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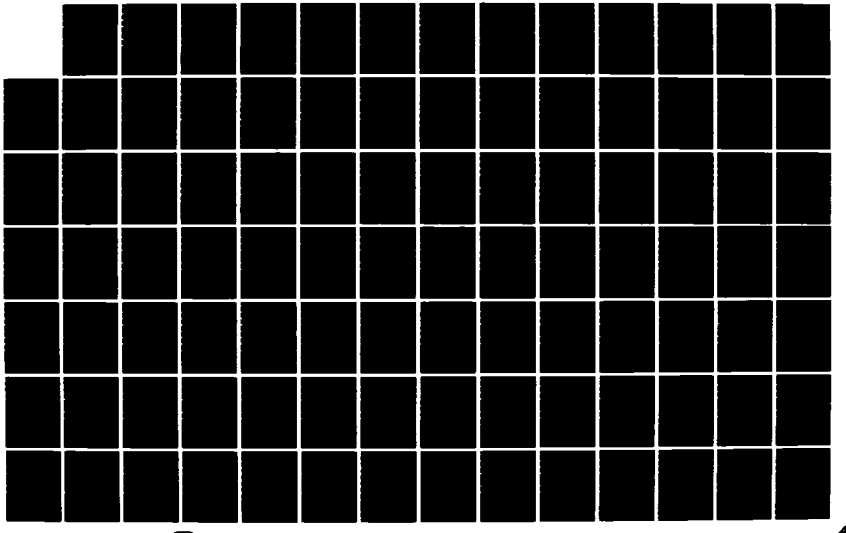

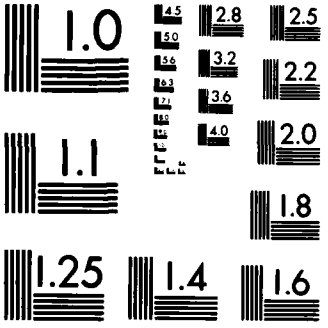

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The purpose of this report is to provide baseline recreational demand and use data for Western Lake Superior from Black River Harbor, Michigan to Grand Portage, Minnesota. The study emphasizes recreational boating but also includes data on camping, picnicking, swimming, sightseeing and fishing. Using 1977 as the base year, demand is projected for recreational boating slips and moorings at five-year intervals for twenty-five years.

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PREFACE

Many recreationalists who use Lake Superior and its shoreline believe that its combination of beauty, remoteness and solitude constitutes an unparalleled experience. For those who regularly boat on Lake Superior, the challenge, beauty and solitude available along its shoreline are particularly unique and, thus, the Lake is one of the most frequently used bodies of water in the Upper Midwest. Outside of the major urban area of Duluth-Superior, the local economy is heavily dependent upon tourism.

But Lake Superior recreational use has changed. Within the last five years slips available at marinas on Western Lake Superior have more than doubled. New or expanded facilities have been constructed at Knife River, Duluth, Port Superior, and Black River Harbor. Plans for expansion are well along at Schroeder, Silver Bay, Superior, Little Sand Bay, and Red Cliff. Further away are proposed developments at Grand Portage, Knife River, Washburn, Ashland, and Little Girls Point. Combined with this planned development is the region's shift to offering year-round recreation. Increases in snowmobiling, alpine and nordic skiing have created sufficient demand for tourist accomodations to remain open throughout the year.

Within this context, the St. Paul District, U.S. Army Corps of Engineers recognized the need to shift their traditional approach to planning for water-oriented recreational facilities. The increased development has not yet caught up with demand for facilities. And yet, the demand for still more facilities raises serious questions for the future. Implicit in development is increased pressure on the environmental resources of the Lake and its shoreline.

Thus, the St. Paul District is faced with two issues. The first deals with traditional recreation issues-specifically what is the extent of pressure for development (demand). The second issue relates to management of the resources entrusted to the St. Paul District. That is, given accurate demand data, what management alternatives are available within the congressional and administrative mandates under which the Corps of Engineers function.

This report addresses the first of these concerns. Working closely with the St. Paul District, Roy F. Weston, Inc. identified demand for recreational boating facilities on Western Lake Superior. Previous studies conducted by the Minnesota Marine Advisory Service, the Upper Great Lakes Regional Commission and the Wisconsin Department of Natural Resources provided a data base which substantially reduced the cost of the study.

Early in the investigation Roy F. Weston, Inc. completed a review of the available literature. Based on that review, Weston and the St. Paul District recommended that additional baseline data be gathered in two areas:

- demand for recreational boat slips, and
- an estimate of the number of boat rampings within the study area.

This report presents the results of a mailed survey of registerd boaters, aerial reconnaissance and photography designed to provide that baseline data. Also presented are manipulations of the preexisting data base relative to existing boat use and land-oriented recreational activities.

The project manager for this study was Dr. David J. Arndorfer. Messrs. Ronald I. Ragan and Ross DeMeritt were responsible for data collection, analysis, and interpretation of results. Computer assisted development of the mailing list, and analytical procedures were developed by Weston's Computer Service group in West Chester, Pennsylvania.

Special appreciation is due Mr. James Holleran, Outdoor Recreation Planner of the St. Paul District who had a central role in developing the methodology and techniques used in the investigation. Messrs. Stanley Kumpla and Norman Hildrum of the St. Paul District also provided valued input and critique of the approach and findings.

Mr. James Murray, Minnesota Marine Advisory Service (Duluth), at considerable inconvenience, provided data necessary to identify the primary market area in addition to free access to a survey of existing boaters prior to its publication late in 1977. Without Mr. Murray's assistance and the cooperation of the Minnesota Marine Advisory Service, the investigation could not have been successfully completed under the severe time constraints imposed.

Also making important contributions were Mr. Ed Drill of Knife River Marina, Dr. Ayse Sommersan of the University of Wisconsin-Madison, and Mr. Ray M. Mischon of Midwest Research Institute. The U.S. Coast Guard at Two Harbors, the City of Superior and the marina at Cornucopia also provided assistance or facilities.

Respectfully submitted,
ROY F. WESTON, INC.

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I. INTRODUCTION

STATEMENT OF PURPOSE

The purpose of this document is to provide baseline recreational demand and use data for Western Lake Superior from Black River Harbor, Michigan to Grand Portage, Minnesota. The study emphasizes recreational boating but also includes data on camping, picnicking, swimming, sightseeing, and fishing. Using 1977 as the base year, the report projects demand for recreational boat slips and moorings at five-year intervals for twenty-five years.

This document is designed to be a reference for recreation planners preparing benefit analyses, detailed project reports, and recreation resource studies in accordance with applicable Corps regulations and authorities. To maximize the document's usefulness, assumptions concerning the readers knowledge of Lake Superior boating, the Upper Midwest and the geography of Western Lake Superior were essential. This is not a primer; it is a working document that presents solutions to base data problems frequently encountered at the Corps Engineering District level. As such, the methodologies presented herein should be viewed as transitory; updates will be necessary. As the data base improves, the suggested approach and even interpretation in specific sections need to be updated.

While the study presents the results of a mailed survey, it departs from the traditional survey report format. It is not a compendium of tables showing frequencies and percentages of responses for each question in the survey. The document goes one step further. Data from the boating demand survey conducted as part of this contract is merged with data available from previous studies to present a comprehensive treatment of boating-related base data and to provide methods for applying that data to specific investigations as the need arises.

SCOPE

A mailed survey of registered boaters in the primary market area (parts of Michigan, Wisconsin, and Minnesota), conducted during the 1977 use season, provides the basis for determining existing demand for permanent berthings. Projections of boating demand are based on a multiple regression equation utilizing population and travel distance as variables.

Transient boating patterns are developed from data collected by the Minnesota Marine Advisory Service and by the mailed survey conducted for the St. Paul District. In 1976 the Minnesota Marine Advisory Service surveyed boat owners who either permanently berthed boats or were members of boat clubs on Western Lake Superior from Grand Portage, Minnesota to Ashland, Wisconsin. The results of that survey are summarized in this report where appropriate.

Boat rampings was an area covered by little available data. To compensate for the paucity of satisfactory data, a series of overflights in conjunction with the use of 8-mm self-operating movie cameras provides the basis for estimating total boat rampings at each access point within the study area.

Finally, camping and day use demand and projections in the Upper Great Lakes were the subject of a telephone survey in 1972. The survey was conducted for the Upper Great Lakes Regional Commission by the University of Wisconsin (published, 1974). This data, the best available, presents demand and projections for camping and a number of day-use activities by multi-county zones. In Section V these data are modified to provide estimates of use and demand for lakeshore facilities only.

REGIONAL FRAMEWORK

As already stated, the study area includes Western Lake Superior from Grand Portage, Minnesota to Black River Harbor, Michigan. The primary population concentration along the shoreline is the Duluth-Superior metropolitan area located at the head of the lake (Figure 1). Other than Duluth-Superior, there are no large concentrations of population on Lake Superior within the study area. Smaller population concentrations, clockwise around the lake, include Ironwood-Hurley, Ashland, Bayfield, Two Harbors, Silver Bay, Grand Marais and Grand Portage. Thunder Bay, an important commercial center in Canada, is 45 miles northeast of Grand Portage, Minnesota (Figure 1).

Within the study area distribution of harbors and marinas appear to reflect several items: 1) the harbor of refuge program implemented by the Federal Government during the 1940's; 2) population concentrations; and 3) Isle Royale National Park and the Apostle Islands National Lakeshore, both important scenic attractions. Table 1 presents existing and proposed harbors in the study area and the number of berths available.

The study area, in this report, is divided into subregions (Figure 2). These functional subregions (which were also used by the Minnesota Marine Advisory Service in their 1977 report) reflect specific areas of attraction, similar boating patterns and densities, and groupings of access points. Thus, the subregions act as coherent foci of boating demand and supply.

The demand and projections for marina-related facilities are presented within this regional framework. The logic of the subregion approach is illustrated by the example of a boater seeking access to the Apostle Islands. The boater desiring permanent berthing may seek berthing at a specific harbor such as Bayfield. However, in the supply-limited market characteristic of the study area, the boater will likely be forced to an alternative harbor nearby such as Port Superior or one of the proposed harbors at Ashland and Washburn.

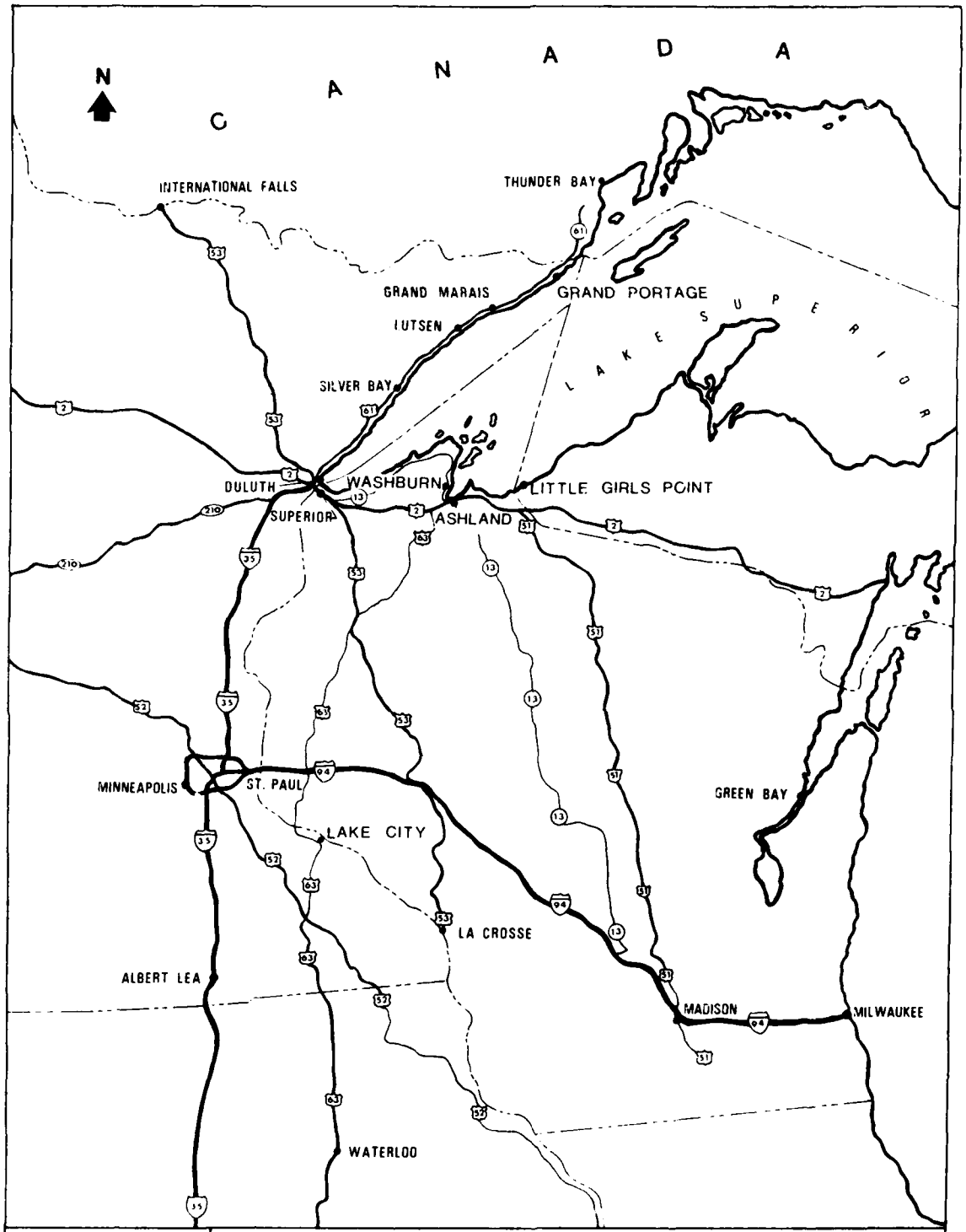

FIGURE 1 LOCATION MAP WITH MAJOR HIGHWAY ROUTES

TABLE 1

Harbor Facilities on Lake Superior, Minnesota and Wisconsin

Harbor Area	Slips available		Possible expansion in near future	
	Total	Known Transient	Total	Known Transient
MINNESOTA				
Grand Portage (private)	15	-		
Grand Marais	10	10		
Schroeder	-	-	50 (1979)	50
Silver Bay	-	-	50 (1979)	50
Two Harbors	0	-		
Knife River	90	-		
Duluth/Superior	260	-		
(Private Docks)	15	0		
Barkers Island	-	-	350 (1978)	
Total Minnesota	390	-	500	
WISCONSIN				
Port Wing[2]	-	-		
Cornucopia	70	-		
Little Sand Bay (National Park Service)	6[3]	-	40 (1978)	40
Red Cliff Bay (private)	2[3]	-	18	
Buffalo Bay (Red Cliff Indian Reservation)	3[3]	-	35 (1978)	
Bayfield				
Public Harbor	125	-		
Apostle Island Yacht Club	22	-		
Madeline Island				
Madeline Island	136	-		
LaPointe	4	4		
Port Superior	120	-		
Washburn	5[3]	0		
Ashland				
Ashland Boat Club	23[3]	-		
Coast Guard Aux Dock (Private)	3[3]	-		
Saxon	55	-		
Total Wisconsin[4]	574	-	93	
MICHIGAN				
Little Girls Point		0		
Black River Harbor	49	-		
Total Michigan	49	-		
Total slips in protected areas	971	-	605	
Total slips in unprotected areas	42	-		

[1] Information pertaining to the Minnesota portion was obtained from Mr. James Murray, Minnesota Marine Advisory Service, University of Minnesota, Duluth. Information pertaining to the Wisconsin portion was obtained from Mr. Ed Kuhlmey, Northwestern Wisconsin Regional Planning and Development Commission, Ashland, Wisconsin.

[2] Actual slips are not available but boats may be docked along harbor walls.

[3] Docking facilities are not adequately protected from Lake Superior storms.

[4] Additional docking facilities for 80 small boats are located some distance upstream from the mouth of the Bad River and due to the shallow water, can only be utilized by small fishing boats not suitable for travel on the open lake.

Results of the mailed survey lend credence to the example given in the previous paragraph. Several of the respondents to the survey who indicated unsuccessful attempts at obtaining berthing at one harbor also indicated attempts to obtain berthing at the next closest harbor. Also, the groupings of survey respondents with respect to boating demand follows closely the existing patterns of berthing and transient boating identified by the Minnesota Marine Advisory Service in their 1977 report. These subregions are briefly discussed below:

MINNESOTA NORTH SHORE

The Minnesota Northshore of Lake Superior offers varied, and sometimes spectacular, scenery. Two Harbors, Silver Bay, and Taconite Harbor are commercial ports that ship substantial quantities of taconite (iron ore). Of these commercial harbors, only Two Harbors Harbor is maintained by the Corps of Engineers. The remaining two are privately maintained by taconite producers. Recreational boating is centered at Knife River, Two Harbors, Grand Marais, and Grand Portage in addition to Duluth-Superior at the head of the lake.

There are two harbors of refuge proposed for Schroeder and Silver Bay, Minnesota. These developments are scheduled for completion in 1979 or 1980 and will include provision for 50 transient vessels each. When these two harbors are completed, recreational boaters will have harbors available at less than 25-mile intervals along the entire north shore. When these are completed, transient boating will likely increase substantially along the north shore.

Isle Royale - Grand Portage

Isle Royale is 155 miles by boat from Duluth, 105 miles from Bayfield, and 21 miles from Grand Portage. The National Park offers boaters solitude, striking scenery and good fishing in adjacent waters. The nearest developed harbor of refuge is Grand Marais, 52 miles away. However, the natural protection afforded Grand Portage Bay provides sufficient protection for that harbor to be used as the debarkation point for ramped boats, excursion and supply boats. This subregion is the second most common destination for transient boaters on longer than weekend voyages (MMAS, 1977).

Grand Portage, within four miles of the Canadian border, is a natural harbor without significant improvements. Presently there are two commercial marinas but neither provide adequate facilities since there is not a breakwater to protect craft from storms. A new hotel managed by the Radisson Hotel chain includes a small dredged harbor for approximately 15 vessels. However, the entrance channel was too shallow for most recreational craft during the low water level which prevailed during the summer of 1977. Two commercial excursion vessels operate between Grand Portage and Isle Royale National Park. These commercial craft use the docks provided at the Grand Portage National Monument or at Voyageurs Marina.

Grand Marais - Two Harbors

The northshore of Lake Superior offers some of the most spectacular scenery on Western Lake Superior. However, between Two Harbors and Grand Marais (84 miles), there are no existing harbors of refuge. Construction on two proposed harbors of refuge at Lutsen and Schroeder is scheduled to begin in 1979. When the harbors are completed transient boating should increase substantially along this segment of shoreline. At the present, facilities for recreational craft are limited.

Two Harbors is primarily utilized by commercial iron ore carriers. Recreational boat access is limited to trailered and transient boats. Grand Marais, on the other hand, is primarily a recreational harbor. Presently there are facilities for ten transient vessels at a dock maintained by the local government.

Knife River - Duluth/Superior

This subregion contains the largest concentration of population on Western Lake Superior. As such, it has the second heaviest concentration of existing facilities for recreational craft (365 berths). It is not a major attraction to transients on a longer than weekend voyage (MMAS, 1977). Proposed expansions in 1978-1979 will provide an additional 350 slips for recreational craft.

WISCONSIN-MICHIGAN SOUTH SHORE

The Wisconsin-Michigan south shore is extensively used for recreational boating. Commercial activity between the head of the lake and Black River Harbor waned approximately 15 years ago when iron ore shipments from Wisconsin and western Michigan ceased. Now, recreational boating is heavily concentrated in the Apostle Islands area with substantial transient boating along the shoreline.

Port Wing - Little Sand Bay

Port Wing and Cornucopia are harbors of refuge along this segment of the Wisconsin shoreline. The National Park Service has a proposed harbor at Little Sand Bay to accommodate transient vessels only. The subregion's importance is primarily that it is between the large boat concentration of Duluth-Superior and the Apostle Islands.

Between Duluth-Superior and the Apostle Islands, Port Wing and Cornucopia function as harbors of refuge. Port Wing is minimally developed; no marina services are available. Cornucopia has a small private marina and additional municipally owned berths. Services at Cornucopia are limited to fuel at the private marina. Three small tourist-oriented shops provide snacks, curios, and souvenirs.

Apostle Islands

The Apostle Islands National Lakeshore includes a series of islands dispersed off of the Bayfield Peninsula in Wisconsin. The islands are the primary attraction to transient recreational boaters and also account for the popularity of existing marinas at Bayfield, La Pointe, and Port Superior. North channel between Bayfield and La Pointe is an important focus of sailing activity with regularly scheduled races.

Between Bayfield and Ashland is the largest concentration of existing boaters on Western Lake Superior. Nearly 445 berths are provided at Bayfield, La Pointe, Port Superior, Washburn, Ashland, and Red Cliff Bay. This subregion serves the Apostle Islands National Lakeshore which is the primary destination for transients on longer than weekend voyages (MMAS, 1977).

Saxon - Black River Harbor

East of the Apostle Islands, near the Wisconsin-Michigan border are harbors at Saxon, Wisconsin, Little Girls Point and Black River Harbor in Michigan. Saxon and Black River Harbor provide services for large recreational craft. Little Girls Point, a private development, is limited to serving small outboards. Saxon, a project harbor of the Corps of Engineers, is maintained by Iron County. Black River Harbor is operated by the U.S. Forest Service.

Saxon and Black River Harbor are located near some of the best fishing grounds on Western Lake Superior. There are also minimally developed facilities for small outboards at Little Girls Point. To the east of Black River Harbor, it is approximately 45 miles to the next available refuge at Ontonagon. Transient boating in the area is low (MMAS, 1977).

Presently there are five proposed developments along the south shore. The National Park Service is developing 40 transient slips at Little Sand Bay near their Apostle Islands headquarters. The Red Cliff Indian Reservation has proposed to build a harbor and associated marina facilities to service 18 recreational craft at Buffalo Bay at the town of Red Cliff. Ashland and Washburn, Wisconsin and Gogebic County, Michigan are currently seeking Corps of Engineers funding for upgrading their existing facilities to include breakwaters, entrance channels and turning basins. All three governmental units intend to construct commercial marinas if the harbor facilities are provided.

ORGANIZATION

The remainder of the report is divided into discussions of use, demand and projections for marina-related facilities including slips, moorings, and anchorages as well as transient boating facilities. Boat ramping frequency at the access points in the study area are estimated for the 1977 use season in the next section. Camping and day use within the multicounty framework imposed by available data is presented in Section V.

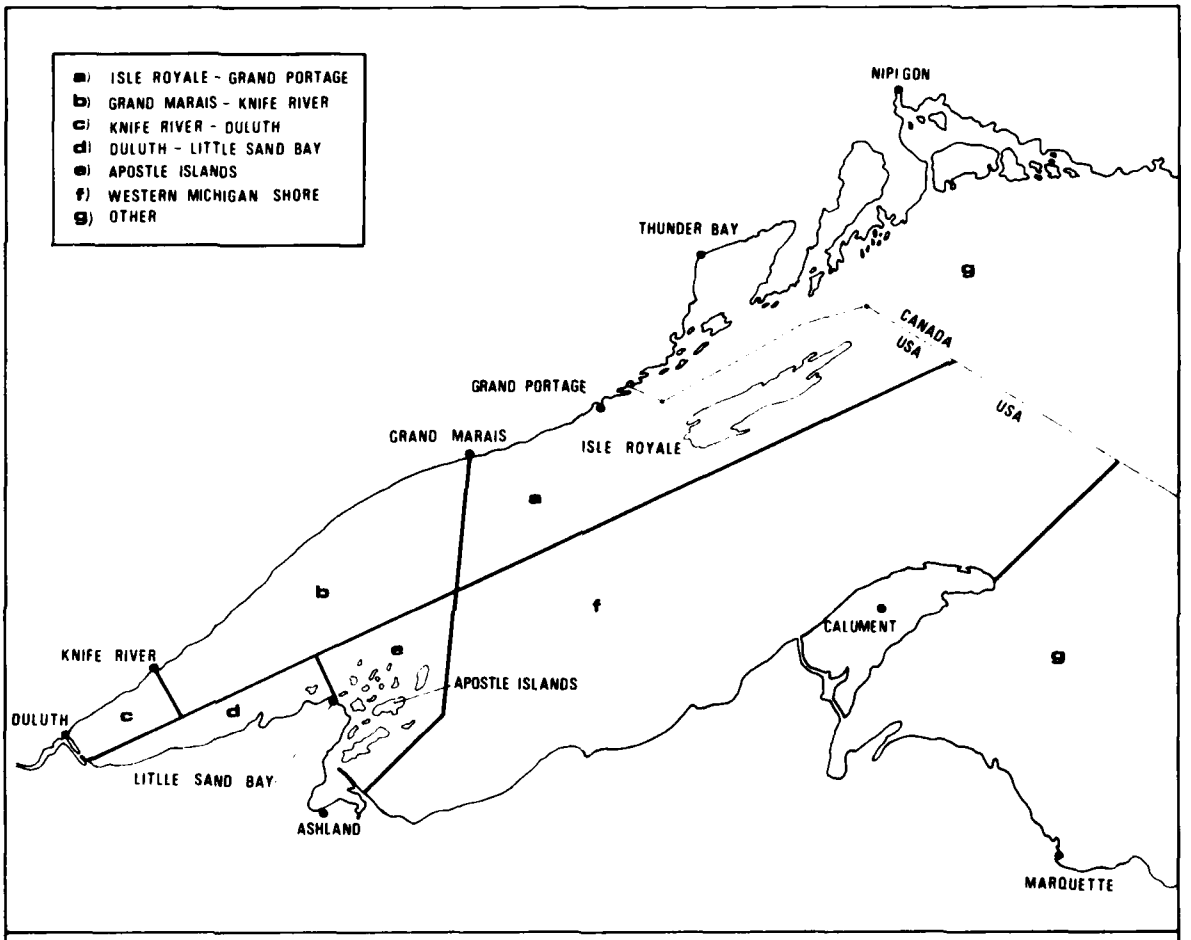

FIGURE 2 SUBREGIONS OF WESTERN LAKE SUPERIOR

II. BOATING DEMANDS AND PROJECTIONS

HARBOR FACILITIES

PERSPECTIVE

Lake Superior boating appears to be growing in popularity among boaters in parts of Michigan, Wisconsin, and Minnesota. Since 1974 every expansion of an existing marina or new marina has filled the first year after construction was completed. Although there have been no baseline demand studies to provide documentation of the growth of demand on Western Lake Superior, it appears that demand outstripped supply early in this decade. In 1974 Knife River Marina opened; that year the marina filled to capacity. Shortly after a private development at Port Superior, approximately 5 miles south of Bayfield, Wisconsin, provided 120 new permanent berthings. After experiencing some financial difficulties, new management now operates the marina at capacity. Again, at Duluth a private marina underwent a major expansion during the winter of 1976-1977. During the 1977 use season, it too filled to capacity.

Another indication of the high level of demand is the number of dry stored recreational craft at some harbors on Western Lake Superior. Knife River marina, Voyageurs Marina (Grand Portage) and Bayfield Marina all dry store craft during the summer of 1977. Most of these craft were large enough to occupy berths if some were available. On Western Lake Superior, boats over 20 feet tend to be permanently berthed; smaller craft are either trailered or dry stored.

Previously, Western Lake Superior boating patterns were studied by the Minnesota Marine Advisory Service (MMAS). That mailed survey of existing boaters on Western Lake Superior provides adequate data on existing use, patterns of boating on the lake, and a profile of existing users.

Within this context, the St. Paul District contracted for a new survey which builds on the MMAS Survey. The Corps study, presented in this report, focuses on latent demand for permanent berthing (hereinafter, the survey presented in this report is referred to as the Latent Demand Survey or boating demand survey). The objectives of the Latent Demand Survey included 1) identification of latent demand for permanent berthing and 2) determination of the percent of registered boaters who used Lake Superior.

Recreational Boating Survey

Conceptual Framework

Demand for berthing on Western Lake Superior can be considered the sum of existing users (expressed demand) and latent (unexpressed) demand. As stated previously, each new marina or marina expansion in the study area since 1974 has filled the first year following completion of construction. That pattern indicates a supply limited market.

The waiting lists at marinas further document the supply limited market. At Black River Harbor, there is a waiting list of over twenty boaters: the average annual turnover is two slips. At Knife River Marina, the operator does not keep a complete waiting list, but during the spring of 1977 he received in excess of seventy inquiries for berthing beyond the 90 berthings available. Further, Grand Portage, Knife River Marina, and Bayfield all dry store boats that are commonly kept in the water when spaces are available on Western Lake Superior. While none of these are accurate measures of demand, they do document the existence of a potentially large unexpressed demand.

Conceptually, latent or unexpressed demand can be considered to be composed of four groups. The first are the owners of large dry stored or trailered boats that could economically utilize berthing in a demand limiting market. The second group are large boat owners who keep their boats on alternative water bodies because permanent berthing is not available on Lake Superior. The third group are small boat owners who have deferred purchase of larger craft because of the unavailability of permanent berthing. Finally, there is a group of nonboat owners, some of whom may be recent immigrants to the region, but who have deferred purchase of a boat because of the limited supply of berthing.

No attempt has been made to quantify these four groups in the Western Lake Superior market area. However, based on knowledge of the market area and boating habits, it is highly probable that the first three groups far exceed the nonboat owner latent demand in numbers. The first three groups can be accessed through state boat registration lists available for the market area. Weather and water conditions on the Lake dictate that boaters have some experience prior to prolonged voyages on the lake; the lake is not for amateurs. Indeed, the results of the Minnesota Marine Advisory Service survey indicates that the mean experience level of Western Lake Superior boaters exceeds 12 years.

Consequently, a mailed survey of state registered boat owners was selected as the optimum procedure for obtaining a measure of the latent demand within the market area even though nonboat owners were not included in the survey. The mailed survey was designed to measure latent demand among registered boat owners in two specific market areas:

- Western Lake Superior - the Upper Peninsula of Michigan, northwestern and northcentral Wisconsin, and east central and northeastern Minnesota.

- Lake Pepin, Minnesota (Mississippi River) - southwestern Wisconsin, southeastern Minnesota, and northwestern Iowa.

Lake Pepin was included because of the large overlap of market area with Western Lake Superior and because a marina expansion was proposed for Lake City, Minnesota. The questionnaire for these two areas is included in Appendix A. The same questionnaire was sent to all boaters in both market areas.

Prior to survey questionnaire design, the researchers faced the issue of how to define latent demand. The specific wording of any survey question can influence the response. Accordingly, concern for over-estimating latent demand led to adopting a conservative posture. In order to be considered as latent demand in this study, it was decided to include only those individuals who had actually attempted to obtain berthing on Western Lake Superior. Consequently, the questions included (10 and 18) were phrased "Did you try to obtain permanent berthing or mooring on Lake Superior (Lake Pepin) this year (1977)?" While this may underestimate demand by eliminating some knowledgeable boaters who did not try because of previous failures, the more conservative estimate of latent demand was deemed preferable.

Sample Design

Literature review of all previous investigations conducted as part of this study revealed that no previous studies of recreational boating latent demand had been undertaken for the Western Lake Superior study area. However, as previously noted, the Minnesota Marine Advisory Service (MMAS) conducted a survey of existing users in 1976(published 1977). Accordingly, a sample design specifically developed to build on the MMAS survey was proposed and implemented during the summer of 1977.

After considering all alternatives, the final approach selected was a mailed survey of registered boaters in the primary market area of Western Lake Superior existing marinas and developed harbors.[1] The mailed survey was selected over a telephone survey because of the lower cost estimated to reach the same number of respondents. The primary market area was defined using data supplied by the MMAS.

Primary Market Area

In developing the mailing list for the 1976 survey of existing boaters, the MMAS compiled a list of home residences of boat owners who rented seasonal berthing or were boat club members from Grand Portage, Minnesota to Ashland, Wisconsin. This survey used that entire list to define the market area for Western Lake Superior. Table 2 presents the list of counties included in the primary market area based on the data supplied by the MMAS. For the purposes of this survey, the primary market area was defined to include those counties with more than three boaters who received the MMAS survey. However, the two populous counties of Milwaukee and Waukesha were deleted to achieve a higher success rate with Lake Superior boaters. That is, The Minnesota Marine Advisory Service research (1977) indicated that less than 8 boaters in these two counties rented permanent berths in the study area during 1976. Therefore, inclusion of registered boaters from these two populous eastern Wisconsin counties would decrease the response rate of boaters who do use Western Lake Superior facilities.

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[1] The survey also included the Lake City, Minnesota (on Lake Pepin) market area, but the results are not presented in this document.

Note that implicit in this definition of the primary market area is the assumption that there is no regional bias exerted by marina operators on Western Lake Superior or Lake Pepin. Conversations with marina operators together with the resultant distribution of boat owners in Wisconsin and Minnesota confirmed the validity of the assumption with respect to the MMAS mailing list.

Secondly, since the Minnesota Marine Advisory Service survey extended along the southern shore of Lake Superior only as far as Ashland, Wisconsin, not all of the study area was included. Saxon, Little Girls Point, and Black River Harbor were excluded from the MMAS survey, but needed to be included in this survey. Accordingly, the county of permanent residence was obtained for boaters who rented permanent slips at those locations. The resultant pattern (and contacts with marina managers) indicated a regional bias at Black River Harbor (local boaters are given preference over nonlocal boaters). Consequently, the primary market area was expanded in Michigan to include all counties in the Upper Peninsula of Michigan. Reasons for including all of those counties were that Ontonagon, Chippewa and Marquette Counties appeared in the market area defined by the MMAS list and also because of the east-west highway transportation routes providing easy access to the shoreline of Western Lake Superior.

TABLE 2

Counties Included in Primary Market Area

Wisconsin	Minnesota	Michigan
Ashland	Anoka	Alger
Barron	Blue Earth	Baraga
Bayfield	Carlton	Chippewa
Clark	Chisago	Delta
Douglas	Cook	Dickinson
Eau Claire	Dakota	Gogebic
Iron	Hennepin	Houghton
Marathon	Lake	Iron
Polk	Olmsted	Keweenaw
Rock	Pine	Luce
Rusk	Ramsey	Mackinac
Sawyer	Saint Louis	Marquette
Taylor	Scott	Menominee
Vilas	Sherburne	Ontonagon
Washburn	Stearns	Schoolcraft
Wood	Washington	

NOTE: Includes 91.8% of all boaters identified in the market area.

Boat Registration Lists

The sample was drawn from boat registration lists supplied by each State in the primary market area (DNR in Wisconsin and Minnesota, and the Secretary of State in Michigan). In addition, the U.S. Coast Guard provided the list of documented boats on the Upper Great Lakes (Documented boats must meet minimum Coast Guard specifications including that the vessel be greater than 5 net tons and greater than 27 feet in length). In each case, one or more computer tapes were supplied. These tapes were the most up-to-date available as of July 1977.

Mailing Lists

All of the tapes included both county of residence and boat length. To obtain the mailing lists for the survey, two sortings were performed on the computer tapes. First to limit mailings to the primary market area as previously defined, the types were sorted to include all registered boaters in those counties. Once the lists were limited to the primary market area, a stratified sample based on boat length was selected for the mailings.

The stratified sample was as follows:

1. Boats under 20 feet in length--every 128th registration.

2. Boats 20 feet and over--every 20th registration.

3. Documented boats--every 36th registration.

The stratified sample gives maximum descrimination to boats over 20 feet in length. These are the boats that are most often permanently berthed on Western Lake Superior at existing marinas. Consequently, the survey achieves greater resolution for these large boats. Because documented boats, by their nature, are rarely trailered, it was believed that less descrimination was required. Therefore, a smaller sampling interval was selected.

Boats under 20 feet in length are typically trailered to Western Lake Superior access points (this observed trend was later verified by the survey). Accordingly, since this survey identifies latent demand for permanent berthing among registered boaters, the large sampling interval provided less discrimination on small boats. (It should be pointed out that funding for this study was also a limit on the sample size.)

The sampling procedure resulted in 4,000 names for the mailing list.[1] Of the four thousand, questionnaires were sent to 960 registrants with boats 20 feet or over in length. The balance were sent to registrants with boats less than 20 feet in length.

[1] A total of 324 (8.1 percent) were sent to counties exclusively in the Lake City, Minnesota market area which includes the southern part of the Lake Superior market area and additional area to the south.

Sample size was determined from conversations with individuals who conducted previous research in the area. Those conversations indicated that from 15 to 20 percent of all registered boaters used Western Lake Superior. Based on that value, it was estimated that a sample size of 4000 would be adequate for the objectives of this study. The results of this Latent Demand Survey indicate that 7.5 percent of all registered boaters in the primary market area actually use Lake Superior. For future studies, it is recommended that the sample size necessary should reflect this lower percentage of use.

Mailings

The questionnaire is presented in Appendix A. Two follow-up mailings after the initial distribution of the questionnaire helped in increasing the response rate. Each mailing went out under St. Paul Corps of Engineers letterhead and was signed by the Deputy District Engineer.

For the initial mailing, each questionnaire were stamped with a unique sequence number which was matched with the appropriate number given each selected registrant by the computer selection process. Numbering each questionnaire permitted each respondent to be logged and his name deleted from follow-up mailings.

The initial mailing resulted in 4.0 percent (161) questionnaires being undeliverable because of address faults. Most appeared to be undeliverable because of the registrant moving without leaving a forwarding address, or because the street number did not exist. Problems with Zip Code omissions were avoided by correcting the lists prior to mailing.

Follow-up mailings were sent out at two-week and four-week intervals following the initial mailings. Within the first three weeks, the survey achieved 48.6 percent response rate. The final response rate was 2,697 (67.4%) responses accounted for either by returned questionnaires or by inadequate mailing addresses. Three completed questionnaires were returned in late November (3 months following initial mailing). These three which were received too late to be included, indicated that they did not use Lake Superior.

As questionnaires were received, the corresponding number on the master mailing list was stamped with the date of return. Only two respondents cut the sequence number from the questionnaire. These were given alternative sequence numbers and weighted according to the length of their boats.

To assure consistency, all coding for keypunching was performed by one individual. The responses were then punched on computer cards with one card per respondent. These cards were then edited using a subroutine within the questionnaire analysis program.

Analytical Procedures

Computer tabulations of the data were performed on a commercially available questionnaire analysis program supplied by a nationwide service bureau. The program included subroutines for editing the data deck and for tabulation of expanded or unexpanded data. Data from the survey are presented in subsequent sections of this report. Expansion factors are equal to the sampling interval with which the stratified sample was drawn. For example, a respondent with an 18-foot boat listed on the registration list was expanded 128 times. Likewise, a respondent who was drawn from the list of boats 20 feet or over, was expanded 20 times.

Existing Latent Demand

Computation of existing latent demand is derived from the "yes" response to Question 10 of the survey form. Question 11 distributes the demand within the Western Lake Superior study area. The estimate of demand thus derived is for the primary market area. However, since the primary market area as defined in the previous section included 91.8 percent of all existing boaters in the total market area, the total demand is actually 1.09 times the number derived from the survey.

Expansion of the respondents to the entire population of registered boaters in the primary market area is accomplished by multiplying each respondent by the appropriate sample interval (20,36,128) as detailed in the section on Sample Design. Thus, the raw existing latent demand in the primary market area is equal to the total of each "yes" response to Question 10 times its expansion factor. The raw existing latent demand in the total market area is the product of the raw latent demand in the primary market area times 1.09 to account for the portion of the Western Lake Superior market area not included in the survey.

Table 3 presents the percent of the survey respondents that indicated that they boated on Lake Superior in the last use season. As shown in the table, 7.5 percent of the survey sample indicated that they used Lake Superior. When that 7.5 percent is expanded to the entire population of registered boaters, the survey indicates that 20,772 boaters originating in the primary market area use the lake.

Raw latent demand, as indicated by Question 10, is derived in Table 4. The initial figure of 1,956 represents only those who responded to the survey. It does not include nonrespondents to the questionnaire (1,303 not expanded). It should be noted that the values in Table 4 include 11 individuals who already rent permanent berthing within the study area. These 11 respondents are deleted from the demand in Table 4 in the column headed Adjusted for Nonrespondents.

TABLE 3

Recreation Boating on Lake Superior
Western Lake Superior Primary Market Area

Use Lake Superior		Do Not Use Lake Superior		No Response[8]	
f	%	f	%	f	%
20,772 (217)	7.5	211,596 (2,049)	76.2	45,322 (431)	16.3
			TOTALS	277,700 (2,697)	

[8]Includes only surveys delivered but not returned.

TABLE 4

Derivation of Raw Latent Demand
Western Lake Superior Market Area

	No Adjustments	Adjusted for Nonrespondents[9]
Attempted Berthing: 33 Respondents		
Boats 20 feet and Over	420	557
Boats Under 20 feet	1,536	2,037
TOTAL EXISTING DEMAND (Primary Market Area)	1,956	2,594
	x 1.09	x 1.09
TOTAL EXISTING DEMAND (Total Market Area)	2,132	2,827

[9]Adjusted for 32.6% nonrespondents which includes the undelivered surveys as well as surveys not returned or not answered.

At first glance, 2,132 additional berthings may seem excessive, but that value represents less than 0.5 percent of all boaters in the market area and 9.4 percent of all boaters who declared that they currently boat on Lake Superior. Additional methodologies for interpreting the survey data are given below.

Alternative Interpretation

The above interpretation of latent demand assumes that all boaters who were interested in boating on Western Lake Superior responded to the survey. That assumption seems tenuous since there is no guarantee that all interested boaters did respond. Indeed, the 1974 Michigan Boaters Survey and the 1974 survey conducted by the Chicago District, Corps of Engineers, both expanded their samples to include the nonrespondents. Further, the Chicago District conducted a follow-up telephone survey of the nonrespondents. With the exception of two peripheral questions, the results of the telephone survey were derived from the same statistical population as the mailed survey. That is, respondents to the telephone survey showed essentially the same use patterns as respondents to the mailed survey. There is, therefore, some justification for adding a correction for the nonrespondents. Table 4 presents the resultant computations.

As shown in Table 4, nonrespondents (including non-deliverable surveys) account for 32.6 percent of the initial mailing. If the nonresidents are expected to be distributed the same as the respondents, then the resulting demand is 2,827 instead of 2,132. That is, the nonrespondents increase demand by an additional 695 berthings (number of users + 32.6% for nonrespondents = 2,827).

Deletion of Berthed Boats

Cross tabulation which was limited only to those respondents who attempted to obtain berthing, revealed that eight respondents were already occupying permanent berthing at commercial marinas on Western Lake Superior. These cannot logically be considered as existing latent demand since their movement from one marina to another makes their original berthing available to another boater. However, they can be used to distribute demand to the subregions since they are apparently not occupying a berth in their first choice marina.

Consequently, the raw demand data presented in Table 4 needs to be modified to delete the eleven boaters now occupying commercial berths within the study area (Table 5). The equivalent of 711 boats are deleted from the existing demand.

In summary, adjusted data from the survey indicated that there is an unsatisfied demand for 1,421 additional slips at the end of 1977 use season. The next section distributes the demand geographically within the study area.

TABLE 5

Latent Demand for Permanent Berthing
on Western Lake Superior[1]

	Nonrespondents Excluded	Nonrespondents Included
Attempt Berthing:		
Boats 20 feet and Over	280	371
Boats Under 20 feet	1,024	1,358
TOTAL EXISTING DEMAND (Primary Market Area)	1,304	1,729
	x 1.09	x 1.09
TOTAL EXISTING DEMAND (Entire Market Area)	1,421	1,884

[1]Does not include respondents already occupying commercial berths.

Throughout the rest of this discussion, reference will be made to both 1421 and 1884 as existing latent demand. These should be viewed as low and high estimates respectively.

DISTRIBUTION OF DEMAND

The previous section identified the existing latent demand for 1421 or 1884 additional berths, depending upon the methodology used to expand the data. However, for this data to be valuable to planners, the demand needs to be allocated first to specific sites and secondly to subregions within the Western Lake Superior Region. At the site specific level, the demand becomes an input into benefit analyses and planning studies prepared in accordance with Corps of Engineer regulations and practices. This allocation process is explained below.

It is important to note that the data base for this section is not the same as in the previous section. In this section, all responses to question 11 are included. That is, some individuals contacted more than one harbor to obtain berthing. In this section these multiple responses are considered since the individual's second choice helps to identify the areas of greatest demand. In addition, the boat owners who currently berth boats at commercial marinas are likewise included since these too, help identify areas of greatest demand.

Question 11 of the survey (Appendix A) distributes demand to specific harbors. However, in a supply limited market, when facilities are not available at the first choice harbor, often the buyer will opt for an alternative location nearby. This appears to be particularly true on Western Lake Superior. One of the most popular boating areas in the study area are the Apostle Islands. Boaters seeking the Apostle Islands now have the option of permanent berthing at Bayfield, La Pointe, or Port Superior. While these marinas are currently filled, proposed harbors at Red Cliff (Buffalo Bay), Red Cliff Bay, Washburn and Ashland will provide alternatives to boaters now forced to locate elsewhere. Upon completion of the harbors, some of the boaters moving to these proposed harbors probably would rather be at the established harbors of Bayfield or La Pointe. However, since the proposed harbors also permit access to the Apostle Islands most, if not all, of the demand at Bayfield, La Pointe and Port Superior can be fulfilled at Red Cliff, Washburn, or others.

For this reason the planner needs to avoid taking too narrow an interpretation of responses to question 11 in the survey. Market forces permit shifting demand from one site to another -- within limits. To shift demand from one harbor to another, however, two sets of variables need to be considered:

- Water-oriented activities sought by the boater.
- Desired user target areas-e.g. specific islands or island, fishing grounds.

Activities are important because for some boaters fishing or cruising is the primary activity. For others, sailing clubs and racing opportunities may be most important. Clearly, the more that is known of boating habits the more accurate the judgement will be. Concomitantly, the more information on target areas available, the more accurate the allocation.

Detailed information on boat use and target areas are presented in Section IV; the reader is referred to that section for specific data. Basically, there appear to be three primary nodes of boating activity in the study area with lesser centers scattered between these nodes. The Apostle Islands, the Duluth-Superior population node, and Isle Royale are among the primary target areas for transient boaters. (Duluth-Superior, however, does not have facilities for transient boaters). These nodes offer some combination of solitude, scenery, cruising and racing opportunities sufficient to attract large numbers of boaters.

When the target areas are identified, that is the area that can be served by a proposed marina, the allocation of demand can proceed. Table 6 presents the demand for berthing as expressed by all respondents who attempted to obtain berthing on Western Lake Superior. It should also be pointed out that the table includes more than one contact per respondent.

Table 6 shows that demand tends to be concentrated at Little Girls Point, Duluth-Superior, Knife River, Grand Portage and Grand Marais. Of these five areas, Little Girls Point and Grand Portage do not have protected harbors.

TABLE 6

Site Specific Demand at Western Lake Superior Harbors and Bays[10]

Harbor/Bay	New Boaters f	New Boaters Expanded	Recreational Berth In Study Area f	Recreational Berth In Study Area Expanded	Total f	Total Expanded
Grand Portage	2	148	2	148	4	296
Grand Marais	1	20	2	256	3	276
Two Harbors	1	128			1	128
Knife River	5	316	3	60	8	376
Duluth/Superior	6	336	1	20	7	356
Port Wing	1	20			1	20
Cornucopia	1	20			1	20
Little Sand Bay	1	20			1	20
Bayfield	2	40	1	20	3	60
La Pointe	2	148			2	148
Port Superior			1	20	1	20
Washburn	4	188			4	188
Ashland	1	20			1	20
Saxon	2	148			2	148
Little Girls Point	4	512			4	512
Black River	1	128			1	128
	34	2192	10	524	44	2716

[10] Multiple responses were allowed on this answer, therefore the 33 respondents listed in Table 3 do not equal the total in this table.

Demand by Subregion

The data in Table 6 can be used to identify the areas of greatest demand and therefore be used as one input into prioritizing commitment of financial resources for harbor developments. Table 7 groups the site specific demand into subregions delineated on the basis of existing use patterns.

These subregions derive their coherence from inherent characteristics that draw boaters who seek amenities such as solitude, scenery, protected waters, good fishing. That is, boaters are not attracted to a specific harbor as much as to resources offered by the area.

Demand for berthing should be considered in the same framework. For example, the demand at Bayfield will primarily be associated with the access it provides to the Apostle Islands, the regularly scheduled races, social events sponsored by local boat clubs, or the quality facilities it provides. Most, if not all of that demand could be satisfied by a new harbor at Red Cliff, Washburn, or Ashland as long as all regional attractions are equally available.

The subregions are logical from two standpoints. First, they reflect existing concentrations of private and public facilities as well as concentration of transient boater target areas. Secondly, they also reflect the population concentrations along the lake. Isle Royale and the Apostle Islands (Bayfield to Ashland) are the primary destination of transient boaters (See Section IV). Knife River-Duluth/Superior represents the population concentration at the head of the Lake. Between these areas are less intensively used subregions where transients tend to be few or where transients are passing through while destined for the Apostle Islands, Isle Royale, or Duluth/Superior.

As shown in Table 7, the greatest demand for berthing is in the Saxon-Black River Harbor subregion where existing berthing accounts for only nine percent in the study area. The second major area of demand is Duluth-Superior and Knife River which already has nearly one-third of available berthing. Note that the third subregion, Grand Marais to Two Harbors ranks fourth in percent of demand. The harbors of refuge at Silver Bay and Schroeder are proposed for this segment, but there are currently no plans for including permanent berthing at either of these locations. In light of this investigation, perhaps the local communities may wish to reevaluate their position.

Allocation of Demand

For the regionalized data to be applicable to specific projects undertaken on Western Lake Superior, the new boater demand listed in Table 6 must be allocated to the proposed harbor site. This section presents the allocation mechanism and presents the case of Ashland and Washburn proposed harbors as examples.

As previously stated, demand for berthing actually reflects the demand for access to certain activities available in the region. This is the underlying assumption in the allocation process. On Western Lake Superior there is a existing pool of demand for berthing equal to 1421. As each proposed harbor is approved for construction, this demand is reduced by an amount equivalent to the berths provided at the new harbor. In the future, the demand pool will grow (projections are provided later). For future projects the projection for the year nearest to the date of completion should be used as the basis for demand allocation.

TABLE 7

Berthing Demand By Subregion

Subregion	Existing and New Boaters Rank	f	Expanded	Percent of Demand	Existing Conditions Berths	Existing Conditions Percent of Total
Isle Royale-Grand Portage	5	4	296	10.9	15	1.5
Grand Marais-Two Harbors	4	4	404	14.9	10	1.0
Knife River-Duluth/Superior	2	15	732	27.0	365	36.5
Port Wing-Little Sand Bay	6	3	60	2.2	76	7.6
Bayfield-Ashland	3	11	436	16.0	443	44.3
Saxon-Black River Harbor	1	7	788	29.0	91	9.1
		43	2716	100.0	1000	100.0

Note: Table 7 differs from Table 6 in that multiple responses are included.

The steps to follow in the allocation process include:

1. Identify the service area of the proposed marina based on local boating patterns and conversations with nearby marina operators.
2. List the alternative existing and proposed harbors within the service area (alternatives are usually within 4 hrs. by boat).
3. From Tables 6 and 7 list the site specific demand expressed in the base year (1977).
4. Considering local conditions, the result in the first column is the demand or the portion of demand available for allocation attributable to new boaters.
5. Add the existing boaters who seek relocation into the region (also from Tables 6 and 7).

At the end of this process the existing demand pool is decreased by the amount equal to the number of new permanent berths added at the proposed facility.

Ashland and Washburn, Wisconsin offer excellent examples of the allocation process. Table 4 reveals a site specific demand for 20 berths at Ashland and 188 at Washburn. Both communities are positioned to provide access for Apostle Islands user demand. Washburn is only 4 miles by boat from Madeline Island and Ashland is approximately 8 miles away. The protected nature of Chequamegon Bay could also attract less adventurous boaters who do not wish to venture onto the open lake. A new harbor at either of these two locations could feasibly service demand associated with Port Superior, Bayfield or La Pointe. Table 8 presents the summation process for determining demand.

TABLE 8

Determination of New Demand for Ashland and Washburn Proposed Harbors

Total Expressed Demand (1977)

Harbor/Bay	Potential New Boaters	Existing Slip Users	Total Potential Demand for Boat Slips
Ashland	20		20
Washburn	188		188
Port Superior		20	20
La Pointe	148		148
Bayfield	40	20	60
	396	40	436
Percent	91	9	100

Hence, there is a total new demand for over 400 new boat slips in the Apostle Islands region. Most of that demand (91 percent) is attributable to new boaters; therefore, most of the subregion's demand can be satisfied at Ashland and Washburn since new boaters are more likely to accept berthing at alternative harbors than existing boaters. Accordingly, using the above assumption, the best estimate of demand for the southern Apostle Islands is 400 new slips. Washburn showed the higher preference level than Ashland, so more of the demand should be allocated to Washburn. However, this is as far as the data can be developed. For two proposed marinas within 5 miles of each other, local conditions will become dominant.

These include:

- o which marina is completed first
- o operating policies and practices of the marina manager
- o support services offered in the community
- o local organization of boating clubs and boating activities

None of these can realistically be quantified 5 or 10 years prior to completion of the proposed harbor. This then must become a judgemental step.

Projection of Demand for Berthings

Existing total demand for recreational berthing is equal to both fulfilled demand and latent (unexpressed) demand. There are currently 1013 slips available and being used within the study area and latent demand of 1421. This yields a total existing demand for 2434 berths. This demand is equivalent to 0.61 percent of all registered boaters within the primary market area. These values, with the projection of registered boaters in the same market area, are the basis of the demand projections.

There are several techniques available for establishing demand projections. Multiple regression is one of the most commonly used methods in developing recreation projections. The multiple regression techique was selected in this case because participation, or desire to participate, in boating can be expressed as a percentage of population or of registerd boaters. Previous studies, including the Lake Michigan Boating Survey (Chicago COE) and the Upper Great Lakes Regional Commission Telephone Survey, utilized this methodology and provided guidance for the socio-economic variables needed in the model. Accordingly, given these previous studies, the multiple regression technique was applied to project boat registration.

Projections of population and income were supplied by the Economics Section of the St. Paul District. In preparing these projections OBERS and State projections were considered. The projections were provided for 1980, 1990, and 2000 by county (Table 9). Since the base year for the demand projections is 1977 and projections are for 5-year increments to 2002, straight-line interpolation was used to develop projected population and income for the year 1982, 1987, 1992, 1997, and 2002. Table 10 presents these projections by county.

TABLE 9

Population and Income Projections

County	Per Capita Income			Population		
	1970	1980	2000	1970	1980	2000
MINNESOTA						
Anoka	3528	4900	8400	154556	190000	342400
Blue Earth	3528	1372	3500	52322	2573	17000
Carlton	2844	3900	7000	28072	28900	30800
Chisago	3528	4900	84000	17492	24000	44900
Cook	2844	3900	7000	3423	3700	3800
Dakota	3528	4900	8400	139808	180000	293000
Hennepin	3528	4900	8400	960080	958400	1100000
Lake	2844	3900	7000	13351	13800	17500
Olmstead	3528	4900	8400	84104	89400	131300
Pine	3529	4900	8400	16831	18900	20900
Ramsey	3528	4900	8400	476255	476100	487200
St. Louis	2844	3900	7000	220693	216600	212700
Scott	3528	4900	8400	32423	41000	56000
Sherburne	3528	4900	8400	18344	26900	45300
Stearns	3528	4900	8400	95400	104500	129300
Washington	3528	4900	8400	82948	111000	156500
WISCONSIN						
Ashland	2844	3900	7000	16743	16800	13000
Barron	2657	3700	6700	33955	37000	36300
Bayfield	2844	3900	7000	11683	12600	13000
Clark	2772	4000	7100	30361	32100	28000
Eau Claire	2657	3700	6700	67219	77000	98700
Marathon	2772	4000	7100	97457	105000	118200
Rock	3500	4800	8200	131970	140600	161400
Rusk	2657	4000	6700	14238	15300	12400
Sawyer	2657	3700	6700	9670	11500	12000
Taylor	2772	4000	7100	16958	18500	17000
Vilas	2772	4000	7100	10958	13600	12600
Washburn	2657	3700	6700	10601	12500	13000
Waukesha	3725	5100	8600	231365	260000	374600
MICHIGAN						
Chippewa	2989	4200	7400	32412	36300	37000
Gogebic	2844	3900	7000	70676	20000	12900
Ontonagon	2844	3900	7000	10548	11300	9600

TABLE 10

PROJECTED BOAT REGISTRATION, WESTERN LAKE SUPERIOR MARKET AREA

	Distance from County to Lake Superior (miles)	Population (1977)	Registered Boaters (1977)	Projected Population (1982)	Projected Registered Boater (1982)	Projected Population (1987)	Projected Registered Boater (1987)	Projected Population (1992)	Projected Registered Boater (1992)	Projected Population (1997)	Projected Registered Boater (1997)	Projected Population (2002)	Projected Registered Boater (2002)
Minnesota													
Anoka	198	179,367	21,115	205,240	21,988	243,340	26,246	281,440	30,504	319,540	34,762	357,640	39,021
Blue Earth	312	54,127	1,650	56,600	3,496	60,850	3,971	65,100	4,446	69,350	4,921	73,600	5,396
Carlton	50	28,652	5,248	29,090	4,742	29,565	4,795	30,040	4,848	30,515	4,901	30,990	4,954
Cook	0	3,617	2,844	3,710	2,730	3,735	2,733	3,760	2,735	3,785	2,738	3,810	2,741
Chisago	163	22,048	4,745	26,090	2,543	31,315	3,127	36,540	3,711	41,765	4,295	46,990	4,879
Dakota	228	167,942	15,825	191,300	19,935	219,550	23,093	247,800	26,250	276,050	29,407	304,300	32,565
Hennepin	213	958,904	104,172	972,560	107,498	1,003,060	111,454	1,047,560	115,433	1,078,760	119,367	1,114,160	123,323
Lake	0	13,665	2,939	14,170	3,899	15,095	4,002	16,020	4,160	16,945	4,209	17,870	4,312
Olmsted	299	87,811	6,551	93,590	7,844	104,065	9,015	114,540	10,186	125,015	11,356	135,490	12,527
Pine	98	18,279	2,797	19,100	2,834	19,600	2,890	20,100	2,946	20,600	3,001	21,100	3,057
Ramsey	264	476,147	51,684	477,210	52,285	479,985	52,595	482,760	52,905	485,535	53,215	488,310	53,526
Scott	258	38,427	4,069	42,500	2,811	46,250	3,230	50,000	3,649	53,750	4,068	57,500	4,487
Sherburne	240	24,334	3,156	28,740	2,394	33,340	2,908	37,940	3,422	42,540	3,936	47,140	4,450
Stearns	241	101,770	12,335	106,980	10,297	113,180	10,990	119,380	11,683	125,580	12,376	131,780	13,069
St. Louis	216	217,828	42,270	216,210	24,566	215,235	24,457	214,260	24,348	213,285	24,239	212,310	24,130
Washington	210	102,584	12,015	115,550	11,766	216,925	13,038	138,300	14,309	149,675	15,580	161,050	16,851
Wisconsin													
Ashland	22	16,783	1,970	16,420	3,787	15,470	3,681	14,520	3,575	13,570	3,469	12,620	3,363
Barron	98	36,087	5,621	36,930	4,826	36,755	4,807	36,580	4,787	36,405	4,768	36,230	4,748
Bayfield	0	12,325	2,521	12,640	3,728	12,740	3,739	12,840	3,750	12,940	3,761	13,040	3,773
Clark	156	31,578	1,989	31,690	3,280	30,665	3,170	29,640	3,055	28,615	2,941	27,590	2,826
Douglas	0	44,897	4,924	45,000	7,344	45,000	7,344	45,000	7,344	45,000	7,344	45,000	7,344
Eau Claire	118	74,066	6,816	79,170	9,217	84,595	9,824	90,020	10,430	95,455	11,036	100,870	11,643
Iron	13	6,370	1,712	6,070	2,779	5,495	2,715	4,920	2,651	4,345	2,586	3,770	2,522
Marathon	140	102,737	9,778	106,320	11,889	109,620	12,258	112,920	12,627	116,220	12,995	119,520	13,364
Rock	325	138,011	8,058	142,680	12,902	147,880	13,483	153,080	14,064	158,280	14,645	163,480	15,227
Rusk	110	14,981	1,542	15,010	2,179	14,285	2,098	13,560	2,017	12,835	1,936	12,110	1,855
Sawyer	53	10,951	5,358	11,550	2,732	11,675	2,746	11,800	2,760	11,925	2,774	12,425	2,830
Taylor	113	18,037	1,549	18,330	2,503	17,975	2,461	17,600	2,419	17,225	2,377	16,850	2,335
Vilas	68	12,807	9,161	13,500	2,703	13,250	2,675	13,000	2,647	12,750	2,619	12,500	2,591
Waukesha	346	252,410	21,262	271,460	26,948	300,110	30.150	328,760	33,352	357,410	36,544	386,060	39,756
Washburn	68	26,772	3,559	12,550	2,596	12,675	2,610	12,800	2,624	12,925	2,638	13,050	2,652
Wood	180	68,049	6,172	70,660	7,244	74,310	6,652	77,960	8,060	81,610	8,468	85,260	8,876
Michigan													
Chippewa	23	35,134	4,522	36,370	6,001	36,545	6,020	36,720	6,040	36,895	6,059	37,070	6,079
Gogebic	0	21,149	2,255	19,290	4,471	17,515	4,273	15,740	4,074	13,965	3,876	12,190	3,678
Marquette	38	69,106	5,009	72,030	9,739	74,605	10,027	77,180	10,314	79,755	10,602	82,330	10,890
Ontonagon	0	11,074	1,118	11,130	3,559	10,705	3,512	10,280	3,464	9,855	3,417	9,430	3,369
TOTAL		3,498,826	398,311	3,627,460	412,055	3,821,860	433,789	4,016,460	455,535	4,210,660	477,236	4,405,435	499,009

The multiple regression equation uses population projections and the inverse of distance to Lake Superior as independent variables and number of registered boaters as the dependent variable. All values were expressed by county within the primary market area.

Distance to Lake Superior by county was developed from state highway road maps. Distance is measured along the most direct trunk highway from the largest city in the county to the nearest harbor on Western Lake Superior. For those counties on the Lake Superior shoreline within the study area, a value of one mile was used.

Table 11 presents the results of the final multiple regression equations. The final equation includes population and the inverse of distance as significant independent variables. The regression initially included income, but the addition of that independent variable increased the percent of the total variation explained by only 0.3 percent of the variation. Income, therefore, is deleted from the final equation.

TABLE 11

Linear Multiple Regression Equation for
Projecting Registered Boaters by County (n=36)

Independent Variable	b_o	b	R	R^2	.d.f	Percent Increased in R
Population		1.117			1& 33	95.6
Inverse of Distance		-1.649			1& 33	0.7
Regression	2.315		0.981**	0.962	2& 33	

Symbols: n = number of observations (days); b = y-intercept; b_{o_2}= sample partial regression coefficient; R = multiple correlation coefficient; R^2 = coefficient of determination; d.f. = degress of freedom; and ** indicates significant at the 0.1 level (highly significant).

In reality none of these three assumptions are likely to be valid for 25 years. However, these assumptions yield very conservative demand estimates. Projections based on these values will not result in overconstruction of facilities. Also, within the present context, there are serious questions concerning the impact that new development would have on existing environmental resources and the quality of the recreation experience of current users if the existing demand levels are to be met. These issues are discussed in the final section.

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TABLE 12

Demand Projections for Western Lake Superior
(0.61 % of registered boaters)

Year	Number Registered Boaters	Total Demand By Year	Percent Change
1977	398,311	2430	
1982	412,055	2514	+ 7.4
1987	433,789	2646	+ 5.2
1992	455,535	2779	+ 5.0
1997	477,236	2911	+ 4.7
2002	499,009	3044	+ 4.6

It is reasonable that population and distance to a large extent explain the number of registered boaters. Fundamental to recreational demand studies is the principle that participation in a specific activity can be expressed as a percent of the population (participation rate). If this is valid, then projection of demand at a specific site would be basically a function of population and the inverse of distance. That is, as distance increases, the percent of the population using specific recreation facilities decreases.

Suggestions have been made in the literature that socioeconomic variables such as income or education level should be included to explain boat ownership. (Corps of Engineers, Chicago District, 1975). Our original model initially included income as an independent variable. In the case of Western Lake Superior this appears to be unnecessary; income was found to be statistically nonsignificant. The relationship between income and boat ownership remains to be demonstrated. Income may to some degree explain the type of boat owned but not whether the individual owns a boat. Even then other variables such as age (low income during middle years versus during retirement) or activity preference (high income but preference for canoes, jet boats, small lake fishing boats) are confounded with income in explaining boat type owned.

Further, the Chicago District also found income to be nonsignificant in explaining boat ownership by type (Corps of Engineers, Chicago District, 1975). Hence, at least in the Upper Midwest where there are numerous lakes and rivers to provide boating alternatives, boat ownership can largely be explained by population alone. The inverse of distance to Western Lake Superior is included as a measure of willingness to travel. It should be noted that also available in the same area are numerous lakes, the Boundary Waters Canoe Area and some white water rivers that are unavailable to the south of population centers such as the Twin Cities and Eau Claire.

Projection of demand on Western Lake Superior within this context can also be based on population, but expressed as a percent of registered boaters (Since boat ownership is partially a function of population, the percent of the boat owners seeking permanent berthing is also a function of population). The demand survey identified that 7.5 percent of all boat owners in the primary market use area boat on Lake Superior. Most of these own trailerable boats and Lake Superior is only one water body used in the course of the summer season. Only 0.61 percent of all boaters either rent permanent berthing or have been attempting to obtain berthing (latent demand). Projection of demand for berthings on Western Lake Superior, then, can be estimated by multiplying the number of registered boaters by 0.61 percent. Table 12 presents the results: projection of demand for berthing on Western Lake Superior by five-year increments.

Assumptions underlying the projections include:

1. The participation rate for boating will not change in the next 25 years.
2. The ratio of boat owners who opt for Western Lake Superior will not change for the next 25 years.
3. Construction of additional facilities will not generate additional demand therefore changing either the boating participation rate or the percent of boat owners opting for Western Lake Superior.

Utilization of these assumptions, results in seemingly very conservative estimates. For example, the recreation demand telephone survey conducted for the Upper Great Lake Regional Commission projects a 5 percent annual growth rate for boating in the Upper Great Lakes Region (UGLRC, 1974). However, since the results of this study are to be used in determining the number of berths needed on Western Lake Superior and because public funds must be allocated for the construction projects, this conservative posture has been adopted. Implications of this approach include 1) the Corps, employing the projections to determine the construction schedule will lag behind demand for berths, and 2) the supply limited market, and the associated economics, will be maintained.

III. BOAT RAMP USAGE METHODOLOGY

PURPOSE

Review of previous studies demonstrated that insufficient data existed on the number of boats ramped on Western Lake Superior. Therefore, during the second half of the 1977 summer use period, the St. Paul District, as part of the overall study, contracted for a series of aerial reconnaissance flights in a light aircraft combined with time lapse photography using 8-mm movie cameras to determine boat ramping activity. The methodology was selected over other, more traditional, methods because of the efficiency and cost savings realized by utilizing the cameras and light aircraft.

DESIGN AND DATA COLLECTION

Because the study included Corps projects over more than 300 miles of shoreline and more than 15 access points for trailered boats, logistics were a major factor in determining the statistical design. Traditional methods, such as having an individual stationed at each boat ramp to count activity occasions, were logistically unsatisfactory and too expensive. Consequently, a cost effective and logistically manageable alternative was developed.

Four super 8-mm movie cameras were installed in secure locations at four access points in Wisconsin and Minnesota in mid-July 1977. The harbors were selected because of their geographic proximity to each other and because secure sites for the cameras were available. The cameras photographed all activity near the boat ramps at Two Harbors and Knife River, Minnesota and Barkers Island (Superior) and Cornucopia, Wisconsin.

These cameras were serviced and functioning on randomly selected weekdays and weekends during July, August, and September 1977 (Table 13). The cameras were set to take one frame each minute (time lapse) using an external intervalometer. The one minute interval assured three or more frames (depending upon focus field) of each boat ramped at the target harbors while the cameras were functioning. One roll of film would provide coverage for 1.5 to 2.0 days.

Upon developing the film, a planner viewed the film using a standard editing viewer. Each boat put in or taken out of the water was recorded on a tally sheet. This process yielded the total number of rampings at each of the four sites on a given day (concurrent with the other harbors).

During the days when cameras were functioning, four flights in a twin engine light aircraft were undertaken on two randomly selected weekends and two randomly selected weekdays. During the flights, the planner counted each boat trailer (attached or near a car) at all access points between Black River Harbor, Michigan and Grand Portage, Minnesota. At the same time, 35-mm photographs were taken of the harbors using a 135-mm telephoto lens. The original count was later verified by counting the trailers recorded on film.

RESULTS

The results of the 8-mm camera documentation and the overflights were then statistically analyzed to determine the overall frequency of ramping for specific sites on Western Lake Superior. First, a student's t-test was computed comparing the results obtained by the 8-mm cameras and the corresponding observations during the overflights (Table 14). The results yielded a statistically significant difference between the two methods of counting.

The second step was to use the four sites with movie cameras to estimate the average weekday and weekend use of the boat ramps at the four harbors. Average weekday and average weekend activity occasions, based on all days when the cameras functioned, were determined for those four harbors.

Step three involved developing a correction factor in lieu of the statistically significant difference found in step one. The overflights underestimated total average rampings by an average of 13 percent at the four harbors where movie cameras were placed. The assumption was made that these percents for four harbors were unbiased; that is, that the 13 percent underestimation could be applied to all access points on Lake Superior. This yielded a correction factor of 1.21.

The fourth step was to apply the correction factor to the observed boat count taken during the overflight.

Step five computed the number of activity occasions (rampings, both in and out of the water) for the 1977 use period. To do this, the High and Medium Boat Use by Month graph (Figure 3) was used from the Minnesota Marine Advisory Service Report (1977). This graph gives the number of weeks for which the average weekend and weekday activity occasions were applicable. Computations used in the report were weighted according to the proportion of use shown in that graph (Table 15).

The average number of rampings identified at each access point were assumed to be indicative of the peak use period shown in Figure 3. The peak use period was selected as mid-June to mid-September. For the remainder of the use season, both early and late, the use was defined as the average between the beginning and end of the season and the peak period ($0 + x \div 2$).

TABLE 13

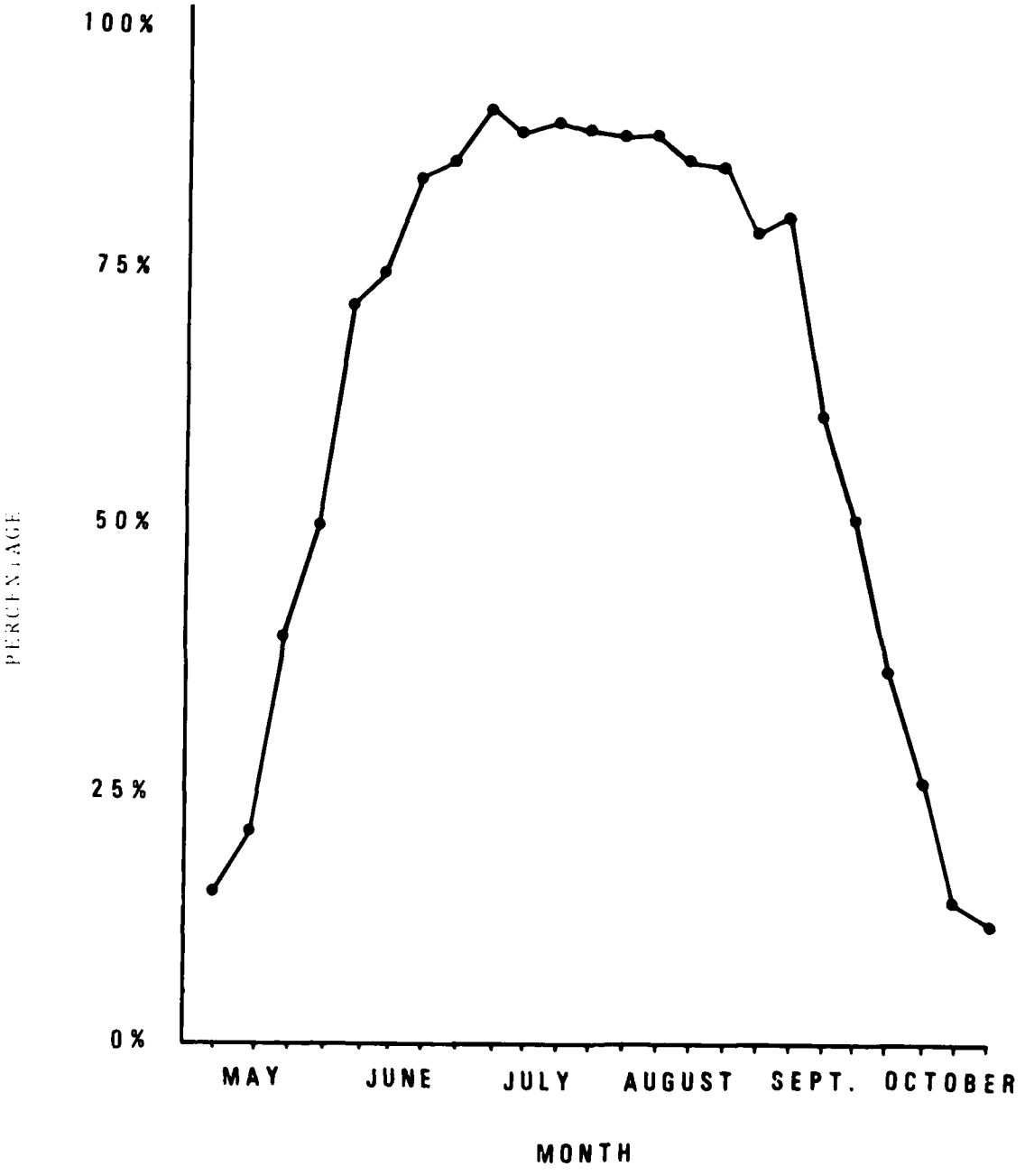
Data Collection Schedule of 8-mm Cameras and Overflights

Date	Harbor[1]			
	Two Harbors	Knife River	Superior	Cornucopia
27 July	C	C	C	-
28 July	C - 0	C - 0	C - 0	-0
29 July	C	C	C	-
3 August	C	C	-	-
4 August	C	C	-	-
5 August	C	C	-	-
12 August	C	C	C	-
13 August	C - 0	C - 0	C - 0	C - 0
14 August	C	C	-	C
16 August	C	-	C	X
17 August	C - 0	- 0	C - 0	C - 0
18 August	-	- -	-	C
3 September	C - 0	C - 0	- 0	C - 0
4 September	C	C	-	C

[1] C = 8-mm cameras functioned entire day.

0 = Overflight over entire study area.

- = Missing observation (camera malfunctioned).



Based on Survey Results Obtained During Summer - 1976

FIGURE 3 HIGH AND MEDIUM BOAT USE BY MONTH

Source: MMAS, 1977

TABLE 14

Statistical t-Test of Difference Between Boat Rampings
Measured by 8-mm Cameras and Overflight Observations

Pair No.	8-mm	35-mm Camera	X_1-X_2	Deviation	Deviation^2
1	7	6	1	-1	1
2	7	7	0	-2	4
3	31	20	11	9	81
4	21	29	-8	-10	100
5	5	2	3	1	1
6	7	1	6	4	16
7	1	0	1	-1	1
Total	79	65	14	0	204
Mean	11.29	9.29	2	-	S_D^2=34.00

$S_D^2 = 34/7 = 4.857$, $S_D = 2.20$ trailers

Two Tailed Test: 2.969 & 4.317

H_o Rejected

Conclusion: 8-mm cameras are a more accurate measure of boat rampings.

TABLE 15

Computations of Rampings by Access Point

Access Point	Sum of Rampings [1]	Percent of Total	Estimated Rampings-1977 [2]	Ramped [3] Equivalents
Grand Portage, Voyageurs	69	14.6	2579	21.1
Grand Portage, Radisson	17	3.6	636	5.2
Hovland	6	1.3	230	1.9
Grand Marais	15	3.2	565	4.6
Tofte	2	0.4	71	0.6
Beaver Bay	11	2.3	406	3.3
Lovell's Marina	3	0.6	106	0.9
King's Landing	3	0.6	106	0.9
Two Harbors, Burlington Bay	5	1.1	194	1.6
Two Harbors, Agate Bay	41	8.7	1537	12.6
Knife River Bar	4	0.9	159	1.3
Knife River Marina	51	10.8	1907	15.6
French River	4	0.9	159	1.3
Duluth, Minnesota Point	20	4.2	742	6.1
Superior, Barkers Island	47	10.0	1766	14.5
Superior, Wisconsin Point	2	0.4	71	0.6
Amincron River	-	-	-	-
Bruce River	1	0.2	35	0.3
Iron River	-	-	-	-
Port Wing	1	0.2	35	0.3
Herbster	3	0.6	106	0.9
Cornucopia	4	0.9	159	1.3
Little Sand Bay	-	-	-	-
Red Cliff Bay	3	0.6	106	0.9
Red Cliff	4	0.9	159	1.3
Bayfield	42	8.9	1572	12.9
La Pointe	1	0.2	35	0.3
Port Superior	4	0.9	159	1.3
Washburn	43	9.1	1608	13.2
Ashland, Bodins	2	0.4	71	0.6
Ashland, City Ramp	26	5.5	972	8.0
Ashland, Boat Club	4	0.9	159	1.3
Ashland, County	3	0.6	106	0.9
Saxon	12	2.5	442	3.6
Little Girls Point	2	0.4	71	0.6
Black River	17	3.6	636	5.2
Total	472	100.0	17665	145.0

[1] Sum of rampings is the total rampings observed at each location corrected as explained in the narrative. Total rampings is the sum of all rampings observed on all overflights.

[2] Total estimated Rampings - 1977 was estimated from data in Table 25 and Figure 3. The value takes into consideration weekday and weekend ramping differences. Forty percent of all rampings occur on weekdays and 60 percent occur on weekend and holidays.

[3] Ramped Equivalents is the is the estimated rampings at each access point divided by the length of the boating season (122 days).

Projections of total rampings by subregion were developed using the same procedures followed for projecting berthing demand. The 1977 rampings are expressed as a percentage (0.044) of registered boaters. Thus, taking a constant percentage of registered boaters results in the projections given in Table 16.

TABLE 16

Projected Annual Trailered Boat Rampings by Subregion

Subregion	1977	1982	1987	1992	1997	2002
Isle Royale - Grand Portage	3215	3326	3501	3677	3852	4028
Grand Marais - Two Harbors	3215	3326	3501	3677	3852	4028
Knife River - Duluth/Superior	4804	4970	5232	5494	5756	6018
Port Wing - Little Sand Bay	335	347	365	383	401	420
Bayfield - Ashland	4947	5118	5388	5658	5927	6198
Saxon - Black River Harbor	1149	1189	1251	1314	1377	1439
TOTAL RAMPINGS	17665	18276	19238	20203	21165	22131

In order to determine site-specific rampings for future studies, the planner can multiply the subregion totals given in Table 16 by the percentage of rampings for the individual access point within the subregion. Caution needs to be employed however. Should one of the access points be substantially improved or fall into disrepair, then the use pattern identified in 1977 could change substantially.

IV. TRANSIENT BOATING

DISTRIBUTION OF DEMAND

Transient boating patterns are important to planning small recreational craft facilities. The following section discusses the patterns of existing moored and trailered boats. Unlike smaller inland lakes, transient craft on Lake Superior consist almost exclusively of permanently moored vessels. The lake is too dangerous for nearly all small trailered boats to venture far from shore. Accordingly, trailered boats are more likely to be hauled to a nearby access point than to traverse extensive open lake distances.

Estimates of transient boating by subregion can be derived from transient boating patterns documented by the Minnesota Marine Advisory Service Survey. It can be assumed that new boaters on the lake will be attracted to the same recreational resources as existing boaters. Therefore, the existing pattern of use will likely continue for the next 25 years. As new berthing becomes available or as sport fishing improves, the number of boaters on the lake will increase, but their pattern within the region should not change appreciably.

The existing pattern is shown in Tables 17 and 18, which present the number of trips taken by home port and destination for both weekend and longer than weekend duration. These values represent trips taken by boats permanently moored at Western Lake Superior harbors. Data presented in the MMAS survey report indicates that the average duration of longer than one night voyages is between five and six days. If we use that value in conjunction with Table 18, it is possible to estimate total average transients by subregion for the summer use season (Table 19). Table 19 includes two estimates of transients, one based on respondents to the MMAS survey. The second by expanding the respondents to include nonrespondents.

Allocation of Transients

For Detailed Project Reports, Recreation Resource Studies, and Reconnaissance Reports, the average number of transients calling at a specific harbor can be estimated from Table 19. The methodology assumes that additional boaters from new marinas or marina expansions will utilize their boats in the same pattern as existing boaters. Further, Table 19 provides the pool of boaters that are transient in the region; an estimate of the number calling at each harbor must be developed. The data does not provide an estimate; the step is judgmental. Obviously, accuracy of the judgmental step is increased by familiarization with boating patterns. For example, it is probable that most transients in the Apostle Islands will be distributed heavily in the northern part near the wilderness islands rather than in Chequamegon Bay. Note that the number of boats in the study area can exceed the number of boats permanently moored in the study area because of trailered or dry stored or transients from other ports of Lake Superior, but outside of the study region.

TABLE 17

Number of Day or Weekend Voyages by Western Lake Superior Boaters by Port

	Apostle Islands f	Cornucopia f	Duluth f	Knife River f	Other f	No Response f	Total
Isle Royale - Grand Portage	181	57	19	15	72	12	344
North Shore, Grand Marais to Knife River	38	4	39	95	21	12	197
Knife River to Duluth	134	0	1,006	373	95	64	1,596
South Shore, Port Wing to Duluth, Bayfield to Duluth	161	49	216	134	27	37	587
Apostle Islands Area	1,368	49	62	71	61	60	1,631
Western Michigan Shore Area	49	51	4	4	0	4	108

Source: Modified from MMAS, 1977, Table 45.

TABLE 18

Number of Voyages Longer Than Weekends by Western Lake Superior Boaters by Port

	Apostle Islands f	Cornucopia f	Duluth f	Knife River f	Other f	No Response f	Total
Isle Royale - Grand Portage	183	96	126	27	15	25	447
North Shore, Grand Marais to Knife River	42	57	74	21	3	3	196
Knife River to Duluth	27	159	139	10	9	6	344
South Shore, Port Wing to Duluth, Bayfield to Port Wing	143	109	215	48	12	13	527
Apostle Islands Area	158	59	190	116	18	25	560
Western Michigan Shore Area	117	6	27	64	3	10	217

Source: Modified (data were collapsed) from MMAS, 1977, Table 45.

Table 19

Total Transient Voyages by Subregion
(Number of Overnights)

Subregion	One Overnight	Two or More Overnights[1]	Subtotal	Nonresident Expansion Factor[2]	Total Expanded Overnights	Length of Season (Days)	Average Daily Transient Equivalents	Total Transient Equivalents (Expanded)
Isle Royale - Grand Portage	344	2,235	2,579	1.76	4,539	122	27	37
Grand Marais to Two Harbors	197	980	1,177	1.76	2,072	122	9	17
Knife River to Duluth/Superior	1,596	1,670	3,266	1.76	5,748	122	27	47
Port Wing to Little Sand Bay	587	2,635	3,222	1.76	5,671			
Bayfield to Ashland	1,631	2,800	4,431	1.76	7,798	122	36	64
Saxon to Black River Harbor	108	1,085	1,193	1.76	2,100	122	10	17
	4,463	11,405	15,868		27,928		129	228

[1]Based on data presented in the MMAS Survey. The average duration of this group is approximately 5 overnights.

[2]There were 447 returned questionnaires of 787 mailed.

[3]Expanded to include non-respondents to the Latent Demand Survey.

V. DAY USE AND CAMPING DEMAND

Introduction

The demand for 12 outdoor recreation activities was studied by the Upper Great Lakes Regional Commission in 1972 (UGLRC, 1975).

The University of Wisconsin, through UW-Extension and UW-Madison conducted a telephone survey of 6,647 households in the nine-state primary market area of the Upper Great Lakes (Figure 4). A review of all available literature reveals that study to be the best available source for demand estimates for day use recreational activities as ell as camping.

The region offers recreation opportunities of two types. For those who seek forest-related experiences and small inland lakes for camping, fishing, picnicking, and swimming, there is an abundance of opportunities (Table 20) limited only by facilities available and the capability of resources to withstand the public use pressure.

On the other hand, Western Lake Superior and its shoreline is in itself, the major attraction in the region. The natural beauty coupled with the rich cultural heritage attract recreationalists from the entire country. For boaters Lake Superior offers a unique, if sometimes intimidating, water recreation experience.

Because of sample size used in the UGLRC telephone survey, the study results could not discriminate to below multiple county levels. Accordingly, the demand data for the 12 activities is reported by multiple county zones. The shoreline of Western Lake Superior is included in three zones (Table 20).

Estimates of demand by multiple county zones is not particularly useful for planning and sizing recreational developments along the Western Lake Superior shoreline area. Therefore, the demand data presented in the Upper Great Lakes Regional Commission's report (1975) needed to be broken down into the demand oriented towards Western Lake Superior and the demand oriented towards the numerous inland recreational sites. To accomplish this, several assumptions were necessary.

Assumptions

Demand data for camping, picnicking, boating, and fishing are relevant to this study. Of these five activities, additional demand data beyond the Upper Great Lakes Regional Commission study exists only for boating. Therefore, if shoreline activity demand is to be separated from inland demand, then it must be by identifying assumptions and manipulation of data based on boating activity and its relationship to these activities. There is some logical support for this approach.

scale in miles
0 125
one inch = 125 miles

FIGURE 4 UPPER GREAT LAKES PRIMARY RECREATIONAL MARKET AREA

Families and individuals on a one day or longer outing frequently participate in more than one recreational activity. Recreationalists attracted to Western Lake Superior areas usually combine boating activity with other activities such as camping, picnicking and fishing. This means that an activity such as fishing could be expressed as partially a function of boating. If this is used as the basis of the assumptions, then an approximation of shoreline demand for camping, picnicking, fishing, and swimming can be derived.

Assumptions underlying the demand estimates that follow include:

1. The estimates of boat rampings derived during the 1977 summer use season are representative of the average level of activity for Western Lake Superior.

2. Camping and picnicking activity on the shores of Western Lake Superior is related to camping and picnicking in the entire multicounty zone in the same way as boating.

The first assumption presents some problems since boat ramping has been measured only over one boating season. To assume that one set of observations accurately estimates the average condition stretches the data. However, in the absence of additional data, that one set of observations is still the best available estimate.

Note that the second assumption does not include swimming; that activity will be discussed separately.

The second assumption causes substantially more of a theoretical problem. The assumption implies that if 10 percent of all Western Lake Superior market area boaters use their craft on Western Lake Superior then 10 percent of all campers and picnickers also use facilities on the shores of Western Lake Superior. However, in the absence of additional data, the assumption does yield the best available desired estimate. The estimates are only provided to reflect overall public use pressures for recreational facilities along the shoreline area and indicate general differences between study regions.

Demand Computations

Using the above two assumptions and the demand estimates for the two multiple county zones, demand for facilities along the shoreline of Western Lake Superior can be developed that include the shoreline of Western Lake Superior in Wisconsin and Minnesota. The Michigan zone is also included, but it must be handled separately as explained below.

Boating demand and use is discussed in detail in earlier sections of this report. The source of the data is a mailed survey of registered boaters and other field work conducted for the St. Paul District, Corps of Engineers and an earlier survey (1976) of Western Lake Superior boaters conducted by the Minnesota Marine Advisory Service. The estimates of activity occasions for boating derived in the next paragraphs utilize data from those studies.

Overflights and 8-mm self-operating cameras were used to measure boat ramping frequency. That data yielded estimate of total activity occasions for boat rampings of 17,665 for the 1977 summer use season. In addition, the mailed survey of Western Lake Superior conducted by the Minnesota Marine Advisory Service (1977) provides an estimate of average boat use. Respondents to the latter survey indicated that the average number of days the boat is used during the boating season is 44.6 days (p.16). There are approximately 1,000 commercial and private berths available within the study area. This means that seasonally moored or berthed boats account for 44,600 activity occasions on Western Lake Superior. Thus, activity occasions for boating on Western Lake Superior total 62,265.

The Upper Great Lakes Regional Commission study estimated that in 1980 there would be a total of 3,046,868 activity occasions for boating in the Minnesota and Wisconsin zones of Western Lake Superior (Table 20). If this estimate is reduced to 1977 predicted levels using linear growth, then there were an estimated 2,446,542 boating activity occasions in 1977. Dividing the estimate for Western Lake Superior by the 1977 level of activity occasions reveals that 2.5 percent of all boating in the two multicounty zones occur on Western Lake Superior.

By multiplying the similar estimates of camping, picnicking, and fishing by 2.5 percent, then an estimate of these activities for Western Lake Superior is available. Table 20 presents the demand data. It is likely that these values are conservative since boating on Western Lake Superior requires some degree of experience and the Lake is sometimes intimidating. Consequently, the percentage of boaters in the market area using the Lake is probably lower than the percentage of picnickers, campers, and fishermen who use the Lake. However, in keeping with the stated objective of producing conservative demand estimates, we have adopted this methodology.

Projection of this data is difficult since there is no reliable data collected which indicates the growth trends past 1980. Thus, projecting camping, picnicking and fishing use for thirty years into the future is precarious at best. The planners who use this report should regard the projections in Table 20 as approximations of reality until more precise data are developed. The projections listed below use the 1972-1980 annual growth rate for each activity through 1992. For 1997 and 2002, the growth rate used is equal to the population growth rate for those intervals. The total activity occasions computed in this manner were then multiplied by 2.5 percent to arrive at the allocation for the shoreline of Lake Superior.

TABLE 20

Estimates of Annual Activity Occasions for Camping, Picnicking and Fishing for Western Lake Superior

State/Year	Picnicking	Camping	Fishing
Minnesota			
1977	5,031	22,649	82,264
1982	6,611	29,648	111,129
1987	8,912	36,648	139,993
1992	9,773	43,647	168,858
1997	10,245	45,757	177,022
2002	10,719	47,874	185,210
Wisconsin			
1977	2,182	11,171	31,485
1982	2,864	14,691	42,470
1987	3,546	18,212	53,455
1992	4,227	21,733	64,440
1997	4,432	22,783	67,555
2002	4,637	23,837	70,680

Little Girls Point, Michigan is located within 8 miles of the Michigan-Wisconsin border. For the purpose of this study and given the level of data available, independent estimates are not derived for Michigan. Therefore, for the Little Girls Point estimate, the Wisconsin values are used.

Swimming was not included in this analysis because of the extremely low use observed on Western Lake Superior. Water temperature in Lake Superior, even in shallow and protected areas, inhibits swimming. Swimming is rare in the Lake, but sunbathing is considerable more common. For the purpose of this investigation, swimming can be ignored since facilities already exist to accommodate the existing low use.

Other Studies

During 1977 two additional studies were undertaken concerning Western Lake Superior shoreline recreation in Wisconsin and Minnesota. The first, was conducted for the Wisconsin DNR. The report, in draft form, addresses economic impacts and provides demand estimates for selected Lake Michigan and Lake Superior Harbors. The study relies on previously collected data. The second study was prepared by the Minnesota DNR as part of their CZM program. The report includes both an inventory and estimates of demand. Again, the report relies on existing data and does not present original demand data.

VI. INVENTORY AND USE AT TEN WESTERN LAKE SUPERIOR HARBORS

As part of this investigation existing recreational facilities were inventoried at ten harbors. These harbors were selected because they are the major existing, publically developed harbors in the study area. Some, such as Port Wing and Grand Marais were developed under the Federal Harbor-of-Refuge program of the 1940's - a function they still serve today. Others, exemplified by Two Harbors, have traditionally been dominated by commercial activity. However, all are now important to recreational boating on Western Lake Superior.

Existing harbors not included in this analysis include Grand Portage, Port Superior, and Black River Harbor. Grand Portage and Port Superior are private developments, although Grand Portage has been proposed as a potential project harbor site. Black River Harbor is operated by the U.S. Forest Service.

Previous sections of this report presented demand for boat slips and boat ramping activity at these harbors. Table 21 presents the inventory or recreational facilities. Facilities range from well designed and maintained marina, camping and picnicking facilities to minimally developed harbors that are only occasionally maintained.

TABLE 21

Existing Recreational Facilities In and Near Ten Western Lake Superior Harbors

Harbor	Boat Slips	Boat Ramps	Camping Sites	Picnic Tables	Fishing From Breakwater
Grand Marais, MN	10		80	4	Yes
Two Harbors, MN	0	1	-	-	
Knife River, MN	90	1	-	-	
Duluth-Superior, MN and WI	275[1]	4	40	35	
Port Wing, WI	0[2]	1	35	5	Yes
Cornucopia, WI	70	2	47	8	
Bayfield, WI	147	2	51	6	Yes
La Pointe, WI	140	1	-	2	Yes
Ashland, WI	26	4	127		
Saxon, WI	55	1	-	-	

[1] Does not include a proposed development on Barkers Island in Superior to develop 350 new slips.

[2] No slips available, but boats may be docked along the harbor walls.

Five harbors have modern, well managed marinas. These are Knife River, Duluth-Superior, Bayfield, La Pointe and Saxon. Only at Duluth-Superior and La Pointe are the marinas built behind privately constructed and maintained protective works. These five harbors are among the most popular at the head of the Lake. To a certain extent, the quality of the facilities explain the long waiting lists and the high demand for boat slips in the area.

The other harbors have significant potential for development of new small boat facilities - each with its own advantages and disadvantages. Some, such as Port Wing are poorly maintained and offer little or no shore support facilities for the boater.

The following discussion addresses potential for development of expanded or new facilities at each of these ten existing harbors. As required by contract, the harbors are prioritized for development. Criteria used by the contractor in developing the list include:

- existing unsatisfied demand
- capability to expand or develop new facilities at the site
- demonstated capability or potential to maintain facilities once constructed
- environmental impacts associated with development

Table 22 presents the priority for development derived in this study. The ranking is partially quantitative and partially qualitative. During the study representatives of Weston and the St. Paul District discussed these key issues with representatives of some communities, individuals conversant in small boating on Western Lake Superior, and other researchers. The final rankings represent the contractor's best judgement based on his review of this background information.

The ranking of each subregion by demand is quantitative. Results of the survey presented earlier in this report are repeated here. Again, demand is treated by subregion because of the greater reliability obtained when the results are grouped.

Physical capability to expand is a general measure of the ease with which new facilities could be constructed. In part, it is an estimate of the degree of existing development of shoreline resources. For this measure a ranking of 1 indicates that new facilities could be provided within the existing breakwater without additional dredging or breakwater construction. A ranking of 2 indicates that either breakwater construction or dredging or both will be required for new facilities. The ranking of 3 indicates that existing shoreline resource constraints inhibit further expansion of facilities.

The third criteria is maintenance potential -- which reflects our estimate of the community's potential capability to maintain facilities when and if constructed. While this is somewhat judgemental, in some cases the ranking is clear cut. At present the several well maintained marinas are visually evident to the investigator as are the poorly maintained facilities. In between are two communities with little or no track record. These are where judgement was applied.

TABLE 22

Ranking of Harbors by Priority

Harbor	Subregion Demand Rank[1]	Physical Capability to Expand	Maintenance Potential	Environmental Impact Disincentive[2]	Final Rank
Grand Marais	4	2	1	1	6
Two Harbors	4	2	2	1	8
Knife River	2	2	1	0	2
Duluth-Superior	2	2	1	0	2
Port Wing	6	1	4	1	10
Cornucopia	6	2	3	1	9
Bayfield	3	3	1	1	7
La Pointe	3	2	1	1	5
Ashland	3	2	2	0	4
Saxon	1	2	1	0	1

[1]The fifth rank subregion-Grand Portage and Isle Royale is not represented in this list. That subregion is discussed in detail in "Benefit Analyses for Small Craft Navigation Harbors in Minnesota, Wisconsin and Michigan".

[2]See each harbor narrative for nature of disincentive.

The final criteria, environmental impact disincentive, reflects the degree to which environmental disruption may occur. For this ranking it is assumed that application of existing sound principles of design, knowledge and consideration of site-specific peculiarities, and adaption of impact mitigation measures would result in construction and operation of an environmentally sound facilities. Considered here are only those impacts which the researchers believe are unavoidable in the project. Final rankings are not entirely additive. That is, environmental impacts associated with a site have resulted in harbors being listed lower in priority. For example, La Pointe's environmental disincentive results in it being rated lower than Ashland.

GRAND MARAIS - Rank 6

Setting

Grand Marais is unquestionably the most picturesque harbor in the study area. Presently, there are two breakwaters which afford protection to small recreational craft. The outer, original breakwater protects a large arcuate bay. A smaller, municipally built breakwater offers additional protection for the ten slips maintained by the local government. Shore support facilities include a large, well designed and maintained campground, a private campground, 4 picnic tables, motels, restaurants and the other services offered by the northshore community.

Potential

Future developments at Grand Marais could include a commercial marina and possibly a picnic area. The beauty of the existing harbor and its proximity to Isle Royale National Park make it an attractive alternative to developments at Grand Portage. As indicated in the previous sections of this report, Grand Marais has a total demand of approximately 276, most of which is derived from existing Western Lake Superior Boaters. As such it ranks as fifth highest in demand of all harbors on Western Lake Superior (although its subregion ranks fourth).

Within the outer breakwater there is more than sufficient area to expand. Additional protection, probably in the form of breakwaters will be necessary, however, to provide minimum permitted protection (1-foot waves).

Grand Marais has demonstrated ability to maintain its existing recreational facilities at a sound management level. While they do not now have responsibilty for maintaining marina facilities, their existing record and the economics of marina management on Western Lake Superior indicate that the investment will likely be adequately maintained.

Environmental Issues

Aesthetics are likely to be the primary area of impacts associated with small boat facilities construction and operation. The vistas and panoramas afforded residents and tourists will be disrupted by the recreational craft moored within the harbor.

Another area of impact relates to the management objectives of Isle Royal National Park. By increasing the number of locally based pleasure craft within one day's sail of Isle Royale there is an implicit increase in pressure on the resources of that National Park. This issue must be assessed in detail before the facilities are expanded.

TWO HARBORS - Rank 8

Setting

Two Harbors has been one of the most important commercial ports for shipping iron ore in Minnesota, Wisconsin or Michigan. The port is dominated by the three ore docks operated by the Duluth, Missabi, and Iron Range Railway Co. Presently, 1000-foot ore boats call at the harbor. The harbor is relatively small so wakes generated by the ore carriers will affect recreational craft and cause some congestion (almost daily in frequency).

Potential

It is questionable that Two Harbors now has sufficient demand to justify development for recreational boating unless Duluth-Superior and Knife River fail to expand their facilities. The demand survey (Table 6) indicates that the site

ranks eleventh (although the subregion ranks fourth).

Additional facilities that could be supplied at Two Harbors include a waterfront park suggested by the City incorporating the historic iron ore shipping (site of the first load of iron ore to Lower Great Lakes steel mills) and day use. Operation of the ore docks at night effectively preclude campground development. However, extensive landscaping will be necessary for an attractive, pleasant recreational experience.

Environmental Issues

Harbor conjestion and boater safety are the two primary issues associated with facilities constructed on Agate Bay. If an alternative site on Burlington Bay was selected, then environmental issues include disruption of the existing aquatic ecosystem since the bay does not now have small boat mooring facilities. Disruption caused by construction of the breakwater would be the most serious

KNIFE RIVER - Ranking 2

Setting

The existing marina development is located lakeward of the settlement of Knife River. The facilities were constructed by Lake County using EDA funding. At present there is pressure to expand facilities because of the long waiting list and the high demand for slips. Further expansion would likely be accomplished by dredging (possibly blasting bedrock) adjacent land.

Potential

Further development at Knife River should be limited to additional small boat facilities. The harbor is located on a stretch of shoreline extensively developed with cabins, motels and private campgrounds. There are no existing camping and picnicking facilities available at the marina site. Consideration of security at the marina argues for continuing the marina's somewhat isolated location.

Environmental Issues

Other than removal of additional overburden, and possibly bedrock, there are no sensitive environmental issues associated with facility expansion. The site characteristics are such that construction procedures could greatly minimize impacts.

DULUTH-SUPERIOR, MINNESOTA AND WISCONSIN - Ranking 2

Setting

The Twin Ports have extensive commercial marina developments. Most of these have developed breakwaters at their own expense within the harbor facilities

maintained by the St. Paul District. At present, the City of Superior is finalizing funding for their Barkers Island Project. As planned, the development will accommodate 350 recreational craft. That is sufficient for the demand identified in Table 13.

Potential

If the Barker's Island project becomes reality, then recreational boating requirements will be essentially satisfied for the present. However, there are no existing formal facilities for transient craft in the harbor. Should Barker's Island project not come to fruition, then transient facilities should be provided for.

Environmental Issues

No significant environmetnal issues that have been identified that would be a disincentive to facility development.

PORT WING, WISCONSIN - Ranking 10

Setting

Port Wing was initially developed as a harbor of refuge. At the present time it is the only existing harbor that does not provide berthing for recreational craft. However, recreational craft can be docked along the harbor walls. Existing facilities, such as there are, at the harbor site are poorly maintained.

Potential

Port Wing has the potential for developing berthings within the existing facilities. The results of this study identify little incentive to develop beyond the limits of the existing development.

Environmental Issues

Areas required for expansion at Port Wing would involve destruction of wetlands at the mouths of streams flowing into the harbor. These wetlands are the primary sensitive environmental concern associated with development at Port Wing.

CORNUCOPIA - Ranking 9

Setting

Like Port Wing, Cornucopia is located on a secondary state highway, somewhat removed from main traveled tourist routes. Presently, there are facilities for 70 recreational craft at one private development and one township development. Facilities are limited to berths, gas and snacks in the immediate harbor area. While the marina facilities are minimal, there is some interest in developing modern facilities and upgrading service.

Potential

Cornucopia's greatest potential lies in upgrading its present facilities to offer services at rates competitive with other parts of Western Lake Superior. Identified demand appears to be too low to justify additional commitment of limited resources. In line with this, the existing picnicking and camping facilities adjacent to the harbor could be upgraded with improved landscaping to provide a more pleasant recreational experience.

Environmental Issue

Expansion of the harbor area at Cornucopia would disrupt adjacent wetlands. The importance of those wetlands relative to further recreational development will need to be addressed.

BAYFIELD - Rank 7

Setting

Bayfield is the primary harbor servicing the Apostle Islands National Lakeshore. Currently there are two separate marinas for recreational craft with the largest located within the publicly built and maintained breakwaters. At present, the waterfront is extensively developed; land support facilities are taxed in some cases. Recently, citizens and tourists have complained of inadequate parking during the peak summer use period. This problem appears sufficiently acute so as to inhibit further development.

Potential

Given the existing level of development along the shoreline in Bayfield, potential for additional new development is restricted. Adjacent communities or harbors may be able to develop at a lower economic and social cost. Modest expansion at existing facilities is possible, but shore support facilities must be provided for.

Environmental Issues

The primary issues associated with new or expanded facilities at Bayfield relate to impact on shore support facilities and the local infrastructure. Bayfield now appears to be heavily affected by the existing harbor facilities (including the ferry and excursion boat).

LA POINTE - Ranking 5

Setting

La Point recreational craft facilities are primarily at a privately developed marina and harbor south of the public dock used by the ferry. The automobile

ferry is the only regularly scheduled connection between the mainland and Madeline Island. At present, there are facilities for 140 recreational craft at the private marina.

Potential

At present there is sufficient demand to double the number of berthings available at La Pointe. The survey (Table 6) indicates demand for 148 new berths. In addition to these facilities, day use and camping facilities would likely be very popular with tourists. However, there will likely be intense local opposition to such land based facilities. Both the residences of Bayfield and La Pointe are likely to object to the increased congestion in Bayfield and the increased influx of tourists to Madeline Island.

Environmental Issues

Two issues are likely to dominate any proposal to increase recreational facilities above the level now offered. The first will be from residences of the island objecting to increasing the number of nonresidences on the island during peak use periods. The second issue relates to the congestion already in existence at Bayfield's waterfront. Development on Madeline Island will directly affect Bayfield. Therefore, these issues will need to be addressed prior to finalization of any future development plans.

ASHLAND - Ranking 4

Setting

Ashland is located at the base of Chequamegon Bay approximately 8 miles south of the Apostle Islands. The city is located on U.S. Hwy. 2 and Wisconsin Hwy. 13, two major routes in this heavily recreational region. Ashland has a tradition of commercial traffic in its port. However, that commercial traffic dramatically decreased fifteen to twenty years ago when iron ore mines in northern Wisconsin closed. Since then, most of Ashland's waterfront has fallen idle.

Potential

Now, the City of Ashland is now planning waterfront redevelopment which will be heavily dependent upon recreational facilities. Included in preliminary plans is a marina and small boat harbor. Table 6 indicates that Ashland has a total demand for only a 20-boat marina, but as explained earlier, the city is situated so that it could satisfy much of the subregions demand that is centered at other harbors.

The quality of Ashland's existing waterfront developments is such that each could benefit from upgrading. A new motel, additional day use facilities and recreational boating facilities appear viable at Ashland.

Environmental Issues

Given the past use and level of development at Ashland's waterfront, no unusual environmental issues can be identified beyond those associated with any small boat harbor.

SAXON - Ranking 1

Setting

Saxon Harbor is located within three miles of the Wisconsin-Michigan border. Initially constructed as a harbor of refuge, a small boat marina was added later. At present there are facilities for 55 recreational craft.

Saxon is located within the subregion with the highest unsatisfied demand for berthings. The coastal segment including Saxon, Wisconsin, Little Girls Point, Michigan and Black River Harbor, Michigan has a total demand of over 750 berthings.

Potential

Saxon has considerable potential for development, particularly if the proposed development at Little Girls Point does not come to fruition. There is sufficient demand in the area for a major expansion at Saxon. Because of Saxon's location near U.S. Hwy. 2 and the attractiveness of the northern forest, a campground and picnic area could be considered in association with the harbor.

Environmental Issues

No environmental issues beyond these associated with expansion of a small boat harbor are likely to be encountered. Expansion could likely be accomplished by dredging (possibly blasting bedrock) inland areas rather than modifying the existing breakwaters.

SUMMARY AND CONCLUSIONS

The results of this study indicate that the number of berthings available for private recreational craft satisfy less than 50 percent of the existing demand. If sufficient facilities are to be planned for the year 2002, then an estimated total of 2031 new berthings and moorings are required. This is by far the area which requires the greatest commitment of Corps of Engineers resources if existing and projected demand is to be accommodated through the use of Federal assistance.

Boat rampings on Western Lake Superior can generally be accommodated within existing facilities. However, locally there are crowding problems which could be alleviated with upgraded ramping facilities. Outstanding examples are:

- Washburn,
- Superior, (Barkers Island) and
- Grand Portage

At each of these three locations a modern, protected, two-lane concrete boat ramp should be built as part of any proposed development.

Further, the number of modern, quality access points are limited on Western Lake Superior. Black River Harbor, Saxon, La Pointe, Minnesota Point (Duluth), Knife River and Grand Marais are among those access points with up-to-date facilities. Other access points could be upgraded to enlarge launching lanes and improve the ramp surfacing.

Beyond the results specifically identified in the several sections of the report, there is one area which was identified early in the study as the area of greatest potential conflict. That is, the implications inherent in developing small boat harbors or upgrading existing facilities which would improve access to Isle Royale National Park and The Apostle Islands National Lakeshore. While it was beyond the scope of this investigation to examine those implications, the investigators feel compelled to conclude with a note of caution.

As shown in this report, the pattern of existing recreational boat facilities is such that transient movements are limited along the Minnesota northshore because of a lack of safe refuges and facilities. However, harbors have been proposed and are at various stages of the planning process at Beaver Bay, Schroeder, and Grand Portage. Construction of these three harbors will likely cause a significant increase in transients willing to sail the northshore. This coupled with new marina facilities (as proposed) at Grand Portage could substantially increase pressure on Isle Royale National Park; pressure that would not necessarily enhance the resources of the Park. Sound planning and conformance with the intent of NEPA argues for thorough investigation of these issues prior to implementation of an ambitious construction program geared to satisfying the existing demand for berthings.

Examination of Western Lake Superior reveals that the U.S. Army Corps of Engineers, through the St. Paul District, is responsible for more harbor developments than any other Federal or State agency. As such, the St. Paul District has the greatest potential for impacting on the Lake and its use as both a recreational and a commercial resource. Careful planning and continued emphasis on basic demand and supply data will result in the best allocation of limited resources.

APPENDIX A

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF
NCSED-ER

Dear Registered Boat Owner:

At this time of year, when boaters are enjoying the benefits of the nation's water resources, the St. Paul District, U.S. Army Corps of Engineers is planning for the boating seasons ahead. We want to make sure that the rivers and lakes of the St. Paul District, including Western Lake Superior, offer safe and accessible recreation to all.

To help us with this job, we need assistance in finding out more about the kinds of facilities that you and other boaters require on two lakes within the District - Lake Superior and Lake Pepin on the Mississippi River. There are shortages in both areas; we would like to know how serious they are. We are, therefore, sending you this confidential questionnaire with the request that you take a few moments to fill it out and send it back to our recreation consultant, Roy F. Weston, Inc.

Your name was selected at random from the list of boat registrants in four States, but we need your reply to represent boating patterns and opinions. It will be used with all the other replies to show us the pattern of boating on Lake Superior and Lake Pepin and to indicate where we should be providing new or improved facilities. Simply place your completed questionnaire in the pre-paid, pre-addressed envelope and mail it back to us. Your responses will be kept confidential.

In an attempt to assure adequate response to the questionnaire, we will be sending out several follow-up reminders. If you have already responded when the follow-up letters arrive, please disregard them.

Thank you very much for you help.

Sincerely,

WALTER L. HEINE
Major, Corps of Engineers
Acting District Engineer

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF
NCSED-ER

Dear Registered Boat Owner:

About two weeks ago, we mailed you a copy of a questionnaire concerning boating on Lake Superior and Lake Pepin. Perhaps you have already completed and returned it? If not, will you please fill it out and mail it back today? We realize that it will take a few minutes of your time and effort, but it is important that we have a reply, even if the boat was not used or was sold or destroyed.

If you did not receive the questionnaire, please return the envelope for this letter with its address label intact and we will send you another.

Thank you.

Sincerely,

WALTER L. HLME
Major, Corps of Engineers
Acting District Engineer

DEPARTMENT OF THE ARMY
ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U S POST OFFICE & CUSTOM HOUSE
ST PAUL MINNESOTA 55101

REPLY TO
ATTENTION OF
NCSED-ER

Dear Registered Boat Owner:

About four weeks ago, we mailed you a questionnaire concerning boat use on Lake Superior and Lake Pepin. Hopefully, you have already completed and returned the questionnaire. If not, would you find time to do so today? If you have misplaced the questionnaire, we will send you another if you return the envelope for this letter with its address label intact.

A response is needed even if this boat was sold or not used for recreational purposes. If you feel you cannot complete the questionnaire, will you please return it unanswered and include a brief note explaining the circumstances.

Your name was selected at random from the list of boat registrants in Michigan, Wisconsin, Minnesota, and Iowa or the list of Federally documented boats. Your response will be used with other replies to show boating patterns and to indicate where we should be providing new or improved facilities.

This survey is rapidly coming to a close. It is important that your information be included in the results so that an accurate picture of boating on Lake Superior and Lake Pepin may be obtained. Please return the questionnaire as soon as possible.

Thank you for your assistance.

Sincerely,

WALTER L. HEME
Major, Corps of Engineers
Acting District Engineer

U. S. ARMY CORPS OF ENGINEERS
RECREATIONAL BOATING STUDY
LAKE SUPERIOR

NOTICE OF CONFIDENTIALITY: Your responses to this questionnaire will be held in complete confidence. Thank you in advance for taking time to complete the questionnaire. We believe that your responses are essential for our study. Please drop the completed questionnaire in the mail today.

TO BE COMPLETED BY THE BOAT OWNER OR MAJOR USER.

1 Location of permanent residence: County_____State_____Zip Code_____

If you have more than one boat, answer all questions with regard to your largest boat.

Please complete the questionnaire only if you used a boat for your own (or family's) personal recreation this year or last year. If you did not use a boat for personal recreation, STOP and return the questionnaire in the enclosed preaddressed and prepaid envelope.

2 Please check the category which best describes your largest boat and indicate the horsepower of the engine (if applicable).

	Horsepower		Horsepower
___Motor inboard	____hp	___Sailboat with auxillary outboard motor	____hp
___Motor outboard	____hp	___Sailboat without auxillary power	
___Motor inboard-outdrive	____hp	___Other (please describe)	
___Sailboat with auxillary inboard motor	____hp	_____	

3 How long is your boat? _____feet.

4 In what year was your boat manufactured? _____year.

5 How long have you owned your (largest) boat? _____years.

Your answers to the following questions (6 through 13) will assist us in our analysis of boating facilities.

6 Did you operate your boat on Lake Superior this year or last year?

___Yes. Please answer questions 8, 9, and 10
___No. Please answer questions 7 and 10.

7 If you did not operate your boat on Lake Superior, please tell us why not.

___Lake Superior is too far from residence
___Boat size is unsafe for Lake Superior
___No convenient launching facilities available
___No interest in boating on Lake Superior
___No permanent berth, anchorage, or storage facilities were available on Lake Superior
___Other (Please explain)_____

_____

(Proceed to Question 10)

8 If you did operate your boat on Lake Superior, how did you usually get your boat onto Lake Superior (check all that apply).

___Berthed or moored at a commercial marina, boat club, yacht club, or publicly-owned marina with direct water access.
___Berthed or moored at a private slip at a summer cottage or permanent home with direct water access.
___Dry stored and launched at a facility with direct water access.
___Trailered from home or other dry storage to launch facility.
___Other (please describe)_____

9 If you did operate your boat on Lake Superior, where is your home port this year? (The location where you kept or launched your boat most frequently).

Port or Location

___Black River Harbor
___Little Girls Point (Oman's Landing)
___Saxon Harbor
___Ashland Harbor
___Washburn Harbor
___Port Superior
___Bayfield Harbor
___La Pointe (Madeline Island)
___Little Sand Bay
___Cornucopia Harbor
___Port Wing Harbor
___Duluth-Superior Harbor
___Knife River Harbor
___Two Harbors Harbor
___Grand Marais
___Grand Portage
___Other (Describe)_____
_____

10 Did you try to obtain permanent berthing or mooring on Lake Superior this year?

___Yes. Complete questions 11, 12, and 13
___No. Complete questions 12 and 13

11 Place a check beside the name of each harbor that you contacted.

Port or Location

___Black River Harbor
___Little Girls Point (Oman's Landing)
___Saxon Harbor
___Ashland Harbor
___Washburn Harbor
___Port Superior
___Bayfield Harbor
___La Pointe (Madeline Island)
___Little Sand Bay
___Cornucopia Harbor
___Port Wing Harbor
___Duluth-Superior Harbor
___Knife River Harbor
___Two Harbors Harbor
___Grand Marais
___Grand Portage
___Other (Describe)_____
_____

12 How many overnight, or longer, cruises do you normally make in your boat on Lake Superior each season? (If you cannot recall the exact number, please give us your best guess)._____

Your answer to the following question will allow us to project boating needs so that adequate facilities can be planned for the future.

13 Please indicate your total family income.

___Less than $10,000
___$10,000 to $12,999
___$13,000 to $15,999
___$16,000 to $19,999
___$20,000 to $24,999
___$25,000 to $49,999
___Over $50,000

U. S. ARMY CORPS OF ENGINEERS
RECREATIONAL BOATING STUDY
LAKE PEPIN

Your answers to the following questions (14 through 20) will assist our analysis of facilities on Lake Pepin.

14 Did you operate your boat on Lake Pepin this year or last year?

___Yes. Please answer questions 16, 17, and 18
___No. Please answer questions 15 and 18

15 If you did not operate your boat on Lake Pepin, please tell us why not.

___Lake Pepin is too far from residence
___Boat size is unsafe for Lake Pepin
___No convenient launching facilities available
___No interest in boating on Lake Pepin
___No permanent berth, anchorage, or storage facilities were available on Lake Pepin
___Other (Please explain)_____

_____

(Proceed to Question 18)

16 If you did operate your boat on Lake Pepin, how did you usually get your boat onto Lake Pepin (check all that apply)

___Berthed or moored at a commercial marina, boat club, yacht club, or publicly-owned marina with direct water access.
___Berthed or moored at a private slip at a summer cottage or permanent home with direct water access.
___Dry stored and launched at a facility with direct water access.
___Trailered from home or other dry storage to launch facility.
___Other (please describe)_____

_____

17 If you did operate your boat on Lake Pepin, where is your home port? (The location where you kept or launched your boat most frequently).

Location_____

18 Did you try to obtain permanent berthing or mooring on Lake Pepin in 1977?

___Yes. Complete questions 19 and 20
___No. Complete question 20

19 Please list the name of each marina that you contacted.

_____ _____

_____ _____

20 How many overnight, or longer, cruises do you normally make in your boat on Lake Pepin each season? (If you cannot recall the exact number, please give us your best guess)._____

21 Approximately how many days per year do you use your boat?_____Days.

22 Do you ever boat on the Upper Mississippi River between Minneapolis-St.Paul and St. Louis?

___Yes. How often?_____Days/year.
___No. Why not? Please explain_____

23 If you used your boat on the Upper Mississippi River, do you use the river's locks to navigate on the river?

___Yes.
___No. Why not? Please explain_____

Use the space below for any additional comments that you want to add to this survey.

APPENDIX B

SOCIOECONOMIC PROFILE

The Minnesota Marine Advisory Service Survey provides a socioeconomic profile for the existing boaters (with permanent berths) on Western Lake Superior. Tables B-1 through B-6 presents boater age, marital status, household size, educational level, occupation, and income. The results of the Boating Demand Survey are also presented in Table B-6. The two surveys did not utilize the same income breakdown. The boating demand survey utilized the same categories as the U.S. Bureau of Census.

Collapsing of the two income distributions to common categories reveals two markedly distinct distributions (Table B-7). Note that nearly 49.6 percent of the boating demand survey incomes are below $20,000. This compares with only 30.2 percent for the Minnesota Marine Advisory Service survey. The reason for the discrepancy relates to the different populations sampled.

The Minnesota Marine Advisory Service survey sampled the smaller population of boaters who occupy berths and also boat club members on Western Lake Superior. The Latent Demand Survey income figures are for all registered boaters who indicated that they boated on Western Lake Superior. The latter group includes a higher percentage of small, trailered boats (see next section, boat length).

TABLE B-1

Age of Western Lake Superior Recreational Boaters [1]

Age	f	%
19 - 24	8	1.8
25 - 29	29	6.5
30 - 34	63	14.1
35 - 39	62	13.9
40 - 44	45	10.1
45 - 49	71	15.9
50 - 54	58	13.0
55 - 59	50	11.2
60 - 64	36	8.0
65 - 69	10	2.2
70 - 74	7	1.5
Nonrespondents	8	1.8
Total	447	100.0

Mean $\overline{X}$ = 44.9

[1] Source: Minnesota Marine Advisory Service, 1977

TABLE B-2

Marital Status for Western Lake Superior Recreational Boaters[2]

	f	%
Single	34	7.6
Married	383	85.7
Separated	3	.7
Widowed	3	.7
Divorced	19	4.3
Nonrespondents	5	1.1
Total	447	100.1

[2] Source: Minnesota Marine Advisory Service, 1977.

TABLE B-3

Size of Household of Western Lake Superior Recreational Boaters [3]

	f	%
1 person	40	8.9
2 persons	140	31.3
3 persons	69	15.4
4 persons	85	19.0
5 persons	58	13.0
6 persons	28	6.3
7 persons	17	3.8
8 persons	4	.9
9 persons	4	.9
Nonrespondents	2	.4
Total	447	99.9

[3] Source: Minnesota Marine Advisory Service, 1977

TABLE B-4

Years of School Completed By Boaters in Western Lake Superior [4]

	f	%
1 - 5	1	.2
6 - 10	12	2.7
11 - 15	168	37.6
16 - 20	243	54.4
21 - 25	7	1.6
26 - 30	3	.7
Nonrespondents	13	2.9
Total	447	100.1
Average	15.5	

[4] Source: Minnesota Marine Advisory Service, 1977

TABLE B-5

Occupations of Western Lake Superior Recreational Boaters [5]

	f	%
Professional	121	27.1
Administrators, Managers	81	18.1
Technical, Semi Professional	44	9.8
Business Owners	30	6.7
Clerical & Kindred Workers	5	1.1
Skilled & Semi Skilled	54	12.1
Sales & Kindred Workers	51	11.4
Farmers	3	.7
Service Workers	5	1.1
Unskilled	2	.4
Housewife	1	.2
Retired	26	5.8
Student	3	.7
Nonrespondents	21	4.7
Total	447	100.0

[5] Source: Minnesota Marine Advisory Service, 1977.

TABLE B-6

Annual Family Income of
Western Lake Superior Recreational Boaters

Minnesota Marine Advisory Service			Boating Demand Survey[6]		
Income Range	Frequency	Percent	Income Range	Frequency	Percent
0 - 5,000	3	0.7	0 - 9,999	1980	9.5
5,000 - 10,000	13	2.9	10,000 - 12,999	1084	5.2
10,000 - 15,000	48	10.7	13,000 - 15,999	3468	16.7
15,000 - 20,000	58	13.0	16,000 - 19,999	3788	18.2
20,000 - 25,000	65	14.5	20,000 - 24,999	3644	17.6
25,000 - 30,000	47	10.5	25,000 - 49,999	4280	20.6
30,000 - 35,000	45	10.1	Over 50,000	1400	6.8
35,000 - 40,000	24	5.4			
40,000 - 45,000	107	23.9			
Nonrespondents	37	8.3		1128	5.4
TOTALS	447	100		20772	100
Mean		$27,768			

[6]Lake Superior users only; sample expanded to population.

NOTE: The mean income from the Weston survey cannot be meaningfully computed from the class data.

TABLE B-7

Comparison of Income Distributions
(Collapsed Data)[7]

Income Range	Minnesota Marine Advisory Service (Percent)	Boating Demand Study (Percent)
Less than 9,999	3.6	9.5
10,000 - 19,999	23.7	40.1
20,000 - 24,999	14.5	17.6
Over 25,000	49.9	27.4
Nonrespondents	8.3	5.4
TOTAL	100.0	100.0

[7]Source: Minnesota Marine Advisory Service, 1977.

Boater Characteristics

This section presents base data useful to planners concerning characteristics of existing boaters on Western Lake Superior and the primary market area. The information is presented in tabular form with little or no explanation. Data presented includes, boat age, length of ownership, horsepower, days the boat is used, and access point for Western Lake Superior boaters.

Table B-8 presents the distribution of boat age as derived from the Latent Demand Survey respondents. Data presented includes boaters in the entire market area and also Lake Superior boaters only.

TABLE B-8

Age Distribution: Boating Demand Survey

Boat Age	Age in Years: Total Market Area	Lake Superior Users	Boat Age	Age in Years: Total Market Area	Lake Superior Users
1	19632	1064	21	2620	128
2	17276	1292	22	1616	0
3	15944	1912	23	1084	0
4	16504	1636	24	521	0
5	14612	1360	25	660	0
6	7804	1144	26	384	0
7	13976	1308	27	2108	384
8	10976	1212	28	60	20
9	12472	1060	29	532	0
10	8916	1812	30	40	0
11	5764	1192	31	128	0
12	10772	808	35	40	20
13	6148	424	37	168	20
14	6108	660	38	276	148
15	4788	552	39	128	0
16	3676	296	41	20	20
17	9240	936	43	148	0
18	4896	404	46	128	0
19	4472	384	47	20	0
20	3596	148			

Source: Latent Demand Survey

Table B-9 presents the length of time (in years) that the respondents owned their boats.

TABLE B-9

Length of Ownership: Boating Demand Survey

Years Owned Boat	Total Market Area		Lake Superior Users	
	frequency	percent	frequency	percent
01	33000	11.9	2180	10.5
02	28460	10.2	3036	15.6
03	28004	10.1	3036	14.6
04	22308	8.0	2484	12.0
05	19348	7.0	1564	7.5
06	11244	4.0	1636	7.9
07	13352	4.8	788	3.8
08	9248	3.3	404	1.9
09	7840	2.8	1536	7.4
10	8768	3.2	956	4.6
11	3636	1.3	168	0.8
12	6580	2.4	404	1.9
13	2492	0.9	384	1.8
14	3812	1.4	256	1.2
15	3604	1.3	384	1.8
16	2088	0.8	256	1.2
17	3840	1.4	384	1.8
18	2088	0.8	276	1.3
19	1408	0.5	128	0.6
20	2068	0.7		
21	936	0.3		
22	896	0.3		
23	768	0.3		
24	20	0.0		
25	256	0.1		
27	788	0.3	128	0.6
29	128	0.0		
30	128	0.0		
31	128	0.0		
37	128	0.0		
40	128	0.0	128	0.6
43	128	0.0		
46	128	0.0		
No Response	59932	21.6	256	1.2
Totals	20772	100.0	20772	100.0

Source: Latent Demand Survey

Horsepower of power or auxillary power boats is presented in Table B-10 for both the total market area and Lake Superior.

TABLE B-10

Horsepower: Boating Demand Survey

Horsepower	Total Market Area Entire Survey frequency	percent	Lake Superior Users frequency	percent
5 or less	21,736	7.8	828	3.9
6-10	39,720	14.3	2464	11.9
11-20	22,964	8.3	2048	9.9
21-30	13,328	4.8	1592	7.7
31-40	20,188	7.3	2048	9.8
41-50	13,644	4.9	1408	6.8
51-60	9,752	3.5	808	3.9
61-70	11,700	4.2	1556	7.5
71-80	8,460	3.0	552	2.7
81-90	6,099	2.2	788	3.8
91-100	2,444	0.9	316	1.5
101-125	9,004	3.2	2256	10.9
126-150	4,868	1.8	652	3.1
151-175	3,496	1.2	800	3.8
176-200	3,392	1.2	732	3.5
201-225	1,436	0.5	256	1.2
226-250	1,376	0.5	168	0.8
251-300	960	0.3	20	0.1
301-350	476	0.2	40	0.2
351-400	436	0.2	60	0.3
401-500	1,264	0.5	296	1.4
501-600	56	0.1	20	0.1
601-700	148	0.1	0	0.0
700 and above	148	0.1	0	0.0
No response	80,320	28.9	1064	5.2
Total		100.0		100.0

Source: Latent Demand Survey

TABLE B-11

Use of Boat: Boating Demand Study
(Days)

	Entire Market Area		Lake Superior Users	
	f	%	f	%
00	788	0.3	-	-
01	128	0.0	-	-
02	1812	0.7	128	0.6
03	1684	0.6	404	1.9
04	1428	0.5	-	-
05	4244	1.5	-	-
06	4264	1.5	256	1.2
07	2708	1.0	128	0.6
08	2196	0.8	128	0.6
09	256	0.1	-	-
10	20984	7.6	808	3.9
11	4176	1.5	256	1.2
13	660	0.2	128	0.6
14	3152	1.1	148	0.7
15	13632	4.9	1300	6.3
16	1340	0.5	384	1.8
17	1024	0.4	384	1.8
18	1232	0.4	-	-
20	24908	9.0	1568	7.5
21	1448	0.5	256	1.2
22	276	0.1	128	0.6
23	20	0.0	-	-
24	1468	0.5	-	-
25	11304	4.1	760	3.7
26	532	0.2	20	0.1
27	256	0.1	-	-
28	660	0.2	-	-
29	20	0.0	20	0.1
30	25928	9.3	2424	11.7
32	908	0.3	168	0.8
33	128	0.0	128	0.6
35	3508	1.3	168	0.8
36	640	0.2	128	0.6
37	424	0.2	40	0.2
38	404	0.1	-	-
40	10476	3.8	1064	5.1
42	296	0.1	40	0.2
43	20	0.0	-	-
45	4356	1.6	276	1.3
46	128	0.0	-	-
48	168	0.1	-	-
50	6900	2.5	424	2.0
52	148	0.1	148	0.6
55	148	0.1	-	-
56	128	0.0	-	-
57	148	0.1	-	-
58	128	0.0	-	-
60	6440	2.3	936	4.5
65	552	0.2	128	0.6
70	1320	0.5	128	0.6
72	20	0.0	-	-
75	1568	0.6	148	0.7
78	276	0.1	128	0.6
80	880	0.3	-	-
82	128	0.0	-	-
85	20	0.0	-	-
87	128	0.0	-	-
88	20	0.0	-	-
90	3084	1.1	384	1.8
93	128	0.0	-	-
95	20	0.0	-	-
96	128	0.0	-	-
100	3392	1.2	660	3.2
105	20	0.0	-	-
110	256	0.1	-	-
120	1380	0.5	128	0.6
125	20	0.0	-	-
128	128	0.0	-	-
135	128	0.0	-	-
140	256	0.1	-	-
150	976	0.4	128	0.6
160	60	0.0	20	0.1
180	424	0.2	20	0.1
200	20	0.0	-	-
210	128	0.0	-	-
220	128	0.0	128	0.6
239	128	0.0	-	-
270	20	0.0	-	-
No response	94028	33.9	5624	27.1
Total	277,200	100.0	20,772	100.0

Table B-12 which presents the percent of boaters accessing Western Lake Superior through specific harbors or bays includes permanently berthed dry stored and trailered boats. The data is listed by geographical location but is also subtotaled by subregion. In contrast to the data presented in the section on latent demand this table includes all Lake Superior boaters who responded to this question.

TABLE B-12

Access Point of Western Lake Superior Boaters:
Boating Demand Survey

	frequency (expanded)	Percent	Percent By Subregion
Black River Harbor	404	3.2	
Little Girls Point	128	1.0	
Saxon	384	3.0	7.2
Ashland	680	5.3	
Washburn	296	2.4	
Port Superior	248	2.0	
Bayfield	1272	10.0	
La Pointe	680	5.3	25.0
Little Sand Bay	128	1.0	
Cornucopia	424	3.3	
Port Wing	148	1.2	5.5
Duluth/Superior	3968	31.1	
Knife River	2472	19.4	50.5
Two Harbors	384	3.0	
Grand Portage	228	1.8	1.8
Total	12,740	100.0	100.0

Source: Latent Demand Survey

APPENDIX C

Prior to initiation of the mailed survey of registered boaters, Weston reviewed all available data which included recreation demand estimates for Western Lake Superior. The following annotated bibliography includes all reports published prior to June 1977. Each of these were reviewed for pertinent data useful in designing the questionnaire mailed to registered boaters.

Upper Great Lakes Regional Recreation Planning Study, 1974. Part 2: Recreation Demand Survey and Forecasts. University of Wisconsin-Extension

TYPE: Telephone Survey SAMPLE SIZE: 6,642

ANALYTICAL TECHNIQUE: Multiple regression analyses with a four step process for determining demand projections to 1980.

A telephone survey of 6,642 households in a nine-state region surrounding the Upper Great Lakes was conducted in 1973. Multiple regression techniques were used to determine the significant socioeconomic variables that influenced recreation activity in the Upper Great Lakes during the 1973 use season. Swimming, sightseeing, bicycling, fishing, picnicking, boating, hunting, horseback riding, camping, hiking, tennis and golf were included in the survey, the estimates of existing use and projections. Demand was projected to 1980 by multiple-county zones in Minnesota, Wisconsin, and Michigan. Sample size limits resolution to less than multiple-county zones. No distinction was made between these activities taking place on the shores of Lake Superior and inland sites.

APPLICABILITY: Statistically, this is the most valuable study available on recreation demand in Western Lake Superior for our purposes. The results can be utilized to determine demand for camping swimming, picnicking, and to a certain extent, fishing. However, the lack of discrimination to smaller than multiple-county zones requires assumptions to allocate demand to specific harbor sites.

1974 Michigan Recreational Boating Study. September, 1975. Recreation Resource Consultants.

TYPE: Mailed questionnaire SAMPLE SIZE: 10,498

ANALYTICAL TECHNIQUE: Very similar to the 1974 Chicago District, Corps of Engineers Lake Michigan Survey.

A survey of registered boaters in the State of Michigan using a stratified sample. Boats over twenty feet were sampled more frequently than boats under twenty feet. The results include estimated 1974 boating participation by destination county. The survey did not include out-of-state visitors unless they had their boats registered in Michigan. These are the best results for Michigan boating use available, but not applicable to Gogebic County.

APPLICABILITY: Methodology only.

Lake Michigan Regional Boating Survey and Analysis. January, 1974. Chicago District, Corps of Engineers

TYPE: Mailed questionnaire SAMPLE SIZE: 2,162

ANALYTICAL TECHNIQUE: Multiple regression analyses.

This is the most directly applicable model for the present investigation. The survey included a stratified sample of registered boaters in Indiana, Illinois, and Wisconsin. Overall, the results are accurate and statistically sound. A critique of the methodology is included, which points out the weakness (mostly minor) in the study. Benefit analyses are included which were derived from the survey results. Discrimination of boating demand is to the specific harbor (except near the geographic limits of the study).

APPLICABILITY: Model for methodology only.

Lake Michigan Regional Boating Survey and Analysis. January, 1974.
Chicago District, Corps of Engineers

TYPE: Mailed questionnaire SAMPLE SIZE: 2,162

ANALYTICAL TECHNIQUE: Multiple regression analyses.

This is the most directly applicable model for the present investigation. The survey included a stratified sample of registered boaters in Indiana, Illinois, and Wisconsin. Overall, the results are accurate and statistically sound. A critique of the methodology is included, which points out the weakness (mostly minor) in the study. Benefit analyses are included which were derived from the survey results. Discrimination of boating demand is to the specific harbor (except near the geographic limits of the study).

APPLICABILITY: Model for methodology only.

Recreational Boating on Western Lake Superior. A Survey, 1977. Minnesota Marine Advisory Service.

TYPE: Mailed survey

SAMPLE SIZE: 477 (57 percent response)

ANALYTICAL TECHNIQUE: To date: Summary compilation only.
Multiple regression possible.

The mailed questionnaire was sent to members of boating clubs and individuals with assigned slips from Grand Portage to Ashland. The survey develops a socioeconomic profile for these groups. Information on boat use, boaters needs, transient facilities, and boat characteristics is available from the survey results. Saxon and Little Girl's Point are not included in the survey.

APPLICABILITY: The final report is scheduled for completion in one month. The data deck is available to Weston for additional analyses as needed. Any survey of berthed boat owners should build on, not repeat, the results of the survey.

Ministry of Natural Resources, 1974. Hedlin Menzies and Associates.

TYPE: Mailed survey

SAMPLE SIZE: Approximately 400 (38.3 percent)

ANALYTICAL TECHNIQUE: Multiple Regression Analysis Possible

The sample includes both Canadian and United States boaters. No demand estimates are available from this study since it surveyed existing boaters on Lake Superior. In addition, we have some reservations about the survey, and are in the process of collecting additional information from the Ministry of Natural Resources.

APPLICABILITY: Perhaps some transient boater information for the Isle Royale, Grand Portage, and Grand Marais area.

Great Lakes Basin Framework Study, Appendix R-9. Recreational Boating, 1975. Great Lakes Basin Commission.

TYPE: Existing Data

The report generated high, medium and low projections of recreational boating by river basin groups (one group covers our study area). High projection is based on boat sales (two times popululation growth); Medium projection is based on population growth (ignores latent demand); Low projection is based only on supply (growth only in areas of excess supply).

APPLICABILITY: The methodology is useful if the St. Paul District determines that existing information is satisfactory.

Impacts of Recreation in the Coastal Area: Demand and Supply of Recreation in Wisconsin's Coastal Counties. February, 1977. Wisconsin Coastal Zone Management.

TYPE: Existing Data

Data developed in the 1972 Upper Great Lakes Region Recreation Planning Study is coupled with the results of an unpublished 1970 survey conducted by the State of Wisconsin. The 1970 survey provided activity occasions by residents and nonresidents on an average weekend day in 1970 by activity. These activity occasions were used to disaggregate the 1972 data from multiple county zones to individual counties. It is generally held that it is not possible to utilize the 1970 activity occasions data to discriminate demand below the county level.

APPLICABILITY: The results for camping and fishing represent the best available for Wisconsin Counties along Lake Superior. The data can be used as indicators of the need for harbor-related, land-based facilities in these counties.

END