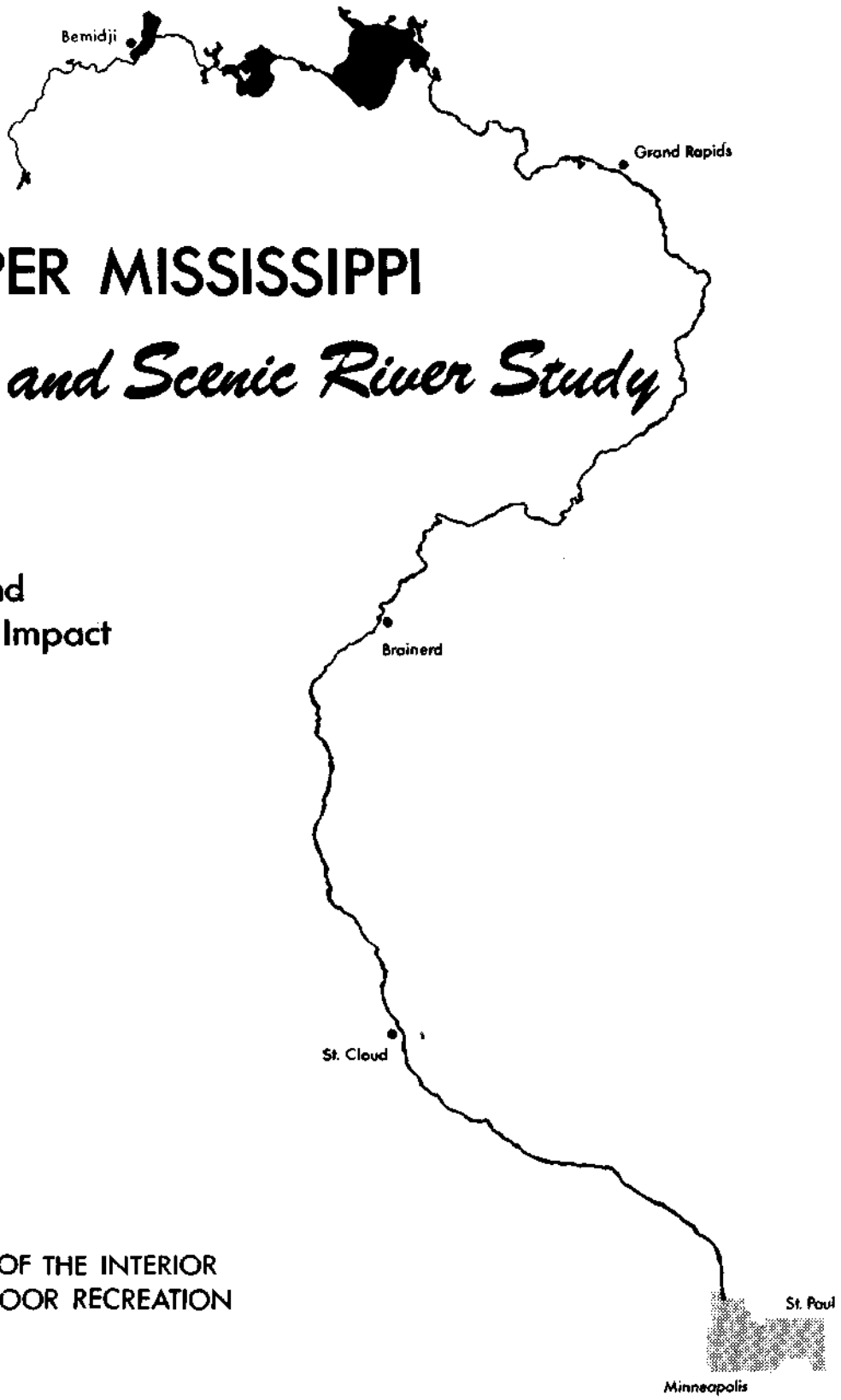

THE UPPER MISSISSIPPI

A Wild and Scenic River Study

Final Report and
Environmental Impact
Statement

Prepared by:
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION

AS THE NATION'S PRINCIPAL CONSERVATION AGENCY, THE DEPARTMENT OF THE INTERIOR HAS RESPONSIBILITY FOR MOST OF OUR NATIONALLY OWNED PUBLIC LAND AND NATURAL RESOURCES.

THIS INCLUDES FOSTERING THE WISEST USE OF OUR LAND AND WATER RESOURCES, PROTECTING OUR FISH AND WILDLIFE, PRESERVING THE ENVIRONMENTAL AND CULTURAL VALUES OF OUR NATIONAL PARKS AND HISTORICAL PLACES, AND PROVIDING FOR THE ENJOYMENT OF LIFE THROUGH OUTDOOR RECREATION.

THE DEPARTMENT ASSESSES OUR ENERGY AND MINERAL RESOURCES AND WORKS TO ASSURE THAT THEIR DEVELOPMENT IS IN THE BEST INTERESTS OF ALL OUR PEOPLE.

THE DEPARTMENT ALSO HAS A MAJOR RESPONSIBILITY FOR AMERICAN INDIAN RESERVATION COMMUNITIES AND FOR PEOPLE WHO LIVE IN ISLAND TERRITORIES UNDER U. S. ADMINISTRATION.

U.S. DEPARTMENT OF THE INTERIOR
Cecil D. Andrus, Secretary

BUREAU OF OUTDOOR RECREATION
Chris Therral Delaporte, Director

UPPER MISSISSIPPI RIVER

MINNESOTA

WILD AND SCENIC RIVER STUDY

JUNE 1977

TABLE OF CONTENTS

PAGE

TABLES

FIGURES

PHOTO CREDITS

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Page 38, Wisconsin Natural Resources Department Madison, Wisconsin.

"It is difficult
in passing it,
to resist the idea,
that it will,
at some future day,
sustain a dense
population."

H. Schoolcraft

"It is wonderful to observe how this river combines all the features of grandeur and beauty, all that can affect and astonish. It comprises at this spot, within a spacious and enchanting enclosure, fifteen islands, rivaling each other in elegance and charms. Nature seems to repose with pleasure in the view of them, and to be proud of her work..."

J. C. Beltrami

I. INTRODUCTION

Purpose

On October 2, 1968, the Congress of the United States enacted the Wild and Scenic Rivers Act, Public Law 90-542. In this Act the Congress declared it:

> . . . to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dams and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

The Act established the National Wild and Scenic Rivers System, designated eight rivers as initial components of the system, identified 27 rivers for study as potential additions to the National System, and prescribed methods and standards by which additional rivers could be added to the system from time to time. In January 1975 the Act was amended placing 29 additional rivers in the study category, one of which is the Upper Mississippi River.

The Act calls for a determination of the suitability of the Upper Mississippi River for inclusion in the National System and, if it is to be included, recommendations and guidelines pertaining to the administration and management of the river and its environment.

This report contains basic data pertaining to the study area, study findings, conclusions, recommendations, and a discussion of alternative actions. In addition, the report includes a conceptual river plan which provides guidelines for the preservation, utilization, and management of the Upper Mississippi River. Pursuant to Section 103 of the Resources Planning Act (P. L. 89-90) and as issued by the Water Resources Council, the Principles and Standards for Planning Water and Related Land Resources will place all environmental and socioeconomic impacts, expected as a result of the actions proposed, into a four account system displaying beneficial and adverse effects of each alternative plan. In accordance with the requirements of Section 102(2)(c) of the National Environmental Policy Act of 1969, an environmental impact statement was prepared and is included as Chapter IX in this report.

Scope

The Upper Mississippi Wild and Scenic River Study is the culmination of one year of field work, analysis, and review on the part of State and Federal agencies. The study has evaluated the Upper Mississippi River from its source at Lake Itasca to the northwestern limits of the City of Anoka. The 466 miles of the Mississippi involved the largest continuous river segment yet studied for inclusion in the National Wild and Scenic Rivers System. A river, or segments of river, qualifying for inclusion into the National Wild and Scenic Rivers System must possess outstanding values regarding scenic quality, fish and wildlife, recreation potential, geologic features, history, or culture.

Principles and Standards of the U. S. Water Resources Council are utilized for planning the use of the water and related land resources of the United States to achieve objectives, determined cooperatively, through the coordinated actions of Federal, State, and local government; private enterprises; organizations; and individuals. Plans for using the Nation's water and land resources will be directed to improvement of the quality of life through contributions to the objectives of national economic development and environmental quality. The beneficial and adverse effects on each of these objectives will be displayed in separate accounts along with accounts for the beneficial and adverse effects on regional development and social well-being. Planning for the use of water and land resources in terms of these objectives aided in identifying alternative courses of action and providing the type of information needed to improve the public decision making process.

Conduct of the Study

The Department of the Interior's responsibility for studying rivers named in the Wild and Scenic Rivers Act was delegated by the Secretary of the Interior to the Bureau of Outdoor Recreation. A group of study associates composed of Federal and State agencies was formed in April 1975. Federal agencies represented as study associates included the Bureau of Indian Affairs, Bureau of Land Management, Bureau of Outdoor Recreation, Corps of Engineers, Environmental Protection Agency, Federal Highway Administration, Fish and Wildlife Service, Forest Service, Geological Survey, National Park Service, and Soil Conservation Service. The State Department of Natural Resources was also represented. Others who contributed to the study included Northern States Power Company and a fishing tackle manufacturer in Big Lake, Minnesota.

One of the most important elements of the study was public involvement in the planning and decision-making process. To insure public input, a news release concerning the study was distributed throughout the State of Minnesota in April 1975. The release "encouraged the public to provide information and ideas concerning the present and/or potential uses of the river's resources . . . . at any time during the study." Meetings with concerned individuals and groups were held after the study associates conducted field trips along the river and its corridor gathering

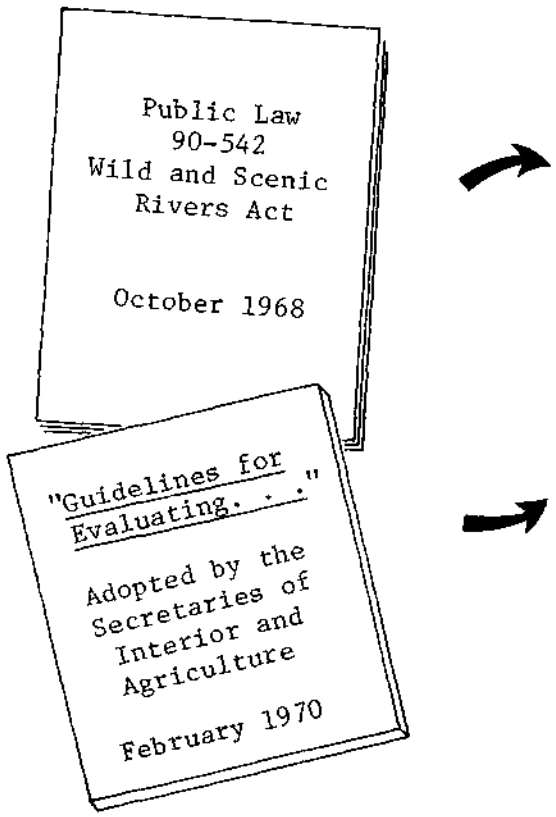
the necessary background material for the preparation of an evaluation report. These trips involved frequent canoeing, boating, and aerial surveying.

In December 1975 study findings and facts were presented at five public meetings to provide special opportunity for the public to comment on various river preservation alternatives and concepts proposed. Comments and suggestions offered at these meetings were very carefully evaluated and served an important role in the subsequent development of a recommended course of action.

Eligibility Determination and Classification Procedure

The first basic task in conducting a wild and scenic river study is to determine whether or not the river or segments of it meet the eligibility criteria for either wild, scenic, or recreational river areas as set forth in the Wild and Scenic Rivers Act and the Guidelines for Evaluating Wild, Scenic, and Recreational River Areas Proposed for Inclusion in the National Wild and Scenic Rivers System Under Section 2, as adopted by the Secretaries of the Interior and Agriculture. In other words . . .

DOES IT QUALIFY FOR THE NATIONAL SYSTEM?



ELIGIBILITY CRITERIA

- FREE FLOWING CONDITION
- ACCESSIBILITY
- SHORELINE DEVELOPMENT
- WATER QUALITY
- SCENIC QUALITY
- FISH AND WILDLIFE VALUES
- RECREATION POTENTIAL
- GEOLOGIC FEATURES
- CULTURAL AND HISTORICAL VALUES

In addition to these general requirements, every wild, scenic, or recreational river in its free-flowing condition or upon restoration to this condition shall be considered eligible for inclusion in the National Wild and Scenic Rivers System and, if included, shall be classified, designated, and administered as one of the following:

1. Wild river areas--Those areas or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive, and waters unpolluted. These represent vestiges of primitive America.

2. Scenic river areas--Those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible.

3. Recreational river areas--Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

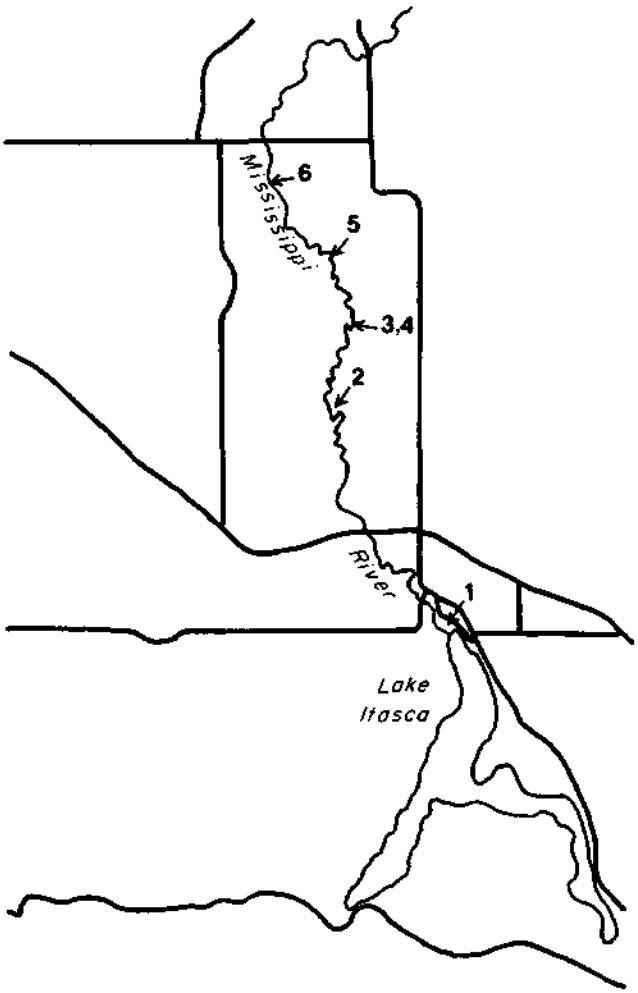
In arriving at a finding of eligibility and stream classification, the study group had to exercise its judgment, not only for each of the eligibility criteria as they applied to a particular segment of a river but on the river system as a whole, and to evaluate the combined effect of all criteria. It should be understood that the criteria are not absolutes. There is no way the criteria can be written so as to automatically indicate which rivers are eligible and what classification they must be. Accordingly, the entire river system and its immediate land area were considered as a unit, with primary emphasis upon the quality of the experience and overall impressions the public would perceive while using the river.

II. PICTORIAL GUIDE TO THE UPPER MISSISSIPPI

1. The famous headwaters outlet from Lake Itasca.

2. The first canoe landing downstream from Lake Itasca.

3. The riverscape fluctuates dramatically among upland and lowland forest and shrub and grass wetland.

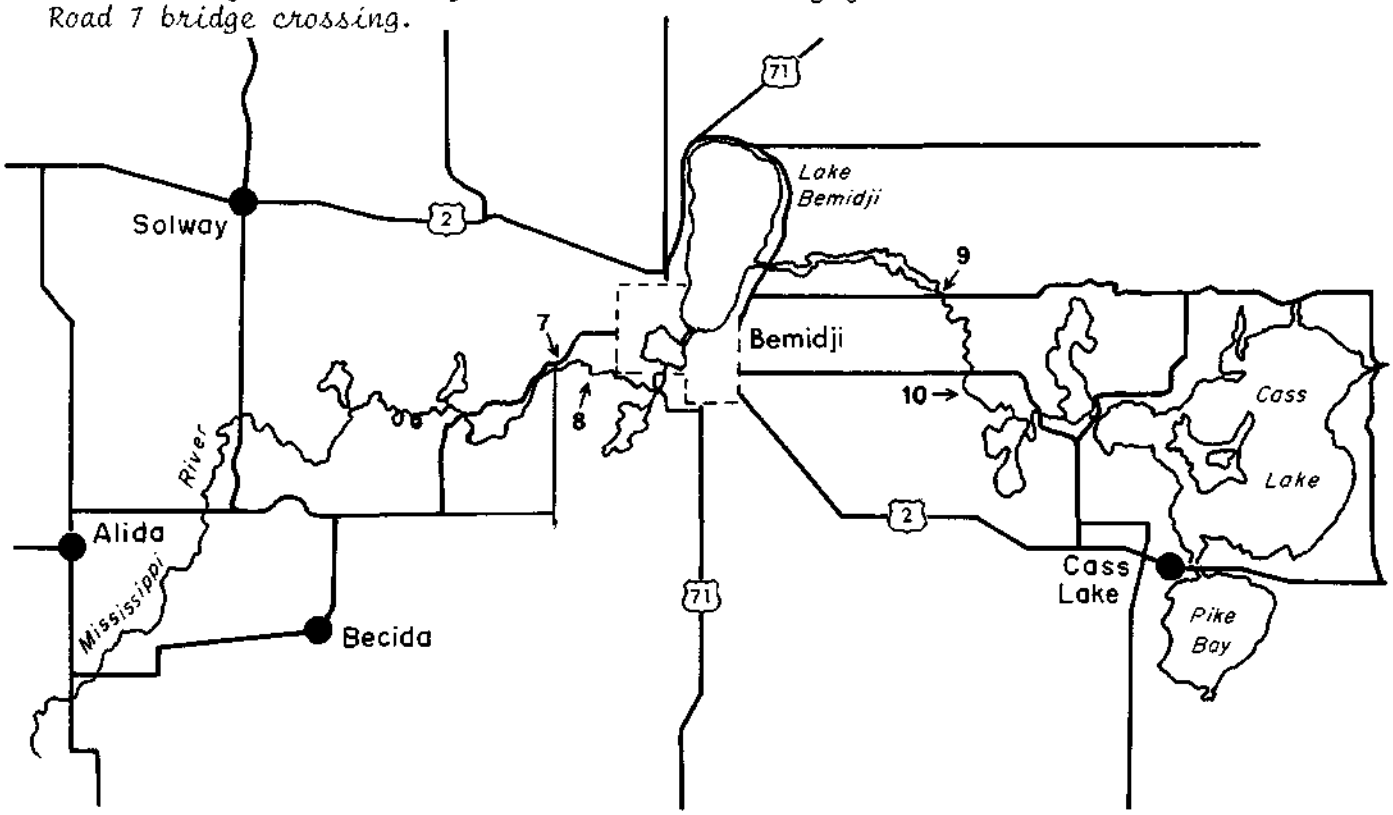


4. A unique structure on the river is this log flume dating back to the turn of the century.

5.,6. Both beaver dams and lodges occur along this upper reach.

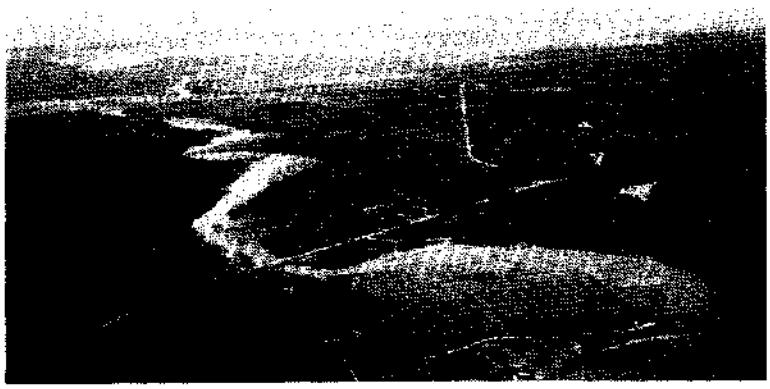
7. Farming activity and housing interrupt the natural setting downstream from the County Road 7 bridge crossing.

8. A scenic highlight is this reach of heavily canopied deciduous forest extending for 3.5 miles.

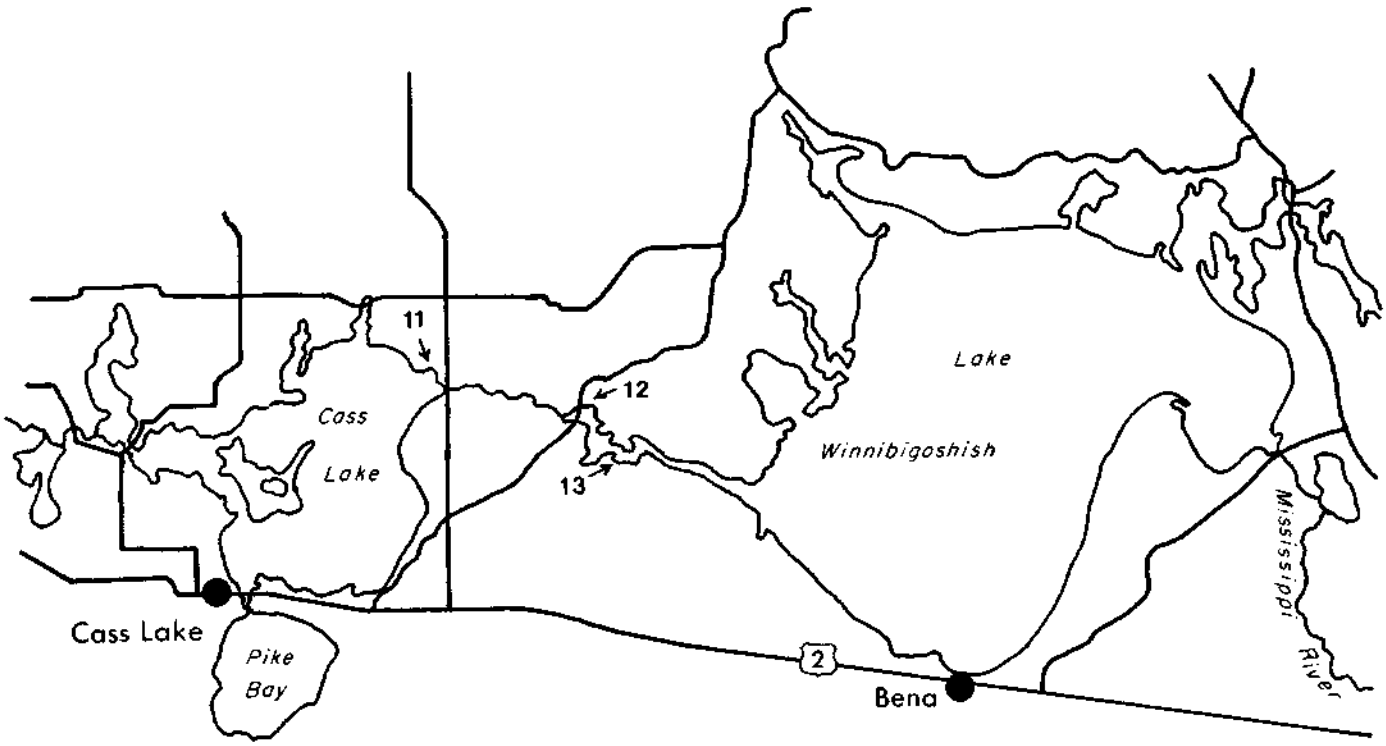


9. Aquatic vegetation in this reach provides good bass and panfish spawning habitat.

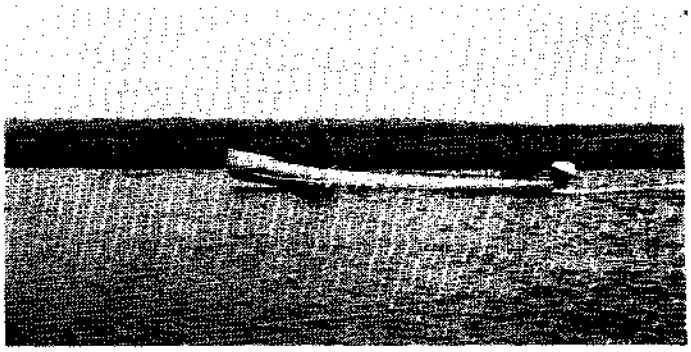
10. Extensive grass wetland occurring at the passage through flowage lakes provides prime waterfowl habitat.



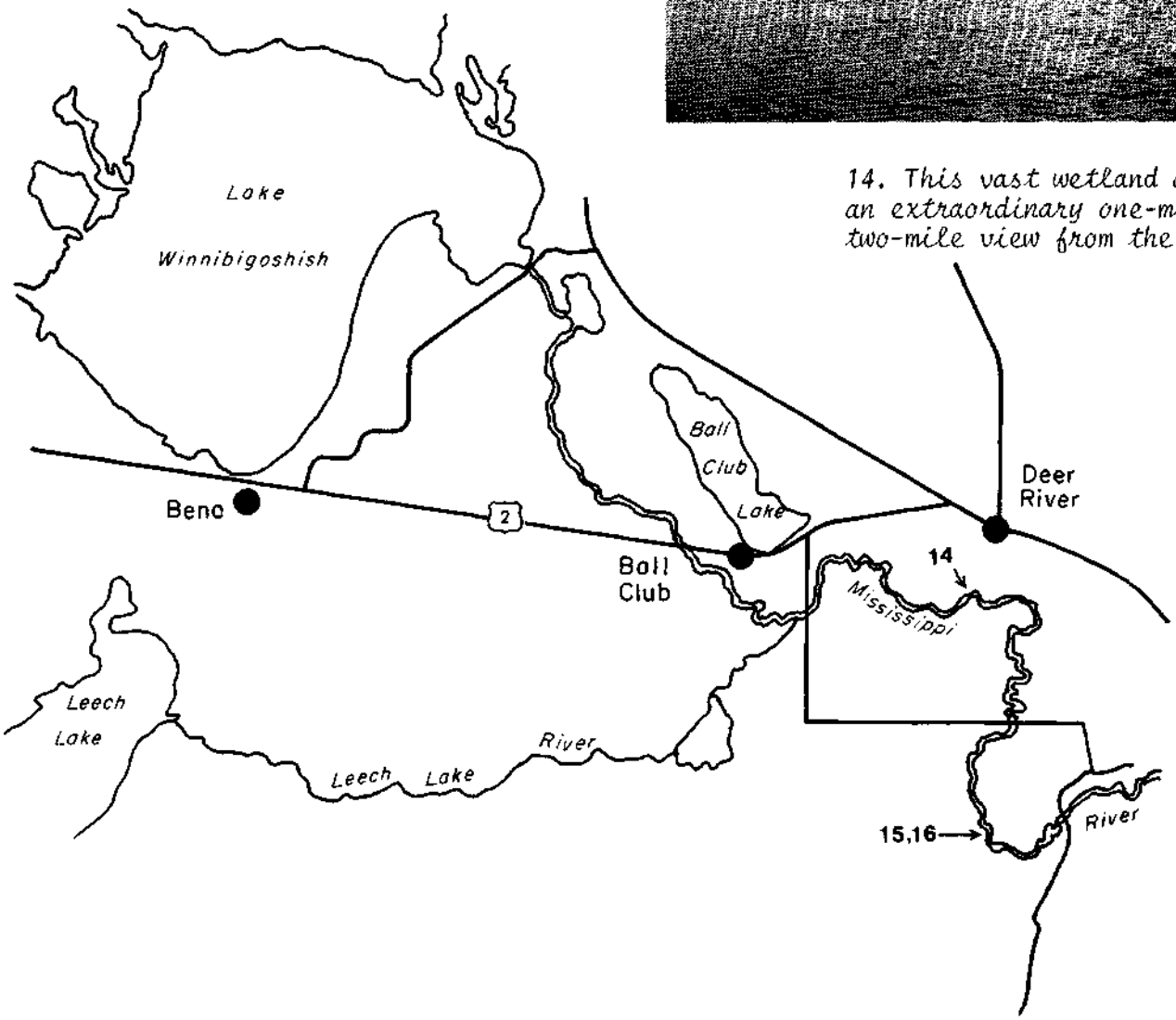
11.,12. The River flows for 10 miles between Cass Lake and Lake Winnibigoshish through the Chippewa National Forest.



13. Extensive beds of wild rice occur along the river.



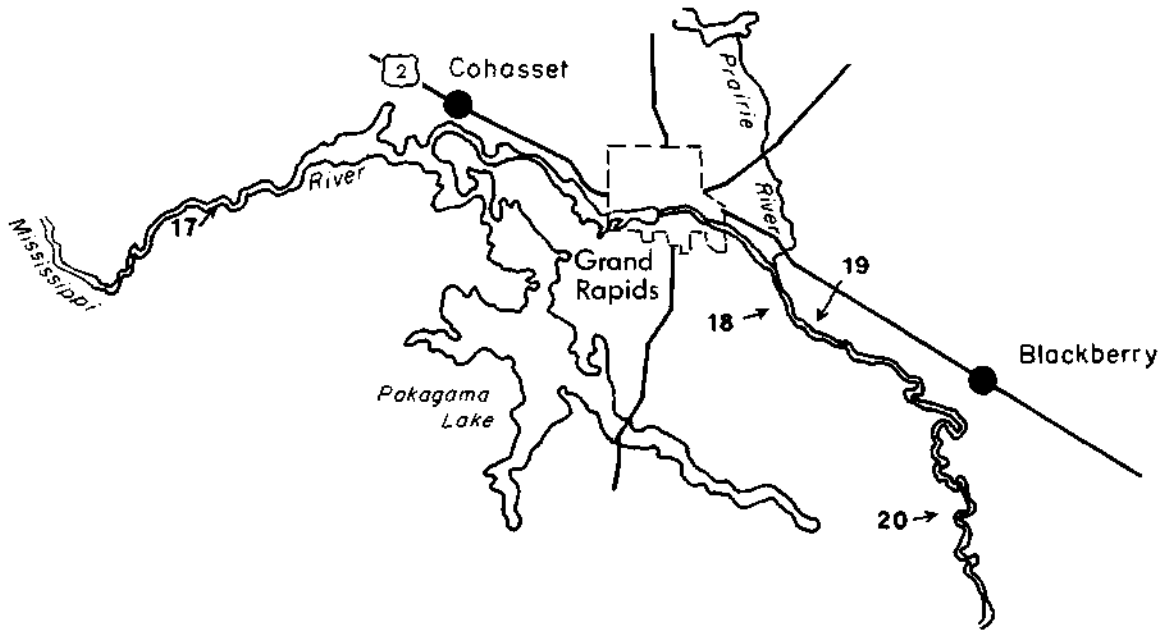
14. This vast wetland affords an extraordinary one-mile to two-mile view from the River.



15.,16. Schoolcraft State Park affords recreation facilities in a picturesque setting of mature Red Pine. The state flower, the Showy Lady Slipper is found here.

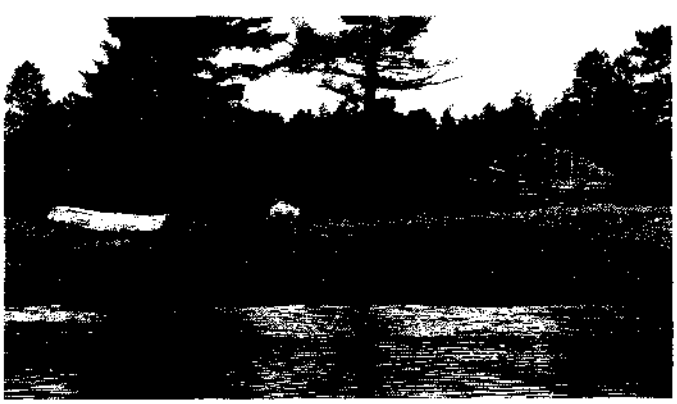
17. Wetlands continue to prevail as the dominant character of the River.

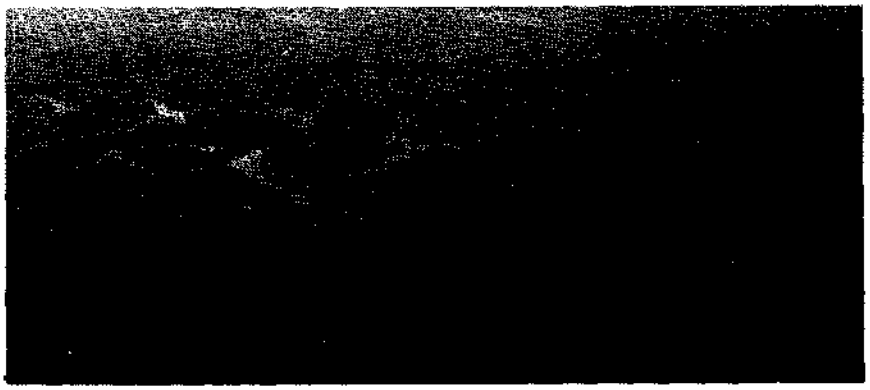
18. Below Grand Rapids the character of the River changes as the corridor is predominantly covered by deciduous forest or pasture land.



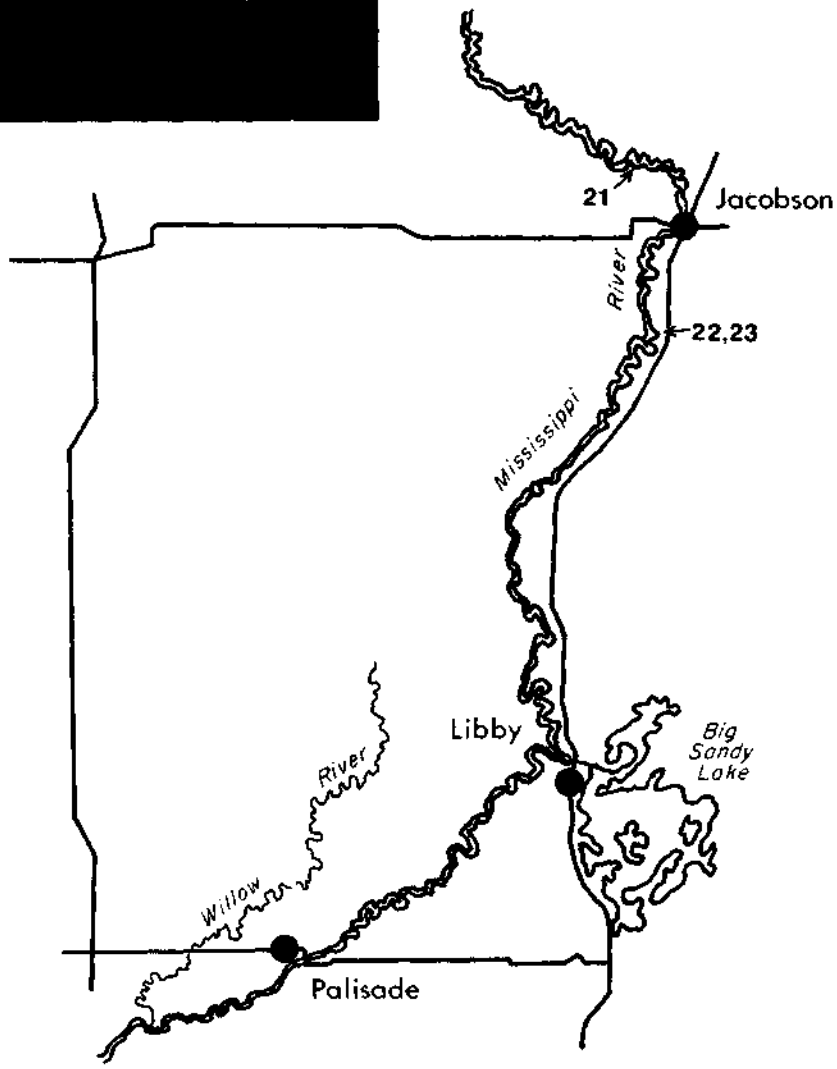
19. Remnants from steamboat landings may be sighted along the reach from Grand Rapids to Aitkin.

20. Reminders of earlier times may occasionally be found along the river.

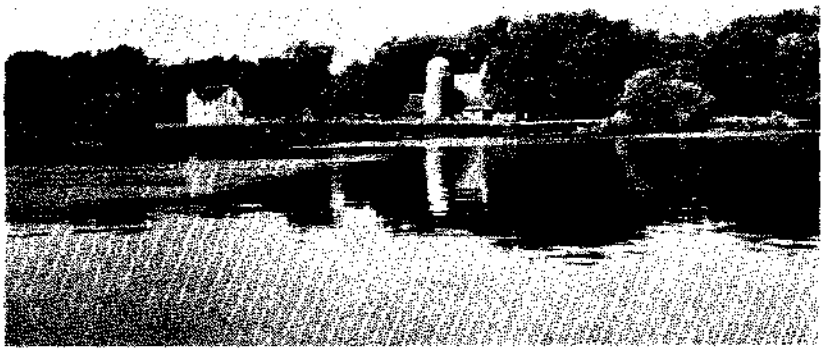




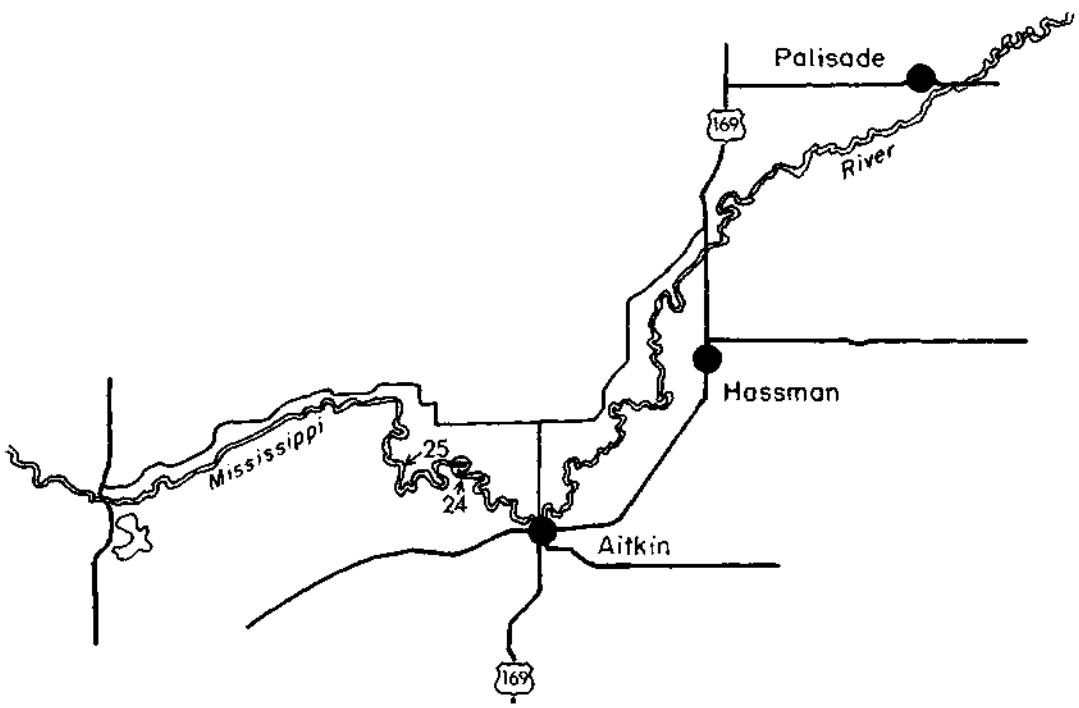
21. A preponderance of oxbow lakes occur north of Jacobson.

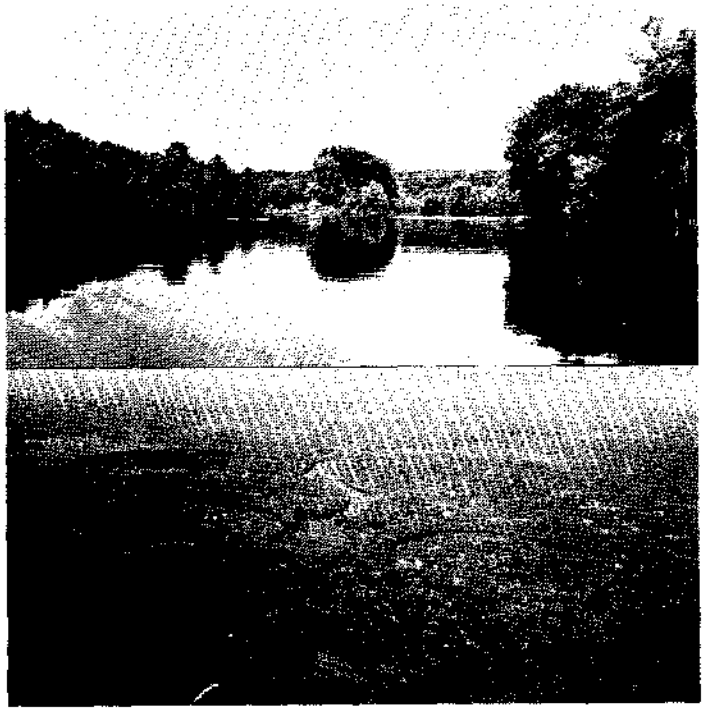


22.,23. These oxbow islands harbor exquisite examples of native vegetation.

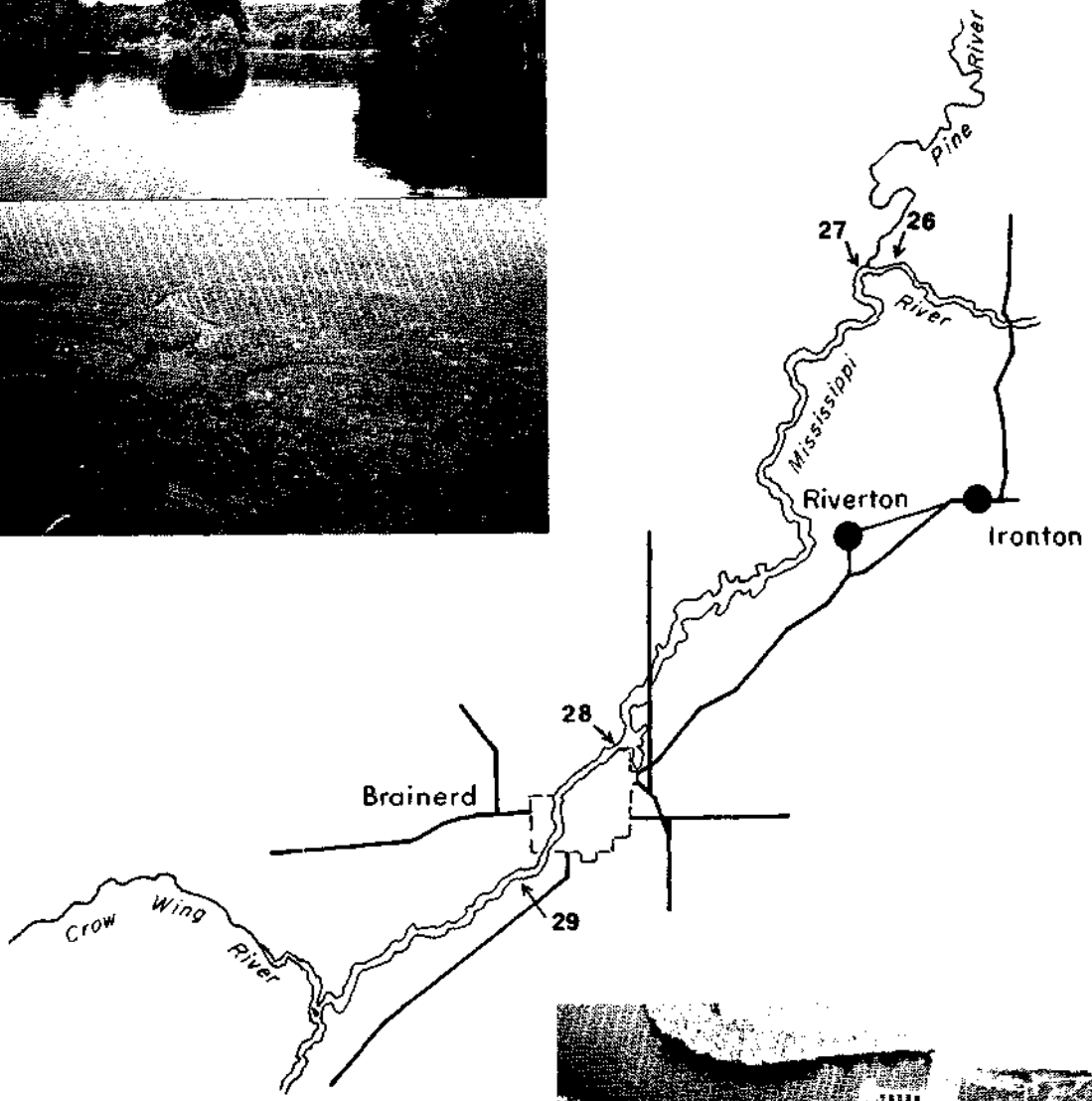


24.,25. In the vicinity of Aitkin, below the flood diversion channel, the shorefront is dominated by seasonal housing development and agricultural activity.



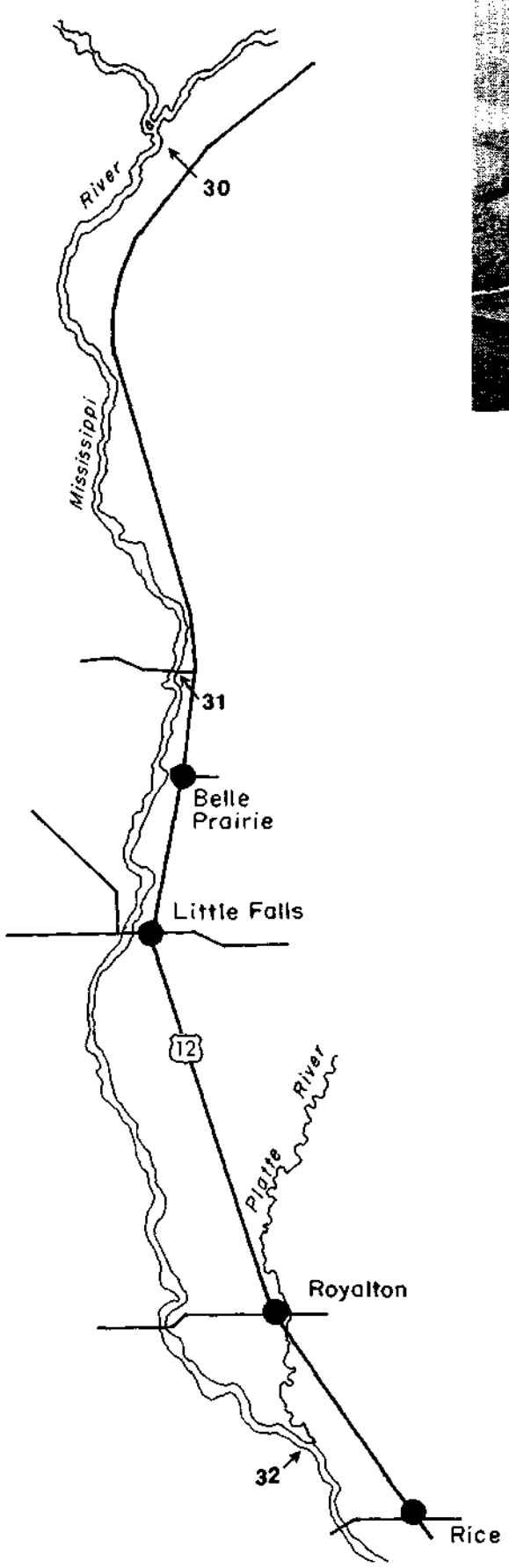


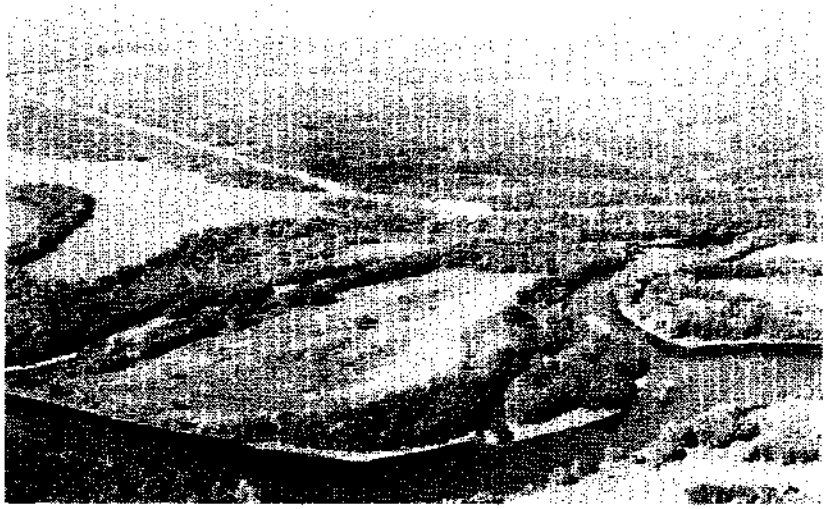
26.,27. A scenic highlight downstream from the outlet of the flood diversion channel is the confluence of the Pine River.



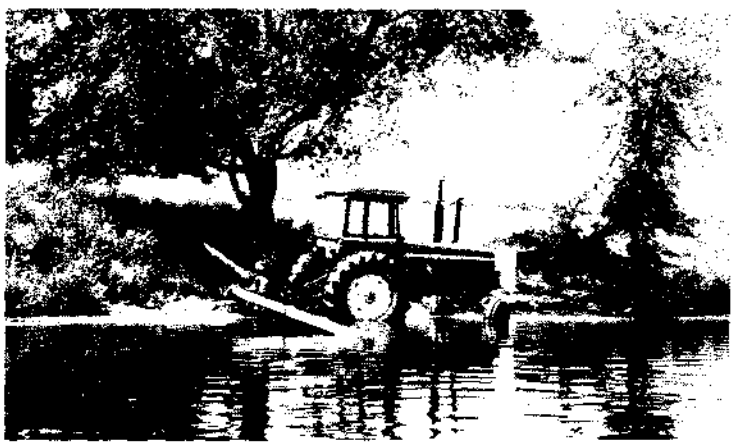
28. A major impoundment is created by the hydropower dam of the Potlatch Corporation.

29. Scenic quality and the free-flowing condition return below Brainerd.



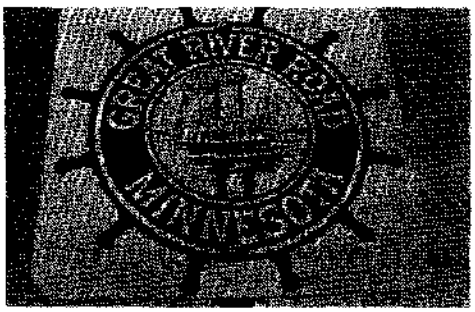


30. The confluence of the Crow Wing River is of scenic, historic, and hydrologic significance.

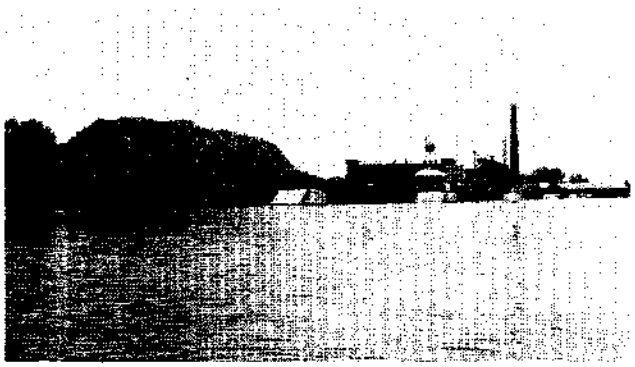


31. Water is frequently drawn from the River for irrigation.

32. A focal point for camping occurs at the confluence of the Platte River.

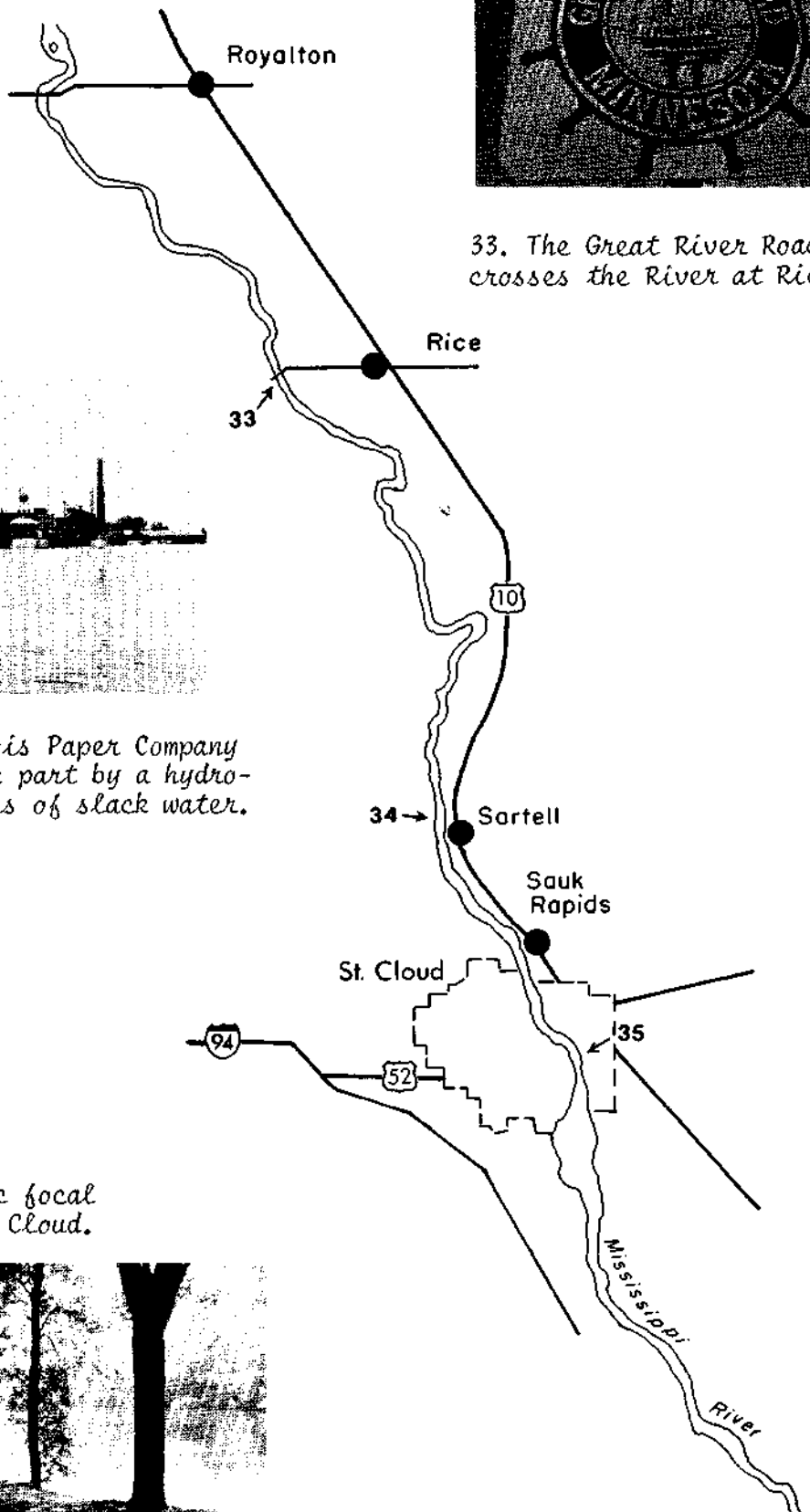


33. The Great River Road route crosses the River at Rice.

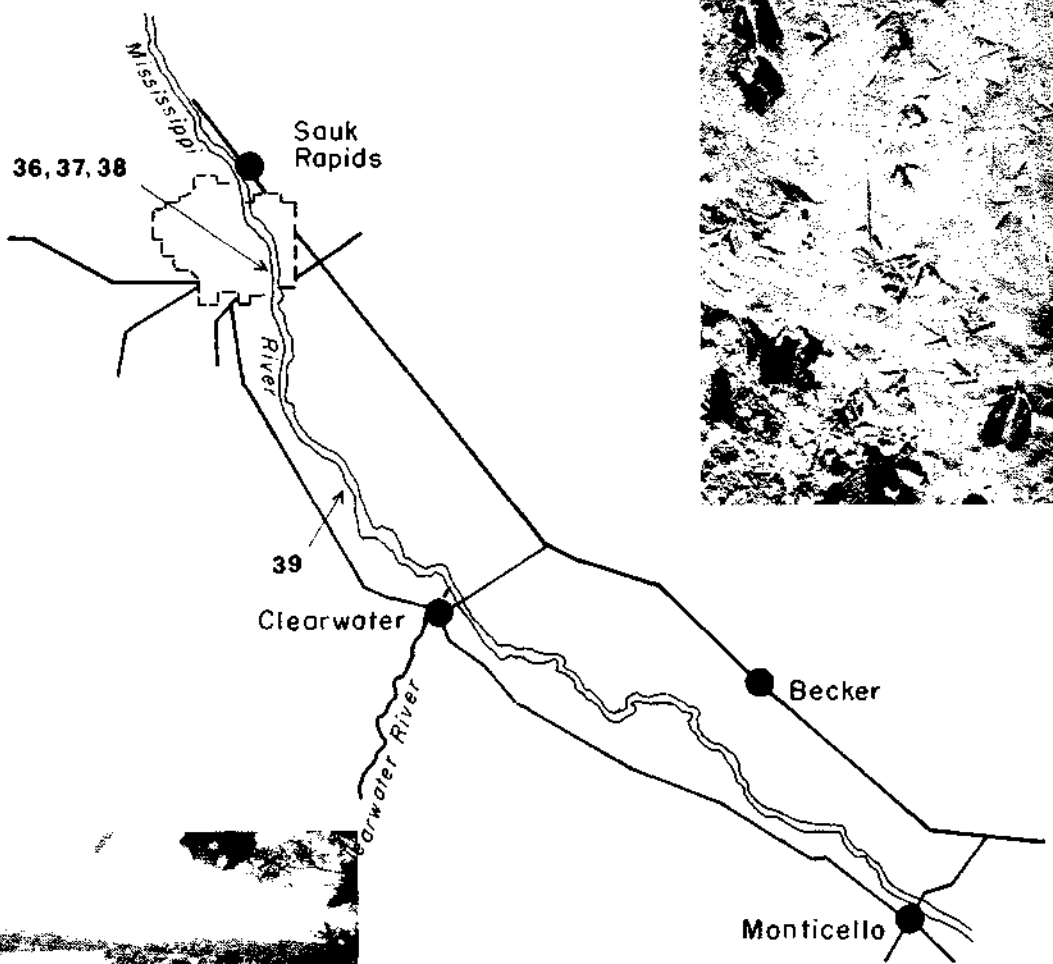


34. Power for the St. Regis Paper Company at Sartell is supplied in part by a hydro-dam creating several miles of slack water.

35. The River is a scenic focal point in the City of St. Cloud.

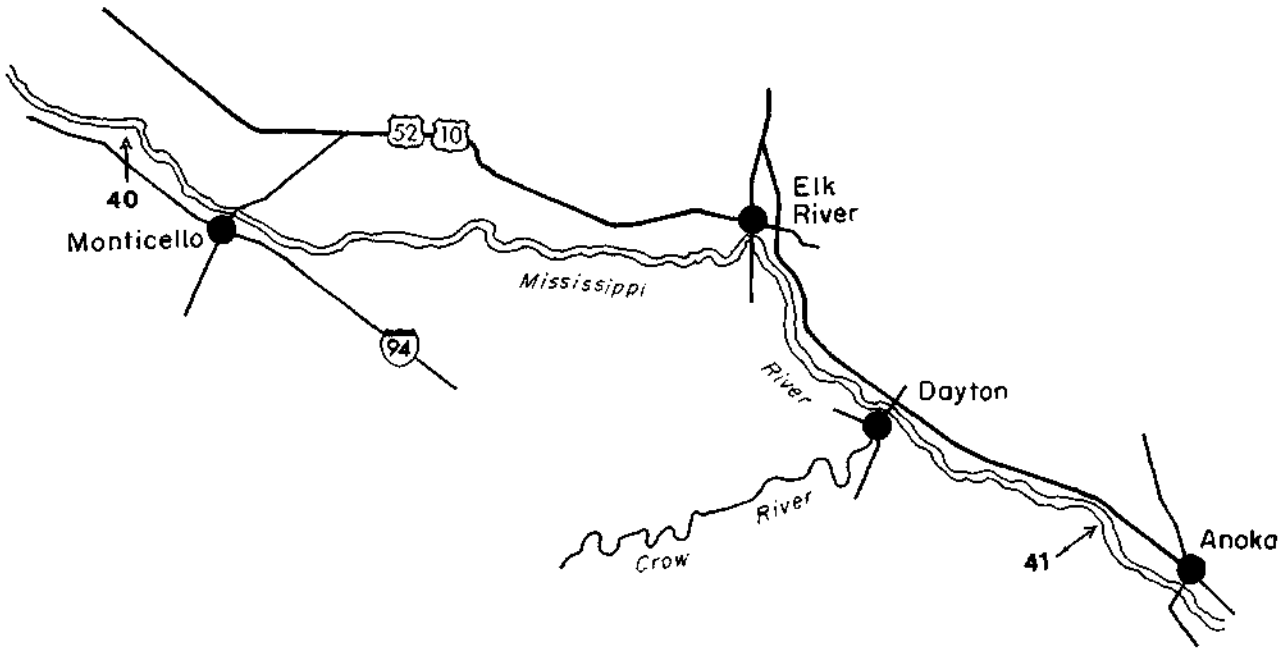


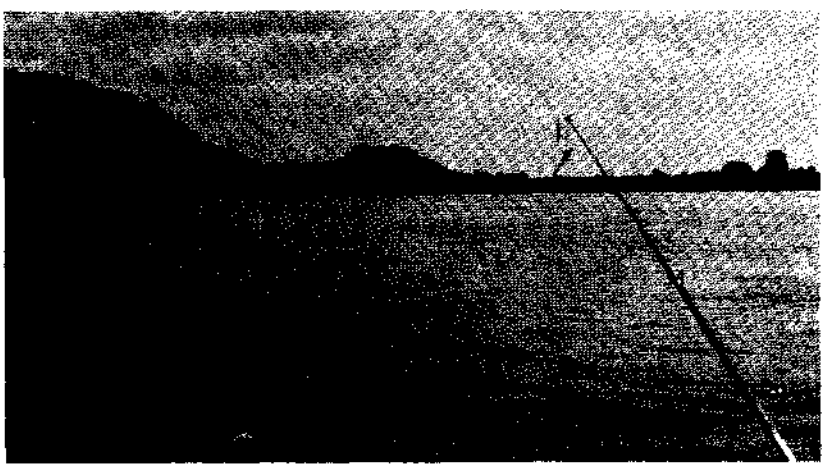
36.,37.,38. *The Beaver Islands south of St. Cloud harbor prime bird habitat, logs carrying company brands from bygone log-driving days, and evidence of wildlife activity.*



39. *Bluffs south of St. Cloud provide topographic relief to the scenic landscape.*

40. The Monticello Nuclear Power Plant is a major intrusion on this reach.





41. Throughout most of this lower reach, the natural integrity of the corridor is maintained.

III. FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Findings

Important study findings include the following:

Prehistory

A voyage down the Upper Mississippi River from its source at Lake Itasca to Anoka takes one through nearly every stage of Minnesota prehistory: the Big Game, Eastern Archaic, Woodland, and Mississippian cultural traditions. Once a vehicle of water transportation was developed by the aboriginal population, the Mississippi became a primary travel route. Some 50 archaeological sites can be found along the banks. Unfortunately, only a few of these sites have been officially excavated.

History

The Mississippi River is one of the most commonly known geographic features of the world. This river, first called the "Father of Waters" centuries ago, has played a prominent role in shaping our country's history. A pageant of history has occurred along the Mississippi, with its first carrying the canoes of Indians and fur trappers; next, rafts and boats of the early homesteaders; logs during the booming logging era; then, paddle-wheeled steamboats exchanging products of towns and cities enroute; and today, completing the circle by again carrying canoes but this time for fishermen and pleasure floaters. The natural beauty of this river is substantial, but its great national heritage is perhaps the most compelling rationale for its inclusion into the National Wild and Scenic Rivers System.

Vegetation

Dramatic examples of plant succession may be observed while floating the upper reaches as the riverscape fluctuates among upland and lowland coniferous and deciduous forest types and dense stands of emergent aquatics; areas of wet meadows; and, less commonly, sphagnum or floating bogs. Below Brainerd the vegetation becomes predominantly deciduous upland or lowland forest.

The prairie bush-clover (Lespedeza leptostachya) is a small plant which has been proposed for endangered status pursuant to the Endangered Species Act of 1973. It is found in Crow Wing County and may occur within the limits of the study area. Its specific location in the county is not known.

Fishery

The Upper Mississippi is a quality fishery resource which is generally underutilized, but present trends indicate an accelerating rate of use.

In the headwaters marshes, it is a warm water fishery producing northern pike as the predominant game fish. Below Grand Rapids walleye and northern pike are the primary species sought by anglers. The river below St. Cloud provides excellent fishing for smallmouth bass and walleye.

Wildlife

The present variety of vegetative patterns along the Upper Mississippi are reflected in the wide variety of wildlife occurring in the area. Animal species generally associated with the coniferous forest portion of the Upper Mississippi include the timber wolf, moose, black bear, bobcat, fisher, red squirrel, varying hare, spruce grouse, great gray owl, common raven, and numerous species of breeding wood warblers. Wolf and moose are uncommon along the river. The deciduous forest portion of the river corridor supports gray squirrel, fox squirrel, raccoon, cottontail rabbit, woodchuck, and badger in addition to the normal mix of avian species associated with the eastern deciduous woods.

The northern bald eagle is found in significant numbers in and around Cass Lake and Lake Winnibigoshish with one known nest as far south as the confluence of the Pine River.

Flow Characteristics

Because of the proliferation of natural lakes and impoundments associated with the headwaters watershed, the Upper Mississippi has a relatively constant flow. Low flow conditions deter recreational use of the river mainly in the first 30 miles of the headwaters reach and for 20 miles downstream from Lake Winnibigoshish. The worst flooding occurs in the vicinity of Aitkin.

Water Use

There are no plans for any commercial use of the river above Anoka, nor is there authority to permit such use. Therefore, river navigation above Anoka is recreation oriented.

The limiting factor for the minimum river flow below Anoka is not the amount required for navigation, but the amount needed to assure municipal water supplies for the Twin Cities area. The minimum low flow needed below Anoka for the river during a seven-day, 10-year low flow period is 1,900 cfs. The only flow necessary for navigation is approximately 300 cubic feet per second (cfs) to replace water lost during lockages. The Northern States Power Company electric plant located at St. Anthony Falls in Minneapolis operates on a stream flow basis and is not considered a priority use.

Water Quality

All segments of the Upper Mississippi which otherwise qualify for inclusion in the National System will by 1980 meet minimum water quality standards of the Wild and Scenic Rivers Act. A total of 141 municipalities and 96 industries are known to be discharging to surface waters in the Upper Mississippi River basin above the Twin Cities. There are 11 major discharges along the mainstem within the study reach. Presently, eight monitoring stations in the river indicate there is a basin-wide problem of fecal coliforms while occasional violations of the pH and dissolved oxygen standards occur.

Runoff from nonpoint sources is the major hinderance to the consistent maintenance of water quality standards. Periodic low flows further aggravate the situation. Although the nonpoint source problem has not been quantified, the potential for pollution is significant, particularly from farm fields and feedlots, and in localized areas, from mining operations. Two tributaries, the Prairie River and the Crow River, are felt to carry the heaviest sediment loads due to mining and agriculture, respectively.

Land Use

The corridor above the Camp Ripley Military Reservation is predominantly utilized for forest production and below for agriculture. Most urban and industrial activity occurs on reaches which do not qualify for inclusion in the National System. Notable exceptions include Elk River, Monticello, Clearwater, Palisades, and Jacobson. Conversion of land use from agriculture or forest production to housing is occurring most rapidly in the lower 70 miles of river and above Brainerd and below Bemidji.

Landownership

Landownership along the river corridor consists mainly of private holdings, corporate and individual, although certain of the defined segments contain considerable public ownership. Corporate ownership tends to be concentrated in the lower 150 and upper 50 miles of river with the heaviest concentration occurring from Anoka to Brainerd. Housing development plots are frequent along the lower 200 miles. Public ownership is most prominent along the corridor above Brainerd, particularly within the Chippewa National Forest and Mississippi Headwaters State Forest.

Socio-Economic

In 1970 approximately 4,100,000 people lived within a 100-mile radius of the center of the study reach and approximately 7,800,000 people lived within a 250-mile radius. The socio-economic profile of the 14 counties

associated with the river corridor varies dramatically from the highly urbanized, fast growing counties near the Twin Cities to the sparcely populated counties with resource oriented economies in the headwaters area. The 1960 and 1970 population growth rate among the 14 counties ranged from an increase of 114 percent in Anoka County to a decrease of 6.5 percent in Itasca County. The number of Indians per county ranged from 11.4 percent in Beltrami County to .01 percent in Wright County. The median family income ranged from $11,800 per year for Hennepin County to $5,600 per year for Clearwater County. Therefore, the social and economic impact of placing the river in the National System will vary greatly from Lake Itasca to Anoka.

Recreation

Recreation areas and facilities located along the river are quite diverse and well distributed. A canoeing route complete with access sites and float camps has been established in the headwaters reach. There are five State parks along the river corridor.

Recreational use of the river is light. Primary recreation activity presently occurring includes floating the headwaters reach, ricing, and waterfowl hunting in the wetlands and bass fishing below St. Cloud.

Access

Overall, access to the river in the study area is quite good considering its length but many sites need to be upgraded. There are only three stretches in the study area which exceed more than 10 miles in length without some type of accessibility. The access points seem to be fairly well distributed as to ownership and/or administration including State, county, municipal, private facilities as well as bridge crossings. In total, there are 68 maintained access points and 53 bridge crossings from Lake Itasca to Anoka. A good system of major and minor connector highways link these access points.

Conclusions

Classification--From field reconnaissance of the 466 river miles in the study segment from Lake Itasca to the city limits of Anoka, it is concluded that 353.3 miles or 76 percent of the Upper Mississippi River possess outstandingly remarkable scenic, fish, wildlife, and historic values, and that these segments of river and their immediate environments should be protected for the benefit of future generations. In accordance with the criteria for river classification as defined in the Wild and Scenic Rivers Act and in the supplementary criteria developed by the Secretaries of the Interior and Agriculture, 41.2 river miles qualify as wild, 207.7 river

miles qualify as scenic, and 104.4 river miles qualify as recreational. The remaining 112.7 miles of river do not qualify due to impoundment or the degree of shorefront development. Specific qualifying segments shown in Figure 1 are defined as follows:

Segment 1 Recreational 41.1 Channel Miles	From the northwestern corporate boundary of Anoka upstream to the confluence of the Clearwater River.
Segment 2 Scenic 11.9 Channel Miles	From the confluence of the Clearwater River upstream to and including the Beaver Islands at St. Cloud.
Segment 3 Recreational 13.8 Channel Miles	From one mile downstream from the southern village boundary of Rice upstream to Blanchard Dam.
Segment 4 Scenic 30.1 Channel Miles	From Roscoe Island upstream to the 25-acre island just south of Brainerd.
Segment 5 Scenic 26.9 Channel Miles	From Riverton upstream to the discharge of the flood diversion channel.
Segment 6 Recreational 27.7 Channel Miles	From the dam at the entrance of the flood diversion channel upstream to the boundary between Logan and Workman Townships.
Segment 7 Scenic 86.7 Channel Miles	From the boundary of Logan and Workman Townships upstream to the confluence of the Prairie River.
Segment 8 Scenic 41.8 Channel Miles	From Blackwater Lake upstream to Lake Winnibigoshish.
Segment 9 Scenic 10.3 Channel Miles	From Lake Winnibigoshish upstream to Cass Lake.
Segment 10 Recreational 10.0 Channel Miles	From Allen's Bay upstream to Otter Tail Powerplant.
Segment 11 Recreational 11.8 Channel Miles	From Lake Bemidji upstream to the iron bridge of County Road 7.
Segment 12 Wild 41.2 Channel Miles	From the iron bridge of County Road 7 upstream to the outlet of Lake Itasca.

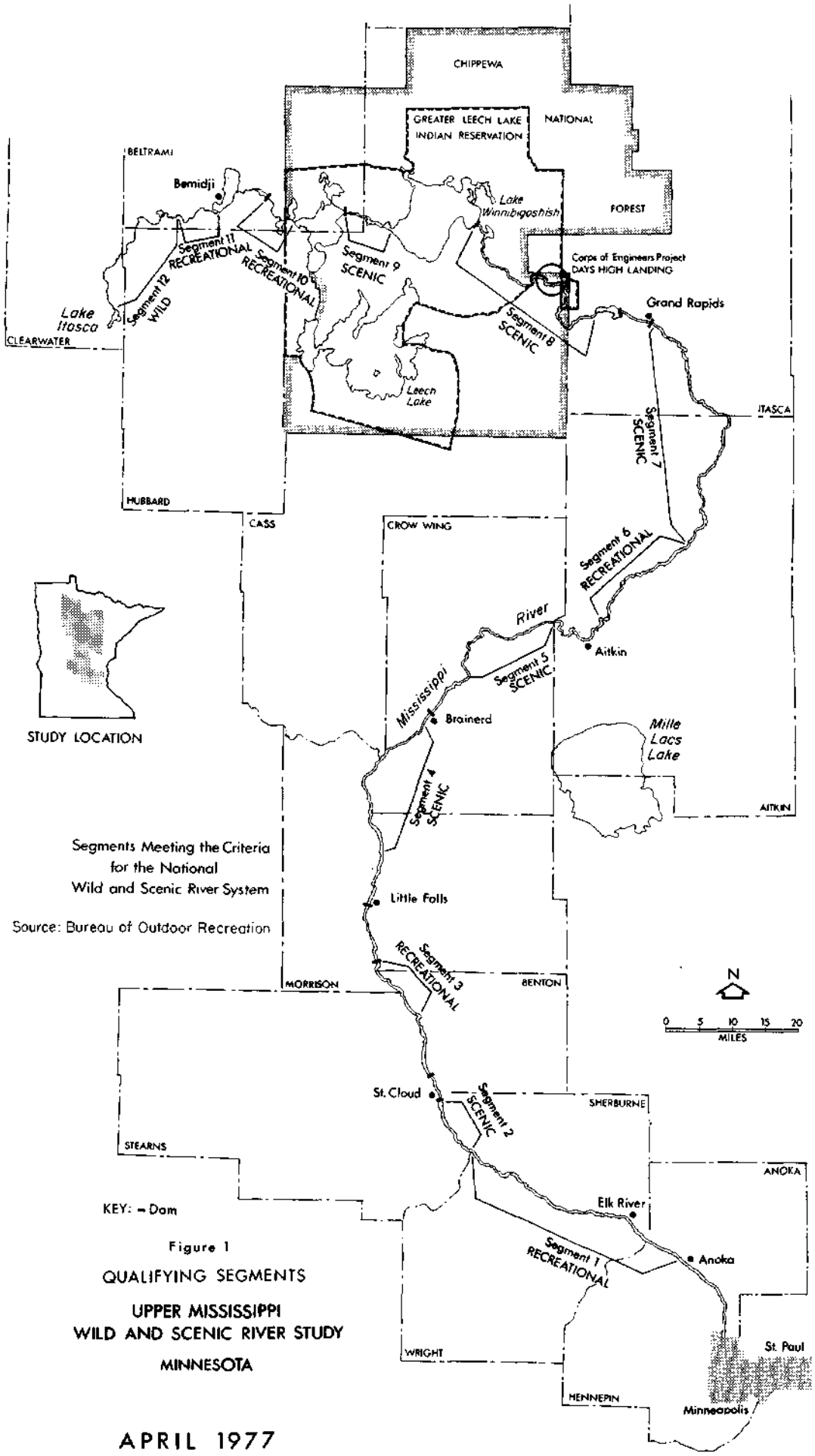


Figure 1

QUALIFYING SEGMENTS

UPPER MISSISSIPPI WILD AND SCENIC RIVER STUDY

MINNESOTA

APRIL 1977

Segments of the river which do not qualify for inclusion include the following:

Mile	Primary Reason for Exclusion
53 to 69.2	Impoundments from St. Cloud and Sartell Dams.
83 to 96	Impoundments from Blanchard and Little Falls Dams and shorefront development.
126.1 to 139.6	Impoundment from Brainerd Dam
166.5 to 190.3	Shorefront development
304.7 to 317	Impoundment from Grand Rapids Dam
358.8 to 375	Lake Winnibigoshish
385.3 to 393	Cass Lake
403 to 413	Impoundment from Ottertail Dam and Lake Bemidji.

Public Involvement

As a basic premise held throughout the study, public involvement in the planning process was considered to be essential. Opinions and ideas expressed by people, both within and outside the Upper Mississippi River basin, were solicited in an attempt to understand all relevant points of view. While it is important to protect and preserve the Nation's outstanding scenic and recreational resources, it is not without people in mind that such protection can be warranted. Therefore, the ideas, concerns, private interests, and philosophies of people, especially those with direct concern, are necessary ingredients to making responsible recommendations with which any study should culminate.

In addition to meeting with representatives of the appropriate Regional Planning Commissions representing local government views and other groups and individuals during conduct of the study, five public information meetings were held to solicit the views of concerned and interested people regarding the following: Placing the river in the National System, alternative means of protection, and administrative options. The meetings were held during the week of December 8, 1975, in Bemidji, Grand Rapids, Brainerd, St. Cloud, and St. Paul. Although the meetings were well covered by the local media and 1,500 brochures reporting study progress were distributed, the total attendance was only 235 persons or an average of less than 50 people per meeting.

Response forms recording opinion on planning alternatives were filled out by one-half of the attendees and their tally showed the following: Seventy percent preferred that some or all of the river should be placed in the National System, 49 percent indicated that the river corridor should be protected via fee title and scenic easements, and 46 percent preferred a combination of Federal and State administration.

The principal issues raised by people owning land along the rivers and other concerned basin residents were:

1. Disruption of agricultural practices and, subsequently, their livelihood as a result of removing crop or pasture lands from production.

2. Adequacy of compensation for scenic easements to be acquired.

3. Removal of land from county tax rolls resulting in increased property taxes.

4. Encroachment on private rights.

5. Deterioration of river resources and scenic values due to excessive public recreation use.

6. Adequacy of law enforcement capabilities to control such things as littering, vandalism, and trespass.

7. Loss of planning or decision-making authority by local government and landowner associations.

The assessment of planning alternatives presented in Chapter VII addresses the concerns raised during the public meetings.

The five meetings revealed a concensus of opinion that the natural environments of the Upper Mississippi should be preserved. Our conclusion from the experience of the public meetings and other sources of public input is that not much opposition exists concerning the concept of including segments of the Upper Mississippi in the National System.

Recommendations

In order to preserve the free-flowing portions of the Upper Mississippi River from Lake Itasca to St. Cloud, to protect and enhance the outstanding natural, scenic, fish, wildlife, and historic values of the river environment, and to assure these values are available for present and future generations, it is recommended that legislation be enacted which:

1. Amends Section 3(a) of P.L. 90-542 to include in the National System all qualifying segments of the Upper Mississippi River from Lake Itasca to St. Cloud, Minnesota, a total of 300.5 channel miles. Appropriate qualifying segments are shown as Segments 3 through 12 in Figure 1. These segments would be wild, scenic, or recreational components of the National System in accordance with criteria set forth in Section 2(b)(2) of the Wild and Scenic Rivers Act.

2. Directs the Secretary of the Interior, in cooperation with the Secretary of Agriculture and the State of Minnesota, to administer the Federal river component and establish project boundaries in accordance with guidelines contained in the Secretary of the Interior's report.

3. Requires completion of a management plan within two years from date of enactment.

4. Recognizes that the 53 river miles between St. Cloud and Anoka are designated as a State scenic and recreational river area and meet the criteria for inclusion in the National System of which 11.9 channel miles qualify as scenic, and 41.1 miles qualify as recreational; and provides that these segments, shown as Segments 1 and 2 in Figure 1, be included in the National System upon request by the Governor of Minnesota.

It is further recommended that:

1. The development and management of the proposed National Wild, Scenic and Recreational River areas give primary emphasis to maintaining and enhancing the historic, aesthetic, scenic, fish and wildlife, and geologic features. All recreation facility development should be consistent with all the protection of those values of the river's environment which enable them to qualify for inclusion in the National System.

2. The delineation of the corridor be determined by the managing agency in terms of a zone of influence on the natural scene as perceived from the river itself. The senses of sight, smell, and sound all directly relate to the zone of influence. The line-of-sight is a primary factor which is determined by topography and land use or vegetative cover. Sounds emitting from engines and machinery such as trucks, automobiles, and irrigation pumps are important influences. Offensive odors from land fill, agricultural activity, or poor water quality are important influences as well. These considerations should be factored into the definition of the zone of influence.

3. Backwater areas such as oxbows and wetlands be included to the extent possible in the corridor protection scheme. Zones of protection should include islands formed by oxbows and the forest fringe bordering wetlands visible from the main channel.

4. All islands occurring in the main channel be protected to the extent possible. A survey of these islands should be conducted to determine their recreation and wildlife potential. The Bureau of Land Management should transfer title of islands under its stewardship that are located in the State designated area to the State.

5. A detailed inventory of all archaeological, historical, and other special interest areas along the river corridors be made and a program developed for their protection. The development of interpretive stations by all levels of government and the private sector should be encouraged and coordinated through the State Historic Preservation Officer. Two key vantage points for interpretation of the river's cultural heritage are from the Great River Road and from the water itself.

6. A portage system be maintained at each dam from Lake Itasca to Anoka. The administering agency should coordinate Federal, State, local, and private sector efforts to develop appropriate facilities.

7. Appropriate State and Federal agencies take the necessary actions to ensure good water quality throughout the Upper Mississippi River basin by enforcement of water quality standards and the encouragement of compatible soil and water conservation practices. Corrections of point source permit violations of the Natural Pollutant Discharge Elimination System along the mainstem of the river should receive high funding priority. Regulations of the State Shoreland Management Act be strictly enforced. A program for monitoring chemical, biological, and physical water quality characteristics should be established throughout the basin.

8. Regulation of water flow from impoundments in the Upper Mississippi basin be coordinated by the Corps of Engineers (COE) to ensure adequate flow for recreation activity during low flow periods. Minimum low flow requirements to sustain a quality recreation experience should be determined by the administering agency. An ongoing study of management of the headwaters reservoirs by the COE will provide important insight into this issue.

9. The administering agency determine the visitor capacity of each segment in the National System and establish a method of visitor control before visitor capacity is reached and implement such controls when necessary. Visitor capacity should relate to maintaining a determined quality of recreator experience and the corridor environment and minimizing the impact on affected private landowners.

10. A variety of recreational opportunity be maintained to the extent practical. Particular activities presently occurring in the corridor which should continue include canoeing, hunting, fishing, nature study, ricing, and camping.

11. Fee title acquisition of lands within the river corridor be kept to a minimum and scenic easements, zoning, and use agreements be applied whenever practical in order to minimize impacts on the local people and economy. Acquisition via fee title or scenic easement should be utilized primarily to provide necessary public access and recreation facilities and to preserve key natural areas. The State has no power of condemnation in their Wild and Scenic Rivers Statute (Minnesota Session Laws 1973, Chapter 271) nor does the Federal government if more than 50 percent of the corridor is already in public ownership. According to the land ownership analysis displayed in Chapter IV, most of the segments recommended for Federal administration are largely in private ownership.

12. Under authority of the Minnesota Shoreland Management Act (Minnesota Statute 105. 485), the segments of the river classified as wild and scenic to be included in the National System be designated as "natural environment" streams and the corresponding zoning regulations be strictly enforced.

13. The Commissioner of Natural Resources of the State of Minnesota withhold from sale all tax forfeit property within segments of river corridor recommended for inclusion in the National System.

14. Local units of government along the river adopt land use policies and zoning standards which are consistent with the purposes of the Wild and Scenic Rivers Act. Zoning objectives should be to prohibit new commercial, industrial, or residential uses which are inconsistent with the purposes of the Act and to protect the shorelands by means of acreage, frontage, and setback requirements. In addition, governmental units throughout the watershed should give consideration to adopting general zoning and subdivision regulations which would promote orderly growth and ensure that future developments do not degrade the overall quality of the basin environment.

15. The Mississippi River Parkway Commission of Minnesota recommend that a portion of any Federal funds made available to the State of Minnesota for expenditure on the Great River Road be accepted by the Commissioner of Highways, for purposes of land acquisition related to preservation of scenic areas adjacent to the river and the Great River Road and for purposes of development of cultural interpretive stations along the Great River Road.

16. Care be taken to limit the impact of locating utility corridors within the zone of influence of segments in the National System. Existing utility crossings should be used as much as possible and routes paralleling the river should be avoided so as to have the least disruptive impact on the natural character of the landscape.

17. All new bridges constructed across segments of the river in the National System be designed to maximize recreation benefits and minimize adverse environmental impacts. Special considerations include the view

of the water from the bridge, how well the bridge blends into the natural setting as observed from the water, access to the water from the roadway and provision for nonmotorized travel on the bridge. The relevance of these and other considerations should be determined in conjunction with the agency managing the affected river segment.

18. Water appropriation permits issued by the Minnesota Department of Natural Resources include requirements for screening the view of the pump from the water and limiting the number of decibels emitting from the pump engine.

IV. REGIONAL SETTING

Pre-history and Archaeological Significance

The first Minnesotans were hardy Indian hunters who moved into the region as plants and animals spread over the land after the glaciers retreated. The earliest date of their migration is not known, but descendants of earlier migrants from Asia--who entered the New World via the Bering Strait region--gradually made their way to Minnesota from the west and south after 8000 B.C. At that time, large mammals such as the woolly mammoth and the giant bison were still present to be hunted for food and clothing.

The Minnesota prehistoric archaeological sequence is complex, partly because the culture of these early people changed and overlapped through the years. Local prehistoric cultures varied significantly both in their adaptions to environmental conditions or events and in response to new ideas which originated as far away as Mexico, the southeastern United States, and the Ohio and Missouri river valleys.

The Minnesota record also shows cultural variations which reflect the great differences in environment in various parts of the State. The Upper Mississippi River corridor, running 466 miles, is an excellent example illustrating the various cultural variations associated with the array of ecosystems. In the north, for example, there were coniferous forests, while farther south and west deciduous forests and grasslands predominated. The rocky Canadian Shield shaped the land in the north, while the central part of the State was dotted with lakes and the south had rolling moraines left by the glaciers. The drainage pattern of the Upper Mississippi was significant to prehistoric man.

Four major cultural traditions existed in prehistoric Minnesota: the Big Game or Baleo-Indian, the Eastern Archaic, the Woodland, and the Mississippian. These cultural traditions were distributed over an area much longer than Minnesota, for the modern boundaries of the State have no relevance to prehistory. However, a voyage down the Upper Mississippi River from its source at Lake Itasca to Anoka would take one through nearly every stage of Minnesota prehistory. The combination of geological and ecological settings influenced the location of these areas of prehistoric activity along the river corridor.

Once a vehicle of water transportation was developed by the aboriginal population, the Mississippi River became a primary travel route. Due to this riverine highway and the food sources afforded by the river and its surrounds, there are a number of archaeological sites associated directly with the Upper Mississippi. Some 50 archaeological sites or three

1/ This section extracted from The Prehistoric Peoples of Minnesota, Elden Johnson, 1969 and material provided by Jim Priesnitz.

percent of the total number of recorded prehistoric sites in the State of Minnesota can be found along the banks of the Upper Mississippi River. Unfortunately, only a few of these sites have been excavated. Due to the fact that little archaeological work has been done along the Mississippi River since the work of Brower and Lewis in the late 19th and early 20th century, many sites which were in good condition at the time have now been disturbed or destroyed.

42. Early travelers.

The Mississippi River valley had been occupied continuously for a long period of time prior to the first European explorations. The first occupation of the area probably came during the earliest cultural period in Minnesota prehistory called the Big Game or Paleo-Indian period, which dates before 5000 B. C. Unfortunately, because no actual dwelling sites of these people have yet been found in the Upper Great Lakes area, this period of occupation, thus far, is only known from surface finds in the area. However, from sites excavated elsewhere, it can be ascertained that these earliest inhabitants were nomadic hunters living in small social groups and subsisted on large game such as mammoth and great bison. They knew the use of fire, and they lived in shelters which were temporary rather than permanent.

The next oldest prehistoric period is called the Eastern Archiac tradition which dates roughly between 5000 B.C. - 1000 B.C. and differs from the previous tradition in both its tools and foods. This is the beginning of regional cultural variations, reflecting a great exploitation of local environments in the use of different raw materials for food and tools. Also during this time, the technological innovation of ground stone tools was developed in addition to chipped stone implements. Also, a new class of tools, those used in woodworking such as axes and gouges, made their appearance. Tools of copper were also fashioned. Hunting of both large and small game animals formed one of the major pursuits of the Eastern Archaic peoples, who still followed a semi-nomadic way of life, shifting their small camps seasonally to utilize different food resources in various localities.

The Archaic period is well represented in two sites along the course of the Upper Mississippi River. The Itasca bison site, on Nicollet Creek near its inlet to Lake Itasca, is a bison kill site. This is a place where hunters ambushed bison as they forded the stream sometime between 700 B. C. - 5000 B. C. This site was used at a time when temperatures were warmer than at present, and the prairie grasses of the west had invaded what is now a pine forest. The meat diet of these people was supplemented by a variety of nuts, berries, tubers, and greens. Another interesting feature unearthed during the excavation of this important site was the skeleton of a dog. This is the earliest evidence of the presence of this animal yet known in Minnesota.

43. White Oak Point as it appears today.

The second Archaic site is White Oak Point, located on the Mississippi near Deer River. This site is significant in that it is a multicomponent site, meaning it was inhabited some 3,500 years ago and was occupied on and off by different groups until white contact and the establishment of a fur trading post on the same site. White Oak Point acts as a transition between the Archaic period and the next prehistoric classification, for after 1000 B. C. we entered a period called the Woodland tradition.

The Woodland tradition is marked by the addition of two important cultural features: (1) the making of pottery and (2) burials in earthen mounds. The vast majority, some 96 percent of the sites along the Mississippi River belong to this cultural tradition which began 3,000 years ago and existed along the Mississippi in the area of discussion until historic times.

A significant number of the archaeological sites along the Mississippi fall into the category of burial mounds. This is commonly due to the fact that these artificial alterations of the natural terrain are usually readily identifiable with the most casual observation and without having to turn over a shovel full of dirt. Over 98 percent of the burial mounds in Minnesota are located within one mile of a large stream or lake, and one can conclude that the major location factor that determines the distribution of burial mounds in Minnesota is the accessibility of a navigable waterway.

Burial mounds during this period, however, yield little information as to the specific cultural associations or pursuits of their builders since there are seldom any grave goods associated with the deceased. Village sites and campsites are much more conducive to interpretation. From the excavation of these sites, it has been found that by 800 A. D. wild rice was being exploited as a major food source. As a result, population increased rapidly and seasonal movements were replaced by permanent villages. This diet of wild rice was supplemented with meat obtained from bison, moose, deer, raccoon, rabbit, beaver, and muskrat.

After 1000 A. D. the final period of prehistory had begun to affect the Minnesota Woodland peoples. This final tradition is called the Mississippian Period. During this time, innovations from the high cultural centers of the Illinois and Ohio River valleys made their way to Minnesota via the Mississippi and Missouri River valleys.

Once this tradition had reached the confluence of the Minnesota and Mississippi Rivers, it took the course west along the Minnesota to the prairie rather than continuing north. This was due mainly to the fact that this tradition relied on intensive corn, beans, and squash agriculture which was not conducive to the north since these areas lie above the zone where the number of frost-free days would permit the growing and dependence on the slowly maturing maize crop. In the northern areas, this tradition is seen in a modified form which continues the use of wild rice but is open to the influx of new cultural traits such as changes in pottery style and lithic technology. A northern variety of the Mississippian tradition can be found at the Hill Point site in Itasca State Park.

By 1700 A. D. the prehistoric period ends and the Historic period is established. Explorers and traders who began to learn of the Upper Mississippi people in the 17th century recorded the presence of several different tribal groups in what is now Minnesota. The Dakota or Sioux dominated central Minnesota and the prairies to the west. In the north the French explorers met the Cree and the Assinoboin.

The Chippewa who today make up the most numerous Indian population in the State are not represented in Minnesota's prehistoric archaeological record. An eastern tribe, they moved into the region from both north and south of Lake Superior during the early historic period, eventually dominating the northern areas of the State and contributing their own history and culture along the Upper Mississippi River corridor.

History

Much of Minnesota's human history is the story of the development of its great natural resources. First the fur bearing animals attracted fur traders, then the fertile soil brought farmers from the eastern United States and Europe, then the thick forests of tall pines attracted lumberjacks, and miners

came to the vast deposits of rich iron ore. Now, Minnesota is one of the chief food producing States (wheat crops, flour mills, dairy products) and a leading producer of corn, flaxseed, hay, potatoes, soy beans, and sugarbeets. Its chief manufacturing is processing the goods from its farms; for example, it leads the nation in the making of butter and shares leadership in processing of milk and cheese.

The Mississippi River is one of the most commonly known geographic features of the world. This river, first called the "Father of Waters" centuries ago, has played a prominent role in shaping our country's history. A pageant of history has occurred along the Mississippi, with it first carrying the canoes of Indians and fur trappers; next, rafts and boats of the early homesteaders; logs during the booming logging era; then paddle-wheeled streamboats exchanging products of towns and cities enroute;[1/] and today completing the circle by again carrying canoes, but this time for fishermen and pleasure floaters. The natural beauty of this river is substantial, but its great national heritage is perhaps the most compelling rationale for its inclusion into the National Wild and Scenic Rivers System.

The Upper Mississippi was discovered and first explored by Frenchmen searching westward from their settlements along the St. Lawrence for furs, a water passage to the Far East, and Indian souls to save. Missionary Louis Hennepin in 1690 was the first to travel above St. Anthony's Falls. He was captured by the Sioux and subsequently freed, but during his stay he discovered the falls and wrote about it in his journals. Later in 1766, Jonathan Carver visited the falls and published an account which aroused considerable interest in the river's northern reaches. The first to investigate any lengthy stretch of the river north of the falls was Northwest Fur Company geographer David Thompson who, in 1798, traveled from Lake Bemidji to Sandy Lake.

The territory surrounding the Upper Mississippi River has been under the influence of many nationalities--French, English, and Spanish. The entire Mississippi basin was originally claimed by France. In 1763, as a result of the French and Indian War, the eastern side of the river fell to the British while the Spanish took the western bank. The United States gained the British possessions following the American Revolution and the land west of the river by purchase from France in 1803; Spain having retroceded her holdings three years before. British companies, however, continued to occupy their posts and Indians to follow their leadership well into the next century.

It was during the period of British trade dominance that Jonathan Carver, a New Englander approved by British officials, and Zebulon Pike, a young officer of the United States Army, made their famous journeys. In 1805, Pike was sent to explore the still largely unknown upper reaches of the

1/ Minnesotans and Their Mississippi River, Jean S. Replinger, 1974.

river and establish American authority. He failed to win the loyalty of the Indians, and the British still clung illegally to their fur trade activities, but he added greatly to knowledge of the Mississippi by ascending the stream as far as Cass Lake.

Pike was followed by General Lewis Cass in 1820 who reached the same lake that afterwards bore his name. Giacomo Beltrami also explored near the river's source in 1823. It remained for Henry Schoolcraft, a U. S. Indian agent, to discover the true source of the Mississippi at Lake Itasca in 1832, and it was not until 1836 that Joseph Nicollet provided for the first time scientific information and accurate mapping of the upper segment of the river.

The initial economic motive for the white man's penetration and acquisition of the Upper Mississippi wilderness was the fur trade. Especially valuable was the beaver, the pelts of which were fashioned into the stylish top hats of the period.

Far ranging independent French traders or "coureurs de bois" were no doubt active in the area soon after Hennepin's journey and continued their personal explorations at the same time the official explorers were recording their adventures for the outside world.

Fixed trading posts do not appear in the region, however, until near the end of the 18th Century. Between 1784 and 1855, the records show that at least 27 permanent posts existed on or near the Mississippi above Anoka. Before 1816, most belonged to the British Northwest Company. After that year, the United States assumed control of the trade and most came under management of John Jacob Astor's American Fur Company.

The earliest permanent fur post reported on the Upper Mississippi was at Pine River in 1784. The area at the mouth of the Crow Wing River saw fur trade activity as early as 1771 and fixed marketing establishments existed there from 1826 until the 1860's.

Another important fur post was at a site called Watab. The business existed from 1844 to 1855. Posts also operated at Gull Lake between 1823 to 1836, and one was reported at Cedar Lake in 1806. The American Fur Company operated an establishment east of Lake Winnibigoshish from 1823 to 1848. The farthest upriver posts were operated by the Northwest Company--one was located on the east side of Lake Bemidji in 1785 and the other at Cass Lake in 1784.

Posts were located near the mouth of the Sauk beginning in 1789 and in the 1850's and 60's the City of St. Cloud at this site continued as a major fur collection station. The water routes servicing these posts

led eventually northeast to the great fur emporium at Michilimackinac or southward to such major centers as Prairie du Chien. For many years the usual means of transportation were birchbark canoes, vessels well adapted to shallow water and portages. In later times, steamboats were utilized

44. Remnants of bygone days near Grand Rapids.

where navigation permitted. A considerable overland trade also developed beginning about 1820 with the Red River country to the west. One branch of the trail crossed the Mississippi at the mouth of the Crow Wing River and another at the Sauk River. From these points, the trail turned southward to Fort Snelling. The Red River trade was carried in wooden carts. The vehicle's ungreased wheels produced a squealing that announced their coming while still miles away.

The junction of land and water routes at the Crow Wing and Sauk Rivers was responsible for the heavy activity at these points. Business prospered until changing styles and depletion of furbearing animals brought the fur trade era on the Upper Mississippi to an end.

A few fur traders maintained scattered posts in the wilderness, with the families of their employees as more or less permanent residents. Some of the more populous posts were Crow Wing, Sauk Rapids, and Elk River. The only strictly agricultural life was in the Mississippi-St. Croix delta and in the nearby settlements stretching northward from St. Paul. As such, the lands at the head of the Mississippi remained a wilderness and little intermixing continued between white men and mixed bloods in the fur trade.

The white man's appropriation of Minnesota, as in other parts of North America, was eased by the trader's contacts with the Indians. The trader had forged bonds with the red man by intermarriage and had made him dependent on his guns, knives, and whiskey. Catholic and Protestant missionaries were also active among the upper river Indians from 1833 to the 1860's, but compared to the fur trader their influence was slight. At one time, the Sioux held substantially all of Minnesota. By the middle of the 18th Century, the Chippewa, supplied with firearms, began forcing the Sioux westward. The Sioux were defeated in a decisive

battle at the mouth of the Crow Wing in 1768. By the end of the American Revolution, the Chippewa occupied everything east of the Mississippi and to the west everything north of the Crow Wing River. Another notable tribal encounter took place on the Rum River in 1839. This time the Sioux were victorious. Animosity between the tribes did not cease until the Sioux were banished from Minnesota following their unsuccessful uprising in 1862. Minnesota territory was created in 1849, and Indian removal became one of the first priorities. By 1855 the Chippewa along the Upper Mississippi were, in accordance with a treaty "as honest as any," concentrated into seven small reservations clinging to the larger lakes, while the Sioux were removed to a strip along the Minnesota River. By 1867 the Chippewa along the Upper Mississippi had been concentrated into a single reservation surrounding Leech, Cass, and Winnibigoshish Lakes. This reservation, enlarged in 1873-74, is the one that exists today. The only hostile encounter of note between whites and Chippewas occurred on the new reservation at Leech Lake in 1898. This was the last recorded battle between Indians and U. S. troops in the United States.

In 1846 a large area between the Long Prairie and Mississippi Rivers south of the Crow Wing was reserved for the Winnebagos transplanted from Iowa. In 1855 the tribe was shifted again to an area south of the Minnesota River.

Fort Ripley was built in 1848 a few miles below Crow Wing on the west bank of the Mississippi to watch over the recently arrived Winnebagos and keep peace between the Sioux and Chippewas. As settlers began arriving in the 1850's, it also served to regulate white-Indian relations. Fort Ripley guarded the area during the Sioux uprising of 1862 but hostile war parties failed to reach the upper river. In 1877, the post was abandoned. By that year all Indians had been removed and the area was well settled. In 1930, a National Guard reservation was established around the site of Old Fort Ripley.

Transportation networks were laid out as settlers moved into the newly opened areas. The Army improved the old Red River route from the mouth of the Minnesota to the Crow Wing and by 1860 the Interior Department had extended the road northward to the Indian reservations at Leech and Red Lakes. Stagecoaches and riverboats were the usual means of transportation and continued in use until supplanted by railroads. Despite the difficulties of navigation on the upper river, steamboats operated as far north as Grand Rapids with some measure of regularity for as late as the 1920's.

The Town of Anoka was founded in 1853 and St. Cloud in the following year. In 1864, the railroad reached Anoka from the south and continued to St. Cloud in 1866. The Town of Brainerd came into existence in 1870 in anticipation of the Northern Pacific Railroad which was building from the east. The first train arrived in 1871. Crow Wing, which in the

1860's, became a thriving town of 600, was abandoned when the railroad bypassed it to the north. In 1877 the rail line at St. Cloud was extended northward to Brainerd. In that same year, Grand Rapids was settled.

Economic disadvantages brought about by railroad officials caused widespread farming problems in the 1860's. Farmers, particularly those of older settlements, left without benefit of direct railroad access, complained of excessive rates and agents grading the grain falsely. It was to adjust such farmer problems that Oliver Kelley, a Minnesota man, founded in Washington in 1867, the Patrons of Husbandry. Popularly called the Grange, the movement spread more rapidly in Minnesota than in any other part of the country, and by the close of 1869, 40 of its 49 Granges were located in this State. Through these Granges, the farmer aired his grievances, and by the endorsement of granger candidates he was able to carry his discontent to the legislature. The series of granger Acts, all benefiting the farmer resulted.1/ Just south of Elk River is the birthplace of Oliver H. Kelley on the east bank of the Mississippi which has been designated a National Historic Landmark.

The great pine forests of the Upper Mississippi were first exploited in 1821 when soldiers floated logs down the Rum River to use in the building of Fort Snelling. Logging began on a large scale after establishment of the territory and moved rapidly up the river. By the 1870's, loggers

45. Transporting logs on the river.

were active in the forests north of Grand Rapids. Logs were hauled to the nearest river and floated to collection points or "booms" then further downstream to sawmills. Rail lines later supplemented the water routes and permitted extension of logging into areas without easy access to water.

1/ Minnesota - A State Guide, State of Minnesota, 1947, p. 57.

The isolated area west of Lake Winnibigoshish was one of the last sections of Minnesota to be opened. Movement of logs downstream across the lakes was impractical and the first logs, cut in the 1880's, were transported along westward flowing streams to the Red River. Logging did not begin in the area on a commercial scale until the railroads arrived. The Great Northern entered Grand Rapids in 1892 and reached Bemidji in 1898. In that same year, the line at Brainerd was extended northward to Bemidji. Brainerd, Grand Rapids, and Bemidji, located strategically on rail junctions with the Mississippi, each in turn became major centers of the lumber industry on the upper river. By 1910 the vast northern forests had been despoiled and the lumber industry faded. Farmers attempted to cultivate the cut-over areas but were mostly unsuccessful.

The great natural beauty and scientific values of the region had been noted by the early explorers. The State and Federal Governments made special efforts to preserve the natural scene for knowledge and enjoyment. As early as 1882, the government had built headwater dams for navigation and flood control in Winnibigoshish and Leech Lakes. In 1891 Itasca State Park was established and Pillsbury State Forest in 1899. A Federal reserve, later designated as the Chippewa National Forest, was created in 1902 and replanting of the trees began in 1911. By the 1930's nearly a million and a half acres had been authorized as part of the national forest. In the 1930's rehabilitation of the forests was undertaken by the Civilian Conservation Corps, a major arm of the Federal Government's conservation efforts.

Farming became successful on a limited scale. Deer River, Bemidji, Elk River, Brainerd, and Walker became important dairy centers. St. Cloud has been famous since the 1870's for its fine granite quarries. Logging and its related activities revived and continued as significant occupations on a sustained yield basis. Recreation has grown in importance in recent years, and the history of the region, revealing the failure or limitations of other human activities, suggests that this will be the optimum long term use for most of the Upper Mississippi area.

HISTORIC CHRONOLOGY OF THE MISSISSIPPI RIVER ABOVE ANOKA

1680 Louis Hennepin travels the Mississippi as far north as the Rum River.

1768 The Chippewa defeat the Sioux at the mouth of the Crow Wing River.

C. 1783 Sioux territory is reduced to an area west of the Mississippi and south of the Crow Wing River.

1783 The United States acquires the east bank of the Mississippi.

1784	First reported fur trading post on upper river established at mouth of Pine River.
1798	David Thompson travels Mississippi between Bemidji and Sandy Lakes.
1803	The United States acquires the west bank of the Mississippi.
1806	Zebulon Pine ascends the Mississippi to Cass Lake.
C.1820	Red River trade established.
1832	Henry R. Schoolcraft discovers the source of the Mississippi at Lake Itasca.
1839	The Sioux defeat the Chippewa near the mouth of the Rum River.
C. 1840	The community of Crow Wing develops around fur trade posts.
1849	Minnesota territory created.
1849	Fort Ripley built near Crow Wing.
1853	Anoka settled.
1854	St. Cloud settled.
1855	Chippewas placed on reservations along the Upper Mississippi. The Sioux are removed to the Minnesota River.
C. 1860	The fur trade fades as the logging industry expands on the upper river.
1866	The railroad reaches St. Cloud from Anoka.
1867	The upper river Chippewa reservations are formed into a single reservation around Leech, Cass, and Winnibigoshish Lakes.
1868	First granite quarry opened at St. Cloud.
1870	Brainerd established, becomes a logging center.
1871	The railroad reaches Brainerd from the east.
1877	The railroad reaches Brainerd from the south.
1877	Grand Rapids settled, becomes a logging center.
1882	Federal navigation dams built at Leech and Winnibigoshish Lakes.
1891	Lake Itasca State Park created.
1892	The railroad reaches Grand Rapids from the east.

1894	Bemidji settled, becomes a logging center.
1898	The railroad reaches Bemidji from the east and south.
1898	Battle of Sugar Point on Leech Lake, the only hostile action of note between whites and Chippewas. Last recorded battle between Indians and U. S. Troops in the United States.
1899	Pillsbury State Forest created.
1902	Morris Act creates forest preserve laying foundation for Chippewa National Forest.
C. 1910	Upper Mississippi forests destroyed. Interest in conservation increases. Small scale farming and recreation develop.
1911	Replanting of trees in Chippewa National Forest begins.
1930's	Conservation continues under the Civilian Conservation Corps. Recreation and limited farming activities become established uses of the Upper Mississippi.

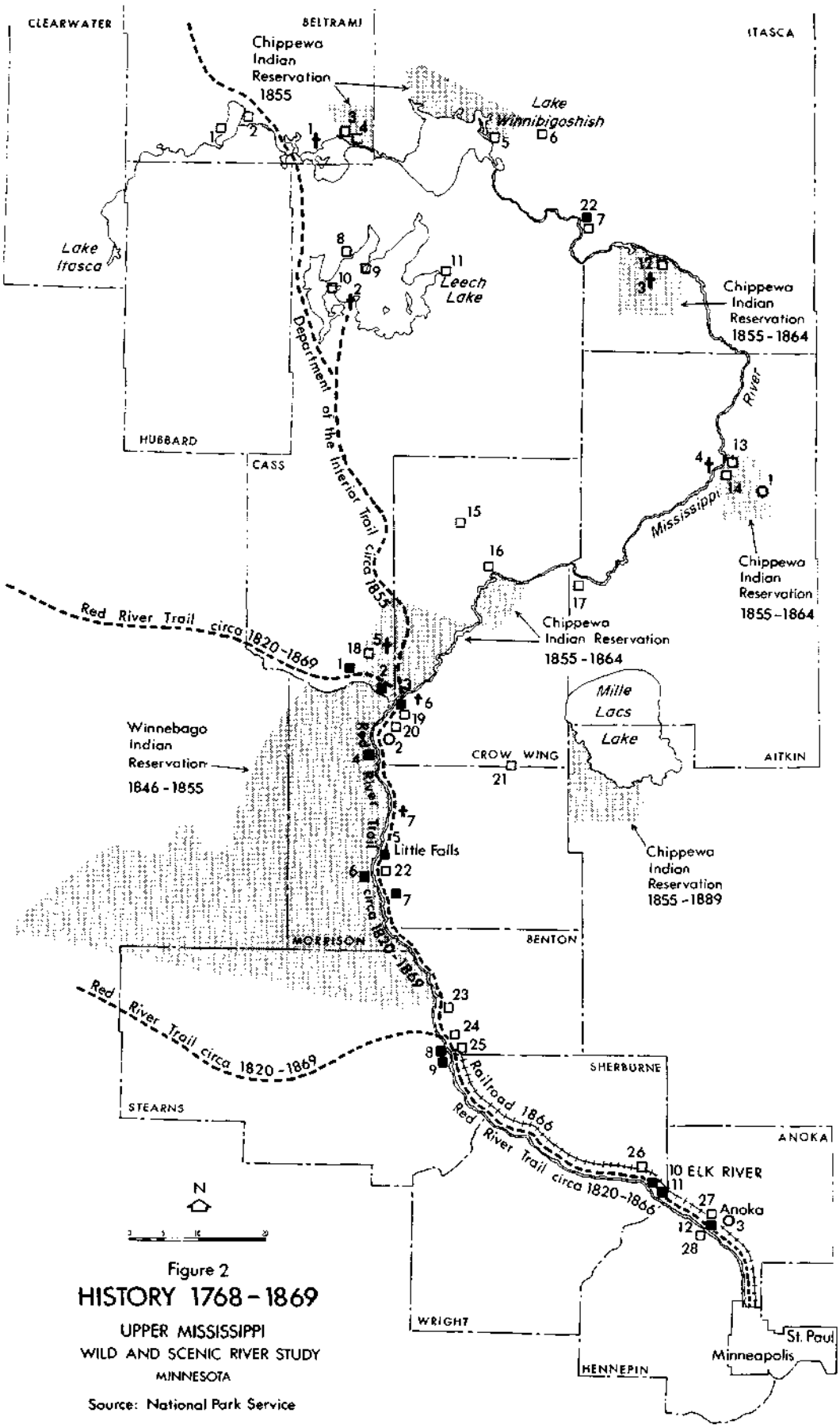


Figure 2

HISTORY 1768 - 1869

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

Source: National Park Service

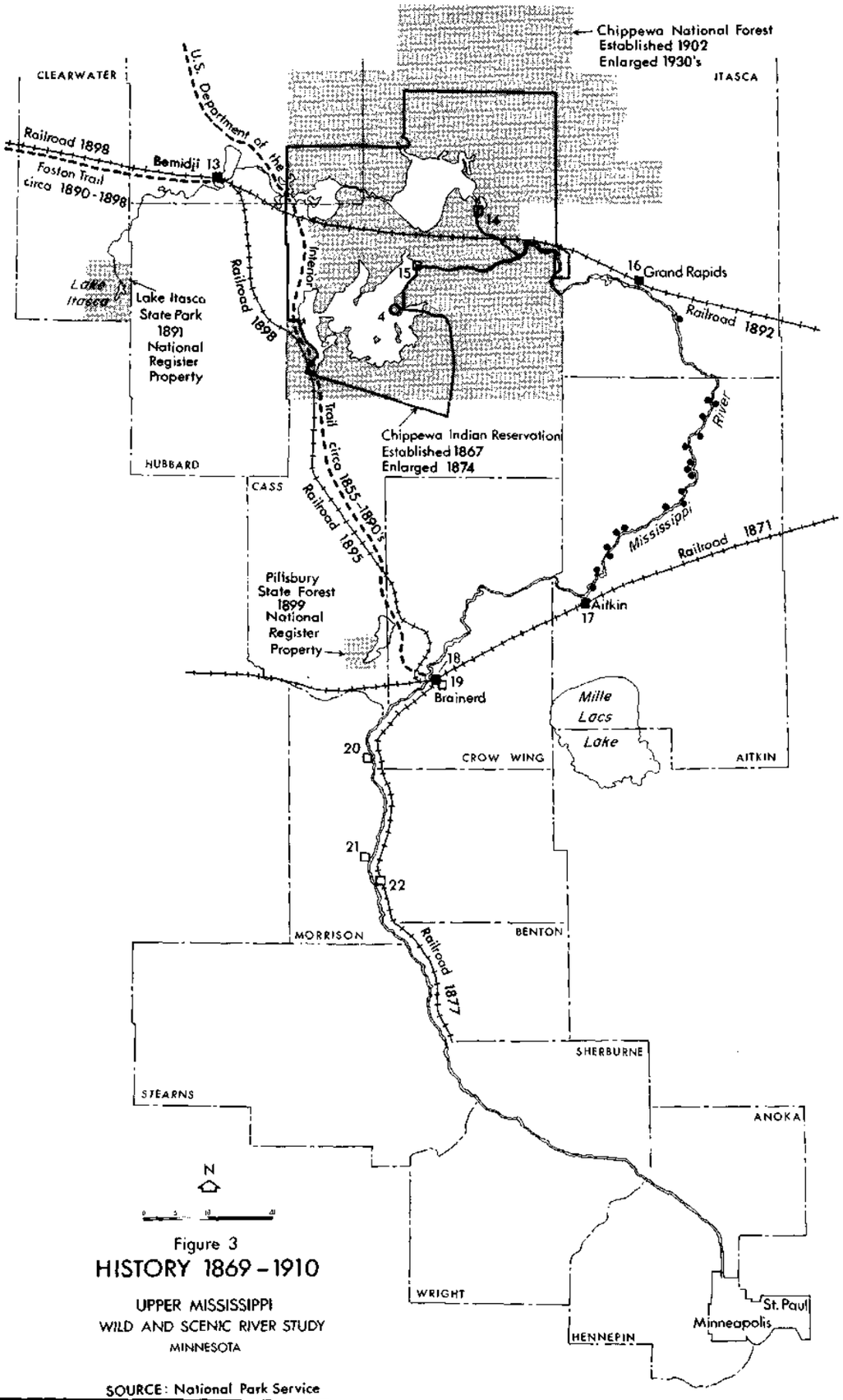


Figure 3

HISTORY 1869 - 1910

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

SOURCE: National Park Service

LEGEND FOR HISTORICAL MAPS
Figures 2 and 3

□ TRADING POSTS

1.	1832	15.	1806
2.	1785	16.	1784
3.	1794	17.	1806
4.	1794	18.	1823
5.	1823-48	19.	1826-48
6.	1785	20.	1832
7.	1791	21.	1830's
8.	1805	22.	1850
9.	1785	23.	1844-55
10.	1833	24.	1789
11.	1833	25.	1805
12.	1805	26.	1846
13.	1820	27.	1847
14.	1794-1833	28.	1805

● STEAMBOAT LANDINGS

✝ MISSIONS

1. 1860
2. 1833-37
3. 1838-47
4. 1833
5. 1852-60's
6. 1850's-60's
7. Ayer Mission Site 1849-60*

○ BATTLES

1. Battle of Sandy Lake 1768
2. Battle of Crow Wing c. 1840.*
3. Battle of Rum River 1839
4. Battle of Sugar Point 1898.

■ OTHER

1. Hole-in-the-Day II Cabin Site 1850's.*
2. Chippewa Agency Historical District 1851-1869.*
3. Town of Crow Wing c. 1840.*
4. Fort Ripley 1849.*
5. Town of Little Falls 1856.
6. Pike Winter Camp 1805-06.
7. Old McDougall Farm 1847.*
8. St. Cloud Granite Quarries 1868.
9. Town of St. Cloud 1854.
10. Town of Elk River 1855.
11. Oliver H. Kelley Homestead c. 1860.*
12. Town of Anoka 1853.
13. Town of Bimidji (logging center) 1894.
14. Federal Dam 1882 (rebuilt 1898).
15. Federal Dam 1882 (rebuilt 1898).
16. Town of Grand Rapids (logging center) 1877.
17. Town of Aitkin 1870.
18. Town of Brainard (logging center) 1870.
19. Brainard Water Tower.*
20. Fort Ripley.*
21. Charles A. Lindberg Home 1901-1920.*
22. Old McDougall Farm 1847-1900.*
23. Whiteoak Point Site 5,000 B.C.*

*Denotes National Register Property.

Physical Environment

The southern boundary of the Upper Mississippi study area located within the larger Mississippi basin, lies approximately 15 miles north of Minneapolis/St. Paul; the eastern boundary lies 60 air miles west of Duluth; and the western boundary lies 110 miles east of Fargo, North Dakota. The river is centered in the State of Minnesota and resembles the form of a "question mark" as it flows from Lake Itasca to Anoka. For purposes of this report, the socioeconomic study area has been defined as those 14 counties that border or lie within the river comprising 16,833 square miles (or 21.2 percent of the State's land area). See Figure 1.

Within the much larger river basin, the Upper Mississippi flows through two watershed units--Mississippi headwaters and Mississippi-Sauk. The headwaters watershed consists of those study counties north of the Crow Wing River (approximately 10,000 square miles), while the Sauk watershed lies south of the Crow Wing River and consists of the remaining seven counties (approximately 7,000 square miles). The course of the Upper Mississippi is confined to low areas between hills of glacial deposits. It is a direct result of the melting of the last glacier and probably began cutting its channel about 13,000 years ago. As the glacier melted back, the river channel extended headward in an irregular path becoming the main channel for meltwater supplied by the retreating glacier. Unlike the Minnesota River, it drained no large glacial lake, but rather received a fairly constant supply of water to which it could adjust readily.1/

The general land elevation varies from 1,488 feet above sea level at Lake Itasca to 879 feet at the Town of Anoka. The highest elevation is Lake Itasca at the river's source and slowly declines to Brainerd before it drops sharply to where it reaches its lowest point at Anoka.

The Upper Mississippi River has many crooked channels with accompanying oxbows and flows approximately 7-1/4 miles for every five miles air distance. Flowing through cretaceous bedrock in the northern portion, the river winds back and forth through large marsh areas and lowlands with numerous lakes. Further south, the river flows through precambian bedrock with intermittent layers of impure sand and shale. Along with numerous lakes, higher precipitation, and lower evaporation rates, the Upper Mississippi tends to maintain a more constant supply of water than the Minnesota River. This is probably why the Upper Mississippi was selected as the headwaters of the Mississippi rather than the Minnesota River.2/

There are several major towns located along the Upper Mississippi--notably Bemidji, Grand Rapids, Aitkin, Brainerd, Little Falls, Sauk Rapids, St. Cloud, Elk River, and Anoka (Figure 1). The only metropolitan area, as of the 1970 U.S. Census, is Minneapolis/St. Paul to the

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1/ Minnesotans and Their Mississippi River, Jean Replinger, P. 22.

2/ Minnesotans and Their Mississippi River, Jean Replinger, P. 23.

south of the study area. In essence, beyond the large tracts of land set aside as State and Federal forests in the northern sector of the river, the adjacent river corridor may be characterized as moderately forested, rural farmland punctuated with a chain of towns along the river.

Climate

The study area, as well as all of Minnesota and much of the Great Plains, has a continental type of climate characterized by great extremes in temperature with the greatest share of precipitation falling within the growing season. There is no topographic feature east of the Rockies to halt the cold and dry Artic air masses from sweeping far to the south, or the warm and moist tropical air masses from moving far to the north. Most of Minnesota lies in an air mass transition zone that is dominated by the modified Pacific air. Only extreme northeastern Minnesota is on the average outside this zone.1/

Annual normal temperature found within the Upper Mississippi area ranges from 37° to 44° F. With few exceptions, extreme high temperatures have been recorded in July (108°) and the lowest temperatures in January (-59°). Spring and fall temperatures are normally moderate and brisk; yet, comfortable for the recreationist in many activities. The average temperature for the three principal months of recreation activity--June through August--is approximately 65 to 70 degrees.

Average annual precipitation varies from 22 inches in the north to 27 inches in the south. Spring represents the highest rainfall with accumulations ranging from 10 to 11 inches, often causing flooding conditions along the Upper Mississippi. Summer droughts frequently occur during July and August. Snowfall averages from 40 to 50 inches during the winter months.

Geology and Mineral Resources

Geology--The bedrock of the State is covered by a layer of debris left by several continental glaciers. These unconsolidated materials generally vary from 100 to 200 feet in thickness, but depths to 600 feet have been found.2/ The Upper Mississippi passes through a range of 200 to 400 feet in thickness. The surface units of the glacial blanket within the Upper Mississippi study area are gray drift (sandy to clayey) found mostly to the north down to Grand Rapids; sand accumulation found between Bemidji and Lake Winnibigoshish and from Aitkin to Anoka; and glacial lake sediments (clayey silts to sands) found northwest of Aitkin to Grand Rapids. See Figure 4.

Throughout the ice age a wide variety of surface depressions were created. Many of these depressions now constitute Minnesota's thousands of lakes having all variations in area, depth, and shape. At times the frontal

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1/ Technical Bulletin No. N2, Minnesota 1969, P. 102

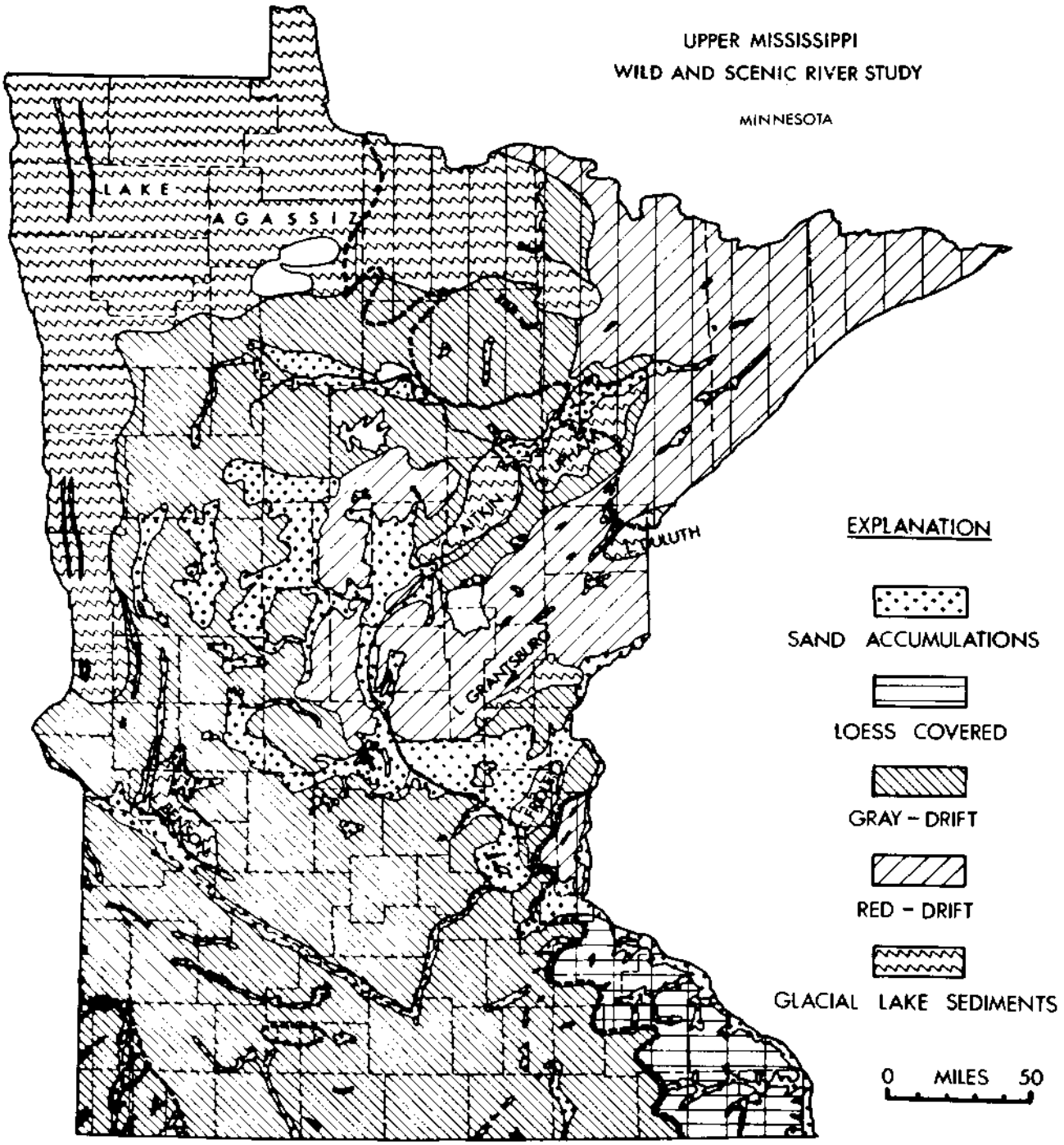
2/ Minnesota Technical Bulletin No. 2, 1969, p. 165.

Figure 4

SURFICIAL GEOLOGY

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY

MINNESOTA



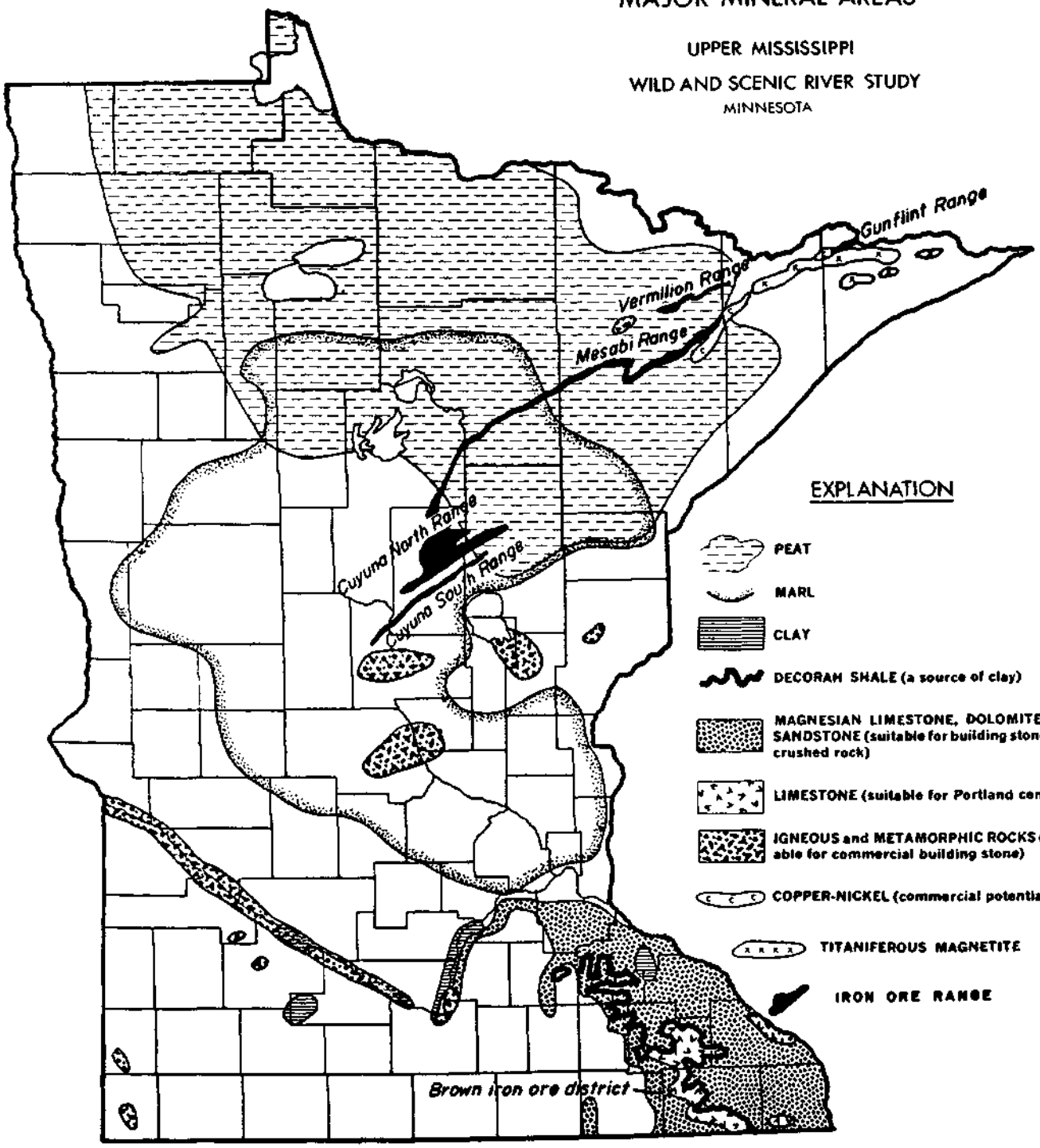
SOURCE: Minnesota Geological Survey

Figure 5

MAJOR MINERAL AREAS

UPPER MISSISSIPPI WILD AND SCENIC RIVER STUDY

MINNESOTA



SOURCE: Minnesota Geological Survey

margins of the glaciers remain stationary and melt water flowing from the glacier deposited sand and gravel in outwash plains. In many areas blocks of ice were deposited on the outwash plains and as the ice melted, it left block basins or pits which later filled with water and became lakes.[1/]

Bedrock of the State consists mostly of a basement of hard and impervious precambrian igneous and metamorphic rocks. Cretaceous sediments, mostly of impure sands and shales, intermittently cover the precambrian rocks in approximately the western half of the State.[1/] To the north, the Upper Mississippi River straddles the cretaceous (impure sandstones and shale) and the precambian undifferentiated bedrock (granite, gabbroic, and basaltic igneous rocks). From Aitkin to Clear Lake, the river passes only through precambian undifferentiated. Past Clearwater to Anoka the river enters into precambian sediments, mostly sandstones and shale.

Mineral Resources--About 91 percent of the State's total value of mineral production comes from iron ore. In addition to iron ore, Minnesota also produces clay, manganiferous ore, marl, stone, sand, gravel, and limestone. Within the major mineral areas, marl covers all of the Upper Mississippi study area, and the river passes through sections of igneous rocks, suitable for commercial building stone.[2/] Iron ore is found north of Brainerd as the Upper Mississippi cuts through both the Cuyunna and Mesabi ranges. North of Aitkin there is some production of peat, which is sold in bulk and packaged for soil improvement and other horticultural purposes. See Figure 5.

Within the 14-county study area, mineral production consists primarily of stone, sand, and gravel. Only in Itasca and Crow Wing Counties is there iron ore and taconite production.

Hobbyists collect other lesser minerals such as gem stones along some portions of the Mississippi River.

Population and Economy

Population--In 1970 approximately 4,100,000 people lived within a 100-mile radius of the Upper Mississippi and approximately 7,800,000 people lived within a 250-mile radius. Minneapolis/St. Paul, Duluth/Superior, Rochester, and Fargo/Moorhead are Standard Metropolitan Statistical Areas (SMSA's) with a total population in 1970 of 2,283,350 which lie within three hour's driving time of the Mississippi. Within a 250-mile radius of the Mississippi there are eight other SMSA's with a combined total of nearly 1,245,800 people. See Figure 6.

1/ Minnesota Technical Bulletin No. 2, 1969, p. 165.

2/ Minnesota Technical Bulletin No. 2, p. 44.

In 1970 there were six nonmetropolitan cities of 5,000 and over along the Upper Mississippi River. These cities--Bemidji, Grand Rapids, Brainerd, Little Falls, St. Cloud, and Sauk Rapids--are all located along the river from Lake Itasca to Anoka.

The 14 counties that have all or a significant portion of their boundaries within the Upper Mississippi basin--Clearwater, Hubbard, Beltrami, Itasca, Aitkin, Cass, Crow Wing, Morrison, Stearns, Benton, Sherburne, Wright, Anoka, and Hennepin--had a 1975 population of over 1,504,400. Current population data and projected population changes can be seen in Table 1 and Figure 7. Hennepin County accounted for approximately 64 percent of this population with a density of approximately 1,690 residents per square mile. In contrast Clearwater County had a population of 8,500 representing about 8.5 residents per square mile. Anoka County, which is also part of the Minneapolis/St. Paul SMSA, accounted for approximately 11 percent of the study area population with a density of approximately 413 residents per square mile. The combination of Anoka and Hennepin populations totals approximately 75 percent with the remaining 12 counties representing much lower population densities.

Anoka, Sherburne, and Wright Counties showed the largest population gains--approximately 114 percent, 42 percent, and 30 percent, respectively--from 1960-1970, while eight counties showed much smaller gains during the same period. Three counties--Clearwater, Itasca, and Aitkin--lost population between 1960 and 1970.

In terms of 1970 residence, the uppermost counties of the Mississippi not only had the smallest total population but, as might be expected, are predominantly rural. The counties nearest the Minneapolis/ St. Paul metropolis are overwhelmingly (90 percent) urban; the middle counties were very similar to each other (approximately 50 percent rural).

Between 1960 and 1970 the State population was up 11.5 percent, while the 14-county area rose 18.7 percent, a slightly higher increase than the State. Note that between 1970 and 1990 the population increase for the 14 counties will be approximately 17.4 percent, while the State's increase will be 19.1 percent. Of these 14 counties, Sherburne and Wright lead the population increase, while Clearwater and Morrison will have the smallest percent increases. Of the three population projections shown in Figure 7, the Minnesota State Planning Agency's projection is the source used for data correlation in this study report.

Economy--The State of Minnesota has achieved a diversity of industry over the last three decades.[1/] The 14-county area of the Upper Mississippi assumes a large proportion of the State's industrial diversification. Although the preponderance of industrial development exists

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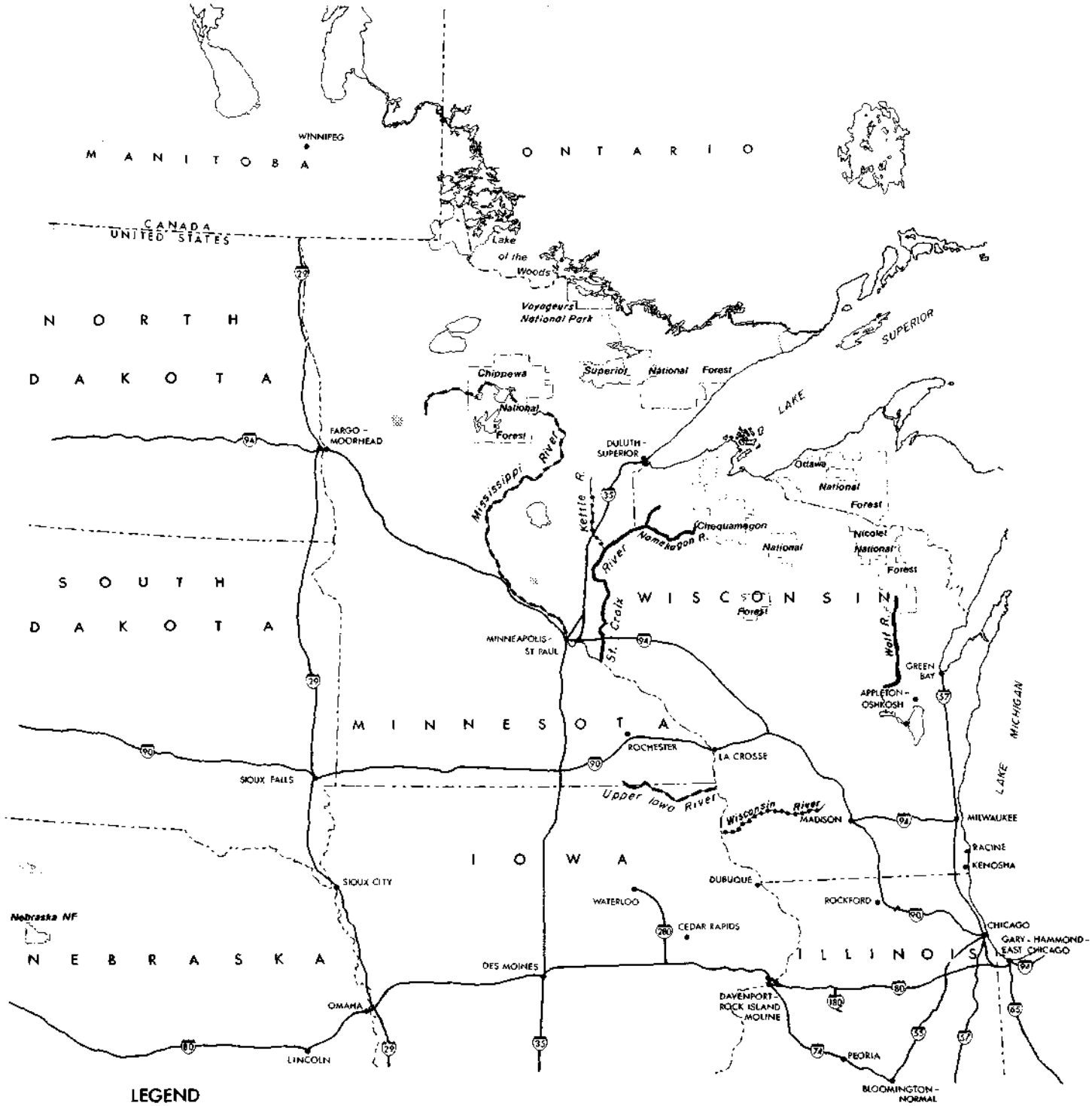
1/ Minnesota Profile, State of Minnesota, Department of Economic Development, 1974, p. 1.



LEGEND

NATIONAL WILDLIFE REFUGE

NATIONAL WILD AND SCENIC RIVERS SYSTEM
- Existing Component
- Study Completed
- Study in Progress

Source: Bureau of Outdoor Recreation

0 100 200
MILES

N

Figure 6

REGIONAL SETTING

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA

TABLE 1

REGIONAL SOCIO-ECONOMIC PROFILE

COUNTY	1975 POPULATION	POPULATION PER SQ. MILE	% POP. CHANGE 1960 - 1970	% PROJECTED POP. CHANGE 1970-1990	MEDIAN FAMILY INCOME	MEAN FAMILY INCOME	PUBLIC ASSIST. PER 1000 POP.	AVERAGE EDUC. LEVEL M/F	BIRTH/DEATH RATIO	UNEMPLOYMENT RATE %	% POP. NEGRO	% POP. INDIAN
Anoka	175,200	413.2	+114.5	+45.5	11,713	12,339	34.6	12.3/12.4	5.4	*	.1	.3
Hennepin	958,400	1,690.3	+ 13.9	+ 6.0	11,805	13,501	73.1	12.6/12/1	1.9	*	2.1	.7
Wright	44,400	65.9	+ 30.0	+78.7	8,936	9,496	35.4	10.4/12.2	2.2	6.5	.05	.09
Sherburne	22,700	52.7	+ 42.6	+85.8	9,564	10,046	27.4	12.1/12/3	2.2	1.0	.6	.6
Stearns	100,000	74.7	+ 18.7	+23.5	8,437	9,215	24.3	10.7/12.0	2.4	10.0	.1	.1
Benton	22,000	54.7	+ 17.1	+29.8	8,461	9,246	31.1	11.2/12.1	2.8	10.0	.009	.2
Morrison	27,200	24.1	+ 1.2	+ 4.1	7,042	8,223	55.0	8.8/10.5	1.8	6.2	.02	.1
Crow Wing	38,000	38.2	+ 8.4	+31.2	7,790	8,496	48.5	10.8/12.1	1.4	6.2	.09	.3
Aitkin	12,400	6.8	- 6.2	+10.5	5,899	7,001	66.3	8.9/11.1	.83	6.9	.07	.7
Itasca	36,500	13.9	- 6.5	+ 6.2	7,985	8,411	72.3	11.1/12.1	1.5	5.7	.02	2.3
Cass	18,800	9.4	+ 3.6	+22.5	5,828	7,214	86.2	9.3/11.6	1.0	4.5	.09	8.7
Beltrami	28,300	11.3	+ 11.2	+29.9	6,995	8,162	88.0	11.1/12.2	1.8	4.9	.09	11.4
Hubbard	11,800	12.7	+ 6.2	+33.9	6,040	7,025	63.3	9.7/12.1	1.0	5.8	.009	1.6
Clearwater	8,500	8.5	- 9.6	+ 5.0	5,644	7,149	95.6	8.6/9.9	1.0	9.7	.9	5.8
TOTAL AVERAGE	1,504,400	176.9	18.7	17.4	8,010	8,966	57.2	10.5/11.8	1.9	6.45	.303	2.35
	(A)	(A)	(B)	(A)	(B)	(B)	(C)	(B)	(D)	(B)	(B)	(B)

Sources:

(A) Minn. State Plan. Agency
(B) 1970 Census
(C) 1973 Minnesota Pub. Assist. Rate per 1,000 pop.
(D) 1970 Minnesota Dept. Health Plan

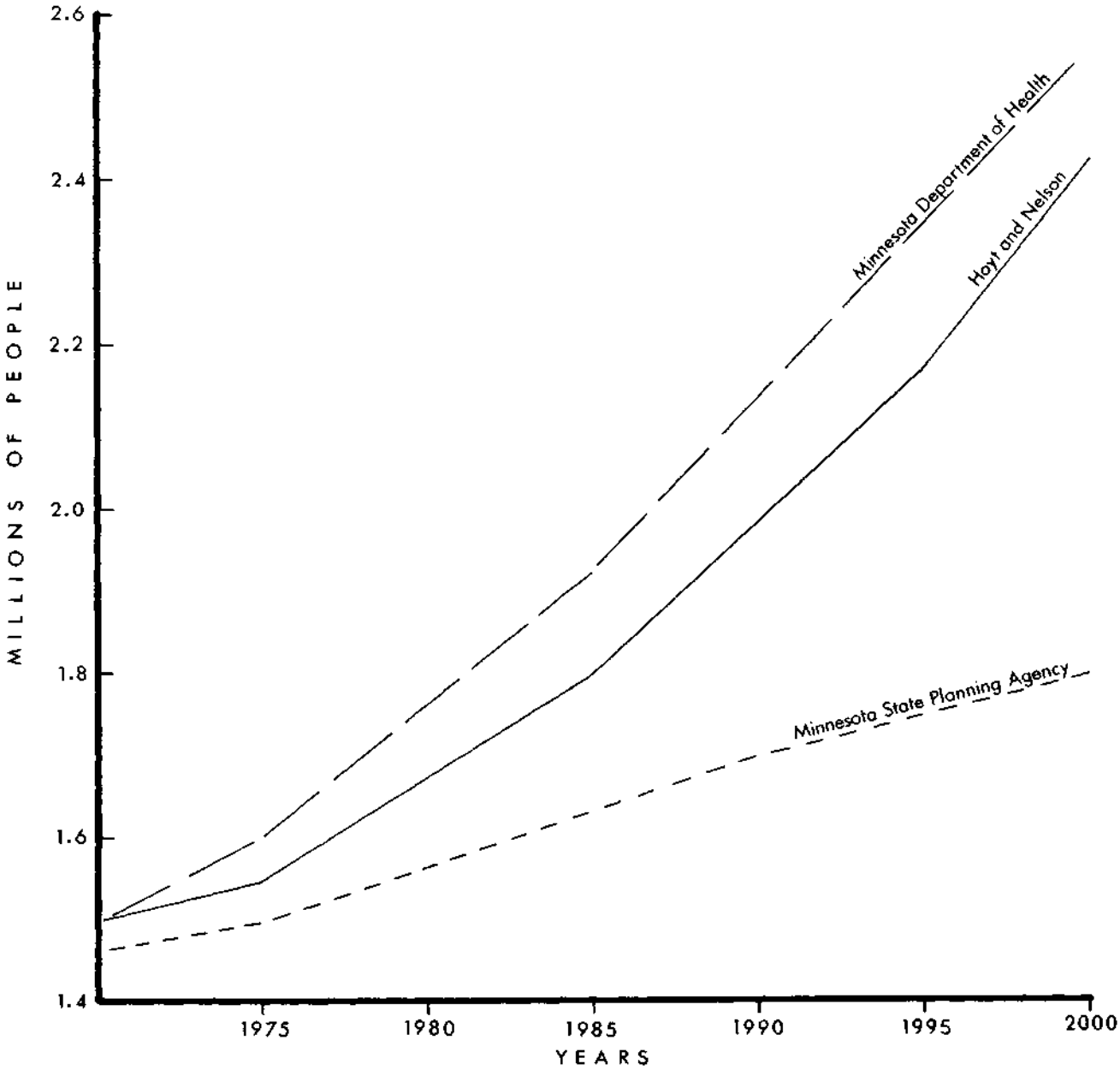


Figure 7

POPULATION PROJECTIONS

14 COUNTY STUDY AREA

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA

within the metropolis of Minneapolis/St. Paul, there has been a continuing process to locate industry in outlying counties. Along the Upper Mississippi, this industrial expansion and new plant development can be seen by the increase of such construction in the cities of Bemidji, Grand Rapids, Brainerd, Little Falls, and St. Cloud.

As the location of industry and services has expanded farther from Minneapolis/St. Paul, the character of many of the Mississippi River counties has changed. Significantly, the counties of Benton, Morrison, Crow Wing, and Stearns recently achieved a 50 percent ratio of urban-rural development. This development led to an increase in population between 1960-1970 and is expected to substantially raise population again over the next 20 years.

The Bureau of Economic Analysis, formerly the Office of Economic Analysis of the U. S. Department of Commerce, and the Economic Research Service of the U. S. Department of Agriculture have combined forces to forecast growth over several decades in related job categories. These forecasts, called OBERS projections represent a continuing effort to portray the economic character of States and major watersheds throughout the United States. The most recent OBERS projections are based on Series "E" population projections prepared by the Bureau of Census in 1972. Projections for the Water Resource Region 702 were interpolated to isolate projections for the 14-county area of the Upper Mississippi. Interpolation was based on the ratio of "Series E" population projections for the 14-county area to that of all counties within the boundary of Water Resource Region 702.

The Census Bureau's 1972 "Series E" national population projection was derived from the Bureau's 1967 "Series C" national population projection. In each instance, three items--population, total personal income, and cropland harvested--have been projected to the year 2000. The "Series E" projection represented a downward revision in the three items due to changes in the national population growth rate assumptions.

In addition, the OBERS projections do not reflect the current energy problem, recent changes in agricultural exports, and recent changes in conservation and environmental activities.1/

Reinforcing the population trends predicted for the 14-county area, the OBERS figures project dramatic increases in manufacturing and services earnings within the Upper Mississippi area. See Figure 8. Additionally, wholesale and retail trade earnings are predicted to increase in large proportion between 1970 and 1990. The minimal growth in mining and agricultural/forestry potential earnings points up again the altering character of these 14 counties along the Mississippi and a shifting away from reliance on mining, agriculture, and forestry as major job employers. Historically, the forest industry has been the "base indus-

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1/ 1972 OBERS Projections, Vol. 1, pp. iii

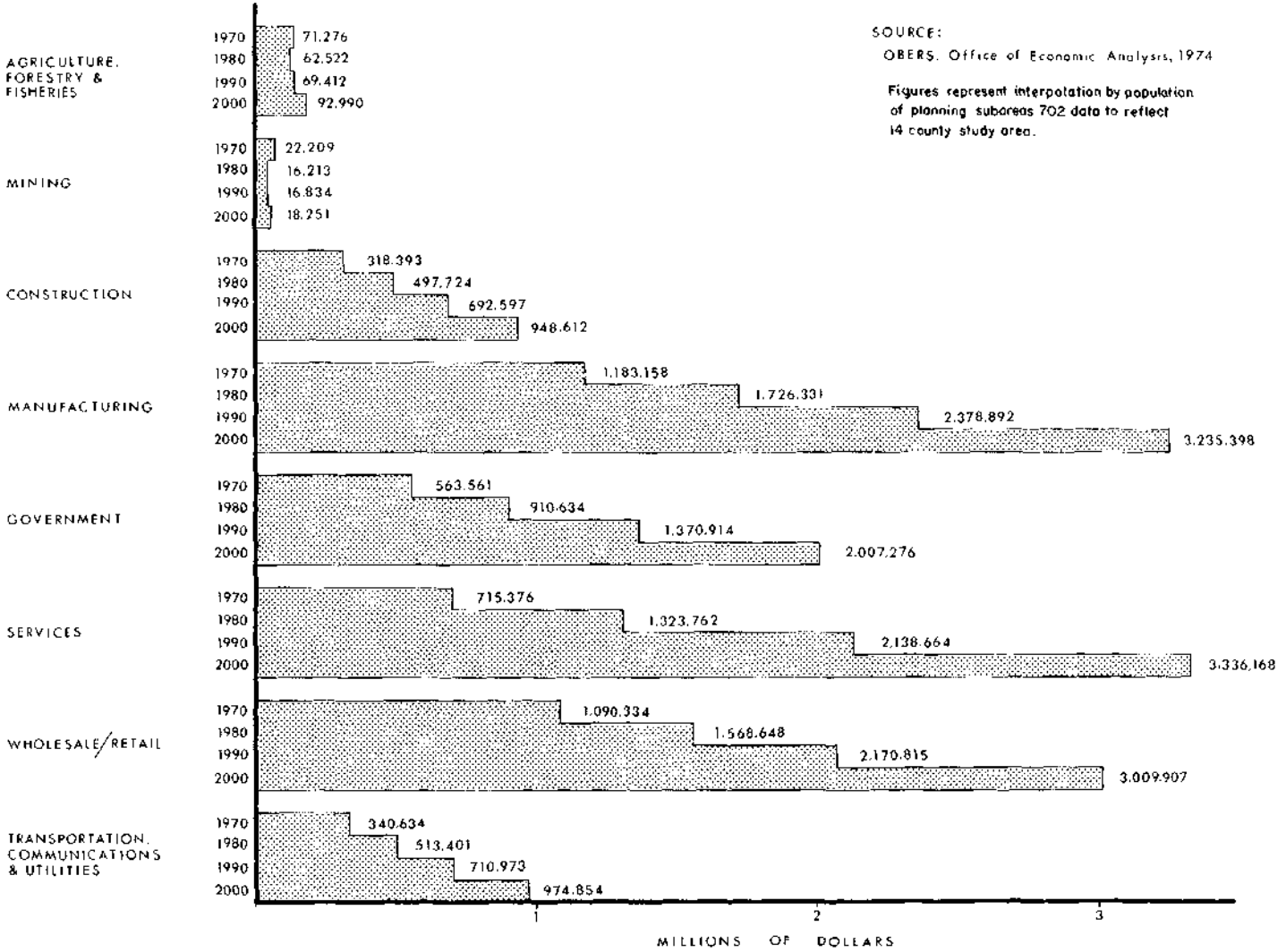


Figure 8

EXISTING & PROJECTED EARNINGS DISTRIBUTION

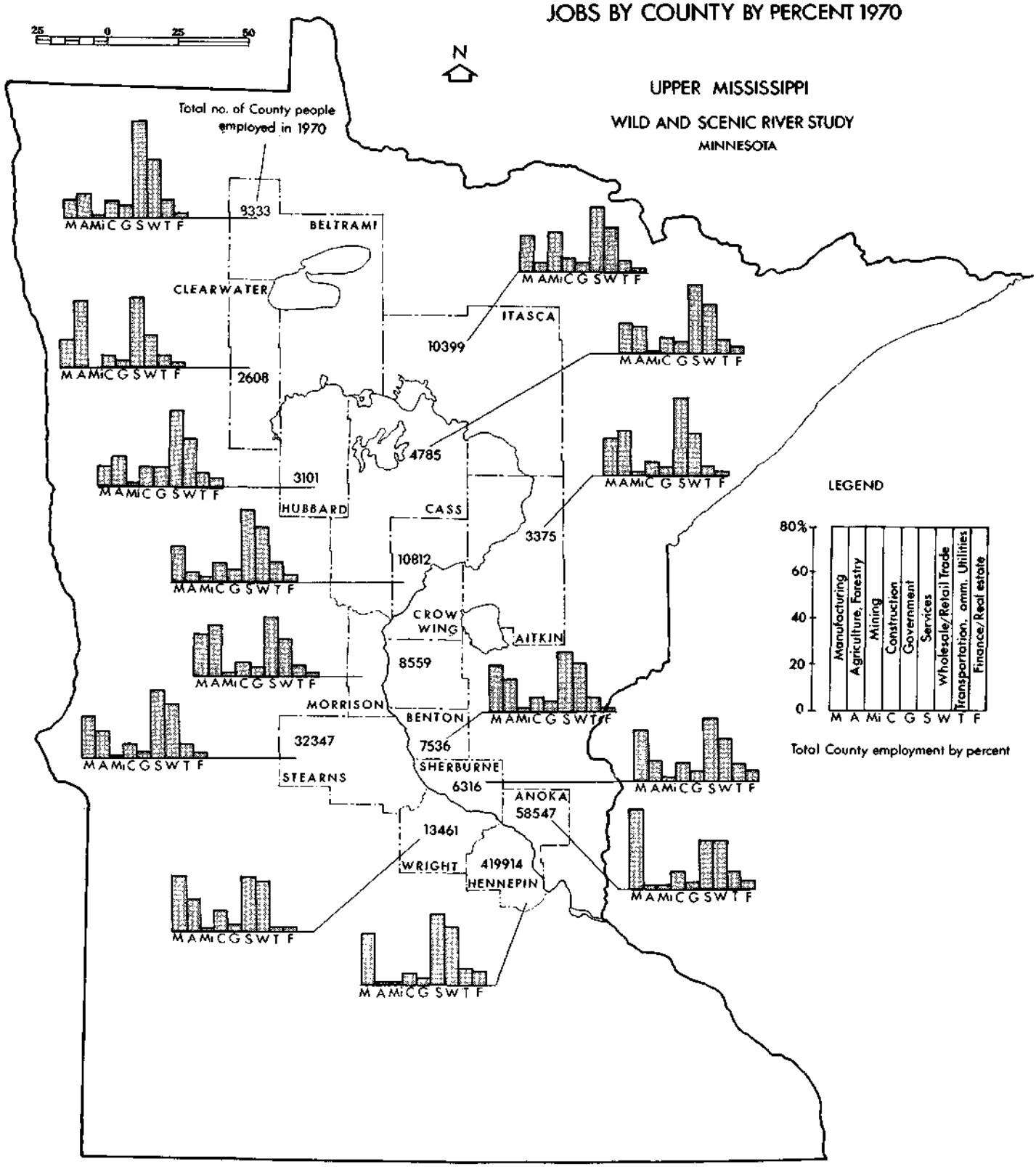
14 COUNTY STUDY AREA

UPPER MISSISSIPPI WILD AND SCENIC RIVER STUDY

MINNESOTA

Figure 9

JOBS BY COUNTY BY PERCENT 1970



SOURCE: 1970 Census

try" in terms of land use north of Brainerd, while agriculture has been the dominant land use of counties south of Brainerd. In terms of outdoor recreation, the predicted growth in services suggests at best a need for increased recreation services along with the whole spectrum of community service associated with growth.

As viewed from the 1970 Census, the major employers found within the 14-county area are manufacturing, services, and wholesale/retail trade business--with services jobs dominating (171,476). See Figure 9. The metropolitan counties of Minneapolis/St. Paul provide the bulk of the jobs for the 14 counties. The northernmost counties employ a higher ratio of agriculture, forestry, and fishery people. Regarding mining, Itasca County leads the other counties with 1,715 people employed in that industry.

In all, Hennepin employes a larger share of any employment category for any of the 14 counties except in agriculture (Stearns) and mining (Itasca). Of all the job categories, however, mining and agriculture constitute the least percentage of totally employed persons.

In the socioeconomic profile of the 14 counties presented in Table 1, Anoka and Hennepin Counties, which are located in the metropolitan area of Minneapolis/St. Paul, overshadow the other 12 counties in status due to the larger populations and greater accumulations in wealth and industry. The lower income levels of the northernmost counties, along with their higher percentages in public assistance and unemployment, readily illustrate that these counties do not generate the same personal income as those counties influenced by metropolitan Minneapolis/St. Paul. Thus the river corridor traverses a wide spectrum of economic viability.

The continued process of industrial diversification has allowed the 14 counties to maintain reasonable employment levels. Clearwater County has the highest unemployment rate at 9.7 percent. Most of the remaining counties have unemployment rates of six-plus percent. See Table 1. Unemployment has an effect on the median family income for the study area. Whereas the State averages $9,931 as median family income, the 14-county area averages $8,010--visibly less than the State average. In fact, only six counties--Benton to Hennepin--have income over $8,000. Of those eight counties below $8,000, Clearwater, Hubbard, Aitkin, and Cass have income levels below $6,000 in which 21 percent or more of their respective populations are contained in the income level of $3,000 or less. This wide disparity can be somewhat attributed to the low median incomes of the northernmost counties which rely heavily on agriculture, forestry, and mining. These occupations are characterized by OBERS figures as having the lowest personal income potential for families.

Agribusiness--Of the 14-county study area in 1973, the counties of Clearwater, Morrison, Benton, Stearns, Sherburne, Wright, Anoka, and

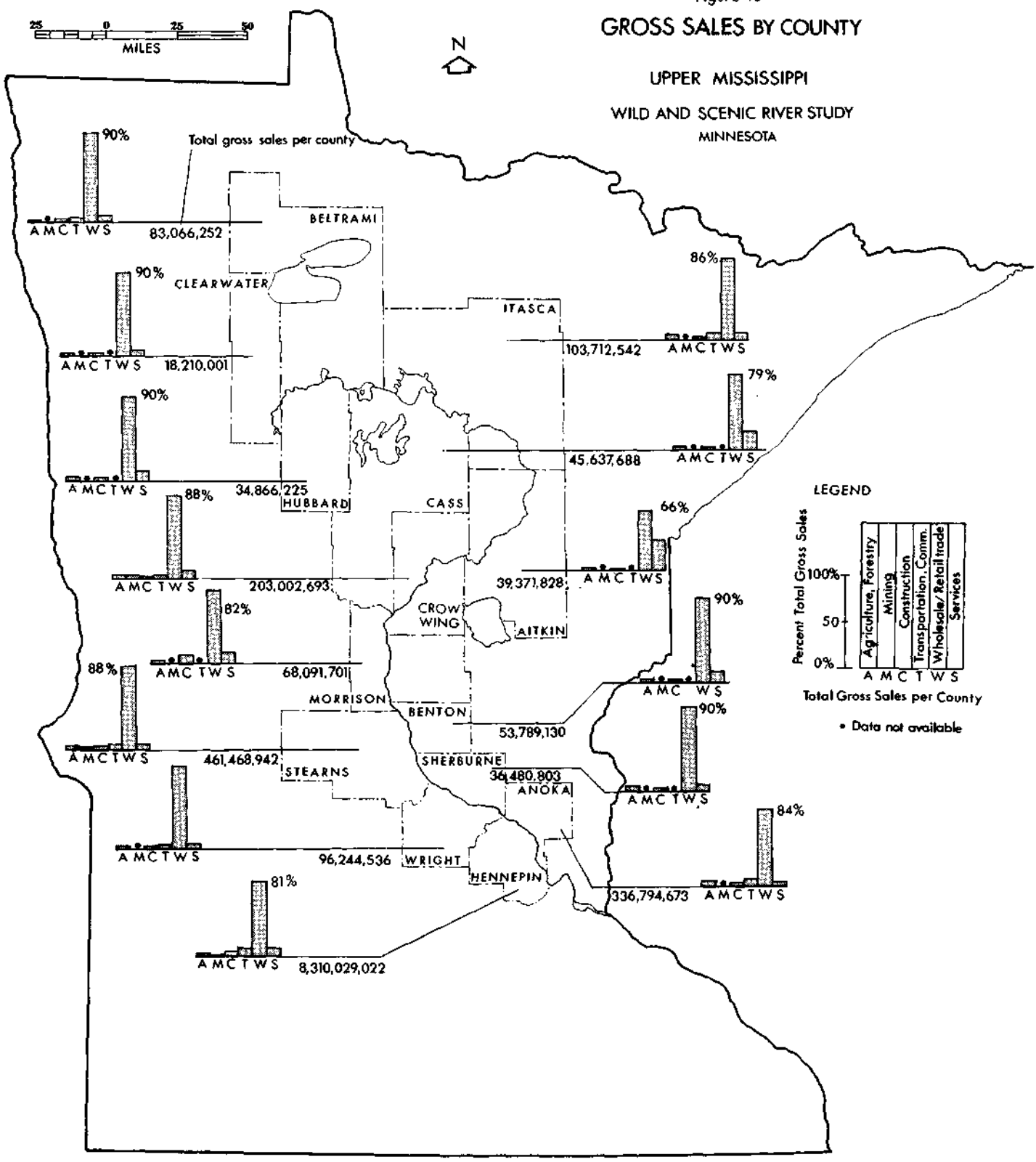
Figure 10

GROSS SALES BY COUNTY

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA



NOTE: %'s Shown Are Not Conclusive for Each County

That is %'s Reflect only Firms Participating in this Survey.

SOURCE: Minnesota Department of Revenue, Tax Research Division.

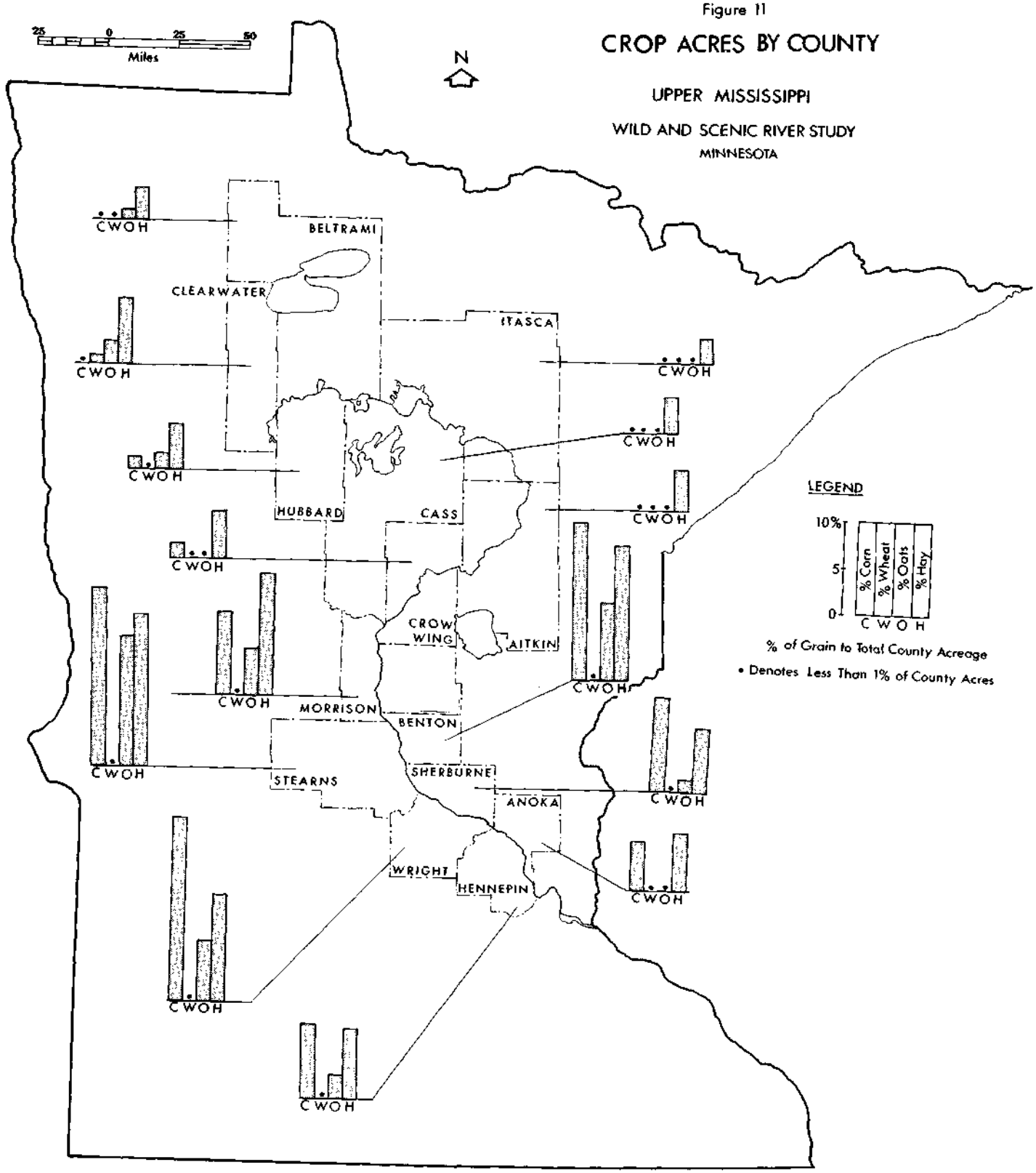
Figure 11

CROP ACRES BY COUNTY

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

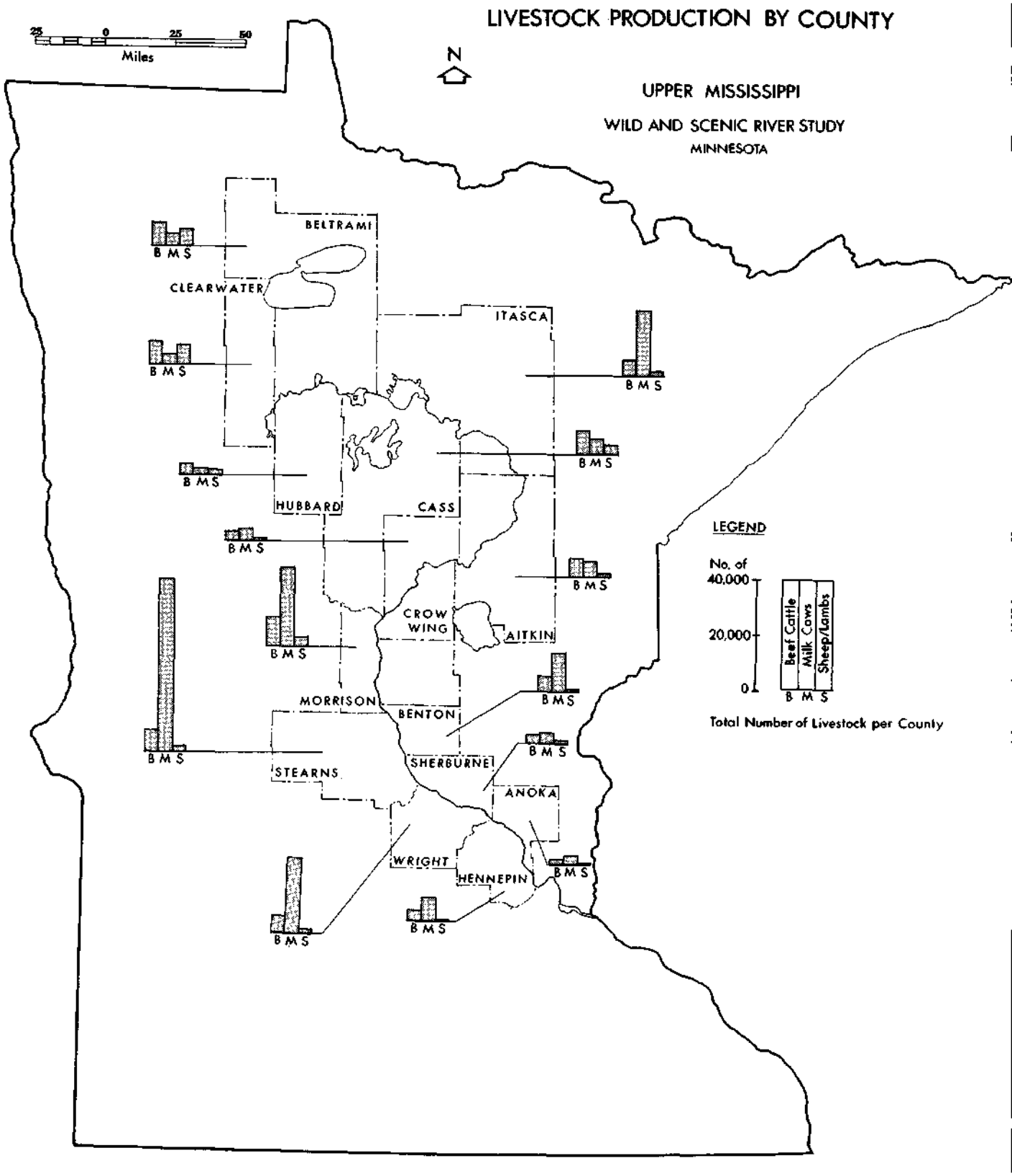
MINNESOTA



SOURCE: USDA Minnesota Agricultural Statistics 1974

Figure 12

LIVESTOCK PRODUCTION BY COUNTY



SOURCE: USDA Minnesota Agricultural Statistics 1974

Hennepin had 20 percent or more cultivated land in their respective counties. Wright County leads with more than 55 percent of its land cultivated.1/

Of the total cash income in 1970 derived from crops, livestock, and livestock products, the 14-county study area accounted for 9.5 percent ($212,863,000) of the State's agribusiness. Stearns and Wright Counties held the lead in total cash income. In crop income the counties produced 4.6 percent ($29,469,000) of Minnesota's total with Hennepin County producing an abundant share of that total. Livestock sales constituted 10 percent ($144,079,000) of the State's livestock revenue with Stearns County producing a healthy portion of that income. Figure 10 depicts gross sales by county. Figure 11 depicts crop and Figure 12 livestock production by county.2/

Forestry--The forest products industry, in 1973, was the third largest industry in Minnesota ($482,997,850) of which pulpwood production made up 88 percent ($424,924,240).3/ Of the 14-county study area, only Anoka, Sherburne, Stearns, Wright, and Benton did not produce pulpwood. The other nine counties generated 28.4 percent ($120,466,022) of the State's pulpwood production (or 22 percent of the total timber industry). An additional one half billion dollars was generated in these nine counties from the secondary processing of those forest products.

The forest products industry has been expanding in Minnesota with an emphasis on increasing pulpwood production. Beltrami County led the study area in production with an average of 115 cords of pulpwood cut per 1,000 acres. Along the Upper Mississippi at Sartell, Brainerd, Grand Rapids, and Bemidji, five of the State's nine active pulpwood mills produce 14.3 percent of the total mill capacity of the State.4/

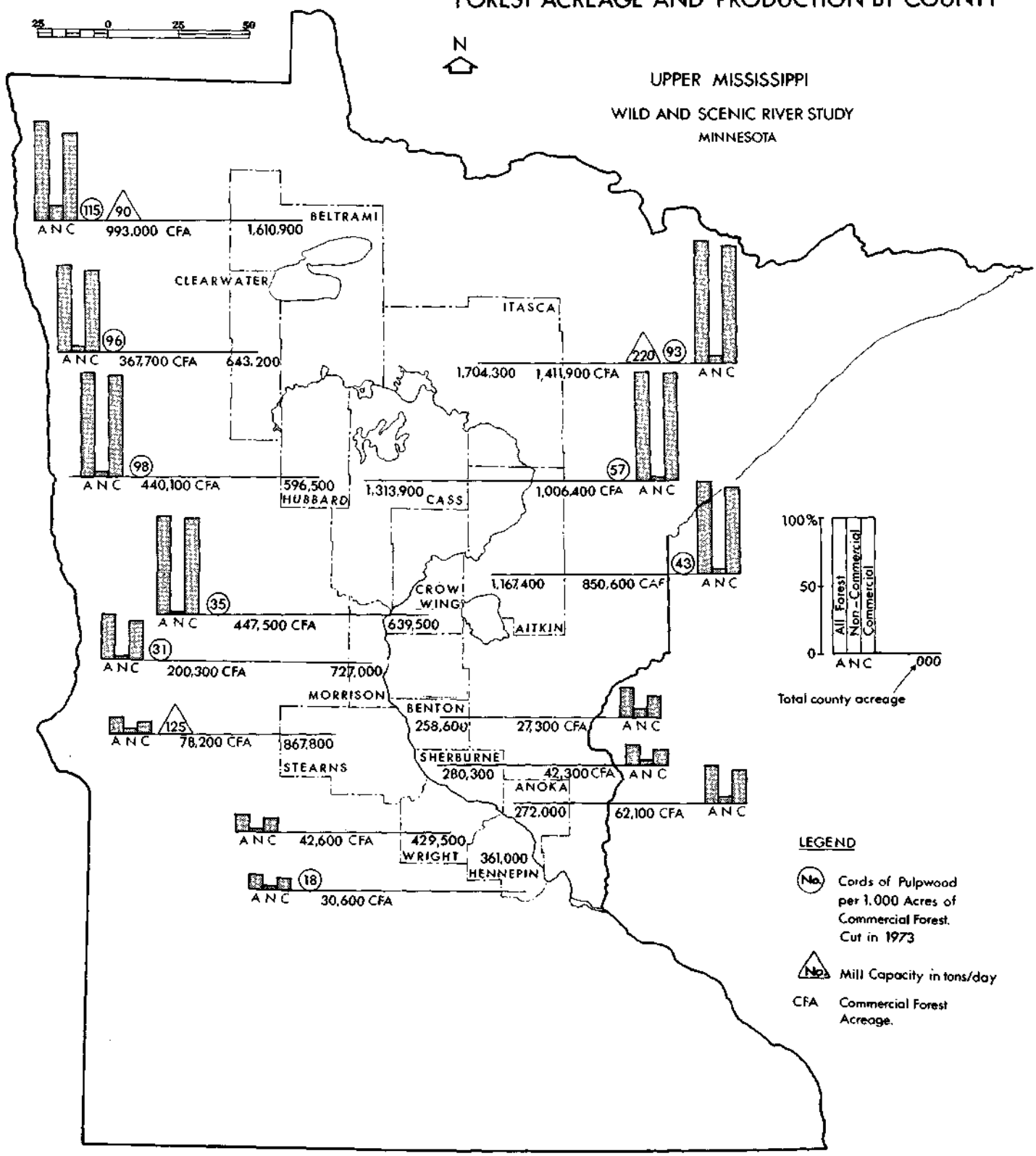
About 20 percent of the State's aspen, which is the most abundant and important forest tree species in Minnesota, is found in the study area. Aspen is best utilized for various types of wood fiber production, in particular pulpwood production. Figure 13 depicts forest production by county.

Mining--There is little direct influence by mining on the river corridor. Although the iron ore ranges lie within the study area, and in fact cross the river in some instances, mining production does not take place next to the river. Perhaps of more relative importance is the fact that the study area accounts for approximately 28 percent (63,677,128 tons) of the State's total iron ore reserves.

1/ Minnesota Profile, State of Minnesota, Department of Economic Development, 1974, P. 39.
2/ Minnesota Agricultural Statistics, 1973, P. 98-99.
3/ Minnesota Profile, State of Minnesota, Department of Economic Development, 1974, P. 45.
4/ Pulpwood Production, James E. Blyth, U.S.D.A., Forest Service, 1973.

Figure 13

FOREST ACREAGE AND PRODUCTION BY COUNTY



SOURCES: USDA Pulpwood Production 1973

USDA A Third Look at Minnesota's Timber 1966

USDA Research Notes NC-30 & NLS-11

The principal mines located near the Mississippi are in Grand Rapids--Bovey/Delaittre, Fargo Reserve, and Lind/Greenway Mines. The major taconite mines in Itasca County are Butler Taconite and National Steel Pellet, producing a combined total of $5,200,000/1,200 employees.

Power Generation--For purposes of delineating and describing the power industry, the Bureau of Power within the Federal Power Commission has designated power supply areas (PSA's) which coincide with the service areas of major utility companies. The study river reach is located in PSA #16, a subaggregate of the Upper Mississippi River basin region (UMRB) which includes the entire Mississippi River watershed above the confluence of the Ohio.

In 1960, PSA #16 totaled approximately four percent of the generated energy of the UMRB. In the same year, power supply area #16 transferred its excess energy outside its boundaries to the rest of the UMRB. Because PSA #16 encompasses more total area than does the 14-county area used in this study, it is difficult to discern the extent to which the Upper Mississippi from Lake Itasca to Anoka plays in the PSA's generating capacity.

As best determined in 1975, a total of 1,168 megawatts (mw) of generating capacity was located within the Upper Mississippi corridor. This represents approximately 35 percent of the total generated capacity in PSA #16. The use of energy in PSA #16 by categories in 1970 was as follows: industrial--38.5 percent, residential--26.6 percent, commercial--13.2 percent, farm--9.4 percent, and losses and other miscellaneous--12.3 percent. For 1980 the power supply area will have an annual peak of approximately 9,000 mw, with the Upper Mississippi corridor providing 37 percent of this power. In addition, by 1980 this area will import 800 mw of electrical power. This imported energy is expected to be transferred from the Nelson River Project in Canada and is committed up to 1992. In the year 2000, PSA #16 is predicted to increase its total power requirements by 31 percent, with an import increase of 1.5 times that of 1980. Although this power supply area will import more megawatts than any other individual area within the basin, it is projected that the total import will continue to be satisfied by the Nelson River Project.[1/]

The extent to which the Upper Mississippi corridor will continue to provide at least 35 percent of the generated power capacity is difficult to ascertain. Projects under construction should maintain this percentage through the early 1980's.

1/ Federal Power Commission, Bureau of Power, Upper Mississippi River Basin, Minnesota, 1975.

Table 2

POWER SUPPLY REQUIREMENTS - PSA 16*

Year	Installed Capacity (1,000 KW)	Peak Load (1,000 KW)	Energy Requirements (million KWH)
1960	2,990	2,296	11,178
1970	4,736	4,567	28,487
1980	9,503	9,210	52,800
1990	19,632	18,350	105,000

* 1970 National Power Survey.

Further commitment of the Mississippi's water to power generation must be approved by the Environmental Quality Council (EQC) under authority of the Minnesota Power Plant Siting Act and by the Minnesota Department of Natural Resources which has authority for issuance of water appropriation permits. The Minnesota Power Plant Siting Act passed in 1973 authorizes the Environmental Quality Council to provide power plant site and transmission line corridor and route selection. A utility, before beginning construction on a large electric generating facility or a high voltage transmission line, must file an application for site or corridor approval indicating a preferred and alternate site or corridor. After hearings and review, the EQC shall issue a Certificate of Site Compatibility on a designated site or corridor or state its reason for rejection of an application. Site decisions must be made within one year; corridor decisions within six months. After receiving the Certificate from the EQC, the utility applies to other State agencies for various permits including the Minnesota Department of Natural Resources for a permit to appropriate water. Therefore, at this point, it is not possible to determine if any additional power capacity will be situated on the Upper Mississippi corridor after the early 1980's.

This being one of the major water resources available to this region, it will undoubtedly be considered for further generation siting.

Within the Upper Mississippi corridor, there are four electric utilities and several smaller concerns that utilize waters of the Mississippi River to assist in power generation. The four utilities producing power--Minnesota Power and Light Company, Northern States Power Company, Otter Tail Power Company, and United Power Association--presently generate approximately 1,100 megawatts in the section of the Mississippi River north of Anoka. Steam and hydro facilities of below ten megawatts are also located in this section of the river generating power to fulfill local and private needs. Table 3 lists the existing and projected energy generating facilities on the Mississippi River dating approximately to 1980. All of the power plants except Bemidji are operated on

TABLE 3

Energy Generating Facilities On the Mississippi River

Plant	Utility	Type of Facility/ Cooling Process	Generating Capacity
Bemidji	OTP	Hydro	.74 mw (2 units)
Grand Rapids	BPC	Steam (once through)	9.5 mw
		Hydro	2.2 mw
Brainerd	PLC	Hydro	2.8 mw
Little Falls	MPL	Hydro	3.3 mw
	HPL	Hydro	1.4 mw
Sartell	RPC	Hydro	2.3 mw
Blanchard	MPL	Hydro	11.8 mw
Clay Boswell	MPL	Steam (30% once through) (70% cooling towers)	514 mw (3 units)
Monticello	NSP	Nuclear (50% once through (50% cooling towers)	569 mw
Elk River	UPA	Steam (once through)	52 mw
Sherburne Co. Unit 1	NPS	Steam (closed system)	680 mw
TOTAL			1,849.04 mw

Energy Generating Facilities Under Construction On the Mississippi River

Plant	Utility	Type of Facility	Generating Capacity	Operating Date
Sherburne Co. Unit 2	NSP	Steam (closed system)	680 mw	1977

Energy Generating Facilities Projected for the Mississippi River

Plant	Utility	Type of Facility	Generating Capacity	Operating Date
Clay Boswell Unit 4	MPL	Steam (30% once through) (70% cooling towers)	500 mw	1980
Sherburne Co. Units 3 & 4	NSP	Steam (closed system)	1,600 mw	1981-83

MW - Megawatts
MPL - Minnesota Power & Light Co.
NSP - Northern States Power Co.
OTP - Otter Tail Power Co.
UPA - United Power Association
BPC - Blandin Paper Co.
RPC - St. Regis Paper Co.
PLC - Potlatch Corporation
HPL - Hennepin Power & Light Co.

a run-of-river basis with very little reservoir storage used for peaking. Bemidji Lake has 40,500 acre-feet of storage usable for stream flow regulation in the interest of power production.

Two utilities have additional facilities under construction or planned which will appropriate water from the study reach of the Mississippi River. Minnesota Power and Light Company is anticipating adding a 500 mw unit to the Clay Boswell plant. The unit is expected to be operational in 1980. Northern States Power Company has just completed one unit and a second is still under construction in Sherburne County. Each will be capable of generating 680 mw and become operational in 1976-77. In 1981-83 two additional units capable of generating 800 mw each will be added to the Sherburne plant.

River water utilized in power generation is generally used in a noncontact, nonconsumptive manner. Steam generation requires water to dissipate energy lost in the generation process. Once-through cooling, as is provided in an open cycle cooling system, appropriates water from the river and passes the water through the plant by means of a separate pipe system allowing heat to be transferred to the water without any contact between plant and river water. The water is then returned to its source, in this case the Mississippi River.

The Grand Rapids and Clay Boswell plants utilize the once-through cooling method. However, the Clay Boswell plant does allow for 70 percent heat dissipation through cooling towers. It would appear that neither of these two plants is a cause for concern in terms of altering the river's water temperature and effect on waterfowl. The other plants, Monticello and Elk River, both utilize once-through cooling process. The Monticello nuclear plant allows for 50 percent heat dissipation through cooling towers.

With a closed cycle system, water is initially appropriated from the river but then recirculated through a plant-cooling tower system to allow for cooling and reuse. The Sherburne County plants to be opened in 1976-77 and 1981-83, are to be closed cycle systems. This is particularly important in preventing the river's alteration in temperature and wildlife because these plants will eventually produce approximately 3,000 mw. The Monticello and Clay Boswell plants also employ this process to some degree with their cooling towers. See Table 3.

The hydroelectric plants on the Mississippi have resulted in slack water behind their respective impoundments. These impounded areas are not free-flowing river areas and subsequently are excluded from consideration as part of a wild and scenic river system. The Bemidji plant utilizes the 6,765-acre Lake Bemidji. The Blanchard dam retains a considerable amount of water (2,200 acres) which prevents this part of river from consideration. The Little Falls and Blandin Dams create 576

and 500 acres, respectively; similar slack water as that at Blanchard Dam. Any further hydroelectric development on the Upper Mississippi would result in an additional loss of natural free-flowing river.

The visual impact of these power generating units detracts from the natural scenic quality of the river. The Monticello nuclear power plant and the fossil fuel power plant south of Elk River have the greatest visual impact since they are in plain view from segments of the river which qualify for inclusion in the National Wild and Scenic Rivers System. The Sherburne County generating plant, on the other hand, is set back from the shoreline approximately three-fourths of a mile with the shoreline being wooded and undisturbed except for the water intake structure area. The chimney of the Sherburne County plant is 650 feet high and is partially visible for two channel miles upriver.

Tourism--To sharpen the perspective of the Upper Mississippi region in the tourism market (travel industry), it is helpful to view Minnesota's tourism strength with respect to its major market area--the north central region--and also in the Nation. Of the 12 north central States, Minnesota ranks fourth in economic impact of travel with 975.5 million dollars in tourist-travel expenditures. Overall, Minnesota ranks ninth in the Nation in the tourist market.1/ The relative importance of the north central region is shown by the fact that six north central States rank within the top 15 States in the United States in the travel industry. Below is a breakdown of these estimated receipts by the major segments of the Minnesota tourist-travel industry:

EXPENDITURE CATEGORY	MINNESOTA	% OF TOTAL
Transportation	$374,592	38.4
Lodging	171,688	17.6
Food	204,855	21.0
Entertainment	57,554	5.9
Gifts	4,878	.5
Incidentals	161,933	16.6
TOTAL	$975,500	100.0

The economic implication of the Minnesota tourist-travel industry ($975.5 million in 1972) can be seen by the industry's substantial contribution to Minnesota's economy--it generates an estimated additional $71 million in State tax receipts ($34.8 million by gas tax). According to studies on the subject, the out-of-State tourist-traveler portion is around the 50 percent mark. Based upon this division, a minimum of $35 million in State tax receipts was generated by out-of-State visitors in 1972.2/

The full realization of the economic benefit to the Nation from the tourist-travel industry has been attempted by the National Tourism

1/ National Travel Survey, 1972 Census of Transportation and U. S. Travel Center data.

2/ Tourism in the Minnesota Economy, Minnesota Department of Economic Development, p. 6.

Resources Review Commission by presenting travel spending, both personal and business, for 1960-61, 1970, and 1980.[1] In its summary of estimated tourism expenditures, total tourist spending in 1970 was $49.7 billion; it is projected to nearly double to $94 billion by 1980. This dramatic increase in tourist expenditures clearly points up the necessity to be aware of loading capacities of recreational facilities of the States and the critical question of environmental quality and resource usage.

Minnesota's total travel industry for the year seems to have faired well in face of current economic conditions and vacation shortages. Overall, Minnesota registered a gain of two percent in 1974 over 1973 in total tourist travel expenditures, adding $940 million to the State's economy for the year.[2]

As depicted in Figure 14, the 14-county study area produced 47.4 percent of the State's gross sales (39.6 percent in Hennepin County), and 51.5 percent of the State's tourist travel expenditures (38.6 percent in Hennepin County). Cass County is a distant second to Hennepin County with 3.2 percent of the State's tourist-travel expenditures. The interesting point about the total State's travel industry is that there were only nine nonmetropolitan counties with accommodations receipts over $2 million each in lodging receipts.

Although the approximately $975 million in tourist-travel expenditures might seem small in comparison to the State's gross sales figures of $28 billion, its importance to the State's economy is more recognizable when we realize it is larger than the gross sales of paper products, printing and publishing chemical manufacturing, fabricated metals manufacturing, primary metals manufacturing, instruments manufacturing, transportation equipment manufacturing, electrical machinery manufacturing, motor freight, communications and utility services.[3]

Upland game birds, migratory waterfowl, small game, and deer drew 574,683 nonresident hunters to Minnesota in 1972 increasing to over 600,000 in 1973. Minnesota's diverse habitat offers small game hunters a choice each year, and hunters harvest some 500,000 squirrels and more than 300,000 cottontails while also taking--in order of number--jack rabbits, snowshoe hares, red foxes, raccoons, and gray foxes.[4] The amount of small game harvest in the study area is unknown.

Minnesota's lakes, streams, and 131,000 acres of public wetlands make an excellent hunting ground for waterfowl. Approximately 25 percent of all ducks taken in the 14-State Mississippi flyway are taken by Minnesota hunters.[4]

1/ National Tourism Resources Review Commission, Destination U.S.A., Vol. J: Summary Report, p. 31.
2/ Minnesota Department of Economic Development, Minnesota Tourist-Travel Industry, 1974, p. 1-7.
3/ Minnesota Department of Economic Development
4/ Tourism in the Minnesota Economy, Minnesota Dept. of Economic Development, p. 4.

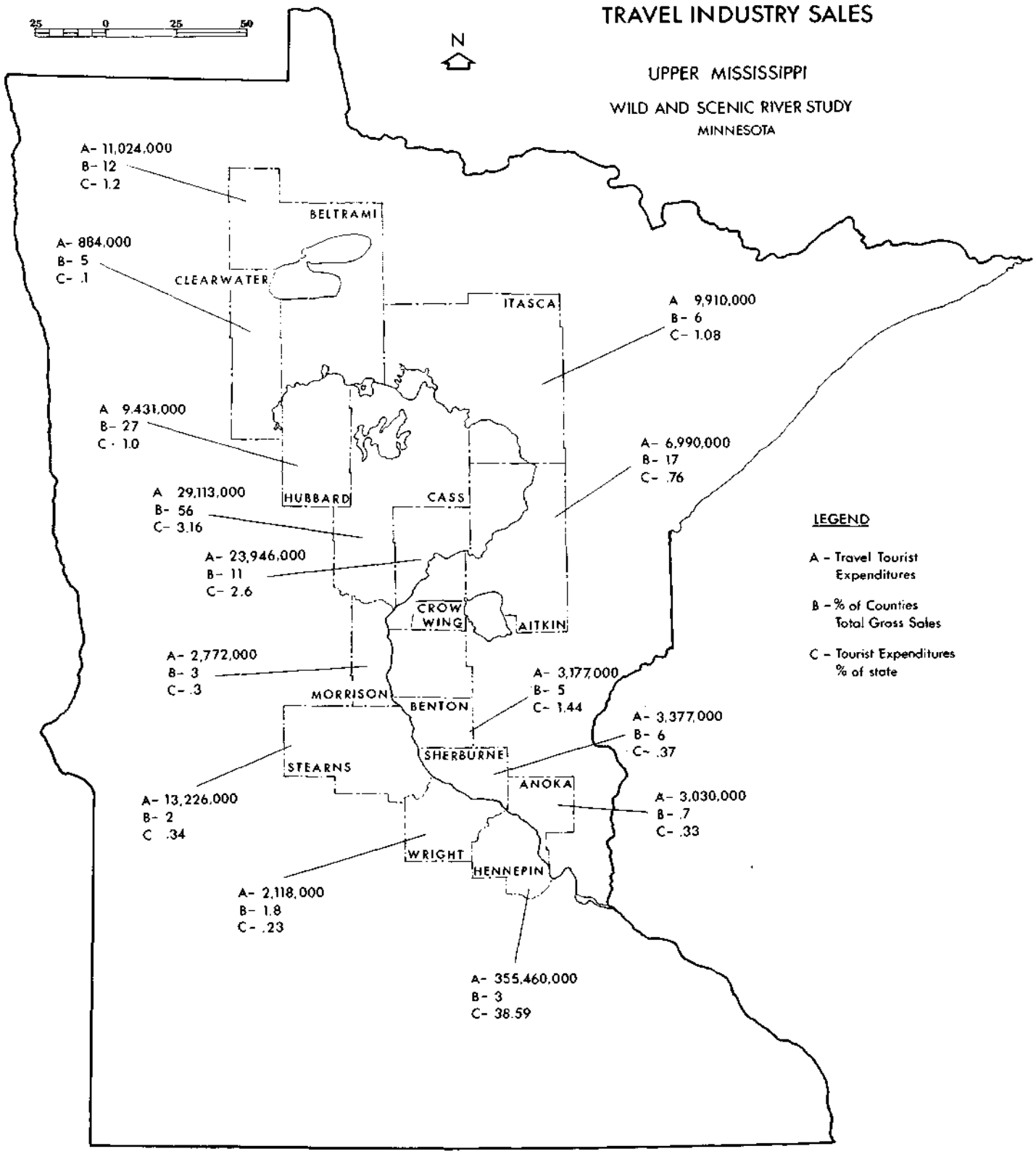
Figure 14

TRAVEL INDUSTRY SALES

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA



SOURCE: State of Minnesota Department of Economic Development Research Division.

Studies indicate that one of Minnesota's most popular outdoor activities is fishing. Minnesota's position as the nation's best freshwater fishing State is evidenced by the 1,440,702 licensed fishermen in 1972, 386,818 of which were nonresident. Yearly this take amounts to 50 million fish totaling 25 million pounds.1/ The 14-county area account for 27.3 percent of the State's 1972 fishing license sales, while accounting for 30 percent of the nonresident fishermen.

Heading the list of States in sales of fishing licenses as well as duck stamps, Minnesota's two million acres of inland fishing waters each year host the equivalent of 40 percent of the State's total population. Better than one Minnesotan in three carries a fishing license. Department of Natural Resources officials estimate that anglers spend some 100 million leisure hours fishing State waters for any or all of the 22 different species of edible fish.1/

Local events and tourist attractions play an important role in the travel-tourist industry. For the Upper Mississippi River, key tourist events and attractions are centered around Bemidji and Brainerd. The Mississippi headwaters and Lake Itasca attract more than a million tourists every year. The proposed parkway concept of the Great River Road could potentially afford the tourist frequent views of the river from adjacent roadways.

Transportation Network

The Upper Mississippi River corridor is readily accessible by automobile in most areas and particularly between Brainerd and Anoka. Figure 6 shows all interstate highways within 400 miles of the Upper Mississippi. Other major highways in the 14 counties of the corridor are depicted in Figure 15. This road network represents the present road system and illustrates those routes having the greatest influence on the Upper Mississippi in terms of traffic flow.

Interstate 94 crossing northwest-southeast through Minnesota and Interstate 35, the major north-south route, lie south and east, respectively, of the Upper Mississippi study segment. Interstate 94 connects Minneapolis/St. Paul with Detroit, Michigan, to the east and Billings, Montana, to the northwest. Interstate 94 lies approximately one to five miles south and parallels the Mississippi from Anoka to St. Cloud. Interstate 35 connects Minneapolis/St. Paul with Duluth to the north and with Laredo, Texas, to the south.

Numerous highways provide access from the interstate network to the entire river corridor. Principal routes are U. S. Highways 2, 10, and 52 allowing east-west travel and U. S. Highways 169, 10, and 71 providing north-south access. Many other State routes provide access between these major routes, such as State Routes 371 and 64 (north-south) and 200, 210, and 23 (east-west). Distance and travel time to and from major population centers are depicted on Table 4.

1/ Tourism in the Minnesota Economy, Minnesota Department of Economic Development, p. 4-5

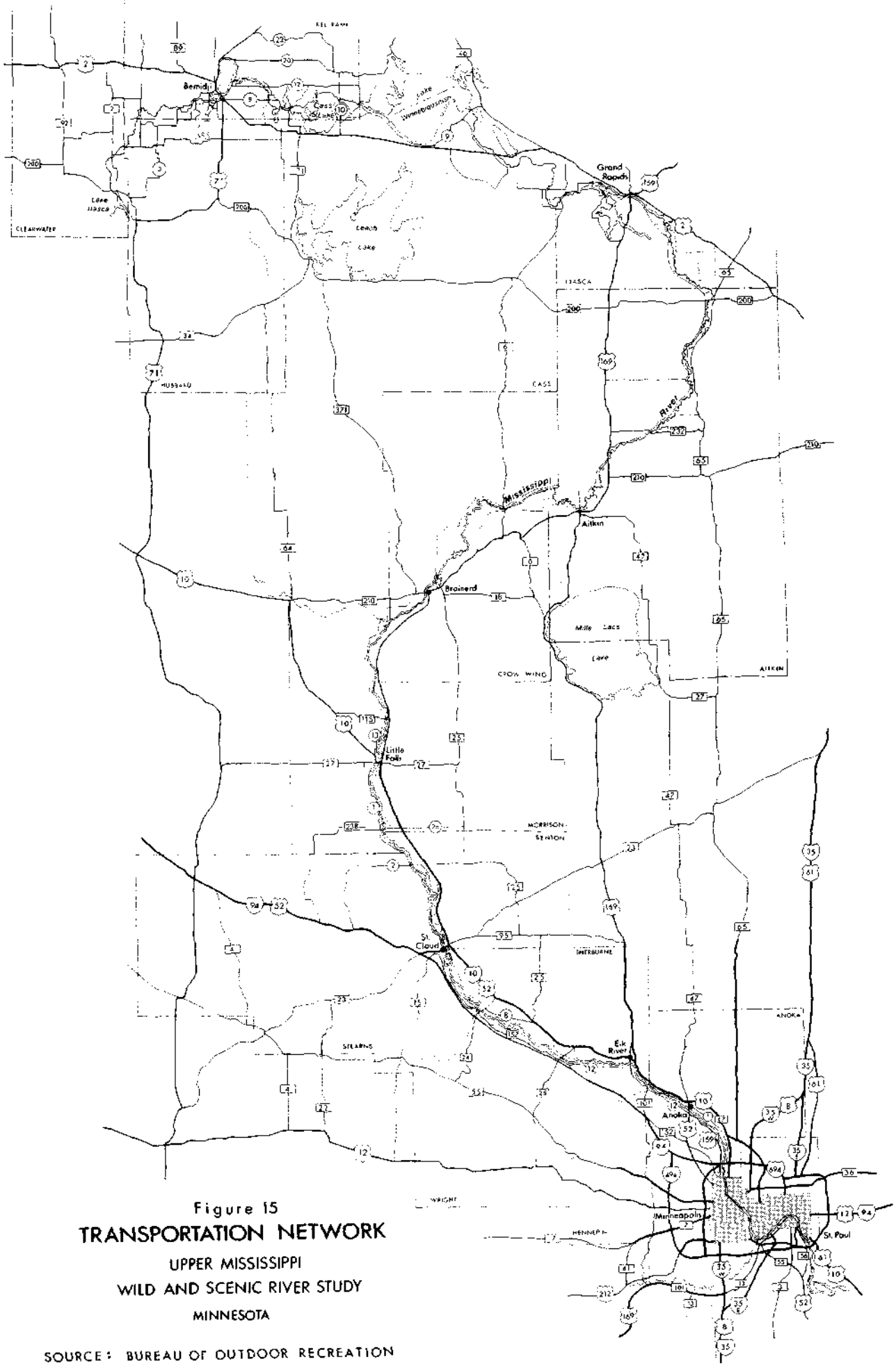


Figure 15

TRANSPORTATION NETWORK

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA

SOURCE: BUREAU OF OUTDOOR RECREATION

Table 4

DISTANCE/TIME FROM MAJOR
URBAN CENTERS TO BRAINERD, MINNESOTA

Urban Center	Distance (Miles) Air	Road	Approx. Time (Hours) Air	Road
Bismarck, N.D.	305	321	1-1/2	5-3/4
Fargo, N.D.	120	131	1	2-1/2
Sioux Falls, S.D.	225	300	1-1/4	5-1/2
Grand Forks, N.D.	175	200	1-1/4	3-3/4
Omaha, NE	364	490	3/4	9
Des Moines, IA	350	384	1-1/4	7
Madison, WI	340	416	1-1/4	7-1/2
Chicago, IL	438	564	1-1/4	10-1/4
Kansas City, MO	464	590	1	10-3/4

Source: Rand McNally Road Atlas

The long range planning by the Minnesota Highway Department for the next 20 years is based upon limiting major projects to those necessary for the development of a "backbone system" of highways. Increased demands and inflation have forced this prioritization of available resources in order to have a realistic plan for major State highway projects.

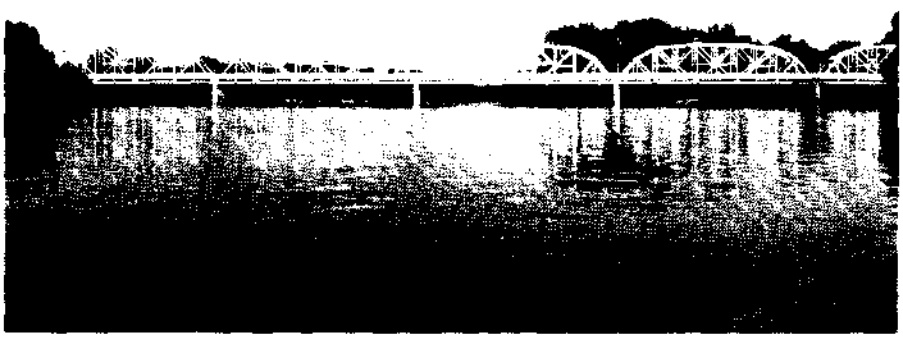
The three criteria for the "backbone system" were translated into routes that would have priorities based on (1) rural development, (2) road user benefits, and (3) recreational use. The combination of all three considerations identifies routes having the highest priority for maintenance and construction.

The prioritizing of certain routes will have a major impact on the access and development along the Upper Mississippi corridor. The segment of U. S. Highway 2 between Bemidji to Grand Rapids has the highest priority of routes in the northern section of Minnesota and it traverses the Upper Mississippi at Bemidji and west of Grand Rapids. Even on a route having highest priority, there will need to be some staging of projects to stay within the funds anticipated to be available. It is expected that U. S. Highway 2 will carry a high volume of traffic, running east-west between Grand Forks, North Dakota, and Duluth, Minnesota. The contract letting for the Bemidji bypass on U. S. Highway 2 is tentatively set for June 1977, and a draft environmental impact statement is being prepared by the Minnesota Highway Department for the Federal Highway Administration as Federal-aid funding is proposed.

U. S. Highways 10 and 52 between Brainerd and Minneapolis/St. Paul also have a high priority rating. This 125-mile stretch will provide a strong north-south movement from the metropolitan area to the mid-portion of the Upper Mississippi. This priority rating can be expected to result in highway projects needed to maintain, if not improve, existing road conditions and provide easier access to a greater portion of the Upper Mississippi and outlying areas.

Of particular note are those routes designated solely as having recreational use traffic flow adjacent to the river. U. S. Highways 169 and 71 provide north-south access to all parts of the river, as does State Route 371. State Routes 210 and 23 serve as principal east-west recreational routes. The interconnection of recreational use routes to Interstates 94 and 35 ensures a regional transportation network connected to urban areas of substantial populations. Many of the urban areas lie within weekend driving distance of the Upper Mississippi corridor.

The promotion of the Great River Road by the Mississippi Parkway Commission has particular recreational importance. This road along the Upper Mississippi is designed to produce "a motor roadway with full or partial control of access, which passes through a park or ribbon of park-like development and is restricted to noncommercial vehicles." Presently, the Great River Road is designated with road markers on several U. S. highways and State routes that parallel and/or run adjacent to the Upper Mississippi. Funding has been authorized by Federal legislation and a substantial amount has been appropriated to Minnesota to be spent within the next three fiscal years.



46. State Highway 25 at Monticello.

In all, there are 53 road/bridge crossings over the 466-mile river. Construction projects over the Upper Mississippi are currently underway or planned for the near future at several locations. Already mentioned was the Bemidji Bypass on U. S Highway 2. The other projects are as follows: (1) bridge construction in Beltrami County on County Road 12, (2) widening of U. S. Highway 169 bridge is scheduled for Grand Rapids in May 1976, (3) construction of a new bridge in Grand Rapids started in Spring 1975, and (4) repair and maintenance of State Route 101 near Elk River is scheduled for October 1977. Replacement of the highway bridge carrying County Road 2 in Benton County and County Road 1 in Stearns County has also been recently noted as proposed construction in 1976.[1/]

1/ Department of Transportation Federal Highway Administration, 1975.

In the long term, it is anticipated that future projects on U. S. Highway 2 may result in a new crossing over the Mississippi near Ball Club; extension of State Route 371 as a bypass around Brainerd may result in another new crossing; and replacement/reconstruction of the State Route 6 bridge near Crosby and the State Route 210 bridge near Itasca State Park are expected sometime after 1980. Some of the existing County Road bridges may need replacement in the future.

Two railroad lines--Burlington/Northern and Soo Line--make up the State's rail network. With Minneapolis/St. Paul as the terminus, Burlington/Northern lines parallel both sides of the river up to Little Falls. From Little Falls to Aitkin, a lone Burlington/Northern line runs parallel east of the Mississippi River. The Soo Line Railroad runs from Duluth to Bemidji and from Duluth to St. Cloud. Both Burlington/Northern and Soo Line provide freight service; yet, neither provide passenger service in Minnesota. In all, there are six railroad crossings over the Upper Mississippi involving both railroad companies. These are at Bemidji, Ball Club, Palisade, Brainerd near Royalton, and St. Cloud.

Scheduled commercial air flights within and adjacent to the Upper Mississippi are available from Minneapolis/St. Paul, Brainerd, Grand Rapids, and Bemidji. In addition to these airports, the study area includes airports at Park Rapids, Aitkin, Little Falls, and St. Cloud which, with the major city airports, comprise the key air service system in the study area. Including private airstrips, there are a total of 26 airports or landing facilities in the 14-county area.

Boat access to the Upper Mississippi is limited to small craft coming up from Minneapolis/St. Paul. The extreme northern portion of the river is largely limited to canoe access.

Recreation Resources

Regional recreation resources are depicted in Figure 6.

Rivers--As of April 1975, there were two rivers in the region formally designated as components of the National Wild and Scenic Rivers System. The Wolf River, Wisconsin, from the Langlade-Menominee County line downstream to Keshena Falls; and the St. Croix River between the dam near Gordon, Wisconsin, (including its tributary the Namekagon from Lake Namekagon downstream to its confluence with the St. Croix) to the confluence with the Mississippi which is 52 miles downstream. The designated section of the Wolf River lies approximately 245 miles east of the Upper Mississippi and is considered one of Wisconsin's most scenic and rugged rivers. The Upper St. Croix-Namekagon system, flowing through heavy timbered land, lies approximately 85 miles east of the Upper Mississippi, while the Lower St. Croix lies only 35 miles from the southern portion of the Upper Mississippi study reach. The lower 25 miles of the St. Croix were designated as a recreational river component of the National System on June 17, 1976.

The Upper Iowa River in northeast Iowa, approximately 175 miles south of the Upper Mississippi, has been designated for potential addition to the National Wild and Scenic Rivers System. In 1971 the Department of the Interior recommended that the Upper Iowa be included in the National Wild and Scenic River System as a State designated and administered scenic river. The State, however, has not requested Secretarial designation to date.

In addition to the Upper Mississippi, there is another river in the Upper Mississippi region currently being studied for inclusion the National Wild and Scenic Rivers System--the Wisconsin River from Prairie du Sac to its confluence with the Mississippi River at Prairie du Chien, lies approximately 210 miles southeast of the Upper Mississippi. The Kettle River lying approximately 70 miles east of the Mississippi was also named as a study river. The State has designated and is managing a portion of the river as a State scenic river. Secretarial designation as a State administered component of the National Wild and Scenic Rivers System can be made upon request by the Governor.

Passage of Minnesota's Wild and Scenic Rivers Act in 1973 provided protection for Minnesota's outstanding rivers. Fifteen rivers are identified in the State outdoor recreation plan for further study as possible inclusion in the State system. The Kettle River, portions of the Mississippi River, north fork of the Crow River, Rum River, and the Crow Wing River are but a few of these rivers which have been or are being studied. In fact, in July 1975 the Minnesota Department of Natural Resources designated the 52-mile stretch of the Kettle River in Pine County as the first component of the Minnesota Wild and Scenic Rivers System, and in June 1976 designated a stretch of the Upper Mississippi between St. Cloud and Anoka as the second component. The original 16 rivers were designated by the legislature in 1967 as canoe and boating routes, but legislation provided only for identification and signing, not protection.[1/] The Minnesota Wild and Scenic Rivers Act provides that detailed management plans be prepared for each river.

Lakes and Reservoirs--Natural lakes and man-made reservoirs are numerous in the Mississippi region and provide a significant amount of slack water recreation opportunity adjacent to the river. Minnesota possesses 3.1 million acres of lakes, some of which interconnect portions of the Upper Mississippi River. Of the State's 10 largest lakes, the Mississippi River passes through three--Winnibigoshish, Cass, and Pokegama, totaling 115,196 acres. Within the 14-county study area there are 1,200,518 lake basin acres (38.7 percent of the State's 3.4 million lake basin acreage). Reservoirs were created by dams constructed at Lake Winnibigoshish, Leech Lake, Pokegama Lake, Pine River, Gull Lake and Sandy Lake--all of which are within the 14-county study area.

1/ Minnesota SCORP, 1974, p. 4-85.

Most seasonal home development in Minnesota has been built on desirable lakeshores. In fact, the combination of residential and resort development has led to a shortage of accessible lakeshore for public recreation in some areas of the State. With lakes as a natural environment, emphasis is being placed on the aesthetic qualities and priority of Minnesota's water resources to continue the State's national recognition as a vacation wonderland.

Other Resources--State and Federal managed forests, waterfowl refuges, and parks in the 14-county region provide significant recreational opportunities.

The system of State parks and historic sites administered by the Minnesota Department of Natural Resources is diverse and provides a variety of environmental opportunities for outdoor recreation enjoyment. In and near the study area, there are six State parks totaling approximately 48,345 acres. See Table 5. The largest of these are Itasca and Savanna State Parks covering 29,290 and 14,650 acres, respectively.

Facilities at these parks and many others within the study area include swimming beaches, boat launching ramps, foot trails, and family and group campgrounds. Many of the State parks have been developed around unique natural features.

The Minnesota Department of Natural Resources has the responsibility for managing State forests. Within the 14-county study area, there are 23 State forests. It is the policy of the Minnesota DNR to protect, develop, and administer these lands for the best combination of uses similar to that of the national forests. The primary purpose of the State forests is management for timber and pulp production to contribute to the State's wood fiber supply in addition to recreation opportunities.1/

The Minnesota Department of Natural Resources also has the responsibility for managing 1,081,000 acres of wildlife areas, all located within 150 miles or less of the Upper Mississippi. Lying within or adjacent to the 14-county study area there are 554,424 acres of wildlife reserves (51.3 percent of the State's total). In addition, public access sites for fishing, hunting, boating, and other water activities, totaling 1,600 acres, are managed by the DNR. In all, the Minnesota DNR is responsible for managing more than 5.8 million acres of land--more than 10 percent of the State's area.2/

The U. S. Department of Agriculture, Forest Service, owns and manages approximately 2.8 million acres in northern Minnesota in the Superior and Chippewa National Forests. National forest areas are managed under the principle of multiple-use, including timber production, watershed protection, wildlife habitat management, and recreation. The Upper Mississippi River flows for 70 miles through the Chippewa National Forest.

1/ Minnesota SCORP, P. 4-14.
2/ Minnesota SCORP, P 4-9.

Major recreational uses on the national forests in Minnesota are driving for pleasure, sightseeing, fishing, camping, and hunting. Other recreational activities provided for in these forests include swimming, picnicking, nature study, boating, canoeing, water skiing, and winter sports. In particular, within the Superior National Forest the Boundary Waters Canoe Area provides an outstanding canoe experience with its many interconnecting lakes and streams.

The U. S. Department of the Interior, Fish and Wildlife Service, manages more than 293,000 acres in Minnesota which includes five refuges--the Agassiz, Rice Lake, Tamarac, Upper Mississippi, and Sherburne National Wildlife Refuges. Both the Rice Lake and Sherburne National Wildlife Refuges are within the 14-county study area and provide over 48,000 acres of wildlife refuge. In addition, the Fish and Wildlife Service administers 530 waterfowl production areas, most of which are located in western Minnesota within the Mississippi waterfowl flyway corridor. Although these areas are managed primarily for waterfowl, other wildlife also benefit. Federal refuges are used for waterfowl production and, in part, for hunting. They also provide opportunities for fishing and trapping[1/] and wildlife observation.

The U. S. Department of the Interior, National Park Service, administers the recently established Voyageurs National Park. Located in the northeastern portion of Minnesota, the park will eventually comprise 219,000 acres of land and water. Interpretation of natural and historic features will be a key attraction of the park.

The Bureau of Land Management administers approximately 43,000 acres of surveyed uplands and more than 1,000 islands in Minnesota. These lands contain 423 lakes and 21 rivers. There are 120 Bureau of Land Management islands in the Upper Mississippi study area.

A 1972 Minnesota DNR inventory revealed the State to have more than 4,300 miles of trails--any path, trail, or road used or intended for hiking, snowmobiling, horseback riding, or bicycling. Of the 4,300 miles, the 14-county study area contains 1,725 miles (or 39.3 percent of the State's total trail miles). In addition, the proposed North Country Trail system will not only connect Minnesota's trails to other States, but will also connect the Upper Mississippi to other States as it runs along and over the river. Tentatively, the trail will cross the Mississippi River at Savanna State Forest and once again at the headwaters of the Mississippi in Itasca State Park.

1/ Minnesota SCORP, 1974, P. 4-5

TABLE 5
FEDERAL AND STATE PARKS--SIZE FACILITIES AND VISITATION
(Attendance Figures for Calender Year 1974)

STATE PARK	ACRES	FACILITIES				NONRESIDENT USE % OF VISITATION	TOTAL USE
Lindbergh	295.65	P FT I	(M) (P) SDS			20	26,936
Crow Wing	1,418.22	P S I	(M) FT F	SDS ST		17	50,953
Itasca	29,290.60	P S FT	(M) F (M) (E)	SDS B/C CGC	ST	33	1,142,031
Lake Bemidji	405.48	P S FT	I F (M)	SDS B/C CGC		N/A	185,887
Savanna Portage	14,605.55	P S FT	I F (M)	B/C ST		N/A	58,020
Schoolcraft	212.33	P FT	F (M)			18	8,753
FEDERAL PARK							
Voyageurs National	219,431	P FT I	F (P) (M)	(E) SDS B/C	ST		
Leech Lake Recreation Area	75	P F	(M) SDS				6,600
Lake Winnibigoshish Recreation Area	10	P F	(M) SDS				2,900
Pokegama Lake Recreation Area	10	P F	(M) SDS				1,600

P = Picnic Ground
S = Swimming Beach
FT = Foot Trails
I = Interpretation
F = Fishing Campgrounds
(P) = Primitive Campground Facilities
(M) = Modern Campground Facilities
(E) = Electricity
SDS = Sanitary Dumping Station
B/C = Boats or Canoes
CGC = Children Group Camp
ST = Snowmobile Trail

Source: Department of Natural Resources 1974 State Park Survey

The 1974 Minnesota State Comprehensive Outdoor Recreation Plan (SCORP) outlines general and specific necessities in each of the 11 economic development regions in the State. The 14-county study area is found in portions of Regions 2, 3, 5, 7, and 11. According to the SCORP, in 1980 there will be a need for additional acreage in trails, public access, camping, swimming areas, and picnic areas for these five regions that the Upper Mississippi flows through. Of the more than 41,000 recreation resource acres needed by 1980, these five regions require approximately three-fifths of that acreage[1/] with region 11 accounting for 36 percent of the total State need. The Minnesota Wild and Scenic Rivers Act points up the continuous need for preserving portions of the Upper Mississippi to preserve scenic and recreational qualities within the State.

1/ Minnesota SCORP, P. 2.

V. DESCRIPTION AND ANALYSIS OF THE RIVER

Water Resources

Flow Characteristics--The amount of water which flows throughout the year is important when considering the recreation potential of the Upper Mississippi River. Rate of flow is particularly important during summer months when recreation is at a yearly peak and water volume is at a minimum. An analysis of flow statistics for the study river is necessary to determine the variability of flow, monthly averages, extremes of high and low flows, and minimum flows considered adequate for good floatability. Gaging stations used in this analysis were located on the Mississippi River near Deer River, Grand Rapids, Libby, Aitkin, Royalton, and Anoka. An average of 64 years of record was available for these stations ranging from 30 years at Aitkin to 92 years at Grand Rapids.

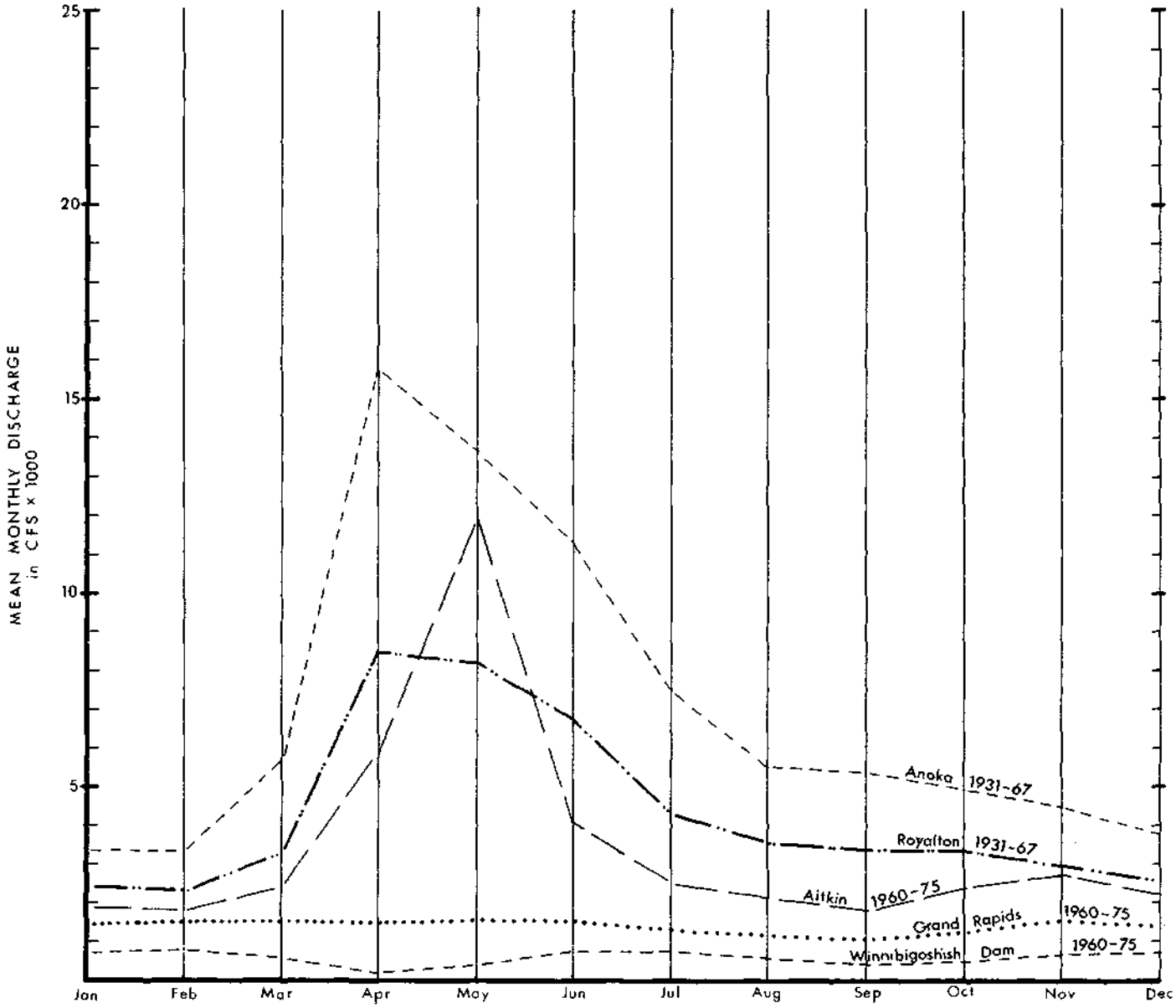
There are distinctive seasonal variations in average flow within the basin--the period of highest flow usually occurs in the spring and periods of lowest flow occur in mid-summer and winter. Mean monthly flows for April and May are generally two to five times the magnitude of that occurring in August and September. Most floods occur during the months of April through June, although floods can occur at any time of the year. The mean monthly flow for each gauging station is graphically shown in Figure 16.

In addition to rainfall and snowmelt, there are physical features within the riverbed that contribute to the flow dimensions of the Upper Mississippi at any given river segment. River width, for example, varies greatly over the 466 miles. The upper portions of this river are generally narrow and shallow. The river reaches its extreme widths below Brainerd averaging over 400 feet in width (see Figure 17).

The combination of the river's sinuosity (channel miles divided by axial miles--Figures 18 and 19) and gradient contributes largely to the velocity of current and the character to be found in any stretch of the river. Downstream from Aitkin the sinuosity is the highest in the study area at 4.7. The degree of meandering becomes noticeably less below Brainerd as the river's sinuosity approaches a factor of 1.0 (a relatively straight flowing river).

The average river gradient is 1.3 feet per mile. As depicted in Figure 19, the steepest section (between mile 45 and 105) is 3.29 feet per mile, and the most gradual gradient ranges are from nearly flat to .6 feet per mile between Lake Winnibigoshish and Brainerd.

The frequency of rapids in the river is extremely low. Most of the rapids occur below Brainerd as the river widens and the sinuosity lessens.



SOURCE : U.S. ARMY CORPS OF ENGINEERS

Figure 16

MEAN MONTHLY FLOW

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

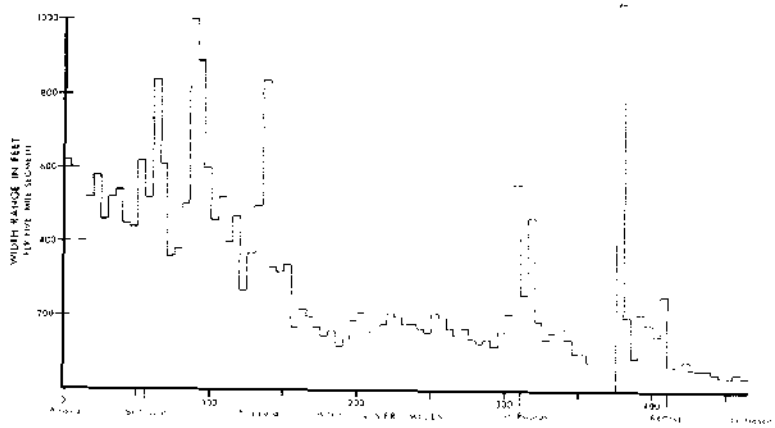


Figure 17

RIVER WIDTH

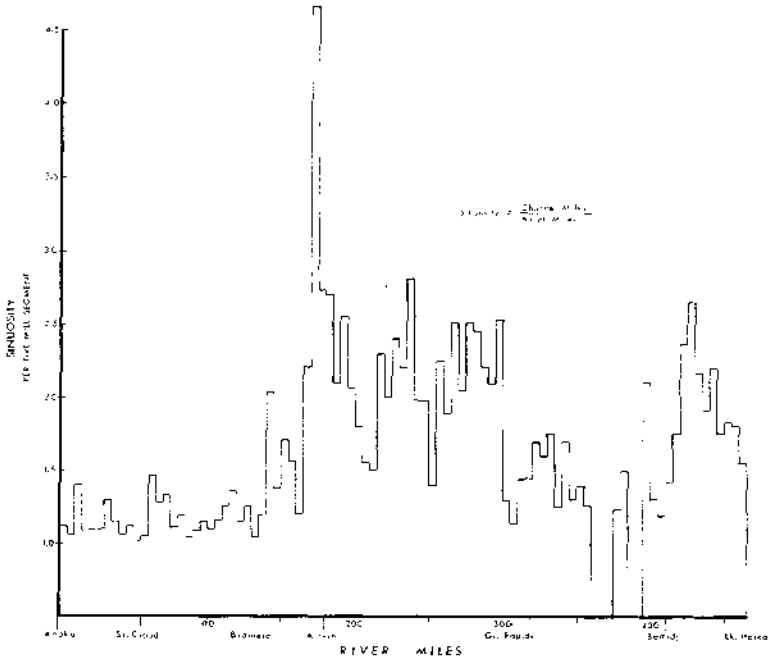
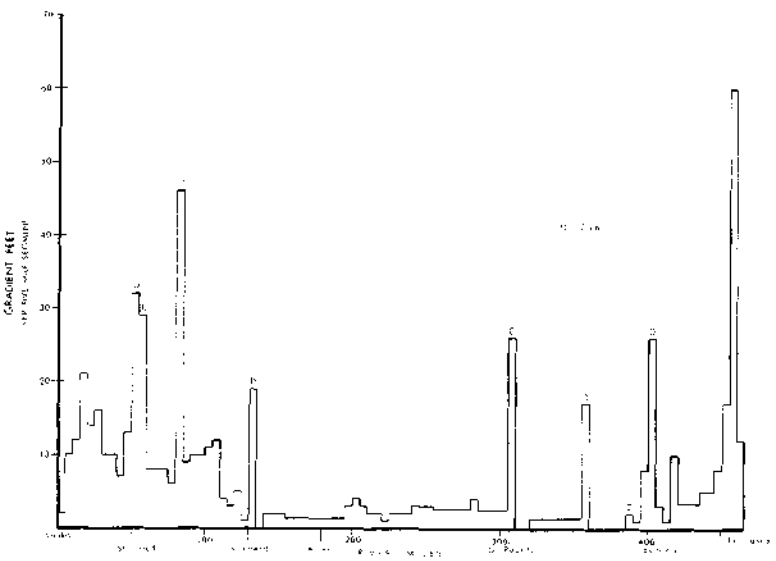
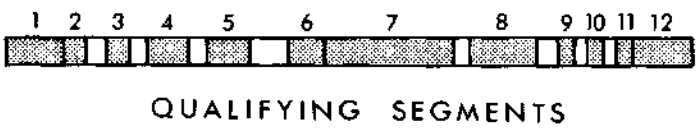


Figure 18

SINUOSITY





QUALIFYING SEGMENTS

Figure 19

GRADIENT

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

Source: Bureau of
Outdoor Recreation

Although rapids do not play a large role in characterizing the river's flow, the abundance of islands and oxbows in the river greatly alters the water's turbidity, as well as the canoeists visual perception of how the river flows. The greatest incidence of oxbows occurs between mile 280 to 315. The frequency of islands is greatest below Brainerd. Figures 21 and 23 shown on page 95 indicate that island frequency occurs where the incidence of oxbows is the lowest and vice versa.

Different reaches of the river combine various flow characteristics to produce distinctive canoeing experiences. For example, the reach above Lake Bemidji possesses a great degree of solitude and scenery variation due to its high sinuousity, narrow river width, and rapid gradient changes. Between Grand Rapids and Aitkin, high frequency of oxbows, relatively high sinuousity, and river width averaging between 125 to 200 feet create a different visual experience as one floats the river. The lowest reach, Brainerd to Anoka, combines great river width and a high incidence of islands to produce still another type of canoeing experience.

Canoes are most suitable for use on the shallow upper portions of the Upper Mississippi. Areas particularly good for floating are: between Lake Itasca and Lake Bemidji, below Otter Tail Dam, and below Lake Winnibigoshish. These areas experience periods of extreme shallow water due to either seasonal variations or from impoundments influencing water flow. Below Grand Rapids, larger craft are suitable, depending on river current, weather conditions, and seasonal water flow.

Water Use--An important doctrine in Minnesota water laws is the State's ownership of navigable waters and the underlying bed. The fundamental aspect of the doctrine is that the State acts as trustee for the people and holds the navigable waters and lands under them for public use. These laws enable people to use and enjoy the waters of Minnesota equally and in common with riparian owners.[1/] Ownership boundaries are established by the "highwater line." The highwater line separates aquatic and terrestrial vegetation excluding drought or flood conditions. The mineral rights are also owned by the State within those boundaries.

Agencies establishing policy for the river include: Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, U. S. Environmental Protection Agency, Water Resources Board, and U. S. Army Corps of Engineers. Agencies which are involved in the enforcement of police powers include: U. S. Coast Guard, U. S. Fish and Wildlife Service, National Park Service, U. S. Environmental Protection Agency, and U. S. Army Corps of Engineers. Permits with the Minnesota Department of Natural Resources, U. S. Army Corps of Engineers, and the Minnesota Pollution Control Agency are required prior to extraction of material from the riverbed.

1/ Upper Mississippi River Comprehensive Basin Study, Appendix J., 1970, p. J-30.

The Mississippi River is a navigable waterway of the United States from the Gulf of Mexico upstream at least to Lake Bemidji. However, the nine-foot navigation channel extends upstream only to the Soo Line Bridge in North Minneapolis. The U. S. Corps of Engineers plays the predominant role in developing and constructing navigation projects in the State. Department of Army permits are required on the Upper Mississippi for all types of work (structures, dredging, filling, etc.). This is the Federal jurisdiction. Under State authority, the Commissioner of the Department of Natural Resources has administration over the use and control of public waters, including navigation affecting waters within the State.1/

There are no plans for any commercial navigational use of the river above Anoka, nor is there authority to permit such use. The limiting factor in the minimum river flow below Anoka is the amount needed for the metropolitan area water supplies. This amounts to a seven-day, 10-year low flow of 1,860 cfs at Anoka to accommodate all water needs including wastewater supply. Navigation is a secondary factor in the minimum river flow requiring only about 300 cfs to replace water lost during lockages. The Northern States Power Company hydroelectric plant at St. Anthony Falls operates on a streamflow basis and is not considered a priority use. If the streamflow is too low, the plant does not operate.

There are six Mississippi headwater lakes which were constructed to maintain necessary navigation depths. These headwater lakes are now operated, when feasible, to reduce flood stages, to aid and maintain fish and wildlife, to provide a water supply for downstream communities, and to provide recreation facilities for public use. These lakes are located in four northcentral Minnesota counties: (1) Gull Lake Dam in Cass and Crow Wing Counties, (2) Pine River Dam in Crow Wing County, (3) Big Sandy Lake Dam in Aitkin County, (4) Lake Pokegama Dam in Itasca County, (5) Leech Lake Dam in Cass County, and (6) Lake Winnibigoshish Dam in Itasca and Cass Counties. All river impoundments are portrayed in Figure 20.

The primary functions of these reservoirs today are to reduce flood stages and to maintain satisfactory levels for summer recreation. There is also a diversion channel above Aitkin, Minnesota, that was constructed for flood control.

The only significant flood problem area in the basin is in the vicinity of Aitkin where flood stages are reduced by a flood diversion channel north of town and by four of the Corps' upstream reservoirs: Leech Lake, Winnibigoshish Lake, Pokegama Lake, and Big Sandy Lake. The flood storage capacities of Pokegama and Big Sandy are small, and the reservoirs are capable of only slightly reducing peak flood stages at Aitkin.2/

1/ UMRCB Study, Appendix J, P. J-31.

2/ Appraisal Report for Hydroelectric Licensing, FPC, Bureau of Power 1975, p. 43.

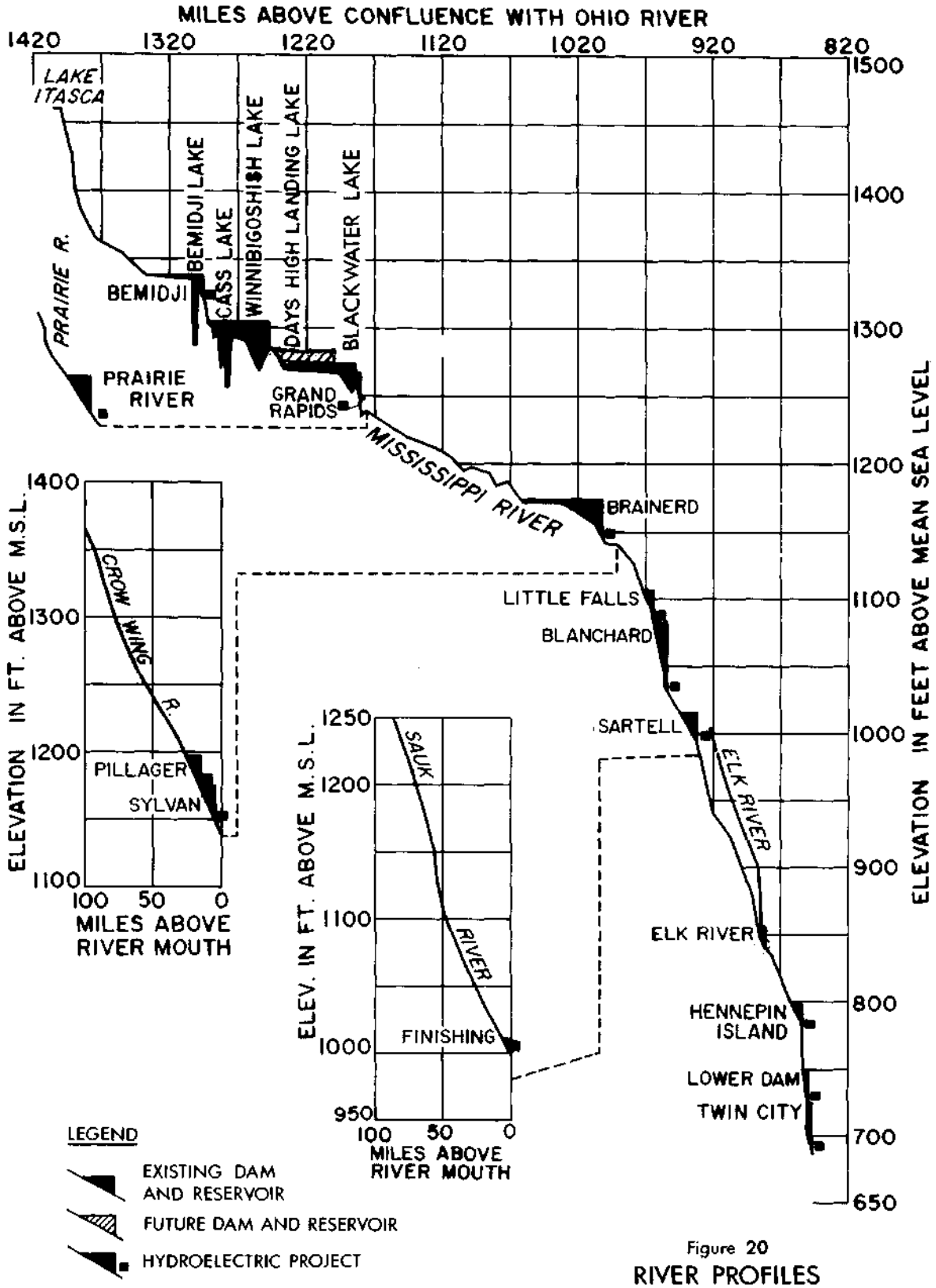


Figure 20

RIVER PROFILES

UPPER MISSISSIPPI

WILD AND SCENIC RIVER STUDY

MINNESOTA

SOURCE: Federal Power Commission, Water Resources Appraisal for Hydroelectric Licensing.

The waters of Minnesota, including the Upper Mississippi River, are used for generation of hydroelectric and steam power. In addition to hydro and steam use of the waters, nuclear plants now use this same water for their cooling processes in generating nuclear power for the basin. These power generating facilities are regulated somewhat by the Commissioner of the Department of Natural Resources, in that permits to appropriate waters must, in certain instances, be acquired,[1/] and by the Environmental Quality Council (EQC), which is empowered to select plant sites. A complete discussion of power generation is found in the Regional Setting chapter of this report.

47. *Irrigation pump.*

Irrigation is practiced to some extent along the Upper Mississippi and its basin. The distribution of rainfall in the area is particularly favorable to agriculture and is generally ample during the growing season. A permit system for the appropriation of ground and surface water in Minnesota has been in effect since 1937. The maximum irrigation appropriation is six inches of water per year per acre of land. The area of greatest water use for irrigation, amounting to about 50 percent of the total water use, is in central Minnesota primarily on truck farms in Sherburne, Stearns, Todd, and Anoka Counties, all of which are situated within the basin.[2/]

The major industrial water use in the basin is in the Minneapolis/St. Paul SMSA. The estimated industrial waste production for the 14-county study area totals approximately 38 percent of the entire basin. The main study area contributors of such industrial waste are Itasca and Stearns Counties.[3/] The Cities of Grand Rapids, Brainerd, and St. Cloud are the major industrial users along the river corridor.

The by-products of water use, domestic/commercial raw waste, and industrial waste are evident in the Mississippi basin. As mentioned, the 14-county area comprises 38 percent of the basin's industrial waste. In addition, the study area contributes 8.1 percent of the basin's domestic/commercial raw waste. Turbidity in the Prairie River south of Grand Rapids appears to be a serious nonpoint source water quality problem. Water quality problems resulting from poor agricultural practices are emerging as another significant pollution source in the basin. For further detail, refer to the water quality section of this chapter.

1/ UMRCB Study, Appendix O, P.O-339
2/ Appraisal Report for Hydroelectric Licensing, FPC, Bureau of Power, p. 50.
3/ UMRCB Study, Appendix H. Table H-26.

Water use by Indian tribes along the Upper Mississippi includes adequate water supplies needed for the tribes to carry forth their management of wild ricing and everyday uses.

Aside from the human water consumptions, the Upper Mississippi River is a prime source for a variety of fish and wildlife. The abundance and overall quality of the river and other basin waters makes the study reach a natural water fowl breeding ground and feeding area. This is discussed in more detail in the wildlife section of this chapter.

The only proposed U. S. Army Corps of Engineers proposal on the Upper Mississippi now pending is the Days High Landing project. Days High Landing is a narrow valley dam proposal on the Mississippi River at Mile 330 near the Town of Deer River. Just upstream from here the river winds its way through large open marsh known as the White Oak Lake area which covers about 15 square miles. This area is located in Figure 1 as Days High Landing. White Oak Lake is a natural shallow lake with low, almost indeterminant bank lines, the level of which is controlled mainly by discharges from Winnibigoshish and Leech Lakes and to a certain extent by the flow of Deer River, a small stream entering the area from the north. Huge stretches of wild rice occur intermittently here with brushy areas.

Local interests have indicated that the generally low and fluctuating water levels in the White Oak Lake area have an adverse effect on the wild rice, fish, and wildlife values in the area. They have requested that a low head dam be constructed at Days High Landing to control the area's water level.

The existing water level of 1,274.3 feet above sea level creates open water in the White Oak Lake area totaling about 1,540 acres and wild rice growing area of about 1,000 acres. Stabilizing the pool elevation at 1,279 feet elevation, the highest alternative in the study proposal, would create an open water area of around 7,500 acres with 6,000 acres of favorable wild rice habitat.

Projected benefits involved include increased production of wild rice, an increase in the fishery resource of bullheads and northern pike, and an increased production of some furbearing animals such as muskrat and mink. A small increase in local employment would be realized along with an increase in Indian income from wild ricing. Increased benefits attributable to future economic growth and land values are negligible.

The proposed dam would be 1,564 feet in length with 1,400 feet of earthen fill and 164 feet of concrete for the control structure. The overall height would be 10 feet. An upstream approach channel 1,200 feet in length would be excavated, and a 1,000-foot long channel of the same width would be excavated downstream from the control structure to the existing river channel. A small lock would be installed to accommodate larger pleasure craft. Projected overall cost of the project is about 2.2 million dollars.

A possible alternative to the construction of a dam at Days High Landing is the use of the dams at Lake Winnibigoshish and Leech Lake for low flow augmentation in the White Oak Lake area and adjustment of operating levels at Pokegama Dam. This alternative will be considered as part of a five-year study of the headwaters reservoirs and the Upper Mississippi River water level operations, presently under way and scheduled for completion by the U. S. Army Corps of Engineers by the early 1980's. If the Days High Landing project is built, about 10 miles of qualifying free-flowing river will be eliminated. If this segment is designated in the Wild and Scenic River System, this project would not be carried out.

Recreational use of the waters of the river is described in another section of this chapter. Lakes and impounded water in the river system are heavily utilized for recreation. Free-flowing segments of the river receive limited use from canoeists, hunters, fishermen, and harvesters of wild rice.

Water Quality--According to the Upper Upper Mississippi Basin Plan for Water Quality released in January 1976 by the Minnesota Pollution Control Agency (MPCA), all segments of the Upper Mississippi which otherwise qualify for inclusion in the National System will be in compliance with the 1983 goals of P.L. 92-500 which provides for a fishable, swimable water quality by that date. The basin plan, a requirement of Section 303(e) of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500), describes MPCA's pollution standards, permits issued for discharge, enforcement laws, system for monitoring water quality, and proposed use of Federal grant programs for pollution control.

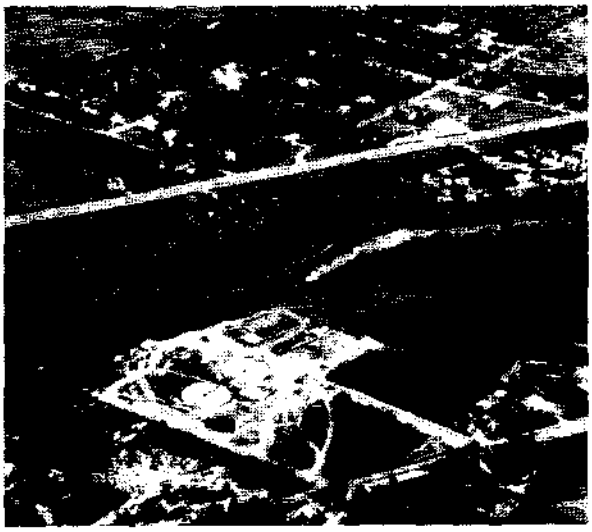
Since the priority for funding to upgrade water treatment is determined in part by the present condition of the receiving waters, it is important to compare the water quality of the Upper Mississippi River with the 11 other basins within the State of Minnesota.[2/]

Of the six water quality parameters with applicable water quality standards the Upper Mississippi ranked as follows among the 11 river basins of the State:

Parameter	Number of Miss. River Samples	Percentage of Violations	# of Basins With Same Percentage of Violations	# of Basins With a Higher Percentage of Violations
Turbidity	90	0	4	7
pH	90	1	0	3
Water Temp.	82	0	11	0
Ammonia Nitrogen	90	0	4	7
Fecal Coliform	91	29	0	8
Dissolved Oxygen	90	3	2	0

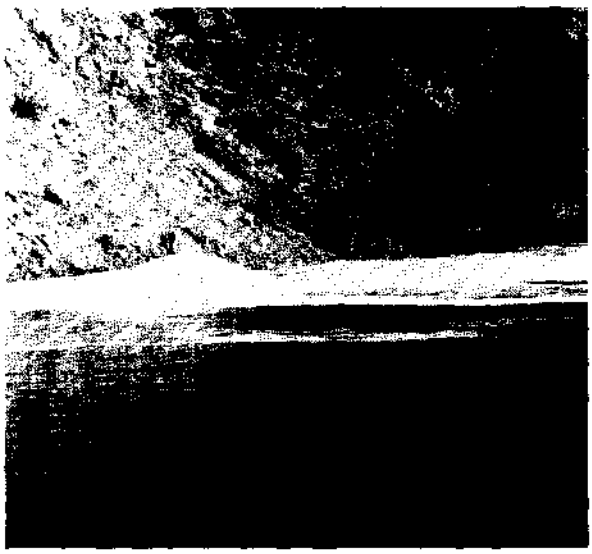
1/ This plan refers to the Mississippi basin above the Twin Cities as the "Upper Upper."

2/ One of these basins is a specially designated water quality area within the Twin Cities.



48. Sewage plant construction in Grand Rapids, 1974.

49. Outfall from the Grand Rapids sewage plant in summer of 1975.



Parameters without an applicable state standard that affect the aesthetic quality of a water body, the average median values of total nitrates, total phosphorus, and total suspended solids could be considered to be extremely low. The water quality of the Upper Mississippi is exceeded only by the water quality of Lake Superior, the Rainy River, and the St. Croix River. With the exception of high fecal coliform levels and low dissolved oxygen concentrations, the water quality is generally comparable to these other water bodies. Due to higher water quality standards set for the St. Croix River, more water quality violations occur on the St. Croix than on the Upper Mississippi.

Municipal wastewater treatment plant construction grants in the Upper Mississippi River basin are near the middle in priority when compared to programs in other basins. The 141 municipalities in this basin that appear on the Municipal Discharge Inventory (MDI) are evenly distributed on the list. Of the Basin's municipalities appearing on the Municipal Needs List, 30 rank high enough to appear on the current Municipal Project List. These communities are eligible for State-Federal grant funds. However, actual funding for these projects is dependent on the availability of grant moneys.

There are 96 industries known to be discharging to surface waters in the Upper Mississippi River basin. A total of 83 of these industries appear on the Industrial Discharge Inventory (IDI), which is a priority ranking of the State's industrial dischargers. The basin's industries on the IDI are evenly distributed on

the list, indicating that the severity of the industrial pollution problem in the basin is moderate relative to other areas in Minnesota. There are also nine miscellaneous facilities that discharge to surface waters in the basin. Wastewater treatment plant improvements for facilities in this latter category are not funded through the State-Federal construction grants program.

Nine water quality monitoring stations representing approximately 20 percent of the State's long-term monitoring network are located along the Upper Mississippi just downstream from major point sources of pollution. This information does not portray the general health of the river but monitors key points of degradation. The values of water quality parameters for each of the nine stations plus three other stations since terminated are shown in Table 6.

A summary of the water quality analysis is presented by qualifying river segments (Figure 1) as follows:

Segments 12 and 11

There have been only two monitoring stations within Segments 11 and 12. The first, at the outlet from Lake Itasca, is a MPCA station, which provides a long-term record of most significant water quality parameters. The second, at the outlet from Lake Irving, provided data on nutrient inflows at the lake only for the period 1972 to 1973. Since there are no discharge points in the study segments or major tributary streams, it was assumed that the water quality data from station UM-1365 was representative of both Segments 11 and 12. Data from this station is portrayed in Table 6.

At the time of a 1975 fishery survey conducted by the Department of Natural Resources, it was observed that submerged aquatic plants covered in excess of 90 percent of the river bed in the area in question. Because of shallow river depth and relatively low flow, plant photosynthesis and respiration can result in extreme diurnal fluctuations of dissolved oxygen, carbon dioxide, and pH. This should only be construed to be of natural origin for this segment of the Mississippi River. Any aberrations in ammonia levels can be attributed to decomposition of plant material. Fecal coliform violations have also been noted and are believed to be caused by animal waste material deposited in the river during low flow conditions.

Temperature peaks in the uppermost reach of the Mississippi are a result of its origin from the epilimnetic waters of Lake Itasca. Extreme warm, calm periods during summer stratification of the lake can cause nontypical but certainly natural high river temperatures.

The portion of the Mississippi between Lake Itasca and Lake Irving would generally be rated poor as a sport fishery. Isolated stretches of better quality fisheries can be found here where coarse substrata and increased stream gradient distinguish the river from the more extensive

TABLE 6

WATER QUALITY

SOURCE: Minnesota Pollution Control Agency

DESCRIPTION	TEMP (°F.)		D.O. (mg/1)		BOD_5 (mg/1)		NH_3 (mg/1)		FECAL COLIFORMS (MPN/100ml)		TDS (mg/1)		pH		TURBIDITY (JTU)		OIL (mg/1)		NO_3 (mg/1)		PHOSPHORUS (mg/1)		TSS (mg/1)	
WATER QUALITY STANDARDS IN THIS SEGMENT	5° above natural 86° max. 3° above natural in lakes		6-April 1-May 31; 5 other times		--		1.0		200		--		6.5-8.5		25		0.5		--		--		--	
MONITORING STATIONS	AVG. MAX.	% VIOLATION	AVG. MIN.	% VIOLATION	AVG. MAX.	% VIOLATION	AVG. MAX.	% VIOLATION	AVG. MAX.	% VIOLATION	AVG. MAX.	% VIOLATION	AVG. RANGE MAX.	% VIOLATION	AVG. MAX.	% OF VIOLATION	AVG. MAX.	% OF VIOLATION	AVG. MAX.	% OF VIOLATION	AVG. MAX.	% OF VIOLATION	AVG. MAX.	% OF VIOLATION
Mile 464 - Bridge on SH-200, 1/2 mile W of Lake Itasca	50.4		9.3		2.0		0.14		102.9				7.78		2.62				0.135		0.08		6.4	
80 reports from 1965, 1967-75	80.0	2	3.4	9	7.1		1.6	1	1700.0	9			8.6	1	12.0	0			2.80		0.70		54	
Mile 413 - Bridge on CSAH-8 E. of Bemidji	49.9		11.09		2.3		0.153		419				8.06		2.35				0.15		0.108		5.05	
78 reports from 1967-75	83.0	0	7.6	0	5.2		0.70	0	1100	26			8.9	13	17.0	0			1.5		0.250		18.0	
Mile 358 - Bridge on CSAH-9 at Federal Dam	49.5		10.14		1.95		0.102		32.8				7.82		1.73				0.15		0.061		5.37	
39 reports 1971-75	77.0	0	5.60	0	6.70		0.2100	0	330	3			8.4	3	4.0	0			2.0		0.420		18.0	
Mile 323 - Bridge on SH-6 SW of Cohasset	49.05		8.54		2.01		0.117		77				7.70		3.11				0.138		0.07		6.5	
80 reports 1967-75	78	0	4.2	2	4.8		0.520	0	2400	6			8.4	0	15.0	0			1.5		0.64		32	
Mile 298 - County Road 441 Bridge, 5 miles SE of Grand Rapids	44.1		8.23		2.75		0.07		1405				7.8		4.22				0.15		0.06		7.94	
11 reports 1974-75	71	0	3.9	9.1	4.5		0.13	0	4900	91			8.2	0	7.60	0			0.32		0.14		16.0	
Mile 264 - Miss. River Bridge on SH-200 at Jacobson	49		8.2		2.6		0.12		1076		180		7.6		7				0.17		0.07		12	
78 reports 1967-1975	76	0	4.6	2	8.0		0.46	0	1657	67		0	6.9-8.7	1	30	1			0.32		0.22		58	
Mile 156 - Miss. River Bridge on SH-6 North of Crosby	51				2.6		0.05		129		200		7.5		20				0.24		0.08		15	
7 reports 1967-68	74	0			6.0		0.05	0	490	29		0	7.0-8.0	0	35	14			0.44		0.13		28	
Mile 99 - Bridge on SH-155 at Camp Ripley	51		9.1		2.5		0.11		316		183		7.8		6.6				0.17		0.1		9	
77 Reports 1967-75	78	0	5.1	0	9.7		0.31	0	3100	46		0	7.3-8.3	0	26	3			1.1	0	0.35		39	
Mile 79 Bridge on CSAH-26, W. of Royalton	50		9.9		1.9		0.10		125		185		7.9		3.7				0.18		0.11		6	
41 reports 1971-75	76	0	6.5	0	3.9		0.23	0	490	22		0	7.2-8.4	0	6.5	0			0.7	0	0.61		23	
Mile 55 - at St. Cloud WTW intake	53		9.3		2.8		0.12		264		212		7.7		19				022		0.14		45	
59 reports 1967-73	79	0	5.9	0	7.9		0.39	0	1700	46		2			600	3			0.25	0	0.54		1900	
Mile 40 Bridge at SH-24 at Clearwater	51		9.8		2.4		0.14		1132		170		7.9		7.1				0.20		0.17		13	
80 reports 1967-75	79	0	6.1	0	5.5		1.0	0	23000	75			7.3-8.5	0	100	1			0.70	0	4.0		230	
Mile 11 Bridge on SH-101 at Elk River	53		8.7		3.3		0.08		1546		245		7.8		11				0.76		0.21		18	
44 reports 1957-65	82	0	5.0		7.5		0.3		4900	85		0	6.6-9.2	11	29	2			3.2		1.5		52	

areas characterized by over abundant submerged vegetation, detritus bottom, and marsh or floating bog borders.

Downstream segments of the Mississippi River study area possess far greater fisheries attributes; but the shortcomings of the headwaters segment, in this category, should not be overemphasized. Present conditions are a result of natural geological and evolutionary processes and not the influence of man.

Segment 10

Fecal coliform and pH violations have been recorded within this segment (Stations UM-1292 at Mile 393.5 and LLR-18 at Mile 409). The last fecal coliform violations noted here were in March 1974. Although the sources of these violations are not known, they may be the result of unsewered residences, poor pasturing practices, or feedlot operations along this reach since there is no industrial component in the Bemidji sewage system. Poor effluent quality data on the operation of the Bemidji sewage treatment plant prevents an evaluation of fecal coliform contamination from this source. However, Bemidji is by far the largest point source of phosphorus in this segment contributing approximately 46 percent of the phosphorus loading to Wolf Lake and 34 percent to Cass Lake, at the downstream end of the segment.[1/] Due to the close proximity of the Wolf Lake outlet to its inlet, only 12 percent of the upstream phosphorus load is retained in the lake. However, the accumulated nutrients in Wolf Lake, Lake Andrusia, and Cass Lake are sufficient to cause excessive biomass production during the spring and fall months and both Wolf Lake and the Allen Bay portion of Cass Lake have been treated to control rooted aquatic plants and filamentous algae in past years.

The implementation of phosphorus removal facilities at Bemidji would have its greatest and most immediate impact on Cass Lake. The survey yielded two major findings: First, that even with phosphorus removal facilities at Bemidji the remaining phosphorus loadings to Lake Andrusia would still be 1-1/2 times Vollenweider's permissible loading rate.[2/] The installation of phosphorus removal at Bemidji is expected to reduce its share of the phosphorus loading to Cass Lake from 34 percent to six percent. This figure is below the permissible phosphorus loading rate and would reverse the eutrophication of this lake. At this point, the phosphorus loading from the Cass Lake facility would become a greater source (seven percent).

Second, a major portion of the phosphorus loading to Wolf Lake could not be accounted for in the nutrient budget. The remaining phosphorus is assumed to be released from channel sediments under conditions of fluctuating water levels. Nitrogen concentrations are the limiting factor in this chain of lakes under normal conditions; however, a phosphorus

1/ National Eutrophication Survey Working Papers 81, 84, 92, and 136 U.S. EPA, Nov. 1974.

2/ Lake Eutrophication Survey Working Papers 81, 84, 92, and 136 U.S. EPA, Nov. 1974.

deficiency may develop during summer stratification conditions. Recreational use of Segment 10 may be impaired somewhat in the near term by over-enrichment. However, the present water pollution abatement schedule should not preclude the complete attainment of a water quality suitable for fish and aquatic life propagation and whole-body contact recreation within the next seven years.

Segments 8 and 9

The nutrient levels of the Mississippi mainstem were quite low, as measured at the Cass Lake outlet, Station 2715A1 at Mile 385.4, presumably due to impoundment. Sampling data for other parameters was not available from this station. However, the water quality of Segment 8 is monitored regularly at Mile 323. At this point, upstream of Black Water Lake, the river has experienced infrequent dissolved oxygen and fecal coliform violations. Both parameter violations may be related to nonpoint source contributions, and in the case of the low dissolved oxygen levels, seemed to vary with flow and temperature conditions. With the possible exception of the Bemidji and Cass Lake sewage treatment facilities, there are no significant municipal or industrial discharges which significantly affect the study area above this point. The proposed scenic designations for Segments 8 and 9 are consistent with existing water quality conditions, since the violations are infrequent and are apparently related to natural conditions.

Segments 6 and 7

The water quality of the 127-mile length of Segments 6 and 7 is monitored at two points, mile points 298 and 264. The upstream station indicated fecal coliform contamination and low dissolved oxygen levels which have been traced to the Grand Rapids area. Fecal coliform violations were noted in over 90 percent of the samples taken. Both the Minnesota Power and Light Company at Cohasset and the Grand Rapids wastewater treatment plant have been singled out for violations of turbidity standards. However, the greatest increase in turbidity levels may periodically occur below the confluence with the Prairie River. Iron mine drainage at this point appears to significantly increase the turbidity and change the color of the mainstem during high flow events. The source of this drainage is presently unknown, since both of the mines in this watershed are believed to be in compliance with their NPDES requirements at this time.

The State Pollution Control Agency has indicated that during high flow events leachate from tailings piles and holding pond overflows may reach the Prairie River. The turbidity and reddish color of the Prairie River noted during the study associate's field inspections may have been due to nonpoint sources from these mining operations and would be corrected under the Minnesota Mined Land Reclamation Act. The fecal coliform and turbidity violations caused by point sources in the Grand Rapids area affects the remainder of Segments 6 and 7.

The recent completion of a new secondary treatment facility at Grand Rapids and the establishment of compliance schedules for industrial dischargers would indicate that the proposed designation of Segments 6 and 7 as recreational and scenic components, respectively, is consistent with projected water quality improvements.

Segment 5

Although monitoring data from widely separated points indicate a steady decrease in the frequency of the fecal coliform violations, turbidity violations do increase considerably just above Segment 5. The increase in average levels of nitrates with a corresponding decrease in ammonia levels suggests the decomposition of ammonia in this reach which, together with high BOD levels, would further impact dissolved oxygen levels. However, dissolved oxygen was not measured at Station 1029, Mile 156, and no standards violations were noted downstream. A number of small, inadequate municipal sewage treatment facilities discharge into this segment. Several of these communities are scheduled for connection to the proposed Crosby-Deerwood facility which ranks 20 out of the 67 projects eligible for a construction grant award from the 1976 State Project Priority List (PPL). Although the actual source of the moderate turbidity levels observed in this reach is not known, the unusually large increase in the frequency of turbidity violations between stations suggests a considerable loading from tributary streams or industries in the Aitkin area. The prospect for water quality improvement to meet applicable State standards in Segment 5 like Segments 6 and 7 appears to be good. Although present water quality conditions may not support body contact recreation, the long-term designation of Segment 5 as a proposed scenic river component seems appropriate.

Segment 4

The water quality of Segment 4 is monitored at Mile 99, near the southern terminus of this segment. At this point, the only violations noted were for fecal coliforms and turbidity. The high BOD levels and fecal coliform counts reflect the significant impact of inadequately treated upstream discharges in Segment 5 and, more particularly, municipal and industrial discharges in the Brainerd area. Turbidity levels are unchanged from those described in Segment 6, suggesting a naturally occurring problem with nonpoint sources. Total phosphorus concentrations remain high over the entire length of the Upper Mississippi and biomass production is apparently limited by the present low nitrogen concentrations. The State has reacted to this condition by requiring phosphorus removal facilities at most municipal and industrial discharge points above Brainerd. The present water quality of Segment 4 does not meet primary body contact recreation criteria and may periodically exceed the recommended criteria for secondary contact recreation. However, conditions appear to be adequate to support a well-balanced fishery. In view of the anticipated upgrading of upstream point source

dischargers and the minor nature of the turbidity problem, the recommendation for inclusion of Segment 4 as a scenic river component is justified.

Segment 3

The water quality of Segment 3 is sampled at Mile 79 within the lower third of the segment. This station, which is just above the only two point source discharges of the segment, showed a considerable improvement in the water quality of the mainstem at this point. Neither of the two discharges should significantly impact the remainder of this segment. Although the river does not meet primary contact recreation standards, it does appear to consistently meet recommended secondary contact recreation standards and aquatic life standards. The proposed designation as a recreational component is, therefore, consistent with present water quality conditions.

Segment 1 and 2

The water quality of the two segments is undifferentiated and treated in this discussion as one contiguous unit. Three long-term monitoring stations approximately border the proposed segments.

The only conclusive trend that can be established from this monitoring data is that fecal coliform violations appear to increase steadily below Mile 79. This trend would be expected with the increasing density of agricultural, suburban residence, and second home developments along this stretch of the mainstem. Although the total solids loading of the river shows a considerable increase below St. Cloud, with the corresponding increase in flows, turbidity violations are generally no higher than the background conditions noted in Segments 6 and 7. The cause of the fecal coliform contamination and solids loadings is not completely understood and may be at least partially related to nonpoint sources from agricultural activities and septic tank systems. However, a significant portion of these loadings is the result of inadequate municipal and industrial discharges and combined sewer overflows in the St. Cloud area. Four communities within Segments 1 and 2, including St. Cloud, are eligible for construction grant awards from Fiscal Year 76 funds.

Responsibility for nonpoint source control planning will rest with the State Continuing Planning Process for basin-wide water quality management. In addition to basin-wide nonpoint source control planning, the Hennepin County portion of Segment 1 will also receive accelerated funding through U.S. Environmental Protection Agency's Section 208 Areawide Waste Treatment Management Program.

Therefore, with the anticipated improvement in water quality projected over the next two to seven years, Segments 1 and 2 may be recommended for inclusion in the National System as recreational and scenic components, respectively.

Wetlands--Wetland occurrence on the Upper Mississippi River is confined primarily to the upper one-third of the study area as clearly portrayed by Figure 22. These vary in size and composition and offer the river user a completely different experience from the many miles of forested shoreline and the open agricultural lands.

Shortly after leaving Lake Itasca, the river enters the first of the numerous marshland areas to be encountered in the study reach. This is a relatively narrow band of marshland rarely exceeding one-fourth mile in width. The river flows through several such areas interspersed with forest in its course down to Bemidji. Just one mile upstream from Lake Bemidji, there is a substantial swamp area completely forested with lowland softwood trees. Cottonwood and similar species predominate in this area and hang over the river, creating the canopy effect of a cypress swamp. Between Cass Lake and Lake Winnibigoshish lies an area of slack water where the river spreads over another large wetland. Wild rice grows here in profusion and becomes a feature attraction in the autumn, drawing people from many miles around during the harvest season. Waterfowl also gather in large numbers here to feast on the rice.

50. Wetlands downstream from Lake Winnibigoshish.

Downstream from Lake Winnibigoshish the river travels through a narrow corridor of marsh for about 15 miles to the Ball Club Lake Area. This area has a very high incidence of oxbows due to early channelization to accommodate river traffic.

The most extensive wetland associated with the river occurs near the Village of Deer River and White Oak Lake. This covers about 12 square miles and is, in places, over three miles wide. At one time before it was channelized, the river meandered extensively in this area. As one

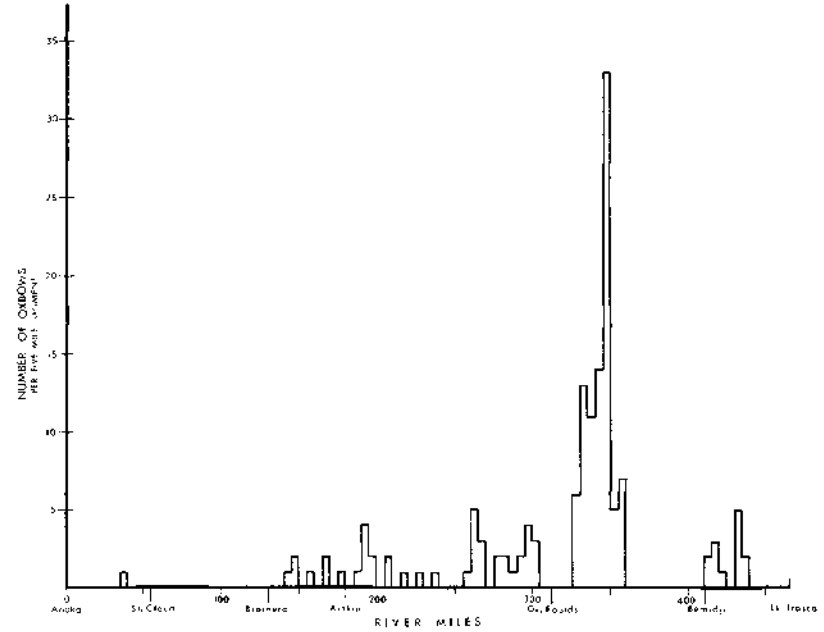


Figure 21

OXBOWS

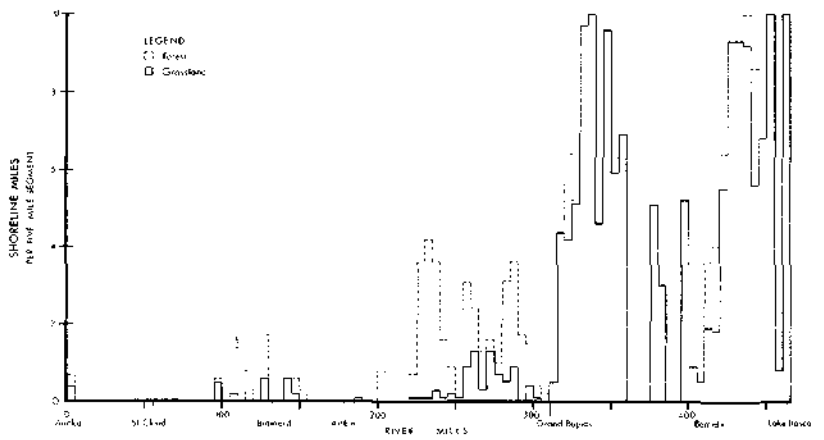


Figure 22

WETLANDS

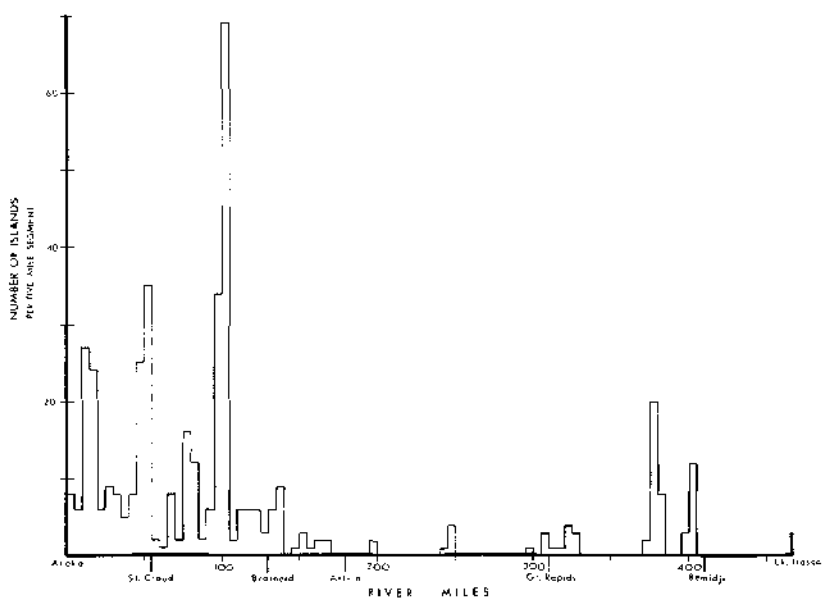


Figure 23

ISLANDS

QUALIFYING SEGMENTS

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

Source: Bureau of Outdoor Recreation

enters the wetland by canoe a huge vista opens up, imparting a feeling of vastness as opposed to the close feeling where the forest forms a canopy over the river's banks. The main river course often becomes obscure to the canoeist as the current slows and alternative channels become available.

Near the City of Jacobson, the river enters the Savannah State Forest named for the vast flooded plains it encompasses known as savannahs. This terrain covers many townships in this part of Minnesota and could be considered one of the State's largest wetlands; however, it is not readily apparent to the river traveler since the riverbanks are heavily wooded.

Oxbows--Oxbows begin to appear on the river upstream from Bemidji and continue to occur intermittently downstream to below Aitkin. Oxbows in every evolutionary phase are associated with the Mississippi River. Some are connected with the river; some are completely cut off, forming oxbow lakes; and some are no more than oxbow swamps or depressions having been cut off from the river hundreds of years ago and since filled in by aquatic vegetation. They vary in size from about an acre in surface area to over 100 acres. The oxbows accounted for in Figure 21 all contain water. Oxbow swamps or depressions are not counted.

The river's first oxbows are encountered in a marsh about 30 miles downstream from Lake Itasca. These are quite small due to the narrow character of the river in this area. Near the City of Bemidji another group of small oxbows occur. Few oxbows occur between Lake Bemidji and Lake Winnibigoshish. The highest concentration of oxbows is closely associated with the major wetland areas along the river's course, extending for 35 miles between Lake Winnibigoshish and the City of Grand Rapids. The oxbows were largely formed when the river was channelized. One five-mile stretch in this area averages over six per mile. A lesser concentration of oxbows occurs below Grand Rapids stretching for about 30 miles, becoming more scattered down to about Aitkin.

Many oxbows still in the early stages of development have created islands--most of which have remained relatively untouched by man. Interesting micro-environments are often associated with such islands.

Oxbows offer the river traveler a diverse experience from that of floating downstream. During periods of high flow, canoeists can follow a channel off the river to find a placid lake, sheltered by the surrounding forest. These occasionally prove to be good fishing spots as well as special nesting areas for waterfowl.

There are about 150 recognizable oxbows accounted for in the study area plus several miles of old channel which were cut off by early channelization projects. These old channels, usually more extensive than oxbows, can also be used for the same purposes.

Islands--Islands of the Upper Mississippi contribute substantially to the scenery and wildlife habitat of the corridor, particularly in the lower half of the study reach. The occurrence of a group of islands in a broad channel transforms the river environment from one dominated by expansive views to an intimate pattern of ribbon-like channels separating undisturbed, isolated ecosystems. The island experience provides a personal relationship with the character of the river that cannot be provided by the river's shoreline.

51. Islands of the Mississippi.

There are 418 islands located within the Upper Mississippi corridor as illustrated in Figure 23. Over 77 percent of these islands can be found between Anoka and Brainerd (130 miles); this equates into approximately 2.5 islands per mile. Above Brainerd, the frequency decreases to 0.3 islands for every mile. The first sighted island down the 466-mile study reach is at Mile 416 before the river enters Lake Bemidji. The first real frequency of islands occurs downstream for five miles below Otter Tail Power Dam (Miles 398 to 403). A cluster of five islands at the confluence of the Pine River (Mile 151) provides an opportunity to explore small river island ecosystems exhibiting lowland hardwood such as maple, ash, cottonwood, and elm. The confluence of the Crow Wing River (Mile 117-8) provides three islands suitable for day use and a reminder of the river's history. A fur trading post was once located on the largest of these islands. The Upper Mississippi Clough (Mile 96-105) challenges the river floater with approximately 45 islands of

varying size, while providing the recreator with ample opportunity for hunting, fishing, and limited camping. Some of the larger islands below the Clough are: Roscoe (40 acres), Ducette (28 acres), and Topeka (18 acres). At Mile 51-53, just south of St. Cloud, the Beaver Islands are encountered. These islands not only provide for a songbird sanctuary but allow the canoeist to once again experience the river's intimacy as found in the upper reaches of the Mississippi. Once owned by the Northern States Power Company, they were donated several years ago to St. Cloud State College for study purposes. Near Elk River the channel is enhanced by a cluster of 15 islands (Mile 12-14). These lowland hardwood islands could provide for limited day use and camping.

There are several islands associated with the river which were created by the formation of oxbows. Although these islands are not located in the river's channel, they are well within the limits of the corridor. These oxbow islands are not subjected to the scouring action of the current and consequently are much more stable and do not shift position over the years. Oxbow islands range in size and are usually wooded. Oxbow islands are not accounted for in Figure 23.

The Bureau of Land Management (BLM) has stewardship responsibility for 120 of the 418 islands found in the river. The BLM islands are scattered among the other private and public islands from Grand Rapids to Anoka. Information has been collected regarding land use, acreage, vegetation, flooding, and recreation potential only on the BLM islands, although these are probably typical of all islands found within the Upper Mississippi reach.

The acreage of islands inventoried by BLM range from less than one acre to 75 acres. Over half are less than two acres; the average acreage is approximately 4.5, with an average height of 4.5 feet above mean high water. The incidence of larger islands (4.5+ acres) is greater below Brainerd; in fact, Greenwood Island, the largest found within the river corridor, is a 75-acre island (Mile 44) located south of St. Cloud which supports a sizeable heronry.

The vegetation found on the islands inventoried by BLM consists primarily of lowland hardwood species. There are a few islands, however, covered mainly with lowland brush (willow, alder). Examples of such islands are a three-acre island at Mile 75 and a four-acre island at Mile 15 near Monticello. A few islands, such as the six-acre island (Mile 130) near Brainerd, exhibit both upland and lowland hardwoods.

The Upper Mississippi islands serve mainly as wildlife habitat. Present land use activity is minimal in terms of hunting, fishing, and camping. In most cases, it is difficult to distinguish day use and overnight use on the islands; campsites and refuse were the key indicators used by the BLM in making such determinations. There is no agricultural farming being performed, and trapping occurs primarily on the uplands along the Mississippi (Mile 330-335) near Deer River. Intensive land use is hampered by two conditions: (1) flooding--most islands are inundated at least annually with greater frequency occurring above Brainerd, and

(2) soil conditions--unsuitable soil types limit ability to support weight and dispose of refuse.

The potential for recreational activity on islands is also limited due to the same constraints of flooding and soil conditions. Islands do, however, present an excellent opportunity for river floaters to rest at other than shoreline access points. Campers are afforded limited campsites and overnight camping situations.

Related Land Resources

Soils--In general, the soils found within the Upper Mississippi study area range from low to good in inherent fertility. From Anoka to Palisade, the soil fertility is fair with portions between St. Cloud and Aitkin having low fertility. North of Palisade the fertility improves to good. The stretch between Bemidji and Grand Rapids has low fertility.

The degree of soil limitation on recreation uses is directly related to the particular soil type. Major constraints on use and development are slopes greater than 12 percent, soil percolation, loose sand concentrations, and wet and unstable soil types. The Mississippi River has many areas with alluvial and organic soil types which severely limit recreation use due to periodic flooding and soil moisture content. These areas need not be written off as unusable for recreation purposes. Activities such as hiking, cross country skiing, bird watching, hunting, and snowmobiling can be carried on to some extent during most of the year. These soil types are, however, not conducive to most forms of construction. For a complete description of soil groups and their limitations for recreation use, refer to Tables 7 and 8.

Estherville-Wadena-Hubbard Association (LLWL, SSWD, SSWL Soil Groups)

This soil association is predominant between Anoka and Little Falls in what is called the Mississippi Valley Outwash. This area contains course to medium textured prairie soils from glacial outwash which contain dark colored soils developed in moderately course to medium textured material overlaying coarser outwash sands and gravel. Gravel or sand usually occurs less than 36 inches below the surface. The surface is nearly level or gently rolling. The soils are well to excessively drained. Major hazards are a tendency toward drought and wind erosion. General agriculture is practiced along this stretch of the river. The large majority of islands in this association contain a peat based landscape. These islands are low lying and very poorly drained or marshy.

The river corridor in this section is made up of about 90 percent sandy over sandy, well drained, dark colored soil which has slopes ranging up to 25 percent and a slight hazard of pollution in regard to septic system absorption. The limitation to roads and streets is slight to severe. Recreation potential associated with this soil group is very good. Camping, picnicking, playgrounds, paths, and trails can all be sustained within the area. Limitations on recreation use occur when the slope is greater than 12 percent or when loose sand is found in sufficient concentrated portions.

TABLE 7

SOIL INTERPRETATIONS

Soils Groups (Landscape Units)	Description	Dominant Slope %	Dept. to High Water Table (ft.)	Recreation Suitability Groups[1/]	General Degree and Kind of Limitation for: Houses	Roads and Streets	Septic Tank Absorption Field
A	Alluvial Soils (undifferentiated)	0-2	0-6	8 and 9	Severe (Flooding)	Moderate to Severe (Flooding and Wetness)	Severe
P	Organic Soils	0-2	0-1	9	Severe (Wetness)	Severe	Severe
SSWD & SSWL	Sandy over sandy, well drained soils (dark & light colored)	0-25	6	1 and 6	Slopes: 0-6% Slight; 6-12% Moderate; 12-25% Severe		Hazard of Pollution also
SSPL	Sandy over sandy, poorly drained, light colored soils.	0-2	0-4	5 and 9	Soils in Group 5: Moderate (Wetness); Soils in Group 9: Severe		Hazard of Pollution
SSPD	Sandy over Sandy, poorly drained, dark colored soils.	0-2	0-3	9	Severe (Wetness)		
CCPL	Clayey over clayey, poorly drained, light colored soils.	0-2	0-3	9	Severe (wet, too clayey)		
XLWL	Loamy over mixed sandy & loamy, well drained, light colored soils	2-25	6	1 and 2	Slopes: 0-6% Slight; 6-12% Moderate; 12-25% Severe		
LLWL & CLWL	Deep silty or loamy, & silty or loamy over clayey, well drained, light colored Soils.	2-18	6	2	Severe		Severe

1/ See Table 8.

SOURCE: USDA-SCS-Minnesota

TABLE 8
DEGREE OF SOIL LIMITATION AND MAJOR FEATURES AFFECTING RECREATION USES*

Recreation Groups	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails
1	0 to 6% : Slight 6-12% : Moderate-Slope 12% : Severe-Slope	0 to 6% : Slight 6-12% : Moderate-Slope 12% : Severe-Slope	0 to 2% : Slight 2-6% : Moderate-slope 6% : Severe-Slope	0 to 18% : Slight 18-25% : Moderate-slope 25% : Severe-slope
2	0 to 12%: Moderate-Percs slowly 12% : Severe-slope	0 to 6% : Slight 6-12% : Moderate-slope 12% : Severe-slope	0 to 6% : Moderate-Percs slowly 6% : Severe-slope	0 to 18% : Slight 18-25% : Moderate-slope 25% : Severe-slope
3	0 to 12%: Moderate-Too Clayey 12% : Severe-slope	0 to 12%: Moderate-Too Clayey 12% : Severe-slope	0 to 6% : Moderate-Too Clayey 6% : Severe-Slope	0-25% : Moderate-Too Clayey 25% : Severe-slope
4	0 to 6% : Slight 6-12% : Moderate-slope 12% : Severe-Slope	0 to 6% : Slight 6-12% : Moderate-slope 12% : Severe-slope	20-40" to rock 0-6% : Moderate-depth to rock 6% : Severe-slope 20" to rock Severe-depth to rock	0 to 18% : Slight 18-25% : Moderate slope 25% : Severe-slope
5	Moderate: Wet	Moderate: Wet	Moderate: Wet	Moderate: Wet
6	0 to 12% ls: Mod.-too sandy 12% ls : Sev.-slope Loose Sand: Sev.-too sandy	0 to 12% ls: Mod.-too sandy 12% ls: Severe-slope Loose sand: Sev.-too sandy	0 to 6% ls: Mod.-too sandy 6% ls: Sev.-Slope Sand: Severe - too sandy	0-25% ls: Moderate-too sandy 25% ls: Severe-slope Loose sand: Severe-too sandy
7	Severe: Too clayey	Severe: Too clayey	Severe: Too clayey	Severe: Too clayey
8	Severe: Flooding	Moderate: Flooding	Mod: Occasional flood Sev: Frequent flood.	Moderate: Flooding
9	Severe: Wet	Severe: Wet	Severe: Wet	Severe: Wet

* Stones and coarse fragments not considered in table. Ratings should be adjusted for those soils that are stony or high in content of coarse fragments.

SOURCE: USDA-SCS-Minnesota

There is a very small area consisting of about 100 acres two miles north of Sartell on the east bank which is a sandy over sandy, poorly drained soil type too wet for most types of recreation development. Deep silty or loamy, well drained, light colored soils make up the remaining 10 percent of the soil type in this section of river. Recreation suitability is slight to severe and the area is generally unsuited to roads and septic systems. This type occurs on the west bank a few miles upstream from Elk River for five miles and again south of Becker on the west bank for three miles. Wetness makes the west bank about three miles south of Little Falls unsuited to recreation development.

Menahga Association (SSWL, SSPL, SSWD, CLWL, LLWL, A Soil Groups)

From Little Falls to south of Aitkin, this soil association was formed from glacial outwash with widely scattered soils known as the Crow Wing Outwash Plain. These soils are predominantly gravelly or sandy. The terrace along the Mississippi River is primarily sandy. The soils are well to excessively drained except when associated with peat. Agriculture is limited to selected and scattered areas. The major hazards are drought and wind erosion. Island soil types in this reach are less hazardous but are still found to possess loose sand and a high flood frequency.

The river corridor between Little Falls and Aitkin is predominantly made up of sandy over sandy, well drained, dark and sandy over sandy, well drained, light colored soils. These types both have a slight to severe limitation to roads and a hazard of pollution. Both appear to stretch over most of this portion of the river and make up about 70 percent of the soil types.

Sandy over sandy, poorly drained, light colored soil occurs south of Fort Riley on the west bank for about three miles and again at the discharge of the flood diversion channel and again upstream from Riverton on both banks for about two miles. The recreation development limitations in this soil group range from moderately wet to severely wet in categories, indicating that it is not well suited for most types of recreation.

Silty or loamy over clayey, well drained, light colored soils occur about 15 miles downstream from Aitkin and continue for about ten miles together with sandy over sandy, well drained, light colored. Silty or loamy over clayey, well drained, light colored ranges from slight limitation to severe limitation for recreation purposes depending on the proposed use and the percent of slope involved.

Hibbing-Zim Association (CCPL, A, CLWL Soil Groups)

The Mississippi River quickly passes through this soil association south of Aitkin, and it is part of the Mille Lacs Moraine complex. The soils are of fine texture and developed in clay till. The topography is nearly level to rolling. Soils are moderately well drained except for

the level areas which are somewhat poorly drained. A major problem is excessive water associated with agricultural use, but few areas are used for agriculture and forests predominate.

Recreation use is somewhat less than that experienced farther south along the river. Soil types restrict recreational use and development to moderate capacity where slope is less than 12 percent and because of slow soil percolation. Soil with slope of greater than 12 percent causes severe restrictions in development, especially for camp areas and picnic areas. For the most part, this reach of the Mississippi is severely restricted to recreation uses directly along the river terrace.

Peat-Swatara-Spooner Association (SSWL, A, SSWD, CCDL, SSPL Soil Groups)

This soil association ranges from Aitkin to below Grand Rapids. Known as part of the Glacial Lakes Plain Outwash, the soils are light colored and developed from waterlain sands, loams, and silts. Some scattered areas of glacial material are found. Peat (organic soil) is found in all parts of the area, occupies the depressions and old lake bottoms, and is always poorly drained. The topography is nearly level to gently undulating. The drainage is excessive to poor depending largely on elevation and soil texture. Agriculture is practiced only in scattered areas and forests predominate. Major hazards when farmed are frost on the peat land and excess water on the other soils.

Alluvial type soil makes up a large majority of the soils in the section of river between Aitkin and Grand Rapids. The alluvial type soil tends to lie mainly adjacent to the river and is highly unsuited to recreation development while the land back from the river is made up mainly of three types; sandy over sandy, well drained, dark colored; sandy over sandy, well drained, light soil; and clayey over clayey, poorly drained, light colored. Clayey over clayey poorly drained, light colored is poorly suited to most types of recreation. It occurs near Aitkin on the west bank for about five miles, near the Workman-Logan Township border and Palisade for four to five miles, and near Big Sandy Lake on both sides for about 10 miles. Sandy over sandy, well drained, dark soil appears in the corridor north of Big Sandy Lake and continues intermittently for 10 miles north of Jacobson. Sandy over sandy, well drained, light soil is primarily located in the area just south of Grand Rapids and appears on both sides of the river for about eight miles. Sandy over sandy, poorly drained, light soil occurs in spots north of Jacobson.

Nebish-Rockwood Association (SSWL, SSPL, LLWL, XLWL, A, P Soil Groups)

From Grand Rapids to Lake Winnibigoshish, this soil association borders on the Itasca Moraine complex. Developed from loam and sandy loam till, the topography ranges from undulating to hill with numerous depressional areas. Surface and substrata drainage is good except for the depressions that are occupied by lakes, organic (peat) soils, or poorly drained. Major hazards are erosion and maintenance of facilities. The predominant land use is forest, with only scattered areas of agricultural use.1/

1/ Portions extracted from Minnesota Tech. Bulletin No. 2, pages 233-237.

In the section of the river from Grand Rapids to Lake Winnibigoshish, alluvial type soil makes up about 40 percent of the river corridor. The heaviest concentration starts near Cohasset and continues for 25 miles to within five miles of Lake Winnibigoshish. Organic type soil exists in a small pocket south of Grand Rapids and from the outlet of Lake Winnibigoshish downstream for five miles on both sides of the river. This soil type is often of a peat origin and is very poor for most types of recreation use; however, it will support such activities as hiking and hunting. Sandy over sandy, well drained, light colored soil appears throughout this section of river with the main concentration being near Ball Club Lake. It makes up about 20 percent of the soil types in this area. Sandy over sandy, poorly drained, light colored soil constitutes a very small portion of the corridor occurring in two places near Ball Club Lake. Loamy over mixed sandy and loamy, well drained, light colored soils cover about 10 percent of the corridor occurring heavily around Grand Rapids and to a lesser extent west of Cohasset.

Most of the soils in this section of river are of the alluvial or organic origin and are not considered conducive to outdoor recreation activities; however, certain types of activities can still be carried on very well such as fishing, hunting, hiking, etc.

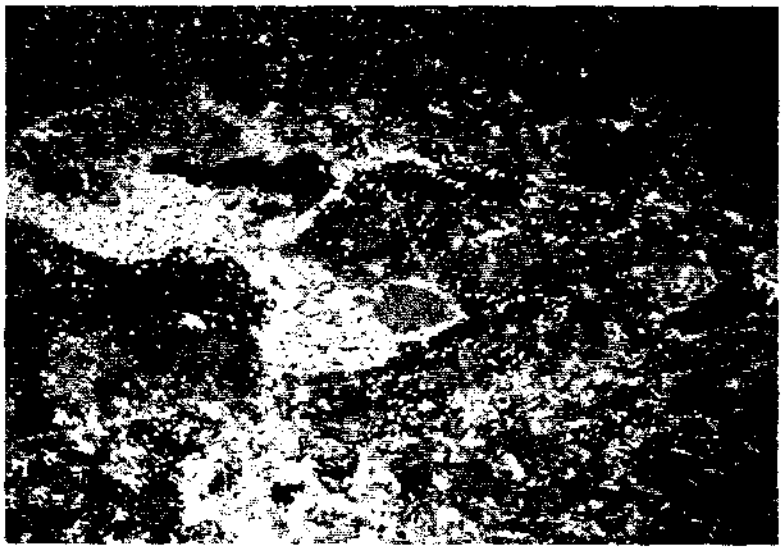
Menahga-Marquette Association (XLWL, SSWL, LLWL, A, P Soil Groups)

From Lake Winnibigoshish to Lake Itasca this soil association enters into the Itasca Moraine complex. This prominent moraine has rolling to steep topography. Small, wet potholes and peat bogs are common. The moraine consists of limey sandy loam glacial till laid down centuries ago. Pockets of sand and gravel are intermixed with the till in most of the area. This region includes a few small gravelly outwash areas. Agricultural use is minor, with the majority of land containing forest. For the most part, the soils are well to excessively drained except when associated with peat (organic soils).

Sandy over sandy, well drained, light soil is predominant along the river between Lake Winnibigoshish and Lake Itasca covering about 30 percent of the corridor in this area. This is fairly well scattered along the corridor. Organic type soils also cover a substantial amount of the corridor in this section occurring heavily near Lake Andrusia, upstream from the iron bridge and just downstream from Lake Itasca. Deep silty or loamy, well drained, light colored soils occur in scattered areas from Bemidji to Itasca. This type appears to be generally good for most types of recreation with some limitations.

In general, much of the Upper Mississippi River north of Aitkin is not conducive to certain types of recreational uses due to river flooding and wetness of the soils on the river terrace. Alluvial soils seem to be prominent along this stretch. Published soil survey maps illustrate the river corridor in greater detail and can guide in the selection of new or expanding recreation sites.

Land Cover/Use--Land cover/use in the river corridor and adjacent counties was quantified by machine interpretation of satellite imagery. LANDSAT[1/] computer compatible tapes were processed to prepare land-use data graphics and tabulations for the Upper Mississippi River. This work was contracted to the Aerospace Systems Division of Bendix Corporation located in Ann Arbor, Michigan.



52. Land use data graphics of White Oak Lake on the Mississippi.

The first task of the contract resulted in a set of categorized computer tapes covering over 18,000 square miles, including the study area. On these tapes, a digital code was used to represent the interpreted vegetation, land and water categories. These categories included shallow or turbid water, deep clear water, grass wetland, transition wetland, brush wetland, forested wetland, mixed forest, deciduous forest, coniferous forest (sparse and dense), open land, grass land, agriculture, mined land, urban, and uncategorized. Computer tabulations were then generated for each land cover/use category by county and river segment within county. For purposes of tabulation, the river corridor was defined to be at least one-half mile wide and included all wetlands and islands. Color categorized images at 1:250,000 scale were also produced in which color was used as a code to designate the various vegetation and land cover categories. The opportunity to observe land cover types portrayed in vivid contrasting colors throughout the entire 466-mile study reach added significant insight into the total land cover/use scheme. A series of land use patterns became readily apparent.

1/ New name for the Earth Resources Technology Satellite.

The overall land cover/use pattern in the river corridor may be generalized into two categories. The upper half of the study reach remains covered by natural vegetation and the lower half below the Mississippi River Clough is dominated by agriculture. Even in portions of the corridor heavily used for agriculture, however, a fringe of trees lining the banks usually remains.

This overall land use pattern is reflected in the portrayal of land cover/use shown in Figure 24. In Clearwater County, for instance, 36 percent of the corridor is coniferous forest. The corridor in Itasca County includes 8,029 acres of grass wetlands or 17 percent of all in the county. Mixed forest makes up 39 percent of the 36,735 acres of the Aitkin County corridor. In contrast, agriculture is the dominant land cover/use in the corridor running through counties in the lower reach such as Stearns (33 percent or 2,997 acres) and Wright (38 percent or 4,647 acres) Counties.

Observations of land cover/use patterns within qualifying segments are as follows:

1. The largest concentration of agricultural activity in the study corridor occurs on the west bank below Clearwater.

2. Much agricultural activity occurs on the east bank opposite Camp Ripley Military Reservation and south of Roscoe Island.

3. Except in the vicinity of Brainerd, the corridor between the confluences of the Pine and Crow Wing Rivers traverses the most dense forest cover downstream from Schoolcraft State Park.

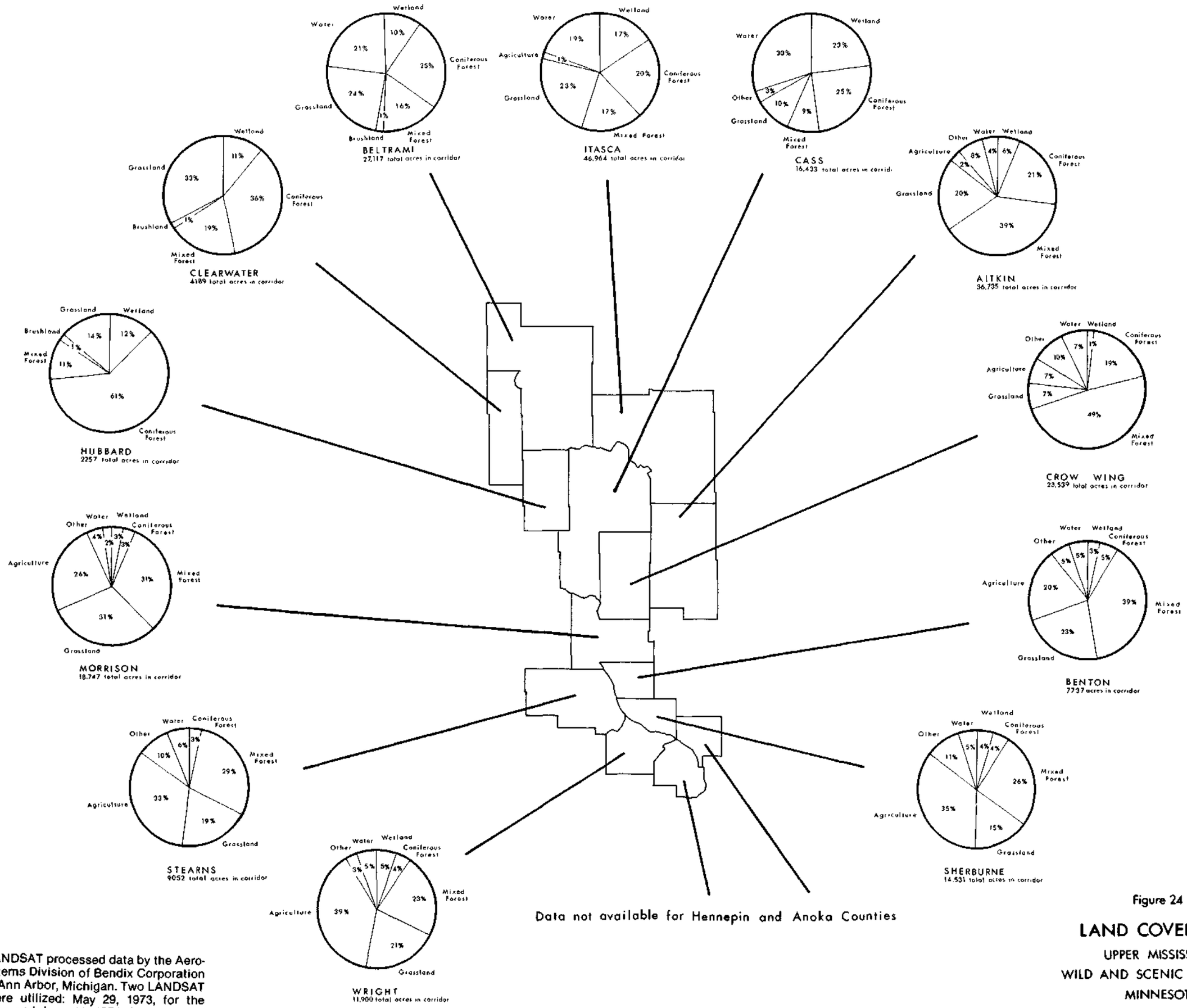
4. Segment 12 contains the greatest concentration of conifers along the river. Segment 5 has the next greatest concentration.

5. The corridor traverses a concentration of forested land in the vicinity of Big Sandy Lake.

6. The concentration of strip mining activity occurring in the watershed of the Prairie River dramatically portrays the reason for its high sediment load.

7. The mature stand of red pine at Schoolcraft State Park is unique to the stretch between Days High Landing and Grand Rapids.

8. The grassland marsh above Days High Landing is the largest anywhere along the study corridor and the largest appearing on the approximately 16,000 square miles of processed data located south of Big Red Lake.



Source: LANDSAT processed data by the Aerospace Systems Division of Bendix Corporation located in Ann Arbor, Michigan. Two LANDSAT scenes were utilized: May 29, 1973, for the upper scene and June 11, 1974, for the lower scene. The lower LANDSAT scene did not include the river corridor in Anoka or Hennepin Counties.

Figure 24

LAND COVER/USE

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

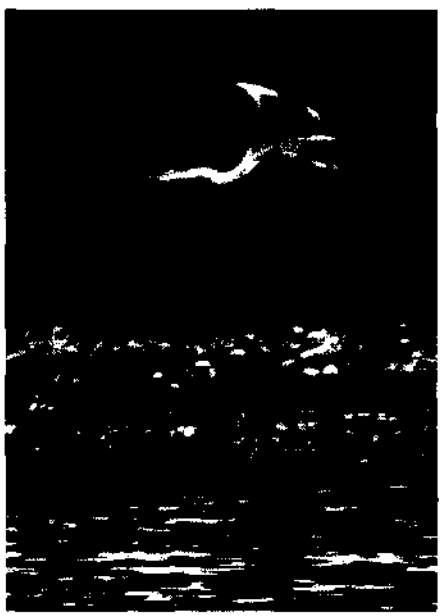
9. The largest continuous forest stand in the study corridor occurs between Day's High Landing and Lake Winnibigoshish and from Lake Winnibigoshish down to Cass Lake. This pattern reflects the large degree of public ownership in that area.

10. North of the 10-mile reach between Cass Lake and Lake Winnibigoshish, the forest cover is predominant deciduous and south of the river it is predominantly coniferous.

11. Agriculture and grassland are predominant land cover/use types between Stump Lake and Bootleg Lake.

12. The headwaters reach qualifying as wild has the greatest variation in land cover type of anywhere along the study corridor.

Wildlife and Fish--The Upper Mississippi River above Anoka, especially those segments that may qualify as wild, scenic, or recreational, contains a vast fish and wildlife resource that can offer many man days of quality fishing, hunting, and nonconsumptive experiences such as photography and bird watching.



53. *Great Blue Heron.*

The river's banks are heavily vegetated over most of its length with relatively few urban, pastured, or completely open areas, thus providing a corridor that serves as a natural travel lane for numerous wildlife species. The interspersion of trees, brush, wetlands, and adjacent cropland offers excellent habitat for these many species by supplying food, cover, and other needs within a relatively small area.

Due to the great length of the study area, the river passes through two major vegetation communities. From its headwaters to approximately Brainerd the Mississippi is within the northern coniferous forest, and from Brainerd to Anoka it flows through intermittent deciduous forest and prairie.

These biotic communities have been altered by man's activities of logging and farming. Much of the original northern evergreen forest was logged and burned-over years ago. Today, this area is covered primarily by second-growth forest with much aspen, birch, spruce, balsam, and pine.

Also found here are mountain maple, hazel, dwarf birch, elders, bracken and sweet-fern, several species of bush honeysuckle, and high-bush cranberry. The shrubs of the coniferous forest include heaths such as

leatherleaf, Labrador tea, trailing arbutus, wintergreen, and several species of blueberries and cranberries.[1/] The present upland deciduous forest is composed of hard maple, basswood, American elm, red elm, red oak, and bur oak. Since the soil types underlying this community are relatively fertile, much of this forest type has been cleared for agriculture. Deciduous bottomland forest species are green ash, silver maple, American elm, and various willows.

Man's influences in changing the structure of these plant communities have not always resulted in negative influences on wildlife. For example, logging has taken large areas of northern Minnesota out of the "climax" type of vegetation and replaced it with second-growth aspen and birch--both valuable habitat for the highly prized ruffed grouse and whitetailed deer.

Local vegetational changes occur where the topography changes. Where the river flows across old lake bottoms, it slows and widens to form extensive marshy areas of exceptional value to aquatic species, particularly waterfowl. These wetland areas in the upper portion of the river contain dense stands of emergent aquatics; areas of wet meadows; and, less commonly, sphagnum or floating bogs. Below Grand Rapids, the Mississippi flows across glacial Lake Aitkin where it meanders to form numerous oxbows, also of high value to waterfowl and fish species.

Where the river flows through confining topography, it becomes narrow and swift between heavily wooded shores.

The present variety of vegetation patterns of the Upper Mississippi River are reflected in the wide variety of wildlife occurring within the area. Each vegetational community supports an association of animals which have become adapted to the food, cover, and breeding conditions offered.

Animal species generally associated with the coniferous forest portion of the Upper Mississippi include the timber wolf, moose, black bear, bobcat, fisher, red squirrel, varying hare, spruce grouse, great gray owl, common raven, and numerous species of breeding wood warblers. The wolf and moose are uncommon in the study area. At least 18 species of reptiles and amphibians occur within Segment 11 alone. (Segment numbers referred to are described in Figure 1.)

The deciduous forest portion of the river corridor supports gray squirrel, fox squirrel, raccoon, cottontail rabbit, woodchuck, and badger, in addition to the normal mix of avian species associated with the eastern deciduous woods.

Certain adaptable species are found in both habitat types within the study area. White-tailed deer, red fox, coyote, beaver, mink, muskrat, ruffed grouse, and woodcock are among these.

1/ Rosendahl, C.O. and F.K. Butters. 1928. Trees and Shrubs of Minnesota, University of Minnesota Press, Minneapolis, Minnesota 385 pp.

There is high quality sport fishing for several species within the study area. Walleye, northern pike, muskellunge, smallmouth bass, crappies, and sunfish are the primary fish sought on the river. Largemouth bass are occasionally taken in impounded and backwater areas.

The northern bald eagle, which has been proposed as an addition to the threatened species list, is found in significant numbers in and around the Chippewa National Forest portion of the study area and this breeding population is being carefully watched and managed by the U. S. Forest Service. The eastern timber wolf and an occasional peregrine falcon are also sighted in the area, both of which are officially listed as endangered species. The range of the timber wolf lying within the study area is primarily north of Palisade. There is evidence that wolves use the heavily timbered river corridor as travel lanes, especially in areas that have been extensively cut over. 1/

Moose and Canada lynx, pine marten, and fisher only occasionally use the area, since their primary range lies to the north of the Upper Mississippi.

The fish and wildlife resources of the Upper Mississippi are treated in more detail in the following paragraphs. For brevity, only biologically significant features of each river segment are discussed.

Segment 11 and 12 from the headwaters at Lake Itasca to Bemidji

The headwaters section of the river has been recommended for status as a wild river because of its essentially primitive character. It ranks very high in scenic and wildlife value.

The geographic location of the headwaters is close to a major intersection of biotic communities (biomes): the northern coniferous forest, temperate deciduous forest, and the prairie all meet west of the headwaters. This results in a variety of floral communities throughout the headwaters area. Between Lake Itasca and Bemidji, the river flows through an interspersion of coniferous forest, even-aged stands of aspen and birch, and extensive areas of wet sedge meadow and bog characterized by tamarack, black spruce, willow, and bog birch which provide habitat for ruffed grouse, whitetailed deer, and woodcock.

A relatively large number of woodland bird species nest in the spruce bogs and coniferous uplands. Among these are the black and white warbler, Tennessee warbler, Nashville warbler, Cape May warbler, palm warbler, Connecticut warbler, Canada warbler, blackburnian warbler, and the parula warbler. During the months of May, June, and part of July, the woods are literally alive with birds going about their activities of nest building, breeding, and rearing of young. At such times, the air is filled with constant warbler song, the plaintive trill of the white-

1/ Mech, David. 1976. Personal Communication.

throated sparrow, and the cry of the loon--all powerful medicine for anyone who appreciates the north country. One can also observe ospreys and bald eagles which nest near Lake Itasca.

Waterfowl use of this river section is high, especially during migration periods. There is some local reproduction of mallards, blue-wing teal, wood ducks, ring-necked ducks, wigeon, and American goldeneyes. The area is heavily hunted in the fall, primarily by hunters who drift down the river in boats and canoes.

Ruffed grouse are found in appreciable numbers in this section. Their preferred habitat is second-growth mixed hardwood-conifer forests interspersed with alder lowlands. Hunting for this species is fair to excellent in the area, especially in adjacent birch-aspen stands. Spruce grouse are found in limited numbers, particularly in the heavier coniferous forest areas. The grassy marshes and low, wet woodlands afford suitable habitat for snipe and woodcock, respectively.

The possibility exists in this section of stream of viewing beaver, mink, raccoon, coyote, red fox, deer, and a rare moose. Also occurring here are black bear, bobcat, timber wolf, badger, river otter, and fisher, but these species are only occasionally seen because of their secretiveness.

Huntable mammal species include white-tailed deer, bear, varying hare, and cottontail rabbit. The varying hare is found in the coniferous and mixed deciduous-coniferous forests, while the cottontail rabbit is restricted to upland brush and more open deciduous forest. The white-tailed deer is a very adaptable species, utilizing a wide variety of cover types ranging from grassland and cropland to dense wooded swamps. Its preferred habitats are edges and intermediate stages of forest succession that provide abundant browse within easy reach.

This river section is not heavily fished. The Mississippi leaves Lake Itasca as a narrow stream. As it increases in volume, it becomes a warm water fishery producing predominantly northern pike. Certain gravel and rubble riffle areas provide spawning habitat for suckers and minnows. Where the stream traverses marsh and low areas, northern pike spawn on the flooded vegetation, particularly in wild rice beds. Catch data indicate that a significant population of northern pike use the headwaters as a nursery.

There are no serious water pollution problems in this section of stream resulting from man's activities, but water quality problems of natural origin are present at certain locations. These are due primarily to organic loads emanating from adjacent marshes and bogs which depress the dissolved oxygen levels in the Mississippi for short distances.

Segments 10, 9, and 8

The wildlife resources of these sections are qualitatively similar to those in Segment 11, but man's development activities have increased. There are certain quantitative differences, however, because of the passage of the Mississippi through several flowage lakes, notably Wolf Lake, Lake Andrusia, Cass Lake, and Lake Winnibigoshish. These lakes create areas with good waterfowl use potential which are further enhanced by their relationship with the Mississippi and other rivers and wetlands in the vicinity.

Rivers form one of the most important components of waterfowl habitat in the spring because they are the first water to open up. They are used by both transient and resident waterfowl. There is evidence that resident birds utilize the Mississippi as a staging area until other wetlands open up. After the main wave of migrating waterfowl passes, resident pairs frequently occupy territories along the river. Local breeding waterfowl species include mallard, blue-winged teal, American goldeneye, wood duck, ring-necked duck, red heads, and wigeon.[1/]

The deltas where the Mississippi enters large lakes also are particularly important to waterfowl. These areas contain an excellent interspersion of open water and emergent aquatic vegetation. Concentrations of ducks are usually found in such areas and along the river itself.

Marshes between Big Wolf Lake and Lake Andrusia and those west of Lake Winnibigoshish (commonly called Mississippi Meadows) also are highly important to water birds. The wide areas of river with backwaters and oxbows filled with stands of wild rice, reed canary grass, phragmites, and cattails, serve as breeding habitat, strategic moulting areas for adult birds, and as staging areas for fall migrants.[2/]

This woodland region provides a significant contribution to the Mississippi Flyway waterfowl population. A 1965 study conducted by the U. S. Forest Service, the Minnesota Department of Natural Resources, and the U. S. Fish and Wildlife Service of the breeding waterfowl population within the Chippewa National Forest determined that observed use of various habitat types by breeding pairs of ducks was seven pairs per mile of lake shoreline, six pairs per mile of stream, and 47 pairs per mile of other occupied wetlands. The 1965 pair count indicated that approximately 20,900 pairs of ducks utilized the Chippewa National Forest that year. Since water conditions in the prairie regions were good in 1965, possibly fewer ducks utilized the woodland regions when compared to a dry year on the prairie. The study concluded that, ". . . the future of waterfowl may well depend on the so-called peripheral breeding zones such as the wooded region where production is perhaps not spectacular but it is relatively constant."[2/]

1/ Cowardin, Lewis M. 1976. Personal Communication.

2/ Mathisen, J. 1966. The Breeding Population of Waterfowl on the Chippewa National Forest. The Loon. March 1966.

The Mississippi in these sections furnishes excellent waterfowl hunting opportunities because it offers both good habitat and easy access.

In addition to waterfowl values, these segments provide excellent opportunities for wildlife observation. For example, the Mississippi River with its associated lakes and reservoirs within the Chippewa National Forest alone comprises feeding habitat for 14 pairs of nesting northern bald eagles. This represents two percent of the entire U. S. population of northern eagles south of Alaska. There are 26 nests within two miles of the river, and several of these are visible from the river; hence chances are good for river-based observation of these magnificant birds.

Common furbearers observed in this area include beaver, mink, muskrat, and river otter.

From a fishery standpoint, Segments 10, 9, and 8 are comparatively rich. The Mississippi from the outlet of Lake Bemidji to the Ottertail Power Company dam supports an excellent lake fishery. A wide variety of game fish species is present, ranging from northern pike to panfish. Aquatic vegetation in this reach provides good bass and panfish spawning habitat and supplies excellent cover for young fish. Considerable walleye and sucker spawning activity takes place immediately below the dam. Minnesota Department of Natural Resources personnel collected sucker eggs here for distribution to other parts of the State. Natural walleye reproduction is largely unsuccessful at this site, probably because of water fluctuations, turbulence, and other factors that contribute to high egg mortality. There is heavy fishing pressure in this stream section, primarily for largemouth bass. Some high quality early-season walleye and northern pike fishing also has been reported.

The marsh and meadow areas of floodplain in Segment 9 are utilized by spawning northern pike and muskellunge. The oxbows of the lower portions of this section are good for immature and adult northern pike. During high flows, fish movement occurs between Cass Lake and Lake Winnibigoshish.

Segment 8 provides spawning habitat for northern pike and walleye. Fishing for these two species is somewhat seasonal, usually occurring in spring and summer in this reach of the river. The quality of the fishing experience at such time is high. Bullheads are commercially harvested from the lower end of this segment.

Segments 7, 6, and 5

The section of the Mississippi represented by these segments is approximately 170 river miles long. The river here is slow-flowing and is generally confined to a single channel. Islands are rare, rapids are few, and cut off oxbows are common and still being formed.

Below Grand Rapids, the upstream limit of Segment 7, the Mississippi is fairly shallow and wide as it flows through glacial moraine topography. Riverbanks in this area are sandy and often unstable and the river bottom is predominantly sand and gravel. The narrow floodplain is vegetated with lowland hardwoods, primarily ash and elm, while uplands are covered by a mixture of jackpines, aspen, and balsam fir.

As it flows south into Aitkin County, the river enters a rather flat and featureless forested plain, the bed of glacial Lake Aitkin. It becomes deeper, slower flowing, and much more sinuous with many cut-off oxbows. The deepest portion (50 feet) of the Upper Mississippi is found in this reach at a point 1.5 river miles above the City of Aitkin. There is a considerable area devoted to wild rice culture north and south of Aitkin. Agricultural practices have removed a considerable portion of upland vegetation through Segment 6, thus giving the Mississippi corridor a higher value for wildlife of the area. The river re-enters glacial moraine after it flows out of Aitkin County and resumes a wider, more shallow, and straighter course.

Waterfowl values are considerably diminished when compared with the flowage marshes associated with the river above Grand Rapids. Between Grand Rapids and Brainerd, the river is only incidentally utilized by migrating waterfowl because of the abundance and proximity of lakes, off-river marshes, and wild rice beds. There is some minor river production of tree-nesting wood ducks and American goldeneyes in the floodplain, especially in old oxbows, and a small amount of local mallard and blue-winged teal reproduction. This reach of river is not heavily hunted from a waterfowl standpoint, although it could sustain heavier hunting pressure than presently occurs.

Hunting for ruffed grouse is excellent in these segments. Most grouse reproduction takes place in higher areas away from the river, but during dry parts of the year the river corridor receives an influx of grouse populations, resulting in huntable densities of these birds. The Mississippi corridor is often hunted by grouse enthusiasts who gain access to their favorite shooting spots by boat.

Woodcock are also present in these river segments. Hunting pressure on this species is low in the area.

The deer herd in this area is in excellent condition; in fact, the region directly to the west of the river between Grand Rapids and Hill City ranks as one of the prime deer hunting spots in the State. Hunting pressure is heavy.

River otter, mink, and muskrat are the aquatic furbearers inhabiting these river segments. Beaver are more common there than in the segments above Grand Rapids.

The river from Grand Rapids to Brainerd sustains a good fishery; however, the carrying capacity for fish in the main channel is less than that of off-channel areas such as the cut-off oxbows. Various factors contribute

to the higher productivity of the oxbows. Increased light penetration occurs because of the settling out of silt and sediment in slower flowing or static water; this stimulates plankton growth, the basis for most aquatic food chains. These areas are periodically flooded, and thus receive increments of nutrient-laden silt. Beds of aquatic vegetation develop that provide habitat and cover for fish food organisms and fish.

Walleye and northern pike are the primary species sought by anglers. This area sustains light to moderate fishing pressure. The most abundant game fish throughout Segments 5, 6, and 7 is the northern pike. The size range includes large individuals as well as smaller fish, indicating that the river supports sustained reproduction. Walleye are found throughout the segments between Grand Rapids and Brainerd. Reproduction is consistent and spawning habitat is adequate. Fishing pressure for walleye occurs mainly at the confluences of smaller tributary streams. Both largemouth and smallmouth bass are present but are not abundant in these river reaches and seem to occur in greater numbers in the lower section of Segment 5. Large muskellunge also are occasionally taken by anglers between Brainerd and Grand Rapids.1/

Evidence has appeared that mercury-containing sediments in the river below Grand Rapids are contaminating fish in Segment 7 and perhaps in Segments 6 and 5. This mercury was formerly discharged from paper mills in Grand Rapids and lodged in sediments down river. Although it is no longer being discharged, these sediments serve as a continual source of mercury to the food chain. Recent analysis of fish flesh in Segments 7, 6, and 5, however, indicate that mercury levels are dropping.

Segments 4, 3, 2, and 1 .

Segment 4, between Brainerd and Little Falls, finds the river entering the deciduous forest region of the State, with a corresponding increase in lands cleared for agriculture. With the exception of Camp Ripley Military Reservation, deciduous forest is often completely confined to the river floodplain and the associated low but steep bluffs. This condition persists down to Anoka.

Floodplain vegetation consists primarily of American elm, willows, green ash, silver maple, cottonwood, boxelder, and basswood. This bottomland forest appears to be very little altered from its original state. Upland deciduous woods cover the steep wooded slopes. There is not a sharply defined demarcation between these forest types, but rather a gradual transition as moisture and soil conditions change with elevation away from the river. The upland deciduous forest is characterized by maple, basswood, elm, red oak, white oak, and bur oak.

1/ Johnson, Merle W. 1968. A Fisheries Survey of the Mississippi River - Grand Rapids to Brainerd, Minnesota. 1965-67. Minnesota Department of Conservation, Division of Game and Fish. Special Publication No. 61.

The corridor has not been severely affected by man's activities because of its steep and variable terrain. Occasional grazing is currently practiced. No doubt development pressures will increase as large communities such as St. Cloud and Anoka expand.

Resident species utilizing the river corridor are those described in segments above. The white-tail deer occurs throughout the undeveloped reaches. Natural stands of oak, red cedar, and occasional windbreaks of evergreens provide winter cover.

Varying edge effects create some good summer cover for upland game birds. Limited numbers of ruffed grouse and woodcock frequent the lowlands and understory thickets. Prairie remnants, hayfields, soil bank lands, small grain cropland, and shrub thickets furnish suitable habitat for the ring-necked pheasant and a few Hungarian partridge. Waterfowl usage of these river segments is quite low because of the limited amount of associated marshy habitat, backwaters, and oxbows in the corridor. Some marginal feeding and resting areas are utilized during spring and fall waterfowl migrations, but this section of the Mississippi is not a major migration route.1/

The river is used as a migration route by bald eagles and golden eagles. Bald eagles are commonly seen during spring ice-out on the river. Golden eagles are reported to be wintering along the river in the vicinity of Camp Ripley.

These river segments provide excellent fishing for smallmouth bass, walleye, and pike. At present, the smallmouth is probably the greatest asset to this fishery, particularly in Segments 1 and 2. It is found throughout the study area in fishable numbers and appears to be thriving. The relatively flat, shallow rubble and boulder riffles on much of the river supply stable substrates that generate large quantities of invertebrate and vertebrate food for this species. Anglers regularly make float trips through Segments 1 and 2 in pursuit of smallmouth; however, depth limitations generally limit use to canoes and boats with very shallow draft.

Segments 4 and 2 furnish good walleye fishing in the lower portion of the study area. Upstream walleye lakes in the watershed are thought to be the main contributor to the river's walleye population.

Muskellunge also occur in these stream reaches and occasional trophy fish are taken by anglers. Limited natural reproduction of this species is thought to occur in the study area.

The only creel census and angler use data obtainable for the entire Upper Mississippi River above Anoka was confined to the river near the

1/ Enblom, J.W., Paul Heberling and Paul Diedrich. 1976. A Biological Reconnaissance of the Upper Mississippi River from St. Cloud to Fridley, Minnesota. River Surveys Project, Environment section, Minnesota Department of Natural Resources. Unpublished - Available June 1976.

Monticello Nuclear Generating Plant. This information was collected by the Northern States Power Company as part of its continuing Environmental Monitoring and Ecological Studies Program for the Monticello plant. Data gathered over a three-year period (1972-1974) from six census stations between the NSP Sherburne County Generating Plant, and the Town of Monticello indicated that more than 90 percent of the anglers utilizing this section of the Mississippi were bank fishermen and that the heaviest fishing pressure occurred on weekends.[1/] Further, most of the angling in the NSP study area is a secondary activity accompanying camping trips or weekend outings.

The NSP study gave overall yearly comparisons of fishing pressure in man hours, but stated that these comparisons should be taken with reservation because census sites varied between successive years. A combination of the 1974 weekend estimates, the deletion of two sites which were of little value, and the addition of two sites which were not utilized in 1972 and 1973 creel surveys are partially responsible for a substantial change in the total fishing pressure estimate in 1974. Man hours of fishing in the study area were:

1972	2570
1973	2435
1974	3700

Additional possible reasons for this increase in fishing pressure may have been increased State and national publicity focused on the area during 1973-1974 and the effect of the energy crisis in stimulating use of resources closer to the Twin Cities.

The overall catch rate is estimated to average about 0.5 fish per hour. Fish species most actively sought in this area were smallmouth bass, walleye, and northern pike.

There are some general conclusions that can be drawn from these descriptions:

1. While the upper portion is the most important part of the study area for fish and wildlife, all of the study area contains high quality fish and wildlife resources.

2. The lower segments of the river are subject to higher use pressures because of the proximity to high populations.

3. The river fishery is generally underutilized at this time, but present trends in usage indicate that river fishing is greatly increasing.

4. Wildlife habitat in the corridor is of good to excellent quality, and preservation of this habitat is important in the northern portion because it is relatively pristine and in the southern portion because it is some of the last remaining wooded habitat.

1/ Northern States Power Company. 1974. Environmental Monitoring and Ecological Studies Program for the Monticello Nuclear Generating Plant. Monticello, Minnesota. 1974 Annual Report.

5. Future quality of the fish and wildlife habitat will depend on the amount of human development allowed or tolerated in the stream corridor.

Air Quality--The Mississippi River corridor between Itasca and Anoka is relatively free from air pollution as compared with some of the more populated downriver areas. There are 32 point sources of air pollution along the river in this 466-mile stretch, most of which are concentrated in the larger cities on the river.

The upper reaches of the river are virtually free of air contaminants. From the headwaters, the first sources of pollution are encountered in the City of Bemidji, these being from commercial sources. The Ottertail power plant located downstream from Bemidji emits the bulk of the pollutants in the area, being high in carbon monoxide, hydro-carbons, and nitrous oxides, and considerably lower in sulfur dioxide and actual particulate matter. The power generating plant at Cohasset emits by far the most pollutants in all five categories and can be considered the river's major source of air pollution.

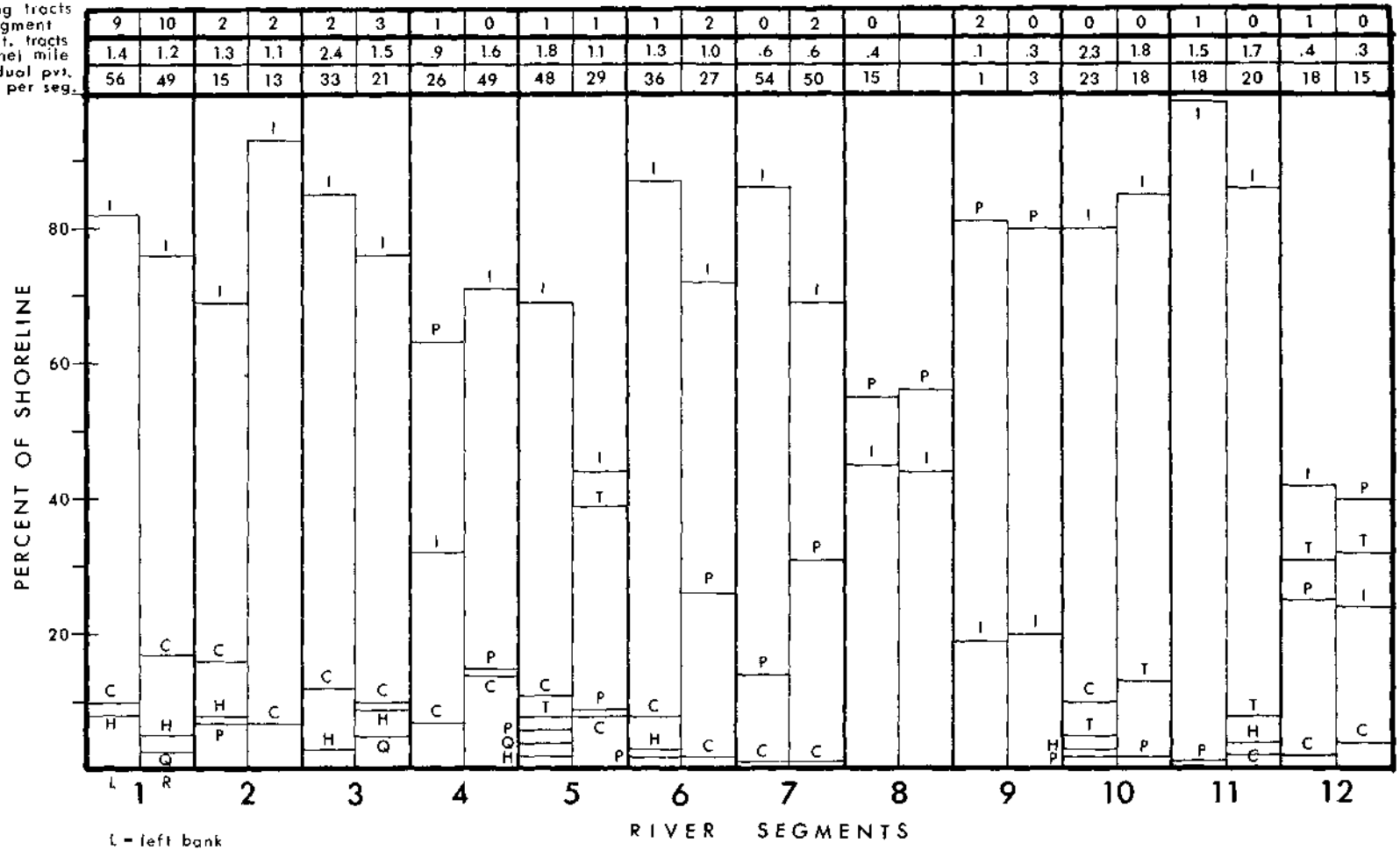
The cities of Brainerd and Little Falls both contribute minor amounts, all from commercial sources. St. Cloud has several sources from minor industrial plants and granite quarries, none of which contribute heavily to the overall problem. The power plant at Elk River is high in particulate matter, sulfur dioxide, and nitrous oxides. Farther down river the City of Anoka has four minor commercial sources of air pollution.

The Northern States Power Company recently completed a fossil fuel power generating plant on the river near the Village of Becker in Sherburne County. No information is yet available concerning the amounts of the various pollutants which will be emitted. Emissions from this facility will be well monitored, however, with modern control devices.

Open burning in Minnesota such as is used in land clearing, highway construction, and agriculture is now under State regulation monitored by the Department of Natural Resources and the Minnesota Pollution Control Agency. A permit must be obtained prior to such burning. Burning of household refuse other than raw garbage can be done without permit only in areas where regular collection is not available.

Landownership--Landownership along the river corridor consists mainly of private holdings, corporate and individual, although certain of the defined segments contain considerable public ownership. Figure 25 portrays by percentage the ownership on the right and left banks moving upstream along each river segment which qualifies for inclusion in the national system.

The corporate ownership in the study area tends to be concentrated in the lower 150 miles and in the upper 50, with the heaviest concentration occurring from Anoka to Brainerd. The Northern States Power Company has



KEY

C – Corporate
H – Housing Dev.
I – Individual private
P – Public
Q – Quasi public
T – Tax forfeit

L – left bank facing upstream
R – right bank facing upstream

NOTE

(1) Segment 1 data excludes Hennepin Co.

(2) Individual pvt. ownership not available for Itasca Co.

Figure 25

RIVERFRONT LAND OWNERSHIP

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

SOURCE: BUREAU OF OUTDOOR RECREATION

about 11 miles of river frontage located south of Clearwater, and the Minnesota Power and Light Company has 4.5 miles of frontage near Little Falls. The Northwest Paper Company has sizeable holdings along the river just south of Brainerd with approximately three miles of frontage.

The remainder of the corporate ownership up to Aitkin is divided between paper companies and miscellaneous small companies. Segment No. 12 has four miles of frontage owned by the Great Northern Railroad located near the Beltrami-Hubbard County line.

54. Shorefront development pressure near Atkin.

Housing developments appear to follow much the same pattern as the corporate ownership. The heaviest concentration is in the lower 200 miles. It is quite well distributed with no one segment having an exceedingly heavy concentration. There is also a small amount of these developments around Bemidji which are most likely oriented toward recreation home development.

Quasi-public holdings, such as scout camps, country clubs, church property, and sportsman clubs, are quite limited throughout the study area with occurrences in Segments 1, 2, 3, and 5.

Private ownership, excluding corporate holdings, is fairly well distributed along the study corridor except in Segments 8 and 9 which are primarily State and Federal lands. Segment 11 has the largest percent (96) in privately owned shorefront while Segment 9 has the least with only 20 percent.

The number of private tracts per river mile arranged from most to least are Segments 10, 3, 11, 5, 1, 2, 6, 4, 7, 8, 12, 9. Segment 6 has one private owner who controls several miles of frontage as well as several thousand acres outside the river corridor.

The occurrence of tax forfeit land seems to be heaviest in the upper three segments of the study area from Cass Lake to Itasca and in Segment 5 from Riverton to near Aitkin.

Segment 12 has the most tax forfeit land with 24 miles of frontage or about 25 percent of the total. There is a small amount located in Segment 4 near Brainerd. In Segment 5, 40 percent of the right bank is tax forfeit. There is a total of 13 miles of frontage in this segment.

The major areas of public land occur in Segments 4, 6, 7, and 8 with several other segments having minor amounts. Segment 4, lying south of Brainerd, has the longest unbroken stretch of State land in the study area. This is Camp Ripley Military Reservation and Crow Wing State Park which combined cover a distance of 17 miles. Segment 7, the longest in the study, has a total of 27 miles of State owned frontage and 11 miles of frontage owned by Aitkin and Itasca Counties. Segment 8 has 24 miles of State land, some of which is in Schoolcraft State Park and Bowstring State Forest; 22 miles of Federal owned frontage managed by the Chippewa National Forest; and a small amount of county owned frontage.

Segment 9 has the greatest percentage of public land in the river corridor with 75 percent. This is all Chippewa National Forest land and covers 15 waterfront miles.

The headwaters segment, number 12, has 12 miles of State owned frontage in the Mississippi Headwaters State Forest and 22 miles of county owned frontage. This totals 35 percent of the segment in public ownership.

The river enters the Leech Lake Indian Reservation west of Andrusia Lake and leaves southeast of Schoolcraft State Park 65 miles downstream. Ownership of Indian land on the Leech Lake Reservation is either part of the Minnesota Chippewa Tribal Trust or an allotted trust.

The Minnesota Chippewa Tribal Trust is owned collectively by members of the Minnesota Chippewa Tribe. Seven parcels totaling 296 acres of tribal trust land are located along the river and include 127 acres of commercial forest land and 150 acres of marsh land. This land occupies 1.9 miles of river shorefront.

Allotted trust land is a parcel of land assigned to an individual Indian by the Allotment Act of January 14, 1889. Today, most of the allotments are in heirship status with the number of heirs ranging from several to sometimes over one hundred. Management activities on allotments become complicated because of regulations requiring consent of the majority of the heirs. Allotted trust land along the river corridor consists of 10 parcels totaling 663.2 acres and includes 523 acres of commercial forest and 112 acres of brush or wetland. This land occupies 1.7 miles of river shorefront.

Of the 418 islands within the study reach, the Bureau of Land Management has stewardship of 120 between Anoka and St. Cloud. The United Power and Land Company owns four islands near Elk River and Northern States Power Company has title to several of the islands between Elk River and St. Cloud.

Land Management Policies

Bureau of Indian Affairs--Management concerns on Indian lands in the corridor are confined to the Leech Lake Indian Reservation.

Agency management policy on forest land prohibits clear-cutting within 300 feet of a river or stream. Timber harvesting is presently planned in the next five years for only one parcel of 37 acres.

The Mississippi River floodplain on Leech Lake Reservation includes extensive wild rice beds; however, there are very few, if any, beds adjacent to Indian owned lands. The wild rice is annually harvested mostly by local Indians and non-Indians. The Minnesota Chippewa Tribe regulates the harvesting of wild rice by Indians within the reservation. The State of Minnesota, Department of Natural Resources, regulates the harvesting of wild rice on all public lands by non-Indians.

At the present time, there is no improved public access to the river through Indian lands, and there are no plans to construct any in the near future.

United States Forest Service--Forest Service land management activities relevant to the Upper Mississippi occur on the Chippewa National Forest. Their policies are derived from the Multiple-Use--Sustained Yield Act. Every work plan involving a forest land treatment proposal must be reviewed by a complete forest multidisciplinary team. This ensures that all aspects of the proposal are considered and that coordination of the use of the resources involved is assured.

Resorts and recreation residences are allowed one boat servicing building within the water influence zone. In addition, there is a requirement to blend building colors and designs with the surrounding topography and forest.

Recreation residence policy states that only one residence will be permitted on each lot; year-long use or use as an established domicile is not permitted except those previously permitted by the Regional Forester.

Sewage systems will be governed by the latest and strictest standards that are available. Seepage pits and filter-type sewage disposal systems shall be used only where soils permit and approval is given.

Several eagle nests are located within the influence zone on the Mississippi River. These areas are kept confidential to protect them from public abuse and excessive activity. Forest Service policy regarding eagle nests is strict and provides that any activity planned within one-half mile of a nest requires a joint field review unless a management plan has been prepared and approved.

Timber activities are governed by stringent policies that restrict clear cutting over a ten-year period. Areas within or visible from the river will not likely be clear cut. Replacement of short-lived species with long-lived tree species is encouraged along lakes and streams.

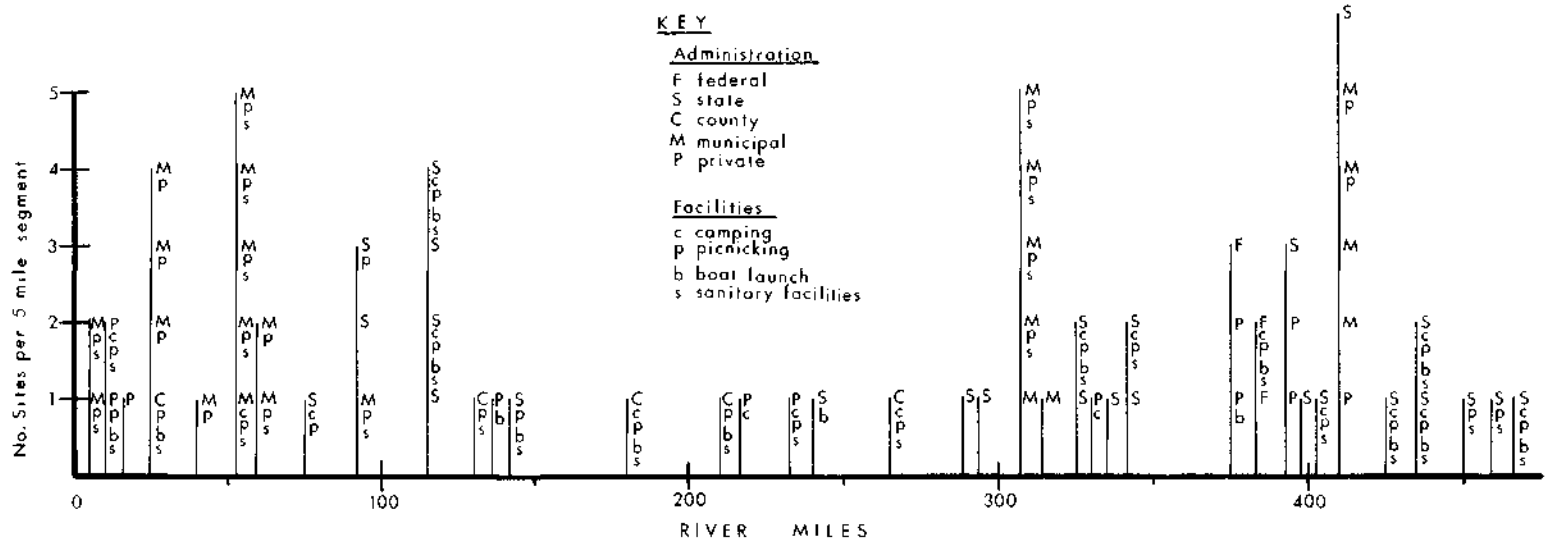
Transportation system policy provides that temporary roads be obliterated after their planned purpose is completed. In addition, there is to be minimum access to major highways and minimized road construction in the water influence zone, such as along the Upper Mississippi River.

Bureau of Land Management (BLM)--The prime concern of the BLM on the Upper Mississippi River are the islands in the public domain found within the river's corridor. Current management policies call for accurate inventorying of all river islands and uplands in the public domain and developing a consistent management policy to perpetuate the fragile environment found on these and other islands in Minnesota.

Although several islands possess the size and soil suitability for developing recreation facilities, the BLM believes these islands should only be developed as a last resort where no suitable area can be found on shore. As of now, recreational potential is broken into five categories: (1) ricing; (2) day use--hunting, launch site, sun bathing; (3) overnight camping undeveloped; (4) overnight camping developed; and (5) wildlife habitat. Of the 120 islands under BLM stewardship most have potential for management as day use areas and as wildlife areas. Agriculture is rarely practiced on these islands. A few islands have been designated as a sanctuary for songbirds and one as a heronry.

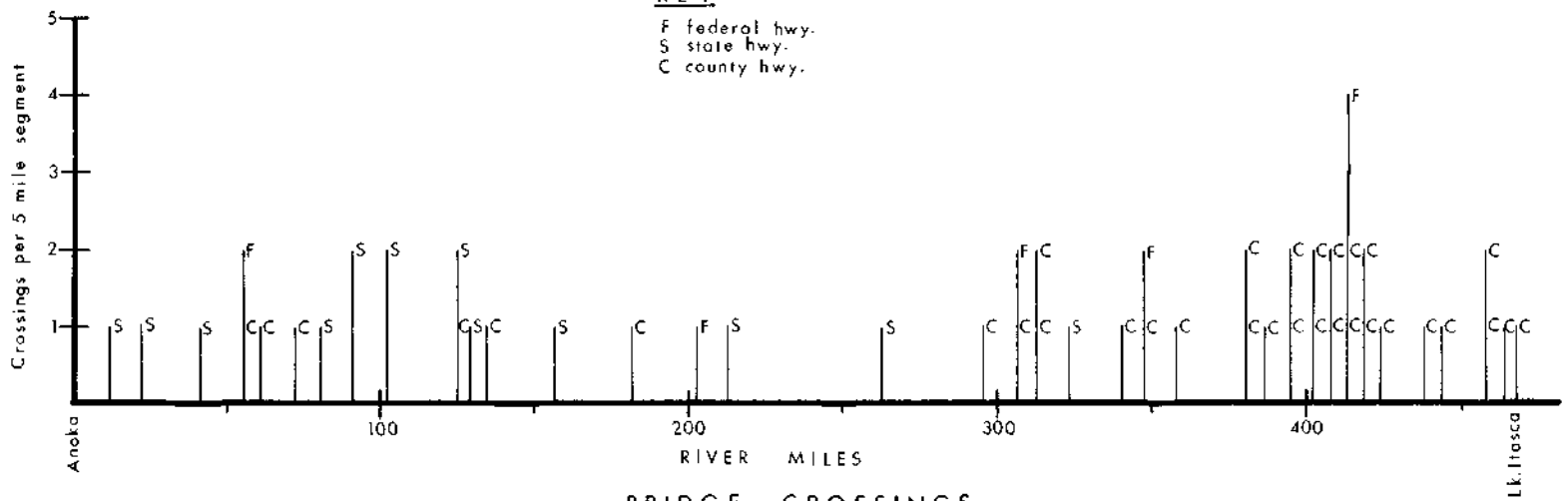
Existing Recreation Resources and Access Points--As portrayed in Figure 25, Table 9, and Appendix A, the river corridor contains a fairly good dispersion of recreation areas and facilities as well as a variety of facility types. Included in this variety of recreation resources are State, county, and municipal parks, and other State and county properties such as forests and boat landing sites.

There are five State parks along the river corridor. See Table 5. Charles A. Lindberg State Park near Little Falls has three-quarters of a mile of frontage on the Mississippi River and covers 300 acres. The park was established in the 1930's and was named for Charles A. Lindberg, Sr., who was a progressive Republican congressman from the area. The old family home is a main attraction of the park as the boyhood residence of Charles Lindberg, Jr. Camping, picnicking, and a launch site are available to the river traveler.



RECREATION FACILITIES

QUALIFYING SEGMENTS



BRIDGE CROSSINGS

Source: Bureau of Outdoor Recreation

Figure 26

RIVER ACCESS AND RECREATION FACILITIES

UPPER MISSISSIPPI WILD AND SCENIC RIVER STUDY

MINNESOTA

Table 9

RECREATION FACILITY INVENTORY FOR THE UPPER MISSISSIPPI RIVER

	RIVER MILE	ACREAGE	CAMPING	PICNICKING	BOAT LAUNCHING	SANITARY DISPOSAL SYSTEM
FEDERAL FACILITIES						
Knutson Dam Campground	385		X	X	X	X
Mississippi River Public Access	378					
Mississippi River Public Access	381					
STATE FACILITIES						
Platte River	74					
Chas. Lindberg State Park	90	110		X		
Mississippi River Public Access	92-3					
Crow Wing Canoe Campground	116.5		X	X	X	X
Mississippi River Public Access	116.5					
Mississippi River Public Access	117.5					
Crow Wing State Park	117-19	2198	X	X	X	X
Crow Wing State Forest Wayside Park	143.5			X	X	X
State Boat Access	241				X	
Mississippi River Public Access	288.5					
Mississippi River Public Access	291					
Schoolcraft State Recreation Area	327.5	295	X	X	X	X
Mississippi River Public Access	327.5	1.29				
Deer River Public Access	335					
Gamblers Point Campground	341	20	X	X		X

	RIVER MILE	ACREAGE	CAMPING	PICNICKING	BOAT LAUNCHING	SANITARY DISPOSAL SYSTEM
STATE FACILITIES (con't)						
Leech Lake River Access	342.5					
Route 33 Access	393					
Wolf Lake Public Access	397					
Island Point Landing	401		X	X		X
Lake Bemidji State Park	409	365				
Iron Bridge Campground	425	35	X	X	X	X
Pine Point Campground	433	15	X	X	X	X
Bear Den Campground	437	50	X	X	X	X
Coffee Pot Landing	451.5			X		X
Wanigan Landing	461			X		X
Itasca State Park	466		X	X	X	X
COUNTY FACILITIES						
Montissippi County Park	25			X	X	X
French Rapids County Park	131			X		X
Aitkin Campground	181.5		X	X	X	X
Bergland County Park	213			X	X	X
Mississippi River Public Access	263.5		X	X		X
MUNICIPAL FACILITIES						
Ehlen Municipal Park	0			X		X
Dayton Wayside Park	6			X		X

MUNICIPAL FACILITIES (con't)	RIVER MILE	ACREAGE	CAMPING	PICNICKING	BOAT LAUNCHING	SANITARY DISPOSAL SYSTEM
Monticello						
Ellison Park	24			X		
East River Municipal Park	24			X		
West River Municipal Park	24			X		
Clearwater Rest Area	41			X		
St. Cloud						
Riverside Municipal Park	53			X		X
Munsinger Park	53			X		X
Hester Park	55			X		X
Wilson Park	55			X		X
Lions Park Municipal Campground	55		X	X		X
Sauk Rapids Municipal Park	56			X		
Sartell Park	59			X		X
Little Falls Municipal Park	92			X		X
Grand Rapids						
Oakland Park	307			X		X
Riverside Park	307			X		X
Roadside Parking Area	307					
Sylvan Municipal Park & Access	308			X		X
Showboat Landing	308			X		X

	RIVER MILE	ACREAGE	CAMPING	PICNICKING	BOAT LAUNCHING	SANITARY DISPOSAL SYSTEM
MUNICIPAL FACILITIES (con't)						
Cohasset Pubic Access	313.5					
Bemidji						
Cameron Park	411			X		
Diamond Point Park	411			X		
Public Beach	412					
Lake Irving Public Access	413.5					
PRIVATE						
KOA Campground	10		X	X		X
Elk River Wayside Park	11			X	X	X
Camp on the Mississippi	16					
Romers Resort	136				X	
Campground	216.5		X			
Big Sandy Campground	233.5		X	X		X
Days High Landing	330		X			
McCradles Resort	375				X	
Four Seasons Resort	375					
Anglers Beach Resort	391					
Wades Riverview Resort	395					
Breezy Hill Resort	409					

55.
Charles Lindberg State Park.

Crow Wing State Park south of Brainerd, located at the confluence of the Crow Wing River, has two miles of frontage on the river and offers camping, picnicking, a launch ramp, and historic interpretive trails along the waterfront. The park is well known for its historical background and was named for Crow Wing Island which lies in the junction of the two rivers. The Indian tribes of the area fought several battles at this site. A fur trading post was established here; later a military post and village were established. Logging was prevalent until the turn of the century. As this industry dwindled, there was hope that the Northern Pacific Railroad would extend its line to cross the Mississippi here. This did not materialize and within a few years the town was virtually abandoned to the wilderness. It was eventually acquired by the State and the park was established. Refer to picture #30 in the pictorial guide.

The next State park encountered as one proceeds up river is Schoolcraft located near Grand Rapids. It was established in 1959 and contains 133 acres, much of which is virgin pine. The park is named after Henry Schoolcraft, an early explorer who discovered the Mississippi headwaters at Lake Itasca. It offers camping, picnicking, a launch site, and various other attractions for river users. Refer to picture Nos. 15 and 16 in the pictorial guide.

Lake Bemidji State Park, on the north shore of Lake Bemidji, was established in 1923 and includes 365 acres, much of which is in virgin pine timber. The park has over a mile of frontage on Lake Bemidji and offers camping and picnicking for the canoeist or boater.

The uppermost State park on the river corridor is Itasca which is probably the most famous since the river originates at Lake Itasca. It was the first State park in Minnesota, having been established in the 1890's. It is also the largest in the State covering about 50 square miles and containing over 100 lakes. The outlet, which is the beginning of the Mississippi River, is the popular starting place for downriver treks originating in the area. The park offers camping, picnicking, and a boat launch site. Refer to picture No. 1 in the pictorial guide.

There are five county and 24 municipal parks scattered along the river, many of which offer camping, picnicking, and various other recreation facilities. The river above Grand Rapids offers an excellent distribution of overnight facilities designed primarily for canoeists. Refer to picture Nos. 32 and 35 in the pictorial guide.

As portrayed in Figure 26, overall access to the river in the study area is quite good considering its length. There are only three reaches in the study area which exceed more than 10 miles in length without some type of accessibility. The access points seem to be fairly well distributed as to ownership and/or administration, including State, county, municipal, private, and bridge crossings. In total there are 68 access points from Anoka to Lake Itasca. The most inaccessible section appears to be from Highway 6 north of Brainerd to about 20 miles north of Palisade. The most accessible section is in the Cass Lake to Bemidji area.

There are 13 actual boat launching sites in the study corridor. These are places where a trailer can be backed into the water to launch larger boats. They are fairly well distributed except for an area from Palisade to Grand Rapids and from Cass Lake to Itasca.

56. Private boat rental near Wolf Lake.

Boat rental businesses on the river are quite sparse. There are only four such places in the entire 466-mile study area. These are located near Elk River, Brainerd, and Cass Lake.

57. Access point at West River Municipal Park, Monticello.

Public access sites are quite well distributed along the river corridor with respect to put in points above and take out points below public picnic and camp areas. Most of the access points are within an easy day's canoeing from an overnight area. The longest distance between an access point and a park is a 24-channel mile distance between the county campground (Mile 171) at Aitkin and State Road 6 crossing downstream (Mile 147).

A major public works proposal for outdoor recreation in the study reach is the development of the Great River Road, a proposed scenic parkway from the headwaters to the mouth of the Mississippi. Although the parkway proposal has literally been around for decades, action is just now being taken in the State of Minnesota. Over nine million Federal dollars were appropriated to the Minnesota Department of Transportation to be

spent within three fiscal years for the development of the Great River Road. Since the parkway follows the Wisconsin side of the Mississippi below the Twin Cities and follows existing roadway through the metropolitan area, most of the State's attention to the project will be focused in the river reach above Anoka.

Tentative State planning objectives for these Federal funds are toward acquiring rights-of-way for new routing and for scenic easements to protect the view from the roadway. Obvious potential conflicts between the Great River Road and the Wild and Scenic River could occur since providing scenic vistas of the river from the road is a primary planning objective for the Great River Road and limited access and a feeling of remoteness are cornerstones of the qualifying criteria in the Wild and Scenic Rivers Act. Although a route for the parkway has not been finalized, a series of routing studies within the State of Minnesota has been conducted by the Federal Highway Administration and the National Park Service. The most recent study, completed in October 1976, includes the headwaters reach between Lake Itasca and Anoka. Along several reaches of the river, the route proposed in this series of studies is in direct conflict with the intent of the Wild and Scenic Rivers Act. The following river reaches would receive particularly adverse impact if the proposals are adopted as written:

1. Camp Ripley to Brainerd--particularly the three bridge crossings at Crow Wing River.

2. Riverton to the outlet of the flood diversion channel--particularly at the Pine River.

3. Palisades to the Prairie River--particularly for 10 miles upstream from Jacobson.

4. Between Winny and Cass Lakes.

5. Between County Road 7 and Lake Itasca.

As long as the Upper Mississippi is being considered for possible inclusion in the National Wild and Scenic Rivers System, any environmental impact statement prepared for the Great River Road above Anoka, Minnesota, must evaluate the impact of the proposal on the classification that the river qualifies as part of the National System.

Careful design of the Great River Road and associated facilities and corridor could be made compatible with the Wild and Scenic River and would, in fact, expand the zone of protection for the resource. In order for the blend of these two Federal programs to successfully enhance the recreation experience from the water and the windshield, close planning coordination and sense of purpose must be maintained between the administering agencies.

Legal and Institutional Framework

Listed below are the legislative and agency frameworks that directly affect the Upper Mississippi River today as well as provide potential means of protection for the resource as a wild, scenic, or recreational component of the National System. (Source: Minnesotans and their Mississippi, 1974, pp. 183-203).

Federal Legislation

Federal Water Resources Planning Act. Congress enacted this piece of major legislation in July 1965, supporting conservation, development, and utilization of water and related land resources of the U. S. on a comprehensive basis. It called for the coordination of efforts of the Federal and State governments and agencies and local and private groups. As a direct outgrowth of this Act, new Federal and State departments and agencies such as the Federal Water Resources Council and the Upper Mississippi River Basin Commission (and the Minnesota Water Resources Coordinating Committee) were created.

Wild and Scenic Rivers Act of 1968. The Act established the National Wild and Scenic Rivers System, designated eight rivers as initial components of the system, identified 27 rivers for study as potential additions to the National System, and prescribed methods and standards by which additional rivers could be added to the system from time to time. In January 1975 the Act was amended placing 29 additional rivers in the study category, one of which is the Upper Mississippi River.

The amended Act calls for a determination of the suitability of the Upper Mississippi River for inclusion in the National System and, if it is to be included, recommendations and guidelines pertaining to the administration and management of the river and its environment.

Water Quality Improvement Act of 1970. Harmful quantities of oil spilling into or upon navigable waters is prohibited by this Act which applies not only to vessels, but also to the onshore and offshore drilling facilities. The Environmental Protection Agency (EPA) and Coast Guard administer this Act with the authority to fine owners and/or operators for knowingly discharging oil in harmful quantities.

National Environmental Policy Act of 1969. Established a national policy to maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans. The Council on Environmental Quality (CEQ) was established to coordinate environmental matters at the Federal level and advise the President. In addition, all Federal actions and proposals which could have an impact on the environment were made subject to review by Federal, State, and local environmental authority.

1972 Amendment to the Federal Water Pollution Control Act. This amendment introduces a new national permit program to control discharge of pollutants into the nation's waters. This new permit program replaces and improves upon the old one under the 1899 Refuse Act. The objective is to prevent, reduce, and eliminate water pollution. The means to such ends is the establishment of a tight regulatory system with strict abatement requirements, enforcement procedures, and heavy penalties for violations.

To meet the Act's objective, the law has established a time table requiring industry:

(a) To use the "best practical" technology to control water pollution by July 1, 1977,

(b) To apply the "best available" technology by July 1, 1983 (a minimum of secondary treatment for waste treatment plants by 1977), and

(c) To remove and eliminate pollution by July 1985.

State Legislation

Critical Areas Act of 1973. This Act was developed out of concern for certain areas of the State possessing important historic, cultural, or aesthetic values, or natural systems which perform functions of greater than local significance. Areas in which there could result irreversible damage to the resources, a decrease in their value and utility for public purposes, or unreasonably endanger life and property. The legislature directed the State to identify these areas of critical concern and assist cooperatively with local units of government in the preparation of plans and regulations for the wise use thereof. In other words, it maintains local involvement in use of land but makes land use decisions within a regional framework. A segment of the Mississippi River flowing through the seven-county Twin Cities area has been declared a critical area under authority of the Critical Areas Act.

Minnesota Wild and Scenic River Act. Made law in May 1973, the Act states that it is in the interest of present and future generations to preserve and protect the outstanding scenic, recreational, natural, historical, and scientific values of certain Minnesota rivers and their adjacent lands. The Commissioner of the Department of Natural Resources is to provide standards and criteria for the preservation, protection, and management of rivers to be recommended for inclusion in this Act. The DNR will hold public hearings in areas of local concern. Following the hearings, and depending upon their outcomes, the Commissioner of DNR may or may not recommend the river(s) be included under the Act. If included, the DNR is responsible to see that the standards and criteria are followed as required. Refer to Table 13.

Shoreland Management Act. Enacted in 1969, to preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise utilization of water and related land resources of the State. The policy states that the uncontrolled use of shorelands adversely affects the public health, safety, and general welfare by contributing to pollution of public waters and by impairing the local tax base. It directs the Commissioner of the Department of Natural Resources (DNR) to provide the counties of the State with minimum standards and criteria for subdivision, use, and development of the shorelands of public waters located in unincorporated areas. See Table 12.

Specifically, it deals with regulations governing the type and placement of sanitary and waste disposal facilities in shoreland areas, regulations governing the size and length of water frontage of lots suitable for building sites,regulations governing the placement of structures in relation to shore lines and roads, regulations governing alterations and preservation of the natural landscape, and regulations governing the subdivision of shoreland areas. The Department of Natural Resources administers this law.

Floodplain Management Act. Enacted in 1969, establishes minimum floodplain management standards, and applies to land adjacent to all watercourses, both intrastate and interstate, where the drainage area of the watercourse is over two square miles and where the Commissioner finds a watercourse having a drainage area under two square miles which has significant flood hazard.

It calls for local governments to submit floodplain information, adopt or amend a floodplain management ordinance which meets the minimum standards and criteria as drawn up by the Department of Natural Resources (DNR), and finally enforce approved floodplain management ordinances upon adoption. The law is administered by the DNR.

Canoe and Boating Routes Legislation. Giving the Commissioner of the Department of Natural Resources (DNR) the authority, in cooperation with local units of government, private individuals, and groups when feasible, to mark canoe and boating routes on the Little Fork, Big Fork, Minnesota, St. Croix, Snake, Mississippi, Red Lake, Cannon, Des Moines, Crow Wing, St. Louis, Rum, Kettle, Cloquet, Root, and Crow Rivers which have historic and scenic values and to mark appropriately points of interest, portages, campsites and all dams, rapids, waterfalls, whirlpools, and other serious hazards which are dangerous to canoe and watercraft travelers.

The Commissioner may take by easement and by leases, land for camp sites and portages and develop and maintain such campsites and portages along such routes on the rivers designated above.

Federal Agencies

Federal Water Resources Council. Enactment of the Water Resources Planning Act provided for the creation of this body with the following responsibilities:

(a) To maintain a study and prepare a national water assessment;

(b) To coordinate and review regional river basin plans and programs prepared by Federal-State interests;

(c) To coordinate water and related land resources planning policies;

(d) To administer Federal financial grants to States;

(e) To establish and assist river basin commissions, such as the Upper Mississippi River Basin Commission, and other supporting committees and groups; and

(f) To establish principles, standards, and procedures necessary for development of Federal water and related land projects.

Environmental Protection Agency (EPA). The establishment of the EPA in July 1970 brought together for the first time into a single agency the major environmental control programs of the Federal Government.

The EPA has been charged with mounting a comprehensive attack on environmental problems of air and water pollution, solid wastes management, pesticides, radiation, and noise, with additional flexibility to tackle other environmental problems as they may occur or be realized.

Specifically in relation to the Mississippi River, the EPA would be concerned about such things as waste materials such as sewage, sludge, etc., from farms, factories, and homes; pollution sources, including animal waste from feedlots; fertilizer and pesticide run-off from fields and forests; heated water returned to river; irrigation return flows bearing fertilizers, pesticides, and salts leached from the soil; quality of water used for drinking water; recreation from and on the river; oil spills; etc.

In review, several Federal Acts have contributed to the fight against water pollution, and the EPA is responsible to see these are administered:

The Federal Water Pollution Act of 1956.
The Refuse Act of 1899, upheld by Federal Court decision in 1966.

Water Quality Act of 1965.
Water Quality Improvement Act of 1970.

And the most current major piece of legislation is the 1972 amendment to the Federal Water Pollution Control Act, referred to as the National Pollution Discharge Elimination System (NPDES).

U. S. Army Corps of Engineers. The Corps water resource programs fall into the following categories:

(a) Flood protection programs.
(b) Development and improvement of navigable waterways.
(c) Floodplain management programs.

Related to these works the Corps also becomes involved in:

(a) Pollution abatement
(b) Fish and Wildlife conservation and enhancement.
(c) Recreation development.
(d) Water Supply.
(e) General regulatory functions
(f) Urban studies programs
(g) Emergency operations and evacuation programs related to water resources.

As of October 1972, the Corps of Engineers has turned all its jurisdiction over water quality to the Minnesota Pollution Control Agency. This is the permit program required for discharge of any industrial waste into navigable waters or their tributaries.

The Corps accomplished dredging and channel cutoffs on the Mississippi and Leech Lake Rivers from 1913 to 1926. Dredging on the Mississippi River was from the upper reaches of Pokegama pool to Winnibigoshish Dam. On the Leech Lake River it was from the mouth to Leech Lake Dam. Channel widths were 100 to 125 feet with a bank-full depth of 8 feet. Improved channel sections included about 65 miles on the Mississippi River and 27 miles on the Leech Lake River. No maintenance has been accomplished on these channels since 1929. Under Section 404 of the Federal Water Pollution Control Act of 1972, the U.S. Army Corps of Engineers has regulatory jurisdiction over placement of dredged or fill material in most rivers, lakes, and adjacent wetlands. The Corps of Engineers works closely with watershed and drainage basin projects. Now it files environmental impact statements prior to the onset of work.

The Bureau of Outdoor Recreation. The Bureau of Outdoor Recreation 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. Promoting coordination of outdoor recreation programs, the Bureau serves all Federal agencies as well as State and local governments, private organizations, and individuals concerned with outdoor recreation. The Bureau manages no lands or waters.

By legislative authority or upon the order of the Secretary of the Interior, the Bureau 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.

Upper Mississippi River Basin Commission. This Commission was created in March 1972. Its purpose is to coordinate Federal, State, local, and interstate programs involving the Upper Mississippi River basin from Itasca south to Cairo, Illinois. It is presently engaged in or has accomplished some eight activities:

(a) Survey of transportation and related studies.

(b) Public hearings on Upper Mississippi River Comprehensive Basin Study.

(c) Level B Study for Minneapolis/St. Paul metropolitan area.

(d) Participation in 1975 National Assessment of Water Needs.

(e) Assessment of water and related resource planning and study management, research, and development priorities throughout the basin.

(f) Continuation of preparation of comprehensive, coordinated joint plan for basin using above mentioned comprehensive basin study.

(g) Regional studies in areas of particular needs but as yet undetermined in location.

(h) Review of other agency plans as requested.

State Agencies

Minnesota Department of Natural Resources (DNR). The DNR is the largest State agency with major responsibilities in water and related land resource planning, development, and management. Its relationships to waters of the Mississippi would be through the

water permit system, whereby the DNR is involved in the issuing of a permit for the withdrawal from or addition to a watercourse, if the act significantly alters (physically or chemically) the natural conditions of the river.

In regard to lands adjacent to the Mississippi River, this involves the DNR in floodplain management as it established zoning and management criteria for any river drainage area of two (2) square miles, or where there is significant flood hazard even if the area is under two (2) square miles.

The DNR is involved in management of shoreland areas of public waters of the State located in unincorporated areas along the Mississippi (1,000 feet horizontal inland distance above the normal high water mark for lake, pond, and flowage or 300 feet from a river, or the landward extent of a floodplain designated by ordinance, whichever is greater. This involvement includes criteria and standards for land-use of these shoreland areas such as type and placement of sanitary and waste disposal facilities, placement of structures in relation to shorelines and roads, preservation of natural landscape, regulating subdivision or shoreland, and regulating size and length of water frontage lots suitable for buildings.

The DNR is also related to wise recreational use of Mississippi shorelands as follows: the provision and upkeep (as appropriate and needed) of public access sites, canoe and camping sites, trails (for hiking, bicycling, cross-country skiing, snowmobiling), and the regulation and enforcement of public use of these lands for hunting, fishing, trapping, cutting, vandalism, littering, etc.

Minnesota Pollution Control Agency. This agency has broad responsibilities related to water and air pollution and solid waste disposal. It conducts surveys and carries out evaluations of pollution sources as they are evidenced, carries out regulatory and enforcement procedures, inspects sewage and waste treatment plants, and administers Federal grants-in-aid. In relation to the Mississippi River, it would: enforce water quality standards as defined by zones it has established, be called in case of any kind of "spills" into the river, maintain monitoring so as to provide information about year-round quality conditions, and administer Federal grants-in-aid for studies relating to the Mississippi River.

Minnesota State Planning Agency. This agency is charged with coordinating the planning of State government departments, and within its jurisdiction it administers water and related land

resources planning. As part of that responsibility, it has activated and chaired an advisory body referred to as the Water Resources Coordinating Committee (now the Water Resources Council). In addition, it provides facts and figures about water and land related resources valuable for planning purposes. For example, it has provided publications such as: "Minnesota Water and Related Land Resources - First Assessment," "Background Information for Framework Statewide Water and Related Land Resources Planning in Minnesota," "Alternate Programs and Projects for Managing Minnesota's Water and Related Land Resources Through the Year 2020," and "Minnesota Resource Potentials in State Outdoor Recreation."

Water Resources Council (formerly Water Resources Coordinating Committee). Stimulated by the passage of the Federal Water Resources Planning Act of 1965, in May 1967 the Minnesota State Planning Agency activated an advisory Water Resources Coordinating Committee to prepare a statewide water and related land resources plan. Since water management functions were so scattered that no one particular agency had the authority and/or responsibility to administer statewide water and related land resources development, it had become critical that such a body as this be created.

Mississippi River Parkway Commission of Minnesota. In 1938 the National Mississippi River Parkway Planning Commission was formed, comprising the ten (10) States bordering the Mississippi River.

As a result of the interest for the Great River Road project, the Mississippi River Parkway Commission of Minnesota was established by the 1963 Legislature.

The Mississippi River Parkway Commission of Minnesota is directed by the policies of the State to aid in the promotion and securement of a scenic parkway and highway for the State of Minnesota; aid in securing the location of Federal parks within the State; and work toward the planning, construction, maintenance, and improvement of the Great River Road.

Water Resources Board. This board was created in 1955 and is concerned with establishing watershed districts through hearing procedures, and reviewing their needs and water policy needs. It is chiefly concerned with the Army Corps of Engineers and the Soil Conservation Service in their watershed district work, thus serving as a link between these agencies and the Federal, State, and local agencies and groups. The board also provides assistance in solving such problems as flood damage, navigation expansion, land treatment and drainage concern, and the need for recreation and fish and wildlife facilities as they relate to watershed districting.

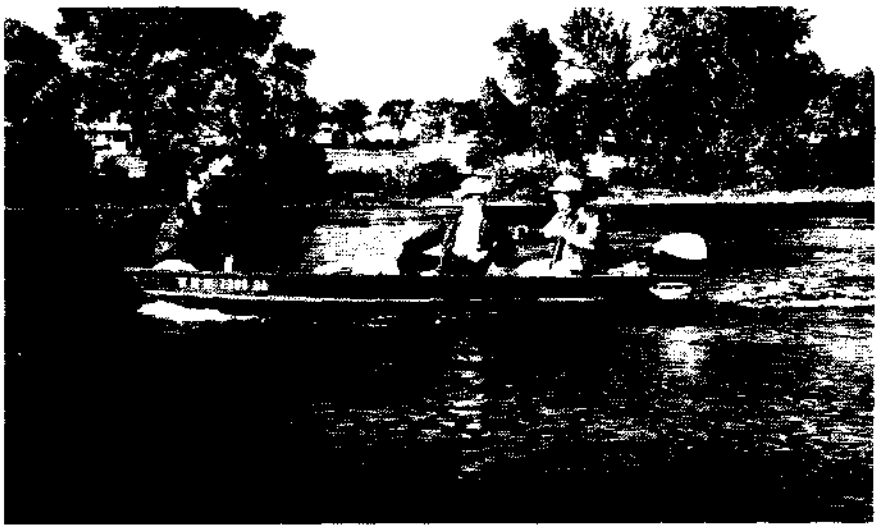
Environmental Quality Council. The legislature of Minnesota found that problems related to the environment often encompass the responsibilities of several State agencies and that solutions to these environmental problems require the interaction of these agencies. The legislature wished that further debate on population and economic and technological growth could be encouraged so the consequences and causes of alternative decisions could be better known and understood by the public and its government. On the basis of this, it established the Minnesota Environmental Quality Council (EQC).

The EQC has specific responsibilities which are not presently assigned to any agencies; for example, it is required to establish State environmental quality standards for the subdivision and development of land in the State; to prescribe regulations governing the preparation of environmental impact statements and the administration of the environmental impact system; to prepare criteria for the selection and treatment of areas of critical concern, recommending to the Governor those areas to be designated as areas of critical concern; to select power plant sites and transmission lines corridors and routes; and otherwise serve as a directive and review organization for major State environmental issues. Its specific relationship to the Mississippi River would be the siting of power plants on its watercourse, the subdivision of lands near the river's edge, and the review of any environmental impact statement regarding a river or river's edge use.

VI. EVALUATION AND CLASSIFICATION OF THE RIVER

River Evaluation

The Mississippi River is one of the most commonly known geographic features of the world. This river, first called the "Father of Waters" centuries ago, has played a prominent role in shaping our country's history. The mighty Mississippi has traditionally been a focal point for populations of fishes, wildlife, waterfowl, and people. The natural beauty of this river is substantial, but its heritage is perhaps the most compelling rationale for its inclusion in the National Wild and Scenic Rivers System.



58. Study associates conducting field reconnaissance.

From its headwaters at Lake Itasca to the lower limits of the study area at Anoka, the river changes character or mood several times. It begins as a narrow stream flowing through the spruce fir timber of the north woods. Within three miles the mood changes dramatically as the stream enters a lowland. The forest cover recedes from the riverbanks, exposing wetland shrub which, in turn, yields as the lowland widens to marsh grass. This vegetative succession repeats itself as the river meanders through a pattern of upland forest and lowland marsh, shrub, and forest. The largest marshes afford an extraordinary one- to two-mile view from the water which is highly contrasted by periodic travel through heavily canopied forest areas. These contrasting moods afford a dramatic variety of experience while floating the river. This pattern continues from Lake Itasca to Grand Rapids, approximately one-third of the total study reach.

Below Grand Rapids, the character of the river changes as the corridor is predominantly covered by deciduous forest and pasture lands. The river is generally broad, averaging 310 feet in width, but it is frequently transformed into a maze of smaller intertwining channels formed by oxbows or islands. The key elements of the overall river corridor which contribute to the changing character of the river may be categorized into eight distinct riverscape classifications: the headwaters stream meandering through (1) upland forest and (2) lowland forest, (3) broad open marsh, and (4) lowland shrub and the lower reach through (5) deciduous forest occasionally interrupted by (6) oxbows, (7) groups of islands, and (8) pastoral farmlands. Each of these riverscape classifications is represented in the portions of the river which meet the criteria for classification as defined in the Wild and Scenic Rivers Act (P. L. 90-542).

The continuity of the river corridor is interrupted by six natural lakes upstream from Grand Rapids and 10 dams along the entire reach shown in Figure 1 on page 23. A total of 72 river miles or 15 percent of the river is slack water. Although these impoundments and natural lakes interrupt the free-flowing property of the Mississippi, its continuity is sufficiently intact to motivate a reported 200 people per year to float from its headwaters to some long distance downstream destination such as Grand Rapids, the Twin Cities, St. Louis, or New Orleans.

Commercial and industrial development along the river corridor is confined to the corporate limits of Grand Rapids, Brainard, Little Falls, Sartell, St. Cloud, and Elk River.

In the entire 466 miles of river between Lake Itasca and Anoka only 53 bridge crossings are encountered. Most of these are concentrated within boundaries of major cities and towns. The largest concentration is at Brainerd where three bridges span the river within a mile. Major power generating facilities are located along the river corridor at Elk River (Mile 11) which is visible from the river for .3 mile upstream and .4 mile downstream, Monticello (Mile 29) which is visible for two miles upstream, Becker (Mile 32) which is visible for two miles upstream and two miles downstream, and Cohasset (Mile 313) which is visible for 1.6 miles upstream. Eleven primary power transmission lines cross the river. Generally, the above mentioned intrusions are concentrated on impounded sections of the river or free-flowing portions in urban areas. The major single intrusion on an undeveloped free-flowing stretch is the nuclear power plant north of Monticello.

Agricultural development in the corridor is prevalent from Anoka (Mile 0) to Camp Ripley Military Reservation (Mile 100) in a section including the communities of Aitkin and Palisades between Mile 166 and 223, south of Jacobson between Miles 246 and 263, and south of Grand Rapids between Miles 296 and 305. The degree of agricultural development in these

areas precludes classification of the river as wild but does not in itself limit any portion to a recreational classification or disqualify it altogether.

Like most other intrusions in the corridor, residential development occurs on the impounded sections of the river and in close proximity to urban areas. Free-flowing segments of the river where residential development is the primary element limiting classification are from Anoka to St. Cloud (Mile 0 to 53), the backwater of the Sartell Dam to Blanchard Dam (Mile 66 to 83), the backwater of the dam at Little Falls to Fort Ripley Military Reservation (Miles 94 to 100), the Riverside Mobile Home Park downstream from Aitkin (Miles 169 to 175), and Lake Bemidji to County Road 7 (Mile 413 to 425).

River Classification

From field reconnaissance of the 466 river miles in the study segment from Lake Itasca to the city limits of Anoka, it is concluded that 353.3 miles or 76 percent of the Upper Mississippi River possesses outstandingly remarkable scenic, fish, wildlife, and historic values and that these segments of river and their immediate environments should be protected for the benefit of future generations. In accordance with the criteria for river classification as defined in the Wild and Scenic Rivers Act and in the supplementary criteria developed by the Secretaries of the Interior and Agriculture, 41.2 river miles qualify as wild, 207.7 river miles qualify as scenic, and 104.4 river miles qualify as recreational. Specific segments are as follows and are depicted in Figure 1 on page 22:

Segment 1 Recreational 41.1 Miles	From the northwestern corporate boundary of Anoka (Mile 0) up stream to the confluence of the Clearwater River (Mile 41.1)

Portions of this segment remain in a completely natural state, particularly in the confines of the eight major groups of islands which highlight the scenic quality of the reach. A total of 84 islands are located in the 41-mile segment. The riverscape is also enhanced by banks rising 50 feet above the river on the south side opposite Lilly Pond Island (Mile 20) and the north side above the Becker Power Plant site (Mile 32). The aquatic environment supports a great variety of game fish, particularly smallmouth bass, and provides a fishing experience very different from that derived through still waters or small streams.

Primary recreation resources include a private campground south of the State Road 101 crossing (Mile 10.5), a wayside park and boat ramp at Elk River (Mile 11), Montissippi County Park (Mile 25.5), and a wayside park and boat ramp at the Clearwater bridge (Mile 41).

This portion of the river was a water highway for Indians, fur traders, explorers, and settlers. Numerous sawmills were built to process the huge white pines which were floated downriver. The famous Red River Oxcart Trail paralleled the river. Fur trading posts, Indian villages, ghost towns, ferry crossings, mill sites, and other historical sites were also located along the river.

The primary intrusions in this segment are the urban and suburban developments and bridge crossings of Anoka (Mile 0 to 1.5), Dayton (Mile 6 to 7), Elk River (Mile 11 to 12.5), and Monticello (Mile 23 to 25), and two power plants and related transmission lines north of Monticello (Mile 27 to 28) and near Becker (Mile 31 to 32). U. S. Highway 10, a principal artery, parallels the river to the east and County Road 12, a minor collector, parallels along the west bank.

The frequency and magnitude of these urban and suburban developments in combination with the two power plants and agricultural activity limit this segment to a recreational classification.

Segment 2 Scenic 11.9 Miles	From the confluence of the Clearwater River (Mile 41.1) upstream to and including the Beaver Islands at St. Cloud (Mile 53)

This segment remains largely in a natural state despite the proximity of St. Cloud. The scenery is dominated by a 30-foot to 40-foot bank on the eastern shore and is accented at Mile 41.6 by the study reach's largest sand bar and by 67 islands scattered throughout the segment. The largest group located just below St. Cloud was named the Beaver Islands by the explorer Zebulon Pike on October 10, 1805; the channels at that date were choked with beaver dams. A heronry is located on Greenwood Island (Mile 44).

The geographical position near what was then the head of Upper Mississippi River traffic brought St. Cloud into prominence in the 1850's and 60's as an outfitting post for fur traders. A vast tonnage of furs from the territory west and north was loaded on steamboats at St. Cloud in exchange for supplies for the wilderness forts and for the distant Canadian posts of the Hudson Bay Company. The goods were carried inland by a steady flow of trains of 100 or more oxen and pony carts. The last regular steamboat trip up the river was made in 1874 by which time the railroads had absorbed the traffic.

State Highways 301 and 152 (minor collectors) border the east and west banks, respectively, but are well screened from view from the water. No public access or road crossings occur between St. Cloud and Clearwater. There are no large concentrations of habitations, only a few individual houses. Thus, this reach meets the scenic criteria.

Segment 3 Recreational 13.8 Miles	One mile downstream from the southern village boundary of Rice (Mile 69.2) upstream to Blanchard Dam (Mile 83)

The riverscape in this reach is interspersed with agricultural activity and homesteads. The scenery is enhanced by six groups of islands. A total of 31 islands are located in the segment. The only recreation facility is a county operated campground at the confluence of the Platte River (Mile 74.4).

One of the most striking scenic and wildlife attractions along the entire study reach occurs on the east bank opposite McDougall Island. Here, a 60-foot high bluff, the highest in the study reach, affords an impressive view of the river. Equally impressive is a heronry located on a five-acre stand of 50- to 100-year old white pine on the crest of the bluff.

County Road 26 (major collector) crosses the river at Mile 79.9, while County Road 1 (major collector) parallels the west bank. No major intrusions degrade the corridor, but the frequency of agricultural activity and groups of buildings in combination do limit its scenic quality. Since the corridor has development and supports a wide variety of agricultural uses, the corridor classification is restricted to the recreational category.

Segment 4 Scenic 30.1 Miles	The southern point of Roscoe Island (Mile 96) upstream and including the 20-acre island south of Brainerd (Mile 126.1)

This scenic segment includes two physiographic features significant to the entire study reach: the Crow Wing River and the Mississippi River Clough.

The Crow Wing River has been judged a significant scenic resource by the Minnesota Department of Natural Resources and is being studied for possible inclusion into the State Wild and Scenic River System.

Just south of the Crow Wing River confluence (Mile 117) is the site of the abandoned town of Crow Wing, one of the State's oldest towns. The town was abandoned circa 1870 when surveyors for the Northern Pacific Railroad Company selected a site on the east bank of the Mississippi for a railroad crossing. This area was also an important crossing of the Red River Oxcart Trail over the Mississippi and the site of a fur trading post dating to the 1700's.

Crow Wing State Park (Miles 115.7 to 120), situated on the east bank across from the confluence, features a historic trail on the crest of a 40-foot bank overlooking the river, a canoe campground, and assorted picnic sites. This 1,418-acre park had a 1974 visitation of 50,954.

The Mississippi River Clough (Miles 103 through 105) harbors the highest concentration of islands on the study reach. In this highly scenic two-mile reach there are seven islands of 10 acres or more and 38 lesser islands. The largest is 40-acre Roscoe Island which is the landmark for the downstream end of the reach. A total of 112 islands are located in the entire 30-mile segment.

The only bridge crossing is State Highway 115 (major collector). A service road in the Fort Ripley Military Reservation follows the west bank from Mile 100 to Mile 104.5, but it is well screened. Although never within sight of the river, State Highway 371 (principal arterial) parallels the east bank coming close only at the confluence of Nokasippi River (Mile 108.3). One primary powerline crosses the river at Mile 123.5.

The shorefront is largely primitive, remaining in a natural state, accessible in places by road, and generally undeveloped except for a few buildings associated with Fort Ripley which are located near State Highway 115. This reach therefore qualifies for scenic classification.

Segment 5	From Riverton (Mile 139.6) upstream
Scenic	to the discharge of the flood
26.9 Miles	diversion channel (Mile 166.5)

The 168-mile reach from Riverton to Grand Rapids which includes Segments 5, 6, and 7 is the longest stretch of the study river without an impoundment interrupting the continuity of flow. This is reflected by the fact that the average width of river for the reach (195 feet) is one-third that between Anoka and Riverton (535 feet). See Figure 17 on page 80. It is also the reach with the least amount of access.

The portion of this reach between Riverton and the flood diversion channel is an outstandingly scenic corridor. The consistent scenic quality of the corridor is accented by five islands, five oxbows, and frequent 30-foot to 50-foot banks shrouded by conifers. The scenic highlight is the confluence of the Pine with the Mississippi River (Mile 151). Here water currents mingle through a series of five islands as the two water bodies converge.

In the 1800's the Pine River was a means of communication for the voyageurs with Leech Lake and was a more direct course to Leech Lake than the Mississippi. In 1805, the explorer Schoolcraft noted a Chippewa encampment of 15 lodges where the two rivers join. A small farm is now located where the Indian encampment was. The farm is not considered a serious intrusion since it is partially hidden from the river by a vegetative screen. Other intrusions include two primary powerline crossings (Miles 139 and 152.5), State Highway 6 at Mile 156.4 (minor arterial), three homesites (Miles 140.5, 142, 145.5), and a fourth under construction at State Highway 6. The major intrusion is the intermittent presence of farm land along 3.5 miles of the upstream shoreline. Although County Road 11 (major collector) parallels the river between Miles 153 and 167, the combination of steep slope and vegetative cover effectively shields the road from the visual corridor.

This segment truly represents a vestige of primitive America. Unlike the headwaters reach, this segment reflects the stereotyped image of the Mississippi River in terms of enormity and grandeur. Remnant white pines tower above the canopy of mixed conifer and hardwood. Animals associated with wildness and freedom, such as bald eagle and deer, are frequently sited and the water invites the angler to challenge the great game fish of the north woods. It is an exhilerating experience to feel the Mississippi River as it once was.

Because of the fact that County Road 11 parallels the river within a quarter mile of the bank for nine miles and farming occurs intermittently for 3.5 miles, the qualification of this segment is limited to the scenic classification.

Segment 6 Recreational 27.7 Miles	From the beginning of the flood diversion channel (Mile 190.3) upstream to the boundary between Logan and Workman Townships in Aitkin County (Mile 218)

The riverscape between Aitkin and Grand Rapids retains the vegetative mix of the corridor downstream from Brainerd and is enhanced by an increased degree of meandering. See Figure 18, page 80. The average sinuosity of 1.89 is accentuated by 38 complete or remnant oxbows forming as many islands surrounded by slack water. These oxbows add a special dimension to the character of the river. Most are not readily apparent from the main channel, thus providing the recreationist with an opportunity to discover secluded segments of river channel from another era. This reach had to be separated into two segments due to increased agricultural activity and related shorefront development. The lower reach, Segment 6, is limited to a recreational classification.

The Willow River entering the Mississippi at Mile 204.5 of this reach is a significant recreational resource in its own right as it meanders for miles through the Hill River and Savana State Forests.

Segment 7 Scenic 86.7 Miles	From the boundary between Logan and Workman Townships in Aitkin County (Mile 218) upstream to the confluence of the Prairie River (Mile 304.7)

The scenic quality of this reach is particularly enhanced by the extreme sinuosity and concentration of oxbows and related islands. Agricultural activity and related development are more dispersed in this corridor than that of Segment 6. Much of the corridor remains in a natural state of lowland deciduous forest.

Just one mile south of the outlet of Sandy Lake (Mile 232.7) was the site of a Northwest Company trading post. An Indian village was located nearby and a trading post of the American Fur Company was located at the

discharge of Sandy Lake into the Mississippi. This reach was actively utilized at the turn of the century by steamboats as the primary means of transporting freight to the north country. Minnesota Voyageur Trails cites 16 riverboat landing sites in this reach. A ghost-like pullman car looms over the river north of Jacobson on the site of an abandoned railroad, a reminder of a later transportation era (Mile 266.5).

Although roads parallel the river along the entire reach, only four cross the river: County Road 11 (major collector) at Aitkin, U.S. Highway 169 (a principal arterial) at Mile 200.5, State Road 232 (minor collector) at Palisade, and State Road 200 (minor arterial) at Jacobson.

Two segments of this corridor are actively utilized for agriculture and the riverscape reflects its presence: from Mile 246 to Jacobson (Mile 264.5) and from Mile 290 to 305. This agricultural activity and related development is the primary intrusion in the corridor. The Town of Jacobson does not represent serious encroachment. There is a primary powerline crossing at Mile 294.

Since approximately two-thirds of the reach has shorefront largely primitive, undeveloped, and relatively inaccessible and the intermittent occurrence of agricultural activity is not of major impact, this segment was classified as scenic.

Segment 8	From Blackwater Lake (Mile 317)
Scenic	upstream to Lake Winnibigoshish
41.8 Miles	Mile 358.8)

This segment has outstanding scenic quality and provides prime waterfowl habitat as it meanders almost exclusively through marshland. Between Miles 330 and 340, for example, the marsh extends over 2,000 acres. The Vermillion River enters at Mile 327.5, Ball Club River at Mile 341, and Leech Lake River at Mile 342.5. The U. S. Forest Service has managed this marshland to enhance wildlife habitat for many years. Longstanding management programs on the Chippewa National Forest include strategic placement of woodduck houses and potholes blasted in the marsh to facilitate duck breeding. Presently, nine bald eagle nests are located along the corridor between U. S. Highway 2 and Lake Winnibigoshish.

The primary recreation area is the 212-acre Schoolcraft State Park (Mile 328) which drew a total attendance in 1974 of 8,753. Gamblers Point Campground, located on a red pine covered bluff at Mile 341, affords a spectacular view of a portion of the marsh. This is the only canoe camp on the State canoe route between Grand Rapids and Lake Itasca that is accessible only from the water. The U. S. Army Corps of Engineers maintains a picnic ground below the Lake Winnibigoshish Dam. It is reported that recreational use of this segment is curtailed during low-flow periods.

Major intrusions include a powerline crossing at Mile 347.3 and bridge crossings for State Road 6 (Mile 323), a minor arterial; an unknown county road (Miles 330 and 342.5; and U. S. Highway 2 (Mile 347.3), a principal arterial. This segment was channelized near the turn of the century, but the impact from the water was judged as not significantly detracting from the natural setting.

Although the corridor is generally inaccessible and essentially primitive, its classification is limited to scenic since the straightening of the channel represents a substantial intrusion by man.

Segment 9	From Lake Winnibigoshish (Mile 375)
Scenic	upstream to Cass Lake (Mile 385.3)
10.3 Miles	

The primary assets of this segment are the variety of scenery, prime fish and wildlife habitat, access distribution, proximity to U. S. Forest Service campgrounds, and length which in combination allows for an extraordinary one-day family float. The U. S. Forest Service maintains a camp and picnic ground on Lake Winnibigoshish, one-half mile north of the mouth of the river, and a campground and mechanical boat portage at Knutson Dam (Mile 385.3). County Road 33, a minor collector, crosses the river at Mile 340 providing a midway access point. A turnout and parking area is located at the bridge. One-half mile upstream from the mouth is a marina which provides a convenient takeout point. Shorefront development in the proximity of this marina is the major intrusion in this segment. A second intrusion is the shorefront development adjacent to the bridge crossing of County Road 39, a major connector. This second intrusion does not have as much impact as the downstream intrusion since it occurred at the beginning of the float.

For the majority of the reach, the corridor remains largely primitive and undeveloped. Shorefront development at each end of the reach is not well screened but is limited to a relatively short stretch of the total segment allowing scenic classification.

Segment 10	From Allen's Bay (Mile 393)
Recreational	upstream to Otter Tail Power
10 Miles	Plant (Mile 403)

This corridor is interrupted by Andrusia and Wolf Lakes. One house and one minor collector road crossing intrudes the .5-mile reach between Cass and Wolf Lakes, and 23 partially screened houses and County Road 8, another minor collector, intrudes the 1.5-mile reach between Wolf and Andrusia Lakes. The County Road 8 bridge is the site of the historic Red Lake Oxcart Trail crossing. Hudson Bay Company wagons carried furs over this route from Steamboat River past Cass Lake to the Red River Valley. These two short segments were included to maintain the integrity of the corridor.

The character of the third segment of six miles is dominated by a mixed forest cover often forming a partial canopy over the river channel. Some of the forest species frequently sited include white spruce, tamarack, black ash, elm, aspen, and white birch. On August 19, 1975, a weasel, great horned owl, great blue herons, and numerous ducks were observed. Beaver activity was seen twice. Island Point Canoe Landing and Campground at Mile 401 is maintained by the State. This segment is crossed by County Road 12, a minor collector, and by County Road 8, a minor collector.

The shorefronts of the two short reaches connecting Allen's Bay, Andrusia Lake, and Wolf Lake are too developed with cottages for a scenic classification but well enough screened to allow a recreational classification. The reach between Wolf Lake and Otter Tail Dam is largely primitive, but in combination with the two short reaches reduces the overall corridor to a recreational classification. These three short reaches are all included in this segment in order to connect with the Chippewa National Forest boundary and thus provide for a viable management unit.

Segment 11	From Lake Irving (Mile 413)
Recreational	upstream to the iron bridge of
11.8 Miles	County Road 7 (Mile 424.8)

The primary aesthetic attraction is a wetland forest which forms a dense canopy over a meandering section of river between Miles 414 and 417. The presence of 13 homes and farmsteads has a particularly adverse impact since they are in such contrast to the pristine upstream corridor. Other intrusions include a powerline visible three times along the river in Mile 415 and three minor collection county road crossings. On May 20, 1975, a large number of dead carp were visible and odoriferous in the river as it meandered through the wetland forest. The degree of cluster residential development and agricultural activity along the corridor limits this segment to a recreational classification.

Segment 12	From the iron bridge of County
Wild	Road 7 (Mile 424.8) upstream
41.2 Miles	to the outlet of Lake Itasca
	(Mile 466).

This segment exudes a feeling of the north woods as the line-of-sight fluctuates from a heavily canopied upland terrace and lowland forest cover to a panoramic view of marshland. Its greatest single attribute is the tremendous variety of natural riverscape which frequently fluctuates dramatically as one floats the river. The marsh areas are prime waterfowl habitat which allow extraordinary sightings of great blue herons, American least bitterns, bald eagles, and a great variety of ducks. Deer and beaver are also prevalent. Numerous beaver lodges and associated sapling cuttings can be seen. Beaver dams were observed at Miles 456 and 458. Remnants of man from bygone days include a trapper's cabin (Mile 454) and a log flume (Mile 459).

Since the time of Schoolcraft, the headwaters area of the Mississippi has become a national landmark dramatized by beautiful Itasca State Park which includes Lake Itasca. Besides being the headwaters of the mighty Mississippi and the largest and most popular park in Minnesota, Itasca has a special quality accented by magnificent towering pines and a myriad of 100 lakes. In 1974, 1,142,031 people visited the 29,290-acre park. This attendance is particularly significant since the park is a four-hour drive from the Twin Cities.

The first 80 historic miles of the Mississippi is a designated State canoe route. The State has developed a system of overnight landings within Segment 12 called Pine Point Landing (Mile 433), Bear Den Landing (Mile 436.7), Coffee Pot Landing (Mile 451.5), and Wanagan Landing (Mile 461.3). Besides these four access points, there are six bridge crossings including County Road 5 (Mile 440), a minor collector; a State forest road (Mile 445); County Road 40 (Mile 454), a minor collector; County Road 2 (Mile 456.2), a major collector; County Road 37 (Mile 458.2), a minor collector; and State Highway 200 (Mile 464.4) a minor arterial.

The primary intrusion is a series of nine cabins just one-half mile downstream from Lake Itasca. This intrusion was allowed because it is felt important to literally maintain the integrity of the corridor designation from the headwaters to the Iron Bridge. Three other intrusions are a house at Mile 456.3, a small cabin at Mile 456.8, and a dump at Mile 457. Except for these brief intrusions, the shoreline of this 42-mile reach is essentially primitive, i.e., free of habitation and evidence of man's intrusion. No roads parallel the river within a quarter-mile of its shores. Therefore, this segment clearly qualifies for the wild classification.

Segments of the river which do not qualify for inclusion include the following:

Mile	Primary Reason for Exclusion
53 to 69.2	Impoundments from St. Cloud and Sartell Dams
83 to 96	Impoundments from Blanchard and Little Falls Dams and shorefront development
126.1 to 139.6	Impoundment from Brainerd Dam
166.5 to 190.3	Shorefront development
304.7 to 317	Impoundment from Grand Rapids Dam
358.8 to 375	Lake Winnibigoshish
385.3 to 393	Cass Lake
403 to 413	Impoundment from Ottertail Dam and Lake Bemidji

VII. ALTERNATIVE CONCEPTUAL PLANS AND THEIR EVALUATION

Planning methodology for the Upper Mississippi Wild and Scenic River Study followed that described under the Principles and Standards for Planning Water and Related Land Resources.[1/] Planning for the use of the nation's water and related land resources is directed toward improvement in the quality of life through contributions to the objectives of national economic development and environmental quality. Studies conducted pursuant to the Wild and Scenic Rivers Act are, by definition, directed toward the environmental quality objective through management, conservation, preservation, creation, restoration, or improvement of natural and cultural resources and ecological systems. Designation of a wild, scenic, or recreational river normally does not maximize the increase in the value of goods and services for a national economic development objective. However, the economic development benefits which would be forgone by designation of a river are displayed in such a manner that the decision maker can evaluate trade-offs. In those instances where a conflicting plan or proposal for the use of the water resource has been advanced by other agencies, the plan would be incorporated into a national economic development objective to be included as an alternative to the environmental quality plan.

In formulating alternative plans for the Upper Mississippi River study, attempts were made early in the planning process to identify significant conflicts in the preferences of society for the utilization of water and related land resources.

The process included public information meetings in five cities along the river during the period of December 8-12, 1975; review of previous studies of the area such as the Upper Mississippi River Comprehensive Basin Study (completed in 1970); and participation in the study by other government agencies having an interest in the river.

This initial phase of the planning process revealed no plans or proposals for the Upper Mississippi River to meet the requirements of a national economic development objective. Because no significant conflicts were identified, the study focused on a range of alternative plans which relate only to the environmental quality objective, i.e., preservation of natural values and enhancement of recreation opportunities. Where the alternative plans preclude existing or potential development of economic activities such as agriculture or timber harvest, the economic values of these activities are identified as benefits forgone under the alternatives.

The objectives of the wild and scenic river study were grouped into three planning components--(1) preserving the remaining free-flowing segments of the Upper Mississippi River, (2) controlling land use within

1/ Federal Register, Volume 38, Number 174, Part III. Water Resources Council, Water and RElated Land Resources, September 10, 1973, Establishment of Principles and Standards for Planning.

the river corridor, and (3) providing for continued high quality recreation opportunities. The impacts of the alternative plans on these planning components were analyzed by arraying the impacts into the four accounts required by the Principles and Standards. These accounts are: National Economic Development (NED), Regional Development (RD), Environmental Quality (EQ), and Social Well-Being (SWB). The impacts are then compared to the conditions throughout the period of analysis (to the year 2000) which could be expected in the absence of plan implementation. Thus, the impacts portrayed in Table 10 are the net effects or those beneficial or adverse effects which are induced solely by the plan.

Summary of the Alternative Plans

Alternative I--Inclusion of all qualifying segments in the National System, primarily under Federal administration.

River Segments 1 through 12, totaling 353.3 river miles which qualify for inclusion in the National System as described in Chapter VI, would be so recommended. Boundaries would be determined by line-of-sight plus appropriate buffer for influences of sight, sound, and smell. All oxbows, islands, and adjacent wetlands would be included in the definition of the zone of influence, totaling approximately 40,000 acres along the 353.3 miles of river. Primary means of corridor protection would be via scenic easement and zoning. Fee acquisition would be limited to securing lands for recreation facilities and to preserve key natural and historic areas. The primary management objective would be to preserve and enhance the natural character of the corridor while providing for a quality recreation experience. The U. S. Department of the Interior would manage Segments 3 through 12 and the Minnesota Department of Natural Resources would manage Segments 1 and 2.

The National Park Service is considered to be the appropriate administering agency for the following reasons:

1. The National Park Service has traditionally been charged with preservation of some of the nation's most wild and scenic land resources. This primary agency objective reflects the intent of the Wild and Scenic Rivers Act.

2. The National Park Service has experience administering all or parts of four components of the National Wild and Scenic Rivers System totaling 493 river miles. Its greatest management experience, however, has been with the popular Ozark National Scenic Riverway created prior to the National Wild and Scenic Rivers Act. Valuable experience has also been gained in negotiating for scenic easements from the private sector along the St. Croix Wild and Scenic River located just 60 miles east of the Upper Mississippi Study area.

The U. S. Army Corps of Engineers was also considered for managing the resource for the following reasons:

1. The Corps has played a historical role on the river. Since the turn of the Century, its program responsibilities have included flow regulation by controlling releases from upstream dams and flood hazard evaluation along the entire river. Since 1899, the Corps has issued permits for construction or modification of the river channel downstream from Lake Bemidji. The control of the Upper Mississippi waterflow relates to the entire study reach whereas no public agency controls a significant quantity or continuous distribution of land within the entire 466-mile study corridor.

2. The Corps has established field offices at each of the headwaters reservoirs (Bir Sandy, Cross, Gull, Leech, Pokegama, Winnibigoshish) and at Remer, Minnesota. The district office in St. Paul, in conjunction with existing field offices, affords a good distribution of potential administrative headquarters.

3. Facilities developed and administered by the Corps across the nation provided a total of 352 million recreation days (visits) making the Corps the greatest provider of water-based recreation activity of any public agency in the United States.

Alternative II--Inclusion of all qualifying segments in the National System under a combination of Federal, State, and local administration.

This alternative would include all 12 segments, or 353.3 miles of river which qualify for inclusion in the National System. All recommendations relating to these segments expressed in Planning Alternative I, except for administration, also apply for this alternative.

The suggested administrative alternative is Federal administration by the Departments of the Interior and/or Agriculture for Segments 4, 5, 8, 9, 10, 11, and 12; State administration of Segments 1, 2, and 7; and local administration of Segments 3 and 6.

This alternative is based on the Minnesota Department of Natural Resources administrative recommendation as of April 1976 and reflects the maximum involvement foreseen by the State due to its present manpower and budgetary climate. The reach above Grand Rapids (Segments 8 through 12) are recommended for Federal administration due to the proximity of the Chippewa National Forest. The reach above and below Brainerd (Segments 4 and 5) are recommended for Federal administration because, according to the Minnesota Department of Natural Resources, the outstanding scenic qualities present require a greater degree of protection than the State program can provide. Segments 3 and 6 are recommended for local administration because of the existing zoning policy and regulations in the areas.

Alternative III--Inclusion of selected segments in the National System.

This alternative would include only Segments 1, 2, 4, 5, 8, 9, and 12, or 203.3 river miles, in the National System. All recommendations relating to these segments expressed in Planning Alternative I also apply for this alternative. Selection of the segments to be included in this limited plan was based on quality of the scenic, fish and wildlife habitat, and recreation resources; representation of the various riverscape classifications and historic qualities; development pressure; and ease of management.

The river between Anoka and St. Cloud (Segments 1 and 2) was included in the plan primarily because of (1) its proximity to the Twin Cities metropolitan area, (3) development pressure, (3) the prime fish habitat, (4) concentrations of islands, and (5) the fact that it is a designated State scenic and recreational river.

The reach between Roscoe Island and Brainerd (Segment 4) was selected to be in the National System because it includes: (1) the Mississippi River Clough which contains the largest group of islands in the study reach, (3) the confluence of the Crow Wing River where the river volume of flow is doubled, and (3) the crossing of the historic trade routes of the Red River Oxcart Trail.

Above Riverton to the outflow of the flood diversion channel bypassing Aitkin (Segment 5), the river was selected to be in the National System because of its: (1) outstanding scenic beauty accented by (2) the confluence of the Pine River which is a prime natural area of historic significance, (3) at least one Bald Eagle nest is located here, and (4) shorefront development pressure exists.

The 52.1 river miles from the backwater of Blackwater Lake upstream to Cass Lake is included in the plan primarily due to: (1) the ease of management since it falls almost entirely in the boundary of the Chippewa National Forest, (2) a large percentage of corridor is already in public ownership, (3) the proximity of high quality recreation facilities, (4) ease of access, and (5) prime fish habitat, all of which combine to contribute to an outstanding recreation resource potential.

The headwaters reach (Segment 12) of 41 river miles is truly a vestige of primitive America and its preservation is recommended since it is a relatively pristine corridor which epitomizes the archaeologic, historic, cultural, scenic, fish, wildlife, and geologic significance of the headwaters of the Mighty Mississippi.

Evaluation of Planning Alternatives

All of these plans are believed to be acceptable by the general public and compatible with known institutional constraints, contribute effectively to components of the objectives, be least cost means to meet the

objectives, and account for all investments necessary and benefits forgone which are needed to assure the full realization of the plans. The selected segment alternative only partially meets the planning objectives.

Evaluation of the three above described planning alternatives is summarized in Table 11 in terms of the four display accounts of the Principles and Standards for Planning Water and Related Land Resources. An evaluative discussion for each account follows.

National Economic Development Account

Beneficial effects in the national economic development (NED) account are the increases in the value of outputs of goods and services and improvements in national economic efficiency.1/

The major NED impact of the alternatives on the planning component, "preserve free-flowing river," is the forgone benefits of potential impoundments. This impact may be measured against the no action alternative only in terms of the one impoundment presently proposed.

The Day's High Landing project proposed by the U. S. Army Corps of Engineers (COE) is discussed in Chapter V of this report. The net forgone benefits for the project shown in the display account table reflect the values assigned by the COE to anticipated increased harvest of fish, wildlife, and wild rice attributable to the project.

The NED impacts of the alternatives on the planning components "control land use" and "quality experience" are also portrayed in terms of dollars. All cost figures are for Federal dollars and are aggregated and discounted over the 25-year project period except for acquisition costs which are discounted over a seven-year period. The total Federal dollar investment needed to implement each of the three planning alternatives over a 25-year project period is displayed in Table 10. The highest cost is for scenic easements under the assumption that they would be acquired on all privately held tracts in the zone of protection.

A sensitivity analysis of the costs associated with procuring protection of the resource showed that if the envisioned zone of protection was acquired in fee title rather than scenic easement, the cost would increase by 95 percent from $14.1 million to $27.5 million. Also, if the zone of protection was redefined from 100 feet inland from the main channel through dense forest stands and 300 feet inland from the main channel through thin forest stands or open land to a standard 1,000 feet inland from the main channel, the total acreage would increase to

1/ Federal Register, Volume 38, Number 174, Part III. September 10, 1973, Water Resources Council, Water and Related Land Resources, Establishment of Principles and Standards for Planning.

252,000 acres and acquiring fee title of the privately held portion would total approximately $114 million (assuming an average upland acreage fee title cost of $3,000 and a wetland acreage fee title cost of $500).

An estimate of river visitation by the year 2000 for the no action alternative is expected to approximate nine percent of the projected visitation attributable to the "all segments" alternatives. The dollar benefits associated with the visitation should reflect a similar ratio to the benefits attributable to the "all segments" alternatives. For an explanation of how these figures were derived, see footnote 13 of the display account tables.

TABLE 10

Total Federal Investment and Resulting Benefits
for Upper Mississippi Alternative Plans
($x1000 outlay and resultant benefit during
25-year project period)

	"All Segments" Alternatives		
	Maximum Federal Involvement	Federal, State, & Local Involvement	"Minimum Segments" Alternative
Costs			
Acquisition			
Fee Title	730	495	377
Scenic Easement[1/]	13,380	7,574	6,755
Development	2,137	1,358	1,055
Replacement	712	453	352
Operation/Maintenance	1,587	866	689
Benefits	36,169	19,746	15,708

1/ Assumes scenic easements would be acquired on all privately held land in the zone of protection.

Regional Economic Development Account

This account displays the beneficial and adverse effects on the region's income, employment, economic base, and any other factors which may exert a significant influence on the course and direction of regional development.[1/]

1/ Federal Register, Vol. 38, No. 174, Part III, Sept. 10, 1973, Water Resources Council, Water and Related Land Resources, Establishment of Principles and Standards for Planning.

TABLE 11

SUMMARY COMPARISON OF RECOMMENDED PLAN AND ALTERNATIVES
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

COMPOSITE EFFECT	ALL SEGMENT ALTERNATIVES: MAXIMUM FEDERAL INVOLVEMENT	ALL SEGMENT ALTERNATIVES: FEDERAL, STATE, LOCAL INVOLVEMENT	LIMITED SEGMENT ALTERNATIVE
1. Preserve Free-Flowing River			
(a) Net benefits forgone from precluding the development of COE Days High Landing project.[1]	$ - 100,300	$ - 100,300	$ - 100,300
2. Control Land Use Within the River Corridor			
(a) Federal acquisition costs			
(1) Fee title[2]	- 428,800	- 290,300	$ - 221,400
(2) Scenic Easement[3]	-10,624,000	- 6,014,100	- 5,363,800
3. Provide Quality Recreation Experience			
(a) Recreation benefits[4]	+17,519,400	+17,519,400	- 9,685,900
(b) Increased Federal Costs			
(1) Development[5]	- 1,080,000	- 686,600	- 533,400
(2) Replacement[6]	- 360,000	- 228,900	- 177,800
(3) Operation and Maintenance[7]	- 618,500	- 336,700	- 267,500

Note: All dollar estimates are aggregated and discounted to their present worth at 6-1/8 percent rate.

\+ Denotes beneficial effects
\- Denotes adverse effects

REGIONAL DEVELOPMENT ACCOUNT

COMPOSITE EFFECT	ALL SEGMENT ALTERNATIVES: MAXIMUM FEDERAL INVOLVEMENT	ALL SEGMENT ALTERNATIVES: FEDERAL, STATE, LOCAL INVOLVEMENT	LIMITED SEGMENT ALTERNATIVE
2. Control Land Use Within River Corridor			
(a) Estimated production benefits foregone.			
(1) Agriculture @ $15/acre [8/]	$ - 472,700	$ - 472,700	$ - 348,800
(2) Forestry @ $5/acre [8/]	- 622,300	- 622,300	- 298,200
(b) State land acquisition costs			
(1) Fee Title [2/]	- 93,500	- 280,400	- 205,600
(2) Scenic Easement [3/]	- 3,384,000	- 4,813,200	- 3,384,000
3. Provide Quality Recreation Experience			
(a) Recreation expenditures (including 1.5 multiplier effect) [9/]	+15,316,300	+15,316,300	+ 8,467,400
(b) Increased State and local costs			
(1) Development	- 33,400	- 426,800	- 293,400
(2) Replacement [6/]	- 11,100	- 142,300	- 97,800
(3) Operation and Maintenance [7/]	- 164,400	- 446,300	- 164,400

ENVIRONMENTAL QUALITY ACCOUNT

COMPOSITE EFFECT	ALL SEGMENT ALTERNATIVES: MAXIMUM FEDERAL INVOLVEMENT	ALL SEGMENT ALTERNATIVES: FEDERAL, STATE, LOCAL INVOLVEMENT	LIMITED SEGMENT ALTERNATIVE
1. Preserve Free-Flowing River			
(a) Total reach preserved	+ 353.3 miles	+ 353.3 miles	+ 203.3 miles
(b) River segments designated as wild	+ 41.2 miles	+ 41.2 miles	+ 41.2 miles
(c) River segments designated as scenic	+ 207.7 miles	+ 207.7 miles	+ 121.0 miles
(d) River segments designated as recreational	+ 104.4 miles	+ 104.4 miles	41.1 miles
(e) Enhance fishery through alteration of upstream reservoir release schedules	+ 11,355 acres	+ 11,355 acres	+ 11,355 acres
(f) Protect islands	+ 360 islands	+ 360 islands	+ 308 islands
(g) Protect oxbows	+ 138 oxbows	+ 138 oxbows	+ 99 oxbows
(h) Elevate Mississippi to be one of State's highest priority rivers for water quality improvement	Yes	Yes	Yes
2. Control Land Use Within River Corridor [10/]			
(a) Total	+ 36,100 acres	+ 36,100 acres	+ 25,280 acres
(1) Fee Simple Acquisition	+ 180 acres	+ 180 acres	+ 100 acres
(2) Private Lands--Zoning or Easement Acquisition	+ 13,770 acres	+ 13,770 acres	+ 7,510 acres
(3) Land Use Agreements	+ 2,650 acres	+ 2,650 acres	+ 2,270 acres
(4) Public Lands	+ 19,500 acres	+ 19,500 acres	+ 15,400 acres
(b) Protect prime wildlife habitat	+ 26,040 acres	+ 26,040 acres	+ 19,315 acres
(c) Natural landmarks protected	+ 5 sites	+ 5 sites	+ 4 sites
3. Provide Quality Recreation Experience [11/]			
(a) Increase average number of canoes on segments in the National System during peak use periods by the year 2000.	4.5 Canoes per mile on peak use days	- 4.5 Canoes per mile on peak use days	- 4.1 Canoes per per mile on peak use days

SOCIAL WELL BEING ACCOUNT

COMPOSITE EFFECT	ALL SEGMENT ALTERNATIVES		
	MAXIMUM FEDERAL INVOLVEMENT	FEDERAL, STATE, LOCAL INVOLVEMENT	LIMITED SEGMENT ALTERNATIVE
1. Preserve Free-Flowing River			
(a) Recreational Diversity	Assure continuation of recreation diversity	Assure continuation of recreation diversity	Assure continuation of recreation diversity
2. Control Land Use Within River Corridor			
(a) Lands elevated to most restrictive category of zoning under existing State law.	- 36,100 acres	- 36,100 acres	- 25,280 acres
(b) Precludes development of suitable lands.	- 6,480 acres	- 6,480 acres	- 3,770 acres
(c) Number of tracts of privately held land except those in subdivisions subject to easement acquisition	- 637 tracts	- 637 tracts	- 337 tract
(d) Number of subdivided housing tracts subject to restrictive zoning or easement acquisition	- 40 tracts	- 40 tracts	- 29 tracts
(e) Protects historical, archaeological, and cultural aspects of the river.	+ 34 historic sites	+ 34 historical sites	+12 historic sites
(f) Employment generated by tourism during the 25-year project analysis period.[12/]	+640 man-years	+640 man-years	+350 man-years
3. Provide Quality Recreation Experience			
(a) Increased recreational use of river due to National recognition and protection and facility development during the 25-year project period.[13/]	+4,019,600 recreation days	+4,019,600 recreation days	+2,222,300 recreation days
(b) New recreation facilities to be developed initially	11 Access Points 9 Portages 3 Float Camps	11 Access Points 9 Portages 3 Float Camps	8 access points 9 Portages 3 Float Camps

1/ Value estimated from 1975 update of net benefit of the Day's High Landing Project provided by the St. Paul District Corps of Engineers minus the value of stabilization of water levels at the present stage of 1,274.3. (Source: Interim Survey Report, Mississippi River Above Coon Rapids Dam Near Minneapolis, Minnesota, Days High Landing Dam, Minnesota Department of the Army, St. Paul District, Corps of Engineers, Page E-12.) The stabilization value was escalated to 1975 dollars using a consumer pricing index of 1.669 (Source: Survey of Current Business, U. S. Department of Commerce, Division of Economic Analysis, Volume 55, #12). The inherent assumption here is that the flow from existing upstream reservoirs can be altered to stabilize the flow at 1,274.3.

2/ Acquisition cost assumed to be $3,000 per acre. Fee title is associated only with lands needed for facility development and protection of key natural and historic values. These costs were amortized over a seven-year period to reflect the envisioned land acquisition time frame.

3/ These figures assume that a scenic easement will be acquired on all privately held land within the zone of protection. Acquisition cost assumed to be $200 for wetland acres and $2,000 for upland acres. The typical upland acre is envisioned to be 100 feet deep and include 435 feet of shorefront. This scenic easement value is meant to reflect one-half of an average fair market value. This narrow 100- to 300-foot fringe is not felt to greatly detract from land use options of most riverfront tracts. These costs were amortized over a seven-year period to reflect the envisioned land acquisition time frame.

4/ An escalating dollar value is assigned per recreation day as follows:

For the wild segment

1975 - $8 per recreation day
2000 - $16 per recreation day

For scenic and recreation segments

1975 - $7 per recreation day
2000 - $14 per recreation day

This escalating dollar value is equivalent to a 2-13/16 percent interest rate compounded annually and is meant to reflect that the future number of areas which meet criteria to qualify for special designation will decrease while there is an increase in population stimulating demand for these areas. Therefore, it is expected the benefits of these areas to the nation will increase over time. The magnitude of the 1975 values is meant to reflect a willingness to pay factor marginally greater than the present day out-of-pocket costs.

5/ The St. Paul District of the U. S. Army Corps of Engineers provided the following development costs in 1975 dollars:

Portage $3,500
Including gravel beaches, signs, and gravel path 30 yards long.

Access Site $37,000
Including two docks, five picnic tables, two vault toilets, gravelled parking lot for 20 cars.

Camp/Rest Area $47,000
Including 20 camp units, 20 fire rings, 15 picnic tables, one hand pump, and two vault toilets.

Costs for upgrading existing facilities were estimated to be one-half the cost for new development. These development costs relate to the value of facilities which should be initially constructed, as shown on page 180 of the recommended conceptual plan, multiplied by three. The factor of three is meant to reflect the magnitude of eventual facility upgrading and development which will be necessary to accommodate the envisioned visitation by the year 2000.

6/ It is assumed that the facilities developed initially on an average have a 25-year life and must be replaced by the year 2000.

7/ The operation and maintenance costs were assumed to approximate $0.50 per recreation day.

8/ The conceptual river plan does not recommend the curtailment of existing forestry or agricultural activity anywhere in the river corridor. However, more intensive forest or agricultural activity in the future is not condoned. Therefore, it is assumed that the only benefits forgone are those which may be attributed to a potential increase in forest and agriculture production.

Present day forest value in pulpwood production averages $20.53 per commercial forest acre (Source: Minnesota Profile, page 45 and Pulpwood Production, page 15). Present day agricultural value in crop income per acre varied from $18.37 in Beltrami County to $104.57 per acre in Hennepin County with an average for the 14 counties of $69.74. (Source: Minnesota Agricultural Statistics, 1972, page 88 and Minnesota Agricultural Statistics, page 98.) A value of $15 per acre was assigned to reflect increased agricultural production forgone, and $5 per acre was assigned to reflect increase forest production forgone.

9/ An intensive economic and employment impact study was conducted in 1966 on the Crow Wing Canoe Trail in Wadena County by the U. S. Department of Agriculture, Economic Research Service, in coopera tion with the Minnesota Agricultural Experiment Station. (Source: Economic Impact of the Crow Wing Canoe Trail, Wadena County, Minnesota, ERS-467, page 22.) The 1966 survey revealed an average

recreator incurred expenditures of $3.90 per recreation day. Present day value via a consumer price index of 1.669 (Source: Survey of Current Business, U.S. Department of Commerce, Division of Economic Analysis, Vol. 55, #12) escalates the expenditures to $6.52 per day. This expenditure generated "new money" in the local economy as added income through a "multiplier effect." Presumably, a portion of the money from outside the community was paid by the local recipients to someone else in the community for goods or services before it was again spent outside the area. Studies of recreation industries in areas similar to Wadena County show that each dollar spent by customers generates an additional $0.50 to $1.00 of community expenditures. A multiplier of $0.50 was used for this analysis. Thus, the total dollar value per recreation day is estimated to be $9.77.

10/ The zone of protection was defined as follows:

For the river segment classified as "wild."

- 300 feet inland from the main channel
- 100 feet of forest fringe around the grass wetlands that the river channel traverses.
- All grass wetlands the river channel traverses.

For the river segment classified as "scenic" and "recreational."

- 100 feet inland from the main channel through dense forest stands.
- 300 feet inland from the main channel through thin forest stands or open land.
- All oxbows, islands, and wetlands associated with the river corridor.

11/ An estimate was made concerning the average increased density of use during peak use days that would occur if the river was placed in the National System. The methodology utilized may be expressed as follows:

$$N = \frac{AT}{UDLRH}$$

Where--

N = Number of canoes per mile during peak use periods which is attributable to placing the river in the National System.

A = Activity days of canoeing attributable to the National System designation.

T = Trip of average length: 10 miles.

U = Unit capacity: 2.2 people per canoe.

D = Capacity utilization days--the number of days which when multiplied by the capacity of the facility, will be equivalent to the total seasonal attendance: 42 days.

L = Length of a river segment in the National System.

R = Rate of travel of craft: 3 miles per hour

H = Hours per day that the launch site could be used: 6 hours.

12/ From Economic Impact of The Crow Wing Canoe Trail, Wadena County, Minnesota, ERS-467, page 24, a 1966 survey revealed that one man-year of employment could be attributed to every 6,300 recreation days. This factor was utilized to estimate employment generated from tourism related to segments in the National System.

13/ Recreation visitation on segments of the river recommended for inclu
sion in the National System was estimated as follows:

1975 Visitation

Using existing attendance figures from parks, access points, and float camp sites and discussions with numerous individuals during the planning process, the following estimates were made concerning present day use of the river:

8,250 unit days of floating
8,250 unit days of fishing
3,500 unit days of waterfowl hunting
20,000 total unit days

2000 Visitation if River is not in National System

Trends in future activity occasions portrayed in the 1974 Minnesota Statewide Comprehensive Outdoor Recreation Plan, (pages 5-21, 5-27, and 5-32) were projected to the year 2000. The growth rate in activity occasions from 1975 to 2000 are as follows: 1.9 for canoeing, 1.5 for fishing, and an inferred approximation of 1.25 for waterfowl hunting. The resulting estimates of visitation for the year 2000 are:

15,675 unit days of floating
12,375 unit days of fishing
4,375 unit days of waterfowl hunting

32,425 total unit days.

2000 Visitation Attributable to Including the River in the National System

It is felt that national recognition of the wild and scenic attributes of this river will substantially increase its recreation use. The Great River Road is evidence of the public's interest in the cultural significance of the river and it is predicted that the discovery of the natural features of the headwaters and uppermost reaches will capture the imagination of many Americans.

An initial assumption is that by the year 2000 the river will be utilized to capacity. Therefore, the estimate of visitation attributable to inclusion of the river in the National System is the estimate of its recreation carrying capacity minus the estimate of visitation for the year 2000 if the river is not included in the National System. Methodology for estimating carrying capacity is as follows:

Floating the River

$$A = \frac{NUDLRH}{T} = 290{,}700 \text{ unit days of floating}$$

Where--

A = Annual activity days or unit days of canoeing when the river is being used to its capacity.

N = Number of canoes per mile during peak use period. Values used are as follows:

For the wild segment--2 canoes per mile
For the scenic segments--4 canoes per mile
For the recreational segments--6 canoes per mile

U Unit capacity: 2.2 people

D = Capacity utilization days (see 11/): 42 days

L = Length of river segment in the National System

R = Rate of travel of craft: 3 miles per hour.

H = Hours per day that the launch site could be used: 6 hours.

T = Trip of average length: 10 miles.

Fishing The River

Estimates of fishing capacity are as follows:

For Segments 10, 11, 12--50 unit days of fishing per river mile.
For Segments 3, 4, 5, 6, 7, 8, 9--100 unit days of fishing per river mile.
For Segments 1, 2--200 unit days of fishing per river mile.
Equals 38,400 unit days of fishing.

Water Fowl Hunting

The methodology for estimating capacity waterfowl hunting is as follows:

$$A = \frac{WD}{C} = 18{,}000 \text{ unit days of waterfowl hunting}$$

A = Annual activity days or unit days of waterfowl hunting when the defined zone of influence on the river is being hunted to capacity.

W = Wetland acres applicable to hunting, considered to be one half of the total wetland acreage in the de fined zone of protection for Segments 8, 9, 10, 12.-

D = Capacity utilization days (see 11/): 10 days.

C = Hunter density: 1 hunter per five acres.

Impact of land use control in the river corridor, the second planning component, has been measured in terms of increased future production benefits forgone from the harvesting and selling of raw agriculture and forestry products. Demand for these products is assumed to continue on an upward trend, thus creating a demand for higher productivity. Since it has been determined that more intensive agriculture and forest activity may prove detrimental to the zone of protection, the benefits associated with this potential activity will be considered forgone and will represent a benefit to other agricultural and forest product regions of the nation which should capture a proportionally larger share of the market. Thus, the sum of these benefits and benefits forgone is zero when netted to the NED account.

The impact of the alternative plans on the property tax base is considered to be negligible since the property value loss due to easement acquisition is considered to be offset by the property value enhancement anticipated for property adjacent to the zone of protection.

None of the river protection schemes should seriously limit the need for industrial sites near water. No potential power plant sites are presently being considered for development along the river. Potential housing development would be impacted in the sense that the river corridor would have zoning regulations in compliance with those of the Minnesota Wild and Scenic Rivers Act and possibly scenic easements would be acquired 100 to 300 feet inland from the median high water line of the river.

The economic profile portrayed in Chapter IV for each county associated with the river reveals that the northern tier would most benefit from the added tourist expenditure generated by the project.

Although it is impossible to fully predict the regional economic impact of placing the Upper Mississippi River in the National System, it is safe to assume that the flow of outside income into the vicinity of the river will significantly increase the volume of gross sales in selected services and add diversity of income to the local economy.

Environmental Quality Account

While effects on environmental quality are characterized by their nonmarket, nonmonetary nature, they provide important evidence for judging the value of proposed dams.

Beneficial effects on the environmental quality account are contributions resulting from the management, preservation, or restoration of one or more of the environmental characteristics of an area under study or elsewhere in the nation. Such contributions generally enhance the quality of life.

Adverse environmental effects--generally the obverse of beneficial environmental effects--are consequences of the proposed plan that

result in the deterioration of relevant environmental characteristics of an area under study or elsewhere in the nation; for example, acres of open and green space, wilderness areas, estuaries, or wildlife habitat inundated or altered, or of lands experiencing increased erosion are such adverse effects which generally detract from or diminish the quality of life.

Often, however, an environmental impact of a plan cannot be easily labeled as being beneficial or adverse, since that decision will vary with the perceptions of the individual concerned. In any case, the effect itself should be quantified and displayed for purposes of decision making.1/

The primary environmental impact of the planning options deals with the first planning component and relates to protecting the integrity of the natural corridor continuum. The free-flowing river from Lake Itasca to Anoka is already interrupted by five natural lakes and eight impoundments. As a result, the overall river corridor is interrupted eight times by segments totaling 112.7 river miles in length. The corridor should be protected to the degree practical throughout the entire length between Lake Itasca and Anoka. The "selected segments" option protects only 42 percent of the river within the protection scheme suggested for the "all segments" alternatives. On the other hand, 65 percent of the river which is classified as "wild" or "scenic" is included in the "selected segment" option. Each alternative includes segments reflecting the various characters or moods of the river, i.e., from a small stream meandering through lowland deciduous forest including oxbows, islands, bluffs, and major river confluences. No river protection is guaranteed between Lake Itasca and St. Cloud if no action is taken.

Two key natural features of the river corridor, which in combination are believed to be relatively unique to the Upper Mississippi, are the vast marshland that the river traverses and the numerous oxbows, remnant oxbows, and resulting oxbow islands found in deciduous forest cover. The selected segment plan includes most of the marshland but excludes the most sinuous portions of the river where the oxbow and related islands most frequently occur in deciduous forest cover.

The impact on controlling land use along the corridor, the second planning component, is portrayed in the display account tables, but the impact on the third planning component, to provide a quality recreation experience, is not thoroughly portrayed since the potential impact of the envisioned visitation on the resource has not been clearly ascertained. Controlling use will be difficult to implement since 22 public agencies operate and maintain 58 facilities in the study reach. Presently, there are three Federal, 26 State, five county, 24 municipal, and 12 private recreation facilities along the river between Lake Itasca and Anoka. The assumption is that the corridor can be managed through

1/ Federal Register, Vol. 38, Number 174, Part III, Sept. 10, 1973, Water Resources Council, Water and RElated Land Resources, Establishment of Principles and Standards for Planning.

control of access, education of users, and patrol to adequately protect the resource at the envisioned carrying capacity. This assumption is considered reasonable since access to the river and adjacent shoreline is most restricted in areas having the most fragile environments.

Social Well-Being Account

In addition to the effects described above, most water and land resource plans have beneficial and adverse effects on social well-being. These effects reflect a highly complex set of relationships and interactions between inputs and outputs of a plan and the social cultural setting in which these are received and acted upon. These effects will be reported as appropriate in the system of accounts for each alternative plan.

With emphasis on their incidence or occurrence, beneficial effects on social well-being are contributions to the equitable distribution of real income and employment and to other social opportunities. Since they are integrally related to the basic values and goals of society, these effects are usually not subject to monetary evaluation. The normal market exchange process, however, produces monetary values which can be utilized to aid in measuring the distributional impacts of plans on real income.

Adverse effects of a plan on social well-being have detrimental impacts on the equitable distribution of real income and employment or otherwise diminished or detract from the attainment of other social opportunities. Additionally, such adverse effects include not only those incurred in the designated planning area, but also include adverse consequences elsewhere in the nation resulting from implementation of the plan.1/

The major social impact from plan implementation would be the preservation of the character of the river which has been most prominent in the economic and cultural development of this country. Significantly, the future of the Mississippi River has been studied and will possibly be etermined during the time of bicentennial celebration. We are all quite aware of our cultural heritage, and the Mississippi River is a geographic symbol of this heritage.

A sizable visitation of 347,000 visitor days has been envisioned for the river, but the estimated resulting employment generated for tourist related services would probably not significantly impact any one area. A few selected services in specific locations would most certinly be enhanced.

1/ Federal Register, Vol. 38, No. 174, Part III, September 10, 1973, Water Resources Council, Water and RElated Land Resources, Establishment of Principles and Standards for Planning.

VIII. RECOMMENDED RIVER PLAN

The following conceptual river plan provides recommendations and guidelines pertaining to the administration and management of the river and its environment. Specific recommendations and guidelines relate to (1) designation of segments to be included in the National System, (2) delineation of the corridor to be protected, (3) means to protect and enhance the natural integrity and floatability of the river, and (4) development, (5) management, and (6) administration of the segments proposed for inclusion in the National System. These proposed guidelines are presented as conceptual recommendations and should not be construed as being the complete or final plan for the Upper Mississippi River system. Concepts presented in this plan should be modified or refined in a final master plan to be prepared by the administering agency in order to ensure that the needs of people in the local, State, and regional areas are met. Master plans for management of designated river areas should be prepared in cooperation with concerned State, local, and private interests and should be completed within two years after designation.

Boundaries

It is recommended that 353.3 miles of the Upper Mississippi River be included in the National System. Thus, all 12 segments which meet the criteria set forth in the Act (P.L. 90-542) and the 1970 Guidelines for Evaluating Rivers adopted by the Secretaries of the Interior and Agriculture are recommended for inclusion. A description of the segments and their recommended classification are shown in Chapter VI of this report.

Delineation of specific riverway boundaries for segments in the National System is the responsibility of the administering agencies and would be determined in terms of a zone of influence on the natural scene as perceived from the river. The senses of sight, smell, and sound all directly relate to the zone of influence. The line-of-sight is a primary factor which is determined by topography and land use or vegetative cover. A narrow strip of dense vegetation, for instance, can provide a more effective vegetative screen than a sparse tree stand of much greater depth. Expansive views of bluff lines and marsh fringes are also key focal points which impact the experience. Sounds emitting from engines and machinery such as trucks, automobiles, and irrigation pumps are important influences. Offensive odors from land fill, agricultural activity, or poor water quality are important as well. All of these factors would be considered when defining the project boundaries.

Backwater areas such as oxbows and wetlands are an integral part of the river system and would be included to the extent possible in the corridor protection scheme. The corridor boundary would include all islands, including those formed by oxbows, and the forest fringe bordering wetlands

Upper Mississippi River
Right - not designated part
of National Wild System

visible from the main channel. Many remnant oxbows do not sustain standing water during all seasons, and their importance to the river system must be determined on a case-by-case basis.

The boundary would also include outstanding natural, historical, or archaeological areas and necessary public use and access areas. Existing property ownership would be utilized where feasible to delineate the boundary in order to reduce new survey and severance costs.

Means of Protection

Land protection methods would be sufficiently comprehensive to ensure that the natural integrity of the river be preserved for future generations in accordance with its classification criteria. Acquisition of lands provides a maximum protection of that land. Property rights acquired within the boundary would be adequate to provide reasonable protection of the natural scene and to accommodate the desired level of recreational use. However, it is the intent of the Wild and Scenic Rivers Act that national wild and scenic rivers be administered in such a way as to protect and enhance scenic and recreational values without limiting other uses that are compatible and do not substantially interfere with public use and enjoyment of these values.

Fee Title Acquisition

Lands needed to provide access and services to the public and to protect the river and its environment, including unique natural areas which may be jeopardized by less-than-fee control, would be acquired in fee title. Fee title acquisition should be limited in order to minimize impacts on the local people and economy. The State has no power of condemnation in its Wild and Scenic Rivers Statute (Minnesota Session Laws 1973, Chapter 271), nor would the Federal Government if more than 50 percent of the river corridor is in public ownership. According to the land ownership analysis displayed in Chapter V, less than 50 percent of the reach recommended for Federal administration is presently in public ownership. The Commissioner of Natural Resources of the State of Minnesota should withhold from sale all tax forfeit property within the designated corridor of segments to be included in the National System.

Scenic Easements

Necessary protection and control of land use for a major portion of the proposed segments would be accomplished through a combination of the purchase of scenic easements and land use zoning. Essentially, a scenic easement involves acquisition of the right to control certain uses of the land for the purpose of protecting the natural qualities of the river. Easement acquisition may be accomplished through an agreement or series of agreements (for appropriate compensation) whereby a landowner binds himself, his heirs, successors, or assigns to:

(1) Refrain from using or developing the land in ways which would detract from the scenic and natural character of the land.

(2) Guarantee public access over his private lands from high bank to high bank (i.e., between the high banks), including islands. Such a guarantee would not infringe upon the landowner's right to continue existing compatible land uses.

In no instance would scenic easement acquisition restrict without the landowner's consent any regular use exercised prior to the acquisition. The use of an easement in lieu of fee purchase would permit land to remain in private ownership and therefore remain on the tax rolls. Easement rights which would be negotiated with landowners could include:

(1) Limitation on the heights of future structures, on the exterior appearance of buildings, and on the intensity of development.

(2) Restriction on the allowable extent of the cutting of trees and native vegetation.

(3) Prohibition of commercial sand and gravel extraction operations.

(4) Prohibition of billboards and advertising signs.

(5) Prohibition of piles of trash or other unsightly materials.

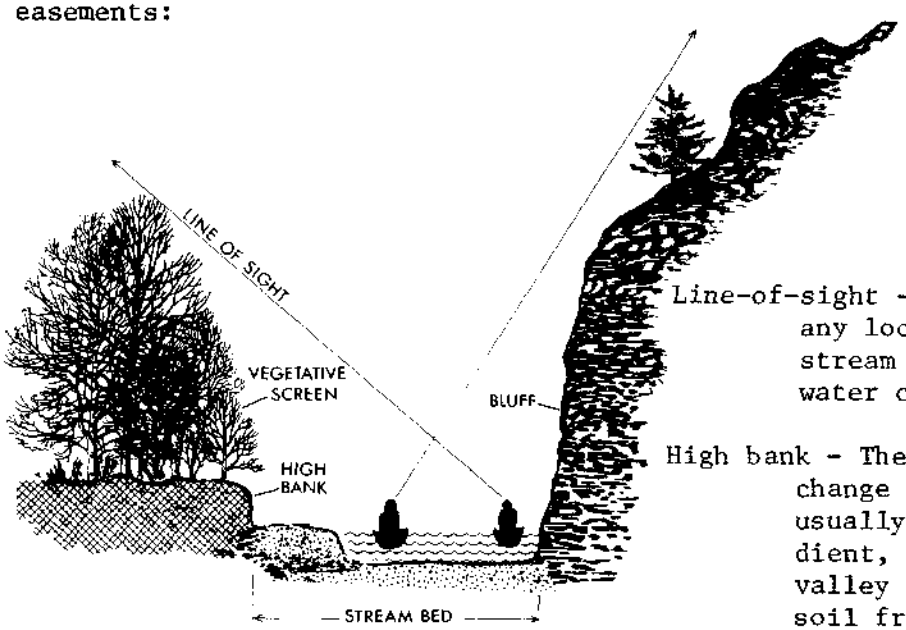
(6) Restriction of the land to specific uses and developments, such as single family residential, agricultural, timber growing, particular recreation uses, etc.

(7) Restriction of livestock grazing and watering in the river but only after such grazing and/or watering had been determined to be environmentally detrimental or inconsistent with the public use of the river by the administering agency.

It is desirable that all scenic easements be established on the basis of mutual agreement between concerned landowners and the administering agency. The easement document would stipulate that the administering agency is responsible for law enforcement and litter control in the river corridor; will maintain the river channel free of obstruction; and, where appropriate and necessary, rehabilitate and stabilize riverbanks.

The location and depth of these easements would depend on the topographic and land cover circumstance of the corridor. A scenic easement, for instance, might be acquired on a property one-half mile away from the main channel in order to preserve a fringe of trees bordering a marsh that the river channel meanders through. In another case where the river traverses a dense forest a sufficient easement could consist of a narrow strip only 100 feet deep right along the channel.

The following sketch illustrates some terms used to describe scenic easements:



Line-of-sight - The view from any location on the stream under normal water conditions.

High bank - The first definite change in elevation, usually on a steep gradient, that separates valley land alluvial soil from that rocky or gravelly type soil associated with the bed of a stream.

Stream bed - That land, normally consisting of rocky or gravelly soil types, that lies within the banks.

Vegetative screen - A growth of various types of plants and trees that is of sufficient density to limit vision or interfere with detailed identification of objects during periods of defoliation.

Bluff - A relatively steep feature of topography formed by rock outcroppings, vegetated slopes, or a combination of both that instills a definite impression of height and magnitude.

Zoning

Existing zoning regulations would apply to all segments in the National System. Local units of government along the river should adopt land use policies and zoning standards which are consistent with the purposes of the Wild and Scenic Rivers Act. Zoning objectives should be to prohibit new commercial, industrial, or residential uses which are inconsistent with the purposes of the Act and to protect the shorelands by means of acreage, frontage, and setback requirements. In addition, governmental units throughout the watershed should give consideration to adopting general zoning and subdivision regulations which would promote orderly growth and ensure that future developments do not degrade the overall quality of the basin environment. The administering agency would evaluate existing zoning regulations during the master planning process to determine their effectiveness.

The following three State Laws include zoning regulations relevant to the intent of the Wild and Scenic Rivers Act:

Floodplain Management Act--The Floodplain Management Act of 1969 is legislation that will have an effect on the management of lands adjacent to the Mississippi River. Regulations under this Act are designed to achieve two general objectives: (1) restrict uses which are dangerous to health, safety, or property in times of flooding or which cause increases in flood heights and velocities and (2) require that uses vulnerable to flooding, including public facilities which serve such uses, be protected against flood damage at the time of initial construction. At the present time, State approved and locally adopted floodplain regulations are not in effect for the entire Upper Mississippi River. The cities of Anoka, Coon Rapids, and Riverton have adopted regulations, and several additional localities are currently drafting regulations. Sherburne and Wright Counties have floodplain land use districts along the Mississippi River as part of their countywide comprehensive zoning ordinances. Affected counties and municipalities will be required to adopt floodplain ordinances meeting State approval as more data becomes available through the National Flood Insurance Program. Recent Federal legislation, the Flood Disaster Protection Act of 1973 (P.L. 93-234), should expedite the adoption of land use controls within these counties and communities because such controls are a requirement of the National Flood Insurance Program.

Shoreland Management Act--The Shoreland Management Act of 1969 requires all counties within the study area except Hennepin to adopt land use control ordinances for the unincorporated shorelands of public waters (about 90 percent of the study shorelands). The three possible shoreland classifications for public waters are Natural Environment, Recreational Development, and General Development. Land use development standards are provided for each of these three possible classifications. The minimum standards of these land use controls regulate: (1) type and placement of sanitary and waste disposal facilities, (2) size and length of water frontage for lots suitable for building sites, (3) placement of structures in relation to shorelines and roads, (4) alteration and preservation of the natural landscape, and (5) subdivision of shoreland areas.

At the present time, the Mississippi River is classified "general development." This classification is the least restrictive of the three possible classifications as shown in Table 12. Segments of the river classified as wild and scenic (249 miles) to be included in the National System should be designated as "natural environment" streams under authority of the Minnesota Shoreland Management Act and the corresponding zoning regulations should be strictly enforced. The 104 miles of river classified as recreational should be designated as "recreational development" under the same authority.

TABLE 12

MINNESOTA SHORELAND MANAGEMENT ACT
MINIMUM ZONING STANDARDS

	Natural Environment Lakes & Streams	Recreation Development Lakes & Streams	General Development Lakes & Streams
Lot Area*+	80,000 Sq. Ft.	40,000 Sq. Ft.	20,000 Sq. Ft.
Water Frontage*	200 Ft.	150 Ft.	100 Ft.
Building Setback From Shoreline	200 Ft.	100 Ft.	75 Ft.
Soil Absorption Unit Setback from Shoreline	150 Ft.	75 Ft.	50 Ft.
Shoreland Alterations	Not specific to shorefront classification		

+ Smaller lot sizes may be permitted for planned cluster developments.
* Applies only to newly platted lots.

Minnesota Wild and Scenic River Act--In the interest of present and future generations to preserve and protect the outstanding scenic, recreational, natural, historical, and scientific values of certain Minnesota rivers and their adjacent lands, a Minnesota Wild and Scenic Rivers Act was passed on May 16, 1973. The Commissioner of the Department of Natural Resources established standards and criteria for the preservation, protection, and management of rivers to be recommended for protection under this Act as shown in Table 13. Zoning regulations have been adopted by the State legislature under this Act. Within six months after designation of a river, each appropriate local government must amend or adopt new zoning and land use regulations which meet the minimum standards included in the management plan. In cases of noncompliance, the Commissioner of the Department of Natural Resources has authority to enforce those regulations.

Development

The purpose of providing public use facilities would be to enhance the visitor's enjoyment of the river area and at the same time maintain the environmental quality of the corridor. Further study must be conducted to determine the nature of recreation use patterns and environmental and social carrying capacity of the corridor before specific recommendations for recreation site development can be made. Therefore, the conceptual development plan for the river system shown in Figure 27 relates only to locations of suggested new or improved sites for access points, portages, float camps, and unique natural and historic areas needed for initial use of the resource upon designation. These as well as alternative sites will be studied by the administering agencies during the master planning process.

Access Points

Access sites must be carefully designed so as to minimize their impact on the natural scene while adequately providing needed recreation facilities. Access facility design must directly reflect a predetermined corridor carrying capacity. Most access sites should require little more than sanitary and trash facilities, drinking water, and limited parking areas for fishing and floating access. In appropriate segments, a limited number of access areas should also provide boat launching and picnicking facilities. All facilities should be well screened from the river.

The river corridor generally has adequate access for present use patterns and densities. However, anticipated increase in recreational use of the river will require some systematic method of facility development in order for the river to reach its full recreation potential.

TABLE 13

MINNESOTA WILD, SCENIC, AND RECREATIONAL RIVERS SYSTEM ACT
MINIMUM ZONING STANDARDS

	RIVER CLASSIFICATION		
	Wild	Scenic	Recreational
Lot Area*+	6 Acres (261,360 sq.ft.)	4 Acres (174,240 sq.ft.)	2 Acres (87,120 sq.ft.)
Water Frontage*	300 Ft.	250 Ft.	200 Ft.
Lot Width at Building Line*	300 Ft.	250 Ft.	200 Ft.
Building Setbacks From:			
Normal High Water Mark	200 Ft.	150 Ft.	100 Ft.
Designated Tributaries	100 Ft.	100 Ft.	100 Ft.
Bluff Line	40 Ft.	30 Ft.	20 Ft.
Sewage System Setbacks From:			
Normal High Water Mark	150 Ft.	100 Ft.	75 Ft.
Designated Tributaries	75 Ft.	75 Ft.	75 Ft.
Regulated Cutting Areas			
Mainstem Shoreline	200 Ft.	150 Ft.	100 Ft.
Designated Tributary Line	100 Ft.	100 Ft.	100 Ft.
Bluff Line	40 Ft.	30 Ft.	20 Ft.

Portages

From Lake Itasca to Anoka, there are a total of 15 known obstructions in the channel which require portage--10 man-made dams, two beaver dams, two log jams, and one log flume. This number varies, of course, as beaver dams and log jams come and go. Few of these obstructions have established portage routes around them. In order to enhance the floatability of the channel, a reasonable portage around each of these obstructions should be provided. Portage trails should have limited slope to allow expedient transport of river craft.

Campgrounds

An excellent system of float camps and State and Federal park campgrounds occurs along the entire stretch of river above Grand Rapids. Below Grand Rapids there is a particular need for small float camps along the river. Ideally, these small campgrounds should be accessible only by water (with service roads for administrative use only) with rustic sanitary, tent pad, and fireplace facilities. Campers should be required to carry out their own trash. The specific number and location of float camps can be determined by studying recreator use patterns.

Unique Natural and Historic Areas

Certain areas along the river display outstanding scenic, ecological, geological, historical, and/or cultural values. Such features should be thoroughly examined by the managing agency to determine their suitability for preservation and public use and interpretation. Where appropriate, access from the river and interpretation facilities should be provided. The full awareness and utilization of these resources by the river floater can provide the frosting on his recreation experience cake.

Management

The management goal for the Upper Mississippi River would be to protect and enhance the values reflecting the rationale for its inclusion in the National Wild and Scenic Rivers System. Management objectives would be to:

-- Maintain the river's natural, free-flowing condition.

-- Protect, enhance, and interpret the scenic, recreational, geologic, fish and wildlife, historic, archaeologic, and other similar resources.

-- Maintain or enhance water quality.

-- Provide opportunities for river-oriented recreation which are consistent with protection of the quality of the river and its environment.

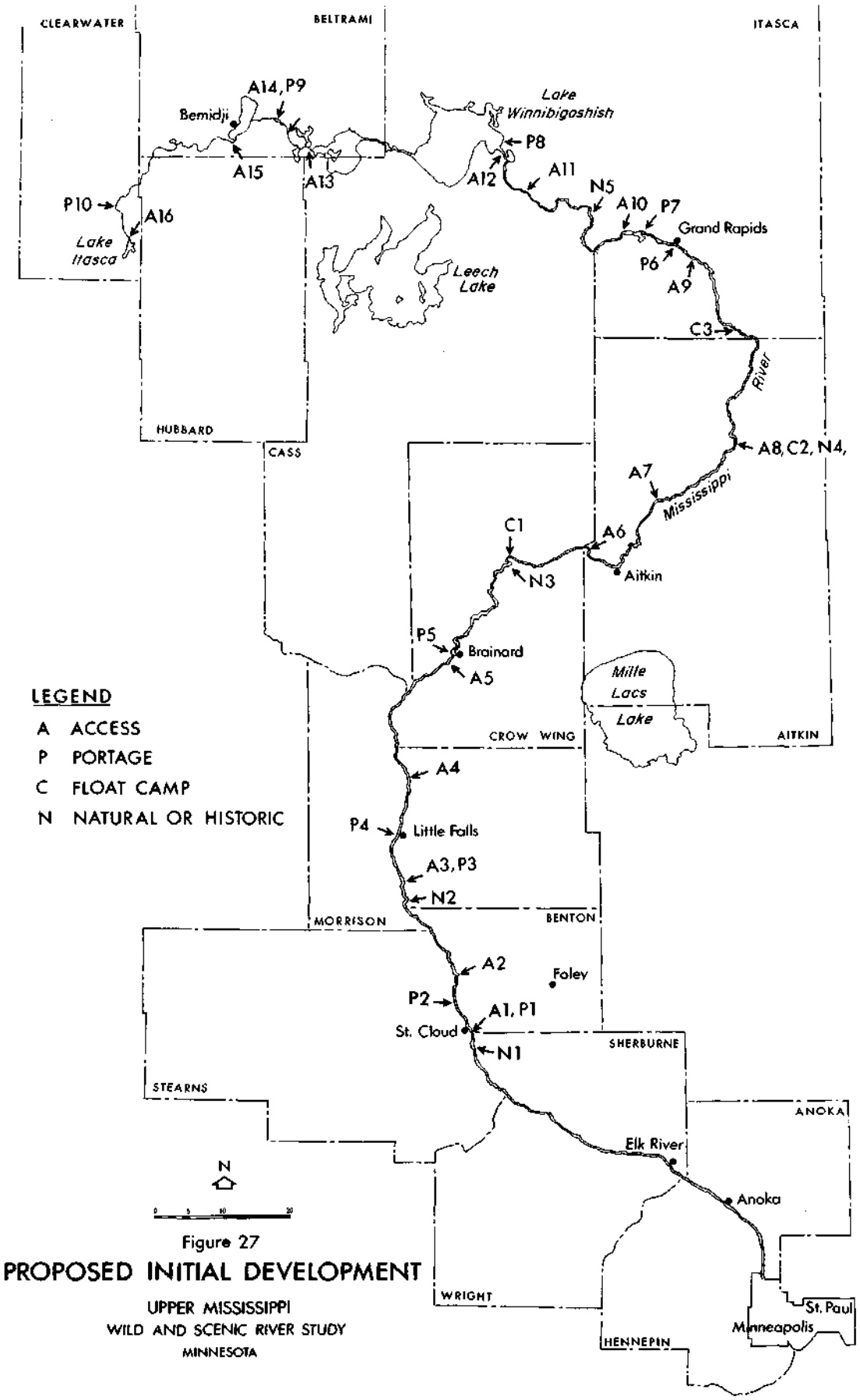


Figure 27

PROPOSED INITIAL DEVELOPMENT

UPPER MISSISSIPPI
WILD AND SCENIC RIVER STUDY
MINNESOTA

LOCATION KEY TO DEVELOPMENT PROPOSALS

Access Points—New
2. Outlet of Little Rock Lake
3. Blanchard Dam
4. Bell Prairie
5. Brainerd
6. Flood diversion channel outfall
8. Outlet of Big Sandy Lake
10. Outlet to Blackwater Lake
11. U.S. Highway 2 bridge crossing
12. Outlet into Lake Winnibigoshish
15. Local road bridge crossing near outlet into Lake Bimidji
16. State Highway 200 bridge crossing

Access Points—Upgrade
1. Riverside Park in St. Cloud
7. Palisade
9. Confluence of Prairie River
13. County road 33 crossing near Andrusia Lake
14. Otter Tail Dam

Portages—New
1. Power dam in St. Cloud
2. St. Regis power dam in Sartel
3. Blanchard hydropower dam
4. Hydropower dam at Little Falls
5. Potlatch Corporation power dam
6. Blandin Paper Company power dam
7. Dam for Blackwater Lake
8. Dam for Lake Winnibigoshish
9. Otter Tail hydropower dam

Portages—Upgrade
10. Log Flume

Float Camps—New
1. Confluence of Pine River
2. Outlet of Big Sandy River
3. Two river miles upstream from Jacobson

Float Camp—Upgrade
4. Island Point Canoe Landing

Natural and Historic Areas Not already protected as a Park
1. Beaver Islands
2. Heronry on east bank across from McDougal Island
3. Confluence of Pine River
4. Outlet of Big Sandy Lake
5. White Oak Point

Source: LANDSAT processed data by the Aerospace Systems Division of Bendix Corporation located in Ann Arbor, Michigan. Two LANDSAT scenes were utilized: May 29, 1973, for the upper scene and June 11, 1974, for the lower scene. The lower LANDSAT scene did not include the river corridor in Anoka or Hennepin Counties.

Some specific management recommendations necessary to to achieve the above objectives are:

Recreation

-- Visitor use levels would be established which do not endanger the scenic and natural values of the river system. Access sites and float camps would be developed and distributed in accordance with the type and amount of use each area can support without causing an unacceptable change in either the physical environment or the recreational experience. Because the long-term and continuing impact of human use on rivers and their environment is not fully understood, a system of periodic evaluation and monitoring would be established to develop criteria for the protection and management necessary to ensure a meaningful scenic experience for the river user.

-- The administering agency would establish a method of visitor control which would be initiated before visitor capacity is reached and should not hesitate to implement such controls when necessary. Only in this manner can there be some assurance that the optimum visitor enjoyment will be obtained without posing a threat to the natural values vital to the river areas.

-- A variety of recreational opportunity would be maintained to the extent practical. Particular activities presently occurring in the corridor which should continue include canoeing, hunting, fishing, nature study, ricing, and camping.

-- A portage system would be maintained at each dam from Lake Itasca to Anoka. The Minnesota Department of Natural Resources should coordinate State, local, and private sector efforts to develop appropriate facilities.

-- New facilities would be designed so as to minimize detraction from the quality of the river scene. Development should generally be back from the river's bank and screened from view of the river user.

-- The use of motorized vehicles and watercraft in the segment managed as "wild" would be strictly controlled and in some areas may need to be prohibited. This would be accomplished under authority of the Minnesota Wild and Scenic Rivers Act of M.S. 361.26.

-- Regulations requiring float campers to carry out their garbage and litter would be established, widely advertised, and en-

forced. The success of this program should be closely monitored, and, if it proves ineffective, other management practices should be administered.

-- A detailed inventory of historic, archaeologic, and other special interest areas would be made and a program developed for their protection and, where appropriate, their interpretation. Interpretive devices and signs should be relatively unobtrusive or complementary to the natural and historic scene. To protect these resources, portions of the inventories may need to be confidential.

Fish and Wildlife

-- Habitat management for fish and wildlife would reflect equal consideration of game and nongame species, and all practices employed would be in conformance with maintenance of the natural qualities of the riverway.

Land Resource Use

-- The State of Minnesota should adopt legislation granting authority to the Commissioner of the Department of Natural Resources to provide affected counties of the State with minimum standards and criteria for subdivision, use, and development of unincorporated Mississippi River shorelands in the National System.

-- Protection of the forest resources within and near the river boundaries from fire, insect, and disease damage should receive added consideration. Control or salvage measures necessary for diseased or damaged trees or other vegetation should be carefully weighed against possible adverse impacts on the ecological and scenic values of the river corridor.

-- Maintenance of soils and protection of the watershed adjacent to the river are essential. Because much of the recreation activity and development would take place near the river's edge, special emphasis would be placed on preventing and controlling soil erosion. This is true for both natural and man-caused deterioration. Soil stabilization measures and revegetation would be carefully weighed against possible adverse impacts on the ecological and scenic values of the river corridor.

-- The present amount of livestock grazing and watering along the river is not considered degrading to the environment and would be treated as a continuing compatible land use. It

is recognized, however, that cattle in the river can be detrimental from the standpoint of aesthetic and public health considerations. Therefore, any incompatible increase or change in the nature of grazing or watering activities may require restriction of grazing and water rights through easements or fee acquisition if necessary.

-- Removal of bankside vegetation would be prevented where it degrades natural or scenic values. However, selective timber harvesting should be allowed, subject to regulation by the administering agency.

-- The tribal lands within the Leech Lake Indian Reservation bordering the Upper Mississippi have been managed in a way compatible with the objectives of the Wild and Scenic Rivers Act. The Minnesota Chippewa Tribe should continue to administer the use of these lands in such a way as to preserve the natural beauty of the corridor for future generations.

-- Efforts would be made to encourage local units of government to apply zoning controls to lands adjacent to the riverway and in nearby developed areas to ensure that the immediate environment of the river is protected.

-- An intensive cooperative program to control littering and dumping along the rivers should be undertaken by administering agencies.

Water Resources

-- Regulation of waterflow from impoundments in the Upper Mississippi basin would be coordinated by the Corps of Engineers (COE) to ensure adequate flow for recreation activity during low-flow periods. Minimum low-flow requirements to sustain a quality recreation experience should be determined by the administering agency. An ongoing study of management of the headwaters reservoirs by the COE will provide important insight into this issue.

-- Appropriate State and Federal agencies would take the necessary actions to ensure good water quality throughout the Upper Mississippi River basin by enforcement of water quality standards and the encouragement of compatible soil and water conservation practices. Corrections of point source permit violations of the National Pollutant Discharge Elimination System along the mainstem of the river should receive high funding priority. Regulations of the State Shoreland Management Act should be strictly enforced. A program for monitoring chemical, biological, and physical water quality characteristics should be established throughout the basin.

-- Alteration of the natural channels in the basin which would significantly affect the free flow of water would not be permitted unless it is clearly demonstrated that such alterations would have no adverse effect on the scenic and recreational qualities of the river corridor.

-- Efforts to reduce siltation through land conservation measures throughout the watershed should be intensified.

-- Water appropriation permits issued for segments in the National System by the Minnesota Department of Natural Resources should include requirements for screening the view of the pump from the water and limiting the number of decibels emitting from the pump engine.

Utilities

-- Any construction of highways and new bridge crossings, renovation of existing structures, or power or pipeline crossings should be reviewed and approved in advance by the managing agency. Where possible, new construction of powerline and pipeline crossings of the river would be avoided. If crossings cannot be avoided, the managing agency, Minnesota Environmental Quality Council, and the public utility company should jointly select the location which will result in the least damage to the river environment. Existing power and pipeline crossings should be adequately screened where possible.

-- All new bridges constructed across segments of the river in the National System should be designed to maximize recreation benefit. Special consideration should include the view of the water from the bridge, how well the bridge blends into the natural setting as observed from the water, access to the water from the roadway, and provision for nonmotorized travel on the bridge. The relevance of these and other considerations would be determined by the agency managing the affected river segment.

-- The Mississippi River Parkway Commission of Minnesota should recommend that a portion of any Federal funds made available to the State of Minnesota for expenditure on the Great River Road be accepted by the Commissioner of Highways, on behalf of the administering agencies of segments in the National System, for purposes of land acquisition related to preservation of scenic areas adjacent to the river and the Great River Road and for purposes of development of cultural interpretive stations along the Great River Road.

Obvious potential conflicts between the Great River Road and the Wild and Scenic River could occur since providing scenic vistas of the river from the road is a primary planning

objective for the Great River Road and limited access and a feeling of remoteness are cornerstones of the qualifying criteria in the Wild and Scenic Rivers Act. Great care must be taken both by the Minnesota Department of Transportation and the administering agency of the wild and scenic river to ensure the compatability of these two Federal programs.

Administration

Recommended administration of the Upper Mississippi Wild and Scenic River includes Federal and State responsibility. Planning guidelines relating to determination of boundary, means of protection, development, and management presented prior to this section relate to all segments of the river in the National System; hence these guidelines also apply to all designated administrators of these segments.

Federal

An Act of the U. S. Congress would be required to direct the Secretary of the Interior through the National Park Service to administer those river segments as a Federal component of the National Wild and Scenic Rivers System. Cooperative agreements would be developed by the managing agency for continued management by major public landholding agencies along the river such as the U.S. National Guard, U. S. Forest Service, U. S. Bureau of Indian Affairs, Minnesota Department of Natural Resources, and applicable county governments. These management agreements would reflect the management guidelines recommended for the river's protection.

A detailed management plan requiring approval by the Secretary of the Interior would be prepared by the National Park Service within two years after designation. This plan, cooperatively developed with all agencies involved, should include a detailed accounting of development, operation, maintenance, and replacement costs necessary for the proper management of the National Wild, Scenic, and Recreational River. The regular appropriations for the National Park Service should then be adjusted accordingly to adequately implement the plan. All land acquisition and initial development proposals would be carried out within five years from the completion of the master plan.

Existing management practices by public landholding agencies in the defined zone of protection are for the most part compatible with the intent of the Wild and Scenic Rivers Act and are expected to continue as part of the cooperative management agreements between those agencies and the National Park Service. Existing recreation facilities would continue to be maintained by their present managing agency with possible future upgrading to be addressed in the master plan.

The State would continue to enforce State game laws and boating regulations throughout the river areas. On Federal lands, the managing Federal agency has authority to enforce Federal regulations. Enforcement of pollution laws would remain the responsibility of the Minnesota Pollution Control Agency.

Local units of government would be encouraged to provide adequate zoning protection through the State Shorelands Protection Act. This would be a major contributing tool to the long-term protection of the corridor.

State

The 53 miles of river between St. Cloud and Anoka would continue to be protected and administered by the Minnesota Department of Natural Resources under authority of the State Wild and Scenic Rivers Act and would be included as a State-administered component of the National Wild and Scenic Rivers System. Section 2(a)(ii) of the Federal Wild and Scenic Rivers Act provides that State rivers which are designated as wild, scenic, or recreational river areas by or pursuant to an Act of the State legislature, and which are to be permanently administered as such by an agency or political subdivision of the State at no cost to the United States, and which meet the criteria in the Act and the Guidelines may, upon application by the Governor, be included as State-administered components in the National System by the Secretary of the Interior. Acquisition, development, and management of designated river segments would be the total responsibility of the State government.

State administration by the Minnesota Department of Natural Resources is suggested for Segment 2, consisting of 11.9 river miles as a State scenic river component, and Segment 1, consisting of 41.1 river miles as a State recreational river component of the National System in accordance with criteria set forth in Section 2(b) of the Wild and Scenic Rivers Act. Administration by the Minnesota Department of Natural Resources for the reach between St. Cloud and Anoka is considered most appropriate for the following reasons:

-- The Minnesota Wild and Scenic Rivers Act passed on May 19, 1973, has given authority to the Commissioner of the Department of Natural Resources to protect and manage outstanding scenic, recreational, natural, historical, and scientific values of certain Minnesota rivers and the adjacent lands. The standards and criteria established for the preservation, protection, and management of these rivers complies with the intent of the Federal Wild and Scenic Rivers Act.

-- The State has placed the Upper Mississippi from Anoka to St. Cloud (Segments 1 and 2) in the State Wild and Scenic Rivers System. A management plan has been prepared and is in compliance with Section 2(a)(ii) of the Federal Act. Therefore, the State is actively demonstrating interest and action on behalf of protecting this reach of the Upper Mississippi River.

IX. ENVIRONMENTAL IMPACT STATEMENT

Description of the Proposed Action

Proposal--It is proposed that legislation be enacted which would:

1. Amend Section 3(a) of P.L. 90-542 to include in the National System all qualifying segments of the Upper Mississippi River from Lake Itasca to St. Cloud, Minnesota, a total of 300.5 channel miles. Appropriate qualifying segments are shown as Segments 3 through 12 in Figure 1. These segments would be federally administered wild, scenic, or recreational components of the National System in accordance with criteria set forth in Section 2(b)(2) of the Wild and Scenic Rivers Act.

2. Direct the Secretary of the Interior (National Park Service), in cooperation with the Secretary of Agriculture and the State of Minnesota, to administer the Federal river component and establish project boundaries in accordance with guidelines contained in the Secretary of the Interior's report.

3. Require completion of a management plan within two years from date of enactment.

4. Recognize that the 53 river miles between St. Cloud and Anoka are designated as a State scenic and recreational area and meet the criteria for inclusion in the National System of which 11.9 channel miles qualify as scenic and 41.1 miles qualify as recreational; and provide that these segments, shown as Segments 1 and 2 in Figure 1, be included in the National System upon request of the Governor of Minnesota.

For detailed description of the proposed action, refer to Chapter VIII.

Interrelationships With Other Projects and Jurisdictions

Federal

A resolution adopted June 7, 1945, by the Committee on Rivers and Harbors, House of Representatives, directed the U. S. Corps of Engineers to conduct further studies of navigation, flood control, and other purposes of the Mississippi River above Coon Rapids dam and the six headwaters reservoirs as referenced in Chapter V. An interim survey report was published on March 21, 1972, which advocates an impoundment on the river at Days High Landing in order to enhance fish, wildlife, and wild rice habitat in the White Oak Lake area. This project, because it involves impoundment of a substantial portion of the river, would be in conflict

with the intent of the Federal Wild and Scenic Rivers Act. The St. Paul District of the Corps of Engineers is presently conducting a five-year management study of the headwaters reservoirs which will include non-structural alternatives to the Days High Landing project proposal.

A draft environmental assessment prepared by the Federal Highway Administration for a proposed U. S. Highway 2 bypass of Bemidji which would cross the Upper Mississippi near Lake Irving is presently being reviewed. (Refer to Figure 15.) The Bureau of Outdoor Recreation has recommended that the project proposal be amended to include a river access facility from one of the rerouted county or township roads.

Management plans for the Chippewa National Forest include limitations on clear-cutting within sight from the river, the replacement of short lived tree species with long lived species along the river, and minimized road construction in the water influence zone. Land management planning for the forest also includes resource management for water, wildlife recreation and aesthetics.

The prime concern of the Bureau of Land Management on the Upper Mississippi River is the islands in the public domain found within the river's corridor. Current management policies call for accurate inventoring of all river islands and uplands in the public domain and developing a consistent management policy to perpetuate the environment found on these and other islands in Minnesota. The section on islands in Chapter V provides further detail.

Management concerns on Indian lands in the corridor which are described in Chapter V are confined to the Leech Lake Indian Reservation. Agency management policy on forest land prohibits clear-cutting within 300 feet of a river or stream. Timber harvesting is presently planned in the next five years for only one affected parcel of 37 acres.

The various agency policies indicated above are all compatible with the intent of the Wild and Scenic Rivers Act.

State

The proposed protection of qualifying segments of the Upper Mississippi River is in accord with the Minnesota Statewide Comprehensive Outdoor Recreation Plan. The plan recognizes that the Upper Mississippi and other waterways in the State are valuable natural resources which merit protection for the benefit of future generations. This statewide policy has been implemented through enactment of the Minnesota Wild, Scenic, and Recreational Rivers Act and the Shoreland Management Act. The Upper Mississippi from St. Cloud to Anoka was placed in the State scenic rivers system in June 1976. The management plan for this reach of river is in full compliance with the intent of the Federal Wild and Scenic Rivers Act.

The proposed Federal plan for the Upper Mississippi includes having appropriate segments of the river classified as either "recreation development" or "natural environment" under authority of the Minnesota Shoreland Management Act so as to provide maximum protection allowable under authority of that statute.

Local

Within the seven-county Twin Cities metropolitan area, the Upper Mississippi River has been declared a critical area under authority of the Minnesota Critical Areas Act. This affects the study reach between Elk River and Anoka. Local units of government must develop plans and zoning regulations for the river corridor. These plans and regulations are expected to reflect the intent of the Minnesota Wild, Scenic, and Recreational Rivers System Act and therefore be compatible with the Federal Act as well.

While there are regional planning commissions in the basin, there are no regional plans which focus on the river area. Counties and municipalities have authority to enact zoning and land use measures, and several have adopted or are currently drafting regulations regarding floodplain management.

Description of the Environment

For a description of the environment, refer to Chapters III, IV, and V of this report.

Environmental Impact of the Proposed Action

The following table briefly summarizes the impacts associated with the proposal. Impacts are described as either minor, moderate, or major, depending on the degree of change (either beneficial or adverse) from the existing situation. Specific definitions of terms is not appropriate since the relative impacts reflect the subjective judgment of the authors.

SUMMARY OF IMPACTS EXPECTED TO RESULT FROM INCLUSION OF THE UPPER MISSISSIPPI IN THE NATIONAL WILD AND SCENIC RIVERS SYSTEM

Resources Affected	Impact
Cultural, Historical, and Archaeological Resources	Major Beneficial
Scenic Quality	Major Beneficial
Air Quality	Minor Adverse

Resources Affected	Impact
Soils and Vegetation	Major Beneficial
Fish	Minor Beneficial
Wildlife	Moderate Beneficial
Water Quality	Minor Beneficial
Water Resource Development	Moderate Adverse
Transportation and Utility Corridors	Moderate Adverse
Agriculture	Minor Adverse
Forestry	Minor Adverse
Minerals	Minor Adverse
Impact on Local Population	Minor Adverse
Residential Development	Moderate Adverse
Recreation	Major Beneficial

Impacts on Cultural, Historical, and Archaeological Resources

The Mississippi River is one of the most commonly known geographic features of the world. This river, first called the "Father of Waters" centuries ago, has played a dominant role in shaping our country's history. The mighty Mississippi has traditionally been a focal point for populations of fishes, wildlife, waterfowl, and people. A pageant of history has occurred along the river, with its first carrying canoes of the Indians; next, rafts and boats of the early homesteaders; then paddle-wheeled steamboats, exchanging products of towns and cities enroute, and today, completing the circle by again carrying canoes--but this time for fishermen and pleasure floaters. No river has played a greater role in the story of America.

The zone of influence for the river described under the subheading boundaries in the recommended plan (Chapter VIII) includes 19 known archaeologic sites, 10 sites of trading posts circa 1784 to 1847, sites of 17 steamboat landings circa 1900 to 1920, four mission sites circa 1833 to the 1860's, three trail crossings circa 1820 to 1869, the site of the 1840 Battle of Crow Wing, and the shorefrontage of six properties listed in the National Register of Historic Places. (See Figures 2 and 3.)

The impact of the proposal would be the preservation of these historic sites in the zone of protection. The State Historic Preservation Officer indicates that unless the proposal involved razing or ground disturbance the impact on cultural resources should not be detrimental. However, a professional historic and prehistoric survey of the proposal area would be conducted. The locations of known archaeological sites are confidential and under the curatorship of the State Archaeologist at the University of Minnesota. Further study is needed to locate other sites. The administering agency would provide for surveys when developing a master plan which would be prepared within two years after inclusion in the system.

Public acquisition of known archaeological sites would avoid possible misuse and commercialization. Protection and interpretation would be the reason for public acquisition. In like token, however, a potential impact is misuse, overuse, and vandalism which can occur under public ownership as well as private ownership. Care would be required by the administrator to avoid damage to this resource through appropriate regulatory measures.

The overall impacts of the project on cultural, historical, and archaeological resources are considered to be of major benefit in that the resources would receive protection.

Impact on Scenic Quality

The key elements of the overall river corridor which contribute to the scenic quality of the river may be categorized into eight distinct riverscape classifications: the headwater's stream meandering through (1) combined upland forest and lowland, (2) broad open marsh, (3) combined marsh and shrub, and (4) upland forest, and the lower reach flowing through (5) deciduous forest occasionally interrupted by (6) oxbows, (7) groups of islands, and (8) pastoral farmlands. Each of these riverscape classifications are represented in the portions of the river which meet the criteria for classification as defined in the Wild and Scenic Rivers Act (P.L. 90-542).

Designation of qualifying segments as a unit of the National Wild and Scenic Rivers System would protect the scenic quality of an estimated 36,100 acres of land by regulating human activities that would alter the existing setting. The actual project boundaries would have to be determined as part of the master planning process. The primary impact of the proposal through fee title and land easement acquisition, zoning, use agreements, and administrative regulations would be the preservation and enhancement of the river environment and related aesthetics and scenic beauty.

The 353 miles of river proposed for protection are estimated to support up to 280,700 annual visitor days of river floating by the year 2000. This figure is based, among other things, on a peak day use factor of

two boats per mile on the wild segment, four boats per mile on the scenic segments, and six boats per mile on the recreational segments. Other annual visitor day estimates for the year 2000 include 38,400 for fishing and 18,000 for hunting.

Potential impacts from this visitation could include camping and picnicking in undesignated areas, littering, and general overcrowding of the waterway. The magnitude of this impact is dependent on the effectiveness of management activity. Presumably, these impacts should be controlled by the project manager. The success of this control depends largely on the nature of the use pattern which evolves and the commitment of the administering agency to maintain the control. On some reaches of the river, particularly the lower reaches of segments 1, 3, 4, 5, 8, 9, and 10, major deterrents to effective management will be slack water allowing free passage upriver by motor boat and lack of control of key access points.

Fortunately, most segments of river likely to be heavily utilized have key access points controlled by Federal, State, or county governments. All recreation access points in Segment 12, for instance, are administered by the State Department of Natural Resources. The access point at the outlet of Cass Lake, key to Segment 9, is maintained by the Federal government. The primary access for Segment 8 is Schoolcraft State Park. A county park in Aitkin is the only access point near the upstream end of Segment 5, and Crow Wing State Park is the primary access point along Segment 4. A total of 57 public recreation facilities occur along the entire 466 miles of river and are administered by 22 different authorities. Presently, 12 private recreation oriented enterprises occur along the study reach.

The overall impact of the proposal on scenic qualities is judged to be of major benefit since the lengthy scenic corridor would be preserved and recreation use would be managed.

Impact on Air Quality

Segments of the Mississippi River which qualify for inclusion in the National System are generally free of air pollution. There are 32 point sources of air pollution in the vicinity of the corridor, all of which occur in the seven major communities along the study reach. The power generating plant at Cohasset emits by far the most pollutants found in the study reach, emitting an average 7,587 actual particles per 24 hours. This plant can be considered the river's major source of air pollution. The cities of Brainerd and Little Falls both contribute minor amounts, all from commercial sources. St. Cloud has several sources from minor industrial plants and granite quarries, none of which contribute heavily to the overall problem. The power plant at Elk River is high in particulate matter, sulfur dioxide, and nitrous oxides. Farther down river the City of Anoka has four minor commercial sources of air pollution.

Offensive odors from agriculture activity in the corridor have not been accurately documented, but a few instances were noted during the field surveillance of the river, particularly in the vicinity of Aitkin.

No violations of carbon monoxide standards are known to have occurred along the river corridor.

Beneficial aspects of the proposal would be the limitation of future development in the corridor and the increased interest in maintaining high standards for environmental quality, including good air quality, in the corridor.

An adverse impact would be the presence of emissions from motors used by recreators on the water and those used to transport persons to access points. Land vehicle emission is not considered to have major potential impact since the recommended segments are generally not in the vicinity of major population centers and the visitation would be distributed over 353 miles of river with some moderate concentrations of traffice at access points. For every one to two canoes floating a reach of the river, however, two automobiles are usually used as land transportation between access points so that between put-in and take-out points at least two trips by automobile are made by every person in a party of river floaters.

Noise and pollutants emitting from boat motors pose a greater potential adverse impact since during high flow periods in the spring all but 10 of the 353 miles of qualifying segments of the river lend themselves to navigation by craft propelled by small engines. No data is available to predict the percentage of future visitation attributable to the project proposal which would utilize motorized craft.

Overall, since the impact of boat engines can be controlled through management, the adverse impact of the proposal on air quality is judged to be minimal.

Impact on Soils and Vegetation

Due to the proximity and great length of the study reach, the river passes through two major vegetation communities and seven soil associations. From its headwaters to approximately Brainerd, the Mississippi is within the northern coniferous forest, and from Brainerd to Anoka it flows through intermittent deciduous forest and prairie.

Three soil associations occur along extensive portions of the river in the coniferous zone. The Menahga-Marquette association extending from Lake Itasca to Lake Winnibigoshish consists mainly of limy sandy loam glacial till with the common occurrence of peat bogs and small wet potholes. From Lake Winnibigoshish to Grand Rapids the Nebish-Rockwell association occurs. Alluvial type soil makes up 40 percent of the river corridor in this reach. Organic type soil of peat origin exists for

five miles south of the outlet of Lake Winnibigoshish. The Peat Swatasa-Spooner association ranges from below Grand Rapids to Aitkin. Known as part of the Glacial Lakes Plain Outwash, the soils are light colored and developed from waterladen sands, loams, and silt.

From Aitkin south to Little Falls, the Menahgo association was formed from glacial outwash with widely scattered soils known as the Crow Wing Outwash Plain. The general transition from coniferous to deciduous forest occurs in this reach, but the immediate river shorefront is dominated by deciduous cover throughout. The terrace along the river is primarily sandy. The soils are well to excessively drained except when associated with peat. The Esterville-Wadena-Hubbard association is predominant between Little Falls and Anoka in what is called the Mississippi Valley Outwash. This area consists of course to medium textured prairie soils from glacial outwash which contain dark colored soils developed in moderately course to medium textured material overlying courser outwash sands and gravel.

For the most part, qualifying Segments 7 through 12, totaling over 200 river miles, flow through extensive wetland areas. The fragile forested wetlands and lowlands are frequently separated from the main river channel by grass wetland particularly in Segments 8 and 12. As portrayed in Figure 2, only 20 percent of the 83 channel miles in Segments 8 and 12 afford easy access to the shoreline. Since the grass wetland is impractical to traverse by boat or on foot, it serves as an effective barrier between the river recreator and the shoreline. In like token, however, areas in these segments where upland shoreline is readily accessible will most probably sustain more intensive recreation traffic than similar shorefront along lower reaches of river.

Upland shorefront for the study reach above Aitkin is largely made up of gravelly or sandy soil which on a 15 percent slope is intolerant of intensive recreation activity. Therefore, a potential adverse impact of the proposal along the upper stretch of river is that accessible shorefront would be broken down by intensive recreation traffic. The managing agency will have to monitor user impact closely in order to determine a reasonable carrying capacity.

A soil retaining wall constructed at Pine Point Landing in Segment 12 is an indication of future potential problems. The structure has effectively checked shoreline degradation on a site receiving heavy recreational traffic but with an adverse impact on aesthetics. Other structures may accomplish the same purpose and be more pleasing to the eye such as a series of wooden steps and slot terraces.

59. Pine Point Landing in the headwaters reach of the Upper Mississippi River.

Below Aitkin, the river shoreline soils and vegetation are more tolerant of recreation activity. Due primarily to the increase in agricultural activity and urbanization, the protection of native vegetation in the river corridor takes on added significance as it becomes more isolated as an ecosystem.

An impact applicable throughout the qualifying reach is the potential degradation of soils and vegetation at existing and proposed recreation facilities. Presently, 69 recreation facility sites are located along the study reach and the proposed initial need for new facilities encompassing 180 acres includes 11 access points, nine portages, and three float camps.

The proposed new access sites would require sanitary and trash facilities, drinking water, picnic tables, and a small parking area. The average access site would consist of about 15 acres, with a parking lot requiring one-half acre and two acres for picnicking. The remainder of the acreage would serve as a buffer. Removal of vegetation would be necessary to accommodate the parking areas, picnic areas, and pathways.

Float camp facilities would be rustic and include sanitary facilities, tent pads, fire rings, picnic tables, and a water supply. Sites would be located back from the river and vegetation removal would be minor.

In all instances, vault toilets would be utilized unless soil conditions provide adequate leech fields. Contents pumped from the vaults would be discharged only into appropriate sewate treatment systems.

A projected beneficial impact on vegetation is the protection of any endangered or threatened plant species in the area.

The primary impact of the proposal on soil and vegetation is the protection of the river corridor and shoreline for future generations. The zone of protection includes shorefront for 353 river miles and 36,100 acres of adjoining land.

The overall long term impact of the proposal on the soil and vegetation is considered to be of major benefit.

Impact on Fish

There is high quality sport fishing for several species within the study reach. Walleye, northern pike, muskellunge, smallmouth bass, crappie, and sunfish are the primary fish sought on the river. Largemouth bass are occasionally taken in impounded and backwater areas. Limited information available indicates that fishing pressure on the river is light with the most concentrated activity occurring between St. Cloud and Anoka.

The major beneficial impact of the project on fish relates to water quality improvement and maintenance. Water quality improvement projects affecting the river would receive priority funding, and the future quality would be closely monitored. The proposal will not affect the jurisdiction or responsibility of the State of Minnesota over fish resources associated with the Upper Mississippi basin.

A potential adverse impact is excessive fishing of the river waters, resulting in a depletion of the fishery resource. The area most likely to receive increased pressure is the reach between St. Cloud and Anoka. The overall impact of the proposal on the fishery resource is expected to be of minor benefit.

Impact on Wildlife

The present variety of vegetation patterns of the Upper Mississippi River are reflected in the wide variety of wildlife occurring within the area. Each vegetational community supports an association of animals which has become adapted to the food, cover, and breeding conditions offered.

Animal species generally associated with the coniferous forest portion of the Upper Mississippi include the timber wolf, moose, black bear, bobcat, fisher, red squirrel, varying hare, spruce grouse, great gray

owl, common raven, and numerous species of breeding wood warblers. The American peregrine falcon is also occasionally seen in the area. The wolf and moose are uncommon in the study area. At least 18 species of reptiles and amphibians occur within Segment 11. (Segment numbers referred to are described in Figure 1.)

The deciduous forest portion of the river corridor supports gray squirrel, fox squirrel, raccoon, cottontail rabbit, woodchuck, and badger in addition to the normal mix of avian species associated with the eastern deciduous woods.

Certain adaptable species are found in both habitat types within the study area. White-tailed deer, red fox, coyote, beaver, mink, muskrat, ruffed grouse, and woodcock are among these.

The upper portion of the river corridor frequently includes backwaters and oxbows filled with stands of wild rice, reed canary grass, phragmites, or cattails. These areas serve as prime waterfowl breeding habitat and strategic moulting areas for adult birds. The main channel provides staging areas for fall migrants and spring arrivals since flowing water is the first to open up from winter ice cover. Local breeding waterfowl species include mallard, blue-winged teal, American goldeneye, wood duck, ring-necked duck, and wigeon.

The upper corridor is often hunted by grouse enthusiasts who gain access to their favorite shooting spots by boat. Spruce grouse are found in limited numbers, particularly in the heavier coniferous forest areas. The grassy marshes and low, wet woodlands afford suitable habitat for snipe and woodcock, respectively.

The corridor serves as a natural travel lane for numerous wildlife species. The interspersion of trees, brush, wetlands, and adjacent cropland offers excellent habitat for these many species by supplying food, cover, and other needs within a relatively small area.

The Mississippi River with its associated lakes and reservoirs within the Chippewa National Forest alone comprises feeding habitat for 14 pairs of nesting northern bald eagles. There are 26 nests within two miles of the river and several of these are visible from the river; hence, chances are good for river-based observation of these magnificent birds.

A relatively large number of woodland bird species nest in the spruce bogs and coniferous uplands. Among these are the black and white warbler, Tennessee warbler, Nashville warbler, Cap May warbler, palm warbler, Connecticut warbler, Canada warbler, blackburnian warbler, and the parula warbler. Wooded islands in the lower reaches are important song bird habitat.

The eastern timber wolf and the American peregrine falcon are officially listed as endangered species and the northern bald eagle has been proposed for the threatened species list.

A potential adverse impact would be the disturbance to nesting waterfowl and bald eagles feeding along the river channel due to increased recreation traffic. The impact of visitor use is not felt to be serious, but close monitoring should take place since the prime floating season occurs during the waterfowl nesting season. The project is not felt to greatly impact hunting pressure since adequate access is already available in prime hunting areas and the hunting season does not conflict with the prime floating, fishing, or wild rice harvesting seasons.

The primary beneficial effect of the project on wildlife would be the preservation of prime wildlife habitat including over 700 miles of land/water interface; 26,700 acres of forest, shrub, and grass wetland including 138 oxbow areas; and 360 islands totaling 2,000 acres.

The overall impact of the proposal on wildlife resources is considered to be moderately beneficial.

Impact on Water Quality

All segments of the Upper Mississippi which qualify for inclusion in the National System will by 1980 meet minimum water quality standards of the Wild and Scenic Rivers Act. A total of 141 municipalities and 96 industries are known to be discharging to surface waters in the Upper Mississippi River basin above the Twin Cities. There are 11 major discharges along the mainstem within the study reach. Presently, eight monitoring stations in the river indicate there is a basin-wide problem of fecal coliform violations, and occasional violations of the pH and dissolved oxygen standards occur.

Runoff from nonpoint sources is the major hinderance to the consistent maintenance of water quality standards. Periodic low flows further aggravate the situation. Although the nonpoint source problem has not been quantified, the potential for pollution is significant, particularly from farm fields and feedlots, and from mining operations in localized areas. Two tributaries, the Prairie River and the Crow River, are felt to carry the heaviest sediment loads due to mining and agriculture, respectively.

The primary beneficial impact would be accelerated improvement of water quality through placement of high priority Federal funding to correct violations of National Pollutant Discharge Elimination System permit standards. A program for monitoring chemical, biological, and physical water quality characteristics would also be established by the administering agency.

Implementation of the proposal would include the initial construction or upgrading of 16 access points, 10 portages, four float camps, and facilities at five natural areas. The construction phase would result in a

temporary increase in runoff, erosion, and siltation associated with a corresponding temporary decrease in water quality. Increased recreational use would also result in increased soil compaction, erosion, and siltation of the river. This impact would be seasonal (primarily the three summer months) due to the rather cold winters in the region. In addition, a major impact on water quality would occur as a result of improper disposal of human waste and litter. At the picnic areas and campsites, solid waste disposal and sanitary facilities would be needed to control pollution.

A 100- to 300-foot wide scenic easement to be acquired on each side of the river (depending on the diversity of the forest cover) would prevent any changes of land use which could increase erosion and adversely affect water quality. This easement would have a slight impact on improving water quality.

Overall, the impacts of the proposal on water quality are considered minor.

Impact on Water Resource Development

The recommended river plan would prevent the implementation of the Days High Landing proposal presently being studied by the U.S. Army Corps of Engineers. Local interests have requested that a low head dam be constructed at Days High Landing to control the area's water level. The intent is to enhance fish, game, and wild rice habitat during low flow periods.

A possible alternative to the construction of a dam at Days High Landing which would probably be compatible with a scenic river status is the use of water from Lake Winnibigoshish and Leech Lake for low flow augmentation. This alternative would enhance a longer reach of the river resource for recreation and wildlife while maintaining its free-flowing condition. Cottage owners around the affected lakes would be adversely impacted. The magnitude of the impact has not been assessed. In 1973 there were 382 seasonal homes on Leech Lake and 85 seasonal homes, 19 resorts, and 30 permanent homes on Lake Winnibigoshish. An ongoing five-year study of the operations of the six Upper Mississippi headwaters reservoirs will consider this alternative.

No major adverse impacts on present uses of the river water are foreseen from the proposal. The river is not being used for commercial navigation traffic in the study reach. Plans for future increased power generation at the Cohasset and Becker plants should not detract from the recreational use of the water, assuming water quality standards are met. Pumps along the riverfront supplying irrigation water may require screening and muffling but would continue to operate as needed. The minimum flow requirements needed for water supply for Minneapolis exceed those necessary to maintain recreation opportunity on the river.

Thus, the overall adverse impact of the proposal on water resource development is felt to be moderate.

Impact on Transportation and Utility Corridors

In all, there are 53 road/bridge crossings over the 466-mile river reach. Construction projects over the Upper Mississippi are currently under way or planned for the near future at several locations. The largest project is the Bemidji bypass on U.S. Highway 2. The other projects are as follows: (1) bridge construction in Beltrami County on County Road 12, (2) widening of U.S. Highway 169 bridge is scheduled for Grand Rapids in May 1976, (3) construction of a new bridge in Grand Rapids started in April 1975, and (4) repair and maintenance of State Route 101 near Elk River is scheduled for October 1977. Replacement of the highway bridge carrying County Road 2 in Benton County and County Road 1 in Stearns County has also been recently noted as proposed construction in 1976.1/

In the long term, it is anticipated that future projects on U.S. Highway 2 may result in a new crossing over the Mississippi near Ball Club, extension of State Route 371 as a bypass around Brainerd may result in another new crossing, and placement of the State Route 6 bridge near Crosby and the state Route 210 bridge near Itasca State Park sometime after 1980. Some of the existing County Road bridges may need replacement in the future. Additional expenses may be incurred to make these projects more compatible with the river areas. Construction, relocation, and upgrading of Federal aid highways may require coordination under Section 4(f) of the Department of Transportation Act of 1966, as amended. The use of public recreation lands for Federal aid transportation projects is not permitted unless no feasible and prudent alternative to such use exists. Opportunities for incorporating public access facilities into project proposals should be explored under authority of Section 147 of the Federal Aid Highway Act of 1976.

Eleven primary transmission lines cross the river. The number of pipeline crossings is unknown but not considered to be significant. Future pipelines and transmission lines would not necessarily be prohibited but should be constructed in an environmentally sound manner. Coordination of route location and construction to avoid adverse impact on the river could result in increased costs.

The impact of the proposal on the local highway system will have to be assessed in the master plan when plans for the Great River Road are finalized. Traffic generated by improvements in the existing Great River Road are expected to far exceed that attributable to the Wild and Scenic River project.

The overall adverse impact of the proposal on transportation and utility corridors is expected to be moderate.

1/ Department of Transportation, Federal Highway Administration, 1975.

Impact on Agriculture

Of the 36,100 acres within the zone of protection, approximately 2,500 are presently being actively used for agriculture.

The initial impact of the proposal shall be negligible since the proposal does not suggest a curtailment of existing agricultural activity. The landowners, however, will be encouraged to adopt land use practices to protect the banks of the river. For example, shorelines should be fenced in places and irrigation pumps should be muffled and screened from the water.

A potential adverse impact is the forgone benefits that could be accrued without the project from future increased utilization of the zone of protection for agriculture. In other words, the removal of streamside timber and other forest vegetation would not be allowed, thus the benefits from increased acreage for agricultural production would be forgone. Cattle grazing along riverbanks and watering in the river itself would also be discouraged. Future benefits forgone were estimated to be $15 per acre for a total of $472,000 amoratized and discounted over 25 years. The overall impact of the proposal on agriculture is of minor adversity.

Impact on Forestry

The primary beneficial impact is the protection of 9,850 acres of forest land within the project boundaries. Present forest practices being conducted along the riverfront by personnel from the Minnesota Department of Natural Resources, the Chippewa National Forest, and the Leech Lake Indian Reservation include restricting timber harvest to selective cutting within a few hundred feet of the river. This practice is compatible with the proposal and there would be no adverse impact to the industry.

A potential negative impact of the proposal would be the forgone option to employ more intensive harvesting techniques in the corridor than are presently used. The value of this forgone option was estimated to be $5 per acre over a 25-year project period for a total benefit forgone of $622,300.

The overall impact of the proposal on forestry is expected to be of minor adversity.

Impact on Minerals

Within the 14-county study area, mineral production consists primarily of stone, sand, and gravel. Only in Itasca and Crow Wing is there iron ore and taconite production.

Hobbyists collect other lesser minerals such as gem stones along some portions of the Mississippi River.

The only mining operation in the proposed zone of protection for qualifying segments of river is a gravel operation on the west bank of the river opposite the southernmost island in the Beaver Island group south of St. Cloud. View of this mining operation is well shielded from the water and is not considered to be a major impact on the natural scene so its continuation of activity would probably be allowed.

Additional operations or enlargement of existing operations on the river could adversely impact the river environment and would not be permitted in the zone of protection. Additional sand and gravel would have to be extracted elsewhere and could cause adverse environmental impacts on other rivers and increased transportation costs. The adverse impact of the proposal on mining is expected to be minor.

Impact on Local Population

In 1975, a total of 1,504,400 people lived within the 14 counties bordering the river. Over one million of these persons are considered to reside in the Twin Cities metropolitan area. The population per square mile ranges from seven for Aitkin County to 1,690 for Hennepin County. The population change from 1960 to 1970 ranged from a drop of 6.5 percent for Itasca County to an increase of 114 percent for Anoka County. The projected population increases from 1970 to 1990 ranges from six percent for Hennepin County to 85 percent for Sherburne County.

The proposal is not expected to affect the permanent population of the counties associated with the river corridor. The major portion of recreation users on the river are expected to originate from outside the immediate area. Planned shoreline support facilities and river access should accommodate the majority of the nonresident users within the proposed project boundaries. Local day-use recreation (mainly fishing) is expected to expand in a manner consistent with projected statewide trends. The introduction of up to 347,000 annual recreation visitors into the area will be considered an adverse social impact by some local residents, but the visitation will be dispersed over 350 miles of river and a four-month visitation season. Therefore, impact upon population as a result of the proposal's implementation is expected to be minimal.

Impact on Residential Development

Presently, there are 637 privately owned tracts and 40 multiple housing tracts within the defined zone of protection. No determination has been made as to the potential development of individual tracts, but these figures do provide insight into the number of landowners affected. Within the 36,100 acres of the zone of protection, there is an estimated 6,480 acres of lands suitable for development.

The major adverse impact of the proposal would be on potential sites for residential development. Scenic easement acquisition or zoning and land use regulations could preclude an open view of the river from these sites. The recommended definition of the zone of protection for the river includes a 100-foot setback along well screened banks and a 300-foot setback along less densely canopied river frontage.

Zoning will most probably be the primary means of protection along developed stretches of the corridor. The proposal will not result in relocation of residential housing.

A beneficial impact of the proposal is the enhancement of land value adjacent to the zone of protection as a result of implementing the proposal.

The overall impact of the proposal on residential development is considered moderate.

Impact on Recreation

Recreation areas and facilities located along the river are quite diverse and well distributed. Access is also well distributed along the entire reach, but many sites need to be upgraded. A canoeing route complete with access sites and float camps has been established in the headwaters reach. There are five State parks along the river corridor.

Recreational use of the river is light. Primary recreation activity presently occurring includes floating the headwaters reach, ricing, and waterfowl hunting in the wetlands and bass fishing below St. Cloud.

Overall, access to the river in the study area is quite good considering its length. There are only three stretches in the study area which exceed more than 10 miles in length without some type of accessibility. The access points seem to be fairly well distributed as to ownership and/ or administration including State, county, municipal, and private facilities as well as bridge crossings. In total, there are 69 maintained access points and 45 bridge crossings from Lake Itasca to Anoka. A good system of major and minor connector highways links these access points.

Primary benefit from the proposal would be the preservation of 353 river miles in a free-flowing condition guaranteeing a degree of diversity for additional water based recreation opportunities in the region. Appropriate facilities would be developed and maintained to provide convenient utilization of the resource which provides an extraordinary variety of riverscape including flow characteristics, topography, scenery, and fish and wildlife species.

Potential adverse impact could result from the envisioned use pressure portrayed in Table 14.

TABLE 14

Estimates of Annual Visitor Days
Recreation Use of Proposal Segments

	1975 Present Use	2000 Without Project	2000 With Project
Floating	8,250	15,675	290,700
Fishing	8,250	12,375	38,400
Hunting	3,500	4,375	18,000
TOTAL	20,000	32,425	347,100

Increased use pressure attributable to the proposal is estimated to be approximately 10 times that envisioned for the river without the proposal. It may then be inferred that the use density will also approximate 10 times that of the river without the proposal. For some recreationists, this would be considered a serious degradation of the experience and a significant adverse impact.

Soil and environmental stress from the envisioned use pressure will most likely be manifest in the headwaters reach (Segment 12) where the corridor is perhaps most beautiful and fragile. Access can be better controlled in this reach than others, however, since the State maintains all public landings.

Presently, 22 public agencies operate and maintain 57 facilities in the study reach. The envisioned recreational use pattern resulting from the project is expected to be well dispersed throughout the 353 miles of river so that no one facility or area is expected to receive an unproportionally large amount of use traffic. Due to the frequency of dams and the extreme length of the project boundaries, only a small percentage of the total visitation is expected to navigate the entire reach.

Overall, the beneficial impacts of the proposal on public recreation use are considered of major importance.

Mitigating Measures Included in the Proposed Action

Measures to mitigate adverse effects of the proposed action resulting from impacts of development and visitor use exist mainly in the form of management practices to be employed by the administering agency. The specific nature of these measures will be determined by the administering agency as part of the management plan for the river and to some

degree by the recreational use patterns which evolve with development of the project. Therefore, this environmental impact assessment of mitigating measures can only relate to a conceptual planning framework.

Archeology and History

Consultation with the State liaison officer for Historic Preservation and the National Register for Historic Places indicates that a survey of historic and prehistoric sites is needed. The Federal administrator will be responsible for continued consultation and compliance with Section 106 of the National Preservation Act and Executive Order 11593. Surveys will be conducted as part of the management plan, which is to be drawn up within two years after designation and prior to construction. If properties listed or eligible for listing in the National Register of Historic Places are affected by the project, the procedures established by the Advisory Council on Historic Preservation for compliance with the requirements of Section 106 of the National Historic Preservation Act (80 State. 915) and Executive Order 11593 (May 13, 1971) would be observed.

Mitigating measures would include full identification and evaluation of cultural resources prior to development or other actions that might affect them, avoidance of such resources in development, salvage of cultural resource fabric and data where physical impact is determined unavoidable, nondisclosure of information on fragile sites to the public, and development of a management strategy to preserve the resources.

Vegetation and Soils

To avoid compaction, erosion, and resultant siltation of the river, recreational facilities will not be placed on steep slopes or in areas where environmental quality would be degraded through the projected level of recreational use. Recreation developments will be designed so as to minimize soil loss during construction, and erosion problems associated with recreational use of the activity areas. When advisable, plantings will consist of native vegetation.

It is recommended that the recreational carrying capacity (a level of visitor use which would not deteriorate the river environment or impair the visitor recreation experience) be determined by the administering agency, and this point of use not be exceeded. This determination will be part of the master plan, but by its nature is a continuing process requiring frequent reevaluation. During peak periods of recreational activity such as holidays and weekends, it could become necessary where possible to actually limit the number of people using the facilities. Appropriate ways to accomplish this will be explained in the master plan. The limited numbers of planned facilities will also serve to limit potential use. Unique and natural areas would only be accessible from the river.

Another potential threat to soils and vegetation could be the lack of enforcement of zoning regulations and scenic easements held by the administering agency. Presently, there are 637 privately owned tracts plus 40 multiple housing tracts within the defined zone of protection. Each of these tracts poses a potential enforcement problem, particularly with subsequent landowners. Mitigating measures would include the granting of authority to the administering agency for enforcement of the easements and monitoring of zoning regulations by the Minnesota Department of Natural Resources under authority of the Minnesota Shoreland Management Act. Protection of endangered/threatened plant species would be included in the easement rights.

Water Quality

Sanitary facilities will be provided at all public use areas to minimize the impact of increased human waste in the river corridor. Treatment of these wastes will be done in accord with State and local regulations.

If soils are not suitable for septic tank fields, then chemical vault toilets will be provided. Care would be taken to ensure that contents of the vaults are discharged only into appropriate sewage treatment systems. Efforts taken to minimize soil loss during construction will also mitigate the impacts of increased siltation on water quality.

Litter

Careful management and provision of trash cans at all recreation areas in combination with effective patroling along the river corridor will be the primary tools used to minimize the impact of litter. All recreation areas will be accessible to service vehicles for solid waste pickup. Literature to inform recreators of proper conduct in the corridor will be provided at appropriate recreation areas.

Economy

Adverse economic impacts should be partially mitigated by the enhancement of land value adjacent to the project boundary, the allowance of existing levels of agriculture, timber harvest and small sand and gravel operations to continue, and the reliance on scenic easements and zoning instead of fee title to protect the corridor.

Probable Adverse Effects Which Cannot be Avoided Should the Proposal be Implemented

Despite the mitigating measures described in Section IV, some adverse environmental impacts will occur as a result of the proposed action.

The construction of access sites and facilities will disturb existing vegetation. Some soil erosion will occur even with preventive measures. The loss of vegetation will reduce existing wildlife habitat. Construction and other noisy activities may

cause some animals to avoid parking lots, boat launching areas, and picnic grounds. Based on a one-half acre parking area at 11 access sites, five and one half acres of vegetation would be removed. A two-acre picnic area at each access site would require removal of some brush. Twenty-two acres would be impacted in this way. A maximum of three two-acre float camps would require minimal brush removal on an additional six acres. Impacts are expected to be minor.

Establishment of a Federally administered scenic river is expected to cause recreational use to increase at a rate 10 times that otherwise expected. Increased visitation will exert pressure on the resource base. Even if control measures are strictly enforced, some evidence of human use will remain. The loss of natural groundcover and resultant soil compaction are effects which cannot be totally mitigated. The habits of some people could result in increased abuse to some forms of plant life (including wildflowers) and certain wild animals. Other problems associated with increased use would be an increase in litter and trash; air, water, and noise pollution; traffic congestion; trespass; and a potentially higher incidence of fire. The severity of these problems will depend upon the number of people and the effectiveness of control measures.

Increased numbers of people visiting the proposed area will require some form of regulation of recreation use to preserve the existing river environment. These regulations on use and potential limitations or distribution of uses will cause a loss of personal freedom of users to go where, when, and how they might otherwise desire.

It can be anticipated that scenic river designation may attract some incompatible recreation developments, increased residential development, and other commercial interests in the area of influence outside the river corridor. This is likely to occur regardless of whether or not the Upper Mississippi is included in the system, but designation may accelerate the trend. Existing data is not adequate for quantitative analysis at this time.

The acquisition of about 200 acres will remove land from the local tax base. Restrictions on the conversion of timber land to pasture, riverside developments, and commercial sand and gravel operations will reduce potential economic benefits.

Use of the designated river segments for water development or Federal Power Commission projects would be forgone if they are determined to have a direct and adverse effect on the values for which such segments were designated. Developments above or below such segments or on tributaries could also be precluded if they are determined to unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area.

New highway construction within or directly affecting the proposal area may be required to select less convenient, more costly routes to prevent conflicts with sensitive resource values. At the present time, there are plans for six new or reconstruction bridge projects.

Another potential threat to soils and vegetation could be the lack of enforcement of zoning regulations and scenic easements held by the administering agency. Presently, there are 637 privately owned tracts plus 40 multiple housing tracts within the defined zone of protection. Each of these tracts is a potential problem, particularly with subsequent landowners. Mitigating measures would include the granting of authority to the administering agency for enforcement of the easements and monitoring of zoning regulations by the Minnesota Department of Natural Resources under authority of the Minnesota Shoreland Management Act.

Relationship Between Short-Term Use of the Environment and Long-Term Productivity

The short-term effect of the proposal would be the protection of 353 miles of river corridor totaling 36,100 land surface acres. Present levels of agriculture and forest activity would continue. Existing residential development would not be affected except for possible incidences of restoration of natural vegetation along the shorefront and abatement of bank erosion. Recreation activity attributable to the project is expected to increase gradually after initial recreation facilities are in place. These 24 facility sites should require a total of only 200 acres of land. Therefore, the short-term use of the environment will not be greatly affected by the project.

The long-term productivity of the project relates to the continued preservation of scenic, historic, cultural, fish, wildlife, and recreational resources as described in Chapter V. The project area includes 23,700 acres of wetlands; 9,850 acres of upland forest habitat; 138 oxbows; and 360 islands totaling 2,000 acres, all of which would generally remain as they are today and continue to support existing fish and wildlife populations. The resource area would be utilized for recreational use in the long-term at its carrying capacity which has been estimated to approach 347,000 annual activity days. This maximum number of recreators would have to be carefully managed to avoid serious degradation of the long-term productivity of the project.

Potential long-term productivity forgone if the project were implemented includes the following: (1) Some portion of the benefits associated with the impoundment project called Days High Landing being studied by the Corps of Engineers, (2) benefits of unforseen impoundment projects along the 353 miles of free-flowing river, (3) benefits associated with more intensive agriculture and forestry activities, and (4) benefits associated with having an unobstructed view of the river from shorefront property suitable for development.

Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action Should it be Implemented

Designation as a National Wild and Scenic River is a commitment to maintain the natural environment of the river corridor. However, it is possible for this Federal designation to be removed, in this case, by an Act of Congress for the Federally administered components and by the Secretary of the Interior for the State administered component, should it be in the national interest to do so at some future time. The potential of the river for water resources development will remain.

The commitment of the 200 acres to recreation development and the commitments to retain the 36,100-acre corridor in present land uses are also reversible commitments.

The proposed action involves no significant physical changes to the existing environment, and no irreversible and irretrievable commitments of resources, including cultural resources.

Alternatives to the Preposed Action

Alternative I. No Action.

With no action to protect segments of the river as part of the National Wild and Scenic Rivers System, present trends in the corridor are assumed to continue.

Impact on Historic, Archaeological, and Cultural Resources

The primary impact of the no action alternative would be the loss of a chance to preserve and highlight for future generations this river called "The Father of Waters." The essence of how this river began remains today but is being threatened by conflicting land uses.

State archeological personnel indicate that the area has potential archeological importance. With the no action alternative, these archeological findings would only be protected by Executive Order 11593. within the authority of the Corps of Engineers jurisdiction.

Impact on Scenic Quality

Through its Wild, Scenic, and Recreational Rivers System program, the State will protect 15 percent of the total corridor advocated for protection by the proposal. No plans are known to exist which specifically relate to protection of other portions of the river corridor included in the project proposal. Land use pressures are predicted to eventually change the character of the unprotected corridor dramatically. Therefore, the long-term impact of the no action alternative on scenic quality is considered to be particularly adverse.

Impact on Soils and Vegetation

For 53 miles between St. Cloud and Anoka, the river will be protected in a manner compatible with the intent of the Federal Wild and Scenic Rivers Act as part of the State Wild, Scenic, and Recreational Rivers System. The State management plan calls for land acquisition in fee title of 846 acres and in scenic easements of 5,363 acres. This represents the only known plans for public land acquisition within the defined zone of protection for the study area. Approximately 62 percent of this zone is presently in public ownership.

The shorefront of the river could be more protected than it is today by changing its designation under the State Shoreland Management Act from "general development" to "natural environment." This action would provide the river similar protection through zoning as that afforded by the "recreational" river classification of the State Wild, Scenic, and Recreational Rivers System (see Tables 12 and 13). The primary loss in protection would be a limit to the regulated vegetation cutting areas and exclusion of bluff lines from the regulations.

Impact on Fish and Wildlife

The long-term impact of the no action alternative on fish and wildlife is similar to that on scenic quality. Since no specific protection is presently planned for 85 percent of the corridor within the proposal, it is assumed that present land use trends will continue. More wildlife habitat along the shorefront will continue to be converted to more intensive types of land use such as housing development.

The short-term impact of the no action alternative on fish and wildlife would be directly related to the expected reduced recreational use of the river and the areas adjacent to it. Disturbance of wildlife breeding and feeding areas would initially be considerably less with the no-action alternative than it would be with the proposal. The specific level of impact would depend on the particular species. Deer populations, for example, would not be significantly affected either way. On the other hand, the northern bald eagle population, which is less tolerant of human presence, would in the short term be less adversely affected by the no action alternative than by the proposal. The impact on small game animals, such as grey squirrel, rabbit, fox, and groundhog, would be minimal in the short term. Waterfowl, such as wood ducks, would benefit by the no action alternative in the short term due to lighter disturbance of their habitat. Furbearers, such as opossum, raccoon, and beaver, would suffer under no action because of the lack of protection afforded their river and riverbank habitat. The no-action alternative would offer significantly less protection from the threat of future impoundment and/or channel alteration to the habitat.

Impact on Water Quality

According to the Upper Upper Mississippi Basin Plan for Water Quality released in Janauary 1976 by the Minnesota Pollution Control Agency, all segments of the Upper Mississippi which qualify for inclusion in the National System will be in compliance with the 1983 goals of P.L. 92-500 which provide for a fishable, swimmable water quality by that date. In the long run, the no-action alternative should not limit the overall water quality of the basin but would probably result in a slower rate of accomplishing the 1983 goals.

Impact on Recreation

The projected recreational use of qualifying segments of river is estimated to be approximately one-tenth that envisioned for the project proposal. Therefore, the recreation potential of the river is effectively reduced with the no action alternative, not only in terms of the number of recreators, but also in terms of continuity of facility convenience. Existing recreation facilities and access points are quite well distributed along the river and adequately support today's light visitation and could probably absorb the increased use estimated for the no action alternative.

If the State Wild, Scenic, and Recreational Rivers System evolves to its full potential, residents of Minnesota will have access to hundreds of miles of rivers and streams representing a variety of natural riverscapes. Free-flowing river resources would not become scarce in the region. There is no guarantee that this system will actually evolve or that it will adequately protect the river resources in the long term.

Other Impacts

Other impacts of the no-action alternative would simply be that present and future uses of the corridor would not be constrained by the proposed action. Housing development would continue to replace areas of natural vegetation or areas actively used for agriculture. The Days High Landing impoundment proposal could be implemented.

Alternative II - Inclusion of All Qualifying Segments in the National System Under a Combination of Federal, State, and Local Administration.

This alternative would include all 12 segments or 353.3 miles of river which qualify for inclusion in the National System. All recommendations relating to these segments expressed in the proposed plan, except for administration, also apply for this alternative.

The suggested administrative alternative is Federal administration by the Departments of the Interior and/or Agriculture for Segments 4, 5, 8, 9, 10, 11, and 12; State administration of Segments 1, 2, and 7; and local administration of Segments 3 and 6. Specific location of these segments may be found in Figure 1.

Impacts associated with this alternative would be essentially the same as those of the recommended plan. The primary effect would be a shift in the responsibility for development, operation, and maintenance from the Federal government to the State and local governments. The Federal dollar commitment for this alternative is 58 percent of that envisioned for the recommended plan.

Alternative III - Inclusion of Selected Segments in the National System

This alternative would include only Segments 1, 2, 4, 5, 8, 9, and 12 (as referenced in Figure 1) or 203 river miles in the National System. All recommendations relating to these segments expressed the recommended plan also apply for this alternative. Selection of the segments to be included in this limited plan were based on quality of the scenic, fish, and wildlife habitat, and recreation resources, representation of the various riverscape classifications and historic qualities, development pressure, and ease of management.

Impact on Soils and Vegetation

Much of the shoreline most vulnerable to degradation is excluded from the limited segment alternative. Farming activity and housing development occur intermittently in these portions of river which qualify for inclusion in the National System.

Most of the grass wetland areas which effectively protect the shorefront from the river traffic occur within this alternative proposal. Except for the deciduous forested wetland west of Lake Bemidji, all major vegetative types occurring along the corridor are represented in the selected segments.

Impact on Fish and Wildlife

The impact of the limited segment alternative on fish and wildlife is not as severe compared to the recommended plan as it is on recreation since the best habitat areas of the corridor are included in both the limited segment alternative and the recommended plan. Prime grass wetland in the vicinity of Boot Lake and Lake Winnibigoshish are included as are many significant groups of islands south of St. Cloud.

Impact on Recreation

The major impact of the alternative would be providing the maximum recreation potential advocated in the recommended plan on 203 miles of river instead of on 353 miles. This is two-thirds of the river recommended in the proposal for Federal protection and would support an estimated 192 thousand annual visitor days or 55 percent of that envisioned for the recommended plan.

Other Impacts

Other impacts of the alternative relate comprising the continuity of the natural features of the corridor from Lake Itasca to Anoka and, on the other hand, limiting alternative shorefront uses along 203 river miles.

Consultation and Coordination With Others

The Department of the Interior's responsibility for studying rivers named in the Wild and Scenic Rivers Act was delegated by the Secretary of the Interior to the Bureau of Outdoor Recreation. A team of study associates composed of Federal and State agencies was formed in April 1975. Federal agencies represented as study associates included the Bureau of Indian Affairs, Bureau of Land Management, Bureau of Outdoor Recreation, Corps of Engineers, Environmental Protection Agency, Federal Highway Administration, Fish and Wildlife Service, Forest Service, Geological Survey, National Park Service, and Soil Conservation Service. The State Department of Natural Resources was also represented. Others who contributed to the study included Northern States Power Company and a fishing tackle manufacturer in Big Lake, Minnesota.

Public involvement was an essential part of the planning process. Opinions and ideas expressed by people, both within and outside the Upper Mississippi River basin, were solicited in an attempt to understand all relevant points of view. While it is important to protect and preserve the Nation's outstanding scenic and recreational resources, it is not without people in mind that such protection can be warranted. Therefore, the ideas, concerns, private interests, and philosophies of people, especially those with direct concern, are necessary ingredients to making responsible recommendations with which any study should culminate.

In addition to meeting with various groups and individuals during conduct of the study, five public information meetings were held to solicit the views of concerned and interested people regarding placing the river in the National System, alternative means of protection, and administrative options. The meetings were held during the week of December 8, 1975, in Bemidji, Grand Rapids, Brainerd, St. Cloud, and St. Paul. Although the

meetings were well covered by the local media and 1,500 brochures reporting study progress were distributed, the total attendance was only 235 persons, or an average of less than 50 people per meeting.

Response forms recording opinion on planning alternatives were filled out by one-half of the attendees and their tally showed the following: Seventy percent preferred that some or all of the river should be placed in the National System, 49 percent indicated that the river corridor should be protected via fee title and scenic easements, and 46 percent preferred a combination of Federal and State administration.

The principal issues raised by people owning land along the rivers and other concerned basin residents were:

1. Disruption of agricultural practices and, subsequently, their livelihood as a result of removing crop or pasture lands from production.

2. Adequacy of compensation for scenic easements to be acquired.

3. Removal of land from county tax rolls resulting in increased property taxes.

4. Encroachment on private rights.

5. Deterioration of river resources and scenic values due to excessive public recreation use.

6. Adequacy of law enforcement capabilities to control such things as littering, vandalism, and trespass.

7. Loss of planning or decision-making authority by local government and landowner associations.

The five meetings revealed a consensus of opinion that the natural environments of the Upper Mississippi should be preserved. Our conclusion from the experience of the public meetings and other sources of public input is that not much opposition exists concerning the concept of including segments of the Upper Mississippi in the National System.

SECRETARY OF THE ARMY
WASHINGTON

24 JUN 1977

Honorable Cecil D. Andrus
Secretary of the Interior
Washington, D. C. 20240

Dear Mr. Secretary:

This letter is in response to a request from Assistant Secretary Herbst for views of the Department of the Army on your proposal that 353 miles of the Upper Mississippi River, from Lake Itasca to Anoka, Minnesota, be designated a component of the National Wild and Scenic River System.

Affirmative action by the Congress on your proposal would not adversely affect water resources programs or projects of the Corps of Engineers, or other elements of this Department.

I appreciate the opportunity afforded this Department to comment on your proposed action.

Sincerely,

Clifford Alexander

Clifford L. Alexander, Jr.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

24 JUN 1977

OFFICE OF THE
ADMINISTRATOR

24 JUN 1977

Mr. Robert Herbst
Assistant Secretary for Fish, Wildlife,
and Parks
Department of the Interior
Washington, D.C. 20240

Dear Mr. Herbst:

Administrator Costle has asked me to respond to your letter of June 1, 1977, requesting written confirmation of the Environmental Protection Agency's position on inclusion of the Upper Mississippi River in the Wild and Scenic River System.

We concur with the recommendation that the Upper Mississippi River from Lake Itasca to Anoka, Minnesota be designed as a component of the Wild and Scenic Rivers Systems.

If I may be of further assistance please do not hesitate to call.

Sincerely yours,

Rebecca W. Hanmer

Rebecca W. Hanmer
Director
Office of Federal Activities (A-104)

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

July 19 1977

Honorable Cecil D. Andrus
Secretary of the Interior
Washington, D. C. 20240

Dear Mr. Secretary:

This is in response to Assistant Secretary Herbst's June 1 letter requesting our views on a proposal to designate the Upper Mississippi River a component of the National Wild and Scenic Rivers System.

The report for the Upper Mississippi, which we reviewed in a preliminary form, recommends that about 300 miles of the river be added to the National system under Federal administration. In addition, 53 miles of river, between the Cities of St. Cloud and Anoka, would be added to the System upon the request of the Governor of Minnesota, and approval by your Department. Further, the report recommends that the Federal portion of the river be administered by the National Park Service. The Forest Service would retain responsibility for administration and management of the National Forest lands involved within the Chippewa National Forest.

The information contained in the report about the natural values of the area favorably supports a wild and scenic river designation for the river. We would have no objection to the recommendation that the river should be made a part of the National Wild and Scenic Rivers System. In the event the proposal is implemented, we look forward to a cooperative effort with your Department to protect and preserve the natural values of the river and adjacent lands.

We appreciate the opportunity to review the proposal and present our views.

Sincerely,

Bob Bergland
Secretary