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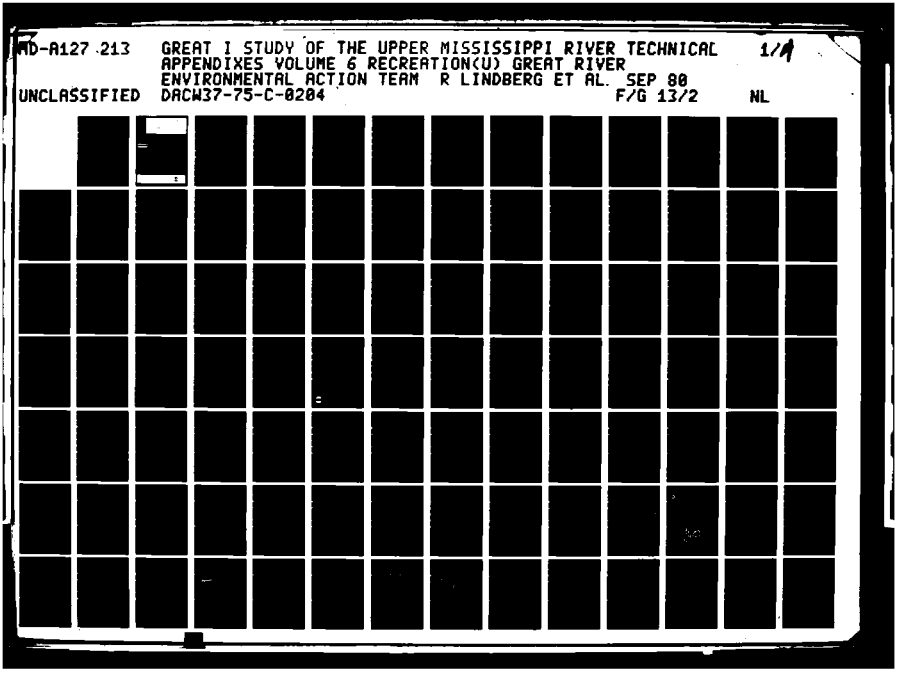

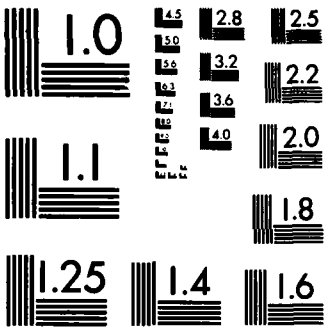

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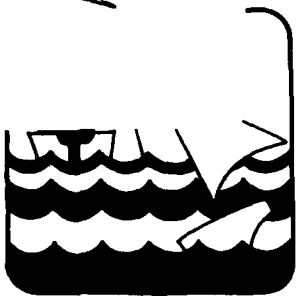

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The GREAT River

1980

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The Recreation Work Group investigated the recreational resources of the Upper Mississippi River corridor, including public use projections, Aerial recreation use survey, recreation facility inventory, the effects of dredged material disposal, and the reacreational boating patterns at the locks.

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OUTLINE

GREAT I

SEPTEMBER 1980

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TECHNICAL APPENDIXES

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- A. FLOODPLAIN MANAGEMENT
- B. DREDGED MATERIAL USES
- C. DREDGING REQUIREMENTS

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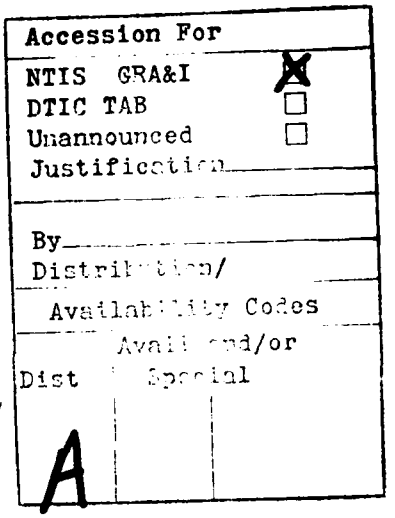

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- L. CHANNEL MAINTENANCE
  - PART I - NARRATIVE
  - PART II - POOL PLANS AND SITE DESCRIPTIONS - MINNESOTA RIVER, ST. CROIX RIVER, ST. ANTHONY FALLS, AND POOLS 1 AND 2
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- M. ENVIRONMENTAL IMPACT STATEMENT

RECREATION APPENDIX

TO

FINAL REPORT

OF

GREAT RIVER ENVIRONMENTAL ACTION TEAM

BY

RECREATION WORK GROUP

Mark C. Ackelson, Chairman (1975-79)
G. F. Schnepf, Chairman (1974-75)
Iowa Conservation Commission
Wallace State Office Building
Des Moines, Iowa 50319

Under Contract No.
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To

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St. Paul District
1135 U. S. Post Office and Custom House
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Written By:

Mark Ackelson, Jim Holleran,
John Tietz, Richard Lindberg
Members, Recreation Work Group

FORWORD FROM THE GREAT TEAM

This report has been prepared by the Recreation Work Group of the Great River Environmental Action Team (GREAT I). The conclusions and recommendations contained in this report reflect the work performed by the work group only, within its specific area of expertise Recommendations from this report will be considered and may be included in the final GREAT I report as considered appropriate by the GREAT I Team.

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From LIFE ON THE MISSISSIPPI

by MARK TWAIN

I entered upon the small enterprise of "learning" twelve or thirteen hundred miles of the great Mississippi River with the easy confidence of my time of life. If I had really known what I was about to require of my faculties, I should not have had the courage to begin.

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INTRODUCTION

The people of the Upper Midwest have long recognized that the Upper Mississippi River is one of the largest, most diverse, most productive river environments in the world. The nine-foot navigation channel project, authorized by Congress in 1930, has had the most influential effect on the natural character of the Upper Mississippi River and its usefulness for other purposes in the past 45 years. This modification of the river involves impoundments created by 29 lock and dam structures between St. Louis, Missouri, and Minneapolis, Minnesota. The navigation channel is continually maintained by dredging. However, the navigation channel occupies only a fraction of the total area of the river's waterscape. Also included are back channels, sloughs, floodplain lakes, thousands of natural and man-made islands, and hundreds of square miles of marsh. Much of this water resource is designated as the Upper Mississippi Wildlife and Fish Refuge, established by acts of Congress in 1924 and 1958. The Upper Mississippi River is the only inland river in the United States designated by Congress as both a fish and wildlife refuge and a Federal navigation project.

The Great River Study is being conducted by the Great River Environmental Action Team (GREAT I) to develop a river system management plan that will incorporate total river resource requirements. The concept of the study originated from a need to coordinate the maintenance of a nine-foot navigation channel by the Corps of Engineers from the head of navigation at Minneapolis and St. Paul, Minnesota, to Guttenberg, Iowa, with other river uses. To accomplish this, 11 "work groups" were established, each having the responsibility of exploring a specific issue relating to the river environment. Key issues to which work groups were assigned included the various aspects of river dredging and material disposal, fish and wildlife, water quality, commercial transportation, floodplain management, and recreation.

The Recreation Work Group of GREAT I (RWG I) includes representatives from the U. S. Corps of Engineers, U. S. Fish and Wildlife Service, Heritage Conservation and Recreation Service (HCRS, formerly the Bureau of Outdoor Recreation), and the States of Iowa (chairman), Wisconsin, and Minnesota. The RWG I was given the task of developing a program to provide for the integration of recreational opportunities with the operation and maintenance activities related to the nine-foot navigation channel.

OBJECTIVES

Total Study Objectives

As defined by the Great River Environmental Action Team, the basic objective of the Great River Study is "to develop a river system management plan that will incorporate total river resource requirements" (with specific emphasis directed at the maintenance requirements of the nine-foot channel within the river corridor).

Recreation Work Group Objectives

As directed by the total study effort, the RWG I considered its objectives in the following time frames:

> Near-term - Represent recreational interests in the process of developing recommendations for annual channel maintenance for the upcoming navigation seasons.

In fulfilling the near-term objective, the work group concentrated its efforts in providing guidance and recommendations to the Corps of Engineers regarding current site specific dredge disposal areas, disposal practices and post dredging treatment of some specific disposal sites.

> Long-term - Represent recreational interests in the process of developing recommendations related to long-term operation and maintenance activities of the nine-foot navigation channel.

The following planning goals were established to reach this long-term objective.

1. Identify and eliminate adverse effects to recreation resulting from channel operation and maintenance activities.

2. Enhance recreational benefits of the river corridor through channel maintenance activities.

3. Enhance recreational use of the river corridor consistent with maintaining quality of the corridor's natural resources by adequate distribution of related recreational opportunities.

4. Maintain the integrity of the recreation viewshed.

SCOPE

Total GREAT I Study

The total study effort embarked upon by the Great River Environmental Action Team involved research, study, and recommendations regarding all river uses within the corridor, especially those which will be affected by activities involved in the maintenance of the nine-foot navigation channel.

Recreation Work Group

The RWG I undertook an investigation of the recreational resources of the river corridor relating to the total study effort. To accomplish this, the work group directed its efforts toward the evaluation of the river resources as they relate to the recreational uses of the lands and waters of the river corridor. Additional efforts were directed at those resource areas which depend upon the river for a major portion of their recreation attraction.

ACCOMPLISHMENTS DURING STUDY PERIOD

Several major study efforts and analysis have been completed or assisted by the RWG I. Details of these efforts are contained elsewhere in this report.

1. Plan of Action - April, 1975

   This document was prepared by the Bureau of Outdoor Recreation and provided the original framework within which the RWG I approached its study efforts.

2. Legal and Institutional Framework Study - March, 1976

   This document was prepared for the RWG I by the former Bureau of Outdoor Recreation, now the Heritage Conservation and Recreation Service (HCRS). Its purpose was in providing an outdoor recreation planning framework by identifying current Federal and State programs and authorities as they relate to the study area.

3. Problem Identification - November, 1976

   To help identify the extent and severity of problems associated with the Mississippi River, a series of public meetings was held in the winter of 1974-75. From Minneapolis to Lansing, Iowa, the range of public attitudes and concerns was recorded. At this formulative stage, the proposed programs of the RWG I were adjusted to reflect these attitudes and concerns.

4. Public Use Projections - Revised February, 1978

   This report was prepared for the RWG I by the Corps of Engineers, St. Paul District. Its purpose was to project estimates of recreation demand for 12 activities. The report identifies supportive assumptions, delineates a project market area, determines existing use, includes population projections, presents per capita use rates and estimates future recreation use.

5. Aerial Recreation Use Survey - September, 1976

   The RWG I conducted an aerial recreation use survey on September 5, 1976 (Sunday of Labor Day weekend). This survey was conducted to begin evaluation of the recreational use of dredged spoil islands (resulting from channel maintenance) and to begin determination of the water-based recreation pressure by testing an aerial survey methodology. This report consists of summaries of the aerial photograph interpretation by pool and activities, provides "ground-truthing" information and discusses future study needs.

6. Recreation Facility and Cultural Resources Inventory - July, 1978

   The data was collected by the RWG I in conjunction with the Upper Mississippi River Conservation Committee and HCRS. This report consists of the completed recreation facility inventory forms, summaries by pool and entire study area, definitions of recreation terms and recommended map symbols; and the cultural resources inventory with definitions.

7. Dredged Material Disposal Site Evaluations - August, 1978

   In early 1978, the RWG I developed criteria by which to evaluate the positive and negative impacts of disposing of dredged material on various sites. The alternative disposal sites, originally identified by the Dredged Material Uses Work Group, were then subjected to a detailed evaluation. The evaluations were completed by site on a matrix.

8. Determining Means of Enhancing and Maintaining Beach Recreation Areas with Dredged Material - June, 1978

   This study analyzed physical site characteristics of existing dredged material disposal sites, determined which physical characteristics enhance the recreational experiences, and developed methods and guidelines for maintaining and enhancing these characteristics.

9. Boating Safety - September, 1978

   This report prepared by the RWG I compiled detailed data on recreational boating accidents. This information was more detailed than U. S. Coast Guard data and provides a combined pool by pool breakdown of accident types by state. The data was then compared to national accident data. Suggested boating safety graphics are contained within this document.

10. Pool by Pool Recommendations - September, 1978

    Public use projections (demand) were compared to the inventory of facilities (supply) to determine recreational facility "need" on a pool by pool basis. Dredged material sites (new and existing) were proposed for recreational use. These pool reports serve to summarize the data gathered, the conclusions and site specific recommendations reached as a result of analysis of the needs and the resource capabilities of each pool.

11. Recreational Facility Needs Analysis - September, 1978

    This document summarizes the recreational facility needs for the entire study area and each pool. The relative need for facility development is ranked by pool, among facilities for each pool and an overall comparison of need is determined between all pools for all activities.

12. Dredged Material Disposal Site Recreational Use Assessment - November, 1978

    This study was done in cooperation with the Recreational Craft Locks Study and St. Croix River studies.

    The following tasks were undertaken in developing information about the recreational use of dredged material.

    a. Collected data concerning the origin of the river trip, actual observed activities, reported activities, activity

preference, motivations for user satisfaction, user characteristics, and user perception.

b. Encoded, validated, reduced, analyzed, and interpreted the data provided.

c. Provided a statistical and narrative breakdown of the results.

d. Compared the results from the Mississippi to that of the Lower St. Croix River.

e. Documented the work performed in a usable format to the average lay reader and as a usable tool for recreational planners and managers of the GREAT I.

13. Recreational Craft Locks - Ongoing

This study is being conducted by the Corps of Engineers.

The study area included the nine-foot navigation channel project from the head of navigation at Minneapolis, Minnesota, to the mouth of the Missouri River between the St. Louis, Missouri, and Alton, Illinois. Within this area, the locks most likely to experience congestion were identified and a preliminary analysis of a wide range of alternatives to alleviate congestion was conducted. To identify these locks, an investigation of recreational boating patterns of boats using the locks was undertaken. In cooperation with the Recreation Work Group of GREATs I and II and work done for the Minnesota/Wisconsin Boundary Area Commission, other investigations of recreation patterns on the river were monitored and the applicable findings used in developing and assessing the alternatives were presented. Investigations were also made of the technical feasibility of the alternatives.

CONCLUSIONS

The following conclusions were reached as a result of various work group studies, discussions with "publics" and analysis of data.

Channel Maintenance Conclusions

1. Recreational Use of Dredged Material Disposal Areas (Sources: Aerial Recreational Use Survey, June, 1978; Dredged Material Disposal Site Recreational Use Assessment, November, 1978; and Methodology and Forecasts of Recreation Use and Small Craft Lockages in the Upper Mississippi River, July 26, 1978).

   Approximately 352,000 people used 130 dredged material disposal areas in 1978. Users of disposal areas spend less than $30.00 locally at each visit. Total expenditures for the visit are less than $75.00 per visit not including the value of recreational equipment. The average visit is 3.6 days. Users will visit the river an average of three times during the year. Disposal area users, therefore, contribute something less than $32 million to local economics annually. This information represents the best available at this time. The data encoding methodology prevents a more detailed estimate of expenditures.

   On one day, September 5, 1976, (Sunday of Labor Day Weekend) between 12:00 noon and 4:00 p.m. there were approximately 1,570 boats on the river at once. Approximately 1,070 of these were pulled up on dredged material disposal areas. Of these, approximately one-third were houseboats and two-thirds were runabouts. These boats represented approximately 7,100 recreationists. This estimate assumes a turnover rate of only 1.0. Using a higher turnover rate could significantly affect this estimate. Over 60 percent of the recreational boaters can be expected to use these areas at any one time.

   According to a recent survey of recreational lockage users, 38 percent of those using the locks camp on dredged material islands. The most popular activities, however, are swimming and picnicking. It is probably reasonable to assume that these activities also take place on dredged material disposal areas.

   Dredged material disposal site distribution throughout the study area influences recreational beach/island use more than population density or access.

2. Characteristics of Dredged Material Disposal Sites Used by Recreationists (Aerial Recreation Use Survey, September, 1978; Determining Means of Maintaining and Enhancing Recreation Areas With Dredged Material, June, 1978).

Physical attributes of disposal sites appear to significantly influence the extent and distribution of recreational use. Most areas used have some overstory vegetation, have relatively deep adjacent water, were adjacent to or near boat ramp access, and have "gentle slopes" on the disposal site.

The on-site inspection teams, which make recommendations for dredged material disposal, can determine the location, shape and contours, and other physical characteristics that would enhance the recreational experiences. With this planning, the recreational experience can be enhanced without radically changing current disposal operations.

3. Protection of Natural Resources (Source: RWG I Discussions).

According to "Island of America" by the Bureau of Outdoor Recreation, August 6, 1970, many islands within the Mississippi River are of regional and national significance. These island areas (state natural, scientific, and preserves) should be afforded appropriate protection from indiscriminate dredged material disposal and development.

Backwater areas provide valuable habitat and support a great deal of recreation. Many of these areas are being lost to natural sedimentation, secondary movement of dredged material and disposal of dredged material. Some areas have "primitive area" benefits and should be protected against encroachments, including dredge material disposal.

River Resource Management Conclusions

4. Available Recreation Resources (Source: Recreation Facility and Cultural Resources Inventory, July, 1978).

Over 12,000 acres of developed and over 15,000 acres of undeveloped recreation lands (not including dredged material islands/beaches) are in the study area. Other recreation resources are listed in the following table.

RECREATION RESOURCES IN THE STUDY AREA

Resource	Number
Boat launching lanes	198
Boat launching parking spaces	7,815
Marina slips	5,830[1]
Rental boats	702
Privately moored boats (not in marinas)	2,860[2]
Boating/fishing service areas	102
Individual camping units	2,483
Group camping units	362
Picnic tables	3,690
Designated hiking trails, miles	140
Designated horseback riding trails, miles	28
Designated bicycling trails, miles	6
Designated cross-country ski trails, miles	30
Designated snowmobile trails, miles	40
Interpretive areas	6
Road access beach, acres	0.3
Fishing barge or pier	9

[1]The inventory incorrectly totals 7,830.

[2]Aerial Survey of September 5, 1976; June, 1978.

5. Additional Recreation Facilities (Source: Recreational Needs Analysis, September, 1978).

   Many of the existing recreational facilities are unequally distributed throughout the study area. Certain areas of the river, therefore, have a greater "need" for additional facilities. Areas showing greatest need are Pools 3, 7, 9, 5A, 5, and 6. The pool-by-pool recommendations contained elsewhere in this report spell out these needs. Much of the projected need can be met by upgrading and/or expanding existing facilities.

   Many recreation areas (public and private) are not adequately marked with signs.

6. Recreation User Data (Source: Public Use Projections, February, 1978; Aerial Recreation Use Survey, September, 1978).

   Consistent and reliable recreational use data are generally lacking. The lack of data has made projecting recreation demands difficult and has resulted in projections with "no statement regarding the statistical validity or reliability of annual use estimates."

   This data is needed by a wide range of management/development agencies and organizations to document and evaluate recreational use areas (including dredged spoil areas), to identify commercial/ recreational conflicts, to identify congested recreation areas, to identify potential development needs, establish long-range management plans, environmental impacts, social/psychological impacts, etc. In addition, an economical standard method of periodically updating this information is needed to provide for continual evaluation and monitoring of recreational use of the river.

7. Environmental Impacts of Recreation (Source: Fish and Wildlife Work Group Evaluation, March 8, 1977).

   Overdevelopment of boat houses, boat landings, docks and floats along shorelines have a potential for a high level of adverse impact to the extent that fish and wildlife as well as habitat is disturbed.

   Prop and wave wash from recreation (and commerical) vessels may increase turbidity and erosion in localized areas. In addition, recreational boaters have been seen "hazing" wildlife and creating habitat disturbances.

8. Potential Recreation Boats (Source: Aerial Recreation Use Survey, June, 1978).

   There is a potential for approximately 15,000 boats to be in use at any one time. This figure represents the total capacity of marina slips, boat launch sites (limited by available

parking), and privately moored boats. Between 6 and 17 percent of these boats are in use at any one time depending upon which pool is being analyzed. Overall, approximately 10 percent of the boating potential is realized at any one time.

9. Recreational Boating Safety (Source: Aerial Recreation Use Survey, June, 1978; Boating Safety, September, 1978).

Some areas experience congestion (0.03 to 0.05 boats per acre), while other areas receive much lower use (0.01 to 0.03 boats per acre) as determined by spatial standards and aerial surveys. This range of densities provides for a variety of recreational experiences and creates different management problems.

Generally, there is no need for additional boating laws, only better enforcement of existing laws.

The states (especially Minnesota and Wisconsin) need to place more emphasis on boating law enforcement along the Mississippi River.

Collisions between recreational boats and commercial tows are not a major source of accidents. Collisions between two or more recreational boats, between recreational boats and objects, faulty equipment, and falling overboard account for most recreational boating accidents in the GREAT I segment of the Mississippi River.

Most of these accidents are the result of operator failure, operator unfamiliarity with the river and its unique safety problems and probably intoxication.

The national accident rate has varied from approximately 0.16-0.21 over the 1970-77 period. All pools within the study area have accident rates higher than the national average. Pools of greatest concern in the GREAT I area for recreational boating accidents are (in decreasing order) St. Croix, 8, 4, 10, and 2. Special emphasis needs to be given to the St. Croix and Pool 8 (LaCrosse, Wisconsin area).

More attention must be given to the accuracy of the boating accident reports. The exact location of accidents, which might include river mile, bank, sketch of areas, etc., should be given. This would allow state enforcement agencies and Coast Guard personnel to better determine "high accident" areas and to better cooperate in water patrolling efforts in these areas.

More attention and consideration needs to be given to supplying information concerning boating safety (potential hazards of channel maintenance structures, tow boats, major causes of accidents, etc.) on the Mississippi River. The states, Corps

of Engineers, and UMRCC should include this information within their "facility guides" in a graphic manner easily interpreted by the public. The U.S. Coast Guard brochure "Riverways" could in part serve as a source for the information. All agencies should continue to emphasize boating safety through classroom instruction, licensing, and information distribution.

There are many (unknown quantity) boating accidents that are probably not reported--both those required by law (over $100 property damage), and those not required by law.

States should consider requiring boat repair facilities (marinas, repair shops, dealers, etc.) to be registered by the states and be required to report accidents (over $100 property damage) to the appropriate state or federal agencies before the necessary repairs can be made. This might also apply to insurance claims.

Information on high accident areas, congested areas, etc., should be distributed to the public by agency managers to help reduce the number of potential accidents.

The Corps of Engineers should further investigate providing mooring facilities, signing, etc. adjacent or near locks to provide for mooring and safe passage of recreational craft through the locks.

Queuing can create safety hazards. Much of this safety concern can be alleviated by allowing waiting recreational craft to lock immediately after a barge tow leaves - one lockage each direction maximum if a barge tow is waiting. This would not only allow the recreational boater to be on his way but, also, clears the approach area for the waiting tow.

The recreation boating accidents for the GREAT I study area, ranked in decreasing order as a percentage of the total reported accidents for the period 1970 to 1977 are:

Accident Type	1970-1977 Overall Percentage
Recreation Boat-Recreation Boat	31.9%
Recreation Boat-Object	17.6%
Faulty Equipment	8.2%
Fell Overboard	7.6%
Recreation Boat-Barge	5.3%
Recreation Boat-Person	4.1%
Swamped by Recreation Boat	3.5%
Swamped by Barge	1.8%
Other	20.0%
Total	100.0%

Accidents within the study area generally follow national patterns identified by the U.S. Coast Guard as far as day of the week, time of day, age, etc.

10. Land Ownership (Source: Recreation Facility Inventory and Cultural Resources Inventory, July, 1978)

Details of ownership and management entity are lacking in many areas. Lack of this information makes management difficult. The entire corridor should be reviewed for completeness of information (especially between FWS and COE).

The state lines vary from state to state, thus causing overall enforcement and management problems and confusion to the public. Standardization would eliminate these problems.

Many private lease areas on federal property are located in areas where additional public access and/or fish and wildlife protection are needed. Termination of these leases would result in better public access and resources management.

11. Litter/Sanitary Problems (Source: Determining Means of Maintaining and Enhancing Recreation Areas with Dredged Material, June, 1978).

Litter is a problem in many recreation areas. Programmed litter clean up by any agency would be very expensive. Local boating clubs, Jaycees, Kiwanis, USCG Auxiliaries, etc. could be organized to provide periodic clean-up of sandbar areas and other areas within the river corridor. Many organizations are seeking long-term project commitments. Local cleanups encourage local control of litter problems and instill pride in keeping areas clean. The FWS should continue its periodic clean-ups of sandbar areas and all public agencies should lend support to anti-litter education programs. An educated public is the long-range solution to litter problems.

Large cruisers, houseboats, etc. are required by law to have liquid waste holding tanks but few pumpout stations are available. Long distance traffic (recreation and commerical)needs strategically located pumpout stations as an alternative to the dumping of sewage on the riverway.

12. Backwater Area Recreation (Source: Sediment and Erosion Control Work Group, Side Channel Work Group, Aerial Recreation Use Survey, September, 1976).

A great deal of recreation occurs in the backwater areas. Many of these areas are being lost to natural sedimentation. Some of these backwater accesses have been closed due to channel maintenance dredged material disposal and natural accretion. Hunting, trapping, and fishing provide many recreational opportunities along the river. These experiences should be protected from further degradation and/or conflicting uses.

13. Coordinating Organization (Source: RWG I Discussions).

    In order to effectively manage the Mississippi River resource in the best interest of the states and nation, a coordinated management effort must be undertaken. Coordinated management can provide the best return for tax dollars spent and the necessary protection to the resource while at the same time providing for a diversity of recreational experiences.

14. Environmental Education (Source: Pool by Pool Recommendations, September, 1978).

    The Mississippi River with its associated uses is a unique resource to the nation. To better understand and interpret this resource, programs of environmental education must be provided.

15. Aesthetic/Wilderness Protection (Source: Aesthetic/Wilderness Management, January, 1979; Pool by Pool Recommendations, September, 1978).

    Many of the natural and aesthetic areas within the river corridor are being lost to visual intrusions. The natural beauty of the river is one of the region's major attractions. Protection of the aesthetics should be a part of any management plan for the Mississippi River.

    Many individuals and agencies have shown an interest in managing areas for a primitive experience. There is inconsistency, however, between state and federal designations. Areas may be more appropriately designated under one agency's definition than another.

16. Cultural Resources (Source: Recreation Facility and Cultural Resources Inventory, July, 1978).

    All historic/archaeologic sites on the National Register of Historic Places have been identified. Undoubtedly, many more areas meet the National Register criteria (Federal Register, No. 28, Volume 41, 10 February 1976, paragraph 800.10, Procedure for the Protection of Historic and Cultural Properties). In order to protect and manage the cultural resources of the Mississippi River corridor, a comprehensive study and inventory must be first undertaken, or at least a Cultural Resource Probability Model established. Some of the areas identified could provide for interpretive programs to better explain our cultural heritage.

    Some sites are being destroyed by wave actions of navigational traffic and the wind. Protection measures should be taken to protect these endangered sites before they are totally destroyed.

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RECOMMENDATIONS

The following general recommendations were adopted by the Recreation Work Group of GREAT I on February 5, 1979. These recommendations were developed as a result of work group studies and/or were contributed by various "publics" during the course of the GREAT I study.

CHANNEL MAINTENANCE RECOMMENDATIONS

1. Afford protection from dredged material disposal and development on island areas that have been identified as regionally or nationally significant.

   Rationale: According to "Island of America" by the Bureau of Outdoor Recreation, August 6, 1970, many islands within the Mississippi River are of regional and national significance. These island areas (state natural, scientific, and preserves) should be afforded appropriate protection.

   Responsibility: Federal - Corps of Engineers (Lead Agency)
   Fish and Wildlife Service
   States - Iowa, Minnesota, Wisconsin

   Reference: "Islands of America", Bureau of Outdoor Recreation August 6, 1970
   "Recreation Facility and Cultural Resources Inventory, July, 1978", Recreation Work Group

2. Recreation enhancement should be considered when selecting dredged material disposal areas and methods. A site plan should be developed for each disposal operation.

   Rationale: Dredge material disposal areas are major attractors to the recreationist. A diversity of areas (size, shape, location) will provide for a diversity of recreational experiences (large beaches, passive areas, canoe camps, etc.). Small off-channel areas should be provided as canoe camps or as isolated recreation areas.

   These areas should be maintained and/or (re)developed according to guidelines developed by the Recreation Work Group.

   Responsibility: Federal - Corps of Engineers (Lead Agency)
   Fish and Wildlife
   States
   GREAT On-Site Inspection Teams

   Reference: "Determining Means of Enhancing and Maintaining Beach Recreation Areas with Dredged Material" Jeremy Coursolle, June, 1978.

3. Post "No Swimming" signs up to two miles below a dredging and disposal operation if water quality tests indicate the need to do so.

Rationale: According to the Water Quality Work Group's studies of the effect of dredging and disposal on water quality, (Grey Cloud Island Study) fecal colliforms may exceed the acceptable standard for body contact recreation (200 per 100 ml) up to two miles below a dredging operation. Water quality monitoring programs of the COE should test for fecal colliform counts during dredging and disposal operations and the COE should temporarily post "No Swimming" signs where required for a period of not less than 24 hours after the dredging operation is completed.

Responsibility: Federal - Corps of Engineers (Lead Agency)

Reference: "Pilot Study, July, 1976; Grey Cloud Island, Upper Mississippi River" Water Quality Work Group, GREAT I.

4. Modify or mark channel control structures where appropriate to reduce hazards to navigation.

Rationale: Approximately 18 percent of the boating accidents in the GREAT I area are attributed to hitting objects - many of which are channel control structures. Modifying these structures (notching, lowering or limited marking) would provide for safe recreational boating passage but yet should not detract from the valuable fisheries habitat provided by these structures.

Responsibility: Federal - Corps of Engineers and U. S. Coast Guard (Lead Agencies)

Reference: "Boating Safety", Recreation Work Group, GREAT I, September, 1978.

5. Mark hazard zones adjacent to navigation dams.

Rationale: Many recreational boaters are not familiar with the strong currents, outdrafts, etc. associated with the dams. Signs, lighting and buoys would provide a deterrent to use in this area.

Responsibility: Federal - Corps of Engineers, (Lead Agency) U.S. Coast Guard

Reference: "Boating Safety", Recreation Work Group, GREAT I, September, 1978.

RIVER RESOURCE MANAGEMENT RECOMMENDATIONS

6. Develop unified management objectives (recreational, fish and wildlife, commercial, etc.) for each pool or segment of pools. Unified management objectives may require modifications of existing state and federal authorities (i.e. Upper Mississippi River Wild Life and Fish Refuge Act, etc.).

Rationale: Unified management objectives would serve to guide overall development and management of the Mississippi River. This would result in better expenditures of public funds and provide for needed opportunities and/or protection. Unified management objectives would also reduce conflicts between commercial/industrial/residential developments, fish and wildlife management and recreational areas and assure future recreational opportunities (including aesthetic and habitat protection).

Responsibility: Federal - Corps of Engineers, Fish & Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

7. Develop, redevelop and/or modify recreation areas as recommended in individual pool recommendations section as interim guidance to be used until unified management objectives are established. (refer to 6 above). Detailed site evaluations should be undertaken prior to implementation.

Rationale: The pool by pool recommendations were made as a result of detailed evaluations of the future needs in each pool. Conflicts with environmental values were minimized in making these recommendations. Following these recommendations will provide ample recreational resources and environmental protection for the future.

Responsibility: Federal - Corps of Engineers, Fish & Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local
Private

Reference: "Pool by Pool Recommendations, September, 1978" Recreation Work Group, GREAT I.

8. Amend P.L. 89-72 to enable the Corps of Engineers in cooperation with other agencies to develop and maintain recreational areas on federal lands along the Upper Mississippi River without or reduced local cost-sharing. This should include primitive island/beach areas created by dredged material disposal.

Rationale: Much of the future demand for additional recreational opportunities can be met on federal lands. It is often difficult (if not impossible) to find local project sponsors that can assume 50 percent of the initial costs and all of the maintenance as presently required by P.L. 89-72. Because of the rural character of much of the river valley, local funds are many times not available to develop recreation areas that are regionally or nationally significant.

Responsibility: Federal - Corps of Engineers (Lead Agency)
States - Iowa, Minnesota, Wisconsin
Local

Reference: "Legal and Institutional Framework Study, March, 1976", Bureau of Outdoor Recreation

9. Expand the Fish and Wildlife Service and St. Paul District Corps of Engineers' existing recreational resource program to provide for active management of recreation areas on the Mississippi River.

Rationale: In order to provide for future recreational opportunities, all agencies will need to cooperate and assist in recreational resource development and maintenance to meet anticipated needs within the Mississippi River Corridor. Amending P.L. 89-72 and/or the navigation project authorization will put the COE in a more active management role. The Fish and Wildlife Service has existing authorities to develop recreation areas consistent with refuge management objectives.

Responsibility: Federal - Corps of Engineers
Fish and Wildlife Service

Reference: Recreation Work Group, GREAT I

10. Develop "lockage waiting areas" where suitable to reduce hazards associated with recreational lockages.

Rationale: Large numbers of recreational craft often must wait to get through locks. These craft are forced to anchor, circle about in the area or leave and return. These areas could provide safe waiting areas for these craft.

Refer to Preliminary Design by Howard, Needles, Tammen and Bergendoff.

Responsibility: Federal - Corps of Engineers

Reference: "Recreational Craft Locks Study" St. Paul District, Corps of Engineers

11. Maintain or relocate publicly-owned recreational boat launching accesses.

Rationale: Many boating accesses are becoming impassable due to sedimentation. Much of the future demand for recreational opportunities can be met by improving existing recreational areas.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local

Private

Reference: "Recreation Facility and Cultural Resources Inventory, July, 1978" and "Pool by Pool Recommendations", Recreation Work Group, GREAT I.

12. Maintain backwater accesses where appropriate.

Rationale: A great deal of recreation occurs in the backwater areas. Many of these areas are being lost to natural sedimentation. Some of these backwater accesses have been closed due to channel maintenance dredged material disposal and natural accretion. (Refer to Side Channel Work Group inventory of side channel modifications recommended).

Many isolated backwater areas are wildlife sanctuaries and should not, therefore, be opened. Refer to 6 above and Fish and Wildlife/Side Channel Work Group's Appendices.

Responsibility: Federal - Corps of Engineers (Lead Agency), Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

13. Provide sanitary pumpouts and trash pickup (possibly privately contracted) at or near locks or other suitable areas.

Rationale: Large cruisers, houseboats, etc. are required by law to have holding tanks on board. Few areas are available as pump out stations, however. Long distance traffic (including barges) need areas for trash pickup and pump outs to avoid accidental or intentional dumping of litter and sewage on the riverway. Areas near locks and dams would be suitable to long distance river traffic because of their road access and common and ready points of contact with commercial and recreational boats.

Responsibility: Federal - Corps of Engineers
With assistance of professional/trade organizations, local organizations and others.

Reference: "Recreation Facility and Cultural Resources Inventory, July, 1978," Recreation Work Group, GREAT I.
"Methodology and Forecasts of Recreation Use and Small Craft Lockages", Midwest Research Institute, July, 1978.
"Upper Mississippi Dredged Material Disposal Site Recreational User Assessment", Robert Becker, November, 1978.

14. Phase out leases where a higher and better use can be demonstrated (as per pool by pool recommendations).

Rationale: Many of these private lease areas (cottages, homes, etc.) are located in areas where additional public access and/or fish and wildlife protection are needed. Termination of these leases where appropriate would make these areas available to the general public.

Responsibility: Federal - Corps of Engineers (Lead Agency), Fish and Wildlife Service

Reference: "Pool by Pool Recommendations, September, 1978", Recreation Work Group, GREAT I.

15. Carefully control and enforce boat house permits to prevent extended residency, sanitary discharge and aesthetic impacts.

Rationale: Although boat houses provide recreational opportunities for a limited number of persons, they must not be allowed to impact on the public access and use and the scenic qualities of the river. The use of boat houses should be restricted to areas and uses considered suitable by the coordinated managing entities.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service (Lead Agencies)
States - Iowa, Minnesota, Wisconsin
Local

Reference: Recreation Work Group, GREAT I

16. Identify and zone water surface use in pools or portions of pools where conflicts exist. Establish no wake zones or buoying in constricted areas and/or where heavy recreation use occurs. This zone would apply to commercial and recreational navigation.

Rationale: Zoning (spatial or temporal) would reduce safety hazards and conflicts between the two uses. Temporal zoning may be the only enforceable means of restricting use in some areas.

Wakes created by large power boats, cruisers, some houseboats as well as barges create extreme safety hazards (swamping, capsizing) in some areas. Restrictions need to be enforced in these areas to reduce this hazard.

Responsibility: Federal - Corps of Engineers, U.S. Coast Guard
States - Iowa, Minnesota, Wisconsin (Lead Agencies)
Local

Reference: "Boating Safety, Recreation Work Group, GREAT I, September, 1978".

17. Provide a bikeway in conjunction with the Great River Road developments.

    Rationale: Great River Road legislation provides authorization for bikeway development. Many organizations support a bikeway the entire length of the Great River Road. The heavy use of the bikeways in Wisconsin, annual bicycle rides in Iowa, etc., attest to the recreational potential of such a bikeway.

    A Great River Road Bikeway could tie into the North-South Bikeway being proposed by the Youth Hostel Association between Kenosha and La Crosse, Wisconsin.

    Responsibility: Federal - Federal Highway Administration
    States - Iowa, Minnesota, Wisconsin; Department of Transportation (Lead Agencies)

    Reference: Great River Road

18. Acquire scenic easements/acquisitions to protect the aesthetic character of the river valley in conjunction with the Great River Road.

    Rationale: Great River Road legislation authorizes the acquisition of areas to protect their scenic quality in conjunction with the Mississippi River Parkway (Great River Road). This protection would serve not only the traveling tourist but the general public, recreationist and the river resource.

    Responsibility: Federal - Federal Highway Administration
    States - Iowa, Minnesota, Wisconsin; Department of Transportation (Lead Agencies)

    Reference: Great River Road

19. The USFWS should continue to upgrade and expand facilities under the Bicentennial Land Heritage Program (BLHP) and other potential funding sources.

    Rationale: Much of the future demand for additional recreational opportunities are consistent with the FWS management objectives and can be met on areas proposed under the BLHP.

    Responsibility: Federal - Fish and Wildlife Service

    Reference: "Pool by Pool Recommendations, September, 1978", Recreation Work Group, GREAT I.

20. Expand and coordinate environmental education efforts.

    Rationale: The Mississippi River with its associated uses is a unique resource to the nation. To better understand and interpret this resource, programs of environmental education must be provided.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service (Lead Agency)
States - Iowa, Minnesota, Wisconsin
Local Governments and Organizations

Reference: Recreation Work Group, GREAT I

21. Provide a diversity of recreational opportunities within the river corridor.

Rationale: Each recreational area cannot (and should not) provide for all types of recreational opportunities. A diversity of areas and opportunities helps reduce user conflicts and makes available a diversity of experiences for the user.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local
Private

Reference: "Pool by Pool Recommendations, September, 1978", Recreation Work Group, GREAT I.

22. Develop a system of canoe trails through selected backwater areas.

Rationale: Canoeing can safely take place in selected backwater areas. The labyrinth character of many of these areas make passage difficult, however. Canoe trails could also be used to explain and interpret natural and cultural features of the areas.

Responsibility: Federal - Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

23. Provide detailed uniform recreational facility guides in a format which includes information unique to the Mississippi River (boating hazards, special regulations, refuge management, locking procedures, etc.).

Rationale: Several studies (GREAT Boating Safety Report, June, 1978; Recreation Trails Analysis, December, 1974; Recreation Facility Inventory, July, 1978; and others) have pointed to the need for detailed recreational facility guides.

The guides should include information on boating safety such as lockage procedures, the Uniform Marking System, hazards of regulatory structures, debris hazards, areas of congestion, and hazards of encountering barge tows. The format of the brochures should be easily understood with sketches, diagrams and limited wording.

The Upper Mississippi River Conservation Committee has developed boating safety information in conjunction with its facility inventory guide (this information is included in the chapter on Boating Safety). The states and agencies should draw upon this information in developing future recreational facility guides for public distribution.

Special regulations and management information should be distributed more readily to make the general public more aware.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Upper Mississippi River Conservation Committee (Lead Agency)

Reference: "Boating Safety, Recreation Work Group, GREAT I, September, 1978".

POLICY RECOMMENDATIONS

24. Include recreation as a "project purpose" of the Nine-Foot Navigation Project.

Rationale: In order to provide for future recreational opportunities, all agencies will need to cooperate and assist in recreational resource development and maintenance. Recreation is a recognized compatible project purpose in most COE projects. Adding recreation as a project purpose expands upon the benefits and opportunities of the project.

Responsibility: Federal - Corps of Engineers

Reference: Recreation Work Group, GREAT I

25. Continue to evaluate impacts on recreational opportunities (at the level of other environmental values) during "permit" reviews and evaluations.

Rationale: Recreational opportunities, like environmental values, must be protected for future use.

Responsibility: Federal - Corps of Engineers (Lead Agency), Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local

Reference: Recreation Work Group, GREAT I

26. Wisconsin and Minnesota should modify their requirements applicable to Section 404(t) of the Clean Water Act of 1977 to allow creation and maintenance of recreation areas within the floodplain.

Rationale: Primitive island/beach areas are one of the major recreation attractors to the Mississippi River. Recreation is a major use of the river. In order to sustain this form of recreation, these areas must be created and/or maintained. Dredged material may be used for these areas, thus providing a beneficial use of the dredged material. Refer to recommendation number 3.

Responsibility: States - Minnesota, Wisconsin

Reference: "Aerial Recreation Use Survey, September, 1976"; Determining Means of Enhancing and Maintaining Recreation Areas with Dredged Material, June, 1978; Dredged Material Disposal Site Recreational Use Assessment, October, 1978".

27. Modify the Performance Monitoring System (PMS) to include monitoring of recreational boating traffic.

Rationale: Accurate data is available to describe commercial navigation traffic (origin, destination, contents, persons on board, etc.), but little is known about recreational boating traffic movements. Accurate data on recreational boating movements is required by all concerned agencies to provide better management of the river.

Responsibility: Federal - Corps of Engineers

Reference: "Public Use Projections, February, 1978"; Recreation Work Group, GREAT I

28. The Corps of Engineers should adopt uniform lockage regulation interpretations to give recreation boats "priority" immediately following each complete barge tow lockage.

Rationale: Recreational boating is a valid use of the Mississippi River. Queuing can create safety hazards. Much of this safety concern can be alleviated, however. If any recreational craft is waiting at a lock approach as a barge tow leaves, it should be immediately locked -one lockage each direction maximum if a barge tow is waiting. This would not only allow the recreational boater to be on his way but, also, clears the approach area for the waiting tow.

Responsibility: Federal - Corps of Engineers

Reference: Recreation Work Group, GREAT I

29. Discourage additional large power boat access, marinas, etc. or high impact recreational developments into areas identified as exceptionally good for hunting, trapping and fishing or "closed refuge areas".

Rationale: Hunting, trapping and fishing provide many recreational opportunities along the river. These experiences should be protected from further degradation and/or conflicting uses. Large power boats often conflict with hunting and fishing use. Protective buffers should be provided, both to protect the hunting, trapping, fishing opportunities and to protect developed recreation area users from hunters gunfire. This protection can be achieved in part by permit review (25 above) and clear management objectives (6 above).

Responsibility: Federal - Corps of Engineers (Lead Agency), Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local - As appropriate
Private

Reference: Recreation Work Group, GREAT I

30. Assign additional water patrol personnel to the Mississippi River, especially in heavily-used areas and high accident areas. Continue coordination of enforcement programs.

Rationale: Existing boating laws appear to be adequate, but water patrol personnel are either nonexistent or drawn extremely thin on various segments of the river. Lack of adequate water patrol has created safety imbalances between pools. Refer to chapter on Boating Safety.

Responsibility: Federal - U.S. Coast Guard
States - Iowa, Minnesota, Wisconsin (Lead Agencies)
Local - As appropriate

Reference: "Boating Safety, Recreation Work Group, GREAT I, September, 1978".

31. Intensively coordinate efforts with the USCG Auxiliaries, boating clubs, etc. to provide boating safety, hazard and navigation information to new and experienced boaters.

Rationale: Many of the boating accidents along the Mississippi River occur because of the boaters' unfamiliarity with the areas and the hazards of a large navigable waterway. Refer to chapter on Boating Safety.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin (Lead Agencies)

Reference: "Boating Safety, Recreation Work Group, GREAT I, September, 1978".

32. Require rental agencies to better brief their patrons on how to handle their boats, river hazards, rules of the road, courtesy and lockage procedures.

Rationale: Many of the safety problems on the river are the result of novice recreational boaters.

Responsibility: Federal - U.S. Coast Guard, Corps of Engineers
States - Iowa, Minnesota, Wisconsin (Lead Agencies)

Reference: "Boating Safety, Recreation Work Group, GREAT I, September, 1978".

33. Provide uniform and/or upgraded signing of recreation areas.

Rationale: Many recreation areas are unidentified or the signs are difficult to read. Better signing would provide directional information to the user and could provide general information about the area and the managing entities. Uniform signs would be readily identified.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service (Lead Agencies)
States - Iowa, Minnesota, Wisconsin

Reference: "Recreation Facility and Cultural Resources Inventory, July, 1978".

34. Establish uniform noise levels (decibel limits) for recreational boats. Noise levels should also be considered for other recreational vehicles.

Rationale: Many areas experience high noise levels which distract from the recreational experience. Some large power boats have unmuffled engines that create the noise disturbance. Some states presently enforce noise standards for power boats.

Responsibility: Federal - U. S. Coast Guard (Lead Agency)
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

35. Encourage "packing out" trash through educational pamphlets, programs and signing.

Rationale: Litter is a problem in many recreation areas. Programmed litter clean up by any agency would be very expensive. Local boating clubs, Jaycees, Kiwanis, USCG Auxiliaries, etc., could be organized to provide periodic clean-up of sandbar areas and other areas within the river corridor. Many organizations are seeking long-term project commitments. Local cleanups encourage local control of litter problems and instill pride in keeping areas clean. The FWS should continue its periodic clean-ups of sandbar areas and all public agencies should lend support to anti-litter education programs. An educated public is the long-range solution to litter problems.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: "Dredged Material Disposal Site Recreational Assessment, October, 1978".

FURTHER STUDY RECOMMENDATIONS

36. Develop a coordinating organization to provide assistance in management, planning, and development of recreation areas and in resolution of associated problems.

Rationale: In order to effectively manage the Mississippi River resource in the best interest of the states and nation, a coordinated management effort must be undertaken. This coordinated management can provide the best return for tax dollars spent and yet provide the necessary protection to the resource.

According to the Upper Mississippi River Comprehensive Basin Study, Page K-95, "Realization of the recreation potential of the Upper Mississippi River has been hampered by lack of coordinated management . . . The true value of this area will not be realized until its development and management for recreation becomes a coordinated effort by all federal, state, local, and private interests. A cooperative agreement is needed to present a coordinated front for public use and enjoyment and to safeguard recreational and aesthetic values from possible desecration. Of highest priority is the establishment of a system to manage the Mississippi River for recreation."

A coordinated management system could also provide for protection of the river recreational opportunities as outlined by the National Recreation Area study of 1974.

Responsibility: Federal - Corps of Engineers, Department of Transportation, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin
Local
Private

Reference: Recreation Work Group, GREAT I; "Upper Mississippi River Comprehensive Basin Study".

37. Continue monitoring of recreational use (type and extent) with methodologies being developed by the GREAT I and GREAT II Recreation Work Group. The environmental and social/psychological impacts of increased recreational use should also be monitored.

Rationale: Accurate information of recreational use is needed to wisely manage the Mississippi River resource in order to reduce recreational conflicts, reduce environmental impacts, and enhance recreational opportunities. Little is known about the environmental and social/psychological impacts of increasing recreational use.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

38. Agencies should continue to cooperate in undertaking recreational use surveys along the river similar to studies undertaken in cooperation with the Upper Mississippi River Conservation Committee (UMRCC).

Rationale: Recreational use studies provide baseline data that is needed for sound planning and management. These studies can also provide information on the effectiveness of programs and policies. The UMRCC schedule for the pool by pool recreational use surveys (10+ years cycle) must be expedited and coordinated with an overall monitoring program of the entire river system including the Corps of Engineers Performance Monitoring System (PMS).

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin (Lead Agencies)

Reference: Recreation Work Group, GREAT I

39. Assign full-time personnel to maintain the Geographical Information System (GIS) with computer terminals available to each agency for the purposes of preliminary assessment of impacts, developing management alternatives, updating data, etc. The GIS system should be expanded to include those additional data requirements identified during the "Pilot Study" and Aesthetic Management elements identified elsewhere in this report.

Rationale: The GIS system will require periodic updating as new data is incorporated. The GIS system will provide the necessary data for both long- and short-term planning and management of the river corridor. This system should include social, recreational and cultural resource data as well as physical and water quality data. The GIS system will not eliminate (nor should it) the need for site specific analysis.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service (Lead Agencies)

Reference: Recreation Work Group, GREAT I

40. Document and assess land ownership and management entity within the river corridor.

Rationale: Details of ownership and management entity are lacking in many areas. Lack of this information makes management difficult. The entire corridor should be reviewed for completeness of information (especially between FWS and COE).

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: "Recreation Facility and Cultural Resources Inventory, July, 1978".

41. States should consider requiring boat repair facilities to be registered by the states and be required to report accidents over $100 property damage to the appropriate state or federal agencies.

Rationale: There are many (unknown quantity) boating accidents that are not reported--both those required by law (over $100 property damage) and those not required by law.

Responsibility: Federal - U. S. Coast Guard
States - Iowa, Minnesota, Wisconsin (Lead Agencies)

Reference: "Boating Safety, September, 1978".

42. Undertake a comprehensive cultural resources study as input to future management decisions.

Rationale: In order to protect and manage the cultural resources of the Mississippi River corridor, a comprehensive study and inventory must be first undertaken. Some of these areas could provide for interpretive programs to better explain our cultural heritage. Some sites are being destroyed by wave actions of navigational traffic and the wind. Before dredged material can be deposited in new disposal sites, an inventory of cultural resources must be undertaken and their eligibility for the National Register determined.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service, Heritage Conservation and Recreation Service (Lead Agencies)
States - Iowa, Minnesota, Wisconsin
Local
Private

Reference: Recreation Work Group, GREAT I

43. Identify potential primitive or "natural" areas and follow-up by designations where appropriate.

Rationale: Many individuals and agencies have shown an interest in managing areas for a wilderness experience. There is inconsistency, however, between state and federal designations. Areas may be more appropriately designated under one agencies' definition than another. Some areas may be appropriately maintained as "bench marks" for succession.

Responsibility: Federal - Fish and Wildlife Service
Heritage Conservation and Recreation Service (Lead Agencies)
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

44. Aesthetic protection designations should be made for the viewshed within the corridor where appropriate.

Rationale: Many of the natural and aesthetic areas within the river corridor are being lost to development and visual impacts. The natural beauty of the river is one of the region's major attractions. Protection of the aesthetics of the area should be a part of any management plan for the Mississippi River. These areas should be identified as a part of the Aesthetic Management Plan proposed elsewhere in this report.

Responsibility: Federal - Corps of Engineers, Fish and Wildlife Service
States - Iowa, Minnesota, Wisconsin

Reference: "Aesthetic Management Guidelines, January, 1979"
Recreation Work Group, GREAT I

45. Further evaluate all adopted recreation recommendations (general and site specific) to determine needs for additional funding, manpower and implementation (e.g. legislative change, administrative order, etc.).

Rationale: In order to carry out the recommendations by GREAT, many of the agencies involved with management of the Mississippi River resource will need additional funding manpower and/or legislative direction. This is needed to provide for additional recreational opportunities, resource protection, safety of users, etc.

Responsibility: GREAT Team (Lead Agency)
Federal - Corps of Engineers, Fish and Wildlife Service, U.S. Coast Guard
States - Iowa, Minnesota, Wisconsin

Reference: Recreation Work Group, GREAT I

BACKGROUND

Study Area

The Great River Study is part of a total study program divided into three separate but related activities. GREAT I, which is scheduled for completion by late 1979, will concentrate on the Upper Mississippi River and its tributaries, including portions of the St. Croix and Minnesota Rivers, from the Twin Cities of Minneapolis-St. Paul to Guttenberg, Iowa (see figure 1). The other two reaches of the river below Guttenberg, to the confluence with the Ohio River, are the responsibility of two other action teams. At the conclusion of each phase, the study programs and recommendations of each action team could be brought together into a single river management strategy for the entire Upper Mississippi River.

In order to avoid duplication of effort, this study of inland river resource management is being coordinated with the ongoing Dredged Material Disposal Study being conducted by the Corps of Engineers Waterways Experiment Station (WES) at Vicksburg, Mississippi. The WES study is oriented primarily to dredging activities in coastal, estuarine, Great Lakes, and deepwater harbor areas.

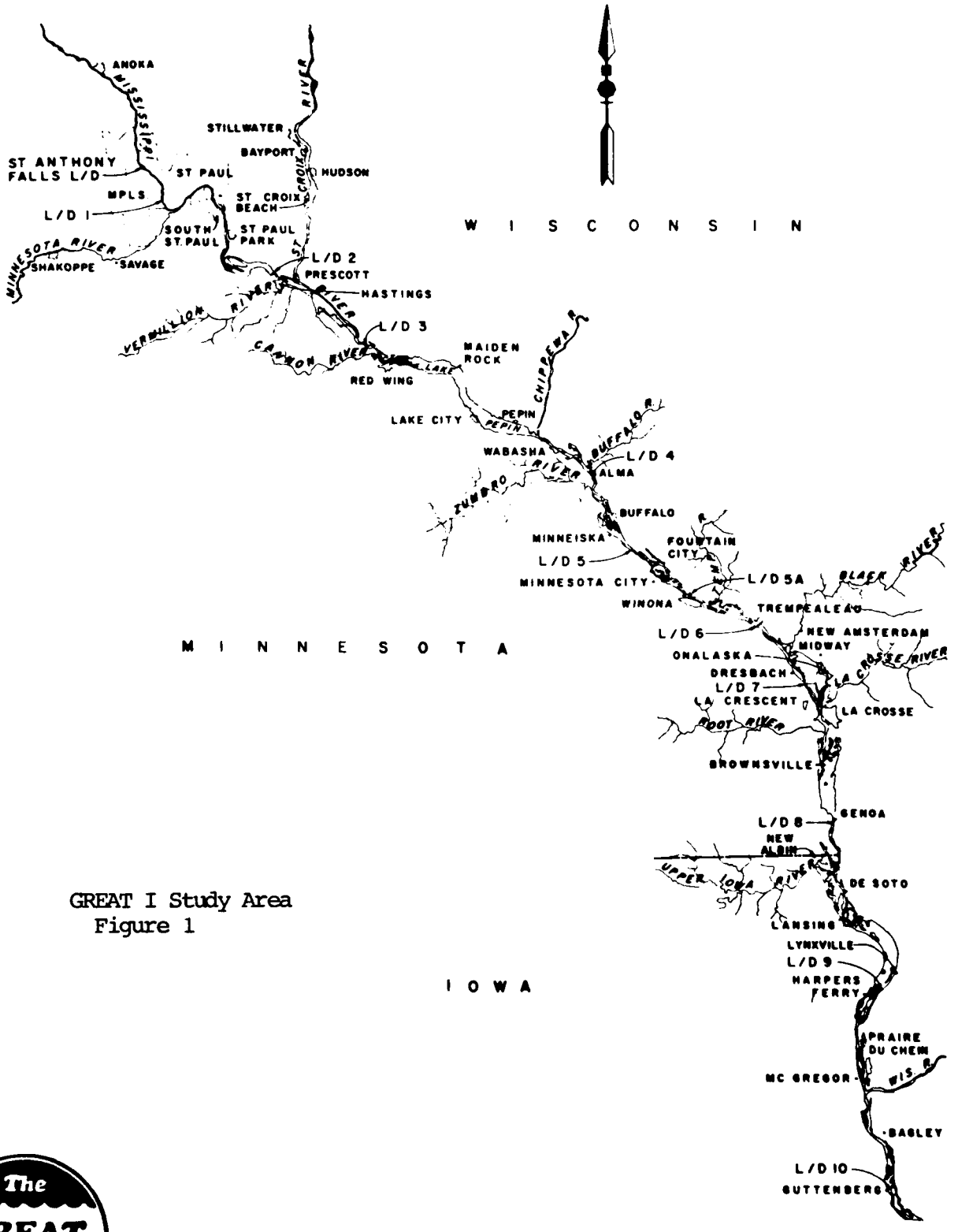
At the conclusion of the GREAT I study, a resource management plan will have evolved that is technically and economically sound, socially and environmentally acceptable, and capable of being put into action within a reasonable period of time.

This plan will be presented by the GREAT teams for consideration by the citizens of the region, local officials, State leaders, Federal agencies and officials and, finally, the Congress.

Recreational Opportunities

The northern section of the Upper Mississippi River has provided innumerable recreation opportunities for the entire region. Even prior to congressional authorization of the 4 1/2-foot channel in 1878, settlers used the river extensively. The Upper Mississippi River provided the opportunity to boat, fish, hunt, and sightsee. However, the settlers' needs while carving out an existence in the early nineteenth century Minnesota wilderness meant that recreational uses of the upper river were few. Thus, boating at that time was not primarily for recreational purposes. It was essential for the settlers' existence and to move people and supplies to where they were needed. Similarly, hunting and fishing were not for sport. They provided the food needed to feed the settlers' families. Surplus fish and game were sold or traded to provide the necessities required for daily living.

At the beginning of the twentieth century, increased leisure time accompanied the settlers' changing standard of living, which brought about more recreational use of the Upper Mississippi River. Segregating present-day recreational uses of the study area from those existing in 1930, prior to the 9-foot channel, presents problems. It is difficult to isolate increased recreational uses of the river resulting from a larger populaton in the region, changed standards of living, and increased leisure, from those caused by improved navigational and other recreational opportunities.



GREAT I Study Area
Figure 1

The GREAT River

A significant portion of today's recreational activity on the Upper Mississippi River is due to the improved navigation opportunities for large pleasure craft, and to improved fish and game habitat resulting from higher water levels created by the locks and dams.

The potential for improved hunting and fishing has not always been realized. The natural process of sedimentation has been aggravated by impoundment and by dredging activities and has covered fish spawning grounds, slough openings onto the main channel, and wildlife feeding and breeding grounds. In addition, increased industrialization along the river has caused pollution that decimated some fishing and hunting areas and has rendered some fish inedible because of unpleasant taste as a result of pollutants.

According to a home interview survey which was conducted by the U.S. Bureau of the Census, 1960 demand for outdoor recreation in the Upper Mississippi River basin was 1,582 million activity occasions. An activity occasion is participation by an individual in any one activity during any part of a 24-hour period. Of these activity occasions, 73 percent originated from metropolitan or urban areas with over 50,000 population. The demand for water-based and water-enhanced activities was 294 million activity occasions. These activities included swimming, canoeing, sailing, and other boating, waterskiing, picnicking, sightseeing, nature walks and hiking. Approximately 16 1/2 percent of this total 1960 outdoor recreation demand originated in the study area considered in this report.

In the future, the degrees of participation in various recreational activities are expected to increase at different rates. The expected increases can be partially attributed to the rapid population expansion of the Minneapolis-St. Paul area and other urban areas.

The 9-foot channel project provides water surfaces ideally suited for water-associated recreation activities. In addition to a deeper navigation channel, 13 pools, or man-made lakes, have been created extending for a distance of about 244 miles. In creating the pools many marshes, swamps, open sloughs, backwater sloughs, ponds, intermediate small lakes and large open expanses of varying depths were formed. Within the water areas, the environment is ideal for spawning grounds for fish, nesting and hatching areas for waterfowl and breeding grounds for aquatic furbearing animals. Water depths and conditions are suitable for movement of river-going yachts, pleasure boats, and speedboats, as well as one-man skiffs and canoes. Numerous areas are suitable for bathing and swimming.

Much of the increased boating in the study area of the river, and virtually all of it for the deeper-draft pleasure boats, is made possible by the improved navigational opportunities provided by the system of locks and dams. Later exhibits show that the number of pleasure boats moving through each lock in the study area increased by an average of 1,500 boats during a twelve-year period.

At the present time, various recreational facilities are provided in the 9-foot channel project area by Federal, State, and local governmental agencies and commercial or private interests. Facilities range widely in adequacy, completeness, and capacity and many are considered as primitive and temporary.

Notwithstanding the recreational resources which make the Upper Mississippi region exceptionally suitable for outdoor recreation, unfavorable features or conditions do exist in the area. Recreational uses may be somewhat limited for the following reasons:

a. The variation in water level from normal to flood stages and occasional low stages occurring during dry periods.

b. The existence of areas of stagnant water in various sloughs during the summer months.

c. The blockage of side channels from natural sedimentation or dredged material disposal.

d. The large mosquito population along the river during the summer months.

e. The discharge of raw and partially treated sewage and commercial wastes into the river by many of the municipalities.

STUDY PROCESS

INTRODUCTION

For many years, conservation organizations, commercial fishermen, biologists, and sportsmen have expressed deep concern over the methods used to operate and maintain the navigation waterway system of the Upper Mississippi River. Their concerns were directed to the U.S. Army Corps of Engineers, the agency assigned to carry out the navigation mandate for Congress. Under the shadow of a lawsuit initiated against the Corps by the State of Wisconsin in 1973, the Corps prepared environmental impact statements in accordance with the National Environmental Policy Act of 1969. The statements attempted to describe the effects of the operation and maintenance program on the Upper Mississippi Waterway. These documents revealed that current methods of channel maintenance, especially dredging and depositing of dredged materials, were significantly damaging the fragile backwaters, marshes, and sloughs for which the river is famous. The environmental impact statements also revealed that little information was available on many key aspects of river use. The lack of information would make it almost impossible for government agencies or Congress to evaluate alternative means of managing the river in a more balanced way without considerable additional study.

Amid all of this activity, several agencies and organizations were intensively studying the Corps voluminous environmental impact statements, seeking ways to solve the growing impasse. One of these agencies was the Minnesota-Wisconsin Boundary Area Commission. The commission is the 10-member interstate body created by the two headwaters-area states to make special studies and recommendations on the broad public interest issues of the Upper Mississippi and St. Croix Rivers. As a result of its review, the commission voted unanimously to go directly to Congress with a recommendation for appropriation of funds to immediately begin interdisciplinary studies and field tests. These studies and tests were necessary to give decision-makers the missing information needed to make wise choices to better balance the management of the resource at a cost the public is willing and able to pay.

As a result of growing congressional and public interest in the Upper Mississippi River management problems, the North Central Division Engineer of the Corps and the North Central Regional Director of the U.S. Fish and Wildlife Service announced in September, 1974, that they planned to establish a partnership team. The team would work out a long-range management strategy for the multipurpose use of the river. This move soon led to organization of a broad-based federal-state task force, as envisioned by the Boundary Area Commission in its congressional testimony. The Upper Mississippi River Basin Commission had established a special Dredged Spoil Disposal Practices Committee several months before to begin laying the groundwork for a cooperative effort. This committee was composed of delegates representing the five principal river basin states and five key resource-oriented federal agencies. Thus, what finally became known as GREAT was set up in October, 1974, as a working partnership of federal agencies and states under the auspices of the Upper Mississippi River Basin Commission.

AUTHORITY

Minnesota Representative Albert Quie and former Wisconsin Representative Vernon Thomson joined in supporting the testimony presented by the Boundary Area Commission. The commission asked for an add-on appropriation of $1 million to the St. Paul District of the Corps for fiscal year 1975 (July, 1974 through June, 1975). The House of Representatives approved the request in June, 1974, but in August the Senated objected to the add-on, contending that the recommended studies and experiments would duplicate the work already programmed by Congress in the $30 million Dredge Material Research Program underway through the Corps Waterways Experiment Station at Vicksburg, Mississippi. House proponents pointed out that the nationwide study was heavily concentrated on coastal zone, estuarine, Great Lakes, and deep-water port dredging and very little meaningful analysis would be made on the unique problems of river dredging. Senate conferees agreed and accepted an add-on of $375,000 for special studies and field tests on the Upper Mississippi River between the mouth of the Missouri River and Minneapolis. The Corps reported this amount as its capability for such activities in the St. Paul District portion of the river for fiscal year 1975.

The GREAT study was authorized by Congress in Section 117 of the Water Resources Development Act of 1976. The section reads:

> "The Secretary of the Army, acting through the Chief of Engineers, is authorized to investigate and study, in cooperation with interested States and Federal agencies, through the Upper Mississippi River Basin Commission the development of a river system management plan in the format of the 'Great River Study' for the Mississippi River from the mouth of the Ohio River to the head of navigation at Minneapolis, incorporating total river resource requirements including, but not limited to, navigation, the effects of increased barge traffic, fish and wildlife, recreation, watershed management, and water quality at an estimated cost of $9,100,000."

The Team established in 1974 is studying the Upper Mississippi River from Minneapolis/St. Paul to lock and dam 10 at Guttenberg. This team is called GREAT I. GREAT II was organized early in fiscal year 1977 (October, 1976 through September, 1977) and is studying the river from Guttenberg to Saverton, Missouri. GREAT III is organizing and will be responsible for the river from Saverton to the mouth of the Ohio River.

STUDY ORGANIZATION

GREAT I is composed of representatives from the following states and federal agencies:

State of Iowa
State of Minnesota
State of Wisconsin
U.S. Department of the Interior - Fish and Wildlife Service

U.S. Department of Agriculture - Soil Conservation Service
U.S. Department of Defense - Department of the Army -
Corps of Engineers
U.S. Department of Transportation - Coast Guard
U.S. Environmental Protection Agency
Minnesota-Wisconsin Boundary Area Commission (ex officio)
Upper Mississippi River Conservation Committee (ex officio)

An organization chart for GREAT I is shown in the following figure.

GREAT I ORGANIZATION

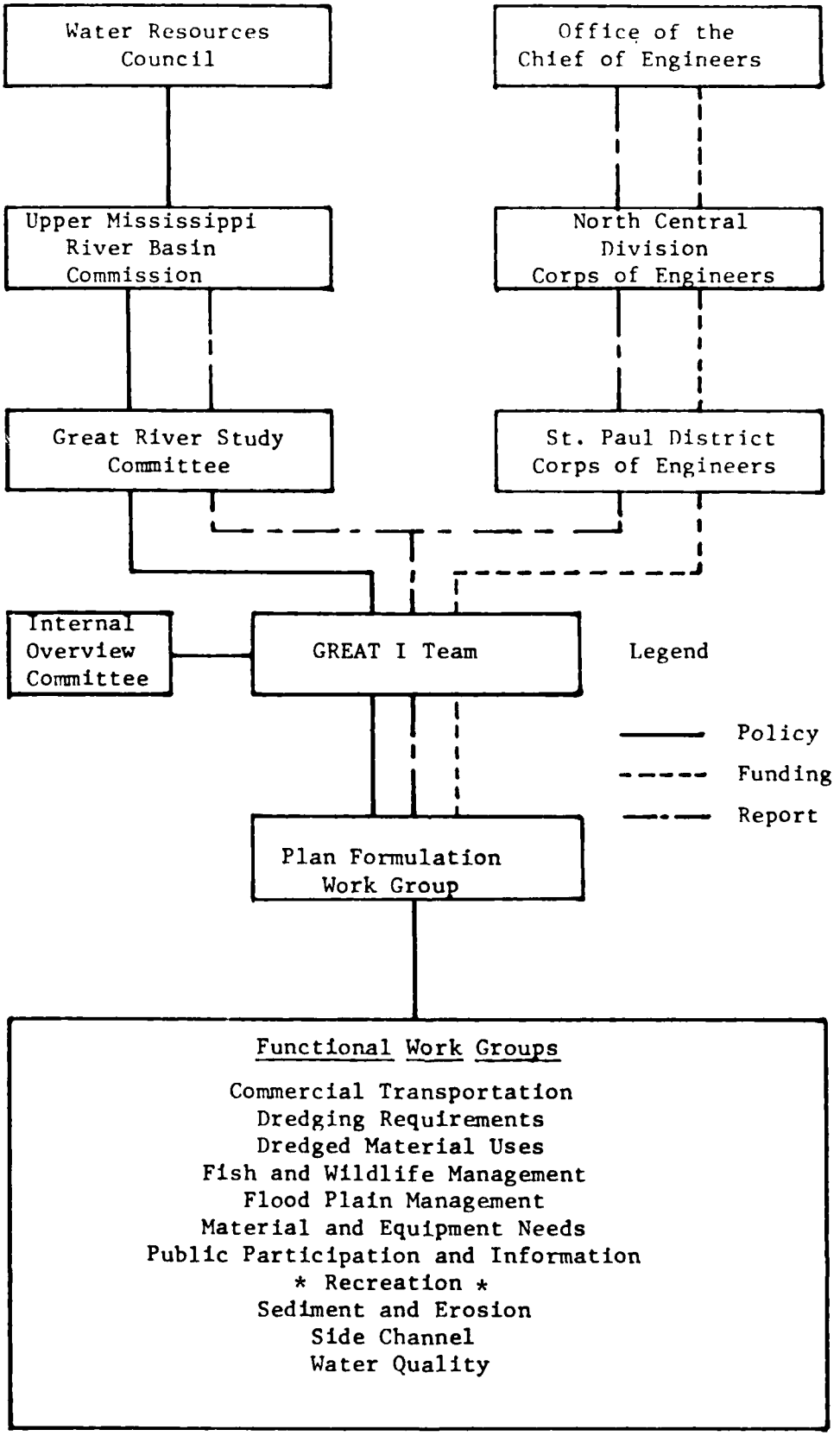


Figure 2

The Corps of Engineers chain of command is shown on the chart because Congress provided study funding through the Corps and, in section 117 of the Water Resources Development Act of 1976, required the Chief of Engineers to report the results of the study. Section 117 also directed that the study coordination be made "through the Upper Mississippi River Basin Commission". Since GREAT I was formed in 1974, several committees of the Basin Commission have provided policy guidance and direction. The Great River Study Committee is currently serving that function.

In the GREAT I area, the Great River Study is managed by GREAT I. The equal partnership Team has one voting member from each state and federal agency involved. The representatives of the Corps of Engineers and Fish and Wildlife Service, the agencies with major management responsibility on the river, serve as cochairpersons. They conduct Team meetings and guide the ongoing studies as directed by the Team. Representatives of the Minnesota-Wisconsin Boundary Area Commission and the Upper Mississippi River Conservation Committee are ex officio members of the Team. The Team operates under the bylaws of the Upper Mississippi River Basin Commission which require that attempts should be made to settle all issues unanimously. However, if all members cannot agree, an issue can be decided by a majority vote of federal representatives and a majority vote of state representatives.

The IOC (Internal Overview Committee) consists of representatives from the three states, a representative of the Minnesota-Wisconsin Boundary Area Commission, and the two Team cochairpersons. The committee functions as an advisory board to the Team. One of its duties is to recommend how GREAT I funds should be spent to best accomplish the study objectives.

GREAT I has 11 functional work groups (see figure 2). Each work group is to accomplish the study objectives as they relate to the work group's functional area and as directed by the Team. Work groups are composed of all interested parties wishing to be represented. In addition, representatives of each Team member are encouraged to participate in each work group. Leadership is provided by the state or agency most suited to provide leadership in that functional area. The Public Participation and Information Work Group is an exception. It is coordinated by a contractor and has broad-based citizen representation. Government and private interests that are not formal Team members are invited to participate in the activities of all the work groups. The Plan Formulation Work Group is composed of the cochairpersons and the chairpersons of each of the 11 function work groups.

STUDY BUDGET

The following table shows funding provided by GREAT I for the Recreation Work Group by fiscal year and study effort. The budget does not display funds contributed by other federal agencies and state participants. Participating states and federal agencies have frequently sought their own non-GREAT operating or planning funds to maintain an active role in the study and achieve study objectives. The exact amount of other funds used is unavailable, but is estimated by the RWG I Chairman to be an additional 25 percent to the study budget.

RECREATION WORK GROUP STUDY BUDGET

Study Element	Fiscal Year 1975	1976	'T' Quarter	1977	1978	1979	1980	Totals
			(in $1,000's)					
Corps of Engineers personnel	-	12.0	-	12.0	15.5	5.0	-	44.5
Coordinator (Iowa)	6.4	30.3	-	23.9	25.0	26.9	15.0	127.5
HCRS Partic. (former BOR)	5.0	16.0	-	-	-	-	-	21.0
Demand study	3.2	8.0	-	-	-	-	-	11.2
Existing use studies:								
Use study	-	-	-	18.3	-	-	-	18.3
Aerial flights	-	2.3	-	-	-	-	-	2.3
Dredged material island enhancement	-	-	-	2.5	-	-	-	2.5
Inventory mapping	-	-	-	-	3.0	-	-	3.0
Coordination with computerized inventory analysis study	-	-	-	-	0.5	-	-	0.5
TOTALS	14.6	68.6	-	56.7	44.0	31.9	-	230.8

PUBLIC INPUT

The basic objective of the Great River study is to develop a river system management plan that will incorporate total river resource requirements. Conflicts often occur between the actions of two agencies having management responsibility on the river. These conflicts have contributed to pockets of environmental degradation. Where problems result from neglect of economic, environmental, or social factors, the environment, the people, and the nation are the losers.

To help identify the extent and severity of these problems, a series of public meetings was held in winter 1974-1975. From Minneapolis to Lansing, Iowa, the range of public attitudes and concerns was recorded. At this formulative stage, the proposed programs of GREAT I were adjusted to reflect these attitudes and concerns.

At each meeting, the GREAT program was explained and people were urged to express their opinions. They responded positively even when river damage meant keenly felt personal loss. The response was honest, realistic, and highly useful to GREAT. People who live along the river and those who use it frequently were concerned about lost beauty and degradation of the river's recreational values. Fish and wildlife and maintenance of the 9-foot navigation channel were recognized as large-scale matters that required official regulation and review. Loss of favorite fishing pools, blocking of small-boat channels by sand, and marring of the river's beauty were realities that cut deeply.

PROBLEM IDENTIFICATION

Following these meetings and initial Team organization, an extensive list of problems was compiled. After the list was developed, the Team realized that it was not equipped or charged with responsibility to address all the problems. A list of criteria, based on the study objectives, was developed. These criteria defined the range of problems the Team would address. Guidelines used to identify problems are as follows:

1. The problem demonstrates a need to define federal, state, and local government roles or a need for change in policy (such as created by conflict at locks).

2. The specific problem or need is located or has significant impact within the riverine area.

3. The public has indicated concerns regarding the importance of a particular problem through newspapers, organization position papers, public meetings, or other means.

4. No other established single or joint body organization (either public or private) is currently addressing the problem or needs; or, if so, the party involved does not have the capability to adequately carry on the effort.

5. The problem or need, as well as possible solutions, has interstate or intergovernmental implications.

6. GREAT is in a unique position to pursue further study relating to the problem or need.

7. The problem reflects areas of conflict requiring a course of action.

8. GREAT has the capability to integrate the specific need with other major problems and needs of the river in reaching a solution.

9. A solution or recommendation to the problem or need can be realistically expected within the time and money constraints of GREAT.

10. The problem or need directly relates to the GREAT study objectives adopted by the Upper Mississippi River Basin Commission. These objectives are to:

a. Devise ways to significantly reduce the volume of dredged material removed for the navigation project.

b. Open backwater areas that have been deprived of necessary freshwater flow as a result of navigation maintenance activity.

c. Assure necessary capability to maintain the total river resources on the Upper Mississippi River in an environmentally sound manner.

d. Contain or stabilize all floodplain dredged material disposal sites to benefit the river resource.

e. Assure all navigation project authorizations include fish, wildlife, and recreation resources as project purposes.

f. Develop physical and biological baseline data to identify factors controlling the river system.

g. Identify sites that can be developed to provide for fish and wildlife habitat irretrievably lost to water development projects.

h. Identify and develop ways to use dredged material as a valuable resource for productive uses.

i. Implement programs to provide for present and projected recreation needs on the river system.

j. Strive to comply with federal and state water quality standards.

k. Strive to comply with federal and state floodplain management standards.

l. Develop procedures for assuring an appropriate level of public participation.

The above criteria were applied to the identified problems. The following tables show the results of the screening process. Each table lists the problems screened by the Recreation Work Group. Following the problem identification column are five columns. The first two show the problem's relevance to the GREAT I study and the work. Problems relevant to a work group but not the GREAT I study were excluded. In many instances, a problem first thought to be relevant to a work group was eliminated from consideration through the screening process. The column marked "Time frame" indicates the time period in which the problem should be solved. The letter "S" (short-term) represents the study period (1975 through 1979). The letter "M" (mid-term) is the period up to 15 years following study completion. The letter "L" (long-term) represents a time period 15 to 40 years following study completion. The last column of each table explains the reason for addressing or excluding a problem.

Table 1a

Recreation Work Group

26 Nov

Problem	GREAT	Work Group	Time Frame	Priority	Rationale
1. Legal and institutional authority - who is responsible for what?	Yes	Yes	S	1	There is a need to define roles of agencies.
2. Little is known about the river recreationist. There is a need to determine recreation use patterns associated with the river - origin and destination studies, length of stay, expenditures, what attracts users, and regional per capita use rates.	Yes	Yes	M	8	Types of recreation use should be identified to properly anticipate future needs and resolve existing and potential conflicts.
3. Significant areas of water surface use must be identified to reduce or avoid conflicts.	Yes	Yes	L	11	Areas of heavy recreation use should be identified to avoid conflicts with other uses (dredged material, navigation, refuges). Conflicting uses will be identified. The Fish and Wildlife Work Group will be assisting.
4. What types and quantities of facilities are currently available?	Yes	Yes	S	2	Determination of the existing supply along with projected demands will determine existing and future needs. This information will be of use to State and regional development commissions.
5. What is the demand for recreation on the Mississippi River?	Yes	Yes	M	9	Site specific recommendations are needed. The problem has interstate implications.
6. Recreation use areas may have adverse impacts on the environment.	Yes	Yes	L	12	Heavy use of areas may destroy the very resources that originally attracted the user. Recreation beach replenishment may cause closing of side channels and destruction of habitat. The Fish and Wildlife Work Group identified critical habitat areas. The Recreation Work Group then tried to alleviate conflicts by relocating and/or redistributing use.
7. Future and existing recreation areas may be adversely affected by development, channel maintenance, and accelerated sedimentation.	Yes	Yes	S	3	Location of potential recreation areas to meet projected demands are identified. This will include areas planned by federal, state, and local agencies.
8. Future and existing recreation areas may be enhanced with the use of dredged material.	Yes	Yes	S	4	Location of potential and planned recreation areas are identified. The Dredged Material Uses Work Group will identify existing and planned areas that may be beneficially affected by using dredged material.

Table 1b

Recreation Work Group (Cont.)

26 Nov 76

Problem	GREAT	Work Group	Time Frame	Priority	Rationale
9. Frequency of boating accidents is relatively high.	Yes	Yes	M	10	Although each State and the U.S. Coast Guard maintain accident records and have enforcement duties, the problem is an interstate problem that requires an interstate solution. Increasing recreation pressure could increase the accident rate. Distribution of recreation use affects accident rates.
10. Recreation use sometimes conflicts with commercial uses.	Yes	Yes	L	13	The quality and quantity of recreation use are directly affected by locking conflicts with commercial traffic and increased conflicts in the main channel. The Corps of Engineers Duplicate Locks Study is addressing locking conflicts. Boating accidents are addressed in the Recreation Work Group's boating accident study.
11. Historic and archaeologic site destruction may occur along the river's edge outside of urban areas or within the riverine area.	Yes	Yes	S	5	Dredged material and side channel openings could adversely affect these areas. Some cultural resource sites are major tourist attractions. Archaeologic sites should be protected until they are evaluated.
12. Areas funded by Land and Water Conservation funds may be adversely affected or the original project purposes may be amended by the deposition or dredged material.	Yes	Yes	S	6	Any such actions would require prior approval of the Heritage Conservation and Recreation Service if there are changes in land use. These recreation areas are protected in perpetuity under the Land and Water Conservation Fund Law. Enhancement of recreation opportunity is permitted with prior approval. Land and Water Conservation fund areas are identified.
13. There is a threat of degradation of the viewshed.	Yes	Yes	S	7	Dredged material sites may adversely affect aesthetics including views from within the river and from scenic bluffs. Areas are identified as part of the inventory.

S - Short-term
M - Mid-term
L - Long-term

LEGAL AND INSTITUTIONAL FRAMEWORK

Introduction

Recreation opportunity in the Upper Mississippi River corridor is provided through a complex interaction of federal, state, and local governments and the private sector. The development of a river management plan that will incorporate total river resource requirements must by necessity consider the activities and capabilities of each level of government and the private sector.

The following overview highlights the major authorities and activities of federal and state agencies related to the provision of outdoor recreation opportunity in the Upper Mississippi River area. It has been developed to provide a perspective that will be useful during the development and formulation of the recreation components of the river management plan. As additional tasks described in the recreation work group Plan of Action are undertaken, definition concerning the activities of local governments and the private sector will be added.

Federal Activities and Responsibilities

Three federal agencies in two departments share the major responsibilities related to direct provision of recreation opportunity in the Upper Mississippi River area: the U.S. Fish and Wildlife Service and National Park Service of the Department of the Interior and the U.S. Corps of Engineers of the Department of Defense. The Heritage Conservation and Recreation Service (formerly Bureau of Outdoor Recreation) and Bureau of Land Management of the Department of Interior and the Federal Highway Administration of the Department of Transportation provide technical, financial, or planning assistance to federal, state, and local governmental agencies. The combination of authorities and activities of these agencies provides a broad framework for coordinated action on the Upper Mississippi River.

U.S. Fish and Wildlife Service--For over 50 years the U.S. Fish and Wildlife Service and its predecessor agencies have safeguarded and managed portions of the Upper Mississippi River bottomlands for fish and wildlife. Currently, the Service provides recreational opportunity by managing one unit of the National Wildlife Refuge System within the study corridor located between Wabasha, Minnesota, and Savanna, Illinois, and one National Fish Hatchery at Genoa, Wisconsin.

The Upper Mississippi River Wildlife and Fish Refuge was established in 1924 and totals 195,080 acres. It is a composite of Corps of Engineers and Fish and Wildlife Service fee-owned lands. In addition, 6,580 acres are being managed by the State of Iowa under cooperative agreement with the Service. The Genoa Fish Hatchery occupies a 0.75-acre tract of additional Service land.

The basic management objectives for the refuge, consistent with national objectives of the Service, are as follows:

> To preserve the wildlands character and natural beauty of the river bottoms, with their unique habitat and wildlife intact, and to foster an understanding and appreciation of this resource by providing for recreation and education uses.
>
> To provide protection for fish, wildlife, and their habitats; to promote the production of wood ducks; and to assure the continuation of an environment beneficial to migratory and resident wildlife.
>
> To preserve and manage as wild areas woodlands and prairie typical of the original vegetation of the valley and to provide natural areas for scientific study.
>
> To encourage proper land use and zoning by local government bodies to assure the preservation of the varied natural resources of the river valley and to cooperate with all land users to develop plans to provide the fullest possible recreational use of the river and lands consistent with multiple resource management.
>
> To cooperate with public land-managing agencies and private interests to develop a balanced recreation program covering all opportunities to enjoy the attractions of the Mississippi River Valley.

Recreational use of refuges is specially provided for by Public Law 87-714, as amended. This Act (Recreational Use of Fish and Wildlife Areas) permits forms of recreation not directly related to the primary purpose and function of the area, provided that:

> (a) Such recreational use will not interfere with the primary purpose for which the area was established, and
>
> (b) Funds are available for the development, operation, and maintenance of these permitted forms of recreation.

Between FY 1971 and FY 1974 the refuge has increased its annual recreation visitation rate from one and one-half million visitors to over an estimated two million visitors. In some areas of the river this level of use is near capacity during certain seasons of the year.

According to the 1972 Policy Statement Concerning Public Use on National Wildlife Refuges, and subsequent policy directives by the Bureau of Sport Fisheries and Wildlife, "the matter of public use on a national wildlife refuge has been given careful review and consideration... as a result we have determined that the Bureau should move to begin the de-emphasis of non-wildlife related public use. These uses are exemplified by swimming, recreational boating, camping, the use of off-road vehicles, picnicking, and

similar activities which do not have a direct relationship to the wildlife and wildlands values for which these areas were created and are managed... These activities will be de-emphasized with the long-term goal being their elimination." This policy is implemented through the Annual Work Plans of the Regional Fish and Wildlife Service offices.

A recent court action, Ruby Lake Refuge case, July, 1978, enjoined the Fish and Wildlife Service from allowing power boating on Ruby Lake Refuge. The 1924 Act creating the Upper Mississippi Wildlife and Fish Refuge emphasizes that the management of the Refuge shall not interfere with navigation, however.

The Service also provides assistance to states through federal aid in Wildlife Restoration Act (Pittman-Robertson Act) and the federal aid in Fish Restoration Act (Dingell-Johnson Act). These programs encompass wild mammal and bird restoration and hunter safety under the federal aid in Wildlife Restoration Act and sport fish restoration through the federal aid in Fish Restoration Act. In each case, federal excise tax revenues collected from the manufacturers of sporting arms, handguns, archery equipment, ammunition, and most types of sport fishing tackle provide the funds. The general objective of the program is to restore and manage fish and wildlife populations for the preservation and improvement of sport fishing, hunting, and other uses of these resources in the public interest. This may be accomplished through purchase, development, management, and administration of lands and waters to restore, establish, and maintain habitat and fish and wildlife populations.

National Park Service--Effigy Mounds National Monument located three miles north of Marquette, Iowa, is the only unit of the National Park System within the study area. Federal ownership of land in the National Monument totals 1,373.8 acres. Negotiations are currently underway for purchase of 93.7 acres, bringing the total NPS ownership to 1,467.5 acres which represents the maximum currently authorized acreage. The purpose of this acquisition is to pick up additional Indian mounds and to round out the boundaries of the management unit.

Public Law 92-560, enacted on October 27, 1972, designated a 52-mile segment of the St. Croix River between Taylors Falls, Minnesota, and the Mississippi River as a component of the National Wild and Scenic River System. The Lower St. Croix National Scenic Riverway encompasses 13,600 acres. The lower 25 miles of the river is to be administered by the states of Minnesota and Wisconsin. Administration of the 27-mile upstream portion of the Scenic Riverway will be the responsibility of the National Park Service.

Overall, the quantity and quality of recreation opportunities in the Lower St. Croix National Scenic Riverway portion of the Upper Mississippi River area will be improved by the development of nature trails and interpretive devices as well as boater wayside mini-parks designed to include comfort facilities and picnic sites.

Corps of Engineers--In developing Corps management programs, the mission is directed to obtain optimum sustained benefits from recreational use,

fish and wildlife conservation, and enhancement and preservation of open space consistent with authorized project purposes. Outlined below is the authority granted to the U.S. Army Corps of Engineers to develop recreational facilities.

> Section 4 of the Flood Control Act of 1944 (16 U.S.C. 460d), as amended by Section 207 of the Flood Control Act of 1962, grants general authority to construct, maintain, and operate recreational developments at water resource developments under control of the Secretary of the Army.
>
> The Federal Water Project Recreation Act of 1965 (P.L. 89-72), as amended by Section 77 of P.L. 93-251, imposes requirements of non-federal participation and cost-sharing for recreation and fish and wildlife enhancement at reservoir projects authorized after January 1, 1965. Similar requirements are being administratively applied to reservoir projects authorized before January 1, 1965.
>
> Section 2, River and Harbor Act of 1920, requires the Chief of Engineers to consider special cost-sharing in recommended projects if special or local benefits are expected to accrue. This authority is administratively interpreted in defining cost-sharing under Section 4 of the 1944 Act, as amended, for recreational development of types of nonreservoir projects exempted by Section 6(e) of P.L. 89-72 from the cost-sharing provisions thereof, except for beach erosion and shore protection projects. The net result is the same as P.L. 89-72, i.e., a 50/50 sharing of recreation development costs with non-federal assumption of all costs of operation and maintenance.

Traditionally, the policy of the Corps of Engineers has encouraged non-federal participation in the administration of recreational opportunities provided at Corps projects. Since 1944, the Corps has entered into agreements which promote state and local development and administration of recreation areas at Civil Works projects. This policy was reaffirmed by Congress through passage of the Federal Water Project Recreation Act of 1965. This Act established uniform policies and procedures relating to benefits and costs of recreation and enhancement of fish and wildlife associated with Corps multi-purpose water resource projects.

Inclusion of recreation development in proposed or authorized projects requires coordination of planning with concerned non-federal public bodies at all stages. Before authorization of a project with recreation developments, non-federal interests must furnish assurances of willingness and ability to meet statutory requirements for non-federal assumption of responsibilities for the development, operation, maintenance, and replacement of recreational facilities, or the recreation development will not be provided.

Specifically, the non-federal public bodies must indicate in writing their intent to administer project land and water areas for recreation or fish and wildlife enhancement, or both, and to bear not less than

one-half the separable costs of the project allocated to recreation, and all costs of operation, maintenance, and replacement for these purposes.

Since the influence and impact of Corps projects extend beyond the federal ownership boundaries, close coordination is required in such areas as highways, public utility location, local zoning requirements, and law enforcement. A master plan is prepared for all Corps projects with significant recreation resource potential. The master plan describes in detail how all project lands and waters will be conserved, enhanced, developed, and managed in the public interest throughout the life of the project. The physical plan of development has two components: land and water use and facilities development.

The land and water use component identifies all the resources of the project and depicts in detail the relationships of varied land and water uses appropriate to those resources. It is, in essence, a complete land use allocation plan presenting specific recommendations for the uses to which all land and water areas are or will be dedicated.

The facilities development component translates the land and water use allocation plan into the specifics for actual facilities developments required over the life of the project. Site plans are prepared for areas showing the most desirable and feasible locations of types and numbers of recreation facilities along with a narrative report.

Each district develops a continuing schedule to completely reevaluate and update the master plan for completed projects. This review reflects any substantial increase in the number of users, their changes in preferred activities, and needs not anticipated in the previous plan. On approval, the updated plan serves as the basis for future programming of expenditures for additional recreation development. Except in a few projects where recreation was specifically authorized for federal development and management, all new construction of recreation facilities requires local participation in keeping with principles of P.L. 89-72.

The Corps of Engineers holds fee title to 185,317 acres of land along the 660-mile mainstem of the Mississippi River; 50,266 acres being located in the St. Paul District. Much of the land acquired in fee lies only slightly above the maximum regulated pool elevation or is inundated during pool regulation.

Heritage Conservation and Recreation Service (HCRS)--The HCRS is the recreation policy and planning agency for the Secretary of the Interior and "banker" for the Land and Water Conservation Fund which provides recreation grants to states and finances acquisition of federal recreation areas. Through its planning and coordination programs, the HCRS serves all federal agencies as well as state and local governments, private organizations, and individuals concerned with outdoor recreation.

By legislative authority or upon the order of the Secretary of the Interior, the HCRS undertakes studies of the suitability of appropriate areas for designation as national parks, recreation areas, wild and

scenic rivers, or trails. If a study finds an area to be so suited, the Bureau recommends how the area could be used, developed, and administered for those purposes. HCRS programs relating to the provision of outdoor recreation opportunity in the study corridor include financial assistance through the Land and Water Conservation Fund and transfer of federal surplus properties for park and recreation purposes. The Fund finances the acquisition of lands for federally-administered recreation areas and provides matching grants to states for recreation planning, acquisition, and development. The HCRS also assists states in developing comprehensive outdoor recreation plans which are required in order for a state or its political subdivisions to participate in the Land and Water Conservation Fund grant program.

The HCRS also administers the historic preservation program established by Public Law 89-665, National Historic Preservation Act of 1966. Under this program, 50 percent federal assistance grants are provided to the states to preserve for public benefit historic districts, sites, buildings, structures; and objects significant in American history, architecture, archaeology, and culture. Grants can be used to help finance state surveys and plans for historic preservation.

The Act provided for the expansion of the National Register of Historic Places to include historic properties of state and local significance. It charged the states with the responsibility for carrying out the necessary surveys with the assistance of the above grant program. Prior to inclusion in the Federal Register of Historic Places, the State Historic Preservation Officer (who is appointed by the Governor) must certify that each registered property was properly nominated. Each state must have an approved review committee and an accepted statewide plan.

On May 13, 1971, Executive Order 11593, Protection and Enhancement of the Cultural Environment, was issued. It emphasizes the federal role in preserving, restoring, and maintaining the historic and cultural environment of the nation. It also stresses the responsibilities of federal stewardship of historic properties and describes the responsibilities of federal agencies in identifying, preserving, and maintaining historic properties.

Bureau of Land Management--To date the role of the Bureau of Land Management in the study corridor has been essentially that of identifying lands for which validity of federal ownership under public domain status can be based. This was accomplished during the course of an island inventory. All islands identified to date as national resource lands are within Ramsey, Dakota, and Goodhue Counties in Minnesota. These total ten in number with a land area of approximately 75 acres. The segment of the river below Goodhue County, Minnesota, will be visited in conjunction with the Wisconsin inventory.

The potential exists to expand the island inventory into other states bordering the Mississippi River. These include Iowa, Illinois, and Missouri. Such a proposal must gain approval within a priority system prior to receiving budget approval.

Federal Highway Administration--The Federal Aid Highway Act of 1973 authorized funds for the development of the Great River Road as the nation's first National Scenic and Recreational Highway. This Act provided for the construction or reconstruction of the Great River Road, including acquisition of areas of historical, archaeological, or scientific interest; necessary easements for scenic purposes; and the construction or reconstruction of roadside rest areas, including appropriate recreational facilities and scenic viewing areas. Planning of this road under existing joint development procedures, with interagency coordination, should provide a highway facility to benefit the combined activities of all entities involved in the plan. Authority for walkways and bike trails were also provided in this Act.

The Highway Beautification Act of 1965 authorized the acquisition and development of rest and recreation areas, acquisition of scenic easements, and the control of outdoor advertising and junkyards. With funds authorized under this program, many states have acquired scenic easements adjacent to the Great River Road. Actions related to the Great River Road in each state are summarized in the section on state activities.

FEDERAL-STATE ACTIVITIES AND AUTHORITIES

The Upper Mississippi River Basin Commission serves as the principal agency for the coordination of federal, state, interstate, local, and nongovernmental plans for the development of water and related land resources in the Upper Mississippi River area. The Commission prepares and keeps up to date, to the extent practicable, a comprehensive, coordinated, joint plan (CCJP) for federal, state, interstate, local and nongovernmental development of water and related land resources. During the comprehensive planning process, the Commission may foster and undertake such studies of water and related land resource problems in its area as are necessary in the preparation of the comprehensive, coordinated joint plan.

The Commission is composed of a chairperson, one member from each designated federal department or agency having substantial interest in the work of the Commission, and one member from each state lying wholly or partially within the basin area. These include the Department of the Army, Department of Agriculture, Department of Commerce, Department of Health, Education and Welfare, Department of Housing and Urban Development, Department of the Interior, Department of Transportation, Environmental Protection Agency, Federal Power Commission, Energy Research and Development Administration, and the States of Wisconsin, Minnesota, Iowa, Illinois, Missouri, and North Dakota.

The Upper Mississippi River Basin Commission has been playing a key coordinating role relative to interagency efforts along the Upper Mississippi River. To initiate the Great River study, the Commission formed the Dredge Spoil Practices Committee which adopted the following objectives for the study: (1) development of a river system management plan which will incorporate fish, wildlife, and related

resources requirements and navigation channel needs, (2) opening of backwater areas to fresh flows of water, (3) containment and stabilization of floodplain disposal sites in a manner to benefit the river resource, (4) establishing physical and biological baseline data to guide plan development and implementation, (5) protection of water quality, (6) performing only essential dredging to maintain the nine foot channel and enhance fish and wildlife resources and recreation opportunity.

The Commission also coordinated the Twin Cities Metropolitan Area Level B Study. The two-year study which began in April, 1974 covered a 2,820 square mile area within Minnesota coinciding with the Minneapolis/St. Paul metropolitan area. The extensive development within the area, future developments being planned, and the need for proper water and related land resource development made necessary the Level B study. The area needs improved and additional facilities for recreation.

The Commission has also recognized the need for additional studies of the Mississippi River and has requested approval and funding of a Level B comprehensive interagency study on the mainstem of the river from Cairo, Illinois, to the upper locks in the Minneapolis/St. Paul, Minnesota, area. That study is principally concerned with resolving conflicts associated with the multi-purpose use of the river for commercial navigation, recreation, and fish and wildlife.

STATE ACTIVITIES AND AUTHORITIES

The three states bordering the portion of the Upper Mississippi River included within the GREAT I study have the following programs, policies, and authorities which relate to the objectives of the recreation work group.

Minnesota

Minnesota Memorial Hardwood State Forest--The Memorial Hardwood Forest lies in southeast Minnesota along the Mississippi River within the counties of Dakota, Dodge, Fillmore, Goodhue, Houston, Olmsted, Wabash, and Winona. Its northern limit lies less than 20 miles south of the Minneapolis-St. Paul metropolitan area, while its southern limit extends to the Iowa state line for an overall length of approximately 125 miles. The gross area within the Forest boundary totals 1,966,000 acres as established by the 1961 Legislation within the enactment of Chapter 89.021, Subdivision 34. The vast majority of the designated area is in private ownership.

The Minnesota Department of Natural Resources will acquire lands to be added to the Minnesota Memorial Hardwood Forest for multi-use purposes. The acquisition program of 200,000 acres of private inholdings within the boundary of the State Forest is scheduled for completion within a 30-year period. Purchases of about 70,000 acres are planned for the first 10-year purchase period extending through 1977. About 25,000

acres have been acquired to date. The primary purpose of the project is to provide a variety of opportunities for high quality recreation experiences in a natural environment. Lands recommended for purchase are primarily wooded areas concentrated along the bluffs of the Mississippi and its tributary rivers where land can be acquired in fairly large consolidated blocks. Reestablishment and management of the Forest will contribute much to the recreational values. A trail is planned along the Mississippi River corridor.

Wild and Scenic Rivers Act--The Minnesota Wild and Scenic Rivers Act was signed into law on May 16, 1973. Generally, the purpose of the Act is to protect and to preserve Minnesota's outstanding rivers. This may entail shoreland restoration such as planting trees or erosion control work projects. Emphasis, however, will not be on creating natural areas but on protecting and preserving areas in their present state. Rivers and their adjacent lands that possess outstanding scenic, recreational, natural, historical, scientific, or similar values will be considered for the Minnesota Wild and Scenic River System. The Cannon and Root Rivers which flow to the Mississippi River through the Memorial Hardwood Forest are presently under study for inclusion in the state system.

The 52 miles of the St. Croix River between Taylors Falls, Minnesota, and the Mississippi River were recently designated a National Scenic Riverway. Administration of the lower 25 miles of the riverway will be the responsibility of the states of Minnesota and Wisconsin. Boater wayside mini-parks are to be provided by the two states.

Critical Area Act--Local units of government may submit recommendations to the Governor for areas of critical concern. The Governor may issue an executive order designating all or part of the recommended area as critical. The resulting order of designation must include specific standards and guidelines to be followed in preparing and adopting plans and regulations for the critical area and the development, if any, that shall be permitted pending the adoption of plans and regulations. An application for critical area designation is being prepared for the Mississippi River corridor in the Twin Cities metropolitan area.

Shoreland Management Act--The Minnesota Shoreland Management Act of 1969 requires the counties to zone unincorporated stream, river, and lake frontage lands according to statewide standards and criteria which include minimum lot size, setback limits, and sewage systems.

Floodplain Management Act--The 1973 natural resources legislation passed by the 86th session of the Minnesota legislature included an amendment to the 1971 Minnesota Statute.

The Act adds additional policy which requires primary emphasis on nonstructural floodplain management ordinances to reduce floodplain management damage reduction without adoption of local ordinances. The bill also encourages greater federal planning assistance to local government and establishes provisions regarding emergency flood

protection measures. In effect, the emergency construction measures must be justified as part of a future comprehensive flood emergency program and must be approved by the Commissioner. If the measures are not approved by the Commissioner, he shall order the removal of the measures.

The bill also provides for action by local governments to establish floodplain ordinances within specific time limits after adequate technical data are available. If a local governmental unit fails to act within the presented time limit, the Commissioner is authorized to adopt the ordinances to the unit at the expense of the unit. A key addition to the law is the requirement that all local governments subject to recurrent flooding participate in the national flood insurance program.

Great River Road--Four land parcels have been acquired along State Highway 26 (Great River Road) just north of Reno. They contain 10 acres acquired in fee and a one-acre easement.

Significant Local Actions--The Minneapolis-St. Paul Metropolitan Council in its development guide for the seven-county metropolitan area, including Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties, has identified areas in the region having the best potential as regionally significant recreation sites. These areas are classified by the Council as either park reserves or regional parks.

The areas relating to the Mississippi River which have been identified for immediate action are described below. These areas are primarily located close to the population, and many are being subjected to severe development pressures.

Lilydale, a 320-acre site located on the Mississippi River just two miles southwest of downtown St. Paul, has tremendous potential because of its proximity to the heart of the urban area. It would largely complete public ownership of the Mississippi River corridor between the University of Minnesota and downtown St. Paul (Harriet Island-Cherokee Park) and also would tie in with the Fort Snelling-Minnesota Valley Trail complex. It would also remove from residential use a flood-prone section of the river bottoms. Recreational potential includes river-oriented activities such as boating accesses and marinas plus possibly swimming at Pickerel Lake. There is also substantial potential for trails to tie in with the Fort Snelling-Minnesota Valley Trail and trails along the Mississippi River corridor. The area is also quite scenic with bluffs rising as much as 250 feet above the floodplain, although most of the site itself is quite flat.

Rush Lake, a 400-acre site located in the Rice Creek watershed, has potential for canoeing for eight miles from this site to the Mississippi River. Also, significant potential for trails exists in conjunction with the entire Rice Creek complex.

Spring Lake, located on the Mississippi River about 20 miles southeast of downtown St. Paul in Dakota County, includes some 1,750 acres of wooded ravines and bluffs, river terrace lands adjacent to Spring Lake (which is formed by backwaters of the Mississippi), and open farm land. There is potential for boat access facilities, but water quality of the Mississippi will determine the extent of other water-oriented activities. There are significant historical and archaeological values in the area.

Wisconsin

Shoreland Management Program--The Wisconsin Water Resources Act of 1965 created a new and imaginative comprehensive state program for managing the water and related land resources of the state. One of the cornerstones of this multi-faceted approach is the requirement for establishing statewide land use controls along lakes and navigable streams.

The legislation makes a distinction between shorelands and floodplains. Shorelands are defined as lands within 1,000 feet of a lake, pond, or flowage and lands within 300 feet of a river or stream or to the landward side of the floodplain, whichever distance is greater. The purposes of shoreland regulations are to: (1) protect public health; (2) control water pollution; (3) protect spawning grounds, fish, and aquatic life; and (4) control building sites, placement of structure and land uses, and reserve shore cover and natural beauty. Floodplain regulations, on the other hand, are applicable for those lands where appreciable damage from floods is likely to occur.

The primary responsibility for enacting and administering shoreland regulations rests with the counties. A unique feature of the program is the overall and direct supervision given by the state.

County shoreland regulations cover the use of any land or water; size, shape, and placement of lots; use, size, type, and location of structures on lots; installation and maintenance of water supply and waste disposal facilities; filling, grading, lagooning and dredging of any land; cutting of shoreland vegetation; and subdivision and platting of lands. All applicable Wisconsin counties have adopted and are implementing shoreland regulations for unincorporated areas.

Floodplain Management Program--The Wisconsin legislature, in enacting Chapter 614, Laws of 1965, recognized that floodplain zoning is a necessary tool to protect human life, health, and to minimize property damages and economic losses. Counties, cities, and villages are required to adopt reasonable and effective floodplain zoning ordinances within their respective jurisdictions where serious flood damage may occur. Floodplain zoning regulations are in effect in approximately 160 cities and villages and in 40 counties within the state.

Wild Resources System

Implementation of the Wild Resources System by the state incorporates the following policy in part:

"The Wisconsin Natural Resources Board finds that the designation of certain lands in various classes of a Wild Resources System is in the public interest. Therefore, it is the policy of the Board to periodically evaluate Department of Natural Resources properties with respect to their qualification for such designation. In addition, the Department shall cooperate with other public agencies and interested private landowners to determine how their lands and waters might become a part of or complement this wild resources system, including methods of equitable compensation."

"To assist the Department and Board in the implementation of this policy, a Wild Resources Advisory Council shall be formed. The chairperson of the Forestry Advisory Council, Scientific Areas Preservation Council, Outdoor Recreation Advisory Council, County Forest Advisory Council, a representative of the U.S. Forest Service, and six public members appointed by the Secretary shall constitute the Council. In addition, wide public participation and advice is encouraged and shall be actively sought in the implementation of this policy.

Plans shall be developed for each unit in the system. If the unit is part of a larger Department project covered by a management plan, the plan for the unit may be prepared as a section of that plan. Because of the potential difficulties arising from conflicting land use on adjacent lands, adequate buffer areas will be included within the designated areas wherever possible. The Council shall review each proposed unit and make recommendations with respect thereto to the Board. Units shall be considered for establishment by the Board, after review by the Council."

Management guidelines for individual units of the system include in part: Wilderness Areas where only protective activities are necessary to protect the values to be preserved are permitted, Wild Areas where restricted timber harvesting and mineral exploration subject to Board approval are permitted, Natural Areas where management is limited to the extent required to assure preservation and facilitate safe use, Scientific Areas which are not publicized and management is limited to the extent required to assure preservation and prevent damage to surrounding lands, Wild, Scenic, and Recreational Rivers in which no developments or vegetative management shall be permitted within 400 feet of the water or to the visual horizon from the water, whichever is the greater, except for access and primitive canoe sites, campsites, and Wild and Wilderness Lakes.

Wisconsin Natural Beauty Council

The Natural Beauty Council, an advisory council on the physical environment, serves as a link between the citizens and state government. Its

statutory charge is to advise the Governor, state legislature, and state departments on matters pertaining to the natural beauty of Wisconsin.

It encourages community improvement projects through its "Contest for Improving the Environment" for elementary schools and its "Mainstreet Wisconsin" contest for small towns of under 5,000 people.

It is also actively promoting the use of native shrubs and prairie plants "natural landscaping" in home yarts, parks, school sites, and along roadsides.

Mississippi River Bluffs Study--A proposal has been made to study the development of a trail for ski touring, hiking, and horseback riding along the bluffs of the Mississippi River from Pierce County south to the vicinity of Cassville. Also under study is a proposed addition of a bicycle trail along a stretch of State Route 35 (the Great River Road) between LaCrosse and Prairie du Chien. One-half million dollars has been recently set aside by the Wisconsin DOT for implementation of this study.

Great River Road--Scenic easements have been acquired along 120 miles of the Great River Road with an average depth from the right-of-way line of approximately 450 feet. These were acquired without federal aid assistance under a state-funded program called ORAP (Outdoor Recreation Action Program).

Iowa

Floodplain Management--The 1965 Iowa legislature enacted the Floodplain Regulation Act. Under this Act, the Iowa Natural Resources Council may establish and enforce regulations for the orderly development and wise use of the floodplains of any river or stream within the state and alter, change, or revoke the same. The Council shall determine the characteristics of the floods which reasonably may be expected to occur and may by order establish encroachment limits, protection methods, and minimum protection levels appropriate to the floodplains. The Council may cooperate with and assist local units of government in the establishment of encroachment limits, floodplain regulations, and zoning ordinances relating to floodplain areas within their jurisdiction.

State Acquisition Policy--The Statewide Comprehensive Outdoor Recreation Plan (SCORP) offered a proposal for a statutory appropriation of $2,000,000 annually for acquisition of open space lands throughout Iowa. The text of the SCORP reads, "These lands should include significant natural areas, inholdings within present boundaries and adjacent parcels needed to improve boundary lines. Particular emphasis should be paid to open space lands adjacent to the Mississippi River." This program has been implemented, and some areas along the Mississippi River have already been acquired.

Scenic and Recreation Rivers Act--"The state scenic river system legislation provides for designation only, without authorization, for protection

techniques and the only area designated by the State Conservation Commission is the Upper Iowa River. The legislation provides for the publicizing of scenic corridors in the state."

Great River Road--Two parcels adjacent to Iowa 26 (Iowa Great River Road) just south of the Upper Iowa River have been acquired. Part of one parcel was acquired in fee and developed as a rest area. The remainder of this parcel and the second parcel were acquired as scenic easements. Other parcels are being acquired adjacent to other Great River Road segments.

Water Access Program--The state is actively acquiring and developing access points to public waters. Several access sites have recently been developed along the Mississippi River.

Trails Program--A conceptual trail system plan has been completed by the state which includes sections of the Mississippi River corridor.

Protected Waters--A general plan is being developed by the Conservation Commission to identify critical water and associated land areas and develop measures for their protection. This plan is scheduled for completion in FY 1980.

CHANNEL MAINTENANCE

Introduction

Dredge "spoil" from channel maintenance dredging has created many sand beaches along the main channel of the river. Because of their proximity to navigable water, the beaches are heavily utilized free of charge for swimming, picnicking, waterskiing, camping and "partying". These areas are essentially undeveloped and unmanaged.

Dredge "spoil" has also cut off valuable side channel opening and destroyed fisheries and wildlife habitat. In addition, some disposal areas have seriously impacted aesthetics of areas. This has had a negative impact on forms of recreation utilizing these resources.

It is estimated that approximately 352,000 people visited dredged material disposal areas in 1978. These visitors each spent less than $30.00 locally for equipment and supplies. Approximately 38 percent of those boaters using the locks camp on dredged material disposal islands. Sixty-five percent of these boaters also engage in swimming and picnicking activities, most of which probably occurs on these disposal islands.

Sandbars of various sizes have historically been common along the Mississippi River. These sandbars have been the result of natural accretion, water level fluctuations, and navigation channel maintenance activities. The river users generally accept some sandbars as part of the "river-scape" and they are one of the major attractions to the river boating recreationists.

Not all dredged material disposal areas are used by recreationists, however.

Large inland sites, sites with steep slopes, and those that sharply contrast to the "natural" surrounding with excessive height are not acceptable to the recreationists.

In addition, those types of sites previously mentioned do not appear as "natural forms" to the viewer from scenic overlooks, waysides, and from within the river corridor. "Natural forms" are identified as land formation types that might appear naturally were the river in an uncontrolled state.

Due to revegetation, very few disposal sites formed before 1960 are used for recreation unless they have been periodically used for disposal and the exposed sand areas maintained. Sites that have completely revegetated receive little or no recreational use.

GREAT I RECREATION WORK GROUP

DREDGED MATERIAL PLACEMENT

SITE EVALUATION FORM

POOL NO. _____

DATE OF EVALUATION _____

SITES EVALUATED _____

SITE NUMBER	RECREATIONAL ENHANCEMENT				ADVERSE IMPACTS: EXISTING REC. USE		BOAT		SWIM		HUNT		FISH		VIEW-SHED		WILDER-NESS		CULTURAL RESOURCES			COMMENTS	ACCEPT		LIMITED
	Y	N	USE	$	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	FS		Y	N	

REVISED 4/8/76

Minimize Impacts

In order to minimize the impacts of dredged material disposal, the Recreation Work Group undertook two major activities: 1) developing criteria and evaluating recommended disposal sites, and 2) developing guidelines to maintain and enhance recreation areas with dredged material.

Disposal Site Evaluations

The Dredged Material Uses Work Group identified potential disposal sites by "site number" for each pool. Each work group of GREAT I then evaluated each of the alternative sites based upon evaluation criteria developed by that work group.

The Recreation Work Group used the following criteria in evaluating potential disposal sites.

RECREATION WORK GROUP, GREAT I
DISPOSAL SITE EVALUATION CRITERIA

Stockpile sites shall not be recommended for use by the Recreation Work Group, if the deposition of the material:

1. has significant adverse impact on existing recreational use or developments.

2. has significant adverse impact on proposed recreational use or developments.

3. is to occur on known or suspected historical/archaeological sites.

The Recreation Work Group will recommend further study or modifications to the stockpile site, if the deposition of the material:

1. occurs on an area previously funded by Land and Water Conservation Funds (LAWCON). Deposition in these areas may change the "project purpose" or have adverse impact on the recreational developments or use in this area.

2. occurs on an area in which no historical/archaeological surveys have been undertaken. This is only restating the Corps of Engineers' legal responsibilities to undertake these studies before material deposition.

3. has major adverse impact on the aesthetics of the area.

The criteria for aesthetic impact evaluation of dredged material disposal sites are:

a. Disposal heights less than or equal to fifteen feet above local unaltered relief with gradual side slopes (1 on 10) are acceptable. (Source: Maintenance and Enhancement of Dredged Material Disposal Areas for Recreation, 15 June 1978, Coursolle and Johnson).

b. Disposal heights greater than fifteen feet above local unaltered relief are acceptable if not viewed from overlooks, waysides, etc., or from within the river corridor.

c. Disposal sites are acceptable in heavily industrialized areas.

In order to clearly and concisely document this evaluation procedure a Site Evaluation Form was developed (Figure 3).

ENHANCEMENT OF DISPOSAL AREAS FOR RECREATION

Dredged material disposal sites are important for recreation. The physical features of these sites have a definite impact on the recreational experience and the intensity of recreational use.

The following physical features of dredged material disposal sites enhance the recreational experience:

-Sand beaches (open sand areas).
-Good boat access; adequate water depth.
-Beach slopes of 10 percent or less.
-Adjacent swimming areas with 10 percent bottom slopes.
-Some overstory on the site to protect the users from sun and wind.
-Some understory separating some areas within the site for user privacy.
-Topographic variety on the site; however, not so extreme as to impair tent sites.
-Good woods access.

Physical features that detract from the recreational experience are:

-Lack of open sand areas on the sites.
-Lack of overstory on the site.
-Steep slopes on the site.
-Deep water in swimming areas.
-Large thickets of sandbar willows causing some of the areas on the site to be impenetrable.
-Litter (excessive amounts).
-Large masses of wood nettles and poison ivy.

An awareness of these physical features when selecting dredged material disposal site would help create better recreational sites with very little change necessary in maintenance practices. These features must be weighed against the estimated amount of dredged material to be deposited. The amount deposited will directly affect both positive and negative physical features.

A dredged material disposal site near the locks would increase and enhance the recreational experiences and, at the same time, alleviate some of the problems associated with locking and lockage waits.

RECOMMENDATIONS AND GUIDELINES

The illustrated recommendations presented in this section constitute the major design concepts resulting from a study of recreational activities and site characteristics (Determining Means of Enhancing and Maintaining Beach Recreation Areas with Dredged Material, June, 1978, Coursolle and Johnson). These recommendations are adaptable to the entire study area and act as a basis from which site specific analysis criteria can be developed.

Some of the recommendations and guidelines contradict currently accepted ideas concerning the environmental impacts of dredged material sites. The proposals made from this study are designed from a recreation use standpoint. They attempt to make site stability, recreational use and natural aesthetics compatible. These concepts are achievable and should assist all concerns in their pursuit of environmental and aesthetic policies and directives.

1. Site Location in Relation to the River Channel

   a. Recommendation

      Dredged material disposal sites should be located in a manner that minimizes maintenance and erosion factors.

   b. Guidelines

      -Sites should be on the accreting side of the river channel to minimize river current erosion.

      -Dredged material disposal sites should be at least 400 feet from the channel centerline. The farther the site is from the main channel, the less the effect of wave action erosion would be.

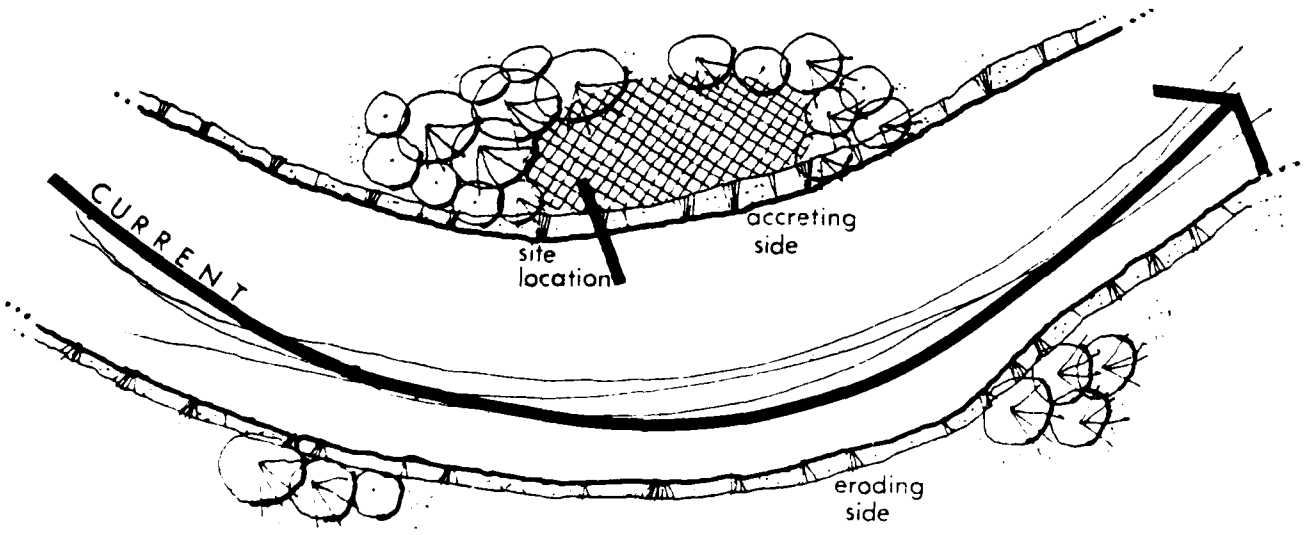


Figure 4 Site Location on a River Bend

-Sites should be on the downstream end of smaller islands. Larger islands can often follow regular riverbank disposal guidelines.

-Sites should have some overstory vegetation surrounding them to minimize the effects of wind erosion.

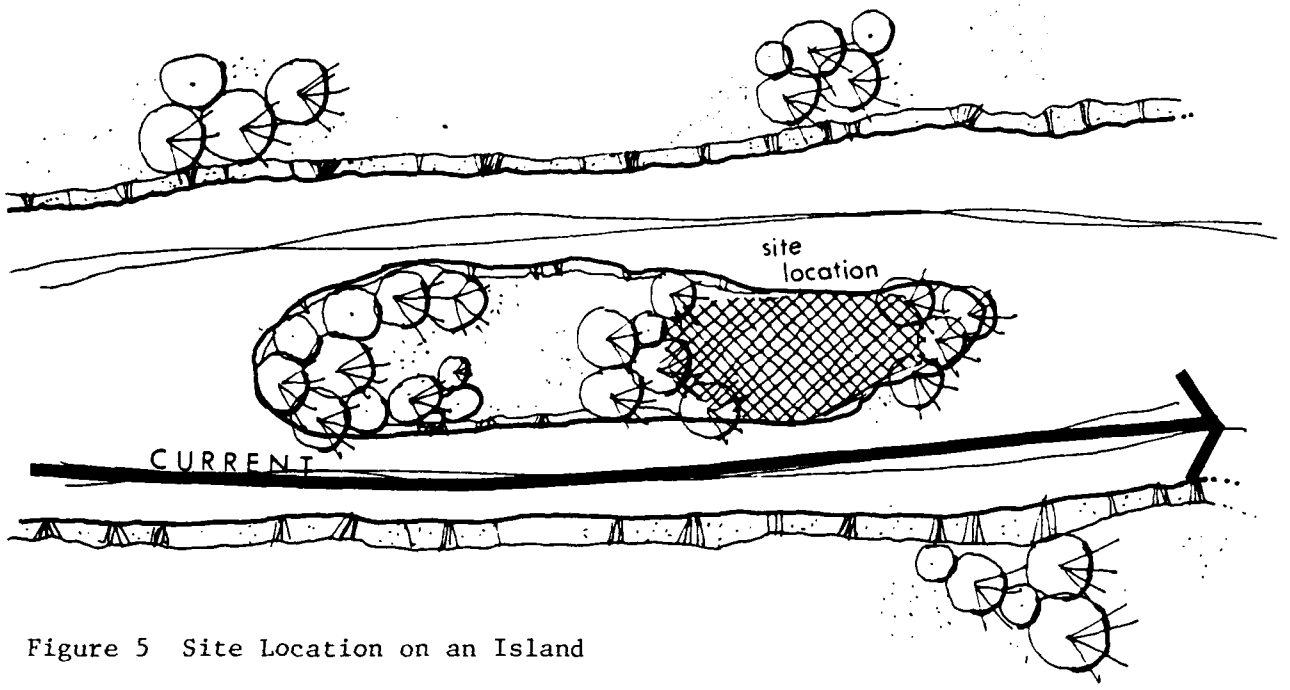


Figure 5 Site Location on an Island

2. Physical Characteristics of Sites

a. Recommendation

Natural physical characteristics that enhance the recreational experience should be maintained. They also add to the safety of the recreational experience.

b. Guidelines

Natural physical characteristics:

-The adjacent underwater slope should be 10 percent or less for at least 50 feet. Steeper slopes become a hazard for swimmers.

-Beach slopes should be 10-15 percent or less. Slopes steeper than 15 percent make user access more difficult, especially if users are carrying camping or picnicking equipment. Steeper slopes make a site more susceptible to water and wind erosion because the steeper an angle, the less stable the sand becomes. Sand that is unstable is more susceptible to outside factors such as wind and water.

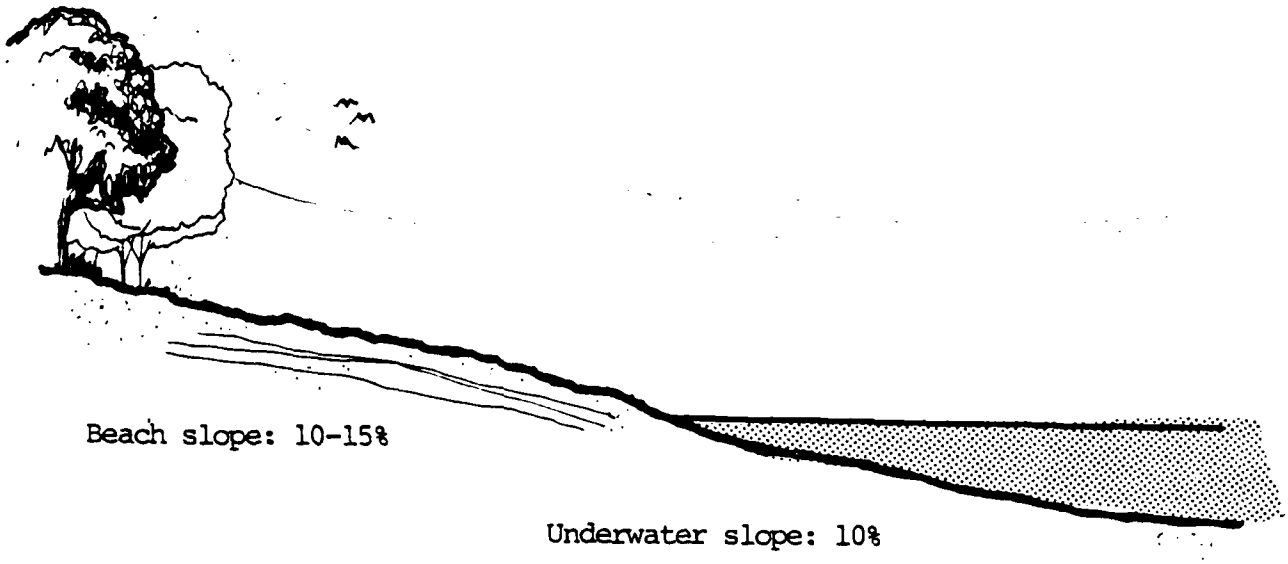


Figure 6 Slope Relationships - Swimming Areas

-Overstory vegetation on a portion of or surrounding the site should be maintained to minimize wind erosion. On larger sites, established vegetation can create a sense of privacy for a number of recreational users. Some understory mixed with the overstory will further minimize wind erosion.

Figure 7 Vegetation Windbreak

-Good access into wooded areas surrounding the sites should be maintained to allow for more recreational opportunities within a natural setting such as opportunities for hiking and exploring. These experiences can be unlimited on many of these sites.

3. Shaping Sites During Dredging Operations

a. Recommendation

The dredged material should be contoured and shaped during dredging operations to maximize site stability and recreational appeal and insure that the site blends in with the existing landscape.

b. Guidelines

-A bulldozer should be used to contour dredged material on the site during dredging operations.

-Steeper slopes adjacent to the river's edge should be avoided. These steeper slopes are difficult to ascend and more susceptible to erosion factors.

-Mound placement and size should occur at a frequency that breaks up the elevation view of the area (Landscape Concept Development for Confined Dredged Material Sites, R. Mann, Contract Report D-75-5).

-The site shape should be determined during on-site inspections before actual dredging operations.

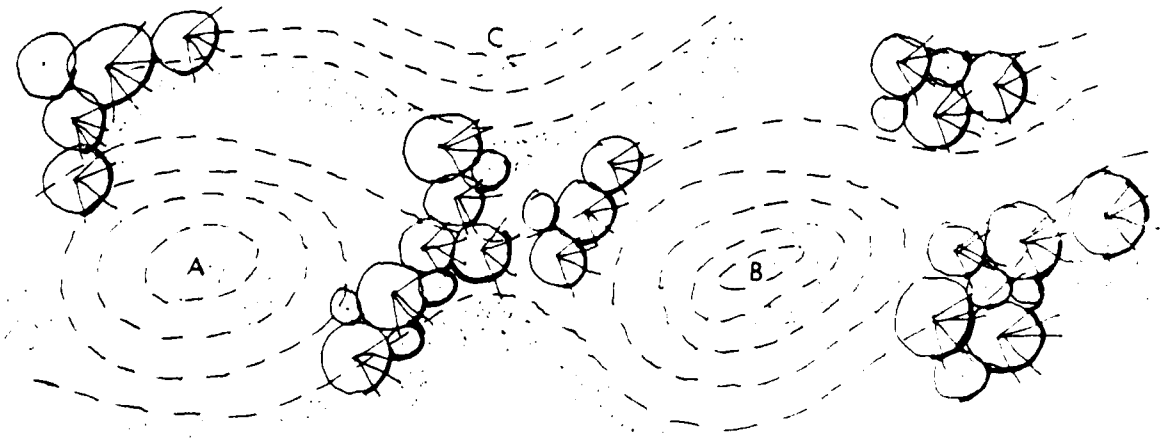


Figure 8 Shaping of Dredged Material

4. Site Maintenance

a. Recommendation

Sites should be planned to take advantage of natural maintenance phenomena. Such planning would greatly reduce maintenance costs and increase the recreational life of a site.

b. Guidelines

-Dredged material should be piled deep enough during dredging operations to inhibit rapid revegetation of the site. Required depths would be 10-15 feet above the mean waterline. This depth raises the surface layer of sand above the capillary action of water. The resulting dry sand will inhibit seed germination and greatly slow down other forms of revegetation.

-Sites should have an aspect of south to west so that the sun would reduce the moisture content of the upper sand layer. This measure would also slow the revegetation process. However, the site should have some overstory to provide shade for the users.

-Existing overstory vegetation should be preserved to protect the users and site from the effects of wind and provide some privacy.

-The vegetation pattern formed by a series of mounds and depressions reduces the wind intensity and erosion on large linear sites by establishing periodic windbreaks.

c. Recommendation

Beach nourishment should be used to reestablish desirable site characteristics for recreation on existing sites.

d. Guidelines

-A minimum depth of about 6 inches (15 cm) will obliterate existing herbaceous plants on a site (Claflin, 1974-75). A sand ground plane, which is more desirable for beach recreation, would be reestablished.

-Existing overstory vegetation should not be completely covered by the dredged material. Although river-bottom trees are able to withstand and adapt to extreme situations, care should be taken when placing the dredged material around them.

-The renourishment practices should not exceed the carrying capacity of a site. The carrying capacity is reached when the site cannot be expanded without great environmental degradation. Such sites have the following characteristics:

-Sand slopes exceed 15 percent.
-Sand mounds exceed 15-20 feet in height. Sand mound over this height appear unnatural with the existing landscape, for example, at river miles [illegible] left descending bank
-Existing overstory vegetation has been destroyed.

5. Stabilizing Existing Dredged Material Sites

a. Recommendation

Existing dredged material disposal sites are badly affected by water and wind erosion should be stabilized.

b. Guidelines

-Sites that have large dredged material piles with steep slopes should be stabilized with riprap.

-The riprap should be placed on vulnerable areas of the site, not to include the entire site. Too much riprap on any one area could appear dangerous and unusable to a casual user.

-To soften the harshness of the riprap, organic soil and seeds could be placed among the rocks to promote vegetation growth. Silt deposit could also be pumped over the riprap using natural seeding. The combination of riprap and the vegetation cover will help to eliminate some of the erosion problems.

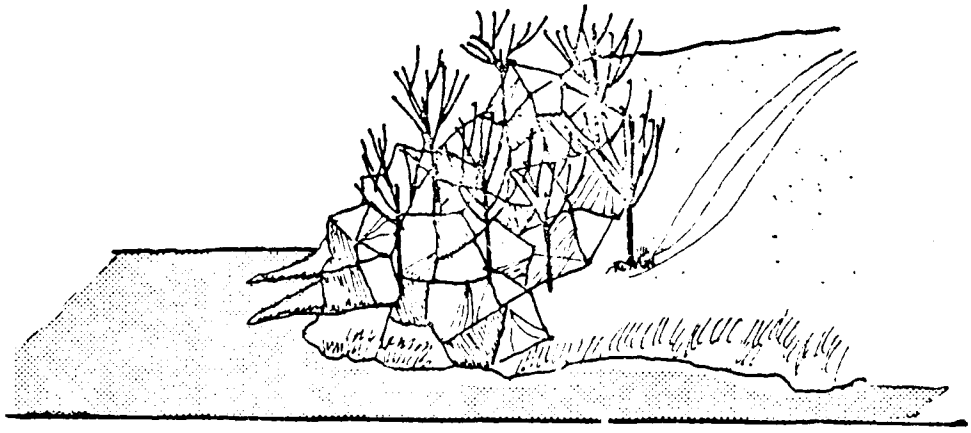


Figure 9 Riprap Vegetation

-The following plants would accomplish the above task with little or no maintenance:*

Trees

Acer negundo	Box Elder
Acer saccharinum	Silver Maple
Betula nigra	River Birch
Fraxinus pennsylvanica	Green Ash
Populus deltoides	Cottonwood
Quercus bicolor	Swamp White Oak
Salix nigra	Black Willow
Salix interior	Sandbar Willow
Ulmus americana	American Elm

Shrubs and Woody Vines

Cephalanthose occidentalis	Common Buttonbush
Cornus racemosa	Gray Dogwood
Cornus stolonifera	Redoiser Dogwood
Parthenocissus quinquiefolia	Virginia Creeper
Rhus glabra	Smooth Sumac
Sambucus canadensis	American Elder
Vitis riparia	Riverbank Grape

*Not an entire list. These plants were observed naturally in most areas.

6. Dredged Material Disposal Sites Close to Lock and Dams

a. Recommendation

To promote boating safety through communications, a dredged material disposal site should be near each lock and dam. These areas would provide a safe place for recreational users to wait for a locking opportunity.

b. Guidelines

-These areas should be within visual and/or audio distance of the locks; both upstream and downstream.

-These areas should be away from the main flow of river traffic, so that recreation craft traveling to and from the area will not conflict with barge and other river traffic.

-Signs should be used at these areas to instruct river users of proper locking procedures.

-Either a loudspeaker, a light system, or a radio frequency should be established to inform river users when it is time to lock.

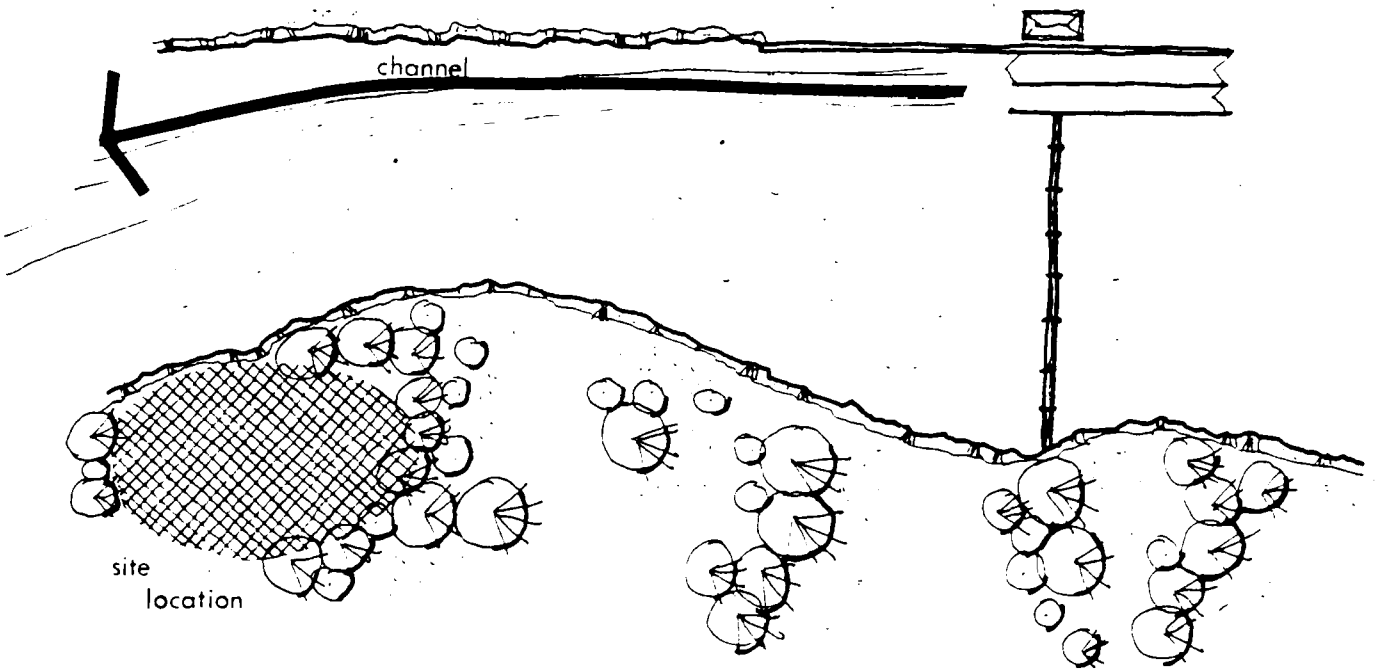


Figure 10 Lock and Dam Waiting Area

7. Pedestrian Accessibility on Developed Dredged Material Disposal Areas.

a. Recommendation

Some dredged material disposal sites should be promoted as water-enhanced recreation areas as well as water-related activity areas. It is important to include these water-enhanced recreation activities, such as picnicking, camping, and hiking.

b. Guidelines

-Hiking and exploring trails, or at least accessibility into the wooded river bottom areas, should be incorporated into these areas.

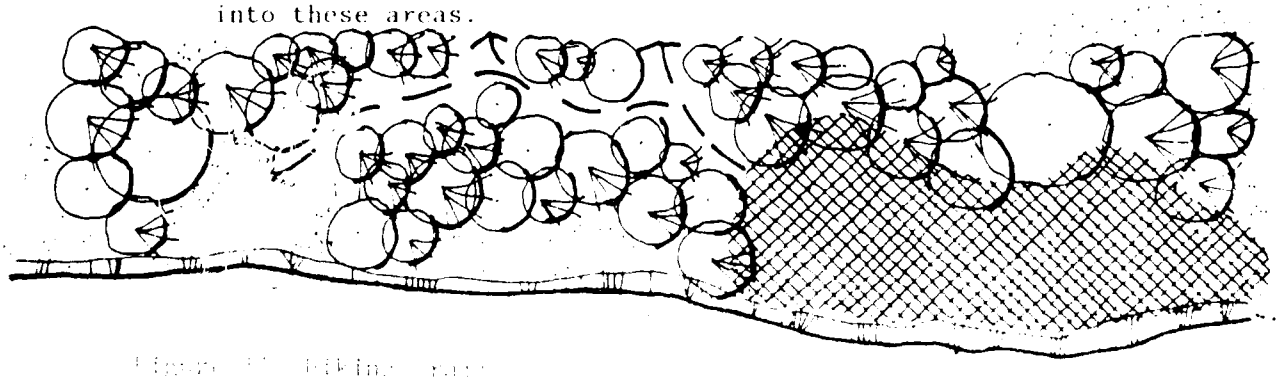


Figure [illegible] Hiking [illegible]

-Signs should be used at these areas to continue public education about recreation and the Upper Mississippi River corridor. This education could go as far as to tell the users what types of vegetation and wildlife inhabit the area.

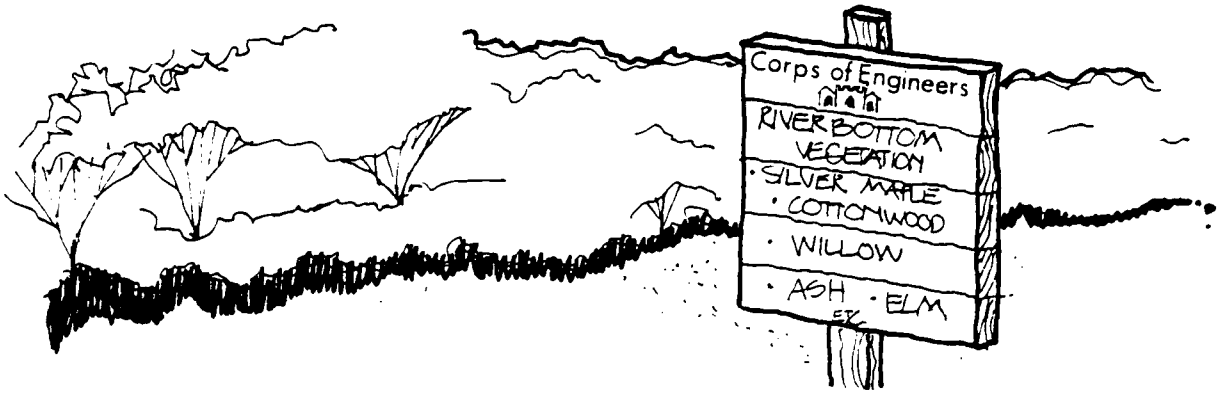


Figure 12 Informative Signage

These hiking trails and/or openings into the woods could be accomplished by the channel maintenance or cutting crews.

8. Planting of the Dredged Material Disposal Sites

Recommendation

It would not be practical to plant new vegetation on all dredged material disposal sites along the study area. However, on unstable areas (See Recommendation 5 for suggestions and plant list), planting is necessary and should be established. Because of the lack of nutrients, water, and care, only the hardiest of plants should be established. With proper placement (See Recommendations 1 and 2 for suggestions), meaning location and planting, dredged material areas could become self-maintaining. The only other ingredients are people usage of the areas and additional dredged material, discriminately placed, every 3-5 years to eliminate such growth as undesirable plants.

9. Facilities at Dredged Material Disposal Sites

Recommendation

Although facilities may enhance recreational experiences, they are not compatible with the river environment in most areas. For example, trash receptacles on dredged material disposal sites would have to be periodically emptied. They would also have to be anchored or removed in the fall because of possible flood loss in the spring. It would be more beneficial for the users, the environment, and the public's tax dollar if recreational users took their litter with them when they left the sites, or, if there were centrally-located litter drop sites. These could be located at launch sites or at the lock and dams.

Makeshift facilities were occasionally found on dredged material disposal sites. These facilities were respected and contructed in a manner that prolonged their usage, and they did not distract from the overall wilderness setting of the areas.

METHODS OF MAINTENANCE OF DREDGED MATERIAL DISPOSAL AREAS FOR RECREATION

Introduction

Maintenance problems on dredged material sites stem primarily from the site's lack of stability because of the environment on which they are established and their initial form and make-up. The sites are located on islands or riverbanks. Most sites are periodically or annually flooded. The river currents during flooding are capable of washing the dredged material away, if it is not properly located. Dredged material is mostly sand and thus, revegetation of these areas is difficult.

Several studies have dealt with the stabilization of these areas; however, none of these studies has adequately looked at the stability of dredged material disposal sites and maintenance from a recreation point of view. This maintenance analysis will take the conclusions drawn in the recreation analysis portion of this study as a basis from which maintenance techniques will be recommended. These recommendations will be based on the hypothesis that recreation on dredged material disposal sites is desirable and should be enhanced.

The sites can be categorized as well-drained areas of nearly pure sand. Willows and cottonwoods are the primary woody species during the pioneer stage of revegetation. They usually seed and germinate in approximately equal density. Further development of these species and other associated plant communities depends on subsequent moisture relationships. Cottonwoods are able to tolerate drier conditions; willows require wetter conditions.

The life cycle of a dredged material disposal site used for recreation is linear. The site starts as a large sand pile devoid of vegetation. Viewed by the recreationists, these areas look conducive for all types of beach recreation. As time passes, the beach area is reduced in size by revegetation and erosion.

Methods of Maintenance

Maintenance of dredged material disposal sites for recreational purposes can be broken down into three methods: mechanical, natural, and chemical. This analysis will attempt to spell out how each method can be most effectively used to lengthen the lifespan of a dredged material disposal site with respect to recreational use and desirability.

1. Mechanical Maintenance Methods

In recent years, the Corps has used advance site preparation before depositing dredged material. This preparation is referred to as "bath-tubbing". The Corps operations will dig out the area on which the dredged material is going to be dumped to allow for more dredged material to be deposited on the site. The depth depends on the depth of the existing water table, depth of existing material, and topography.

Brush that is removed during "bathtubbing" is piled up into windrows and left on the site or removed. If left on the site, these windrows create cover for game, promote vegetation growth, prevent erosion, and allow the particles to settle with the dredged material making it more stable.

To maintain and enhance the recreational experiences on the sites, advance site preparation could be taken one step farther. Rather than just "bathtubbing" a designated area, the Corps could use dozers to create and maximize spaces within the sites. With this in mind, a certain percentage of overstory, dredged material, edges, accessible shoreline slopes, 10 percent or less, gentle underwater slopes and spatial quality could be established.

It is suggested that the DERRICKBARGE HAUSER and DREDGE THOMPSON operations use the dozers during their dredging operations. Currently, as the dredged material is cast or pumped on land, the dozers push the dredged material over the designated area. It is recommended that, during the on-site inspection meetings, plans be made to recommend how and where the dredged material should be placed on the area. These plans could fulfill many requirements deemed necessary by the entire GREAT study team. For example, properly placed dredged material will minimize the effects on existing aquatic and other benthic organisms in the area nor would it increase future dredging operation requirements by having the dredged material erode back into the navigational channel. Instead of the dozers just pushing the dredged material onto the area, the dredged material could be shaped and placed in a manner that is in harmony with existing ecosystems, habitats and topography, and responds to the recreational needs of the river.

Allowing the dredged material to flow or be pushed into the woods clears out the understory vegetation. It also prohibits the growth of wood nettles which are undesirable in recreational areas. The relatively unvegetated areas created under the overstory canopy provide excellent shaded camping areas.

Mechanical methods of maintenance other than at the time of dredging operations deal primarily with vegetation removal to preserve open sand areas, stabilization of existing sites, and trash removal. If natural methods of maintenance described in the next section are properly used, vegetation would have to be removed from beach areas over the years.

Stabilizing existing sites could be accomplished through the use of riprap, establishing desirable vegetation, and/or the use of fences. All of these items could be incorporated to stabilize existing erosion problems on these sites. The Corps uses riprap for shore protection; however, this material could also be placed on sites that have erosive banks, thus eliminating extreme erosion problems. Organic matter, seeds and mulch could be placed among the riprap to induce vegetation growth to further help stabilize these steep banks and also increase the aesthetic appeal of these areas. Riprap alone may appear dangerous to a person using these areas for recreational purposes, whereas the partial vegetation cover will soften this effect. The riprap is not to encompass the entire shoreline of the dredged material area, but only the portion of these areas that will strategically eliminate severe erosion and aesthetic problems.

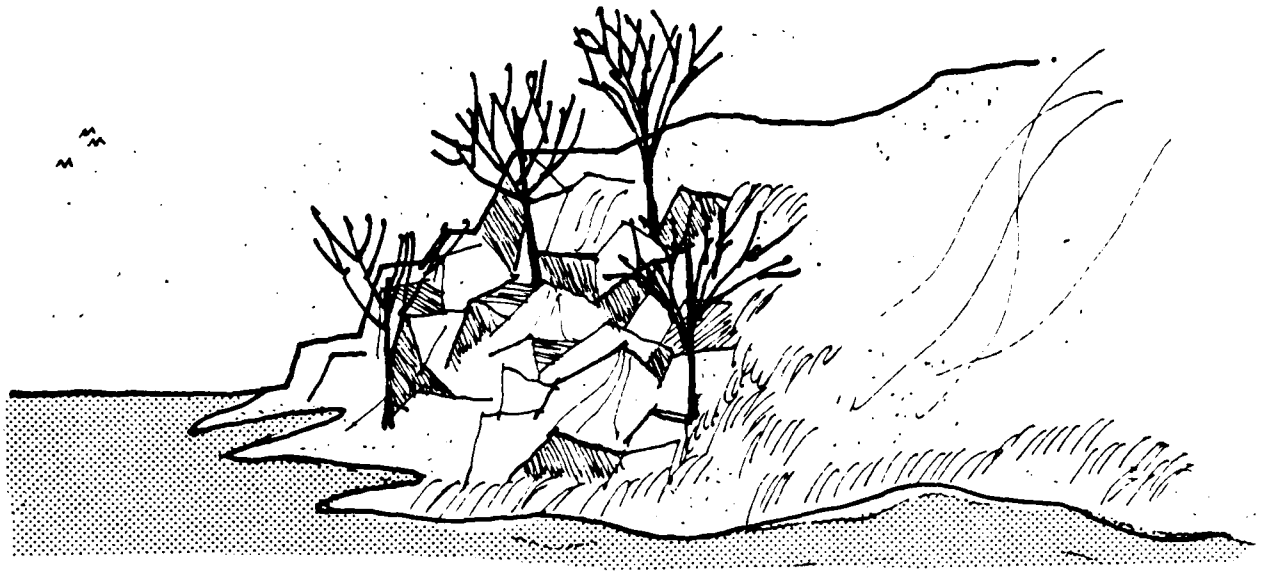


Figure 13 Riprap Stabilization

Other methods of mechanical maintenance that were considered involved the use of cutting crews. These crews would periodically eliminate the undesirable vegetation on the sites. The crews would consist of 4-5 people. This process could also be accomplished with the use of small dozers. However, only a few areas would be able to be maintained. Both of these means are awkward, expensive and time consuming.

2. "Natural" Maintenance Methods

Natural methods of maintenance will overlap with mechanical methods of maintenance. Areas to consider should include:

- -Proper site location = aspect, existing vegetation, side of channel, protection from erosion.
- -Depth of dredged material.
- -Vegetation control.
- -Erosion control.
- -Frequency of additional dredged material.

Proper placement of a dredged material disposal site is the most important criterion. Proper planning and working with the existing natural elements encompassing an area can enhance and prolong the functions of a dredged material recreational area.

One of the important characteristics of site placement is the aspect of that location. South facing areas with minimal overstory retain a more vegetation-free ground cover because of the extreme temperatures ($130^{\circ}F$) that occur on the sand surfaces (McMahon, 1975). The extreme heat discourages vegetation and recreation.

Sites that were north facing or had reasonable shade allow grasses and other pioneer materials to establish themselves. Therefore, existing vegetation as well as aspect should be considered.

Existing vegetation around the perimeter of a site can also help curb erosion problems. By locating the dredged material disposal site downstream from the existing vegetation cover, water erosion (wave action and inundation) can be kept to a minimum. The effects of this erosion can be seen in some areas where the dredged material extends beyond the existing shoreline (Figure 14) or where extremely high sand piles exist without any forms of vegetative cover.

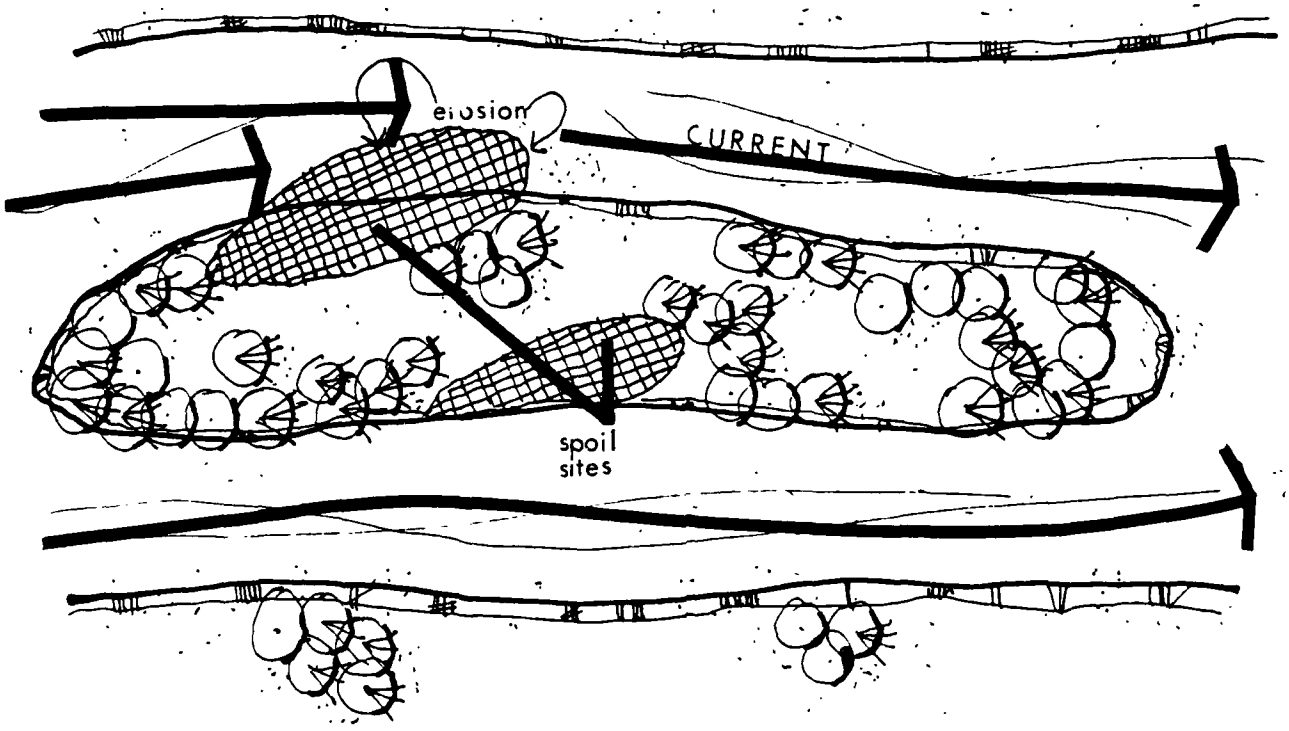


Figure 14 Site Location in Relation to the Channel

Location in relationship to the channel will also help maintain and stabilize the dredged material disposal area. It is characteristic of flowing water in a river to pick up (erosion) or deposit (accretion) sediment with subtle changes in velocity. Such changes alter the kinetic energy or sediment load carrying capacity of the water. This characteristic is most evident in river bends. The outside of the bend is cut away (eroded) and the inside of the bend is built up (accretion) exhibiting the laws of centrifugal force. Even in straight stretches of the river, the channel may meander while the above landforms appear straight.

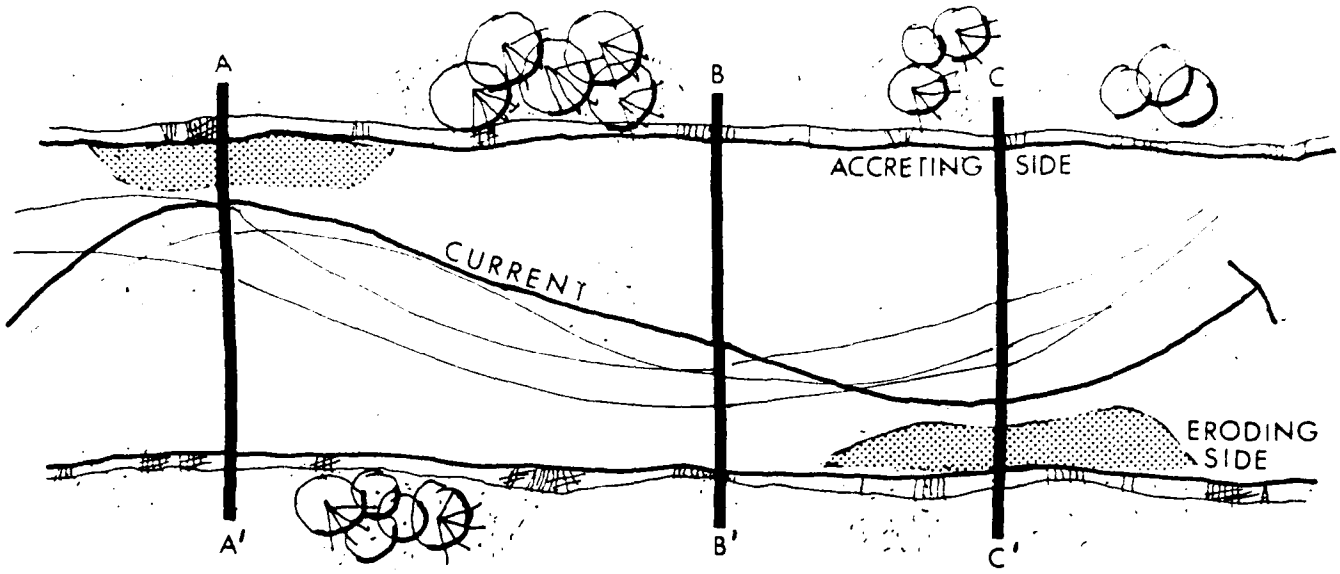


Figure 15 Channel Flow -- Plan View

Soundings of an area should be considered when locating a disposal site. Through this underwater topographical study, eroding and accreting sides of the channel can be determined. It also helps to find an adjacent underwater slope more conducive to swimming and wading. The accreting side of the channel also has less current action (secondary flows generated by centrifugal force), which is another advantage in terms of safety for swimming, wading and all water-related activities. The only negative

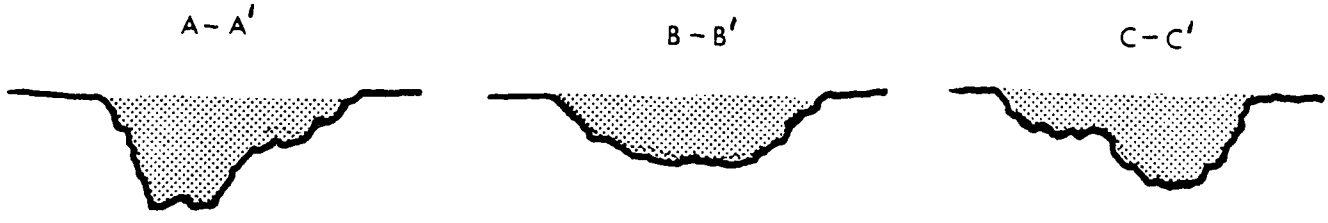


Figure 16 Channel Flow -- Cross Sections

factor related to the accreting side of the channel is the possibility of the water depth becoming too shallow for easy boat access. However, this characteristic was not found during the site analysis phase of this study. The settling properties of the dredged material are such that this should not be a problem.

The depth of dredged material is achieved by mechanical means, but this helps to maintain an open sand area by natural means. Dredged material piled above the moisture level is the cheapest and perhaps best method of vegetation control. Revegetation of the high and dry sand areas is difficult. Thus, a good open sand area conducive to recreation could be maintained for several years with no other maintenance necessary, providing this area gets used.

The intensively-used historic dredged material disposal sites have maintained their recreational appeal through repeated disposals about every 3-5 years on top of the old dredged material, thus, reestablishing a new vegetation-free beach area. In the past, it has been purely coincidental that channel maintenance has enhanced recreation on the Mississippi River. Although it has not been thought of as a maintenance practice, this frequent beach nourishment has been the primary means of maintaining desirable recreation beaches over extended time spans.

The control of undesirable vegetation by natural means could be achieved by eliminating the water supply or by changing the growing environments. One way to achieve this is to pile the dredged material above the moisture level. Changing the environment with dredged material works well on plants that require higher nutrients levels. The dredged material is primarily sand and devoid of soil nutrients at the time of disposal. Plant materials requiring high organic soils, such as wood nettles, can be effectively controlled by additional dredged material disposal. Although much of the understory will be destroyed by additional dredged material, more tolerant plants such as cottonwoods and silver maples, are able to send out additional root systems, prolonging their existence. Maintaining an overstory canopy on a site also shades areas, prohibiting rapid understory growth and allowing for more hiking, camping, exploring, and erosion protection.

Erosion control on the open sand areas of the sites is achieved through a combination of site location and other factors discussed earlier and the site form. The primary factor of form is the steepness of the sand slopes. The flatter the slope, the more stable the sand. Slopes above 10 percent become more unstable when confronted with river currents. These flatter slopes can be easily obtained during either type of dredging operation. Slopes of 10 percent or less should be maintained to at least 3 feet above the mean waterline to minimize erosion caused by seasonal high-water fluctuations and wave action. Above this level, where the sand does not interact with normal water currents and wave action, the sand can be adequately maintained at slopes to about 20 percent.

3. Chemical Maintenance Methods

The two compounds most widely used in controlling the growth of woody materials are 2,4-D(2,4-Dichloriphenoxyacetic acid) and 2,4,5-T(2,4,5-Trichlorophenoxyacetic acid). The chemicals are under tight restrictions

by the Environmental Protection Agency. These phenoxy compounds are selective in their killing action. Grasses are relatively uninjured if accidentally hit by overspray. 2,4-D is more effective on broad-leaved herbaceous perennials, nettles, etc., while 2,4,5-T is more effective on woody species such as sandbar willows. One other compound, Silvex (2,2,4,5-Trichlorophenoxypropionic acid), has also been found effective on hard-to-kill perennials.

The most effective chemical compound for controlling herbaceous materials is Glyphosate (Roundup). This compound kills grasses and other plants in larger areas because it is systemic (travels through the vascular system of the plant, rhizomes, etc., to kill off more than just the sprayed herbaceous materials). Roundup is most effectively used when the plants reach a height of 6 to 10 inches.

The most effective methods of applying these chemicals are by hand sprayers. Spraying with a five-gallon backpack sprayer will allow for a more selective application of these compounds with the least amount of drift. Because of the relatively small size of the dredged material disposal areas, the costs involved would be much less than other mechanical or aerial sprayers.

Two types of applications are used on woody material:

1. The basal treatment involves applying chemicals around the base of the stem. The lowermost foot of the stems and the root collars should be soaked thoroughly. To minimize possible damage to other plant materials, these herbicides should be applied during the fall and winter; however, they can be applied at any time.

2. The notch-frill treatment involves breaking the bark by scattered axe cuts around the base of the tree, notching or frilling, before spraying the tree. This method is usually employed with trees that have a diameter greater than 3 inches.

The use of these chemicals does not coincide with the wildlife refuge management on the river and conflicts with policies related to chemical use in force in some states. Dosage and type of application will greatly affect the chemicals' effects on vegetation and wildlife. Since this is an overview of these chemicals, a more detailed study should be considered before these chemicals are used.

Conclusions

The recommendations and guidelines presented in this report are general recommendations and guidelines for dredged material disposal sites on the Upper Mississippi River. These recommendations will help to solve some of the recreational and environmental problems related to the disposal sites.

The "on-site" inspection teams in conjunction with the Corps of Engineers, the many work groups connected with the GREAT study, and public awareness play an integral role in determining the effectiveness and appropriateness of the disposal sites, not only for recreational purposes, but for all concerns involved with the Upper Mississippi River.

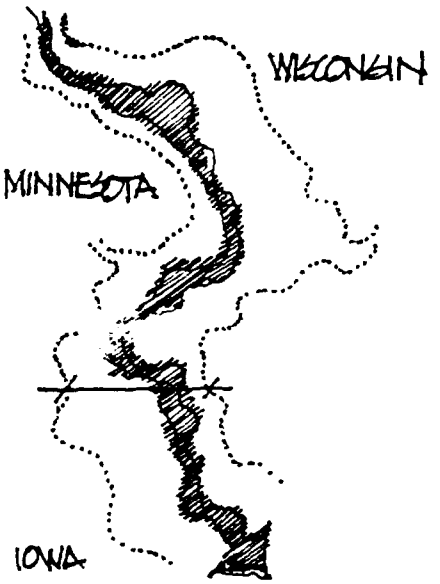
The "on-site" inspection teams can determine the location, shape and contours, and other physical characteristics of these disposal sites that would enhance and prolong the recreational experiences on the Upper Mississippi River. With this planning, the recreation experience can be enhanced on these sites without radically changing current disposal operations.

To preserve the river corridor, all concerns must be able to work symbiotically with the natural systems; with the idea that the dredging will continue to create these disposal areas and the extensive recreational use on the river will not cease.

A PROPOSAL FOR THE PREPARATION OF AN AESTHETIC MANAGEMENT PLAN

The Recreation Work Group accepted the task of developing an aesthetic management guidelines for GREAT I. In the process of discussing the task and the problems associated with it, it was suggested that to be able to develop a management strategy, one should first define the problem and understand the landscape setting.

The definition and ultimately the management of "aesthetic quality" is an extremely difficult task. It implies that aesthetic quality is definable and that the ability exists to appropriately manage that "quality" for the public. The use of the word aesthetic implies "preference" and pertains to the quality judgments made as a result of the experience. The perceptual experience is created by: sight, sound, smell, taste, touch, and movement. Because these senses are so individualized and influenced by so many factors, it is extremely difficult to predict individual preferences. A particular "setting" may be viewed or perceived differently by a number of individuals even though the elements, which create the setting, remain constant. Perception can be affected by factors such as: climatic conditions, an individual's background (experience), mode of travel, reason for travel, etc.



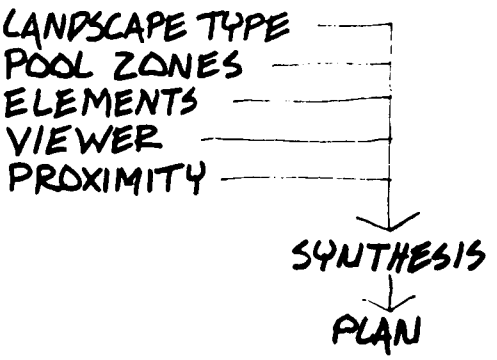
The problem of managing aesthetic quality must, therefore, begin with defining aesthetic quality and identifying it in the landscape. The following process is an attempt to classify the Mississippi River corridor, evaluate the elements and document a process for assessing aesthetic quality.

PROPOSED PROCESS

Management of the aesthetic environment begins with an understanding of the natural and cultural systems interacting in the study area. The proposed process is an attempt at organizing the landscape elements found within the corridor so that further evaluation will be possible. The efforts should result in the identification of "high quality" aesthetic areas, the identification of visually diverse areas, a tool to be used in the assessment of corridor proposals (land use), and the identification of areas exhibiting relatively low visual quality (based upon criteria used in this study).

The process of cataloging the visual landscape of the Upper Mississippi River was broken down and described in six parts:

1. Landscape type classification
2. Pool zones
3. Landscape elements
4. Viewer
5. Proximity
6. Synthesis



Until these basic tasks can be completed and findings assessed, it would be unrealistic to attempt to identify management policies for specific segments of the river.

STEP 1: LANDSCAPE TYPE CLASSIFICATION

The initial step would classify the landscape character of the corridor by present land use. Information would be collected, interpreted and mapped to create the first level of data. Five categories of LANDSCAPE TYPE have been presented. They range from the natural to the man-made (altered) environments that are to be found along the river. The following is a description of each of the landscape types proposed, user orientation and user activities associated with each.

AD-A127 213 GREAT I STUDY OF THE UPPER MISSISSIPPI RIVER TECHNICAL 2/4
APPENDIXES VOLUME 6 RECREATION(U) GREAT RIVER
ENVIRONMENTAL ACTION TEAM R LINDBERG ET AL. SEP 80
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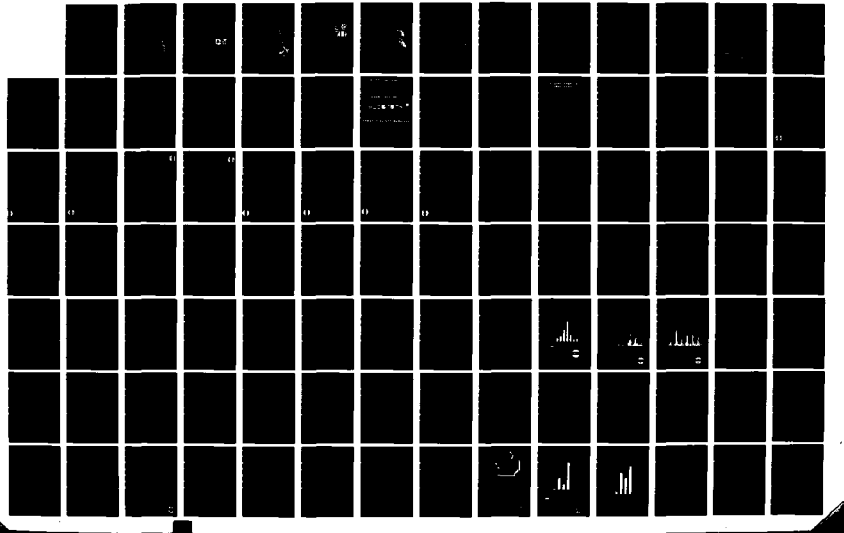
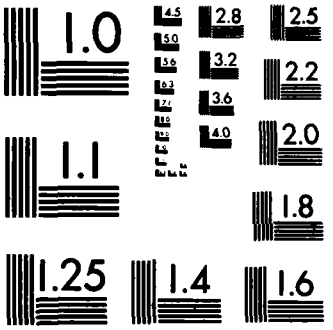




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

1. UNIQUE WILDLANDS

Criteria (characteristics):

An area containing unique physical features such as rock formations, undisturbed wooded islands, wetlands (visible water orientation) and heavily forested shorelines. Also, areas containing sites of historical or archaeological interest that should be left in an undisturbed state.

User Orientation:

For users interested in an unmodified environment that allows for the appreciation and study of natural phenomena.

User Activities:

Oriented to nonconsumptive, low impact, activities such as nature study, hiking, pioneering, canoeing, rock climbing and cross-country skiing. Fish and hunting as permitted.

2. WILDLAND

Criteria:

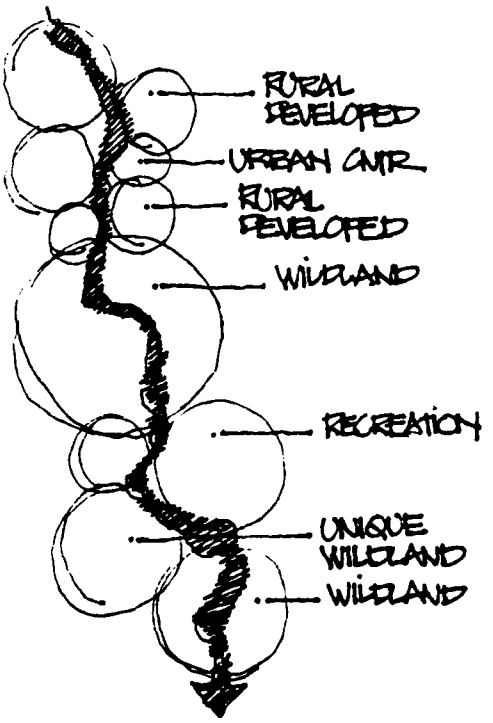
An area containing natural features in which improvements related to outdoor recreation and fish and wildlife management can be provided.

User Orientation:

Natural surroundings and low density recreational use assure a reasonable amount of privacy and quiet.

User Activities:

Suited to such recreation activities as undesignated boating, camping, picnicking, hiking, fishing, and hunting and timber production.



3. LIMITED DEVELOPMENT

Criteria:

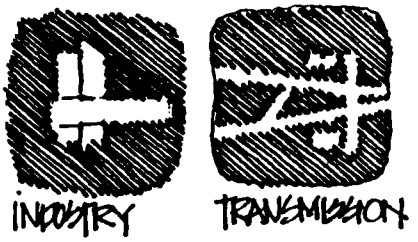
An area developed for intensive recreational or residential use in which a reasonable amount of natural landscape is retained. Also, an area of limited size that represents an intrusion in unique wildlands and wildlands (power line right-of-way, bridge crossing, etc.)

User Orientation:

Oriented to agri-business, first or second home development, and intensive recreational use. Accessible from land or water. The provision of natural surroundings of secondary importance to the satisfaction of demands of people.

User Activities:

Picnicking, camping, waterskiing, boating, field games, pleasure driving, and fishing are among several acceptable recreation activities. Food and timber production typify nonrecreation-oriented activities.



4. RURAL DEVELOPED

Criteria:

An area that is generally rural by description that has been so thoroughly disturbed by past use to preclude the recapture of river corridor natural features.

User Orientation:

Food and timber production, commercial facilities, transportation, government sponsored facilities and residential development.

User Activities:

Residential; intensive recreation; commercial; quarrying; highway, railroad and powerline ROWs; light industry; dams; and commercial boat traffic.

5. URBAN

Criteria:

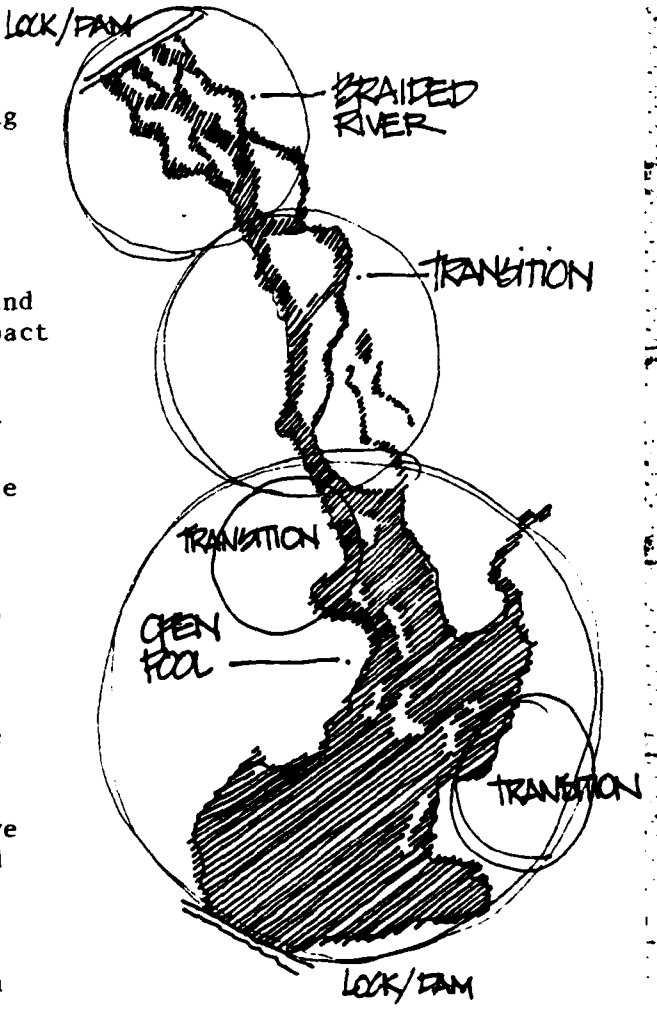
An area representative of intensive man-made intrusions as might be expected in highly urbanized areas.

User Orientation:

Largely industrial, (light and heavy) commercial, institutional and residential. Natural amenities nonexistent or in very short supply. Users expect intrusions from other land use activities.

Users Activities:

Public access and activities normally associated with urban park programs (e.g. team games and activities requiring minimum space considerations).



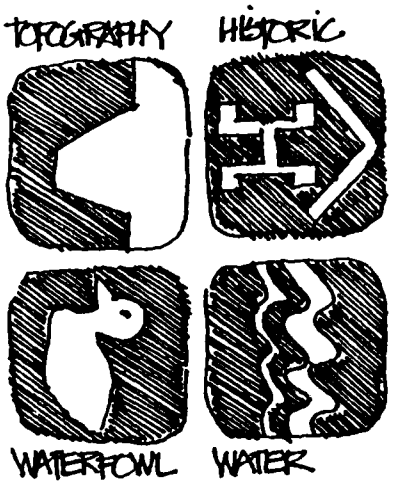
STEP 2. POOL ZONES

The location within a pool of a feature in the landscape or a landscape type (land use activity) can be critical to the impact it will have upon the potential viewer. Each pool can be broken down into three distinct segments. The area immediately below a dam which we will call the "braided river" is characterized by dense growth of bottom land hardwoods and a braided water course (numerous islands and backwater channels). The element which controls the extent of the zone is topography. The sites for locks/dams have been selected for their subsurface stability, ability to maintain proper pool elevations throughout pool, and the length of construction.

The area immediately below a dam may have some topographic restriction which would likely place the highway user close to the river. The view of water is intermittent and usually screened by dense overstory vegetation growth in non-urban areas. The view from the water edge is short and contained.

The second area is a "blending" or transitional area where the characteristics of the "braided river" and the "open pool" come together. Open surface water for recreation is increasing, dense wooded shoreline is prevalent, backwater areas are increasing (more wetlands, less distinction of land/water), and views from water edge are longer and broader.

The third area is the "open pool", the area immediately above the dam. Depending upon the topography of an area, the "open pool" may encompass two-thirds of a pool. It is characterized by a distinct surface water area that may be a mile or more in width. The edge may be "soft" where the water moves into a shallow wetland or maybe "hard" as in situations where the pool has been defined by a dike or where abrupt natural topographic change occurs.



The recreational use is generally high. However, this is dependent upon location of pool within the system and existing access. The views from the water, to the water, and from the edge are generally long and uninterrupted.

STEP 3: LANDSCAPE ELEMENTS

In addition to the two zone classifications that have been presented, the next step would be to identify elements in the landscape that may affect the experience of the viewer. The elements are separated into two categories: those elements that may enhance the experience of the viewer and those that may detract from the viewing experience.

ENHANCE (three types)

1. Attractions

    bluffs
    wildlife observance
    vegetation/color
    water--streams, lakes
    diversity (composite of above)

2. Important/Interest

archaeologic
historic
architectural
lock/dam
rural community

3. Unique

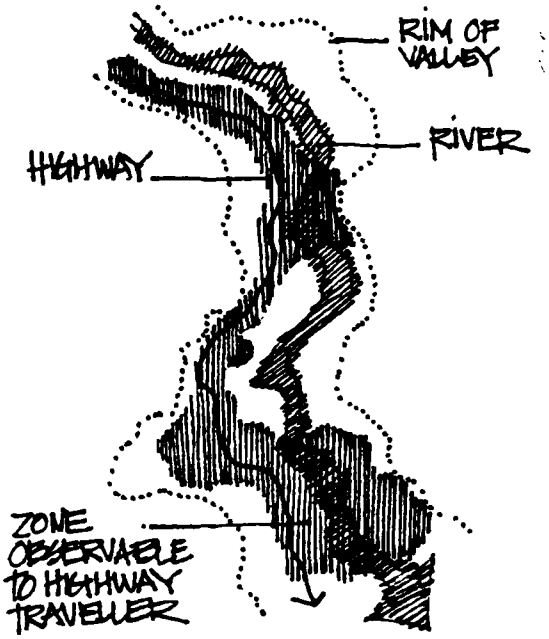
geologic
historic land use
vegetative community
wildlife (eagle, etc.)
complex topography

DETRACT (eyesore or intrusion)

Litter along highway
Powerlines crossing or paralleling river or highway
Industrial stacks or cooling towers
Signs
Extractive industry
Disposal sites (auto junk, solid waste, etc.)

Eyesores can generally be eliminated whereas intrusions are or may be more permanent.

Landscape elements would be inventoried, mapped, coded, and described for future use.



STEP 4: VIEWER

An assumption was made for the purpose of this proposal that the viewer would either be the highway traveler (automobile) or the river traveler (recreational craft). An attempt was made at selecting a user and mode of travel most common to the river corridor. Factors which would influence the viewer's perception of the corridor would be direction of movement, speed of movement, time (day, week, year), climate, purpose of trip. These would have to be assessed and judged as to value before they would be considered in the general frame work of the model.

At this time it was felt that it was important to define the visible corridor of each of the identified users. This task, having been accomplished, patterns would begin to emerge which would illustrate the types of views (impressions) that are being presented along the corridor. Views would be limited or focused or manipulated by topography, vegetation and man-made elements.

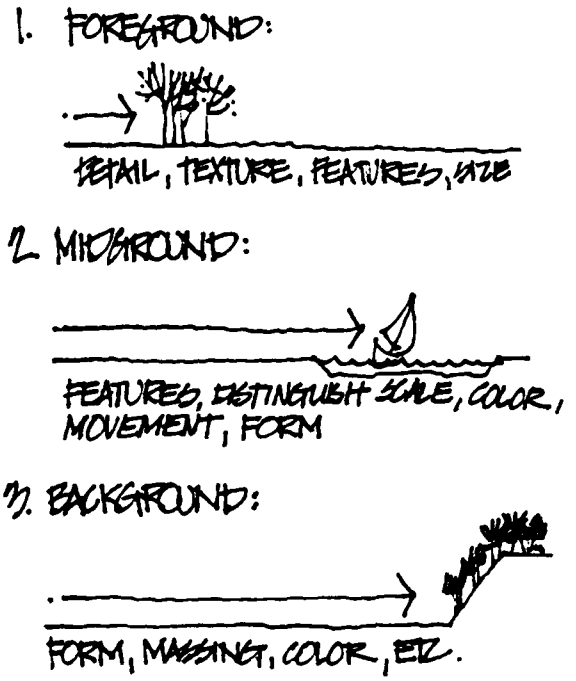
STEP 5: PROXIMITY

The last level of analysis that might be conducted would be to isolate the elements (positive/negative) within the viewing areas by distance from the viewer. At this point information from the POOL CLASSIFICATION step will be helpful as well as a determination in this step as to the relative position of the element or setting in the landscape.

The options would be:

1. FOREGROUND
2. MIDGROUND
3. BACKGROUND

Each viewing distance allows the viewer to see something that cannot be seen at the next distance. Patterns and tone can be seen as well as large expanses at the BACKGROUND level. At the FOREGROUND level scale can be perceived, relative distance can be judged, detail observed, small objects identified. If a landscape element that was considered a "detracter" was isolated in a "wildland" zone and could only be viewed as "background" it would likely have little impact upon the aesthetic quality of the experience.



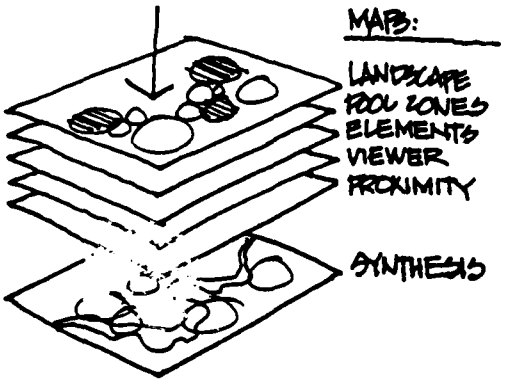
STEP 6: SYNTHESIS

This step involves the integration and interpretation of information collected in the preceding steps. The end result will

be a composite image of the visual quality of the river corridor. It will enable the user to identify areas within the corridor or "high" visual quality (sensitive areas worthy of preservation), areas which have low visual quality, areas of high use and low visual quality, and identify areas of "visual" diversity. It is possible that through such knowledge appropriate visual (aesthetic) management criteria could be developed.

RESULTS:

The technique suggested is not a "tried" time proven method, it is merely an approach to a complex problem. The results would illustrate within which LANDSCAPE TYPE which LANDSCAPE ELEMENTS (positive/negative) were being viewed most frequently by the typical corridor traveler and at what distance were the ELEMENTS being viewed (PROXIMITY). The more ephemeral issues are still unanswered--the weather conditions, the speed at which the individual is traveling, seasonal change, etc. This would be a general model directed toward a cross-section of the viewing public.



Management of Aesthetic Areas

It is recognized that attainment and perpetuation of aesthetic quality within any of the five landscape types defined in this section will require some alterations in current management problems and the establishment of long-range objectives. The management techniques applied by landowners (public and private) will vary considerably depending upon the opportunities for change within current operations and upon the level of criteria acceptance. Public land-holding agencies are expected to experience less difficulty adapting to the criteria than is the private sector.

The establishment of set management criteria for each of the five aesthetic areas have been intentionally avoided for the reasons previously cited. However, it would be desirable

if the following broad management quidelines would be considered in development of land use (management) programs by all ownerships.

1. Prohibit man-made improvements in the unique wildland and wildland categories and in all other categories make them as compatible with the natural viewsheds as possible.

2. Permit hunting and fishing in all categories except when these activities (especially hunting) may cause a harmful, or dangerous, impact on other riverway users or are in conflict with management objectives.

3. Adopt regulatory measures within land-holding agencies and among local units of government that would assure public and private adherence to the criteria established for the respective aesthetic area.

4. Maintain all publicly and privately-owned improvements in a high quality manner to assure a pleasing visual experience.

5. Measure the impact of all river-oriented actions on the aesthetics.

   These actions might pertain to the raising or lowering of pool levels, the artificial establishment of vegetative cover, the deposit of dredged materials, or the lengthening of the navigation season, powerline crossing, etc.

6. Control numbers of river users when the presence of people, and their attendant equipment, in themselves infringe on aesthetic management objectives.

7. Standardize aesthetic management objectives between all public agencies and units of government having influence on the river viewshed. The GREAT I study and the aesthetic categories it presents should form the basis for standardization.

Recommendations for Aesthetic Study

1. Delete from study those areas having obvious aesthetic category designations.

2. Accept the premise that the viewshed from any of the accepted travel corridors is subject to individual interpretations.

3. Recognize that some intrusions may be tolerated within an aesthetic category designation.

4. Suggest means by which governmental units can protect or enhance the objectives of the aesthetic categories. These may include acquisition, zoning, easements, etc.

5. In the course of inventory, whether for aesthetic intrusions or unique features, determine current ownership.

6. Determine need for transition zones between aesthetic categories.

7. Develop a consistent procedure for assessing views (See No. 2).

8. Do not predetermine aesthetic categories except as described in recommendation #1.

9. Combine topographic and vegetative cover maps with on-ground assessments for aesthetic measuring of viewshed.

10. Include the entire river valley, from rim to rim, in the study area.

BOATING SAFETY

Introduction

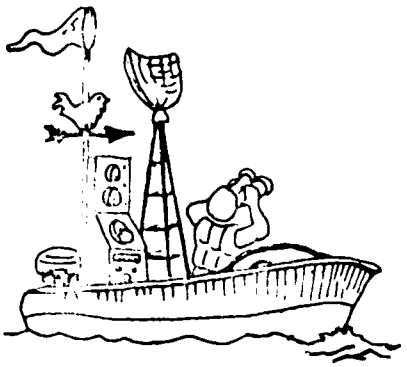
During the early problem identification process (town meetings, work group meetings, etc.) the conflicts between commercial and recreational craft were identified. To obtain a better "feel" for this problem, the Recreation Work Group, GREAT I (RWG I) compiled and evaluated boating accident statistics for the GREAT I study area (Twin Cities, Minnesota to Guttenberg, Iowa, Mississippi River Miles 614 to 866).

Background

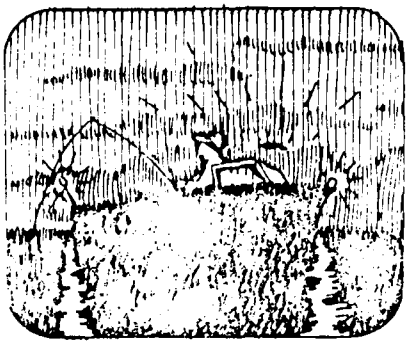
Boating statistics are compiled annually by the Department of Transportation (U.S. Coast Guard) and distributed. "Under the authority of the Federal Boat Safety Act of 1971, the Chief, Office of Boating Safety, has been delegated the responsibility to collect, analyze and annually publish statistical information obtained from recreational boat numbering and casualty reporting systems. The report, Boating Statistics (CG-357), has been published annually since 1959 to meet the requirements of the 1971 Act and the Federal Boating Act of 1958, which preceded it." (Boating Statistics-1975, CG-357.)

The Federal Boat Safety Act of 1971 and the regulations which implement this law, require that in case of collision, accident, or other casualty involving a motorboat or other vessel, the operator must file a report if the occurrence resulted in:

a. loss of life, or
b. personal injury involving loss of consciousness, requiring medical treatment, or resulting in incapacitation for 24 hours or more, or
c. property damage in excess of $100.00.

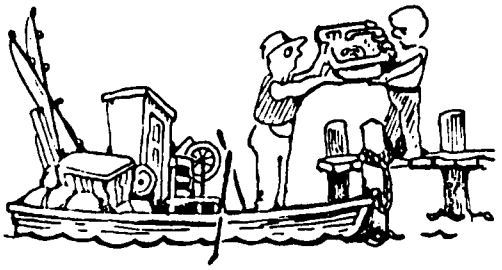


WATCH THE WEATHER

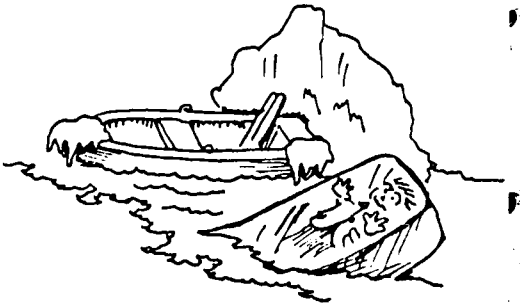


LIGHTS ON AT SUNRISE
& SUNSET

WATCH FOR HAZARDS



DON'T OVERLOAD



COLD WATER KILLS

BOATING SAFETY TIPS

Figure 17

Source: Greg Wimmer, Minnesota Department of Natural Resources

Coast Guard accident reports do not distinguish between accidents involving recreational boats and commercial barges and accidents involving only recreational boats. The states in the study area (Iowa, Minnesota, and Wisconsin) supplied more detailed accident data for 1970-77. The information from these data that is allowed to be distributed by state laws is summarized by pool in tables 4-12.

Recreational Boating Accidents

Although the total reported number of boating fatalities increased in the U.S. by 29 percent between 1965 and 1973, the overall accident rate, based on the Coast Guard estimates of actual boats in use, actually decreased--21.4 fatalities per 100,000 in 1965 to 21.0 fatalities per 100,000 boats in 1973. The annual rates from 1961 through 1975 vary from a high 21.4 fatalities per 100,000 boats in 1965 to a low of 16.6 deaths per 100,000 boats in 1975.

In summary, the recreation boating accidents for the GREAT I study area ranked in decreasing order as a percentage of the total reported accidents for the period 1970 to 1977 are:

Accident Type	1970-77 Overall Percentage
Recreation Boat - Recreation Boat	31.9 percent
Recreation Boat - Object	17.6 percent
Faulty Equipment	8.2 percent
Fell Overboard	7.6 percent
Recreation Boat - Barge	5.3 percent
Recreation Boat - Person	4.1 percent
Swamped by Recreation Boat	3.5 percent
Swamped by Barge	1.8 percent
Other	20.0 percent
	100.0 percent

How do the accident rates on the Mississippi River (within the study area) compare to the rates of the entire nation? Accident rates for the Mississippi River were calculated as the number of accidents per total potential boats available in the pool (as of January 1, 1977) as accidents per 1,000 recreational boats (note that this approach can be misleading because the earlier years probably did not have as many total potential boats in the area as now). The national accident rates are expressed, also, as accidents per 1,000 recreational boats. The source for the national accident rates is Boating Statistics, CG-357 (note that accident rates are recorded as accident rates per 100,000 boats in this report). This information is shown in Table 3.

Accident occurrence data for the entire nation is shown in Figures 18-22 (Source--Boating Statistics, 1976). Accidents within the study area generally follow these national patterns.

Although all pools have accident rates higher than the national rates, pools of greatest concern for boating accidents are Pools 8, St. Croix, 4, 10, and 2 (in decreasing order of accident rates). The decreasing ranking of total potential boats per pool (Source--GREAT I Recreational Facility Inventory) is 4, 10, 8, 6, and 2. Table 2 illustrates the number of accidents--the 1970-77 average per river mile and per navigable water surface acre (Water Surface Acre Source--Remote Sensing Applications in Agriculture and Forestry, Olson and Meyer).

Boating Accidents Per River Mile and Water Acre

Pools			1970-77 Accidents			
Number	River Miles	Navigable Water Acres	Total Accidents	Average Annual	Average Per River Mile	Average Per Water Acre
St. Croix	NA	NA	31	3.9	NA	NA
1	18.5	500	4	0.5	.03	.0010
2	32.4	3319	15	1.9	.06	.0006
3	18.3	1961	5	0.6	.03	.0003
4	44.2	29120	30	3.8	.09	.0001
5	14.6	2201	4	0.5	.03	.0002
5A	9.7	1044	1	0.1	.01	.0001
6	14.2	2333	12	1.5	.11	.0006
7	11.8	2012	4	0.5	.04	.0002
8	23.3	3261	32	4.0	.17	.0012
9	31.3	4200	12	1.5	.05	.0004
10	32.8	6536	20	2.5	.08	.0004

Table 2

Recreational Boating Accident Rates
Upper Mississippi River, Pools 1-10, St. Croix River

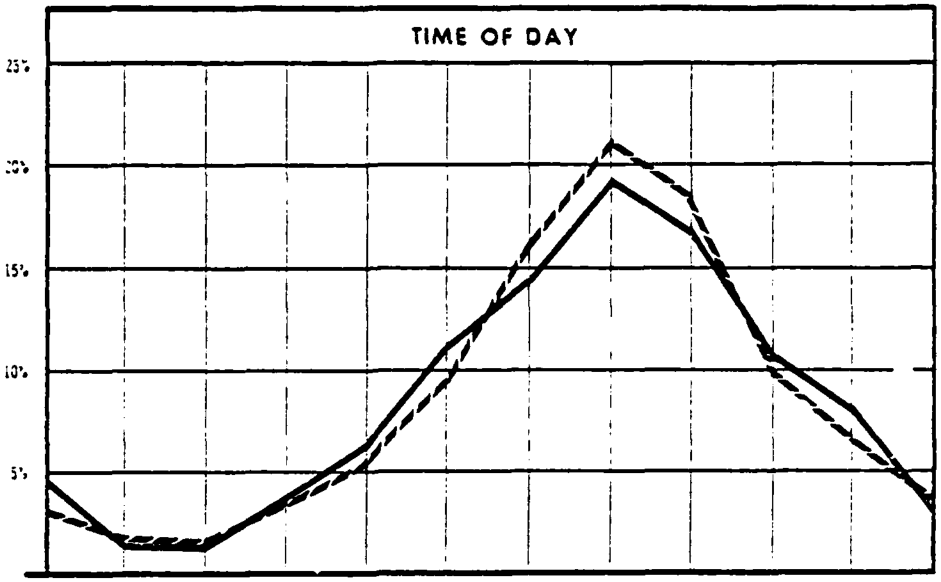
Pool Number	1970-77 Average Annual Accidents	Total* Potential Boats	Accident Rate Per 1,000 Boats
St. Croix	3.9	NA	NA
1	0.5	50	10.000
2	1.9	1,246	1.520
3	0.6	901	0.666
4	3.8	3,323	1.144
5	0.5	438	1.142
5A	0.1	437	0.229
6	1.5	1,449	1.035
7	0.5	661	0.756
8	4.0	2,557	1.564
9	1.5	1,166	1.286
10	2.5	2,947	0.848

Table 3

*GREAT I, Aerial Recreation Survey, September, 1976;
Recreation Facility Inventory, July, 1978.

Vessels Involved in all Accidents ▬ ▬ ▬ ▬

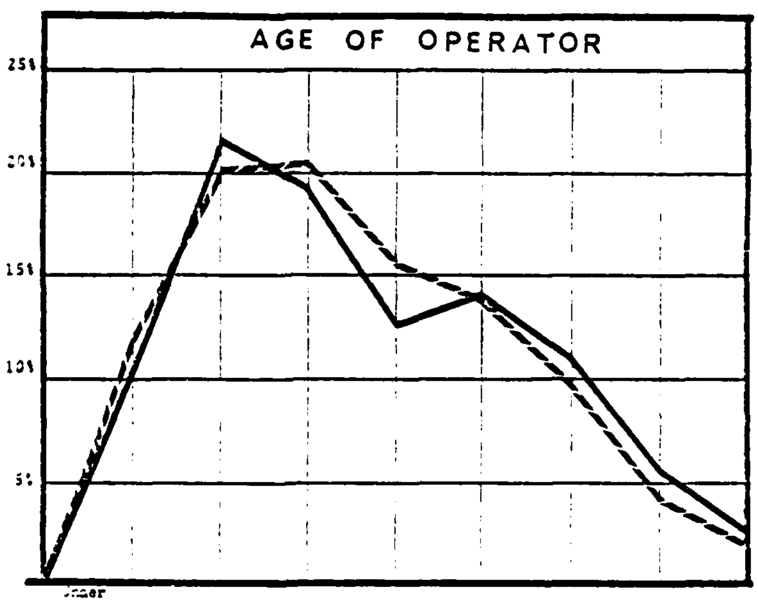
Fatalities ────



	Midnight 2am	2am 4am	4am 6am	6am 8am	8am 10am	10am Noon	Noon 2pm	2pm 4pm	4pm 6pm	6pm 8pm	8pm 10pm	10pm Midnight	TOTAL*
VESSELS	219	112	95	244	408	715	1227	1616	1357	751	509	225	7538
FATALITIES	55	17	14	41	78	140	181	230	210	132	97	43	1238

*Includes only those vessels or fatalities where the time of accident was known.

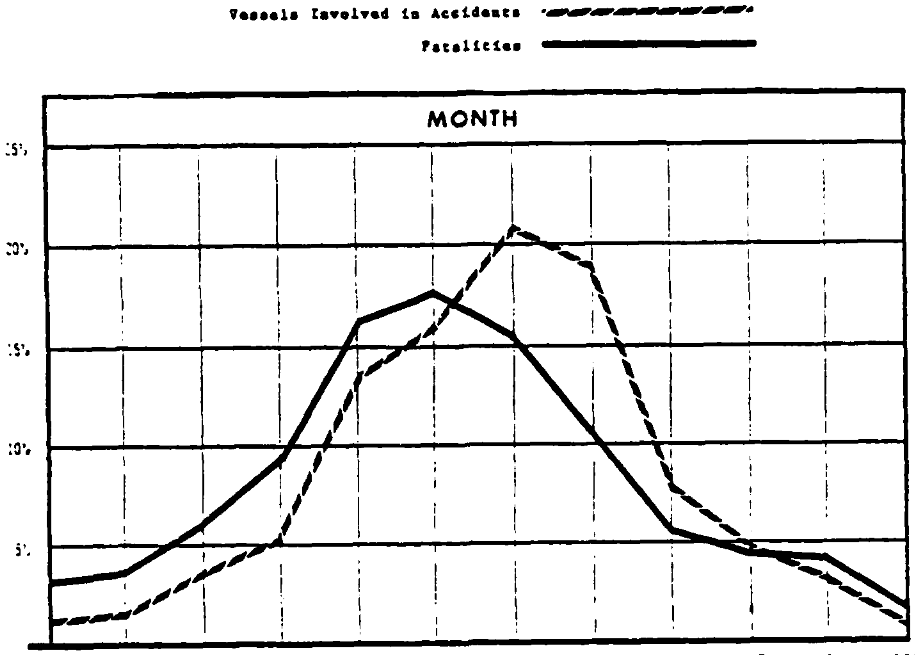
Figure 18



	Under 12	12 - 20	20 - 28	28 - 36	36 - 44	44 - 52	52 - 60	60 - 68	Over 68	TOTAL*
VESSELS	26	801	1327	1370	1076	919	645	315	106	[illegible]
FATALITIES	9	137	271	253	156	172	137	70	—	[illegible]

*Includes only those vessels involved in accidents where there was an operator and the operator's age was known.

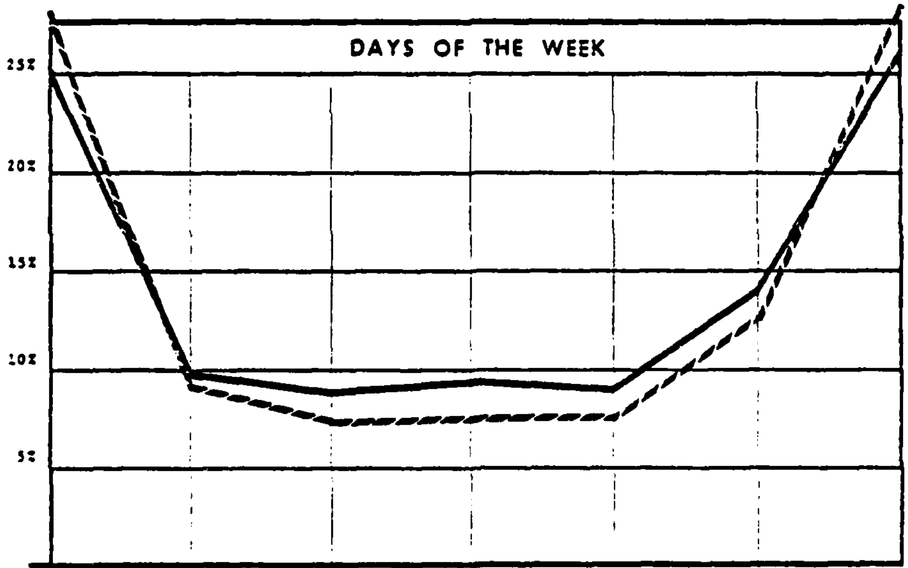
Figure 19



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL*
VESSELS	156	179	302	413	1095	1307	1662	[illegible]	606	[illegible]	[illegible]	[illegible]	[illegible]
FATALITIES	[illegible]	[illegible]	94	137	[illegible]	[illegible]	225	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Includes only those vessels or fatalities where the month of the accident was known.

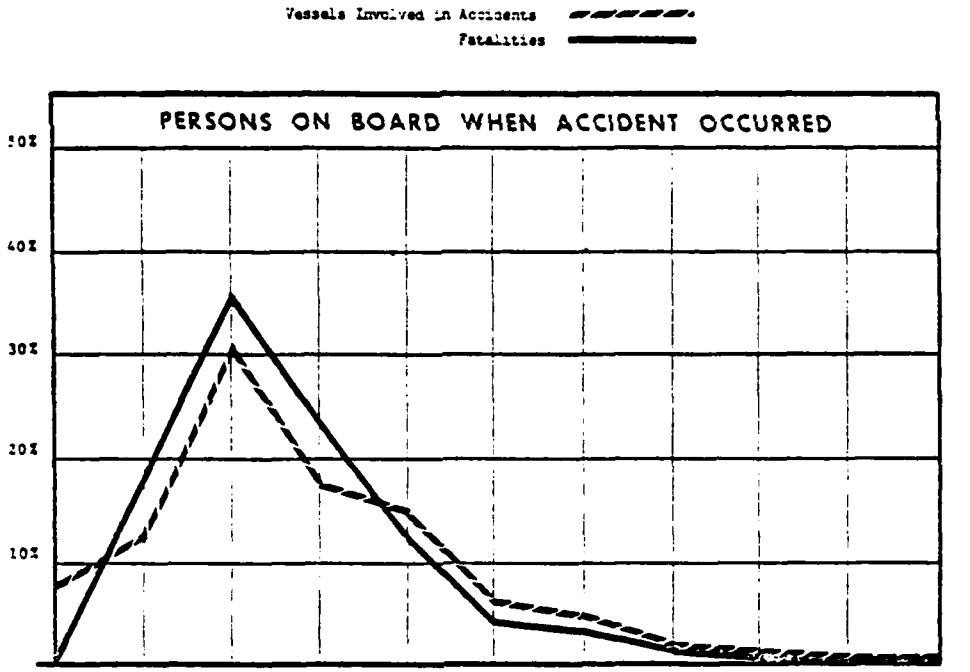
Figure 20



	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL*
VESSELS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	974	[illegible]	[illegible]
FATALITIES	373	132	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Includes only those vessels and fatalities where the date of the accident was known.

Figure 21



	0	1	2	3	4	5	6	7	8	9	10 or More	Total*
VESSELS	533	1009	2258	1299	1100	483	311	128	92	30	63	7338
FATALITIES	0	251	488	321	180	65	47	10	11	7	9	1299

*Includes only those vessels and fatalities where the number of people on board the vessel at the time of the accident was known.

Figure 22

Pool 8 is in close proximity to the LaCrosse population and has a narrow navigation channel. Pool 2, close to the Twin Cities, also has a narrow navigation channel. Pool 10 which contains Guttenberg and Prairie du Chien is the most heavily used recreational boating area within the study area (Source--Aerial Recreation Use Survey, 1976). Pool 4 with its broader area offers a much different experience and is heavily used for sailing and water skiing.

The GREAT I study area on the Mississippi River is approximately 252 miles long. Minnesota has approximately 192 miles of the Mississippi River adjacent or within the state (76.2 percent of miles), Wisconsin has approximately 198 miles adjacent to it (78.6 percent of miles), Iowa has approximately 60 miles adjacent to it (23.8 percent of miles). In other words, approximately 80 percent of the study area is bordered by Minnesota and Wisconsin.

Of the total of 170 accidents reported between 1970 and 1977, 87 (51.2 percent) occurred in Minnesota, 59 (34.7 percent) in Wisconsin, and 24 (14.1 percent) in Iowa. The accidents per state compared to mileage indicates a disproportionate share of accidents in Minnesota boundary waters.

Enforcement

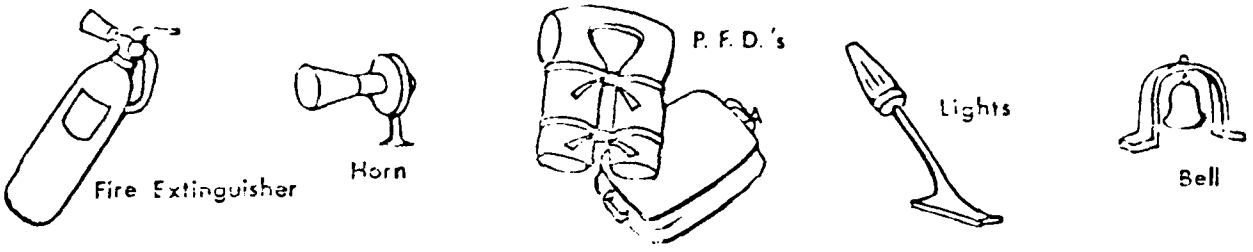
Enforcement of boating regulations and safety patrolling is undertaken by the DNR conservation officers and county sheriffs in Minnesota. "Sheriffs are required to report all incidents to the commissioner of natural resources, who shall transmit statistics on boating accidents and incidents to the secretary of the treasury." (Minnesota, Waters and Watercraft Safety Laws). The Minnesota DNR provides grant monies to the county sheriffs for the purpose of boat and water safety. Most arrests are made by the conservation officers.

The Wisconsin Department of Natural Resources has eleven enforcement wardens assigned to the Mississippi River bordering counties that have responsibility for enforcing all rules and regulations of the DNR. The wardens spend approximately 10 percent of their time enforcing boating regulations (Source-Wisconsin DNR, LaCrosse Office).

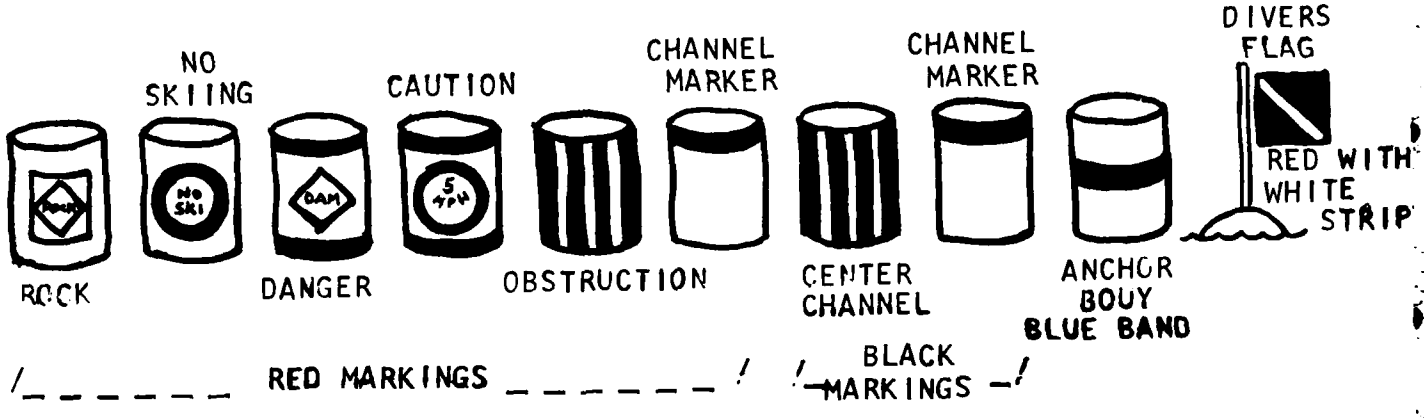
Iowa has five full-time Waters Officers and one supervisor assigned to the Mississippi River (three officers in the study area). Although these officers have other responsibilities within their districts, they spend 75-90 percent of their time on the Mississippi River. These officers are responsible for enforcement of boating regulations and snowmobiling regulations (Source--Mississippi River Supervisor, Waters Section, Iowa Conservation Commission).

The Corps of Engineers does not have enforcement authority, but does assist the Coast Guard and the states. The Corps participates in boating safety classes throughout the area.

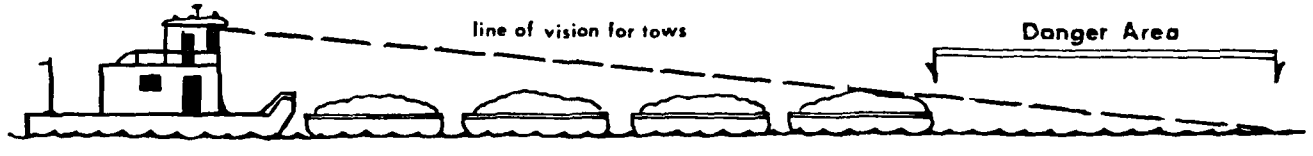
SAFETY EQUIPMENT



KNOW YOUR BOUYS



TOWBOAT SAFETY REMINDER



STAY CLEAR OF TOWS, THEY CREATE STRONG WAVES.

NEVER ANCHOR (WITHOUT THE ENGINE RUNNING) IN THEIR COURSE, IT MAY REQUIRE A HALF MILE OR MORE FOR THEM TO STOP.

REMEMBER, AT NIGHT THEIR LIGHTS APPEAR FAR APART COMPARED TO SMALL BOATS.

Figure 23

Other Concerns

Several other concerns/comments have surfaced that are not reflected in the accident data:

1. Intoxication of operators is believed by many to be a much greater problem than the statistics reflect. Many of the accidents involving intoxicated operators are not reported as such because of the uncertainty of the investigating officers.

2. The Corps makes suggestions and offers assistance during lockages. Intoxicated operators are not detained at the locks except in "severe cases". Lockmasters do contact the local enforcement authority or give the boat number to the Coast Guard for prosecution of these "severe cases". (Source--Locking Operations, St. Paul District.)

3. All the enforcement agencies within the study area use a Coast Guard approved accident report form. Many of the older forms did not adequately specify the exact location of the accidents, however. All enforcement personnel should accurately delineate the location of all accidents. The U.S. Coast Guard reviews all accident reports. This information could be used by management and enforcement personnel to identify problem areas so that they can be better publicized, local safety education classes can include these areas, increased patrolling, modification to or elimination of hazards, etc. Interstate cooperation and exchanges of information are obviously required and must continue.

4. All the responsible agencies within the study area distribute "boating regulations" and information on recreational lockages and participate or conduct boating safety courses.

   Wisconsin has mandatory boating safety classes for persons 12-16 years of age (no one under 10 can operate a motorboat alone, ages 10-12 must be accompanied by a parent or guardian, and must be certified to operate a motor-powered boat alone between the ages of 12-16 (Source--Dale Morey, Boating Safety Administrator). Minnesota requires that "no person 13 years of age or over but less than 18 years may operate a motorboat powered by a motor over 24 horsepower without possessing a valid watercraft operator's permit..." (Source--Minnesota Waters and Watercraft Safety Laws, Rules and Regulations). In Iowa, "it is unlawful to let anyone under 12 years of age operate a motorboat which is propelled by a motor more than 6 horsepower unless he or she is accompanied by a responsible person of at least 18 years of age who is experienced in motorboat operation." (Source--Iowa Boating Regulations).

5. According to the Rules of the Road, CG-184, vessels with deep draft (commercial tows) have right-of-way over shallow draft (recreation) boats. The "privileged vessels" (commercial tow) are allowed to maintain speed and stay on course while the "burden vessel" (recreation boat in this case) must yield. (Source--Commander Ken Elkins, U.S.C.G.)

6. A large number of accidents occur because of the operator's unfamiliarity with the area--the inherent hazards of a modified river system (wing dams, closing dams, etc.) and natural hazards.

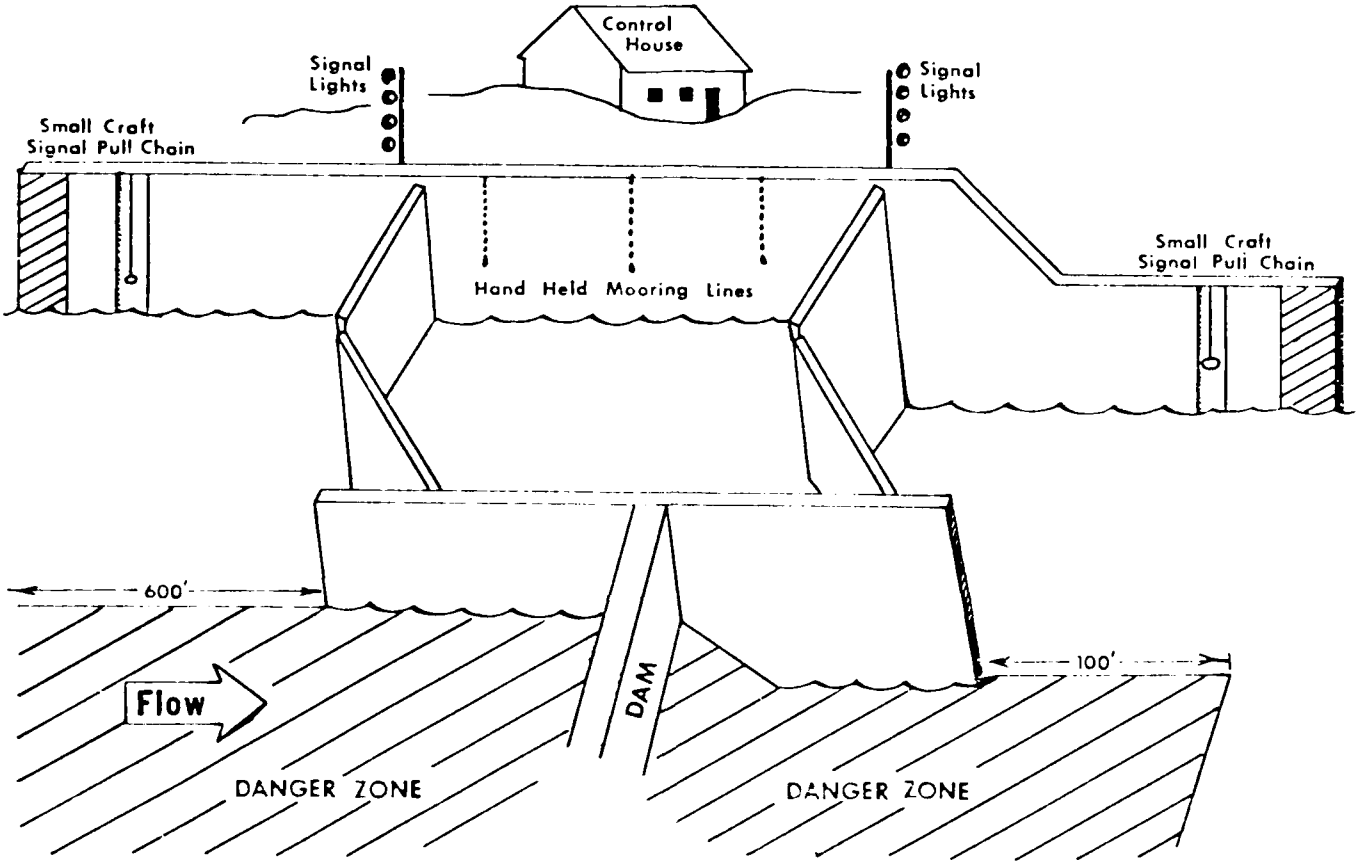
7. Boating regulation or facility brochures from Iowa, Minnesota and Wisconsin do not presently include segments on safety problems unique to the Mississippi River, or information on "locking through". (Note: As a result of earlier RWG I recommendations, the Minnesota DNR has proposed a brochure entitled "Boating on Big Rivers"; the Iowa Conservation Commission, Waters Section, is considering expansion of their facility guide to include boating safety information; and the Upper Mississippi River Conservation Committee (UMRCC) will include boating safety guidelines in upcoming publications.) The St. Paul District, Corps of Engineers, distributes an informative brochure entitled "Locking Through". The U.S. Coast Guard has many fine brochures available for distribution. One such brochure, "Riverways", includes valuable information on locking, tow boat dangers, ventilation and fueling safety, etc. Emphasis needs to be given to easily discerned graphics which describe safety problems and boating tips which are particular to the Mississippi River.

8. The Twin Cities Metropolitan Level B Study identified problems in "the lack of mooring facilities for pleasure boats (and tows) waiting to lock... Boaters waiting to lock are now forced to: (a) cruise in slow circles which is a dangerous practice near spillway structures and lock intake/discharge structures; (b) anchor, also a dangerous practice in a flowing river; or (c) leave and return at intervals hoping to catch the lock open" and "safe passage for canoes and other nonpowered craft at locks. (Note--in some areas portages could be constructed around lock structures). Any federal action to supply these facilities would take a congressional resolution or under Section 107 project which requires 50 percent local participation."

9. Interviews with recreationists have pointed out the problem of swamping of small recreational craft by large recreational cruisers and houseboats.

10. Law enforcement authorities suspect that many boating accidents are not reported.

LOCKING THROUGH PROCEDURE



1. SIGNAL FOR LOCK USE, SMALL BOATS MAY SIGNAL BY USING PULLCORD.

2. WATCH SIGNAL LIGHTS --
   --NO LIGHT - lock not in use
   --RED LIGHT - stand clear, do not approach
   --AMBER LIGHT - lock is being made ready
   --GREEN LIGHT - enter lock, use caution

3. HOLD ONTO THE MOORIING LINE -- DO NOT TIE ANY LINES ESPECIALLY TO A RECESSED LADDER -- DO NOT RUN MOTOR.

4. A SIGNAL WILL BE GIVEN TO LEAVE LOCK -- WILL BE EITHER HAND SIGNAL OR SHORT HORN TOOT.

Figure 24

11. Boating administrators from the Upper Mississippi River bordering states, the Coast Guard, and recreational boating public and industry spokesmen met in Bloomington, Minnesota, on May 16, 1978, for a meeting of the Upper Mississippi River Basin Commission covering recreational boating.

    Speakers agreed that no new boating laws were necessary, just better enforcement of existing ones; and recommended continued federal assistance for state boating safety problems.

Conclusions and Recommendations

1. There is no need for additional boating laws, only better enforcement of existing laws.

2. The states (especially Minnesota and Wisconsin) need to place more emphasis on boating law enforcement along the Mississippi River.

3. At recent public workshops on the Recreational Craft Locks Study, public preference was overwhelmingly for providing information on waiting times and lockages rather than facilities. The Corps of Engineers should further investigate providing mooring facilities, signing, etc., adjacent or near locks to provide for mooring and safe passage of recreational craft through the locks.

4. Collisions between recreational boats and commercial tows are not a major source of accidents (most are with moored barges). Collisions between two or more recreational boats, between recreational boats and objects, faulty equipment, and falling overboard account for most recreational boating accidents in the GREAT I segment of the Mississippi River.

    Most of these accidents are the result of operator failure, operator unfamiliarity with the river and its unique safety problems and probably intoxication.

5. The national accident rate has varied from approximately 0.16-0.21 over the 1970-77 period. All pools within the study area have accident rates higher than the national average. This is to be expected as a result of the high frequency of boating activity on the Mississippi River when compared to the rest of the nation. Pools of greatest concern in the GREAT I area for recreational boating accidents are St. Croix, 8, 4, 10, and 2. Special emphasis needs to be given to the St. Croix and Pool 8 (LaCrosse, Wisconsin area).

6. More attention needs to be given to the accuracy of the boating accident reports. The exact location of accidents, which might include river mile, bank, sketch of areas, etc., should be given. This would allow adjacent states' enforcement agencies and Coast Guard personnel to better determine "high accident" areas and to better cooperate in water patrolling efforts in these areas.

7. More attention and consideration needs to be given to supplying information concerning boating safety problems (potential hazards of channel maintenance structures, tow boats, major causes of accidents, etc.) on the Mississippi River. The states, Corps of Engineers, and UMRCC should include this information within their "facility guides" in a graphic manner easily interpreted by the public. The U. S. Coast Guard brochure "Riverways" could in part serve as a guide for the information contents. All the agencies should continue to emphasize boating safety through classroom instruction, licensing, and information distribution.

8. There are many (unknown quantity) boating accidents that are probably not reported--both those required by law (over $100 property damage), and those not required by law.

   States should consider requiring boat repair facilities (marinas, repair shops, dealers, etc.) to be registered by the states and be required to report accidents over $100 property damage to the appropriate state or federal agencies.

9. Information on high accident areas, congested areas, etc, should be distributed by agency managers readily to the public to help reduce the number of potential accidents.

Definition of Terms

Pool Number--The number designation assigned to the pools formed by the series of numbered locks and dams on the Upper Mississippi River.

Accident Type--Accidents involving recreational boats which are reported to the appropriate agency as required by law.

a. Recreation Boat-Barge Collision--Accidents in which there is a direct collision between recreational boats and barges.

b. Recreation Boat-Recreation Boat Collisions--Accidents in which there is a direct collision between two or more recreational boats.

c. Recreation Boat-Person Collisions--Accidents in which a person (swimmer, water skier, person falling overboard, etc.) is hit by a recreational boat.

d. Recreation Boat-Object Collisions--Accidents in which a recreational boat collides with a floating or fixed object in the water (wing dam, log, etc.).

e. Swamped by Barge Wake--Accidents in which a recreational boat is swamped and sinks as a direct result of the wake of a passing barge.

f. Swamped by Recreational Boat Wake--Accidents in which a recreational boat is swamped and sinks as a direct result of the wake of another passing recreational boat.

g. Faulty Equipment--Accidents that are caused by faulty equipment aboard a recreational boat (fuel leak explosions, wiring fires, etc.).

h. Fell Overboard--Accidents in which a person falls out of a recreational craft and is injured or dies.

i. Other--Accidents for which the cause was not clearly defined or is not included in one of the other categories (skiers tangled in ropes or hitting objects, boats capsized in wind or when overloaded, swamped by own wake, etc.).

Results--The results of the previously noted recreational boating accidents. One recorded accident may consist of several result categories.

a. Injured--The total number of persons reported injured in the accidents. Some accidents may injure none or may injure several.

b. Dead--The total number of persons reported to have lost their lives in the accidents. Some accidents may have no fatalities or may have several.

c. Property Damage--The number of recreational boats damaged as a result of accidents. An accident may result in no property damage or may result in property damage to one or more boats. Only property damage of $100 or more is reported.

d. Medical Expenses--The total number of persons reporting medical expenses incurred as a result of a recreational boating accident or the number of persons assumed (by nature of the type of reported injury) to have experienced medical expenses.

Total Reported Accidents--The total number of recreational boating accidents reported.

Table 4

RECREATION BOATING ACCIDENTS

1970-1977 TOTALS

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River		11	2	6			3	1	8	4	2	21	1	31	Figures are only for 1975-77 on St. Croix.
1	1			1	1				1	10		3	10	4	
2	4	4		3			2	1	1	3	4	11		15	
3		3		1				1		1		3	1	5	
4	1	12	2	5	1		1	2	6	8	6	21	3	30	
5		1						2	1	1	1	1	1	4	
5A		1										1		1	
6	1	3		2		1	1	2	2	5	4	10		12	
7		1	1			1			1	1	2	2		4	
8	1	6	2	8		2	2	4	7	9	3	20	5	32	
9	1	2		1	1	1	1		5	5	6	9	3	12	
10		10		3		1	4		2	6	2	16	4	20	
TOTALS	9	54	7	30	3	6	14	13	34	53	30	118	28	170	
% OF TOTAL	5.3	31.9	4.1	17.6	1.8	3.5	8.2	7.6	20.0						

GREAT River

RECREATION BOATING ACCIDENTS

1970

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River															
1															
2		1										1		1	
3															
4		2		1					1	2		3		4	
5									1					1	
5A															
6															
7															
8		3	1	2				1		3		6		7	
9					1					1		1		1	
10															
TOTALS	0	6	1	3	1	0	0	1	2	6	0	11	0	14	
% OF TOTAL	0.0	42.9	7.1	21.5	7.1	0.0	0.0	7.1	14.3						

Table 6

RECREATION BOATING ACCIDENTS

1971

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River															
1									1	6		1	6	1	
2				1			1		1	2	1	2		3	
3															
4		3	1							1		3		4	
5															
5A															
6	1								1	3		2		2	
7			1								1			1	
8		1		3		1		1				4		6	
9	1	2							1		2	3		4	
10		1					1					2		2	
TOTALS	2	7	2	4	0	1	2	1	4	12	4	17	6	23	
% OF TOTAL	8.7	30.5	8.7	17.4	0	4.3	8.7	4.3	17.4						

Table 7

RECREATION BOATING ACCIDENTS

1972

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River															
1															
2	1							1			1	1		2	
3															
4		2										2		2	
5															
5A															
6							1	1	1		3	2		3	
7															
8		1		1		1			4	2	1	4	2	7	
9									2	2	1		2	2	
10									1		1			1	
TOTALS	1	3	0	1	0	1	1	2	8	4	7	9	4	17	
% OF TOTAL	5.9	17.6	0	5.9	0	5.9	5.9								

Table 8

RECREATION BOATING ACCIDENTS

1973

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River															
1															
2				1								1		1	
3															
4		2		2			1	1		4	1	4	2	6	
5								1		1			1	1	
5A		1										1		1	
6		1								1		1		1	
7															
8								1			1			1	
9									1			1		1	
10		3										3		3	
TOTALS	0	7	0	3	0	0	1	3	1	6	2	11	3	15	
% OF TOTAL	0	46.7	0	20.0	0	0	6.6	20.0	6.7						

Table 9

RECREATION BOATING ACCIDENTS

1974

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River															
1	1			1						4		1	4	2	
2		2								1				2	
3															
4	1	1		1	1				1		1	4		5	
5															
5A															
6															
7															
8	1	1	1					1	1	1	1	2	1	5	
9						1						1		1	
10		2					2		1	2	1	4	2	5	
TOTALS	3	6	1	2	1	1	2	1	3	9	3	12	7	20	
% OF TOTAL	15.0	30.0	5.0	10.0	5.0	5.0	10.0	5.0	15.0						

Table 10

RECREATION BOATING ACCIDENTS

1975

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River		5		1			1		2		1	7		9	
1															
2															
3		3										3		3	
4		1	1					1	1	1	2	2	1	4	
5															
5A															
6		1						1			1	1		2	
7															
8				1			1		1	1		3		3	
9															
10		3		2			1			2		5	1	6	
TOTALS	0	13	1	4	0	0	3	2	4	4	4	21	2	27	
% OF TOTAL	0	48.2	3.7	14.8	0	0	11.1	7.4	14.8						

Table 11

RECREATION BOATING ACCIDENTS

1976

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River		3	2	1			2	1	3	3	1	6	1	12	
1															
2	2										2	2		2	
3				1				1		1			1	2	
4									1		1			1	
5		1						1			1	1		2	
5A															
6		1										1		1	
7		1										1		1	
8				1					1	1		1	1	2	
9				1			1		1	1	3	3	1	3	
10		1		1						2		1	1	2	
TOTALS	2	7	2	5	0	0	3	3	6	8	8	16	5	28	
% OF TOTAL	7.1	25.1	7.1	17.9	0	0	10.7	10.7	21.4						

Table 12

RECREATION BOATING ACCIDENTS

1977

POOL NUMBER	ACCIDENT TYPE									RESULTS					REMARKS
	Recreation Boat - Barge Collision	Recreation Boat - Rec. Boat Collision	Recreation Boat - Person Collision	Recreation Boat - Object Collision	Swamped by Barge Wake	Swamped by Recreation Boat Wake	Faulty Equipment	Fell Overboard	Other	Injured	Dead	Property Damage	Medical Expenses	Total Reported Accidents	
St. Croix River		3		4					3	1		8		10	
1					1							1		1	
2	1	1		1			1					4		4	
3															
4		1		1					2		1	3		4	
5															
5A															
6				2		1				1		3		3	
7						1			1	1	1	1		2	
8							1			1			1	1	
9															
10						1						1		1	
TOTALS	1	5	0	8	1	3	2	0	6	4	2	21	1	26	
% OF TOTAL	3.8	19.2	0	30.9	3.8	11.5	7.7	0	23.1						

DREDGED MATERIAL ISLAND/BEACH RECREATIONAL USER ASSESSMENT

One goal of recreation resource managers in general has been to provide a diversity of experiences. As this study will indicate, in part, the rich multiple-use setting of the Upper Mississippi (from the Lock and Dam at St. Anthony Falls, opposite St. Paul, Minnesota, to Lock and Dam 10 at Guttenberg, Iowa) provides such a diversity of use by accident and design.

The basic mission of the recreational user assessment was to develop, as a tool for managers, a profile of those with watercraft who use dredge spoil sites in the Upper Mississippi, and, as a corollary, to compare this profile with data obtained from a 1977 study of the Lower St. Croix River. To fulfill this objective watercraft users of dredge spoil sites within pools one through ten of the Upper Mississippi (from St. Paul, Minnesota to Guttenberg, Iowa) were surveyed from 7/3/77 to 10/10/77 by an Iowa Conservation Commission study team assisted by GREAT participants. The survey instrument was prepared by the School of Natural Resources, University of Wisconsin-Madison, based on prior research efforts by R. H. Becker and B. J. Niemann of the Forestry and Landscape Architecture Departments, respectively. Pool sample patterns (relative density) were originally calculated by using density estimations from an aerial flight made on the Sunday of Labor Day weekend 1976, and subsequently modified to increase the reliability of the density classifications. Units measured on the flight were boats extractable at a 1:24,000 scale (i.e. what the camera could register).

During the summer of 1977 a total of 1,783 questionnaires were distributed by the Iowa Conservation Commission. The completed questionnaires were then collected by the ICC and subsequently delivered for analysis to the University of Wisconsin-Madison participants in the study. Of the 1,783 questionnaires delivered, 1,651 were prepared and encoded for analysis. The balance were invalid because they either lacked observation sheets, answers to entire sections, or answers to less than 50% of the questions overall.

The 1977 questionnaires were given in two sets, on two different forms, the second reflecting selected question rewording during the study period. Of the 1,651 valid questionnaires, 789 were from the first wave and 862 were from the second wave. In most cases the combined results from both sets are presented as a total percentage. In those few situations where wording changes in a question from the first to the second form require it, the wave results are presented separately, or, where appropriate, singly.

[illegible] between the Upper Mississippi and the Lower St. [illegible] users, and was mailed to 450 on-site users from the 1977 Upper Mississippi study and to 450 on-site users from a 1977 parallel study on the Lower St. [illegible]. Responses from those returning the questionnaire (48% and 58%, respectively) contribute to an analysis of displacement and substitutability which may be operating between these two rivers.

Detailed data, analysis and interpretation is contained within a report entitled "Upper Mississippi Dredged Material Disposal Site Recreational User Assessment, November, 1978." Significant variations in data by pool are contained elsewhere in this report (pool by pool breakdowns).

Dredge Spoil Island User Profile

In brief, the composite user of dredge spoil islands surveyed in this study has come 50 miles or less to be on the river with two other people. They will use only one watercraft, a powerboat 16 to 25 feet long. In a general profession earning more than $18,000 a year, this typical user owns the boat he is running and does not rent marina space.

By his own estimation he will spend less than $30 during this particular trip, most of that on the river. During an overnight stay of at least three days he will use islands more than shores or camp aboard his boat. Over the season he will visit the river both on weekends and weekdays from one to three times. He chooses his put-in site either because it has easy access or is close to his home (or to a favorite island or section of the river). He also wants to find a grocery store and/or a restaurant and a boat pumpout near that launch. As his trip is pool specific he will probably not use a lock.

The composite user enjoys dredge spoil islands and would like to see more of them created, but is unsure of what actually is and is not a dredge spoil island. He does prefer islands which are a combination of sand and trees. In fact, a sand beach is his most important criteria for selecting an island at which to stop.

As a general recreation experience he prefers to relax in natural areas where few outdoor skills are required and there is no supervision or control of any activities. While he is compatible with his own kind, and with houseboats and canoes, he prefers to be with his immediate group or alone. Related to the number of other powerboats he sees, his perception of crowding directly affects his level of satisfaction. Overall, he is now very satisfied as a river user.

Although he thinks recreation use is as important to the river as commercial traffic, he does not feel barge tows reduce his enjoyment of the river. He is not sure if any developments (artificial amenities) should be provided to each pool or island, and whether or not dredge materials should be placed either along the river or on islands.

Among the rivers they know, both the Upper Mississippi and Lower St. Croix user (as compiled from the surveys) rank these two rivers high, first or second, for beauty, environment, wildlife, and overall enjoyment. The composite user surveyed on the Lower St. Croix has attempted to avoid crowds by picking a trip time he thought the fewest people would be on the river. However, he does not mind encountering other people while traveling along the river as much as when he is stopped on shore, and does not mind encountering a group of quiet people anywhere.

He is as satisfied with his visit as the Upper Mississippi user surveyed, and this satisfaction level is not lowered by an increased perception of crowding. Receptive to controls such as restricting the type of watercraft and limiting some areas of the river to specific uses, he does not agree to limiting peak use areas.

Like the user of the Upper Mississippi he also prefers natural areas which require few outdoor skills and have no controls on activities. Also running a powerboat 16-25 feet long, he too is looking for a sandy beach and adequate depth when choosing an island stop.

FINDINGS

Major results from the Upper Mississippi and regional surveys include the following observations:

User Statistics

* Those with watercraft using the dredge spoil sites are from the immediate region. Over 98% are from the four bordering states of Minnesota (40%), Wisconsin (34%), Iowa (16%), and Illinois (9%). The overwhelming use for all pools surveyed is by people living within 25 to 50 miles of their put-in point.

* Average party size was six people (mode size was three).

* Most parties had only one watercraft for the entire group. Two was the most common number of multiple watercraft per group.

* Given the nature of the survey, the most dominant recreation craft used by those contacted were runabouts (50%), followed by houseboats (27%), cabin cruisers (12%), fishing boats (8%), canoes (2%), and pontoon boats (1%).

* Although it might be expected that with a study focused on a boating-related activity as an activity itself [illegible] be important, only 40% of the users surveyed identified it as the most important activity of their visit that day. Camping, fishing, and swimming were cited as the most important activity by 12%, 8%, and 16%, respectively.

* Users surveyed tended to be general professionals (24%) or in business (22%). Housewives (11%) and students (9%) were the next largest occupational categories listed.

* User incomes were in the high end of the scale: 24% were above $30,000; 64% earned $18,000 or more.

* Over 64% of the river users surveyed reported owning the boat they were running. Only 18% were renting their crafts.

Costs, Length, and Timing of Trips

* Total trip costs were reported to be less than $30 by 46%. Only 18% indicated costs of more than $150.

* Of the total costs of the average trip 2% was spent at home, [illegible] traveling to the river, and 6% on the river [illegible] etc.). A significant relationship [illegible]

Desired Access and Facilities

* "Easy access", "close to favorite island", "close to residence", and "close to favorite section of river" are reasons rated equally important for a "put-in" choice.

* In response to another question 62% of the visitors considered a grocery store to the most important service in the immediate vicinity of the river access used. Also cited frequently as important services were a restaurant (43%), boat pumpout (39%), bait shop (30%), and tavern (28%).

* Dominant put-in locations which accounted for over 50% of the access for river users surveyed were LaCrosse, Wisconsin (18%), Wabasha, Minnesota (15%), McGregor, Iowa (7%), Winona, Minnesota (7%), and Lansing, Iowa (6%).

* Use appears to be pool specific in that most visitors (68%) do not utilize a lockage during most river trips. During the study period the ratio of those not using locks to those using them was approximately 3:1 on weekends but only 1.5:1 on weekdays.

* Almost 66% of the users in the survey did not rent marina space.

Island and Experience Preferences

* Almost 88% of the users surveyed said they enjoyed using dredge spoil sites and would like to see more of these islands created (first set only).

* When asked to select an island description that approximates the type of island they would prefer to stop at, over 47% of the visitors indicated "islands which are mostly sand with some trees". Forty-one percent selected "islands which have trees, few shrubs, open sand with some grass". Island "heavily vegetated with trees, shrubs, and grasses" and islands which are "all sand" were each preferred by only 3.4% of the users surveyed. The data reveal no relationship between island type preference and river pool, so preferences cannot be attributed to spatial clustering of island types along the river (second set only).

* Most visitors stated that sandy beaches (45%), adequat water depth (19%), not crowded (13%), and safe swimming (11%) were the most important criteria in choosing a place to stop.

* On a five-point Likert scale measuring preferred wildness conditions (1 most wild, 5 least), 55% checked the number 2 response: "I enjoy visiting natural river areas where few outdoor skills are required and I can relax. I prefer no supervision or control of any activities".

* Those users checking conditions 4 or 5 on the scale (8%), which are a planned or controlled experience with many facilities provided, did not mention camping as an important activity, but did indicate boating, sunbathing, and waterskiing.

* When the preferred island type response was compared with the preferred outdoor recreation experience, a significant relationship was found. Those preferring "no controls" in their experiences (wildness level 2) had a smaller proportion preferring heavily vegetated islands than any other type of island. Those preferring extremely natural experiences (wildness level 1) had a proportionally higher preference for heavily vegetated islands than other types of islands.

* Apparently, no significant relationship exists between the outdoor recreation experience preferred and the day or month of a visit for those users surveyed.

* Activities which were rated most important did exhibit some variation by month between weekdays and weekends: in July, sightseeing, camping, and waterskiing were most important on weekends; in August, sunbathing, camping, and waterskiing were most important on weekends; in September, camping, fishing, and picnicking were more important on weekends. During July and August fishing was more important on weekdays.

Encountering Others:
Density Perception and Satisfaction

* Another measure of the type of experience sought was the indicated degree of interaction preferred on a river visit. A majority preferred either to be alone (7%) or with their immediate group (57%). However, 27% indicated a tolerance for meeting others, and 8% wished to do so.

* As might be expected, a generally high compatibility exists for all groups encountering their own kind: canoeists, 80%; fishing boats, 83%; runabouts, 65%; cabin cruisers, 64%; houseboats, 59%.

* The least desirable travel mode for other users to encounter was a cabin cruiser.

* The travel modes most compatible with other users are the two which are slow and create little wake: houseboats and canoes.

* However, canoeists were the most tolerant of barge tows, perhaps reflecting the fact that the barge tows stay in the channels while canoes generally travel along the shore and back-water sloughs.

* Cabin cruisers and runabouts were the least tolerant of barge tows, reflecting a possible competition for the same water areas.

* The users' perceptions of density were compared to perceptions of crowdings. There was no apparent relationship between perception of crowding and perceptions of fishing boats and barges.

* As the number of powerboats perceived increased, the frequency of an "extremely crowded" response increased for all categories of watercraft users.

* There was a significant relationship between satisfaction and perceived crowding--particularly between high satisfaction and low crowding.

* However, there was no significant relationship between user satisfaction and actual density.

* On weekdays, more than expected** "not crowded" responses were received, while on weekends more than expected "moderately" and "extremely crowded" responses were received.

* Overall satisfaction of river users surveyed was high: 28% rated their visit as "perfect"; 38% thought it was "excellent, only minor problems", 17% rated it as "very good, but could have been better".

**When one looks at the relationships between two variables one would get an expected value for each cell in a matrix, if these variables distribute normally. If the observed value deviates sustantially from the expected value, this deviation indicates that there is a significant association between the two variables. The statement "more crowded responses on weekends than expected" does not mean that there were more crowded responses on weekdays. In fact, there were very few people who said they were crowded at anytime. But, more of the extremely crowded responses were given on weekends than would be expected with a normal distribution between two independent variables. When responses do not distribute in a normal fashion and cluster in some manner, such clustering indicates that the two variables are somehow acting on each other, that they are not independent. It follows then that there is some relationship between perceived crowding and day of the week.

* Almost 90% of the Upper Mississippi visitors reported that stopping on shore or islands was a part of their trips to the river.

Management Considerations

* Only 22% of the visitors surveyed agreed that commercial traffic is much more important than recreational use. However, 62% feel that barge tow traffic does not reduce enjoyment of the river.

* Users had mixed attitudes about additional developed boat access to each pool. Some 35% did not care, while 53% agreed and 22% disagreed that more ramps should be provided.

* Only 38% of those surveyed approved of providing more island facilities for houseboats and large cruisers. Twenty-eight percent disagreed.

* When asked if sanitation facilities should be provided on all islands, 42% agreed and 26% disagreed. The rest were neutral.

* Users were asked whether "dredge materials from channel maintenance should not be placed along the river or on islands". Forty-four percent agreed it should not, 38% disagreed, saying that it should, and 18% did not care. When these results were compared to the users' island type preferences a significant relationship appeared: users preferring no vegetation feel dredge materials should be placed along the river and on islands; those preferring heavily vegetated islands did not agree with such placement of dredge spoil. Due to the wording of the question, those surveyed in the first wave were usually informed they were on dredge spoil islands. After a wording change in the same question, these surveyed in the second wave were not usually informed. While both waves did indicate they enjoyed using the islands (77% and 88%, respectively), only 38% of the second wave agreed that dredged materials from channel maintenance work should be placed along the river or on islands. (The first set was not asked this question).

Regional Survey:
Upper Mississippi and Lower St. Croix

The process of user displacement is a central focus of the regional survey (questionnaire) sent both to Upper Mississippi and Lower St. Croix users. The questions posed were to assess if users who are density sensitive adjust their use of the rivers in timing and/or in location (temporally and spatially).

* Encountering other people as visitors travel along the river is not as bothersome as encountering them when visitors are stopped on shore. (51% agree or strongly agree with this statement while 37% are neutral).

* Of the users surveyed with the regional questionnaire, 17% strongly agree and 28% agree that the quality of river experience is changed by meeting people. Encountering a group of "quiet" people on the river does not bother 86% of the respondents.

* A majority of users on the Lower St. Croix (63%) reported that they have attempted to avoid crowds by selecting a time they thought the fewest people would be on the river.

* Other results showed that, on one trip or another, 49% used a section of the river they "knew" was not crowded, 17% did not go to the river because they "knew" it was crowded, and 6% had used another river altogether. Forty percent said they had made no such attempts to avoid others.

* Fifteen percent of Upper Mississippi users surveyed who had visited the Lower St. Croix in the past cited that it was now too crowded; 7% cited unsafe boat operation as a reason for no longer going (also a function of user density).

* Only 1% of the respondents cited "crowded" as a reason for no longer visiting the Upper Mississippi.

* However, users on the Upper Mississippi and Lower St. Croix who were surveyed are equally satisfied with their visits to these rivers.

* An increase of perceived crowding on the Upper Mississippi was accompanied, to a degree, by decreased satisfaction levels, a correlation not found in the Lower St. Croix data.

* The observed effect of users moving from the Lower St. Croix to the Upper Mississippi may be influenced by potential management alternatives. Users on the Lower St. Croix were receptive to some control:

* Sixty-five percent (Lower St. Croix) agree to restricting the type of watercraft.

* Eighty-one percent (Lower St. Croix) agree it is reasonable to limit peak use areas, even though these respondents report a high proportion of avoidance at peak use times.

* As with the Upper Mississippi users, more of the Lower St. Croix respondents selected the level 2 wildness on the experience preference skill (natural areas that require few outdoor skills and activities that are not controlled). However, more Lower St. Croix users surveyed seek an experience of outdoor comfort while more of the Upper Mississippi users surveyed seek to be a part of nature.

* Stops by users on shores or islands are a regular part of the recreation experience on both rivers.

* River characteristics important in selecting a stopping place on both rivers were a sandy beach and adequate water depth.

* While the majority of crafts used by those surveyed on both the Lower St. Croix and the Upper Mississippi were 16-25 feet long (42% and 40%, respectively), the Lower St. Croix had a higher percentage of crafts in the next larger category (22% to 14% in the 26-36 foot size) and the Upper Mississippi had a higher percentage in the largest category (4% to 12% in the 36-55 foot size).

* Nineteen percent of those responding to the regional questionnaire had also visited the Minnesota River in the last two years, 14% the Boundary Waters Canoe Area, 12% the Wisconsin River, and 10% the Cannon River.

* Respondents ranked rivers they had visited for several recreational qualities. The Upper Mississippi was ranked first for being the least crowded (27%), and for having the best fishing (36%), the best motorboating (50%), and, notably, the best overall recreation experience (40%).

* The Lower St. Croix was ranked first by respondents for having the best canoeing (in upper reach of Lower) (23%), the most wildlife (38%), and the best environmental quality (36%), as well as for being the most beautiful (36%).

* When respondents were asked to name their preferred recreation experience location, 35% cited the Upper Mississippi and 24% the Lower St. Croix. Both rivers were also picked as second choices for a preferred recreation experience by 19% and 16% of those responding, respectively.

DISCUSSION OF FINDINGS

Not all of the preceding findings need and/or merit further discussion. Some may have no particular implications for management, at least at this time. Discussion may, however, bring out additional survey findings and relate different aspects of these findings to each other. The areas receiving the greatest attention in this discussion section concern the effect of encountering others on the river and the process of user displacement.

User Statistics

Those using the dredge spoil islands who were surveyed are neighbors of the river and the Corps. Use seems to be fairly localized within the region and within each pool, within a 25-mile radius of a pool. The cities visitors recorded are those from which their trips started, not their home towns (in summer home towns and trip origins may be different).

Users of some of the pools are rather well distributed among many local communities. The principal population centers near the other pools are where those pools' users started their trips. For Pool 2, it's St. Paul. Hudson, Wisconsin, is on a different river but is still within a 25-mile field. Heavy contributors Hastings, Minnesota, and Prescott, Wisconsin, are on Pool 3. Use of Pool 4, Lake Peppin, is dominated by local communities like Wabasha, and Alma. Rochester, Minnesota is a big city adjacent to Pool 4.

As one continues down the list of main origins of pool users one can almost plot the cities along the river. For Pool 5 users' major home cities are Alma, Wisconsin, Wabasha, and Weaver, Minnesota; for Pool 5A they are Winona and Wabasha, Minnesota, and Merrick, Wisconsin; for Pool 6 they are Winona, Minnesota, and LaCrosse, Wisconsin, which is just down from Pool 6. In Pool 7, visitors started their trips from LaCrosse, Trempaleau, and Onalaska, Wisconsin. Pool 8 is at LaCrosse, where most of its users started. The major starting points for Pool 9 (besides a scattering of little Iowa cities along the way) are Lansing and McGregor, Iowa, near and right on that pool, respectively. Pool 10 users are from a scattering of Illinois cities and little Iowa cities which are not right on the river but close by. McGregor and Waterloo are very close Iowa cities from which other users of Pool 10 started their trips.

Rochester, Minnesota, and Chicago, Illinois, each contributed dredge spoil island users to an array of pools, but very few numbers to any one pool. Madison, Wisconsin, also contributed users to an array of pools, but a large number to only one. The Minneapolis-St. Paul area may seem to be underrepresented in the results. However, those from the Twin Cities have traditionally looked north and to the St. Croix for their recreation, not to the Mississippi.

The average party size of six is a reliable figure. Because of the question structure of the survey instrument, however, the reliability falls off considerably in any consideration of average number of people/ boat type or even just average number of people/boat. The survey also did not determine where people were docking or launching their boats, only the number using rental slippage.

The observed craft type used very closely approximates the type which users stated they preferred for travel. When user preferences approximate observed (actual) behavior, the preferred measures can be generalized with greater confidence and are more reliable.

The reported outlays for river trips (averaging less than $30) are not representative of the capital investments of the crafts and other equipment used. To get to the dredge spoil islands one has to have a boat and even a canoe is a substantial investment. When a user group has a modal income of over $30,000 it is just not a river use for the average person. Those surveyed are not casual users, either. Just the purchase of a boat is a major commitment to this type of activity.

Costs, Length, and Timing of Trip

According to observations made during this study, dredge spoil island users who camp overnight camp on their boats. In the manner by which they tie up their boats at islands, each party takes up room along an island's shore and cordons off a section of the beach as "its" own. Tie-up space may thus be more important than camping space.

The 4.5% who indicated they visit the river only on weekdays may be anglers. But they may also represent some who are making a shift in the time they use the river because of crowding.

Desired Access and Facilities

While it is reasonable to assume that users decide to go to a section(s) of the Mississippi because of the qualities of this section(s) that attract them, it appears that many users in this study are making visits based on convenience and proximity. Some users put into the river at places where access is easy and then travel on the river to get to the section they most prefer.

The choice of put-in sites for most dredge spoil island users surveyed does seem influenced by convenience, of location and/or access. Of course, where the launch is in relationship to where a user wants to go or where he is coming from are not factors the Corps and the adjoining states can really control. But the Corps does have complete control over where they grant a permit for an access. What service a user wants to find in the vicinity of a launch (grocery store, restaurant, bait shop), could be useful input before and after a new launch site is determined.

Weekend use tends to be more pool specific, as indicated by the ratio of lock to nonlock users (1:3). Weekday use tends to be more flow-through. That is, there is almost as much flow-through use as pool specific use (1:1.5). On weekends the amount of recreational boating increases so much it could be that lockage wait times are high. Or, during the week more of the longer-term visitors may come to the river. These tend to be linear, rather than pool specific users of the river.

Since only a third of the users indicated that they rented marina space, river use pressure from these users may be more affected by launching facilities and private moorage than by marina slippage.

Island and Experience Preferences

It appears that users like dredge spoil islands and would like to see more of them created, but are not in favor of dredging. Many are not aware they are on islands created (at least in part) by dredging. So, some association between dredging and this particular product of that process has yet to be established in the minds of these users.

It is clear that some contribution of sand and vegetation (generally trees) is the preferred island type to most of these users. And what are they looking for in choosing a place to stop at one of the islands? Users of all categories of boat types want sandy beaches. Anglers and large boaters want adequate water depth. Canoeists, anglers, and waterskiiers want to avoid crowds.

The type of recreation experience that users surveyed sought did not change by day or month. One can thus assume that for the period (season) sampled, dredge spoils island users have not yet started to displace in time due to real or perceived crowding (see later discussion on displacement). Apparently, most can still go out on the river on weekends and get the experience they want.

An early indicator that use is changing on the river would be a segregation of preferred recreation experience by day of the week. There may thus be a period of time remaining before any such response to crowding begins on the Upper Mississippi. There was a change in preferred activity by month; fishing picked up on weekends after crowds dropped off in September. This shift may still be a seasonal one, associated with a variety of long-established general influences such as a lower incidence in the fall of other water activities (such as waterskiing) which are rather incompatible with fishing. Camping remained a weekend activity throughout the sampling season. It is family-oriented and families can continue to get away on weekends even after school starts.

Encountering Others: Density Perception and Satisfaction

Although the physical attributes of a river have in the past been identified as effects on user perception and reported behavior, there are several indications that other people can have a major effect on the user.

The recreational experience on the Upper Mississippi is not one of solitude, nor do users of dredge spoil islands necessarily require it to be. However, the majority surveyed in this study are not there to socialize with others outside of their own groups. While encountering others is less tolerable to some users (especially on shore), the diversity of the resource itself may allow users to manage their own experience somewhat so that encounters may be minimized by the use of backwaters, etc.

Conflict between user groups has been of concern to resource managers attempting to optimize users' experiences. In the process of allocating limited natural resources, it is useful to identify the degree of compatibility between different user groups and to determine if this compatibility is shared symmetrically between user groups, and which user groups are most sensitive to other groups.

If all groups were equally tolerant or intolerant of each other, then all relationships are said to be symmetrical. However, when one group is tolerant of a particular group and that group does not return that tolerance, then an asymmetrical relationship exists. Although no user groups are completely compatible, not all members of a group dislike encountering any other user group (e.g. a small percentage of canoeists feel an encounter with a cabin cruiser is desirable). Fishing boats and houseboats, houseboats and canoes, fishing boats and runabouts, and fishing boats and cabin cruisers have a symmetrical compatibility. Cabin cruisers and houseboats, cabin cruisers and runabouts, cabin cruisers and canoes, runabouts and canoes, runabouts and houseboats, and fishing boats and canoes have an asymmetrical compatibility.

The watercrafts which are slow and create little wake, canoe and houseboats, were the most compatible with other users. Canoes do not disturb the water surface for anyone. Houseboats are generally used for conveyance and generally have quiet, inboard motors.

Those users surveyed in fishing boats were the most tolerant of other users. Anglers do require a degree of quiet around them while engaged in fishing, usually in areas right below the dams and in the back sloughs, areas not often visited by other crafts. When fishing boats are in other parts of the river they are in transit and tolerant of encounters.

Canoeists are the least tolerant of other users, perhaps because they tend to seek out the least traveled parts of the river. In addition, while canoes have great flexibility, they are at the same time least able of the craft types to handle the main currents or wakes created by power traffic.

In general, users of the Upper Mississippi have probably always had to accommodate a variety of users so that they expect to encounter commercial traffic as part of their visit. Canoeists surveyed who were using the dredge spoil islands were the most tolerant of barge tows. Of course, they don't compete for the same water. It may be that the barges are seen, if seen at all from the backwaters, as "historic". They may be appreciated as a part of the Mississippi scene as steamers were appreciated.

Given their size, the tows <u>are</u> an awesome experience on the Mississippi, the one "craft" in proportion to the river itself. Cabin cruisers and runabouts are the least tolerant of barge tows, reflecting a competition for the same water space. Barge tows churn up the water, making it very hard to handle runabouts and tossing houseboats around.

On the Lower St. Croix, where there is only one barge a day, users surveyed in 1977 were very antagonistic to barges. They were the one item disliked by those using all craft types. Perhaps those who encounter barges more often as a part of the river are not antagonistic to them. Perhaps on a scenic and recreation river like the St. Croix a barge is not expected, does not seem to fit. Established uses may simply be accepted where a new use or one that a visitor is not prepared to see may not be.

The complexity of human satisfaction makes it difficult to determine what affects it. However, a statement of satisfaction does give an assessment of the user population at a fixed point in time. Theoretically, when user satisfaction levels decrease, the recreation carrying capacity has been reached and use limits should be imposed. While previous river research has indicated no relationship between satisfaction levels and density perception (Shelby and Nielsen 1975; Heberlein and Vaske 1977), this study has found a direct relationship between level of satisfaction and perceived crowding for certain users on the Upper Mississippi.

Satisfaction of users surveyed in this study was high; 66% rated their visit as excellent or better. A definite factor in a user's satisfaction was encountering other people when he was on shore. Encountering others during travel on the river was not as bothersome, probably because one expects to meet others when traveling. In addition, a number of studies with hikers indicates that an individual's territorial prerogative doesn't occur until he has stopped to camp. While hikers are on the trail their tolerance of meeting others is high compared to when they are stopped. A similar shift in tolerance seems to be operating with the river users surveyed.

The density measures in this study (e.g. extremely crowded, etc.) were related to relative density as determined from aerial photographs of Labor Day weekend 1976 at particular locations. However, perception of crowding among these users goes up on weekends and thus seems to be directly associated with density levels.

The majority do not feel crowded, but in terms of days of the week more people indicated crowding on weekends than expected. On the other hand, there were more "not crowded" responses on weekdays than expected. Also, 40% of the users surveyed in Pool 8, the pool with the highest use, said they were crowded. Crowding was indicated by no more than 15% in any of the other pools. (Only 9% overall felt extremely crowded.)

The most evident direct crowding factor was the number of powerboats a visitor observed. Powerboats are a more overt craft, both seen and heard. And although the term could include anything that generates power, even houseboats, it is most likely that the general perception of powerboats focuses on runabouts, cabin cruisers, and large fishing type boats (and not houseboats).

Management Considerations

Most people surveyed felt that recreational use of the Upper Mississippi was as important as commercial traffic, but that commercial traffic did not reduce their enjoyment of the river. As previously discussed, most of these users are locals. There are a number of local activities having to do with local economies that are based on trafficking on the Mississippi. Perhaps because of their proximity to the river, these users understand such commercial dynamics. The largely urban population from St. Paul which was surveyed on the Lower St. Croix felt that barges were inappropriate to that river.

The remaining management questions in the Upper Mississippi survey posed concern for the development of facilities. These facilities, which involve potential economic spinoffs to adjacent river communities, would probably affect not only the level and type of use, but the satisfaction of some current users. The questions elicited attitudes towards additional launch ramps, island facilities for houseboats and large cabin cruisers, and sanitation facilities on islands. All of these responses drew no clear direction from respondents, indicating that while more artificial amenities on the river would be desired by some, their construction could potentially disrupt the experiences of other user groups.

Negative responses to the island facilities question could be in part a reaction against enhancing use for large cabin cruisers, which seem to be the most incompatible group, and not necessarily to the facilities themselves. Since the majority of users also wanted no development in any other form (sanitation facilities, etc.) their rejection of island facilities is probably a rejection of development.

As previously mentioned, a sizable portion of the users of dredge spoil islands probably do not know they are on a dredge spoil island. This lack of information about a positive effect of a procedure which has had much negative press may be affecting how they feel about dredging. When users were definitely informed (the first wave) it seems they will still respond favorably to the creation of such islands.

Evaluation of the mixed responses to proposed facility development should consider the factor that users tend to access potential options in view of how they may affect their individual chance of having the kind of experience they prefer. This type of reasoning is necessarily part of many controversies in recreation management. Certainly the type of experience currently preferred by these users is now prevalent on the Mississippi. But what actually constitutes an experience in "a natural area with no controls"? What are the structural amenities or lack of structural amenities that define the specific experience for a user?

While the goal of recreation resource managers should be to provide a diversity of experiences, in order to more equitably allocate resources decision-makers should be aware of the probable effects and possible behavior pattern changes that can result from an array of management alternatives. In addition, the types of information gleaned from attitude surveys are likely to reflect the kinds of users who are presently on the resource, and the types who are present in the largest numbers.

Pool Variations

Variations in responses by pool are detailed in the pool-by-pool analysis section contained elsewhere in this report. Only a few areas will be discussed further in this section. The overall implication of pool specific use will be covered in the Management Implications section.

Lower costs for a trip seemed to be associated with the day-use areas such as Pool 8 or a transitional area such as Pool 3. Even though users indicated that they incurred most of their costs on the river, higher total costs were associated with pools such as 5, 6, and 9 to which users traveled a little further, and with Pool 4, which draws people from greater distance to visit Lake Pepin.

The relationship found between being "near a favorite island" and put-in choice for pools 4, 7, 8, 9, and 10 suggests the value of these islands to the recreational experience of these users. The multitude of back-water sloughs and islands in Pool 10 may absorb users so that the level of use is not as readily perceived as on open expanses of water. This condition may explain why "less crowded" was so characteristic of a put-in choice in Pool 10.

The disproportionately high level of lockage use reported in pools 7, 8, and 10 seems to coincide with qualitative observations by study team members. For example, users of Driesback Island in Pool 7 were largely waiting passage through lock and dam 7. The transitional use of Pool 2 can probably be ascribed to the degree of intrusions, industrial and otherwise, which lessen this pool's beauty and curtail uses of its waters. Five A is a short pool. Users in Pool 5 often go up to Lake Pepin , which is in Pool 4.

Regional Survey

The Concept of Displacement (and Substitutability)

The regional questionnaire sent to Upper Mississippi and Lower St. Croix users was designed not only to examine the use interface between the two rivers, but to explore the concepts of displacement and substitut-ability.

Displacement and substitutability are related concepts in that the amount and rate of displacement may be modified by the availability of substitutable experiences and resources. As the prefix implies, displacement implies a move away from an unacceptable situation, rather than a move toward an acceptable one. Adjustments of use both in time and space are involved.

A number of river studies (on the Wolf, Colorado, Brule, Namegogan, etc.) have shown that at any given point in time, on any river, the majority of the users will say they are satisfied with their experience. That is, in a one-time, site-specific experience study the dominant response will be yes, we are satisfied. Simply by being at that river, the majority are accepting the situation at that site at that time.

It is to be expected that most of the minority who express dissatisfaction with their experience will eventually do something about it. Identified from other studies, possible responses to dissatisfaction progress from changing the day or time of day of a visit, on to changing the location on the river of the visit, changing rivers, and ultimately, to changing activities entirely (i.e. no longer boating). So the question is no

longer "who is satisfied now with their experience on a river", but "are those who are satisfied now the same group that was satisfied five years ago on this site--and, if not, where have these people come from and where have the others gone?" To answer such questions one-river studies must be tied into the context of other similar rivers in the same region and thus into the concept of movement behavior, or displacement knowledge for managers (which will be discussed in the Management Section also) one-year studies must defer to regular, periodic studies of the same river to identify where that river is in the displacement process.

So the basic observation behind displacement is that people leave. There is a transition, a succession of users. New users come in, change a site by the nature of their own behavioral norm(s) (they may be louder or quieter), and affect the experience of those other uses who don't share that norm(s). One of the driving forces which sets in motion this succession of users appears to be perceived density. On a site which is receiving increasing use levels those new users who stay tend to be relatively tolerant of encountering other people, perhaps even considering that such social interchange is a desirable part of the experience. At the same time the people who are sensitive to increased density, who are not seeking social interaction with others, are changing their visits to the river in time or location, or changing rivers, or dropping out of boating altogether. As will be subsequently discussed, the combination of the Lower St. Croix/Upper Mississippi studies was able to pick up just such movement.

This displacement process may be described as a spiral, the rate and duration of which is influenced by the interaction of 1) availability of alternate or substitutable sites (rivers); 2) limitation of user time and money--how far a new site (river) is; and 3) user commitment to the activity. Initially, users dissatisfied with the experience on a river may choose to use the river during a weekday rather than on a weekend, a time displacement which seems to be one of the most common moves occurring. In combination with this move users may go less often to the river, going only when they know they can get the experience they want. Or, users may instead move from a formerly optimal spot to a new location on the river, a space displacement which is the easiest change to make.

If, as in the case of the St. Croix, there is another substitutable river (the Upper Mississippi) within a reasonable distance relative to travel time and cost, users may change rivers altogether. In fact, in the presence of a relatively nearby substitute river, users may often make this change first. In the absence of a substitutable river users may more slowly make the other changes in time and space noted. The most sensitive may simply opt to quit the activity entirely. This move is called total displacement. There is no data to date on the level of occurrence of total displacement but it is the final step in the displacement theory. Following through with the displacement theory

also implies that with increasing use eventually even a river substituted for the original river used would become a dissatisfying experience for many users. With nowhere else to go, increasingly dissatisfied users may tend to continue to use a river under density levels which they would not otherwise tolerate (assuming a high commitment to the activity).

Is a displacement movement operating already on the Upper Mississippi? If so, how far along is it? Is the Mississippi already a substitute river for some users? How long do managers have before user dissatisfaction becomes a real management factor? Will there be a substitute for the Mississippi for some users in the future? The following discussion on results from the Lower St. Croix, Upper Mississippi, and regional surveys will touch on these and other considerations.

MANAGEMENT IMPLICATIONS

The usefulness of the dredge spoil island user population information already gained from just this initial survey is best illustrated by the number of management options open to agencies in response to this information. These options are all, more or less, anticipating the major condition of the displacement process, that on any given site (river) user populations change over time. The management possibilities outlined revolve around dredge spoil islands and aim at shaping, controlling, and even slowing displacement which involves the use of these islands and the surrounding river environment. These management suggestions are far from exhaustive, but they propose some of the avenues possible for an agency working with a thorough data knowledge of its user population(s).

User Preferences For Island Types, Encounters, And Services

As a first consideration, user preferences for the type and degree of vegetation on dredge spoil islands have a major implication for management: 89% liked a combination of sand and trees (implying mature vegetation, not shrubs). Such a strong preference indicates that neither creating an entirely new island with dredge material, which is often done, nor burying an entire natural island with dredge material is, in the short run, going to satisfy very many of these users. (Only 3% prefer islands which are all sand.)

A procedure much more immediately responsive to user preferences would be placing spoil only on part of an existing island which has complete vegetative cover, including trees. Spoil material added to certain depths would allow only part of the shrubs and undergrowth to come through, creating a more open area. This dredge spoil portion also would be more usable as a stopping place because, being sandy, it would be better drained than the natural, more sedgy part of an island.

As the island type preferences showed no real variation from pool to pool, management measures responding to these references would be appropriate for the entire section of the Upper Mississippi in question.

The design of dredge spoil islands offers a number of management possibilities in the manner in which the dredge material is deposited. While the findings of this study indicate a general vegetation type preference which holds for all boat-type users, users of runabouts and cabin cruisers, for example, do have different physical requirements for an island. Thus, spoil could be placed on an island to create a steep pitch for cabin cruisers. Conversely, the spoil could be placed to create a long, shallow approach which runabout users like for swimming and waterskiing.

Regulating the size of an island can also influence users. For example, creation of a much larger island, or one with several pockets in its shoreline, would encourage houseboat users to pull up. However, most users, regardless of boat type, are least tolerant of encountering groups when on shore. Even those participating in a fairly active use of the river such as waterskiing expressed a desire to avoid crowds at islands. In response to this sensitivity islands could be kept small, limiting use to fewer groups. Or, dredge material could be placed on several locations at larger islands, leaving the spoil sites slightly separated by sections (buffers) of natural vegetation.

In such ways each dredge spoil island could be designed to enhance use by one group over another, to somewhat segregate boat types, and to reduce the numbers incompatibility in a very unobtrusive fashion.

A manager interested in manipulating the levels, distribution, and/or segregation of users among islands within a single pool, or connecting pools, can also consider whether or not to place spoil on existing islands at all. By choosing not to add sand in one pool or one part of a pool while adding sites to another part of that pool or another pool a manager can eventually cause some shift in use. For example, creation of new dredge spoil islands can provide potential sites in an area or section of a pool that is by-passed at the moment, or that can sustain higher use. Such new sites could also be specifically designed to attract a new boat-type user compatible to those user types already in an area.

Nearness to favorite islands is definitely a factor for many users in choosing their put-in sites on the river. In those pools where simple observation or user responses indicate a lack of islands, placement of dredge spoil material could create potential sites whose eventual use can increase the numbers utilizing an existing town launch. Use of such additional sites at another location might subsequently encourage the building of a new launch at another small town.

Vegetation growth on these new islands could be speeded up by a limited seeding program, but given the general preferences of users, new sites probably would not affect use for some years until their vegetative cover included some small trees.

In short, placement and design of dredge spoil material can be versatile management tools. At any one area on the river they can encourage or discourage use in general or use by specific boat-types, encourage or discourage social interaction, encourage or discourage the use of an existing launch or the building of a new one. An overall scheme to shift use or segregate user types from one pool to another could also be eventually implemented through planned spoil placement.

Of course, dredge materials, however carefully placed, remain susceptible to the flow of the river itself. Material located in the middle of an island may be moved by build-up to one end of the island. After five years without dredging visitors are beginning to notice that some islands are changing in this way. So, the dynamics of the river also will remain a factor in any management effectiveness of planned spoil placement.

The dredge spoil island users surveyed in this study had definite ideas of what services (restaurant, boat pumpout, bait shop) they want to find near a launch site, a site they have chosen on the basis of another set of criteria concerning ease of access and proximity. This list of preferred services should be useful to the Corps in its considerations over where to put in (grant a permit for) a new launch site. Such a list is also helpful when a community wants to know what kind of services are likely to make a go of it near a launch. Placement of a new launch site can be most effective as a management tool for shifting some use from one pool to another when combined with the management of dredge spoil islands for dispersal of use and/or user types in those same pools.

As indicated in the discussion section, those dredge spoil island users who stay overnight may find tie-up space along the shore more important than camping space on shore. The practice of cordoning off a section of beach as their own with their tie-up ropes correlates with the importance given sandy beaches in choosing a place to stop.

Dredge spoil islands in general are accorded a favorable response by those users surveyed. However, it appears that while users like these islands and would like to see more of them created, many are not aware of what a dredge spoil island actually is.

Interpretation Of Dredge Spoil Islands And Their Economic Contributions

The creation of dredge spoil islands was originally, of course, just a way to get the spoil out of the channel without actually taking it out of the river--recreation use of the spoil sites evolved quite spontaneously. Having thus created a supply, so to speak, how agencies not only cope with but manage the demand that supply has stimulated is a demand which will not go away, which must be considered in planning, which is generated by a user group that is now a viable, political entity. But there can be benefits from this new planning input.

Specifically, if a manager can place the dredge material in such a way that it enhances the recreational value of the area, then a manager can put an economic value on that placement. The economic spinoffs to the small riverside communities from the users of dredge spoil islands are real. Although there is not the data now to say that the use of dredge spoil sites in Pool 5 contributes X dollars to community Z, users did report that 63% of their trip expenditures do occur on the river, for launching fees, bait shop purchases, gasoline, etc. The number of the trips reported costing under $30 probably do not include the depreciation of the boat and other equipment bought for previous trips--there is a lifestyle built into river use that is not figured in their costs. This use itself, aside from the exchange of money on the river, has a value in that it is a stimulus to the economy as a whole. If there is boating, there are service units, boating construction businesses, etc.

Although the recreational use of dredge spoil islands is a demand which has come about quite accidental to the activity of dredging the river, it is a real use which makes a real contribution to the communities distributed all down the river. It is a use that is here to stay and management of the islands should include a message which links dredging, the islands it creates, the people's enjoyment of them, and the economic contribution of their use. While dredging to keep the river open for navigation has significant environmental effects--in an unexpected quarter there are some benefits coming from it. Agencies should be interested in developing this link and giving it some coverage.

Wording changes were made during the survey (from dredge spoil islands to sand area) because of any negative connotations or associations they may have as words or with a practice. However, the results of the first set of this survey with the original wording indicates that when users are informed of what a dredge spoil island is, this product of the practice of dredging does not create a negative impression. The agencies seem afraid of the words "dredge spoil". What they should really be afraid of is that people don't know that the island(s) they are enjoying is made, at least in part, from dredge spoil.

Agency management might consider a modest interpretive effort in the direction of that developed by the Forest Service, USDA, for the practice of clear-cutting as it is carried out today. Some national forests have laid out the whole practice at demonstration sites. Skids with log beds and chokers are displayed. The uniform stand, optimal growth conditions for a species such as red pine, are diagrammed, etc. One island every few pools could at least have a sign informing users that it is a dredge spoil island, discussing how it was built and why the combination of dredge spoil and natural island makes a comfortable stopping place for camping, picnicking, etc.

Basically, the agencies (mainly the Corps) has an identity, not a terminology, problem here, and it is one that can be exploited.

Management VS No Management Of Future Use

Some feel that recreation on the Upper Mississippi will develop pretty much the same with or without specific management of such use, perhaps because the size and scope of the river and its environs do give the impression that it will indefinitely absorb an infinite variety of recreational activities as individuals continue to find their own places on the river. However, even the Mississippi is not the unlimited resource it appears to be today, a future hinted at by results from Pool 8 which, in this study, had a higher than expected number of dredge spoil users saying they felt extremely crowded.

One generally-held view is that resource managers concerned with recreation should promote a diversity of experiences. Just as it is today the Upper Mississippi seems to be providing that diversity for the range of dredge spoil island users represented in this study. However, the true intent of the old multiple use act was that you cannot have diversity without some degree of separation of uses.

This kind of separation is a part of viewing recreation in terms of experience instead of one activity vs another, or one user vs another. One type of experience within which a number of activities can occur is that of relative isolation where the user can feel he is becoming a part of nature. It can be characterized by a family group camping type atmosphere where one is not going to be encountering many other people. A second type of experience would accommodate a spectrum of activities in a highly social, interactive, almost party type atmosphere. Although some of the activities may be occurring in both experiences--the atmosphere in which they occur greatly differs and thus makes the total experience (environment + atmosphere + activity) altogether different. (Note: both Upper Mississippi and Lower St. Croix users surveyed wanted an experience in a natural area with no controls and, as groups, were equally satisfied with their actual experiences on two rivers with very different user levels.)

Diversity of use, then, does not mean that every site can be everything to everybody. That was the fallacy in the usual interpretation of multiple use. If everybody uses a site in actuality you lose diversity; the only person who winds up using that site is the one who can tolerate a higher level of use (numbers, noise, etc.). The process of displacement is based on individual differences in such tolerance of atmosphere. And in the absence of any active management those least tolerant of (most sensitive to) atmospheric changes created by more uses and more users leave the site.

Left unmanaged, use on the Upper Mississippi can eventually go the way of the Lower St. Croix, a spiraling use which will gradually eliminate those who cannot reconcile the atmospheric changes with their desired experience. It is true that with or without recreation management there will likely be many more people using dredge spoil islands. But in the absence of management measures like those previously outlined in this section, that use will be much more homogenous. And the river will lose its capacity of being a place where someone can get away from others.

That recreation use of the Upper Mississippi needs to be managed is underscored by the fact that the homogenation of use which proceeds without management will have a significant effect not only on the desired experiences of some users who must eventually seek them elsewhere, but on the physical environment of the river itself, and on the latitude, costs, and success that area managers will have in dealing with the recreation uses and users remaining.

High Density Use And Related Problems

It has been demonstrated on the Lower St. Croix that a higher density user situation requires more intensive management, a level of intervention which would raise management costs on the Mississippi in quantum leaps. One price of increased use stems from the need to use management intervention to maintain the natural resources at that level of use--hardening the resource by building facilities, etc.

High numbers alone, for example, create problems of sanitation requiring facilities. Sanitation has now surfaced as a problem on the Lower St. Croix. The only management options for this river now are to reduce existing use levels or harden the area by providing sanitation facilities. On the Upper Mississippi there appear to be enough use locations with the use sufficiently spread out that sanitation does not seem to be a problem now. However, concentrations of use in the future may make it so. Sustaining current dispersal by the creation of new islands in strategic locations might help to prolong the period during which sanitation facilities would not be necessary.

As recreational use becomes more of a factor in management of the Upper Mississippi, a coordinated effort to manage that use should reduce the cost/benefit ratio of dredge spoiling and the long-range maintenance costs for the islands; if use, even increased use, is distributed such that concentrated areas are essentially discouraged, clean-up of litter, repair of launch deterioration, and repercussions from sanitation and litter problems should be minimized.

The implications of the displacement process are that, in the absence of any management response, the increasing population of users will change in type, gradually shifting to a proponderance of those who want more development. Users more tolerant of high numbers have as a part of their recreation experience an expectation of structural amenities in addition to sanitation.

Even the expectations of density sensitive users displacing from other rivers can influence the success of Corps management actions. For example, the current users surveyed on the Lower St. Croix are favorably disposed to controls which are aimed at specific groups (restricting types of use in different areas) but do not accept "across the board" controls (restricting use levels in a peak use area). As the most sensitive of those surveyed displace to the Upper Mississippi (among other places) they will probably bring these attitudes with them. Most of the dredge spoil island users surveyed in 1977 want to experience a natural area with no controls. (And the islands are perceived as a

part of that naturalness.) The Corps should not have to put in intensive developments such as sanitation facilities or tie-ups to maintain overall satisfaction in this population. What the response of these users would be to selective vs "across the board" controls is yet unknown.

So, anything that the Corps can do to maintain the diversity of river experiences and therefore the diversity of users could slow the demand for facilities and other hardening of the resources.

The Corps has long looked to lockage figures (one of the few really reliable figures obtainable on the river, even today) as being a good indicator of total river use. However, at any given time at least half of the dredge spoil island users are not using locks. For the majority, their use of the Upper Mississippi tends to be pool specific. If appropriate, then, management actions aimed at these users can be pool specific.

Thus, one management approach to maintaining diversity could be to establish base line objectives determined from the experience to be provided by a given reach of the river. It could be determined that one pool of the river is going to be designed to provide a dispersed, isolated experience with virtually no amenities. In other pools of the river management could determine to promote high intensive uses such as water-skiing and design dredge spoil islands that will accommodate large boating groups. The highly interactive sections would be hardened to the extent that water and sanitation facilities would be available. Such segregation of different experiences along the river means that any one pool may not provide every experience to everybody--but by going between adjoining pools or to different pools everyone could find the experience they wanted most.

Concentrations of users generate other long-range concerns for management. In those areas where concentrations are now occurring, some users are already expressing dissatisfaction with their experience. (As noted previously, perceptions of crowding and level of satisfaction have been shown to be directly related for the Upper Mississippi users surveyed.) As density levels increase, so do perceptions of crowding. As people start feeling crowded on the Upper Mississippi they are going to express it through increased dissatisfaction. Because there are not many other places to displace to from the Upper Mississippi, at least not for those using large boats, displacement will likely be in the form of time and actual space adjustments on the Upper Mississippi itself.

It has been apparent in other agency/user situations that people who are more satisfied with how they believe they have been personally affected by an agency tend to have a more positive attitude toward that agency in general. If an issue or a problem not really close to them comes up involving that agency, they are more likely to, if not support the agency, at least not go after it actively. Thus, there may be a certain amount of residual flack for the Corps if the dissatisfaction of users who have nowhere else to go begins to build because of crowding on the Upper Mississippi.

Monitoring A User Population

If displacement is operating on the Upper Mississippi, do we have any indications how far along it is? As pointed out in the discussion section, evidence from this study indicates that most users can still go out on the river on weekends (the highest use days) and get the experience they want. However, 4.5% of those surveyed stated they visit the river only on weekdays and may represent some who are already making a displacement in time. With the exception of Pool 8, only 15% or so of the users in any one pool felt they were crowded. This figure may reflect both actual density and the expectation users have that the Upper Mississippi is "not crowded". Most current users surveyed do not display the desire for structural amenities found in the density tolerant users characteristic of later stages of displacement. But some do. Most of the current users prefer to be with their own group or alone and are very satisfied with their experience on this river. But some enjoy meeting others and some are dissatisfied.

In short, thanks largely to its sheer size, the Upper Mississippi would appear to be in the early stage of the displacement process. Thus, it would seem that ample time remains to set up some sort of system to monitor the user population, a system which would identify changes in that population as they occurred (such as an increase in dissatisfaction) before real difficulties developed. Such an advanced warning system would allow a manager to anticipate a potential problem. Without it, a manager can only react to existing problems which have become large enough to be noticed informally.

However, any management moves made in anticipation of a potential problem or change in the user population must be based on certain and detailed knowledge of that population. As described in the following research section, such knowledge can be based on both intensive and general surveys which are, in turn, based on a regular monitoring system that depends on periodic aerial flights assessing actual density levels.

SUMMARY ANALYSIS OF PUBLIC USE PROJECTIONS

The following tables and figures provide a summarized picture of study findings as are presented by pool in other sections of this report. For a complete explanation of the methodology, criteria, and terminology, please refer to "GREAT Public Use Projections, February, 1978".

Little interpolation of these results is deemed necessary. A careful review of the methodology (GREAT Public Use Projections, February, 1978) used to develop these estimates is required in order to insure a full understanding of their impact. It is not surprising that projected recreation demands for the Upper Mississippi River Navigation Pools are substantial. Visitor days are estimated to increase 49.8 percent over the 50-year planning of the demand (77.5 percent in year 2025). The largest incremental increase in demand is expected to occur between 1980 and 1990, with an average annual increase of 4 percent projected from 1990 through 2025. A partial explanation of these increases is explained in the methodology. SCORP-based projected increases for water-related recreation activities were generally limited to this decade with increases in market area populations being responsible for the remaining increases. Pools 6 and 4, respectively, are estimated to receive the greatest pressure for public use while pools 3, 8, and 9 support moderate demands.

"Demand" should not be confused with "need". Need is the difference between supply and demand expressed in quantitative terms. A need analysis may show a deficit or a surplus of a given commodity.

Much of the projected demand in GREAT I can be met with existing facilities and programs. A review of the Recreation Facility and Cultural Resources Inventory, 1978, gives information on the existing facilities within the GREAT I study area.

GREAT RIVER ENVIRONMENTAL ACTION TEAM
PROJECTED RECREATIONAL ACTIVITY DEMAND ESTIMATES

SUMMARY TABLE 13
(000's)

1975

Pool	Picnic	S.see	Camp.	W.Ski	Swim	Fish	Boat	Hike	Hunt	Snowmobile
U&L S.A.F.	2.0	27.7	--	--	--	12.7	63.5	76.9	4,561.7	9,951.4
1	5.2	38.4	--	--	--	29.1	50.4	76.9	4,561.7	9,951.4
2	6.0	137.9	--	--	--	14.6	46.4	70.6	3,925.3	8,674.4
3	93.9	85.4	32.9	155.3	17.5	165.9	363.9	85.6	4,207.0	8,854.5
4	52.0	90.5	44.1	294.1	77.3	190.4	592.6	60.0	1,401.2	1,584.6
5	18.4	49.8	16.6	35.1	9.2	75.0	178.4	65.8	1,401.0	1,533.7
5A	31.8	63.4	22.4	40.0	22.5	92.9	223.4	59.7	1,306.1	1,440.1
6	51.1	69.7	54.1	153.1	52.4	382.7	565.7	67.0	1,276.5	1,294.7
7	35.3	51.1	11.2	78.7	33.7	188.5	250.8	92.6	985.0	899.4
8	89.3	104.8	49.7	86.9	42.4	277.4	274.0	707.5	1,111.7	829.7
9	76.3	48.3	142.6	99.3	65.4	318.7	347.3	2089.0	1,389.2	749.8
10	37.1	72.1	84.7	95.8	32.5	236.9	249.9	5381.4	1,649.7	694.8

2000

*Note, Computer limited

Pool	Picnic	S.see	Camp.	W.Ski	Swim	Fish	Boat	Hike	Hunt	Snowmobile
U&L S.A.F.	3.6	45.9	--	--	--	16.4	77.2	94.7	5,506.9	*
1	8.2	61.1	--	--	--	37.9	62.8	94.7	5,506.9	*
2	8.2	220.3	--	--	--	19.5	55.6	88.9	4,789.3	*
3	172.7	147.2	69.9	278.2	30.1	240.4	467.9	105.0	4,917.7	*
4	66.2	127.3	63.7	429.6	104.4	221.9	712.7	75.1	1,758.3	2,022.9
5	24.1	74.0	35.0	54.0	12.9	92.1	210.9	79.0	1,723.9	1,932.2
5A	41.3	93.6	35.8	61.2	31.1	112.5	259.3	69.5	1,555.1	1,733.1
6	66.4	97.7	79.7	217.7	70.4	478.7	690.7	77.0	1,505.4	1,556.0
7	45.2	70.1	16.1	107.8	44.5	233.6	303.3	95.8	1,091.6	1,008.3
8	109.7	135.3	65.7	112.5	53.2	331.8	322.1	666.1	1,204.1	892.8
9	86.1	55.3	171.6	113.2	76.1	356.5	386.0	2219.7	1,525.9	819.7
10	40.2	78.8	98.1	105.4	35.4	256.6	272.6	5611.4	1,728.0	730.6

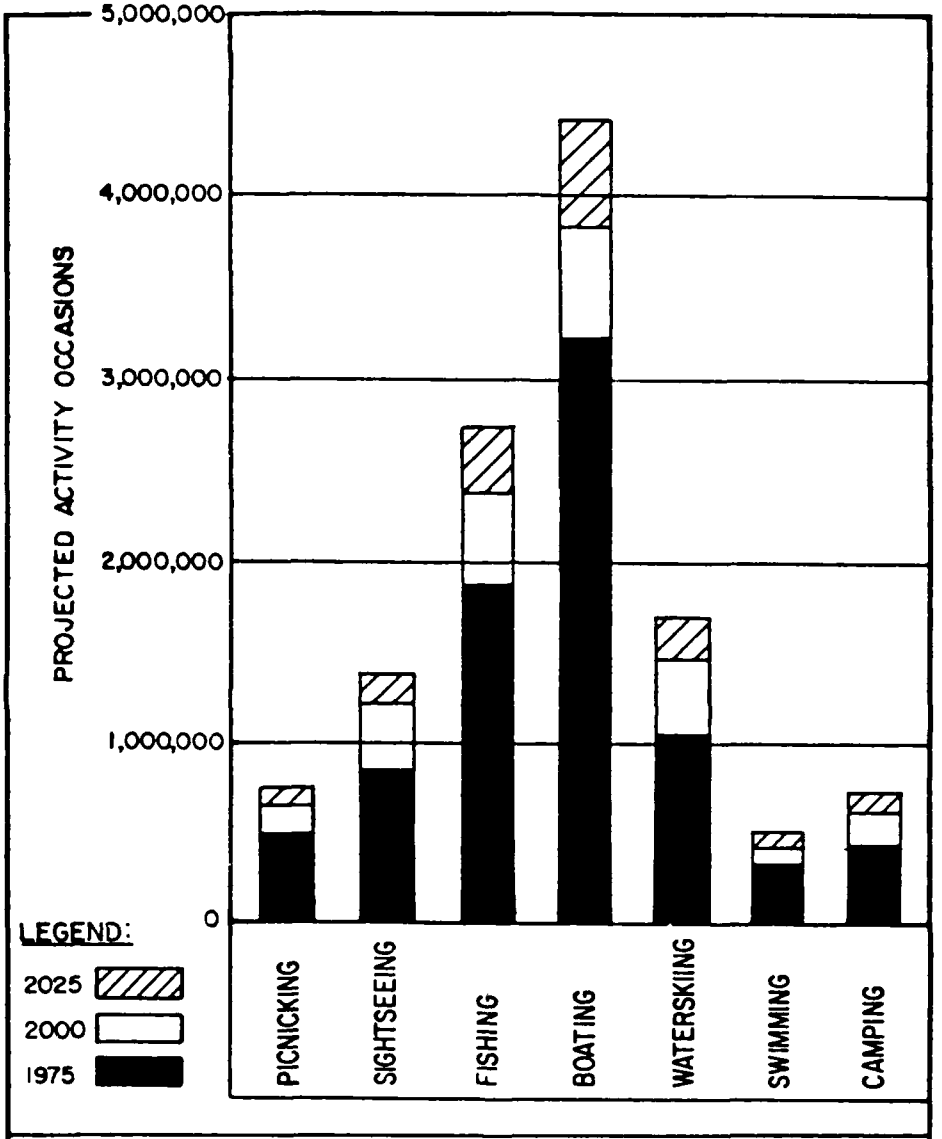
2025

*Note, Computer limited

Pool	Picnic	S.see	Camp.	W.Ski	Swim	Fish	Boat	Hike	Hunt	Snowmobile
U&L S.A.F.	4.4	52.3	--	--	--	18.8	88.1	110.5	6,329.4	*
1	9.5	70.5	--	--	--	43.7	73.1	110.5	6,329.4	*
2	9.1	242.2	--	--	--	22.2	62.4	105.0	5,451.5	*
3	200.9	172.3	81.8	326.1	33.8	283.4	553.0	125.3	5,626.6	*
4	75.0	144.4	71.7	491.2	119.3	253.3	811.9	92.2	2,224.9	2,598.1
5	28.6	87.9	41.2	64.1	15.3	109.7	251.1	94.6	2,152.4	2,440.0
5A	48.7	110.4	42.3	72.1	36.7	132.8	306.0	80.9	1,918.8	2,159.7
6	79.2	116.6	95.1	259.8	84.0	570.8	823.5	88.6	1,859.2	1,953.0
7	53.4	83.2	19.1	126.3	52.7	277.5	360.6	104.7	1,271.7	1,182.4
8	126.2	155.6	75.7	129.4	61.2	381.6	370.4	687.1	1,358.7	1,008.1
9	93.6	60.1	193.8	123.2	84.8	387.6	418.8	2519.3	1,732.9	992.7
10	43.7	85.7	107.7	114.6	38.5	278.9	296.3	6102.2	1,380.3	789.5

GREAT RIVER ENVIRONMENTAL ACTION TEAM
PROJECTED RECREATIONAL ACTIVITY DEMAND ESTIMATES
SUMMARY TABLE 14
(ooo's)
SYSTEM ACTIVITY DEMAND TOTALS

YEAR	PICNICKING	SIGHTSEEING	FISHING	BOATING	WATERSKI	SWIM	CAMP	TOTAL VISITOR DAYS
1975	498.4	839.1	1984.9	3206.3	1038.3	352.9	458.3	4842.5
1980	524.5	888.4	2057.0	3327.0	1096.9	367.6	480.4	5070.7
1990	646.0	1158.8	2319.8	3682.6	1422.3	445.7	605.7	6025.9
2000	671.9	1206.8	2399.0	3821.1	1479.6	458.1	635.6	6267.9
2010	714.8	1282.6	2550.8	4183.1	1577.5	486.0	675.2	6674.2
2020	752.3	1346.9	2685.9	4293.7	1660.4	512.8	709.4	7027.6
2025	772.3	1381.3	2760.4	4415.2	1706.8	526.3	728.4	7193.7



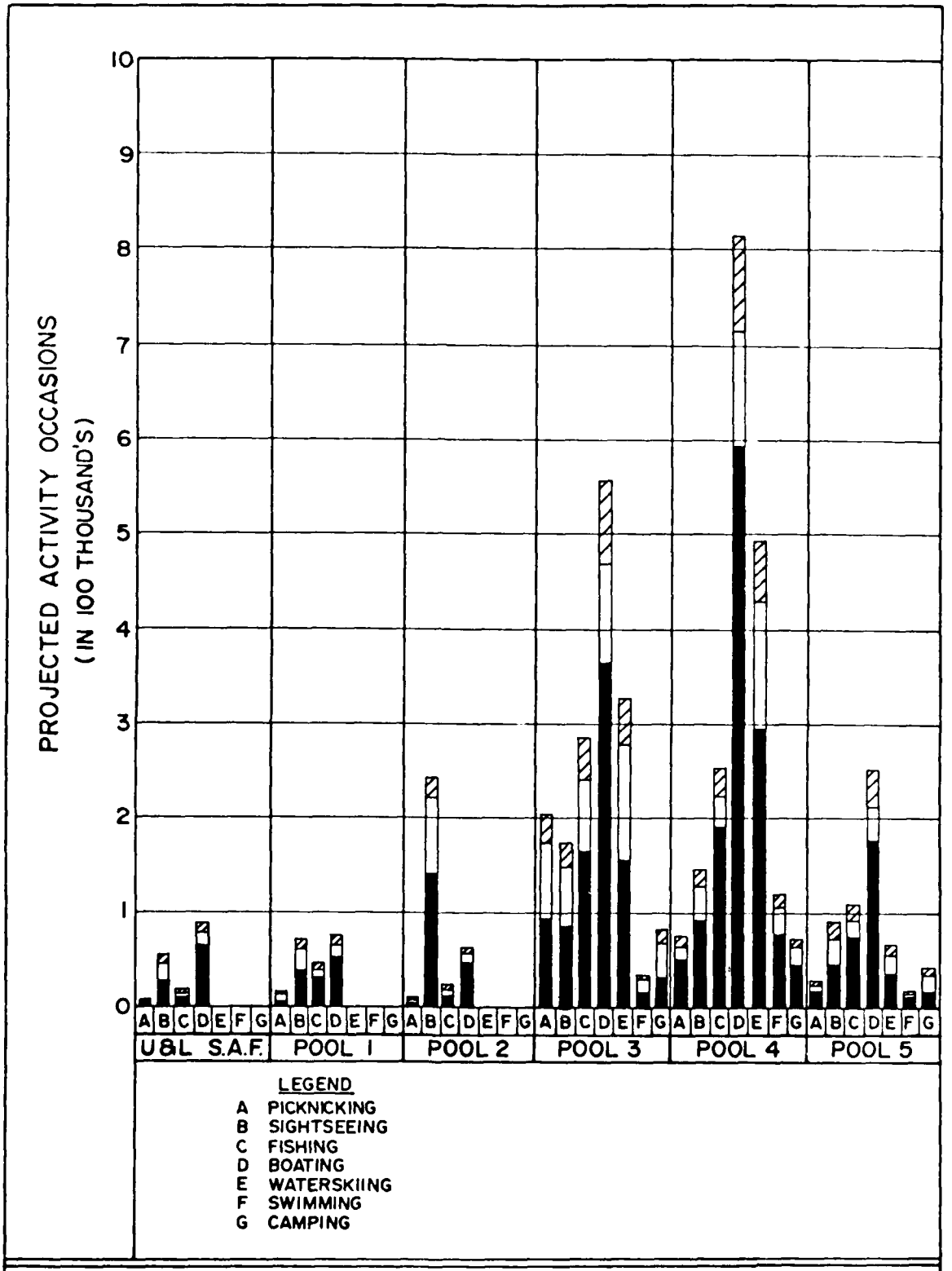
RECREATION

DEMAND ANALYSIS SUMMARY

TOTAL FOR ALL POOLS

1975-2000-2025 FIGURE 25

The GREAT River

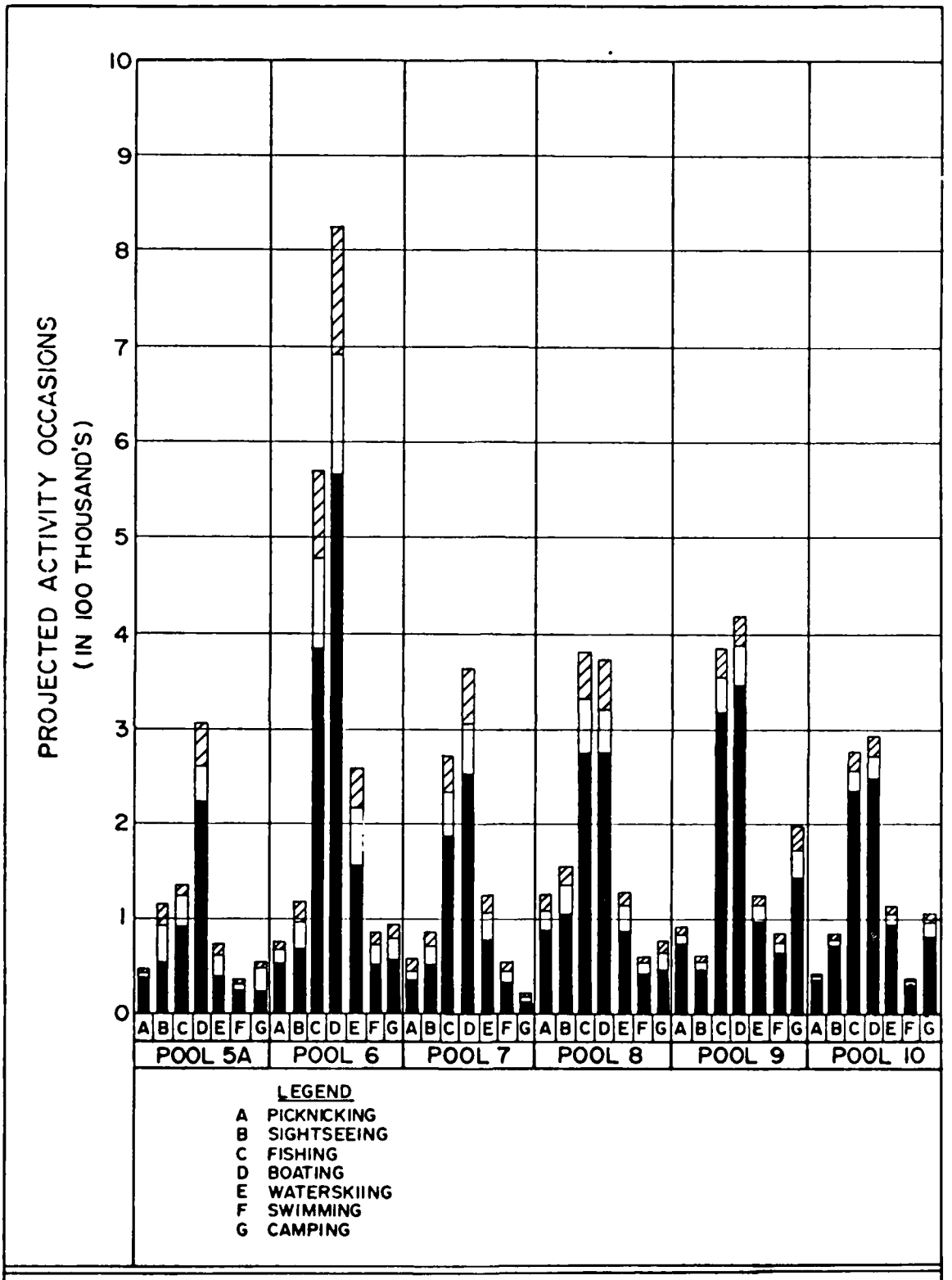


RECREATION

DEMAND ANALYSIS SUMMARY
POOLS U&L S.A.F. TO POOL 5

1975-2000-2025 FIGURE 26

The GREAT River



RECREATION

DEMAND ANALYSIS SUMMARY
POOLS 5A TO 10

1975-2000-2025 FIGURE 27

The GREAT River

SUMMARY ANALYSIS OF EXISTING FACILITIES

The following tables provide a summary of the "supply" of existing recreation facilities within the GREAT I study area (refer to Recreation Facility and Cultural Resources Inventory, July, 1978). As can be seen, there is a good supply of existing recreational opportunities/facilities. Many of these facilities are, however, unevenly distributed throughout the study area and some may be of less than acceptable quality. Many of these facilities require major renovations or changes in management to make them suitable for increasing recreational use.

Table 15

GREAT I SUMMARY

UPPER MISSISSIPPI RIVER

RECREATION FACILITY

INVENTORY

		LAND ACRES		BOATING ACCESS					
		UNDEVELOPED	DEVELOPED	PARKING SPACES	RAMPS: NUMBERS & SURFACES	FEE'S CHARGED	MARINA SLIPS	RENTAL BOATS	SERVICES PROVIDED
Pool 1	Minn.	272	38	50	1H				
Pool 2	Minn.	1041	94	705	8H 2N 1C	7X	497	12	7X
Pool 3	Minn.	1314	29	205	4H 2G 1N	3X	525	8	3X
	Wisc.	1	24	11	2H	1X	144	4	3X
Pool 4 (Above Chippewa R.)	Minn.		35	647	7H 1G 1N	5X	1022	30	4X
	Wisc.	4	151	181	3N, 2C, 5H	2X	82	109	8X
Pool 4 (Below Chippewa R.)	Minn.	105	367	173	3G 12H	6X	188	54	5X
	Wisc.	5	39	215	5G, 1H		40	17	2X

GREAT I SUMMARY

UPPER MISSISSIPPI RIVER

RECREATION FACILITY

INVENTORY

		FISHING PIER OR BARGES	PICNIC TABLES	INTERPRETIVE AREA	SWIM AREA		CAMPING UNITS		MILES OF TRAILS				
					BEACH SIZE	AREA LENGTH	GROUP	INDIVIDUAL	HIKING	HORSEBACK	BICYCLE	SNOWMOBILE	CROSS-COUNTRY SKIING
Pool 1	Minnesota		15						5		5		
Pool 2	Minnesota		89					24	6				
Pool 3	Minnesota		15	X									
	Wisconsin		6	X									
Pool 4 (Above Chippewa R.)	Minnesota		226		3690	390'		160					
	Wisconsin	2X	42			300'		81					
Pool 4 (Below Chippewa R.)	Minnesota		85		3700	390'	12	436					
	Wisconsin	1X	28		300			15					

GREAT I SUMMARY UPPER MISSISSIPPI RIVER RECREATION FACILITY INVENTORY		LAND ACRES		BOATING ACCESS					
		UNDEVELOPED	DEVELOPED	PARKING SPACES	RAMPS: NUMBERS & SURFACES	FEE'S CHARGED	MARINA SLIPS	RENTAL BOATS	SERVICES PROVIDED
ool 5	Minnesota	2	4	110	3G, 2H	1X	0	0	0
	Wisconsin	13	30	117	3C,3G,1H	0	12	16	3X
ool 5A	Minnesota	136	73	228	6H 0N	2X	70	25	2X
	Wisconsin	1494	180	74	2H, 1C	0	10	13	4X
ool 6	Minnesota	1970	92	965	5H, 4N	1X	382	0	2X
	Wisconsin	1319	108	30	2H, 1C	0	0	2	2X
ool 7	Minnesota		3	34	1H	0	20	2	1X
	Wisconsin	127	57	352	3C, 4G 1H, 3N	0	26	64	6X
ool 8	Minnesota	24	66	445	4H, 3G	0	105	59	3X
	Wisconsin	1	1506	635	4C 4N,4G,7H	2X	804	102	11X
ool 9	Minnesota	0	1	75	2G	0	0	0	0
	Wisconsin	0	309	352	8N,3H,2C	1X	70	30	8X
	Iowa	0	822	393	3H, 3G	1X	146	25	4X

GREAT I SUMMARY

UPPER MISSISSIPPI RIVER

RECREATION FACILITY

INVENTORY

		FISHING PIER OR BARGES	PICNIC TABLES	INTERPRETIVE AREA	SWIM AREA		CAMPING UNITS		MILES OF TRAILS				
					BEACH SIZE	AREA LENGTH	GROUP	INDIVIDUAL	HIKING	HORSEBACK	BICYCLE	SNOWMOBILE	CROSS-COUNTRY SKIING
Pool 5	Minnesota							126					
	Wisconsin	1X	15					15					
Pool 5A	Minnesota							50					
	Wisconsin		189		200'			76					
Pool 6	Minnesota		275					170					
	Wisconsin	1X	145		500'			105	3.5				
Pool 7	Minnesota		28		1100'								
	Wisconsin	1X	185			300'		112	4				
Pool 8	Minnesota		57		2600'	300'		48	1				
	Wisconsin	1X	784		0	750'		414	16				
Pool 9	Minnesota												
	Wisconsin	2X	35				30	10					
	Iowa		34	2X					2				

GREAT I SUMMARY UPPER MISSISSIPPI RIVER RECREATION FACILITY INVENTORY		LAND ACRES		BOATING ACCESS					
		UNDEVELOPED	DEVELOPED	PARKING SPACES	RAMPS: NUMBERS & SURFACES	FEE'S CHARGED	MARINA SLIPS	RENTAL BOATS	SERVICES PROVIDED
Pool 10	Wisconsin	2814	286	556	7N,4C,7H	1X	218	60	9X
	Iowa	853	7540	847	10H,3G,2N	2X	567	70	11X
St. Croix River (To Stillwater, Minn. only)	Wisconsin	0	33	83	4H, 1C	3X	265	0	1X
	Minnesota	710	55	207	3H,1G,1N	3X	637	0	3X
Minnesota River (To Savage, Minn. only)	Minnesota	2976	508	125	2H				
XXXXXXXXXXXXXXXXXXXX									
Total for GREAT I		15,181	12,450	7,815	103H 36N 22C 37G	41	5,830	702	10[illegible]

GREAT I SUMMARY UPPER MISSISSIPPI RIVER RECREATION FACILITY INVENTORY		FISHING PIER OR BARGES	PICNIC TABLES	INTERPRETIVE AREA	SWIM AREA		CAMPING UNITS		MILES OF TRAILS				
					BEACH SIZE	AREA LENGTH	GROUP	INDIVIDUAL	HIKING	HORSEBACK	BICYCLE	SNOWMOBILE	CROSS-COUNTRY SKIING
Pool 10	Wisconsin		669					510	18			8	
	Iowa		343	1X			320	131	55	17	1	20	20
St. Croix River	Wisconsin		25		1100'	200'							
	Minnesota		100		135'	670'			6	6		2	6
Minnesota River	Minnesota		300	1X		300'			23	5		10	4
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXX	XXXXX	XXXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
Total for GREAT I		9X	3690	6X	13,325	3,600	362	2483	139.5	28	6	40	30

SUMMARY ANALYSIS OF "NEEDS" PROJECTIONS

Recreation "needs", as identified in this report, are the type and amount of facilities that are required to meet the anticipated "demand" as projected in the GREAT I Public Use Projections, February, 1978.

The task of developing recreation need projections is very difficult. The only concrete portion of the analysis is the recreation facility inventory which helps identify how much of what type of recreational opportunity is available.

The demand analysis and subsequent projections are based on a number of assumptions such as projected population trends, recreational activity participation rates and trends, user preferences, etc. This type of analysis has resulted from the lack of recreational use data in the GREAT I study area. Projections of actual recreational use on the Mississippi have been at best "guesstimates" or more commonly projected by adding 5-10 percent to the previous years estimates. Almost all agencies involved in some sort of recreation management on the Mississippi River are using data obtained from estimates. This data is, however, the "best available".

The Upper Mississippi River Conservation Committee (UMRCC) has undertaken a ten-year program to study recreation use for each pool on the Mississippi River. This information is needed to serve as a "base" for future use projections.

In addition to these surveys, an economical method of periodically updating user data must be developed to assure that all managing agencies are supplied the most current and reliable data. The collection of this data might be the responsibility of one of the managing agencies or might continue to be "coordinated" by the UMRCC.

Caution must be taken when reviewing each individual number identified as a recreation "need". The actual numbers are not as important (or valid) as the relative ranking of these needs. The individual numbers can vary depending upon what "standards" are used as a basis for the demand analysis. The relative weight or ranking of the recreation needs remains consistent regardless of the "standard" used, however. It should be noted that the standards used in this report are not expected to adversely affect basic land and water resources. See Table 16 for GREAT Outdoor Recreation Space Standards.

The Midwest (like elsewhere) is generally experiencing increasing demand for recreational resources. There are some areas that may have adequate facilities and have been identified within the study area. However, most areas, according to this analysis, have inadequate recreational facilities to meet anticipated demand. This assumes perpetual and encouraged growth of existing recreational use in these areas.

Great River Environmental Action Team

OUTDOOR RECREATION SPACE STANDARDS

REVISED MAY 1, 1976
JULY 1, 1976
DECEMBER 17, 1976

ACTIVITY	IOWA	MINNESOTA	WISCONSIN	OTHER	GREAT I	REMARKS
BEACH SWIMMING	35 sq. ft./user 3.3 days/capita	30-40 sq. ft./user 18.2 days/capita	100 sq. ft. of beach/user 185 users/acre of water Turnover 3.0	NRPA: 50-100 sq.ft./ user COE: 50 sq. ft./ user	50 sq. ft./person in water 100 sq. ft./person on beach 25% in water at one time Water sq. ft. = beach length x 100' (water width) Beach sq. ft. = beach length x beach width (sq. ft. determined from facility inventory) 3.6 days/capita Turnover - 2.0	To preserve the open rural experience, standards are established to reflect non-crowded conditions. More users could use these sites, at a decrease in the quality of the experience as a result of more crowding. Lower per capita use rates from N.E. Iowa better reflects Mississippi River use (for GREAT I) as opposed to other areas influenced by lakes and ponds. Lower turn-over rate of 2.0 reflects rural areas that require people driving to area for participation.
RIVER FISHING	1 boat/2 acres 4.2 days/capita	1 boat/8 acres 2.25 people/boat Turnover 1.6	Stream: 4 fishermen/mile of bank Turnover 1.6 Lake: 1 boat/3.6 acres 2.2 people/boat	SCS: 4-7 boats/acre UMRCC: 2.17 people/ boat 22% fish from bank 53% fish from boat 11% fish fm. barge 14% fish on ice 72-73 Sport Fishing Survey	River Bank: 4 fishermen/mile of bank Open Water: 1 boat/ 4 acres Note: 22% of fishing from bank, 53% fm. boat, 11% from barge, 14% on ice Turnover - 1.6 2.2 people/boat Launching: 60/ people/lane/day 4.2 days/capita	Boat fishing should be assumed to take place outside the main channel - the channel is crossed but not used extensively.
POWER BOATING	2.4 days/capita 1 boat/10 acres	No. of accesses/ lake	1 boat/15 acres	SCS: 1 boat/3 acres	2.4 days/capita 1 boat/20 acres 3.5 persons/boat Turnover - 2.0	See notes under waterskiing

Great River Environmental Action Team

OUTDOOR RECREATION SPACE STANDARDS

ACTIVITY	IOWA	MINNESOTA	WISCONSIN	OTHER	GREAT I	REMARKS
WATERSKIING	2.4 days/capita 1 boat/10 acres		1 person/5.7 acres 3.5 persons/boat 1 boat/20 acres 1 boat/40 acres is desirable Turnover - 1.3	SCS: 1 boat/5 acres Louisiana: 1 boat/40 acres	2.4 days/capita 1 boat/30 acres 3.5 persons/boat Turnover - 2.0	Larger acreage per boat because of lineal aspect of pools and to avoid congestion. Physical obstructions and debris in areas.
NON-POWERED BOATING	0.9 days/capita 1 boat/5 acres	No. of accesses/lake	1 boat/8 acres		1.1 days/capita 1 boat/8 acres 2.2 people/boat Turnover 2.0	N.E. Iowa participation rates lump boating other than power and water skiing together. Rates higher than N.E. Iowa (0.9 days/capita) reflect higher participation rates of Minnesota and Wisconsin. Boating should be assumed to take place for the most part outside the navigation channel - the channel is crossed but not used extensively.
PICNICKING	4.8 days/capita 16 units/acre + 20 acres of support	10 units/acre	8 units/acre + 19 acres of support Turnover - 1.6	ASPO: 8 units/acre NPS: 10-15 units/acre SCS: 8-10 units/acre NRPA: 10.5 units/acre BLM: 8-10 units/acre	5.6 days/capita 10 units/acre + 19 ac. of support Turnover - 2.0	Wayside areas would have higher capacity of 16 units/acre. Turnover - 2.0 Reflects higher participation rates of Minnesota and Wisconsin.
DEVELOPED CAMPING	6 units/acre + 20 acres of support 4 people/unit 2.2 days/capita	4 people/unit Turnover - 1.0	3.0 people/unit 5 units/acre + 19 acres of support	NPS: 4-7 units/acre SCS: 14 units/acre 4 people/unit	2.2 days/capita 4 people/unit 6 units/acre + 19 ac. of support Turnover - 1.0	This category includes facilities readily accessible by automobile, mainly travel trailers, motor homes, etc.
UNDEVELOPED CAMPING	1.0 days/capita	Same as above	Same as above	BLM: 5 units/acre Louisiana: 14 units/acre	1.0 days/capita 3.5 people/unit 5 units/acre Turnover - 1.0	Considered to be primitive - limited access (boat, foot, etc.), no facilities or limited facilities, primarily tent camping only.

Great River Environmental Action Team

OUTDOOR RECREATION SPACE STANDARDS

ACTIVITY	IOWA	MINNESOTA	WISCONSIN	OTHER	GREAT I	REMARKS
HIKING - DEVELOPED TRAIL	14.9 days/capita 25 people/mile	4 people/mile	40 people/mile	Wisc. Res. Devel.: 20 people/mile	14.9 days/capita 20 people/mile Turnover - 3.0	Increased impact may indicate need for more developed trails.
WATERFOWL HUNTING	1-5 man days/acre 0.2 days/capita	None	None	Rec. in Wisc.: 1 blind/9 acres F&WS-St. Paul - 1 blind/20 acres not over 4 people/ blind F&WS- Michigan - 5 hunting days/ year/acre	0.2 days/capita 5 man-days/year/ac	Remarks under Big Game Hunting and Small Game Hunting apply to all three hunting categories.
BIG GAME HUNTING	1 man-day/15-40 acres (varies by species and management intensity) 0.1 days/capita	None		F&WS-Michigan - 5 days/acre/year Rec. in Wisc.: 1 hunter/8-10 acres (small game) 1 hunter/.1 sq. mi.= 1 hunter/64 acres (big game)	0.1 days/capita 1 hunter/40 acres	Standards vary by species and intensity of management. This standard is for general hunting only. Management standards are developed by local agencies.
SMALL GAME HUNTING	1 man-day/5-100 acres (varies by species and management intensity) 1.8 days/capita	None		Rec. in Wisc.: 1 hunter/8-10 acres	2.0 days/capita 1 hunter/10 acres	Most wildlife areas in river valley are under the management of F&WS. Most areas not intensively managed. Major migratory flyway.
SNOWMOBILING	10 units/mile 0.8 days/capita	16 units/mile 4.32 days/capita	None	None	4.5 days/capita 16 units/mile 1.3 persons/unit Turnover - 1.3	Minnesota - 77% preferred use of trails over open fields and lakes. Varies by region; 86% of snowmobiling occurs in home county. Higher days/capita reflects moderate increase in use in coming years and higher participation in Minnesota and Wisconsin (Minnesota-snowmobiling increasing at a decreasing rate). 1.3 persons/unit-estimate based on observation (no statistical base).

Great River Environmental Action Team

OUTDOOR RECREATION SPACE STANDARDS

ACTIVITY	IOWA	MINNESOTA	WISCONSIN	OTHER	GREAT I	REMARKS
SIGHTSEEING (Driving for Pleasure)	14.9 days/capita 70-85% of population participates	39 days/capita 87% of population participates	None	None	25 days/capita	Estimated days/capita; large percent of population participates; could increase significantly with increased publicity of scenic areas an/or Great River Road. According to Psychographics of Auto Traveler, 75% of those driving for pleasure did to sight see.

The Mississippi River is unique in that its physical attributes make it possible to have a wide range of recreational experiences within each pool or segment of a pool.

Our work group, GREAT, the Upper Mississippi River Basin Commission, managing agencies and the public must, however, look to the future and determine how areas (pools) within the Mississippi River will be managed for a variety of recreation uses, commercial transportation, fish and wildlife propagation, energy needs, etc. All of these uses are not compatible and, therefore, "management objectives" will need to be developed.

Each area of public ownership (pool surface water, adjoining land, islands, etc.) cannot be everything to everybody. The goal of managing agencies should be to collectively provide a diversity of recreational opportunities (experiences). The diversity of recreational uses, recreational and commercial use, recreation and fish and wildlife uses, etc., provides different experiences. The managing agencies must avoid development of recreational areas for the "average user" and must be concerned with supplying the diversity of experiences sought by recreationists (high density social recreation to low density "primitive" recreation).

Table 17 identifies recreational facility needs for Pools 1 through 10 for the years 1985, 2000, and 2025 and Tables 18 through 22 rank these needs by activity and by pool for the same time intervals. Facility needs identified are for picnicking, boat access parking, boat launching lanes (boating includes fishing boats, power boats, and waterskiing), swimming beach, and camping units. Other facility needs identified in the GREAT Public Use Projections cannot be quantified for the Mississippi River since these are regional demands/needs. Regional demands have been determined for hiking, large game hunting, small game hunting, waterfowl hunting and snowmobiling. Although an exact "need" for these types of recreational opportunities cannot be determined because the exact availability of facilities within the region is unknown, it is safe to conclude that trails (hiking, bicycle, snowmobile, crosscountry, and equestrian) and areas for large and small game hunting are greatly needed to satisfy demand.

Table 18 summarizes and ranks the need for additional picnicking units. Pool 3 is significantly more deficient than the other pools. Many of the pools (2, 4, 5A, 6, 7, 8, and 10) have adequate picnicking facilities.

Table 19 summarizes and ranks the need for additional boat access parking. Pool 3 has the greatest deficiency, followed closely by Pools 6 and 7. Pools 2, 8, and 10 have adequate boat access parking.

Table 20 summarizes and ranks the need for additional boat launching lanes. All pools except Pools 2 and 10 have inadequate boat launching lane facilities. Again, Pool 3 has the greatest deficiency.

GREAT I
RECREATION NEEDS PROJECTIONS
Table 17

PROJECTED NEEDS
1 9 8 5

POOL	Picnic (Units)	Boat (P.S.)	Boat (L.L.)	Swim (B.A.)	Camp (Units)
1	5.5	211	5.5	—	--
2	—	--	--	--	—
3	208	1490	51	--	220
4	—	--	10	—	—
5	19.5	435	5	.21	--
5A	--	737	19	.27	3
6	--	1052	46	--	—
7	--	1110	19	.40	19
8	--	--	8	--	--
9	3	288	11	.70	307
10	—	--	--	--	--

PROJECTED NEEDS
2 0 0 0

PROJECTED NEEDS
2 0 2 5

POOL	Picnic (Units)	Boat (P.S.)	Boat (L.L.)	Swim (B.A.)	Camp (Units)	Picnic (Units)	Boat (P.S.)	Boat (L.L.)	Swim (B.A.)	Camp (Units)
U&LSAF										
1	8	244	7	--	—	10	291	7	—	—
2	—	—	—	—	—	—	—	—	—	--
3	276	1954	63	.14	301	325	2242	67	.21	352
4	—	--	18	—	—	—	195	29	—	—
5	24	530	7	.24	—	32	716	13	.29	18
5A	—	850	21	.35	32	—	1084	28	.46	60
6	—	1350	53	--	—	—	1869	67	.117	--
7	—	1300	25	.50	28	2	1650	35	.70	39
8	—	--	13	--	—	—	—	22	—	—
9	7	454	12	.80	338	14	579	15	.90	386
10	—	--	—	—	—	—	—	—	—	—

P.S. - Parking spaces; automobile and boat trailer
L.L. - Boat launching lanes
B.A. - Beach area, acres

GREAT I
Recreation Needs Projections
Ranking of Pools by Development Needs

Table 18

Picnic Facilities

Rank	Pool	Year 1985 Units Req'd.	Year 2000 Units Req'd.	Year 2025 Units Req'd.
1	3	208	276	325
2	5	19.5	24	32
3	9	3	7	14
4	1	5.5	8	10
5	7	--	—	2
6	2	—	—	—
6	4	—	—	—
6	5A	—	—	—
6	6	—	—	—
6	8	—	—	—
6	10	—	—	—

Table 19

Boating Facilities—Parking

Rank	Pool	Year 1985 P.S. Req'd.	Year 2000 P.S. Req'd.	Year 2025 P.S. Req'd.
1	3	1490	1954	2242
2	6	1052	1350	1869
3	7	1110	1300	1650
4	1	211	2444	291
5	5A	737	850	1084
6	5	435	530	716
7	9	288	454	579
8	4	—	—	195
9	2	—	—	--
9	8	--	—	—
9	10	--	—	--

GREAT I
Recreation Needs Projections
Ranking of Pools by Development Needs

Table 20

Boating Facilities—Launching Lanes

Rank	Pool	Year 1985 L.L. Req'd.	Year 2000 L.L. Req'd.	Year 2025 L.L. Req'd.
1	3	51	63	67
2	6	46	53	67
3	7	19	25	35
4	5A	19	21	28
5	4	10	18	29
6	8	8	13	22
7	9	11	12	15
8	5	5	7	13
9	1	5.5	7	7
10	2	—	—	—
10	10	—	—	—

Table 21

Swimming Facilities—Beach Area

Rank	Pool	Year 1985 Acres Req'd.	Year 2000 Acres Req'd.	Year 2025 Acres Req'd.
1	9	.70	.80	.90
2	7	.40	.50	.70
3	5A	.27	.35	.46
4	5	.21	.24	.29
5	3	—	.14	.21
6	6	—	—	.117
7	1	—	—	—
7	2	—	—	—
7	4	—	—	—
7	8	—	—	—
7	10	—	—	—

GREAT I
Recreation Needs Projections
Ranking of Pools by Development Needs

Table 22

Camping Facilities

Rank	Pool	Year 1985 Units Req'd.	Year 2000 Units Req'd.	Year 2025 Units Req'd.
1	9	307	338	386
2	3	220	301	352
3	5A	3	32	60
4	7	19	28	39
5	5	—	—	18
6	1	—	—	—
6	2	—	—	—
6	4	—	—	—
6	6	—	—	—
6	8	—	—	—
6	10	—	—	—

Table 23

Overall Needs

Pool	RANKING					Overall Score	Overall Needs Rank
	Picnic	Boat Park	Boat Launch	Swim Beach	Camp Units		
1	4	4	9	7	6	30	7
2	6	9	10	7	6	38	10
3	1	1	1	5	2	10	1
4	6	8	5	7	6	32	8
5	2	6	8	4	5	25	6
5A	6	5	4	3	3	21	4
6	6	2	2	6	6	22	5
7	5	3	3	2	4	17	2
8	6	9	6	7	6	34	9
9	3	7	7	1	1	19	3
10	6	9	10	7	6	38	10

Lowest score denotes greatest need.

Table 21 summarizes and ranks the need for additional swimming facilities. Pools 5, 5A, 7, and 9 are deficient. Pools 1 and 2 are considered unsuitable for swimming because of water quality problems and heavy industrialization.

Table 22 summarizes and ranks the need for additional camping facilities. The greatest deficiencies exist in Pools 3 and 9. Again, Pools 1 and 2 are considered unsuitable for the aforementioned reasons. Pools 4, 6, 8, and 10 have adequate facilities.

Overall Pool 3 has the greatest deficiency of recreational facilities to meet projected needs. Table 23 summarizes the ranking of each pool for each type of facility need and then ranks the pools on their overall needs (includes all of the individual needs identified in the previous tables) for recreational facilities.

Again, it should be pointed out that not all areas can be developed for the mythical "average user". This report documents where the greatest "need" for recreational facilities occurs, assuming continuation of existing use. The next step in the planning process will be to determine "management objectives" which will involve interfacing the various recreational needs, commercial needs, fish and wildlife needs, etc., in a manner compatible to recreationists.

Recommendations to satisfy many of the recreational needs identified in this section are contained in the analysis of the individual pools which follows. The recommendations are considered sound and are expressed in terms of the number of facilities needed to meet a reasonable amount of unsatisifed demands. Later evaluation of needs based on the proposed additional studies will provide more reliable data upon which to make recommendations to satisfy optimum levels of demand.

The RWG I is confident that the recommendations offered as a result of the needs analysis, and obtained from river management agencies, will be beneficial to the recreationists and contain few harmful impacts of significance of the riverway resources. It also recognizes that some of the site specific recommendations may require change due to later, and more detailed, site investigations which the work group recommends prior to implementation.

POOL 1

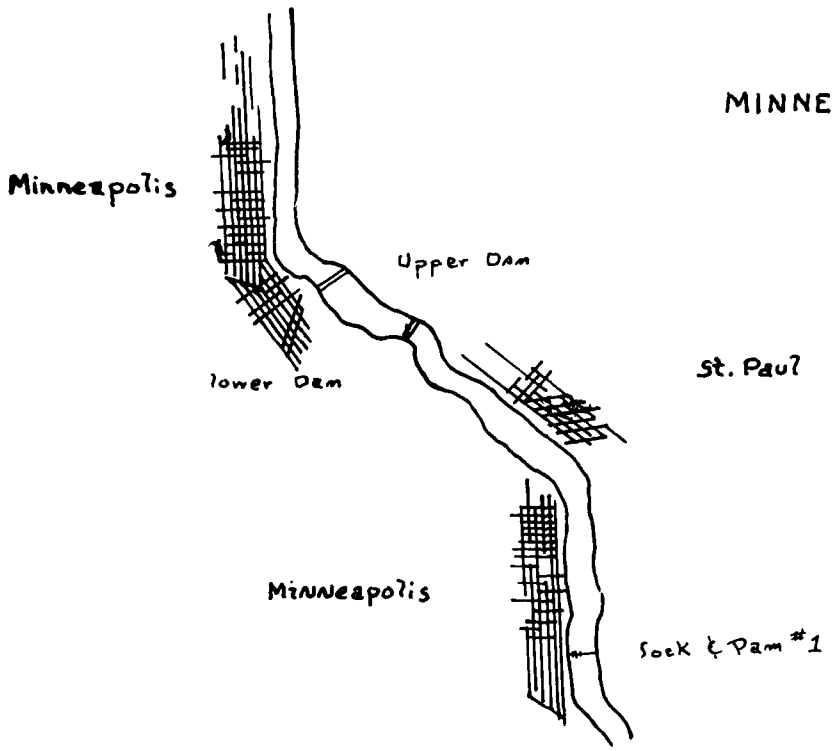


Figure 28

UPPER AND LOWER ST. ANTHONY FALLS AND POOL 1

A. Description of Pools:

Upper and Lower St. Anthony Falls (U&L SAF) locks and dams are located at river miles 853.8 and 853.4, respectively, above the mouth of the Ohio River. Lower St. Anthony Falls lock and dam is 0.4 river miles below Upper St. Anthony Falls. Both St. Anthony Falls locks and dams are located in the City of Minneapolis on the right bank of the main channel of the Mississippi River.

The land adjacent to the Upper and Lower St. Anthony Falls pools is one of the earliest areas of settlement in the Twin Cities. It has undergone continuous and intensive urban settlement for over 150 years. In the early period, the falls were a barrier to navigation but also a ready source of power for saw and grain mills and for manufacturing.

Lock and Dam No. 1 is located 847.7 river miles above the mouth of the Ohio River. The structure is 5.7 river miles below Lower St. Anthony Falls lock and dam, 32.5 river miles above Lock and Dam No. 2, and is situated between the cities of St. Paul and Minneapolis, Minnesota.

The original lock and dam was opened to navigation on July 3, 1917. Because of extensive damage in 1929, it was necessary to rebuild the lock, which was completed in September, 1938. A second lock, landward of the first, was completed in May, 1932. The two locks lie adjacent to each other on the right bank of the main channel. Historical recreational boat lockages at U&L SAF are shown on Table 25, and on Table 26 for Pool 1.

Upstream from Lock and Dam No. 1, Pool 1 is typical of the upper reaches of Pool 2. The pool is confined to the old narrow river channel which cuts deeply through the heavily wooded sandstone bluffs. The bluffs in this section of the river are rather unique in that they rise almost vertically from the river channel to heights approaching 150 feet. The bluffs are covered with deciduous trees and rock outcroppings which are particularly scenic in autumn. An interesting feature of Pool 1 is the abandoned lock at river mile 850.4, which protrudes a foot or two above the water at normal pool. Construction of the lock was halted when it was discovered that geological conditions were not conducive to a lock and dam at this location in the river.

Upstream of the Washington Avenue Bridge, the bluffs begin to decrease in height. Much industry is located on the banks of the Mississippi River from the upper area of Pool 1 and the St. Anthony Falls pools up to river miles 857.6, the upstream limit of the Corps of Engineers' nine-foot channel project. The upper limit of the flat pool created by the Upper St. Anthony Falls dam is at river mile 865.5 near the Coon Rapids dam.

B. Pools Features:

Principal physical and other features of the three pools are summarized in Table 24.

TABLE 24
FEATURES OF POOL 1 AND UPPER AND LOWER
ST. ANTHONY FALLS POOLS

Item	Pool 1	Lower St. Anthony Falls pool	Upper St. Anthony Falls pool
Length of Pool (river miles)	5.7	0.4	10.9
River Miles	847.7-853.4	853.4-853.8	853.8-864.7
Pool Elevation (flat pool)	725.1	750.0	799.2
Water Area of Pool (acres)	546	51	974
Primary Shoreline in Miles (meandering outer perimeter limits, main and secondary channels, and main traversed sloughs adjacent to firm, high ground accessible by land)	11.6	1.5	23.1
Federal lands above normal flat pool (acres)	16	4	2

C. Existing Recreational Facilities:

Pool 1 (including Upper and Lower St. Anthony Falls) has one access with one launching lane, 50 parking spaces adjacent to the access, 15 picnicking units, 5.0 miles of hiking trails, and 5.0 miles of bicycling trails.

Major parks in the areas include: North Mississippi River Park (RM 858), St. Anthony Parkway (RM 857.5), Mississippi River Park (RM 853.5), East River Flats (RM 852.5), West River Cave, and portions of Minnehaha Park (RM 847-848).

D. Pools Accessibility:

The Mississippi River is paralleled very closely on both sides of all three pools by State, county, and local roads. Numerous roads enter the pool segments laterally. The river is traversed by 12 highway bridges and six railroad bridges between Lock and Dam No. 1 and the upper limits of the nine-foot navigation channel. Access is limited, however, by the steep bluffs along the river. The cities of Minneapolis and St. Paul own narrow tracts of land adjacent to the river from Lock and Dam No. 1 to near the University of Minnesota. The majority of the land is privately owned, industrialized, and offers no public access.

E. Natural Resources:

Due to the present degree of intermittent pollution from non-point sources and storm water overflows, this three-pool segment of the Mississippi River and its waters are considered a limited resource for pleasure boating and general access. Fishing, swimming, and waterskiing are expected to

TABLE 25
PLEASURE BOAT LOCKAGES IN UPPER AND
LOWER ST. ANTHONY FALLS POOLS, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock LSAF	Lock USAF	Lock LSAF	Lock USAF
1960	0	0	0	0
1961	10	0	10	0
1962	1	0	1	0
1963	5	1	5	3
1964	887	879	679	668
1965	402	399	208	292
1966	809	794	581	582
1967	1,024	1,005	732	729
1968	1,218	1,211	881	885
1969	1,134	1,152	769	814
1970	1,482	1,555	1,010	1,014
1971	1,936	1,902	1,226	1,209
1972	1,455	1,458	926	943
1973	2,165	2,194	1,287	1,296
1974	1,842	1,857	1,091	1,082
1975	1,615	1,649	818	865
1976	1,700	1,682	904	912
*1980	1,584	1,677	959	991
*1990	1,532	1,627	941	974
*2000	1,484	1,592	925	962

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978". Midwest Research Institute.

TABLE 26
PLEASURE BOAT LOCKAGES IN POOL 1
1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 1	Lock LSAF	Lock 1	Lock LSAF
1960	1,278	0	708	0
1961	1,211	10	838	10
1962	959	1	623	1
1963	1,427	5	856	5
1964	1,890	887	1,155	679
1965	1,121	402	743	208
1966	1,677	809	1,064	581
1967	2,088	1,024	1,221	732
1968	2,193	1,218	1,422	881
1969	2,415	1,134	1,405	769
1970	2,960	1,482	1,861	1,010
1971	3,455	1,936	1,783	1,226
1972	2,798	1,455	1,568	926
1973	4,229	2,165	2,056	1,287
1974	4,014	1,842	1,822	1,091
1975	3,344	1,615	1,242	818
1976	4,007	1,700	1,502	904
*1980	8,687	1,584	3,411	959
*1990	16,166	1,532	5,993	941
*2000	21,975	1,484	7,998	925

* Ibid.

generate very limited demand until these pollution problems are alleviated. The heavy amount of commercial traffic, the lack of access and facilities, the narrowness of the channel, the short distance between locks, and the unpleasing aesthetic appearance encountered in the St. Anthony Falls pools combine to discourage many of the recreational boaters who might otherwise use the river.

Suitable above-water lands are not available in the pools for present use. Future development for land-based activities, including provision for additional facilities to support an increase in water-oriented activities when water conditions become more favorable, is dependent upon the amount and quality of land acquired in the future. The present below-normal demand for land-based activities results from a lack of land and quality water in the desired proportions.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F that are normal to pool areas in general also prevail in these three pools. Summer temperatures range upward to about 95 degrees F during June, July, and August and temperatures on occasion drop to about -30 degrees F during the winter months.

F. Cultural Resources:

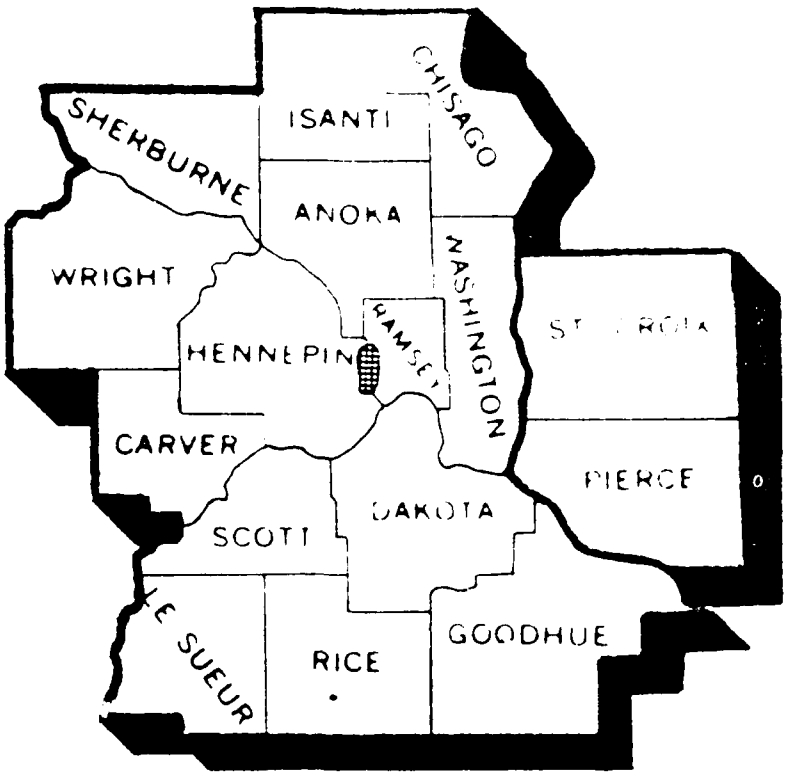
Such archaeological sites as may have existed between the high bluffs in the extremely narrow valley of this pool are likely to have been obliterated by commercial, residential, and industrial development over the past 150 years. Sites of historic interest which are known and have survived are located on the tops of the bluffs, well removed from the effects of water levels or man's activities in and alongside the river proper. Also of cultural significance, the University of Minnesota's Centennial Showboat is moored at the bank below the University's main campus, and depends in part on its backdrop of river panorama for its appearance.

Today, the area has many historical and cultural associations and remaining sites of historic interest have been integrated into continuing economic use of the area. Structures and sites considered worthy of preservation in this area include: Art Godfrey Cottage, Lady of Lourdes Church, Nicollet Island, the Third Avenue Bridge, and the Stone Arch Bridge. The Pillsbury "A" Mill, when built in 1881, was the largest flour mill in the world, and is still in operation today.

Several areas within the pools are on the National Historic Register - St. Anthony Falls Historic District (RM 853) and Pillsbury "A" Mill (RM 853). Other sites in proximity of significance owned by the Minnesota Historical Society include: Edwin H. Hewitt House (RM 851, est.), Bennett/McBridge House (RM 854, est.) and the Grain Belt Brewery (RM 854-858, est.).

G. Fish and Wildlife Resources:

A lack of shallow water areas conducive to fish spawning, and the degree of pollution in the river are the major reasons for the lack of fishing opportunity in the area. The extreme pollution has resulted in a



UPPER AND LOWER ST. ANTHONY FALLS
AND POOL 1

FIG. 29

ZONAL POPULATION PROJECTION

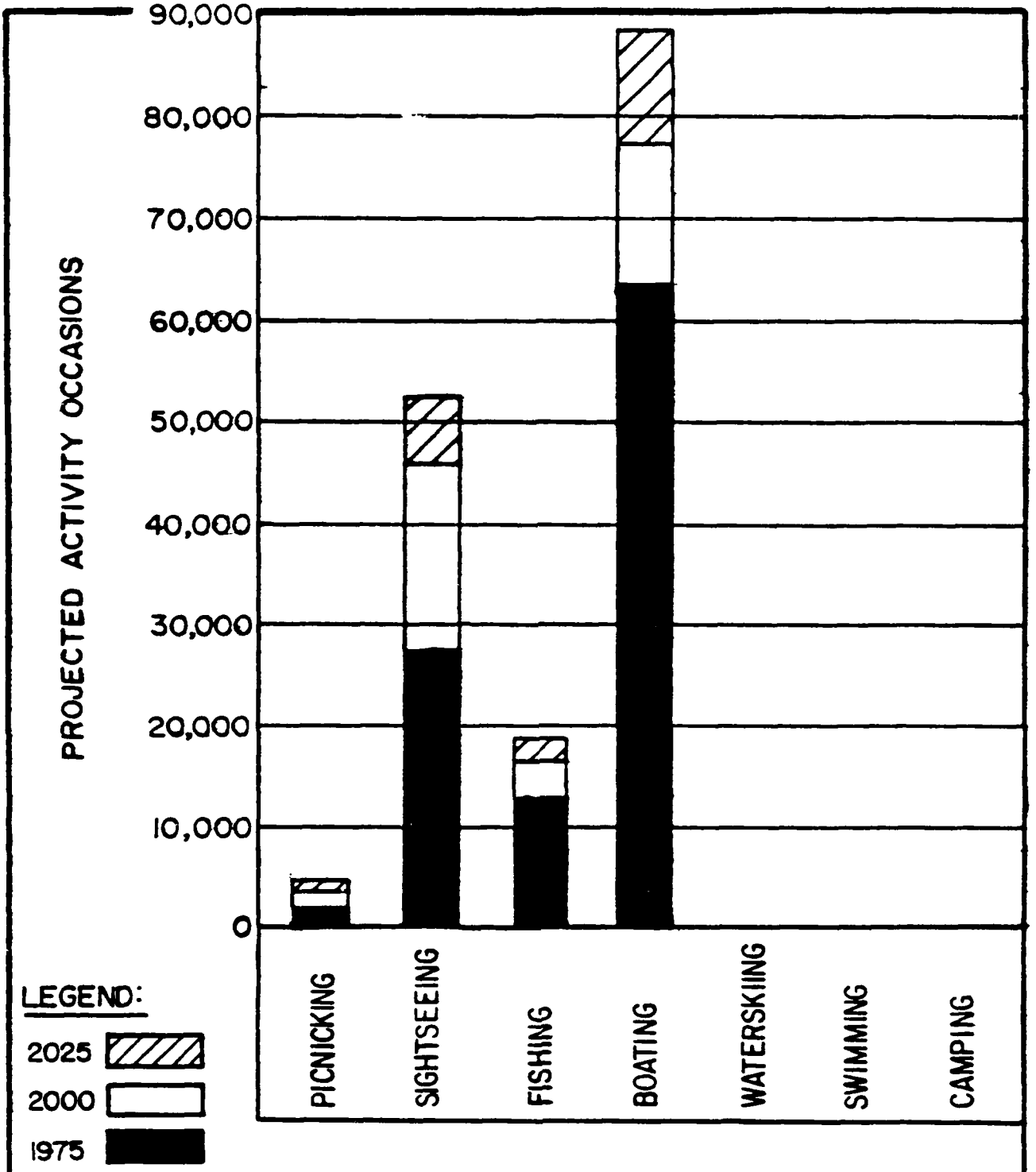
ZONE	1975	2010	2025
0-25 Mi.	1,408,730	2,250,400	1,576,280
26-50 Mi.	671,455	1,005,085	1,169,250

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL USAF, LSAF, 1

The GREAT River

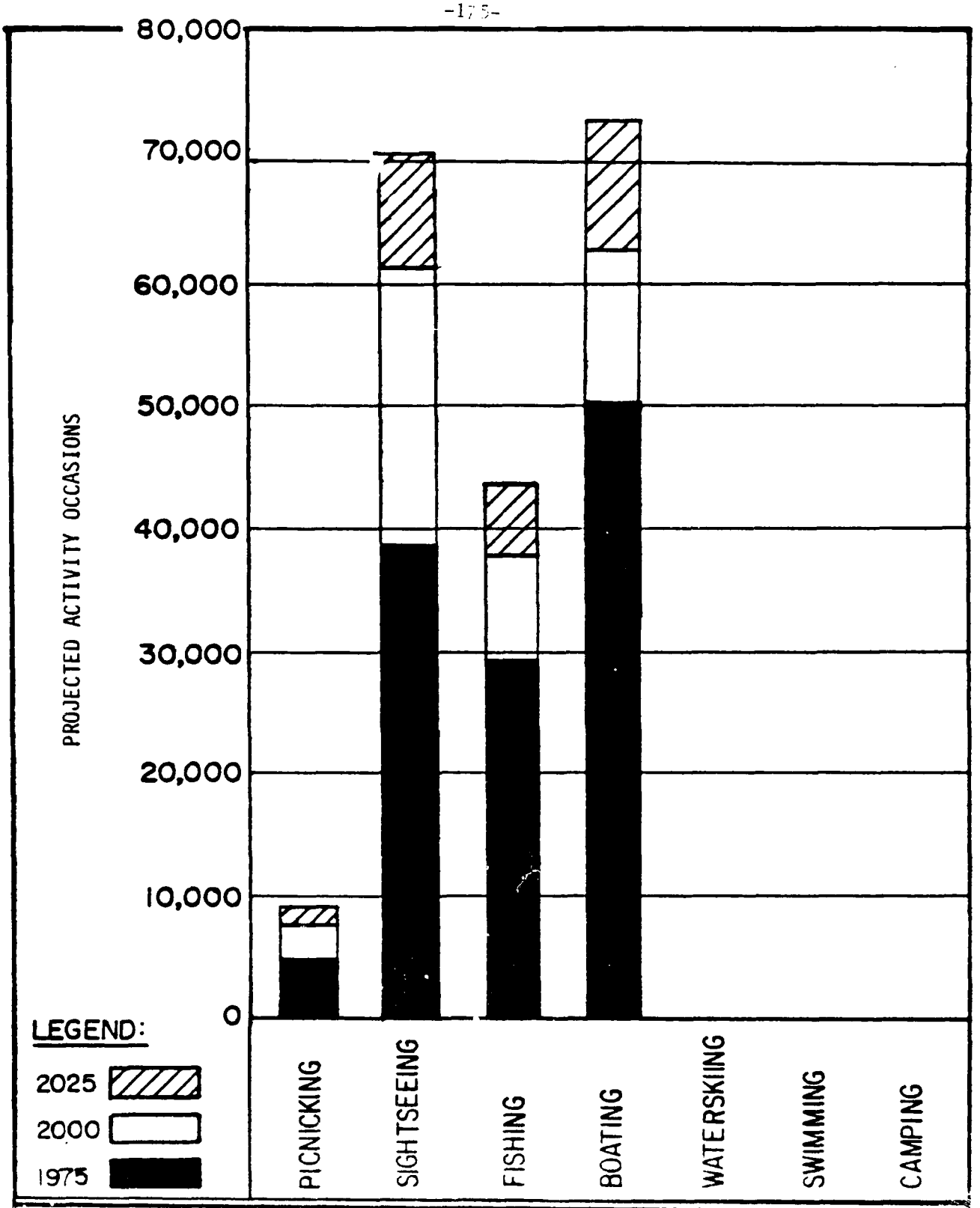


RECREATION
DEMAND ANALYSIS

POOL U&L S.A.F.

FIGURE 30

The GREAT



RECREATION
DEMAND ANALYSIS

POOL 1 FIGURE

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 27
Pool - Upper and Lower St. Anthony Falls

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	2.0	2.3	3.3	3.6	3.9	4.3	4.4
Sightseeing:	27.7	30.4	43.1	45.9	48.6	51.2	52.3
Fishing:	12.7	13.6	15.4	16.4	17.4	18.4	18.8
Boating:	63.5	67.5	72.5	77.2	81.7	86.1	88.1
Waterskiing:	----	----	----	----	----	----	----
Swimming:	----	----	----	----	----	----	----
Camping:	----	----	----	----	----	----	----
Hiking:	76.9	81.6	88.0	94.7	101.5	107.7	110.6
Hunting:							
Small Game-	2463.3	2609.2	2785.9	2973.7	3158.2	3335.6	3417.9
Large Game-	1003.6	1063.0	1135.0	1211.5	1286.7	1358.9	1392.5
Waterfowl-	1094.8	1159.7	1238.2	1321.7	1403.7	1482.5	1519.0
Snowmobiling:	9951.4	----	----	----	----	----	----
Sub-Total:							
Activity Occassions:	105.9	113.8	134.3	143.1	151.6	160.0	163.6
Visitor Days:	67.5	72.5	85.5	91.2	96.6	101.9	104.2
Conversion Factor:	1.57						

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 28
Pool - 1

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	5.2	5.7	7.6	8.2	8.7	9.3	9.5
Sightseeing:	38.4	42.1	57.1	61.1	65.0	68.8	70.5
Fishing:	29.1	31.2	35.4	37.9	40.3	42.6	43.7
Boating:	50.4	54.0	58.5	62.8	67.1	71.2	73.1
Waterskiing:	----	----	----	----	----	----	----
Swimming:	----	----	----	----	----	----	----
Camping:	----	----	----	----	----	----	----
Hiking:	76.9	81.6	88.0	94.7	101.5	107.6	110.6
Hunting:							
Small Game-	2463.1	2609.2	2785.9	2973.7	3158.2	3335.6	3417.9
Large Game-	1003.6	1063.0	1135.0	1211.5	1286.7	1358.9	1392.5
Waterfowl-	1094.8	1159.7	1238.2	1321.7	1403.7	1482.5	1519.0
Snowmobiling:	9951.4	----	----	----	----	----	----
Sub-Total:							
Activity Occassions:	123.1	133.0	158.6	170.0	181.1	191.9	196.8
Visitor Days:	93.3	100.8	120.2	128.8	137.2	145.4	149.1
Conversion Factor:	1.32.						

continual decrease in the rate of fish propagation and the palatability of fish harvested in the three pools, making these pools among the least productive in the St. Paul District. Hunting of game is prohibited in the three-pool area, primarily because the lands adjacent to the pools are located in or near metropolitan or residential areas where the discharge of firearms is prohibited. The presence of urban development combined with industrialization has resulted in a reduction in wildlife habitat along the riverbanks. However, some smaller animals exist in the area, such as rabbits, migratory waterfowl, and waterfowl that live in the region year-round.

H. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 1 include:

Pool 1 has few dredge sites accessible by boat. When these were visited during the study, they were occupied only once. Thus, not enough users were surveyed in this pool to be able to discern data variations.

I. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978 GREAT I, Recreation Work Group. Visitor day use is projected to increase approximately 58 percent between 1975 and 2025. This is an increase of approximately 92,500 visitor days. Each visitor will engage in more than one activity, however. Refer to Tables 27 and 28.

J. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities require to support a particular recreational activity. Refer to Tables 29 and 30.

K. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements.

The greatest needs in the USAF, LSAF and Pool 1 area are for boating access (launching lanes and adjacent parking), multi-purpose trails, and hunting areas. There is also a need for a few additional picnicking units. Refer to Table 31.

AD-A127 213 GREAT I STUDY OF THE UPPER MISSISSIPPI RIVER TECHNICAL 3/4
APPENDIXES VOLUME 6 RECREATION(U) GREAT RIVER
ENVIRONMENTAL ACTION TEAM R LINDBERG ET AL. SEP 80
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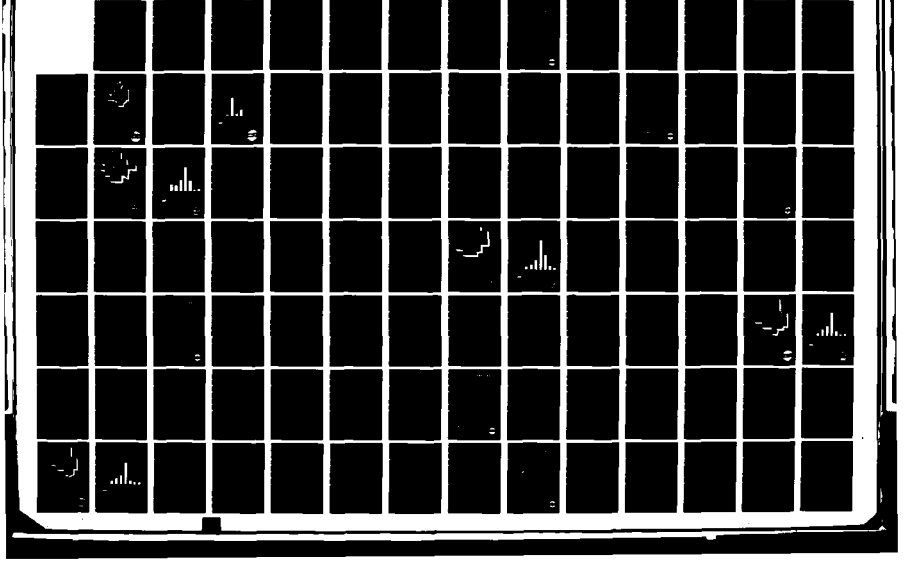


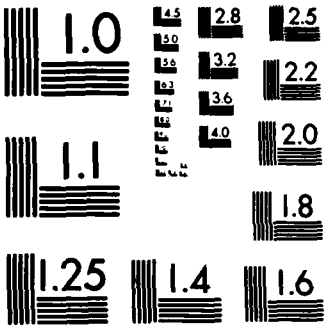


Table 29
Pool U & L SAF

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	3	6	7	1	47	1	1	136	3	3	--	--	--	--	--	--	--	--	--	22.3	8028	12317	54.8	3864
1980:	3	6	7	1	51	1	1	145	4	4	--	--	--	--	--	--	--	--	--	24.0	8504	13046	58.0	4085
1990:	5	10	10	1	57	1	1	155	4	4	--	--	--	--	--	--	--	--	--	25.6	9080	13930	62.0	4347
2000:	5	10	11	1	61	1	1	165	4	4	--	--	--	--	--	--	--	--	--	27.2	9692	14869	66.1	4624
2010:	6	12	12	1	65	1	1	175	4	4	--	--	--	--	--	--	--	--	--	29.7	10292	15791	70.2	4887
2020:	6	12	12	1	68	1	1	184	5	5	--	--	--	--	--	--	--	--	--	31.3	10872	16678	74.2	5140
2025:	7	14	13	1	70	1	1	188	5	5	--	--	--	--	--	--	--	--	--	32.2	11140	17090	76.0	5255

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
190	4	4	11	237	6	5	17	271	7	6	20

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 30
Pool 1

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	8	16	20	1	116	3	2	115	3	3	--	--	--	--	--	--	--	--	--	22.3	8028	12317	54.8	3864
1980:	9	18	22	1	124	3	2	123	3	3	--	--	--	--	--	--	--	--	--	24.0	8504	13046	58.0	4085
1990:	12	24	30	1	141	4	2	134	3	3	--	--	--	--	--	--	--	--	--	25.6	9080	13930	62.0	4347
2000:	13	26	33	1	151	4	3	143	4	4	--	--	--	--	--	--	--	--	--	27.2	9692	14869	66.1	4624
2010:	14	28	35	1	160	4	3	153	4	4	--	--	--	--	--	--	--	--	--	29.7	10292	15791	70.2	4887
2020:	15	30	37	1	169	4	3	163	4	4	--	--	--	--	--	--	--	--	--	31.3	10872	16678	74.2	5140
2025:	15	30	38	1	174	4	3	167	4	4	--	--	--	--	--	--	--	--	--	32.2	11140	17090	76.0	5255

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
251	6	4	23	327	8	5	34	379	8	5	38

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 31

UPPER AND LOWER ST. ANTHONY FALLS AND POOL 1

K. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	5	10.5	5.5	13	8	15	10	
Sightseeing (P.S.)	38	26		33		38		
Fishing (P.S.)	0	132.5		151		174		
(L.L.)	0	3.5		4		4		
Boating (P.S.)	50	128.5	211	143	2,444	167	291	
(L.L.)	1	3.0	5.5	4	7	4	7	
	0 Slips							
	0 Private							
Waterskiing (P.S.)		0		0		0		
(L.L.)		0		0		0		
Swimming (B.A.)								
Camping (Units)								
Hiking* (Miles)	5.0	24.8	19.8	27.2	22.2	32.2	27.2	
Hunting* Large Game (Land Acres)	14	8,792,000						Hunting is illegal within city limits of Minneapolis/St. Paul.
Small Game* (Land Acres)	1	13,488,000						Hunting is illegal within city limits of Minneapolis/St. Paul.

UPPER AND LOWER ST. ANTHONY FALLS AND POOL 1

K. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	534	60,000,000	Hunting is illegal within city limits of Minneapolis/St. Paul.					
Snowmobiling* (Miles)	0	4,216	4,216	4,624	4,624	5,255	5,255	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

L. How to Meet the Needs:

Due to the urban character of the area and water pollution, fishing, swimming, and waterskiing are expected to generate very limited demand. Establishing "parkways", regional parks, and abating pollution will undoubtedly bring the area into higher demand, however.

The "gorge" topography and urban nature of the pool limits direct road access to the river in many areas.

The following information was provided by the Metropolitan Council which coordinated planning and development in the Twin Cities Metropolitan area.

Proposed and existing river-oriented parks which serve the Twin City Metropolitan Area are described below. Park locations are illustrated on the Regional Recreational Open Space System (December, 1977) developed by the Metropolitan Council.

Four islands on the Mississippi are potential regional recreation open space sites. Goodin Island and Cloquet Island (approximately 18 miles upriver of downtown Minneapolis) have been recently acquired by the Minnesota Department of Natural Resources. One of these islands may be developed for limited recreational use. Bonfill and Durnam Islands are located approximately 10 miles upriver of downtown Minneapolis. Durnam Island has been proposed for development as part of a park for the physically handicapped.

Coon Rapids Dam Regional Park is located above the St. Anthony Falls Lock and Dam on both sides of the river in the cities of Coon Rapids and Brooklyn Park. The park is currently 360 acres in size, and includes a hydro-electric dam (previously owned by the Northern States Power Company) and the land surrounding the dam. The park was officially opened in September, 1978, and offers hiking trails, picnic areas, a boat launch upstream of the dam, and observation/fishing decks, plus a walkway on the dam. An additional 225 acres within the city of Coon Rapids is proposed for acquisition from 1979-1983.

The park will also serve as a trailhead for a multiple-use recreational trail to Elm Creek Park Reserve, 6.5 miles to the west. This trail is a demonstration project for developing a system of recreational trails linking regional parks, park reserves, and significant natural resource areas, which offer recreational opportunities.

North Mississippi River Regional Park is located on the west bank of the river near the Camden Bridge in Minneapolis. The 35-acre park presently has a boat-launch. Proposed improvements to the park scheduled for 1980-81 are trailhead facilities (for a regional trail system linking trails along the river with the Minneapolis trail system linking trails along the river with the Minneapolis Grand Round Parkway system), a picnic area, and fishing area. The site also has potential for an out-of-current swimming beach and marina.

Central Mississippi Riverfront Regional Park is a proposed 150-acre park encompassing Nicollet Island and both banks of the river at the St. Anthony Falls Lock and Dam. A picnic area and outdoor amphitheatre have been developed on the south end of Nicollet Island. A system of pedestrian walkways along the east bank of the river (Hennepin Island-Bluffs

and Main Street) will be developed in 1979. A master plan for the park is currently being reviewed by the Metropolitan Council. Proposed facilities for the park are hiking and bicycle trails, observation/fishing platforms, picnic areas, and motorway (extension of West River Road) as a part of the Great River Road scheduled for 1979-83.

East River Flats is a 24-acre picnic and passive recreation area on the east bank of the river near the University of Minnesota in Minneapolis. The site has potential for a non-motorized small craft boat launching area. The park is the terminus of a parkway/trail corridor on East River Road (Minneapolis) and Mississippi River Boulevard (St. Paul) to Hidden Falls/ Crosby Farm Regional Park. A similar parkway/trail system on the west bank of the river runs along West River Road and Godfrey Parkway, terminating at Minnehaha Regional Park. A proposal to extend West River Road north to the Central Mississippi Riverfront Regional Park is currently being prepared as a Great River Road project.

Minnehaha Regional Park is located on the west bank of the river near Lock and Dam No. 1. The 171-acre park surrounds the confluence of Minnehaha Creek to the Mississippi River. Park facilities include picnic areas, active and passive recreation areas, observation platforms overlooking Minnehaha Falls, and walkways through the Minnehaha Creek corridor to the Mississippi River. Some redevelopment of these facilities is scheduled for 1983.

A regional trail policy and system plan has been proposed by the Metropolitan Council. Adoption of the plan would authorize trail acquisition and development funds for the system. The trail system plan encourages the development of a trail corridor along the Mississippi River. Potential trail uses would be hiking, bicycling, ski-touring, snowmobiling, and horseback riding. Specific trail alignments and uses would be determined in trail master plans.

Several old dredged material disposal areas and natural sandbars receive local use by foot access. An evaluation of these areas indicates that due to heavy trampling of vegetation these areas remain as open sand areas. Additional disposal sites for recreation use should be limited because of the effect of annual flooding. Water contact recreation should not be encouraged until the water quality improves and the Minnesota Pollution Control Agency standards are met.

Hunting (large game, small game, and waterfowl) are regional type demands which cannot be fulfilled in the Pool 1 area because of its urban character and legal restrictions on the discharge of firearms.

M. Recommendations:

1. The Metropolitan Council should be encouraged in its plan to acquire, develop, and refine the park facilities along the Mississippi River. Only in this way can the GREAT I projected needs be met.

2. The Corps of Engineers should further investigate the feasibility of developing an island area at RM 848.1 L. This area could serve as a "lockage holding area".

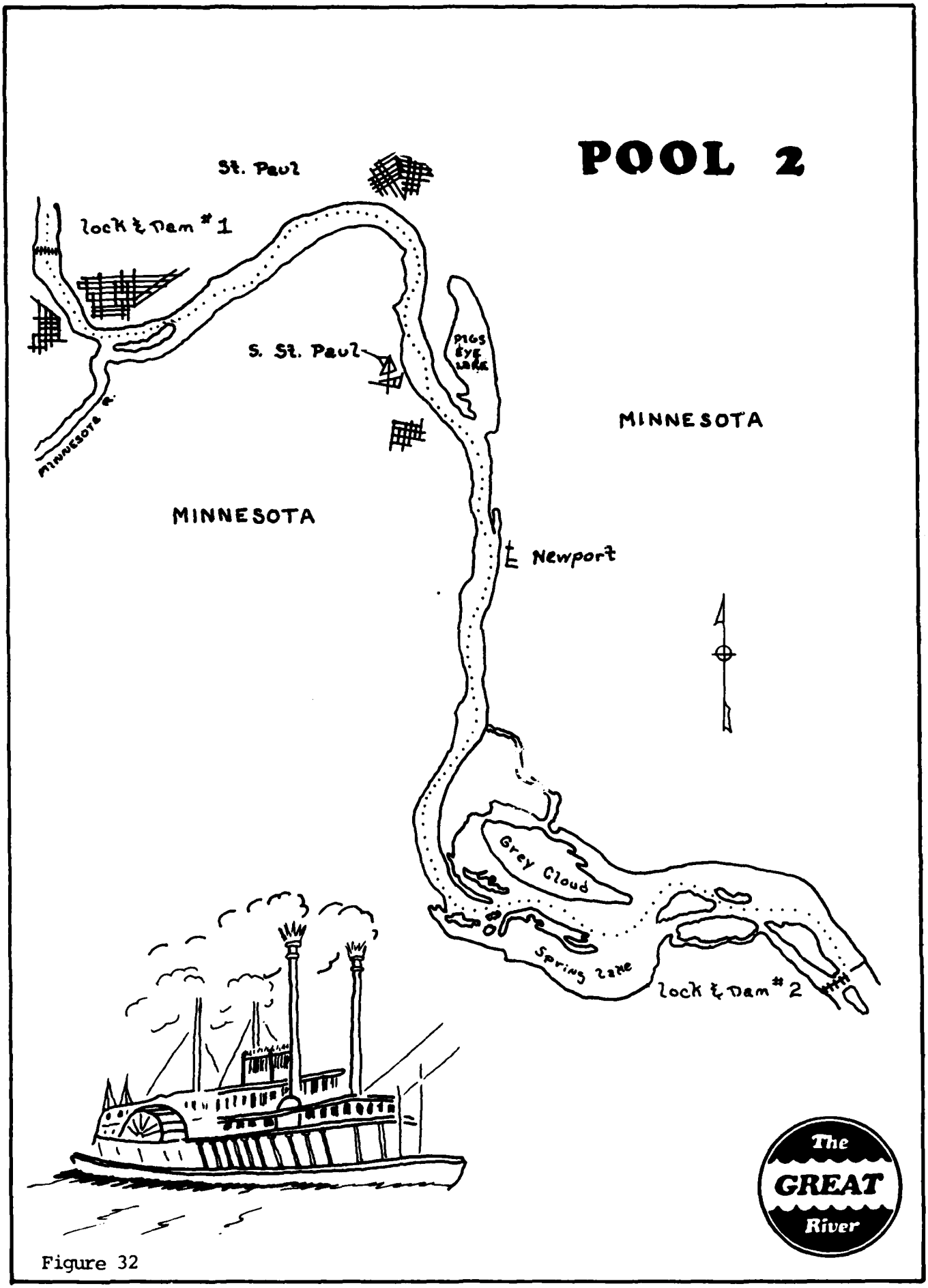

POOL 2
St. Paul
lock & Dam # 1
S. St. Paul
Pigs Eye Lake
MINNESOTA R.
MINNESOTA
MINNESOTA
Newport
Grey Cloud
Spring Lake
lock & Dam # 2
The GREAT River

Figure 32

POOL 2
(Includes Minnesota River)

A. Description of Pool:

Lock and Dam No. 2 is located 815.2 river miles above the mouth of the Ohio River. The structure is 32.5 river miles below Lock and Dam No. 1, 18.3 river miles above Lock and Dam No. 3, and 1.3 river miles above the City of Hastings, Minnesota. Lock and Dam No. 2 and Pool 2 are located entirely within the State of Minnesota. The main channel at this point follows the left side of the valley and floodplain, adjacent to the lines of both the Chicago, Milwaukee, St. Paul and Pacific Railroad and Burlington Northern, Inc.

Upstream from St. Paul Park (mile 829.0) to Lock and Dam No. 1, extensive residential institutional, and commercial developments now claim the bluff top and floodplain in Pool 2. Urban development along the 5.5 mile reach from Lock and Dam No. 1 to Lilydale is, however, partially screened by vegetation and high bluffs. Downstream from St. Paul Park (mile 829.0) to Lock and Dam No. 2, only occasional residential or industrial sites interrupt the floodplain and bluff slope woodlands.

Pool 2 includes 25 navigable river miles up the Minnesota River also.

B. Pool Features:

Upstream from Lock and Dam No. 2, Pool 2 is typical of the downriver pools, spreading over the old floodplain with the deeper navigable channel meandering through the valley. In the approximate vicinity of river mile 825, the pool becomes confined to the old river channel. Except for several backwater areas and connected lakes, the pool remains within the confined and progressively narrowing channel up to Lock and Dam No. 1.

Principal features of Pool 2 are summarized below:

a.	Length of Pool - Mississippi River	32.5 river miles
	- Minnesota River	25.0 river miles
b.	River Miles - Mississippi River	815.2 to 847.7
	- Minnesota River	0.0 to 25.0
c.	Pool Elevation (flat pool)	687.2
d.	Water Area of Pool - Mississippi River segment	9,653 acres
e.	Primary shoreline (meandering mile perimeter limits, main and secondary channels, and main traversed sloughs adjacent to high ground accessible by land) Mississippi River segment	110 miles
f.	Federal lands above normal flat pool (approximate) Mississippi River segment, administered by Corps of Engineers	55 acres

C. Existing Recreational Facilities:

Pool 2 has 11 accesses with a total of 11 launching lanes, 705 parking spaces adjacent to boat accesses, 497 marina slips, 40 rental boats, 24 camping units and 89 picnicking units. In addition, approximately 45 boats are privately moored on the pool (Aerial Survey, 1976).

Parks in the Pool 2 area include: Harriet Island Municipal Park, Hidden Falls Municipal Park, Crosby Lake Municipal Park, Spring Lake County Park and Ft. Snelling State Park. Also see Section L, "How to Meet the Needs", below.

Most of the open water recreational boating occurs in the upper and lower portions of Pool 2 (Aerial Survey, 1976).

Six dredged material island/beach/camps were identified during the Aerial Survey of September 5, 1976. Two of these areas receive heavy use - RM 827.8 R and 845.5 L.

In addition, the Minnesota River has 2 accesses with a total of 2 launching lanes, 125 parking spaces adjacent to boat accesses, 60 camping units, 300 picnicking units, 23.0 miles of hiking trails, and 3.5 miles of cross-country ski trails. The City of Bloomington has approximately 525 acres of undeveloped park lands adjacent to the river.

D. Pool Accessibility:

The Mississippi River segment is paralleled on both sides of the pool by Federal, State, and county highways. Numerous highways enter this pool segment laterally, particularly near the Minneapolis-St. Paul metropolitan area. Access is limited, however, by the abundance of privately-owned land adjacent to the river and the lack of publicly-owned lands.

In the Minnesota River segment, a paved highway parallels the river on the right bank and several main trunk highways approach the pool from the Minneapolis-St. Paul metropolitan area.

E. Natural Resources:

In view of the degree of intermittent pollution existing in the Mississippi River segment of Pool 2 above Pig's Eye (RM 850.3) at the present time, its waters are considered a limited resource suitable for pleasure boating and general access (non-water contact recreation). Fishing, swimming, and waterskiing (water contact recreation) are expected to be limited until the pollution problem below Pig's Eye is alleviated. If the pollution levels are reduced or eliminated, the recreation demand is expected to be much greater than the capacity of the resource to satisfy it. The heavy amount of commercial traffic occurring in Pool 2 tends to limit the recreational boating that might otherwise occur, however. A review of recreational craft lockage movement through Locks 1 and 2 is shown on Table 32, and through 2 and 3 on Table 33.

Suitable above-water lands are not available in the pool for present use. Future development for land-based activities, including provision for additional facilities to support an increase in water-oriented activities when water conditions become more favorable, is dependent on the amount and quality of land acquired in the future. At present the land-based

[illegible]

[illegible]

[illegible]

Year	[illegible]	[illegible]	[illegible]	[illegible]
1960	5,137	1,278	2,484	[illegible]
1961	5,536	1,211	2,519	838
1962	4,270	959	2,184	623
1963	5,174	1,427	2,412	856
1964	5,107	1,890	2,537	1,155
1965	3,308	1,121	1,827	743
1966	4,423	1,677	2,213	1,064
1967	3,869	2,088	1,981	1,221
1968	4,702	2,193	2,181	1,422
1969	4,189	2,415	1,888	1,405
1970	4,555	2,960	1,953	1,861
1971	5,788	3,455	2,359	1,783
1972	5,723	2,798	2,345	1,568
1973	6,844	4,229	2,652	2,056
1974	6,410	4,014	2,504	1,822
1975	6,852	3,344	2,514	1,242
1976	8,014	4,007	2,482	1,502
*1980	17,020	8,687	6,288	3,443
*1990	34,166	16,166	12,206	5,993
*2000	47,581	21,975	16,837	7,998

* "Methodology and Forecasts of Recreation Use and Small Craft on the Upper Mississippi River, June 26, 1978" Midwest Research Institute.

TABLE 33
PLEASURE BOAT LOCKAGES
LOCKS 2 AND 3, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 3	Lock 2	Lock 3	Lock 2
1960	5,486	5,137	2,760	484
1961	5,490	5,536	2,748	519
1962	4,501	4,270	2,372	84
1963	5,113	5,174	2,497	[illegible]
1964	4,784	5,107	2,488	2,537
1965	4,139	3,308	2,096	1,827
1966	5,379	4,423	2,377	2,213
1967	4,519	3,869	2,528	1,981
1968	3,992	4,702	2,385	2,181
1969	3,747	4,189	2,499	1,888
1970	6,641	4,555	3,258	1,953
1971	8,051	5,788	3,282	2,359
1972	8,102	5,723	3,252	2,354
1973	9,585	6,844	3,690	2,652
1974	8,286	6,410	3,360	2,504
1975	9,057	6,852	3,297	2,514
1976	11,390	8,014	3,671	2,482
*1980	21,088	17,020	7,692	6,288
*1990	41,042	34,166	14,580	12,206
*2000	56,965	47,581	20,077	16,837

* Ibid.

activities are suffering from a below normal demand as a related consequence of not being able to provide both adequate amounts of land and quality water in a desired relationship and proper perspective.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F that are normal to the pool areas in general also prevail in Pool 2. Summer temperatures range upward to about 95 degrees F during June, July, and August and winter temperatures on occasion drop to about -30 degrees F.

F. Cultural Resources:

Fort Snelling, which dominates the confluence of the Mississippi and Minnesota Rivers, was the State's first military post and, until 1849, the northwesternmost outpost in the nation. This site is not directly affected by water level or man's activities in the floodplain. Cantonment New Hope, the site of the makeshift encampment occupied by the soldiers who built Fort Snelling, and located on low ground near the east end of the present Mendota Bridge, has been located by archaeological excavation, but has not been opened to the public.

Records show that two archaeological sites were inundated by the raising of the water level in Pool 2. These were Schilling Site [illegible] mound and village site on Grey Cloud Island, and the Sorg Site, [illegible] site on Spring Lake. No other archaeological, historical, or [illegible] sites of potential historical value are known to have been [illegible] establishment of Pool [illegible] as part of the [illegible] channel navigation [illegible] Several other [illegible] sites are [illegible] vicinity.

Other cultural resources adjacent to the Minnesota River include: Kennedy Site-Black Dog Aboriginal Americans (Archaeological), RM [illegible], Gideon Pond House (Historic), RM 9.5; Aboriginal Americans (Archaeological), RM 12, 13, and 14.

Other cultural resources adjacent to Pool 2 include: Aboriginal Americans (Archaeological), RM 818, 819, 821, 822, 825, and 826; Nininger Townsite (Historic), RM 818; German Evangelical Church (Historic), RM 825 (est.); and Kochendorfer House (Historical and Archaeological), RM 833 (est.).

G. Fish and Wildlife Resources:

Sport hunting of waterfowl along other parts of the Mississippi River study area is large. However, local ordinances limit hunting in the urban areas of Pool 2. Some trapping activity occurs around the Grey Cloud Island Area.

H. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged) Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 2 include:

* There was a higher than expected proportion of very high cost trips and a higher proportion of users in the high travel cost bracket (money traveling to the river).

* Although overall most visitors do not use locks (68%) some 67% in Pool 2 do.

* As a reason for choosing a put-in site, "near favorite island" had a higher than expected number of no responses.

Origin of trip of those users surveyed in this Pool:	St. Paul, Minnesota	73.7%
	Other Minnesota cities	7%
	Hudson, Wisconsin	3.5%

I. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. Visitor day use is projected to increase approximately 64 percent between 1975 and 2025. This is an increase of approximately 195,500 visitor days. Each visitor is anticipated to participate in more than one activity. Not all visitors will participate in activities associated with the river, however. Refer to Table 34.

J. Estimated Recreation Resource Requirements:

The projected recreation resource needs are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 35.

K. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements.

The greatest projected needs in Pool 2 are for multipurpose trails and hunting areas (both represent regional demands, however).

L. How to Meet the Needs:

Because of poor water quality conditions, there is very little existing demand for water-oriented recreational use (swimming, boating, fishing, etc.). The industrial/commercial development has limited demand for camping, picnicking, etc. The urban character of the area also limits hunting.

If the water quality is improved in Pool 2, the recreation demand is expected to be much greater than presently projected for boating and other water-related recreational activities. This demand will probably be greater than the capacity of the resource to satisfy it.

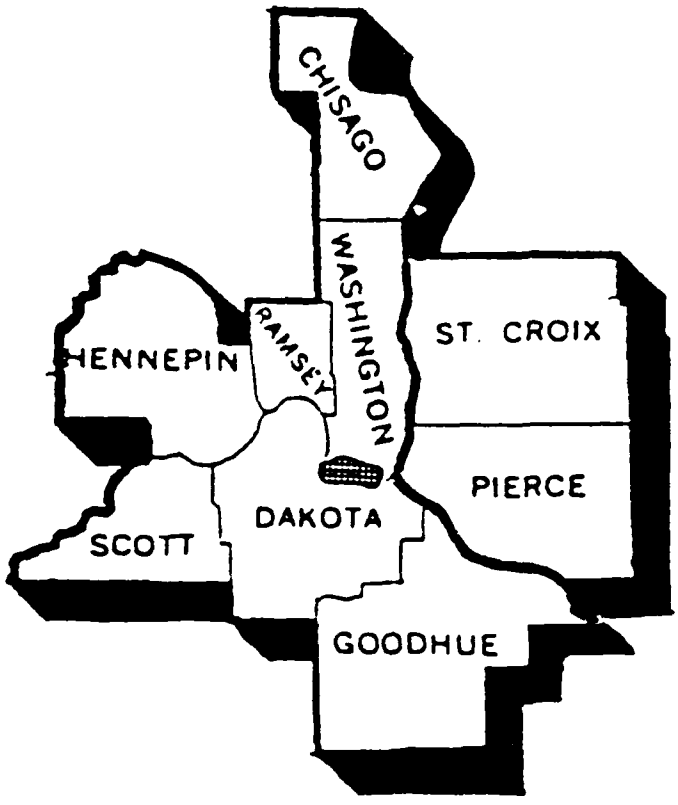


FIG. 33

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	515,715	752,175	840,280
26-50 Mi.	917,980	1,184,025	1,273,750

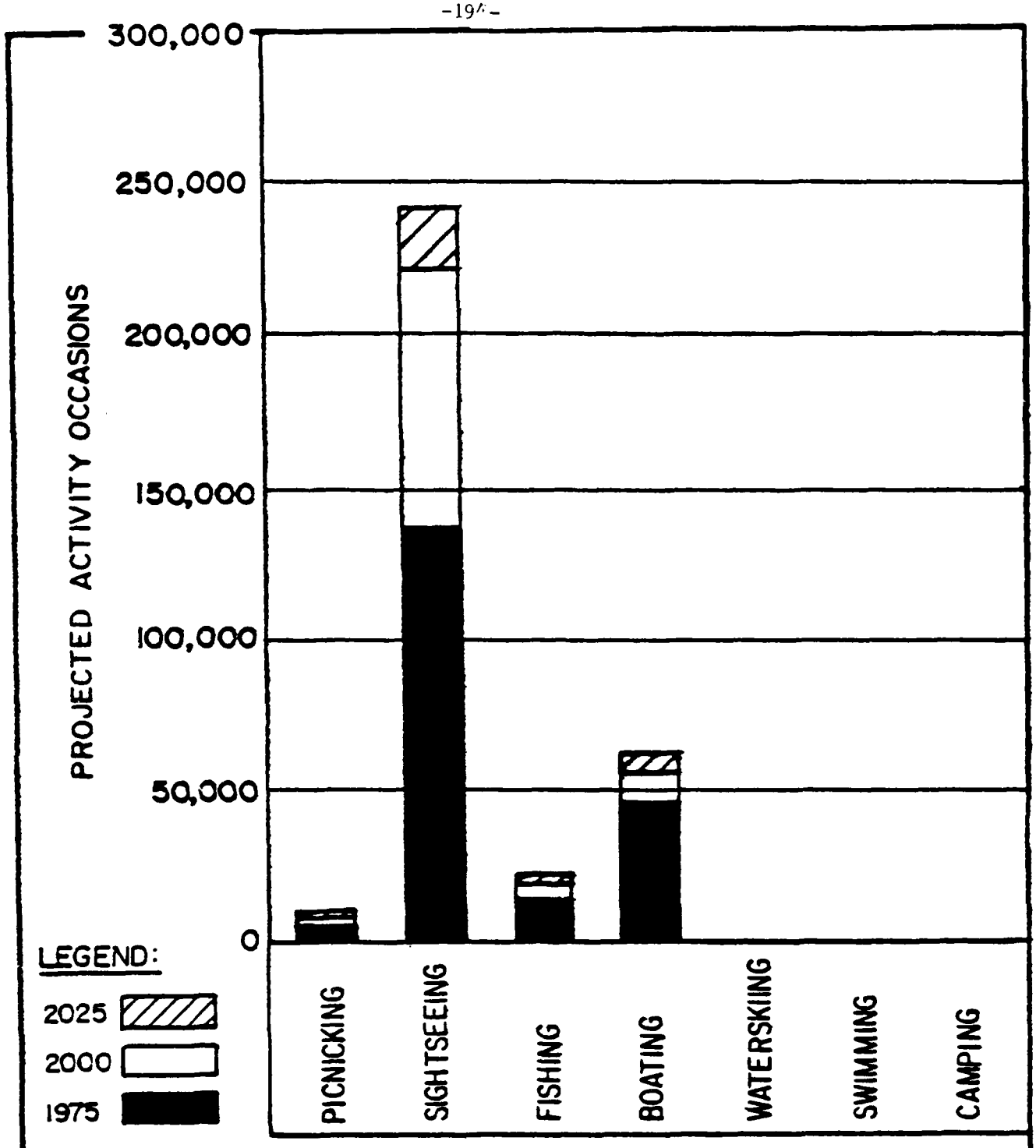
RECREATION DEMAND ANALYSIS
UPPER MISSISSIPPI RIVER NAVIGATION
POOL 2

GREAT

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 34
Pool - 2

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	6.0	6.4	7.7	8.2	8.6	8.9	9.1
Sightseeing:	137.9	148.3	209.8	220.3	229.3	238.3	242.2
Fishing:	14.6	15.9	18.2	19.5	20.6	21.7	22.2
Boating:	46.4	49.0	52.5	55.6	58.5	61.2	62.4
Waterskiing:	----	----	----	----	----	----	----
Swimming:	----	----	----	----	----	----	----
Camping:	----	----	----	----	----	----	----
Hiking:	70.6	75.7	82.2	88.9	96.0	101.9	105.0
Hunting:							
Small Game-	2119.6	2264.7	2426.9	2586.2	2739.1	2878.8	2943.8
Large Game-	863.7	922.7	988.8	1053.7	1116.0	1172.8	1199.3
Waterfowl-	942.0	1006.6	1078.6	1149.4	1217.4	1279.5	1308.4
Snowmobiling:	8674.4	9264.8	9914.2	----	----	----	----
Sub-Total:							
Activity Occassions:	204.9	219.6	288.2	303.6	317.0	330.1	335.9
Visitor Days:	305.8	327.8	430.2	453.1	473.1	492.7	501.3
Conversion Factor:	.67						



RECREATION
DEMAND ANALYSIS

POOL 2

FIGURE 34

GREAT

Table 35
Pool 2

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	10	20	78	1	62	2	1	112	3	3	--	--	--	--	--	--	--	--	--	20.6	6908	10,598	47.1	3368
1980:	11	22	84	1	67	2	1	119	3	3	--	--	--	--	--	--	--	--	--	22.3	7380	11,324	50.4	3598
1990:	13	26	119	1	77	2	1	127	3	3	--	--	--	--	--	--	--	--	--	23.9	7912	12,135	54.0	3850
2000:	14	28	125	2	82	2	1	135	3	3	--	--	--	--	--	--	--	--	--	25.6	8428	12,931	57.5	4096
2010:	15	30	130	2	87	2	1	142	4	4	--	--	--	--	--	--	--	--	--	28.0	8928	13,696	60.9	4327
2020:	15	30	135	2	92	2	2	148	4	4	--	--	--	--	--	--	--	--	--	29.7	9384	14,304	64.0	4542
2025:	15	30	137	2	94	2	2	151	4	4	--	--	--	--	--	--	--	--	--	30.5	9596	14,719	65.4	4640

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
252	5	4	25	342	5	5	34	382	6	6	39

U. - Number of Units
Ac. - Number of Acres
P.A. - Number of Parking Acres
P.S. - Number of Parking Spaces
L.L. - Launching Lanes

SWIMMING:
B.A. - Beach Area (sq. ft.)
S.B. - Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

The Metropolitan Council which is responsible for coordinating planning and development in the Twin Cities Metropolitan area provided the following analysis:

"Fort Snelling State Park is a 2,443-acre park located at the mouth of the Minnesota River. The park includes historic Fort Snelling (established in 1820) and floodplain areas of the Minnesota and Mississippi Rivers. Existing recreational facilities include picnic areas, swimming, and non-motorized boating on Snelling Lake; historical interpretive programs of the Fort, nature interpretive programs; and a system of hiking and ski-touring trails. Future developments for the park are bicycle trails, multiple-use trail connections to Minnehaha Regional Park, the Minnesota Valley National Wildlife Refuge and Recreation Area, and Lebanon Hills Regional Park, with a potential link to Lilydale Regional Park. The site also has a potential for an excursion ferry dock facility. The ferry would take passengers between Fort Snelling, Hidden Falls/Crosby Farm Regional Park in St. Paul and the Sibley and Faribault Historic Homes in Mendota.

Hidden Falls/Crosby Farm Regional Park is located on the east bank of the river from Fort Snelling State Park. The park encompasses 657 acres of river bluff and floodplain. Existing facilities include picnic area, boat launch, and more than seven miles of hiking/bicycle trails. Additional trails and a nature interpretive center are proposed for future development in 1979-80.

Lilydale Regional Park is a 350-acre park on the south (right hand) bank of the river downstream from Fort Snelling State Park. Land acquisition of the park is nearly completed. Proposed development for 1979-82 includes river-oriented picnic areas, hiking and bicycle trails, group camping, boat launch for Pickerel Lake (not on the river), and interpretive center for archaeological/paleontological study of clay pits, formerly owned by the Twin City Brick Company.

Harriet Island Regional Park is downstream of Lilydale Park, and across the river from downtown St. Paul. The 63-acre site is currently used for a marina, public boat launch, tour-boat launch, and picnic area. Proposed improvements for the park include expansion of the marina and related support facilities, plus a trail and parkway connection to Lilydale Regional Park scheduled for 1982-83.

Acquisition of a 1500-acre regional park in 1979-80 is proposed on land surrounding Pig's Eye Lake. This floodplain lake area supports a large heron rookery and other waterfowl species only five miles downriver of downtown St. Paul. Proposed development of the park includes river-oriented picnic areas, boat accesses for Pig's Eye Lake and the river, athletic fields, hiking, bicycle, ski-touring trails, and bird sanctuary. An additional 800 acres of regional park land (Battle Creek Regional Park) is adjacent to the proposed park site. Battle Creek Regional Park protects the scenic bluffs of the Mississippi River and the Battle Creek Valley. Both parks will be linked by a trail system.

Pool 2

Table 36

K. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	389	12		14		15		
Sightseeing (P.S.)	Approximately 109	101.5		125	16	137	26	
Fishing (P.S.)		72		82		94		
Fishing (L.L.)		2		2		2		
Boating (P.S.)	850	123		135		151		
Boating (L.L.)	13	3		3		4		
	497 (Slips)							
	44 private+							
Waterskiing (P.S.)		N/A		N/A		N/A		
Waterskiing (L.L.)								
Swimming (B.A.)	0	N/A		N/A		N/A		
Camping (Units)	84	N/A		N/A		N/A		
Hiking* (Miles)	290	23.1		25.6		30.5	1.5	
Hunting* Large Game (Land Acres)	4,569	7,646,000	Hunting is illegal within city limits of Minneapolis/St. Paul.					
Small Game* (Land Acres)	2,400	11,730,000	Hunting is illegal within city limits of Minneapolis/St. Paul.					

Pool 2

K. ESTIMATED RECREATION RESOURCE NEEDS
(CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	10,500	52,200,000	Hunting is illegal within city limits of Minneapolis/St. Paul.					
Snowmobiling* (Miles)	10.0	3,724	3,714	4,096	4,086	4,640	4,630	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

A 300- to 500-acre regional park is proposed on Grey Cloud Island, approximately eight miles downriver of Pig's Eye Lake Regional Park. Specific location and development concepts have not been determined at this time. A park in this area has a potential for providing boat access, river-oriented picnic areas, trail system, and a geological/archaeological interpretive center.

Spring Lake Regional Park is located about 20 miles southeast of downtown St. Paul in Dakota County. Approximately 1,000 acres of the 1,530-acre park has been acquired. Existing facilities include a picnic area and archery range. Proposed developments include a campground, picnic area, trail system, two boat launches, and a historical/archaeological interpretive facility scheduled for 1979-83.

A regional trail policy and system plan has been proposed by the Metropolitan Council. Adoption of the plan would authorize trail acquisition and development funds for the system. The trail system plan encourages the development of a trail corridor along the Mississippi River. Potential trail uses would be hiking, bicycling, ski-touring, snowmobiling, and horseback riding. Specific trail alignments and uses would be determined in trail master plans."

Several primitive island/camps should be maintained. Water contact recreation should not be promoted, however.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional developments occur, these impacts should be continuously monitored.

M. Recommendations:

1. Water contact recreation should not be encouraged until the water quality in the pool is suitable under Minnesota Pollution Control Agency standards.

2. Lands adjacent to existing recreational facilities should be purchased to meet anticipated demands due to water quality improvements. New future areas should be given consideration also.

3. The Corps of Engineers should develop a public use area on the pennisula northwest of Lock and Dam No. 2 (RM 815.4 R). This area could be developed in conjunction with Lake Rebecca Park development concepts and could include a "holding" area for recreational lockages.

4. Spring Lake County Park should be encouraged to expand its picnicking and trail facilities. The feasibility of providing camping should be further investigated.

5. The Corps of Engineers, Fish and Wildlife Service, and/or the Minnesota Department of Natural Resources should investigate the feasibility of purchasing islands within Pool 2 for future recreational use and wildlife management purposes (i.e. RM 823.0 R, 824.5 L, 826.0 R, 827.0 L (Upper Grey Cloud Island), 828.5 L, and 831.0 R).

6. The Jolly Roger Marina owners (RM 830.5) should be encouraged to investigate the feasibility of expanding their facility.

7. St. Paul should be encouraged to continue its expansion of Crosby Lake Municipal Park (RM 844.0 L). Dredged material should be provided by the Corps for fill material as requested.

8. The Minnesota DNR, Minneapolis and St. Paul should be encouraged to continue its efforts in the Critical Area designation in the Mississippi/Minnesota Rivers "gorge" area.

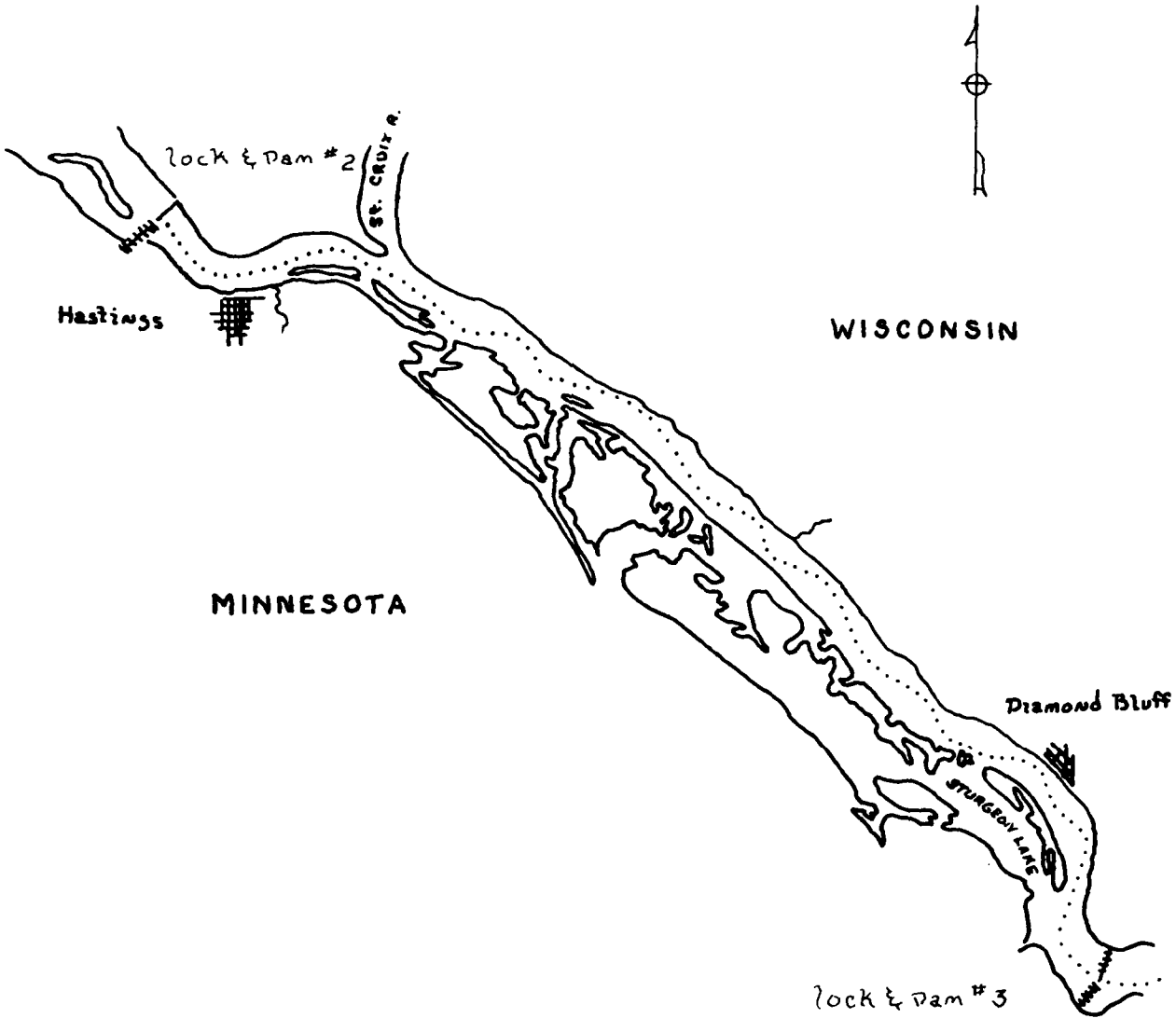
9. A primitive island/camp area should be maintained with dredged material at RM 824.1 L.

10. A primitive island/camp area should be maintained with dredged material at RM 827.8 R.

11. A primitive island/camp area should be maintained with dredged material at RM 828.1 L.

12. The Metropolitan Council should be encouraged to continue its efforts in developing refining and expanding existing park facilities and to acquire and develop additional areas as per their Regional Recreation Open Space System Policy Plan, December, 1974.

13. The Corps of Engineers should further investigate the feasibility of developing an island/camp area at RM 847.4 L. This area would serve as "lockage holding areas".



POOL 3

The GREAT River

Figure 35

POOL 3
(Includes St. Croix River)

A. Description of Pool:

The existing Lock and Dam No. 3 is located 796.9 river miles above the mouth of the Ohio River. The structure is 18.3 river miles below Lock and Dam No. 2, 6.1 river miles above the city of Red Wing, Minnesota, and 44.2 river miles above Lock and Dam No. 4. The main lock and completed upper section of the auxiliary lock are located on the Minnesota side or right bank of the main channel. A dike section about 2,400 feet long extends landward of the main lock and ties into a high alluvial terrace that parellels the Chicago, Milwaukee, St. Paul and Pacific Railroad riverward of its right-of-way at this point.

B. Pool Features:

Pool 3 is the fifth largest of the pools in the GREAT I study area. In addition to the area within the Mississippi River Valley extending for 18.3 miles up to Lock and Dam 2, the pool extends for a total distance of about 33 miles through Lake St. Croix and into the St. Croix River to a point about 10 miles above Stillwater, Minnesota. Within the St. Croix River Valley the pool is generally confined within the original banks with very little lowland or floodplain area.

In the Mississippi River Valley below the mouth of Lake St. Croix, the pool widens and spreads over areas of typical low, flat bottom lands in a generally wide floodplain. The lock and dam site and the main channel, at this point, are near the center of the floodplain which lies between high bluffs outlining the valley. Extending upstream from Lock 3, the main channel curves toward the Wisconsin side of the valley and approaches the high bluffs at the village of Diamond Bluff. From Diamond Bluff, the channel parallels the Chicago, Burlington and Quincy Railroad right-of-way along the left bank bluffs to about a mile above the mouth of Lake St. Croix, swings toward the right side of the valley and touches high ground at Hastings, again meeting the left side high bluffs at Lock and Dam No. 2. Because of the general channel alignment, most of the above-water project lands are on the right, or Minnesota, side of the channel.

Principal features of the pool are summarized below:

a.	Length of Pool - Mississippi River	18.3 river miles
	- St. Croix River	33.0 river miles
b.	River Miles - Mississippi River	796.9 to 815.2
	- St. Croix River	0 to 33.0
c.	Pool Elevation (flat Pool)	675.0
d.	Water Area of Pool (Mississippi River segment)	17,950 acres
e.	Primary shoreline (Mississippi River segment)	37.1 miles

f. Federal lands above normal flat pool (approximate)

(1) Administered by Corps of Engineers	3,430 acres
(2) Administered by Dept. of the Interior	68 acres
(3) Total above-water lands	3,498 acres

C. Federal Lands:

Approximately 5,680 acres are held in fee by the Federal Government within the actual limits of Pool 3. Of this total, 5,612 acres are under the jurisdiction of the Corps of Engineers. Audit records of current land holdings in the Pool 3 account show a total of 5,604.5 acres under Corps jurisdiction, the difference being due to the manner of acquisition which generally provided for overlap through the proposed structure site into the next downstream pool.

Approximately 4,217.1 acres are leased by the Federal Government for various uses: conservation - 4,122.8 acres, barge mooring - 21.4 acres, agriculture - 65.0 acres, utilities - 7.8 acres and private cottage - 0.1 acres.

D. Existing Recreational Facilities:

Pool 3 (excluding St. Croix River) has 9 access areas with a total of 9 launching lanes (7 in Minnesota, 2 in Wisconsin), 216 parking spaces adjacent to boat accesses, 669 marina slips (525 in Minnesota, 144 in Wisconsin), no camping units and 21 picnicking units. In addition, approximately 16 boats are privately moored on the pool (Aerial Survey, 1976).

Lake Rebecca Municipal Park is the only major park area in the pool, and it is largely undeveloped. The Corps of Engineers has two areas - Sturgeon Lake Public Access and Commissary Point Campground. There are several private marinas/harbors located mainly at Prescott, Wisconsin and Hastings, Minnesota.

Most of the open water recreation boating occurs near the mouth of the St. Croix River, near Hastings and Diamond Bluff. Pool 3 has the third highest number of open water boat use (Aerial Survey, 1976). A historical record of the recreational craft flow through Locks 3 and 4 is presented on Table 37.

Eleven dredged material island/beach/camps were identified during the Aerial Survey of September 5, 1976. Two of these areas receive "heavy" use - RM 807.5 R and 799.4 R.

E. Pool Accessibility:

Auto transport on the expressways places the area of Pool 3 within an hour's drive of the Twin Cities. However, once in the area, access to the river by well-paved roads is lacking, which makes the pool somewhat difficult to get to. The Mississippi River segment has no main trunk or secondary feeder highways closely paralleling either side of the pool. Since general physical characteristics of the region below the mouth of Lake St. Croix have precluded development of cities and towns in or immediately adjacent to the valley, main highways running in the same general north-to-south direction have been routed inland past this reach. The only main highways directly entering this pool segment laterally through the primary zone are at Prescott, Wisconsin, and Hastings, Minnesota, where

the only Mississippi River highway bridge crossing is located. On the Minnesota side, county and township roads extending from main trunk and secondary highways provide the only direct access. On the Wisconsin side, accessibility in general is more limited but improved county roads lead to the one available area of Corps bottom lands below Diamond Bluff.

In the St. Croix Lake and River segment, paved highways parallel the upper half and several main trunk highways approach the pool from the St. Paul-Minneapolis metropolitan area, with three highway bridge crossings into Wisconsin.

F. Natural Resources:

In view of the degree of intermittent pollution existing in the Mississippi River segment of Pcol 3 at the present time, its waters are considered as a limited resource suitable for pleasure boating, general access, and transportation. Fishing, swimming, and waterskiing are expected to generate very limited demand until these pollutions are alleviated.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, which are normal to the pool areas in general, also prevail in Pool 3. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources:

There are a number of known archaeological sites in Pool 3 (7 in Minnesota, 1 in Wisconsin), some of which have been affected by the activities of the Corps of Engineers. Still of archaeological significance is the Bartron Site (National Register site), located in Goodhue County on the southern portion of Prairie Island in the Mississippi River bottom lands. This site is relatively undisturbed by farming and contains possible evidence of house form, village arrangement, and artifacts from the major Mississippian culture (1000 A.D. to 1700 A.D.). This site is owned by Northern States Power and has been excavated by Professor Eldon Johnson (State Archaeologist). It is known that Pierre Le Sueur spent the winter of 1696 there. The Diamond Bluff Site/Mero Mound Group at RM 797 is also on the National Register.

H. Fish and Wildlife Resources:

Pool 3 has a small but important commercial fishery in North and Sturgeon Lakes located in the southernmost section. Compared with Pool 4, however, it is not large. Table 2-13 shows the catch for each year from 1960 through 1975.

The commercial catch fluctuates widely in this pool from year to year. This is probably an indication of the pool's sensitivity to environmental impacts but it also reflects the fluctuating market values of the fish. Economic factors and the proximity to Pool 2, with its frequent high levels of pollution, influence the commercial catch in Pool 3. Using the most recent data of the Upper Mississippi River Conservation Committee in its compendium incorporating the 12-year averages between 1953 and 1965, the following tabulation indicates the extent and composition of the commercial fishery in Pools 3, 4, and 5.

TABLE 37
PLEASURE BOAT LOCKAGES
LOCKS 3 AND 4, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 4	Lock 3	Lock 4	Lock 3
1960	4,305	5,486	2,498	2,760
1961	4,361	5,490	2,400	2,748
1962	3,943	4,501	2,202	2,372
1963	4,225	5,113	2,472	2,497
1964	4,347	4,784	2,633	2,488
1965	3,621	4,139	2,108	2,096
1966	4,276	5,379	2,662	2,377
1967	4,179	4,519	2,519	2,528
1968	4,281	3,992	2,481	2,385
1969	4,523	3,747	2,485	2,499
1970	5,144	6,641	2,832	3,258
1971	6,086	8,051	3,613	3,282
1972	6,488	8,102	3,153	3,252
1973	6,595	9,585	3,224	3,690
1974	6,164	8,286	2,953	3,360
1975	5,953	9,057	2,709	3,297
1976	7,674	11,390	3,148	3,671
*1980	6,617	21,088	2,697	7,692
*1990	9,531	41,042	3,702	14,580
*2000	11,854	56,965	4,504	20,077

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

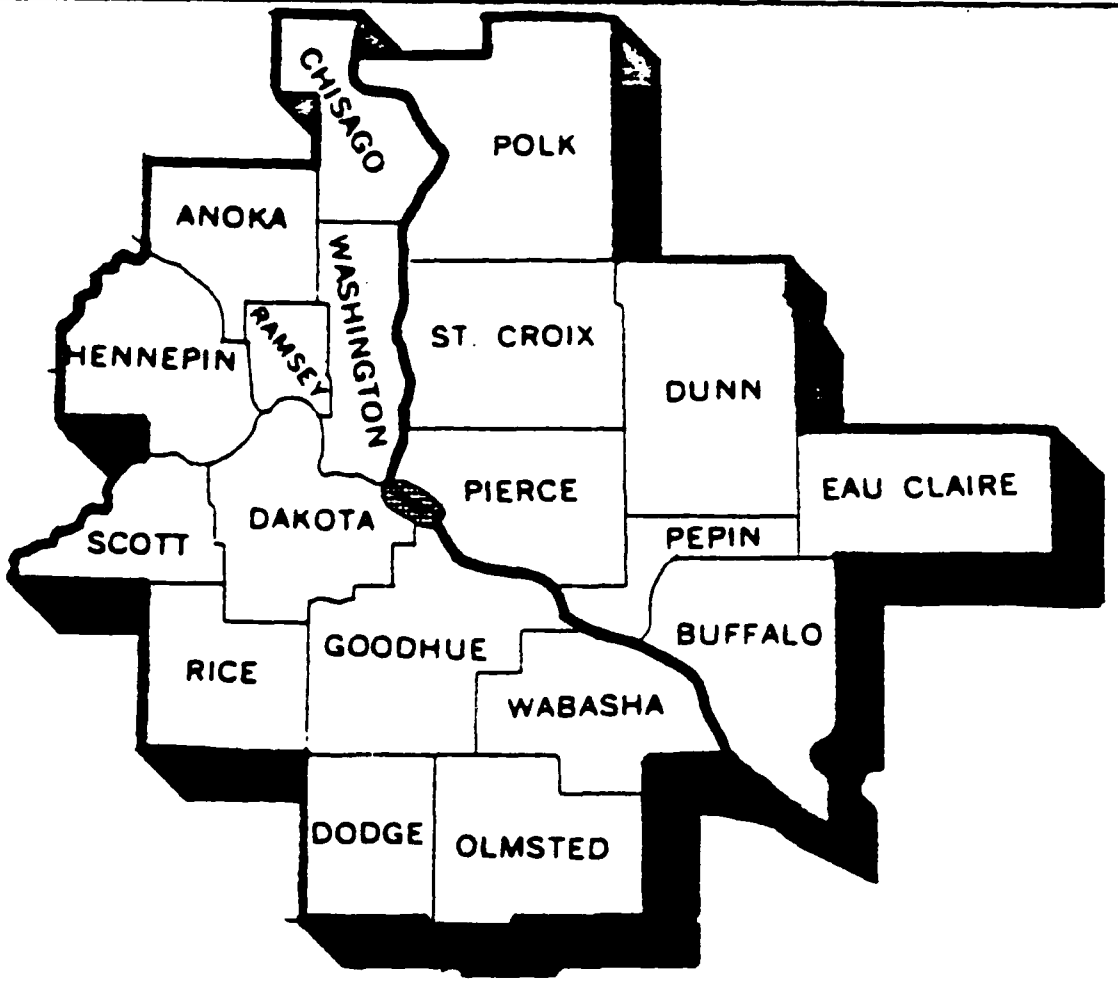


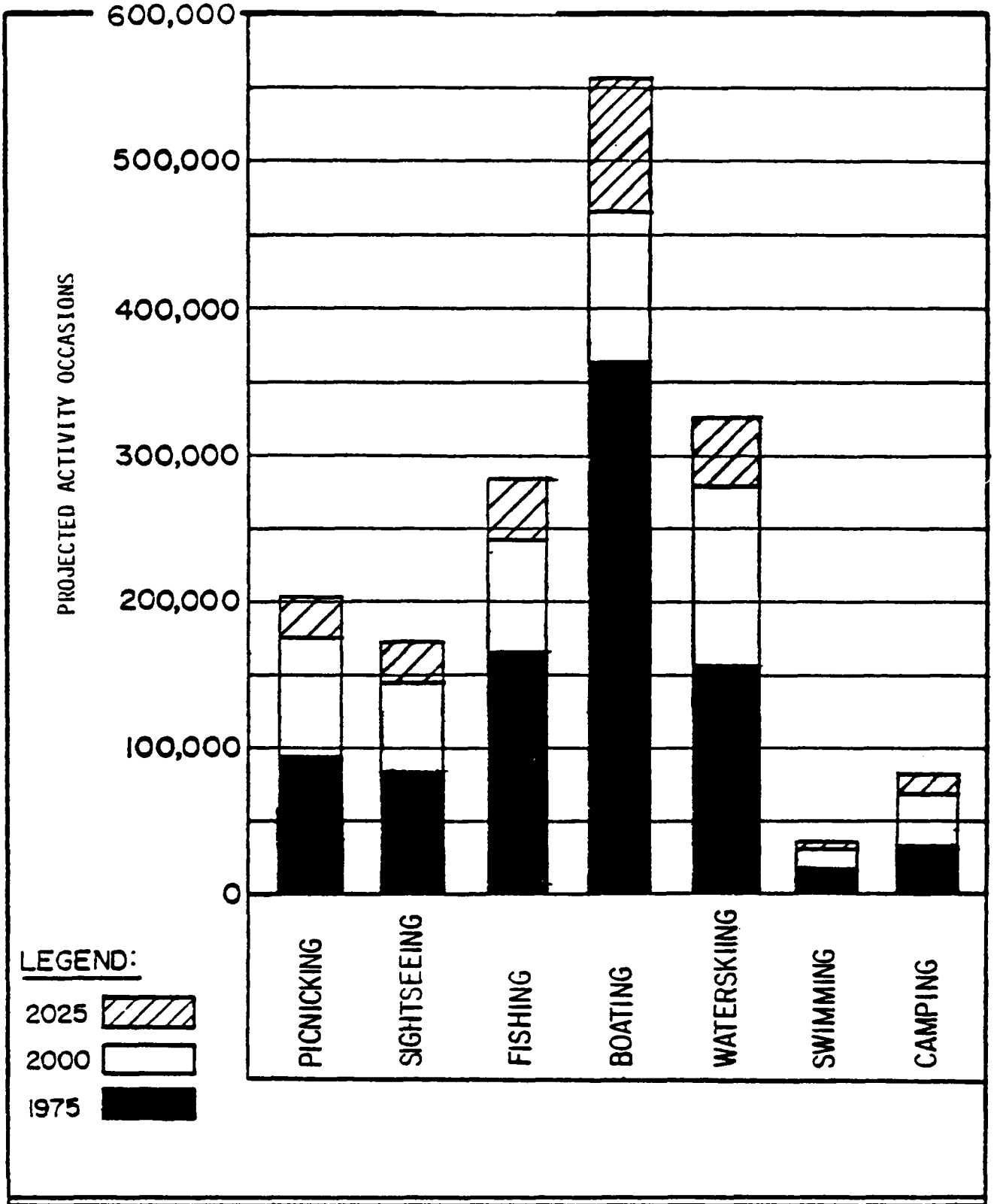
FIG. 36

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	72,390	128,550	153,100
26-50 Mi.	519,445	703,680	773,690
51-75 Mi.	1,195,559	1,433,530	1,549,115

RECREATION DEMAND ANALYSIS
UPPER MISSISSIPPI RIVER NAVIGATION
POOL 3

The GREAT River



RECREATION
DEMAND ANALYSIS

POOL 3

FIGURE 37

The GREAT River

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 38
Pool 3

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	93.9	105.8	159.9	172.7	185.0	195.7	200.9
Sightseeing:	85.4	94.9	135.7	147.2	158.1	167.7	172.3
Fishing:	165.9	181.4	220.8	240.4	259.3	275.4	283.4
Boating:	363.9	393.1	428.9	467.9	505.2	537.3	553.0
Waterskiing:	155.3	173.7	256.4	278.2	299.1	317.3	326.1
Swimming:	17.5	19.2	28.3	30.1	31.7	33.1	33.8
Camping:	32.9	37.7	64.5	69.9	75.1	79.6	81.8
Hiking:	85.6	89.6	95.2	75.1	113.4	121.3	125.3
Hunting:							
Small Game-	2103.5	2186.4	2301.5	2458.9	2605.4	2746.5	2813.3
Large Game-	883.5	918.3	966.6	1032.7	1094.2	1153.5	1181.6
Waterfowl-	1220.0	1268.1	1334.9	1426.1	1511.1	1593.0	1631.7
Snowmobiling:	8854.5	9195.6	9664.6	----	----	----	----
Sub-Total:							
Activity Occassions:	914.8	1005.8	1294.5	1406.4	1513.5	1606.1	1651.3
Visitor Days:	667.7	734.2	944.9	1026.6	1104.7	1172.3	1205.3
Conversion Factor:	1.37						

Table 39
Pool 3

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	162	324	49	1	709	18	12	893	22	22	381	10	10	43	15,082	5	3	141	470	24.7	7068	10,518	61,000	3438
1980:	182	364	54	1	776	19	13	965	24	24	426	11	11	47	16,512	6	4	162	540	25.5	7348	10,932	63,400	3571
1990:	275	550	78	1	944	24	16	1,053	26	26	629	16	16	69	24,303	8	6	277	923	27.2	7732	11,508	66,800	3745
2000:	297	594	84	1	1,028	26	17	1,149	29	29	683	17	17	74	25,888	9	6	301	1,003	30.5	8260	12,295	71,300	3994
2010:	318	636	91	1	1,109	28	18	1,240	31	31	734	18	18	78	27,221	9	6	323	1,077	33.0	8752	13,027	75,600	4205
2020:	337	674	96	1	1,178	29	20	1,319	33	33	779	19	19	81	28,498	10	7	342	1,140	35.4	9228	13,733	79,700	4415
2025:	346	692	99	1	1,212	30	20	1,357	34	34	800	20	20	83	29,075	10	7	352	1,173	36.3	9452	14,067	81,600	4511

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
2,075	50	38	843	3,018	72	56	1,670	3,551	84	65	1,949

U. - Number of Units
Ac. - Number of Acres
P.A. - Number of Parking Acres
P.S. - Number of Parking Spaces
L.L. - Launching Lanes

SWIMMING:
B.A. - Beach Area (sq. ft.)
S.B. - Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Average Commercial Fish Catch By Species in Pools 3, 4, and 5 in pounds.

Species	Pool 3	Pool 4	Pool 5
Carp	75,803	1,492,265	90,519
Buffalo	5,088	47,142	9,134
Sheepshead	4,975	93,710	15,521
Catfish	2,013	35,173	14,667
Other*	2,071	37,758	11,633

*Bullheads, suckers, quillback, mooneyes, goldeneyes, garfish, and bowfins.

Hunting is a popular sport in the Mississippi River segment of Pool 3 and the natural resources of the area provide a good supply of native game and locally nesting waterfowl. Bag checks by the Minnesota Department of Natural Resources reveal waterfowl harvests comparable with the State average. Between 1961 and 1973, spot bag checks revealed that hunter numbers ranged from 30 to 100 and the number of ducks, principally wood ducks, ranged from 0.53 to 1.66 per hunter.

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 3 include:

* Cost on the river was significantly related to pool location with Pool 3 having a higher proportion of low cost trips.

* Choice of put-in exhibited significant relationships, with "near favorite island" having a higher than expected group of no responses in Pool 3.

* There was a disproportional level of extreme perceived crowding in Pool 3.

Origin of trip to those users surveyed in this Pool:	Hastings, Minnesota	39.4%
	Prescott, Wisconsin	17 %
	Other Minnesota cities	15 %
	Red Wing, Minnesota	8.5%
	St. Paul, Minnesota	7.4%

Note: For detailed information on the St. Croix River refer to the Minnesota-Wisconsin Boundary Area Commission studies of 1977-78.

TABLE 40
POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 3 OF THE UPPER MISSISSIPPI RIVER, 1960-1975

Year	Commercial Fish Catch
1960	119,000
1961	104,000
1962	46,000
1963	39,000
1964	89,000
1965	Not Available
1966	21,000
1967	46,000
1968	363,000
1969	129,000
1970	278,396
1971	38,323
1972	237,172
1973	23,910
1974	245,425
1975	110,641

Source: Upper Mississippi River Conservation Committee

Pool 3

Table 41

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	21	229	208	297	276	346	325	
Sightseeing (P.S.)	Approximately 43	66	23	84	41	99	56	
Fishing (P.S.)		860		1,028		1,212		
(L.L.)		21.5		26		30		
Boating (P.S.)	221	1,009	1,490	1,149	1,954	1,357	2,242	
(L.L.)	9	25	51++	29	63++	34	67++	
	669 (Slips) 16 private+							
Waterskiing (P.S.)		527.5		683		800		
(L.L.)		13.5		17		20		
Swimming (B.A.)	20,000 ft^2 0.4591 Ac.	20,400 ft^2 0.47 Ac.		26,000 ft^2 0.59 Ac.	6,000 ft^2 0.14 Ac.	29,000 ft^2 0.67 Ac.	9,000 ft^2 0.21 Ac.	
Camping (Units)	0	220	220	301	301	352	352	
Hiking* (Miles)	0	26	26	31	31	36	36	
Hunting* Large Game (Land Acres)	10,849**	7,540,000	7,529,151	8,260,000	8,249,151	9,452,000	9,441,151	
Small Game* (Land Acres)	4,658**	11,220,000	11,215,342	12,295,000	12,290,342	14,067,000	14,062,342	

Pool 3

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	9,213**	65,100,000	65,090,787	71,300,000	71,290,787	81,600,000	81,590,787	
Snowmobiling* (Miles)	Approximately 10	3,658	3,648	3,994	3,984	4,511	4,501	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from the Public Use Projections, February, 1978, GREAT I, Recreation Work Group. Visitor day use is projected to increase approximately 81 percent between 1975 and 2025. This is an increase of approximately 537,600 visitor days. Each visitor is anticipated to participate in more than one activity, however. Refer to Table 38.

K. Estimated Recreation Resource Requirements:

The projected recreation resource needs are taken from the Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements are calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 39.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements.

According to GREAT projections, the largest deficiencies in Pool 3 are for boat access launching lanes and adjacent parking and hunting areas (regional demand). The need is slightly higher for powerboating/waterskiing over fishing access. Refer to Table 41.

By 1985, it is estimated that there will be approximately 1,500 additional parking spaces adjacent to accesses and over 50 launching lanes required to meet the projected recreational use. By 2000, approximately 2,000 additional parking spaces and over 60 launching lanes are projected to be required.

M. How to Meet the Needs:

The topography of the Pool 3 area and the lack of existing access roads are the main factors that limit the kind and number of boat access areas. Existing access to the river can only be gained from Diamond Bluff, Prescott, and Hastings. Access from the Minnesota side is, in addition, limited by sloughs and marshes that lie between the main channel and existing gravel roadways. Several state and federal boat access areas can be upgraded and expanded. Several private areas can also be expanded. It is doubtful, however, that projected boating facility needs can be satisfied within Pool 3.

Camping and picnicking facilities are very limited in the Pool 3 area. Additional facilities could be provided at Lake Rebecca Park, Commissary Point, and Vermillion River Public Accesses. It is doubtful, however, that projected facility requirements can be satisfied within Pool 3.

Multipurpose trail needs represent regional demands. Some of these demands can be satisfied in the Gores Pool Wildlife Area, Lake Rebecca Park and Commissary Point. Several wildlife management areas located within the pool may be suitable for low density hiking trails. In addition, snowmobiling can occur on frozen backwater areas.

Projected demands for large game, small game, and waterfowl hunting (regional demands) cannot be satisfied within Pool 3.

The beach at Diamond Bluff, formed from dredged material, is very heavily used. The additional requirement for road access swimming beaches is very limited. Additional facilities would be desirable in Minnesota, possibly at Lake Rebecca Park. Water quality conditions should be carefully monitored at all beaches, however.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continuously monitored.

N. Recommendations:

1. Vermillion River Public Accesses (RM 797.2, 807.3) should be improved--expand parking, upgrade ramps, and improve signage.

2. The Corps of Engineers should investigate expanding the recreational facilities at Commissary Point (RM 797.3R)--camping, picnicking, beach and other general recreation use.

3. The owner of the Diamond Bluff Beach (RM 800.1) should be encouraged (assisted by Wisconsin DNR) to investigate the feasibility of constructing a parking lot, upgrading and expanding the boat access and dredging the harbor.

4. The Minnesota DNR should investigate the feasibility of expanding the North Lake Public Access (RM 804.1) and the adjacent parking.

5. The Corps of Engineers should investigate expanding the Sturgeon Lake Public Access (RM 798.5) and the adjacent parking.

6. The Prescott Jaycees should be encouraged to upgrade boat access (RM 811.2).

7. The owner of King's Cove Marina (RM 813.8) should be encouraged to investigate the feasibility of expanding the marina and boat launching facilities and parking.

8. The owner of the Hastings Marina (RM 813.2) should be encouraged to investigate the feasibility of expanding the marina and boat launching facilities and parking.

9. The owner of Hub's Bait (RM 814.1) should be encouraged to investigate the feasibility of expanding its boat launching facilities and parking.

10. The City of Hastings should be assisted by the Minnesota Department of Natural Resources and the Corps of Engineers in developing Lake Rebecca Park. Possible facilities to be developed include boat launching and mooring, picnicking, camping, swimming beach, multipurpose trails, and recreational lockage holding area.

11. The City of Prescott in cooperation with the Corps of Engineers should investigate the feasibility and impact of a "wet storage" marina development behind Prescott Island (RM 811.8R).

12. The Wisconsin DNR should investigate the feasibility of providing a boat access off County Road Q between Prescott and Diamond Bluff (RM 808.5).

13. The Minnesota Department of Natural Resources should provide a system of low-impact trails on state refuge lands in Pool 3.

14. The Wisconsin DNR should investigate the feasibility of developing multipurpose trails along the bluff tops.

15. The City of Hastings should be encouraged to provide picnicking facilities in Levee Park (RM 813.9).

16. A primitive island/beach area should be maintained at RM 799.4 R.

17. A primitive island/beach area should be maintained at RM 801.7 L.

18. A primitive island/beach area should be maintained at RM 802.3 R.

19. A primitive island/beach area should be maintained at RM 805.5 R.

20. A primitive island/beach area should be maintained at RM 807.5 R.

21. The Corps of Engineers should further investigate the feasibility of developing a primitive dredged material island/beach area at RM 797.4 L for use as a recreational "lockage holding area".

22. The Fish and Wildlife Service, Minnesota and Wisconsin DNRs should intensively manage their wildlife management lands in Pool 3 for fish and wildlife purposes.

23. The Corps of Engineers should further investigate the feasibility of developing a beach/camp area at RM 814.9 L. This area could serve as a "lockage holding area". Road access could be provided to the area.

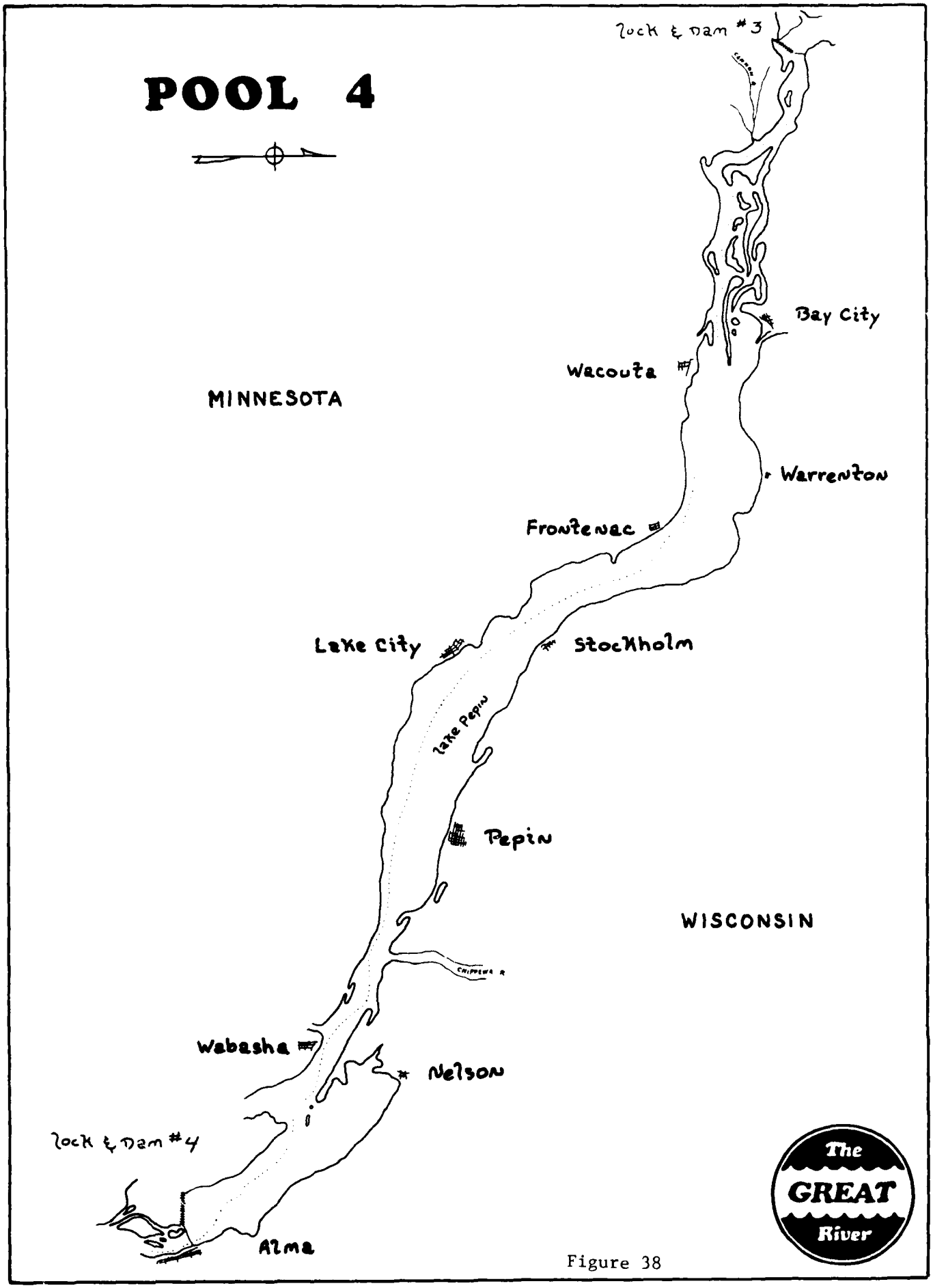

POOL 4
Lock & Dam #3
Bay City
Wacouta
MINNESOTA
Warrenton
Frontenac
Lake City
Stockholm
Lake Pepin
Pepin
WISCONSIN
Wabasha
Nelson
Lock & Dam #4
Alma
The GREAT River

Figure 38

Pool 4

A. Description of Pool:

Lock and Dam No. 4 is located 752.7 river miles above the mouth of the Ohio River. The structure is 44.2 river miles below Lock and Dam No. 3, 14.6 river miles above Lock and Dam No. 5, and 27.2 river miles above the city of Winona, Minnesota and within the limits of the city of Alma, Wisconsin. The main lock and completed portion of the auxiliary lock are located on the Wisconsin side or left bank of the main channel of the Mississippi River which at this point is immediately adjacent to the Chicago, Burlington, and Quincy Railroad right-of-way embankment.

B. Pool Features:

Pool 4, the longest pool in terms of river miles, has the largest water area and the longest shoreline of all the pools in the GREAT I study area. However, it is sixth in total acres of federally-owned lands and fifth in acres of federal lands protruding above the normal water elevation of the pool. The entire Lake Pepin area is contained in Pool 4, accounting, to a large extent, for both the length and size of the pool. This area has been affected relatively little by channelization. The areas both upstream and downstream from the lake are typical of other sections of the river. The channel meanders through the alluvial fill and the multilevel terraces and lowlands formed by the glacial outwash. These features have been changed somewhat by the action of recurring high water.

Extending upstream from Lock and Dam No. 4, the main channel meanders through the floodplain toward the right side of the valley, reaches high ground at Wabasha, Minnesota, and essentially parallels this high-ground area to the lower end of Lake Pepin beginning at the Chippewa River Delta. Through Lake Pepin, the commercial sailing course generally meanders with the alignment of the lake and then bears to the Minnesota side at the upstream end of the lake. Here, the sailing course again follows a defined main channel at the edge of the floodplain to the city of Red Wing, Minnesota. From Red Wing, the channel crosses the floodplain sharply to Wisconsin high ground at Trenton and then angles to meet the lower approach channel to Lock No. 3. The Chippewa River is the only major tributary flowing into Pool 4. Well-known smaller tributaries are the Vermillion and Cannon Rivers in Minnesota and the Buffalo River in Wisconsin.

Principal features of the pool are summarized below:

a.	Length of Pool	44.2 river miles
b.	River miles	752.7 to 796.9
c.	Pool elevation (flat pool)	667.0
d.	Water area of pool (includes Lake Pepin)	35,198 acres

e.	Shoreline miles (meandering outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm high ground, accessible by land)	155 miles
f.	Federal land above normal flat pool (Approximate)	
	(1) Administered by Corps of Engineers	1,769 acres
	(2) Administered by the Department of the Interior	4,836 acres
	(3) Total above-water lands	6,605 acres

C. Federal Lands:

The Corps of Engineers has acquired and presently administers about 2,900 acres of federally-owned land and water area and holds special rights on an additional 6,535 acres administered by the Fish and Wildlife Service. Of the 2,900 acres of Corps-administered land and water area, about 2,898 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi River Wildlife and Fish Refuge in conjunction with Service-owned lands. About 2 acres of Corps lands at the structure site (Lock and Dam No. 4) have been retained solely for Corps use.

Federal lands acquired and presently being administered for all purposes in connection with Lock and Dam No. 4 extend upstream to the Chippewa River. No federally-owned lands are located from the Chippewa River through Lake Pepin and upstream to the area immediately downstream from Lock and Dam No. 3. In this area, about 138 acres on the Minnesota side of the old channel were acquired by the Corps of Engineers in connection with work on the lower approach channel to Lock No. 3 and, although technically and physically related to Pool 4, federal audit records relate the land to the Lock and Dam No. 3 project. Therefore, these 138 acres are not included in the 2,900 acres of Corps lands acquired and being administered as Pool 4 lands.

About 6,605 acres of federally-owned, above-water lands in Pool 4 protrude above the normal flat pool elevation of 667.0. The Fish and Wildlife Service has jurisdiction over 4,836 acres, all of which are in the refuge area downstream from the Chippewa River. The Corps of Engineers has jurisdiction over 1,769 acres, with about 1,614 acres located downstream from the Chippewa River and about 155 acres located immediately downstream of Lock and Dam No. 3. These 155 acres represent an increase over the originally acquired 138 acres and result from accretion and the deposition and buildup of dredge material.

In the Pool 4 area, the Corps of Engineers exercises varying degrees of management, both directly and by delegation, over lands under its jurisdiction for navigation, flood control, recreation and preservation of natural resources. Both the Fish and Wildlife Service and the Minnesota Department of Natural Resources are managing Corps lands in Pool 4 as fish and wildlife refuges and for recreational development.

Approximately 20.2 acres are leased by the Federal Government for various uses: roads, power lines - 4.2 acres, public park - 13.9 acres, commercial recreation - 1.9 acres and private cottages - 0.2 acres.

D. Existing Recreational Facilities

Pool 4 has 35 access areas with a total of 40 launching lanes (25 in Minnesota, 15 in Wisconsin), 1,216 parking spaces adjacent to boat accesses, 1,332 marina slips (1,210 in Minnesota, 122 in Wisconsin), 692 camping units, and 381 picnicking units. In addition, approximately 775 boats are privately moored on the pool (Aerial Survey, 1976).

There is one state park--Frontenac State Park, Minnesota. Several municipal parks provide major recreational facilities--Wabasha Municipal Park, Bay Point Park, Barn Bluff Municipal Park, Colville Municipal Park, Hok-Si-La Municipal Park, Onuta Municipal Park, McCahill Municipal Park, Roscher Park, etc. There are many private recreational developments throughout the pool.

Most of the open water recreational boating occurs in Lake Pepin. Lake Pepin is well known for its sailboating and waterskiing. The sport of waterskiing is believed to have originated at Lake City.

The dredged material island/beach/camps below the Chippewa River are the third most heavily-used areas within the GREAT I area (Aerial Survey, 1976). Only Pools 9 and 10 have more island/beach camp recreation.

E. Pool Assessibility

Railroads and primary highways closely parallel both side of the pool. Primary and secondary highways and typical networks of county and township roads provide lateral access through the zone of influence. Highway bridges at Red Wing and Wabasha provide crossings from Minnesota to Wisconsin. A small airport near Red Wing is available for private planes.

F. Natural Resources

Relatively few areas of Corps of Engineers lands in Pool 4 are presently accessible by wheeled vehicles. Furthermore, few areas can provide good water access to the pool or have characteristics suitable for the development of general recreational activities. The federal lands are primarily suitable for wildlife-oriented activities which require a minimum of development. Water areas of the pool, particularly Lake Pepin, can provide the full range of on-water activities, limited only by the degree of acceptance of conditions caused by pollution. Historical flows of recreation craft through Locks 4 and 5 are shown on Table 42. Lands and waters combined with forests and plant life provide habitat that produces a continuing supply of fish, waterfowl, and wild game. The harvesting of these resources is limited only by the availability of unrestricted areas and by the degree to which the undesirable features can be overlooked.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees to 48 degrees F, that are normal to the pool areas in general, also prevail in Pool 4. Summer temperatures range [illegible] to about 97 degrees F during June, July, and August, and winter temperatures [illegible] about -30 degrees.

TABLE 42
PLEASURE BOAT LOCKAGES
LOCKS 4 AND 5, 1960-1976

Year	Pleasure Boats Through Lock 5	Pleasure Boats Through Lock 4	Pleasure Boat Lockages Through Lock 5	Pleasure Boat Lockages Through Lock 4
1960	2,846	4,305	1,715	2,498
1961	2,919	4,361	1,722	2,400
1962	3,295	3,943	1,958	2,202
1963	3,202	4,225	1,820	2,472
1964	3,192	4,347	1,967	2,633
1965	3,034	3,621	1,671	2,108
1966	3,422	4,276	2,112	2,662
1967	3,132	4,179	2,033	2,519
1968	3,297	4,281	2,591	2,481
1969	3,408	4,523	1,933	2,485
1970	3,891	5,144	2,152	2,832
1971	4,768	6,086	2,476	3,613
1972	5,270	6,488	2,653	3,153
1973	5,018	6,595	2,491	3,224
1974	4,420	6,164	2,191	2,953
1975	4,984	5,953	2,162	2,709
1976	6,108	7,674	2,494	3,148
*1980	5,152	6,617	2,191	2,697
*1990	5,216	9,531	2,213	3,702
*2000	5,331	11,854	2,253	4,504

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

G. Cultural Resources:

The State of Wisconsin has designated Tiffany Bottoms as a State Scientific Area and Nelson-Trevino as a State Natural Area. One area has been designated as a National Natural Landmark--Chippewa River Bottoms (RM 760-64). Several areas within Pool 4 have been placed on the National Register. Six archaeological sites have been included: Mitchell-Lewis Catalog (RM 772), Aborginal Americans (RMs 778, 765, and 759), Nauer Mounds (RM 797), and Diamond Bluff/Mero Mound Group (RM 797). Four areas have been designated historical areas: Old Frontenac Historical District (RM 780), Minnesota State Training School (RM 788), Fleischman's Malting Company (RM 791), and Reeds Landing Historic District (RM 763).

H. Fish and Wildlife Resources:

Pool 4, along with Pool 9, is one of the two major sources of commercial fish in the Upper Mississippi River. During the 1960's these two pools ranked either first or second as the pool providing the greatest weight of commercial fish caught. The commercial catch in Pool 4 from 1960 through 1975 is shown in Table 43.

Increased commercial fishing in Pool 4 since the lock and dam construction is at least partially due to the beneficial impact of a larger area of fish habitat caused by raising the water level. However, in recent years dredge material placement and natural sedimentation below wing dams are seen to have reduced fish habitat. Some experts in river fishing believe that major year-to-year variations in commercial fish catches are less affected by the supply of fish in the river than by market demand, as reflected in prices commercial fishermen receive for their catch. For example, high meat prices in mid-1973 caused fish prices to increase with an attendant increase in commercial fishing activity on the river.

A sport fishery survey in 1972-73 estimated 136,821 fishing trips to Pool 4. At $11.50 (1978 National Survey, Fish and Wildlife Service) per trip this would result in an estimated recreational value of $1,573,441 (see Table 44).

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 4 include:

* This pool had a higher proportion of users in the high travel cost bracket (cost of travel to the river).

* The highest proportion of two-day stays occurred in this Pool (31 percent of total number of stays in the pool).

* Easy access, less crowded, and adequate water depth were cited more in Pool 4 as the reason for choice of put-in site.

* There was a disproportionate level of extreme perceived crowding in this pool.

Origin of trip of those users surveyed in this Pool:	Rochester, Minnesota	34%
	Wabasha, Minnesota	25%
	Alma, Wisconsin	10%
	Other Minnesota cities	10%
	Tee Peeoto Pt.	2%
	St. Paul, Minnesota	2%

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I Recreation Work Group. The population within the zone-of-influence (Figure 39) is projected to increase by approximately 60 percent. Visitor day use in Pool 4 is projected to increase approximately 46.6 percent between 1975 and 2025. This is an increase of approximately 314,000 visitor days. It is estimated that the average visitor will participate in more than one activity, however. Refer to Table 45.

TABLE 43
POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 4
1960-1975

Year	Commercial Fish Catch
1960	1,629,000
1961	1,737,000
1962	1,836,000
1963	2,183,000
1964	2,593,000
1965	Not Available
1966	2,390,000
1967	2,250,000
1968	1,891,000
1969	1,498,000
1970	1,917,542
1971	2,518,106
1972	1,248,703
1973	1,871,787
1974	1,262,258
1975	706,380

Source: Upper Mississippi River Conservation Committee

TABLE 44
RESULTS OF THREE SPORT FISHERY SURVEYS ON POOL 4
1962-1963, 1967-1968, and 1972-1973

Measure of Comparison	1962-1963	1967-1968	1972-1973
Projected Number of Fishing Hours Annually	424,153	575,230	477,694
Breakdown of Fishing Hours:			
a. Boat	55%	53%	66%
b. Bank	12%	15%	7%
c. Barge	18%	7%	4%
d. Ice	15%	25%	23%
Total	100%	100%	100%
% Breakdown of Fish Chiefly Sought:			
a. Bluegill, Crappie, and Sunfish	36%	22%	7%
b. Walleye and Sauger	36%	45%	57%
c. Northern Pike	2%	4%	2%
d. Other	26%	29%	34%
Total	100%	100%	100%
Projected Annual Seasonal Catch (In Fish):			
a. Bluegill, Crappie, and Sunfish	162,490	158,944	44,667
b. Walleye and Sauger	59,505	128,385	162,957
c. Northern Pike	4,104	9,972	4,330
d. Other	114,205	54,670	31,631
Total (Fish)	340,304	377,925	312,071
Catch Rates (Fish Caught per Manhour):			
a. Boat	0.819	0.592	0.664
b. Bank	0.888	0.609	0.550
c. Barge	0.726	0.257	0.279
d. Ice	1.042	0.958	.719
Annual Average	0.901	0.712	0.653
Estimated Annual Recreational Value:			
a. Fishing trips	112,769	169,361	136,821
b. Value at $11.50 per Trip*	$1,296,843.50	$1,947,651.50	$1,573,441.50

SOURCES:
The 1962-1963 data are from Robert C. Nord, The 1962-1963 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Committee; October 6, 1964).

The 1967-1968 data are from Kenneth J. Wright, The 1967-1968 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Commitee; October 1, 1970).

The 1972-73 data are from George C. Fleener, The 1972-73 Sport Fishery Survey of the Upper Mississippi River, Upper Mississippi River Conservation Committee, November 28, 1975.

*1975 National Survey of Hunting, Fishing, and Wildlife Associated Recreation, U.S. Fish and Wildlife Service.

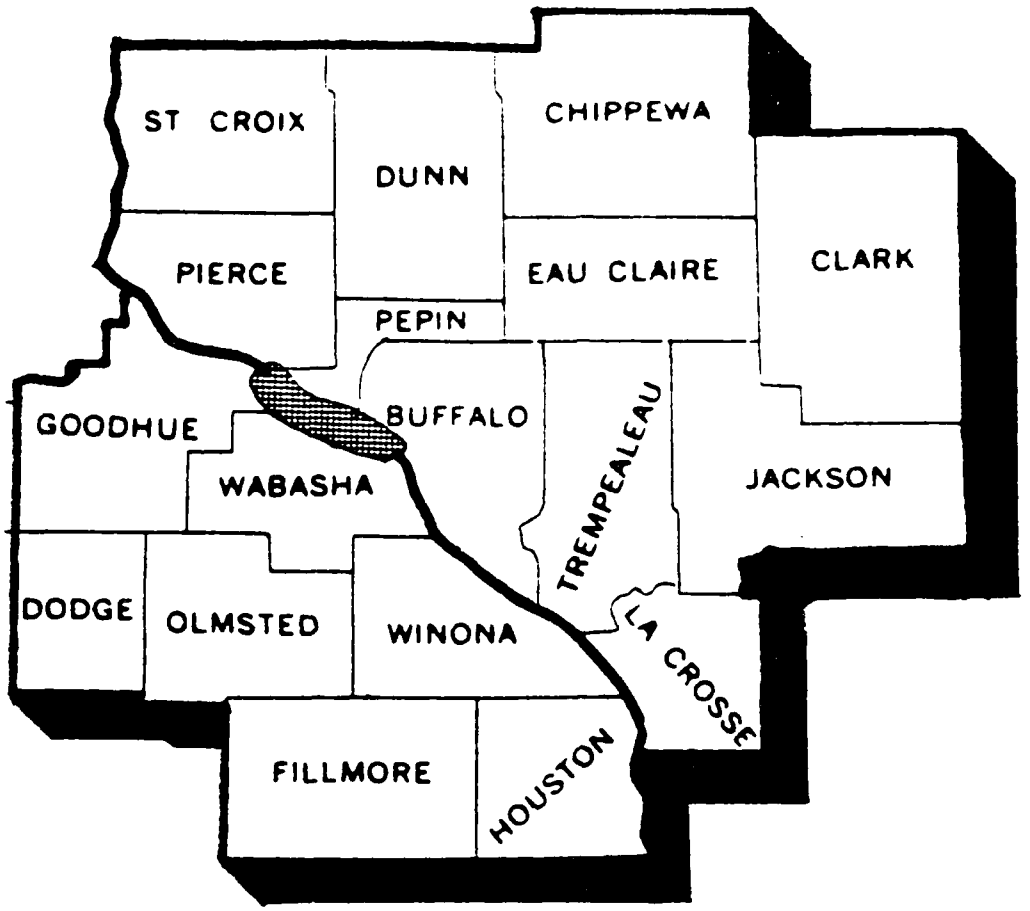


FIG. 39

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	20,350	23,000	24,380
26-50 Mi.	109,990	145,460	171,295
51-75 Mi.	386,065	529,610	627,580

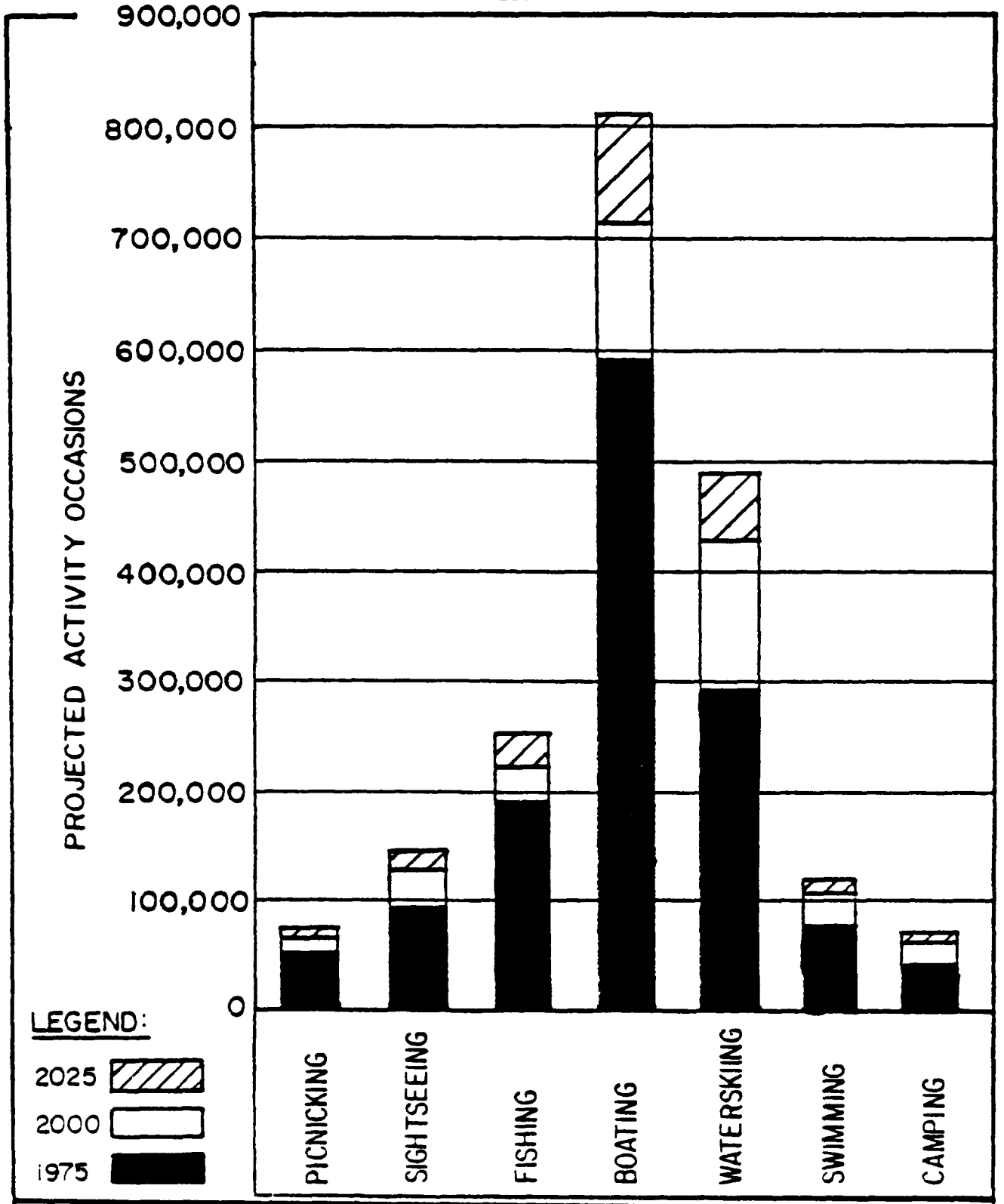
RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 4

Source: GREAT I Public Use Projections, February, 1978

The GREAT River



RECREATION
DEMAND ANALYSIS

POOL 4

FIGURE 40

The GREAT River

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 45
Pool 4

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	[illegible]	54.3	64.0	66.2	69.9	73.1	75.0
Sightseeing:	90.5	95.5	123.0	127.3	134.6	140.7	144.4
Fishing:	190.4	197.2	214.1	221.9	235.2	246.4	253.3
Boating:	592.6	615.7	688.6	712.7	754.4	789.7	811.9
Waterskiing:	294.1	311.7	413.5	429.6	455.8	477.9	491.2
Swimming:	77.3	81.3	101.2	104.4	109.7	116.8	119.3
Camping:	44.1	46.7	51.7	63.7	67.1	70.0	71.7
Hiking:	60.0	62.6	70.2	75.1	81.9	88.8	92.2
Hunting:							
Small Game-	700.6	730.6	808.7	879.2	980.3	1066.3	1112.5
Large Game-	294.3	306.9	339.6	369.2	411.7	447.8	467.2
Waterfowl-	406.3	423.7	469.0	509.9	568.5	618.4	645.2
Snowmobiling:	1584.6	1656.9	1836.8	2022.9	2276.7	2485.2	2598.1
Sub-Total:							
Activity Occasions:	1341.0	1402.4	1666.0	1725.8	1826.7	1914.6	1966.8
Visitor Days:	673.9	704.7	837.2	867.2	917.9	962.1	988.3
Conversion Factor:	1.99						

Table 46
Pool 4

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	68	136	46	1	706	18	18	1104	28	28	639	16	16	144	50,461	17	12	144	480	17.3	2,356.0	3,503.0	20.3	615
1980:	71	142	48	1	731	18	18	1147	29	29	677	17	17	151	53,021	18	12	152	507	18.1	2,456.0	3,653.0	21.2	643
1990:	84	168	62	1	794	20	20	1282	32	32	899	22	22	189	66,007	22	15	201	670	20.6	2,716.0	4,044.0	23.5	713
2000:	87	174	65	1	823	21	21	1327	33	33	933	23	23	195	68,114	23	16	208	693	21.4	2,952.0	4,396.0	25.5	786
2010:	91	182	68	1	872	22	22	1405	35	35	990	25	25	204	71,559	24	16	219	730	23.9	3,292.0	4,902.0	28.5	884
2020:	96	192	71	1	914	23	23	1471	37	37	1038	26	26	218	76,200	26	18	228	760	25.6	3,584.0	5,332.0	30.9	965
2025:	98	196	73	1	939	23	23	1512	38	38	1067	27	27	222	77,839	26	18	234	780	26.4	3,736.0	5,563.0	32.3	1009

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
2,639	62	62	696	3,343	77	80	968	3,813	88	92	1,091

U. - Number of Units
Ac. - Number of Acres
P.A. - Number of Parking Acres
P.S. - Number of Parking Spaces
L.L. - Launching Lanes

SWIMMING:
B.A. - Beach Area (sq. ft.)
S.B. - Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

K. Estimated Recreation Resource Requirements:

The projected recreational resource requirements are taken from Public Use Projections, February, 1978, GREAT I Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 46.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 47.

According to GREAT projections, Pool 4 is projected to have few if any additional recreational facility requirements. Ten additional launching lanes are projected for 1985, 18 launching lanes for 2000, and 195 parking spaces and 29 launching lanes for 2025. Of these projections, the greatest need is for increased fishing/hunting type access.

A separate study conducted by Roy F. Weston, Assoc. for the Corps of Engineers in 1977-1978 indicated that all existing marinas in Pool 4 are operating at capacity. A survey of registered boaters within the market area indicated a need for approximately 684 additional marina slips:

368 in Lake City
20 in Pepin
40 in Red Wing
256 in Hansen's Harbor

During the 1977 recreational facility inventory, the Red Wing Boat Harbor and Hansen's Harbor indicated they would be expanding in the near future.

The discrepancies between the two projections can probably be accounted for because of the uniqueness of Lake Pepin and its heavy sailboat use. The GREAT projections involve primarily powerboating, yet most of the boats in the Lake City Marina (600+) are sailboats. These sailboats have in essence probably "displaced" the powerboats.

The Weston study did not estimate a resource capacity. Using GREAT capacity standards, the existing density is one boat per 88 acres (assuming 10 percent are in use at any one time). Adding 684 marina slips would increase the density to one boat per 73 acres. These appear to be well within the water surface area required for boating (Note: The GREAT powerboat standard is one boat per 20 acres).

Pool 4

Table 47

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	601	77.5	-	87	-	98	-	
Sightseeing (P.S.)	Approximately 175	55	-	65	-	73	-	
Fishing (P.S.)		762.5		823		939		
(L.L.)		19		21		23		
Boating (P.S.)	1,216	1,214.5	-	1,327	-	1,512	195	
(L.L.)	40	30.5	10++	33	18++	38	29++	
	1,332 slips 775 private+							
Waterskiing (P.S.)		788		933		1,067		
(L.L.)		19.5		23		27		
Swimming (B.A.)	119,248 ft^2 2.7375 acres	59,514 ft^2 1.366 acres	-	68,114 ft^2 1.564 acres	-	77,839 ft^2 1,787 acres	-	
Camping (Units)	756	176.5	-	208	-	234	-	
Hiking* (Miles)	70.0	19.4	-	21.4	-	26.4	-	
Hunting* Large Game (Land Acres)	15,644**	2,586,000	2,570,356	2,952,000	2,936,356	3,736,000	3,720,352	
Small Game* (Land Acres)	5,234**	3,848,500	3,843,266	4,396,000	4,390,766	5,563,000	5,557,766	

Pool 4

L. ESTIMATED RECREATION RESOURCE NEEDS
(CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	39,260**	22,400	-	25,500	-	32,300	-	
Snowmobiling* (Miles)	26	678	652	786	760	1,009	983	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

M. How to Meet the Needs:

Several of the existing public boat accesses could be upgraded and improved. The Fish and Wildlife Service is proposing to upgrade Indian, Pontoon, and/or Beef Slough Landings under the Bicentennial Land Heritage Program. The slight expansion of private facilities in addition to the public access improvements within the area should be able to handle the projected requirements.

Multipurpose trails needs represent regional demands. There is a regional demand for additional large and small game hunting opportunities. This regional demand cannot be satisfied in Pool 4. There is probably a shorage throughout the region, even though the only projected requirement within the GREAT I area is for snowmobiling.

Little is known, however, about the environmental and social psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continuously monitored.

N. Recommendations:

1. The Fish and Wildlife Service should continue to upgrade its facilities at Indian Slough, Pontoon Slough, and Beef Slough landings. Access channels in this area may need maintenance.

2. Wisconsin and Minnesota should encourage and assist private recreational facility operators in upgrading their facilities (Everts' Resort, Island Campground, Goose Lake Resort, Maiden Rock, Wilcox Resort, Hansen's Harbor, Red Wing Yacht Club).

3. Wisconsin, Minnesota, and Fish and Wildlife Service should encourage and assist in upgrading local public recreational facilities (Stockholm Landing, Deer Island Ramp, Beef River Landing, Wabasha Boat Launch, Wabasha Boat Harbor, Florence Township Access.

4. The Corps of Engineers should investigate the feasibility of supplying dredged material to the following areas which have expressed a need: Wilcox Resort, Wabasha Boat Harbor, Camp Lacupolis, Wyatt's Landing, Hansen's Harbor .

5. Redevelop Grand Encampment Island (RM 756.2 R) according to guidelines for dredged material disposal for recreational use.

6. The Fish and Wildlife Service should investigate the feasibility of a visitor contact station on Highway 25 at one of the present landings. This area could include a small picnic area, an interpretive facility, and trails for interpretation and wildlife information.

7. Redevelop Hershey Island, RM 759.2 R, according to guidelines for dredged material disposal for recreational use.

8. Redevelop the existing recreational use area, RM 759.5 L, according to guidelines for dredged material disposal for recreational use.

9. Redevelop the existing use area, RM 762.4 R, according t guidelines for dredged material disposal for recreational use.

10. Redevelop the existing use area, RM 784.7 R, according to guidelines for dredged material disposal for recreational use.

11. Redevelop the existing use area, RM 789.6 R, according to guidelines for dredged material disposal for recreational use.

12. The Corps of Engineers should further investigate the feasibility of developing a new recreation area with dredged material at RM 790.4 L.

13. The Corps of Engineers should further investigate the feasibility of developing a new recreation area with dredged material at RM 791.3R.

14. The city of Red Wing should be encouraged to develop the Bay Point Park into a recreation area.

15. Reshape the existing beach/camp area at RM 753.3R. This area presently is used as "lockage waiting area".

16. The Corps of Engineers should further investigate the feasibility of developing a "lockage waiting area" at RM 796.9L. The flat-topped island in this area could also serve as a recreation area.

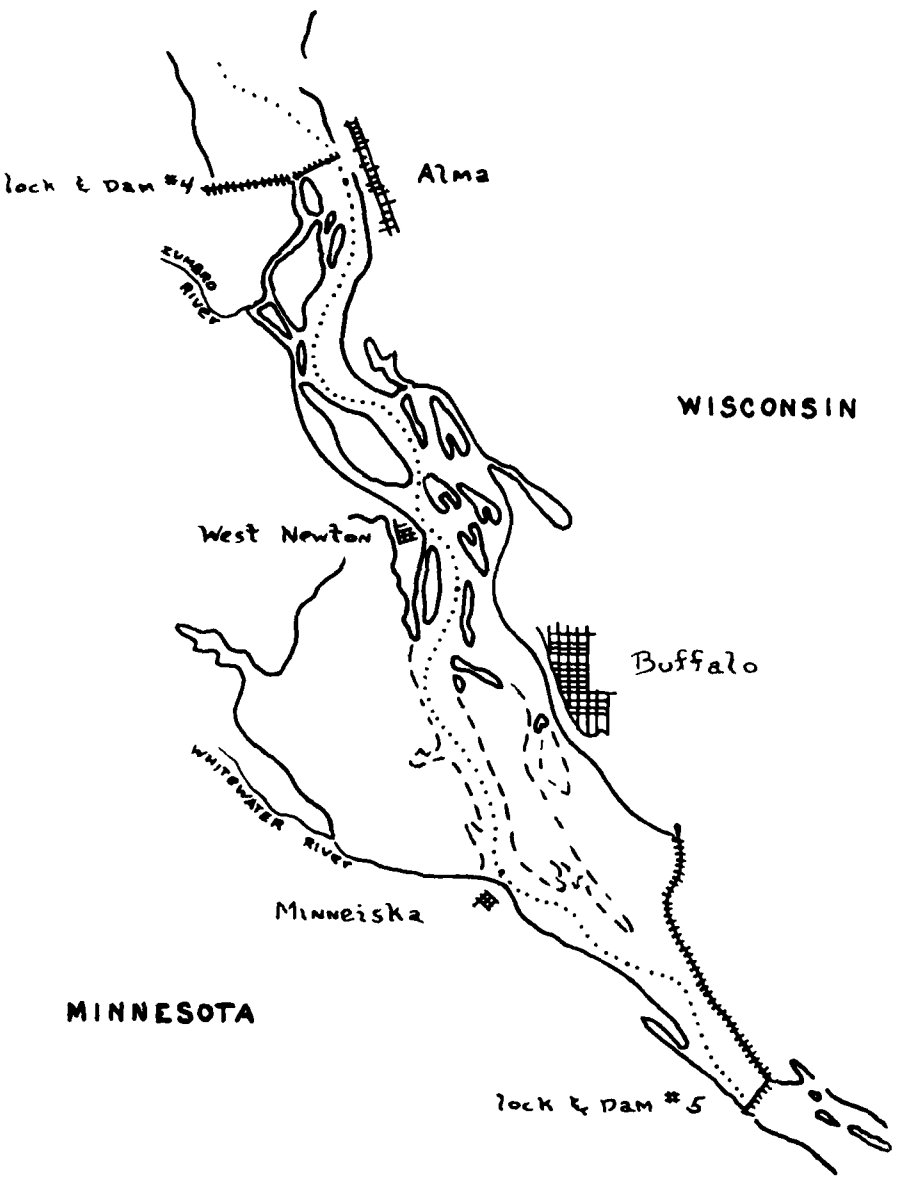

POOL 5
N
Lock & Dam #4
Alma
Zumbro River
WISCONSIN
West Newton
Buffalo
Whitewater River
Minneiska
MINNESOTA
Lock & Dam #5

Figure 41

POOL 5

A. Description of Pool:

Lock and Dam No. 5 is located 738.1 river miles above the mouth of the Ohio River. The structure is 14.6 river miles below Lock and Dam No. 4, 9.6 river miles above Lock and Dam 5A, and about 12.6 river miles above the city of Winona, Minnesota. The main lock and the completed portion of the auxiliary lock are located on the Minnesota side or right bank of the main channel, immediately adjacent to the Chicago, Milwaukee, St. Paul and Pacific Railroad right-of-way and the paralleling U.S. Highway 61.

B. Pool 5 Features:

In overall pool area, the size of Pool 5 is about average in both water area and federally-owned lands, and has no particular features which distinguish it from other typical Mississippi River pools. The high bluff areas through Pool 5 show signs of previous glacial action and the lowland and floodplain areas basically consist of alluvial fill deposited in the form of terraces by the glacial stream outwash. Much of the land has retained these features except for changes in configuration caused by recurring high water which has eroded, carried, and deposited material all along the river's course.

For about 2 1/2 miles above Lock and Dam No. 5, Pool 5 and the main channel are confined within a relatively narrow area between Minnesota high ground and two longitudinal sections of the earth dike which funnel the flow into the lock and movable dam section. Thereafter, the main channel follows Minnesota high ground to about mile 742.5, meanders through the floodplain until it reaches Wisconsin high ground near the downstream city limits of Alma, Wisconsin, and then parallels this high ground to Lock and Dam No. 4. Two small tributaries, the Zumbro and Whitewater Rivers, enter the pool from Minnesota.

Principal features of Pool 5 are summarized below:

a.	Length of pool	14.6 river miles
b.	River miles	738.1 to 752.7
c.	Pool elevation (flat pool)	660.0
d.	Water area of pool	10,836 acres
e.	Shoreline miles (meandering outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	50 miles

f. Federal lands above normal flat pool (approximate)

(1) Administered by Corps of Engineers	2,044 acres
(2) Administered by the Department of the Interior (Bureau of Sport Fisheries and Wildlife)	2,109 acres
(3) Total above-water lands	4,153 acres

C. Federal Lands:

The Corps of Engineers has acquired and presently administers about 7,565 acres of federally-owned land and water area and hold special rights on an additional 1,363 acres administered by the Fish and Wildlife Service. Of the 7,565 acres of Corps-administered land and water area, about 7,563 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi River Wildlife and Fish Refuge in conjunction with Service-owned lands. About 2 acres of Corps lands at the structure site (Lock and Dam No. 5) have been retained solely for Corps use.

Approximately 32.9 acres are leased by the Federal Government for various purposes: roads and commercial-4.5 acres, recreational access-27.7 acres, and four cottage leases (3 at RM 741.2 R, 1 at RM 746.0 L)-0.7 acres.

Of the Federal lands owned in fee in Pool 5, about 5,153 acres protrude above the normal flat pool elevation of 660.0. Of this total, 2,044 acres are under jurisdiction of the Corps of Engineers and 2,109 acres are under jurisdiction of the Department of the Interior. Any development contemplated by the Corps will be restricted to selected sites on the 2,044 acres of Corps above-water lands.

D. Existing Recreational Facilities:

Pool 5 has 11 access areas with a total of 12 launching lanes (5 in Minnesota, 7 in Wisconsin), 12 marina slips, 16 rental boats, 227 parking spaces adjacent to boat accesses, 141 camping units, and 15 picnicking units. In addition, approximately 210 private boats are moored on the pool (Aerial Survey, 1976).

There are two major park facilities in the area--John Latsch State Park (Minnesota) and Buena Vista Park (Wisconsin).

Most of the recreational boating activity is in the upper third of the pool. Weaver Bottoms is a heavily-used hunting area. Dredged material island/beach areas at RM 749 and 745 experience moderate recreational use.

E. Pool Accessibility:

Primary highways either closely parallel the shorelines for a considerable distance along both sides of the pool or follow the nearby high-terraced areas within the valley in the same general north-to-south direction. Networks of secondary, county, and township roads connect with primary roads to service the areas adjacent to the pool and to provide access from outlying areas of the zone. Railroads closely parallel the primary highways on both sides of the pool. No highway bridges or railroad crossings from Minnesota and Wisconsin are located on Pool 5. Neither airline service nor small airports are available in the immediate area.

TABLE 48
PLEASURE BOAT LOCKAGES
LOCKS 5 AND 5A, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 5A	Lock 5	Lock 5A	Lock 5
1960	7,421	2,846	3,860	1,715
1961	7,932	2,919	4,230	1,722
1962	6,389	3,295	3,379	1,958
1963	7,128	3,202	3,783	1,820
1964	7,158	3,192	3,794	1,967
1965	5,111	3,034	2,819	1,671
1966	6,350	3,422	3,690	2,112
1967	5,858	3,132	3,356	2,033
1968	6,065	3,297	3,527	2,591
1969	6,261	3,408	3,316	1,933
1970	7,124	3,891	3,832	2,152
1971	8,057	4,768	3,809	2,476
1972	7,768	5,270	3,801	2,653
1973	7,645	5,018	3,739	2,491
1974	6,853	4,420	3,230	2,191
1975	6,652	4,984	2,996	2,162
1976	8,872	6,108	3,596	2,494
*1980	7,051	5,152	2,846	2,191
*1990	8,823	5,216	3,459	2,213
*2000	10,204	5,331	3,935	2,253

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

F. Natural Resources:

A relatively small portion of the total above-water lands consists of high, firm ground which is suitable for development and use for land-based recreational activities. Also, much of this otherwise suitable area cannot be reached via land with vehicular-type equipment. However, sufficient land areas are accessible with features suitable for the degree of development and the quality of facilities desired. The water areas of the pool provide unlimited opportunity for participation in all the various on-water type of activities. Recreational craft lockages from 1960-1976 through Locks 5 and 5A reflect some of the public use in this area and are shown on Table 48. Lands and waters with the forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl, and wild game. The moderately low pollution level of the pool waters is conducive to water-contact sports and is not harmful to fish or wildlife.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool areas in general, also prevail in Pool 5. Summer temperatures range upward to 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

Small islands of Federal land, including sand bars formed by dredge material disposal or natural accretion, frequently are used in their undeveloped state by boaters and fishermen for day-use activities and camping. The characteristics of the area together with their vulnerability to periodic flooding make it impractical to provide facilities. Use of the areas in their primitive state is not restricted; however, such use is not encouraged because of maintenance problems.

G. Cultural Resources:

GREAT did not find any areas on the National Register in Pool 5, but there are probably cultural resources of some significance in the area of Pool 5.

H. Fish and Wildlife Resources:

Sport fishery survey data for the years 1962-1963, 1967-1968, and 1972-73 are available for Pool 5. These are summarized in Table 50 and show that the number of fish caught in Pool 5 declined by about one-third from the 1962-1963 season as compared to the 1967-1968 season. This decline occurred in spite of an increase of about 30 percent in the number of fishing trips in Pool 5, from about 40,000 to 52,000. This decline can probably be attributed to the 1965 flood.

The Winona District of the Upper Mississippi River Wildlife and Fish Refuge (which covers Pools 4, 5, 5A, and 6) estimates that for the 10 years from 1961 to 1970, an average of 12,053 hunters in the District bagged an average of 15,600 waterfowl annually in the 4 pools.

TABLE 49
POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 5
1960-1975

Year	Commercial Fish Catch
1960	163,300
1961	218.800
1962	178,000
1963	147,300
1964	164,900
1965	129,700
1966	61,500
1967	62,000
1968	49,000
1969	92,800
1970	96,843
1971	108,397
1972	85,702
1973	73,463
1974	79,986
1975	166,859

Source: Upper Mississippi River Conservation Committee

TABLE 50
RESULTS OF THREE SPORT FISHERY SURVEYS ON POOL 5
1962-1963, 1967-1968, and 1972-1973

Measure of Comparison	1962-1963	1967-1968	1972-1973
Projected Number of Fishing Hours Annually	157,112	186,234	249,324
Breakdown of Fishing Hours:			
a. Boat	23%	34%	36%
b. Bank	9%	16%	14%
c. Barge	39%	24%	32%
d. Ice	29%	26%	18%
Total	100%	100%	100%
% Breakdown of Fish Chiefly Sought:			
a. Bluegill, Crappie, and Sunfish	55%	43%	19%
b. Walleye and Sauger	20%	27%	22%
c. Northern Pike	11%	16%	5%
d. Other	14%	14%	54%
Total	100%	100%	100%
Projected Annual Seasonal Catch (In Fish):			
a. Bluegill, Crappie, and Sunfish	148,000	84,000	69,289
b. Walleye and Sauger	18,000	19,000	49,213
c. Northern Pike	3,000	6,000	4,381
d. Other	27,000	25,000	46,054
Total (Fish)	196,000	134,000	168,937
Catch Rates (Fish Caught per Manhour):			
a. Boat	1.557	0.708	0.628
b. Bank	0.703	0.578	0.719
c. Barge	0.669	0.565	0.525
d. Ice	1.937	0.966	1.023
Annual Average	1.245	0.720	0.678
Estimated Annual Recreational Value:			
a. Fishing trips	39,568	51,786	62,400
b. Value at $11.50 per Trip*	$455,032	$595,539	$717,600

SOURCES:
The 1962-1963 data are from Robert C. Nord, The 1962-1963 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Committee; October 6, 1964). The 1967-1968 data are from Kenneth J. Wright, The 1967-1968 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Commitee; October 1, 1970).

The 1972-73 data are from George C. Fleener, The 1972-73 Sport Fishery Survey of the Upper Mississippi River, Upper Mississippi River Conservation Committee, November 28, 1975.

*1975 National Survey of Hunting, Fishing, and Wildlife Associated Recreation, U.S. Fish and Wildlife Service.

The decrease in the 1967-68 sport fishery catch can probably be attributed to the 1965 flood impacts.

There is substantial commercial fishing in Pool 5. Table 49 shows the commercial catch in pounds of fish from 1960 through 1975.

In 1939, following establishment of the slack water pools, trapping was allowed and has continued each year since then. Pool 5 has consistently been a good producer of pelts. For 1962-1963, Upper Mississippi Wildlife Refuge records show that in Pool 5, 36 trappers pelted 6,803 muskrats for a total value return of $6,390.00. Field figures for the 1971-1972 season show 8,283 muskrats harvested by 34 trappers. Muskrats enjoy the greatest expanse of suitable habitat in the marshes and shallow water areas. Weaver Bottoms is of particular importance in terms of canvasback duck and swan concentrations during migration periods. Weaver Bottoms offers ample space and habitat to support considerable number of other species of waterfowl and muskrats although the quality of the area is declining.

I. Recreational User Survey:

The Fisheries Section, Minnesota Department of Natural Resources in cooperation with the Upper Mississippi River Conservation Committee is presently undertaking a detailed study of total recreational use in Pool 5. This data will be available in early 1979. The base projections in this report should be modified as necessary to reflect actual measured use as a part of the Minnesota study.

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 5 include:

* A significant relationship between river pool location and total costs exists for Pool 5, which had more users at both the low and high cost figures than expected.

* For trip costs on the river this pool had fewer low costs trips and more high costs trips than expected.

* For travel costs to the river, this pool had a lower proportion of low travel costs and high intermediate travel cost proportions than expected.

* Although overall most visitors do not use locks (68%), some 60% of those in Pool 5 do.

* As a reason for choosing a put-in site "near favorite island" had a higher than expected group of no responses in Pool 5.

Origin of trip of those users surveyed in this Pool:	Alma, Wisconsin	14%
	Wabasha, Minnesota	13%
	Rochester, Minnesota	10%
	Other Minnesota cities	9%
	Winona, Minnesota	7%

J. Projected Recreational Activity Occasions:

The projected recreation activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. Population within the zone-of-influence is projected to increase by approximately 53 percent (Figure 42). Visitor day use is projected to increase approximately 56 percent between 1975 and 2025. This is an increase of approximately 119,700 visitor days. It is estimated that the average visitor participates in more than one activity, however. Refer to Table 43.

K. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group, the resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 52.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 53.

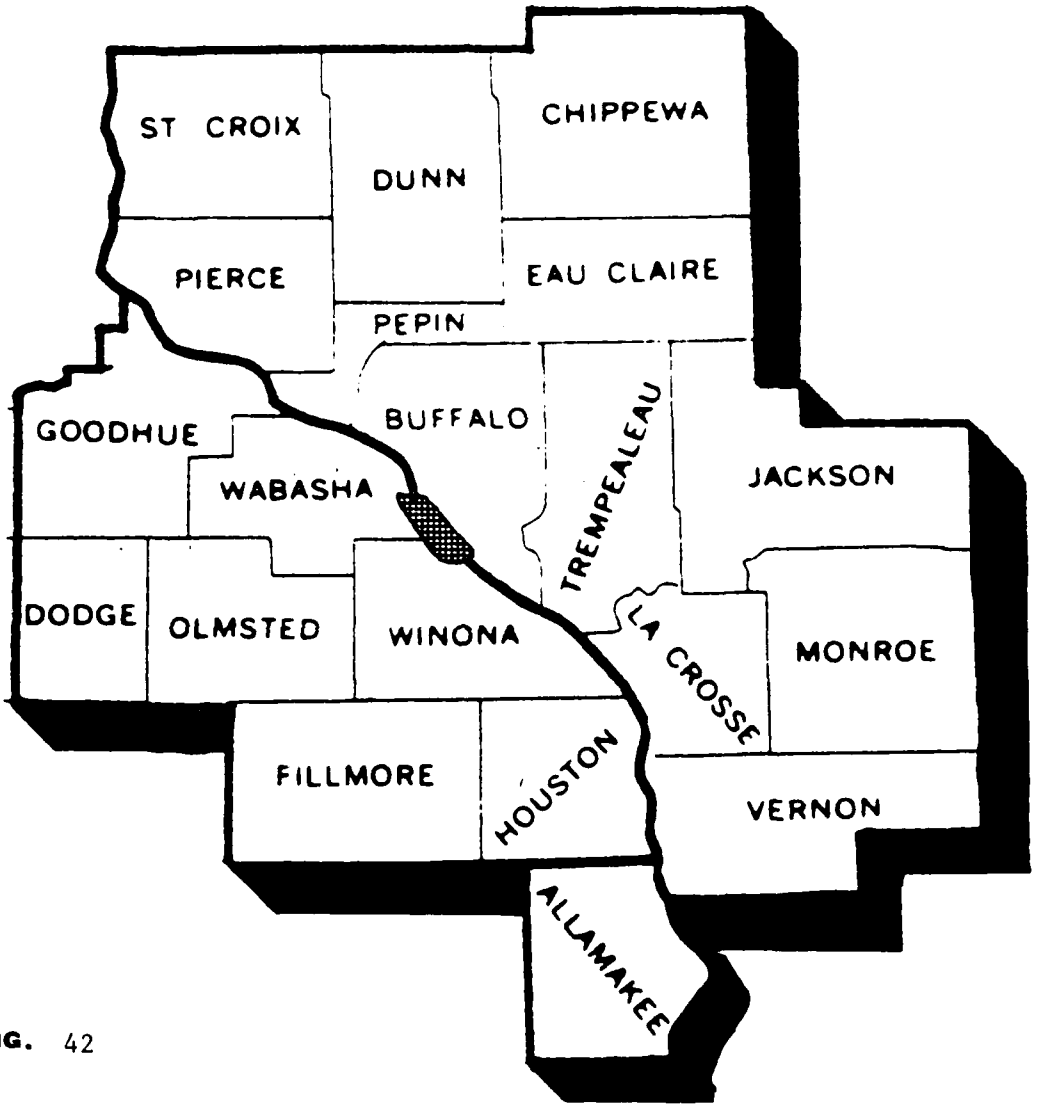


FIG. 42

ZONAL POPULATION PROJECTION

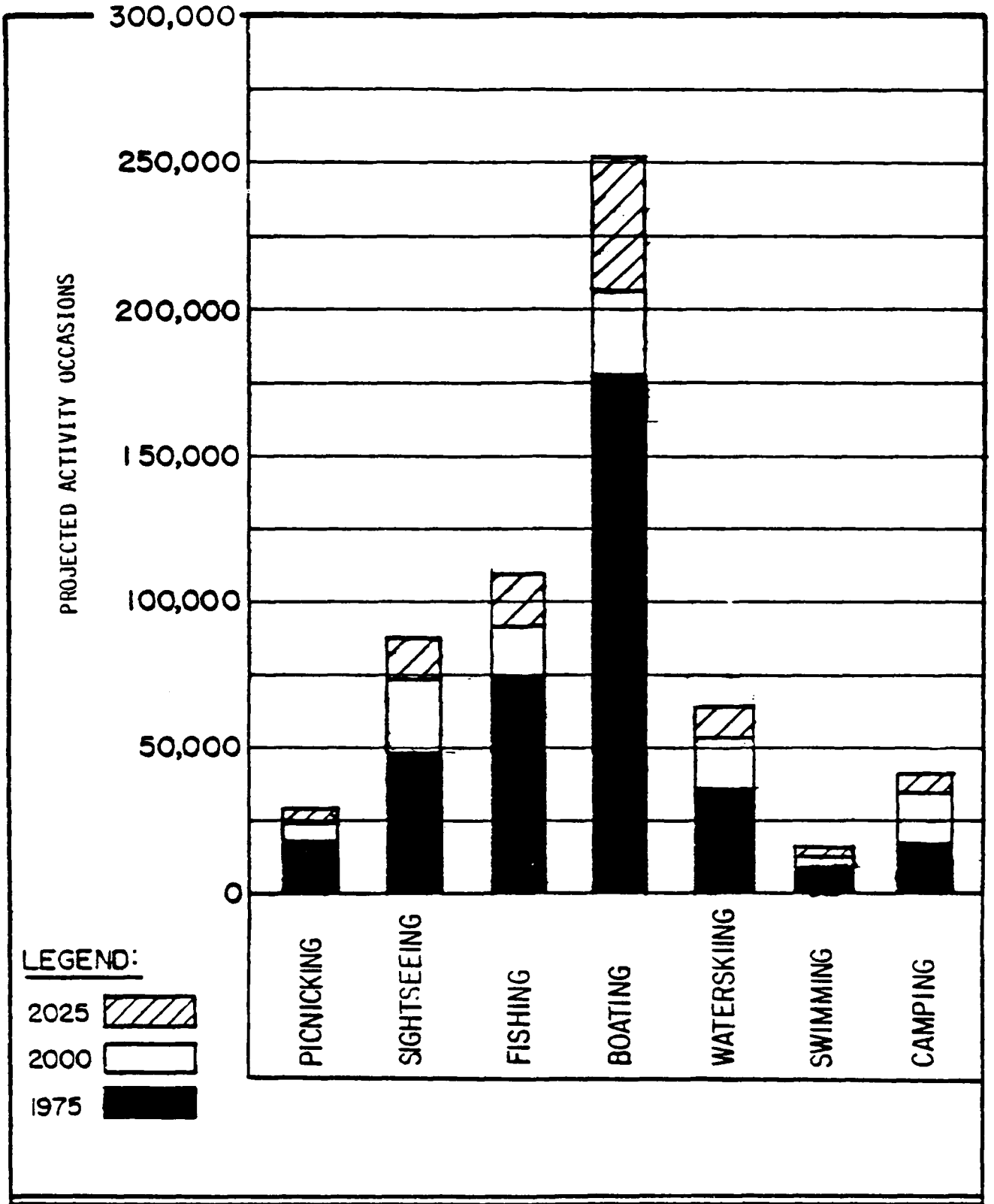
ZONE	1975	2010	2025
0-25 Mi.	58,570	68,895	75,185
26-50 Mi.	202,605	278,945	338,010
51-75 Mi.	263,200	341,095	391,000

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 5

GREAT



RECREATION
DEMAND ANALYSIS

POOL 5

FIGURE 43

GREAT

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 51
Pool 5

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	18.4	19.2	23.4	24.1	26.3	27.8	28.6
Sightseeing:	49.8	52.5	72.0	74.0	80.9	85.3	87.9
Fishing:	75.0	77.6	89.5	92.1	100.6	106.3	109.7
Boating:	178.4	184.1	205.0	210.9	230.2	243.3	251.1
Waterskiing:	35.1	37.1	52.5	54.0	59.0	62.2	64.1
Swimming:	9.2	9.7	12.5	12.9	14.1	14.9	15.3
Camping:	16.6	18.4	34.3	35.0	38.3	40.1	41.2
Hiking:	65.8	68.2	75.5	79.0	85.2	91.5	94.6
Hunting:							
Small Game-	700.6	727.3	800.4	862.0	955.3	1033.7	1076.2
Large Game-	294.2	305.5	336.2	362.0	401.3	434.1	452.0
Waterfowl-	406.3	421.8	464.3	499.9	554.0	599.5	624.2
Snowmobiling:	1533.7	1614.7	1782.2	1932.2	2159.4	2334.0	2440.0
Sub-Total:							
Activity Occassions:	382.5	398.6	489.2	503.0	549.4	579.9	597.9
Visitor Days:	212.5	221.*	271.8	279.4	305.2	322.2	332.2
Conversion Factor:	1.8						

Table 52
Pool 5

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	30	60	27	1	302	8	8	412	10	10	81	2	2	21	7,468	3	2	67	223	18.0	2,532.0	3,503.0	20.3	603
1980:	31	62	28	1	312	8	8	426	11	11	86	2	2	22	7,833	3	2	75	250	19.8	2,444.0	3,637.0	21.1	627
1990:	38	76	39	1	361	9	9	474	12	12	121	3	3	29	10,158	3	2	139	463	22.3	2,688.0	4,002.0	23.2	692
2000:	39	78	40	1	371	9	9	488	12	12	125	3	3	30	10,443	4	3	142	473	23.1	2,896.0	4,310.0	25.0	750
2010:	43	86	44	1	405	10	10	532	13	13	136	3	3	33	11,412	4	3	155	517	24.7	3,212.0	4,777.0	27.7	839
2020:	45	90	46	1	428	11	11	562	14	14	144	4	4	34	12,035	4	3	162	540	26.4	3,472.0	5,169.0	30.0	909
2025:	47	94	47	1	442	11	11	580	15	15	148	4	4	35	12,412	4	3	167	557	27.2	3,616.0	5,381.0	31.2	947

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
843	20	16	307	1,054	24	20	580	1,252	30	24	686

U. - Number of Units
Ac. - Number of Acres
P.A. - Number of Parking Acres
P.S. - Number of Parking Spaces
L.L. - Launching Lanes

SWIMMING:
B.A. - Beach Area (sq. ft.)
S.B. - Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Pool 5

Table 53

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	15	34.5	19.5	39	24	47	32	
Sightseeing (P.S.)	Approximately 40	33.5	-	40	-	47	7	
Fishing (P.S.)		336.5		371		442		
(L.L.)		8.5		9		11		
Boating (P.S.)	227	450	435	488	530	580	716	
(L.L.)	12	11.5	5++	12	7++	15	13++	
	12 slips 210 private+							
Waterskiing (P.S.)		103.5		125		148		
(L.L.)		2.5		3		4		
Swimming (B.A.)	0	9,000 ft^2 0.21 acre	9,000 ft^2 0.21 acre	10,400 ft^2 0.24 acre	10,440 ft^2 0.24 acre	12,400 ft^2 0.29 acre	12,400 ft^2 0.29 acre	
Camping (Units)	149	107		142	-	167	18	
Hiking* (Miles)	2.0	21.0	19.0	23.1	21.1	27.2	25.2	
Hunting* Large Game (Land Acres)	13,011**	2,566,000	-	2,896,000	-	3,616,000	-	
Small Game* (Land Acres)	10,971**	3,819,500	-	4,310,000	-	5,381,000	-	

Pool 5

L. ESTIMATED RECREATION RESOURCE NEEDS
(CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	13,560**	22,150	-	25,000	-	31,200	-	
Snowmobiling* (Miles)	0	659.5	659.5	750	750	947	947	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I, Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

M. How to Meet the Needs:

The greatest projected deficiencies in Pool 5 are for boat access launching lanes and access, multipurpose trails and road access swimming beaches. There is low projected additional requirement for picnicking facilities.

By 1985 it is estimated that there will be approximately 400 additional parking spaces and 4 launching lanes required for projected recreation demand. By 2000 approximately 495 additional parking spaces and 6 launching lanes are projected to be required. By 2025 approximately 680 additional parking spaces and 12 launching lanes are projected to be required. The needs for powerboat access are projected to slightly exceed those of fishing access needs.

Data from the Aerial Recreation Use Survey of September 5, 1976, indicated an instantaneous open water boat use of approximately one boat per 130 acres with an additional 35 boats pulled up on sand bars. This is very low density for recreational boating.

If approximately 400 additional boats were allowed access to the pool in 1985, and 2 to 10 percent were in use at any one time (Aerial Survey, 1976; Fernholtz, 1970), a boat density of approximately one boat per 25 acres would result in the main channel and main channel border. Allowing approximately 495 additional boats access would result in a density of one boat per 22 acres by 2000. Allowing 680 additional boats access would result in a density of one boat per 19 acres by 2025. The Recreation Work Group of GREAT has established a maximum acceptable density of one boat per 20 acres.

The Fish and Wildlife Service is proposing to enlarge and redevelop Half Moon Lake Landing and Weaver Landing under the Bicentennial Land Heritage Program. Several private enterprises within the pool can also be expanded. These improvements should approximately meet the projected boating access needs until 1985. Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As increasing development occurs, these impacts should be continually monitored.

Multipurpose trails, a regional demand, are also deficient in Pool 5. The Mississippi River Regional Planning Commission noted in their 1974 Recreation Trails Analysis, "There is a lack of interest in public (snowmobile) trails. Local needs are being met by private clubs and groups." Snowmobiling is presently allowed on the ice-covered backwater areas.

Hiking trail needs also represent regional demands. Hiking trails are limited to John Latsch State Park and between Alma and Buena Vista Park. Several other recreational areas and state forests within the region, Memorial Hardwood Forest, Whitewater State Park, Trout Valley, etc. provide the needed recreational trails.

The projections indicate a small need (15 units by 1985) for additional picnicking units which is considered insignificant in the GREAT I study area.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continuously monitored.

N. Recommendations:

1. Modify demand/needs projections based upon the results of the ongoing Pool 5 Recreational Use Survey being conducted by the Minnesota DNR.

2. The Fish and Wildlife Service should continue to upgrade and expand its accesses (Half Moon Lake, Weaver) as proposed under the Bicentennial Land Heritage Program.

3. Encourage private recreational developments to expand their operations (Pioneer Campsite, Risley Farm, Douglas Livery, Valley Inn Marina, Sunset Resort, Perries Resort).

4. The Minnesota DNR and Fish and Wildlife Service should investigate the feasibility of providing a public landing and road access public beach at Minneiska, Minnesota (RM 742.5 R) using dredged material.

5. Maintain existing primitive island/beach recreation use area at RM 741.6 R.

6. Maintain existing primitive island/beach recreation use area at RM 743.6 R.

7. Maintain existing primitive island/beach recreation use area at RM 744.3 R.

8. Maintain existing primitive island/beach recreation use area at RM 745.6 L.

9. Maintain existing primitive island/beach recreation use area at RM 748.9 R.

10. Maintain existing primitive island/beach recreation use area at RM 749.7 L.

11. The Corps of Engineers should further investigate the feasibility of developing a beach at RM 739.0 L. This area could serve as a holding area for craft awaiting lockages.

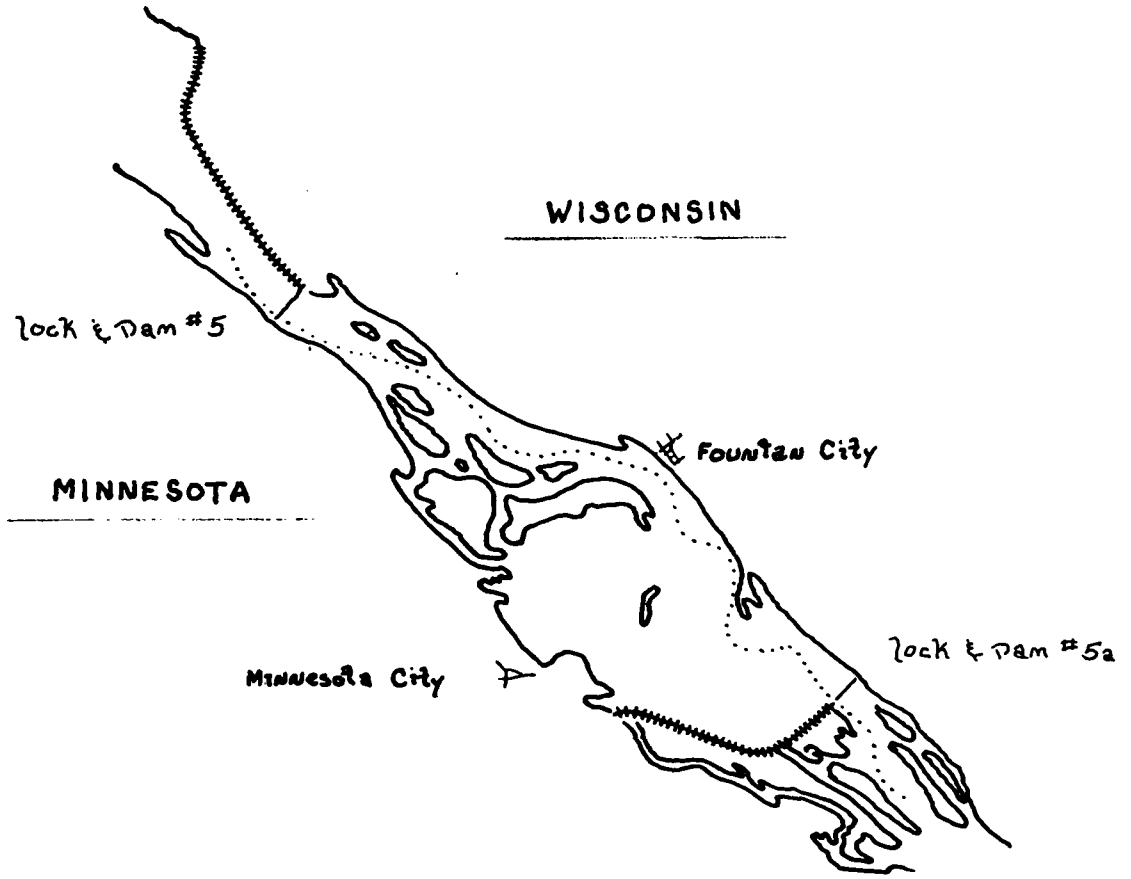
12. The Corps of Engineers should further investigate the feasibility of developing an island/beach at RM 752.5 R. Modify channel control structures in this area. This area could serve as a "holding area" for craft awaiting lockages.

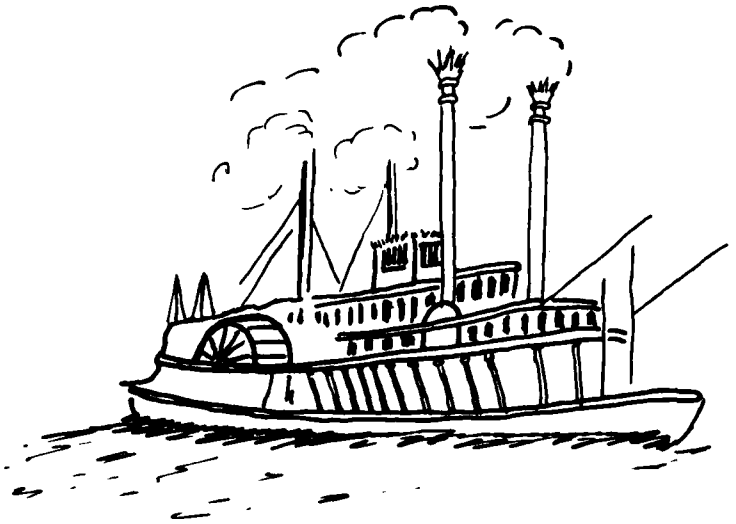
13. Encourage the Minnesota DNR to (re)establish the boat access at RM 739.1 R. This area was previously removed by highway construction.

14. The Fish and Wildlife Service should further investigate the feasibility of providing a public access at RM 757.0 R on Teepeeota Point.

15. The Corps of Engineers should further investigate the feasibility of developing an island/beach/camp area at RM 747.8 L according to guidelines prepared by the Recreation Work Group to provide for primitive recreation use. Some sand presently exists in this area.

POOL 5a





The GREAT River

Figure 44

POOL 5A

A. Description of Pool:

Lock and Dam No. 5A is located 728.5 river miles above the mouth of the Ohio River. The structure is 9.6 river miles below Lock and Dam No. 5, 14.2 river miles above Lock and Dam No. 6, and 3.0 river miles above the city of Winona, Minnesota.

B. Pool 5A Features:

Dam 5A has the lowest lift (5.5 feet) of the 13 navigation dams in the GREAT I area. Except for Pools 1 and lower St. Anthony Falls, Pool 5A is the shorest in river miles. Of all the pools below Pool 1, Pool 5A has the least water area, the least overall pool area and the least shoreline that is accessible by land. In other respects the pool has the typical features of a wide floodplain extending across the valley between high bluffs with the main channel meandering through the alluvial fill and the multilevel terraces and lowlands formed by glacial outwash.

Except for one sweep into the floodplain, the main channel upstream of Lock 5A follows the Wisconsin high-ground shoreline to the upper city limits of Fountain City, Wisconsin. From Fountain City the channel curves to the center of the floodplain and then diagonals to the Minnesota high-ground shoreline at Lock and Dam No. 5. The greatest portion of federally-owned lands is in the State of Minnesota. No tributary rivers flow into Pool 5A.

Principal features of the pool are summarized below:

a.	Length of pool	9.6 river miles
b.	River miles	728.5 to 738.1
c.	Pool elevation (flat pool)	651.0
d.	Water area of pool	6,140
e.	Shoreline miles (outer perimeter limits main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	35 miles
f.	Federal lands above normal flat pool (approximate)	
	(1) Administered by Corps of Engineers	2,670 acres
	(2) Administered by the Department of the Interior	1,250 acres
	(3) Total above-water lands	3,920 acres

C. Federal Lands:

The Corps of Engineers has acquired and presently administers about 3,915 acres of federally-owned land and water area and holds special rights on an additional 1,196 acres administered by the Fish and Wildlife Service. Of the 3,915 acres of Corps-administered land and water area, about 3,885 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi Wildlife and Fish Refuge in conjunction with Service-owned lands. About 30 acres of Corps lands at the structure site (Lock and Dam No. 5A) and at the Corps of Engineers Boatyard have been retained solely for Corps use.

Of the Federal lands owned in fee in Pool 5A about 3,920 acres protrude above the normal flat pool elevation of 651.0. Of this total, 2,670 acres are under jurisdiction of the Corps of Engineers and 1,250 acres are under jurisdiction of the Department of the Interior.

Approximately 125.6 acres are leased by the Corps of Engineers for various uses: recreation - 124.0 acres, roads and powerlines - 1.6 acres. Any development contemplated by the Corps will be restricted to selected sites on the 2,670 acres of Corps above-water lands.

D. Existing Recreational Facilities:

Pool 5A has 7 access areas with a total of 10 launching lanes (6 in Minnesota, 4 in Wisconsin), 80 marina slips, 207 parking spaces adjacent to boat accesses, 38 rental boats, 126 camping units and 189 picnicking units. In addition, approximately 65 private boats are moored on the pool (Aerial Survey, 1976).

There is one major park, Merrick State Park (Wisconsin), adjacent to the pool. Several private developments provide recreational facilities in the area.

Most of the recreational boating activity occurs midway in the pool in conjunction with the dredged material disposal sites.

E. Pool Accessibility:

Railroads and primary highways closely parallel both sides of the pool. Primary and secondary highways and networks of county and township roads provide lateral access through the zone of influence. No highway crossings exist from Minnesota to Wisconsin in Pool 5A. The nearest commercial airport is at Winona.

F. Natural Resources:

A relatively small portion of Corps of Engineers lands in Pool 5A is presently accessible by wheeled vehicles and areas that are of general recreational activities. Water areas provide conditions and opportunities for participation in all of the various on-water activities. (Recreation craft lockages for Locks 5A and 6 are shown on Table 54.) The low pollution level of the pool waters is conducive to water-contact sports and is not harmful to fish and wildlife. Lands and waters with forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl, and wild game.

TABLE 54
PLEASURE BOAT LOCKAGES
LOCKS 5A AND 6, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 6	Lock 5A	Lock 6	Lock 5A
1960	3,697	7,421	2,351	3,860
1961	3,828	7,932	2,312	4,230
1962	3,591	6,389	2,096	3,379
1963	4,095	7,128	2,527	3,783
1964	4,484	7,158	2,739	3,794
1965	3,505	5,111	2,124	2,819
1966	4,291	6,350	2,657	3,690
1967	4,317	5,858	2,666	3,356
1968	5,010	6,065	3,387	3,527
1969	3,772	6,261	2,273	3,316
1970	4,137	7,124	2,386	3,832
1971	4,734	8,057	2,641	3,809
1972	5,823	7,768	3,312	3,801
1973	6,448	7,645	3,158	3,739
1974	5,475	6,853	2,854	3,230
1975	5,300	6,562	2,498	2,996
1976	6,466	8,872	2,989	3,596
*1980	5,883	7,051	2,443	2,846
*1990	7,028	8,823	2,838	3,458
*2000	8,026	10,204	3,183	3,935

*"Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool areas in general, also prevail in Pool 5A. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources:

Two archaeological sites in Pool 5A have been placed on the National Register. Both sites are Aborginal American sites in Minnesota.

The Wisconsin Department of Natural Resources has designated one natural area - Kammeroski Rookery, RM 734.

H. Fish and Wildlife Resources:

There is substantial commercial fishing in Pool 5A. Table 55 shows the commercial catch in pounds of fish from 1960-1975 for Pool 5A.

Trapping was allowed as of the year 1939 and has continued each year since. Pool 5A has consistently been a good producer of pelts. In 1962-1963, the Upper Mississippi Wildlife Refuge records show that in Pool 5A, 41 trappers pelted 7,233 muskrats for a total value return to the trappers of $7,092.00. Field figures for the 1971-1972 season show 9,175 muskrats harvested by 61 trappers. This represents a value, at one dollar per pelt, of approximately $9,000.00.

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 5A include:

* A significant relationship between river pool location and total cost exists for Pool 5A, which had more users at both the low and high cost figures than expected.

* Cost of travel to the river also had a significant relationship to pool location with Pool 5A having a higher proportion of users in the high travel cost bracket.

* Sixty-seven percent of those surveyed in Pool 5A do use lockages, although overall most visitors surveyed (68%) do not use lockages.

* As a choice for put-in, "near favorite island" had a higher than expected group of no responses in Pool 5A.

Origin of trip of those users surveyed in this Pool:	Winona, Minnesota	26%
	Wabasha, Minnesota	12%
	Merrick, Wisconsin	12%
	LaCrosse, Wisconsin	9%
	Other Minnesota cities	9%
	Alma, Wisconsin	8%

TABLE 55
POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN IN POOL 5A
1960-1975

Year	Commercial Fish Catch
1960	145,000
1961	72,000
1962	120,000
1963	105,000
1964	110,000
1965	Not Available
1966	104,000
1967	112,000
1968	277,000
1969	239,000
1970	215,006
1971	225,131
1972	321,873
1973	173,982
1974	177,451
1975	200,239

Source: Upper Mississippi River Conservation Committee

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The population within the zone-of-influence (Figure 45) is estimated to increase by approximately 48 percent between 1975 and 2025.

Visitor day use is projected to increase approximately 51 percent between 1975 and 2025. This is an increase of approximately 152,200 visitor days. It is estimated that the average visitor will participate in more than one activity, however. Refer to Table 56.

K. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 57.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 58.

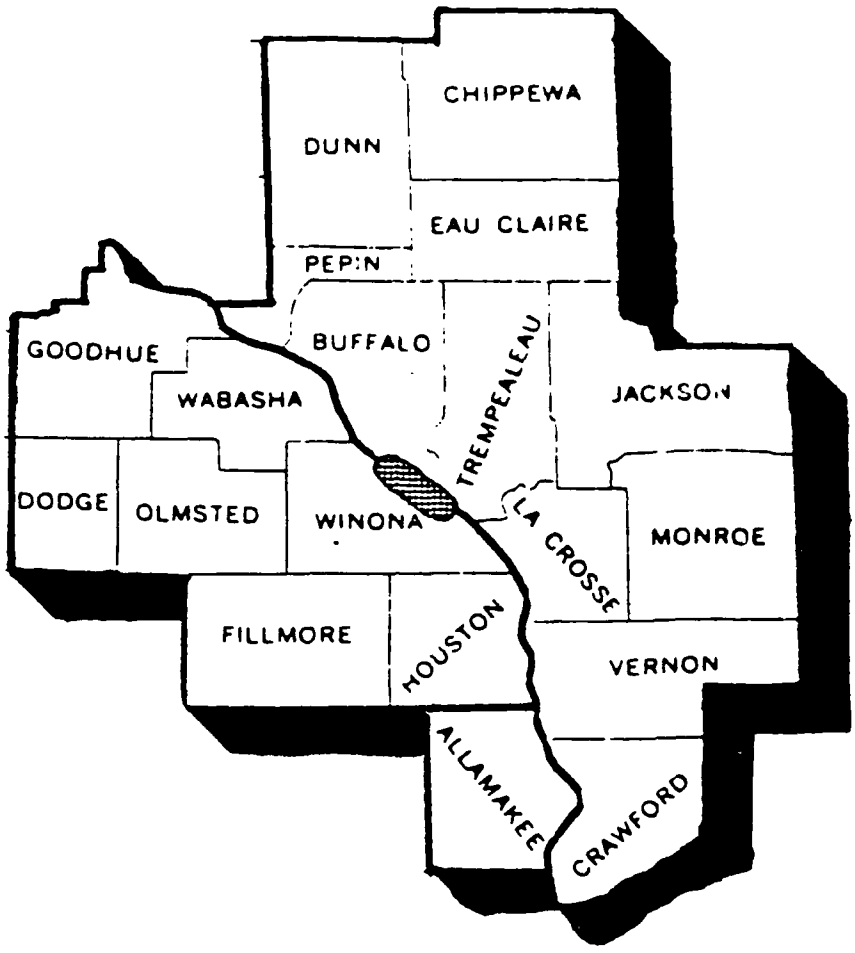


FIG. 45

ZONAL POPULATION PROJECTION

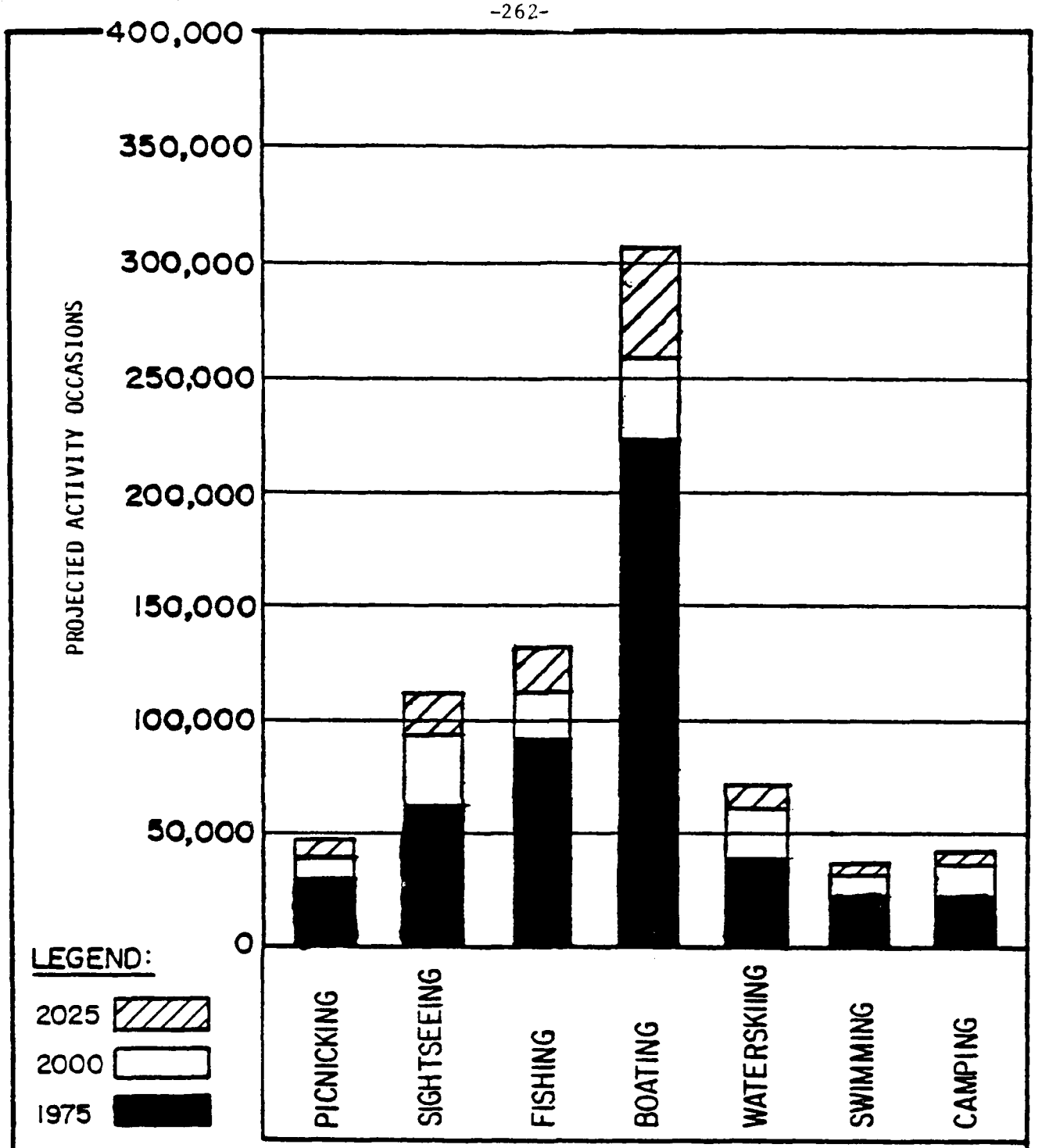
ZONE	1975	2010	2025
0-25 Mi.	62,375	71,930	78,630
26-50 Mi.	245,375	331,685	399,200
51-75 Mi.	178,760	215,595	240,705

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 5A

GREAT



RECREATION
DEMAND ANALYSIS

POOL 5A

FIGURE 46

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 56
Pool 5A

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	31.8	33.0	40.1	41.3	44.9	47.3	48.7
Sightseeing:	63.4	66.6	91.5	93.6	102.0	107.3	110.4
Fishing:	92.9	95.7	109.9	112.5	122.4	128.9	132.8
Boating:	223.4	229.2	253.3	259.3	281.9	297.2	306.0
Waterskiing:	40.0	42.2	59.8	61.2	66.6	70.1	72.1
Swimming:	22.5	23.5	30.4	31.1	33.8	35.6	36.7
Camping:	22.4	23.7	35.0	35.8	39.1	41.0	42.3
Hiking:	59.7	61.5	67.9	69.5	73.7	78.7	80.9
Hunting:							
Small Game-	653.0	672.0	730.8	777.5	855.4	923.1	959.4
Large Game-	274.3	282.3	306.9	326.6	359.3	387.7	402.9
Waterfowl-	378.8	389.7	423.8	451.0	496.2	535.4	556.5
Snowmobiling:	1440.1	1481.4	1620.3	1733.1	1921.1	2075.0	2159.7
Sub-Total:							
Activity Occassions:	496.4	513.9	620.2	634.8	690.7	727.4	749.0
Visitor Days:	299.0	309.6	373.6	382.4	416.1	438.2	451.2
Conversion Factor:	1.66						

Table 57
Pool 5A

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	56	112	37	1	407	10	10	561	14	14	100	3	3	57	19,818	7	5	98	327	17.3	2,196.0	3,265.0	19.0	559
1980:	58	116	39	1	419	10	10	576	14	14	106	3	3	59	20,673	7	5	104	347	18.1	2,260.0	3,360.0	19.5	575
1990:	71	142	54	1	481	12	12	636	16	16	150	4	4	76	26,713	9	6	154	513	19.8	2,456.0	3,654.0	21.2	629
2000:	73	146	55	1	492	12	12	651	16	16	154	4	4	78	27,342	9	6	158	527	19.8	2,612.0	3,888.0	22.7	673
2010:	79	158	60	1	536	13	13	708	18	18	167	4	4	85	29,780	10	7	172	573	21.4	2,875.0	4,277.0	24.8	746
2020:	83	166	63	1	564	14	14	746	19	19	176	4	4	90	31,327	11	7	181	603	23.1	3,100.0	4,616.0	26.8	806
2025:	86	172	65	1	581	15	15	769	19	19	181	5	5	92	32,265	11	7	186	620	23.1	3,224.0	4,797.0	27.9	839

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
1,162	27	25	474	1,430	32	30	715	1,688	39	36	843

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B. A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 58

Pool 5A

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	189	64.5	-	73	-	86	-	
Sightseeing (P.S.)	Approximately 65	46.6	-	55	-	65	-	
Fishing (P.S.)		450		492		581		
Fishing (L.L.)		11		12		15		
Boating (P.S.)	302	606	737	651	850	769	1,084	
Boating (L.L.)	10	15	19++	16	21++	19	28++	
	80 slips 65 private+							
Waterskiing (P.S.)		128		154		181		
Waterskiing (L.L.)		35		4		5		
Swimming (B.A.)	12,000 ft^2 0.28 acre	24,000 ft^2 0.54 acre	12,000 ft^2 0.27 acre	27,000 ft^2 0.63 acre	15,000 ft^2 0.35 acre	32,000 ft^2 0.74 acre	20,000 ft^2 0.46 acre	
Camping (Units)	126	129	3	158	32	186	60	
Hiking* (Miles)	0	19.0	19.0	19.8	19.8	23.1	23.1	Afternoon strolling trails in Merrick State Park
Hunting* Large Game (Land Acres)	4,651**	2,358,000	2,353,349	2,612,000	2,607,349	3,224,000	3,219,349	
Small Game* (Land Acres)	840**	3,507,000	3,506,160	3,888,000	3,887,160	4,797,000	4,796,160	

Pool 5A

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	7,154**	20,350	13,196	22,700	15,546	27,900	20,746	
Snowmobiling* (Miles)	0	602	602	673	673	839	839	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I, Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs.

M. How to Meet the Needs:

The greatest projected deficiencies in Pool 5A are for boat access launching lanes and adjacent parking, road access, swimming beaches, multipurpose trails and hunting areas.

By 1985 it is estimated that there will be approximately 740 additional parking spaces and 19 launching lanes required for projected recreation demand. By 2000 approximately 850 additional parking spaces and 21 launching lanes are projected to be reuqired. By 2025 approximately 1,085 parking spaces and 28 launching lanes are projected to be required. The needs for powerboat access are projected to be almost double those of fishing access needs.

The recreational use projections reflect the tremendous demand for recreational opportunties in the area Pool 5A. Data from the Aerial Recreation Use Survey of September 5, 1976, indicated an instantaneous open water boat use of approximately one boat per 50 acres with an additional 50 boats pulled up on sandbars. This is relatively low density.

If approximately 740 additional boats were allowed access to the pool in 1985 and 2 to 10 percent were in use at any one time (Aerial Survey, 1976; Fernholtz, 1969), a boat density of approximately one boat per 0.9 acres would result in extremely crowded and dangerous conditions on the Mississippi River (GREAT I, Recreation Work Group, Space Standards, December, 1976).

If a maximum acres per boat standard of 1 boat/20 acres is used (GREAT I, Space Standards, 1976), and 10 percent of the boats were assumed to be in use at any one time, approximately 170 additional parking spaces and 4 launching lanes would be desirable. If the standard were lowered to 1 boat/10 acres, approximately 690 additional parking spaces and 17 launching lanes would be required. The addition of approximately 170 additional parking spaces and 4 launching lanes appear to better reflect the capacity of the resources in Pool 5A.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continuously monitored.

Additional camping units are being developed at Bass Camp which should meet the projected 2025 demands. The existing camping use and increasing camping capacity at Bass Camp will also affect the recreational boating on the river and further slightly decrease the recreation resource requirements.

Even though there apprears to be adequate picnicking units, it must be pointed out that they are all located at Merrick Park in Wisconsin. Additional facilities in Minnesota would be desirable.

Multipurpose trails and hunting represent regional demands. Some of this demand will be satisfied elsewhere in the region. Mutlipurpose trail deficiencies probably exist throughout the region, however. Some additional low-impact trails could probably be provided in Merrick State Park and in the Whitman Wildlife Area. Wisconsin should consider a trail joining Merrick and Perrot State Parks. The regional demand for hunting cannot be satisfied within Pool 5A.

N. Recommendations:

1. Investigate the feasibility of expanding the camping, picnicking, boat access, parking, and beach facilities at Latsch Prairie Island Park.

2. The need for improved maintenance of the access channel into the Minnesota City Boat Club should be investigated (leased from Corps).

3. Encourage Bass Camp to expand its camping, boating access, parking, and picnicking facilities.

4. Minnesota DNR should investigate the feasibility of establishing a public access at Bass Camp.

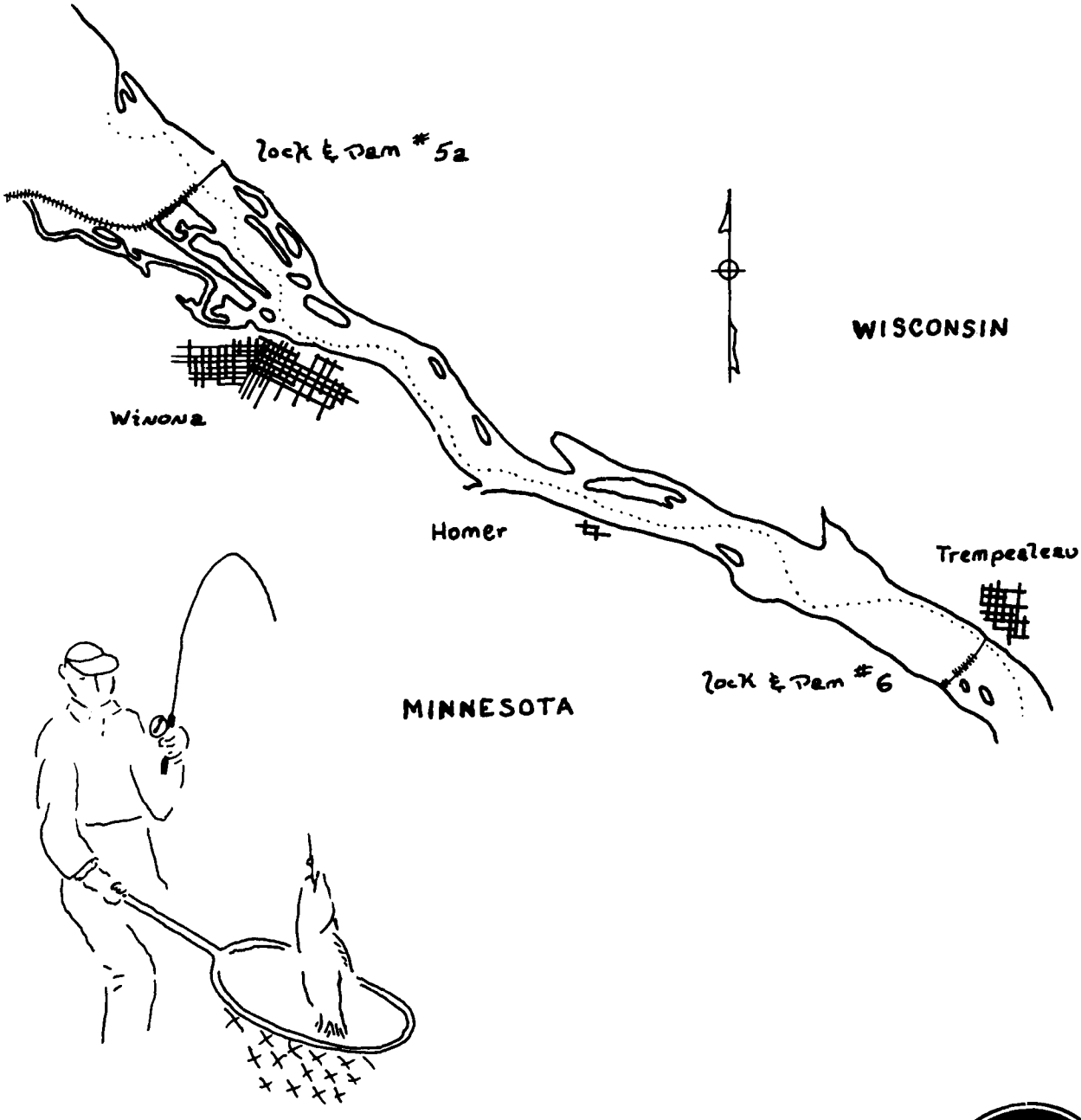
5. The Wisconsin DNR should investigate the feasibility of additional trail developments in Merrick State Park, Whitman Wildlife Area, and a system of interconnecting trails.

6. The Corps of Engineers should place dredged material and reshape the area at RM 737.7 L to expand the beach facility. This area could be used as a "holding area" for those awaiting lockage and provide additional primitive recreation facilities.

7. Redevelop the recreational access at RM 734 - Burleigh Slough Area.

8. The Corps of Engineers should further investigate the feasibility of developing a new beach area at RM 729.0 R. This area would serve as a "lockage waiting area".

POOL 6



The GREAT River

Figure 47

POOL 6

A. Description of Pool:

Lock and Dam No. 6 is located 714.3 river miles above the mouth of the Ohio River. The structure is 14.2 river miles below Lock and Dam No. 5A, 11.8 river miles above Lock and Dam No. 7, and 11.2 river miles below the city of Winona, Minnesota. The main lock and completed portion of the auxiliary lock are located on the Wisconsin side, or left bank, of the main channel adjacent to the Chicago, Burlington and Quincy Railroad at the village of Trempealeau.

B. Pool 6 Features:

Between river miles 717 and 725, from Trempealeau Bay upstream to about Bluff Siding, the Chicago, Burlington and Quincy Railroad is located so that its right-of-way embankment longitudinally divides the pool created by Lock and Dam No. 6 into two large and relatively equal sized segments. The main channel segment lies on the right, or south side, of the railroad embankment in this reach and has all the features that are typical of deep-water channel sections of the pools.

The left, or north segment, is almost entirely occupied by the Delta Fish and Fur Farm which is privately owned and managed to enhance the propagation of fish and wildlife for private sport fishing and hunting by permit only. Water is much more shallow and no direct inlets from the deep-water channel segment exist. Source of water for the most part is seepage from the main channel segment which provides a supply sufficient to permit a nominal range of water level regulation independent of adjacent main channel levels maintained by the Corps of Engineers. Regulation of water levels in this private segment is accomplished by means of control structures at the downstream end of this segment in the Trempealeau River and Bay area.

Principal features of the pool are summarized below:

a.	Length of pool	14.2 river miles
b.	River miles	714.3 to 728.5
c.	Pool elevation (flat pool)	645.5
d.	Water area of pool	8,870 acres
e.	Shoreline miles (outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	55 miles

f. Federal lands above normal flat pool (approximate)

(1) Administered by Corps of Engineers	295 acres
(2) Administered by the Department of the Interior (Bureau of Sport Fisheries and Wildlife)	1,345 acres
(3) Total above-water lands	1,640 acres

C. Federal Lands:

The Corps of Engineers, in connection with construction and operation of Lock and Dam and Pool No. 6, has acquired and presently administers about 327 acres of federally-owned land and water area and holds special rights on an additional 1,470 acres which are administered by the Fish and Wildlife Service. Of the 327 acres of Corps-administered land and water area, about 325 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi Wildlife and Fish Refuge in conjunction with Service-owned lands. About 2 acres of Corps lands at the structure site (Lock and Dam No. 6) have been retained solely under Corps management.

Of the federal lands owned in fee in Pool 6, about 1,640 acres protrude above the normal flat pool elevation of 645.5. Of this total, 295 acres are under jurisdiction of the Corps of Engineers and 1,345 acres are under the jurisdiction of the Department of the Interior.

Approximately 13.0 acres are leased by the Federal Government for various uses: public access - 1.6 acres, sewer - 0.4 acres, and storage areas - 11.0 acres.

Any development contemplated by the Corps will be restricted to selected sites on the 295 acres of Corps above-water lands.

D. Existing Recreational Facilities:

Pool 6 has 11 access areas with a total of 12 launching lanes (9 in Minnesota, 3 in Wisconsin), 547 marina slips, 1,120 parking spaces adjacent to boat accesses, 275 camping units, and 420 picnicking units. In addition, approximately 70 private boats are moored on the pool (Aerial Survey, 1976).

There are two major parks adjacent to the pool: Perrot State Park (Wisconsin) and Latsch Prairie Island Park (Minnesota).

Most of the recreational boating use is centered around Winona or immediately downstream. There are recreational accesses in the lower portions of the pool, however.

The entire pool is used heavily by recreationists. Recreational boating use is concentrated around the dredged material disposal areas near Winona. Fishing is mainly below the dam at Trempealeau.

E. Pool Accessibility:

Railroads and primary highways closely parallel both sides of the pool. Primary and secondary highways and a network of county and township roads provide lateral access through the zone of influence. One highway crossing from Minnesota to Wisconsin is located in Winona. A commercial airport is also located at Winona, Minnesota.

F. Natural Resources:

Of all the pools downstream from Locks and Dam No. 2, Pool 6 has the smallest average of Corps-owned lands. While most of this acreage is above water and accessible, much of the area is unsuitable for development of general recreational facilities. Although access via Corps lands is limited, water areas provide conditions and opportunity for participation in all the various on-water activities. (Recreational craft lockage flow through Locks 6 and 7 is presented on Table 59.) The degree of water pollution appears to be acceptable for water-contact activities and fish are edible. Lands and waters with forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl, and wild game.

The Wisconsin Department of Natural Resources has classified three areas as Natural Areas: Trempealeau Mountain, Delta Fur and Fish Farm, and Mertes Slough.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool areas in general, also prevail in Pool 6. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources:

One archeological site in Pool 6 has been placed on the National Register (Vos Site, Minnesota).

H. Fish and Wildlife Resources:

There is not substantial volume of commercial fishing in Pool 6. Table 60 shows the commercial catch in pounds of fish from 1960 through 1975.

Public trapping take in Pool 6 is one of the lowest of all pools in the study area due to the small amount of good furbearer habitat. However, more than 5,000 acres of privately-owned lands within the Delta Fish and Fur Farm support harvestable muskrat populations.

TABLE 59
PLEASURE BOAT LOCKAGE AT LOCKS 6 AND 7
1960 - 1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 7	Lock 6	Lock 7	Lock 6
1960	6,849	3,697	3,528	2,351
1961	8,041	3,828	4,100	2,312
1962	7,152	3,591	3,673	2,096
1963	8,337	4,095	3,836	2,527
1964	8,603	4,484	4,216	2,739
1965	6,226	3,505	3,207	2,124
1966	8,239	4,291	4,208	2,657
1967	6,879	4,317	3,620	2,666
1968	6,806	5,010	3,664	3,387
1969	6,535	3,772	3,193	2,273
1970	7,339	4,137	3,674	2,386
1971	8,281	4,734	3,307	2,641
1972	9,184	5,823	4,164	3,312
1973	9,037	6,448	3,863	3,158
1974	7,851	5,475	3,462	2,854
1975	8,176	5,300	3,426	2,498
1976	9,894	6,466	3,585	2,989
*1980	8,640	5,883	3,395	2,443
*1990	11,209	7,028	4,282	2,838
*2000	13,130	8,026	4,945	?,183

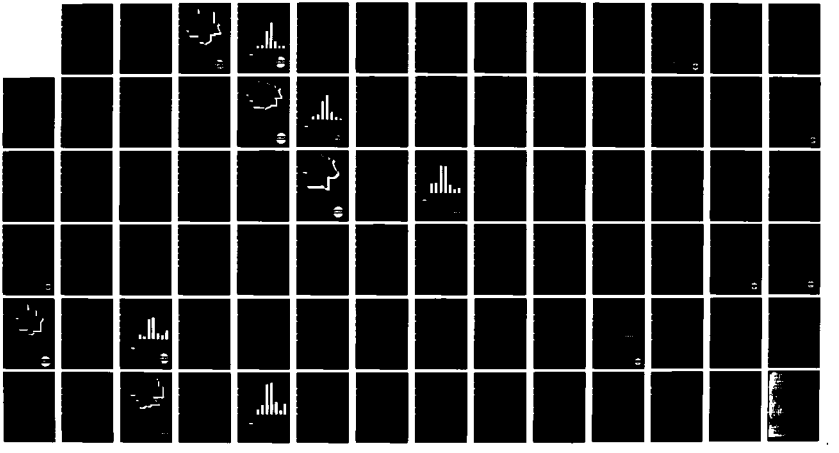
* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

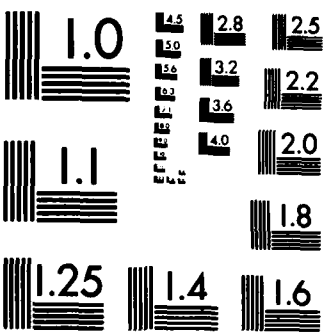
TABLE 60
POUNDS OF FISH CAUGHT ANNUALLY BY COMMERCIAL FISHERMEN
IN POOL 6
1960 - 1975

Year	Commercial Fish Catch
1960	99,000
1961	126,000
1962	90,000
1963	128,000
1964	135,000
1965	Not Available
1966	82,000
1967	63,000
1968	101,000
1969	44,000
1970	37,758
1971	112,476
1972	133,685
1973	124,237
1974	52,693
1975	93,709

Source: Upper Mississippi River Conservation Committee

AD-A127 213 GREAT I STUDY OF THE UPPER MISSISSIPPI RIVER TECHNICAL 4/4
APPENDIXES VOLUME 6 RECREATION(U) GREAT RIVER
ENVIRONMENTAL ACTION TEAM R LINDBERG ET AL. SEP 80
UNCLASSIFIED DACW37-75-C-0204 F/G 13/2 NL





I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 6 include:

* For trip costs on the river, Pool 6 had more high cost trips than expected.

* As a reason for choosing a put-in site "near favorite island" had a higher than expected group of no response in Pool 6.

* "Easy access" was most frequently an important reason for choosing a put-in site in this pool.

Origin of trip of those users surveyed in this Pool:	Winona, Minnesota	56%
	LaCrosse, Wisconsin	13%
	Other Minnesota cities	9%
	Other Wisconsin cities	4%
	Alma, Wisconsin	4%

J. Projected Recreational Activity Occasions:

The projected recreation activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The population within the zone-of-influence is estimated to increase by approximately 46 percent between 1975 and 2025.

Visitor day use is projected to increase approximately 49 percent between 1975 and 2025. This is an increase of approximately 325,100 visitor days. It is estimated that the average visitor will participate in more than one activity, however. Refer to Table 61.

K. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular activity. Refer to Table 62.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 63.

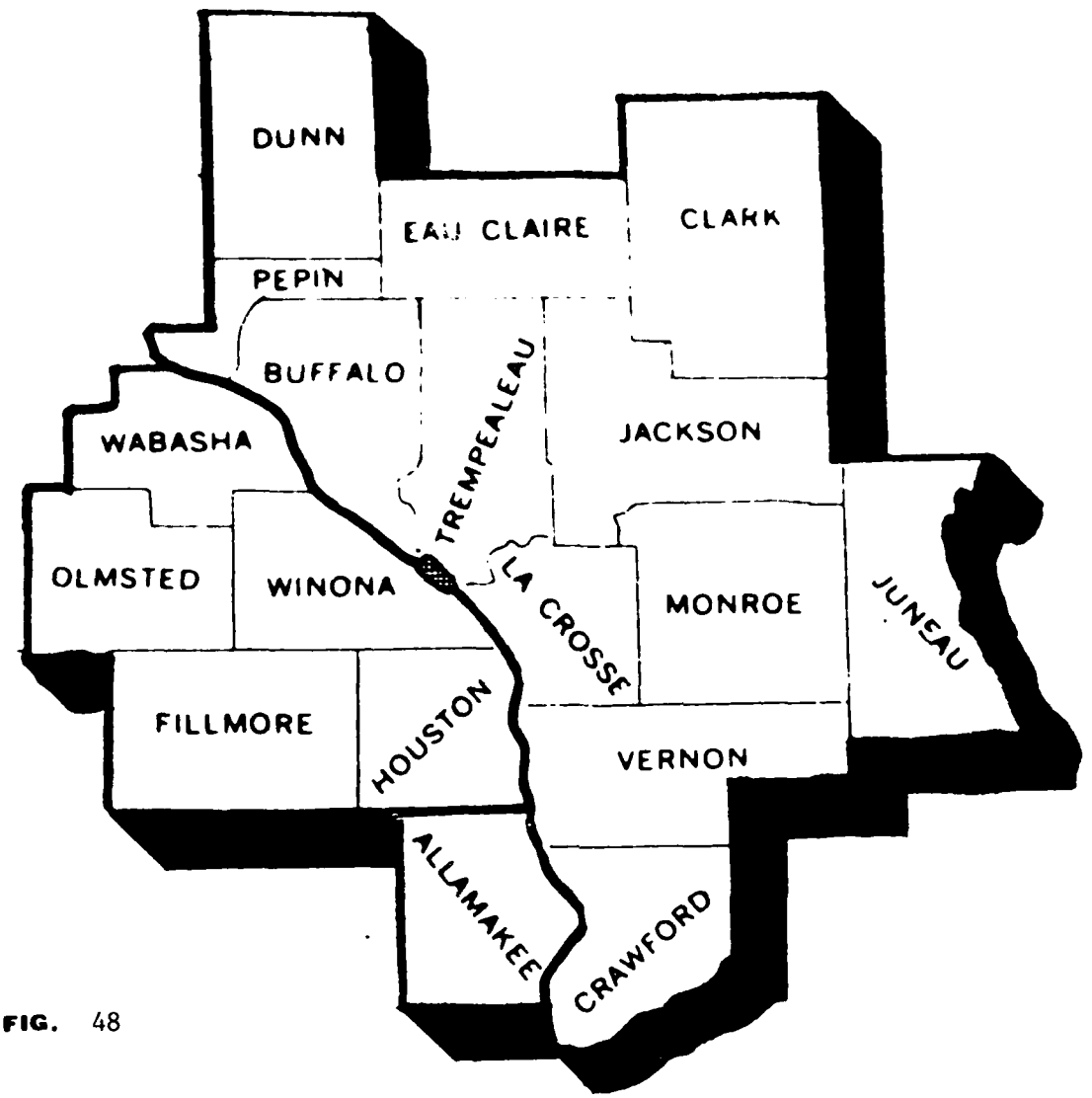


FIG. 48

ZONAL POPULATION PROJECTION

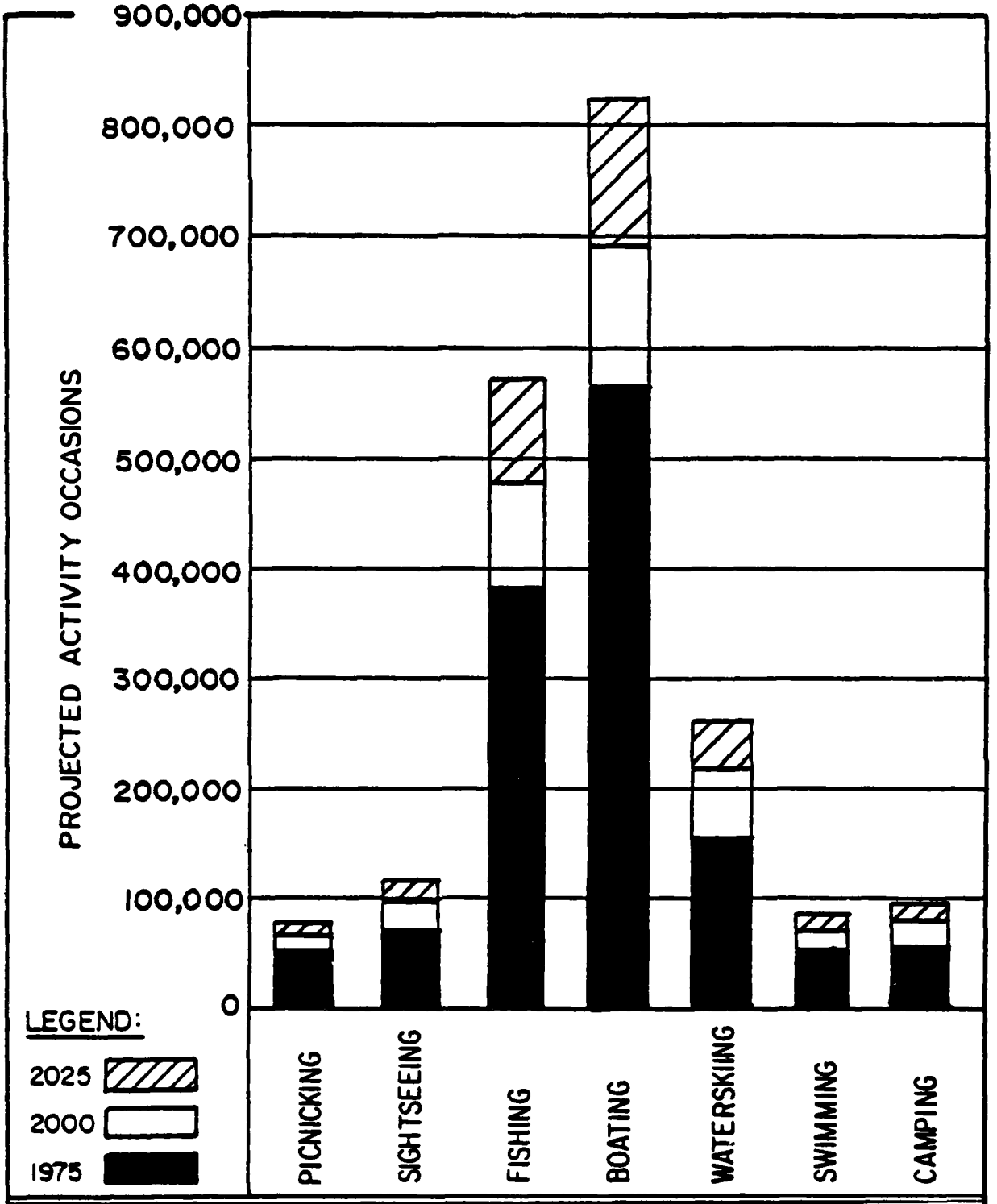
ZONE	1975	2010	2025
0-25 Mi.	125,810	152,395	174,520
26-50 Mi.	101,225	118,755	130,360
51-75 Mi.	179,350	242,715	289,605

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 6

GREAT



RECREATION
DEMAND ANALYSIS

POOL 6

FIGURE 49

GREAT

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 61
Pool 6

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	51.1	53.1	63.8	66.4	71.8	76.5	79.2
Sightseeing:	69.7	73.0	93.9	97.7	105.8	112.7	116.6
Fishing:	382.7	396.6	459.8	478.7	517.3	551.6	570.8
Boating:	565.7	584.9	663.4	690.7	746.0	795.8	823.5
Waterskiing:	153.1	160.7	209.2	217.7	235.7	251.0	259.8
Swimming:	52.4	54.7	67.6	70.4	76.2	81.1	84.0
Camping:	54.1	57.0	76.6	79.7	86.3	91.9	95.1
Hiking:	67.0	68.9	75.8	77.0	81.2	86.4	88.6
Hunting:							
Small Game-	638.3	656.2	709.4	752.7	829.1	894.2	926.6
Large Game-	268.0	275.6	297.9	316.1	348.2	375.6	390.4
Waterfowl-	370.2	380.6	411.5	436.6	480.8	518.6	539.2
Snowmobiling:	1294.7	1330.9	1454.6	1556.0	1732.9	1873.8	1953.0
Sub-Total:							
Activity Occassions:	1328.8	1380.0	1634.3	1701.3	1839.1	1960.6	1979.0
Visitor Days:	664.4	690.0	817.2	850.7	919.6	980.3	989.5
Conversion Factor:	2.00						

Table 62
Pool 6

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	55	110	30	1	935	23	23	868	22	22	329	8	8	80	28,175	9	6	145	483	19.8	2,144.0	3,192.0	18.5	503
1980:	57	114	31	1	969	24	24	897	22	22	345	9	9	84	29,389	10	7	153	510	19.8	2,204.0	3,281.0	19.1	517
1990:	69	138	40	1	1,123	28	28	1,018	25	25	449	11	11	104	36,354	12	8	206	687	22.2	2,384.0	3,547.0	20.6	565
2000:	72	144	42	1	1,170	29	29	1,060	26	26	467	12	12	108	37,836	13	9	214	713	22.2	2,528.0	3,764.0	21.9	604
2010:	77	154	46	1	1,264	32	32	1,144	29	29	506	13	13	117	40,939	14	9	232	773	23.9	2,784.0	4,146.0	24.1	673
2020:	82	164	48	1	1,348	34	34	1,221	31	31	539	13	13	125	43,613	15	10	247	823	24.7	2,860.0	4,471.0	26.0	728
2025:	85	170	50	1	1,395	35	35	1,263	32	32	558	14	14	129	45,139	15	10	256	853	25.5	3,124.0	4,648.0	27.0	758

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
2,242	53	40	656	2,847	67	52	938	3,395	81	62	1,120

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 63

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	420	63	-	72	-	85	-	
Sightseeing (P.S.)	Approximately 320	35.5	-	42	-	50	-	
Fishing (P.S.)		1,046	-	1,170	-	1,395	-	
Fishing (L.L.)		26	-	29	-	35	-	
Boating (P.S.)	895	956.5	1,052	1,060	1,350	1,263	1,869	
Boating (L.L.)	12	23.5	46++	26++	53	32	67++	
	382 Slips 70 private+							
Waterskiing (P.S.)		397	-	467	-	558	-	
Waterskiing (L.L.)		10	-	12	-	14	-	
Swimming (B.A.)	40,000 sq. ft. (0.918 Acre)	32,871.5 (0.76 Acre)	-	37,836 (0.869 Acre)	-	45,139 (1.04 Acres)	5,139 sq. ft. (0.117 Acre)	
Camping (Units)	275	179.5		214		256		
Hiking* (Miles)	3.5	21.0	12.5	22.2	13.7	25.5	17.0	
Hunting* Large Game (Land Acres)	3,622**	2,294,000	2,290,378	2,528,000	2,524,378	3,124,000	3,120,378	
Small Game* (Land Acres)	1,766**	3,414,000	3,412,234	3,764,000	3,762,234	4,648,000	4,646,234	

Pool 6

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	10,808**	19,900	9,092	21,900	11,092	27,000	16,192	
Snowmobiling* (Miles)	0	541	541	604	604	758	758	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I, Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats= reduction in parking area needs.

M. How to Meet the Needs:

The greatest projected deficiencies in Pool 6 are for boat access launching lanes and adjacent parking, multipurpose trails and game hunting areas.

By 1985 it is estimated that there will be approximately 1,050 additional parking spaces and 46 launching lanes required for projected recreational demand. By 2000 approximately 1,335 additional parking spaces and 53 additional launching lanes are required. By 2025 approximately 1,855 additional parking spaces and 67 additional launching lanes are required. The needs are approximately equal for fishing and powerboating access.

The recreational use projections reflect the tremendous demand for recreational opportunities in Pool 6. Data from the Aerial Recreation Use Survey of September 5, 1976, indicated an instantaneous use of approximately one boat per 65 acres which would be relatively low density. Approximately 50 boats were pulled up on sandbars, also. If approximately 1,855 additional boats were allowed access to the pool in 2025 and 2 to 10 percent were in use at any one time (Aerial Survey, 1976; Fernholtz, 1969). A boat density of approximately 1 boat per 7.5 acres would result--extremely crowded and dangerous on the Mississippi River (GREAT I, Space Standards, December, 1976).

If a maximum acres/boats standard of 1 boat/20 acres is used (GREAT I, Recreation Work Group, Outdoor Recreation Space Standards, December, 1976), no additional boating access would be desirable. If the standard were dropped to 1 boat/10 acres, the 1985 projected requirements were provided (1,040 parking spaces and 46 launching lanes) and 10 percent of the boats were in use at any one time, the 1 boat/10 acres would be slightly exceeded in 1985. These projections would seem to better reflect the capacity of the resources in Pool 6.

If additional boating facilities were desirable (beyond the 1985 projection) it is doubtful that these developments could occur without substantial modifications to the river, the landscape and existing recreational use.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continually monitored.

Mutlipurpose trails and hunting represent regional demands. Some of this demand will be satisfied elsewhere in the region. Multipurpose trail deficiencies probably exist throughout the region, however. Some additional trails could possibly be provided at Perrot State Park, Latsch Prairie Island Park and on Latsch Island. Winter trail use can take place on ice-covered backwater areas. Regional hunting demand can not be satisfied within Pool 6.

N. Recommendations:

1. The Fish and Wildlife Service should investigate the feasibility of opening, upgrading, and maintaining the Big Trout Creek Access (old FWS fishing/hunting access) at RM 715.2R.

2. The Corps of Engineers should further investigate the feasibility of creating an island/beach area with dredged material at approximately RM 715.5 R or RM 717.5 L.

3. The Corps of Engineers should further investigate the feasibility of creating an island/beach area with dredged material at RM 714.5 R for use as a lockage "waiting area".

4. The Corps of Engineers and Town of Homer should further investigate the feasibility of upgrading and expanding the boat ramp at Homer. Dredged material could be used.

5. The city of Winona and state of Minnesota should provide a major park area on Latsch Island (RM 725.2 - 726.3). Dredged material should be used to fill in low spots. Additional parking, boat ramps, and multipurpose (as well as support facilities) should be provided.

6. The City of Winona should investigate the feasibility of expanding and upgrading the facilities (parking and boat ramp) at the St. Charles Boat Ramp (RM 724.7 R).

7. The City of Winona should investigate the feasibility of upgrading and expanding the East Boat Harbor at RM 723.8 R. Use dredged material to bury debris and provide parking; widen the ramp.

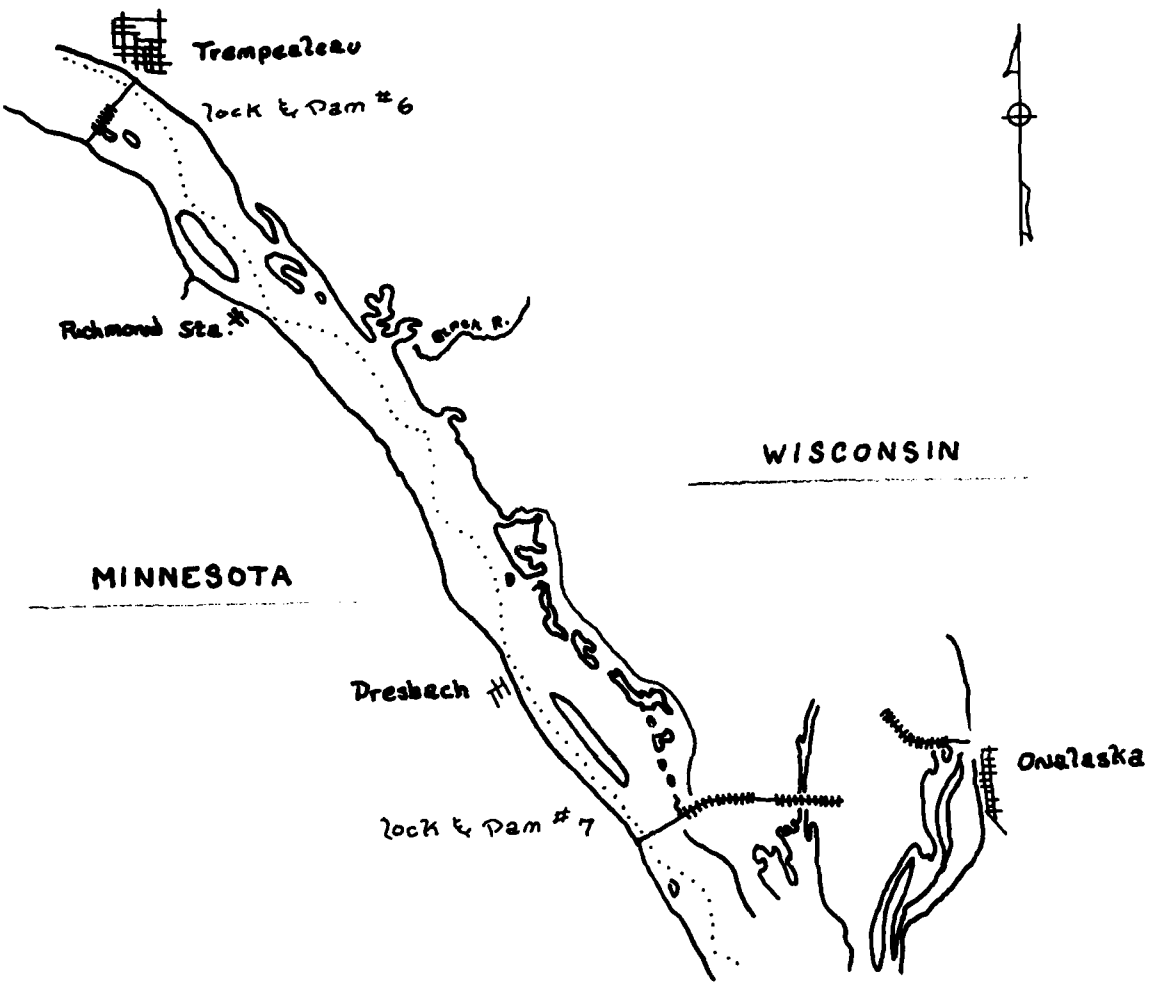
8. The Corps of Engineers should further investigate the feasibility of locating a new boating access area on County Ditch No. 4 (RM 722.3 R). This area adjoins Highway 14-61 and the main channel.

9. The Corps of Engineers should further investigate the feasibility of placing dredged material for "beach nourishment" at Latsch Prairie Island Park. The City of Winona should further investigate the feasibility of expanding the park facility and adding a second ramp.

10. Wisconsin and Minnesota should investigate nonmotorized trail developments in Perrot State Park and Latsch Prairie Island Park.

11. The Corps of Engineers should further investigate the feasibility of developing a new beach area at RM 714.7 L.

12. The Corps of Engineers should further investigate the feasibility of purchasing and reshaping the existing beach/camp area at RM 728.0 L. This area would serve as a "lockage waiting area". Buoy the wing dams in the area.



POOL 7

The GREAT River

Figure 50

POOL 7

A. Description of Pool:

Lock and Dam No. 7 is located 702.5 miles above the Ohio River. The structure is 11.8 river miles below Lock and Dam No. 6, 4.6 river miles above the city of LaCrosse, and 23.3 river miles above Lock and Dam No. 8. The main lock and completed upper section of the auxiliary lock are located on the Minnesota side or right bank of the main channel of the Mississippi which at this point is immediately adjacent to the main line of the Chicago, Milwaukee, St. Paul and Pacific Railroad. U.S. Highway 61 parallels the railroad on the landward side at the foot of the high bluffs which outline most of the Mississippi Valley.

B. Pool 7 Features:

Beginning in Pool 7 and extending downstream, the high bluf egion adjacent to the pool (in both Minnesota and Wisconsin) is known ; he Driftless Area and shows few signs of previous glacial action. T owland and floodplain areas between bluffs in Pool 7, however, as in ot aches of the river, basically consist of alluvial terraces deposited b cial stream outwash. The surface conditions have probably been altered from time to time as the result of recurring high water which has eroded, carried, and deposited material all along its course.

Above Lock and Dam No. 7 and extending upstream through the approximate full length of the pool, the main channel follows along the Minnesota side of the valley adjacent to the Chicago, Milwaukee, St. Paul and Pacific Railroad right-of-way which forms the right bank pool limits. About a mile below Lock and Dam No. 6 the channel swings toward the Wisconsin side of the valley where the lock is located. Because of the main channel location, most of the project lands above pool level are located on the Wisconsin side of the main channel. Project lands on the Minnesota side consist only of an area extending about a mile below the earth dike and spillway section of Lock and Dam No. 6, several main-channel islands, and narrow strips along the Minnesota shoreline of the channel.

Physical conditions and topography at the extreme lower end of the pool on the Wisconsin side in the French Island, Onalaska, and Brice's Prairie areas are especially suitable for access to water. Compared to other access points, these locations are the most easily accessible over good roads, and land is more level and less broken up by interspersed areas of water. Shoreline areas are generally not wooded except for fringe cover and are not considered desirable areas for extensive land-type recreational activities.

Upstream of Brice's Prairie, in the area where the Black River enters the pool, water is pooled on both sides of the Chicago, Burlington, and Quincy Railroad right-of-way. Much of the area riverward of the railroad along this stretch is almost inaccessible from land. Areas above this stretch in the upper reach become more easily accessible from land as Lock and Dam No. 6 at Trempealeau is approached. These areas are more heavily and extensively wooded and are more aesthetically attractive from a "primitive" viewpoint than areas in the lower pool reaches.

Pool 7 is the sixth largest of the 13 pools in the GREAT I area in terms of water acreage. For several miles above the structure, the Black River, which originally had a separate channel, becomes integrated with the Mississippi in the lower pool reaches. The city of LaCrosse, located downstream of Pool 7, is the largest city in the district that is located on the Mississippi River south of Minneapolis and St. Paul. Pool 7 is one of the most heavily used of all the pools (third, by estimated visitation in 1963; fourth, by aerial recreation use counts in 1976). It primarily accommodates people from the LaCrosse area even though that city is located on Pool 8.

Principal features of the pool are summarized below:

a.	Length of Pool	11.8 river miles
b.	River miles	702.5 to 714.3
c.	Pool elevation (flat pool)	639.0
d.	Water area of pool (sixth largest)	13,440 acres
e.	Primary shoreline (outer perimeter)	37.1 miles
f.	Federal lands above normal flat pool (approximate)	
	1. Administered by Corps of Engineers	2,340 acres
	2. Administered by Bureau of Sport Fisheries and Wildlife	4,730 acres
	3. Total above-water lands	7,070 acres

C. Federal Lands:

Approximately 14,328 acres are held in fee by the Federal Government in Pool 7. Of this total, 6,988 acres are under the jurisdiction of the Corps of Engineers and 7,340 acres are under jurisdiction of the Department of the Interior. All but two acres of the Corps of Engineers lands are under permit to the Fish and Wildlife Service for utilization as part of the Upper Mississippi River Fish and Wildlife Refuge.

Of the federal lands owned in fee, it is estimated that about 7,070 acres protrude above the normal flat pool level of elevation 639.0.

Approximately 209.2 acres are leased by the Corps of Engineers for various uses: private cottages-2.6 acres, (4 cottages on French Island, 1 cottage on Lake Onalaska), public park and recreation-108.8, other-97.8 (includes airport, roads, drainage, etc.).

Lands considered for Corps of Engineers development of recreational facilities will be restricted to the 2,340 acres above pool level that are under Corps of Engineers jurisdiction.

D. Existing Recreational Facilities:

Pool 7 has 12 access areas with a total of 13 launching lanes (1 in Minnesota, 12 in Wisconsin), 46 marina slips, 386 parking spaces adjacent to boat accesses, 112 camping units (Wisconsin), 213 picnicking units (28 in Minnesota, 185 in Wisconsin) and 4 miles of hiking trails (Wisconsin). In addition, approximately 270 private boats are moored on the pool (Aerial Survey, 1976).

There are two major parks adjacent to the pool: O. L. Kipp State Park (Minnesota) and Louis Nelson Park (Wisconsin).

E. Pool Accessibility

Most points along the outer limits on each side of Pool 7 are accessible by both railroad and highway. The city of LaCrosse is a focal point for highways servicing both the states of Wisconsin and Minnesota. The new Interstate Highway 90, which crosses the river just downstream of Lock and Dam No. 7, provides a rapid and unrestricted means of reaching the lower end of the pool from the Minnesota zone of population influence. There are no highway crossings within the limits of the pool. The Interstate Highway 90 bridge is the crossing nearest Pool 7.

F. Natural Resources:

A diversity of resources exists in Pool 7. Major features include Lake Onalaska and several large island complexes.

Lake Onalaska provides an excellent wildlife (closed to waterfowl hunting) and fishing area. A great deal of fishing also occurs below the Trempealeau Dam (Lock and Dam 6).

The Wisconsin Department of Natural Resources has classified two areas as Natural Areas: Upland Plover Nesting Site and Tank Creek.

G. Cultural Resources:

Four archaeological sites in Pool 7 have been placed on the National Register. One of the sites is the Trempealeau Lakes Mound Group and Second Lake Village Site in the upper segment of the pool.

H. Fish and Wildlife Resources:

There is substantial commercial fishing in Pool 7 although catches showed significant year-to-year variation in the 1960's. Table 64 shows the commercial catch in pounds of fish from 1960 through 1975.

Opening day duck harvest is approximately 3 to 4 thousand, all species combined, with an average seasonal harvest of approximately 10 to 15 thousand. Additional hunting statistics reveal that on the average 25 deer and about 500 raccoons, squirrels, and rabbits combined, are harvested annually.

TABLE 64
POUNDS OF FISH CAUGHT ANNUALLY
BY COMMERCIAL FISHERMEN IN POOL 7
1960-1975

Year	Commercial Fish Catch
1960	283,000
1961	416,000
1962	721,000
1963	530,000
1964	458,000
1965	Not Available
1966	259,000
1967	517,000
1968	528,000
1969	242,000
1970	839,740
1971	512,316
1972	419,798
1973	335,296
1974	417,950
1975	349,008

Source: Upper Mississippi River Conservation Committee

TABLE 65
RESULTS OF THREE SPORT FISHERY SURVEYS ON POOL 7
1962-1963, 1967-1968, and 1972-1973

Measure of Comparison	1962-1963	1967-1968	1972-1973
Projected Number of Fishing Hours Annually	308,741	233,973	218,511
Breakdown of Fishing Hours:			
a. Boat	48%	36%	46%
b. Bank	18%	10%	12%
c. Barge	6%	6%	7%
d. Ice	28%	48%	34%
Total	100%	100%	99%*
% Breakdown of Fish Chiefly Sought:			
a. Bluegill, Crappie, and Sunfish	78%	40%	62%
b. Walleye and Sauger	15%	17%	26%
c. Northern Pike	--	4%	5%
d. Other	7%	39%	7%
Total	100%	100%	100%
Projected Annual Seasonal Catch (In Fish):			
a. Bluegill, Crappie, and Sunfish	355,110	181,868	241,993
b. Walleye and Sauger	13,462	20,725	28,817
c. Northern Pike	4,364	5,596	3,721
d. Other	72,007	50,445	52,962
Total (Fish)	444,943	258,634	327,493
Catch Rates (Fish Caught per Manhour):			
a. Boat	1.263	0.789	1.144
b. Bank	1.288	0.964	1.202
c. Barge	0.632	0.527	0.631
d. Ice	1.904	1.449	2.310
Annual Average	1.406	1.068	1.482
Estimated Annual Recreational Value:			
a. Fishing trips	79,030	63,238	60,049
b. Value at $11.50 per Trip**	$908,845	$727,237	$690,563.50

SOURCES:
The 1962-1963 data are from Robert C. Nord, The 1962-1963 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Committee; October 6, 1964). The 1967-1968 data are from Kenneth J. Wright, The 1967-1968 Sport Fishery Survey of the Upper Mississippi River (LaCrosse, Wisconsin: Upper Mississippi Conservation Commitee; October 1, 1970).

The 1972-73 data are from George C. Fleener, The 1972-73 Sport Fishery Survey of the Upper Mississippi River, Upper Mississippi River Conservation Committee, November 28, 1975.

* Rounding off error.
**1975 National Survey of Hunting, Fishing, and Wildlife Associated Recreation, U.S. Fish and Wildlife Service.

Annual trapping harvests are approximately 10,000 muskrats, 150 beaver, 2 otter, and 15 mink. This represents a current annual value to the trapper of approximately $10,000 to $15,000.

Creel censuses were taken in 1962-1963, 1967-1968, and 1972-1973. The surveys indicated that during 1962-63, 79,930 fishermen fished approximately 308,740 hours and caught about 1.44 fish per fisherman hour. During the 1967-1968 survey, 63,238 fishermen fished approximately 233,970 hours and caught about 1.10 fish per hour. During the 1972-1973 survey, 60,049 fishermen fished approximately 218,511 hours and caught 1.47 fish per hour. At a value of $11.50 per fishing trip, this would represent an estimated recreational value of $690,563. See Table 65.

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 7 include:

* Near LaCrosse, this pool had a higher than expected proportion of users with low cost trips.

* Pool 7 exhibited more yes responses than were expected concerning whether or not a put-in site had been selected to avoid locks.

Origin of trip of those users surveyed in this Pool:	LaCrosse, Wisconsin	29%
	Trempealeau, Wisconsin	16%
	Onalaska, Wisconsin	13%
	Other Wisconsin cities	12%

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I Recreation Work Group. The population within the zone-of-influence is projected to increase approximately 21 percent between 1975 and 2025 (Figure 51).

Visitor day use is projected to increase approximately 49 percent between 1975 and 2025. This is an increase of approximately 195,000 visitor days. It is estimated that each visitor will participate in more than one activity, however. Refer to Table 66.

K. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 67.

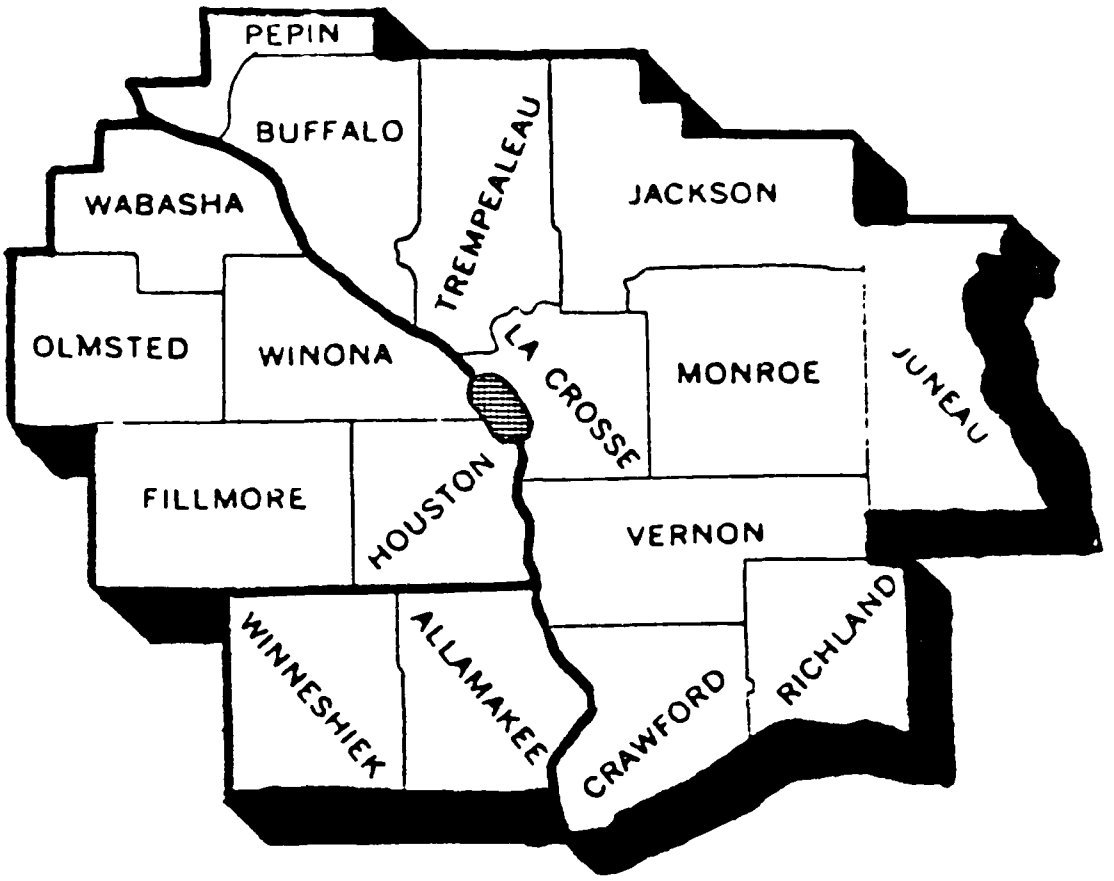


FIG. 51

ZONAL POPULATION PROJECTION

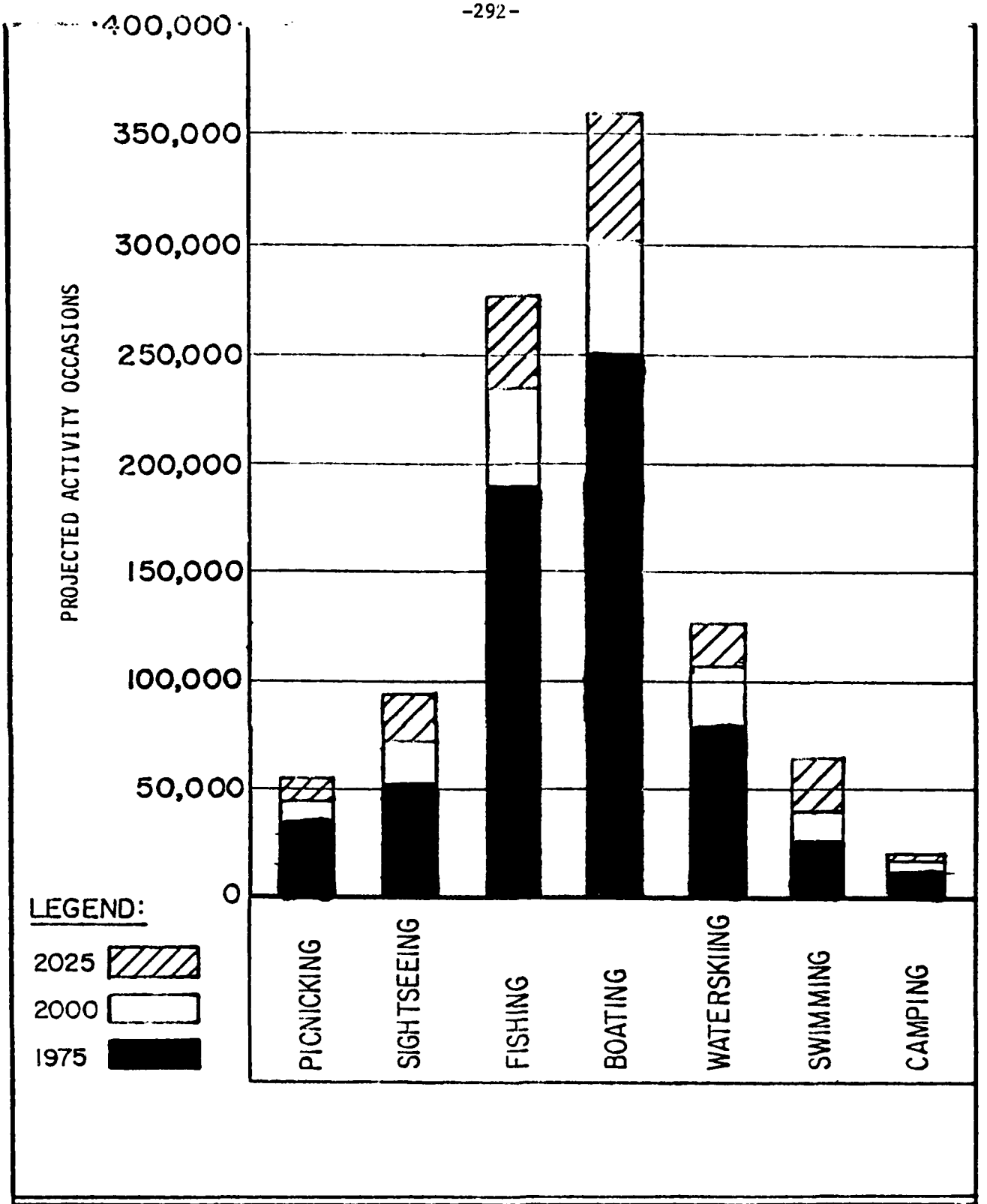
ZONE	1975	2010	2025
0-25 Mi.	124,890	152,085	174,515
26-50 Mi.	95,310	106,795	115,445
51-75 Mi.	139,170	163,940	181,000

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 7

GREAT



RECREATION
DEMAND ANALYSIS

POOL 7

FIGURE 52

The GREAT River

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 66
Pool 7

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	35.3	36.6	43.5	45.2	48.6	51.7	53.4
Sightseeing:	51.1	53.4	67.8	70.1	75.8	80.4	83.2
Fishing:	188.5	195.0	224.9	233.6	251.8	268.0	277.5
Boating:	250.8	259.0	292.0	303.3	327.0	348.2	360.6
Waterskiing:	78.7	82.2	104.4	107.8	115.7	122.3	126.3
Swimming:	33.7	35.0	43.9	44.5	48.0	51.0	52.7
Camping:	11.2	11.8	15.5	16.1	17.4	18.4	19.1
Hiking:	92.6	94.2	97.4	95.8	98.9	103.0	104.7
Hunting:							
Small Game-	492.5	503.5	527.8	545.8	584.6	617.6	635.9
Large Game-	206.9	211.5	221.7	229.2	245.5	259.4	267.0
Waterfowl-	285.6	292.0	306.1	316.6	339.0	358.2	368.8
Snowmobiling:	899.4	918.8	971.1	1008.3	1087.7	1146.7	1182.4
Sub-Total:							
Activity Occassions:	649.3	673.0	792.0	820.6	884.3	940.0	972.8
Visitor Days:	391.1	405.4	477.1	494.3	532.7	566.3	586.0
Conversion Factor:	1.66						

Table 67
Pool 7

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	53	106	39	1	796	20	20	532	13	13	191	5	5	72	25,056	8	6	42	140	445.5	1,656.0	2,463.0	14.3	349
1980:	55	110	30	1	824	21	21	550	14	14	199	5	5	75	26,075	9	6	44	147	453.8	1,692.0	2,518.0	14.6	357
1990:	65	130	38	1	950	24	24	620	15	15	253	6	6	91	31,933	11	7	58	193	468.6	1,772.0	2,639.0	15.3	377
2000:	67	134	40	1	987	25	25	644	16	16	262	7	7	95	33,125	11	8	60	200	461.2	1,832.0	2,729.0	15.9	392
2010:	73	146	43	1	1064	27	27	694	17	17	281	7	7	102	35,691	12	8	65	217	476.1	1,964.0	2,923.0	17.0	422
2020:	77	154	46	1	1133	28	28	739	18	18	297	7	7	108	37,894	13	9	68	227	495.9	2,076.0	3,088.0	17.9	445
2025:	80	160	47	1	1173	29	29	766	19	19	306	8	8	112	39,194	13	9	71	237	504.1	2,136.0	3,180.0	18.5	459

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
1,630	38	27	293	2,028	48	35	394	2,404	56	41	467

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Pool 7

Table 68

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	68	60	-	67	-	80	2	
Sightseeing (P.S.)	Approximately 160	34	-	40	-	47	-	
Fishing (P.S.)	-	897	-	987	-	1,173	-	
(L.L.)	-	22.5	-	25	-	29	-	
Boating (P.S.)	370	585	1,110	644	1,300	766	1,650	
(L.L.)	17	14.5	19++	16	25++	19	35++	
	46 Slips 229 private+							
Waterskiing (P.S.)	-	226	-	262	-	306	-	
(L.L.)	-	5.5	-	7	-	8	-	
Swimming (B.A.)	10,000 sq. ft. (0.2 Acre)	29,004 (0.7 acre)	19,000 (0.4 acre)	33,125 (0.8 Acre)	23,125 (0.5 Acre)	39,194 (0.9 Acre)	29,194 (0.7 acre)	
Camping (Units)	32	51	19	60	28	71	39	
Hiking* (Miles)	0	461.2	-461	461.2	-461	504.1	-504	
Hunting* Large Game (Land Acres)	4,710**	1,732,000	1,727,290	1,832,000	1,827,290	2,136,000	2,131,290	
Small Game* (Land Acres)	1,945**	2,578,500	2,576,555	2,729,000	2,727,055	3,180,000	3,178,055	

Pool 7

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	15,357**	14,950	-	15,900	543	18,500	3,143	
Snowmobiling* (Miles)	0	367	-367	392	-392	459	-459	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I, Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreational resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 68.

M. How to Meet the Needs:

Pool 7 ranks second in facility needs in the GREAT I area (behind Pool 3). The greatest deficiencies in Pool 7 are for boat access launching lanes and adjacent parking, hiking trails, snowmobile trails and hunting access. (Refer to Table 68). By 1985 it is estimated that there will be over 1,110 additional parking spaces and 19 launching lanes required for projected recreational use. By 2000 approximately 1,300 parking spaces and 25 launching lanes are required. By 2025 approximately 1,650 parking spaces and 35 launching lanes are required. The needs are approximately equal for fishing and power-boating access. The Minnesota side of the channel has only one boat ramp, however.

Approximately 400-500 miles of hiking and snowmobiles trails are also required. This is a "regional" need, however, and some of this demand will be satisfied outside the GREAT I area. The regional demand for hunting cannot be satisfied in Pool 7.

Additional needs are for road access swimming and camping units. The Fish and Wildlife Service has proposed to upgrade facilities at Brice's Prairie Landing and Lone Tree Landing under the Bicentennial Land Heritage Program.

The owner of Sunset Bay would like state of Minnesota assistance in developing a boat ramp. A new recreation access (several ramps, large parking areas) could be built with dredged material at Dakota (RM 707.0 R). The city has indicated an interest in the project. A recreation development at Dakota should also include a road access swimming beach to accommodate projected beach deficiencies. The old fish ponds at RM 713.2 R could also be developed into an extensive recreation access. These three projects could provide for much needed access from Minnesota.

Minor additional needs for camping and picnicking can be accommodated by a slight expansion of Birch Area Resort (private). Additional picnicking could possibly be provided at Louis Nelson Park (Wisconsin) and at boat landing sites including the proposed area at Dakota (Minnesota).

A recreation development at Dakota should also include a road access swimming beach to accommodate projected beach deficiencies.

Potential multipurpose trail development areas are quite limited. Some hiking trails could be built in O. L. Kipp State Park (Minnesota). Trails might also be provided in the Long Lake-Lone Tree Landing area. The tremendous deficiency of multipurpose trails will require additional facilities within the region but outside the study area. Snowmobiling is allowed on the ice areas within the backwaters, but again, additional facilities are required outside the study area.

Primitive beach/island facilties could eliminate some of the heavy recreational lockage pressure at Lock and Dam 7. Dresbach Island, Richmond Island, islands at RM 712.8 L, 709.0 L, and 706.5 R should be reshaped according to guidelines provided elsewhere in this report.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional development occurs, these impacts should be continually monitored.

N. Recommendations:

1. The Fish and Wildlife Service should further investigate the feasibility of upgrading its facilities at Brice's Prairie and Lone Tree Landings.

2. The state of Minnesota should investigate the feasibility of providing assistance to the owner of Sunset Bay to develop a boat ramp open to the general public.

3. The Corps of Engineers and Town of Dakota should investigate the feasibility of developing a major recreation area (using dredged material) at RM 707.0 R on the Dakota shoreline. This area should provide for picnicking, boat launching, car/trailer parking, and beach swimming.

4. The old fish ponds at RM 713.2 R should be purchased or the owner assisted by the state of Minnesota and developed into a recreation area which should include picnicking, boat launching, car/trailer parking and possibly limited camping.

5. The Fish and Wildlife Service should further investigate the feasibility of developing hiking trails in the Long Lake-Lone Tree Landing area.

6. The state of Minnesota should further investigate the feasibility of developing hiking trails in O. L. Kipp State Park.

7. The owners of the Birch Acres Resort should be encouraged to expand their camping and picnicking facilities.

8. The Corps of Engineers should consider termination of leases to private cottages and provide public recreational accesses at these sites.

9. The Corps of Engineers should reshape the southern end of Dresbach Island (RM 703.3 R) to make it suitable for a lockage waiting area.

10. Dresbach Island (RM 705.0 L) should be reshaped by the Corps of Engineers according to recommended guidelines to make these sites suitable for primitive island/beach recreation.

11. Richmond Island (RM 712.0 R) should be reshaped by the Corps of Engineers according to recommended guidelines to make these sites suitable for primitive island/beach recreation.

12. The island at RM 712.8 L should be reshaped by the Corps of Engineers according to recommended guidelines to make these sites suitable for primitive island/beach recreation.

13. The island at RM 709.0 L should be reshaped by the Corps of Engineers according to recommended guidelines to make these sites suitable for primitive island/beach recreation.

14. The island at RM 706.5 R should be reshaped by the Corps of Engineers according to recommended guidelines to make these sites suitable for primitive island/beach recreation.

15. The Corps of Engineers should reshape the recreation island/beach area at RM 714.0 R. This area presently serves as a "lockage waiting area".

16. The Corps of Engineers should further investigate the feasibility of developing a recreation area at 714.2 L using dredged material.

17. The Corps of Engineers should further investigate the feasibility of developing a recreation area at 712.0 L using dredged material.

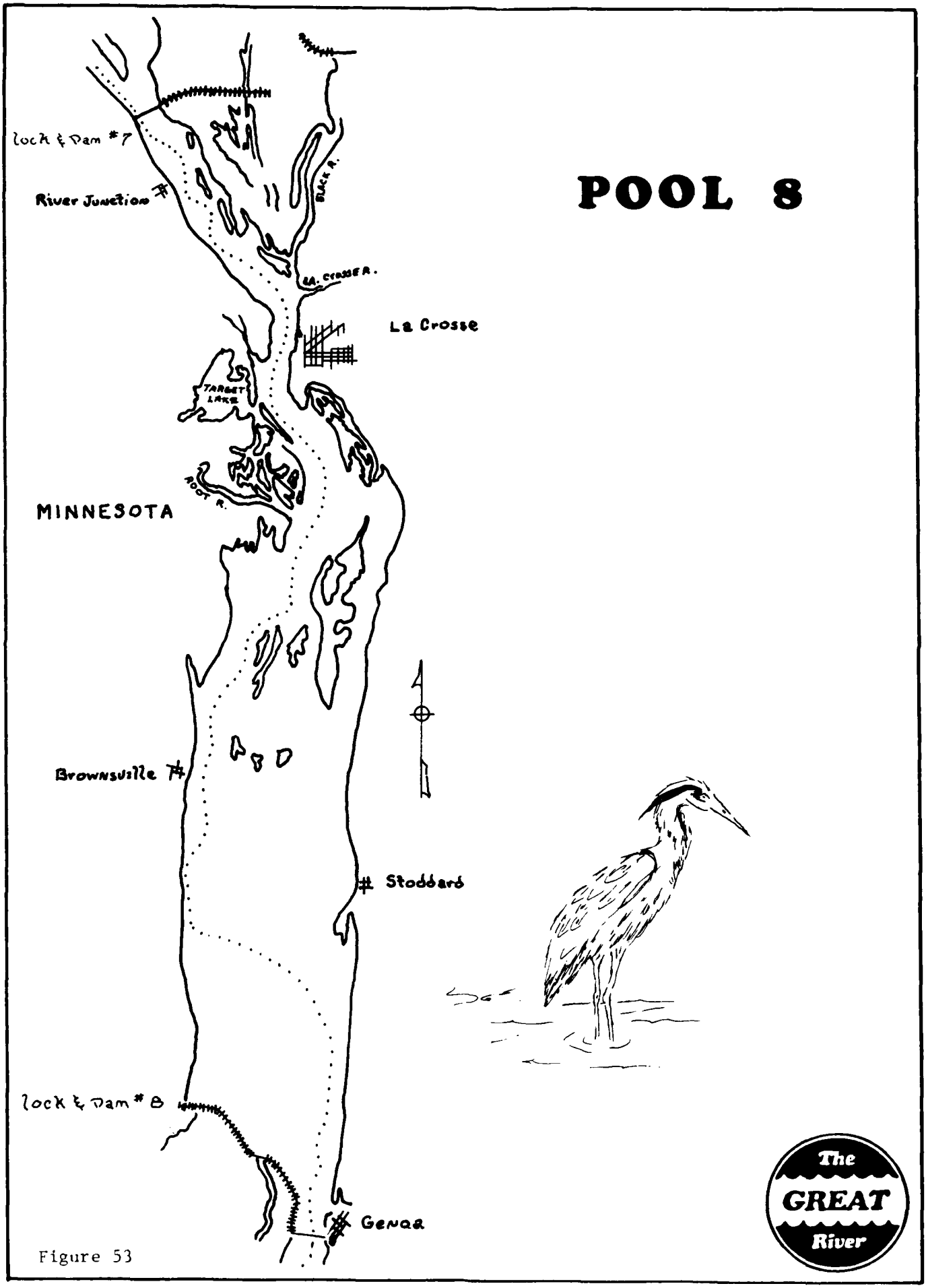

POOL 8
Lock & Dam #7
River Junction
BLACK R.
LA CROSSE R.
La Crosse
TARGET LAKE
ROCK R.
MINNESOTA
Brownsville
Stoddard
Lock & Dam #8
Genoa
The GREAT River

Figure 53

POOL 8

A. Description of Pool:

Lock and Dam No. 8 is located 679.2 river miles above the mouth of the Ohio River. The structure is 23.3 river miles below Lock and Dam No. 7, 31.3 river miles above Lock and Dam No. 9, and 18.7 river miles below the city of LaCrosse. The main lock and completed portion of the auxiliary lock are located on the Wisconsin side or left bank of the main channel of the Mississippi River which at this point is immediately adjacent to the Chicago, Burlington, and Quincy Railroad right-of-way embankment.

B. Pool 8 Features:

Pool 8 is the third longest of the 13 project pools in the GREAT I area and, in the lower reach above Lock and Dam No. 8, has one of the broader expanses of water surface relatively unbroken by interspersed areas of protruding land. Goose Island, located in the pool about midway between Locks and Dams 7 and 8 is one of the largest Corps-administered land areas in the District that is completely surrounded by pool water. The high bluff area through Pool 8 show no signs of glacial action but the lowland and floodplain areas basically consist of alluvial fill deposited in the form of terraces by the glacial stream outwash. Much of the land has retained these features except for changes in configuration caused by recurring high water which has eroded, carried, and deposited material all along the river's course.

Beginning on the Wisconsin side of the valley at Lock and Dam No. 8 and extending upstream, the main channel follows a meandering course through the valley and reaches the high bluff area at Brownsville; angles to and reaches the terrace which contains the city of LaCrosse, again crosses the valley to reach the high bluff area at La Crescent, and then parallels the high bluffs up to Lock and Dam No. 7. Because of the general channel alignment, most of the above-water project lands are on the Wisconsin side of the channel.

Two tributary rivers flow directly into the Mississippi River in Pool 8. The Root River enters from the Minnesota side and the LaCrosse River enters from the Wisconsin side. Although the Black River now flows directly into and becomes integrated with Pool 7, the lower 5 miles of the old channel still exist below the Onalaska Dam section of Lock and Dam No. 7 to the point of original juncture with the Mississippi River at LaCrosse.

Principal features of the pool are summarized below:

a.	Length of Pool	23.3 river miles
b.	River miles	679.2 to 702.5
c.	Pool elevation (flat pool)	631.0
d.	Water area of pool	20,810 acres

e.	Shoreline miles (outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	85 miles
f.	Federal lands above normal flat pool (approximate)	
	(1) Administered by Corps of Engineers	3,945 acres
	(2) Administered by the Department of the Interior	6,337 acres
	(3) Total above-water lands	10,282 acres

C. Federal Lands:

Approximately 24,084 acres of combined land and water area are held in fee by the Federal Government in Pool 8. Of this total, 9,496 acres are under the jurisdiction of the Corps of Engineers and 14,588 acres are under the jurisdiction of the Department of the Interior. All but 2 acres of the Corps of Engineers lands have been made available to the Fish and Wildlife Service for utilization as part of the Mississippi River Fish and Wildlife Refuge.

Of the Federal lands owned in fee in Pool 8, about 10,282 acres protrude above the normal flat pool elevation of 631.0. Of this total, 3,945 acres are under the jurisdiction of the Corps of Engineers and 6,337 acres are under the jurisdiction of the Department of the Interior. Any development contemplated by the Corps will be restricted to selected sites on the 3,945 acres of above-water Corps lands.

Approximately 1001.1 acres are leased by the Corps of Engineers for various uses: private cottages - 13.4 acres (19 cottages south of Stoddard, 1 cottage north of Reno), public park and recreation - 783.5 acres, other - 204.2 (roads, power and sewer lines, radio station).

D. Existing Recreational Facilities:

Pool 8 has 24 access areas with a total of 26 launching lanes (19 in Wisconsin, 7 in Minnesota), 909 marina slips, 1,080 parking spaces adjacent to boat accesses, 462 camping units (414 in Wisconsin, 48 in Minnesota), 841 picnicking units (784 in Wisconsin, 57 in Minnesota), 4 road access beach areas (3 in Wisconsin, 1 in Minnesota) and 17 miles of hiking trails (16 in Wisconsin, 1 in Minnesota). In addition, approximately 578 private boats are moored on the pool (Aerial Survey, 1976).

E. Pool Accessibility:

Pool 8 is serviced for its full length by paralleling primary and secondary highways which are fed by other primary and secondary highways leading laterally toward the pool area. The city of LaCrosse is a focal point for numerous highways servicing both the states of Wisconsin and Minnesota. One highway bridge crossing carries three U.S. highways from

TABLE 69
PLEASURE BOAT LOCKAGES OF POOL 8
1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 8	Lock 9	Lock 8	Lock 9
1960	4,069	5,186	2,500	2,677
1961	3,719	5,596	2,412	2,947
1962	3,683	4,333	2,586	2,371
1963	5,157	5,243	3,434	2,785
1964	4,893	5,468	3,036	2,979
1965	3,694	3,935	2,379	1,984
1966	3,827	4,816	2,395	2,634
1967	3,943	4,445	2,433	2,380
1968	3,523	4,370	2,292	2,466
1969	4,159	4,131	2,225	2,081
1970	4,749	4,430	2,425	2,259
1971	5,368	4,983	2,518	2,415
1972	5,569	5,465	2,940	2,638
1973	5,439	5,274	2,787	2,509
1974	4,833	4,973	2,438	2,311
1975	4,724	4,484	2,182	2,053
1976	5,378	6,344	2,449	2,421
*1980	4,889	5,931	2,100	2,460
*1990	6,572	7,528	2,681	3,011
*2000	7,822	8,724	?,113	3,424

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwes Research Institute.

Minnesota to Wisconsin between La Crescent and LaCrosse and Interstate Highway 90 crosses just downstream of Lock and Dam No. 7. Railroads parallel both sides of the pool along the high bluffs outlining the valley. Commercial and passenger airline service is available at LaCrosse, Wisconsin.

F. Pool Natural Resources:

Project lands in Pool 8 provide a variety of conditions and abundance of areas suitable for most land-based activities and ideal for access to water. Pool waters provide satisfactory conditions and ample opportunity to provide for and participate in all the various on-water type activities. (The flows of recreational craft through Locks 8 and 9 are presented in Table 2-36.) Lands and waters with the forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl, and wild game.

The Reno Bottoms area is a major wildlife area refuge. Crosby Slough provides for excellent waterfowl hunting. The main channel north of Genoa adjacent to Brownsville and north of LaCrosse is heavily used for power boating and water-skiing. The Target Lake area is used as a wildlife area and provides for fishing.

The state of Wisconsin has designated a Natural Area: Turtle Nesting Site at approximately RM 685.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool area in general, also prevail in Pool 8. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources:

GREAT I found no documentation of known archaeological sites within the study area. There are probably significant cultural resources in the area, however.

H. Fish and Wildlife Resources:

Pool 8 is a major source of commercial fishing in the northern section of the Upper Mississippi River. The commercial catch in Pool 8 is exceeded only by Pools 4 and 9. (See Table 70.)

Average annual harvest of furbearers were estimated by the Wisconsin Department of Natural Resources to be 75,000 muskrats, 1,000 to 1,500 beaver, 10 otter, and 50 to 75 mink for Pools 7 through 10.

It is estimated that in 1963, the year for which the most precise data are available, hunters made about 15,600 visits to Pool 8. The LaCrosse District of the Upper Mississippi River Wildlife and Fish Refuge estimates that for the ten years from 1961 to 1970, an average of 26,800 hunters in the District bagged an average of 49,750 waterfowl annually.

A major heron rookery is located near the mouth of the Root River.

TABLE 70
COMMERCIAL FISHING, AVERAGE CATCH PER UNIT EFFORT
WITH SETLINES, GILL NETS, AND SEINES, AND TOTAL POUNDS
CAUGHT PER YEAR NAVIGATION POOL NUMBER 8

Year	Set Line	Gill Net	Seine	Total Pounds
1953	10.80	0.13	0.48	375,080
1954	10.00	0.22	0.31	369,220
1955	16.06	0.16	0.55	436,420
1956	7.45	0.20	0.67	462,983
1957	10.86	0.13	0.49	93,559
1958	9.47	0.19	0.48	487,154
1959	12.47	0.23	0.90	633.991
1960	11.12	0.25	1.68	764,697
1961	13.66	0.35	0.90	921.613
1962	8.98	0.11	2.20	1,144,425
1963	12.35	0.14	1.50	645,545
1964	13.94	0.16	2.42	1,063,069
1965	12.44	0.21	5.23	860,506
1966	14.59	0.20	3.28	790,679
1967	14.93	0.15	5.10	860,269
1968	15.24	0.17	8.66	670,758
1969	15.73	0.20	3.96	553,622
1970	16.46	0.29	6.14	782,864
1971	20.41	0.28	7.00	1,019,762
1972				1,112,264
1973				842,514
1974				678,576
1975				708,083

Source: Upper Mississippi River Conservation Committee

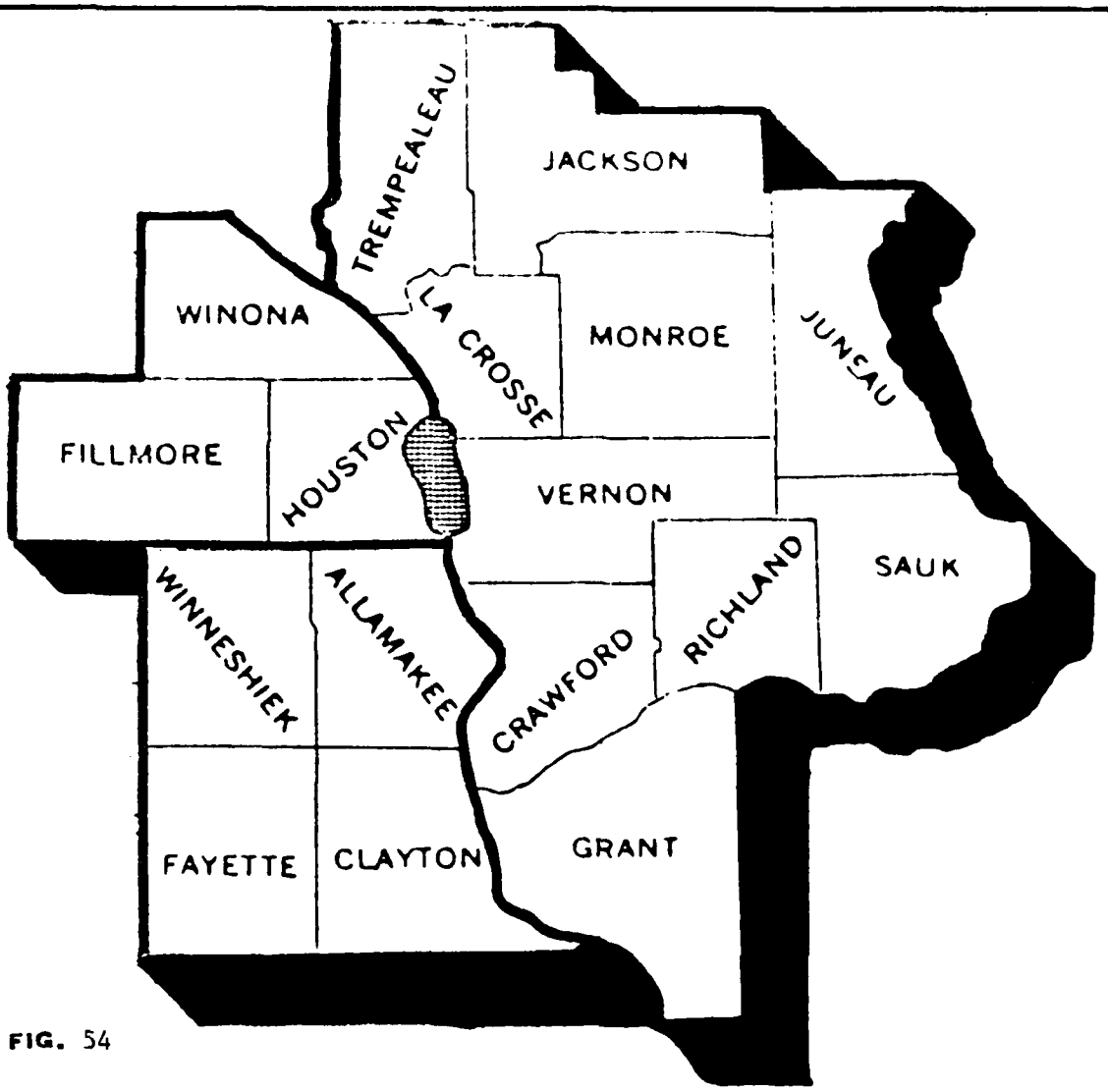


FIG. 54

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	98,770	119,880	138,610
26-50 Mi.	98,450	105,450	111,910
51-75 Mi.	156,120	171,260	182,295

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 8

GREAT

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 8 include:

* Higher than expected proportion of those surveyed with low cost trips were in Pool 8.

* A higher percentage said "proximity to residence" was the most important choice of put-in for Pool 8 than in any other pool.

* Easy access was also an important choice of put-in for Pool 8.

* There was a disproportional level of extreme perceived crowding in Pool 8.

Origin of trip for those users surveyed in this Pool:	LaCrosse, Wisconsin	71%
	Brownsville, Minnesota	4%
	Rochester, Minnesota	4%
	Other Wisconsin cities	3%

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The population within the zone-of-influence is projected to increase approximately 22 percent between 1975 and 2025. Refer to Figure 55.

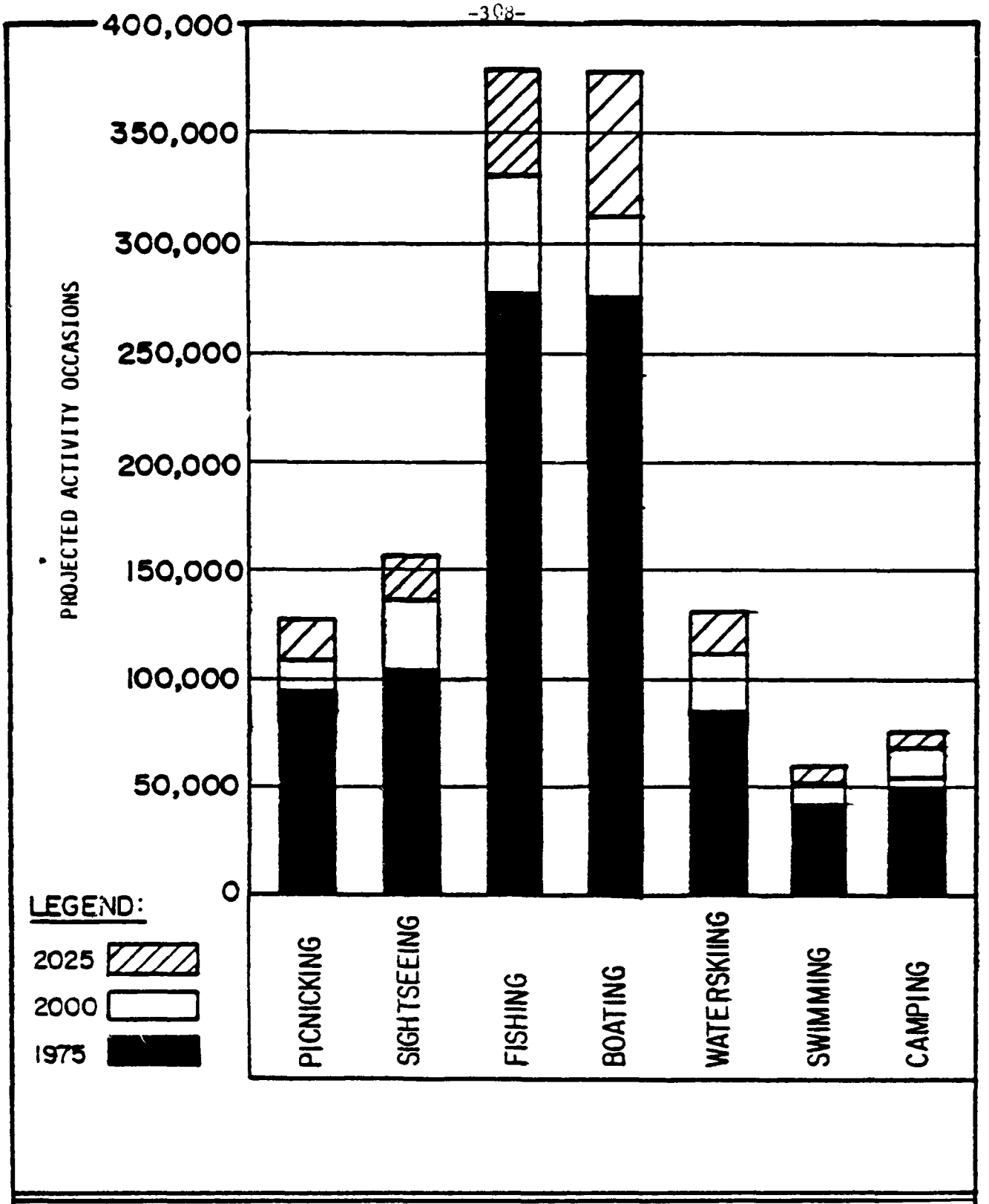
Visitor day use is projected to increase approximately 41 percent between 1975 and 2025. This is an increase of approximately 211,000 visitor days. It is estimated that the average visitor will participate in more than one activity per visit, however. Refer to Table 71.

K. Estimated Recreation Resource Requirements:

The estimated recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determing the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 72.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 73.



RECREATION
DEMAND ANALYSIS

POOL 8

FIGURE 55

The GREAT River

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 71
Pool 8

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	89.3	92.3	107.1	109.7	116.6	122.6	126.2
Sightseeing:	104.8	108.8	132.0	135.3	143.8	151.1	155.6
Fishing:	277.4	286.0	323.8	331.3	352.3	370.9	381.6
Boating:	274.0	282.0	314.2	322.1	341.9	360.0	370.4
Waterskiing:	86.9	90.2	109.9	112.5	119.7	125.7	129.4
Swimming:	42.4	43.9	51.9	53.2	56.5	59.5	61.2
Camping:	49.7	51.8	64.2	65.7	69.9	73.5	75.7
Hiking:	707.5	712.6	692.5	666.1	673.8	683.4	687.1
Hunting:							
Small Game-	555.9	568.0	590.1	602.0	634.8	663.4	679.4
Large Game-	233.4	238.5	247.9	252.9	266.6	278.6	285.3
Waterfowl-	322.4	329.4	342.3	342.3	368.2	384.8	394.0
Snowmobiling:	829.7	846.0	832.3	897.8	949.6	984.3	1008.1
Sub-Total:							
Activity Occassions:	924.5	955.0	1103.1	1130.3	1208.7	1263.3	1300.1
Visitor Days:	519.4	536.5	619.7	635.0	674.6	709.7	730.4
Conversion Factor:	1.78						

Table 72
Pool 8

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	136	272	61	1	1,200	30	30	595	15	15	216	5	5	92	32,298	11	7	189	630	205.4	1,868.0	2,780.0	16.1	322
1980:	141	282	63	1	1,237	31	31	613	15	15	224	6	6	96	33,349	11	8	197	657	206.3	1,908.0	2,840.0	16.5	329
1990:	163	326	77	1	1,400	35	35	683	17	17	273	7	7	113	39,538	13	9	244	813	200.5	1,984.0	2,951.0	17.1	343
2000:	168	336	78	1	1,435	36	36	700	17	17	279	7	7	116	40,507	14	9	250	833	193.1	2,024.0	3,010.0	17.5	349
2010:	178	356	83	1	1,524	38	38	743	19	19	297	7	7	123	43,042	14	10	266	887	195.5	2,132.0	3,174.0	18.4	369
2020:	187	374	88	1	1,604	40	40	782	20	20	312	8	8	129	45,266	15	10	280	933	198.0	2,228.0	3,317.0	19.3	382
2025:	193	386	90	1	1,651	41	41	805	20	20	321	8	8	133	46,588	16	11	288	960	198.8	2,284.0	3,397.0	19.7	391

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
2,164	50	32	964	2,608	60	39	1,244	3,000	69	45	1,432

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Pool 8

Table 73

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	841	152	-	168	-	193	-	
Sightseeing (P.S.)	Approximately 250	70	-	78	-	90	-	
Fishing (P.S.)	-	1,318	-	1,435	-	1,651	-	
(L.L.)	-	33	-	36	-	41	-	
Boating (P.S.)	1,849 P.S.	648	- P.S.	700	- P.S.	805	- P.S.	
(L.L.)	30 L.L.	16	8 L.L.	17	13 L.L.++	20	22 L.L.++	
Waterskiing (P.S.)	909 Clubs	249	-	279	-	321	-	
(L.L.)	568 Private+	6	-	7	-	8	-	
Swimming (B.A.)	52,280 sq. ft. (1.36 Acres)	36,444 sq. ft. (0.8 Acre)	-	40,507 sq. ft. (0.93 Acre)	-	46,588 sq. ft. (1.07 Acres)	-	
Camping (Units)	507	221	-	250	-	288	-	
Hiking* (Miles)	16.3	203.4	187.1	193.1	176.8	198.8	182.5	
Hunting* (Large Game Land Acres)	6,213**	1,888,000	1,881,787	2,024,000	2,017,787	2,284,000	2,277,787	
Small Game* (Land Acres)	1,948**	2,896,000	2,894,052	3,010,000	3,008,052	3,397,000	3,395,052	

Pool 8

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	25,264**	16,800	-	17,500	-	19,700	-	
Snowmobiling* (Miles)	0	336	336	349	349	391	391	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I, Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs.

M. How to Meet the Needs:

The area near Brownsville is one of the most heavily used (sometimes "congested") recreation areas in the GREAT I area. The dredged material disposal areas are major attractors for recreational boaters from the LaCrosse area.

The greatest deficiencies in Pool 8 are boat launching lanes-especially for fishing (refer to Table 73 , hiking and snowmobiling trails and small game hunting areas. By 1985 it is anticipated that 8 additional launching lanes would be required. By 2000 approximately 13 additional lanes will be needed and by 2025 approximately 22 additional launching lanes will be needed. In addition, approximately 180 miles of hiking trails and 335-390 miles of snowmobile trails will be needed in this region over the next 50 years. Additional large and small game hunting areas are also needed in the region. Pool 8 cannot satisfy these regional needs.

Several areas are suitable for expansion of boating facilities. The Sand Bar Inn (private) has plans to expand its camping and possibly boating access areas. Wildcat Landing (county) is in the development stage and has plans for increased boating facilities. Both the Sand Bar Inn and Wildcat Landing have been constructed with dredged material. The North I-90 Landing (Minnesota DNR) could be substantially upgraded. Sportmens' Landing (Minnesota DNR) could be expanded to the north. Holiday Vacation Cruises, Inc. is planning to add 30 more marina slips. Sias Boat Livery (private) could be upgraded and the capacity expanded. Bank's Slough Landing (Catholic Diocese of LaCrosse) and Stoddard Park Landings could, also, be upgraded.

The Fish and Wildlife Service is proposing to upgrade launching facilities on Goose Island Park (Wisconsin) and at the South I-90 boat ramp under the Bicentennial Land Heritage Program.

Additional environmental education/interpretive facilities/programs would be desirable to better explain environmental concerns. The Fish and Wildlife Service can provide these programs at several existing areas or in cooperation with other agencies.

Old dredged material disposal areas between Brownsville and Stoddard should be reshaped according to guidelines contained elsewhere in this report. This would provide additional primitive island/beach recreation areas and displace congestion from the Brownsville area. Creation of a new island/beach near RM 680.0 R would distribute use through the pool and provide temporary beaching while awaiting lockage.

Termination of Corps of Engineers cottage leases near Stoddard could provide an additional 13 acres suitable for public recreational development.

Little is known, however, about the environmental and social/psychological impacts of increasingly dense recreational use. As additional recreational developments occur, these impacts should be continuously monitored.

The Mississippi River Regional Planning Commission has recommended a multipurpose trail development to the south and southeast of LaCrosse to Goose Island County Park connecting with the LaCrosse park system. The Wisconsin DNR is also developing a state trail plan which is recommending a trail system along the Mississippi River.

N. Recommendations:

1. The Fish and Wildlife Service should further investigate the feasibility of upgrading boating facilities on Goose Island and at the South I-90 boat ramp under the Bicentennial Land Heritage Program.

2. Dredged material disposal areas between Brownsville and Stoddard should be reshaped by the Corps of Engineers according to guidelines contained elsewhere in this report to make them more suitable for primitive beach/island/camp recreation river trails.

3. The Corps of Engineers should consider termination of the private cottage leases south of Stoddard and provide for a public recreational development.

4. Houston County should be encouraged to continue development of Wildcat Landing Public Use Area.

5. Private developments at the Sand Bar Inn (Minnesota), Sias Boat Livery (Wisconsin), Bank's Slough Landing (Wisconsin), and Holiday Vacation Cruises, Inc. should be encouraged to upgrade and expand their facilities.

6. The Minnesota DOT and Fish and Wildlife Service should further investigate the feasibility of expanding, upgrading, and reducing hazards at the North I-90 Landing and expanding and upgrading the Sportsmen's Landing.

7. The Corps of Engineers should further investigate the feasibility of developing a new primitive beach/island recreation area near RM 680.0 R with dredged material. This area would serve as a holding area for recreational lockages.

8. The trail system recommended by the Mississippi River Regional Planning Commission to connect the LaCrosse park system and Goose Island County Park should be developed by Wisconsin.

9. The Corps of Engineers should reshape the beach/camp area at RM 702.3 L. This site is presently used as a "lockage waiting area".

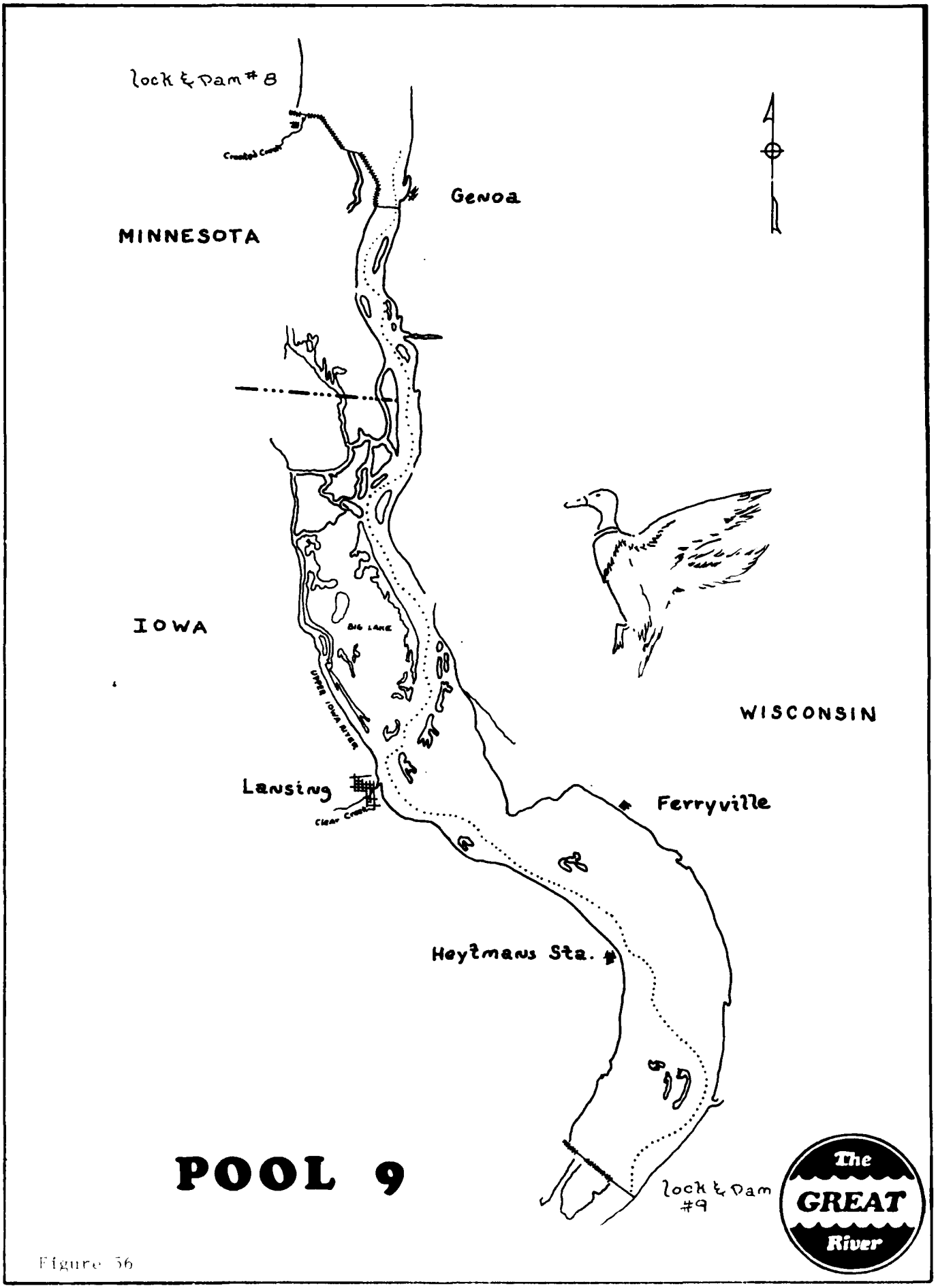

lock & Dam # 8
Genoa
MINNESOTA
IOWA
WISCONSIN
BIG LAKE
UPPER IOWA RIVER
Lansing
Clear Creek
Ferryville
Heytmans Sta.
lock & Dam #9
POOL 9
The GREAT River

Figure 56

POOL 9

A. Description of Pool:

Lock and Dam No. 9 is located at Lynxville, Wisconsin, 647.9 river miles above the mouth of the Ohio River. The structure is 31.3 river miles below Lock and Dam No. 8, 32.8 river miles above Lock and Dam No. 10, and 13 river miles upstream of Prairie du Chien, Wisconsin. The main lock and completed portion of the auxiliary lock are located on the Wisconsin side or left bank of the main channel of the Mississippi River which at this point is immediately adjacent to the Chicago, Burlington and Quincy Railroad right-of-way embankment. Wisconsin Highway 35 parallels the railroad on the landward side at the foot of high bluffs which outline most of the valley.

B. Pool 9 Features:

The total water area of the pool, combined with all Federal above-water lands within acquisition limits, constitutes the largest federally managed area of any pool in the GREAT I study area. Pool 9 is the only pool in the St. Paul District with boundaries formed by three states, Minnesota and Iowa on the right bank and Wisconsin on the left bank. No signs of previous glacial action are apparent in the high bluff areas of Pool 9, but the lowland and floodplain areas consist of alluvial fill deposited in the form of terraces by the receding glacial stream outwash. These features have been generally retained except for changes in configuration caused by recurring flood stages which have eroded, carried and deposited material all along the river's course.

The main channel parallels the high Wisconsin shoreline from the lock upstream to the village of Lynxville, angles sharply across the valley to the Iowa shoreline which it then parallels to the town of Lansing, again angles across the valley to the village of De Soto and continues upstream at or near Wisconsin high ground until it reaches Lock and Dam No. 8 at Genoa. Because of the channel alignment, about 78 percent of federally owned above-water lands are located on the right side of the main channel in Minnesota and Iowa. Two small tributary rivers flow directly into the Mississippi River in Pool 9: The Bad Axe, entering from Wisconsin, and the Upper Iowa entering from Iowa.

Principal features of Pool 9 are summaried below:

a.	Length of pool	31.3 river miles
b.	River miles	647.9 to 679.2
c.	Pool elevation (flat pool)	620.0
d.	Water area of pool (2nd largest)	29,125 acres
e.	Shoreline miles (Meandering outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	90 miles

f. Federal lands above normal flat pool (approximate)

(1) Administered by the Corps of Engineers	6,620 acres
(2) Administered by the Department of the Interior	12,170 acres
(3) Total above-water lands	18,790 acres

C. Federal Lands:

The Corps of Engineers has acquired and presently administers about 8,708 acres of federally-owned land and water areas and holds special rights on an additional 25,050 acres which are administered by the Fish and Wildlife Service in Pool 9. Of the 8,708 acres of Corps-administered land and water areas, about 8,700 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi Wildlife and Fish Refuge in conjunction with Service-owned lands. About 8 acres of Corps lands at the structure site (Lock and Dam No. 9) have been retained solely for Corps use.

Of the Federal lands owned in fee in Pool 9, about 18,790 acres protrude above the normal flat pool elevation of 620.0. Of this total, 6,620 acres are under jurisdiction of the Corps of Engineers and 12,170 acres are under jurisdiction of the Department of the Interior. Any development contemplated by the Corps will be restricted to selected sites on the 6,620 acres of Corps above-water lands.

D. Existing Recreational Facilities:

Pool 9 has 20 access areas with a total of 21 launching lanes (2 in Minnesota, 13 in Wisconsin, and 6 in Iowa), 216 marina slips (70 in Wisconsin and 146 in Iowa), 637 parking spaces adjacent to boat accesses, 40 camping units (Wisconsin), 69 picnicking units (34 in Iowa and 35 in Wisconsin), and 2 miles of hiking trail in Iowa. In addition, there are approximately 130 boats privately moored in the pool. Black Hawk Memorial County Park is the only major park. Mt. Hosmer Park in Lansing, Iowa, provides picnicking facilities and scenic overlooks of the river.

E. Pool Accessibility:

Primary highways closely parallel Pool 9 for its full length on the Wisconsin side and along the upper one-half on the Iowa and Minnesota side. Secondary highways provide adequate access along the lower one-half in Iowa. Combinations of primary and secondary roads provide access through the zone of influence. A highway bridge over the main channel at Lansing and the connecting De Soto-Lansing causeway provide one crossing between Wisconsin and Iowa within the length of the pool. This causeway lies along the federally designated Great River Road Parkway. Railroads parallel both sides of the river, generally along the base of the high bluffs outlining the valley. Airline service is available at LaCrosse, Wisconsin, and small airports are available at several smaller towns for use of private planes.

TABLE 74
PLEASURE BOAT LOCKAGES
LOCKS 9 AND 10, 1960-1976

	Pleasure Boats Through		Pleasure Boat Lockages Through	
Year	Lock 10	Lock 9	Lock 10	Lock 9
1960	5,654	5,186	2,729	2,677
1961	5,870	5,596	3,100	2,947
1962	5,097	4,333	2,763	2,371
1963	6,218	5,243	3,209	2,785
1964	6,720	5,468	3,460	2,979
1965	4,326	3,935	2,485	1,984
1966	5,919	4,816	2,614	2,634
1967	4,957	4,445	2,548	2,380
1968	5,575	4,370	3,105	2,466
1969	5,405	4,131	2,841	2,081
1970	6,166	4,430	3,086	2,259
1971	6,076	4,983	2,986	2,415
1972	6,196	5,465	3,206	2,638
1973	6,718	5,274	3,266	2,509
1974	7,181	4,973	3,509	2,311
1975	6,218	4,484	2,959	2,053
1976	8,379	6,344	3,624	2,421
*1980	8,362	5,931	3,299	2,460
*1990	10,745	7,528	4,122	3,011
*2000	12,507	8,724	4,730	3,424

* "Methodology and Forecasts of Recreation Use and Small Craft Lockages on the Upper Mississippi River, June 26, 1978", Midwest Research Institute.

F. Natural Resources:

A relatively small portion of the total above-water lands consists of high and firm ground suitable for development and use for land-based recreational activities. Also, much of this otherwise suitable area cannot be reached via land with vehicular-type equipment. The railroad tracks and steep adjacent bluff lands limit access. The water areas of the pool provide unlimited opportunity for participation in all the various on-water type activities. Lands and waters with the forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl and other wild game. The relatively low pollution level of the pool waters encourages water contact sports and is not harmful to fish and wildlife.

Capoli Slough, Winneshiek Slough, Big Lake, and Minnesota Slough provide excellent waterfowl hunting and trapping. In addition, Winneshiek Slough, Big Lake, Minnesota Slough, and the main channel border north of Lansing provide excellent sport fishing.

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool areas in general, also prevail in Pool 9. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources

At one time, there were an estimated 30,000 Indian burial mounds in Iowa. Many mounds also exist in Wisconsin. Most of them lay on prominent ridges or bluffs along the rivers and larger streams. The mounds occur in clusters or groups. A single site sometimes contains more than one hundred mounds. Mounds are in three forms: conical (round), linear (long), and effigy mounds which are large, elaborately-shaped animal forms and may measure as much as 100 feet across.

For Pool 9, 1973 data provide information of the status of several Indian mound sites. R. Clark Mallam of Luther College Archaeological Research Center identified a number of Iowa effigy mounds in a report submitted to the State Historical Preservation Program. The mound sites include:

a. The Waukon Junction Mound Group, located on a high bluff overlooking the Mississippi River to the east, and Paint Creek to the south. It originally consisted of one bear effigy, one bird, five conicals, and nine linears. Only three conicals remain.

b. The Keller Mound Group, located on a terrace overlooking the Mississippi River and immediately adjacent to the Lansing Insterstate Public Power Plant, originally consisted of 2 bear effigies, 23 conicals, and 4 linears. Of these, 2 bear effigies, 15 conicals, and 2 linears remain. The Luther College Archaeological Research Center has received

a verbal commitment from the Interstate Public Power Corporation (IPPC) that they will not destroy the mound group. Efforts are being made to encourage the IPPC to construct a public park for the remaining mounds.

c. The Capoli Bluff Mound Group, located in a small valley facing the Mississippi River approximately 2 1/2 miles south of Lansing consists of four bear effigies, four bird effigies, six conicals, and one linear. Except for the conicals, all are in a good state of preservation.

d. The Hemminway Mound Group, located on a terrace adjacent to the Mississippi River within the town limits of Lansing, originally consisted of two bear effigies and one conical. All the mounds have been partially destroyed and the effigies are so indistinct that the possibility of obtaining valid outlines has been eliminated. The group was surveyed in 1885 but the mounds were already indistinct at that time.

e. Effigy Mounds National Monument, bordering Pool 10, is the nearest large park. No Federal or State parks have been developed in the area immediately bordering Pool 9.

In addition, the Iowa State Preserves Board owns the Fish Farm Mounds Preserve located some distance off the main channel south of New Albin.

H. Fish and Wildlife Resources:

Pool 9 shares with Pool 4 the distinction of being the most important pools in the northern section of the Upper Mississippi River for commercial fishing. In every year during the 1960s, except for 1969, the catch in Pool 4 slightly exceeded that of Pool 9. The commercial catch from 1960 through 1975 is shown in Table 75.

Carp ranks first in commercial value in Pool 9, with an average of 607,734 pounds per year from 1953 to 1964. Annual catfish catch during this same period was 248,741 pounds. The 12-year average catch (1953 to 1964) for all commercial species in Pool 9 was 1,333,856 pounds which is greater than that for any other pool in the Upper Mississippi River except for Pool 4. The average annual harvest of fur-bearers was estimated by the Wisconsin Department of Natural Resources to be 75,000 muskrats, 1,000 to 1,500 beaver, 10 otter and 50 to 75 mink for Pools 7 through 10.

Mussel fishing - Another aspect of the commercial fishery of the Upper Mississippi River is the mussel fishery. Its commercial importance has greatly diminished since the 1920s when the market for pearl buttons disappeared. Until the 1920s, clams were fished heavily and provided the raw material for pearl buttons. With the advent of plastics demand diminished. The Lansing Company of Lansing, Iowa, was formerly one of the major manufacturers of pearl buttons. The company is now one of the largest distributors of plastic buttons and also makes zippers.

TABLE 75
POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 9
1960-1975

Year	Commercial Fish Catch
1960	1,410,000
1961	1,227,000
1962	1,437,000
1963	1,523,000
1964	2,025,000
1965	Not Available
1966	2,172,000
1967	1,886,000
1968	1,837,000
1969	2,010,000
1970	2,400,283
1971	2,065,258
1972	2,040,780
1973	2,325,973
1974	2,668,669
1975	1,794,825

The mussel populations of the Upper Mississippi River went virtually unexploited until 1964 when interest in mussel shells was renewed. In that year the clamming industry revived slightly. Four southern companies moved operations to Prairie du Chien, Wisconsin. This move was prompted by two prime factors, the constant Japanese market for 5,000 ton of clam shells per year and the depletion of the mussel beds in the Tennessee River. In Japan, pellets of freshwater clam shells are used to stimulate the production of cultured pearls in oysters.

The four companies operating out of Prairie du Chien in 1964 were the Tennessee Shell Company with 34 boats, the George Borden Company with 10 boats, the Automatic Button Company, and the Blumenfield Company, each with 6 boats. The estimated production figures for three of these companies as of August 10, 1976 were: Tennessee Shell Company - 300 ton dried weight, George Borden Company - 150 ton dried weight, and the Blumenfield Company - 26 tons. In 1965, a ton of clams, live weight, brought $40. A ton of cooked-out shells was worth $60.

The most important clam species commercially fished today is the Three-Ridge. Other less important species include the Pig-Toe, the Warty Back, the Maple Leaf, and the Niggerhead, which was previously of prime value. There has been some clamming recently in the Lansing-Ferryville-De Soto area of Pool 9, but most clamming is done in Pool 10.

Although in the entire Upper Mississippi River, bluegills ranked first in sport catch in the surveys made in both 1956-1958 and 1962-1963, in Pool 9 the 1956-1957 survey revealed, in order of importance to sport catch, that crappie species, sunfish species, sauger, freshwater drum, and walleye ranked first to fifth, respectively.

While it is generally agreed that there has been a considerable increase in both commercial and sport fishing since 1938, when Lock and Dam No. 9 was constructed, the potential both for increased commercial and sport fishing in Pool 9 is seen to be partially offset in recent years by dredge material placement and by natural sedimentation which have adversely affected fish habitat, particularly in areas below wing dams and in backwater areas.

Sport hunting of waterfowl is an important Mississippi River recreation activity. It is estimated that in 1963, the year for which the most precise data are available, about 6,200 visits by hunters were made to Pool 9. The Lansing District of the Upper Mississippi River Wildlife and Fish Refuge, which covers Pool 9, estimates that for the 10 years from 1961 to 1970 an average of 5,375 hunters in Pool 9 bagged an average of 9,970 waterfowl annually.

According to a Recreational Use Study of Pool 9 by Ernest Hartmann, July, 1976, there were approximately 384,000 activity days (estimated 1,679,000 hours) to Pool 9 between June, 1974 and June, 1975. Of this total approximately 173,000 activity days were for fishing, 48,000 for boating, 36,000 for camping, and 51,000 for sight-seeing. Approximately 80,635 trips were for hunting and fishing-related activities. At $11.50 per trip (as obtained from 1975 National Survey by Fish and Wildlife Service) this would produce an estimated recreational value of $927,300. Additional values for other recreational activities would be added to this.

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 9 include:

* Pool 9 had more users at both the low and high cost figures for total costs than expected.

* For trip costs on the river Pool 9 had more high cost trips than expected.

* For trip costs to the river Pool 9 had a higher proportion of users in the high travel cost bracket.

* The highest proportion of four-day stays occurred in this pool (17% of the total number of stays in the Pool).

* Pool 9 exhibited fewer yes responses than were expected concerning whether or not a put-in site had been selected to avoid locks.

Origin of trip of those users surveyed in this Pool:	Lansing, Iowa	32%
	Other Iowa cities	16%
	Other Wisconsin cities	16%
	McGregor, Iowa	7%
	Dubuque, Iowa	6%

The average number of river craft per river mile (Figure 57) and the average number of users per river mile (Figure 58) was compiled by the St. Paul District, Corps of Engineers. The figures illustrate some of the high use of Pool 9, dredged material disposal area use (RM 663-674) and the recreational boating pressure in this area. As previously noted, Pool 9 is heavily-used for other nonboating activities as well.

Students from Luther College conducted a study of the impacts of dredged material disposal. One hundred and eighty-two surveys were completed between June 12 and July 29, 1975. These surveys represented 1,251 users whose total occupancy time on the sites was approximately 22,000 hours. Refer to Table 76.

The Upper Mississippi River Conservation Committee (UMRCC) conducted a Recreation Use Study of Pool 9 in 1974-75. The original report prepared in 1976 was considered unacceptable to UMRCC. The UMRCC Recreation and Water Use Technical Section is in the process of reviewing and modifying this report. This data will serve as a valuable "bench mark" and a source of information to further refine public use projection data and identify recreational facility needs in the Pool 9 area. Some of the data is shown in Table 77.

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The population within the zone-of-influence is projected to increase approximately 28 percent between 1975 and 2025. Refer to Figure 59.

Table 76
RECREATION USE OF DREDGED MATERIAL[1]
POOL 9

*This site is located:

18% less than 10 miles from home	16% 30-49 miles from home
17% 10-19 miles from home	8% 50-99 miles from home
6% 20-29 miles from home	35% 100 or more miles from home

*How many recreation visits do you make to the Mississippi each year?

9% 1 visit	19% 7-15 visits
15% 2-3 visits	46% over 16 visits
11% 4-6 visits	

*Of these visits, how frequently do you stop at sandbars?

6% less than 20% of the time	13% 61-80% of the time
6% 20-40% of the time	68% more than 80% of the time
8% 41-60% of the time	

*How long do you intend to stay on the sandbar this visit?

1% less than 1 hour	1% between 10-15 hours
15% between 1-3 hours	6% between 15-24 hours
25% between 3-6 hours	15% one to two days
15% between 6-10 hours	22% more than two days

*How long do you intend to stay in the vicinity of this pool?

1% less than 1 hour	1% between 10 to 15 hours
10% between 1 to 3 hours	5% between 15-24 hours
21% between 3 to 6 hours	16% one to two days
16% between 6 to 10 hours	28% more than two days

*Which category best describes the group with which you made this trip?

1% individual	54% family and friends
5% husband and wife	20% friends
20% family	

*Do you live:

12% on a farm	25% in a city 2,500 - 10,000
7% on rural, non-farm acreage	9% in a city 10,000 - 50,000
22% in a town less than 2,500	26% in a city larger than 50,000

*Circle the numbers of people in your group that apply to each age category given:

Age	Numbers in Group	
1-10 years	1 2 3 4 5 6 7 8 9 10	(16%)
11-20	1 2 3 4 5 6 7 8 9 10	(33%)
21-35	1 2 3 4 5 6 7 8 9 10	(31%)
36-50	1 2 3 4 5 6 7 8 9 10	(16%)
51-65	1 2 3 4 5 6 7 8 9 10	(3%)
66-80	1 2 3 4 5 6 7 8 9 10	(0%)
81-100	1 2 3 4 5 6 7 8 9 10	(0%)

*Which of the following were most important in your selection of this site?

54% previous visits	18% isolation
20% inexpensive recreation	25% accessibility
60% sand beach	4% good fishing

*Did you purchase any supplies for this trip in the vicinity of the Mississippi River, or did you bring them from home?

64% in vicinity
36% from home

*(If in the vicinity), estimate your total expenses.

29% 1-10 dollars
23% 11-25 dollars
28% 26-50 dollars
11% 51-100 dollars
9% more than 100 dollars

(If in the vicinity), estimate your total expenses in each of the following:

transportation $1,326 (total)
food and beverages $2,207 (total)
recreational supplies (fishing equipment, bait, etc.) $188 (total)
boat rental $50 (total)

*What was the approximate total yearly income of your family in 1974?

1% under $3,999
3% 4,000-5,999
5% 6,000-7,999
18% 8,000-10,999
11% no answer
13% 11,000-13,999
13% 14,000-18,999
15% 19,000-24,999
22% 25,000 and over

*What is the highest level of education you have completed?

1% grades 1-8
48% grades 9-12
23% some college
19% college graduate
9% post graduate

*Check those activities that you are taking part in on this visit to the sand bar:

72% picnicking	37% camping	93% sunbathing
91% swimming	3% canoeing	42% party
33% fishing	24% sightseeing	89% relaxing
4% hunting	65% waterskiing	8% hiking

*Would you prefer that the condition of this sand bar:

63% be left essentially as it is in its present state.
37% be more developed for recreational use. (If so, check those which apply):

6% campsites	9% fireplaces	33% litter disposal
16% toilets	12% tables	9% firewood supplied

*On this visit, did you expect to find:

3% nobody else	65% numbers of people seen	
15% fewer people	16% more people	2% no answer

*Would you like to see the volume of recreation on this sand bar restricted?

14% yes 82% no 4% no answer

*Are you aware that this site exists as a result of main channel dredging?

72% yes 25% no 3% no answer

[1]McMahon, Greg and Eckblad, Dr. James. The Impacts of Dredge Spoil Placement on the Upper Mississippi River, Section 4 - Recreation. Luther College. May 26 - August 15, 1975.

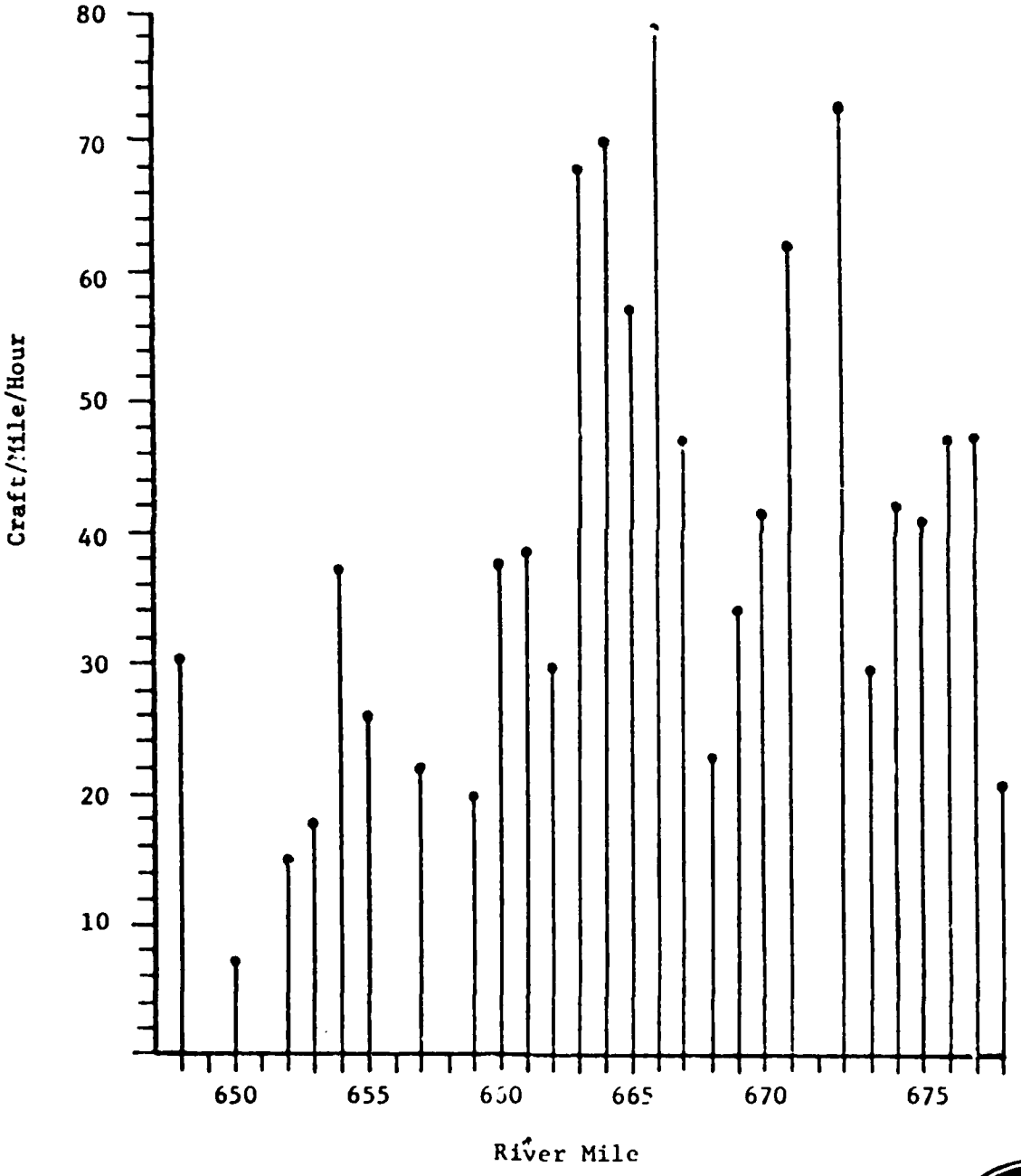
Table 77. Distances traveled by recreationists to reach Pool 9, Mississippi River, June 16, 1974, to June 14, 1975.

Mileage Zones	Spring and Summer	Fall	Winter	Total	Percent
1-25	1,379	355	460	2,194	29.4
26-50	998	175	305	1,478	19.8
51-75	404	101	112	617	8.2
76-100	253	82	55	390	5.2
101-125	352	69	54	475	6.4
126-150	361	67	61	489	6.5
150 +	1,232	307	248	1,787	23.9
Unknown	---	---	---	36	0.4
TOTAL	4,979	1,156	1,295	7,466	100.00

Source: Ackelson, Mark C. Recreation Use Study Pool 9. Upper Mississippi River Conservation Committee, 1979.

Figure 57

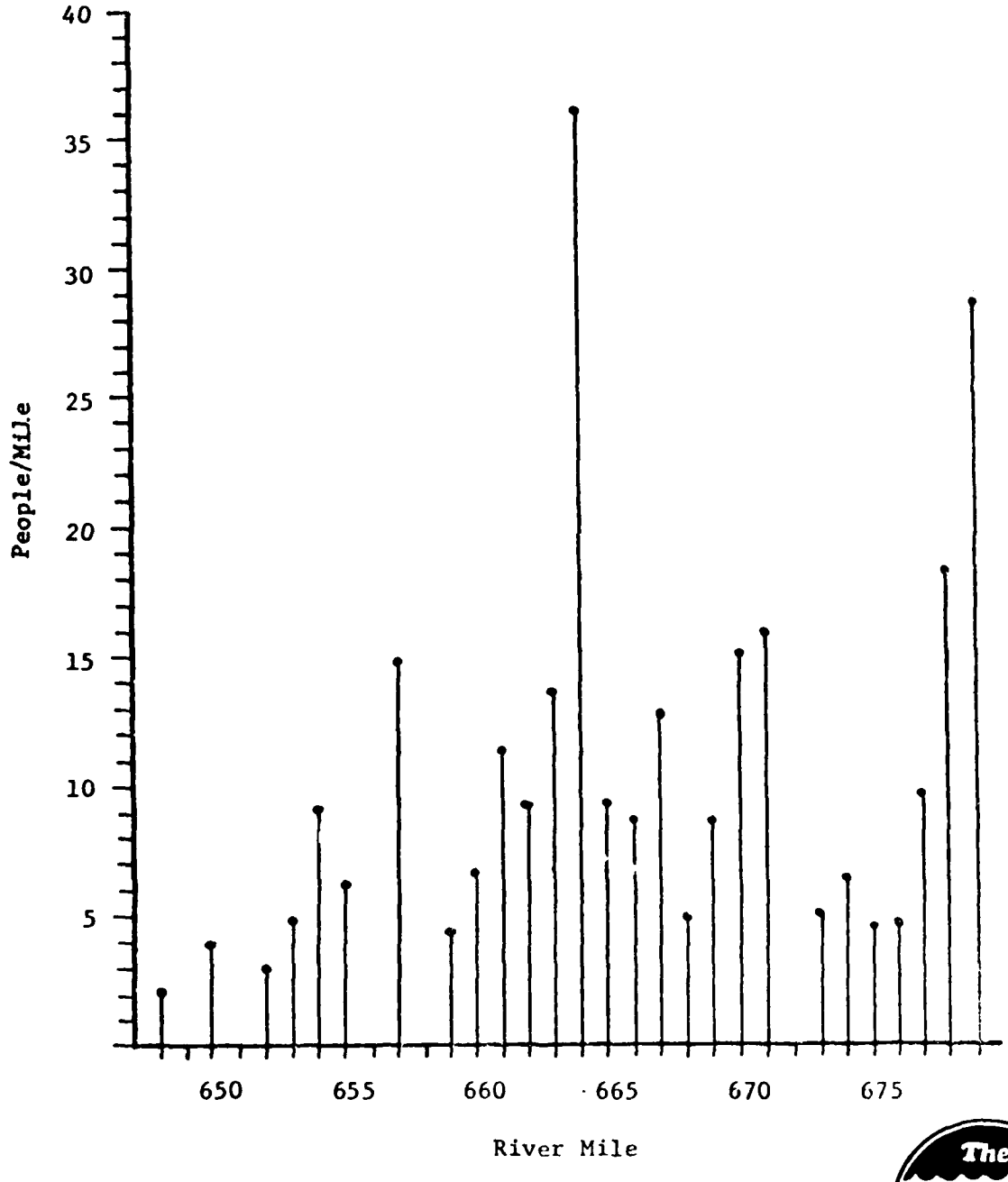
AVERAGE NUMBER OF RIVER CRAFT OF ALL TYPES PER MILE OF RIVER IN POOL 9, UPPER MISSISSIPPI RIVER, DURING JULY 1973 SURVEY PERIOD



Source: St. Paul District, Corps of Engineers

Figure 58

AVERAGE NUMBER OF RIVER USERS PER MILE OF RIVER IN POOL 9, UPPER MISSISSIPPI RIVER, DURING JULY 1973 SURVEY PERIOD



Source: St. Paul District, Corps of Engineers

The GREAT River

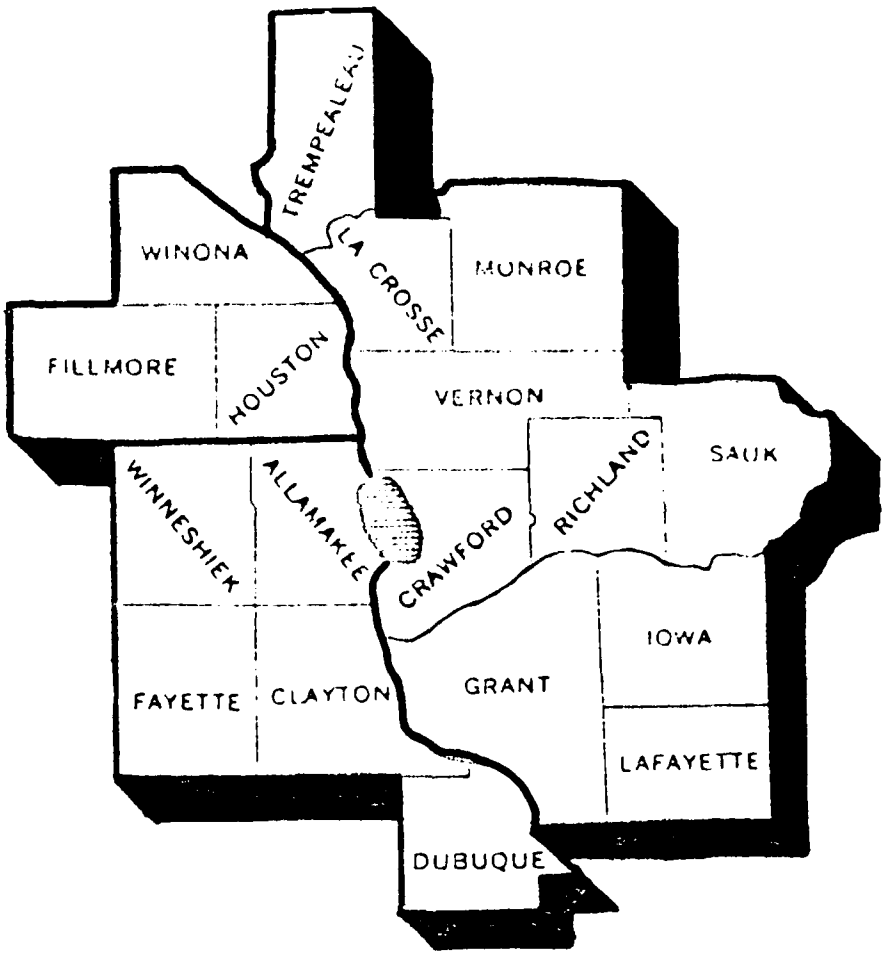


FIG. 59

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	32,365	32,010	32,535
26-50 Mi.	135,270	157,575	177,015
51-75 Mi.	202,480	239,870	265,045

RECREATION DEMAND ANALYSIS
UPPER MISSISSIPPI RIVER NAVIGATION
POOL 9

GREAT

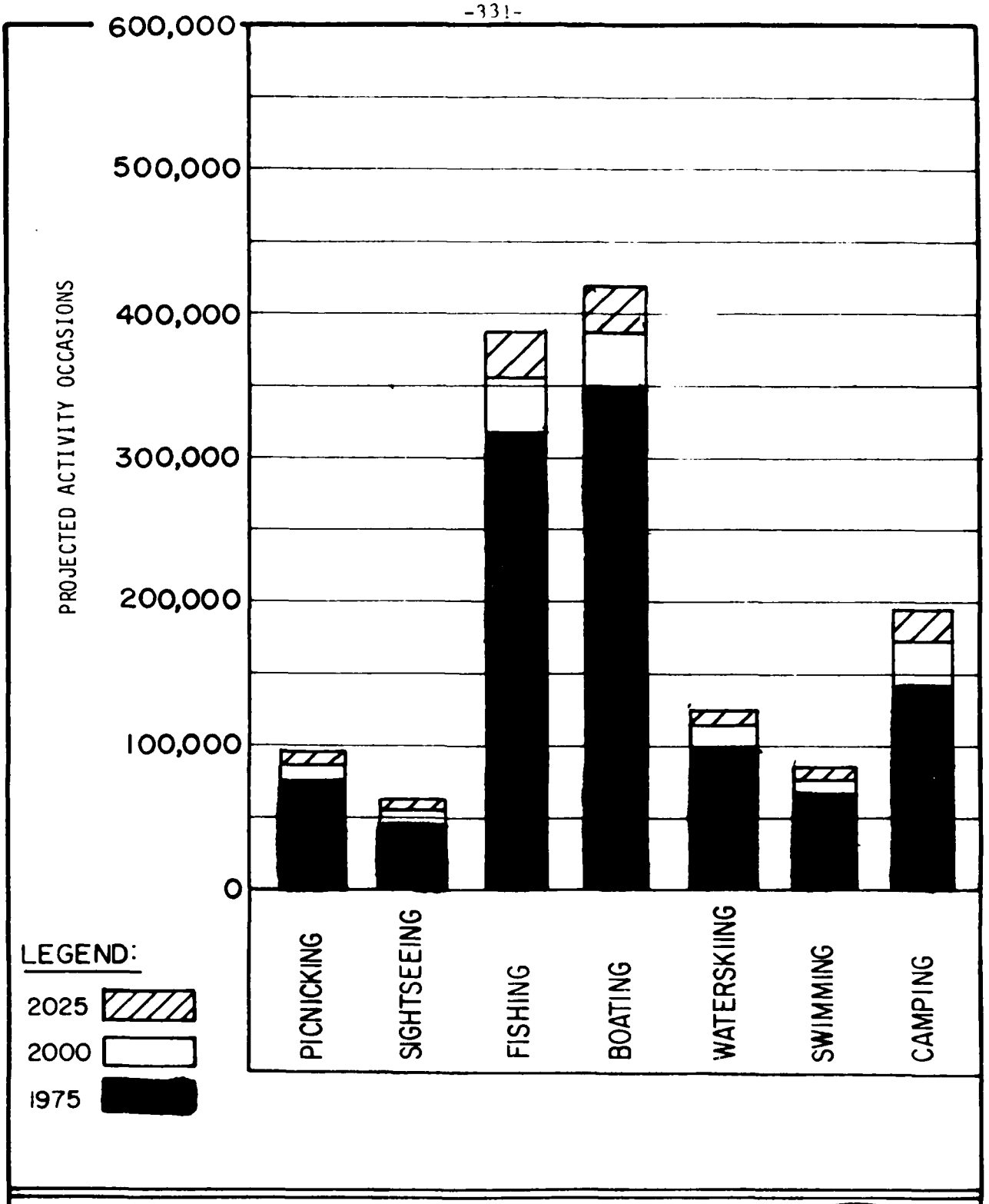
Visitor day use is projected to increase approximately 24 percent between 1975 and 2025. This is an increase of approximately 128,100 visitor days. Each visitor is estimated to participate in more than one activity, however. Refer to Table 78 and Figure 60.

K. Estimated Recreational Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determining the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 79.

L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Recreation Facility Inventory, July, 1978) from the projected resource requirements. Refer to Table 80.



RECREATION
DEMAND ANALYSIS

POOL 9

FIGURE 60

GREAT

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

Table 78
Pool 9

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	76.3	78.1	85.7	86.1	88.9	92.1	93.6
Sightseeing:	48.3	49.5	55.0	55.3	57.1	59.1	60.1
Fishing:	318.7	326.2	354.5	356.5	368.1	381.1	387.6
Boating:	347.3	355.3	384.5	386.0	398.1	412.0	418.8
Waterskiing:	99.3	101.7	112.6	113.2	116.9	121.1	123.2
Swimming:	65.4	67.2	74.9	76.1	79.4	82.9	84.8
Camping:	142.6	147.2	168.1	171.6	180.1	189.0	193.8
Hiking:	2089.0	2097.5	2161.7	2219.7	2339.0	2459.8	2519.3
Hunting:							
Small Game-	694.6	707.2	739.1	763.0	803.9	844.4	866.5
Large Game-	291.7	297.0	310.4	320.4	337.6	354.7	363.9
Waterfowl-	402.9	410.2	428.7	442.5	466.3	489.8	502.5
Snowmobiling:	749.9	762.2	797.9	819.7	861.7	898.4	992.7
Sub-Total:							
Activity Occassions:	1097.9	1125.2	1235.3	1244.8	1288.6	1337.3	1361.9
Visitor Days:	533.0	546.2	599.7	604.3	625.5	649.2	661.1

Table 79
Pool 9

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	67	134	18	1	593	15	15	436	11	11	249	6	6	82	28,754	10	7	314	1047	605.6	2,332.0	347.3	20.2	291
1980:	69	138	18	1	612	15	15	446	11	11	255	6	6	84	29,556	10	7	324	1080	608.1	2,376.0	3,536.0	20.5	296
1990:	76	152	20	1	665	17	17	483	12	12	283	7	7	94	32,977	11	8	370	1233	627.1	2,484.0	3,696.0	21.5	310
2000:	76	152	20	1	668	17	17	485	12	12	284	7	7	96	33,484	11	8	378	1260	643.5	2,564.0	3,815.0	22.5	318
2010:	78	156	21	1	690	17	17	500	12	12	294	7	7	100	34,939	12	8	396	1320	678.2	2,700.0	4,020.0	23.3	335
2020:	81	162	22	1	715	18	18	517	13	13	304	8	8	104	36,485	12	8	416	1387	712.9	2,836.0	4,222.0	24.5	349
2025:	83	166	22	1	727	18	18	526	13	13	309	8	8	107	37,304	13	9	426	1420	730.2	2,912.0	4,333.0	25.2	358

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
1,383	32	28	1224	1,553	36	31	1,460	1,691	39	35	1,639

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 80

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	69	72	3	76	7	83	14	
Sightseeing (P.S.)	Approximately 225	19	-	20	-	22	-	
Fishing (P.S.)		638		668		727		
(L.L.)		16		17		18		
Boating (P.S.)	637 P.S.	364	288 P.S.++	485	454 P.S.++	526	579 P.S.++	
(L.L.)	21 L.L.	12	11 L.L.++	12	12 L.L.++	13	15 L.L.++	
	216 Slips							
	130 Private+							
Waterskiing (P.S.)		269		284		309		
(L.L.)		7		7		8		
Swimming (B.A.)	0	31,267 feet^2 (0.7 acres)	0.7 acres	33,484 feet^2 (0.8 acres)	0.8 acres	37,304 feet^2 (0.9 acres)	0.9 acres	
Camping (Units)	40	347	307	378	338	426	386	
Hiking* (Miles)	2	616	614	643	641	730	728	
Hunting* Large Game (Land Acres)	14,817**	2,430,000	2,415,183	2,564,000	2,549,183	2,912,000	4,329,544	Includes: forest agriculture, plantation and reproductio lands.
Small Game* (Land Acres)	3,456**	3,616,000	3,612,544	3,815,000	3,811,544	4,333,000	4,329,544	Includes: upland meadow, agriculture brush, plantation, and reproducting lands.

Pool 9

L. ESTIMATED RECREATION RESOURCE NEEDS
(CONTINUED)

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Waterfowl* (Water Acres)	34,105**	21,000	-	22,500	-	25,200	-	Includes: all open water, emergent aquatic vegetation, and marsh areas.
Snowmobiling* (Miles)	_	303	303	318	318	358	358	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P.S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

M. How to Meet the Needs:

The greatest deficiencies in Pool 9 are boat access launching lanes and adjacent parking and camping units. (Refer to Table 80.) By 1985 it is estimated that there will be approximately 290 additional parking spaces and 11 launching lanes required for projected recreational use. By 2000 approximately 450 total parking spaces and 12 total launching lanes are required. And, by 2025 approximately 580 parking spaces and 15 launching lanes are required. Fishing boats are able to launch at any of the accesses, whereas power boats are only able to launch at some of the accesses. By 2025 there will be a need for 145+ parking spaces at power boat launching areas and 435+ parking spaces for fishing access. Approximately 300-400 additional camping units will be required in the next 10-50 years. Additional needs are for road access swimming beach facilities and environmental education opportunities. There is also a regional demand for multipurpose trails and large and small game hunting areas.

The Iowa Conservation Commission is proposing an additional 200-300 slip marina at Lansing. The Fish and Wildlife Service is proposing to upgrade and expand accesses under the Bicentennial Land Heritage Program (Visger's Landing - 100 car parking plus 2 concrete ramps, Millstone Landing - upgrade, Bad Axe Landing - upgrade, New Albin Landing - 2 concrete ramps upgrade, Cold Springs - concrete ramp, upgrade and Winneshiek and Big Slough Landings - upgrade).

The New Albin Access could be expanded to accommodate 25-30 more parking spaces. In addition, the Lynxville Boar Harbor (private) could be improved, the Victory Landing (municipal) expanded and upgraded to accommodate 15-20 more parking spaces, the Lynxville Depot Ramp (municipal) could be improved, the De Soto Landing (municipal) could be improved and the capactiy increased by 15-20 parking spaces, and Earl's Boat Landing (private) could be improved. An additional ramp on the Iowa side in the lower third of the pool near Heytman's Station would be desirable, however, to provide access to this area. These improvements will provide the necessary boat trailer and automobile parking required.

Increasing future launching delays slightly (40 launches/day/ramp to 50 launches/day/ramp) and upgrading existing ramps along with the above improvements should provide adequate boat launching facilities.

Pool 9 experiences moderate to high density boating in the Lansing Bend area (RM 664-666) presently and relatively low density use elsewhere in the pool (Aerial Survey, 1976).

The Lansing Bend area experiences a great deal of congestion because of the availability of sand beach and camping areas and its proximity to the town of Lansing and it accompanying services. Houseboat rentals from McGregor which are limited to using Pools 9 and 10 account for some of the high houseboat use in Pool 9. Fishing, hunting, and canoeing use will continue to be low density because more water surfaces acres are available for these uses.

Development, redevelopment, or expansion of sand beach and camping areas elsewhere in the pool - away from the Lansing Bend - should provide additional recreational use and reduce the congestion near Lansing.

The only developed on-channel camping presently in Pool 9 is in Black Hawk Memorial County Park, Wisconsin (30 units), and Cold Springs, Wisconsin (10 units). A large private campground three miles west of Lansing has a capacity for approximately 200 camping units. An expansion of Black Hawk Park to accommodate an additional 100+ units would meet the needs in Pool 9. The Wisconsin Department of Natural Resources is studying the potential of a linear park along the Mississippi River Bluffs. This park could provide many of the needs for the region.

One of the major attractions in the pool is the aesthetics of the area. Increasing developments and/or indescriminate placement of dredged material can seriously degrade the natural beauty of the area.

The regional demands for multipurpose trails and hunting cannot be satisfied by Pool 9 alone. Opportunities must be provided elsewhere in the region.

N. Recommendations:

1. Iowa should further investigate the feasibility of providing increased boat access/storage capacity near Lansing.

2. The State of Wisconsin should further investigate the feasibility of improving and expanding De Soto Landing.

3. The State of Wisconsin should further investigate the flexibility of upgrading and expanding Victory Landing.

4. The State of Wisconsin should further investigate the feasibility of improving the Lynxville Depot Ramp.

5. Iowa should further investigate the feasibility of providing an access near Heytman's Station and/or near the L&D 9 dike.

6. The Corps of Engineers should further investigate the feasibility of developing an island/beach recreation area with dredged material near RM 652.9 R to provide additional recreation and to lower the Lansing Bend congestion.

7. The Black Hawk Memorial County Park camping and picnicking area should be expanded.

8. The Corps of Engineers should further investigate the feasibility of developing Black Hawk Island (RM 671.5, right bank) with additional dredged material and reshaping to provide a use area close to Black Hawk Park and reduce congestion at Lansing Bend.

9. The Corps of Engineers, Fish and Wildlife Service and the states of Wisconsin and Iowa should further investigate the feasibility of establishing a road access day-use area on the Lansing-De Soto causeway (Great River Road). This area should have a road access off-channel beach, picnicking, an interpretive facility and trails. Limit use to nonboating to avoid additional boating congestion at the Lansing Bend.

10. The Corps of Engineers should further investigate the feasibility of reshaping the dredged material disposal site at Twin Island (RM 676) to provide a recreation area in the upper portion of the pool and to reduce congestion at the Lansing Bend. (Note: The Recreation Work Group has prepared a site plan for this area--refer to "Determining Means of Enhancing Recreation Areas with Dredged Material, June, 1978").

11. The Corps of Engineers, Fish and Wildlife Service, State of Wisconsin and Crawford County should further investigate the purchase of Battle Island (RM 670.5) and including it with Black Hawk Park as a management unit.

12. The Corps of Engineers should continue to maintain the beach/island area at RM 664R according to guidelines contained elsewhere in this report.

13. The Corps of Engineers should continue to maintain the beach/island area at RM 664.5L according to guidelines contained elsewhere in this report.

14. The Corps of Engineers should continue to maintain the beach/island area at RM 665.5R according to guidelines contained elsewhere in this report.

15. Wisconsin should be encouraged to continue its Mississippi River Bluffs Study and develop a linear park if it is determined to be feasible.

16. The Corps of Engineers should further investigate the feasibility of developing a new beach/island recreation area at RM 648.5R with dredged material. This area would serve as a "lockage waiting area".

17. The Corps of Engineers should continue to maintain the recreation beach area at RM 678.9 R. This area presently serves as a "lockage waiting area". Reshaping is required. Buoy the wing dams in this area.

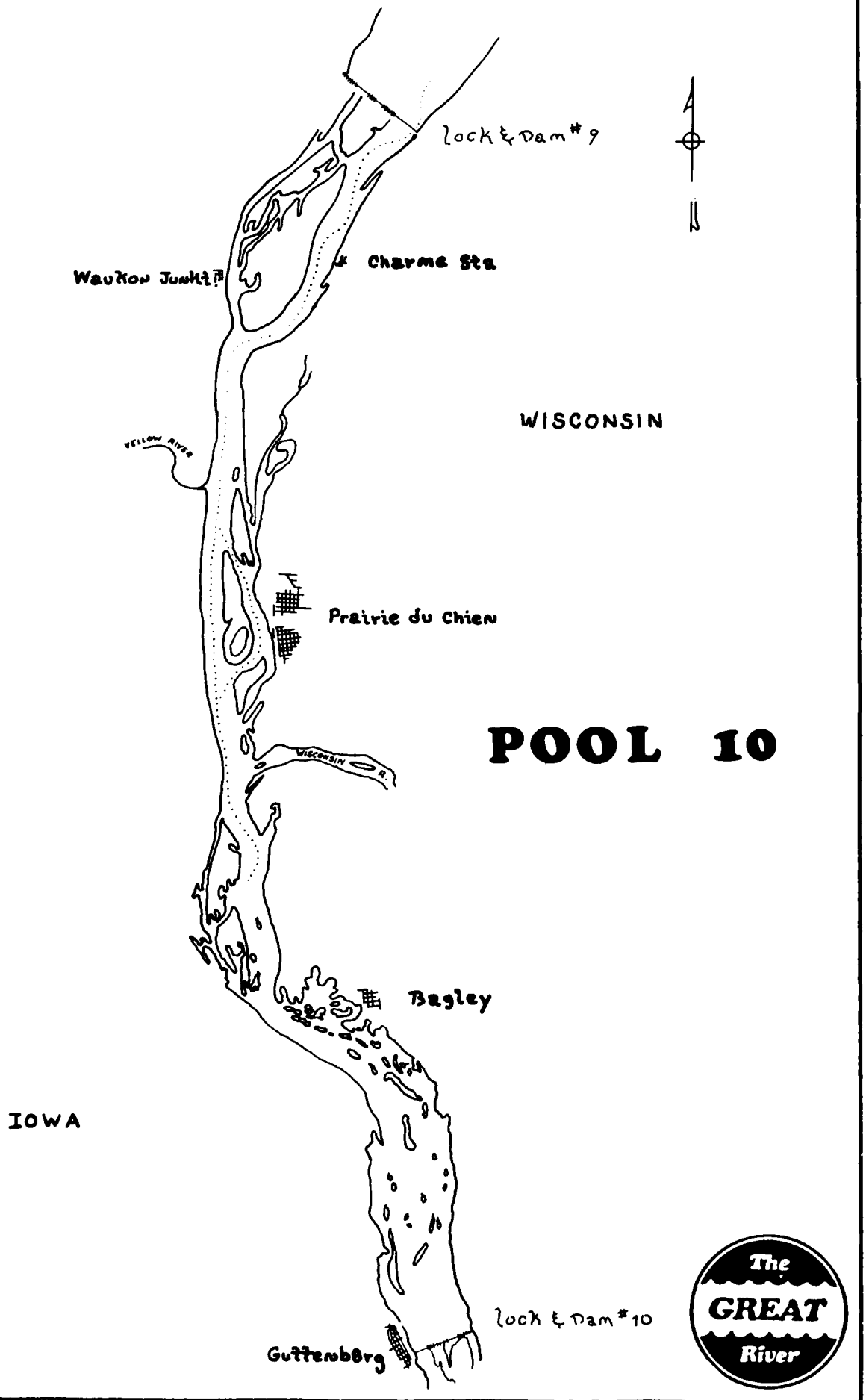

lock & Dam #9
Waukon Junction
Charme Sta
WISCONSIN
YELLOW RIVER
Prairie du Chien
POOL 10
WISCONSIN R.
Bagley
IOWA
lock & Dam #10
Guttenberg
The GREAT River

Figure 61

POOL 10

A. Description of Pool:

Lock and Dam No. 10 is located in Guttenberg, Iowa, 615.1 river miles above the mouth of the Ohio River. The structure is 32.8 river miles below Lock and Dam No. 9, 32.1 river miles above Lock and Dam No. 11, and about 20 river miles below the city of Prairie du Chien, Wisconsin. The main lock and completed portion of the auxiliary lock are located on the Iowa side or right bank of the main channel at the riverfront area immediately adjacent to the downtown section of the city of Guttenberg.

B. Pool 10 Features:

The area around Pool 10 has considerable historic interest because it contains several of the larger early-day outposts and settlements which grew into flourishing river cities as early-day migration moved northward along the Mississippi River. Principal existing cities on Pool 10 which have developed from the early era are Prairie du Chien, Wisconsin, and Guttenberg, Iowa. Preservation or restoration of ruins, relics, and artifacts continue to stimulate interest in the area.

The Mississippi River segment of Pool 10 is the second largest in the St. Paul District, 32.8 river miles, and has the second longest shoreline, about 110 miles. However, the pool has less water area than various other shorter length pools in the St. Paul District because the valley and floodplain area between the high bluffs becomes increasingly narrow at the lower end of the pool. The high bluff area through Pool 10 shows no signs of previous glacial action, but the lowland and floodplain areas basically consist of alluvial fill deposited in the form of terraces by the glacial stream outwash. Much of the land has retained these features except for changes in configuration caused by recurring high water which has eroded, carried, and deposited material all along the river's course.

From the lock at Guttenberg, the main channel follows a meandering course within the floodplain, reaching Iowa high ground again at Mile 622, parallels high ground to Clayton, Mile 625, angles sharply across the valley to near the Wisconsin side off Wyalusing, then angles back again to the Iowa side at Pikes Peak State Park where the Wisconsin River converges with the main stem, Mile 631. From this point upstream, the main channel follows the Iowa side about 10 miles, through McGregor and Marquette, to about Mile 641, where it angles sharply toward Wisconsin and follows that shoreline up to Lock No. 9. In addition to the Wisconsin River, a smaller tributary, the Yellow River, enters the pool from Iowa, about 3 miles above Prairie du Chien.

Principal features of Pool 10 are summarized below:

a.	Length of pool	32.8 river miles
b.	River miles	615.6 to 647.9
c.	Pool elevation (flat pool)	611.0
d.	Water area of pool	17,070 acres
e.	Shoreline miles (meandering outer perimeter limits, main and secondary channels and main traversed sloughs adjacent to firm, high ground accessible by land)	110 miles
f.	Federal lands above normal flat pool (approximate)	
	(1) Administered by Corps of Engineers	2,255 acres
	(2) Administered by the Department of the Interior	8,840 acres
	(3) Total above-water lands	11,095 acres

C. Federal Lands:

The Corps of Engineers has acquired and presently administers about 3,721 acres of federally owned land and water areas and holds special rights on an additional 5,343 acres administered by the Fish and Wildlife Service. Of the 3,721 acres of Corps-administered land and water area, about 3,719 acres have been made available to the Fish and Wildlife Service for management as part of the Upper Mississippi Wildlife and Fish Refuge in conjunction with Service-owned lands. About 2 acres of Corps lands at the structure site (Lock and Dam No. 10) have been retained solely for Corps use.

Of the Federal lands owned in fee in Pool 10, about 11,095 acres protrude above the normal flat pool elevation of 611.0. Of this total, 2,255 acres are under the jurisdiction of the Corps of Engineers and 8,840 acres are under the jurisdiction of the Department of the Interior. Any development contemplated by the Corps will be restricted by current law to selected sites on the 2,255 acres of Corps above-water lands.

The Federal Government has leased 41.25 acres as follows: Guttenberg Fish Hatchery - 1.84 acres, utilities and roads - 8.30 acres, commercial - 10.5 acres, park and recreation - 20.61.

D. Existing Recreation Facilities:

Pool 10 has 30 access areas with a total of 37 launching lanes (18 in Wisconsin and 19 in Iowa), 785 marina slips (218 in Wisconsin and 567 in Iowa), 1,403 parking spaces adjacent to boat accesses, 130 rental boats (60 in Wisconsin and 70 in Iowa), 961 camping units (510 in Wisconsin

and 451 in Iowa), 1,012 picnicking units (669 in Wisconsin and 343 in Iowa), 73 miles of hiking trails (18 in Wisconsin and 55 in Iowa), 28 miles of snowmobile trails (8 in Wisconsin and 20 in Iowa), 20 miles of cross-country skiing (all in Iowa), 17 miles of horseback trails (all in Iowa), and wayside stops are provided near the mouth of the Yellow River (approximately 20 spaces) at the Pikes Peak scenic overlook (overlooking the confluence of the Wisconsin and Mississippi Rivers) which can accommodate 50 vehicles in addition to the picnic ground.

In addition, there are approximately 760 boats privately moored in the pool (Aerial Survey, 1976). Major parks and forests in the pool include: Effigy Mounds National Monument (Iowa), Pikes Peak State Park (Iowa), Yellow River State Forest (Iowa), and Wyalusing State Park (Wisconsin). There are large concentrations of private boats and marina slips between Lock and Dam 10 and Clayton, Iowa and between the Highway 18 bridge (Marquette-Prairie du Chien bridge/causeway) and Lock and Dam 9.

The federally designated Great River Road travels down the Iowa side between Lansing and Dubuque.

E. Pool Accessibility:

Primary highways closely parallel both sides of the pool through most of the area upstream of the Wisconsin River, but from that point downstream to Lock and Dam No. 10, the primary highways loop inland for a considerable distance before returning to the immediate area bordering the pool. Networks of county and township roads extend from the primary roads to service the areas adjacent to the pool. A highway bridge at Prairie du Chien provides a crossing from Iowa to Wisconsin. Railroads parallel both sides of the river, generally along the base of the high bluffs outlining the valley.

F. Natural Resources:

A relatively small portion of the total above-water lands consists of high, firm ground suitable for development and use for land-based recreational activities. Lands and waters with the forests and plant life combine to provide habitat that produces a continuing supply of fish, waterfowl, and wild game. The relatively low pollution level of the pool waters encourages water-contact sports and is not harmful to fish or wildlife.

The Gordon's Bay-Jackson Island-Harper's Slough area is used heavily for fishing, hunting, camping, and boating. Gernet Lake, Johnson Slough area (Norwegian Lake),Wyalusing Slough area (Methodist Lake), Gremore Lake, Ambro Lake, Bagley Bottoms, and Ferry Slough area (Glen Haven Lake) are used extensively for hunting and fishing. Wyalusing Slough area is heavily used for camping and boating also.

The Wisconsin Department of Natural Resources has three Natural Areas within Pool 10--Lowland Woods (RM 621), Cliffs Woods (RM 618), and Eagle Valley (RM 614).

Climate and year-round changes in temperature permit participation in varied seasonal activities. Average annual temperatures of 44 degrees F to 49 degrees F, that are normal to the pool areas in general, also

prevail in Pool 10. Summer temperatures range upward to about 95 degrees F during June, July, and August, and winter temperatures on occasion drop to about -30 degrees F.

G. Cultural Resources:

Pool 10 is rich in known cultural resources. Villa Louis located on St. Feriole Island at Prairie du Chien is on the National Historic Register and is managed by the Wisconsin Historical Society. The Second Fort Crawford located at RM 634 is also on the National Historic Register and is managed by the Wisconsin Historic Society. In addition, there are many historic buildings in McGregor, Marquette, and Prairie du Chien.

Effigy Mounds National Monument with a variety of prehistoric effigy mounds is located approximately RM 627 and is managed by the National Park Service. This area features extensive interpretive facilities and hiking trails.

H. Fish and Wildlife Resources:

Although it produces only about 30 percent of the catch provided by Pool 9, Pool 10 supports a substantial level of commercial fishing. There is no discernible trend in the catch data for this pool. (See Table 81.)

The average annual harvest of furbearers was estimated by the Wisconsin Deparment of Natural Resources to be 75,000 muskrats, 1,000 to 1,500 beaver, 10 otter, and 50 to 75 mink for Pools 7 through 9.

I. Recreational User Survey:

Information regarding the recreational use of dredged material disposal areas was collected during the summer of 1977 (Upper Mississippi River Dredged Material Disposal Site Recreational Assessment, November, 1978). Refer to the aforementioned report and the earlier chapter on this topic for a complete discussion.

Significant variations in the survey for Pool 10 include:

* The highest proportion of three-day stays occurred in this pool. (32 percent of the total number of stays in the pool.)

* Pool 10 exhibited fewer yes responses than were expected concerning whether or not a put-in site had been selected to avoid locks.

* As reasons for choosing a "put-in" site, "less crowded", adequate water depth, very near a favorite section of the river, and availability of services were more often cited in Pool 10.

TABLE 81
POUNDS OF FISH CAUGHT ANNUALLY BY
COMMERCIAL FISHERMEN IN POOL 10
1960-1975

Year	Commercial Fish Catch
1960	405,000
1961	625,000
1962	296,000
1963	396,000
1964	518,000
1965	Not Available
1966	564,000
1967	580,000
1968	644,000
1969	663,000
1970	753,813
1971	655,622
1972	675,405
1973	640,549
1974	703,185
1975	554,197

Source: Upper Mississippi River Conservation Committee

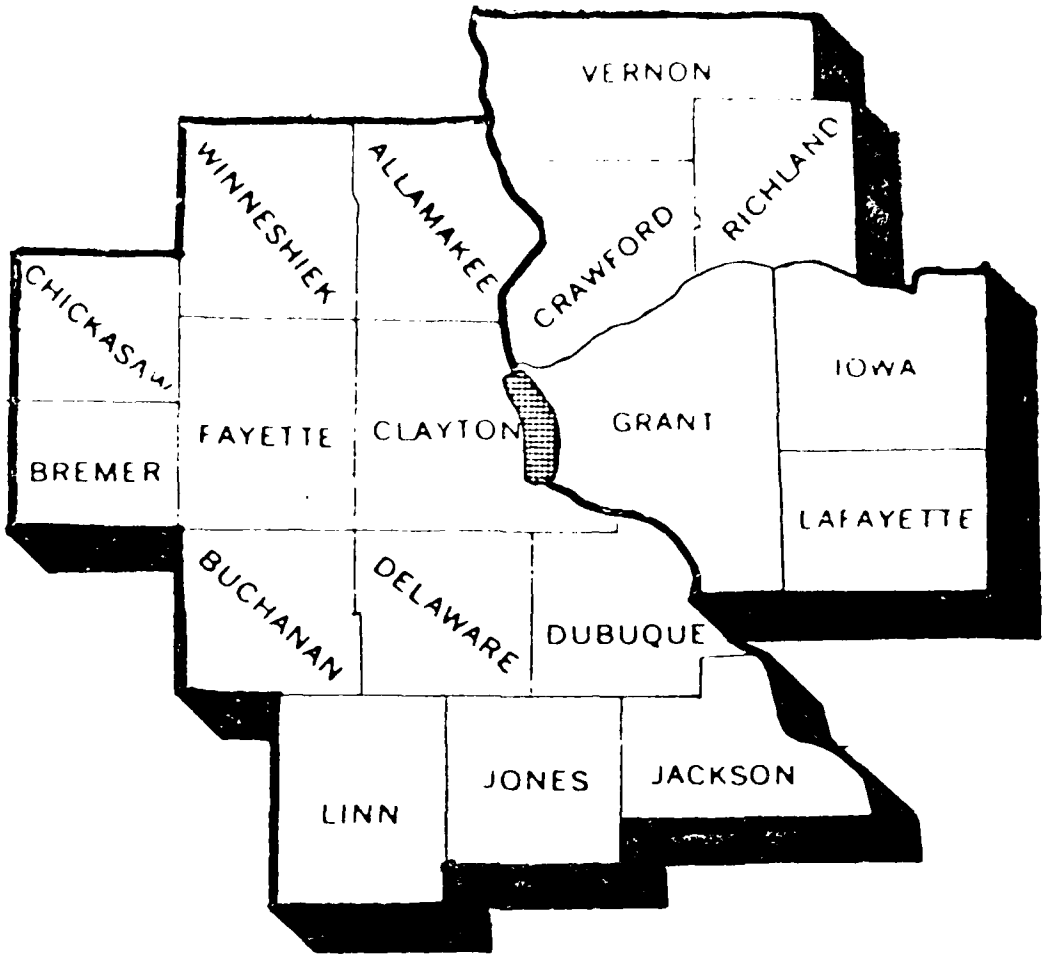


FIG. 62

ZONAL POPULATION PROJECTION

ZONE	1975	2010	2025
0-25 Mi.	38,730	41,840	44,910
26-50 Mi.	191,850	225,970	244,880
51-75 Mi.	119,730	124,075	128,560

RECREATION DEMAND ANALYSIS

UPPER MISSISSIPPI RIVER NAVIGATION

POOL 10

The GREAT River

* There was a disproportionate level of perceived extreme crowding in Pool 10.

Origin of trip of those users surveyed in this Pool:	Other Iowa cities	17%
	Other Illinois cities	14%
	McGregor, Iowa	14%
	Waterloo, Iowa	11%
	Madison, Wisconsin	7%
	Gordon's Bay	5%

J. Projected Recreational Activity Occasions:

The projected recreational activity occasions are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The population within the zone-of-influence is expected to increase 19 percent between 1975 and 2025. Refer to Figure 62.

Visitor day use is projected to increase approximately 19 percent between 1975 and 2025. This is an increase of approximately 80,200 visitor days. Each visitor is estimated to engage in more than one activity, however. Refer to Table 82.

K. Estimated Recreation Resource Requirements:

The projected recreation resource requirements are taken from Public Use Projections, February, 1978, GREAT I, Recreation Work Group. The resource requirements were calculated by determing the amount of land and/or support facilities required to support a particular recreational activity. Refer to Table 83.

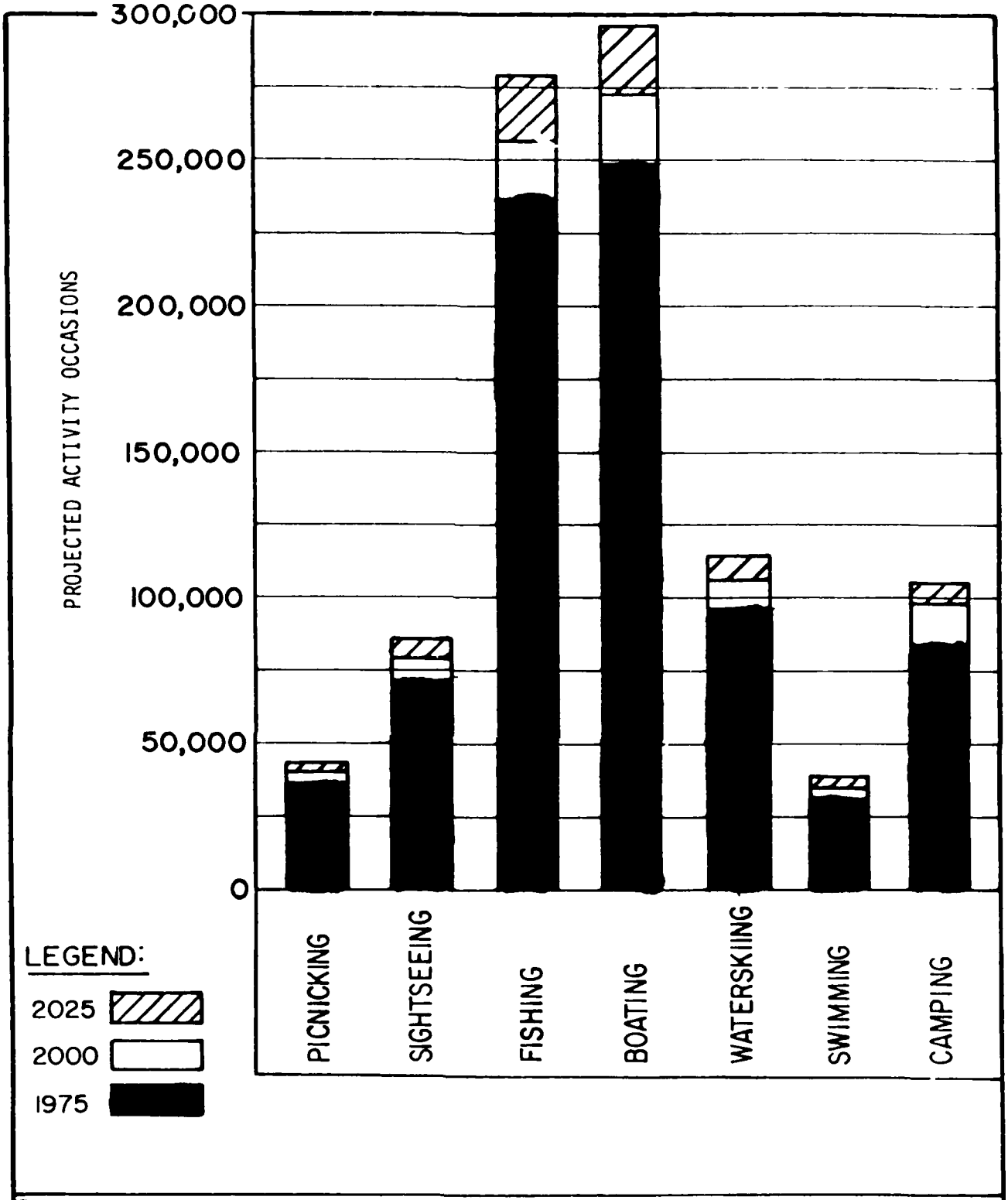
L. Estimated Recreation Resource Needs:

Estimated recreation resource needs are determined by subtracting the amount of available recreation resources (Facility Inventory, July, 1978) from the projected requirements.

M. How to Meet the Needs:

The greatest deficiencies in Pool 10 are multi-purpose trails (hiking, snowmobile) and hunting areas. These all represent "regional demands" (refer to Table 84), however, and are not necessarily demands on the Mississippi River resource. All of the regional needs can not be met by Pool 10 and must be partially satisfied elsewhere in the region. There is a need for environmental education facilities contiguous to the Mississippi River, however, to better explain the resource and its uses.

Some of these needs could be met in existing recreation areas. Additional trails could be constructed in the Yellow River State Forest, Pikes Peak State Park, Effigy Mounds, and Wyalusing State Park. A trail connecting Effigy Mounds, Pikes Peak, and the Yellow River Forest areas would be a tremendous recreational asset. Snowmobiling can take place on frozen water areas but not on refuge lands where motorized vehicles are prohibited.



RECREATION
DEMAND ANALYSIS

POOL 10

FIGURE 63

The GREAT River

Table 82

Pool 10

PROJECTED POOL ANNUAL ACTIVITY OCCASSIONS
1975 - 2025
(000's)

ACTIVITY	1975	1980	1990	2000	2010	2020	2025
Picnicking:	37.1	37.7	39.7	40.2	41.6	43.0	43.7
Sightseeing:	72.1	73.3	77.9	78.8	81.6	84.4	85.7
Fishing:	236.9	240.7	253.5	256.6	265.5	274.6	278.9
Boating:	249.9	253.9	269.2	272.6	282.1	291.7	296.3
Waterskiing:	95.8	97.4	104.0	105.4	109.0	112.8	114.6
Swimming:	32.5	33.0	35.0	35.4	36.6	37.9	38.5
Camping:	84.7	86.2	95.8	98.1	102.0	105.9	107.7
Hiking:	5381.4	5415.7	5520.3	5611.4	5817.1	6015.7	6102.2
Hunting:							
Small Game-	890.9	900.8	912.3	933.1	966.4	1000.5	1015.4
Large Game-	362.9	367.0	371.7	380.2	393.7	407.6	413.6
Waterfowl-	395.9	400.4	405.5	414.7	429.5	444.7	451.3
Snowmobiling:	694.8	702.1	716.8	730.6	754.0	779.0	789.5
Sub-Total:							
Activity Occassions:	809.0	822.2	875.1	887.1	918.4	950.3	965.4
Visitor Days:	414.9	421.6	448.8	454.9	471.0	487.3	495.1
Conversion Factor:	1.95						

Table 83

Pool 10

ESTIMATED RECREATION RESOURCE REQUIREMENTS
1975 - 2025

Year	Picnicking		Sightseeing		Fishing			Boating			Waterskiing			Swimming				Camping		Hiking	Hunting			Snowmobiling
	U.	Ac.	P.S.	P.A.	P.S.	L.L.	Ac.	P.S.	L.L.	P.A.	P.S.	L.L.	P.A.	P.S.	B.A.	P.A.	S.B.	U.	Ac.	Miles/Tr.	L.G.	S.G.	W.F.	Miles/Tr.
1975:	39	78	30	1	707	18	18	374	9	9	201	5	5	49	17,065	6	4	222	740	1,560	2,904.0	4,455.0	19.8	270
1980:	40	80	31	1	718	18	18	381	10	10	204	5	5	50	17,341	6	4	226	753	1,570	2,936.0	4,504.0	20.0	273
1990:	42	84	33	1	756	19	19	403	10	10	218	5	5	52	18,364	6	4	252	840	1,600	2,972.0	4,562.0	20.3	278
2000:	42	84	33	1	765	19	19	408	10	10	221	6	6	53	18,587	6	4	257	857	1,672	3,040.0	4,666.0	20.8	284
2010:	44	88	34	1	792	20	20	423	11	11	229	6	6	55	19,233	6	4	268	893	1,686	3,148.0	4,832.0	21.5	293
2020:	45	90	35	1	819	20	20	437	11	11	237	6	6	57	19,887	7	5	278	927	1,744	3,260.0	5,003.0	22.3	302
2025:	46	92	36	1	832	21	21	444	11	11	240	6	6	58	20,203	7	5	283	943	1,769	3,308.0	5,077.0	22.6	307

(Initial) 1975				2000				(Ultimate) 2025			
P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES	P.S.	L.L.	P.A.	TOTAL ACRES
1,361	32	21	857	1,480	35	23	983	1,610	38	25	1081

U. = Number of Units
Ac. = Number of Acres
P.A. = Number of Parking Acres
P.S. = Number of Parking Spaces
L.L. = Launching Lanes

SWIMMING:
B.A. = Beach Area (sq. ft.)
S.B. = Swimmers Beach in Acres

HUNTING:
L.G. - Large Game - 1000's Acres
S.G. - Small Game - 1000's Acres
W.F. - Waterfowl - 1000's Water Acres

Table 84

L. ESTIMATED RECREATION RESOURCE NEEDS

Recreation Activities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
Picnicking (Units)	1,012	41	-	42	-	46	-	
Sightseeing (P.S.)	Approximately 70	32	-	33	-	36	-	
Fishing (P.S.)		737		765		832		
(L.L.)		18		19		21		
Boating (P.S.)	1,413 P.S.	392	-	408	-	444	-	
(L.L.)	37 L.L.	10	-	10	-	11	-	
	785 slips							
	759 private+							
Waterskiing (P.S.)		211		221		240		
(L.L.)		5		6		6		
Swimming (B.A.)	60.5 acres	17,853 ft^2 (0.4 acres)	-	18,587 ft^2 (0.4 acres)	-	20,203 ft^2 (0.4 acres)	-	
Camping (Units)	356	239	-	257	-	283	-	
Hiking* (Miles)	30.5	1,585	1,555	1,672	1,642	1,769	1,739	
Hunting* Large Game* (Land Acres)	11,062**	2,954,000	2,942,938	3,040,000	3,028,938	3,308,000	3,296,938	Includes: forest agriculture, plantation and reproduction lands

Pool 10

L. ESTIMATED RECREATION RESOURCE NEEDS (CONTINUED)

ecreation ctivities	Available Facilities Sept. 1, 1977	1985 Projected Requirements	1985 Projected Deficiencies	2000 Projected Requirements	2000 Projected Deficiencies	2025 Projected Requirements	2025 Projected Deficiencies	Remarks
mall Game* Land Acres)	2,507**	4,533,000	4,530,493	4,666,000	4,663,493	5,077,000	5,074,493	Includes: upland meadow agriculture, brush, plantation, and reproducing lands
aterfowl* Water cres)	18,525**	20,150	1,625	20,800	2,275	22,600	4,075	Includes: all open water, emergent aquatic vegetation and marsh areas
nowmobiling* (Miles)	28.5	276	248	293	264	307	278	

*Regional demand, requirements, and needs.

**Source--"Vegetation, Land, and Water Surface Changes in the Upper Navigable Portion of the Mississippi Basin over the Period 1939-1973", Olson and Meyer.

P..S.--Parking Spaces
L.L.--Launching Lanes
B.A.--Beach Area
One marina slip is assumed to replace one parking space.

+ Source--GREAT I Recreation Work Group, Aerial Recreation Use Survey, September 5, 1976.

++Since use projections assume 40 launches/ramps/day and private boats moored in the area, the use projections have been lowered to reflect these impacts (private boats ÷ 40 = reduction in launching lanes; private boats = reduction in parking area needs).

The Fish and Wildlife Service through the Bicentennial Land Heritage Program is proposing several additions and major improvements in the Pool 10 area. An interpretive complex is proposed off the west bound lane on the Marquette-Prairie du Chien bridge/causeway. This complex is to have a shelter, trail, and 30-car parking area. Upgrading of facilities is proposed by the Service at Ambro Slough Landing, Bagley Access, Glen Lake and Bussey Lake. Interpretive displays are proposed for many of the accesses, state and local parks, and Effigy Mounds National Monument.

Pool 10 experiences moderate to high density boating activity immmediately south of Lock and Dam 9 in the Gordon's Bay Islands-Jackson Island-Du Charme Creek area and near the upstream end of Wyalusing Slough (across from the Wyalusing public access). These areas all have sand beach/islands readily available. The Gordon's Bay Islands-Jackson Island-Du Charme Creek area is used heavily by houseboats and runabouts. Many of the houseboats are rental units from McGregor which are restricted to Pools 9 and 10. The Gordon's Bay and Du Charme Creek Islands are low lying and become submerged and, thus, not useful for recreation many times during the season.

N. Recommendations:

1. The Fish and Wildlife Service should provide interpretive facilities as proposed under the Bicentennial Land Heritage Program.

2. Iowa and Wisconsin should further investigate the feasibility of additional multi-purpose trails in the Yellow River Forest-Pikes Peak-Effigy Mounds area (Iowa) and within Wyalusing State Park (Wisconsin).

3. The Corps of Engineers and State of Wisconsin should further investigate the feasibility of purchasing the islands off Gordon's Bay (RM 646-647 L) and filling them slightly to provide a recreation area available throughout the summer.

4. The Corps of Engineers and State of Wisconsin should further investigate the feasibility of purchasing the islands off Du Charme Creek (RM 644-644.5 L) and filling them slightly to continue to provide a recreation area.

5. The National Park Service should further investigate the feasibility of providing a boat access to the interpretive center at Effigy Mounds. This access could be at the north side of the mouth of the Yellow River (RM 637.7 R) with a trail from here to the center (possibly under the railroad trestle).

6. The Corps of Engineers should further investigate the feasibility of developing a new beach/island recreation area with dredged material at RM 636.2 L (actually in the Prairie du Chien East Channel divides). This would provide a much needed recreation area between the mouth of the Wisconsin River (RM 631) and Du Charme Creek Islands (RM 644) and would take some of the pressure off the Wyalusing area.

7. The Corps of Engineers should develop ("redevelop") the beach/island recreation area on Hovie Island (RM 623 L) according to guidelines contained elsewhere in this report. This area presently receives substantial use.

8. The Corps of Engineers should develop ("redevelop") the beach/island recreation area off the channel side of Frenchtown Lake (RM 619.5 R). This area presently receives some use but could provide a recreation area immediately north of Lock and Dam 10. This should also reduce some of the recreational lockage congestion at this lock.

9. The Corps of Engineers should continue to maintain the major beach/island area across from Wyalusing (RM 628 R) with periodic dredged material disposal or other means as necessary to prevent complete revegetation. The southern portion of this area should be stabilized to prevent sedimentation into the adjacent backwater channel.

10. Dredged material should be made available for maintaining the road access public beach at Wyalusing State Park (RM 627.7 L).

11. The Corps of Engineers should further investigate the feasibility of developing a beach/island recreation area at RM 616.0 R with dredged material. This area would serve as a "lockage waiting area".

12. The Corps of Engineers should further investigate the feasibility of developing a "lockage waiting area" at RM 614.8 R with dredged material. This area is in Pool 11, but within the St. Paul District.

13. The Corps of Engineers should further investigate the feasibility of developing a "lockage waiting area" at RM 647.7 R with dredged material.

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