those interviewed indicated that there were one or more additional facilities they would prefer on the site.

The boating facility needs were analyzed by site and Table 18 gives the identified needs by site. In reading Table 18, for the Two Harbors site, 25 percent of those surveyed at Two Harbors saw no need for additional boating related facilities but 60 percent felt that additional dock facilities were needed there. That was the top ranked need. The additional preferred facility developments most often identified at all sites were docks, improved launch facility, increased parking area, and marina facilities.

Table 18 Boating Facility Needs by Harbor Site

Facilities	Knife River N=139		Two Harbors N=88		Silver Bay/Beaver Bay N=86		Grand Marais N=102	
	Rank	%	Rank	%	Rank	%	Rank	%
none needed	-	71	-	25	-	29	-	69
docks	1	11	1	60	1	22	1	11
navigation-								
weather info	2	4	3	1	-	-	6	1
boating supplies	6	1	-	-	5	2	6	1
groceries	2	4	-	-	5	2	6	1
repair shop	5	2	-	-	6	1	-	-
marina	4	3	-	-	4	7	4	3
waste disposed								
pumpstation	6	1	-	-	6	1	-	1
improved launch	5	2	3	1	3	13	3	4
more parking	4	3	3	1	2	19	5	2
boat/equip rental	-	-	-	-	6	1	-	-
other	6	1	2	5	5	2	2	8

N=417

The identified needs for Silver Bay/Beaver Bay should be viewed with caution. The Beaver Bay site had little parking and a difficult ramp launch to use. The identified facility needs shown in Table 18 for Silver Bay/Beaver Bay may already be remedied by the recent opening of the Silver Bay site which has ample parking and an easily approached, double launch ramp.

Docking space is the number one ranked facility need at each site, especially at Two Harbors where 60 percent of the boaters identified

this need.

Analysis of the preferred additional facilities data, informal conversations with boaters, and observation of the four sites resulted in the following general facility needs for each site:

- 1.) Knife River: The harbor is small, is filled to capacity with berthed boats, and is usually congested because of concentrated use of both the berths and the launch ramp. There is little room for larger boats to maneuver and tie up if they are forced into the harbor because of bad weather on the Lake, if they need repairs, or if they are being used overnight. They must raft-up with other berthed boats. There is also little room for small boats to wait to use the ramp. Other facility needs expressed were for food services, camping, and other recreational services.
- 2.) Two Harbors: Main needs are for docks to which to tie up for waiting and for overnight stays, and for a breakwater to protect the site. The ramp launch is inadequate in size, design, and protection from wave action. Boaters are often lined up for long waits to use the ramp. The site is within walking distance of Two Harbors for support services such as food, fuel, and supplies. But, the site has no camping, picnicking, or restroom facilities. These seem to be the main service related needs. The site was observed to be used extensively for camping, even though there were no camping services. This will eventually lead to sanitation and control problems.
- 3.) Silver Bay: This new (1980) boat ramp site was extremely popular with the boaters who used it, who were mainly local residents. The development plans for the site should alleviate some problems noted during the survey period such as lack of adequate waste disposal and night lighting. Other facility needs expressed were for picnic and camping facilities on the site.

The launch ramp at Silver Bay is adequate for small boats, but too steep for larger, heavier boats. The site needs a breakwater and docks to allow larger boats to seek protection from the Lake and to tie up overnight.

- 4.) Schroeder: The boat launch site at Schroeder was not included in the scheduled observations and interviews for this study. However, there is a small boat harbor of refuge planned for this site by the town of Schroeder and the Corps of Engineers. It is a logical site to place a harbor to provide equal distance distribution along the Shore and to conform to the general standard of placing a

small boat harbor approximately every thirty miles. The Schroeder site has a hard surface launch ramp and a partial breakwater. Additional facility needs are a permanent breakwater, improved launch ramp, docks to tie up large and small boats, parking, restroom facilities, and camping/picnic facilities.

- 5.) Grand Marais: The inner breakwater at Grand Marais is too close to the existing docks and makes maneuvering difficult for large boats. There is a need for additional dock space for large and small boats to tie up for the night. There is a need for a restroom and shower facility for the marina as well as increased parking space at the marina. Even though many boaters at Grand Marais are staying in the adjacent campgrounds, they still expressed a need for restroom, parking, and trash containers closer to the marina.

Preferred Additional Harbor Recreational Facilities

In addition to indicating needs for the boating related facilities reported above, respondents were asked to indicate the recreation-related facilities they felt were needed in the harbor sites. Most boaters, 82 percent (340), felt that there was no need for additional recreation related facilities. Of the needed facilities itemized by the boaters, additional camping facilities were indicated by 7 percent (twenty-eight) of the boaters; additional picnic facilities by 6 percent (twenty-seven); and bar-restaurant facilities by 6 percent (twenty-six). Additional recreation related facilities were not a priority with the interviewed boaters.

Non-boating Recreational Activities on Site

Two methods were used to estimate the extent of non-boating recreational activities at each site. Each interviewed boater was asked to identify from a list of seventeen activities, those activities he or she normally participate in on the site, in addition to boating. Interviewers also used a general activity observation method on the site.

Since boating, and on-the-boat oriented activities, were the primary reason for boaters to be on the site, many indicated that boating was their primary and only reason for being on the site. It was difficult to get boaters to name other activities, and the resulting data should be used to indicate patterns and not absolute numbers.

Of the interviewed boaters, 57 percent (237) indicated they did not engage in other recreation on the site; 21 percent (eighty-six) said they fished on site; 14 percent (fifty-nine) camped; 11 percent (forty-six) picnicked; 7 percent (thirty-one) hiked; 6 percent (twenty-three) worked on their boats; and 6 percent (twenty-three) did

sightseeing. Activities named by fewer than 5 percent of those sampled were scuba diving, biking, motorbiking, photography, rock hunting, jogging, sun tanning, and playing games.

The interviewers on each site recorded observed recreation activities taking place during each sample day. The amount of people participating in these activities varied a great deal depending on the weather and the occurrence of local community festivals in Knife River and Grand Marais. Also, since the interviewers were usually occupied with boaters it was difficult for them to maintain an accurate count of recreation activity participants. Therefore, the information presented here is more of a pattern of use rather than an accurate count.

In Knife River Marina the main recreational activities observed were, in order of participation: working on boats; socializing and visiting with those on other berthed boats; sightseeing; and hiking.

At Two Harbors the activities were: camping (mainly recreational vehicle, but some tents) even though there were no camping facilities on the site; picnicking (again no facilities); sightseeing; and fishing from shore.

The new Silver Bay site was being used for sightseeing and little else. Future plans on that site for picnic facilities should enhance both sightseeing and boating opportunities.

The Grand Marais site had the most on-site recreational activity. Camping, picnicking, fishing from shore, rock hunting, biking, swimming, and sightseeing were all major activities on this site.

Relationship of Harbors to State Park System

One purpose of this study was to determine what role the Minnesota State Parks system could play in the provision of services for harbor uses. The data and observations point to the need for additional Lake access points similar to the new site at Silver Bay. The provision of camping and picnic facilities near the Two Harbors, Silver Bay, and Knife River sites could also be accomplished by the State Park System.

Park facilities located anywhere but on the harbor site seem to offer little for boaters. This can be seen in the need for camping facilities expressed at the Two Harbors site, when there is a city campground one mile away. The location of the city campground in Grand Marais adjacent to the marina and boat launch seems to be a model situation. Boat harbor use also appears to have little impact on park facilities located more than a few miles from the harbor site.

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