AD-A171 125 MISSISSIPPI RIVER HEADWATERS RESERVOIRS MINNESOTA MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT(U) INTERDESIGN INC MINNEAPOLIS MN 06 DEC 77 1/4

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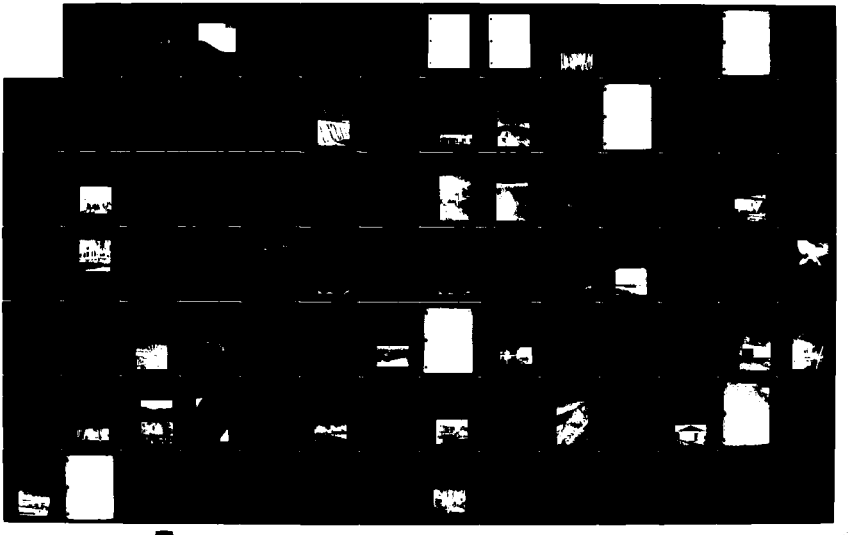

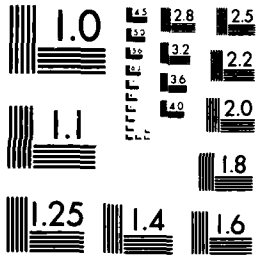

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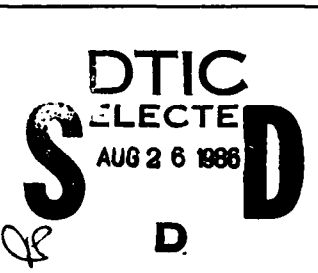

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Mississippi River
Headwaters
Reservoirs

MASTER PLAN
FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT

U.S. Army Engineer District, St. Paul Corps of Engineers

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

AD-A171 125

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This document updates the approved master plans and appendices for the six Mississippi Headwaters reservoirs: Gull Lake, Pine River Reservoir, Leech Lake, Lake Winnibigoshish, Pokegama Lake and Big Sandy Lake. The report describes and evaluates the six existing recreation areas and proposes necessary modifications to insure adequate public use facilities and proper resource management. An environmental assessment has been prepared that examines and documents potential effects of environment modifications that may result from implementing this plan.

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

REPLY TO
ATTENTION OF:
NCSED-ER

6 December 1977

SUBJECT: Mississippi River Headwaters Reservoirs, Minnesota Master Plan for Public Use Development and Resource Management

Division Engineer, North Central
ATTN: NCDCO-MO

1. Inclosed are 12 copies of final master plan which has been revised in accordance with NCD comments. The master plan has been prepared and submitted in accordance with the guidance contained in ER 1120-2-400 and ER-1130-2-400. This document will serve as the basis for future site planning decisions at the Headwaters projects.

2. Public input has frequently been solicited during the course of this study; in fact, 17 separate public encounters have transpired. These included 12 public workshops, 3 user workshops, and 2 public meetings. In every instance, those participating considered the six major Corps-operated areas to be among the finest they have ever seen. In spite of those plaudits, concern was expressed about our inability to complete needed facilities at Corps-operated sites.

3. The Mississippi Headwaters Reservoirs are Category A projects (ER 1120-2-404, Appendix 1). For such projects, existing policy requires a non-Federal sponsor to cost-share additional work, even for the completion of partially developed areas. These areas could have been completed entirely at Federal expense prior to FY 76. Unfortunately, funds were not made available and the overall Plan of Development, as set forth in previously approved master plans, was never accomplished. In addition, because the six areas in question are immediately adjacent to the six damsites, it is unrealistic to expect a non-Federal sponsor to want to cost-share and operate and maintain constructed facilities. Ironically, the facilities to be constructed are water based and sorely needed to make the existing complex truly water oriented. Therefore, I recommend that existing policy be reevaluated, and modified to provide sufficient authority to complete needed

recreation facilities at existing Corps-operated areas (on a case-by-case basis if necessary).

4. The key aspect of our plan at Sandy Lake Recreation Area involves modifications to provide a single entrance to the site. The success of that plan is contingent upon upgrading the existing road over the dam. The Waterways Experiment Station has initiated a year-long study of the stability of the six Headwaters dams. The results of that effort will affect our proposals for a public road over the dam at Sandy, and a modified plan will then be prepared and presented in a supplement to this master plan.

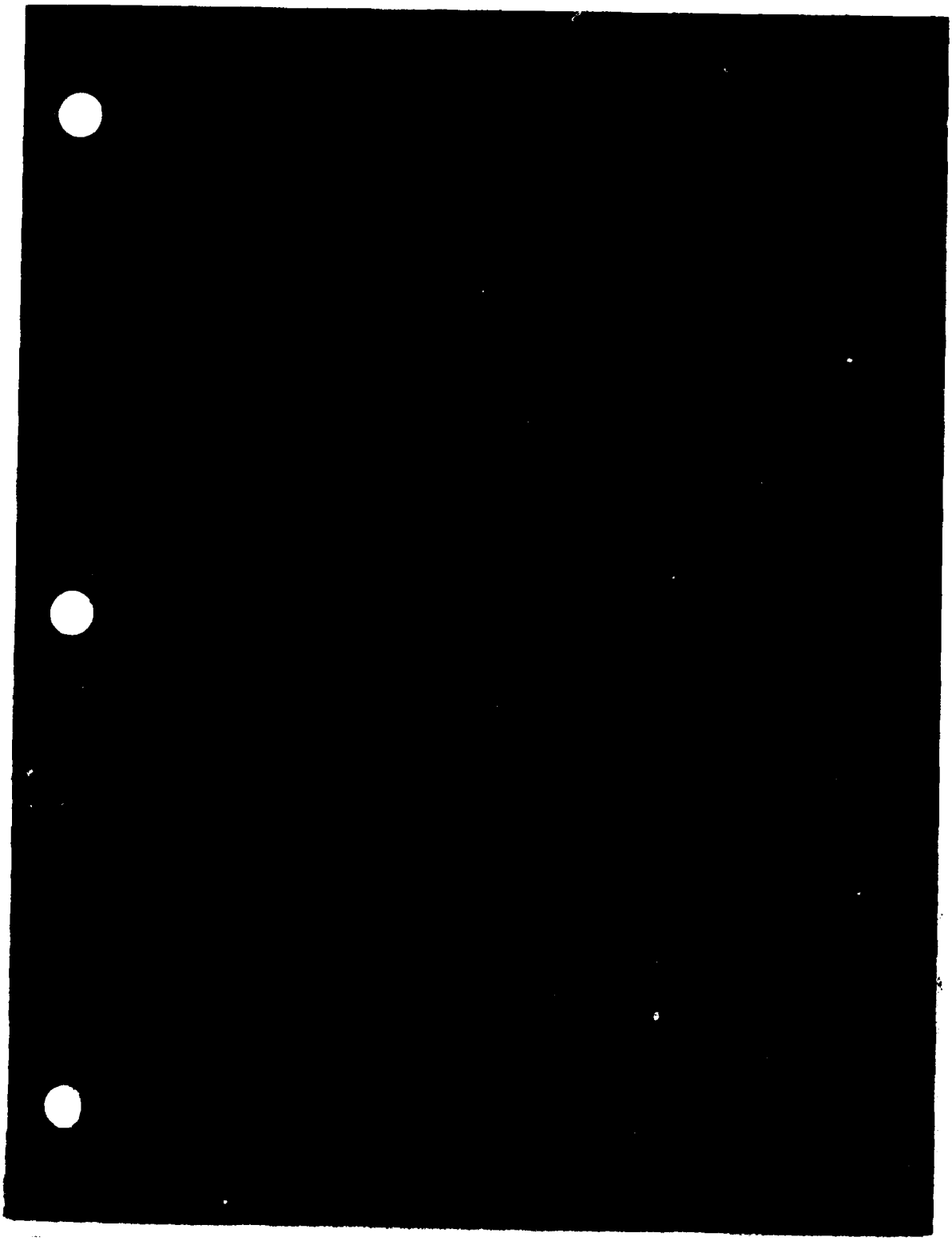
5. Some public comment concerned the length of stay allowed at Pokegama Lake camp area. Local citizens view our development as competing with private enterprise. Further, they feel that because the area is quite small and has no expansion potential, a shorter length of stay would allow more people to utilize the site. Consequently, we have indicated a willingness to explore a shorter length of stay at this area. Our records indicate that approximately 46 percent of the campers at Pokegama stay 2 days or more, yet the average stay is only about 2.5 days. We feel that, at a minimum, campers should be able to stay for a 3-day weekend. Allowing for 1-day travel time on each end, we arrived at 5 days. Therefore, for the 1978 recreation season, I intend to reduce the maximum length of stay at Pokegama from 14 days to 5 days. Public reaction will be carefully monitored, and data from this test case will be utilized in subsequent actions on length of stay.

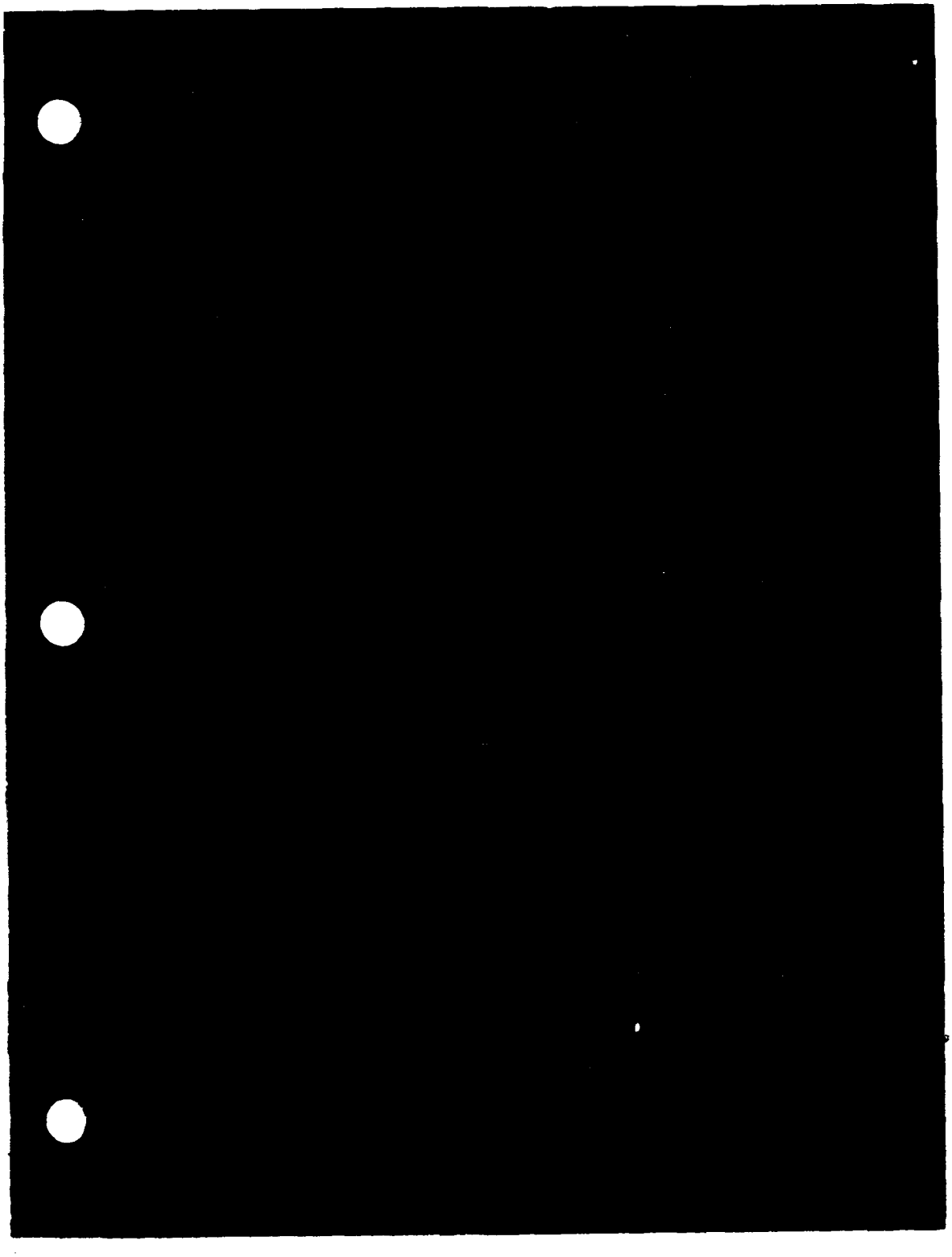
6. An Environmental Assessment and Negative Declaration have been prepared for this effort, 12 copies of which are provided for your information. Upon approval of the master plan, copies of the plan, Environmental Assessment, and Negative Declaration will be mailed to Federal and State agencies and interested individuals.

7. The required resource management appendixes will be forwarded separately during 2Q 78 for review and approval.

3 Incl
1 Master Plan (12)
2 EA (12)
3 Neg Dec (12)

FORREST T. GAY, III
Colonel, Corps of Engineers
District Engineer





1 INTRODUCTION

PROJECT AUTHORIZATION

1.01 Original authorization to improve navigation of the Mississippi River was provided by the River and Harbor Act of 1880. See paragraph 2.03. The Flood Control Act of 1944 provides basic authority to develop and operate recreational facilities. Further information on pertinent public laws is discussed in exhibit A.

AUTHORITY FOR THE STUDY

1.02 The authority to develop master plans for public use development and resource management is contained in ER 1120-2-400 and ER 1130-2-400. These Engineering Regulations, "The Design of Recreation Sites, Areas, and Facilities" and "Project Operation -- Recreation Resource Management" stipulate that a continuing schedule for re-evaluation of master plans for completed projects be established. This study satisfies that requirement, and is a comprehensive evaluation of existing conditions and facilities.

PURPOSE OF THE STUDY

1.03 The purpose of this report is to review all aspects of the existing master plans for the six Mississippi River Headwaters Reservoirs, and to propose needed modifications to insure proper resource development, protection and management.

SCOPE OF THE STUDY

1.04 This report has been written in two parts. Part One discusses resource factors that have an immediate effect upon later recommendations for resource development and management. Part One is the foundation upon which subsequent recommendations are made. The background information contained in this part includes regional and reservoir scale analyses of current conditions, a survey of recreational use, projected demand, supply and needs, and an inventory and evaluation of the six existing Corps' recreational sites.

1.05 Part Two proposes plans for development and anticipated effects for each recreational site. The relationships and potential interfaces between the natural resources and proposed developments are discussed. A set of design criteria has been established that will allow and stimulate a uniform design solution. Estimated construction costs, potential funding sources, and facility management policies dealing with operations and maintenance are discussed. This report is a summary of recommendations that will produce a coordinated and manageable system of recreational developments.

Note: paragraphs 1.06–1.07 have been deleted.

1 INTRODUCTION

PRIOR STUDIES AND REPORTS

1.08 Prior reports concerned with examinations and surveys of the Mississippi River in north central Minnesota date back to 1870. The earlier reports deal primarily with investigations pertaining to navigation. Some of the more pertinent prior studies and their content are summarized below. Laws applicable to resource development and management are found in exhibit A.

a. A report contained in House Document No. 113, 56th Congress, 2nd Session, covers a survey and investigation to determine the causes of and means of preventing excessive floods in the Mississippi River valley between the Federal dam at Sandy Lake and Brainerd, Minnesota, and the effect of floods on navigation. The report, dated 30 November 1900, was submitted in compliance with the requirements of the River and Harbor Act of 3 March 1899 and covered possible means of reducing flood damages by levees, cutoff channels and channel improvement. No recommendations were included in the report.

b. The annual report of the Chief of Engineers for 1906, pages 1458-1464, discussed the flood situation at Aitkin with particular reference to the operation of the headwaters reservoirs and concluded that the Aitkin area had been benefited, never injured, through reservoir operation. Particular mention was made of the serious situation created by the 1905 flood and possible solutions of the problem were outlined, but the report did not recommend that the Federal Government undertake the work.

c. The report of the Board of Engineers for Rivers and Harbors, dated 5 November 1906 (House Document No. 42, 61st Congress, 2nd session) supplemented the 30 November 1900 report in House Document No. 113. The advisability of expanding reservoir control for flood protection in the vicinity of Aitkin was suggested since it would also benefit navigation, but no reservoir change was recommended. Levee construction by local interests was mentioned as a possible means of protection.

d. Reports dated 1 September 1909, and 18 December 1909, are contained in House Document 607, 61st Congress, 2nd Session. The reports recommended improvement of 181.5 miles of the Mississippi River between Grand Rapids and Brainerd, Minnesota, by dredging, wing-dam construction, and removal of snags. Purpose of the project was to provide a 3 ½ foot channel in this portion of the River.

e. Reports dated 7 January and 14 December 1911 are contained in House Document No. 1223, 62nd Congress, 3rd session. The reports recommended straightening and improving of the Mississippi River channels between Winnibigoshish and Pokegama Lakes and from Leech Lake Dam to the mouth of the Leech Lake River. This improvement, authorized under the 1913 River and Harbor Act, and completed in 1926, was to provide for more efficient transmission of water from the upstream reservoirs to Pokegama Lake Dam, and ultimately downstream, in the interest of navigation below Minneapolis, Minnesota.

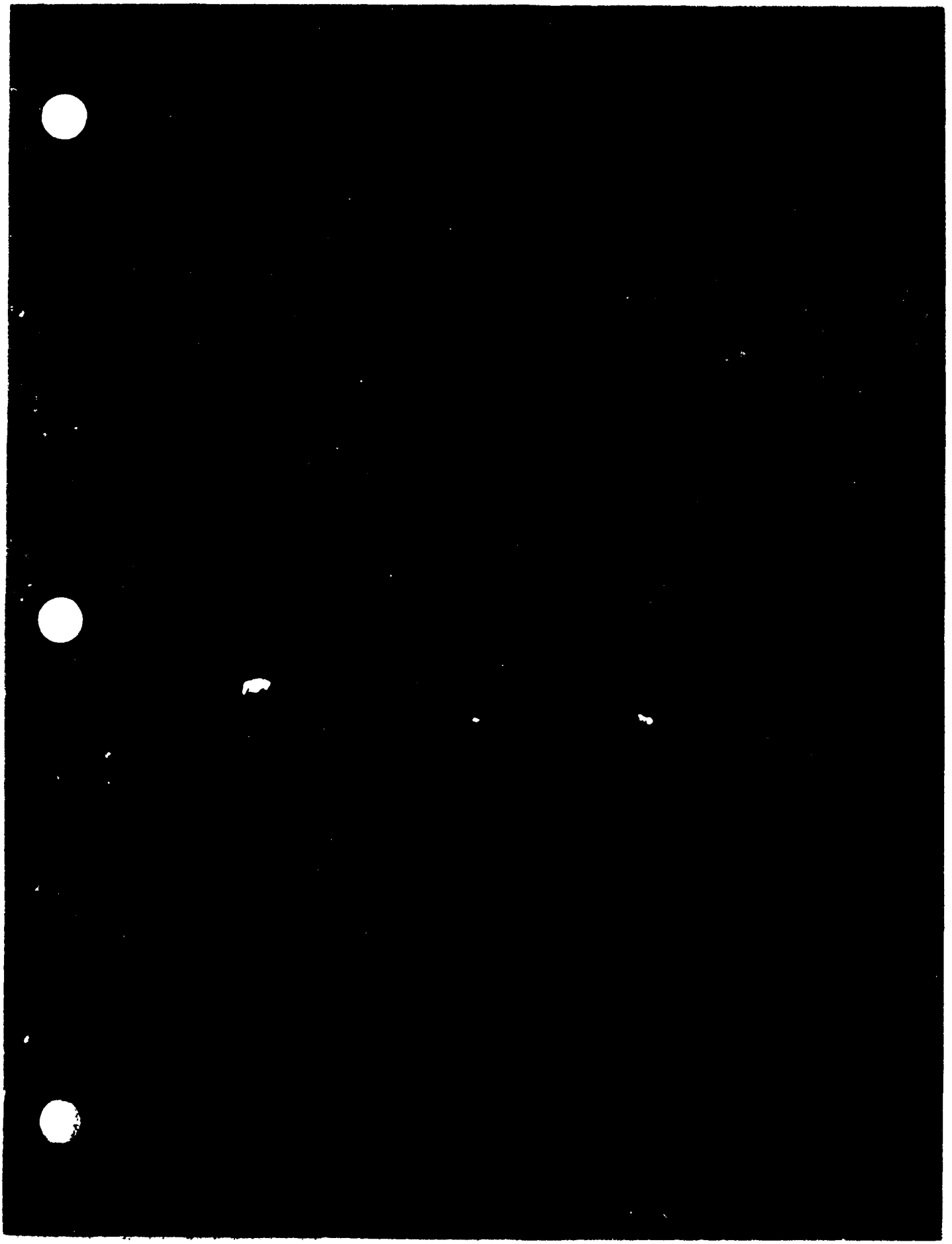
f. A report dated 13 January 1913, is contained in H.D. 243, 63rd Congress, 1st session and recommends against the construction of navigation locks in the Mississippi Headwaters Dams at Winnibigoshish, Leech and Pokegama Lake Dams.

g. A report discussing conditions in the Aitkin area is contained in House Document No. 66, 73rd Congress, 1st session. The report, dated 24 May 1933, is a survey by the Department of the Army in accordance with provisions of House Document No. 308, 69th Congress, 1st session, and in agreement with the provisions of Section 1 of the River and Harbor Act of 21 January 1927 and Section 10 of the Flood Control Act of 15 May 1928. The report covers the subjects of navigation, flood control, power and irrigation on the Mississippi River above Coon Rapids Dam, Minnesota. The most feasible plan of improvement found at that time for reducing floods at Aitkin included channel improvement together with reservoir operation in the interest of flood control as well as navigation. The report concluded that the flood problem at Aitkin was essentially local in character, that the floods affected only a small area and had no widespread economic effect, and that there was no interest to justify participation by the United States at that time.

h. A report entitled "Feasibility Study, Restoration of Water Levels along Leech Lake River below Federal Dam, Minnesota, 9 August 1966", found that restoration of a four mile portion of Leech Lake River downstream of Leech Lake Dam was economically feasible and recommended further detailed studies as a part of the overall headwaters reservoirs study.

1.09 In addition to the documents listed above, design considerations applicable to resource development and management are included in previous master plans prepared by the St. Paul District. The improvements contained in these reports give consideration to and suggest plans for development of public access, parking, picnicking, camping facilities and associated activities at each of the six recreational areas. These reports and the respective project sites are listed below.

a. Master Plan for Reservoir Development: Pine River Reservoir -- April, 1964
b. Master Plan for Reservoir Development: Leech Lake Reservoir -- December, 1964
c. Master Plan for Reservoir Development: Pokegama Lake Reservoir -- January, 1965
d. Master Plan for Reservoir Development: Sandy Lake Reservoir -- May, 1965
e. Master Plan for Reservoir Development: Gull Lake Reservoir -- August, 1965
f. Master Plan for Resource Management: Winnibigoshish Reservoir -- September, 1967



2 BACKGROUND INFORMATION

CONSTRUCTION HISTORY

By 1858 a number of factors, including relative peace with the Indian people and certain land annexations produced a population that brought Minnesota into the Union. 2.01

As late as the 1880's navigation on the Mississippi River from the mouth of the Wisconsin at Prairie du Chien, Wisconsin, to St. Paul, Minnesota, was considered hazardous. In 1896, Major General G. K. Warren headed a survey of the Mississippi Headwaters region in an effort to determine whether the river level along the 200 mile stretch between St. Paul and Prairie du Chien might not be stabilized. Four years after Major General Warren began his study he reported that a system of dams and reservoirs on the headwaters of the Mississippi, St. Croix, Chippewa and Wisconsin Rivers would be capable of storing the annual spring runoff until low water downstream made it necessary to release the stored water to achieve a desired river level and flow stabilization between St. Paul and Prairie du Chien. 2.02

BASE PROJECTS

This effort by Major General Warren prompted Congress to fund the Mississippi Headwaters project on June 14, 1880 through legislation of the River and Harbor Act of 1880. The six impounding structures and resulting reservoirs were authorized for construction to improve navigation on the Mississippi River by providing supplemental water during periods of low flow at and below Minneapolis and St. Paul, Minnesota. Construction on a test dam began in the winter of 1881 at Lake Winnibigoshish, and subsequent construction of dam facilities at Pokegama Lake, Leech Lake, the Pine River at Cross Lake, and Big Sandy Lake was completed by 1891. The sixth and final dam was built in the spring of 1911 at Gull Lake. 2.03

With the additional development of the 9-foot channel locks and dams in the 1930's, and the more recent completion of the lock at Chain of Rocks near St. Louis, Mo., the necessity for supplemental flows has been considerably reduced and a greater emphasis has been placed on flood control, recreation, conservation, and related uses. 2.04

RECREATIONAL FACILITIES

Construction of recreational and resource oriented facilities at each of the project areas began in 1964 with the establishment of a master plan for Pine River Reservoir. A listing of these six projects and the comparative quality of the facilities offered at each may be found in figure 36. 2.05

PROJECT STATUS

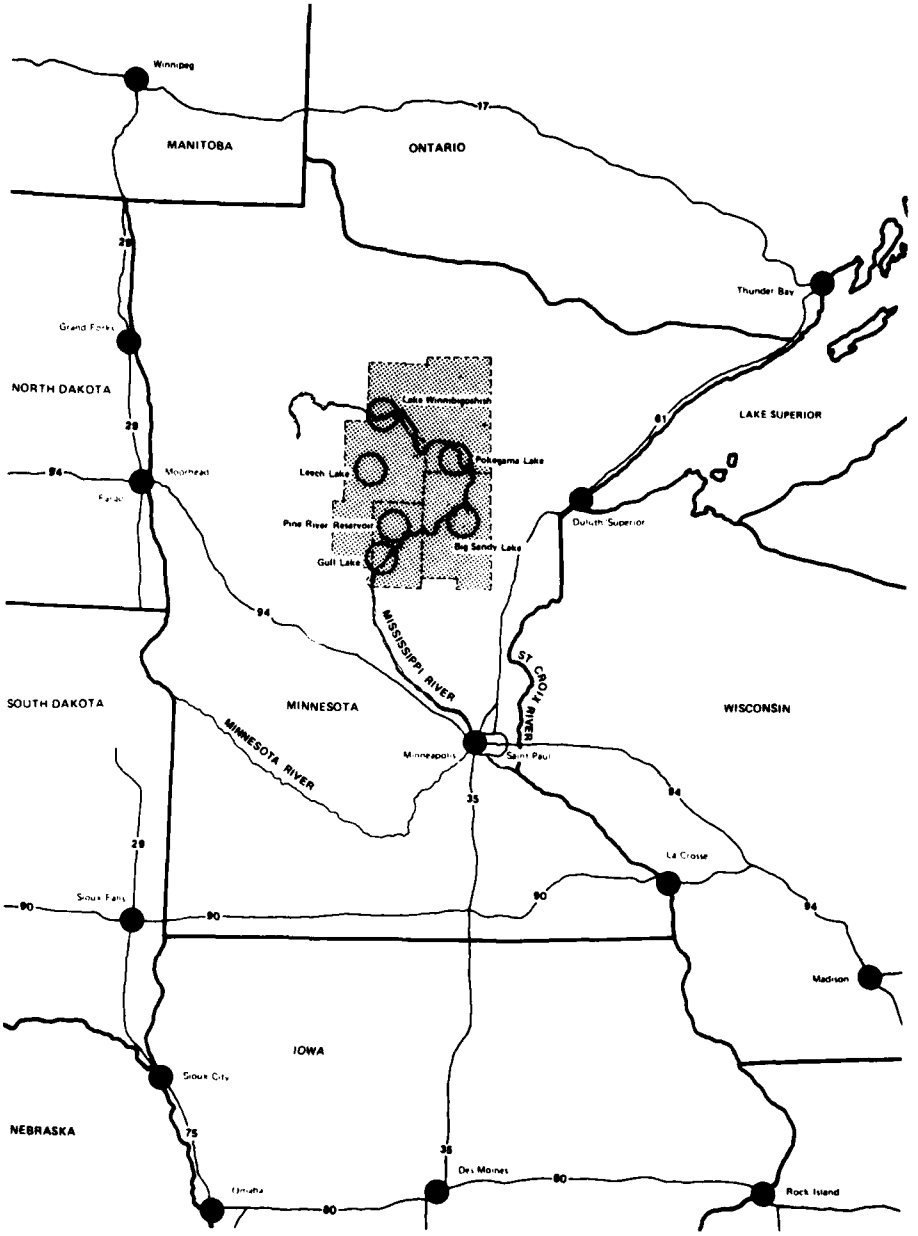
None of the Corps' recreational sites at any of the six lakes is considered to be complete. The existing master plans which this study reviewed were carefully evaluated to insure that proposals for physical improvements and management policies reflected stated resource use objectives. See paragraph 5.01. Attendance projections and user needs were also analyzed. Proposals for future implementation indicate a phased and coordinated approach to growth at the sites, and a comprehensive approach for resource management and public use development. 2.06

PROJECT DESCRIPTION

The six Reservoir projects which comprise the Mississippi Headwaters system are located in north central Minnesota. The reasons for, and decision to, construct the six Federal dams (see plate 1) that help to create the system are discussed in paragraph 2.03. The total drainage area upstream of these dams is 4,535 square miles. Lake Winnibigoshish is located on the main stem of the Mississippi River. Gull Lake, Pine River Reservoir, Leech Lake, Pokegama Lake and Big Sandy Lake are situated on tributary streams. 2.07

2 BACKGROUND INFORMATION

FIGURE 1 **LOCATION MAP**



2 BACKGROUND INFORMATION

GENERAL

The discussion that follows deals with each of the six lakes that are located within the Mississippi River headwaters system, and is incorporated in this study to facilitate future dialogue at the project level. It reviews the location of each reservoir defined in road miles from the Twin Cities and Duluth, Minnesota, access to it along major roads and lands currently administered under use permit or held in fee title by the Corps. Reservoir operations are discussed in a separate section, and are illustrated in figures 3 and 4. 2.08

Discussion of recreational facilities at each lake and within a fifty mile radius of it are described in subsequent sections and illustrated in figures 36 and 39. 36 and 40. 2.09

FIGURE 2 **DAM CONSTRUCTION**

PROJECT	DAM TYPE: STRUCTURE
Gull Lake	69' conc. struct. on timber piles, 8' roadway 5-5' sluiceways 1-5' fishway, 1-log sluiceway maximum control elevation 1195.0
Pine River Reservoir	150' conc. struct. on timber piles 1240.7 top elev. 8' roadway 13-6' sluiceway maximum control elevation 1235.0
Leech Lake	294' conc. struct. on timber piles top elev. 1308.8 25-6' & 1-12' sluiceways, 20' roadway w/ 15' road + sidewalk bridge, maximum control elevation 1298.0
Lake Winnibigoshish	162' conc. struct. on timber piles, 20' roadway bridge 5-14' sluiceways, 1-12' log sluiceway, maximum control elevation 1303.14
Pokegama Lake	225' conc. struct. on quartzite outcrop 1279.3 top elev. earth dike - east & west 3' walkway, 13-8' sluiceways 1-12' sluiceway, maximum control elevation 1278.0
Big Sandy Lake	109' conc. struct. on timber piles, 30' x 160' lock chamber w/ 5 sluice, 7 sluice, 8' roadway top elev. 1227.0, maximum control elevation 1221.5

GULL LAKE

Gull Lake is located near Brainerd, Minnesota. It is about 100 miles northwest of Minneapolis, Minnesota, and the same distance southwest of Duluth, Minnesota. It is the southernmost of the six reservoirs (see figure 1). It controls the runoff from a 287 mile drainage area including six natural lakes. These lakes are Gull, Upper Gull, Roy, Patrick, Round, Nisswa and Love Lakes (see plate 3 and figure 4). 2.10

Access to and within the vicinity of Gull Lake is provided by routing on a system of Federal, State and County highways. State Trunk Highway 371, which parallels the reservoir to the east, State Trunk Highway 210 to the south and U.S. Trunk Highway 10 to the southwest provide the primary circulation routes from the major population centers of the state (see plate 2). 2.11

Lands held in fee title by the Federal government amount to 100.4 acres with flowage easements on an additional 15,150 acres at the reservoir. The Corps presently administers two parcels of 18.5 acres and 81.9 acres (see plate 3). The first parcel is situated on the north shore of Nisswa Lake, is predominantly marshland and unacceptable for intensive recreational development. The 81.9 acres is located adjacent to the dam site on the Gull River. Known as the Terry R. Johnson Recreation Area, it fronts on both the Gull River and Gull Lake. 2.12

PINE RIVER RESERVOIR

One of the first reservoirs placed in operation, Pine River Reservoir is known as the Whitefish Chain of Lakes and is situated 90 miles west of Duluth, Minnesota, and 120 northwest of Minneapolis, Minnesota (see figure 1). The dam is located at the outlet of the Pine River from Cross Lake 15 miles above its confluence with the Mississippi River. The reservoir controls the *runoff from a 562 mile drainage area encompassing about 15 natural lakes* (see plate 4 and figure 4). 2.13

Access to the Whitefish Chain of Lakes is accommodated by a road network that circles the lakes. State Trunk Highway 371 routes traffic on the western periphery; U.S. Trunk Highway 2 is on the north; U.S. Trunk Highway 169 is on the east and State Trunk Highway 210 is located on the southern edge. State Trunk Highway 6 parallels the reservoir site about 7 miles to the east and is augmented by a system of State-aid and County roads that traverse the area. County State-aid Road 3 crosses the Pine River about 375 feet below the dam at Cross Lake (see plate 2). 2.14

Lands currently held in fee title by the Federal government amount to 475.58 acres in addition to flowage easements on another 21,794 acres at Pine River. The Corps of Engineers presently has jurisdiction over a number of scattered parcels besides the Ronald Louis Cloutier Recreation Area at the dam. These include lands on South Cross Lake Bay, Clamshell Lake, Upper Whitefish, Arrowhead Lakes and a site on Rush Lake (see plate 4). 2.15

LEECH LAKE

Leech Lake is situated about 200 miles northwest of Minneapolis, Minnesota, and 120 miles west of Duluth, Minnesota. Leech Lake contains the runoff from a drainage area in excess of 1,163 square miles. Located by the town of Federal Dam, the impounding structure (see figure 2) regulates 192 square miles of water. It is situated on the Leech Lake River about 27 miles above the junction with the Mississippi River. Among the lakes contained in the reservoir are Leech, Steamboat, Little Steamboat, Boy, Portage, Lomish, Swift, Three, Sucker, Swamp, Kabekona, Benedict, Horseshoe, and Garfield (see plate 5 and figure 1). 2.16

Leech Lake is accessible by an adequate system of roadways. It is bordered by State Trunk Highway 371 to the west, U.S. Trunk Highway 2 to the north via County State-aid Road 8 and State Trunk Highway 200 to the south. The town of Federal Dam is situated about 400 river miles from the Twin Cities metropolitan area and is served by U.S. Trunk Highway 2 to the north and is accessible by County State-aid roads 8 and 63 from the south (see plate 2). 2.17

Presently, the Corps of Engineers administers approximately 278 acres at Leech Lake. Of the 44.45 acres held in fee title 38.6 make up the Leech Lake Recreation area and dam site. The Corps of Engineers has a United States Department of the Interior use permit for the remaining land. The flowage easement incorporates 100,743 acres of both private and Federal lands (see plate 5). 2.18

LAKE WINNIBIGOSHISH

Lake Winnibigoshish is located 100 miles west of Duluth, Minnesota, and 200 miles northwest of Minneapolis, Minnesota. The dam and recreation area are situated about 170 miles from the source of the Mississippi River at the outlet of Lake Itasca and 390 river miles from the Twin Cities. Winnibigoshish controls the runoff from a 1,442 square mile drainage area that includes 28 lakes (see plate 6 and figure 1). 2.19

Access to the area is available on a good system of roads including U.S. Trunk Highways 2 and 71 to the south and west, respectively, and Minnesota Highway 46 from the east. Additional access from the south is afforded by U.S. Trunk Highway 169 and State Trunk Highway 371. Winnibigoshish dam is accessible by County Road 9 which connects U.S. Trunk Highway 2 and State Trunk Highway 46 (see plate 2). 2.20

In May of 1905, the Corps of Engineers was granted permanent use of 133.9 acres at the Winnibigoshish dam site. The Department of the Interior subsequently transferred 30.7 acres of the original grant to the State of Minnesota. Flowage easements on Federal and private lands in excess of 82,460 acres are held by the Corps of Engineers, although no land is held in fee title. Since Winnibigoshish lies within the boundaries of the Leech Lake Indian Reservation and the Chippewa National Forest, the Federal lands in the area are controlled by the U.S. Bureau of Indian Affairs and the U.S. Forest Service. The Minnesota Department of Natural Resources administers non-federal school and tax-forfeit lands in the area (see plate 6). 2.21

POKEGAMA LAKE

From Minneapolis/St. Paul, Minnesota, Pokegama Lake is 340 river miles, or 175 highway miles north of Minneapolis. It is 80 miles west of Duluth, Minnesota. Grand Rapids, the second largest city in the Mississippi River Headwaters Reservoir area, is only 3 miles downstream from the dam which affects a 660 square-mile drainage area encompassing 19 lakes. Included in this group are Pokegama, Rice, Loon, Jay Gould, Cavanaugh and Long Lakes (see plate 7 and figure 1). 2.22

Because of Pokegama's proximity to Grand Rapids, access is easily available from U.S. Trunk Highway 2 to the north, State Trunk Highway 169 to the east and by Minnesota Highway 34 to the south and County State-aid Highway 6 to the west.. County State-aid Road 63 crosses the Mississippi River about one mile downstream from the control dam (see plate 2). 2.23

At the present time, the Federal government holds fee title to 10.58 acres at the Pokegama dam site. The Corps of Engineers, which administers these lands, also has flowage easements on an additional 66,415.26 acres (see plate 7). 2.24

BIG SANDY LAKE

Big Sandy Lake, which is the most easterly reservoir of the six, is the only one not sharing a common watershed boundary with another headwaters reservoir (see plate 9). It is about 120 miles north of Minneapolis, and 70 miles west of Duluth, Minnesota. The lake which controls runoff from a 421-square mile drainage area, has its dam located on the Sandy River about 2.25

1 mile above its juncture with the Mississippi River. The eight natural lakes encompassed in this drainage area include Sandy, Aitkin, Sandy River, Rat, Flowage, Round, Davis and Tiesen Lakes (see plate 8 and figure 1).

Present plans call for the proposed Great River Road, which is a scenic road paralleling the Mississippi River, to pass Big Sandy Lake using State Trunk Highway 65. Access to Sandy Lake is accomplished along U.S. Trunk Highway 2 on the north and State Trunk Highway 210 on the south. State Highway 65 parallels the area to the west (see plate 2). 2.26

The Federal government holds fee title to over 1,116 acres of land and flowage easements on another 9,785 acres at Big Sandy Lake. Those lands presently administered by the Corps of Engineers are located on a narrow strip around the northern perimeter of Big Sandy Lake and on one large tract at the dam structure. In addition, the Bureau of Indian Affairs administers two parcels of land at the present time (see plate 8). 2.27

PROJECT MANAGEMENT

All the properties just discussed are currently administered by the U.S. Army Engineer District, St. Paul. The Corps has jurisdictional responsibilities for management of the lands and waters involved with operation, maintenance and protection of those Corps' projects illustrated on plate 2. 2.28

As stated in ER 1165-2-400 (Water Resource Policies and Authorities -- Recreational Planning, Development, and Management Policies), "The developed and natural resources of Civil Works projects are the public property of both present and future generations. Corps resource management activity is directed toward the continued enjoyment and maximum sustained use by the public of lands, waters, forests and associated recreational resources, consistent with their carrying capacity and their aesthetic and biological values, and to allow such other new and innovative uses of the project that are not detrimental thereto. Maintenance and administration of recreation areas, where they remain under Corps jurisdiction, are part of the overall management objective to preserve and protect the quality of project resources." 2.29

Additionally, management of Corps' administered waters and related lands is coordinated with those agencies and individuals who share use and/or have an interest in the lakes and recreation facilities other than those for which the Corps of Engineers has responsibility. The non-Corps of Engineers' administered facilities include National forest lands, State forests, State parks, county and local lands, Indian reservations, wildlife areas and private developments. 2.30

RESERVOIR OPERATION

Although the concept of navigational improvement and flood control for the Mississippi River is still the priority consideration for tne Reservoir operation, an additional emphasis is being placed on obtaining and maintaining the greatest number benefits for all those who live adjacent to and/or use the Corps' maintained lakes and downstream areas. 2.31

During the fall and winter, each reservoir is lowered to provide storage for spring runoff. Through late fall and winter, each reservoir is drawn down to the normal spring pool. Runoff then fills the reservoirs, and another drawdown to the normal summer level occurs (see figure 3). To control potential flooding downstream in times of excessive spring inflow, additional storage can be retained in the reservoirs. If, however, less than normal runoff occurs in the spring and the reservoir does not reach its anticipated level, 2.32

the discharge through the dams is reduced. The reservoirs at Gull, Pine and Sandy usually reach their summer pool by May 15. Winnibigoshish, Leech and Pokegama generally do not reach normal summer level for another month and a half. See figure 4 for pool elevations. After the series of navigation locks and dams in the Mississippi were developed, the need for releasing water for navigational purposes from the headwaters reservoirs was reduced and reservoir fluctuation minimized. Recreation that is oriented to the lakes' fish and wildlife interests and wild rice production among others can be greatly affected by reservoir levels. For this reason a number of regulations affecting water levels were established after 1931. These regulations dealt with specific lake levels, discharge limits and limits within which reservoirs were to be maintained (see figure 4).

FIGURE 3 **TYPICAL STORAGE REGULATION CYCLE**

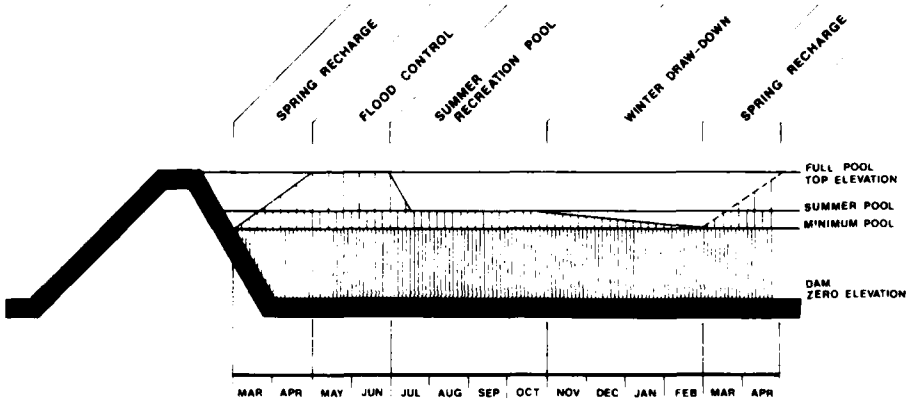


FIGURE 4 **SUMMARIZED PROJECT DATA**

Reservoir	Gull Lake	Pine River	Leech	Winnibigoshish	Pokegama	Big Sandy
Dam Location	11 mi. NW of Brainerd on Co. Rd. 105	22 mi. N. of Brainerd at the village of Cross Lake	Just west of Federal Dam on Co. Rd. 8	14 mi. NW of Deer River on Highway 2	3 mi. NW of Grand Rapids on Hwy. 2	12 mi. N. of McGregor on Highway 65
River	Gull River	Pine River	Leech Lake River	Mississippi River	Mississippi River	Sandy River
Drainage Area Sq. Miles	287	562	1163	1442	660	421
Reservoir Area *	13,100 acres	13,334 acres	122,880 acres (192 sq mi.)	75,000 acres (117 sq mi.)	15,000 acres (23.4 sq mi.)	9,500 acres
Average Storage Capacity	26,200 ac./ft.	40,000 ac./ft.	306,00 ac./ft.	300,000 ac. ft.	60,000 ac. ft.	38,000 ac./ft.
Maximum Storage Capacity		106,700 ac./ft.	695,000 ac. ft.	653,600 ac. ft.	149,000 ac. ft.	74,000 ac./ft.
Dam's Zero Elevation	1190.0'	1218.2'	1293.76'	1290.08'	1265.3'	1209.0'
Min. Pool Elevation	1192.75'	1227.32'	1293.20'	1296.94'	1270.42'	1214.31'
Ave. Pool Elevation *	1193.87'	1229.32'	1294.70	1299.79'	1273.42'	1216.31'
Full Pool Elevation	1197.0'	1236.7'	1296.76'	1302.08	1275.3'	1220.0'
Desirable Operating Limits	1192.75'-1194.75'	1227.32'-1230.32'	1293.20'-1295.70'	1296.94'-1299.44'	1271.42'-1274.42'	1214.31'-1218.31'
Desirable Summer Range	1193.75'-1194.0'	1229.07'-1229.57'	1294.50'-1294.90'	1298.94'-1299.44'	1273.17'-1273.67'	1216.06'-1216.56'
Maximum Elevation Ever Attained	1195.05'	1234.56'	1297.88'	1303.39'	1277.92'	1224.82'
Land in Fee	100.4 ac.	475.58 ac.	44.45 ac	0	10.58 ac	1,116 ac
Flowage Rights Acquired: to Elevation of/Acres	1198.75' +/- 15,150 acres	1238.82' +/- 21,794 acres	1301.70' +/- 100,743 ac	1306.94' +/- 82,460 acres	1280.42' +/- 66,415.26 ac	1222.31' +/- 9,785 acres
Miles of Shoreline[1]	35.6	112	182.3	55.9	50.8	56.5
Feet of Corps Land	7440'	17,210'	4000'		2072'	8190'

* The reservoir area refers to the surface area at the average pool elevation.

[1] Minnesota Department of Natural Resources, Shoreline Management Study

2 BACKGROUND INFORMATION

OPERATIONS AND MAINTENANCE POLICIES–MANAGEMENT OBJECTIVES

The developed and natural resources of Civil Works projects are the public property of both present and future generations. Resource management activities are directed toward providing continued enjoyment and maximum sustained use by the public of lands, waters, forests and associated recreational resources, under the jurisdiction of the Corps. These activities must be consistent with the carrying capacity and aesthetic, and biological values of the resource. Maintenance and administration of recreation areas such as those in the Headwaters is part of the overall management objective to preserve and protect the quality of project resources. 2.33

MANAGEMENT PRINCIPLES

The basic principles by which the Headwaters areas are managed is contained in established regulations. Specific guidance for operation and maintenance policies and practices is contained in Section 10 and Appendices A through E of this report. 2.34

CITATION AUTHORITY

As part of its management program, certain regulatory powers have been given the Corps. Section 234 of the 1970 FC Act provided that the Secretary of the Army may cause to be issued citations for aggravated cases of refuse dumping and violations of the rules and regulations under Chapter III, Title 36, CFR. Division Engineers have been authorized to designate Civil Works installations wherein the citation authority will be implemented. Oral and written warnings are utilized in minor cases to the extent possible. There is no authority for Corps personnel to take an offender into custody. Weapons are not carried or used for citation enforcement. Federal, state, and local law enforcement agencies, as applicable, retain the authority and responsibility to enforce all laws. 2.35

SANITATION AND POLLUTION CONTROL

Sanitation for public use is in accord with all Federal, State and local laws. Solid waste disposal and the control of air and water pollution is in accordance with Executive Order Number 11507 on prevention, control and abatement of air and water pollution at Federal facilities. While it is a responsibility of the Corps to provide facilities which meet State standards, there is no requirement that the specific pollution abatement processes, equipment, or operating procedures proposed by the Corps must be submitted for State approval. Section 107 of Public Law 93–251 permits Federal participation in the costs of local sewage treatment plant installations as warranted to provide for treatment of the additional sewage resulting from the operation of facilities (including recreation) at Corps projects. 2.36

WILDLIFE AND FISHERIES MANAGEMENT

Section 3 of the Fish and Wildlife Coordination Act (P.L. 85–624) provides for the use of Civil Works projects for conservation, maintenance and management of fish and wildlife resources and wildlife habitat. This is accomplished through licensing of lands and waters to state wildlife agencies or by cooperative agreement with the Secretary of the Interior. There are no existing outgrants in the Headwaters area for wildlife management because the Federal land holdings are so small that meaningful programs cannot be established. 2.37

Fisheries management at all Headwaters lakes is the responsibility of the Minnesota Department of Natural Resources. 2.38

2 BACKGROUND INFORMATION

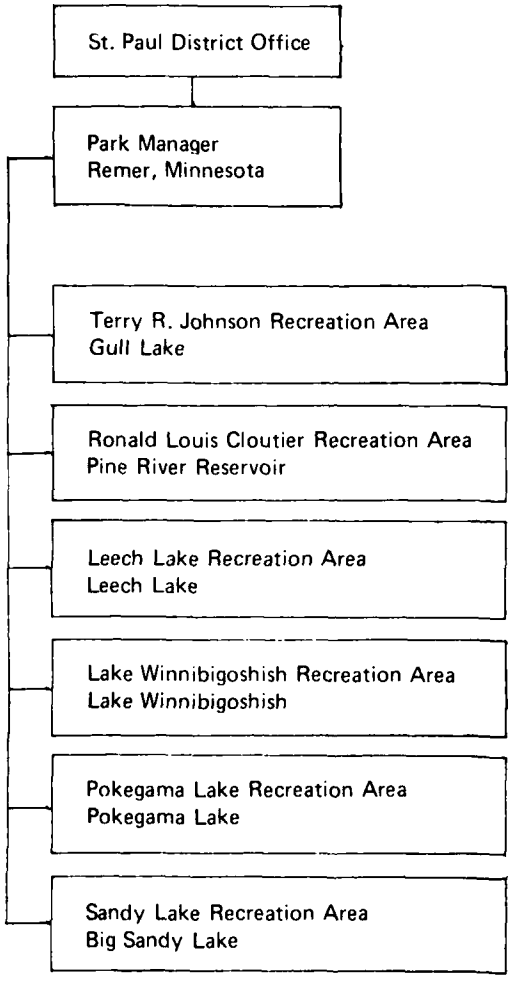
FOREST MANAGEMENT

2.39 P.L. 86–717 requires that projects be developed and maintained to encourage, promote, and assure adequate and dependable future resources, including supplies of forest products. Because of the small amount of lands available, the forest management program in the Headwaters has been administered to increase the value of project lands for recreation and wildlife, and to promote natural ecological conditions by following accepted conservation practices. Because the preservation of natural conditions are the paramount consideration, there is no justification for using cultural practices appropriate to commercial forestry production such as thinning, pruning, and release cutting for stand improvement. Vegetation living or dead, has been removed only with such justification as urgent disease control, urgent insect pest control, fire hazard reduction, wildlife management practice, removal for construction of recreational facilities or other specific essential uses.

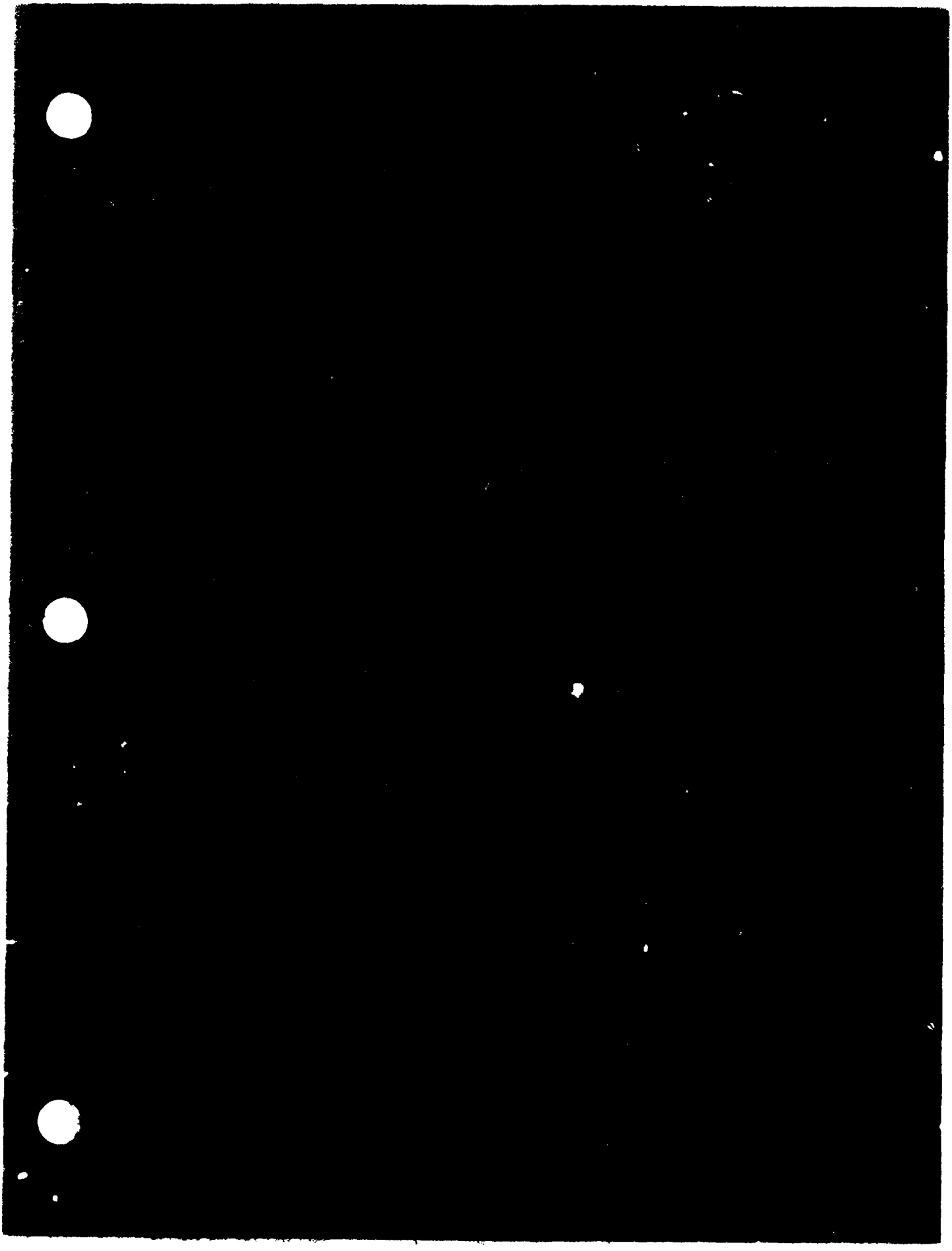
LAKESHORE MANAGEMENT

2.40 Present Federal policy is to manage and protect the shoreline of all lands under Federal jurisdiction to properly establish and maintain acceptable fish and wildlife environmental conditions and to promote the safe and healthful use of these shorelines for recreational purposes. Existing management practices are directed toward gaining the maximum benefit to the general public.

FIGURE 5 SCHEMATIC ORGANIZATION STRUCTURE:* RECREATION MANAGEMENT



* Detailed organization charts are contained in Appendix A.



3

FACTORS AFFECTING RESOURCE DEVELOPMENT

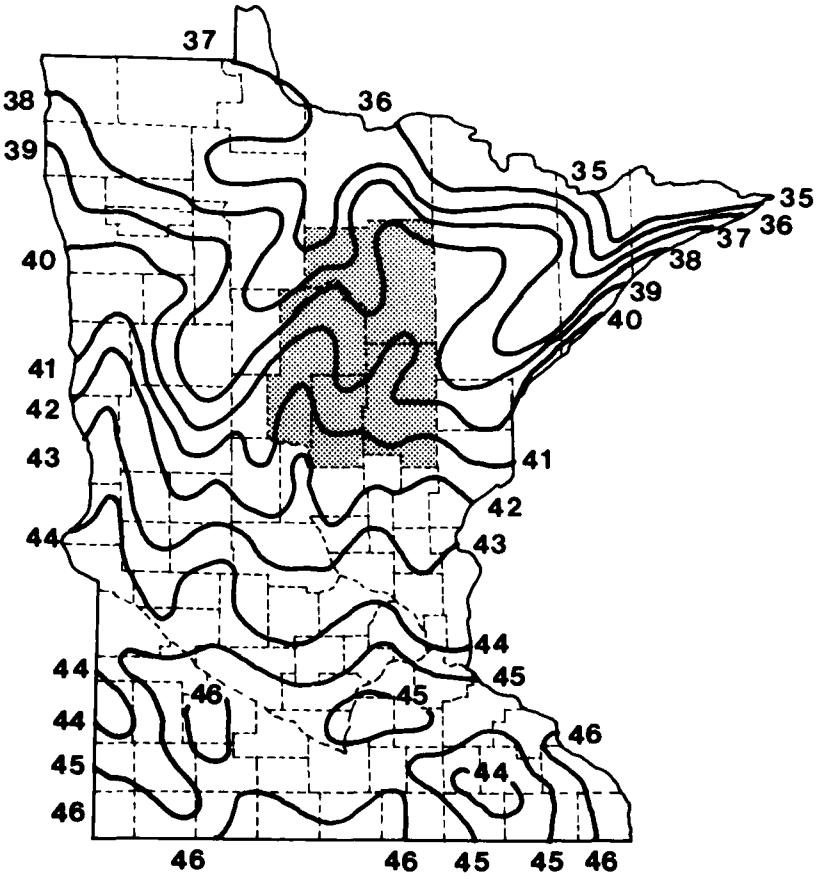
GENERAL

3.01 There are many factors that affect resource development and management. These factors which have an influence upon the recreational and environmental resources of each project area are considered separately. They include natural resources which are defined in EC 1105-2-65 (Resource Use: Establishment of Objectives) as "those elements, features, conditions, etc. of land and water valued by man that can be characterized as physiographic or biological," and man-made resources. The combination of these two sets of resources is termed project resources. The interrelationships of these project resources, the limitations they may impose and the potential qualities they may have, bear directly on the development of resource use objectives which are formulated and discussed in section five.

CLIMATE

3.02 One of the more unique aspects of Minnesota is the seasonal change and variation in a climate. The climate of the headwaters area characteristically has comfortable, warm summers and very cold winters. This distinction is made on the basis of summer and winter temperature differences which create distinct and different recreational seasons. Figure 7 indicates the relationship among temperature, season and recreation activities such as boating, fishing, swimming, camping, picnicking, hiking, snowmobiling, hunting, cross country skiing and ice fishing.

FIGURE 6 **ANNUAL NORMAL TEMPERATURE - DEGREES F.**



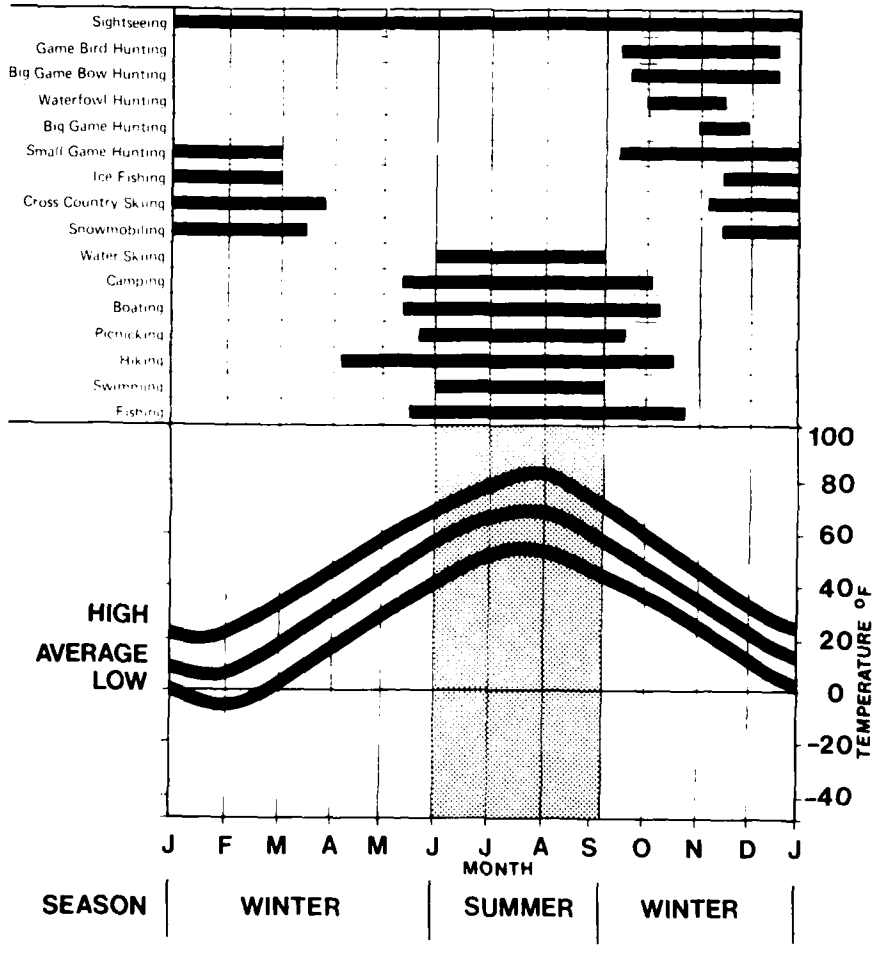
3 FACTORS AFFECTING RESOURCE DEVELOPMENT

January temperatures at the northernmost extent of the headwaters region average 5° F. with temperatures having been recorded as low as -50° F. Temperature in the summer months averages a refreshing 65° F. The area south of Brainerd typically reports an average 5° warmer. Summer temperatures greater than 100° have occurred. 3.03

FIGURE 7

TEMPERATURE, SEASON AND ASSOCIATED RECREATIONAL ACTIVITIES

The toned area represents the typical summer recreation season of Memorial Day to Labor Day. It should be noted that a great many activities occur outside this season.



Precipitation averages 28 inches annually with a variation from 17 to 38 inches per year at the most easterly portion of Big Sandy Lake. At the opposite end of the headwaters region the annual precipitation falls between 15 and 34 inches and averages 22 inches. 3.04

FIGURE 8 ANNUAL NORMAL PRECIPITATION IN INCHES

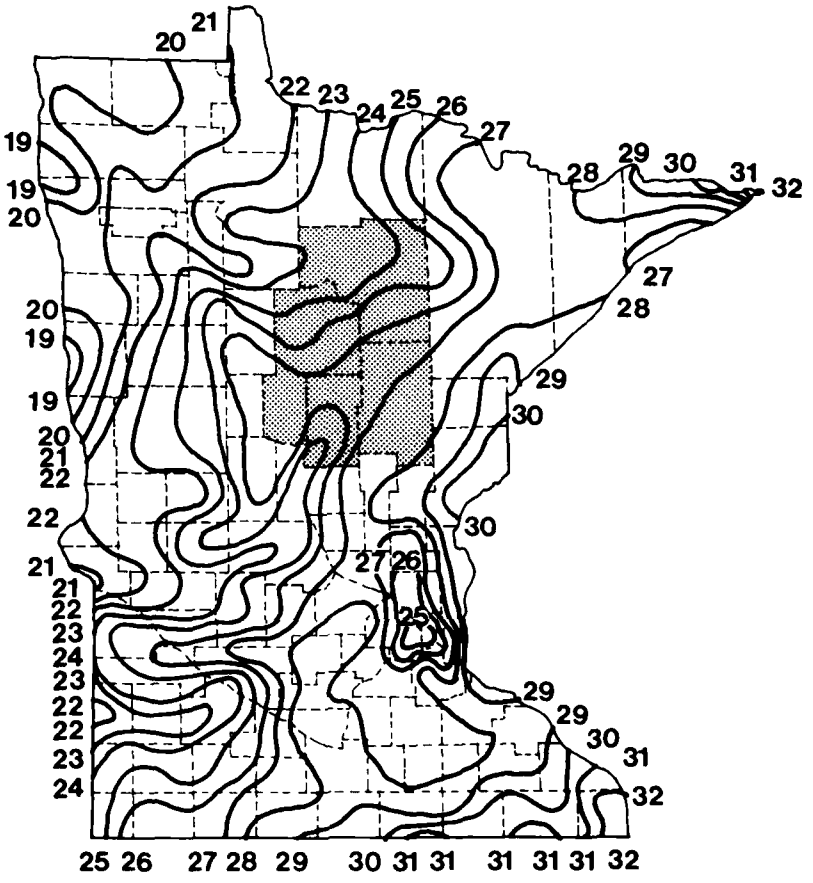


FIGURE 9 TOTAL MONTHLY PRECIPITATION IN INCHES

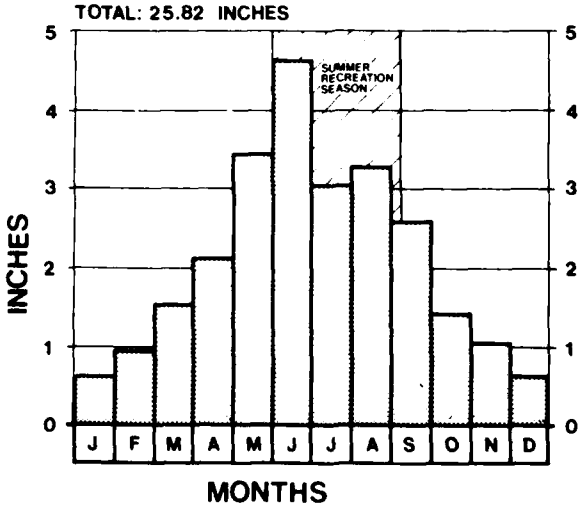
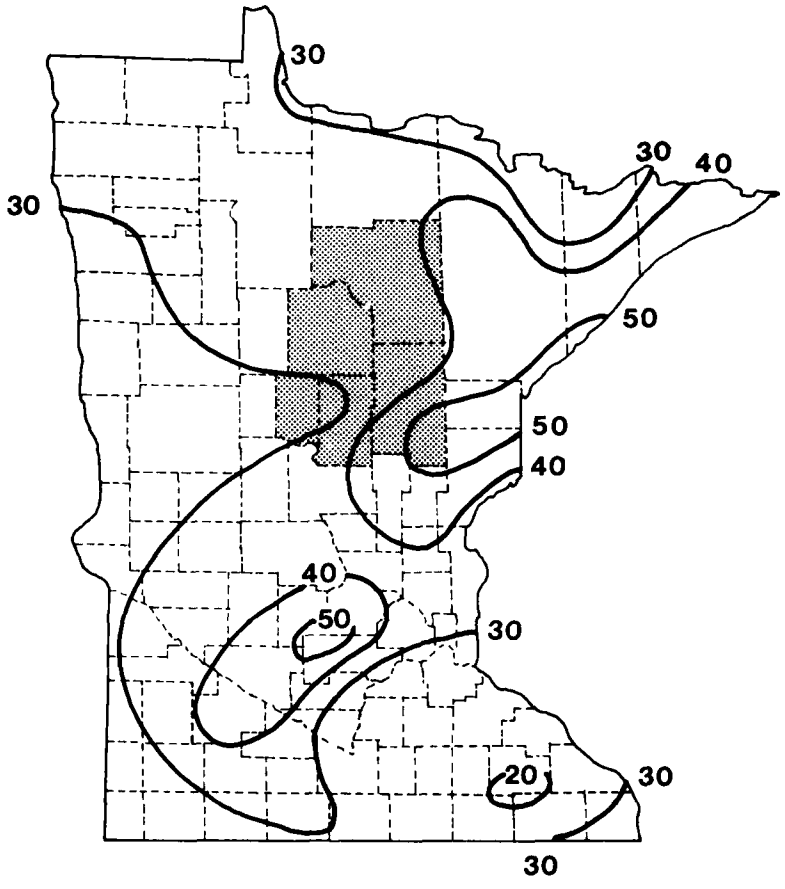


FIGURE 10 MAXIMUM ACCUMULATED DEPTH OF SNOW ON GROUND 1949 - 1965



The evapotranspiration rate for the entire reservoir system averages about 20-22 inches per year. This indicates that while the eastern edge may have a water surplus resulting in runoff, those areas to the west may have periods of water deficiency. A lack or overabundance of precipitation can impact much more than just lake levels and recreation. It can also affect vegetation, wildlife, and the overall economy of the headwaters region. Annual snowfall is generally between 43-50 inches, but the northwest winter winds can cause drifts that are much higher (see figure 10). 3.05

POPULATION AND SETTLEMENT

Population patterns in the Mississippi headwaters are varied and dispersed. The large communities are Brainerd in Crow Wing County with a population of 12,575 (1973) and Grand Rapids in Itasca County with a population of 7,627 (1973) (see plate 1). As of 1970 these two communities contained 34% and 20% of the respective counties' population. Other nearby centers of concentration and their 1973 populations include Bemidji -- 12,215, Park Rapids -- 2,962, Aitkin -- 1,995, Cass Lake -- 1,195 and Walker -- 1,178 (see plate 1 and figure 11). The majority of the population, however, is scattered through the countryside and is considered rural, non-farm dwellers (see figure 12). 3.06

3

FACTORS AFFECTING RESOURCE DEVELOPMENT

FIGURE 11 **POPULATION STATISTICS OF HEADWATERS COMMUNITIES**

COUNTY	COMMUNITY	POPULATION[1]
Aitkin	Aitkin	1955
Clearwater	Bagley	1269
Beltrami	Bemidji	12215
Crow Wing	Brainerd	12575
Cass	Cass Lake	1195
St. Louis	Chisholm	5908
Crow Wing	Crosby	2204
Becker	Detroit Lakes	6397
St. Louis	Eveleth	4634
Itasca	Grand Rapids	7627
St. Louis	Hibbing	15608
Aitkin	Hill City	396
Hubbard	Park Rapids	2962
Cass	Pine River	894
Todd	Staples	2772
St. Louis	Virginia	12116
Wadena	Wadena	4459
Cass	Walker	1178

[1] Taken from U.S. Department of Commerce, Bureau of Census, 1973

FIGURE 12

POPULATION OF THE HEADWATERS RESERVOIRS WATERSHED COUNTIES[1]

	Aitkin	Cass	Crow Wing	Itasca
Reservoir	Sandy	Leech, Gull, Winni-bigoshish	Pine River	Winnibigo-shish Pokegama
Population				
1890	2,462	1,247	9,852	743
1970	11,403	17,323	34,826	35,530
1975	12,367	18,799	37,962	36,524
Rural Farm	29.3%	20.6%	14.6%	8.6%
Rural Non-Farm	70.7%	79.4%	57.9%	71.0%
Urban			23.5%	10.4%
Density Persons Per Sq. Mi. 1890/1970	1.3/6.2	0.6/8.6	8.9/35.0	0.3/13.4

Although the four counties in which the headwaters projects are located contain only 2.7% of the state's population, they contain 30.3% of the seasonally vacant homes in the state (see figure 14). This is a strong indication of the role that the headwaters region plays as a summer home and recreational attraction for vacationers from other parts of the state as well as from out of Minnesota. 3.07

1 Source: Minnesota State Board of Health, MINNESOTA VITAL STATISTICS, Minneapolis, Minnesota, 1970.

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

FIGURE 13 **POPULATION CHANGE 1940 - 75**[1]

Area	Minnesota	Aitkin	Cass	Crow Wing	Itasca
1940	2,792,300	17,865	20,646	30,226	32,996
1950	2,982,483	14,327	19,468	30,875	33,321
1960	3,413,864	12,162	16,720	32,134	38,006
1970	3,804,971	11,403	17,323	34,826	35,530
1975	3,923,026	12,367	18,799	37,962	36,524
% Change 1940 - 75	+ 40.5%	- 30.7%	- 8.95%	+ 25.6%	+ 10.6%

FIGURE 14 **HOUSING CHARACTERISTICS**[2]

Area	Home Owners % of total population	Median Home Value	Seasonally Vacant Homes	Year Round Homes
Minnesota	71.5	$18,000	54,491	1,219,591
Aitkin	84.5	8,500	2,650	5,148
Cass	83.1	9,200	3,958	7,406
Crow Wing	81.8	11,600	7,252	12,547
Itasca	82.6	10,300	2,662	12,282

ECONOMY

3.08 The economy of the headwaters region is based on permanent production and seasonal services. Agricultural products, timber products and manufactured items are produced for local use as well as shipment out of the area. These economies originated because of the many natural resources available in the area. Today, income from mineral deposits, forest products, and agricultural commodities support less than 50% of the region's population.

3.09 Employment that is service oriented (wholesale trade, retail trade, finance, insurance, real estate and recreation) has become the major source of newly created private sector employment (see figure 15).

3.10 More than two million visitors come to the area each year to the more than 200 resorts and Federal, State and municipal public use areas to vacation. Visitation to the headwaters' region is detailed in section six. According to

[1] Minnesota State Comprehensive Outdoor Recreation

[2] ibid

the Center for Environmental Studies at Bemidji State College in Bemidji, Minnesota tourists contribute more than 20 million dollars annually to the area's economy.

3.11 Within this region the median income is approximately $2,000 below the state average (see figure 16). In 1970, 8.2% of all the families in Minnesota had an income which was less than the United States Census Bureau's definition of the poverty level. Figure 16 indicates that the average percentage of families below the poverty level in Aitkin, Cass, Crow Wing and Itasca Counties is almost twice that of the State of Minnesota.

3.12 The rate of unemployment, also shown in figure 16 reflects the problem of seasonal unemployment. As indicated earlier, the area is characterized by heavy employment in the natural-resource oriented industries. Severe weather conditions during the winter months curtail much of the mineral extraction and harvesting work. During spring and fall, forestry and agriculture are hindered by transportation difficulties due to melting snow and rain.

3.13 Another significant contribution of seasonal fluctuation in employment is the tourist industry. This is reflected under the heading of "services" in figure 15. In the headwaters area where the summer tourist season lasts 4-5 months (see figure 7) the drop in off-season employment in the service and retail trade industries impacts the unemployment rates. Seasonal unemployment is beginning to decrease slightly, however, as winter recreation becomes more popular. The influence of recreation upon the economy is dramatically evidenced by a survey conducted by the Center for Environmental Studies at Bemidji State College -- Bemidji, Minnesota. This survey of businessmen in communities near the lakes indicated that 50% of the summer retail business was attributable to tourism.

FIGURE 15 **TOTAL EMPLOYMENT AND CHANGE IN EMPLOYMENT**[1]

	U.S. in Thousands			Minnesota			Headwaters Area		
	1964	1967	% Change	1964	1967	% Change	1964	1967	% Change
Agriculture	6,518	4,903	-24.1	190,200	160,000	-15.9	4,544	4,067	-10.5
Transportation Communications Utilities	3,951	4,261	+ 7.8	52,706	60,696	+15.2	838	967	+15.4
Trade	12,160	13,606	+11.9	234,436	268,845	+14.7	4,288	5,034	+17.4
Services	8,709	10,009	+16.0	81,459	100,180	+23.0	19,627	21,993	+12.0
Finance Insurance Real Estate	2,957	3,225	+ 9.0	49,619	54,022	+ 8.9	704	591	-16.1
Government	9,596	11,398	+18.8	59,922	66,555	+11.1	2,083	2,341	+12.4
Manufacturing	16,995	19,447	+14.4	244,864	300,932	+22.9	3,589	4,100	+14.2

[1] Minnesota County Work Force and Wage Data 1964-69
Minnesota Department of Manpower Services, Minneapolis 1971.

FIGURE 16 **SELECTED INCOME AND EDUCATION CHARACTERISTICS, 1970[1]**

	Minnesota	Aitkin Co.	Cass Co.	Crow Wing Co.	Itasca Co.
Median Family Income	$ 9,931	$ 5,899	$ 5,828	$ 7,790	$ 7,985
Families with Incomes Below Poverty Level % of Families	8.2	18.3	21.4	11.6	12.7
Families with Incomes of $15,000 or more % of Families	20.3	6.4	7.8	10.2	7.7
Individual Unemployment Rate % Labor Force	4.2	10.3	6.7	7.5	8.6
Median Years Education[2]	12.2	9.7	10.6	11.9	12.0

SOCIAL FACTORS

A survey detailed in the Environmental Review of the Headwaters of the Mississippi Reservoir Projects (1973) considers social and attitudinal responses attributed to seasonal and permanent lakeshore residents, recreational area users and businessmen and local government officials. 3.14

Resident perception of the factors influencing lake quality provides insights and additional documentation of environmental impacts not perceived by a non-resident population. A primary concern to these residents is the effect of water level changes within the lakes. Approximately three-quarters of the residents questioned felt that the water level was satisfactory. Those factors believed to be most important in determining water levels include flood control down river, fish reproduction in the lakes, public water supply demands of the Twin Cities, navigation requirements on the Mississippi River and control of lakeshore erosion. An ongoing study currently titled "Mississippi River Headwaters Lakes Study" will provide a detailed accounting of lake levels and their effects. This study, being prepared by the Corps, is scheduled for completion in 1981. 3.15

Another aspect of potential environmental impact involves the effects of dams and recreation and camp areas on water quality (see figure 22). Of the representative residents questioned 53% of the total believed that the lake they lived on was as clean or cleaner than most neighboring lakes. 3.16

1 Environmental Review of the Headwaters of the Mississippi Reservoir Projects

2 For respondents 24 years old or older

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

Figure 17 lists the concerns most often described by residents as being potential problems. Factors most frequently mentioned as minor or major are algae growth, a decline in fish population, water pollution, a decline in hunting and shoreline erosion. 3.17

FIGURE 17 **RESIDENT ATTITUDE OF POTENTIAL PROBLEMS AT THE LAKES**[1]

Concerns	No Problem	Minor Problem	Major Problem	Don't Know	No Response
Too many tourists	79%	16%	3%	1%	1%
Flooding	78	18	6	3	1
Excessive use of lake	76	19	5	--	1
Need for dredging	67	19	8	6	1
Overbuilding on shore	66	21	11	3	1
Excessive power boats	62	24	13	--	1
Ice damage	60	30	5	4	1
Decline in hunting	41	22	8	29	1
Shoreland erosion	46	32	14	8	1
Water pollution	39	36	18	7	1
Decline in fishing	33	29	28	9	1
Algae growth	30	50	17	3	1

A majority of the residents felt that the Corps of Engineers' administered recreation areas were well maintained and had no major negative effect upon the lake. While 79% of the residents questioned in 1973 felt that the public recreational areas should be kept at their present size rather than expanded, response at public workshops held in conjunction with this study indicate a desire for increased recreational facilities (see exhibit C). Section six, Recreation Demand, Supply and Needs, deals with this question and is expanded upon in Part Two of this study. 3.18

Of the 235 recreational area users questioned by the Center for Environmental Studies at Bemidji State College the greatest percentage (22%) were professional, technical and related workers. This group of users was followed by managers, officers and proprietors (16%) and craftsmen, foremen and kindred workers (15%). The smallest percentages of users were farmers, farm managers and students (each 1%). 3.19

The most popular activities in order of importance are sightseeing, swimming and hiking.[2] Those activities having the greatest negative effect on the environment according to respondents questioned by the Center for Environmental Studies, were described as pleasure boating, water skiing and motorbike riding. 3.20

As mentioned earlier, the recreation industry in the headwaters area is a major economic consideration. Businessmen in communities near the lakes are the major beneficiaries of tourism. With regard to the economic and social life of these communities, businessmen and local government officials perceived differences only in those who were either lakeshore residents or campers. No clear distinction was made between vacationers at Corps of Engineers' administered recreation areas and tourists who stayed elsewhere. 3.21

1 Environmental Review of the Headwaters of the Mississippi Reservoir Projects, 1973; D-IX-32.

2 Minnesota State Comprehensive Outdoor Recreation Plan -- 1974, page 5 - 17.

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

LAND USE AND REAL ESTATE

3.22 The headwaters area is abundant in scenic, historical, recreational, cultural and educational attractions. The availability of these attractions at a regional scale is shown on plate 2. A large portion of the land area is devoted to forests, woodlands and associated activities.

3.23 The Projects, located in Aitkin, Cass, Crow Wing and Itasca Counties (see plate 1), are shown on plates 17, 19, 21, 23, 25, 27. The relationship of these recreational areas to nearby National and State forests and State parks, provides opportunities for vacationers to enjoy an environment and quality of life that is being maintained for the public's use.

Public use areas within a 50 mile radius of each lake and the basic recreational facilities each offers are indicated in figure 39. Fee owned lands and flowage easements administered by the Corps are illustrated on the following plates and discussed under Project Description (see paragraphs 2.07 - 2.09). 3.24

This understanding of the relationships between existing land use patterns, and land ownership has helped to determine the solutions and recommendations, as they relate to recreation, in Part Two of this report. 3.25

SOILS

Geological formations which were altered by such factors as deposition, erosion and vegetation are the parent material for the soils of the headwaters of the Mississippi River. Five parent materials are associated with portions of the four counties in which the headwaters projects are located (see figure 18). 3.26

AREA 1b

This parent material is comprised of lake bed deposits, and is mixed with glacially transported sands and gravels. This gray glacial drift is higher in silts and clays than other glacially transported drift to the south. Many shallow depressions in this region were probably the result of large ice chunks which melted after breaking away from the main glacial tongue as it receded northward. 3.27

AREA 3

This is a combination of glacial till plain and moraine and is characterized by many small lakes and flat to hilly topography. The soils are typically a clayey, silty, sand with some gravel and stone. 3.28

AREA 4

This type includes soils of a typical glacial outwash plain. These consist mostly of sands and gravels on a flat plain and are normally stratified by the process of water borne sedimentation. 3.29

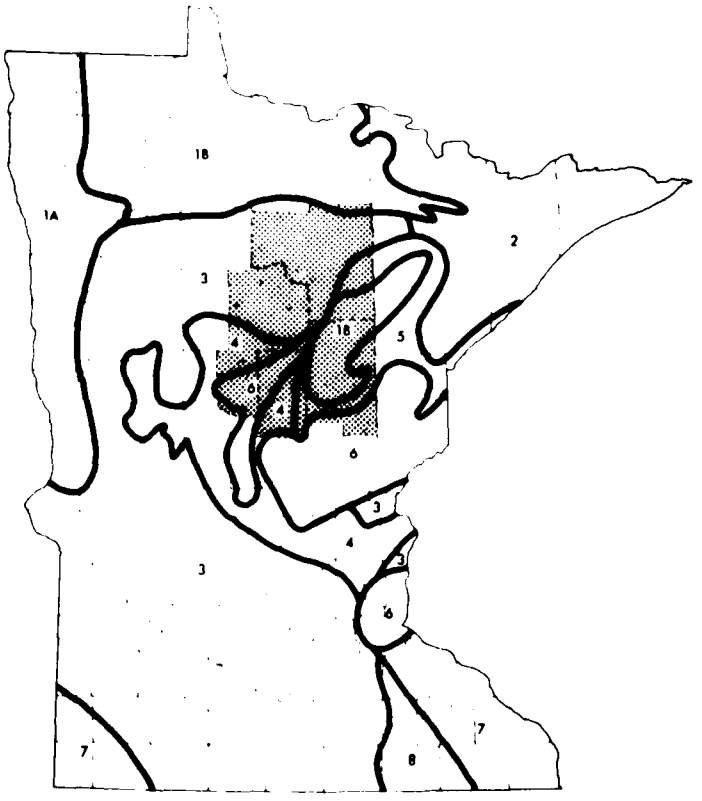
AREA 5

This is a clayey glacial till often characterized by granite and gneiss outcrops. 3.30

AREA 6

This parent material is a glacial till of many stones mixed with sands and gravel dotted with lakes set within hilly topography. 3.31

FIGURE 18 **LANDFORM GROUPINGS AND SOIL PARENT MATERIAL AREAS**



3 FACTORS AFFECTING RESOURCE DEVELOPMENT

AITKIN COUNTY

CASS COUNTY

The area around Big Sandy Lake in Aitkin County is primarily till plain with a large outwash area characterized by surface deposits of sand and gravel to the northeast. Cass County in which Gull Lake, Leech Lake and Lake Winnibigoshish are located is comprised of 1998 square miles of undulating upland surface dotted with many lakes. There are three types of glacial drift whose deposition during the Wisconsin age is responsible for the gently rolling topography. The Wisconsin age occurred over 10,000 years ago. The area from northern Gull Lake to Leech Lake in the southwestern portion of Cass County is part of the St. Croix moraine system. In the north along the southern edge of Lake Winnibigoshish there is a sandy outwash plain. South of this outwash toward and in the area of Leech Lake is a major area of till plain. 3.32

CROW WING COUNTY

ITASCA COUNTY

Crow Wing County in which Pine River Reservoir is located consists primarily of glacial outwash with a dominant moraine in the eastern portion and areas of till plain to the south. Itasca County in which Pokegama Lake is located is characterized by gray glacial drift and surface features identified with the Wisconsin glacial period. Loamy sands are found in the east and west-central portions of the county with a greater deposition of sand and peat reserves of low fertility in the southeast. 3.33

The development of the soils around the lakes is partially a result of the vegetation established on the various glacial deposits. The north and east consist of poor unfertile gravels, sands, and stones on which pine-spruce and birch-aspen vegetation became established. The needle and leaf litter from these forests did not mix with the glacial deposits, thus forming a matt. As a result, the soils in this area are bleached and light colored. In contrast, soils to the west and north and southwestern portions of the region were established in prairie grasses. These were more easily incorporated with the sands, silts and clays of the lake beds and outwash plains to create darker surface soils with a high degree of organic matter. 3.34

Three hundred different soils within the state of Minnesota have been consolidated into fifteen groups. Nine of these groups occur in the headwaters region (see plate 9). Of these nine groups, five are found in or adjacent to one or more of the headwaters areas. 3.35

GROUP 1

These medium to fine textured prairie border soils are calcareous loam glacial till. There are a few small areas of calcareous sands and gravels and lake modified calcareous silts. Drainage is excessive on steep slopes, moderate on gently rolling land and very poor on level lands. Because of this, erosion is a major problem on hilly and rolling lands with excess water on level lands. These soils are intensively farmed. 3.36

GROUP 2

These medium textured forest soils consist of calcareous loam and sandy loam till. Drainage is good in hilly portions, with many depressions occupied by lakes or peat. The major problem associated with this group is erosion and/or maintenance of organic matter on the mineral sub-surface soils. Most of these soils are forested. 3.37

GROUP 3

These coarse to medium textured forest soils are light colored, non-calcareous glacial material consisting of gravel, sands, loam or mixture of these. Stones are abundant. The numerous depressions are lakes, marshes, peat or mineral soils often underlain with a hard pan condition. Major problems include stoniness, erosion control, and poor drainage in level areas. Such areas are therefore generally forested. 3.38

GROUP 4 — These fine textured soils are light colored and weakly calcareous. They contain reddish clay till or reddish lacustrine (lake) clay. These soils are moderately well drained except for level areas where drainage is a problem. These soils are generally forested. 3.39

GROUP 5 — These coarse to fine textured prairie and organic soils consist of fine silts and clays toward the Red River valley grading to sands and gravels to the eastern edge of ancient Lake Agassiz. Drainage of these soils ranges from excessive along the sand and gravel beach areas to moderately well drained in the deeper sands and sands over glacial till within the lake bed area. A few shallow peat areas remain. Major problems in this soil group are slow surface drainage and wind erosion. 3.40

GROUP 6 — These coarse to fine textured forest soils and organic soils of glacial lake plain are calcareous light colored soils of waterlain sands, loams and silts. Poorly drained peat is found in depressions and old lake bottoms. Drainage ranges from excessive to poor depending on soil texture and elevation. Forests cover most of these soils. The major problem is excessive water. 3.41

GROUP 7 — These coarse to fine textured forest soils and rock outcrops developed from from non-calcareous glacial till or gravelly glacial drift. Some soils consist of weakly calcareous lacustrine clay. Granite and gneiss rock outcrop are common. The area is generally forested and well suited for recreation. 3.42

GROUP 8 — These coarse to medium textured prairie soils from glacial outwash are characterized by dark colored moderately coarse to medium textured material. They tend to overlay coarser outwash sands and gravel usually less than 36" below the surface. This porous layer provides excessive drainage which increases the susceptibility to drought conditions and wind erosion. 3.43

GROUP 9 — These coarse to medium textured forest soils formed from glacial outwash are comprised mostly of gravel or sandy gravel near the surface. Often these sands and gravels are overlain with fine sandy loams which become peat in depressions. They may be excessively drained soils and are subject to drought and wind erosion. 3.44

FIGURE 19 **SOILS CAPABILITY**

PROJECT	SOIL GROUP	CAPABILITY TO SUPPORT RECREATION		
		High	Moderate	Low
Gull Lake	3		x	
	9		x	
Pine River Reservoir	9		x	
Leech Lake	6			x
Lake Winnibigoshish	9		x	
Pokegama Lake	2	x		
	4		x	
	6			x
Big Sandy Lake	4		x	
	6			x

The following set of restrictions published by the Soil Conservation Service generally reflects the capability of specific soil groups to withstand recreational activities and uses (see figures 19 and 32). 3.45

Restrictions for playgrounds, camping and picnic areas include avoidance of excessive stoniness, steep slopes, moisture prone soils and highly erosive soils. 3.46

Restrictions for road and major pathway construction include avoidance of major slopes, highly erosive soils, plastic soils, and areas of potential flooding. 3.47

Restrictions for construction of foundations related to park and recreation structures include avoidance of steep gradients, highly plastic and erosive soils, areas flood susceptibility and non-load bearing soils. 3.48

3

FACTORS AFFECTING RESOURCE DEVELOPMENT

WATER QUALITY

3.49 The Upper Mississippi River Basin comprises a watershed of 24,687 square miles, and contains a number of rivers including the Mississippi, Leech Lake, Crow Wing, Savanna, Pine, Gull, Prairie, Sandy, and Pine and the six Corps' lakes. Tests to determine water quality in these lakes (see plate 9) were conducted by the Center for Environmental Studies in 1972 and 1973. Water samples were taken from (1) an upstream location (2) a spot within the lake and (3) a downstream location below the dam at each of the lakes.

3.50 The upstream samples were taken, wherever possible, two feet below the surface from the center of a flowing stream at a point one to two miles from the point of discharge into the lake. This was intended to be representative of the waters entering the reservoir and occurred, as often as possible, at sites that were relatively undeveloped. The lake sample was taken 100 - 150 yards above the dam two feet below the water surface to reflect the average composition of the waters leaving the reservoir. The downstream sample was taken 100 - 200 yards below the dam two feet below the water surface in the center of the flowing stream.

3.51 Water temperatures at each of the six sites reflect obvious seasonal variations, but are similar from one water sampling area to another. Temperatures in October were in the range of 37° to 41° F., in February they were typically 32° F.; in April, two weeks after drawdown at each lake, temperatures fluctuated from 41° to 48° F., and in July they were between 68° and 70° F. These summer water temperatures remain relatively stable into early fall and tend to parallel the air temperatures and length of recreation-season illustrated in figure 7.

3.52 Chemical analysis included testing of (1) phosphates (2) nitrogen (3) manganese (4) iron (5) cadmium, copper and chromium, (6) arsenic (7) mercury (8) pH level (9) alkalinity (10) hardness (11) filterable and total residues (12) turbidity and (13) specific conductance (see figure 20).

3.53 Of particular importance in determining water quality is an evaluation and analysis of the nutrient elements, phosphorus and nitrogen. When phosphorus content, for example, and the amount of inorganic nitrogen are above specific levels, algae growth may be hastened. When algae blooms over an extensive area, it can cause a deficiency in oxygen content and potentially alter the life cycle of certain deep-water and bottom dwelling organisms. This condition, which is more prevalent at Big Sandy Lake than the other five can potentially impact the aesthetics of the lake, the fish population, and recreational activities such as swimming and boating.

3.54 The documentation of trace metals in water is useful in detecting potential toxicants. Arsenic was found in Sandy Lake to exceed 60 ppb (parts per billion). This is not a concern, however, since 50 ppb is acceptable in raw drinking water prior to treatment in public water systems (see figure 20). Although iron and manganese can be found in major concentrations, they pose no significant health problems. Their only impact upon boating, swimming and other water oriented recreation is that they alter the visual clarity and color of the water. Water samples should regularly be taken from each lake, especially Big Sandy, to monitor the level of potential toxiants.

3.55 Although water quality may be affected by natural aspects, man's presence in the environment has created some special problems as well. The absence, for example, of adequate sewage disposal facilities in a number of communities

and single homes around the lakes can pose a threat to health and recreational capacity as a result of the possible spread of bacterial water-borne diseases. Presently, this is not the case.

The original construction of the impounding structures and raising of water levels in the lakes has affected the groundwater. In the porous and sandy soils of the area, an increase in water level creates a corresponding increase in the water table. This water level cycle is paralleled by changing water levels in nearby wells causing occasional infiltration of soluble components of lake waters into well waters. 3.56

Care should be taken to reduce any water pollution which might affect aquatic life as well as decrease the attractiveness of water-related recreational activities. Except for Sandy Lake which exceeds guideline levels of arsenic and iron, Water quality at all the lakes is acceptable for public use. 3.57

FIGURE 20 **WATER QUALITY SAMPLES COMPARED WITH VARIOUS STANDARDS**

OBSERVED AVERAGE MEASUREMENT[1]

STANDARDS	Public Water Supply	Fish and Wildlife	Agriculture	Winnibigoshish	Leech	Pokegama	Big Sandy	Pine River	Gull
pH (a)	6.0-8.5	6.0-8.5	6.0-8.5	7.8	7.6	7.6	7.2	7.8	7.6
Diss. Oxygen (ppm)(min.)	4	5-7	--	(7)	(5)	(6)	(6)	(6)	(5)
Turbidity (Jackson units) (max.)	5(b)	10-50	--	3	2	2	4	1	2
Alkalinity (mg/1 $CaCO_3$	30-400	50-240	--	143	143	144	46	122	104
Nitrate-nitrite N (mg/1)(max.)	45 (c)	--	--	0.1	0.1	0.1	0.1	0.1	0.1
Ammonia N (mg/1)(max.)	tr (c)	2	--	0.05	0.02	0.04	0.04	0.03	0.03
Diss. solids (mg/1)(max.)	500	--	10,000	159	163	168	110	124	126
Color (APHA units)(max.)	75	--	--	--	--	--	(100)	(37)	(20)
Sulfate (mg/1) (max.)	--	--	1,000	--	--	(2)	--	(9)	--
Chromium* (ppb)(max.)	1000	--	--	20	20	20	20	20	20
Copper (ppb) (max.)	1000	200	--	9	8	14	11	11	10
Iron (ppb) (max.)	300	--	300	250	200	210	650	200	170
Arsenic (ppb) (max.)	50**	--	50	50	30	40	60	30	30

Concentrations given in parentheses are derived from prior publications.

* Trivalent only

** European standards allow 200 ppm in drinking water (McKee and Wolf, 1963)

(a) EPA (Aug 1972) brochure on "acidity/alkalinity"
(b) EPA (Aug 1972) brochure on "turbidity"
(c) EPA (Aug 1972) brochure on "nitrates"

[1] Source: Environmental Review of the Headwaters of the Mississippi Reservoir Projects.

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

VEGETATION

3.58 The vegetation throughout the headwaters area is comprised of a number of associated plant species termed communities (see plate 10 and figures 22 - 29). These communities vary with topography, orientation, soil texture, acidity, successional trends, fertility, moisture availability and land use. Several community types are often found interfacing with one another due to changes in natural conditions. Also contributing to the complexity of these communities are human disturbances such as logging, mining, and agriculture.

3.59 Forest communities are the dominant type of vegetation in the headwaters area. Present, but not as dominant, are scattered bog and marsh communities which are found in shallow bays and poorly drained areas.

ELM - ASH

3.60 These communities are generally found on upland sites of low relief that are less than 10 feet above lake level. This stable community has displaced the original climax (final ecological succession) community as a result of disturbance to the lake level by construction of the reservoir. The trees, shrubs and herbaceous species within this community are associated with moisture prone soils close to the water table having a high mineral content.

MAPLE - BASSWOOD

3.61 These climax communities are typically found on mid-upland sites from 10 - 25 feet above lake level.

BIRCH - ASPEN

These comprise a successional community in upland locales. Eventually this association will be replaced by Maple and Basswood which are the climax community for much of the region. 3.62

PINE - MIXED HARDWOOD

These are characteristic of upland communities and are associated with light textured soils. The Oak and Birch favor heavier soils than the Pine. 3.63

CEDAR - BALSAM - SPRUCE AND

These vegetative groupings are established in a variety of wet boggy lowland conifer communities. 3.64

TAMARACK BOG AND MARSH

These communities occur at lake level and are often associated with stream and river flowages in shallow aquatic surroundings although floating bog mats can be found over deep water as well. 3.65

A number of plant species associated with each community are illustrated in figures 22 - 29. Even within one community, there is an assortment of vegetative overstory, understory and groundcover that enhances the resource management and recreational potential of an area. The alteration and/or maintenance of plant materials is a determining factor for indicating capability for recreation. Each category of capability reflects a grouping of communities that will react similarly to recreational activities (see figure 21 and plates 11 - 16). 3.66

The term high capability refers to areas that are minimally vegetated and/or that have been disturbed or created by man's intervention in the natural processes of plant succession. Either the initiation or further development of recreational activity will result in limited harm. 3.67

Plant communities that indicate a moderate capability for support of recreation are typically mature forest types that might readily adjust to passive or low intensity recreation without major disruption to vegetation. 3.68

Vegetation that has a low capability for recreation is found in areas where any significant activity might irreversibly damage that vegetation. These communities are usually typified by extremes in drainage capacities. 3.69

GULL LAKE

This is the most heavily developed of the six lakes. Much of the shoreline vegetation has been disturbed. Most of the shoreline consists of topography falling within the ranges described as upland sites of low relief and mid upland sites. Elm-Ash and Maple-Basswood communities form the primary vegetative cover with scattered stands of Birch-Aspen, pine and mixed hardwood communities also found. Marsh communities are located in bays primarily in the north and south parts of the Lake (see plate 11). 3.70

PINE RIVER RESERVOIR

The shoreline is almost completely forest. The land along the water generally rises dramatically from the shoreline and is densely covered with Pine and hardwoods such as Oak and Birch. More than 50% of the shoreline is comprised of Norway, White and Jack Pine (see plate 12). 3.71

LEECH LAKE

This lake is different from the five other lakes in that approximately one-quarter of the shoreline is bog. The rest of the shoreline is forested and a good portion is developed. The prevailing communities are Elm-Ash and Maple-Basswood intermixed on gentle slopes. Possibly because of heavier soils, lumbering and successional patterns, there are also areas of Birch-Aspen and Pine-mixed hardwoods associations. That portion of the shoreline that is occupied by bog appears to be succeeding the few locations of well-developed lowland conifer that exist (see plate 13). 3.72

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

LAKE WINNIBIGOSHISH

This lake has a lowland forest (see figure 22) shoreline that is characteristically Elm-Ash. The more upland sites are Birch-Aspen and Pine-mixed hardwoods which seem to do well in sandier soils. Maple-Basswood communities are situated away from the lake on high ground behind the Elm-Ash communities. Marsh communities are numerous (see plate 14). 3.73

POKEGAMA LAKE

The shoreline is composed primarily of Maple-Basswood and Birch-Aspen communities. The climax forest consists of Maple-Basswood with the Birch-Aspen community approaching this climax through succession. The upland sites of low relief in the northern extremities of the lake are Elm-Ash forest. Although there are occasional pure stands of Norway Pine and White Pine, the concentration of heavy soils in the area has resulted in a noticeable absence of Pine-mixed hardwoods vegetation. Several small groupings of Cedar-Balsam-Spruce-Tamarack associations have established themselves as have marsh communities in a great many bogs (see plate 15). 3.74

BIG SANDY LAKE

The forest vegetation surrounding Big Sandy Lake is principally deciduous. Elm-Ash with some Aspen and Oak is found at lower elevations associated with marsh habitats. Maple-Basswood intermixed with Aspen and Oak is predominant. There are almost no pure Pine stands, although there are some Pine-mixed hardwoods communities on the east and southeast shore of Big Sandy (see plate 16). 3.75

FIGURE 21 VEGETATION CAPABILITY

PROJECT	PREDOMINANT VEGETATIVE COMMUNITY/ ASSOCIATION	CAPABILITY TO SUPPORT RECREATION		
		High	Moderate	Low
Gull Lake	Disturbed	H		
	Maple-Basswood		M	
	Birch-Aspen		M	
	Elm-Ash			L
Pine River Reservoir	Birch-Aspen		M	
	Pine-Mixed Hardwood		M	
	Cedar-Fir-Spruce-Tamarack			L
Leech Lake	Maple-Basswood		M	
	Pine-Mixed Hardwood		M	
	Elm-Ash			L
	Marsh-Bog			L
Lake Winnibigoshish	Maple-Basswood		M	
	Birch-Aspen		M	
	Pine-Mixed Hardwood		M	
	Elm-Ash			L
	Marsh-Bog			L
Pokegama Lake	Maple-Basswood		M	
	Pine-Mixed Hardwood		M	
	Marsh-Bog			L
Big Sandy Lake	Maple-Basswood		M	
	Pine-Mixed Hardwood		M	
	Elm-Ash			L
	Marsh-Bog			L

FIGURE 22 **ECOSYSTEMS**

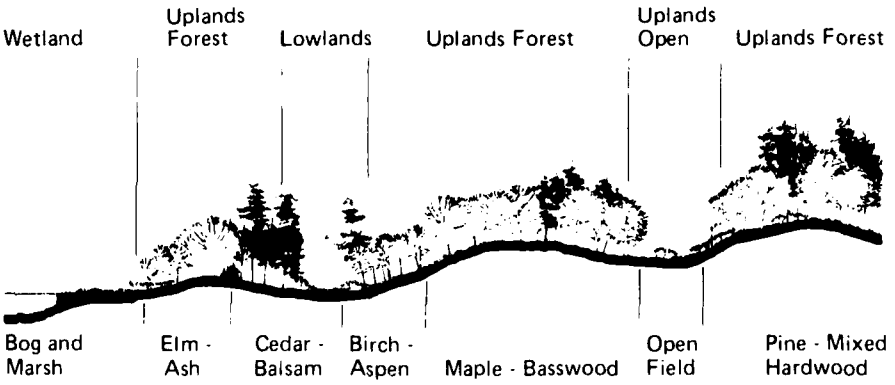


FIGURE 23 ***BOG AND MARSH***

TREES
- Black Spruce
- Paper Birch
- Trembling Aspen
- Willow
- Tamarack

SHRUBS
- Alder
- Dogwood
- Willow
- Bog Laurel
- Bog Birch

HERBS
- Sedges
- Horsetail
- Reeds
- Cattail
- Sphagnum Moss

MAMMALS
- Beaver
- Muskrat
- Mink
- Otter
- Moose

BIRDS
- Loon
- Pelican
- Grebe
- Trumpeter Swan
- Ducks
- Marsh Hawk
- Cranes
- Coot
- Tern
- Barred Owl

REPTILES & AMPHIBIANS
- Turtle
- Newt
- Salamander
- Frog

FIGURE 24

ELM-ASH

TREES
- American Elm
- Green Ash
- N. Red Oak
- Paper Birch

SHRUBS
- Chokecherry
- Alder
- Dogwood

HERBS
- Bellwort
- Horsetail
- Ostrich Fern
- Nettle
- Jack-in-the-Pulpit

MAMMALS
- Chipmunk
- Snowshoe Hare
- Woodchuck
- White Tailed Deer

BIRDS
- Great Blue Heron
- Common Egret
- Woodduck
- Merganser
- Hawks
- Great Horned Owl
- Blue Jay
- Warblers

REPTILES & AMPHIBIANS
- Frog
- Garter Snake
- Skink

FIGURE 25

CEDAR-BALSAM

TREES
- Balsam Fir
- Black Spruce
- White Spruce
- Tamarack
- White Cedar

SHRUBS
- Chokecherry
- Bog Birch
- Leatherleaf
- Bog Laurel
- Bush Honeysuckle

HERBS
- Sphagnum Moss
- Cottongrass
- Starflower

MAMMALS
- Whitetailed Deer
- Shrew
- Red Squirrel
- Lynx
- Moose

BIRDS
- Hawks
- Blue Heron
- Egret
- Merganser
- Crow
- Blue Jay

REPTILES & AMPHIBIANS
- Frog
- Salamander
- Newt

FIGURE 26 **BIRCH-ASPEN**

TREES
- Paper Birch
- Trembling Aspen
- White Pine
- Ironwood

SHRUBS
- Hazelnut
- Honeysuckle
- Raspberry

HERBS
- Lily of the Valley
- Bracken Fern
- Goldenrod

MAMMALS
- Shrew
- Squirrel
- Whitetailed Deer
- Moose

BIRDS
- Hawk
- Mourning Dove
- Woodpecker
- Crow
- Warblers
- Wood Thrush

REPTILES & AMPHIBIANS
- Frog
- Garter Snake
- Skink

FIGURE 27 **MAPLE-BASSWOOD**

TREES
- Sugar Maple
- Basswood
- Ironwood
- American Elm
- Oak

SHRUBS
- Hazelnut
- Chokecherry
- Juneberry

HERBS
- Hepatica
- Violet
- Solomons Seal

MAMMALS
- Vole
- Chipmunk
- Squirrel
- Bobcat
- Whitetailed Deer

BIRDS
- Eagle
- Hawks
- Great Horned Owl
- Woodpeckers
- Chickadee
- Wren
- Warblers
- Sparrows

REPTILES & AMPHIBIANS
- Frog
- Garter Snake

FIGURE 24

ELM-ASH

TREES
- American Elm
- Green Ash
- N. Red Oak
- Paper Birch

SHRUBS
- Chokecherry
- Alder
- Dogwood

HERBS
- Bellwort
- Horsetail
- Ostrich Fern
- Nettle
- Jack-in-the-Pulpit

MAMMALS
- Chipmunk
- Snowshoe Hare
- Woodchuck
- White Tailed Deer

BIRDS
- Great Blue Heron
- Common Egret
- Woodduck
- Merganser
- Hawks
- Great Horned Owl
- Blue Jay
- Warblers

REPTILES & AMPHIBIANS
- Frog
- Garter Snake
- Skink

FIGURE 25

CEDAR-BALSAM

TREES
- Balsam Fir
- Black Spruce
- White Spruce
- Tamarack
- White Cedar

SHRUBS
- Chokecherry
- Bog Birch
- Leatherleaf
- Bog Laurel
- Bush Honeysuckle

HERBS
- Sphagnum Moss
- Cottongrass
- Starflower

MAMMALS
- Whitetailed Deer
- Shrew
- Red Squirrel
- Lynx
- Moose

BIRDS
- Hawks
- Blue Heron
- Egret
- Merganser
- Crow
- Blue Jay

REPTILES & AMPHIBIANS
- Frog
- Salamander
- Newt

FIGURE 26

BIRCH-ASPEN

TREES
- Paper Birch
- Trembling Aspen
- White Pine
- Ironwood

SHRUBS
- Hazelnut
- Honeysuckle
- Raspberry

HERBS
- Lily of the Valley
- Bracken Fern
- Goldenrod

MAMMALS
- Shrew
- Squirrel
- Whitetailed Deer
- Moose

BIRDS
- Hawk
- Mourning Dove
- Woodpecker
- Crow
- Warblers
- Wood Thrush

REPTILES & AMPHIBIANS
- Frog
- Garter Snake
- Skink

FIGURE 27

MAPLE-BASSWOOD

TREES
- Sugar Maple
- Basswood
- Ironwood
- American Elm
- Oak

SHRUBS
- Hazelnut
- Chokecherry
- Juneberry

HERBS
- Hepatica
- Violet
- Solomons Seal

MAMMALS
- Vole
- Chipmunk
- Squirrel
- Bobcat
- Whitetailed Deer

BIRDS
- Eagle
- Hawks
- Great Horned Owl
- Woodpeckers
- Chickadee
- Wren
- Warblers
- Sparrows

REPTILES & AMPHIBIANS
- Frog
- Garter Snake

FIGURE 28 **OPEN FIELD**

TREES
- Bur Oak

SHRUBS
- Hazelnut
- Raspberry
- Dogwood
- Wild Rose

HERBS
- Meadow Rue
- Goldenrod
- Burdock
- Yarrow
- Meadowgrass
- Sweet Clover

MAMMALS
- Cottontail
- Gopher
- Red Fox
- Raccoon
- Whitetailed Deer

BIRDS
- Marsh Hawk
- Crow
- Bluebird
- Meadow Lark
- Blackbird
- Gold Finch
- Bunting

FIGURE 29 **PINE-MIXED HARDWOOD**

TREES
- Norway Pine
- White Pine
- Jack Pine
- Ironwood
- N. Red Oak
- Paper Birch

SHRUBS
- Hazelnut
- Honeysuckle
- Raspberry
- Chokecherry

HERBS
- Bracken Fern
- Lily of the Valley
- Strawberry

MAMMALS
- Red Squirrel
- Lynx
- Snowshoe Hare

BIRDS
- Eagle
- Hawks
- Woodpeckers
- Blue Jay
- Nuthatch
- Warblers
- Sparrows
- Cardinal

REPTILES & AMPHIBIANS
- Frog
- Garter Snake

FIGURE 30 **ECOSYSTEM CAPABILITIES FOR RECREATIONAL ACTIVITIES**

ACTIVITIES / ECOSYSTEM	Bog and Marsh	Elm-Ash	Cedar-Balsam	Birch-Aspen	Maple-Basswood	Open Field	Pine-Mixed Hardwood
Camping		x		x	x	x	x
Picnicking		x		x	x	x	x
Swimming (beach)		x					
Boating (access)	x						
Canoeing	x						
Playground						x	
Organized Athletics						x	
Hiking		x	x	x	x	x	x
Sightseeing	x	x	x	x	x	x	x
Cross Country Skiing		x		x	x	x	x
Downhill Skiing							x
Snowmobiling		x		x	x	x	x
Bike Riding						x	
Ricing	x						

SLOPE

3.76 In addition to soil characteristics and vegetative associations, slopes greatly affect the capability of an area to support recreation. Gradients under 5% are typically preferred for most recreational activities and facilities. The soils on these slopes generally do not have erosional problems. If not located in moist lowland areas, these slopes can support the widest development of high intensity recreational activity (see figure 31).

3.77 Although suitable for certain types of activities, areas with a slope between 6 and 19% have a moderate capability to support recreational development. Passive recreation activities are more consistent with this type of topography.

3.78 Slopes greater than 20% are usually inappropriate for the development of recreational facilities. Many of the activities which occur on the more gentle slopes are not desirable here because of probable adverse environmental effects and engineering constraints. Construction on steep slopes should be minimized and emphasis placed on the most passive recreational activities such as sightseeing.

FIGURE 31 ***SLOPE CAPABILITY***

3.79

RECREATIONAL ACTIVITY	CAPABILITY TO SUPPORT RECREATION		
	0-5% Slope	6-19% Slope	20%+ Slope
Camping	High	Low	Low
Picnicking	High	Moderate	Low
Swimming (beach)	High	Low	Low
Boating (access)	Low	High	Low
Playground	High	Low	Low
Organized athletics	High	Low	Low
Parking	High	Moderate	Low
Driving	High	Moderate	Low
Hiking	High	High	Low
Sightseeing	High	High	High
Cross-country skiing	Low	High	Moderate
Downhill skiing	Low	Moderate	High
Snowmobiling	High	Moderate	Low
Bike riding	High	Moderate	Low

GULL LAKE

3.80 The shoreline topography at Gull Lake is relatively uniform. On some of the moderately sloping banks occasional erosion occurs when the lake level approaches 1194.75 feet (see plate 11).

PINE RIVER RESERVOIR

3.81 Pine River Reservoir is fairly intensively developed. Although the majority of land at the shoreline falls within the 0 - 5% slope range a portion of its shoreline is between 5 and 20% (see plate 12).

LEECH LAKE

3.82 Even before construction of the impounding structure on the Leech Lake River, Leech was a large natural lake. From the northwest side of the lake to the southeast, the character of shoreline reflects a relatively steep bank. Further to the east and north, the lake edge has a low upland profile interfacing with hard sandy beaches and sedge marshes (see plate 13).

LAKE WINNIBIGOSHISH

3.83 Lake Winnigbigoshish has a gradually sloping sandy shoreline. Areas over one mile offshore can be found that are less than 5 feet deep. One of the reasons for this relatively gentle edge was the construction of the Winnibigoshish

dam and subsequent inundation of many acres of bogs and tamarack swamps adjacent to the original lake (see plate 14).

POKEGAMA LAKE

The majority of the shoreline along Pokegama Lake falls within the 5 - 19% slope range, and a good portion is greater than 20% (see plate 15). 3.84

BIG SANDY LAKE

The shoreline at Big Sandy Lake is highly irregular with moderate on and off-shore grades such that a one-foot vertical change in the water level can alter the shoreline 5 to 20 feet horizontally. There are some exceptionally flat areas, but the lake edge is almost totally uniform in the 5 - 19% slope range (see plate 16). 3.85

FIGURE 32

COMPOSITE CAPABILITY TO SUPPORT RECREATION

SOILS	Fine textured	Peat	Gravel & rocky	Stony	Easily erodable	Moderately erodable	Well drained	Moderately drained	Poorly drained	High	Moderate	Low
Group 2		x			x		x			H		
Group 3				x		x			x		M	
Group 4	x					x		x			M	
Group 6	x	x							x			L
Group 9			x		x		x				M	

VEGETATION	High	Moderate	Low
Open area	H		
Disturbed area	H		
Maple-Basswood successional community		M	
Birch-Aspen "		M	
Pine-Mixed Hardwood "		M	
Bog-Marsh "			L
Elm-Ash "			L
Cedar-Balsam-Spruce-Tamarack "			L

SLOPE	High	Moderate	Low
0-5%	H		
6-19%		M	
20% +			L

FISH AND WILDLIFE RESOURCES

Minnesota has a tremendous resource of lakes, streams, forests and open spaces that support many complex and varied forms of wildlife. The habitats of the headwaters area are diverse and support an abundance of fish and wildlife. The forests, marshes and wetlands bordering and connecting many water bodies provide ideal habitat conditions for many species of migratory waterfowl and game fish. These habitats have been divided into four basic types, each comprised of various vegetative communities. The four categories are wetland, lowland forest, upland forest and open upland. 3.86

3 FACTORS AFFECTING RESOURCE DEVELOPMENT

ECOSYSTEMS

3.87 The evolution of these habitats or ecosystems (see figure 22) at each of the projects has been modified and, in part, reflects development and recreational activities. Figures 22 - 29 illustrate typical ecosystems which may be found alone or in combination with one another at the Corps recreational areas. These figures also illustrate relationships between plant communities and associated wildlife. The listing of vegetation and animals has been abbreviated to include only those prominent and typically found in these habitats.

3.88 The wetland classification includes lakes, ponds, marshes, streams and very wet bogs and marshes (see figure 23). The lowland forest habitat consists of swamps, low meadows and wet woods with vegetative communities that include Birch-Aspen, Elm-Ash and Cedar-Balsam-Spruce-Tamarack associations (see figures 24 - 26).

3.89 The species of plant materials and wildlife found in an upland forest habitat are associated with Birch-Aspen, Maple-Basswood and Pine-mixed hardwood communities (see figures 26, 27, 29). Open upland habitats consist primarily of Pine-mixed hardwood and open field vegetative communities (see figures 28, 29).

3.90 Many of the animals around the lakes range over a wide area; others are more confined in their distribution. In all cases, a species is limited by environmental tolerances. Although the general land character of the lakes area was once primarily coniferous, numerous factors such as lumbering and forestry have reduced it to second growth forests of mixed deciduous and coniferous vegetation. This has impacted the ecosystem and resulted in the sharing of habitats by some forms of wildlife that have adapted to survival under a variety of conditions.

The lakes support major populations of fish. Some of the more common species include northern pike, walleye, muskie, yellow perch, bass and crappie. Shoreline erosion and wave action in the lakes, especially in the Whitefish Chain of Lakes, have a tendency to create sandbars which may close off northern pike spawning marshes. Also water levels can affect walleye incubation on offshore gravel slopes. Therefore it is important that careful regulation of lake levels in May and early June be maintained. Although eutrophication, noted in the discussion of water quality, does not yet appear to have impacted fish populations, the prospect of increased nutrient levels requires careful observation. 3.91

CULTURAL RESOURCES

The artifacts and site materials which are the tangible cultural resource base of an area, are significant to public use development in two major ways. First, the Corps is explicitly responsible for the protection, preservation, and enhancement of cultural resources located within areas of its jurisdiction and impact. Second, cultural resources are literally a resource with development potential. Attending to the first responsibility will often be the first step toward realizing the development potential of the resource base. 3.92

Prior to construction of any new recreational facilities, cultural resource investigations, including review of documents, site surveys and test excavations, will be carried out on Corps administered land in order to locate the resources and to assess their significance to present and future generations. Once known, the cultural materials can be evaluated for their suitability for incorporation into interpretive facilities of various sorts, such as self-guided walking trails, educational displays, and reconstructed buildings and sites. 3.93

The size of the headwaters area, the abundance and diversity of its cultural materials and the fact that some may be appropriately developed while others must be preserved and protected are considerations which indicate the need for an explicit cultural resources management plan. Such a plan would include both short and long term policies which are needed to accomplish the objectives of preservation and enhancement of resources. Within the headwaters area it is possible to illustrate the ways of life of groups of people whose existence depended upon resources which may no longer be available or are no longer used to support human communities. Within the region there are prehistoric and historic materials which have the potential to contribute to our understanding of regional and local cultural history. 3.94

CULTURAL HISTORY

The headwaters reservoirs region is an area particularly rich in archeological remains of prehistoric and historic habitation. Even though no systematic or professional surveys have been completed, it is known that more than 80 sites exist on the reservoirs' shorelines. The remains from those sites which are known indicate that the area was occupied from the time it first became inhabitable (shortly after the retreat of the last glaciers, about 10,000 years ago) until the present. 3.95

The headwaters area was the scene of a number of significant occurrences in human history and it is fortunate that their remains are still reasonably well preserved. 3.96

The oldest such occurrence was the initial occupation of the area. Little is known of the processes by which human groups begin to utilize an environment which was previously uninhabitable. 3.97

An example of cultural phenomena special to the area was the utilization of wild rice as a food staple. After about 800 AD rice appears to have become increasingly important, and capable of supporting permanent communities. Anthropologists have estimated that the wild rice area supported one of the highest aboriginal populations in the area of what is now the United States. 3.98

Later in time, north-central Minnesota was the arena of major population shifts and changes in adaptation. The impetus for these changes came from the European fur trade. The effects were substantial on the peoples we now know as the Dakota and Ojibwa. 3.99

There are habitation and burial sites of various other American Indian cultures not mentioned above, and sites related to the historic fur trade and the early logging industry. 3.100

CULTURAL RESOURCE MANAGEMENT

Under the mandate of Executive Order 11593 for Protection and Enhancement of the Cultural Environment the Corps is required to locate, inventory and nominate to the Secretary of the Interior all sites, buildings, districts and objects under its jurisdiction or control which appear to qualify for listing on the National Register of Historic Places (see figure 35). 3.101

A systematic survey for cultural resources has been carried out only at Lake Winnibigoshish; and the final report on that survey is currently in preparation. What follows is based on limited data, except for Lake Winnibigoshish. The actual patterns of prehistoric and historic settlement and land use of the headwaters will not be known until the cultural resource surveys of each lake are completed. 3.102

GULL LAKE

Within the Terry R. Johnson Recreation Area at Gull Lake there is an extensive mound group and a habitation site which was occupied repeatedly by various Woodland cultural groups (see figure 34). Several of the mounds and portions of the site have been excavated and reported on by archeologists. Based on the information gained from those excavations some interpretive displays have been developed and installed at the recreation area. Except for these sites little is known about the cultural resources of Gull Lake. 3.103

PINE RIVER RESERVOIR

The extensive shorelines of the lake have never been examined for prehistoric and historic sites. The same is true of the Ronald Louis Cloutier Recreation Area. When surveyed, it is likely that many sites will be located. Until the inventory is accomplished, specific surveys will be carried out prior to construction of any public use facilities on Corps administered land. 3.104

LEECH LAKE

Largely as a result of the activities of artifact collectors there are over 30 sites known from the shoreline of Leech Lake. The experience gained at Lake Winnibigoshish (see paragraph 3.106) combined with what is generally known about the prehistory and history of the region strongly suggest that many additional sites will be located during the inventory survey. Leech Lake sites are subjected to inundation, erosion and damage by public and private construction. The need is great for a professional survey and preservation measures. At Federal Dam most of the area now used for Corps' activities and recreation has been disturbed by construction activities. There is evidence to indicate the former existence of habitation and burial sites, and there is a burial mound remaining which can be incorporated into the interpretive program for the area. 3.105

LAKE WINNIBIGOSHISH

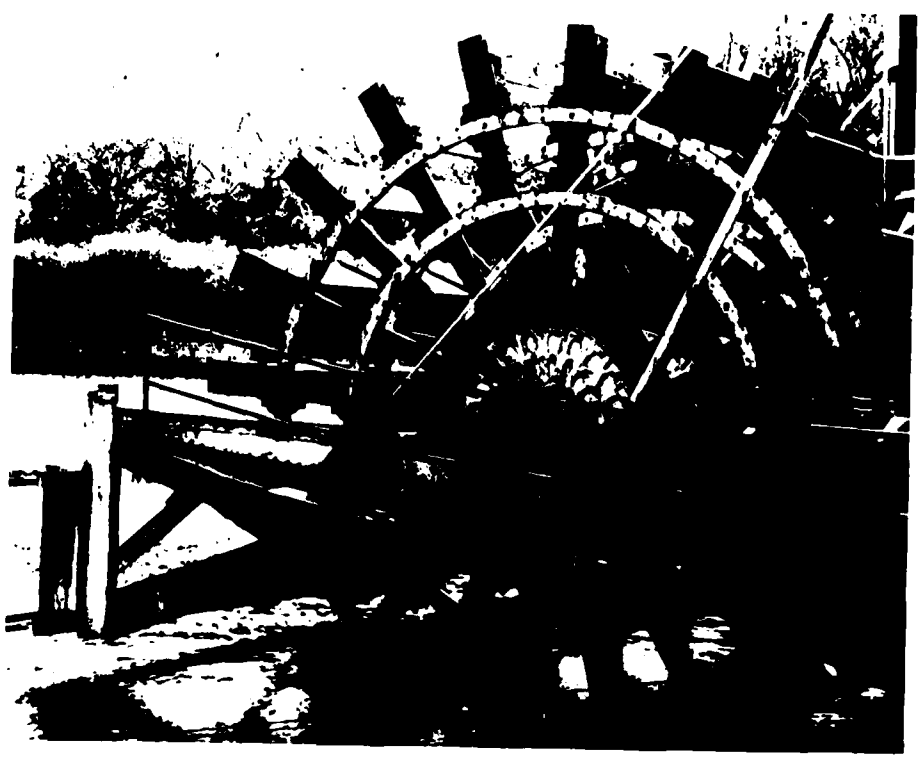
3.106 At Lake Winnibigoshish a total of 53 archeological sites have been located. Nearly all of them have been partially or completely disturbed or destroyed by inundation or shoreline erosion resulting from raising the water 8 to 12 feet above its natural level. There are no archeological sites within the public use areas. The construction of the dam and dam operator's residence destroyed parts of a habitation site and associated burial mounds. Material from the site indicates occupation by people of Sandy Lake and Blackduck cultural affiliations. Enough of the site remains for it to qualify for listing on the National Register of Historic Places. Therefore it will be protected and any adverse impacts from future actions in the area will be mitigated by professional archeological excavation. A number of other sites, related to Paleo-Indian, Archaic, Woodland, and historic inhabitants appear to be eligible for the Register, but the details will not be available until the final survey report is completed.

POKEGAMA LAKE

3.107 Archeologically, little is known about Pokegama Lake. A single habitation has been recorded on its shoreline and it is known to have been damaged by erosion. The recreation area will be surveyed before any additional development takes place.

BIG SANDY LAKE

3.108 There are nine known prehistoric and historic sites scattered around Big Sandy Lake. Information about these sites is the result of informal observations and has not yet been confirmed or evaluated by professional archeologists. Big Sandy Lake is the only headwaters reservoir that has a lock associated with the dam. Although the lock is inoperable today, an extract from Irvin Harlow Hart's "Minnesota History on Steam Boating on the Mississippi River Headwaters" notes that one of the larger boats to originally use it and to travel portions of the lake systems " ... is the stern-wheeled steamboat Oriole.



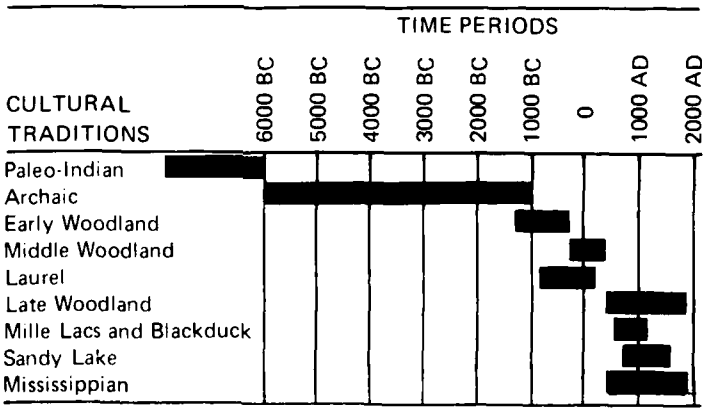
This vessel was constructed at Aitkin, Minnesota, by the Mississippi Transportation Company in 1907 and 1908, and was placed in regular commercial service in August 1908 between Aitkin and Grand Rapids. This boat was 107 feet in length with an overall width of 22-1/2 feet. A height or clearance of 35 feet from the waterline to the top of the stacks was required for navigation. The boat had a carrying capacity of 60 tons. It is interesting to note that in one year the "Oriole" carried about 1,700 passengers, and 1,500 tons of merchandise valued at $100,000. In 1910 the St. Paul District of the U.S. Army Corps of Engineers bought the ORIOLE for $3,500. The ORIOLE was thoroughly overhauled, fitted with dredging and snagging equipment, and put into channel maintenance operations early in September 1911."

IMPLICATIONS

3.109 The specific details of cultural resources are not yet well-known. Most sites leave no surface indications which the eye can detect after the passage of hundreds and thousands of years. To locate the sites, assess their significance, evaluate their interpretive potential and to determine appropriate protective measures requires systematic site surveys and test excavations. The potential exists at each of the Corps' projects for expanding the present interpretive and educational programs. Part Two of this report explains plans to accomplish a more detailed accounting of the occupation sites, burial mounds, fur trading posts and cultural history of the peoples who have inhabited and used the lakes since the Wisconsin age.

FIGURE 33

CULTURAL TRADITIONS



PALEO - INDIAN

3.110 This cultural tradition represents nomadic hunters and gatherers, especially exploiting large animals which are now extinct. Artifacts of this tradition are found across the entire continent.

ARCHAIC

3.111 This tradition represents hunters and gatherers utilizing a wider range of food resources than earlier peoples. Archaic cultural remains are regionally diverse and distinctive indicating specialized adaptations to local resources.

WOODLAND

3.112 This tradition represents diverse cultural adaptations throughout the Eastern Woodlands of North America. Pottery and burial mound construction are distinctive characteristics which first appear during this period. Seasonal and permanent village habitation sites are also characteristic. Woodland subdivisions are largely based on distinctive pottery types.

LAUREL

3.113 This is a subdivision of the Middle Woodland tradition restricted to far northern Minnesota and adjacent parts of Canada.

MILLE LACS — This is one of several Late Woodland cultural manifestations located in central Minnesota. 3.114

BLACKDUCK — This is another distinctive Late Woodland adaptation found in north-central Minnesota. 3.115

SANDY LAKE — This cultural tradition is a very Late Woodland adaptation. 3.116

MISSISSIPPIAN — This tradition is contemporaneous with and distinct from Late Woodland. It is confined to river valleys. It is characterized by sophisticated social organizations including extensive trade networks. 3.117

FIGURE 34 **ARCHEOLOGICAL LOCATIONS** (See Plates 12-16)

Plate Designation		CULTURAL AFFILIATION: Middle Woodland	Late Woodland	Historic	Pre-historic	Mille Lacs	Sandy Lake	Blackduck	Mississippian	Laurel	Archaic	Paleo Indian	CONDITION: excavated	protected	damaged	undisturbed	badly damaged	eroded	mostly destroyed	inundated	threatened
	GULL LAKE																				
a.	Round Lake Mounds				x																
b.	Bishop's Creek			x	x												x				
c.	St. Colombo Mounds				x											x					
d.	Sandy Point				x										x						
*e.	Gull Lake Dam Mounds	x	x										x	x							
	PINE RIVER RESERVOIR																				
a.	Bertha Lake, SW				x										x						
b.	Pine River Inlet				x										x			x			
c.	Big Whitefish Narrows				x															x	
d.	Gordon Ancient Embankments				x										x						
e.	McAloon Mounds					x							x		x						
f.	Island				x										x			x			
g.	Bertha, SW				x										x						
h.	Lower Whitefish, N				x									x	x						
i.	King Mound												x								
	LEECH LAKE																				
a.	Cedar Point				x																
b.	Oram (Trader's) Bay, SE				x																
c	Agency Bay, NE				x																
d.	Squaw Point, SW				x																
e	Squaw Point, SW			x																	
f.	Squaw Pt. Peninsula, E						x														
g	Squaw Pt. Peninsula, E				x																
h.	Squaw Pt. Peninsula, E			x																	
i	Bear Island			x	x													x			
j	Battle Point Village			x	x																
k	Two Points Village				x													x	x		
l	Sugar Point				x														x		
m.	Otter Tail Point			x	x										x			x			
n	Sugar Point Village			x																	
o	Sucker Bay, W. shore						x								x			x			
p	Sucker Bay, N						x	x							x			x			
q	Drumbeater's Landing	x						x							x			x			
r	Squaw Point						x	x							x						
s	Squaw Point, SW				x																
t	Sand Point Village							x													
u.	Minnesota Island							x													
v.	Goose Island				x																
w.	Shingobee Island				x																
x.	Kabekona Narrows				x													x	x		
y.	Pelican Island				x																
z.	Bear Trap Point							x													
aa.	Squaw Point Mounds				x																
bb.	Squaw Point, NW				x																
cc	Portage Brook					x									x			x			
dd.	Sucker Bay, NW				x																
ee.	Boy Bay, S.				x																
ff.	Waboose Bay, NW			x	x											x					

Plate designation		CULTURAL AFFILIATION										CONDITION								
	LAKE WINNIBIGOSHISH	Middle Woodland	Late Woodland	Historic	Pre-historic	Mille Lacs	Sandy Lake	Blackduck	Mississippian	Laurel	Archaic	Paleo-Indian	excavated	protected	damaged	undisturbed	badly damaged	eroded	mostly destroyed	inundated	threatened
a.	Sugar Lake Outlet				x															x	
*b.	Lake Harry Site	x	x								x										
c.	Mississippi Inlet						x	x		x					x			x			
d.	Tamarack Point		x																	x	
e.	Winni Dam Mounds	x	x	x											x			x			
f.	Raven's Point				x															x	
g.	Stoney Point				x													x		x	
h.	Pigeon River			x	x															x	
i.	Sugar Bush Point										x									x	
j.	Seelye Point				x													x			
k.	Williams Narrows	x						x			x	x			x			x			
l.	Little Cut Foot Sioux Lake, W.							x		x	x										
m.	Turtle Lake Portage, W.end				x													x			x
n.	Plug Hat Point			x			x	x		x					x				x	x	
	The following sites are from a preliminary report to U.S. Corps of Engineers - study ongoing																				
o.	WS-1												x		x					x	
p.	WS-2												x		x						
q.	WS-4												x		x		x	x			
r.	WS-5												x		x						
s.	WS-7												x		x			x		x	
t.	WS-8												x		x					x	
u.	WS-9												x		x			x			
v.	WS-10												x		x			x			
w.	WS-11												x		x					x	
x.	WS-13												x		x			x			
y.	WS-15												x		x			x		x	
z.	WS-16												x		x			x			
aa.	WS-18												x		x			x		x	
bb.	WS-21												x		x			x			
cc.	WS-22												x		x			x			
dd.	WS-23												x		x			x			
	POKEGAMA LAKE																				
a.	Pokegama, SE, Island																				
b.	Pokegama, S.																				
c.	Nesbitt Island														x			x			
d.	Dumbbeater Island														x			x			
e.	Pokegama, W.																				
f.	Pokegama, NE																				
g.	Jay Gould-Pokegama, W.																				
h.	Jay Gould, island																				
i.	Black Water Jay Gould, S.														x			x			
j.	Black Water-Jay Gould, S.														x			x			
k.	Mississippi River, N.														x			x			
l.	Mississippi River, N.														x			x			
m.	Black Water Lake, NE														x			x			
n.	Black Water Lake, NW														x			x			
o.	Robinson Habitation														x						
	BIG SANDY LAKE																				
a.	Sandy Lake, NE						x	x	x												
b.	Miner's Point						x														
c.	Sandy Lake, N.			x																	
d.	Sandy Lake, N.			x																	
e.	Brown's Point Fur Post			x											x						
f.	Knollwood Resort Mounds				x									x							
g.	Indian Mound Point				x									x	x						
h.	Sandy River, E.				x										x						
i.	Battle Island			x	x										x			x			

* Indicates archeological site within ¼ mile radius of Corps of Engineers' recreation area.

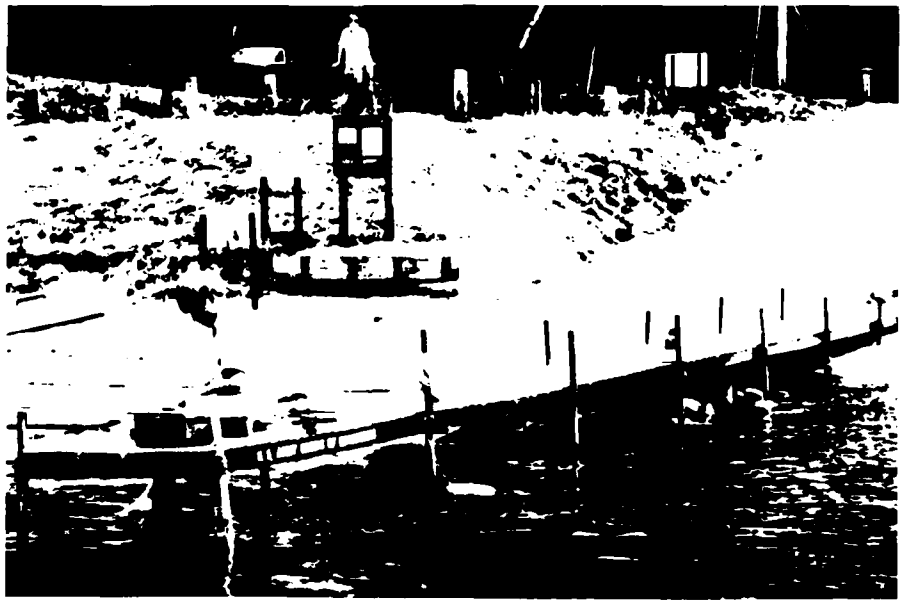
FIGURE 35 **MINNESOTA SITES LISTED IN THE NATIONAL REGISTER OF HISTORIC PLACES**[1] (see plate 2)

	SITE	COUNTY
1.	Hull-Rust-Mahoning Mine	St. Louis
2.	Chippewa Agency	Cass
3.	Gull Lake Mounds	Cass
4.	Hole in The Day The Younger Cabin Site	Cass
5.	Itasca State Park	Clearwater/Becker/ Hubbard
6.	Morrison Mounds	Otter Tail
7.	Old Crow Wing	Crow Wing
8.	Old Wadena Historic District	Wadena
9.	Rice Lake Hut Rings	Cass
10.	Savanna Portage	Aitkin
11.	Shell River Prehistoric Site	Hubbard
12.	White Oak Point	Itasca

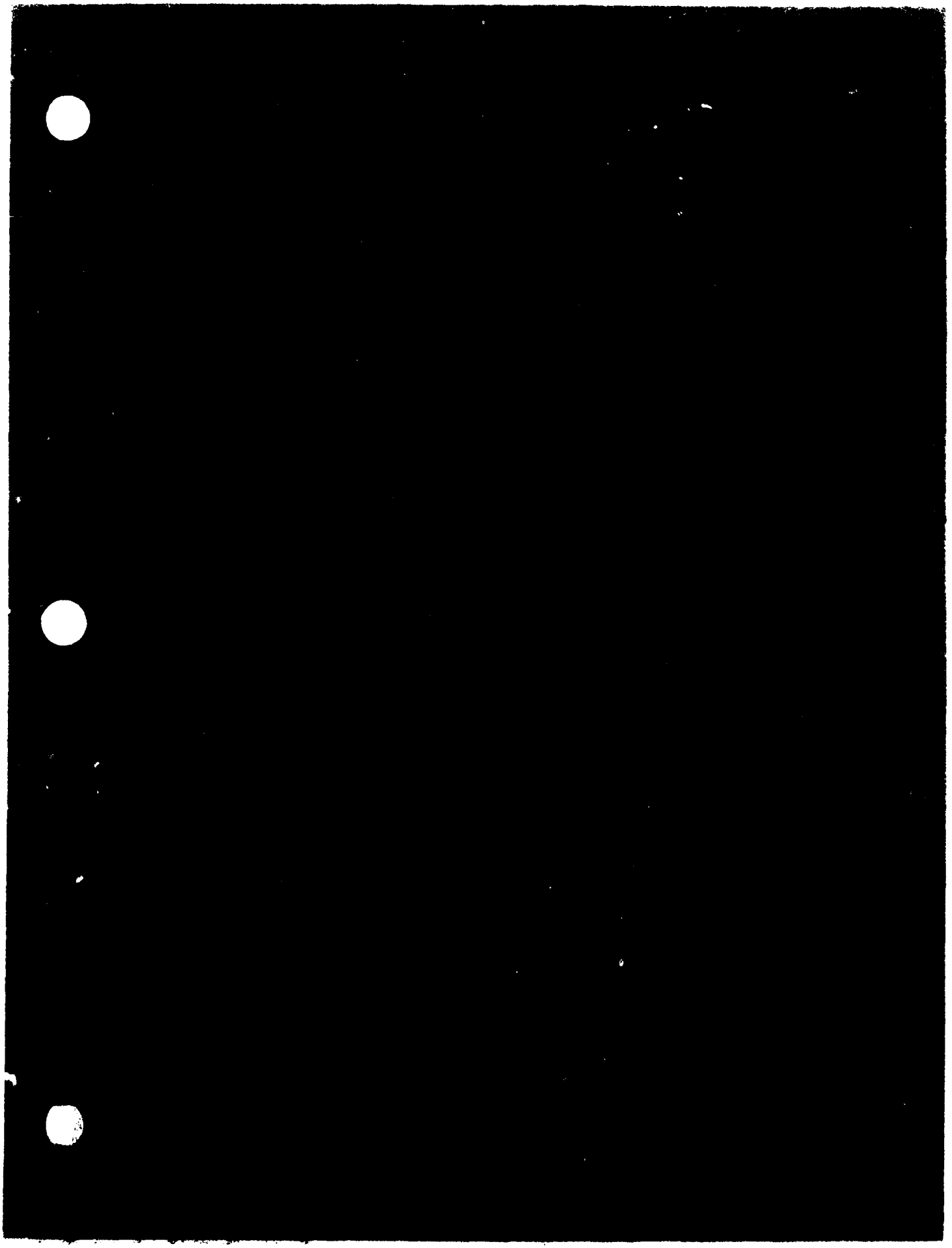
INSTITUTIONAL CONSTRAINTS

There are various local, state and federal agencies located in the headwaters area that have developed their own ordinances, regulations and laws. These agencies include local municipalities, the Minnesota Department of Natural Resources, the United States Department of the Interior and the United States Department of Agriculture. 3.118

Even though the Corps may not be directly affected by the regulations and ordinances of these agencies, they have been and will continue to be informed of Corps' actions to insure that all Corps' projects are developed, operated and maintained in the best public interest. 3.119



[1] Minnesota State Comprehensive Outdoor Recreation Plan - 1974, pages 4-17 (see plate 2).



4

SITE DESCRIPTION AND EVALUATION

GENERAL

The following evaluation helps form the basis for the recommended plans illustrated in Part Two. This evaluation details the availability, quantity and *quality (see figure 36) of the recreational facilities at* Terry R. Johnson, Ronald Louis Cloutier, Clamshell, Arrowhead, Leech Lake, Lake Winnibigoshish, Pokegama Lake and Sandy Lake Recreation Areas. 4.01

This process results in a focus for planning efforts such that when implementation occurs it will be a response based on a rational decision making process. These determinations will establish guidelines which will facilitate project maintenance, provide adequate recreational facilities and enhance the resource base at each site. 4.02

Consideration is given to the character of the terrain and the preservation and organization of existing and undeveloped spaces. The relationship among vehicular and pedestrian circulation, separation and/or consolidation of activities, site preparation and utilities is a priority for ongoing development. The consistency of landscape furniture, planting and architectural style is reviewed. The ecological resource base and aesthetics are reinforced as the *foundation of design and eventual implementation.* 4.03

These factors are reviewed within the context of (1) a thorough consideration of existing resources and facilities needed to support recreational use (see section five and section six), (2) a comparison of the "as-built" (existing) facilities with the current master plan (1964 - 1967) and (3) a discussion of site use relationships and spatial organization related to function. 4.04

The discussion of each recreational area is accompanied by two plates. The first illustration depicts the existing master plan as a light background including topography. The darker and more prominent information delineates the existing vegetation as a mass and the "as-built" facilities. Vehicular circulation is shown with a tone. The second plate illustrates the "as-built" condition as a light background overlain by a diagrammatic representation of existing activity and organizational zones. 4.05

Note: paragraphs 4.06—4.09 have been deleted.

There are three basic elements that are constant at each of the projects. These are signage, lighting and landscape furniture. Signage conforms to the basic requirements in NCDP 1130-2-1. Appendix A -- Project Signs and Markers at Civil Works Projects. An obvious, and generally successful, effort has been made to coordinate lettering style, representational symbols, size, standard, and aesthetics. Although the basic functional requirements of signage are satisfied, the existing entry, directional, informational, identification, interpretive, and instructional graphics need refinement. A resolution in terms of a consistency in lettering, style, size, material, placement, color and content is contained in Part Two of this study. 4.10

Lighting in all cases is primarily functional with no major emphasis on aesthetics. Except for occasional spot lighting at the shower buildings at Terry R. Johnson, Ronald Louis Cloutier, Leech Lake and Big Sandy Lake no effort has been made to use lighting to accent or call attention to major points of interest. The light standards are approximately 24 feet high, utilize mercury vapor lamps and are sporadically located along vehicular roadways and at maintenance areas. 4.11

Landscape furniture which includes elements such as benches, picnic tables, fireplaces, trash receptacles, bulletin boards, etc. are located throughout each recreation area. The quality of these elements is indicated in figure 36. Like lighting and signage, the landscape furniture lacks the uniformity of character necessary to project the image of a total system of related elements. As the anticipated demand for facilities increases (see section five and section six) and the design solutions illustrated in Part Two are implemented, a comprehensive system of signage, lighting and landscape furniture will evolve. 4.12

TERRY R. JOHNSON RECREATIONAL AREA GULL LAKE

There are 69.7 acres of land above normal lake level in the vicinity of the impounding structure at the Terry R. Johnson Recreational Area on the Gull River. 25.1 acres are located east of the dam and 44.6 are found to the west on a peninsula known as Government Point (see plate 17). Of the approximately 25 acres, all but one is about 6 feet above the normal pool. That one acre parcel is only 1 or 2 feet above lake level. Government Point has dramatic changes in topography with its west shoreline rising 40 to 60 feet above the lake. This steep bank offers excellent vistas. Every effort should be made to preserve and enhance the character of this scenic area. In comparison, the area east of the dam which is developed for recreational use, is relatively flat. Back from the moderate slope of the shoreline the terrain lies between 15 and 20 feet above the lake. 4.13

SOILS

The soils are from Group 3 and Group 9 (see paragraph 3.38 and 3.44). This composition is made up of coarse to medium textured forest soils. Both have a moderate capability rating for recreation based on an accumulation of information pertaining to slope, erosion potential, texture and rate of percolation. The grades in the developed area rate a high capability, while Government Point falls into the categories of moderate and low capability. 4.14

VEGETATION

Both sides of the Gull River and the shoreline of the lake are heavily wooded with Birch-Aspen and Pine-mixed hardwoods associations. These forested areas have a moderate capability rating for supporting intense and active recreational activities and a high rating for passive recreational use. That portion of the site which is marsh is not considered acceptable for recreation purposes, but does have a high resource capacity. 4.15

FIGURE 36

CORPS OF ENGINEERS' RECREATION AREA FACILITIES

This exhibit documents the quantity or availability of facilities and the quality of the facilities ranked according to design standards described in Part Two.

CORPS OF ENGINEERS' RECREATION AREAS

Recreation Area Facilities	Terry R. Johnson		Ronald L. Cloutier		Leech Lake		Lake Winnibigoshish		Pokegama Lake		Sandy Lake	
	Facility	Quality	Facility	Quality	Facility	Quality	Facility	Quality	Facility	Quality	Facility	Quality
Mixed Camping	39	AA	112	A	56	A	20	AA	15	A	37	A
Tent Camping											21	A
Picnic Units	7	AA	40	AA	15	AA	8	A	31	AA	15	BA
Swimming Beach	0	0	2	A	0	0	0	0	0	0	0	0
Boat Launch	0	0	2	AA	1	AA	0	0	1	A	2	AA
Boat Dock	0	0	2	A	1	BA	0	0	1	BA	2	A
Canoe Launch	x	A	x	A	x	A	x	A	x	A	x	A
Day Use Area	x	A	x	BA	x	A	x	AA	x	A	x	BA
Playground	x	A	x	A	x	A	x	A	x	A	x	A
Parking	10	BA	60	BA	50	A	18	A	100	A	30	BA
Ranger Station	x	BA	x	AA	0	0	0	0	0	0	0	0
Interpretive Facilities	x	BA	0	0	0	0	0	0	0	0	x	AA
Interpretive Trails	x	BA	0	0	0	0	0	0	x	A	0	0
Concessions	0	0	0	0	x	BA	0	0	0	0	0	0
Potable Water Source	x	A	x	A	x	A	x	A	x	A	x	A
Shower Building	x	AA	x	AA	x	AA	0	0	0	0	x	AA
Flush Toilets	x	AA	x	AA	x	AA	0	0	0	0	x	AA
Vault Toilets	x	A	x	A	x	A	x	A	x	A	x	A
Sanitary Dumping Station	x	A	x	A	x	A	x	A	x	A	x	A
Sewage Treatment Plant	x	AA	x	AA	x	AA	0	0	0	0	x	AA
Maintenance Facility	x	AA	x	AA	x	AA	x	AA	x	AA	x	AA
Residence	x	AA	0	0	x	AA	x	A	0	0	x	BA
Access to the Areas	x	BA	x	A	x	A	x	A	x	A	x	BA
Internal Vehicular Circulation	x	A	x	BA	x	BA	x	A	x	A	x	BA
Walkways	x	BA	x	BA	x	BA	x	BA	x	BA	x	BA
Bulletin Boards	x	A	x	A	x	A	x	A	x	A	x	A
Camp Cleaning Tools	x	AA	x	AA	x	AA	x	AA	x	AA	x	AA
Picnic Tables	x	A	x	A	x	A	x	A	x	A	x	A
Picnic Shelters	0	0	0	0	0	0	x	AA	0	0	0	0
Fireplaces	x	AA	x	AA	x	AA	x	AA	x	AA	x	AA
Firewood	x	AA	x	AA	x	AA	x	AA	x	AA	x	AA
Barbeque Units	x	AA	x	AA	x	AA	x	AA	x	AA	x	AA
Trash Receptacles	x	A	x	A	x	A	x	A	x	A	x	A
Movie Screen	x	BA	x	BA	x	BA	x	BA	x	BA	x	BA
Lighting	x	A	x	A	x	A	x	A	x	A	x	A
Signage	x	BA	x	BA	x	BA	x	BA	x	BA	x	BA
Water Traffic Controls	x	A	x	A	x	BA	0	0	x	A	x	A
Fences	x	BA	x	BA	x	BA	x	BA	x	BA	x	BA
Landscaping Practices	x	A	x	A	x	A	x	A	x	A	x	A
Telephones	x	A	x	A	x	A	x	A	x	A	x	A

Where: 39 = The number of facilities available
x = The facility is available
0 = The facility is not available
AA = Above Average
A = Average
BA = Below Average

The wildlife here is typical of that found in an upland forest habitat (see figure 29) with a special emphasis on repeated sitings of bald eagles in winter, red tailed hawks, pileated woodpeckers and black squirrels. 4.16

Primary access is direct from Brainerd. Visual notification of the project's location is minimal but adequate (see paragraph 4.10). Signage is limited on State Highway 371 and the visitor can miss the turnoff to Crow Wing County State-aid Highway (CSAH) 125. The entry sequence and sense of arrival at the site are understated and require emphasis (see plate 17). 4.17

INTERNAL VEHICULAR CIRCULATION

Movement within the campgrounds is adequate and the one way circulation system works well. There is some confusion at the point where County Road 105 crosses the dam and the entry to the recreation area takes off in the opposite direction. The internal roadway conditions are excellent, but the parking pattern, specifically at the shower building, is unclear. Movement from the ranger station to the camping pads is immediate and readily discernible. At the present time, vehicular movement across the impounding structure is minor. The updated master plan illustrated in Part Two proposes a modified use for the area west of the Gull River on Government Point. This reorganization of activities will have an effect on current traffic patterns. 4.18

PEDESTRIAN CIRCULATION

Primary pedestrian traffic is currently limited to sharing paved surfaces with vehicular traffic. This does not impose a serious problem as long as speed limits are carefully observed. A system of paths through the woods has evolved because of patterns from campsites to the shower building, day use area, interpretive structure and canoe launch. An upgrading of these routes is considered in Part Two of this study. There is an existing loosely defined trail system into the woods from the interpretive center which should also be upgraded. Pedestrian circulation back and forth to the dam, ranger station and playground is intense. There is a tendency, however, for pedestrians not to cross the dam to explore that area known as Government Point. Consideration is given to providing a pedestrian crossing for safety reasons. The scenic and potential interpretive qualities of this peninsula are significant. The master plan (1965) designates camping in an area that is rated low for that activity because of slope and vegetation and in an area now known to be historically significant. 4.19

STRUCTURE EVALUATION

It can be seen, by comparing the "as built" plan with the 1965 Gull Lake plan on plate 17 that no major additional structures are anticipated. However, with the increased number of camp facilities indicated, another comfort station should be considered. The ranger station has a pleasing architectural character that, through the use of materials, reflects the design of the shower building. The use of wood and earthy colors is a major step toward integrating these structures carefully into the environment. The ranger station is well located, but there are a number of functional problems with respect to visitor supervision. The shower building which is centrally situated and the rest rooms have caused a number of unplanned pedestrian walkways to develop. The shower facility works very well, is clean and invites a minimal amount of vandalism. Support facilities and utility areas, such as the one near the shower building, should be visually screened to minimize their visual impact upon the site. The maintenance area and sewage treatment plant are nicely separated from user activity areas, although a potential conflict exists should development occur on Government Point. This suggests a careful evaluation of the desirability for visual screening of the sewage treatment facility. This is contained in Part Two. The existing dam operator's residence is structurally sound and currently occupied. 4.20

This project is the only one of the areas that has a recently built interpretive facility dealing with the historical and cultural aspects of the site. The internal functions need reorganization to be fully utilized and pedestrian access to the "tee-pee" facility needs improvement. Consideration needs to be given to coordinating the nature/interpretive trail system, interpretive center and exterior movie screen to develop an integrated interpretive program. 4.21

LAND USE RELATIONSHIPS

One of the primary topics that is considered is the relationships that presently exist between the functions and activities organization. The established functions at the site interface with one another fairly well. The area diagrammatically shown as camping on plate 18 is clearly separated from the day use area on the downstream side of the dam. Undeveloped area 3 forms a heavily wooded buffer from the Gull River where a boat launching ramp is indicated south of the current playground and dump station. Currently undeveloped area 4 and the forested interpretive area also tend to form a nice protective screen around the present camping. Access, as detailed previously, is not clear and conflict area 1 calls attention to the intersection of that visual and functional problem. 4.22

Conflict area 2 indicates the location of a vehicular/vehicular and pedestrian/vehicular conflict. This juncture of access to the site, automobile circulation, pedestrian patterns, and parking will only get worse as anticipated expansion to undeveloped area 1 becomes imminent. This suggests that a closer look at the organizational qualities is necessary to develop a working plan that incorporates camping, resource management, nature interpretation, historical and cultural sites, a day use area, swimming area, etc. 4.23

While the primary consideration of this study is to update the existing Federal projects, a careful review must also be made of the influences surrounding each of these sites. The private development just north and across the channel from Government Point is a prime example. Both the public use facility and the private resort influence one another. Ongoing decisions that are made must take this into account. 4.24

Of the seven public use areas on the shores of the Pine River reservoir, two are in current operation with the other five having been reserved for future development. Clamshell Lake Recreation Area and proposed Arrowhead Lake Recreation Area are discussed in paragraphs 4.41 and 4.42. 4.25

RONALD LOUIS CLOUTIER RECREATION AREA PINE RIVER RESERVOIR

This recreation area consists of 42 acres of land at the Pine River dam on Cross Lake and in the city of Cross Lake. The topography is gently rolling with slopes well below 5%. The average elevation of the site is almost 6 feet above the average pool elevation (see figure 4). An inventory of facilities available at the recreation area is included in figure 36. A comparison between the plan of 1964 and the existing layout and facilities offered can be seen on plate 19. 4.26

SOILS

Surficial geology is primarily a result of glacial outwash with areas of till plain. This has resulted in soils with a moderate capability rating for recreation comprised of coarse to medium textured forest soils (see figure 19). The minimal vertical change in topography suggests a high capacity for recreational development and can support the widest range of intensity and activity. 4.27

VEGETATION

The overstory is Oak, Birch and Pine. 4.28

WILDLIFE

Due to the areas proximity to the city of Cross Lake, unique wildlife sightings are few although osprey and deer are not uncommon. 4.29

ACCESS

This area is the largest and most intensely developed of the public use sites and is easily accessible. Highly visible from County State-aid Road 3 and Minnesota Highway 6 its close proximity to the city of Cross Lake makes it difficult to miss (see plate 19). 4.30

INTERNAL VEHICULAR CIRCULATION

Circulation tends to be confusing because of its size, number of access points, and lack of signage distinguishing between day use and camping. The movement to and from parking lots on one-way and two-way roads is also confusing. When the campsites are full and people are waiting for a vacancy, stacking of cars at the ranger station is a special problem. Greater definition and separation of activities will greatly help the internal automobile patterns. 4.31

PEDESTRIAN CIRCULATION

The pedestrian circulation patterns, while occasionally occurring on the vehicular roadways, are loosely defined with patterns worn throughout the site between major generators of foot traffic. These generators reflect the volume of activity use. Because this area is the only one with beach facilities, its popularity is extremely high. Pedestrian paths between campsites, beach areas, and shower buildings receive the greatest amount of foot traffic. An additional factor is the high amount of foot traffic by tourists not staying at the project and local residents of the city who may share some of the day use facilities. There are no hiking trails or interpretive facilities available. 4.32

STRUCTURE EVALUATION

A rest room, similar in character to the shower building, has recently been constructed just north of the dam near the day use swimming area. This building has an interesting architectural quality and is used primarily by visitors to the day use area and swimming beach. The ranger station blends in well with the environment, functions well and is nicely sited. Consideration is given in Part Two to removing the vault toilets directly west of the most northerly water borne shower building. The maintenance facility is very well situated but needs screening to decrease its visibility. The sewage treatment plant is also well away from the majority of activities, but needs to be screened from the highway to the south. There is no dam tender's residence on the site. 4.33

There is no interpretive structure at the recreation area in Cross Lake. The city has, however, leased a large parcel to the south of Cross Lake for a nature trail that was constructed in 1975. The Cross Lake Historical Society presently leases a tract near the sewage treatment plant across Highway 6 and proposes to restore an old schoolhouse as interpretive and educational display facility. 4.34

LAND USE RELATIONSHIPS

The present site use relationships at first glance appear to work well with one another. However, after more detailed inspection there are some functions that do not relate as well as they might with some minor reorganization. Plate 20 illustrates the existing spatial order. Undeveloped area 1 is not intensely wooded, yet contains a very pleasing character. 4.35

The general atmosphere of the camping areas is one of relaxation in casual surroundings. There is a problem of pedestrians mixing with automobiles indicated by conflict area 1 also on plate 20. 4.36

Conflict area 2 by the ranger station calls attention to the occasional problem of automobile and camper unit congestion while waiting for a campsite. Fortunately, good visual control from the ranger station makes this a secondary concern. The confusing internal circulation system which results because of day use and camping activities should resolve itself as a result of a modified layout presently under consideration. Access to the area resulting in conflicts at the entry points also needs modification. Consideration should be given to reducing the number of points of entry and exit along County State-aid Highway 6. 4.37

Undeveloped area 2 near the major point of entry should be allowed to revert to a more natural state with additional indigenous planting to augment a visual screening effect. The duplication of activities such as maintaing multiple playgrounds is reviewed to assess the potential for combining these activities at an appropriate location in Part Two. 4.38

The combination of activities that results from the proximity of existing playground area 2, day use area 1, the free camping area and the maintenance area to one another is undesirable. Access to undeveloped area 4 and mixed use area 2 is primarily across the dam. These areas are under utilized implying that a careful review of the organization and activities here is needed. 4.39

This recreation area currently offers a greater variety of experiences to the visitor than any of the other areas. A strong commitment should be made to reorganize and modify the existing functions to insure continued excellence at this site. 4.40

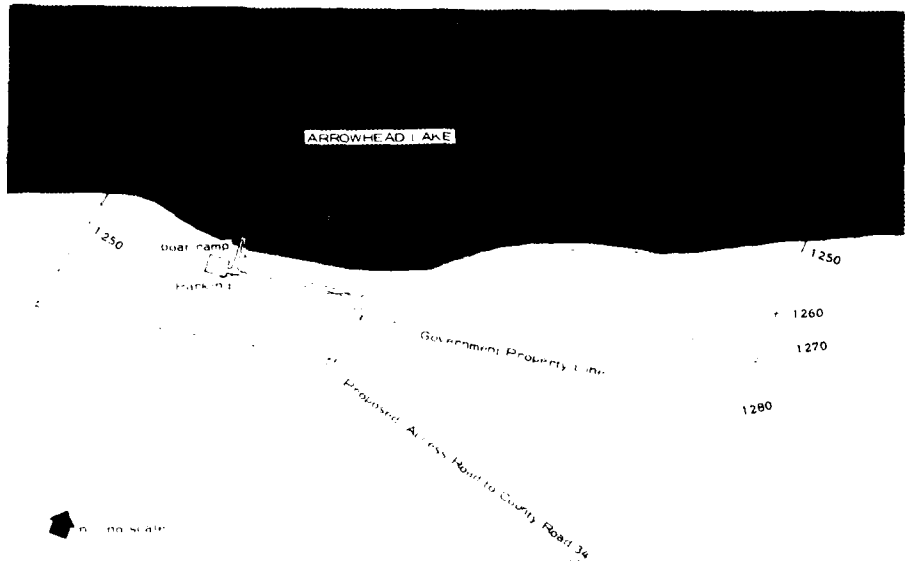
4

SITE DESCRIPTION AND EVALUATION

ARROWHEAD LAKE RECREATION AREA

This proposed recreation area is situated on the east side of Arrowhead Lake (see plate 4). It consists of approximately 39 acres of land above the average pool (see figure 38). It is about six miles from the Pine River dam. The area is heavily wooded with birch and pine and is accessible from CSAHs 1 and 134. Present plans for this facility call for the future development of an upgraded access road, boat launch ramp, two vault toilets, water well, picnic tables and fireplaces, and parking for 20 cars and trailers. No overnight facilities were contemplated in the 1964 master plan. 4.41

FIGURE 37 **PROPOSED ARROWHEAD LAKE PUBLIC USE AREA**



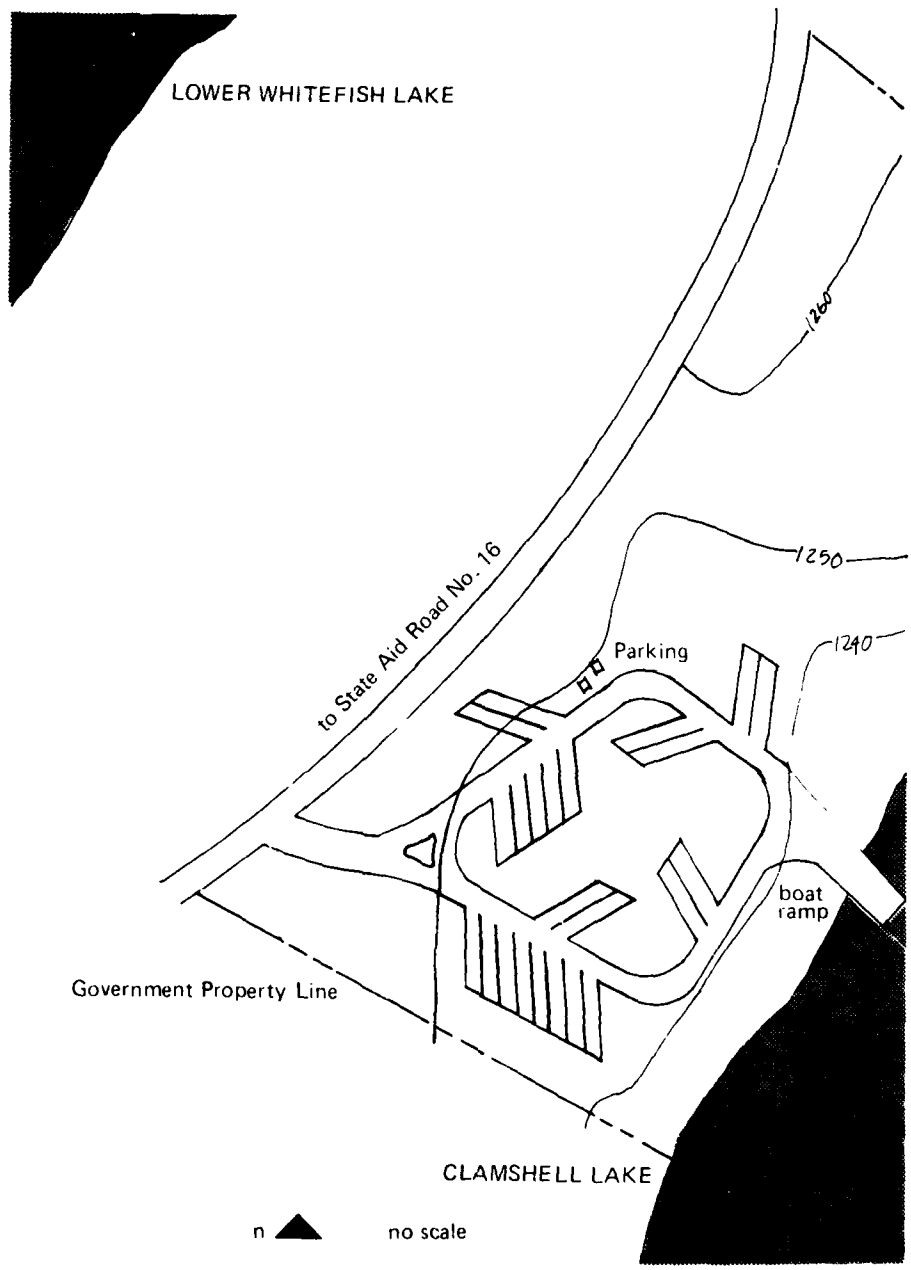
4

SITE DESCRIPTION AND EVALUATION

CLAMSHELL LAKE

The Clamshell Recreation Area is located 12 miles from Cross Lake with access on paved County Road 16. It is about 3½ miles south from Arrowhead across Lower Whitefish Lake. It consists of 5 acres of land on the north shore of Clamshell Lake. Facilities include a launching ramp, boat dock, 2 vault toilets, 5 picnic grilles and tables and parking for 23 automobiles and boat trailers. No over night camping facilities are provided (see figure 38). 4.42

FIGURE 38 **EXISTING CLAMSHELL LAKE PUBLIC USE AREA** *



* Approximation of actual field condition

LEECH LAKE RECREATION AREA

LEECH LAKE

4.43 Leech Lake Dam and Recreation Area are immediately west of Federal Dam, Minnesota on 75 acres of forested land. The site is bordered by County State-aid Highway 8 on the east, State land on the south and Leech Lake River on the west and north (see plate 5). The terrain upstream of the dam is heavily wooded with deciduous and coniferous trees and some underbrush. The elevation of the relatively flat site averages 5 feet above the average lake level. Downstream, and in an undeveloped area, the site rolls gently toward the river and is barren of trees. This area, planned only for picnickers, is about 3 feet above record high water in the Leech Lake River. An access channel 500 feet long has been developed adjacent to the parking area to provide boat access through a marsh area to a boat-beaching area along the west side of the seventy-five acres shown on plate 21. The available facilities are shown in figure 36 and illustrated on plates 21 and 22.

SOILS

4.44 The site is underlain by coarse to fine textured forest soils and soils of glacial lake plains. These particular soils include a predominance of peat which receives a very low capability rating with respect to active recreation. Erosion is minimal due to the very low shoreline profile and the lack of steep topography. The project has an excellent capacity to support recreational activity with respect to slopes.

VEGETATION

4.45 The primary vegetation at the site is comprised of oak, aspen and pine associations. The coniferous material is dominant at the northeastern periphery by the maintenance area. These plantings are indicative of an upland forest habitat and bear a moderate capability for recreational activity. The marsh vegetation along the shoreline extends north a considerable distance before interfacing with open water. This is not conducive to recreation in the normal sense, but offers potential for outdoor education and interpretation of wildlife and rice cultivation and harvesting.

WILDLIFE

4.46 This site is typified by those animals that are found in water, upland forest, and certain lowlands habitats (see figure 26). Of special significance are eagle nesting sites and an annual influx of migrating Canada geese.

ACCESS

4.47 The main entrance to the camping area and the entrance to the day use area both occur off of CSAH 8 (see plate 21). This separation of entries with respect to activity organization, provides the camper with a very nice arrival sequence through a wooded area. Access to the day use area along the northern perimeter of the project is direct and efficient.

INTERNAL VEHICULAR CIRCULATION

4.48 Internal movement at the site is greatly facilitated by the access road to the south. The parking lot illustrated in plate 21 will be divided. This provides a total separation of day use and camper access to the water and eliminates a potential conflict.

PEDESTRIAN CIRCULATION

4.49 Pedestrian movement is not restricted by the road network or walkways. There are currently no paved walkways through the camping area, although the 1964 plan indicates that a number of paths were planned. Most circulation originates at the campsites and goes to the day use area, the boat launch ramp and/or to the concessionaires' facilities. If the master plan is implemented as shown, a number of complicated patterns and conflicts will develop. For example, the shower building has altered the manner in which visitors move through the area.

4

SITE DESCRIPTION AND EVALUATION

STRUCTURE EVALUATION

4.50 At every project the maintenance facility receives a high rating for functionality. The dam operator's residence at Leech Lake is an older building, but appears to be well maintained and in excellent repair. The five buildings that house the concessionaires are not well kept. Although aesthetics may not be a primary concern of the concession operators, the condition of their facilities does reflect upon the Corps, since visitors pass these buildings. The architecture of the shower building is pleasing. There is no formal ranger station and the trailer that presently fulfills this function should be replaced. There is no established interpretive structure or program at Leech Lake. Consideration is given to the development of a trail system along the lake edge to inform visitors of the variety of wildlife and vegetation that are associated with a lowland marsh habitat. Presently the only method of information dissemination and display is a bulletin board by the ranger trailer.

LAND USE RELATIONSHIPS

4.51 The relationship of the various activity zones and spaces to one another is fairly direct. The new entry does not completely solve the circulation problems, although the conflict between pedestrian circulation and vehicular circulation as evidenced in the parking lot will be alleviated (see plate 22). The character of the camping area is rustic and provides an overall feeling of privacy. Views, especially from the west and northern fringes of the site are exciting and should be exploited. Until planned development of areas 1 and 2 are implemented, the entry sequence to the camping area through the woods will offer the visitor a very pleasing and scenic entrance. When implementation does occur, a strong visual buffer will be maintained between camping facilities and vehicular circulation.

4.52 The separation between day use area 1 and the existing camping should be reinforced. A stronger physical and visual link needs to be provided between day use area 2 and day use area 1. The concessionaires' area which separates these two activity zones can be an exciting area if redeveloped correctly. Part Two elaborates upon this. No adjacent lands are available for expansion. The major function of the concessionaires is to provide day use visitors, campers, and fishermen with supplies, boat rental charter and guide services. This is the only area that currently has concessionaires.

LAKE WINNIBIGOSHISH RECREATION AREA

LAKE WINNIBIGOSHISH

This area is sited on about 10 acres of land on the east bank of the Mississippi River. From the river there is a moderate slope for a horizontal distance of about 40 feet. A portion of that has been stabilized to prevent erosion. The terrain then levels out creating a fairly flat plateau 6 to 8 feet above average lake level (see figure 4). This plateau was created in part when sand, used as a fill in the coffer dams constructed recently for rehabilitation of the impoundment structure, was deposited in the area. The fill eliminated low marshy areas as well as all brush and undergrowth leaving only a very few trees standing. Another comparatively level area is located adjacent to and about 20 feet higher than the former marsh and present day use area. This elevated camping area is heavily wooded with deciduous trees, conifers and underbrush. A tornado in 1976 caused noticeable damage to the vegetation at this site, but the general character remains unchanged. 4.53

A comparison of the 1967 master plan and "as built" conditions (see plate 23) shows that there has been a considerable variance from the original design intent. Future growth has not been a primary consideration. The area is administered by the Corps of Engineers under a permit granted by the United States Department of the Interior (U.S.D.I.). An adjacent parcel of land northwest of the maintenance area and administered by the U.S. Forest Service contains primitive camping facilities that compliment the facilities provided by the Corps. One of the outstanding characteristics of the recreation area is the existence of many white pines, one of which is said to be over 350 years old, and occasional sightings of bald eagles. 4.54

SOILS

The soils are generally coarse to medium textured forest soils formed as a result of glacial outwash. These Group 9 soils (see figure 19) typically have a moderate capability for recreation. Erosion problems are clearly visible along the east shoreline of Lake Winnibigoshish. 4.55

VEGETATION

The day use area by the picnic shelter and parking lot is basically unvegetated. It has been previously disturbed giving it a high capability rating for recreational activities. The camping area on the upper plateau and the maintenance area are heavily wooded with Pine and mixed hardwoods. This area has a moderate capability for supporting recreational development (see figure 21). 4.56

ACCESS

The highway to the recreation area bisects the site. North of the highway are the dam operator's house and maintenance area. South of the road are the day use and the camping areas. Because of this separation there is a problem of three different access points within a short distance of one another. Signage is adequate but in all cases, too close to the turnoffs. Because the camping area is so close to County Route 9 there is no entry sequence (see plate 23). 4.57

INTERNAL VEHICULAR CIRCULATION

The one-way circulation pattern within the campground functions very well. There is no conflict between day use activities along the shoreline and the camping roadways on the upper plateau because of the strict separation of areas. The greatest inconvenience is that service vehicles must leave one of the three areas and travel along a highway to get to another. Parking, by the picnic shelter, is centrally located for the day use area. 4.58

PEDESTRIAN CIRCULATION

In the camping area most movement is on unpaved trails from the campsites to the vault rest rooms which are centrally located, and from the campsites down a set of stairs to the playground and picnic facilities on the west bank of the Mississippi River (see plate 23). There is little traffic to the maintenance area. There are no interpretive trails. 4.59

STRUCTURE EVALUATION

4.60 The dam operator's residence is in physically good condition, but the style and character does not fit the image of a woodsy campground and recreational facility. The residence and the maintenance building function adequately. Their lack of compatibility with the recreation area is minimized because of their disassociation from the campground and day use areas. The only other structures, not including the dam itself, are the two sets of vault rest rooms and a picnic shelter. There is no ranger station or shower building. The picnic shelter is functional, but ill sited in that it bears no relationship to the site or its surroundings. Its style is questionable and unexciting. A complete review of the day use area is justified to make it more sympathetic to its surroundings. It should have a greater relationship and interface with the camping area and the shoreline of the river. Although movies are occasionally shown at the picnic shelter, there is no interpretive or education facility. Consideration should be given to employing a portion of the existing picnic shelter for information and interpretive display.

LAND USE RELATIONSHIPS

4.61 The type of activities that occur in day use area 1 (see plate 24) has already been discussed. Its relationship to the river needs reorganization. Day use area 2 contains a small amount of parking to accommodate travelers who wish to stop and view the dam. An effort should be made to link these two use areas together. The majority of this area is unvegetated. Future development will attempt to create a more inviting environment that can relate directly to the upper level camping area through the heavily wooded and sloping undeveloped site. A successful effort has been made to create a very private feeling in the camping area. The separation of camping pads through the maintenance and upgrading of existing vegetation adds much to the character of the entire area. A pedestrian linkage to the undeveloped woodlands north of the maintenance area will be considered. The potential exists for developing a boat launch ramp and tailwaters fishing in day use area 1. Potential lookout locations exist in this area and will be a valuable asset to any development.

POKEGAMA LAKE RECREATION AREA POKEGAMA LAKE

The Pokegama Lake Recreation Area is located closer to a major population center (Grand Rapids) than any area in the headwaters. It is a park-like lineal development boarded by the Mississippi River to the south. At its broadest point this area is only 375 feet wide. The terrain of the area in the vicinity of the dam site is comparatively flat with an average elevation which is approximately 10 feet above normal summer pool (see figure 4). 4.62

The availability of recreational facilities is listed in figure 36. There is no additional land held in fee title adjacent to the recreation area for expansion. The majority of the land that has been developed is unwooded, and very manicured in character compared to the surrounding undeveloped landscape across the Mississippi to the south (see plate 25). 4.63

SOILS

Pokegama's soils indicate a low capability for recreation because they are very rocky. The topography has a high capability except for the shoreline along the river. It is fairly steep and eroded by human use and wave action. 4.64

VEGETATION

Vegetation is primarily deciduous, with a scattering of pines. 4.65

WILDLIFE

There are few forms of wildlife present; this may be a result of the high degree of maintenance and proximity to the city of Grand Rapids. 4.66

ACCESS

Access is direct from U.S. Trunk Highway 2 (see plate 25). 4.67

INTERNAL CIRCULATION

The pattern of movement is simple and direct. The system consists of one point of entry off the highway with a major parking lot at the boat launch ramp. The roadway continues through the day use area to another parking lot and on to the camping area ending in a cul-de-sac. The predominance of parking is an indication of the heavy use received from the local residents and vistors at the boat launching ramp. As plate 25 illustrates, movement to the camping area must move through the day use activity area. 4.68

PEDESTRIAN CIRCULATION

Because of the modest size, pedestrian circulation does not pose any major problems. Visitors tend to use the existing roadbed as well as a path that has been worn along the shoreline. This unplanned walkway is problematic and slope stabilization is needed to upgrade both the upstream and downstream banks of the river. Moderate to heavy pedestrian movement across Pokegama dam is a result of visitation to Pokegama Falls Nature Trail which was developed in 1969-1970. This trail was established on property belonging to the Hanna Mining Company through the cooperation of the Itasca County Travel Association, Itasca County Extension Office, Itasca County Land Commissioner's Office, Grand Rapids Chamber of Commerce and the Corps. Refinement of this interpretive trail on the south shore of the Mississippi River should be a high priority. 4.69

STRUCTURE EVALUATION

The only significant structure is the maintenance building. It is partially screened from the east, but needs a greater visual buffer at the entrance to the site to make it a less dominant element in the landscape. A small woodshed has been constructed to store firewood for campers. There is no ranger station anticipated nor does the master plan (1965) project the construction of a picnic shelter or interpretive facility. 4.70

LAND USE RELATIONSHIPS

Except for the problem of vehicular circulation through the day use areas to the camping area, the organization of activities is straightforward and functional (see plate 26). The location of the unscreened parking area near the boat 4.71

launch ramp is problematic in that a vehicular conflict occurs at this entry point. It is unfortunate that day use areas 1 and 2 are bisected by the parking lot and road, but a clear division of activities and a reorganization of spaces can alleviate this inconvenience. There is presently a pedestrian conflict in area 1 as a result of tail water fishing and picnicking being so close together.

There is a possibility that might allow the Corps to develop, with a cooperating non-Federal sponsor (see exhibit D), recreation facilities on the south shore of the Mississippi. This area could allow for a diversity of camping experiences and offer the visitor a choice between the park-like character that presently exists and the more rustic environment that might be created. 4.72

SANDY LAKE RECREATION AREA BIG SANDY LAKE

4.73 Situated on the western edge of the Savanna State Forest, the Sandy Lake dam and Recreation Area is located on the north shore of Big Sandy Lake. The size of this area is approximately 120 acres. A portion of that land downstream from the dam and non operational lock is low, marshy, and subject to flooding. The makeup of the 76 acres on the right bank are relatively level and includes an extensive amount of marsh land not adaptable for conventional recreational activities. The remainder of the site is partially wooded with deciduous trees and low brush.

4.74 Sandy Lake is the only area that has specifically allotted spaces for tent camping. The siting of these facilities in comparison to those proposed in the 1965 plan is illustrated on plate 27 with an inventory of all facilities included in figure 36.

SOILS

4.75 The predominant soil associations belong to the low capability bearing Group 6 (see figure 19). All of the avoidance restrictions categorized by the Soil Conservation Service are partially applicable and are considered parameters in any future development.

VEGETATION

4.76 The low capability rating with respect to vegetation is directly related to the deciduous lowland character of the area and suggests that unnecessary intrusion might severely affect the existing eco-system and wildlife habitats.

WILDLIFE

4.77 Although there are no indications of significant or special forms of wildlife, the ecology of the marshes offers a valuable environment for rice production, lowland and open water mammals, migratory fowl, reptiles, amphibians, and fish.

ACCESS

4.78 The entrance is the most frustrating to the visitor of the headwaters' recreation areas. Signage on Highway 65 is inadequate. It is too small and too close to each of the two separate entrances. The recreation area is one-half mile from the highway and not visible. If one approaches from the north and takes the first entrance he arrives directly in one of the camping areas. If one approaches from the south he arrives at the shower building, dam operator's residence, free camping and day use areas. The dam on the Sandy River that separates these two major land bodies is restricted to pedestrian traffic only (see plate 27).

INTERNAL VEHICULAR CIRCULATION

4.79 The dam on the Sandy River, which is the only internal link between the two major camping areas, is restricted to pedestrian traffic only. This complicates the vehicular circulation by forcing visitors that have entered one camping area where there are no vacant or acceptable campsites available to return to the highway and enter by the other access road. The existing mixture of one-way and two-way road systems further frustrates the visitor.

PEDESTRIAN CIRCULATION

4.80 Pedestrian circulation in this area is less complicated than vehicular circulation. The reason for this is that pedestrians can cross the dam structure. Movement through the site is primarily on the paved roads which connect major activity areas including the interpretive facilities. There are no interpretive trails.

STRUCTURE EVALUATION

4.81 There are a number of structures at Sandy Lake that deserve discussion. The maintenance facility, like that at all the other areas, is functionally adequate. The dam operator's residence just east of the maintenance area is older and not especially significant. The new shower building on the north shore of the lake by the boat ramp is similar in style and function to the facilities at Terry R. Johnson and Ronald Louis Cloutier Recreation Areas. Sandy Lake has a working

interpretive center. The original lock house overlooking the lock on the north shore of the Sandy River provides this function. Near this, and surrounded by camping spurs is the restored foundation of the first schoolhouse in Aitkin County.

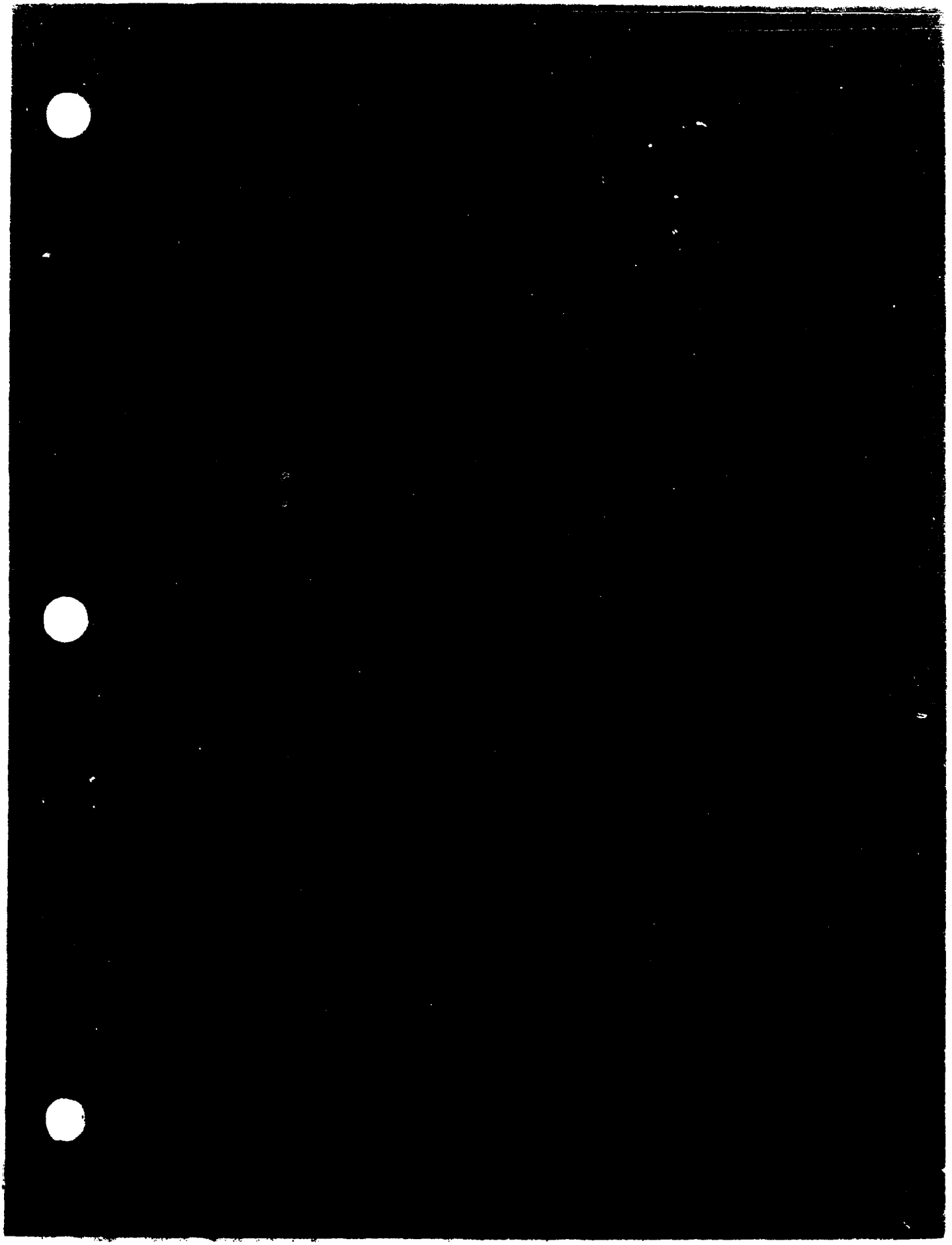
LAND USE RELATIONSHIPS

4.82 There is a lack of activity organization at this area because it is divided by the river (see plate 28). Camping area 1 has a two-way road along its southern periphery bordered by a small number of camping pads on the north side and undeveloped area 1 on the south. This undeveloped area slopes gently down to the river. It is moderately wooded and floods occasionally. There are, however, areas along the road that satisfy the requirements for camping. There is also potential for expanding the interpretive program to include a nature trail through this area.

4.83 The upper loop in camping area 1 is intensely developed with campsites on either side of the road and tent camping spurs to the north. These stretch toward lowland habitats and exhibit fine views. The old schoolhouse foundation should be more clearly identified and accented. Day use area 1 is a conflict point. It occurs at the junction of a parking area, a boat ramp, a vehicular circulation route, and a pedestrian pattern. There is no shower building on the north bank of the river.

4.84 On the south bank of the Sandy River, the camping is situated to take advantage of some marvelous views. There is no tree cover to screen one unit from another. The tent camping on the tip of the peninsula is nicely sited and away from the major conflict that occurs at the intersection of the shower building, dam operator's residence, burial mound and parking lot.

4.85 There is no real day use activity area at Sandy Lake although space is available just south of the shower building. Consideration needs to be given to include a beach area and a circulation system realignment in what is now the free camping area. The area around the maintenance building where the shops and sewage treatment facility are located should be screened from the public and the burial mound made a focal point.



5 RESOURCE USE OBJECTIVES

GENERAL

Resource use objectives are defined as "clearly written statements, specific to a given project, which specify the attainable, publicly acceptable options for resource use determined from study and analysis of resource capabilities and public needs (opportunities and problems)".[1] 5.01

PUBLIC NEEDS AND BENEFITS

The public needs are briefly discussed in the following paragraphs. A more detailed list of needs is found in exhibit C. The public benefits are defined as "tangible or intangible gains to society directly attributed to a water resource project that satisfies the expressed or observed needs of the public."[2] 5.02

During a series of public workshops held during September 20-22, 1976, one at each headwaters project, a cross-section of local residents were invited to express their concerns regarding the existing recreational facilities and their future potential. The participants included private residents, members of the local economic and political organizations, private recreational development operators and representatives of various state and federal agencies. The recreation oriented comments that were obtained during these workshops are listed in exhibit C. Briefly, the comments concentrated on maintaining public access to the six lakes, developing swimming beaches and boat launches where not presently available and a general expansion of the camping and day use area facilities. 5.03

In addition to the public involvement in the determination of needs, a market area assessment was conducted to determine the availability of similar recreational facilities in the headwaters area. Although there are a great number of facilities in the area, the demand is greater than the supply (see figures 56 and 57). 5.04

During the public workshops the participants were asked if they felt that any benefits were derived through association with the recreation areas. The responses were, in most cases, positive. The benefits include economic activity increases due to the influx of visitors during the recreation season (see paragraph 3.13). 5.05

STATEMENT OF OBJECTIVES

Resource use objectives for the six headwaters projects are as follows: 5.06

1. To preserve ecologically or environmentally sensitive areas. These areas shall include unique wildlife habitat or breeding areas.

2. To exclude limited physical capacity areas from development. These include areas where poor soils or severe slopes exist that may be prone to erosion and wetland areas.

3. To provide interpretive areas for the protection, study and viewing of archeological or historically important sites.

4. To provide facilities for water oriented activities such as swimming beaches or boat launches where feasible.

[1] EC 1105-2-65; Resource Use: Establishment of Objectives, paragraph 3.a.

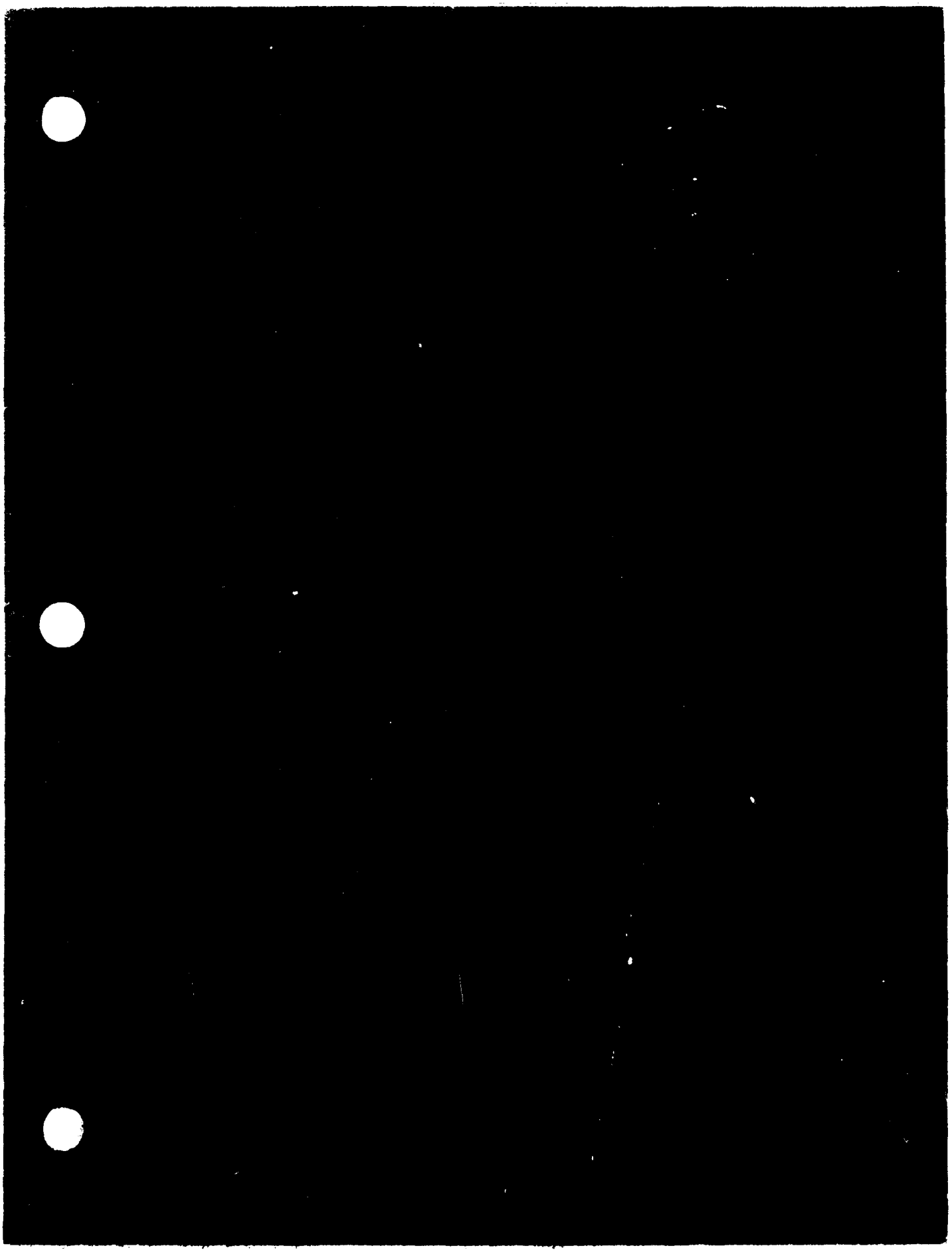
[2] ibid, paragraph 3.c.

5. To provide recreational or educational opportunities at those areas which exhibit potential for such developments.

6. To continually evaluate the effectiveness of management programs to assure sustained user satisfaction.

EVALUATION OF OBJECTIVES

The resource use objectives form guidelines for the development and management of all six recreation areas to obtain the greatest possible public benefits while preserving and enhancing the environmental quality. 5.07



6 RECREATIONAL DEMAND, SUPPLY AND NEED

RECREATION TRENDS

6.01 The increase in demand for recreation as noted in the recent past is expected to continue at a rapid rate. For example, by the year 2000 it is expected that camper visitation will increase five times over and that day use visitation will double. [1] Similar increases in demand are anticipated at the Corps recreation areas and at similar recreation facilities in the headwaters area.

6.02 Equally important as the number of expected visitors to the area is the type of visitors that is expected. Recent trends indicate that there are two distinct groups of recreationists emerging.[2] One being the 'back to nature' type -- those that backpack, hike or canoe and the other type that prefer self-contained, mobile trailers or campers. The recreational experience that these two groups seek is equally distinct. The 'back to nature' type prefers or demands solitude while the self-contained type tends to prefer a more social recreational experience if not by choice then by mere physical constraints imposed by their mobile units. Refer to paragraph 6.07 which explains in greater detail the recreational experience levels that these two groups represent. Experience levels one and two typify the 'back to nature' type while experience levels four and five typify the self-contained unit type.

6.03 The recreation season has been historically limited to fair weather months. With the increased popularity of self-contained mobile units, increased availability of cold weather recreation equipment, and the recent popularity of snowmobiling and cross-country skiing, the typical recreation season has been expanding. The Corps operating season of May to October must be examined to determine the possible need for an extended season.

6.04 As populations, personal incomes and leisure time increase there will be an increased demand for recreation.[3] On the other hand, fuel shortages, if they become severe, will have a marked effect on future recreation increases. This one fact alone may be the determinating factor in the location, type and density of recreational areas in the future.

RELATED RECREATIONAL DEVELOPMENTS

6.05 The recreational facilities available in the headwaters area encompass an extensive range. This range includes camping sites accessible only by backpacking to ultra modern facilities with all the comforts of home. The Corps' recreation areas provide only a portion of this range and even a smaller portion of the total number of facilities available to the recreationist. See figure 40 for other facilities available in the headwaters area.

6.06 Compared to other recreational developments in the region, the Corps' facilities overall rank as a median level of recreational experience. That is, they provide facilities that are not provided in primitive camping areas and they do not provide facilities that are available in ultra-modern camping areas such as electrical, water and sewer hook ups. In general, the more primitive camping areas are provided by the Forest Service and the Minnesota Department of Natural Resources. The ultra-modern areas are usually provided by private recreational developments.

1 Minnesota State Comprehensive Outdoor Recreation Plan - 1974; pages 5-18 to 5-34.

2 ibid; pages 5-19, 20.

3 ibid; pages 5-8.

FIGURE 39 **RECREATIONAL DEVELOPMENTS IN THE HEADWATER AREA***

Recreational Developments	Developments within 50 miles of the following**						Facilities Available***							
	Terry R.Johnson	Ronald L.Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Modern Camping Units	Primitive Camping Units	Picnic Units	Swimming Areas	Boat Accesses	Trails	Electrical Hookups	Dump Stations
Corps of Engineers														
Terry R. Johnson (11 mi.NW of Brainerd on Co.Rd.105)		x					39		7			x		x
Ronald L. Cloutier (22 mi.N.of Brainerd at the village of Cross Lake)	x		x				112		40	2	2			x
Leech Lake (Just W.of Federal Dam on Co.Rd.8)		x		x	x		56		15		1			
Lake Winnibigoshish (14 mi.NW of Deer River on Co.Rd.9)			x		x		20		8					x
Pokegama Lake (3 mi.NW of Grand Rapids on Highway 2)		x	x	x		x	15		31		1	x		x
Sandy Lake (14 mi. N of McGregor on Highway 65)					x		58		15		2			x
State Parks														
Charles Lindbergh (2 mi.S.of Little Falls on Co.Rd.238)	x						52	20	40			x		x
Crow Wing (9 mi. S.of Brainerd on Highway 371)	x	x					101		50		x	x		x
Father Hennepin (1 mi.NW of Isle on Highway 371)	x	x					52		30	x	x	x		x
Lake Bemidji (5 mi.NE of Bemidji on Highway 71)			x	x			113		40	x	x	x	27	x
Mille Lacs Kathio (5 mi.NW of Onamia on Highway 27)	x	x					45	27	40	x	x	x		
Savanah Portage (16 mi.NE of McGregor on Co.Hwy.36)					x	x	62		15	x	x	x		
Schoolcraft (8 mi.S. of Deer River on Highway 6)			x	x	x		38		24		x	x		
State Forests														
Blackduck (10 mi. NE of Bemidji on Highway 7)			x	x										
Bowstring (E.Shore of Leech Lake and surrounding Lake Winnibigoshish)	x	x	x	x	x				13	4	x	x		
Crow Wing (8 mi.NW of Crosby on Highway 6)	x	x	x						33	6	x	x		
Fond du Lac (25 mi.W. of Duluth on Highway 210)						x								
George Washington (30 mi. N. of Grand Rapids on Hwy.65)				x	x				117	51	x	x	x	
Land O' Lakes (35 mi. N. of Crosby on Highway 6)	x	x	x	x	x	x			30	15	x	x	x	
Mississippi Headwaters (8 mi. W. of Bemidji on Highway 2)			x	x					8			x		
Paul Bunyan (15 mi.SW of Bemidji on Hwy 71)	x	x	x						38	14	x	x	x	
Pillsbury (15 mi.W. of Brainerd on Hwy.210)	x	x							16	6	x	x	x	
Savanah (10 mi. N. of McGregor on Hwy.65)	x	x		x	x	x			20	15	x	x	x	
National Forests														
Chippewa (North Central Minnesota)	x	x	x	x	x	x			671	125	x	x	x	

* This list includes only Corps of Engineers Areas, State Parks, State Forests, and National Forests that have recreational facilities available.

** This 50 mile distance refers to 50 road miles via major County Roads or State or Federal Highways.

*** This is only a partial listing of facilities available. See Figure 36 for a more complete list of recreational facilities available at the Corps of Engineers' recreation areas.

6 RECREATIONAL DEMAND, SUPPLY AND NEED

RECREATIONAL EXPERIENCE LEVELS

6.07 The categories of recreational experience levels have been documented by the Forest Service for the evaluation of recreational developments. These experience levels range from Level 1, primitive to Level 5, modern. They are as follows:[1]

Level 1. There is a high degree of basic outdoor skills involved. The feeling of physical achievement in reaching the area without mechanization is important to the user. There are restrictive minimum controls. There is a high degree of opportunity for isolation. There is a feeling of being closely associated with nature. Examples of this type of experience level are backpacking and canoe - camping.

Level 2. There is a feeling of achievement for reaching the area though motorized access is important. There are few restrictive controls. The opportunity to socialize with others is more important than at more primitive experience levels. Examples of this type of experience level are primitive campsites accessible by vehicles.

Level 3. There is a moderate degree of outdoor skills involved. Controls and regulations offer a sense of security although some sense of adventure is still important to the user. The opportunity to socialize is of equal importance to the need for isolation. There is a feeling of being close to nature.

Level 4. There is a moderate degree of outdoor skills involved. Obvious controls and restrictions and a sense of security are important. The user is aware of the opportunity to socialize and realizes isolation is unavailable. There is some opportunity to use contemporary recreational skills such as snow or water skiing. Modern camping areas or small resorts are examples of this experience level.

Level 5. Skills required for basic outdoor activities are minimal. The feeling of security is very important to the user. There is a high degree of opportunity to be gregarious. There is great opportunity to develop or use contemporary outdoor skills such as snow or water skiing, tennis or golf. There is a feeling of being 'next to nature' rather than closely associated with it. Examples of this type of experience level are ultra-modern camping areas or large resorts.

6.08 The Corps' recreation areas may be generally classified as being in experience level three. However, for example, the tent only camping area at Sandy Lake may be classified as being in level two and the entire camping area at Pokegama Lake may be classified as being in experience level four. The six recreation areas have the existing facilities and the future potential to provide a limited range of experience levels and attract varying user types.

6.09 Users seeking the extremes in experience levels have those opportunities available within the headwaters area at facilities provided by other governmental agencies and the private sector.

[1] Obtained from the Recreation Management Plan for the Chippewa National Forest, November 2, 1976.

6

RECREATIONAL DEMAND, SUPPLY AND NEED

HISTORICAL USE PATTERN

The types of users that predominantly visit recreation facilities during the summer are families due to school age members of the family being on summer vacation and favorable weather. The following figure illustrates the percentages of age groups that are campers at the recreation areas: 6.10

FIGURE 40 **AGE OF CAMPERS**[1]

Age	Under 6	6-17	18-30	31-60	Over 60
Percent	12	28	16	36	7

The age distribution and the largest percentages of campers in the under 17 and 31-60 groups would indicate that a majority of these campers are family groups.

The historical pattern of monthly attendance at the Corps' recreation areas is high attendance during the summer months with July accounting for the highest monthly attendance (see figure 41). 6.11

FIGURE 41 **TOTAL VISITATION FOR ALL SIX RECREATION AREAS, 1972–1975**[2]

	Recreation Areas						
	Terry R. Johnson	Ronald Louis Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Total
1972	1,595	64,160	42,240	3,045	44,908	38,384	194,332
1973	42,800	93,600	69,600	85,800	78,500	78,500	448,800
1974	39,869	168,714	81,500	99,266	80,000	73,902	543,251
1975	86,557	209,269	109,206	79,221	81,757	84,933	650,943

[1] Environmental Review of the Headwaters of the Mississippi Reservoir Projects - 1973; p. D-1X-44

[2] Corps of Engineers' R.R.M.S. Visitation Reports

FIGURE 42 **RECREATION AREA VISITATION FOR 1973, 1974 AND 1975**[1]

	Terry R. Johnson	Ronald Louis Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Total
1973							
Day Use	38,345	60,481	64,164	84,157	72,706	69,252	389,105
Camping	4,455	33,119	5,436	1,643	5,794	9,248	59,695
Total	42,800	93,600	69,600	85,800	78,500	78,500	448,800
1974							
Day Use	35,250	127,542	75,376	97,066	73,756	64,667	473,657
Camping	4,619	41,172	6,124	2,200	6,244	9,235	69,594
Total	39,869	168,714	81,500	99,266	80,000	73,902	543,251
1975							
Day Use	77,285	153,756	102,215	75,180	72,783	77,930	578,315
Camping	9,272	36,347	6,991	4,041	8,974	7,003	72,628
Total	86,557	190,103	109,206	79,221	81,757	84,933	650,943

MARKET AREA PROJECTIONS

The market area is defined as the area or zone from which potential users of a facility originate. The market area for the six Corps' recreation areas consists of the entire United States and portions of Canada. It has been observed that both campers and limited day use visitors originate from this market area. 6.12

The majority of visitors originate from within Minnesota and its immediate neighboring states of North and South Dakota, Nebraska, Iowa, Wisconsin, Illinois, Missouri and Kansas. About 55 to 60 percent of persons vacationing in Minnesota are out-of-state residents. Of these, about 90 percent originate from the states mentioned above.[2] 6.13

The market area projections for day use are based on four user origin zones. Origin zone one is 0-25 miles from the recreation area, origin zone two is 26-50 miles, origin zone three is 51-100 miles and origin zone four is 100 miles and beyond. These four zones were established for the six recreation areas. 6.14

[1] Corps of Engineers, 1973, 1974, 1975 R.R.M.S. Visitation Reports

[2] Minnesota State Comprehensive Outdoor Recreation Plan -- 1974; page 5-6.

The dam operators and park rangers were surveyed to determine what percentage of day use visitation originated from the first three user origin zones. This survey was necessary because documented data for the users' place of origin was not available for the base year 1975. The fourth zone, 100 miles and beyond, was assumed to account for 10% of the total day use visitation for each recreation area. This 10% represents long distance travelers that may stop for reasons of picnicking or sightseeing or the very small percentage of users that may travel to a recreation area from greater than 100 miles for day use activities. The percent visitation by origin zone for the six recreation areas is available in figure 44. 6.15

To obtain the population increases within the origin zones it was necessary to document population increases by county within the origin zones (see figure 45). The percent of the particular county within a particular origin zone was determined. The population of the county and the percent of the county within the origin zone were then multiplied. These figures were then totaled to obtain the population within each origin zone. This total zonal population was then multiplied by the percent visitation from the respective origin zones (see figure 46). Population distributions within each county were taken into consideration when determining the population of the portion of the county that fell within each origin zone. 6.18

The market area projections for camping are based upon the assumption that camping visitation originates from all four origin zones and is a certain percent of the total visitation of a recreation area. The percent that represents camping visitation was calculated by averaging the number of reported campers for the years 1973, 1974 and 1975 against the total visitation for the same years. 6.19

Note: Paragraphs 6.16 and 6.17 have been deleted.

These three years were used because accurate data for previous years was unavailable. The following figure illustrates the average percent camping and day use visitation:

FIGURE 43 **PERCENT DAY USE AND CAMPING VISITATION**

Recreation Area	Average Percent of Total Visitation that Are Day Users	Average Percent of Total Visitation that Are Campers
Terry R. Johnson	90%	10%
Ronald L. Cloutier	70	30
Leech Lake	93	7
Lake Winnibigoshish	97	3
Pokegama Lake	92	8
Sandy Lake	90	10

FIGURE 44 **PERCENT DAY USE VISITATION BY ORIGIN ZONE**[1]

The following indicates the percentage of estimated day use visitation by origin zone for the six recreation areas.

Origin Zones in Miles	0-25	26-50	51-100	100 +
Terry R. Johnson	63%	18%	9%	10%
Ronald L. Cloutier	54	29	7	10
Leech	30	33	27	10
Winnibigoshish	27	43	20	10
Pokegama	59	23	8	10
Sandy	29	36	25	10

[1] Survey of the individual dam operators and park rangers and adjusted according to observed patterns in location, proximity to population centers and major circulation routes and proximity to other recreational attractions.

FIGURE 45

POPULATION PROJECTIONS[1]

For Counties Within The First Three User Origin Zones

County	1975 Pop.	1980 Pop.	1990 Pop.	2000 Pop.
Aitkin	12,367	12,342	12,619	12,796
Anoka	175,242	200,335	255,522	305,927
Becker	25,196	26,635	27,590	28,604
Beltrami	28,332	30,210	34,315	37,877
Benton	21,999	23,445	27,000	29,740
Carlton	28,898	29,340	30,877	30,781
Cass	18,799	19,395	21,180	24,071
Chisago	20,313	23,881	33,989	44,847
Clay	49,044	51,787	56,447	59,882
Clearwater	8,479	8,344	8,425	8,277
Crow Wing	37,962	40,149	45,693	50,608
Douglas	24,495	25,950	29,459	33,479
Grant	7,531	7,287	7,168	6,644
Hennepin	958,375	983,448	1,018,119	1,011,147
Hubbard	11,812	12,400	14,200	16,936
Isanti	19,178	21,734	28,964	37,000
Itasca	36,524	36,569	37,746	36,384
Kanabec	11,002	11,769	14,004	16,502
Kandiyohi	31,074	32,169	34,540	35,563
Koochiching	17,597	17,791	18,359	17,804
Lake	13,535	13,700	14,246	13,862
Lake of the Woods	4,169	4,193	4,348	4,245
Mahnomen	5,724	5,619	5,636	5,450
Marshall	13,214	13,003	13,092	12,784
Meeker	19,593	19,702	20,910	21,425
Mille Lacs	16,896	17,702	19,869	22,938
Morrison	27,198	27,266	28,042	27,594
Norman	9,705	9,452	9,398	8,953
Ottertail	47,176	46,961	47,906	47,277
Pennington	14,410	15,117	16,879	18,175
Pine	17,873	18,455	20,067	21,105
Polk	34,920	34,778	35,010	33,677
Pope	11,179	11,168	11,423	11,396
Red Lake	5,265	5,191	5,215	5,128
St. Louis	218,736	217,092	215,047	210,033
Sherburne	22,662	25,526	34,041	45,297
Stearns	100,227	106,343	117,827	126,005
Stevens	11,499	11,583	11,766	11,499
Todd	22,843	22,941	24,052	24,547
Wadena	12,641	12,718	12,823	12,687
Wilkin	9,380	9,288	9,172	8,636
Wright	44,394	51,202	69,526	86,990

[1] State Demographers Office, Minnesota State Planning Agency, November, 1975

FIGURE 46 **POPULATION PROJECTIONS BY PROJECT FOR THE FIRST THREE USER ORIGIN ZONES**

Recreation Area	Origin Zones in Miles	1975 Population	1980 Population	1990 Population	2000 Population
Terry R. Johnson	0- 25	47,204	49,298	54,906	60,049
	26- 50	103,248	105,307	112,084	117,565
	51-100	751,377	795,763	893,272	1,000,144
Ronald L. Cloutier	0- 25	41,643	43,736	49,736	54,564
	26- 50	76,164	77,445	81,972	86,014
	51-100	612,046	636,423	702,202	772,304
Leech Lake	0- 25	11,300	11,607	12,555	13,600
	26- 50	75,414	77,584	89,727	73,684
	51-100	390,749	395,055	406,183	400,067
Lake Winnibigoshish	0- 25	20,727	20,988	22,109	22,470
	26- 50	52,971	54,334	58,518	61,584
	51-100	409,980	413,695	428,395	400,067
Pokegama Lake	0- 25	27,529	27,671	28,777	28,563
	26- 50	80,600	81,052	83,254	83,710
	51-100	401,397	406,416	423,486	426,223
Sandy Lake	0- 25	24,517	24,489	24,323	24,615
	26- 50	131,505	133,785	141,153	145,486
	51-100	472,905	490,697	539,747	584,126
Totals		3,731,276	3,845,350	4,151,877	4,354,835

Example calculation:

Pine River, 0-25 mile origin zone, target year 1980

Projected population by county x percent of county within the origin zone = total projected population within the origin zone. Then total the figures for all counties.

Aitkin County	12,342 x 15% = 1,851
Cass County	19,395 x 40% = 7,758
Crow Wing County	40,149 x 85% = 34,127
Total	43,736

PROJECTED DEMAND

The projected visitor demand methodology is closely related to the market area projections discussed in paragraphs 6.12 through 6.19. Due to the nature of the activities and project market area characteristics, day use and camping demand projections are calculated separately. 6.20

The projected day use visitor demand was calculated according to origin zones, origin zone projected populations, and per capita use rates. Per capita use rates are defined as the number of times an individual from an origin zone will visit the facility. For example, if the per capita use rate for an origin zone is 2, it is anticipated that all persons within that origin zone will visit the facility twice during the recreation season. This does take into account that some individuals from an origin zone may never visit the recreation area while other individuals may visit it many times. To calculate the base year, 1975, per capita use rates, the visitation of each origin zone is divided by the population from the same origin zone. The visitation from origin zone four, 10%, was subtracted from the annual visitation prior to this calculation. See figure 50 for the projected per capita use rates. 6.21

FIGURE 47

DAY USE VISITATION BY ORIGIN ZONE FOR 1975

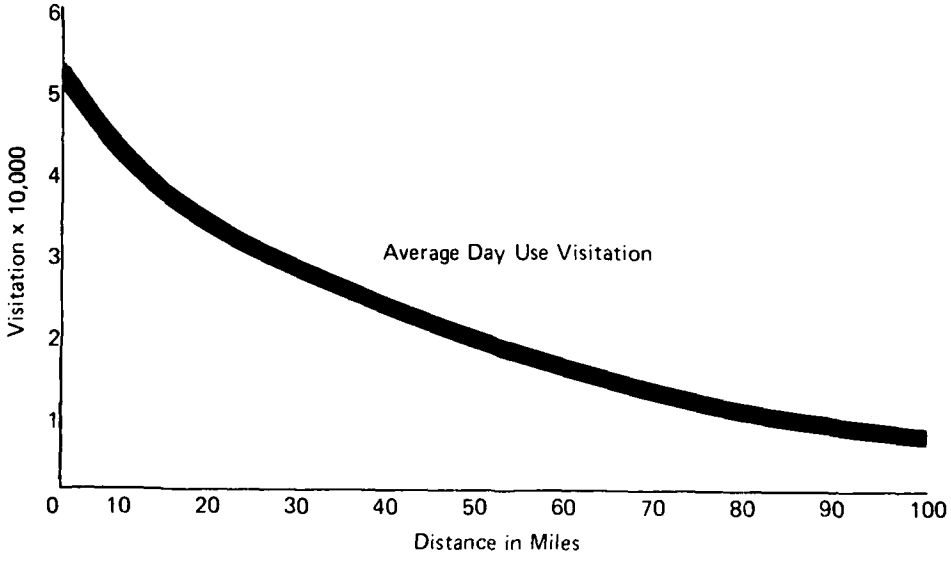
Recreation Area	Total Day Use Visitation For 1975*	Percent Visitation and Visitation by Origin Zone							
		0-25 Miles		26-50 Miles		51-100 Miles		100+ Miles	
		%	Visitation	%	Visitation	%	Visitation	%	Visitation
Terry R. Johnson	77,285	63	48,690	18	13,911	9	6,955	10	7,729
Ronald Louis Cloutier	153,756	54	83,028	29	44,589	7	10,763	10	15,376
Leech Lake	102,215	30	30,665	33	33,731	27	27,597	10	10,222
Lake Winnibigoshish	75,180	27	20,299	43	32,327	20	15,036	10	7,518
Pokegama Lake	72,783	59	42,942	23	16,740	8	5,823	10	7,278
Sandy Lake	77,930	29	22,600	36	28,055	25	19,482	10	7,793
Totals	578,315		248,224		169,353		85,656		55,916

* Corps of Engineers' 1975 Visitation Reports

FIGURE 48

AVERAGE DAY USE VISITATION CURVE FOR ALL SIX RECREATION AREAS FOR 1975

The following graphically illustrates the average visitation for each origin zone for all six recreation areas as compared to the distance from an area.



The data used in the projected day use demand calculations is the percent visitation by origin zone, the projected population by origin zone and the percent increase in demand for day use activities as obtained from the Minnesota State Comprehensive Outdoor Recreation Plan -- 1974, trend data. The percent increase in demand is the anticipated future increase of activity occasions of day use activities (see figure 49). 6.22

FIGURE 49 **PERCENT INCREASE IN DEMAND FOR CAMPING & DAY USE**

Activity	% Increase of Participation Rate per Capita			
	1975	1980*	1990*	2000**
Camping	--	25%	75%	125%
Day Use				
Picnicking	--	5%	15%	25%
Fishing	--	2.5%	9%	17%
Swimming	--	10%	30%	50%
Boating	--	30%	90%	150%
Canoeing	--	10%	33%	55%
Average % increase		11.5%	35.4%	59.4%

* Minnesota State Comprehensive Outdoor Recreation Plan - 1974, pp. 5-18 through 5-33.

** Projection beyond the information obtained from SCORP based on extrapolation of given trends.

6.23 The projected day use demand was determined to be the projected population of the origin zones multiplied by the per capita use rate of the zone. To incorporate the average percent increase for day use as projected by the Minnesota State Comprehensive Outdoor Recreation Plan -- 1974, into the calculations, the base year 1975 per capita use rates were adjusted (see figure 50). To determine the projected per capita use rate, the 1975 figure is multiplied by the average percent increase. The resultant day use demand projections are found in figure 51.

6.24 The projected camper demand was calculated by using the projected day use demand. As previously discussed in paragraph 6.19, it was assumed that camper demand can be calculated by applying a certain percent of the total demand. The percents that represent camper visitation as compared to total visitation can be found in figure 43.

6.25 The data used to calculate the camper demand is the total day use demand by recreation area for each target year, the average percent of the total demand by recreation area that are campers and the percent increase in demand for camping as obtained from the Minnesota State Comprehensive Outdoor Recreation Plan -- 1974. The percent increase in demand for camping is the anticipated future increase of activity occasions for camping (see figure 49).

6.26 The projected camper demand was determined to be the total projected day use demand by recreation area multiplied by the percent of the total demand that are campers and then adjusted by multiplying the percent increase in demand for camping. The projected camper demand is found in figure 52. The total projected demand for both day use and camping for all six recreation areas shown as visitor days is as follows:

Target Year	Total Projected Demand
1980	774,390
1990	1,099,305
2000	1,455,134

FIGURE 50 **PROJECTED PER CAPITA USE RATES FOR DAY USE**

Recreation Area	Origin Zone	1975 Visitation	1975 Population	1975 PCUR**	1980 PCUR**	1990 PCUR**	2000 PCUR**
Terry R. Johnson	0- 25	48,690	47,204	1.03	1.15	1.39	1.64
	26- 50	13,911	103,248	0.13	0.14	0.18	0.21
	51-100	6,955	751,377	0.01	0.01	0.01	0.02
	100+*	7,729			1.115	1.354	1.594
Ronald Louis Cloutier	0- 25	83,028	41,643	1.99	2.22	2.69	3.17
	26- 50	44,589	76,164	0.59	0.66	0.80	0.94
	51-100	10,763	612,046	0.02	0.02	0.03	0.03
	100+*	15,376					
Leech Lake	0- 25	30,665	11,300	2.71	3.02	3.37	4.32
	26- 50	33,731	75,414	0.45	0.50	0.61	0.72
	51-100	27,597	390,749	0.07	0.08	0.09	0.11
	100+*	10,222					
Lake Winnibigoshish	0- 25	20,299	20,727	0.98	1.09	1.33	1.56
	26- 50	32,327	52,971	0.61	0.68	0.83	0.97
	51-100	15,036	409,980	0.04	0.04	0.05	0.06
	100+*	7,518					
Pokegama Lake	0- 25	42,942	27,529	1.56	1.74	2.11	2.49
	26- 50	16,740	80,600	0.21	0.23	0.28	0.33
	51-100	5,823	401,397	0.01	0.01	0.01	0.02
	100+*	7,278					
Sandy Lake	0- 25	22,600	24,517	0.92	1.03	1.25	1.47
	26- 50	28,055	131,505	0.21	0.23	0.28	0.33
	51-100	19,482	472,905	0.04	0.04	0.05	0.06
	100+*	7,793					

* A per capita use rate was not determined for the 100+ mile origin zone due to the large population within the zone. The day use visitation from this zone was assumed to be 10% of the total day use visitation.

** PCUR = per capita use rate. The average percent increase for day use for 1980 is 11.5%, for 1990 is 35.4% and for 2000 is 59.4%. See figure 49.

Example calculation:

The 1975 PCUR for Leech Lake for the 0-25 mile origin zone is calculated as follows:
The estimated day-use visitation from the 0-25 mile origin zone divided by the estimated population form the same zone = 1975 PCUR
30,665 divided by 11,300 = 2.71

The PCUR for Leech Lake for the 0-25 mile origin zone for 1980 is calculated as follows:
1975 PCUR for the 0-25 mile origin zone x percent increase in demand = 1980 PCUR
2.71 x 11.5% = 3.02

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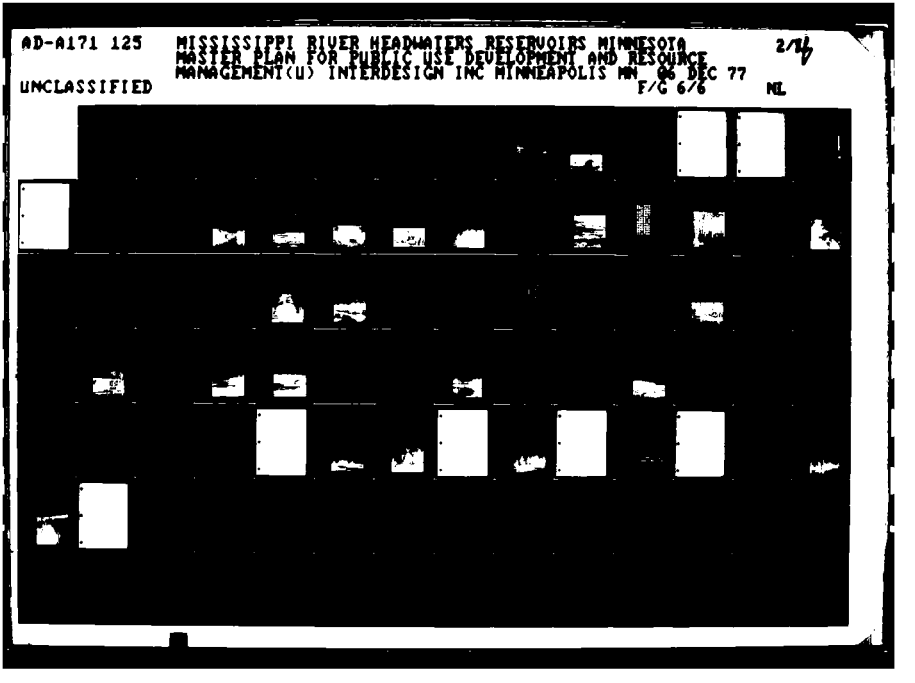


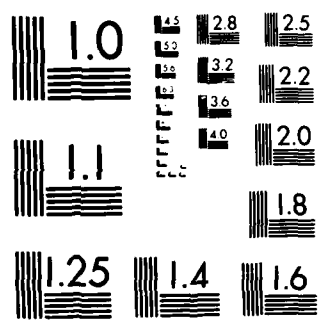


FIGURE 51 **DAY USE DEMAND PROJECTIONS**

Recreation Area	Origin Zone	1975 PCUR	1975 Visitation	1980 PCUR	1980 Demand	1990 PCUR	1990 Demand	2000 PCUR	2000 Demand
Terry R. Johnson	0- 25	1.03	48,690	1.15	56,693	1.39	76,319	1.64	98,480
	26- 50	0.13	13,911	0.14	14,743	0.18	20,175	0.21	1 24,689
	51-100	0.01	6,955	0.01	7,958	0.01	8,933	0.02	20,003
	100+**		7,729		8,822		11,714		15,908
	Total		77,285***		88,216		117,141		159,080
Ronald Louis Cloutier	0- 25	1.99	83,028	2.22	97,094	2.69	133,790	3.17	172,968
	26- 50	0.59	44,589	0.66	51,114	0.80	65,578	0.94	80,853
	51-100	0.02	10,763	0.02	12,728	0.03	21,066	0.03	23,169
	100+**		15,376		17,882		24,493		30,777
	Total		153,756***		178,818		244,927		307,767
Leech Lake	0- 25	2.71	30,665	3.02	35,053	3.67	46,077	4.32	58,752
	26- 50	0.45	33,731	0.50	38,792	0.61	54,733	0.72	53,752
	51-100	0.07	27,597	0.08	31,604	0.09	36,556	0.11	44,007
	100+**		10,222		11,717		15,263		17,312
	Total		102,215***		117,166		152,629		173,123
Lake Winnibigoshish	0- 25	0.98	20,299	1.09	22,877	1.33	29,405	1.56	35,053
	26- 50	0.61	32,327	0.68	36,947	0.83	48,570	0.97	59,736
	51-100	0.04	15,036	0.04	16,548	0.05	21,420	0.06	24,040
	100+**		7,518		8,485		11,044		13,199
	Total		75,180***		84,858		110,439		131,992
Pokegama Lake	0- 25	1.56	42,942	1.74	48,148	2.11	60,719	2.49	71,122
	26- 50	0.21	16,740	0.23	18,642	0.28	23,311	0.33	27,624
	51-100	0.01	5,823	0.01	4,064	0.01	4,235	0.02	8,524
	100+**		7,278		7,873		9,807		11,919
	Total		72,783***		78,727		98,072		119,189
Sandy Lake	0- 25	0.92	22,600	1.03	25,224	1.25	30,404	1.47	36,184
	26- 50	0.21	28,055	0.23	30,771	0.28	39,523	0.33	48,010
	51-100	0.04	19,492	0.04	19,628	0.05	26,987	0.06	35,048
	100+**		7,793		8,403		10,768		13,249
	Total		77,930***		84,026		107,682		132,491
TOTALS			559,149		631,811		830,890		1,023,642

* PCUR = per capita use rate. See figure 50.

** The projected day use demand for the 100+ mile origin zone was assumed to be 10% of the total day use visitation for the area.

*** The 1975 day use visitation figures exceed the maximum use capacities for day use at all six recreation areas. See figure 54 and paragraphs 6.27 through 6.43.

Example Calculation:

The day use demand for Terry R. Johnson recreation area for the 0-25 mile origin zone for 1980 is calculated as follows:

1980 projected population for the 0-25 mile origin zone x the 1980 PCUR for the same zone = 1980 day use demand for the 0-25 mile origin zone.
49,298 x 1.15 = 56,693

FIGURE 52 **CAMPER DEMAND PROJECTIONS**

Recreation Area	Average Percent of Total Visitation That Are Campers*	1975 Visitation	Demand 1980 (x 25%)	Demand 1990 (x 75%)	Demand 2000 (x 125%)
Terry R. Johnson	10	9,272	12,252**	22,777	39,770
Ronald Louis Cloutier	30	36,347**	95,795	183,695	296,775
Leech Lake	7	6,991	11,024	20,104**	29,319
Lake Winnibigoshish	3	4,041	3,281	5,977**	9,185
Pokegama Lake	8	8,974**	8,557	14,924	23,320
Sandy Lake	10	7,003	11,670	20,938**	33,123
Totals		72,628	142,579	268,415	431,492

* See figure 43.

** Exceed the maximum use capacities for camping at the particular recreation area. By the year 1990 all six areas will have exceeded the maximum use capacities. See figure 54 and paragraphs 6.34 through 6.42.

Example Calculation:

The camper demand for the Terry R. Johnson recreation area for 1980 is calculated as follows:

Total day use demand for 1980 for Terry R. Johnson recreation area x the average percent of total visitation that are campers x the average percent increase in camping for 1980 = 1980 total camper demand.

$$\left(\frac{88{,}216 \times 0.10}{0.90}\right) \times 1.25 = 12{,}252$$

EVALUATION OF DEMAND AND EXISTING SUPPLY

The projected demand must be tempered by physical, economic and social variables. The demand figures are merely the statistical projections for demand based on current and projected population trends, current project visitation estimates and projected trends in recreation activity use based on current and historical trends. 6.27

It is assumed that the population will increase as illustrated. As recreation trends change it must be assumed that the projected demand may also change. The statistical projections provided the best guidelines available under the constraints of this report to determine the level of development which best meets the needs of the public while maintaining the integrity of the resource. 6.28

Based upon the great projected demand for recreation it appears only logical to assume that attendance will increase. The limiting factor will be the capacity of the existing recreational facilities and resources. 6.29

To determine the capacity or the maximum practical use for the six individual recreation areas, a number of variables must be considered. These variables are incorporated into the following design standard formula: 6.30

$$\frac{U \times PU \times T \times S}{\%WD \times \%S} = \text{Annual Activity Occasions}$$

Where:
U = Units or activity spaces
PU = Persons per unit or group size
T = Daily turnover rate
S = Number of weeks in the recreation season
%WD = Percent of weekly activities that occurs on a weekend day
%S = Percent of a particular activity that occurs during the recreation season

Two constants for all six recreation areas appear in this formula. They are 'PU' which is assumed to be 3.8[1] persons per unit or group and 'S' which is 19[2] weeks.

The existing maximum use capacities can be calculated for camping, picnicking, swimming, fishing, boating, water supply, liquid waste, and solid waste.[3] The data used for the variables in the formula are obtained from figure 36, Recreation Area Facilities, which assigns values to the symbol U and the following figure which assigns values to the symbols T, daily turnover rate; %WD, percent of weekly activities that occurs on a weekend day; and %S, percent of a particular activity that occurs during the recreation season. 6.31

FIGURE 53 **MAXIMUM USE CAPACITY FORMULA VARIABLES***

Activity	Variables[4]		
	T	%WD	%S
Camping	1	30%	90%
Picnicking	2	35%	90%
Fishing	2	30%	70%
Boating	2	35%	95%
Swimming	2.5	35%	100%

* These variables apply for all six recreation areas.

The U value for camping is the number of camp pads at each recreation area. The U value for picnicking is the number of picnic tables at each site. The U value for swimming is the total square footage of beach area divided by 50 square feet per user.[5] Once all the values for the formula are known the maximum use capacities for camping, picnicking and swimming can be calculated directly. 6.32

[1] Standard figures used by St. Paul District.

[2] Minnesota State Comprehensive Outdoor Recreation Plan -- 1974.

[3] Capacity calculation data is available for these items only. The data for these activities or facilities are standard figures used by the St. Paul District.

[4] Standard figures used by the St. Paul District.

[5] ibid.

Because the Corps cannot control access to the six lakes, an accurate determination of activity capacities for lake oriented activities cannot be made. One way of measuring the maximum use capacity of activity occasions provided is by using the number of parking spaces provided for lake oriented activities. The maximum use capacities for boating and fishing can be calculated by first determining the number of parking spaces available for these two activities and then apply an appropriate percentage of usage for the two activities. 6.33

The percentages for boating and fishing were determined by dividing a typical 18 hour recreation day into three equal parts: 5 A.M. - 11 A.M., 11 A.M. - 5 P.M., and 5 P.M. - 11 P.M. For each time period a percentage was assigned to each of the two activities that would normally occur during the time period. These assignments are based on observation and experience of use patterns in the headwaters area. For example, assuming the number of cars in a 100 car parking lot is proportional to the percentage of activities occurring, the number of spaces allocated to each activity would be as follows: 6.34

Activity	Morning		Midday		Evening	
	Percent	Spaces	Percent	Spaces	Percent	Spaces
Fishing	35%	87	20%	20	45%	75
Boating	5%	13	80%	80	15%	25

The average is 60% for fishing and 40% for boating. This is determined by adding the number of spaces for each activity and dividing by the total number of spaces available (300).

The input into the sanitary sewer system is determined by totaling the number of users calculated by the maximum use capacity formula and multiplying by the estimated quantities of water usage, and liquid waste and solid waste generation per year. 6.35

The estimated quantities, expressed in gallons or pounds per visitor per day, are as follows:

Activity	Water* Usage (Gallons)	Liquid* Waste Generated (Gallons)	Solid Waste Generated (Pounds)
Camping (water borne)	30	30	0.92
Camping (vault type)	10	10	0.92
Day Use:	10	10	
Picnicking			0.93
Fishing			0.096
Boating			0.08
Swimming			0.04

* It is assumed that all water used returns to the sewer system, therefore, water usage and liquid waste generated is equal.

By multiplying these values times the number of users calculated by the maximum use capacity formula, the estimated quantities for water usage and waste generation can be determined. The total quantity of sewage introduced into the sewer system is the liquid waste figures plus the solid waste figures. The maximum use capacity for the existing sanitary sewer treatment plants is given at 13,500 gallons per day or 1,795,500 gallons per recreation season.[1] 6.36

[1] Operations and Maintenance Branch, St. Paul District.

6 RECREATIONAL DEMAND, SUPPLY AND NEED

The maximum use capacities or the existing maximum supply for recreation activity occasions is found in figure 54. The figures listed by activity for the six recreation areas, represent the total capacity of recreational facilities for satisfying annual activity occasions. 6.37

The maximum use capacities are also shown in figure 51, Day Use Demand Projections, and figure 52, Camper Demand Projections. In these two figures, the year in which the day use and camper demand exceeds the capacity is indicated. 6.38

Several clarifications must be made. First, all six recreation areas exceed the estimated day use capacity in 1975. The capacities for day use were calculated by using the recreational activities of picnicking, swimming, boating and fishing. Other activities not included in the calculations due to the lack of data are sightseeing and pleasure driving. It must be assumed that the 1975 demand for day use recreation exceeds the existing supply. Second, the 1975 camper visitation at Ronald L. Cloutier and Pokegama Lake recreation areas exceeds the estimated camper capacity. This is due to the 1975 policy of allowing campers to use parking lots and overflow areas for overnight camping. Even though the demand for camping at these two areas has not decreased, this policy is no longer in effect. 6.39

DETERMINATION OF NEEDS

The capacity of the existing recreational facilities to meet the estimated demand has been exceeded for day use at all six recreation areas and for camping at two areas. By the year 1990, it is expected that demand for camping will exceed capacity at all recreation areas. Figure 55 graphically illustrates the estimated total demand, the existing supply and the estimated need for additional facilities. 6.40

Another item that bears consideration is the number of camper turnaways that each recreation area experienced during 1975. A camper turnaway is defined as a vehicle or group that is denied access to an area because all the available camping spaces are occupied. The capacities shown in figure 54 represent the total annual capacity and do not indicate peak day demands. Peak recreation days are considered to be Memorial Day, Independence Day, and Labor Day. Although only two areas exceed the estimated annual capacity, all recreation areas have experienced total occupancy due to peak day demand. The following table indicates the number of turnaways: 6.41

Recreation Area	Number of Turnaways in 1975[1]
Terry R. Johnson	202
Ronald L. Cloutier	817
Leech Lake	20
Lake Winnibigoshish	195
Pokegama Lake	1182
Sandy Lake	120

These demand and supply comparisons relate only to Corps recreation areas. The existing supply for all types of recreation developments in the headwaters area is found in figure 56. The estimated deficiencies or surpluses of recreational facilities of all types is found in figure 57. It should be noted from figure 57, that there is a need for expansion of all types of recreational developments at present and the need for additional facilities is expected to increase. 6.42

[1] Corps of Engineers' 1975 Visitation Reports

FIGURE 54 **MAXIMUM USE CAPACITIES BY ACTIVITY FOR THE RECREATION AREAS***

The following maximum use capacities or existing supply of recreation facilities are expressed in annual activity occasions. The units are defined as camp sites for camping, picnic tables for picnicking, beach area for swimming, and parking spaces for parking, fishing and boating.

Recreation Area	Terry R. Johnson	Ronald L. Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake
Day Use **						
Capacity	7,335	125,730	36,204	11,231	50,510	53,800
Camping						
Units	39	112	56	20	15	58
Capacity	10,429	29,950	14,975	5,348	4,011	15,510
Picnicking						
Units	7	40	15	8	31	15
Capacity	3,209	18,337	6,876	3,667	14,211	6,876
Swimming						
Units		140				
Capacity		72,200				
Parking						
Units	10	60	50	18	62	80
Fishing ***						
Units	6	36	30	11	37	48
Capacity	4,126	24,754	20,629	7,564	25,442	33,006
Boating ***						
Units		24	20		25	32
Capacity		10,439	8,699		10,857	13,918
Water Use and Liquid Waste						
Gallons	386,220	2,155,800	811,290	165,790	545,210	1,003,300
Acre-feet	1.19	6.62	2.49	0.51	1.67	3.08
Solid Waste						
Pounds	12,975	50,706	22,848	9,056	20,217	24,946
Gallons	10,832	42,330	19,074	7,560	16,881	20,825
Acre-feet	0.03	0.13	0.06	0.02	0.05	0.06

* See figure 51 and 52 to determine at what point the six recreation areas have exceeded their maximum use capacities.

** The day use maximum use capacity was obtained by totaling the capacities for picnicking, swimming, fishing and boating.

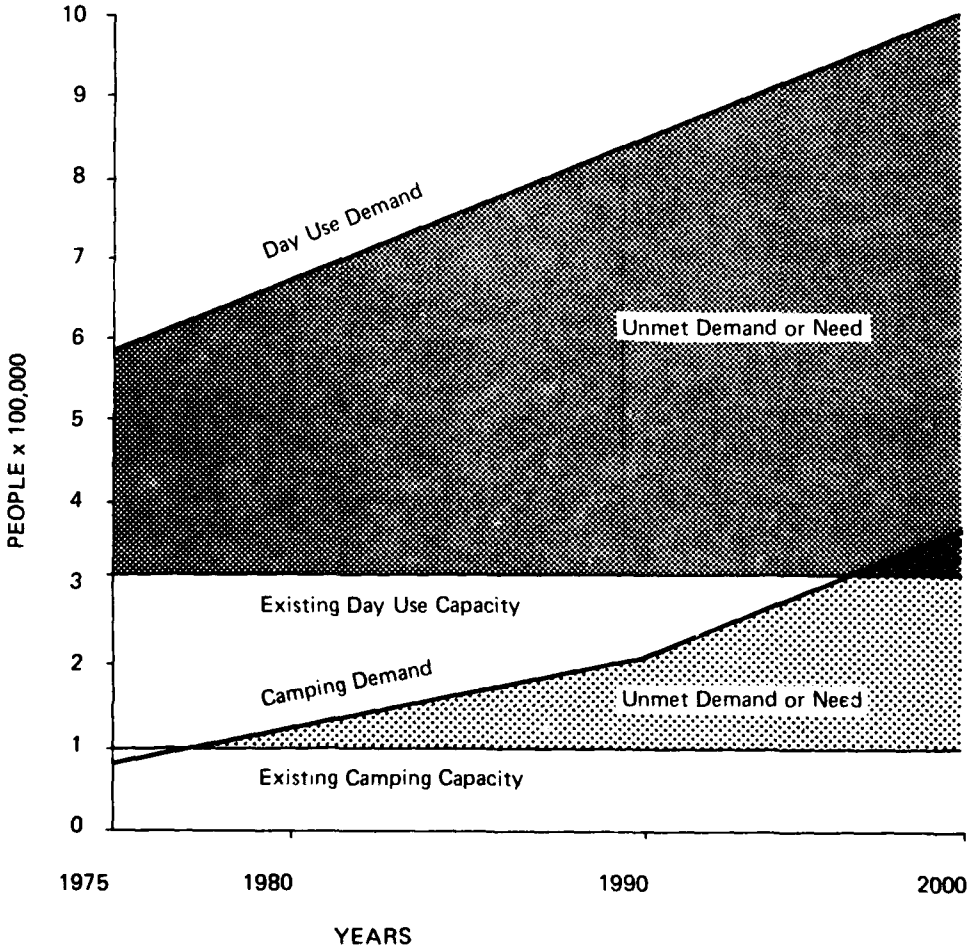
*** The maximum use capacities for fishing and boating were calculated by determining the number of parking spaces available for the two activities.

The formula used to calculate the maximum use capacities may be found in paragraph 6.30.

In addition to the statistical estimations for demand and supply there is also an expressed need for certain recreational facilities based on public demand. Briefly, the needs expressed by the public during the workshops concentrated on maintaining or expanding public access to the six lakes, developing boat accesses and swimming beaches where not currently available, an extension of the seasonal operating policies, an addition of winter type trails and a general expansion of both day use and camping areas and facilities. A detailed summary of the comments obtained at the public workshops is found in exhibit C. 6.43

FIGURE 55 **TOTAL CAMPING AND DAY USE DEMAND, SUPPLY AND NEEDS**

The following graphically illustrates the total projected day use and camper demand for all six recreation areas, the existing total supply of day use camper facilities for all six recreation areas and the resultant need for additional facilities to meet the estimated demand.



See figure 51, Day Use Demand Projections, figure 52, Camper Demand Projections and Figures 54, Maximum Use Capacities.

FIGURE 56 **RECREATIONAL FACILITY INVENTORY BY COUNTY** [1]

The following indicates the quantity of recreational facilities existing in the headwaters area by county:

Facility	Wadena County	Todd County	Crow Wing County	Cass County	St. Louis County	Itasca County	Aitkin County	Hubbard County	Clearwater County	Beltrami County
Tent camping (no. sites)	---	9	337	308	212	53	37	84	131	34
Vehicular camping (no. sites)	91	127	1079	1670	902	1133	542	736	712	631
Picnic tables (total no.)	237	72	304	394	825	432	105	219	413	328
Equestrian trails (miles)	28	5	9	39	---	47	11	86	---	18
Snowmobile trails (miles)	28	30	22	123	327	298	241	186	96	92
Hiking trails (miles)	28	8	62	238	70	121	88	108	27	64
Bicycle trails (miles)	---	7	29	50	---	37	1	18	---	6
Multi-use trails (miles)	28	7	49	94	41	119	74	133	---	51
Nature trails (miles)	3	---	15	9	4	12	2	30	3	8
Golf course (total no.)	1	2	13	6	18	4	2	2	2	3
Swimming beaches (total no.)	3	22	180	240	106	134	52	89	4	81
Boat accesses (total no.)	14	34	125	209	203	186	88	87	34	93
Marinas (capacity)	3	25	144	223	100	121	51	76	4	86
Ski areas (total no.)	---	1	1	1	5	2	1	1	---	1

[1] Minnesota State Comprehensive Outdoor Recreation Plan - 1974 pp. A1-12

FIGURE 57 **RECREATIONAL FACILITY DEFICIENCIES (-) OR SURPLUSES (+) FOR SCORP REGION 3 AND REGION 5[1]**

The following indicates the quantity of recreational facilities and the land required for those facilities that are estimated to be deficient or in surplus in the headwaters area projected to 1990:

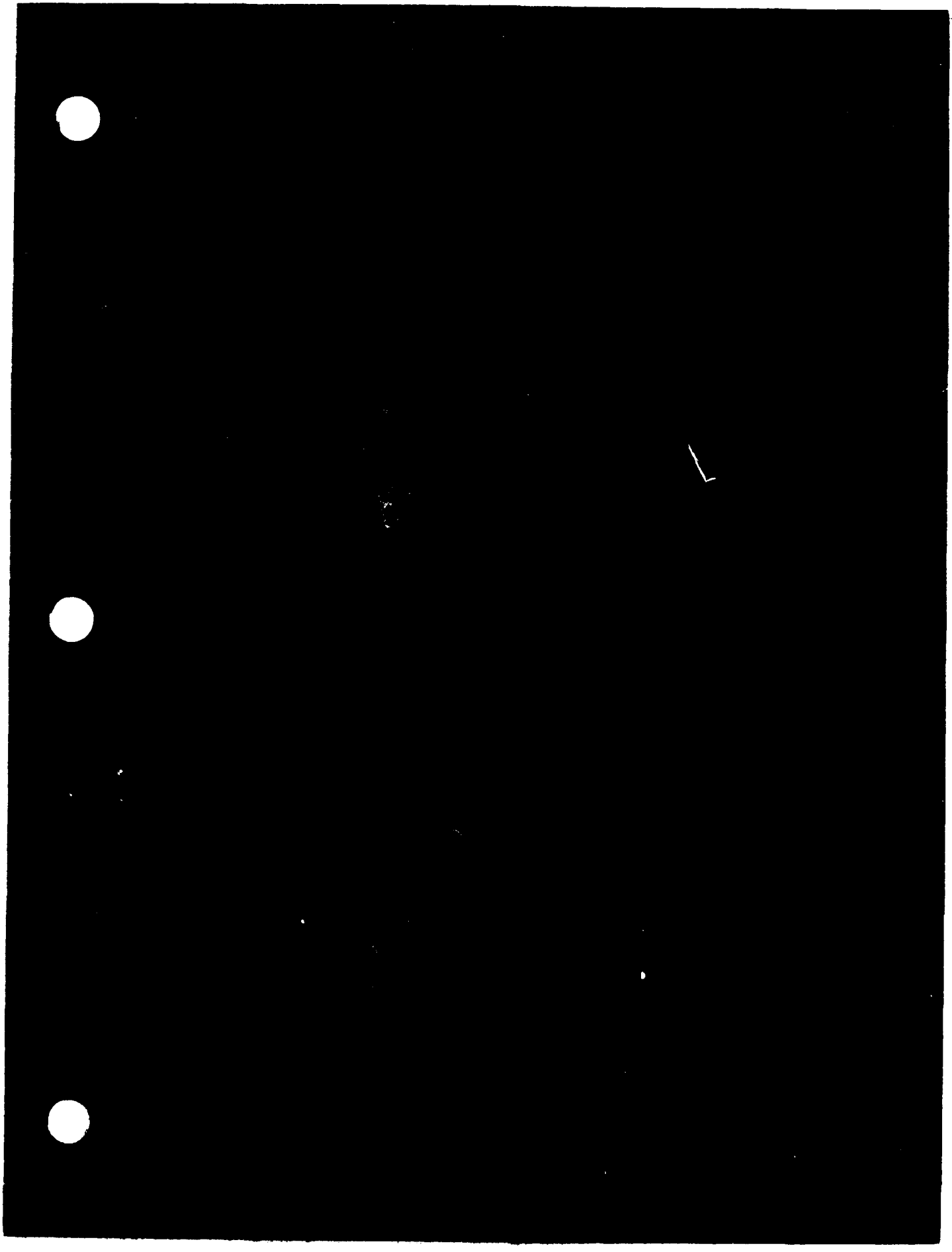
A. Aitkin, Carlton, Cook, Itasca, Koochiching, Lake and St. Louis Counties

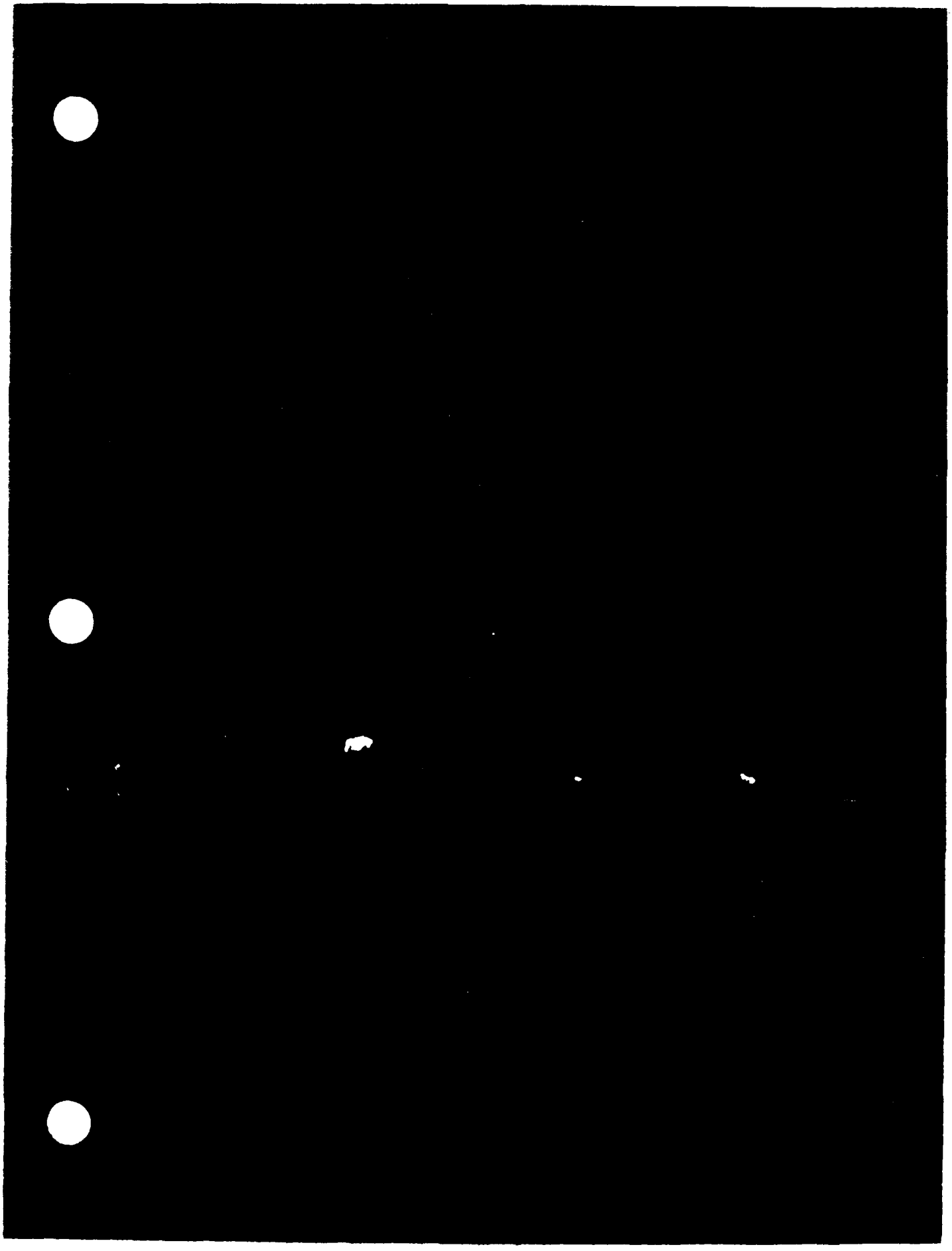
	Swimming	Camping	Picnicking	Water Access	Snow Trails	Hiking Trails
1975:						
Units	+ 80.6	- 790	-1,321	- 110	- 274	+ 438
Acres	--	- 198	- 132	- 550	--	--
1980:						
Units	+ 75.6	-2,487	-1,470	--	--	--
Acres	--	- 622	- 147	--	--	--
1990:						
Units	+ 65.3	-5,527	-1,762	--	--	--
Acres	--	-1,381	- 176	--	--	--

B. Cass, Crow Wing, Morrison, Todd, Wadena Counties

	Swimming	Camping	Picnicking	Water Access	Snow Trails	Hiking Trails
1975:						
Units	+143.0	- 141	- 785	- 100	- 587	+ 224
Acres	--	- 35	- 78	- 500	--	--
1980:						
Units	+137.8	-1,208	- 879	--	--	--
Acres	--	- 032	- 88	--	--	--
1990:						
Units	+128.3	-2,635	-1,055	--	--	--
Acres	--	- 659	- 106	--	--	--

[1] Minnesota State Comprehensive Outdoor Recreation Plan - 1974
P 6 - 13 from 1976 projections
The units in this table refer to: Swimming, water acres; Camping, sites; Picnicking, tables; Water Access, number of lakes; Snow Trails, miles; Hiking Trails, miles.
The acres in this table refer to the number of acres required to support any deficiencies in recreational activities based on area standards from the Minnesota State Comprehensive Outdoor Recreation Plan - 1974.





7 ASSUMPTIONS, IMPLICATIONS AND CONSTRAINTS

GENERAL

The following assumptions, implications and constraints, together with the analysis in Part One, provide the framework for the plans proposed in Part Two. Assumptions summarize and interpret what was learned during the analysis. Implications are the resulting effects suggested by the assumptions. Each assumption has a definite implication. Constraints are limiting factors and may apply to one or several implications. 7.01

Figure 58 lists the assumptions, their implications and constraints. The shaded area designates which constraint(s) apply to the assumptions and implications. 7.02

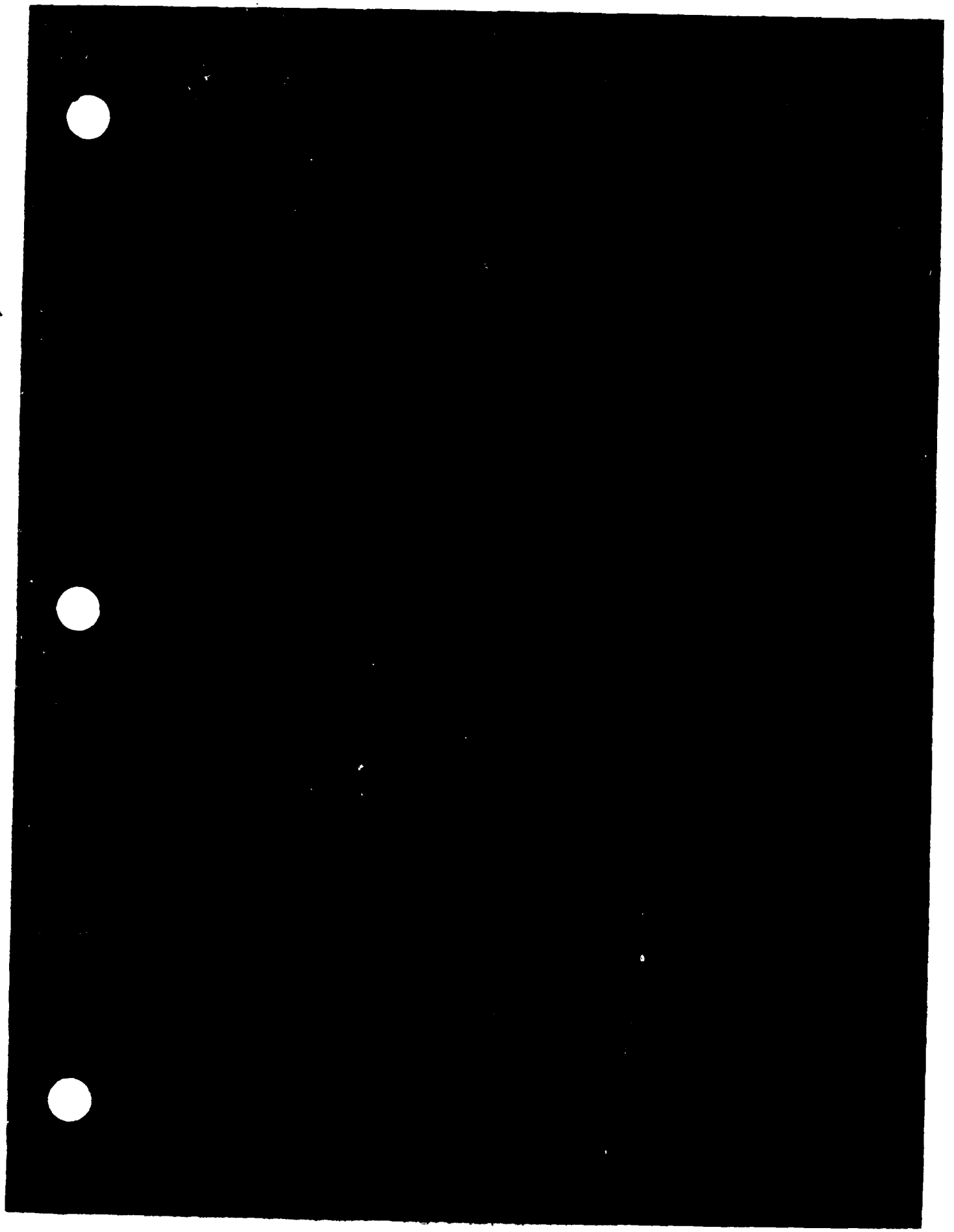
FIGURE 58 **ASSUMPTIONS, IMPLICATIONS AND CONSTRAINTS**

Assumptions	Implications	Constraints *				
		1	2	3	4	5
The resource use objectives as described in Section Five will be implemented where possible.	The preservation and interpretation of project resources and the development and continuing evaluation of public use facilities will occur.	■	■			
Recreational demand at the Headwaters' recreation areas will increase as projected.	Additional recreational facilities are necessary to meet the anticipated demand.	■	■			
There is no interest by non-federal sponsors to initiate or participate in public use developments.	The Corps will be responsible for developing, funding and implementing public use facilities, at existing areas.	■	■			
Additional land is unavailable for public use development without congressional authorization.	Additional recreational facilities when implemented, will only occur at lands now in Federal ownership.	■	■			
Design criteria for all recreational facilities and activities will be established.	New development or modifications to existing facilities will follow the established criteria.	■	■	■		
Specific programs for development will be established for each recreation area.	New development will be in accordance with the established program.	■	■		■	
The operation and maintenance of the headwaters dams and adjacent recreational developments is and will continue to be the responsibility of the St. Paul District.	Sufficient manpower and funds needed to accomplish required operations and maintenance activities will be requested.		■			■
Existing resource management practices can be modified where necessary.	New resource management practices will be established that reflect future demands.		■			■
Expressed public desires will be carefully considered in the planning process.	The implementation of publicly desired facilities or activities will occur where feasible.	■	■	■	■	

* Constraints

The constraining factors that will limit the extent of planned development are as follows:

1. No development will be allowed that exceeds the established resource carrying capacity.
2. The level of development is dependent upon obtaining necessary funding.
3. No development will be allowed that cannot meet the established design criteria.
4. Only the items contained in the approved master plan will be implemented.
5. The level of operation and maintenance activities is dependent upon receiving adequate manpower and funding.



8 PLAN OF DEVELOPMENT

LAND USE ALLOCATIONS

There are nine land use allocation categories described in ER 1120-2-400. Only five of these categories apply to Corps owned land in the Headwaters. The applicable categories are listed and described in the following figure. 8.01

FIGURE 59 **LAND USE ALLOCATIONS**[1]

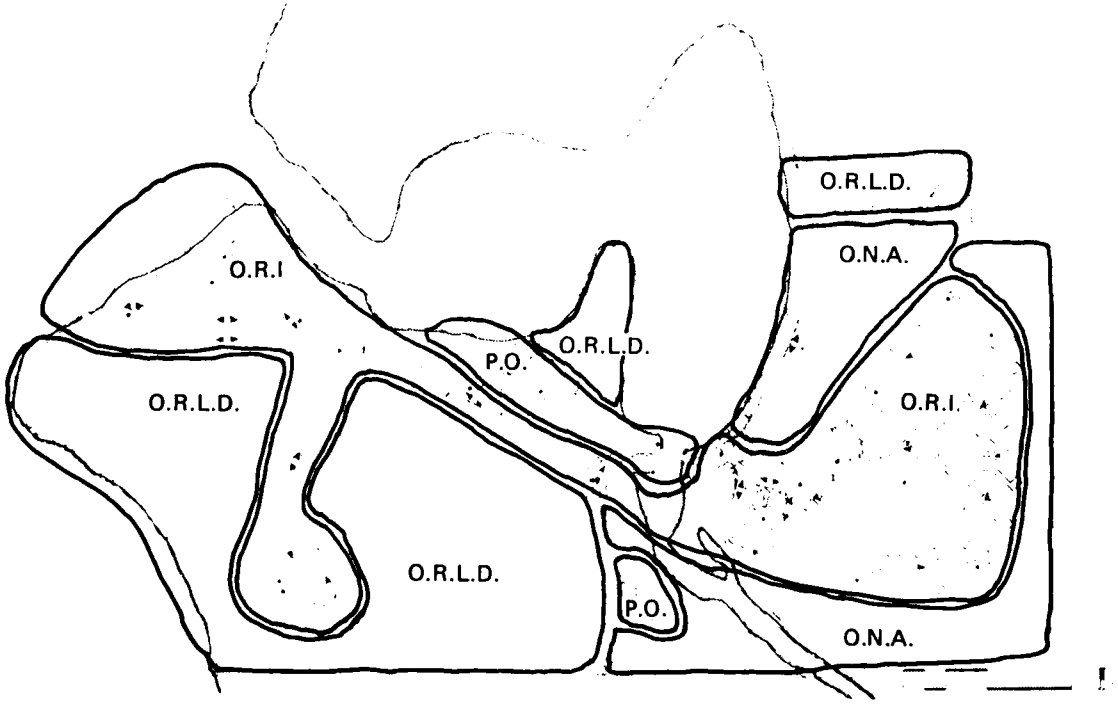
Category	Description
Project Operations (P.O.)	Lands acquired and allocated to provide for safe, efficient operation of the project for those authorized purposes other than recreation and fish and wildlife. In all cases this will include, but is not limited to, the land on which project operational structures are located. Lands on navigation projects which are required for industrial and public port terminals will be included in this allocation. Agricultural use of these lands will be permitted on an interim basis when not in conflict with use for authorized purposes, recreation use or wildlife habitat.
Operations: Recreation-Low Density Use (O.R.L.D.)	Lands acquired for project operations and allocated for low density recreation activities by the visiting public as required as open space between intensive recreational developments or between an intensive recreational development and land which, by virtue of use, is incompatible with the recreational development and would detract from the quality of the public use. Such incompatible land may be located either on the project or adjacent to the project. Land required for ecological workshops and forums, hiking trails, primitive camping, or similar low density recreational use available for a significant role in shaping public understanding of the environment will be under this allocation. No agricultural uses are permitted on this land except on an interim basis for terrain adaptable for maintenance of open space and/or scenic values.
Operations: Recreation-Intensive Use (O.R.I.)	Lands acquired for project operations and allocated for use as developed public use areas for intensive recreational activities by the visiting public, including areas for concession and quasi-public development. No agricultural uses are permitted on these lands except on an interim basis for terrain adaptable for maintenance of open space and/or scenic values.

[1] ER 1120-2-400

Operations: Natural Area (O.N.A.)	Land acquired for project operations and allocated for preservation of scientific, ecological, historical, archeological or visual values. Lands managed to protect rare and endangered species of flora and/or fauna will be allocated as natural areas. Normally limited or no development is contemplated on land in this allocation. Narrow bands of project land located between the normal recreation pool and the project boundary generally fall within this category. Project operational land may be a dual allocation. No agricultural uses are permitted on this land.
Operations: Reserve Forest Land (O.R.F.L.)	Lands acquired for project operations and allocated for vegetation control to support management objectives not compatible with sustained yield based on established harvest rotation. Timber will be harvested only when required to achieve other management objectives such as wildlife habitat improvement. Forest improvement measures may be paramount on this land such as timber planting or vegetation manipulation for erosion control. Such lands should be continuously available for low density recreational activities.

FIGURE 60 **TERRY R. JOHNSON RECREATION AREA LAND USE ALLOCATION**

The following figure illustrates the land use allocations based on the proposed site plan (see plate 29).



GULL LAKE

The only other Corps owned land on this reservoir is north of Nisswa, Minnesota on Nisswa Lake (see plate 3). The land use allocation for this land is Operations: Natural Area. 8.02

FIGURE 61 **RONALD LOUIS CLOUTIER RECREATION AREA LAND USE ALLOCATION**

The following figure illustrates the land use allocations based on the proposed site plan (see plate 30).

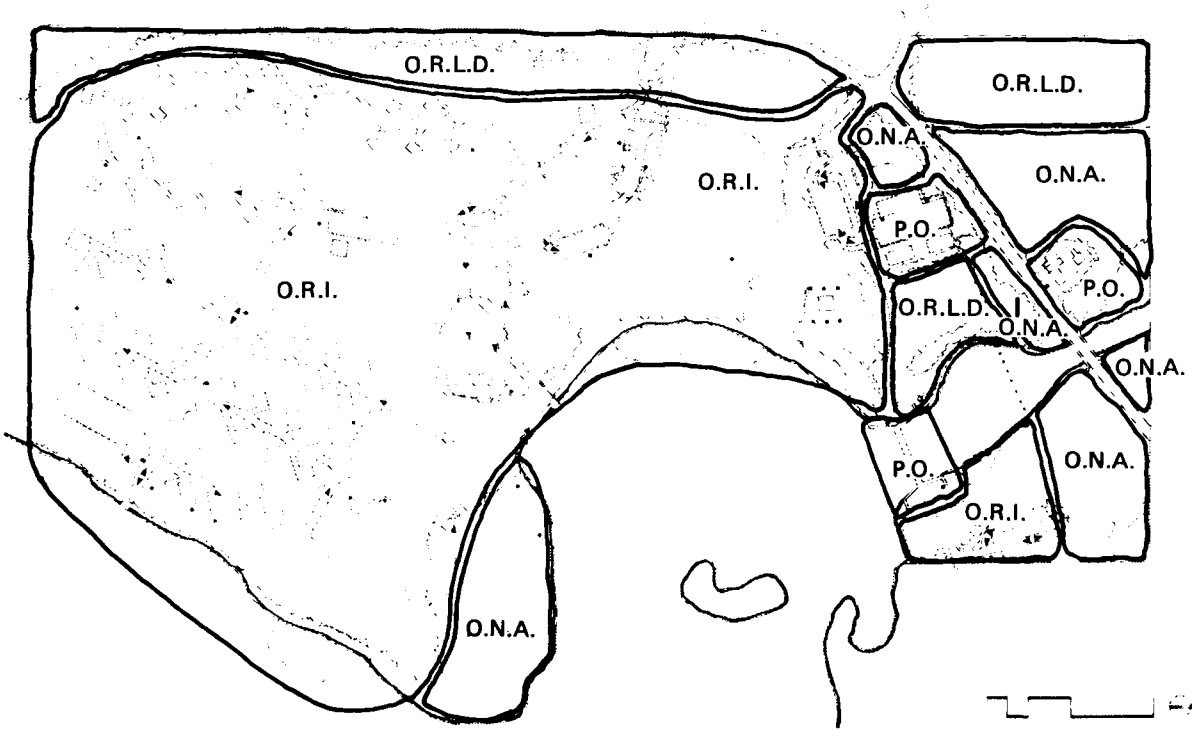
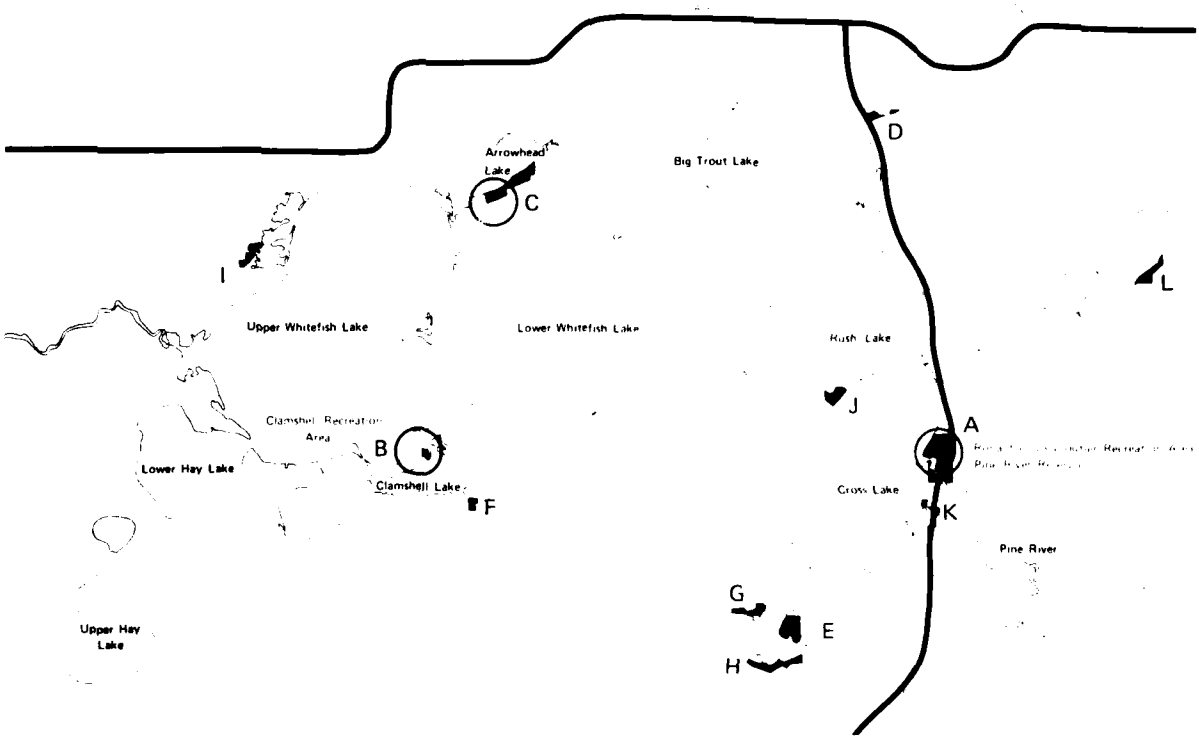


FIGURE 62

PINE RIVER RESERVOIR
LAND USE ALLOCATIONS

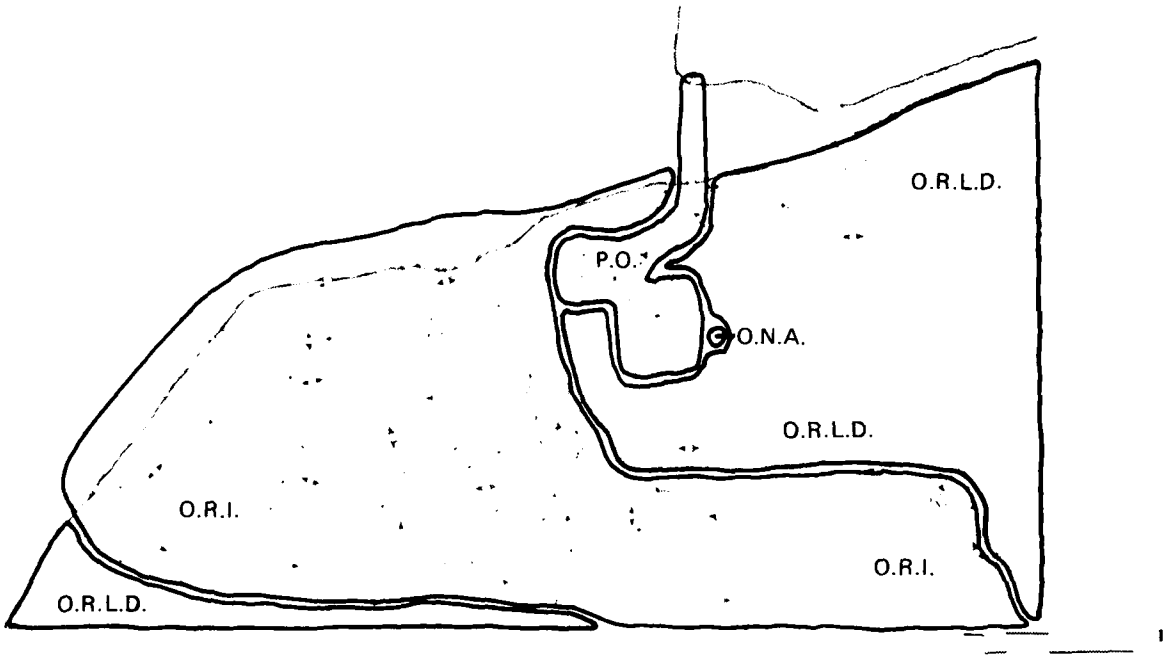
The following figure illustrates the land use allocations for all the Corps owned land on this reservoir (see plate 4).



A. Ronald Louis Cloutier Recreation Area (see figure 61)
B. Clamshell Lake - Operations: Recreation Intensive
C. Arrowhead Lake - Operations: Recreation Low Density
D. Manhattan Beach - Operations: Recreation Low Density
E. Leased to the city of Cross Lake – Operations: Recreation Low Density

FIGURE 63 **LEECH LAKE RECREATION AREA LAND USE ALLOCATIONS**

The following figure illustrates the land use allocations based on the proposed site plan (see plate 31).

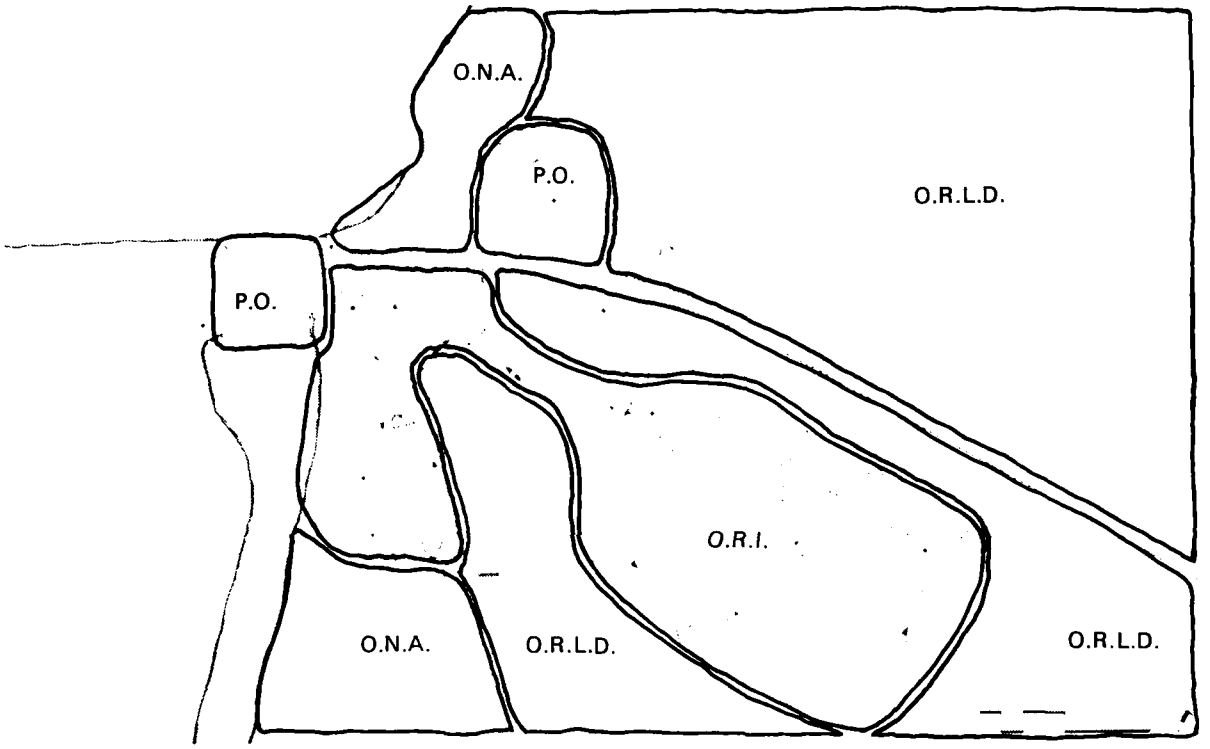


LEECH LAKE

All other Corps owned lands on this reservoir are allocated Operations: Recreation-Low Density Use (See plate 5). 8.03

FIGURE 64 **LAKE WINNIBIGOSHISH RECREATION AREA LAND USE ALLOCATION**

The following figure illustrates the land use allocations based on the proposed site plans (see plate 32).

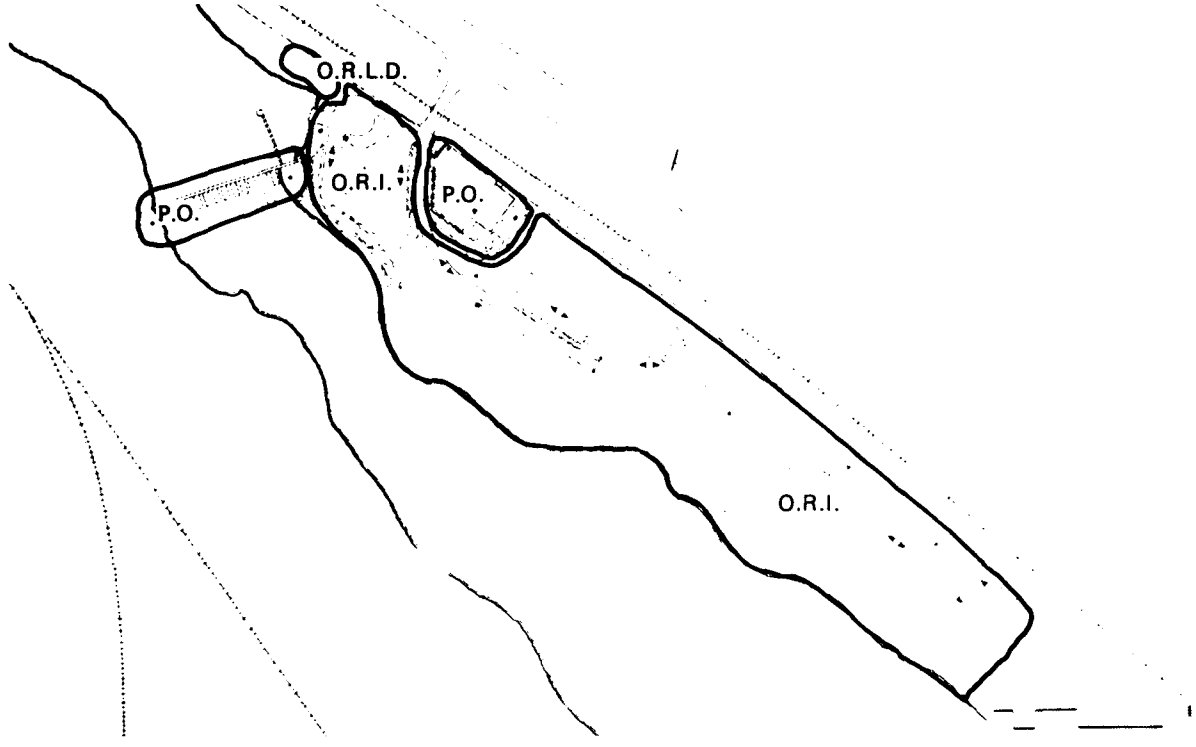


LAKE WINNIBIGOSHISH

The Corps does not own any land on this reservoir (see plate 6). 8.04

FIGURE 65 **POKEGAMA LAKE RECREATION AREA**
LAND USE ALLOCATION

The following figure illustrates the land use allocations based on the proposed site plans (see plate 33).



POKEGAMA LAKE The Corps does not own any land on this reservoir (see plate 7). 8.05

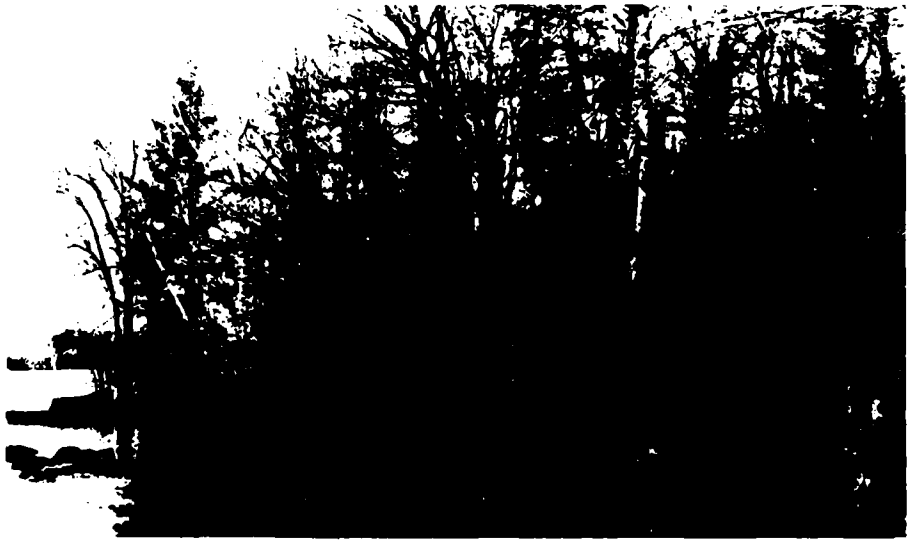
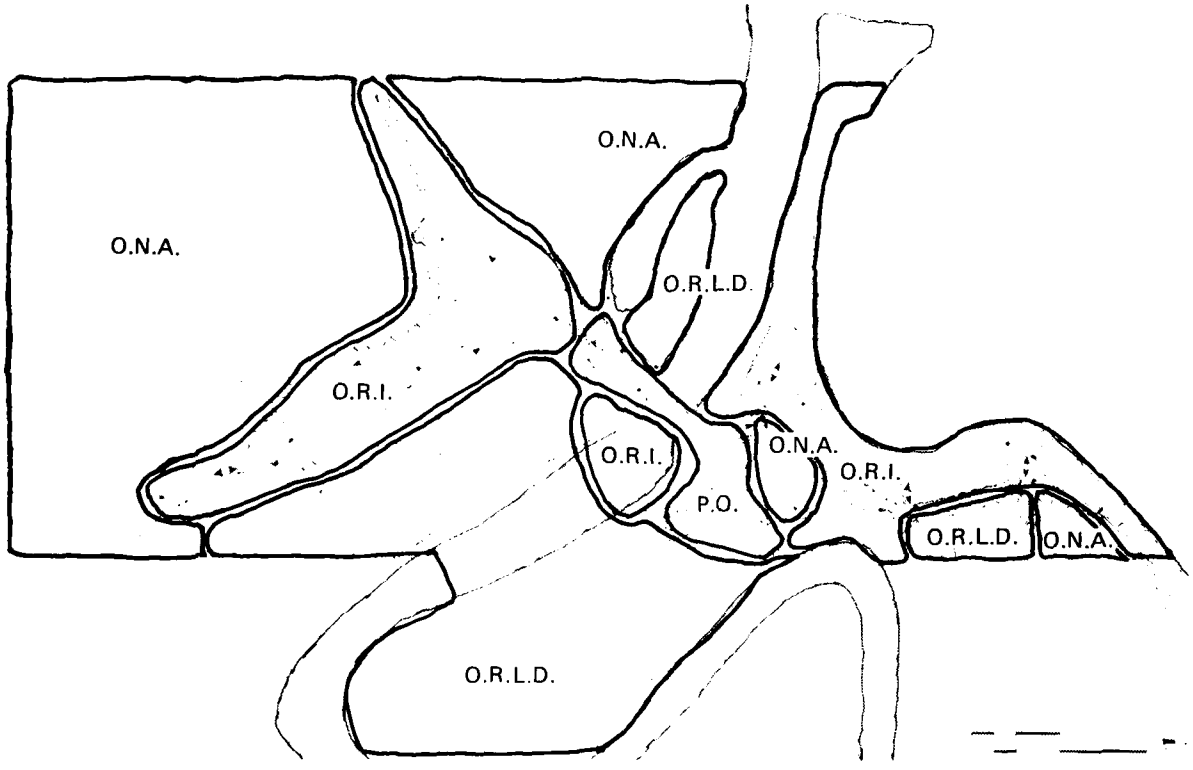


FIGURE 66 **SANDY LAKE RECREATION AREA LAND USE ALLOCATIONS**

The following figure illustrates the land use allocations based on the proposed site plans (see plate 34).



BIG SANDY LAKE

All other Corps owned lands on this reservoir are allocated Operations:Recreation Low Density Use (see plate 8). 8.06

USER FEES

In order to offset operating expenses for the Headwaters project it is desirable to charge user fees at all recreation areas. At present, wherever user fees are charged, P.L. 93–303 requires that there be an area set aside for free, primitive camping. Lake Winnibigoshish and Pokegama Lake recreation areas do not provide free camping and Terry R. Johnson and Leech Lake recreation areas do not provide separate primitive camp sites. To comply with P.L. 93–303 and to allow charging fees at all recreation areas, free, primitive camp sites have been planned. The proposed site plans indicate areas separated from fee camping areas that are designated primitive camping (see plates 29–34). 8.07

COMMERCIAL CONCESSIONS

With the exception of Leech Lake, concessionaires do not presently exist, nor are any planned at Corps recreation areas in the Headwaters. This is a result of several factors. They are; recreation area size, proximity to food services and lake size. Based on these factors, Lake Winnibigoshish is the only area where concessionaires would be able to supply services and not compete with existing services. However, this 21 unit recreation area is not of sufficient size to make concessionaire activities economically feasible. There is also no lake access possible at this area for launch services. The four other recreation areas are either too small 8.08

to support concessionaires, close to food or recreation oriented services or the adjacent lakes are of such a size that safe navigation is possible with small, trailerable boats.

THE GREAT RIVER ROAD

8.09 In 1976 a route designation was made for the Great River Road. Since that time new criteria has been established for the road location. The original route does not in all cases meet this new criteria in the Headwaters area.

8.10 When the formal designation is finally made it may involve roads adjacent to several Corps recreation areas, which, in turn, may affect the potential for increased future visitation. When this occurs, the Corps will cooperate with this effort in any way possible. This master plan proposes the addition of interpretive displays at all dam structures together with a project level visitor center and various other interpretive facilities. An expanded interpretive program may be necessary to fully inform the visiting public of the Corps' role in the Headwaters as a result of the Great River Road project.

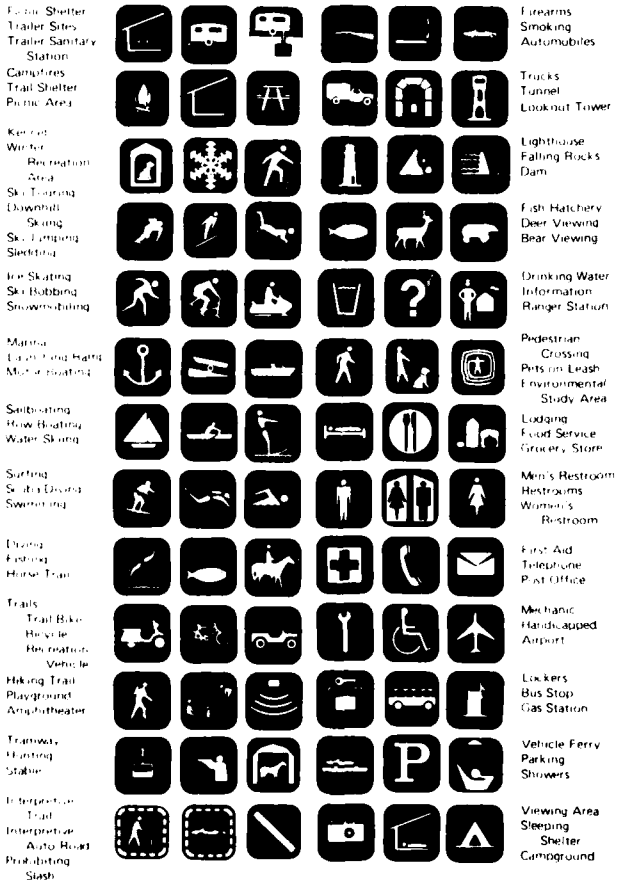
CONSISTENT DEVELOPMENT FACTORS

8.11 Consistent development factors are elements which appear at all recreation areas. They are support items necessary for smooth operation, project enjoyment, and public safety. By developing this thread of continuity, a common theme is created and design, installation, and maintenance costs, are reduced.

8 PLAN OF DEVELOPMENT

SIGNAGE

8.12 To create a unified and pleasing signage system, a design schedule and signage details have been prepared for all Headwaters' areas. (See exhibit N and details 31-35.) The system conforms to NCDP 1130-2-1, Sign Handbook. This system will be harmonious with the natural environment and is unifying in terms of materials, colors and construction. In accordance with the requirements set forth in NCDP 1130-2-1, a sign plan will be prepared for each of the recreation areas in the Headwaters. Standard recreation symbol signs will be incorporated to the greatest extent possible, and are as follows.



8.13 Design criteria for the signage system are contained in Exhibit N and details 31, 32, 33, and 35. Standard traffic control and waterway signs and markers are not illustrated.

LIGHTING

8.14 Two styles of light fixtures will be utilized at the headwaters projects. The differences between the fixtures are height, luminaire size and lamp wattage. The pedestrian oriented lights are 12' high. Their function is to illuminate minor intersections, path locations within use areas and structures such as restrooms, shower buildings and ranger stations. The vehicular oriented lights are 24' high and will serve to illuminate major intersections and parking areas. Both fixtures will have wood parts and metal, concealed source luminaires (see detail 29).

8.15 The lights will be located to best serve the area users but will not interfere with sleeping campers (see plates 29 to 34). The lights will be equipped with photoelectric sensors for energy conservation and will operate from dusk to dawn.

SITE AND LANDSCAPE ELEMENTS

8.16 The following is a list of site and landscape elements that will be utilized. Construction materials for each element are specified and the recreation areas where they will be implemented are identified. There are items on the list which are not currently available but are proposed for implementation. Exhibit L illustrates design details for these elements.

8 PLAN OF DEVELOPMENT

FIGURE 67

Facilities	detail number	Construction Materials								Useable at						
		wood	metal	concrete	bituminous	gravel	sand	woodchips	turf	Terry R. Johnson	Ronald Louis Cloutier	Clamshell Lake	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake
camp sites	1, 2					x					x		x			x
swimming beaches	13						x		x	x			x			x
boat launches	3			x	x					x	x	x				x
boat docks	3	x	x							x		x				x
tailwater fishing	4		x	x						x	x		x	x	x	x
roadways	5-7				x	x				x	x	x	x	x	x	x
pathways	10,11				x			x		x	x		x	x	x	x
trails	12							x		x					x	
parking	8, 9				x	x				x	x	x	x	x	x	x
overlooks	14					x		x		x						
picnic tables	18	x	x							x	x	x	x			x
playground equipment		x	x							x						x
bulletin boards	28	x								x	x	x	x	x	x	x
telephone booths	37	x								x	x		x	x	x	x
drinking fountains	17	x								x			x			x
fire extinguishers	30		x							x	x		x	x	x	x
camp cleaning tools	26	x	x							x	x		x	x	x	x
fireplaces	24		x	x						x	x		x	x	x	x
barbecue units	23		x							x	x	x	x	x	x	x
lighting	29	x	x							x	x		x	x	x	x
signage	31-35	x	x							x	x	x	x	x	x	x
trash receptacles	16	x	x							x	x	x	x	x	x	x
benches	15	x	x	x						x	x	x	x	x	x	x
steps	25	x								x	x		x	x	x	x
fences	21	x	x							x	x	x	x	x	x	x
water traffic controls			x							x	x	x	x	x	x	x
bollards	19	x								x	x	x	x	x	x	x
observation towers	41	x	x							x			x			
observation blinds	40	x		x						x			x			x
dam walkways		x	x							x						x
floating marsh walkways	39	x											x			x
camp area control gates	20		x							x	x	x	x	x	x	x
bicycle racks	22	x								x	x		x	x	x	x
canoe launches	27	x						x		x	x			x		
fish cleaning houses	36	x								x	x		x	x	x	x
vault restrooms	38	x	x	x						x	x	x	x	x	x	x
emergency call boxes		x	x							x	x	x	x	x	x	x

8 PLAN OF DEVELOPMENT

PLANTINGS

8.17 The existing vegetation at the recreation areas was identified and analyzed in Section Three. These plant species together with a supplemental list will be used, where necessary, to create a functional, aesthetic planting scheme to define exterior spaces, give visual organization to large open areas, control circulation, reduce erosion problems and augment existing vegetation.

8.18 In general, there are two types of landscapes existing. The first has a natural character, with overstory, dense understory and groundcover. The areas included in this category are Terry R. Johnson and Lake Winnibigoshish. Every effort will be made to maintain this natural landscape when development occurs. New planting is proposed to augment this character. The second category is more park-like, with overstory and a manicured groundcover. New planting and a modification of landscape practices will occur at Leech Lake and Sandy Lake recreation areas in order to return the camping areas to a more natural state. The park-like environment of the day use areas will be maintained. Due to the heavy use at Ronald Louis Cloutier and Pokegama Lake recreation areas, the park-like character will be maintained throughout. The only exception to this will be in areas designated as buffer zones or screen planting areas.

8.19 Figure 60 lists the materials that will be used for new planting and acceptable applications for each species. The information contained in Section Three regarding recreational capability and plant location in terms of ecosystems must be consulted prior to the actual on-site placement of the material.

8 PLAN OF DEVELOPMENT

FIGURE 68 **RECOMMENDED PLANT LIST AND RELATED APPLICATIONS**

Plant List		Useable For									Useable At						
Botanical Name	Common Name	wildlife (food)	wildlife (cover)	screen planting	focal planting	visual control	physical control	erosion control	shade	wind screening	augment native material	Terry R. Johnson	Ronald Louis Cloutier	Clamshell Lake	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake
Trees																		
Abies balsamea	Balsam Fir	x	x	x		x				x	x		x	x		x	x	
Acer saccharinum	Silver Maple				x				x		x	x			x	x	x	x
Acer saccharum	Sugar Maple				x	x			x		x	x			x	x	x	x
Betula papyrifera	Paper Birch				x						x	x	x	x	x			
Fraxinus pennsylvanica	Green Ash								x		x	x			x	x		x
Juniperus virginiana	Eastern Redcedar		x		x					x	x		x	x				
Larix laricina	Tamarack	x	x	x		x				x	x		x	x	x			x
Picea glauca	White Spruce	x	x	x		x				x	x		x	x		x		
Picea mariana	Black Spruce	x	x	x		x				x	x		x	x		x		
Pinus resinosa	Norway Pine	x	x	x		x				x	x	x	x	x	x	x	x	x
Pinus strobus	White Pine	x	x	x		x				x	x	x	x	x	x	x	x	x
Quercus alba	White Oak	x	x						x		x	x	x	x	x	x		
Populus tremuloides	Quaking Aspen	x	x		x			x			x	x			x			
Salix alba	Willow	x							x		x				x	x		x
Tilia americana	Basswood								x		x	x			x	x	x	x
Shrubs																		
Alnus incana	Speckled Alder		x				x	x			x	x			x	x		x
Amelanchier canadensis	Juneberry	x	x		x						x	x			x	x	x	x
Cornus stolonifera	Regtwig Dogwood				x		x	x			x	x			x	x		x
Prunus virginiana	Chockcherry	x	x								x	x	x	x	x	x	x	x
Ribes alpinum	Alpine Currant	x	x				x				x		x	x		x	x	
Rhus glabra	Smooth Sumac							x			x	x	x	x	x	x	x	x
Rubus strigosus	Raspberry	x	x				x				x	x	x	x	x	x		x
Zanthoxylum americanum	Prickly Ash		x				x				x	x	x	x		x		
Supplemental List																		
Acer ginnala	Amur Maple		x	x	x	x						x	x	x	x	x	x	x
Cornus racemosa	Gray Dogwood	x	x	x		x	x	x			x	x	x	x	x	x	x	x
Corylus americana	American Hazelnut	x	x	x			x	x			x	x	x	x	x	x	x	x
Dirca palustris	Atlantic Leatherwood	x	x		x			x				x	x	x	x	x	x	x
Ligustrum vulgare	European Privet		x	x			x	x				x	x	x	x	x	x	x
Physocarpus opulifolius	Common Ninebark		x	x			x	x				x	x	x	x	x	x	x
Rhamnus catharticus	Common Buckthorn		x	x		x	x			x		x	x	x	x	x	x	x
Ribes americanum	Wild Black Currant	x	x	x		x	x	x				x	x	x	x	x	x	x
Viburnam dentatum	Arrowwood Viburnum	x	x	x		x	x	x		x		x	x	x	x	x	x	x
Viburnam lentago	Nannyberry Viburnum	x	x	x		x	x	x		x		x	x	x	x	x	x	x
Viburnum trilobum	Highbush Cranberry	x	x	x	x		x				x	x	x	x	x	x	x	x

TAILWATER FISHING

In cooperation with the Minnesota Department of Natural Resources, existing bank fishing restrictions from the dam to a point 300' downstream from the structure will be relaxed. Fishing from the dam structure will continue to be prohibited for safety reasons. The existing restriction that prohibits boats from this 300' area will be maintained. 8.20

Restriction in the downstream area may be temporarily reinstituted during high discharge or critical spawning periods for safety and resource management reasons. 8.21

This action will increase fishing activity in the tailwater area. Surfaced pathways and bank fishing facilities will be provided to prevent shoreline disruption and erosion. All facilities provided in the tailwater area will be accessible by handicapped persons. This will include fishing platforms at the bank edge equipped with railings for safety. 8.22

The exact location of the tailwater fishing facilities will be determined in the field. Hydrological characteristics, fishing potential and access will be the deciding factors for the location. These facilities will be constructed of concrete and metal to reduce maintenance and to withstand the forces of high discharge. 8.23

VAULT RESTROOMS

Existing temporary metal vault restrooms will be scheduled for orderly replacement with the type of structure illustrated in the photograph on page 57 and detail no. 38. 8.24

PARKING

Parking areas will be designed or modified to provide flow-through circulation. By eliminating dead-end lots, recreational vehicles, car and trailer units and cars will be able to maneuver with much greater ease. Also, parking areas will be separated by islands from adjacent traffic movement lanes to minimize traffic conflicts, avoid unnecessary signage and minimize management problems. 8.25

INTERSECTIONS

To the extent possible, intersections will be designed or modified to form 90° intersections. This will allow for greater safety, better visibility and ease of circulation, and , in some cases, reduce the quantity of pavement that presently exists. 8.26

DESIGN CRITERIA

Design criteria have been established for proposed facilities and site elements (see figure 60). This information together with the design details contained in Exhibit L will be used as the basis for implementation of the proposed items. 8.27

INTERPRETIVE DISPLAYS

An interpretive display will be located adjacent to the dam structure at each recreation area. This display will contain information about the Headwaters region and the role of the dam and reservoir system. The history of the dam, the recreation area and the role of the Corps will be presented together with other pertinent and interesting features on the area (see detail 35). 8.28

SANITARY DISPOSAL STATION

At Ronald Louis Cloutier, Leech Lake and Sandy Lake recreation areas the sanitary disposal stations are being relocated as a result of the proposed site plans. When this relocation occurs or when any existing station requires upgrading, a sewage storage tank will be installed with a 10,000 gallons minimum capacity. This tank will serve to store sewage during times of peak station usage or during times when the sewage treatment plant is not in operation. Prior to the beginning of the treatment plant's operation in the early spring and after the plant must be closed in the late fall, this storage tank will be available for use by the visiting public. This may in turn prompt an extended seasonal use especially for self-contained camping units. 8.29

FIGURE 69 **DESIGN CRITERIA AND DEVELOPMENT PROGRAM MATRIX**

The following is a list of site elements and their circulation and area associations, soil, vegetation and slope capability requirements as defined in Section Three and the areas where they are proposed. An example of how to use this figure is as follows. Swimming beaches will be associated with roadways, pathways and parking and will be adjacent to lake shoreline. Proximity to cultural/historical and wildlife habitat areas is undesirable for this type of activity. Beaches will be constructed on high to moderate soil and vegetation capability areas and on high slope capability areas. Beaches will be constructed at Terry R. Johnson and Sandy Lake recreation areas.

Facilities	Facility Associations						Resource Capability Requirement									Recreation Areas						
	roadway access	pathway access	parking available	shoreline access	cultural/historical area	wildlife habitat area	high	moderate	low	high	moderate	low	high	moderate	low	Terry J. Johnson	Ronald Louis Cloutier	Clamshell Lake	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake
camp sites	x	x	x				x	x		x	x		x	x			x		x	x		x
day use area	x	x	x	x	x		x	x		x	x		x	x		x	x		x	x	x	x
picnic area	x	x	x	x	x		x	x		x	x		x	x		x	x		x			x
swimming beach	x	x	x	x			x	x		x	x		x			x						x
boat launch	x		x	x			x	x	x	x	x	x		x		x	x		x		x	x
canoe launch	x	x	x	x			x	x	x	x	x	x	x	x		x	x			x		
boat dock	x	x	x	x			x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
fishing dock	x	x	x	x			x	x	x	x	x	x	x	x		x	x		x	x	x	x
roadway	x						x	x		x	x		x	x		x	x		x	x	x	x
parking	x	x	x				x	x		x	x		x			x	x		x	x	x	x
walkway	x	x	x	x	x		x	x		x	x		x			x	x		x	x	x	x
trail	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x	
overlooks	x	x	x		x	x	x	x		x	x		x	x		x						
ranger station	x	x	x		x		x	x		x	x		x			x			x			x
interpretive facility	x	x	x		x	x	x	x		x	x		x			x						x
interpretive trail	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						
comfort station	x	x	x				x	x		x	x		x				x					x
flush restroom	x	x					x	x		x	x		x							x		x
vault restroom		x					x	x		x	x		x	x		x	x	x	x	x	x	x
potable water source	x	x					x	x		x	x		x	x		x	x		x	x	x	x
sewage treatment plant	x						x			x			x									
sanitary dump station	x		x				x			x			x				x		x			x
maintenance facility	x		x				x	x		x	x		x									
concessionaire	x	x	x	x			x	x		x	x		x	x					x			
shelters	x	x	x	x	x	x	x	x		x	x		x	x		x						x
amphitheater	x	x	x				x	x		x	x		x	x		x	x					x
winterized facilities	x	x	x	x			x	x		x	x		x	x		x	x		x			x
winter traffic controls				x												x	x	x	x	x	x	x
fire fighting equipment	x	x					x	x	x	x	x	x	x	x	x	x	x		x	x	x	x
emergency call box	x	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

8 PLAN OF DEVELOPMENT

INDIVIDUAL PLAN OF DEVELOPMENT

The following presents, on an area-by-area basis, specific courses of action for improving the recreation areas and for resolving any special problems that may exist. Unique design details, a site use capacity and a cost estimate for each area is presented. 8.30

Interim measures regarding actions that will take place until the proposed site plans are implemented are also presented. 8.31

TERRY R. JOHNSON RECREATION AREA

Emphasis will be placed on completing those originally planned facilities which are compatible with the area. Additional camping is no longer proposed because this area lacks sufficient land with resources capable of supporting camping. The only remaining land is Government Point (see plate 29). The steep slopes, soil types and existing vegetation are not well suited for camping without potential resource disruption. Government Point, however, is well suited for day use activities due to their minimal impact on the resource. Consequently, a boat ramp, swimming beach, picnic areas, hiking trails, observation points, a combination beach change house and vault restroom, parking and a project visitor center will be provided. These facilities are consistent with the resource use objectives and expressed public desire. 8.32

Access to Government Point will be from the county road at a point southeast of the maintenance facility. This road will generally follow an existing road corridor and terminate at the boat ramp and beach parking area. Because of the steep topography of the area, the road and parking area are located on a level area at the base of the hill, somewhat closer to the lake than would normally be recommended. This plan provides space for activity areas and trails adjacent to the lake and river. A two lane boat ramp will be developed. Access to the project visitor center will follow the general alignment of an old road to the top of the hill. 8.33

The visitor center and interpretive program will be planned and designed according to ER 1130-2-401, Visitor Center Program, and will be contained in a supplement to this master plan. The function of this center will be to identify, interpret and educate the public as to the nature, location and purpose of the six headwaters reservoirs. The functions of the existing 'tee-pee' display will be coordinated with those of the new center. 8.34

Existing and projected day use near the dam will necessitate the development of a pedestrian walkway over the structure. This walkway will be constructed on the tailwater side of the existing road. This needed addition will provide a safe link between the camping area, the day use area, and the downstream fishing areas (see figure 63). 8.35

County road 105 which passes through the area and over the dam is on Federal property but maintained by the County. Because of existing and proposed uses at this site this road needs to be upgraded and widened for public safety. This work would include widening the road over the dam. The cultural/historical area west of the camping area will be protected from disruption when the road is widened. This proposal is not intended to increase the design speed of the roadway. 8.36

The two conflict areas identified on plate 18 will be reorganized. The entrance to the camping area from county road 105 will be a 90° intersection allowing for a free flow on the county road at the same time reducing the quantity of pavement. The internal functions of the ranger station will be reorganized to provide better visual control over the area (see figure 64). 8.37

A primitive camping area will be provided north of county road 105. This free area will contain six sites. New planting will be placed to define the camp sites and to screen the area from adjacent roads and private property. A trail will be provided to the vault restroom in the existing camping area. 8.38

SPECIAL CONSIDERATIONS

Plate 18 identifies a cultural/historical site on Government Point. A swimming beach and picnic area are planned nearby. Although these two activities do not require extensive development, it will be necessary to excavate and salvage any artifacts prior to construction. Some of the artifacts may be displayed and interpreted in the visitor center. 8.39

According to the Minnesota Department of Natural Resources, the Gull River from the lake to the upstream side of the dam is one of the best bass spawning areas on Gull Lake. Because of this, every effort will be made to minimize the impact water traffic may have on the spawning beds. This will be accomplished by signing the river for minimum speeds and wakes. Water traffic cannot be completely eliminated because two private residences and a resort front on the river. Further, the proposed plan has carefully avoided any development adjacent to the river. 8.40

INTERIM MEASURES

The upgrading and widening of county road 105 including the roadway across the dam and modifying the camping area access intersection will occur when the existing pavement requires resurfacing. The existing maintenance area access road will remain in use until the road to the proposed day use area and project visitor center is constructed. The cultural/historical area on Government Point will be excavated prior to implementing the proposed day use area. 8.41

FIGURE 70

TERRY R. JOHNSON RECREATION AREA
LAND USE RELATIONSHIPS

The following figure illustrates the land use relationships based on the proposed site plan (see plate 29).

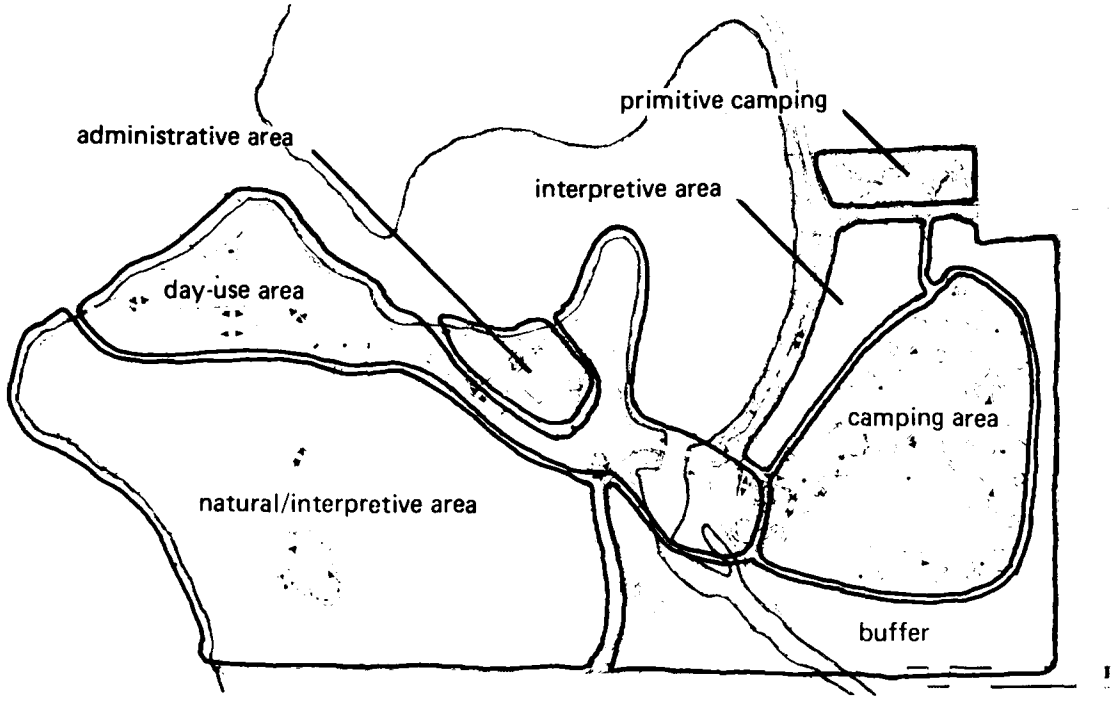
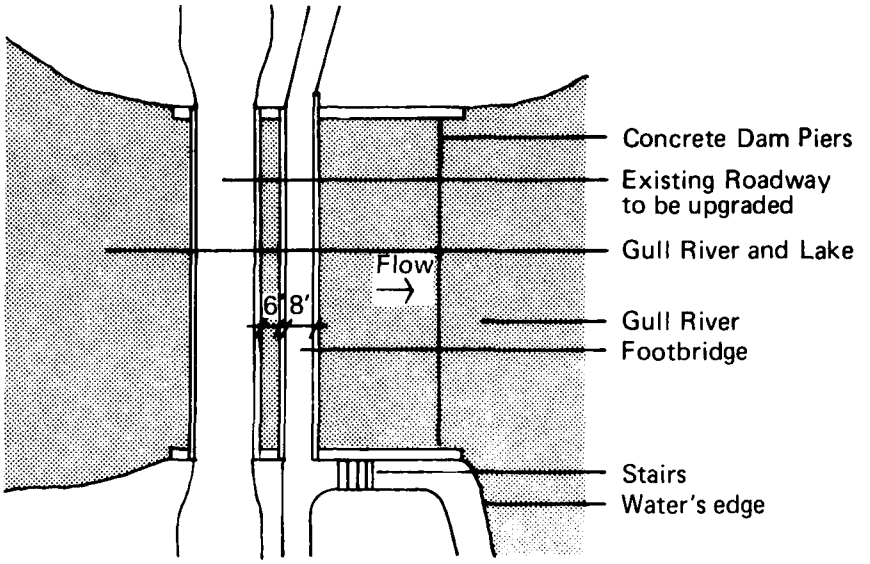
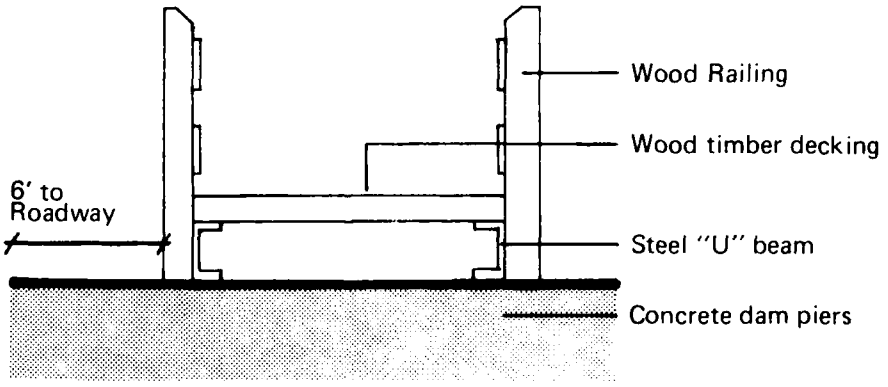


FIGURE 71 **GULL LAKE DAM WALKWAY**

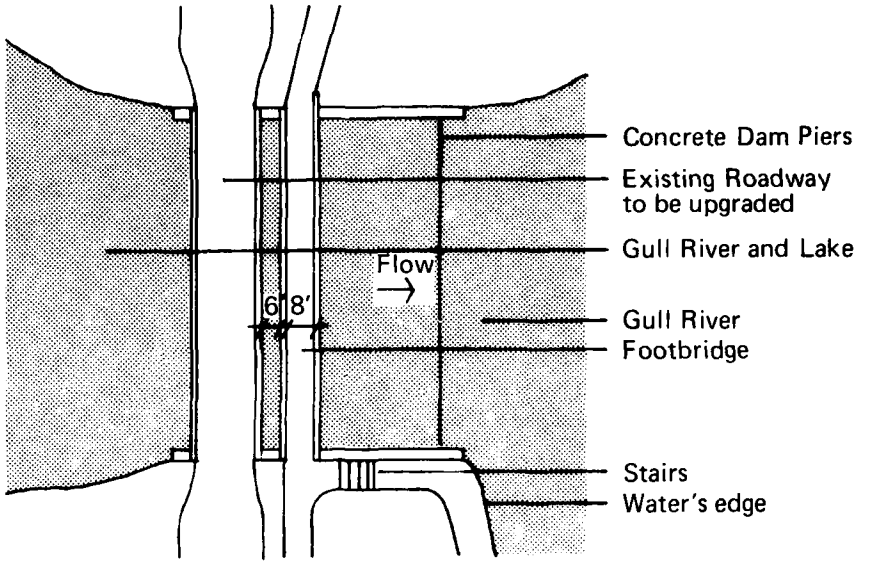


Plan

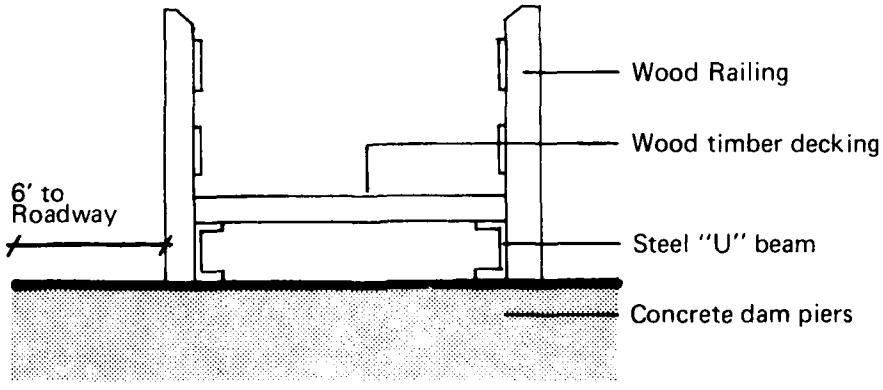


Section

FIGURE 71 **GULL LAKE DAM WALKWAY**



Plan



Section

FIGURE 72 **TERRY R. JOHNSON RANGER STATION MODIFICATION**

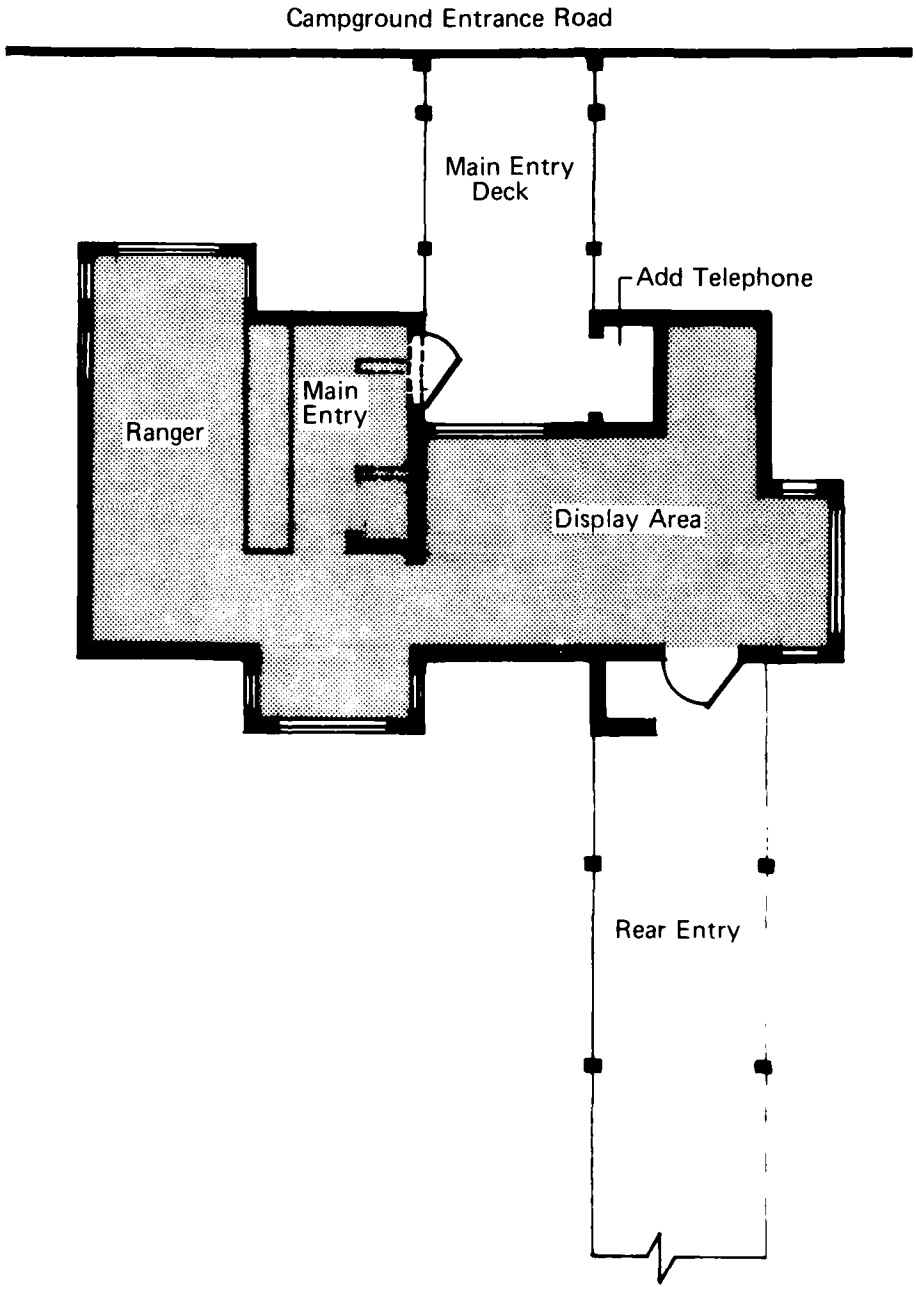


FIGURE 73 **TERRY R. JOHNSON RECREATION AREA COST ESTIMATE**

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	roads	L.F.	480	4.00	$ 1,920.00
*	vault restrooms	Each	2	500.00	1,000.00
	Construction				
*	two lane asphalt road	L.F.	2040	28.00	57,120.00
*	parking areas	S.Y.	5760	7.00	40,320.00
*	paved paths	L.F.	240	1.50	360.00
*	woodchip paths	L.F.	10800	3.00	32,400.00
1	dam walkway	Each	1	3000.00	3,000.00
10	camp pad	Each	6	350.00	2,100.00
*	picnic unit	Each	33	300.00	9,900.00
3	visitor center	Each	1	300,000.00	300,000.00
9	vault restroom	Each	1	19,000.00	19,000.00
8	beach change house	Each	1	30,000.00	30,000.00
*	modify existing structure	Each	Ranger Station	5,000.00	5,000.00
5	boat launching ramp	Each	1	10,000.00	10,000.00
6	boat dock	Each	1	6,000.00	6,000.00
4	tailwater fishing platform	Each	1	8,000.00	8,000.00
*	lighting	Each	29	200.00	5,800.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	3170	2.50	7,925.00
*	drinking fountain	Each	3	200.00	600.00
*	fire extinguisher	Each	8	50.00	400.00
7	swimming beach	S.Y.	1000	2.00	2,000.00
2	dam road widening	Each	1	220,000.00	220,000.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-total				$768,345.00
	Contingencies (20%)				153,669.00
					922,014.00
	Engineering and Design (12%)				110,641.68
	Supervision and Administration				
	Inspection (5%)				46,100.70
	Overhead				
	on Engineering and Design (13%)				14,383.42
	on Inspection (13%)				5,993.09
	TOTAL				$1,099,132.70

* The asteriked items are supportive to those items with numbered priority and will be implemented when necessary.

** Based on June 1977 St. Paul District cost figures.

RONALD LOUIS CLOUTIER RECREATION AREA

8.42 Needed reorganization of activities is the primary focus at this site. As illustrated on plate 20 and discussed in Section Four, the existing land use relationships are intermingled and confusing. The proposed plan resolves this problem (see plate 30). Access to all major functions will be reduced to one location. A second, minor access road to a small day use area west of the dam must be retained because of private residences in the area. This reorganization is consistent with Crow Wing County's plans to upgrade highway 6. In cooperation with the county, the main entrance will be developed at the intersection of highways 6 and 3. By this action, concurrent reorganization of uses, internal vehicular circulation, major activity areas operation and maintenance problems and conflict areas 2, 3, 4 and 5 will be eliminated.

8.43 Visitors will enter the area by the main entrance road. Day use visitors will be directed to one of three parking lots in the reorganized day use area. Day use visitors will not be allowed to drive past the ranger station into the camping area. Campers will pass the ranger station to enter the camping area. A 400' (10 unit) stacking lane is provided for campers who wish to wait for a vacancy. The existing camp areas will be combined into one area north of the ranger station (see plate 30). As a result, control can be maintained with the security point occurring at the ranger station. The 20 camp sites that presently exist west of the ranger station will be relocated. By taking full advantage of the site's potentials, it is possible to relocate all 20 camp pads and develop additional pads. A second, smaller shower building will be provided.

8.44 The lands adjacent to the lake and river from the main boat ramp to the river access road west of the dam will be designated for day use activities. (see figure 67 and plate 30). Four small parking lots will be available for day users; three for cars only, and one for cars and trailers located near the main boat ramp. Two volley ball courts will be provided adjacent to the maintenance area. The amphitheater will be relocated to the day use area.

8.45 Pine River has been designated a state canoe route by the Minnesota Department of Natural Resources. In cooperation with this effort, a canoe portage around the dam will be provided. Canoe landings will be provided both upstream and downstream of the dam.

INTERIM MEASURES

8.46 Provisions will be made for the implementation of the proposed main access road when highway 6 is upgraded. The existing access and egress roads and the internal circulation system will remain in use until the pavement requires resurfacing. At that time, the proposed circulation modifications and the reorganization of use areas will be implemented.

FIGURE 74 **RONALD LOUIS CLOUTIER RECREATION AREA LAND USE RELATIONSHIPS**

The following figure illustrates the land use relationships based on the proposed site plan (see plate 30).

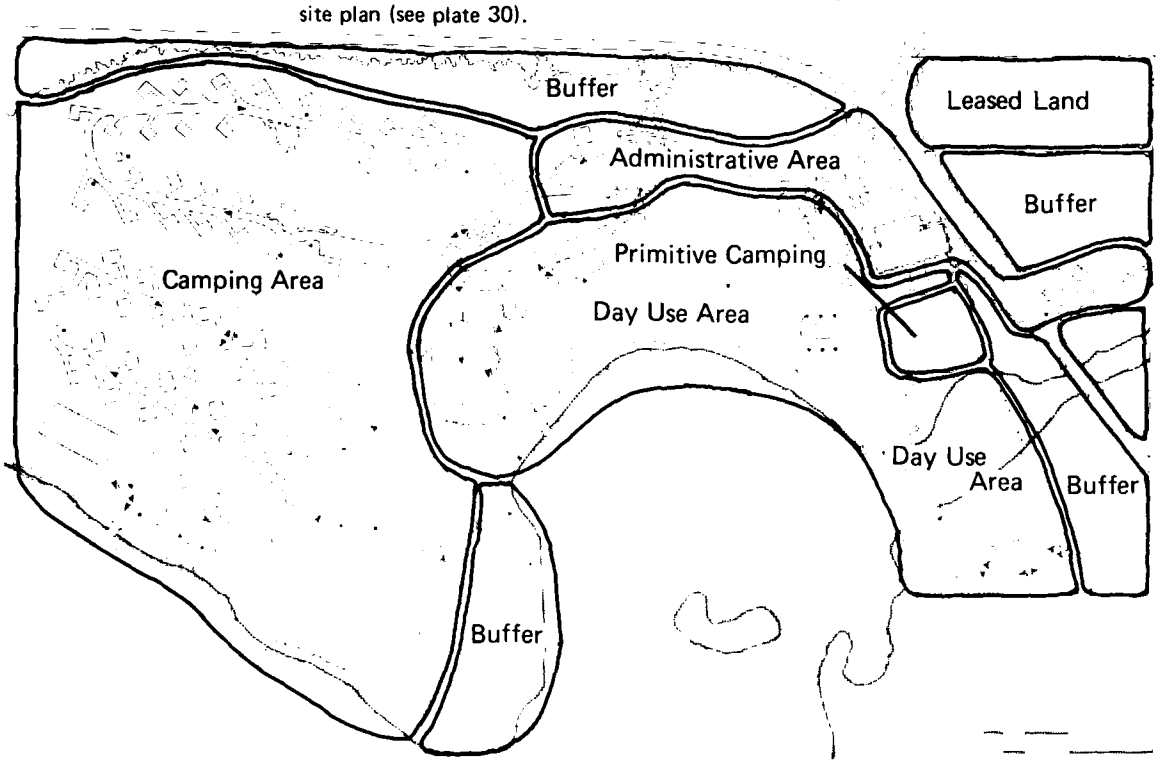


FIGURE 75

RONALD LOUIS CLOUTIER RECREATION AREA
COST ESTIMATE

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	roads	L.F.	4080	4.00	$ 16,320.00
*	parking areas	S.Y.	1440	1.50	2,160.00
*	camp pads	Each	35	50.00	1,750.00
*	vault restrooms	Each	4	500.00	2,000.00
	Construction				
*	two lane asphalt road	L.F.	1920	28.00	53,760.00
*	one lane asphalt road	L.F.	2400	18.00	43,200.00
*	parking areas	S.Y.	2528	7.00	17,696.00
*	paved paths	L.F.	540	3.00	1,620.00
*	woodchip paths	L.F.	4440	3.00	13,320.00
2	camp pad	Each	46	350.00	16,100.00
*	picnic units	Each	20	300.00	6,000.00
6	comfort station	Each	1	38,000.00	38,000.00
4	vault restroom	Each	2	19,000.00	38,000.00
3	boat launching ramp	Each	1	10,000.00	10,000.00
5	canoe landing	Each	2	8,000.00	16,000.00
1	tailwater fishing platform	Each	1	8,000.00	8,000.00
*	lighting	Each	36	200.00	7,200.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	5600	2.50	14,000.00
*	drinking fountain	Each	14	200.00	2,800.00
*	sanitary dumping station	Each	1	9,500.00	9,500.00
*	fire extinguisher	Each	7	50.00	350.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-Total				$460,972.00
	Contingencies (20%)				92,194.40
					$553,166.40
	Engineering and Design (12%)				66,379.97
	Supervision and Administration				
	Inspection (5%)				27,658.32
	Overhead				
	on Engineering and Design (13%)				8,629.40
	on Inspection (13%)				3,595.58
	TOTAL				$659,429.67

* The asteriked items are supportive to those items with numbered priority and will be implemented when necessary

** Based on June 1977 St. Paul District cost figures

8 PLAN OF DEVELOPMENT

CLAMSHELL LAKE RECREATION AREA

8.47 The physical layout of the Clamshell Lake Recreation Area will remain essentially unchanged as a result of this master plan (see figure 38). Proposed modifications to this area involve the upgrading of existing facilities. This includes the vault restrooms, signage, the boat dock, the area control gate and water traffic controls.

8.48 The operating season at this area will be lengthened as a result of comments received from the area's users. This specifically applies to the boat ramp. The ramp will open in early spring shortly after the ice disappears and will remain open until ice begins forming in late fall.

INTERIM MEASURES

8.49 The upgrading of the existing metal vault restrooms and the addition or modification of site elements will occur when feasible.

FIGURE 76 **CLAMSHELL LAKE RECREATION AREA**
COST ESTIMATE

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	vault restroom	Each	2	500.00	$ 1,000.00
	Construction				
*	vault restroom	Each	1	19,000.00	19,000.00
*	boat dock	Each	1	6,000.00	6,000.00
*	entrance sign	Each	1	500.00	500.00
*	area control gate	Each	1	500.00	500.00
	Sub-Total				$26,000.00
	Contingencies (20%)				3,200.00
					29,200.00
	Engineering and Design (12%)				3,504.00
	Supervision and Administration				
	Inspection (5%)				1,460.00
	Overhead				
	on Engineering and Design (13%)				455.52
	on Inspection (13%)				189.80
	TOTAL				$34,809.32

* The asteriked items will be implemented when feasible.

** Based on June 1977 St. Paul District cost figures.

8 PLAN OF DEVELOPMENT

LEECH LAKE RECREATION AREA

8.50 The existing camp area will remain essentially the same with only minor modifications to the circulation pattern. Completion of camping facilities will occur both in the existing area and along the new access road. Camp pads, tent-only sites, multiple family sites and primitive camp sites will be provided. Vault restrooms will be added to the existing camp area. Circulation between the camping and day use areas will be eliminated by reorganizing the parking areas. A second boat ramp, boat trailer storage and boat beaching area will be provided for campers and will be separated from the existing ramp and day use parking. The expanded boat beaching area will require the clearing of vegetation from approximately two acres of wetland. An environmental assessment will be conducted to evaluate the potential environmental effects on this area.

SPECIAL CONSIDERATIONS

8.51 During the course of public workshops it became apparent that the future role of commercial concessions needs to be evaluated. This site presently has five separate leases for essentially the same services. Generally, each concessionaire provides launch services, gas, bait and miscellaneous supplies. The concessionaires have reported that they are operating at about 50% capacity (see exhibit G) and the use of their facilities has been declining. They attribute this to private use of larger trailerable boats capable of facing the rigors of Leech Lake. If this trend continues, and all five concessionaires remain, the economic success of all could be jeopardized.

8.52 Based on discussions and field observations it appears that near term demands will continue for launch and guide services, gas, bait and other fisherman-related supplies. In addition, there appears to be an increasing demand for repair services, transient overnight docking, boat storage, and sanitary pump-out facilities. The revised site plan (plate 31) recognizes future need for concession services, however no specific modifications are proposed at this time. The needs of the public for water-oriented accommodations and services must be considered with the same degree of planning as those determinations made for other public use facilities. Consequently, an adequate market study and analysis will be accomplished to insure that facilities and services specified are of an investment scale favorable to economic success of a prudent operator (s) and will provide optimum services to the public. This study and analysis will be accomplished and documented in a supplement to this master plan. No modifications to the existing leases will be made pending the completion of that market analysis and future actions concerning these commercial concessions will be based on the recommendations contained in that study.

8.53 The access channel to the lake is an area of increasing concern. Large boats including sailboats are using the channel with increased frequency. These boats require and should be provided safe access to and from the lake. A uniform navigational buoy system will be provided. These buoys will include flags of sufficient height to be visible over the marsh grasses and wild rice. If the trend toward large boats continues it may be necessary to deepen the channel.

INTERIM MEASURES

8.54 The camper boat and trailer storage area has been separated from the existing boat ramp. Campers wishing to use the ramp must circulate through the camping area to the highway and finally to the day use area. This situation will remain in effect until the proposed boat ramp and trailer storage area, west of the camping area, is constructed. The existing day use area will remain in use until a decision is made regarding the concessionaires' area.

FIGURE 77 **LEECH LAKE RECREATION AREA LAND USE RELATIONSHIPS**

The following figure illustrates the land use relationships based on the proposed site plan (see plate 31).

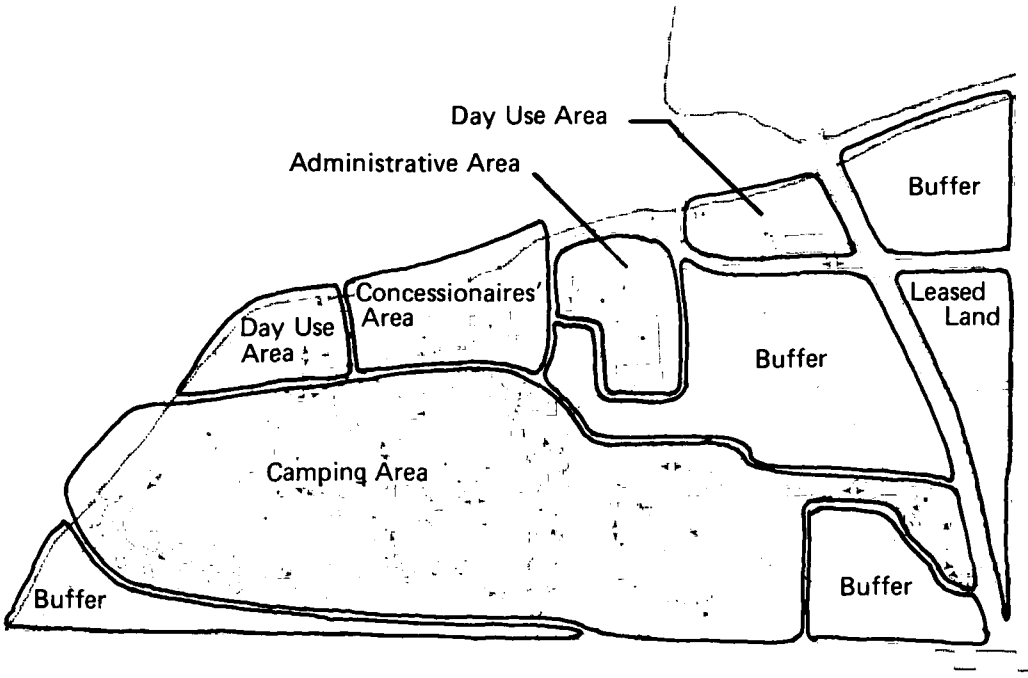


FIGURE 78 **LEECH LAKE RECREATION AREA COST ESTIMATE**

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	vault restrooms	Each	4	500.00	$ 2,000.00
	Construction				
*	two lane asphalt road	L.F.	1200	28.00	33,600.00
*	one lane asphalt road	L.F.	2400	18.00	43,200.00
*	parking areas	S.Y.	1250	7.00	8,750.00
*	paved paths	L.F.	360	3.00	1,080.00
*	woodchip paths	L.F.	360	3.00	1,080.00
1	camp pad	Each	39	350.00	13,650.00
2	tent pad	Each	5	300.00	1,500.00
*	picnic unit	Each	5	300.00	1,500.00
3	ranger station	Each	1	45,000.00	45,000.00
8	vault restroom	Each	3	19,000.00	57,000.00
7	flush restroom	Each	1	35,000.00	35,000.00
5	boat launching ramp	Each	1	10,000.00	10,000.00
6	boat dock	Each	1	8,000.00	8,000.00
4	tailwater fishing platform	Each	1	8,000.00	8,000.00
*	lighting	Each	30	200.00	6,000.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	2560	2.50	6,400.00
*	drinking fountain	Each	9	200.00	1,800.00
*	sanitary dumping station	Each	1	9,500.00	9,500.00
*	fire extinguisher	Each	7	50.00	350.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-Total				$298,910.00
	Contingencies (20%)				59,782.00
					$358,692.00
	Engineering and Design (12%)				43,043.04
	Supervision and Administration				
	Inspection (5%)				17,934.60
	Overhead				
	on Engineering and Design (13%)				5,595.60
	on Inspection (13%)				2,331.50
	TOTAL				$427,596.74

* The asteriked items are supportive of those items with numbered priority and will be implemented when necessary.

** Based on June 1977 St. Paul District cost figures.

8 PLAN OF DEVELOPMENT

LAKE WINNIBIGOSHISH RECREATION AREA

Access will be simplified and made safer by combining the day use and camp area entrance roads, eliminating one intersection with highway 9 (see plate 32). Both campers and day users will enter the area at the existing day use road. Access to the camping area begins approximately 100' east of the highway and is located on an old service road corridor. No large trees will be removed to construct this road. The abandoned road will be scarified and planted to screen the highway from the camping area. 8.55

The new camp area access road enters through an existing camp pad. This pad will be eliminated and two new pads will be constructed. The other change in this area involves replacing the existing temporary vault restroom with a permanent structure (see detail 38). 8.56

Parking in the day use area will be reorganized to accommodate cars and trailers and provide flow-through circulation. The only additional facility is the tailwater fishing development. The parking area adjacent to highway 9 will be relocated to the east and physically separated from the highway for safety reasons. A path will connect this parking area and the vault restrooms. The same path will serve as a canoe portage route around the dam. The lake canoe landing will be located northeast of the dam and the downstream landing will be at least 300' from the dam. The canoe portage will be provided because of the canoe route designation for the Mississippi River. 8.57

A primitive camping area will be provided north of highway 9. The free area access road will intersect with highway 9 directly opposite the existing camping area access road. The existing vegetation will be selectively cleared to provide space for four camp sites. 8.58

INTERIM MEASURES

The construction of the proposed camping area access road, the removal of the existing road and the modifications to the parking area adjacent to highway 9 will occur when feasible. The proposed day use parking area will be constructed when the existing pavement requires resurfacing. 8.59

FIGURE 79 **LAKE WINNIBIGOSHISH RECREATION AREA LAND USE RELATIONSHIPS**

The following figure illustrates the land use relationships based on the proposed site plan (see plate 32).

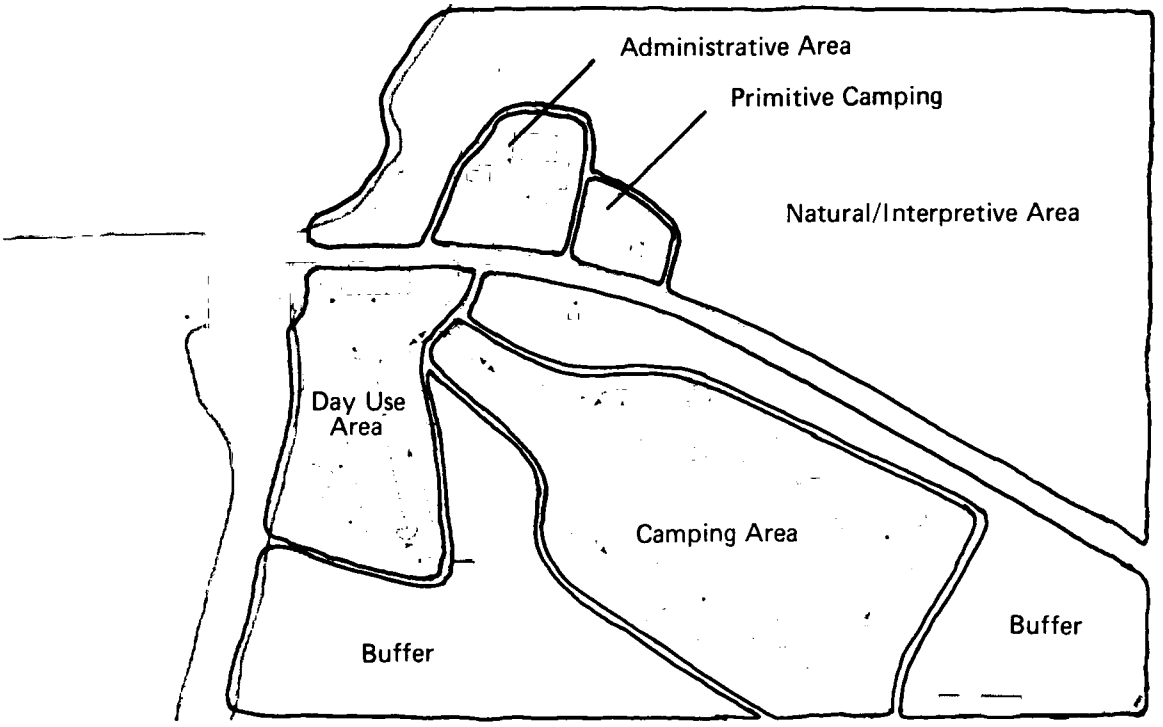


FIGURE 80 **LAKE WINNIBIGOSHISH RECREATION AREA COST ESTIMATE**

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	roads	L.F.	280	4.00	$ 1,120.00
*	parking area	S.Y.	245	1.50	367.50
*	camp pads	Each	1	50.00	50.00
*	vault restrooms	Each	2	500.00	1,000.00
	Construction				
*	two lane asphalt road	L.F.	395	28.00	11,060.00
*	one lane asphalt road	L.F.	245	18.00	4,410.00
*	parking areas	S.Y.	2553	7.00	17,871.00
*	paved paths	L.F.	1340	3.00	3,570.00
*	paved paths	L.F.	1340	3.00	3,570.00
*	woodchip paths	L.F.	210	3.00	630.00
1	camp pad	Each	6	350.00	2,100.00
*	picnic unit	Each	2	300.00	600.00
3	vault restroom	Each	2	19,000.00	38,000.00
4	canoe landing	Each	2	8,000.00	16,000.00
2	tailwater fishing platform	Each	1	8,000.00	8,000.00
*	lighting	Each	17	200.00	3,400.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	1360	2.50	3,400.00
*	drinking fountain	Each	4	200.00	800.00
*	fire extinguisher	Each	4	50.00	200.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-Total				$118,078.50
	Contingencies (20%)				23,615.70
					141,694.20
	Enigneerimg				
	Engineering and Design (12%)				17,003.30
	Supervision and Administration				
	Inspection (5%)				7,084.71
	Overhead				
	on Engineering and Design (13%)				2,210.43
	on Inspection (13%)				921.01
	TOTAL				$168,913.65

* The asteriked items are supportive to those items with numbered priority and will be implemented when necessary.

** Based on June 1977 St. Paul District cost figures.

POKEGAMA LAKE RECREATION AREA

Internal circulation and parking area modifications are proposed at this area. Due to the lack of available space, no further recreational development is practical. 8.60

As discussed in Appendix A, existing development encroaches on private land at the east end of the area. The most feasible solution to this encroachment appears to be through a small land exchange. However, should the land exchange fail, the cul-de-sac will be relocated to what is now the sanitary dumping station loop. The sanitary dumping station will be relocated to the west along the camp area road. By moving the cul-de-sac, space would be available to add one camp pad. 8.61

The parking area adjacent to the dam will be modified to accommodate car and trailer parking. Day use car parking is provided east of the maintenance facility. 8.62

Two primitive camp sites will be located southeast of the maintenance facility. New planting will be placed to screen the maintenance facility and the railroad from this area. 8.63

The Minnesota Historical Society is constructing a forest history center downstream from the recreation area. Efforts will be made to provide information about the center and its location. A trail connection between this recreation area and the center, on the south side of the river, may be feasible. Further interpretation of the forest could occur along this trail. 8.64

SPECIAL CONSIDERATIONS

Potential exists for the development of the Hanna Mining property south of the river where the interpretive trail presently exists. Any such development would require cooperation with a non-federal, cost sharing sponsor. If a day use or camping area is proposed, provisions could be made for vehicular traffic to cross the dam. A preliminary evaluation of the structure indicates that a roadbed could be constructed on the dam. Any such proposals would be discussed in a supplement to this master plan. 8.65

INTERIM MEASURES

The proposed parking area modification will not occur until the existing pavement requires resurfacing. The encroachment mentioned above will remain in effect until the land exchange is complete. If the exchange cannot be made, the adjustment of the cul-de-sac and sanitary dumping station will be implemented. 8.66

FIGURE 81 **POKEGAMA LAKE RECREATION AREA LAND USE RELATIONSHIPS**

The following figure illustrates the land use relationships based on the proposed site plan (see plate 33).

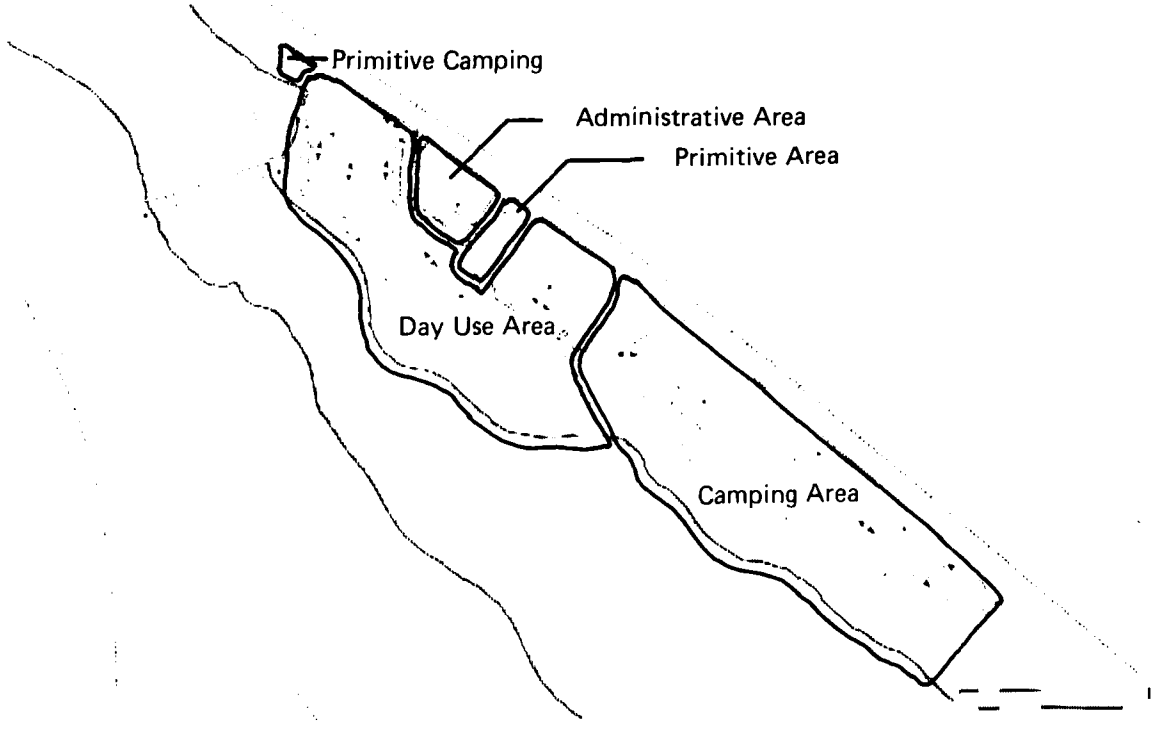


FIGURE 82 **POKEGAMA LAKE RECREATION AREA COST ESTIMATE**

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	roads	L.F.	180	4.00	$ 720.00
*	parking areas	S.Y.	1728	1.50	2,592.00
*	vault restrooms	Each	4	500.00	2,000.00
	Construction				
*	parking areas	S.Y.	3456	7.00	24,192.00
*	paved paths	L.F.	638	3.00	1,914.00
*	woodchip paths	L.F.	1650	3.00	4,950.00
2	camp pad	Each	2	350.00	700.00
*	picnic unit	Each	4	300.00	1,200.00
5	vault restroom	Each	2	19,000.00	38,000.00
3	boat launching ramp	Each	1	10,000.00	10,000.00
4	boat dock	Each	1	8,000.00	8,000.00
1	tailwater fishing platform	Each	1	8,000.00	8,000.00
*	lighting	Each	15	200.00	3,000.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	3170	2.50	7,925.00
*	drinking fountain	Each	3	200.00	600.00
*	sanitary dumping station	Each	1	4,500.00	4,500.00
*	fire extinguisher	Each	5	50.00	250.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-Total				$124,043.00
	Contingencies (20%)				24,808.60
					148,851.60
	Engineering and Design (12%)				17,862.19
	Supervision and Administration				
	Inspection (5%)				7,442.58
	Overhead				
	on Engineering and Design (13%)				2,322.08
	on Inspection (13%)				967.54
	TOTAL				$177,445.99

* The asteriked items are supportive to those items with numbered priority and will be implemented when necessary.

** Based on June 1977 St. Paul District cost figures.

SANDY LAKE RECREATION AREA

8.67 Access to this area will occur at only one location. Currently there are two access roads. By closing the northern road to public use, better control can be maintained, the internal circulation will be simplified and additional space becomes available for camping along the vacated access road. Visitors will enter from the south and be directed to either the day use or camp areas. By closing the northern road, it will be necessary for campers to cross the dam (see plate 34). This is discussed further in the Special Considerations section that follows.

8.68 The natural separation of this area by the Sandy River will be capitalized upon for separating uses. The 14 existing camp sites and the primitive free camping area will be relocated to the north side of the river. These camp sites will be located on the north and west sides of the existing camp loop road. The existing vault restroom will be removed and a centrally located shower building will be provided. A ranger station will be located north of the lock house and will become the control point for the camping area. The existing camp area boat ramp will remain in its present location and boat trailer parking will be provided adjacent to it.

8.69 The area south of the river, excluding the maintenance facility, will become the day use area. Facilities to be provided in this area include car and trailer parking, a boat launching ramp, swimming beach, picnic units and a beach change house/flush restroom. The existing boat launch will be relocated to the south thus providing a protected water zone for the beach and easier access to the ramp. The existing shower building will become a beach change house and restroom. Picnic units will be scattered throughout the area from the relocated boat ramp to the point of land between the river and the lake.

8.70 The dam operator's residence will be removed when the current operator relocates to another residence. When removed, additional space will become available for day use activities adjacent to the tailwater area.

8.71 A primitive camping area will be provided in the vegetated area east of the proposed access road near the day use area boat launching ramp. Selective clearing will provide space for ten free camp sites. Access to this free area will occur opposite the day use boat ramp parking access drives.

8.72 An interpretive marsh walkway will be added to augment the existing interpretive facilities at this area. The walkway is located east of the camping area. The existing lock house interpretive display will be upgraded and expanded to more fully explain the role of the Corps at Sandy Lake. The existing schoolhouse foundation, located in the camping area, will be interpreted to a greater extent through informative displays at the foundation and in the lock house.

SPECIAL CONSIDERATIONS

8.73 The roadbed over the dam must be widened to successfully implement this plan. The existing width could accommodate recreational vehicles but maneuvering would be difficult. Pedestrian crossings would be totally unsafe under the present conditions if vehicles were allowed to use this road. Pedestrian crossings are necessary for campers to use the swimming beach and for day users to visit the lock house and use the tailwater fishing area north of the river. For these reasons, the width of the roadbed will be changed to 12' and a separate pedestrian walkway will be constructed. Movement over the bridge will be restricted to one lane. Vehicles approaching the dam will yield the right-of-way to vehicles on the dam (see figure 76).

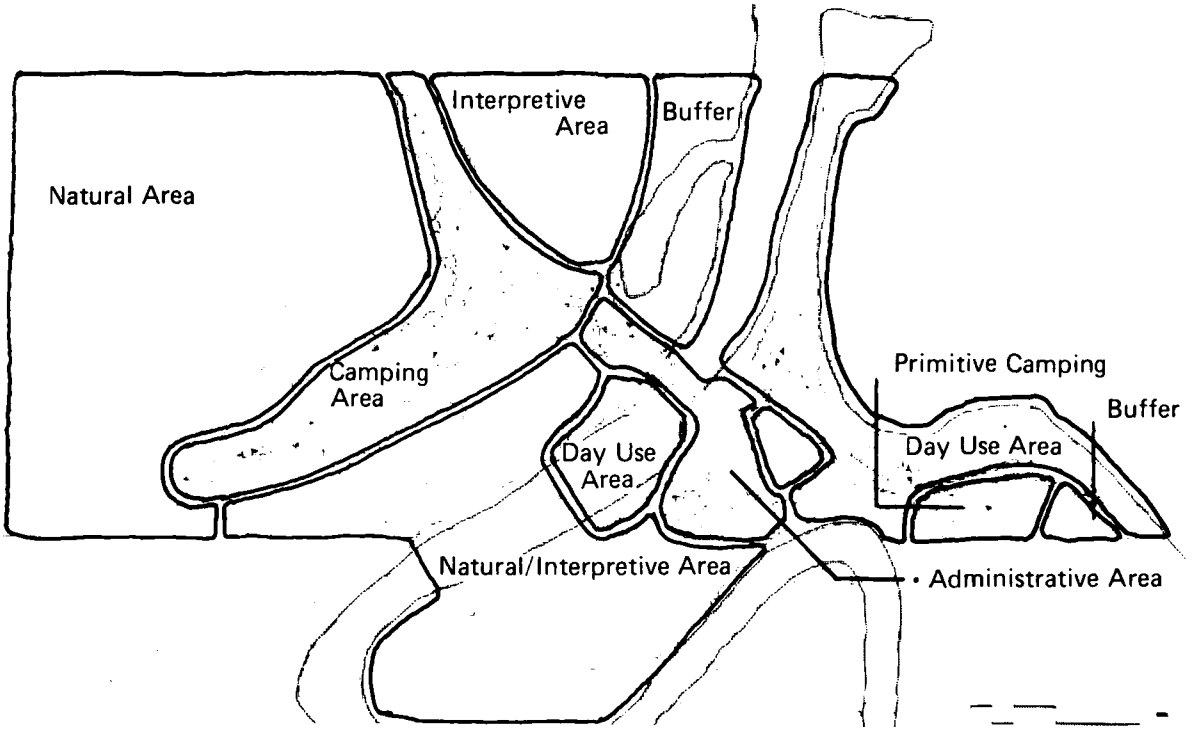
8.74 The wood pavers that will be removed when the road over the dam is widened will be recycled and utilized in the expanded interpretive display. The public will be informed that these pavers were once the road surface on the dam.

INTERIM MEASURES

The widening of the roadway across the dam will occur when feasible. The wood paver roadbed is subject to frost heave and is a maintenance and safety problem. The existing use areas will not be modified and the northern access road will remain in use until the roadway over the dam is widened. 8.75

FIGURE 83 **SANDY LAKE RECREATION AREA LAND USE RELATIONSHIPS**

The following figure illustrates the land use relationships based on the proposed site plan (see plate 34).



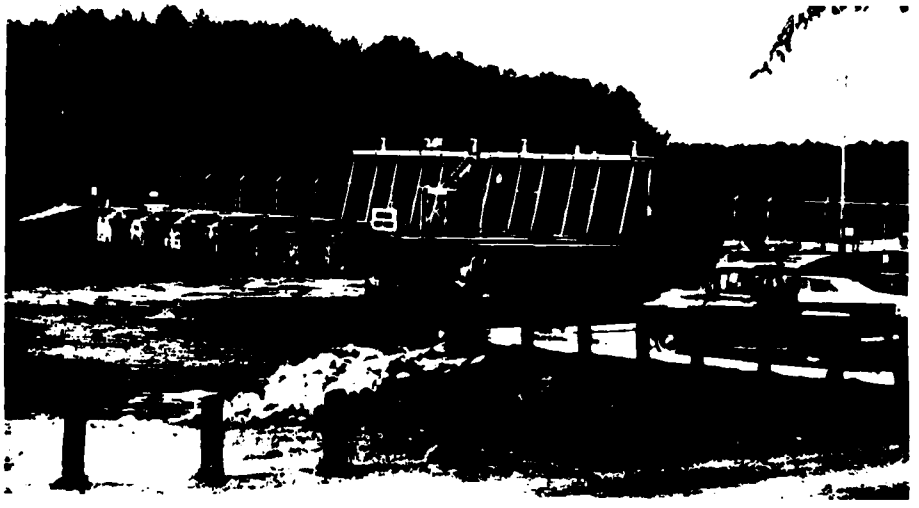
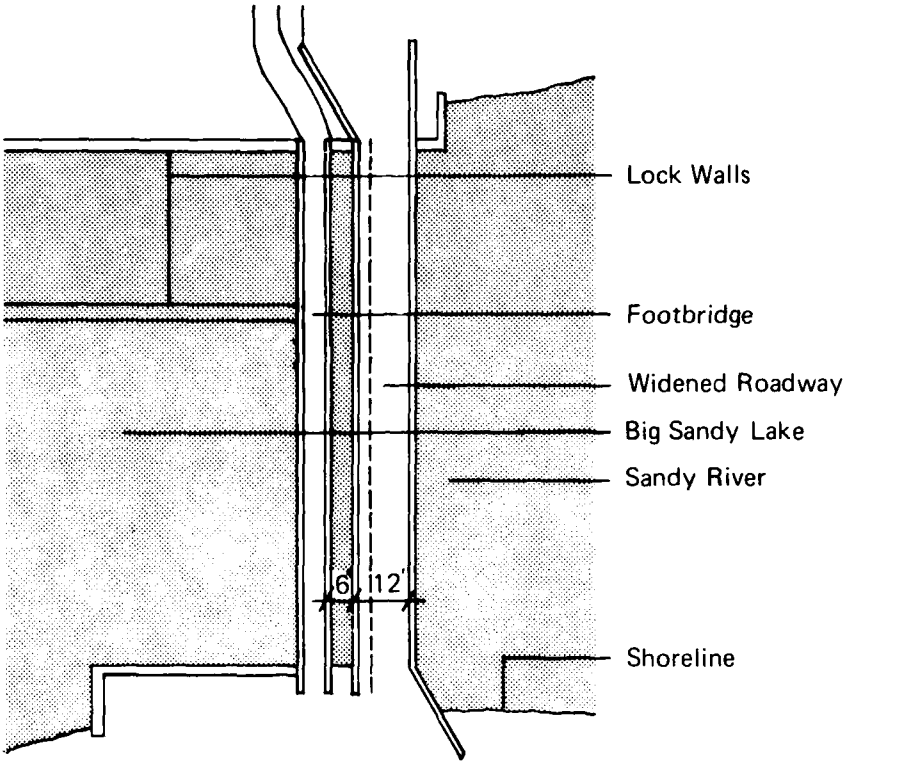
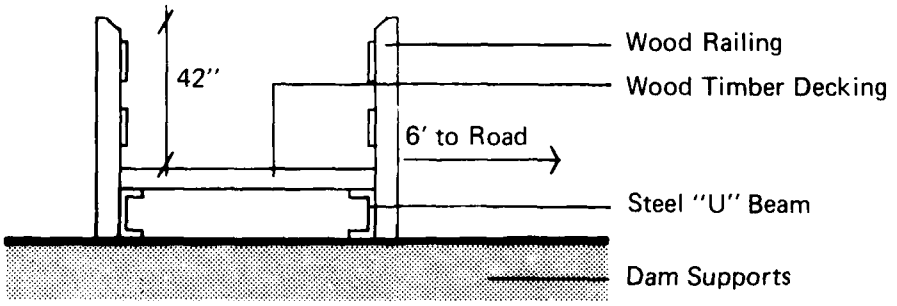


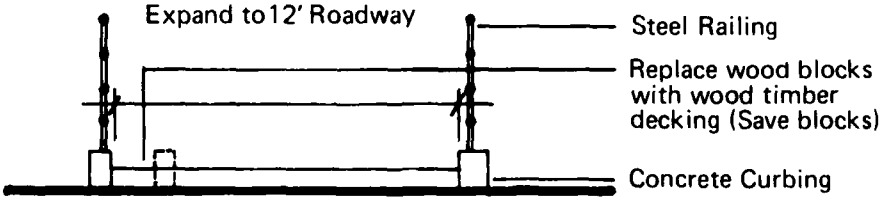
FIGURE 84 BIG SANDY DAM WALKWAY



Plan



Walkway Section



Roadway Section

FIGURE 85 **SANDY LAKE RECREATION AREA COST ESTIMATE**

Priority	Item	Unit	Quantity	Unit Price**	Total
	Removal				
*	roads	L.F.	2880	4.00	$ 11,520.00
*	parking areas	S.Y.	1200	1.50	1,800.00
*	camp pads	Each	27	50.00	1,350.00
*	vault restrooms	Each	4	500.00	2,000.00
					16,670.00
	Construction				
*	two lane asphalt road	L.F.	1320	28.00	36,960.00
*	one lane asphalt road	L.F.	1920	18.00	34,560.00
*	parking areas	S.Y.	3290	7.00	23,030.00
*	paved paths	L.F.	540	3.00	1,620.00
*	woodchip paths	L.F.	4960	3.00	13,680.00
1	dam walkway	Each	1	3,000.00	3,000.00
11	floating marsh walkway	L.F.	1440	10.00	14,400.00
7	camp pad	Each	40	350.00	14,000.00
*	picnic unit	Each	15	300.00	4,500.00
8	ranger station	Each	1	45,000.00	45,000.00
10	comfort station	Each	1	38,000.00	38,000.00
9	vault restroom	Each	1	19,000.00	19,000.00
*	modify existing structure	Each	Shower Bldg.	5,000.00	5,000.00
4	boat launching ramp	Each	1	10,000.00	10,000.00
5	boat dock	Each	1	8,000.00	8,000.00
3	tailwater fishing platform	Each	2	8,000.00	8,000.00
*	lighting	Each	23	200.00	4,600.00
*	entrance sign	Each	1	500.00	500.00
*	planting	S.Y.	2680	2.50	6,700.00
*	drinking fountain	Each	4	200.00	800.00
*	sanitary dumping station	Each	1	9,500.00	9,500.00
*	fire extinguisher	Each	8	50.00	400.00
6	swimming beach	S.Y.	1110	2.00	2,220.00
2	dam roadway widening	Each	1	220,000.00	220,000.00
*	interpretive display	Each	1	5,000.00	5,000.00
	Sub-total				$553,140.00
	Contingencies (20%)				110,628.00
					$663,768.00
	Engineering and Design (12%)				79,652.16
	Supervision and Administration				
	Inspection (5%)				33,188.40
	Overhead				
	on Engineering and Design (13%)				10,354.78
	on Inspection				4,314.50
	TOTAL				$791,277.84

* The asteriked items are supportive to those items with numbered priority and will be implemented when necessary.

** Based on June 1977 St. Paul District cost figures.

FIGURE 86

TABULATION OF PLANNED FACILITIES

The following summarizes the proposed facilities at each area.

Facilities	Terry R. Johnson	Ronald Louis Cloutier	Clamshell Lake	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Total
Mixed Camping	39	109	0	80	21	15	58	332
Tent Camping Only	0	0	0	5	0	0	6	11
Primitive Camping	6	18	0	15	4	2	10	55
Picnic Units	40	60	5	20	10	35	25	190
Swimming Beach	1	2	0	0	0	0	1	4
Boat Ramps	1	2	1	2	0	1	2	8
Boat Dock	1	2	1	2	0	1	2	8
Canoe Launch	x	x	o	x	x	x	x	
Day Use Area	x	x	x	x	x	x	x	
Playground	x	x	o	x	x	x	x	
Parking	121	151	23	80	68	57	66	543
Ranger Station	x	x	o	x	o	o	x	
Interpretive Displays	x	x	o	x	x	x	x	
Interpretive Trails	x	o	o	o	x	x	x	
Concessions	o	o	o	x	o	o	o	
Drinking Water	x	x	o	x	x	x	x	
Shower Building	1	2	0	1	0	0	1	5
Flush Restroom	0	1	0	1	0	0	1	3
Vault Restroom	x	x	x	x	x	x	x	
Sanitary Dumping Station	x	x	o	x	x	x	x	
Sewage Treatment Plant	x	x	o	x	o	o	x	
Maintenance Facility	x	x	o	x	x	x	x	
Bulletin Boards	x	x	x	x	x	x	x	
Camp Cleaning Tools	x	x	o	x	x	x	x	
Picnic Tables	x	x	x	x	x	x	x	
Picnic Shelters	o	o	o	o	x	o	o	
Fireplaces	x	x	x	x	x	x	x	
Firewood	x	x	x	x	x	x	x	
Barbecue Units	x	x	x	x	x	x	x	
Trash Receptacles	x	x	x	x	x	x	x	
Amphitheater	x	x	o	x	x	x	x	
Lighting	x	x	o	x	x	x	x	
Signage	x	x	x	x	x	x	x	
Water Traffic Controls	x	x	x	x	x	x	x	
Fences	x	x	x	x	x	x	x	
Landscape Practices	x	x	x	x	x	x	x	
Telephones	x	x	o	x	x	x	x	
Headwaters Proj. Visitor Ctr.	x	o	x	o	o	o	o	
Beach Change House	x	x	o	o	o	o	x	
Fire Fighting Equipment	x	x	o	x	x	x	x	
Bicycle Rack	x	x	x	x	x	x	x	
Observation Towers	x	o	o	x	o	o	o	
Observation Blinds	x	o	o	o	o	o	x	
Overlooks	x	x	o	x	x	x	x	
Interpretive Marsh Walkway	o	o	o	o	o	o	x	
Pedestrian Dam Walkways	x	x	o	o	o	x	x	
Tailwater Fishing Area	x	x	o	x	x	x	x	
Emergency Call Boxes	x	x	x	x	x	x	x	

Where 39 = Number of Facilities Available

x = The Facility is Available

o = The Facility is not Available

FIGURE 87

PLANNED MAXIMUM USE CAPACITIES

When the modifications outlined in this plan are implemented the maximum capacity of all six areas will increase. The following presents revised figures calculated by the same values and formulas described in section six.

	Terry R. Johnson	Ronald Louis Cloutier	Clamshell Lake	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Total
Day Use Capacity	188,208	188,335	15,828	56,071	32,776	49,412	153,399	684,029
Camping Units	45	127	0	100	25	17	74	388
Capacity	12,033	33,961	0	26,741	6,685	4,546	19,788	103,754
Picnicking Units	40	60	5	20	10	35	25	195
Capacity	18,337	27,505	2,292	9,168	4,584	16,044	11,460	89,390
Swimming Units	180	140	0	0	0	0	200	520
Capacity	92,829	72,200	0	0	0	0	103,143	268,172
Parking Units	121	151	23	80	68	57	66	566
Fishing Units	73	91	14	48	41	34	40	341
Capacity	56,196	62,573	9,627	33,006	28,192	23,379	27,505	240,478
Boating Units	48	60	9	32	0	23	26	198
Capacity	20,846	26,057	3,909	13,897	0	9,989	11,291	85,989
Water Use and Liquid Waste Gallons	2,183,070	2,902,180	158,280	1,362,940	528,310	630,500	2,127,630	9,892,910
Acre-Feet	6.70	8.91	0.49	4.18	1.62	1.94	6.53	30.37
Solid Waste Pounds	38,899	67,804	3,369	37,409	13,119	22,147	36,532	219.279
Gallons	32,481	56,617	2,813	31,229	10,955	18,492	30,504	183,091
Acre-Feet	.10	.17	.10	.10	.03	.06	.09	.56

FIGURE 88 **SUMMARY OF EXISTING AND PLANNED CAPACITIES**

	Terry R. Johnson	Ronald Louis Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake
Existing Capacity[1]						
Day Use	7,335	125,730	36,204	11,231	50,510	53,800
Camping	10,429	29,950	14,975	5,348	4,011	15,510
Total	17,764	155,680	51,179	16,579	54,521	69,310
Actual Use (1975)[2]						
Day Use	77,285	153,756	102,215	75,180	72,783	77,930
Camping	9,272	36,347	6,991	4,041	8,974	7,003
Total	86,557	190,103	109,206	79,221	81,757	84,933
Planned Capacity[3]						
Day Use	188,208	188,335	56,071	32,776	49,412	153,399
Camping	12,033	33,961	26,741	6,685	4,546	19,788
Total	200,241	222,296	82,812	39,461	53,958	173,187
Difference Between Existing and Planned Capacity						
Day Use	+180,873	+62,605	+19,867	+21,545	-1,098	+99,599
Camping	+1,604	+4,011	+11,766	+1,337	+535	+4,278
Total	+182,477	+66,616	+31,633	+22,882	-563	+103,877
Year Expected To Reach Planned Capacity[4]						
Day Use	2000+	1984	*	*	*	2000+
Camping	1980	*	1997	1992	*	1989
Total	2000+	1977	*	*	*	2000+

1 See figure 54.

2 See figure 42.

3 See figure 87.

4 See figures 51, 52 and 89.
(Years interpolated from the demand projection figures.)

* Day use or camping is presently over capacity.

FIGURE 89 **TOTAL ESTIMATED VISITATION FOR ALL SIX RECREATION AREAS, 1975–2000**

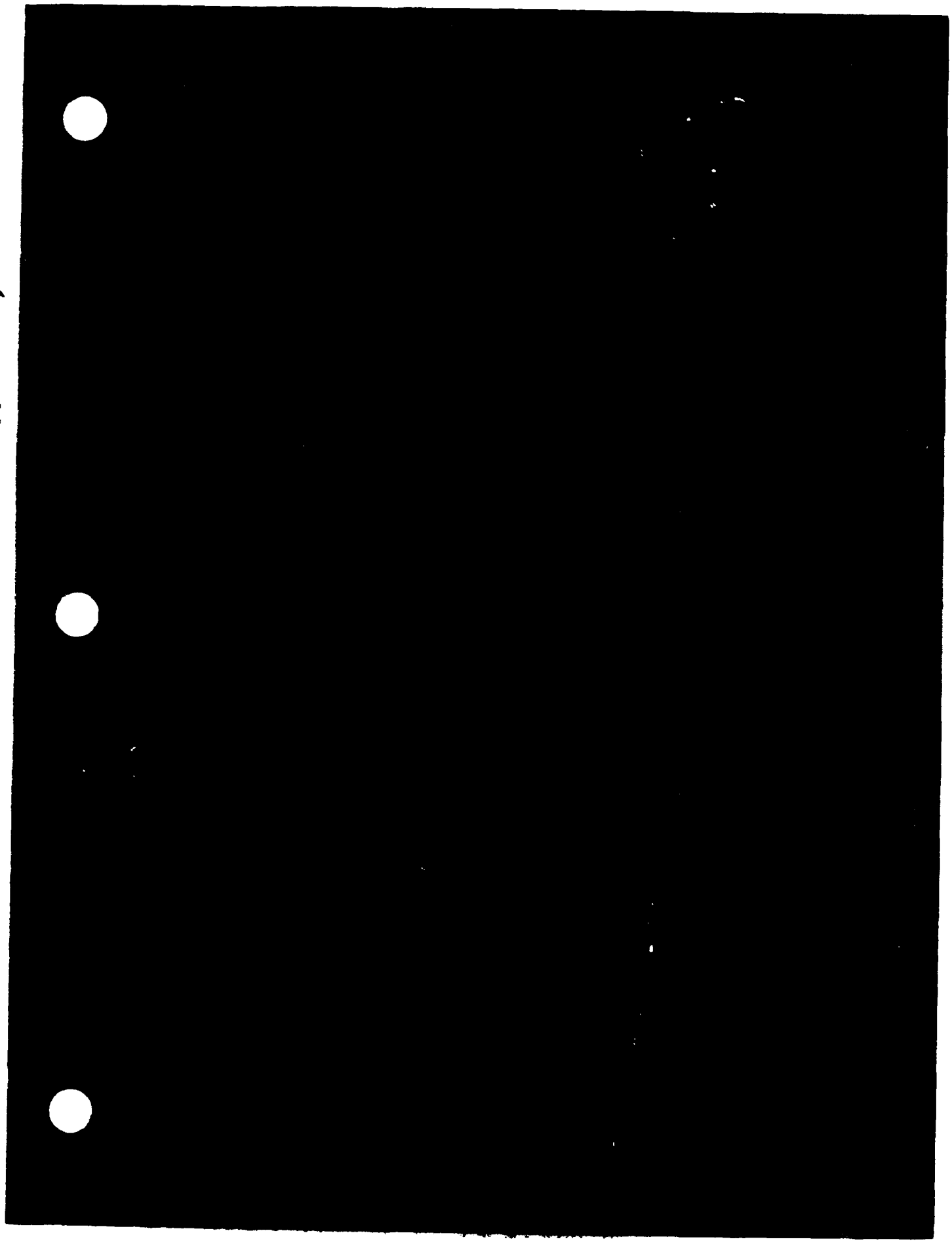
The following figure indicates the combined day use and camper demand for the six recreation areas through the year 2000. The base year 1975 and the target years 1980, 1990 and 2000 have been calculated. The demand figures for the remaining years were interpreted.

Year	Terry R. Johnson	Ronald Louis Cloutier	Leech Lake	Lake Winnibigoshish	Pokegama Lake	Sandy Lake	Total
1975	86,557	190,103	109,206	79,221	81,757	84,933	650,943
1976	89,300	207,000	113,000	81,000	82,800	87,100	660,200
1977	92,100	223,900	116,800	82,800	84,000	89,200	688,800
1978	94,900	240,800	120,600	84,600	85,000	91,400	717,300
1979	97,700	257,700	124,400	86,300	86,100	93,500	745,700
1980	100,468	274,613	128,190	88,139	87,284	95,696	774,390
1981	104,400	290,000	132,600	91,000	89,900	99,000	806,900
1982	108,400	305,400	137,100	93,800	92,400	102,300	839,400
1983	112,300	320,800	141,600	96,600	95,000	105,600	871,900
1984	116,200	336,200	146,000	99,400	97,600	108,900	904,300
1985	120,200	351,600	150,500	102,300	100,100	112,200	936,900
1986	124,100	367,000	154,900	105,100	102,700	115,400	969,200
1987	128,100	382,400	159,400	107,900	105,300	118,700	1,001,800
1988	132,000	397,800	163,800	110,800	107,900	122,000	1,034,300
1989	136,000	413,200	168,300	113,600	110,400	125,300	1,066,800
1990	139,918	428,622	172,733	116,416	112,996	128,620	1,099,305
1991	145,800	446,200	175,700	118,900	115,900	132,300	1,134,800
1992	151,700	463,800	178,700	121,400	118,900	136,000	1,170,500
1993	157,600	481,400	181,600	123,800	121,800	139,700	1,205,900
1994	163,500	499,000	184,600	126,300	124,800	143,400	1,241,600
1995	169,400	516,600	187,600	128,800	127,700	147,100	1,277,200
1996	175,300	534,200	190,600	131,300	130,700	150,800	1,312,900
1997	181,200	551,800	193,500	133,700	133,700	154,500	1,348,400
1998	187,100	569,400	196,500	136,200	136,600	158,200	1,384,000
1999	193,000	587,000	199,500	138,700	139,600	161,900	1,419,700
2000	198,850	604,542	202,442	141,177	142,509	165,614	1,455,134

8 PLAN OF DEVELOPMENT

SUMMARY OF ESTIMATED COSTS FOR PLAN OF DEVELOPMENT

RECREATION AREA	COST
Terry R. Johnson	$ 768,345.00
Ronald Louis Cloutier	460,972.00
Clamshell Lake	26,000.00
Leech Lake	298,910.00
Lake Winnibigoshish	118,078.50
Pokegama Lake	124,043.00
Big Sandy Lake	553,140.00
Subtotal	$2,349,488.50
CONTINGENCIES (20%)	467,897.70
ENGINEERING and DESIGN (12%)	338,086.34
SUPERVISION and ADMINISTRATION	
Inspection (5%)	140,869.31
Overhead	
on Engineering & Design (13%)	43,951.23
on Inspection (13%)	18,313.02
TOTAL	$3,358,606.10



9 INTERPRETIVE PROGRAM

GENERAL

The interpretive program refers to the various elements involved in the interpretive effort. These include structures, displays, trails, activities and personnel. The detailed interpretive program for each area will be presented in Appendix A. The principal guidance for the program is found in ER 1130-2-401, Visitor Center Program, and the interim guidance dated 18 February 1977. 9.01

INTERPRETIVE PROGRAM

The three objectives of the interpretive program in the Headwaters region are: to promote a better understanding of the Corps' role in the Headwaters; to make the users' stay an enjoyable one; and, to assist in accomplishing resource management goals. 9.02

Most of the recreation area related activities can be considered part of the interpretive program. For example, the manner in which the areas are maintained indicates the Corps' concern for the resource, which in turn prompts the users to be more thoughtful in their use of the resource which enhances the experience for all. 9.03

All Corps personnel will be made continually aware of their role in the overall interpretive program. Through their current attitudes and actions, and by constant concern for public health and safety and project resource protection, they present a favorable image to the visiting public. 9.04

VISITOR CENTER

A project visitor center will be located at the Terry R. Johnson recreation area. This site was chosen for several reasons. There is available land at this area for the development of the center. Government Point, where the center is located, is a natural area typical of the headwaters region with excellent views of Gull Lake. This area is on the southern edge of Minnesota's famed vacation land. It is also located near highway 371 which is a major travel route through the region. Because of this, a great number of visitors will have the opportunity to visit the center. 9.05

The interpretive programs planned for the center will include an historical and current description and discussion, through visual and written media, of the role the Corps plays in the region, and the nature and location of the six recreation areas. Also included will be an historical and current overview of Indian and white activities in the region. This may be displayed in a time sequence format beginning with early Indian domination, to the beginnings of white settlement, to the present-day economic and physical characteristics of the region. The reasons for white settlement such as the fur trading and logging and mining industries will be highlighted. 9.06

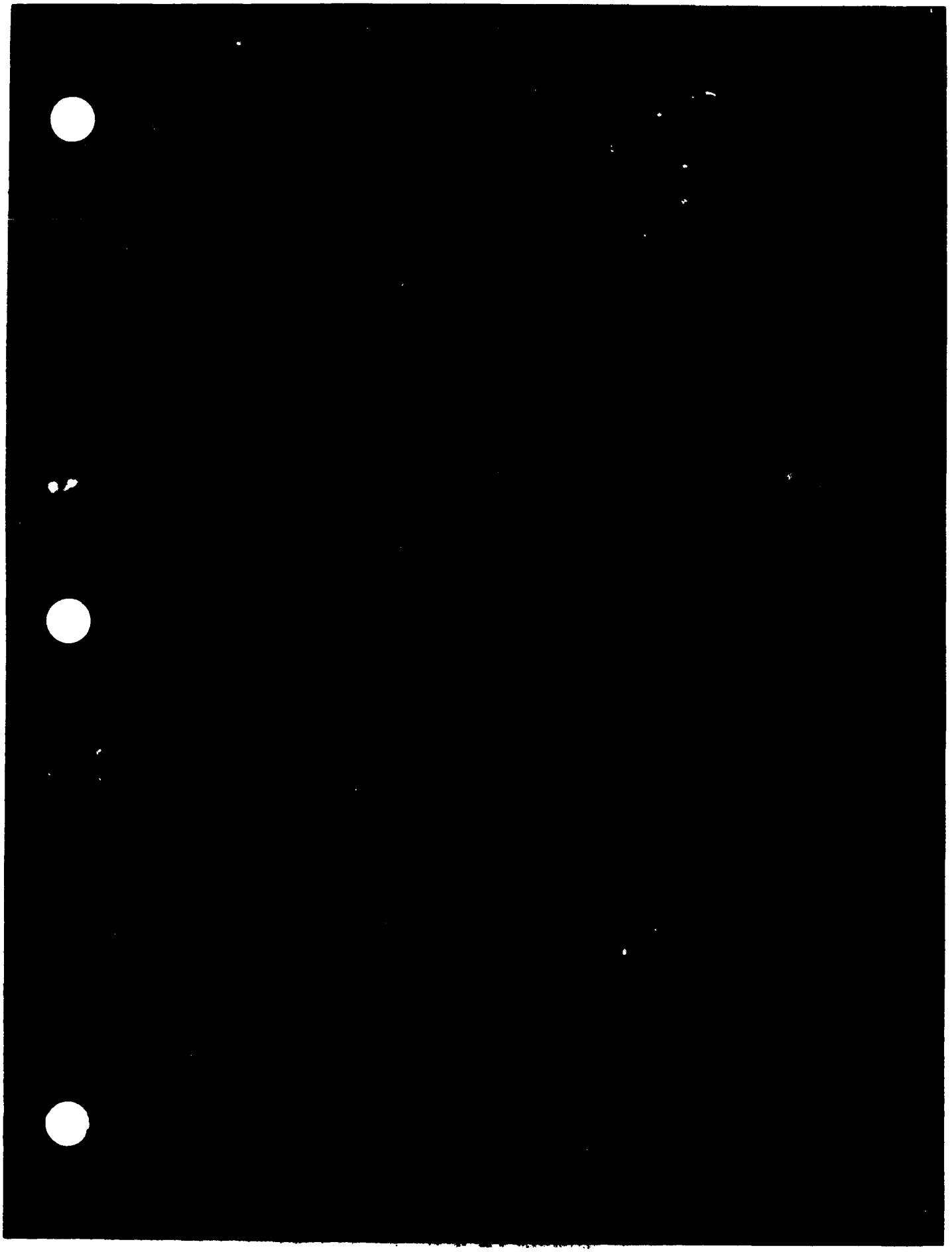
The building and design concepts for the visitor center will be developed and discussed in a separate feature design memorandum. 9.07

9 INTERPRETIVE PROGRAM

FIGURE 90 **EXISTING AND PLANNED INTERPRETIVE FACILITIES**

Recreation Area	Facilities
Terry R. Johnson	Visitor Center * Interpretive 'Tee-Pee' Interpretive Trails Burial Mounds Dam Structure *
Ronald Louis Cloutier	Historical Society Facility * Dam Structure *
Leech Lake	Dam Structure *
Lake Winnibigoshish	Dam Structure *
Pokegama Lake	Interpretive Trail Dam Structure *
Sandy Lake	Lock House Schoolhouse Foundation * Burial Mound Interpretive Marsh Walkway * Dam and Lock Structure *

*Planned



10 PROJECT MANAGEMENT POLICIES

GENERAL

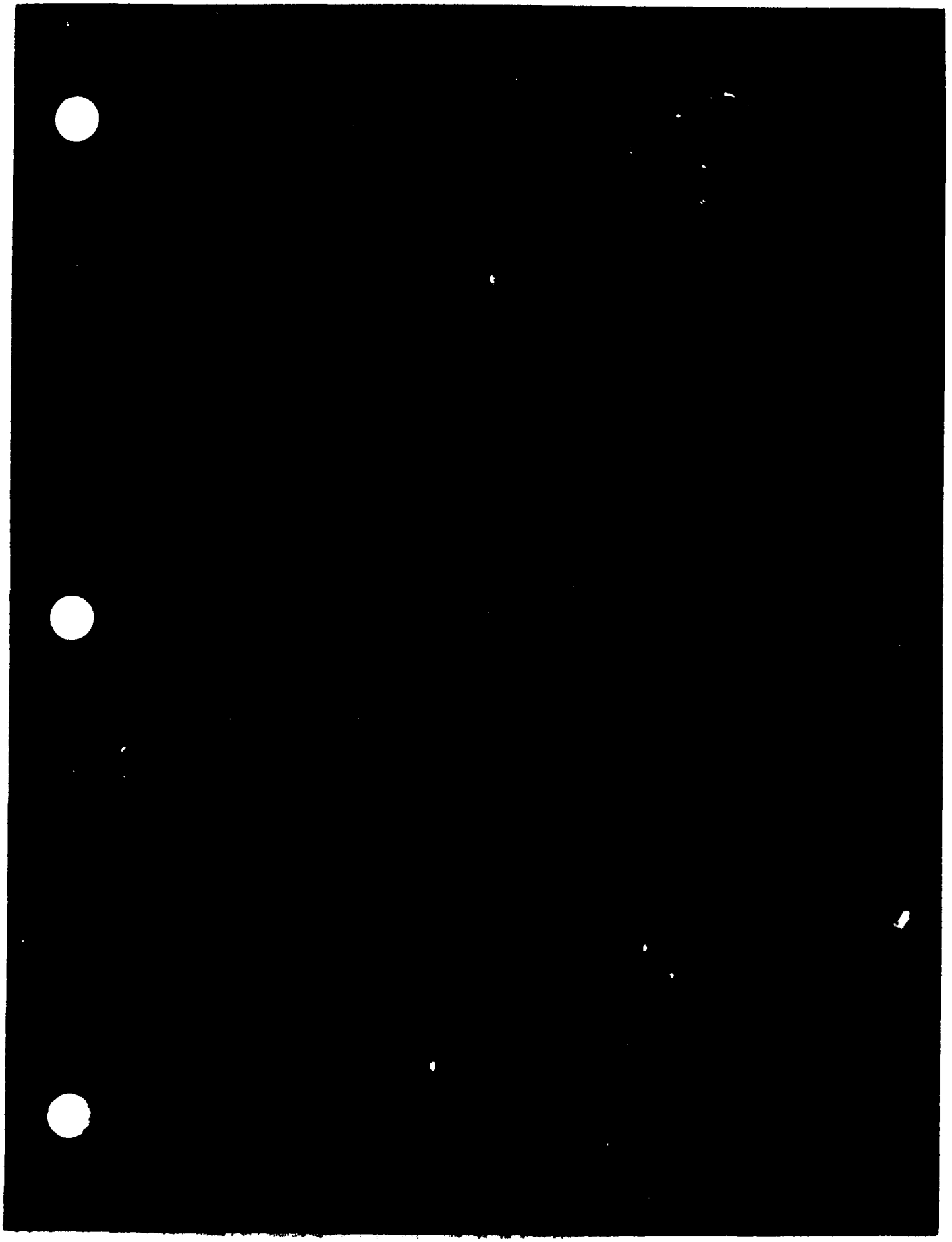
10.01 Project management practices will be consistent with the established resource use objectives discussed in section five. Efforts will be made to provide complete recreational, educational and interpretive opportunities where their implementation is feasible. All resource management policies will be continually evaluated to assess their effectiveness.

10.02 Appendix A, Project Resource Management Plan, contains detailed policies and practices regarding the administration, operation and maintenance of project resources. Appendix C, Fire Protection Plan, describes the organization and training of personnel for fire prevention and suppression techniques. Procedures for the fire fighting and coordination with other fire fighting agencies are also discussed. Appendix E, Project Safety Plan, defines programs and guidelines relative to employee and visitor safety together with procedures to follow in the event of accidents. In conjunction with this plan, emergency call boxes will be provided in the public use areas. They are typically placed at shower buildings and vault restrooms in conspicuous locations. These call boxes will be connected to the maintenance facility office and the dam operator's residence.

10.03 The requirement to prepare Appendix B Forest Management Plan, and Appendix D Fish and Wildlife Management Plan, has been waived because there is insufficient land administered by the Corps in the Headwaters to justify their preparation. The majority of land administered is devoted to recreation. Remaining lands are impractical to manage for forest or fish and wildlife management due to their minimal size. Efforts have been and will continue to be made to monitor Corps administered land to identify and rectify tree disease problems, storm damage and wildlife habitat disruption.

EFFECTS OF THE POLICIES

10.04 Management policies are directed toward providing the public with a safe, more enjoyable and diverse experience while maintaining the integrity of the resource. The consistent design elements and the area reorganizations discussed in this plan will reduce many of the menial tasks now performed. Personnel can then be better utilized in the areas of resource management and protection and in visitor related activities.



11 PUBLIC INVOLVEMENT AND COORDINATION

GENERAL

The master planning effort recognizes the needs and desires of those persons or agencies associated with or affected by the Corps facilities. Coordination and communication with these parties is an integral part of all master plans. 11.01

PUBLIC INVOLVEMENT

Public input into the master planning process occurred in several ways. Two sets of public workshops and one set of user workshops were conducted. The first two sets, held in September 1976 and April 1977, involved all six recreation areas. These workshops were announced in the local newspapers and personal invitations were sent to local residents, resort owners, lake shore property owners, members of local governmental bodies and representatives of the various federal and state agencies associated with the Headwaters region. The third set of workshops were conducted at Terry R. Johnson, Ronald Louis Cloutier and Sandy Lake recreation areas. The participants in this workshop were campers and day users at the areas during the 4th of July weekend. By conducting this workshop on one of the peak recreational weekends, it was possible to obtain pertinent comments from area users regarding the master plan. 11.02

Public input was also obtained at two public meetings: one in Brainerd, and the other in Grand Rapids, Minnesota. These were held in August, 1977. 11.03

The letters of invitation to these workshops and meetings and the comments recorded at each are found in Exhibits B, C, F, G, H, I, J, and K. Copies of the transcripts recorded at the two public meetings are available for review at the St. Paul District Office. 11.04

COORDINATION WITH OTHER AGENCIES

Numerous federal and state agencies were contacted in an effort to obtain the broadest possible spectrum of input and to coordinate the efforts of this master plan. An interagency meeting was held at the St. Paul District Office to inform these agencies of the scope and purpose of the master plan. After the completion of the final draft plan, these same agencies were contacted and supplied with a copy of the plan for their review. The agencies contacted and their comments regarding the master plan are found in Exhibits E and M. 11.05

All local fire departments that have contracted with the Corps for fire protection will be supplied with a copy of the master plan. These departments and all local police and sheriff departments will be made aware of any modifications that occur to the recreation areas as a result of the proposed site plans. 11.06

Corps Seeking Local Input In Headwaters Master Plan

The second in a series of workshops was held this week at the Gull Lake Dam and Reservoir Recreation Area, sponsored by the U.S. Army Corps of Engineers which is seeking needed input for its new comprehensive master plan for public use and resource management for the Mississippi River headwaters reservoirs.

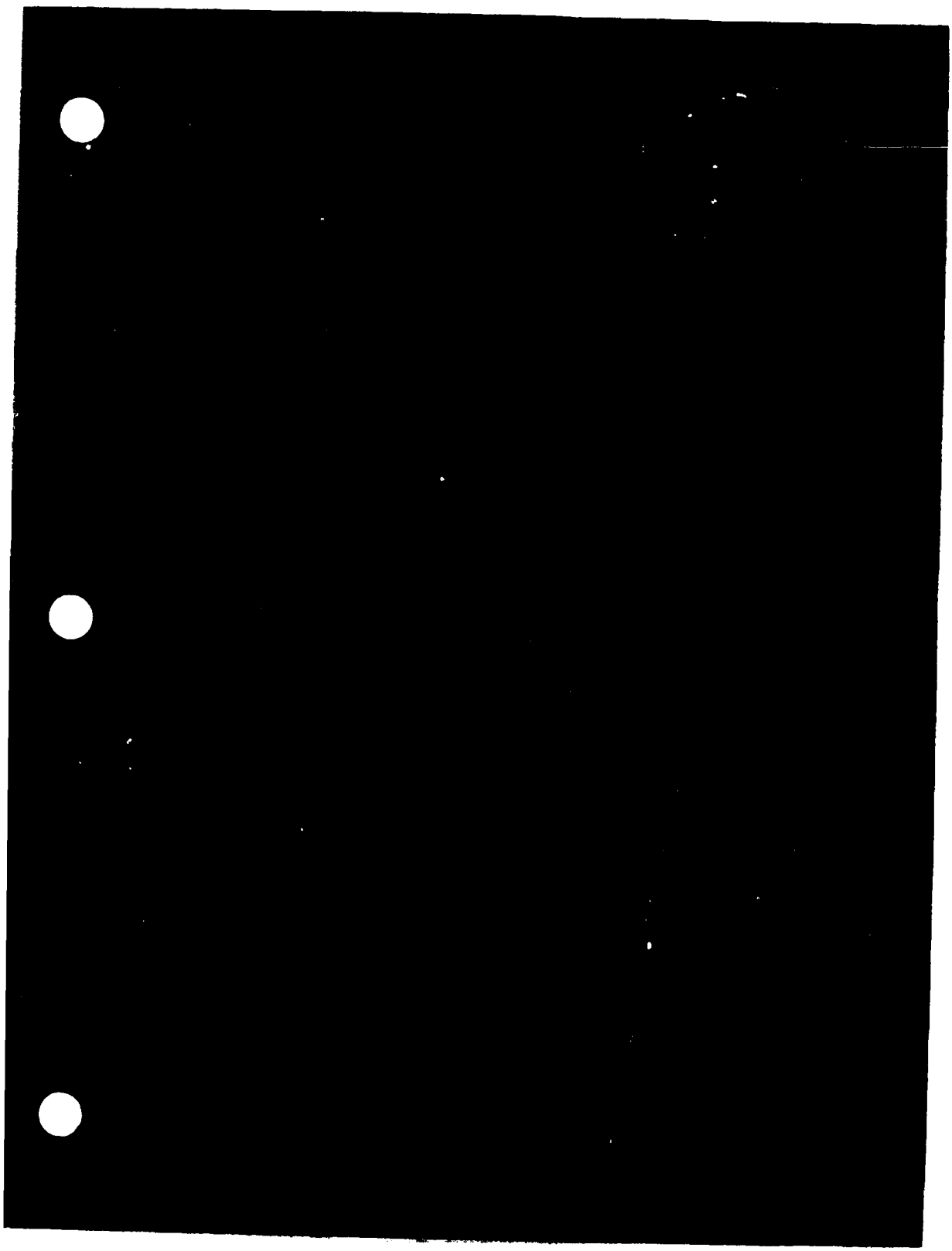
headwaters areas to obtain needed input for the first part of the study. The meeting this week was for a second review of workshops to obtain additional information needed for part two of the plan.

The purpose was to discuss the information previously obtained, to review resource use objectives, and to discuss potential alternative public use options for each area.

snowplowing.

Consideration will also given to moving the pedestri walkway that adjoins the ro to the opposite side of the brid to avoid unsafe conditions f pedestrians walking to t bridge from the campgrou

Considerable concern w expressed regarding wat level fluctuation and wat quality. The Corps was asked examine its current polic



12 PLAN IMPLEMENTATION

GENERAL

As a guide for the orderly implementation of the proposed developments, a careful evaluation of all proposals was made to determine priorities. 12.01

PRIORITIES

The following list defines categories of items which when implemented would be most beneficial to the public and Federal Government in order of importance. 12.02

a. to resolve existing circulation problems.
b. to separate recreation use areas.
c. to complete recreation facilities.
d. to complete the existing recreation use areas.
e. to implement new support facilities.
f. to upgrade existing facilities.

Specific site developments, in order of priority, and their estimated cost is as follows:

Priority	Site Development	Estimated Cost*
1.	Reorganize the internal circulation system at Ronald Louis Cloutier and establish one main entrance road.	$134,886.00
2.	Consolidate the camping and day use areas at Ronald Louis Cloutier.	included in no. 1
3.	Widen the roadway over the dam at Sandy Lake to allow recreation vehicles access to the camping area from the south. As a result, the northern access road can be closed.	220,000.00
4.	Develop the Project Visitor Center at Terry R. Johnson.	300,000.00
5.	Widen the road over the dam at Terry R. Johnson and upgraded county road 105.	220,000.00
6.	Provide separate pedestrian walkways over the dams at Terry R. Johnson and Sandy Lake.	3,000.00 ea.
7.	Remove the tailwaters fishing restrictions 300' downstream of the dam and provide fishing platforms and access trails at all recreation areas.	8,000.00 ea.
8.	Reorganize all existing parking areas to provide flow-through circulation.	see individual cost estimates.
9.	Provide only one public use area access at Lake Winnibigoshish at the existing day use area road.	9,940.00
10.	Adjust the camping area road and the county road 105 intersection at Terry R. Johnson.	5,000.00
11.	Reorganize the internal circulation and the parking areas at Pokegama Lake.	17,000.00
12.	Develop the new day use area at Terry R. Johnson, including a boat launch ramp, swimming beach, picnic area, trails and parking.	68,320.00
13.	Provide a vault restroom and beach change house at Terry R. Johnson.	30,000.00
14.	Provide a camper only boat launching ramp and separate camper boat trailer parking at Leech Lake.	16,500.00
15.	Consolidate the camping area north of the river and the day use area south of the river at Sandy Lake.	120,950.00

16.	Provide a new shower building north of the river at Sandy Lake.	38,000.00
17.	Develop the day use area at Sandy Lake, including a relocated boat launching ramp, a swimming beach, picnic area and parking.	24,030.00
18.	Provide additional camp pads at Ronald Louis Cloutier.	16,100.00
19.	Provide additional camping areas at Leech Lake, including multiple family camp areas, tent-only areas and a primitive camp area.	15,150.00
20.	Provide canoe portage routes and landings at Ronald Louis Cloutier and Lake Winnibigoshish.	19,000.00 ea.
21.	Provide a new shower building in the consolidated area and vault restrooms at Ronald Louis Cloutier.	76,000.00
22.	Provide a vault restroom near the multiple family camp area at Leech Lake and an additional vault restroom in the existing camp area.	38,000.00
23.	Provide a ranger station at Leech Lake.	45,000.00
24.	Provide a ranger station at Sandy Lake.	45,000.00
25.	Remove the existing temporary metal vault restrooms and replace them with permanent structures.	19,000.00 ea.

*Based on June 1977 St. Paul District Cost Figures.

EFFECTS OF DEVELOPMENT

As previously discussed, no new development has been planned or will be implemented that exceeds the established resource carrying capacity. Therefore the objectives of preservation, conservation and enhancement of the natural resources will be upheld. 12.03

The most obvious result of the proposed development is that the visitation will increase when the new facilities are implemented. The effect of this increased visitation is that the operation and maintenance responsibilities of the Corps of Engineers will increase. This may in turn result in the need for additional personnel to protect the integrity of the resource. 12.04

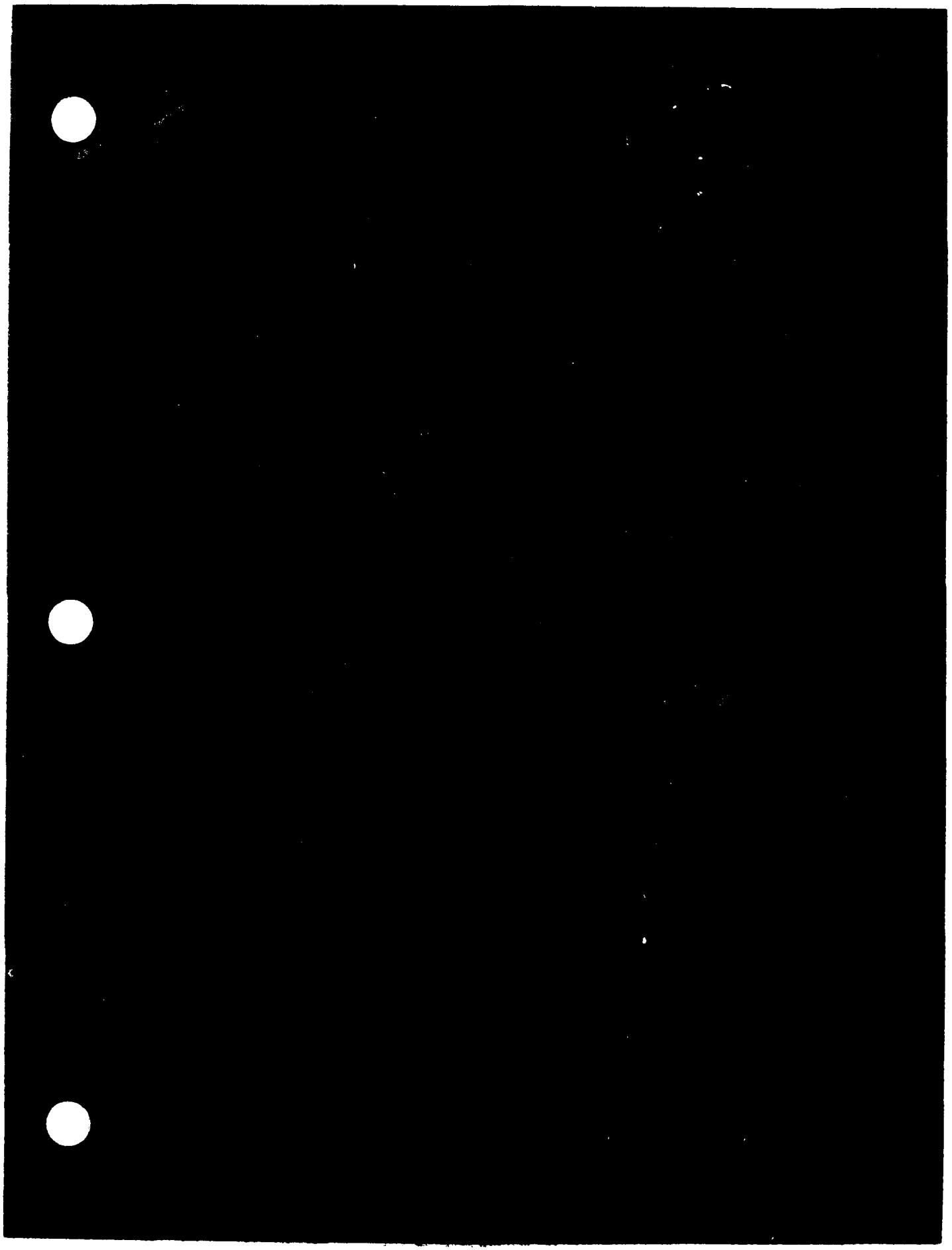
The most important effect of the development is that the needs of the visiting public will be satisfied to the degree possible, given the established constraints. 12.05

12 PLAN IMPLEMENTATION

PROJECT FUNDING

12.06 During the time this report was prepared, no potential, non-federal sponsors had indicated an interest in participating with the Corps in planning, designing, implementing, or operating and maintaining any new developments. Under current policy contained in ER 1120-2-204, new development can occur only with the aid of a non-federal sponsor. This cost sharing program specifies that the non-federal sponsor must assume not less than fifty percent of the initial and future project development costs and all of the operations, and maintenance replacement costs and responsibilities. Elements of the plans included lighting, signage, planting, trails, safety improvements, interpretive programs, fencing, and operation and maintenance modifications, will be implemented under normal O & M funding procedures.

12.07 Existing sanitary facilities at all sites meet current minimum State and Federal pollution abatement standards. However, these minimum standards do not assure that visitors to public use areas can be reasonably and safely accommodated. In this regard, upgrading of facilities at some sites is deemed appropriate to accommodate increased visitation and to forestall overloading of sanitary facilities. Consequently, Code 710 funds will be requested to further upgrade existing facilities and to provide additional facilities where necessary.



13 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

13.01 The revised Master Plan presents a conceptual basis for the design and construction of needed recreation facilities. Particular attention has been paid to the capability of project resources to withstand further development. The design concepts presented balance the human factors against the overall resource constraints to insure that both will be carefully treated and that the ecological balance will be maintained. The master plan provides a framework for future development and resource management.

13.02 As future recreation development is implemented according to this plan, the Headwaters Reservoirs will continue to provide high quality water and land oriented recreation opportunities.

13.03 Current policy requires cost-sharing by a non-federal public agency for the development of new recreation facilities at the Mississippi River Headwaters Reservoirs. A sponsor for cost-sharing in recreation development has not been identified. Because of this, some development proposed in the master plan may not be accomplished within desired time frames.

13.04 Until a non-federal cost-sharing sponsor is identified or there is a policy change allowing the completion of needed recreation facilities by other means, the following management practices will be applied:

1. The existing facilities will be operated and maintained, as in the past, to provide the highest quality recreation experience to visitors that available funding and personnel will permit.

2. Every effort will be made to control facility loading in the interest of public health and safety and to prevent overuse of the project resources.

3. Continuing efforts will be made to obtain non-federal cost-sharing sponsors for needed recreation facility development.

13.05 Some of the actions recommended in this master plan are needed for the safety of the visiting public and to protect project resources. Typical examples are the pedestrian walkways over the dams at Gull and Sandy Lakes, and shoreline protection in the tailwater areas. These and similar actions will be implemented as soon as possible using regular operation and maintenance funding.

RECOMMENDATIONS

13.06 It is recommended that this master plan be approved and that it replace the currently approved master plan as the basis for development and management of both present and future recreation facilities at the Mississippi River Headwaters Reservoirs. It is further recommended that this master plan and accompanying site plans serve as the basis for development of detailed construction drawings and specifications.

Mississippi River Headwaters Reservoirs

MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT

U. S. Army Engineer District, St. Paul
1135 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

August 1977

ERRATA ITEMS

The following corrections should be noted in the report:

1. Page 1, paragraphs 1.06 and 1.07. These paragraphs have been deleted.

2. Page 59, paragraph 4.30. Change Minnesota Highway 6 to County State Aid Highway 6.

3. Page 59, paragraph 4.33, sixth sentence. Change south to north.

4. Page 78, paragraphs 6.16 and 6.17. These paragraphs have been deleted.

5. Page 100, figure 62. Add the following after E.: F.—L. All other Corps owned lands on this reservoir are allocated Project Operations.

6. Page 103, paragraph 8.05. Change to read: The Corps does not own any other land on this reservoir (see plate 7).

7. Page 108, figure 67. Add the following: Note—See exhibit L for the details referenced in the detail number column.

8. Page 123, paragraph 8.52, last sentence. Add the word "significant" between "No" and "modifications".

9. Page 129, paragraph 8.63. Change southeast to northwest.

10. Page 130, figure 81. Change Primitive Area to Buffer.

11. Page 132, paragraph 8.73, last sentence. Change figure 76 to figure 84.

12. Page 139, figure 89, last sentence. Change interpreted to interpolated.

13. Page 145, paragraph 11.03. Change imput to input.

14. Page 149, paragraph 12.06, second sentence. Change ER 1120-2-204 to ER 1120-2-404.

INSTRUCTIONS AND ERRATA SHEET

INSTRUCTIONS FOR COMPLETING THE MASTER PLAN

The pages and plates that accompany this sheet are updated, corrected pages for Part One, final Part Two pages and exhibits and final Part Two plates. The following instructions describe how to remove and replace this material.

1. Preface, Tables and Summary
   Remove pages i through xi and replace updated pages i through xii.

2. Part One
   Remove and replace the following corrected pages:
   a. 7 and 8
   b. 11 and 12
   c. 61 through 64
   d. 75 through 78
   e. 81 through 86
   f. 89 and 90

3. Part Two
   Remove the rough draft of Part Two, pages 95 through 139, and replace the final Part Two, pages 95 through 151, including the Part Two divider page and the divider pages for Sections 7 through 13.

4. Exhibits
   Remove the rough draft exhibits F through N and replace the final exhibits F through N.

5. Appendices
   Insert the appendix page after the brown appendix divider sheet.

6. Plates
   First, remove plates 1 through 28 from their locations throughout the text and place all plates at the end of the report. Remove the rough draft plates, 29 through 34, and replace the final plates 29 through 34.

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PREFACE

This document, prepared by InterDesign Inc. of Minneapolis, Minnesota, for the U. S. Army Corps of Engineers, St. Paul District, updates the approved master plans and appendices for the six Mississippi River Headwaters reservoirs: Gull Lake, Pine River Reservoir, Leech Lake, Lake Winnibigoshish, Pokegama Lake and Big Sandy Lake.

A master plan must contain information needed and used by the Planner, the Designer, and the Resource Manager. In addition, because of increased public awareness, it must be presented in such a manner as to be understandable by the general public. This master plan has been assembled with that concept in mind. The report describes and evaluates the six existing Corps of Engineers' administered recreation areas and proposes necessary modifications to insure adequate public use facilities and proper resource management. This master plan has been developed in accordance with the regulations contained in paragraph 1.02 and is intended to serve as a working guideline within which ongoing development can occur.

Because of the desire to keep this study concise, only topics that are directly applicable to its content have been included. For example, a detailed accounting of monetary expenditures at each project is not included because the age and growth of these recreation areas make such a subject meaningless.

An environmental assessment has been prepared that examines and documents potential effects of environmental modifications that may result from implementing this master plan. Copies of this assessment report are available for review at the St. Paul District Office.

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SUMMARY

With the completion of Part Two, this report becomes one master plan which identifies existing conditions and proposes possible courses of action to restore problematic situations. This includes both the recreation development and resource management.

The proposed modifications and development to complete needed recreation facilities are not intended to be implemented immediately. Current policies prohibit development without the aid of non-federal cost-sharing sponsors. Until a sponsor is identified or the policies regarding development are changed, the existing facilities will be maintained, as in the past, to provide for user needs and to protect the existing project resources from overuse.

Two supplements to this master plan are proposed. They involve a market analysis and recommendations for the concessionaires at the Leech Lake recreation area and the conceptual design for a project level visitor center at the Terry R. Johnson recreation area.

When this master plan is approved, it will replace the currently approved master plan as the basis for recreation development and resource management.

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APPENDIX

The following appendices will be added to this report at a later date:

Appendix A - Project Resource Management Plan
Appendix B - Forest Management Plan
Appendix C - Fire Protection Plan
Appendix D - Fish and Wildlife Management Plan
Appendix E - Project Safety Plan

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PLATE 3

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PLATE 4

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PLATE 5

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PLATE 7

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PLATE 10

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PLATE 11

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PLATE 12

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PLATE 14

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AD-A171 125 MISSISSIPPI RIVER HEADWATERS RESERVOIRS MINNESOTA MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT(U) INTERDESIGN INC MINNEAPOLIS MN 06 DEC 77 3/4

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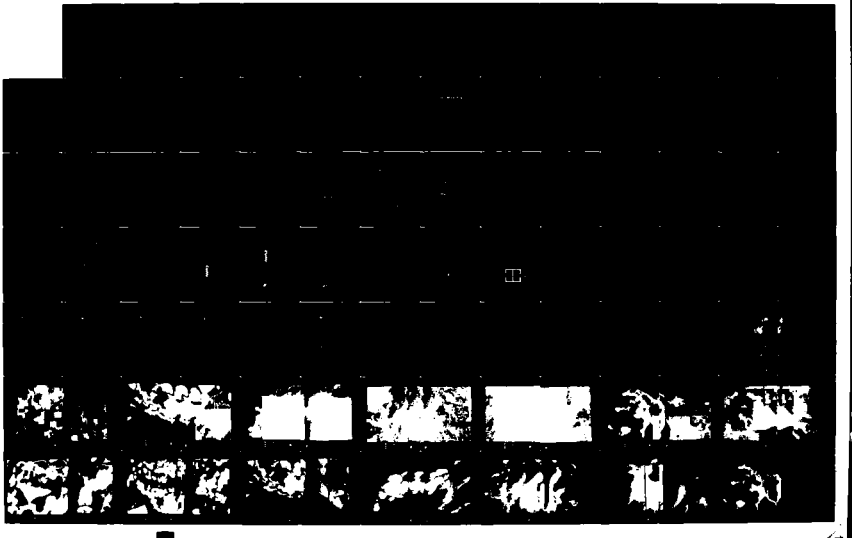

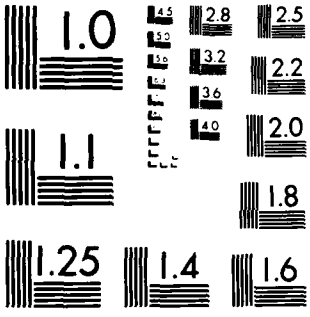

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PLATE 17 — U.S. Army Corps of Engineers, St. Paul District

PLATE 18 — U.S. Army Corps of Engineers, St. Paul District

PLATE 19 — U.S. Army Corps of Engineers, St. Paul District

PLATE 20 — U.S. Army Corps of Engineers, St. Paul District

PLATE 21 — U.S. Army Corps of Engineers, St. Paul District

PLATE 22 — U.S. Army Corps of Engineers, St. Paul District

PLATE 23 — U.S. Army Corps of Engineers, St. Paul District

PLATE 24 — U.S. Army Corps of Engineers, St. Paul District

PLATE 25 — U.S. Army Corps of Engineers, St. Paul District

PLATE 26 — U.S. Army Corps of Engineers, St. Paul District

PLATE 27 — U.S. Army Corps of Engineers, St. Paul District

PLATE 28 — U.S. Army Corps of Engineers, St. Paul District

A EXHIBIT

EXHIBIT A — LAWS APPLICABLE TO RESOURCE DEVELOPMENT AND MANAGEMENT

The federal statutes that are listed below are those pieces of legislation that are applicable and determined to have a major impact with respect to the development and management of federal reservoirs according to the intent of the Congress of the United States and the executive office.

PUBLIC LAW 59-209 JUNE 1906

Public Law 59-209, the Antiquities Act of 1906 (34 Stat. 225), 8 June 1906, provides for the preservation and protection of antiquities on public lands. This includes archeological remains and historic sites.

PUBLIC LAW 534 1944

The 78th Congress Flood Control Act of 1944 provides authority for the Corps of Engineers to develop and maintain power and recreation facilities of water resources projects. Section 4 of Public Law 534 was amended in 1962 by Section 207 of Public Law 87-874. Section 1 of this 1944 law and section 1 of Public Law 14, Seventy-Ninth Congress, known as the River and Harbor Act of 1945, specify coordination with state agencies in planning for flood control and watershed development.

PUBLIC LAW 85-624 12 AUGUST 1958

The Fish and Wildlife Coordination Act, Public Law 85-624, 12 August 1958, provides for integration of fish and wildlife programs with Federal water resource developments. Subsequent legislation has added to and modified the basic act somewhat.

PUBLIC LAW 86-645 14 JULY 1960

The River and Harbor Act of 1960 provides for effective management of industrial resources and allows sale of project lands to states, political, subdivisions thereof, and port districts.

PUBLIC LAW 86-717 6 SEPTEMBER 1960

Public Law 86-717 provides for the protection and improvement of forest cover for reservoir areas under the jurisdiction of the Secretary of the Army and the Chief of Engineers.

PUBLIC LAW 86-665 1966

The National Historic Preservation Act of 1966 declares that the historical and cultural foundations of the country must be preserved as a living heritage of our background and development. It provides for Federal assistance to state and local governments, private organizations, and individuals for historic preservation projects.

PUBLIC LAW 91-190 1969

The National Environmental Policy Act of 1969, Public Law 91-190, declares a National Environmental Policy for protection and enhancement of the environment and established a Council on Environmental Quality, and set forth the requirement for an environmental impact statement on any federal action significantly affecting the environment.

EXECUTIVE ORDER 11593 13 MAY 1971

This Executive Order, Protection and Enhancement of the Cultural Environment extends an act legislated in 1966 by providing that projects on federally owned lands must be reviewed to assure protection and upgrading of our cultural surrounding.

PUBLIC LAW 93-205 28 DECEMBER 1973

The Federal Law repeals the Endangered Species Act of 1969. Public Law 93-205 is presently referred to as the Endangered Species Act of 1973. This act is concerned with the development and management of any endangered species of fish, wildlife or plant within federally owned or operated land, and stipulates that any proposed developments allow for the protection of threatened species and species of a wide range of influence, such as migratory waterfowl and fish.

A EXHIBIT

Additionally, there are numerous Federal Laws, Executive Orders, and interagency agreements that may also be applicable including:

Federal Laws cited in EM 1120-2-101, 12 December 1964 detailing policies and procedures discussing Corps of Engineers coordination with other federal agencies.

PUBLIC LAW 87-77 22 JULY 1961	Federal Water Pollution Control Act, 1961, amends the Federal Water Pollution Control Act of 1956 to provide for a more effective program of water pollution control and for other purposes by extending Federal authority and increasing construction grant authority.
PUBLIC LAW 89-234 1965	The Water Qualtiy Act of 1965, amends previous laws establishing the Federal Water Pollution Control Administration and transfers administration to the Department of Interior.
PUBLIC LAW 89-80 22 JULY 1965	The Water Resources Planning Act establishes the National Water Resources Council to bring together and coordinate the variety of activities of Federal, State and local government agencies concerned with water resources development.
PUBLIC LAW 89-72 9 JULY 1965	The Federal Water Project Recreation Act of 1965 as amended by Section 77 of the Water Resources Development Act of 1974 (P.L. 93–251) imposes requirements of non-Federal cooperation and cost sharing for recreation and fish and Wildlife enhancement at reservoir projects authorized after 1 January 1965. Similar requirements are being applied administratively to reservoir projects, like the Headwaters, authorized before 1 January 1965.
PUBLIC LAW 89-753 1966	The Clean Waters Restoration Act of 1966 provides more Federal money for building treatment facilities.
ER 1105-2-11 15 MARCH 1972	Federal Laws provide instructions on the coordination with state historic preservation programs and the objectives of the Secretary of the Interior and the Advisory Council on Historic Preservation for the purpose of providing responsibility for planning, protection, preservation and maintenance of unique historic districts, sites, structures, and objects in regard to water resource development programs.
ER 1105-2-12 15 MAY 1972	Federal Laws pertaining to Archeological Salvage Operations and indicating that investigation of archeological resources and salvage of artifacts, including obtaining funds for all such work, shall be the responsibility of the National Park Service and the Smithsonian Institution.
EP 1165-2-1 JANUARY 1975	Federal Laws discuss responsibilities and cooperation with respect to a variety of water resource policies.
PUBLIC LAW 93-291 1974	The Preservation of Historic and Archeological Data Act permits the expenditure of up to one percent of the amount appropriated for a Civil Works project for survey, recovery, analysis and reporting of important (scientific, historical, archeological and paleontological) data which may be lost as the result of Civil Works under Corps jurisdiction, including non-Federal lands provided by local interests for certain types of projects. The authorities of P. L. 93–291 apply to operating projects as well as those in the planning or design stages.

B

EXHIBIT

EXHIBIT B

LETTER OF INVITATION TO THE PUBLIC WORKSHOPS

To inform the public of Corps of Engineers' activities and to obtain input from the public regarding recreational developments and resource management, a series of public workshops were conducted. The following is typical of the letters sent.

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

IN REPLY REFER TO
NCSED-ER

15 September 1976

We are in the process of updating our public use development and resource management master plans for the six Mississippi River headwaters reservoirs. The firm of InterDesign Inc. of Minneapolis, has been contracted to carry out this study.

InterDesign, Inc. will examine existing resource developments and use, project future resource demands, determine the adequacy of currently approved master plans, and develop revised site plans and resource management guidelines for all Corps lands in the headwaters area. This work was initiated in July 1976 and will continue until August 1977.

Workshops are being held to brief interested local residents and officials on the nature of the study and to obtain pertinent comments on the proposed study procedure, report outline, the existing and projected use and demands and their effects. These workshops will be held at the maintenance facility at each of the six headwaters reservoirs locations.

The workshops are open to the public and a notice of the meeting has been provided to local newspapers. While anyone may attend, I am extending this personal invitation to you because of your past and continuing interest in our developments in the headwaters region.

In addition to these workshops, public meetings will be held in the future. The times and places for these meetings will be announced later.

A workshop will be held at Gull Lake on September 20 at 9:00 A.M. Please inform Mr. Milton Roppe, Corps of Engineers Area Manager at Remer (218-566-2306, or Mr. Martin W. Ehrhard, Flood Control Dam Operator (218-829-3334), of your attendance plans.

Sincerely,

FORREST T. GAY, III
Colonel, Corps of Engineers
District Engineer

EXHIBIT C PUBLIC WORKSHOP COMMENTS

The following is a summary of the comments as recorded at each of the six public workshops. Included after each set of comments is a brief summarization of what we felt the participants were trying to communicate.

GULL LAKE

1. Concern was expressed to maintain public access to the lake. The majority of the lakeshore is privately owned with very few public access points.
2. Swimming areas and boat launching facilities are in high demand especially relating to camping facilities.
3. A form of water zoning was discussed to regulate power boat usage and to preserve water orientated wildlife habitat areas.
4. The recreation demand for the area should be examined with the existing similar facilities in mind to reduce any unnecessary duplication of facilities.
5. There was great concern expressed regarding water level fluctuation and water quality. Lake pollution has been on the increase.
6. The day use area is of great value as there are few similar facilities in the area. The lack of a swimming beach and boat launch are, however, deterents for increased use.
7. A comment was made to possibly develop recreational facilities closer to the Twin Cities to relieve some pressure on this area.
8. The current regulations regarding the need for matching funds from non-federal sponsors was explained. There is very little tax base in this area from which funds could be derived.
9. It was explained that it was possible to lease Corps of Engineers owned land to private concessionaires as support facilities to the recreation development.
10. There is a demand to provide cross-country skiing and riding trails. Extensive snowmobile trails exist in the area. The Corps of Engineers owned lands at Gull Lake are limited in terms of trail developments.
11. Some participants felt that Government Point should have been developed first. This would have provided exposure to the lake with the possibility for swimming and boat launching.
12. It was mentioned that the grounds were maintained very well and that the quality of maintenance should continue.
13. Concern was expressed over the high cost of construction for Corps of Engineers related facilities in comparison with private construction.
14. A question was raised as to what precautions the Corps of Engineers has taken this year or will take in the future for drought conditions.
15. It was mentioned that a watercraft toilet pump-out facility should be provided to help eliminate the dumping of wastes into the lake.

SUMMARY

1. There is a definite need for public access to the lake that should include a swimming area and a boat launch. This should be of the highest priority for this area.
2. Water zoning policies should be drafted and explained to other concerned agencies for their compliance.
3. All of the current policies regarding lake level fluctuation as it relates to recreation, water pollution and drought and flood orientated regulations should be examined.

4. The operations and maintenance policies including the construction of new facilities to the maintenance of existing facilities should be reviewed to determine if there are measures that could be taken to reduce costs and at the same time maintain quality.

PINE RIVER RESERVOIR

1. Concern was expressed regarding the operation of the Clamshell area. The residents complained that it opened too late in the season and closed too early. The daily operating hours were also insufficient. This is apparently due to lack of staff.
2. The regulations regarding matching funds and non-federal sponsors was discussed.
3. A question was raised regarding the status of other Corps of Engineers owned land on the Whitefish chain for possible development. It was explained that the updating of the existing master plan would be reviewing these holdings.
4. A clarification was requested as to who can use the Corps of Engineers facilities. Apparently, the local historical society has been using the amphitheater to show films. It was explained that this is a public facility and any outside group may use the area.
5. Two items of concern for the entire reservoir were mentioned. These are the locating, removing or marking of underwater stumps, rocks or logs and the dredging of channels between lakes of the reservoir.
6. The pressure on the lake in terms of boating and fishing has increased. This may be due in part to the great number of access points to the lake.
7. The need for water zoning and regulations was mentioned. One particular case was the competition between water skiing and fishing. Current laws restrict water skiing one hour after sunset.
8. The majority of the participant concern and the reason for the large turnout was in regard to lake level fluctuation. It was stressed that this meeting was to discuss the recreation development.

SUMMARY

1. The policies regarding the recreation season and daily operating hours should be reviewed based upon demand.
2. The present use of the Pine River Reservoir recreation development dictates that an option should be available for the people wishing to use the area. If the surrounding recreation developments, both public and private, cannot support this great demand, the Corps of Engineers should consider development of its holidings to help alleviate this pressure. This may include the development of the Arrowhead Lake area.
3. An investigation must be made to determine whose responsibility it is to maintain channels within the reservoirs and to locate and mark hazards to navigation. This is especially critical as it would be expected that the majority of the lake users are unfamiliar with the lake and its rock and stump locations. A standardized system of navigational buoys should also be incorporated to eliminate confusion.
4. Water zoning policies may be necessary to eliminate conflicts of user types especially in areas of high concentrations of users. These policies may also be considered from the standpoint of water pollution and water oriented wildlife habitats.

C EXHIBIT

LEECH LAKE

1. The concessionaires' leases have been extended. They have a major complaint dealing with the requirement to hook-up to the sanitary sewer system. At present, they must pay to install sewer lines on government property. They feel this is unfair.
2. The concessionaires' business has decreased in recent years. They relate this decrease to the quality of the boat ramp which is capable of launching large boats necessary to safely navigate on Leech Lake.
3. There has also been a trend toward large, self-contained camping rigs which do not need support facilities in the area.
4. These large camping rigs also demand electrical, water and sewer hook-ups. It is felt that if the Corps of Engineers provides these facilities they will completely eliminate any competition in the area. This is because of the low prices for camping in the Corps of Engineers recreation developments.
5. It was felt that fees should be charged to launch boats thereby making it more feasible for the concessionaires to compete.
6. With the increase in private boat usage, there is a greater demand for boat docking facilities especially with the large boats used on Leech Lake.
7. There has been an increase of sailing on the lake. These are large boats which have deep drafts and require cleared channels and moorings. The present facilities are inadequate for large sailboats.
8. It is necessary to determine whose responsibility it is to maintain the channel to the lake.
9. The concessionaires' customers come from all over the United States and Canada with the majority of out-of-state people coming from Iowa. About 60% of the customers are from Minnesota.
10. The five concessionaires are approximately 1/2 to 1/4 busy or booked during the season.
11. The reduced speed limits have also reduced the concessionaires' business.
12. It was suggested that a pump-out station be provided for large boats with self-contained toilets.
13. The primary seasonal users are male fishermen in the spring and fall and families during the summer. Area resort owners have noticed an increase in family use.
14. The residents of Federal Dam, Mn. asked if it was possible to hook-up with the Corps of Engineers sanitary sewer treatment plant. It was explained that the plant is only seasonal and not large enough to handle the town's discharge.
15. In general, it was felt that the Corps of Engineers was providing too many services and not charging enough for them. They have created competition with local resort ownership. These resorts generally provide minimal camping averaging 3 to 5 camp sites.
16. One major facility that was felt to be lacking was a swimming beach.
17. The Recreation Management Plan prepared by the National Forest Service was presented and explained.

SUMMARY

1. The concessionaires' role at Leech Lake must be examined. With the current decline in business and the duplication of services, it may be necessary to consolidate their facilities. With the completion presented by the boat ramp it may be considered

that the concessionaire operate and maintain the boat ramp along with an expansion of the public use docks and beaching facilities.

2. Consideration for the mooring and navigation of large boats and sailboats must be incorporated. It must be determined whose responsibility it is to maintain the channel to the lake and to standardize the navigation buoys.
3. The policies regarding the Corps of Engineers cost sharing programs dealing with the development of facilities should be reviewed. The case in point at Leech Lake concerns the sewage treatment plant. If possible in the future, the Corps of Engineers should consider the cost sharing of a public area treatment.
4. The Forest Service's Recreation Management Plan must be obtained and reviewed. This report contains information that directly relates to the Corps of Engineers recreation development.

LAKE WINNIBIGOSHISH

1. The Forest Service operates six campsites near the Corps of Engineers recreation development. All six sites have boat ramps, several of which are capable of launching large boats.
2. The closest Forest Service campground is Plug Hat Point which offers 13 camp units. This area, like the Corps of Engineers recreation development, is rarely filled to capacity. This is due to poorer fishing at this end of the lake and no large boat launching.
3. The recent trend in boating is toward larger boats which require deep boat ramps.
4. The recent trends in camping have gone in both directions; there are more large, self-contained rigs and more tent camping.
5. The Forest Service maintains 200-300 campsites in the area. The primary activity is fishing, both summer and winter.
6. The Forest Service plows the roads to its access point for snowmobile access to the lake for ice fishing.
7. Very little winter camping occurs in the area. The camping season is however expanding with people arriving earlier in the spring and leaving later in the fall.
8. Snowmobile use has peaked in this area. Increasing numbers are not expected.
9. The Forest Service "off-the-road" policies are changing to help prevent snowmobile damage to vegetation.
10. The Forest Service lands are used quite extensively for hunting with grouse hunting being the primary attraction. Most of the hunters in the area are local residents.
11. Cross-country skiing and the need for trails is on the increase.
12. There is a great deal of trapping in the area.
13. The DNR has been monitoring fishing activities on the lake. The figures indicate that there are more fishermen but they are catching fewer fish. The fishing pressure has increased to the point where the DNR may have to restrict the fish harvest.
14. Most fishing occurs out of small boats but more fish are caught from launches on a per fisherman basis. The launch users are primarily middle age and older people.
15. Ice fishing and spearing have increased only slightly in past years.

16. The DNR did not have reservations to allow fishing in the dam's tailwaters. They did however request that the no fishing within 300' of the dam be maintained during the spawning season.
17. Water level policies and fluctuations are of great concern for this lake. Due to its shallow off shore conditions, even slight reductions in the water level create navigation problems for large boats. Large boats must stay out from shore on the average of 300' for safe operation. Due to the sandy soil conditions and steep banks on the shore, slight increases in water levels together with wave action on this large lake create great bank erosion problems.
18. There has been a noticeable trend in the purchase of land for private use in the area. More homes are being constructed and existing cabins are being winterized for year round use.
19. An increase in sailing on the lake has been noticed.
20. The Corps of Engineers recreation development in general is too small, too close to the road and does not provide the same facilities other Corps of Engineers areas do. It was stated that a camping area in Minnesota that does not have direct water (lake) access has marginal value in meeting the public's demand.
21. The day use is a valuable facility to retain for sightseeing, fishing and short stops made by travelers. Fishing in the dam's tailwaters could be improved by providing deep holes and other favorable fish habitats.
22. It was stated that there are policy differences between the agencies that have camping facilities in the area. One example is that the Corps of Engineers has kept its camping areas open during this year's forest fire danger period while other federal and state camping areas are closed. There is also a difference in fee schedules between areas that offer similar facilities.

SUMMARY

1. Due to the close proximity of similar facilities the Corps of Engineers and the Forest Service should review and compare recreational demand figures and attempt to eliminate the duplication of facilities. This may lead the Corps of Engineers to a type of development that it does not presently support. Any expansion of Corps of Engineers facilities in this area should be carefully justified.
2. It does not seem justifiable, for example, that the Corps of Engineers provide a boat launch at its recreation development. This is due to the 9 or 10 boat ramps that exist in the area presently. It may, on the other hand, be feasible if the boat ramp was constructed to handle large boats. This ramp would have to be constructed on the lake which would mean land acquisition and development.
3. It may be feasible however, to develop further the day use area and provide a boat launch for downstream fishing or canoeing.
4. The removal of the 300' no fishing restriction in the dam's tailwaters would further increase the usage of the day use area.
5. For environmental and navigational reasons the water level fluctuation policies must be closely reviewed for this reservoir.
6. Due to large land holding by various government agencies around the reservoir the trend toward land purchases for private use will not impair public use of the reservoir.

7. The Corps of Engineers policies for operations and maintenance should be compared to other governmental agencies and revised as critical differences occur.

POKEGAMA LAKE

1. This recreation development is approximately 10 1/2 acres with 12 camp pads. The camp pad density is about 5 pads per acre.
2. It was generally agreed that this recreation development should be expanded. As it is located on a major transportation route, there is great demand for overnight camping. The number of campers that are turned away has increased.
3. In the recent past there was a policy of allowing late arriving self-contained units to use the day use parking lots for overnight camping. This is no longer allowed.
4. Local residents and seasonal workers use the recreation development for short term living facilities. Because of this it was suggested that the 14 day allowable visitation period be reviewed. A 48 hour visitation period was suggested.
5. Out of state campers average about 40 - 50%.
6. There are two parcels of land that may be available for expansion. One is about 24 acres to the east between the highway and the river and the other is the parcel south of the river presently owned by Hanna Mining. The 24 acre parcel is owned by two private individuals.
7. It was explained that the Corps of Engineers cannot acquire land or initiate new construction without 50 - 50 cost sharing with some non-federal sponsor. The first likely source to contact for this funding would be the county.
8. The demand for expansion is great due to the lack of similar facilities in the area. There are approximately 4 other boat ramps on the lake, but none are available downstream of the dam. There is only one publicly owned campground and two campgrounds owned and maintained by Blandin Paper Co. on the lake.
9. The day use area is heavily used by local residents and groups for fishing and picnicking etc. There are approximately 3 to 4 boats launched per day in the summer.
10. No development has occurred at this recreation development for about 10 years.
11. The noticeable trend in camping at this site has been to large, self-contained units. These units provide great competition for local resorts. It was mentioned that if the Corps of Engineers provided hook-ups, the local resorts would have an even harder time competing. It was felt in general that the Corps of Engineers should charge for the facilities they provide.
12. About 75% of time spent by the Corps of Engineers for maintenance is related to the recreation development and the remaining 25% is related to the dam operations.
13. Concern was expressed regarding the Corps of Engineers policy for water level fluctuations. It was mentioned that the Corps of Engineers operates independently of other agencies, including the DNR, in regards to water levels and discharges.
14. At present there are no swimming facilities available. It would be difficult to develop swimming at this site.

15. It was mentioned that the "Environmental Council" is excited about an expansion of recreational facilities in the area. They and the county should be contacted.

SUMMARY

1. All available sources should be tapped to determine whether additional land can be obtained for expansion of the recreation development. The city, county and other agencies should be contacted regarding the Corps of Engineers cost sharing policies.
2. The acquisition of any available lands should be incorporated into the updating of the Master Plan. This could dramatically alter the organization of the present facility.
3. The structural capabilities of the dam should be investigated to determine if it is possible to construct a bridge over the river to the Hanna Mining property.
4. The Corps of Engineers should not develop its facilities to compete with local resorts. This would dictate that no hook-ups should be provided for self-contained trailers.
5. The operations and maintenance policies regarding the recreation development, the dam and water level fluctuations must be reviewed to determine their efficiencies.
6. The Corps of Engineers policies of camping fees and reservations should be examined. Reservations would be extremely beneficial at this site due to its size and proximity to a major transportation route.

BIG SANDY LAKE

1. In general, it was felt that the Corps of Engineers recreation development is in direct competition with local resorts. The resorts cannot compete with the low prices charged by the Corps of Engineers.
2. The people who use the Corps of Engineers recreation development do not benefit the surrounding resorts. Most campers bring all their supplies with them.
3. There has been some conflict noticed by the resort owners of campers from the Corps of Engineers recreation development using their beach facilities. The Corps of Engineers does not provide a swimming beach.
4. It has also been noticed that the people staying at local resorts use the Corps of Engineers comfort station.
5. The local resorts offer several types of camping. They rent cabins or camp pads on a seasonal as well as on a short term basis. Resort owners have been hesitant to develop camping types similar to the Corps of Engineers as they cannot compete price-wise.
6. It was mentioned that Ole's Resort, just to the south, is planning to develop a camping area.
7. The number of resorts on the lake have decreased.
8. There are only several access points to the lake and these are generally unimproved. The Corps of Engineers boat ramps are the best on the lake and are used by local residents, resort owners as well as campers.
9. The Corps of Engineers does not provide a swimming area which is in great demand. The Savannah State Forest campground as well as local resorts provide swimming area.
10. The Corps of Engineers day use area is extensively used by local residents and groups.

11. The Corps of Engineers facility is the best in the area of its type.
12. Any expansion of the Corps of Engineers recreation development would be poorly received by the local residents and resort owners.
13. It was suggested that the Corps of Engineers charge higher prices and charge for boat launching.
14. Camping reservations were discussed to help eliminate turnaways and to serve all factions of the public more fairly.
15. The fishing pressure on the lake has increased and the fish harvest has decreased. There is very little ice fishing on the lake.
16. Water skiing has increased, especially on the weekends.
17. Snowmobiling is quite active in the area. There are approximately 300 miles of trails in the area with Sandy Lake as the hub.
18. Few resort owners have winterized their cabins. They cannot compete with centrally heated motels.
19. Cross-country skiing has increased in the area. There is one available trail at present.

SUMMARY

1. The Corps of Engineers should plan future development so as not to compete with or duplicate facilities found at surrounding resorts or campgrounds.
2. The Corps of Engineers should expand its day use area as it is heavily used and this type of facility is needed in the area. A swimming beach should be included in this expansion.
3. The Corps of Engineers policies of camping fees and reservations should be examined. The policy of camping reservations should be reviewed for all of the Corps of Engineers recreation development based upon existing and projected use.

EXHIBIT D LETTER TO POSSIBLE NON-FEDERAL SPONSORS

To assess the potential for participation by non-Federal sponsors in future recreation and/or fish and wildlife enhancement features a number of agencies were contacted. The following is typical of the letters sent..

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

IN REPLY REFER TO
NCSED-ER

15 November 1976

We are in the process of updating our master plans for public use development and resource management for the six Mississippi River Headwaters Reservoirs. The updating process will examine existing Corps of Engineers recreation developments and use, estimate future recreation resource demand, and develop revised site plans and resource management guidelines for all Corps of Engineers lands in the Headwaters area. This work was initiated in July 1976 and will continue until August 1977.

D

EXHIBIT

An integral part of this effort is to inform potential non-Federal sponsors of the opportunities available under Federal law concerning recreational development. This letter is not meant as a solicitation of a sponsor. We merely wish to inform you of the possibilities for participation in developing recreational facilities in the Headwaters area.

The authority for this type of program stems from the Flood Control Act of 1944, as amended, and the Federal Water Project Recreation Act of 1965. This authority allows the Corps of Engineers to work with local, non-Federal entities in the development of recreational facilities on Federal lands at water resource projects. Under this program, the non-Federal sponsor must agree to share in the construction costs and operate, maintain and replace constructed recreational facilities.

The following procedure is presented to give you a basic understanding of what is involved in the implementation of sponsored recreational developments. Briefly, it is:

a. Planning for the recreation development at a water resource project must be accomplished jointly with the prospective local sponsor, and in coordination with comprehensive Federal, State, and Regional plans.

b. The types of water-oriented outdoor recreation facilities that may be provided generally include public boat accesses, swimming beaches, sanitary facilities, camping and picnic areas. The Corps of Engineers cannot participate in the construction of revenue producing facilities such as golf courses, swimming pools, riding stables, marinas, etc.

c. Prior to construction, a formal agreement must be entered into between the Corps of Engineers and the local sponsor concerning the development, operation, maintenance, and replacement of the recreation facilities. The local sponsor must agree to assume not less than 50 percent of the development costs of recreation facilities and agree to operate, maintain, and replace constructed facilities. Necessary Federal lands would be leased to the local sponsor for a sufficient term to accommodate development.

d. There are four methods of payment of the local sponsor's share: (1) through provision of facilities for the project; (2) payment in cash during the construction period; (3) by repayment, with interest, on the unpaid balance at a rate comparable to that for other interest-bearing functions of Federal water resource projects; and (4) a combination of these.

As part of our study we will be reviewing recreation demand, supply and needs in the area. You will be kept informed of the results of that review, however, you may currently be aware of some needed project that may qualify for Federal participation under this program. To insure consideration of your needs in our study, we would appreciate your input and comments concerning your present and long range plans for recreational development.

If you have any questions or would like to discuss this matter further, please contact Mr. Norman Hildrum, Chief, Public Use Development Section (612-725-7574).

Sincerely,

NORMAN C. HINTZ
Lieutenant Colonel, CE
Acting District Engineer

E EXHIBIT

EXHIBIT E

LIST OF AGENCIES CONTACTED AND THE LETTER OF INVITATION FOR THE INTERAGENCY MEETING

To inform interested parties of the activities undertaken by the Corps of Engineers, St. Paul District, the following representatives from various Federal and State agencies were contacted in an effort to coordinate this effort with other public agencies. Following the list is a typical letter sent to the representatives.

Identical letters were sent to:

Mr. Jay H. Cravens
Eastern Region Forest Service
U.S. Dept. of Agriculture
633 West Wisconsin Ave.
Milwaukee, Wisconsin 53202

Mr. J. E. Brewer
Forest Supervisor
Chippewa National Forest
U.S. Forest Service, U.S.D.A.
Cass Lake, Minnesota 56633

Mr. Harry M. Major
State Conservationist
Soil Conservation Service, U.S.D.A.
200 Federal Building
316 North Robert St.
St. Paul, MN 55101

Mr. George Alexander, Jr.
Region 5 Administrator
Environmental Protection Agency
230 South Dearborn
Chicago, Illinois 60604

Mr. Jack Hemphill
Regional Director
U.S. Fish & Wildlife Serv., U.S.D.I.M.
Federal Building
Fort Snelling
Twin Cities, Minnesota 55111

Mr. Rudy Esala
Executive Director
Arrowhead Regional Development Commission
200 Arrowhead Place
211 West 2nd Street
Duluth, Minnesota 55802

Mr. Robert Benner
Executive Director
Region 5 Development Commission
102 Sixth Street North
Staples, Minnesota 56479

E

EXHIBIT

Mr. Carl Falk
Midwest Archaeological Center
2605 North 27th Street
Lincoln, Nebraska 68504

Mr. Alton Nordwall
Acting Director
Bureau of Indian Affairs
831 2nd Avenue South
Minneapolis, Minnesota 55402

Mr. John Cherry
Regional Director
Lake Central Region
Bureau of Outdoor Recreation
3853 Research Park Drive
Ann Arbor, Michigan 48104

Mr. James Heltzer
Commissioner
Minnesota Dept. of Economic Dev.
480 Cedar Street
St. Paul, MN 55101

Mr. Robert L. Herbst
Commissioner
Minnesota Dept. of Natural Resources
Centennial Building
St. Paul, Minnesota 55155

Mr. Peter Vanderpool
Director
Minnesota State Planning Agency
101 Capitol Square Building
550 Cedar Street
St. Paul, Minnesota 55105

Mr. Peter L. Gove
Director
Minnesota Pollution Control Agency
1935 West County Road B2
St. Paul, Minnesota 55113

Mr. Russell W. Fridley
Director
Minnesota Historical Society
Main Historical Building
640 Cedar Street
St. Paul, Minnesota 55101

Dr. Elden Johnson
Minnesota State Archaeologist
University of Minnesota
Minneapolis, Minnesota 55455

E

EXHIBIT

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

NCSED-ER

20 August 1976

The Corps of Engineers is in the process of updating our existing public use development and resource management master plans for the six Mississippi River Headwaters Reservoirs. The firm of InterDesign Inc., of Minneapolis has been contracted to carry out this study.

InterDesign Inc., will examine existing resource developments and use, project future resource demands, determine the adequacy of currently approved master plans, and develop revised site plans and resource management guidelines for all Corps lands in the headwaters area. This work was initiated in July 1976 and will continue until August 1977.

An interagency meeting will be held to brief interested regional, State and Federal agencies on the nature of the study and to obtain pertinent comments on the proposed study procedure and report outline. This interagency meeting will be held at the St. Paul District Office at 180 East Kellogg Boulevard on Monday, 30 August, at 10:30 a.m. in rooms 1219 and 1220.

As a part of our ongoing effort to inform interested agencies of Corps activities, I cordially invite you or a member of your staff to attend this interagency meeting. Please inform Mr. Norman Hildrum, Chief, Public Use Development Section (612-725-7574) if you or your representative(s) plan to attend.

Sincerely,

FORREST T. GAY, III
Colonel, Corps of Engineers
District Engineer

F

EXHIBIT

EXHIBIT F **LETTER OF INVITATION TO THE SECOND PUBLIC WORKSHOP**

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

REPLY TO
ATTENTION OF

NCSED-ER

29 March 1977

We are in the process of updating our Master Plan for Public Use Development and Resource Management for the Mississippi River Headwaters Reservoirs. We have recently completed the first part of this effort, which involved describing, analyzing, and evaluating existing conditions. A brief summary of that work and a brochure describing our areas are inclosed for your information and use. Copies of Part One of the master plan are available for your review at the maintenance facility at each of the headwaters reservoirs recreation areas.

We are currently reviewing the data collected for the existing public use areas and developing alternative concepts. Present resource management guidelines are also being reviewed for each headwaters area. This work will culminate in a revised master plan.

Workshops were held in September 1976 in the headwaters area to obtain needed input for Part One of our study. We will be returning for a second series of workshops to obtain additional information needed in Part Two. The purpose of the workshops will be to: discuss the information previously obtained, to review resource use objectives, and to discuss potential alternative public use options for each area. These workshops will be held at the maintenance facility at each of the six headwaters reservoirs recreation areas.

As before, the workshops are open to the public and notices of the meetings have been provided to local newspapers. While anyone may attend, I am extending this personal invitation to you because of your past and continuing interest in our management in the headwaters region. A workshop will be held at Gull Lake on Monday, 18 April 1977 at 9:00 A.M. Please inform Mr. Milton Roppe, Corps of Engineers Area Manager at Remer (218-566-2306), or Mr. Martin W. Ehrhard, Flood Control Dam Operator (218-829-3334), of your attendance plans.

In addition to these workshops, public meetings will be held in the future. The times and places for these meetings will be announced later.

Sincerely,

2 Incls.
1. Brochure
2. Summary

FORREST T. GAY, III
Colonel, Corps of Engineers
District Engineer

EXHIBIT G SECOND PUBLIC WORKSHOP COMMENTS

The following is a summary of the comments as recorded at each of the six public workshops conducted on April 18-20, 1977.

GULL LAKE

1. Concern was expressed regarding the need for a standardized buoy system for navigational purposes.
2. County road 105 that passes through the recreation area and over the dam is owned by the Corps and is operated and maintained by East Gull Lake Township. For safety and snow-plowing reasons, the township requested that the road be upgraded and widened.
3. Snowmobile and bicycle trails are in demand in this area. It was explained that the Corps does not administer enough land to develop these types of trails.
4. The proposed project level visitor center on Government Point was presented. The subsequent discussion was that the upgrading of county road 105 and the implementation of navigational buoys should take higher priority.

PINE RIVER RESERVOIR

1. The Minnesota Department of Natural Resources has declared Pine River a state canoe route. The Corps will cooperate in this effort by providing a portage route around the dam.
2. A local property owners association has plans to locate channel buoys throughout the Whitefish chain.
3. A request was made to investigate the possibility of providing electrical hookups at this recreation area.
4. The Park Manager has requested that this recreation area be posted for no snowmobiling for resource protection.

LEECH LAKE

1. The concessionaires report that they were about 50% busy during the past year and that the average is somewhat higher than what was reported at the first public workshop.
2. The Forest Service is hesitant to close their recreation areas in the region due to loss in the tourist trade; however, the forest fire potential is still extremely high and closures may be necessary.
3. A beach at this recreation area may not be necessary. There are several good beaches nearby.
4. It has been observed that users of this area originate from as much as 500 miles away. Recreation trends were discussed regarding the direction of recreation for the future. The effects of these trends will have an impact on the type of facilities that should be provided.
5. The Forest Service does provide level three recreational experiences. Although most of their facilities are primitive, some are comparable to the Corps' facilities.
6. It was explained that group camping facilities could be provided east of the existing camping area.

G EXHIBIT

LAKE WINNIBIGOSHISH	1. There is a demand to maintain parking near the dam and adjacent to the highway. Many travelers use this parking to stop and look at the dam. 2. As a result of the Mississippi River becoming a major canoe route, a portage path should be provided around the dam. 3. It was agreed that the combined day use and camping area access road be located at the existing day use area intersection with the highway.
POKEGAMA LAKE	1. Due to the high use of this area, an investigation into the possibility of shortening the camper duration period may be necessary. Any decreased duration period will be tested to determine opposition or increased satisfaction. 2. A decreased duration period may promote the use of other camping facilities in the area. 3. It was suggested that the Corps provide the visiting public with information and/or guidance in locating other recreational attractions in the area. 4. The State Historical Society is developing a regional forest interpretation Center downstream from the dam. It was suggested that the society be contacted to determine what their plans are for the area and if the Corps could cooperate in any manner. 5. The proposed tailwaters fishing area should be moved slightly downstream from its proposed location due to the swift current near the dam. 6. It was requested that the Grand Rapids Chamber of Commerce be placed on the Corps mailing list.
BIG SANDY LAKE	1. The proposed plan was discussed including the relocation of the camp sites south of the river to the north side. Concern was expressed regarding this proposal as many campers enjoy these sites. 2. During the first public workshop it was noted that Ole's resort was proceeding with some development along the access road to this recreation area. It was learned that this development was not a camping facility but a permanent mobile home park.

EXHIBIT H **USER WORKSHOP NOTICE**

Three user workshops were conducted on Saturday, July 2, 1977. They were held at Terry R. Johnson, Ronald Louis Cloutier and Sandy Lake recreation areas. Through these workshops, pertinent comments were obtained regarding the master plan.

User Workshop

During the past year we have been working on developing a plan for recreation development and resource management for this area. Before we finalize this plan we want you as users of this area to comment on the draft plan.

Your comments and suggestions will be carefully considered in making our final recommendations.

Please help us by attending the scheduled workshop.

Location

Campground amphitheater
(where the movies are shown)

Time

7:00 p.m., Saturday, July 2, 1977

EXHIBIT I USER WORKSHOP DATA SHEET SUMMARY

On Saturday, July 2, 1977 user workshops were conducted at Terry R. Johnson, Ronald Louis Cloutier and Sandy Lake recreation areas. It was the objective of these workshops to obtain pertinent information regarding the areas from the people who use the areas. The following is the list of questions asked the participants and their responses.

Questions	Recreation Areas		
	Terry R. Johnson Participants—14	Ronald Louis Cloutier Participants—15	Sandy Lake Participants—34
Is this area your destination?	10	15	32
Is this area a stopping point on route to some other area?	4	0	2
How long do you intend to stay?			
one day	1		1
2 days	2		1
3 days	3		9
4 days	2		6
5 days	1		5
6 days	3	1	1
7 days	2	3	9
8 days		1	1
9 days			
10 days		1	
11 days		2	
12 days			
13 days			
14 days		7	
What type of camping unit are you using?			
tent	5	2	7
tent trailer	4	3	14
pickup camper	1	4	3
travel trailer	2	4	7
motor home	2	2	2
What activities will the members of your family be participating in? (in order of frequency)	fishing swimming hiking boating picnicking playground bicycling socializing sightseeing	swimming fishing boating hiking bicycling playground relaxing socializing picnicking water skiing river floating	fishing playground hiking swimming relaxing waterskiing bicycling socializing boating sightseeing picnicking

EXHIBIT

Questions	Recreation Areas		
	Terry R. Johnson Participants—14	Ronald Louis Cloutier Participants—15	Sandy Lake Participants—34
Have you ever camped here before?			
Yes	5	13	28
No	8	2	5
Would you camp here again?			
Yes	13	15	33
No	0	0	0
Are you camping alone or with other parties?			
Alone	9	8	13
With others	4	7	20
How many people are in your party?			
2	3	1	4
3	1	2	3
4	5	8	6
5	2	3	6
6	2		3
7		1	5
8			1
10			3
13	1		
20			1
Where are you from from?			
County State			
Anoka, Mn.	1	1	1
Benton, Mn.			1
Carlton, Mn.	1		3
Cass, Mn.			1
Crow Wing, Mn.		7	3
Dakota, Mn.	2		
Hennepin, Mn.	3	2	4
Kanabec, Mn.			1
Kandiyohi, Mn.	2		
Olmstead, Mn.		1	
Pine, Mn.			1
Ramsey, Mn.	2	3	5
St. Louis, Mn.	1		3
Washington, Mn.	1	1	1
Wright, Mn.			2
Burlington, N.J.	1		
DuPage, Il.			1
Jackson, Mi.			1
Minnehaha, S.D.			1

EXHIBIT

Questions	Recreation Areas		
	Terry R. Johnson Participants—14	Ronald Louis C'outier Participants—15	Sandy Lake Participants—34
How did you learn about this area?			
Known about it for years		x	x
Information booths	x		
Camper Guide books	x		
Referred by Other Corps areas	x		x
Other campers	x	x	x
Friends	x	x	x
Relatives	x	x	x
Local Service Stations	x		
Maps		x	x
By Chance	x	x	x
C.O.E. St. Paul office			x
Reputation		x	x
How does this area compare to other camping areas?	Similar to other Corps areas	More space better facilities	Clean/well kept
	Very clean well kept/quiet	The best in Minnesota	Well supervised
	Above average	Very good	More Regimented
	Excellent	Superior	Equal to others
		Excellent	Good
			One of the best
			Excellent
What do you like about the area?	Quiet/clean	The facilities	The facilities
	Helpful, courteous personnel	Friendly personnel	Not overcrowded
	Relaxing Atmosphere	Clean	Well maintained
	Easy access	Spacious sites	Helpful, courteous personnel
	Plenty of firewood	Scenic	Proximity to the lake and river
		Well maintained	Scenery
		Free firewood	Peace and quiet
		Large beaches	
		Close to shopping areas	

EXHIBIT

Questions	Recreation Areas		
	Terry R. Johnson Participants—14	**Ronald Louis Cloutier Participants—15**	**Sandy Lake Participants—34**
What do you dislike about the area?	No swimming beach No group camping	Excessive evening traffic Pets Shower building Cleaning schedule Overcrowding Lack of vegetation for campsite separation Insufficient lighting at the restrooms	No swimming beach No electrical hookups Not enough campsites Few private spaces Restrictions on fishing below the dam Not enough recreational facilities
How could we improve the area?	Add a swimming beach & boat ramp Provide electrical hookups Add more hiking trails Provide concessions for ice & supplies Add more lighting at restrooms Add tennis courts	Add more showers Allow a second vehicle on campsites Provide a separate area for campers with pets Add hiking trails Provide electrical hookups Limit outside traffic Add volley ball courts Add tennis courts Add more campsites Provide boat rentals	Add a swimming beach Add another shower building Provide more childrens facilities Add more campsites Provide electrical hookups Provide more privacy Do not relocate the southern camping area

J

EXHIBIT

EXHIBIT J **PUBLIC MEETING NOTICE**

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

IN REPLY REFER TO

NCSED-ER

1 July 1977

— NOTICE —

PUBLIC MEETING
ON THE
DRAFT MASTER PLAN FOR PUBLIC USE DEVELOPMENT
AND RESOURCE MANAGEMENT AT THE
MISSISSIPPI RIVER HEADWATERS RESERVOIRS

PURPOSE

The Corps of Engineers has been developing an updated master plan for its recreation areas on the Mississippi River Headwaters Reservoirs. This plan is now in draft form and we are taking this opportunity to obtain additional public input for the final report. The plan considers only Corps of Engineers operated and maintained recreation areas. These areas are located adjacent to our dams at Gull Lake, the Whitefish Chain of Lakes at Crosslake, Minnesota, Leech Lake at Federal Dam, Minnesota, Lake Winnibigoshish, Pokegama Dam near Grand Rapids, Minnesota, and Big Sandy Lake.

Part One of the draft master plan contains an inventory and analysis of those natural and man-made resources which affect recreational development, an inventory of existing facilities, and estimates of present and future recreational demand. Part Two proposes alternative site plans and developments for each area. Copies of the draft master plan are available for public review at the maintenance building at each of our recreation areas, the Grand Rapids Public Library, and the Kitchigami Regional Library (branches in Bemidji, Brainerd, Longville, Blackduck, Cass Lake, Pine River, Walker, and Wadena). A limited number of copies are available from the District Office upon request.

You will have the opportunity to state your views and furnish any information pertinent to the draft master plan at the public meetings.

LOCATIONS AND TIMES	Wednesday, August 3rd, 7:00 pm Council Chambers City Hall Grand Rapids, Minnesota	Thursday, August 4th, 7:00 pm Crow Wing County Social Service Building 4th and Laurel Brainerd, Minnesota

Please bring this announcement to the attention of anyone you know who may be interested in this master plan.

EXHIBIT K PUBLIC MEETING COMMENTS

Two public meetings were conducted to inform the public of the nature and scope of this master plan. They were held August 3 and 4, 1977, at Grand Rapids and Brainerd, Minnesota, respectively.

Both meetings were conducted in a similar format. They began with an introduction of the staff present and with a description of the draft master plan. A series of orientation slides were presented with the introduction. Next, the proposed site plans were presented and the modifications or development proposed at the six recreation areas was described. Minor question and answer periods followed the presentation of each site. At the end of the formal presentation the meeting was opened to general comments from the floor.

The attendance at the meetings was less than expected. One participant at the Grand Rapids meeting explained that through the two previous public workshops the local citizens were informed of the nature of the study, that being a recreation and resource management study. As this is not a controversial topic, the public was satisfied with the scope of the proposed modifications and development.

GRAND RAPIDS PUBLIC MEETING

The majority of questions and comments at this meeting were directed toward Corps of Engineers policies rather than planning and design decisions. These included user fees, camper duration periods and resource management concerns as they relate to the capacity to support recreation. Other topics regarding lake level fluctuation and supplying Minneapolis with water by lower lake levels were mentioned. It was explained that water resource questions would be addressed during upcoming public meetings.

A great deal of discussion centered around user fees and the comparison between Corps recreation facilities and other federal, state and private campgrounds in the region. It was explained that the Corps has its own set of regulations that govern how fees may be charged. These regulations do not apply to other agencies. One main concern was that the Corps provides equal or better facilities and charges less for them than other campgrounds. It was felt that the public was being confused by two sets of standards. One for the Corps and another for the Forest Service. Also, by charging minimum fees or no fees at all, it was felt that the Corps was competing with other campgrounds. This was discounted by the fact that the Corps provides only a small percentage of the total number of all camping sites available in the Headwaters region.

The validity of the existing 14 day camper duration period was questioned especially regarding the Pokegama Lake recreation area. Because of the high number of turnaways reported, the meeting participants suggested a reduced duration period, perhaps 3 days, and that an assessment should be made as to whether or not it would better serve the public. Through a tabulation of visitation reports, it was found that the average stay for the majority of users was one to three days. This average was higher at the Ronald Louis Cloutier recreation area. It was concluded from this tabulation that users were governing themselves in terms of camper duration. There have been offenders of the 14 day limit. Measures are being taken to control them.

It was mentioned during the presentation and stressed during the open period that the proposed development does not exceed the carrying capacity of the existing resources. A question was raised whether the proposed development was intended to meet peak demands. This was clarified by discussing that the proposed development was not to exceed the resource carrying capacity therefore it was not intended to satisfy peak demand. It was also explained that the development would be implemented on a demand basis only. As visitation increases in the future, additional facilities will be added until all the development on the proposed site plans is completed. No other development will occur.

The participants were generally pleased with the Corps recreation areas. It was felt that the well-maintained recreation areas reflected directly on the surrounding communities in a very positive manner.

BRAINERD PUBLIC MEETING

The questions and comments from the participants of this meeting were similar to those of the Grand Rapids meeting. They consisted primarily of policy and management concerns.

A similar question was asked regarding the regulations set by the Corps and those of other agencies that operate recreation facilities in the Headwaters. This was answered by explaining that the Corps has a separate set of governing regulations which it must follow and that some regulations, such as those regarding user fees, do not coincide with other agencies.

Of primary concern were management policies that the Corps has established and follows. They included water quality and sewage handling. The response to questions explained that the Corps has sewage treatment plants at four recreation areas and that discharge must and does meet established water quality standards. The two remaining areas and all vault restrooms are emptied and the waste is disposed of by contractors. This is also true of garbage which is disposed of at authorized landfills.

Because of the high use at several areas, especially Ronald Louis Cloutier, the question of control was raised. This was in regard to policing. It was explained that all Corps recreation areas have cooperative agreements with local police and sheriff departments for the suppression of civil and/or criminal disturbances. These services are required only if the park rangers or the dam operators are not able to control a situation. The rangers and dam operators have citation authority. This allows Corps personnel to confront and terminate unlawful, hazardous or distructive behavior on the part of the users.

The participants at this meeting were also generally pleased with the Corps recreation areas. It was stated that the areas have a positive economic effect of surrounding communities.

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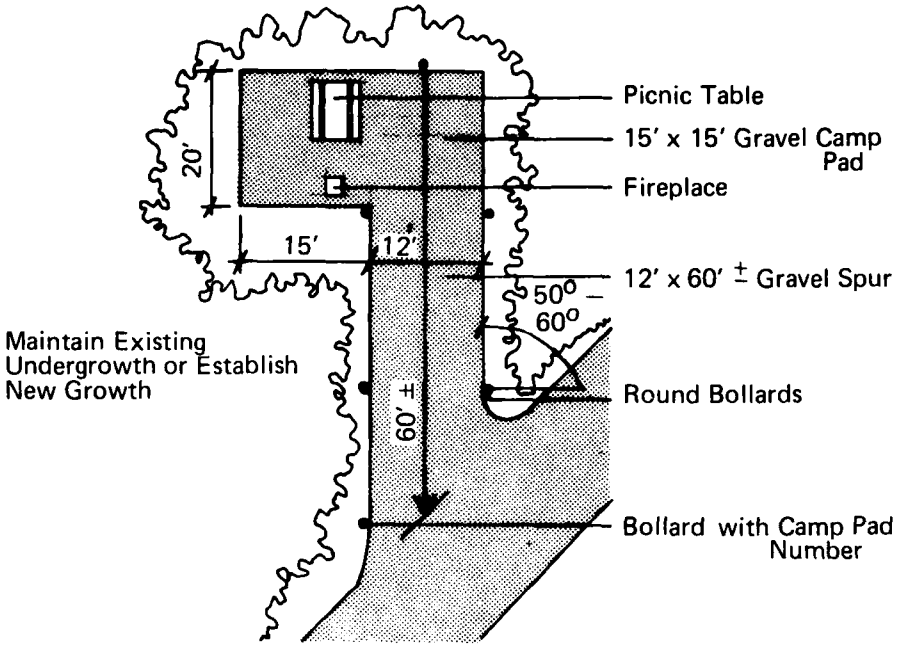
EXHIBIT

1 Camp Pad



2 Walk-In Camp Pad

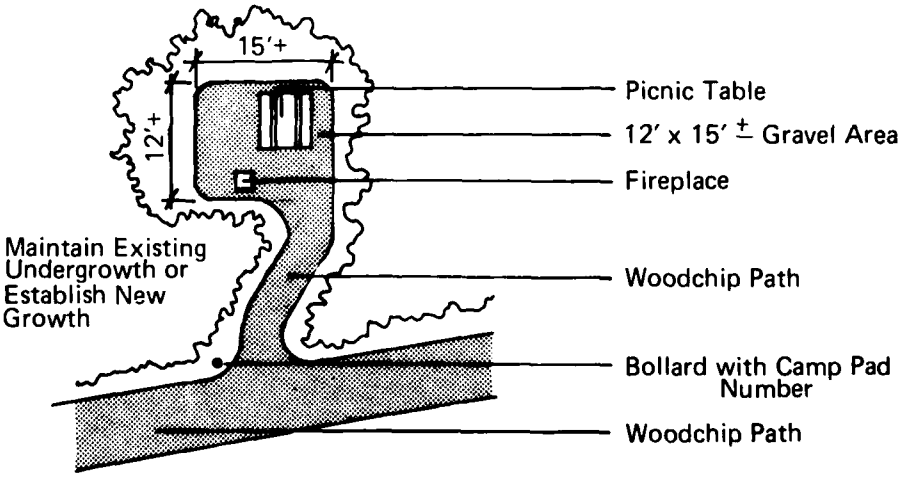


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EXHIBIT

2a

Pull Through Camp Pads

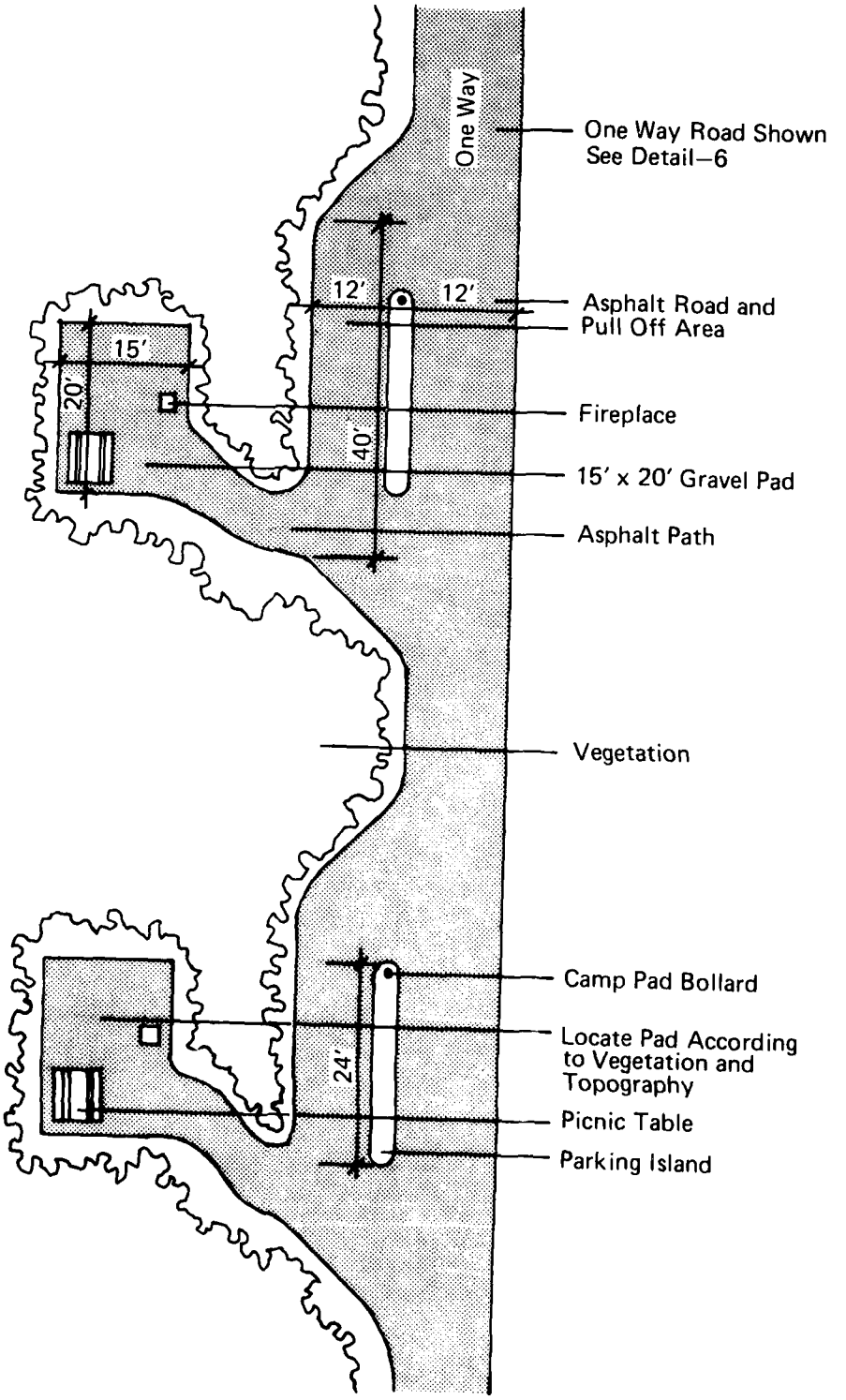

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EXHIBIT

2b

Multi-Family Camp Pads

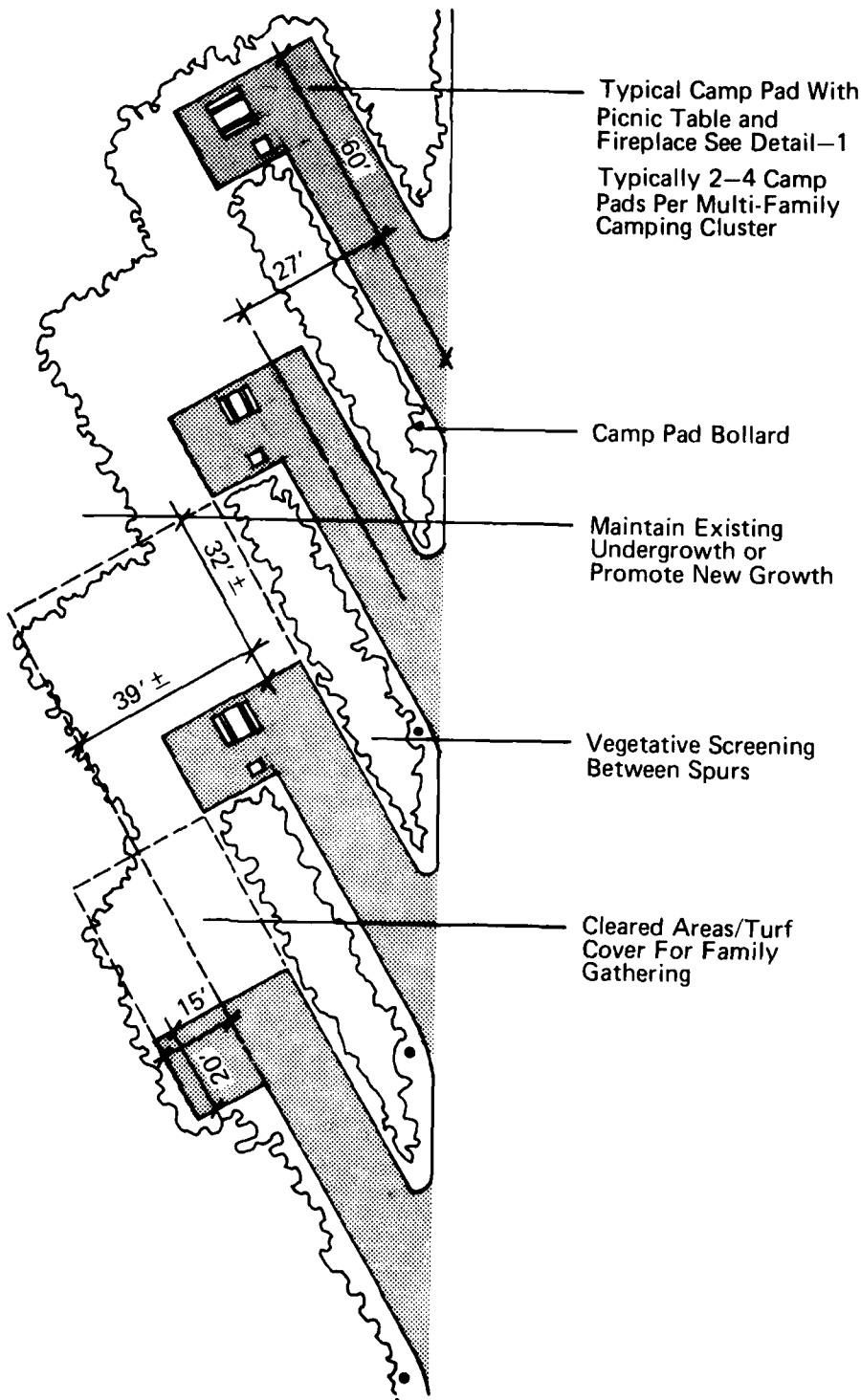

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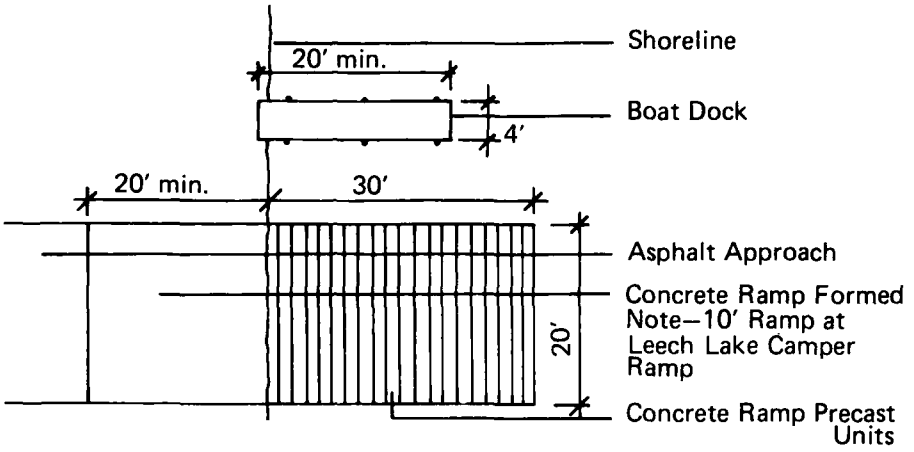
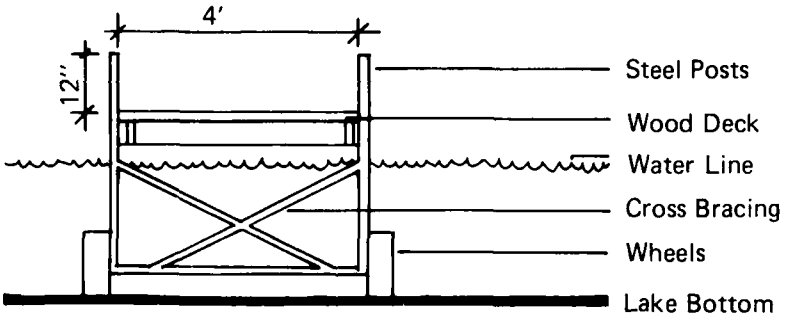
EXHIBIT

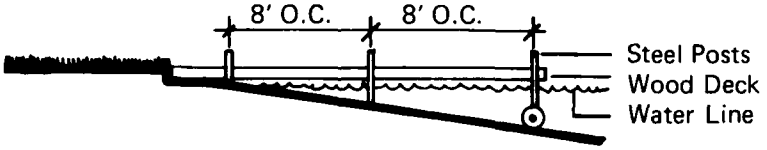
3 Boat Launch Ramp and Dock



Plan—Dock and Ramp



Section—Dock



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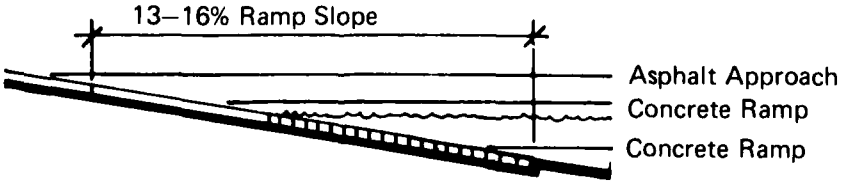
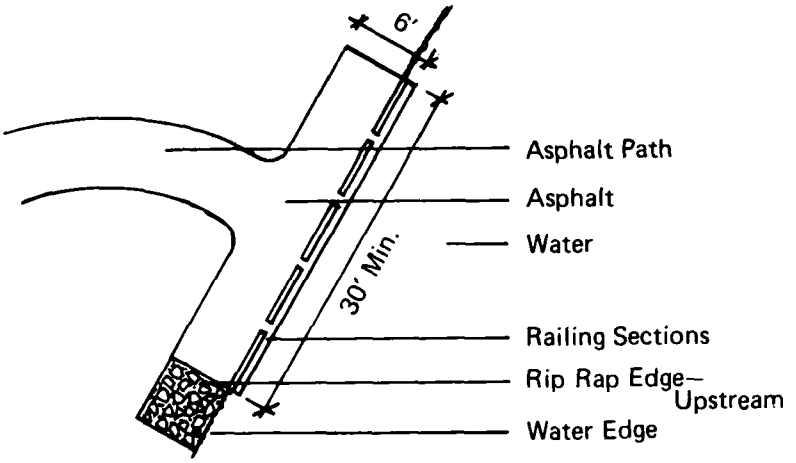


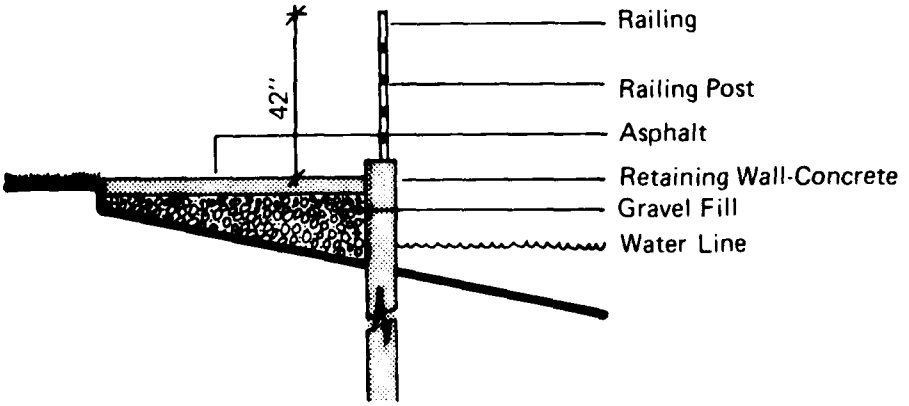
Section—Ramp

L EXHIBIT

4 Tailwater Fishing



Plan



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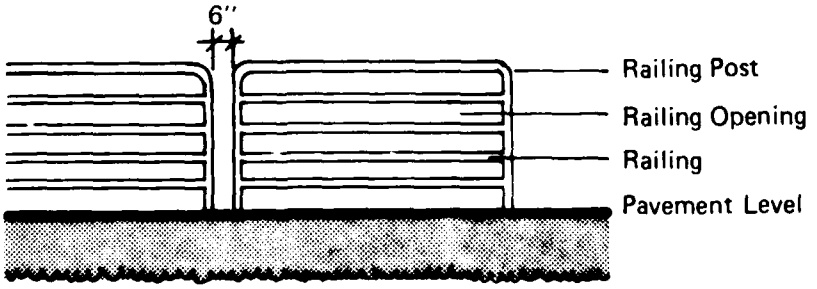

Elevation

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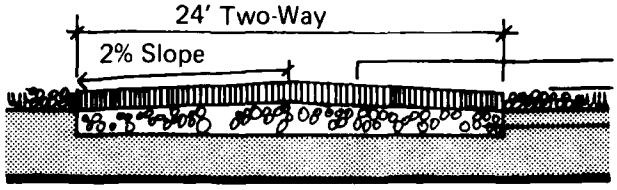
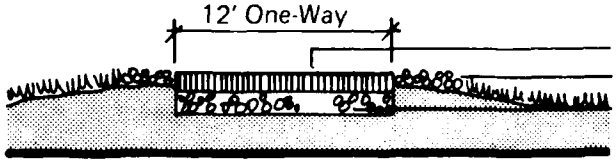
EXHIBIT

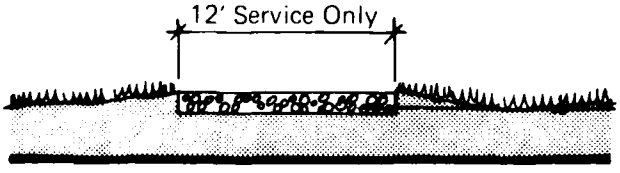
5 Two-Lane Asphalt Road



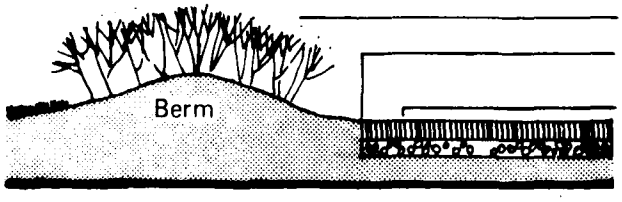
6 One-Lane Asphalt Road



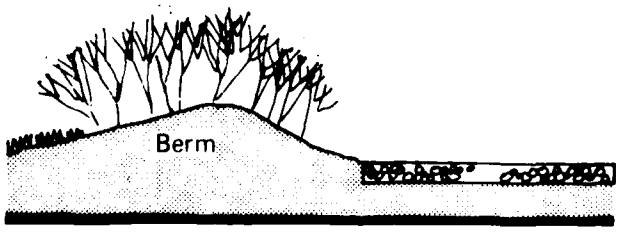
7 One-Lane Gravel Service Road



8 Asphalt Parking Lot



9 Gravel Parking Lot



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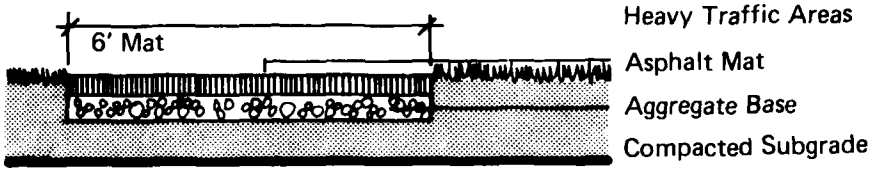
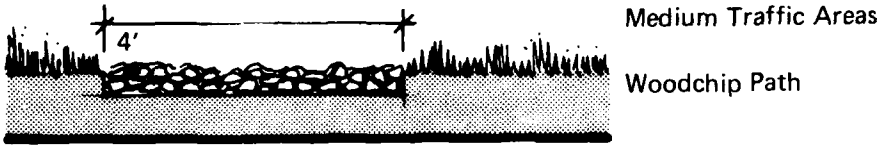
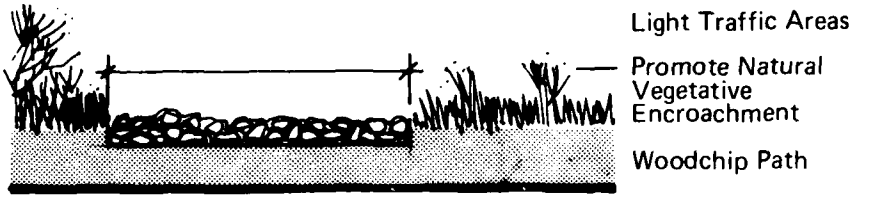
10 Asphalt Path



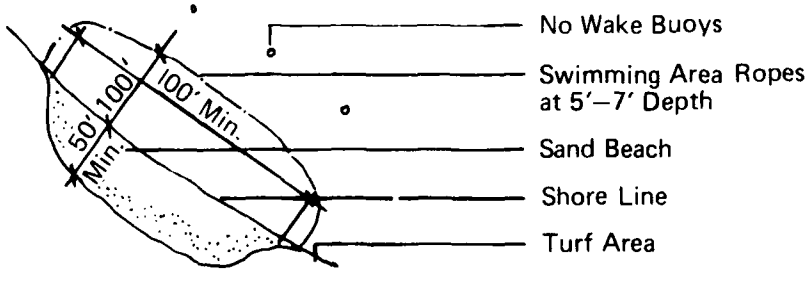
11 Woodchip Path



12 Interpretive Trail



13 Swimming Beach – Plan



Section

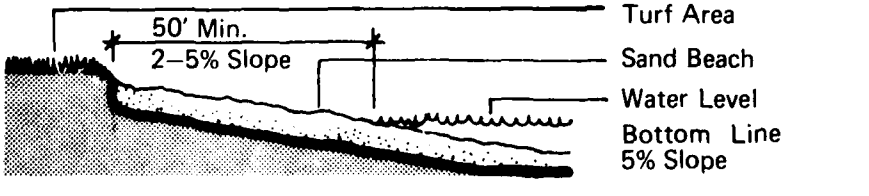


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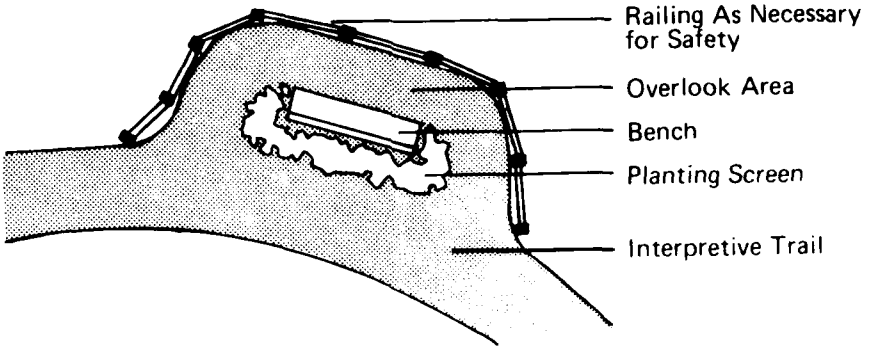
EXHIBIT

14 Overlook—Plan



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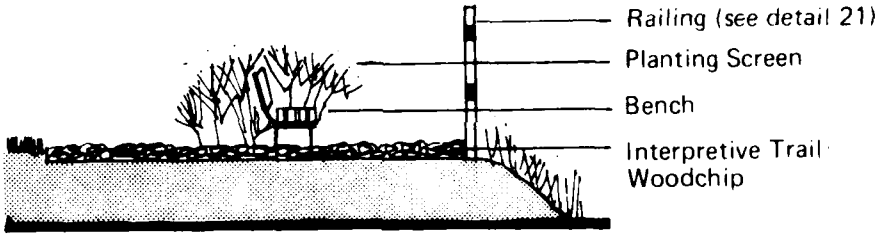
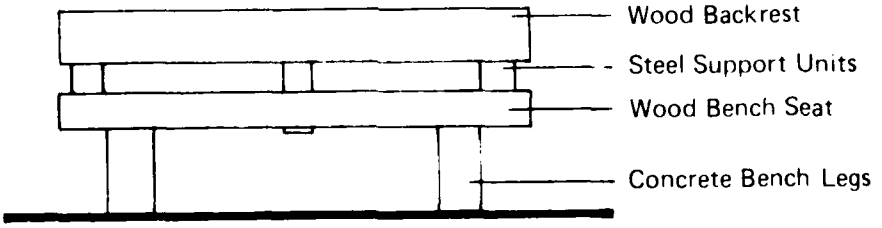


15 Bench—Elevation



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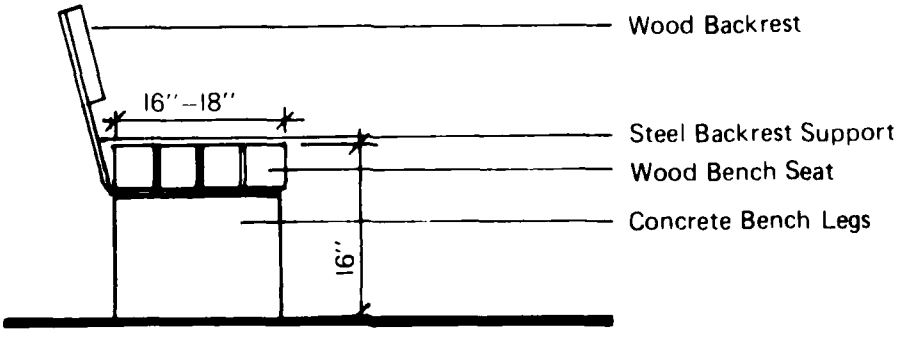
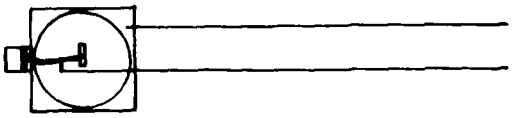


L

EXHIBIT

16 Trash Receptacle–Plan



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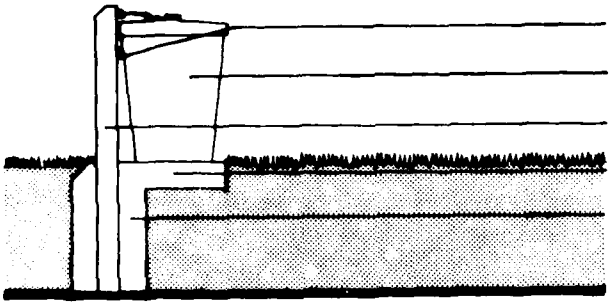
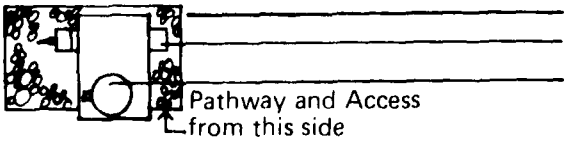


17 Drinking Fountain and Water Faucet – Plan



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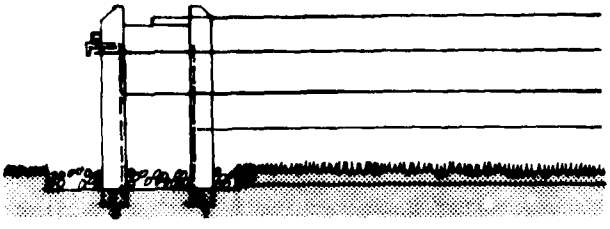
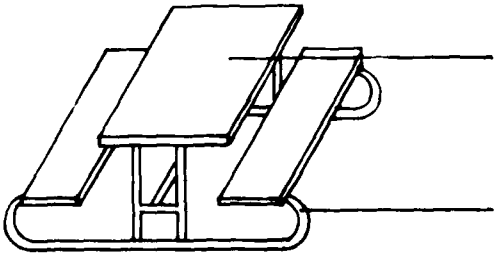


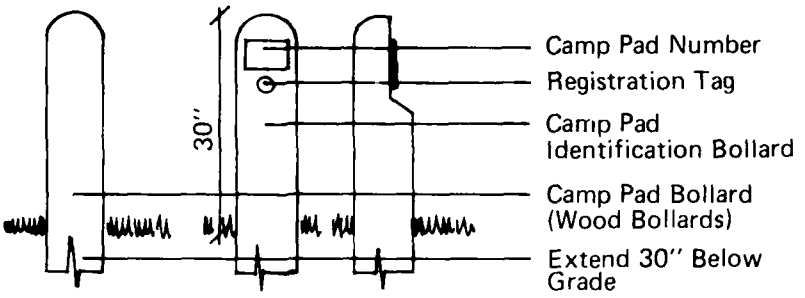
18 Picnic Table



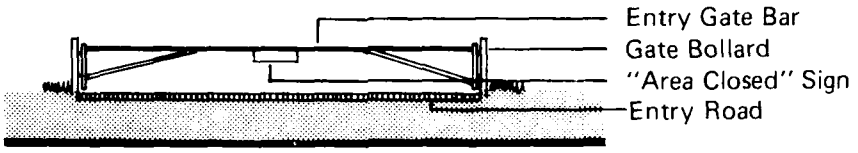
L

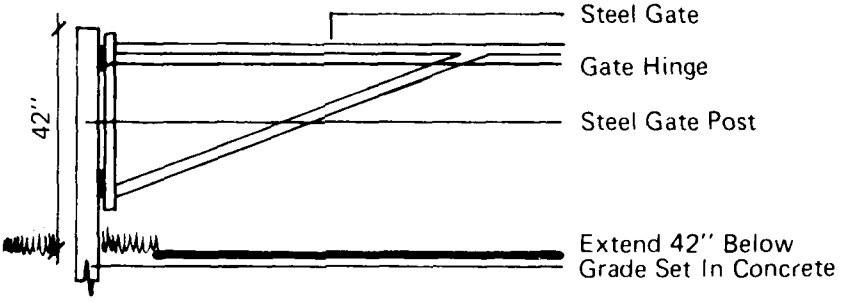
EXHIBIT

19 Camp Pad Bollards

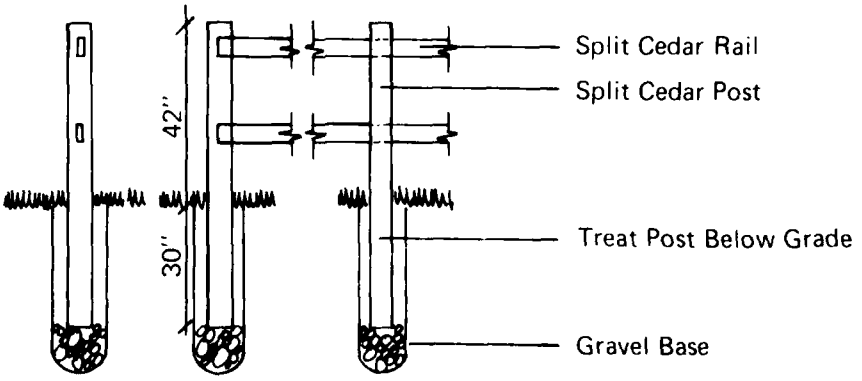


20 Camp Area Control Gate Elevation





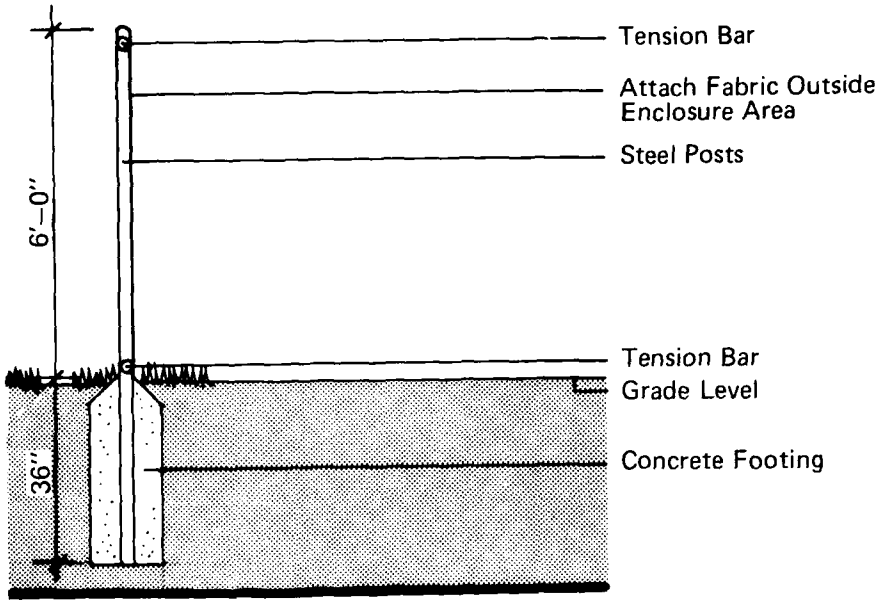
21 Fence–Split Rail



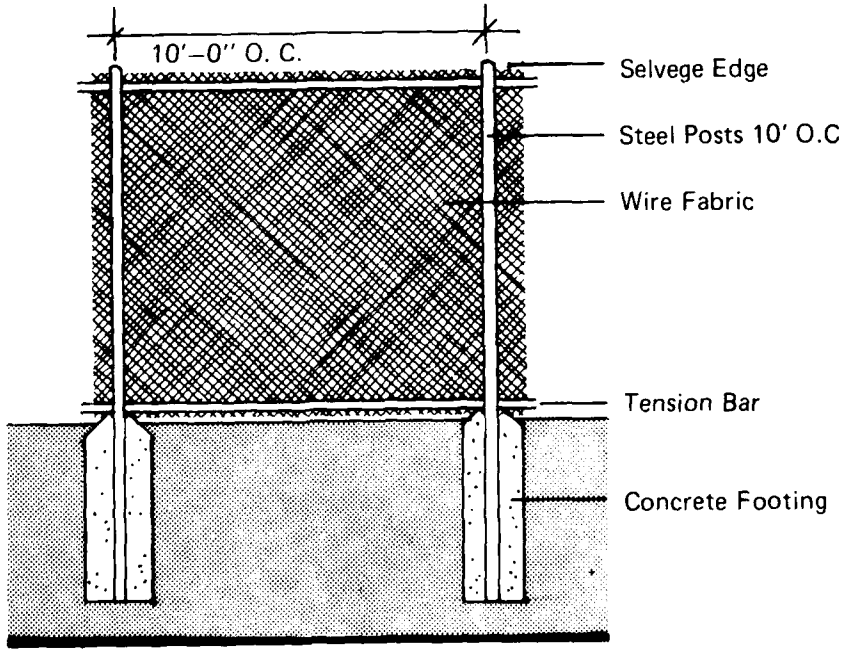
L EXHIBIT

21a

Chain Link Fence Section



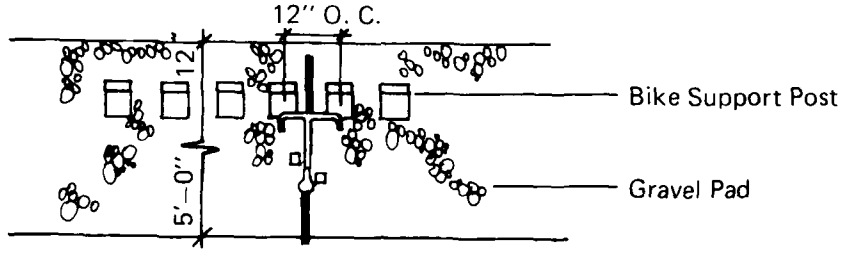
Elevation



L

EXHIBIT

22 Bicycle Rack–Plan



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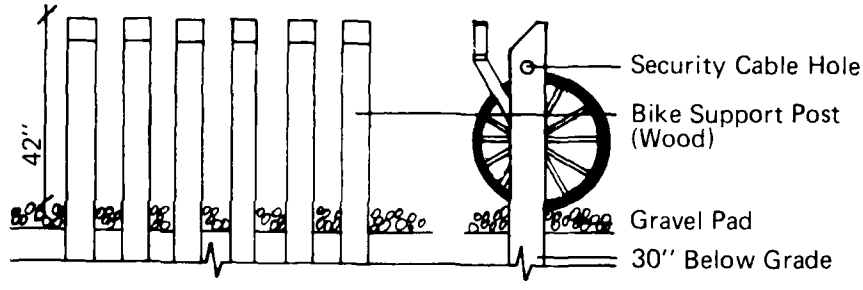
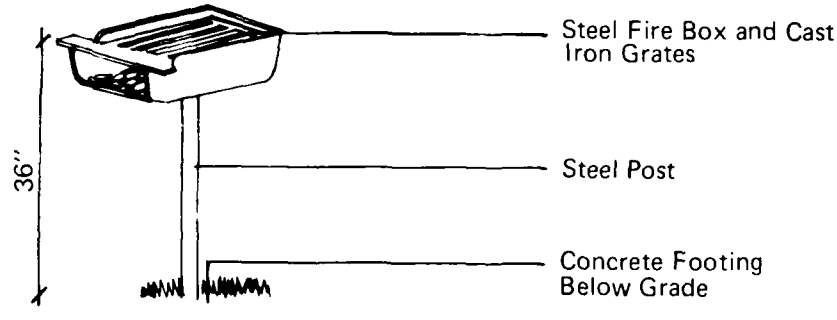
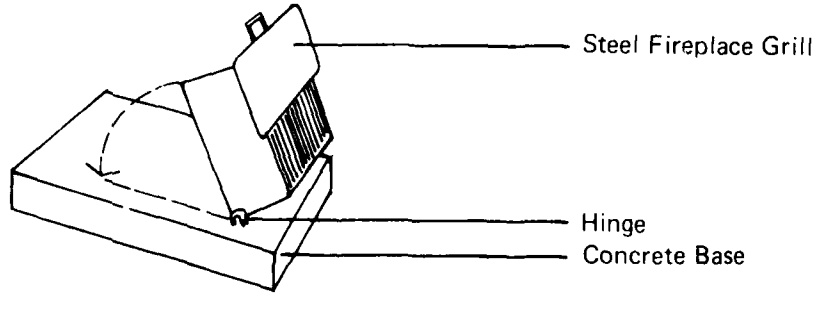


23 Barbecue Unit



24 Fireplace

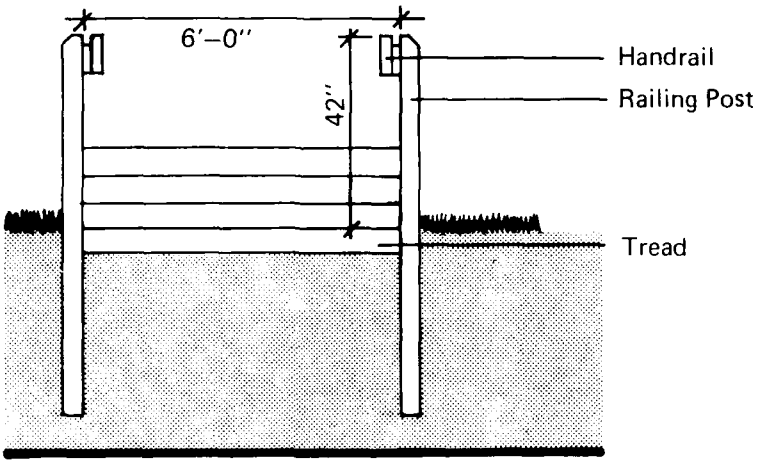


L

EXHIBIT

25

Steps–Elevation



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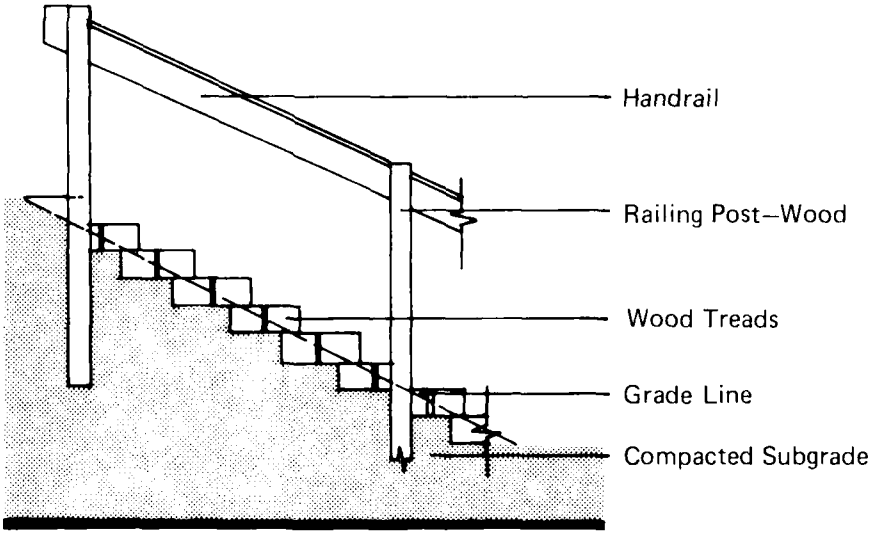
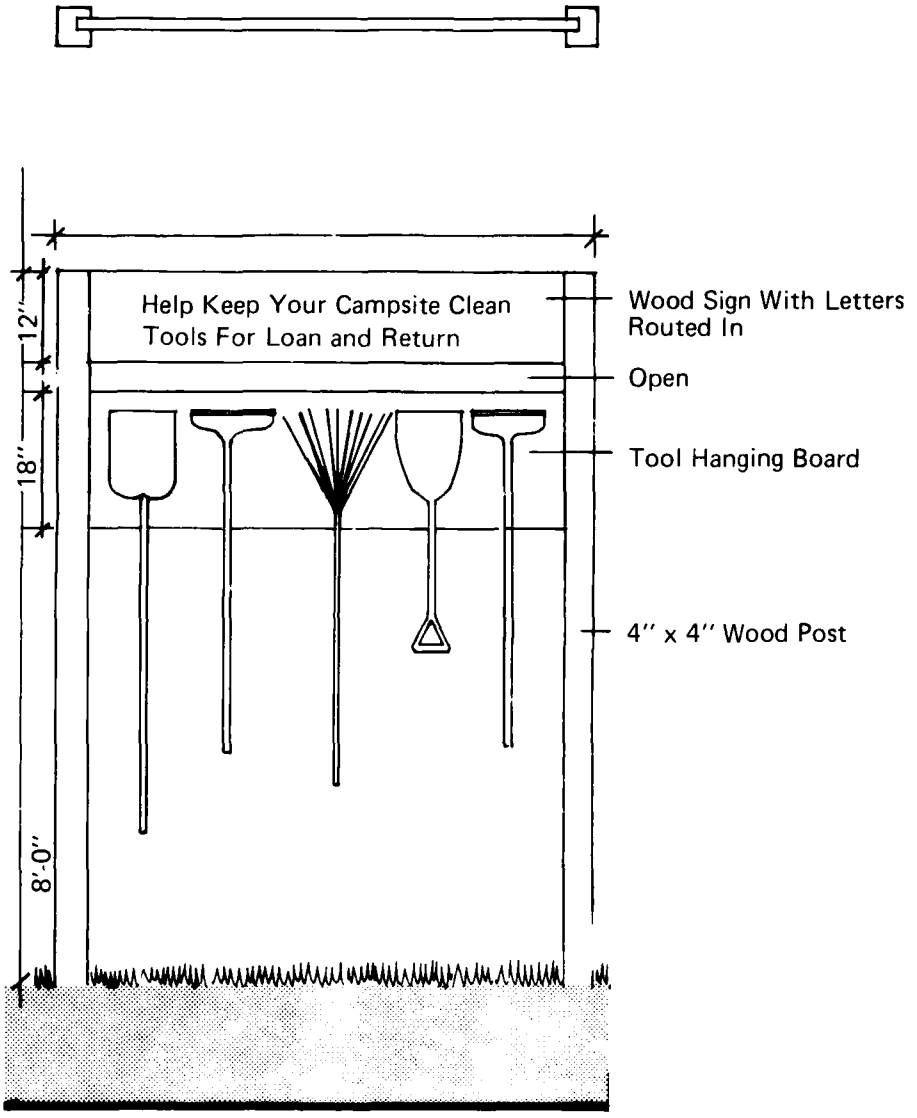


L

EXHIBIT

26 Camp Cleaning Tools-Plan

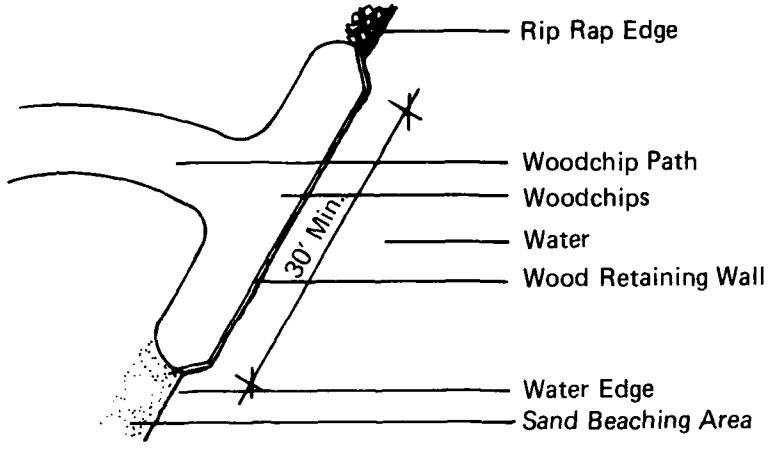


L

EXHIBIT

27

Canoe Launch – Plan



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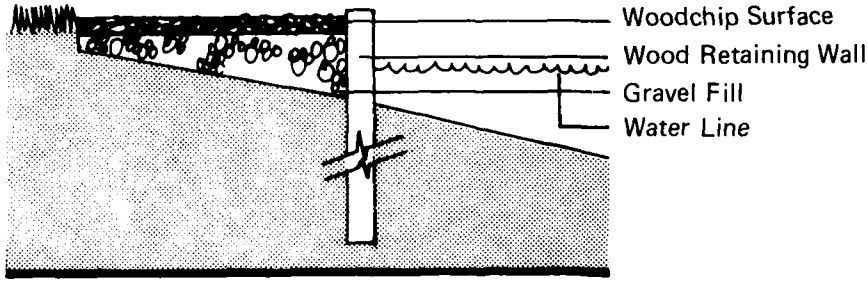

Elevation

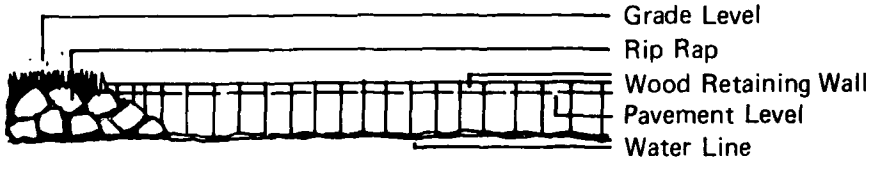

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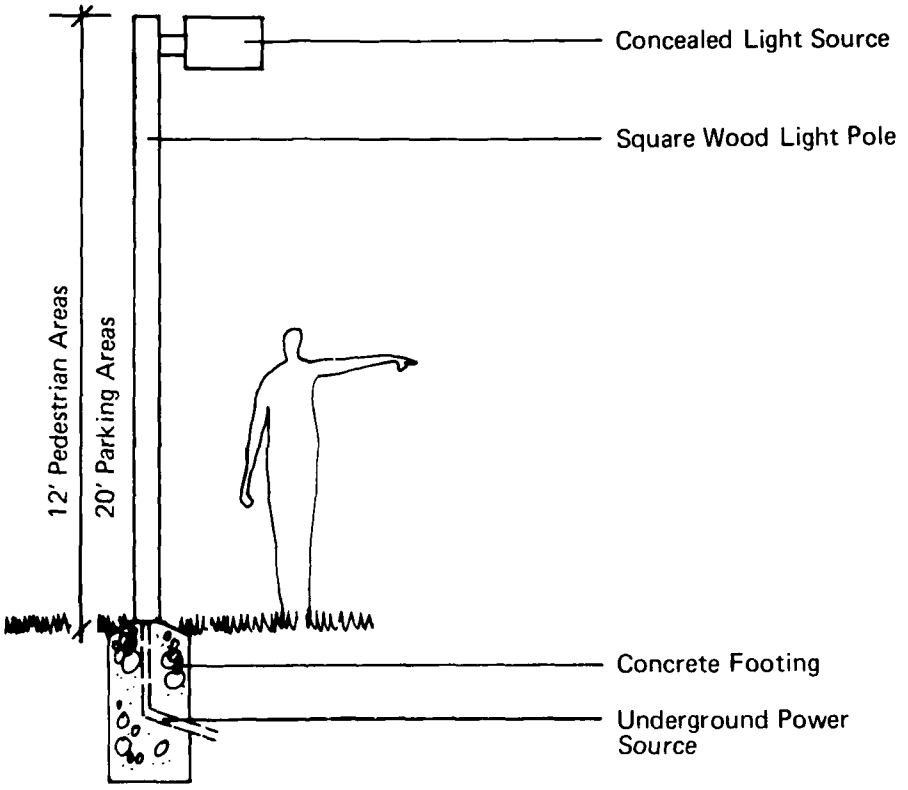
EXHIBIT

29 Light



30

Fire Extinguisher

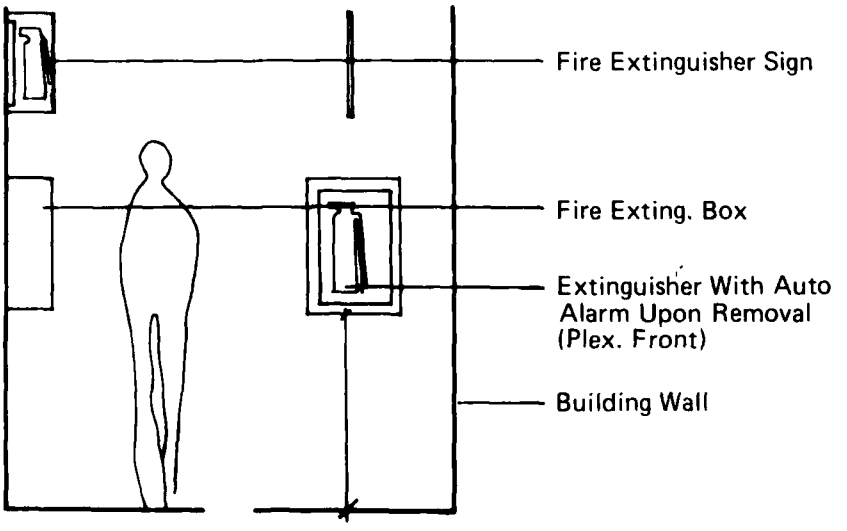


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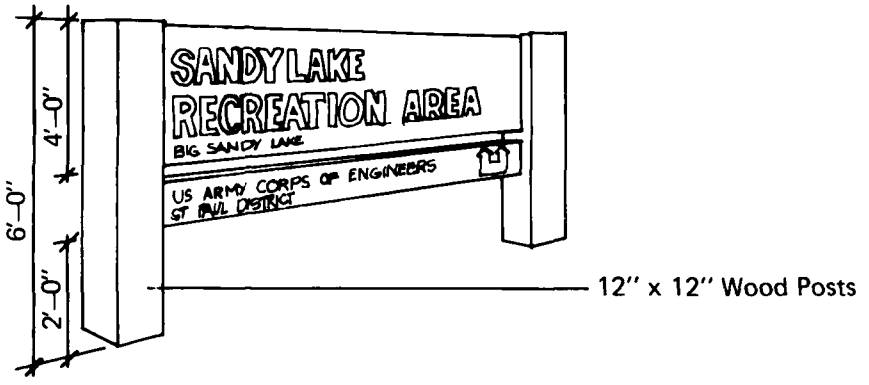
EXHIBIT

31 Area Entry Sign



32 Pedestrian Oriented Directional Sign

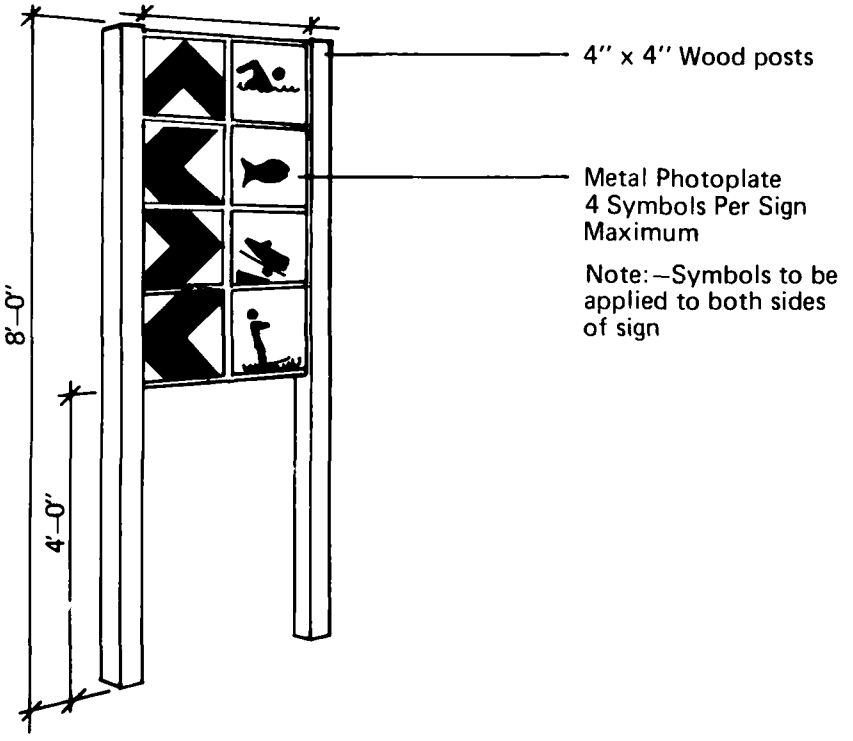


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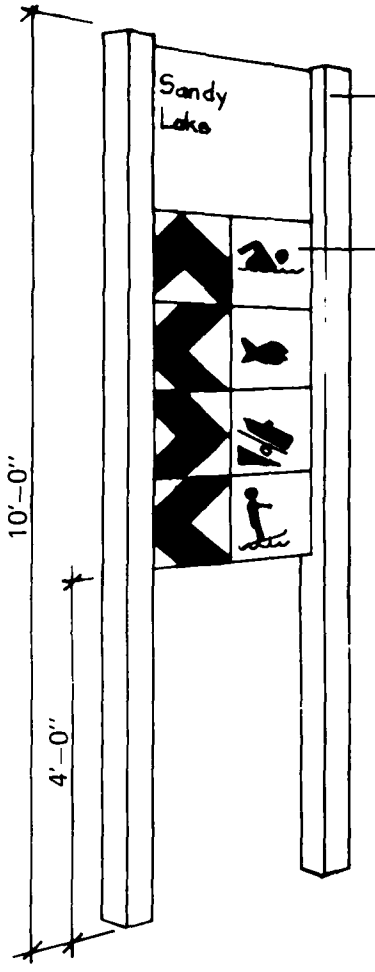
EXHIBIT

33 Directional Entry Sign

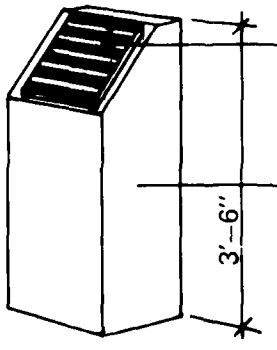


6" x 6" Wood Post

Metal Photoplate White on Brown
4 Symbols Per Sign Maximum

Note:–Symbols to be applied to both sides of sign

34 Interpretive Trail Bollard

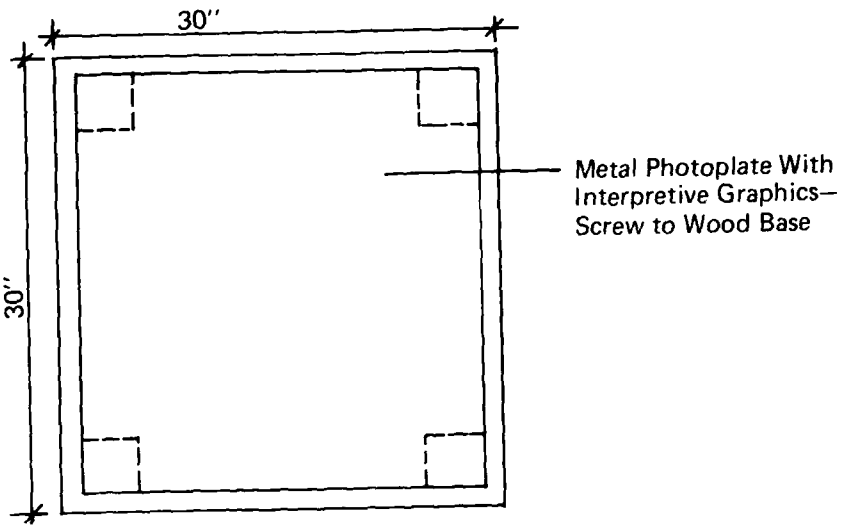


Metal Photoplate Screw to Bollard

12" x 12" Wood Bollard

L EXHIBIT

35 Interpretive Display–Plan



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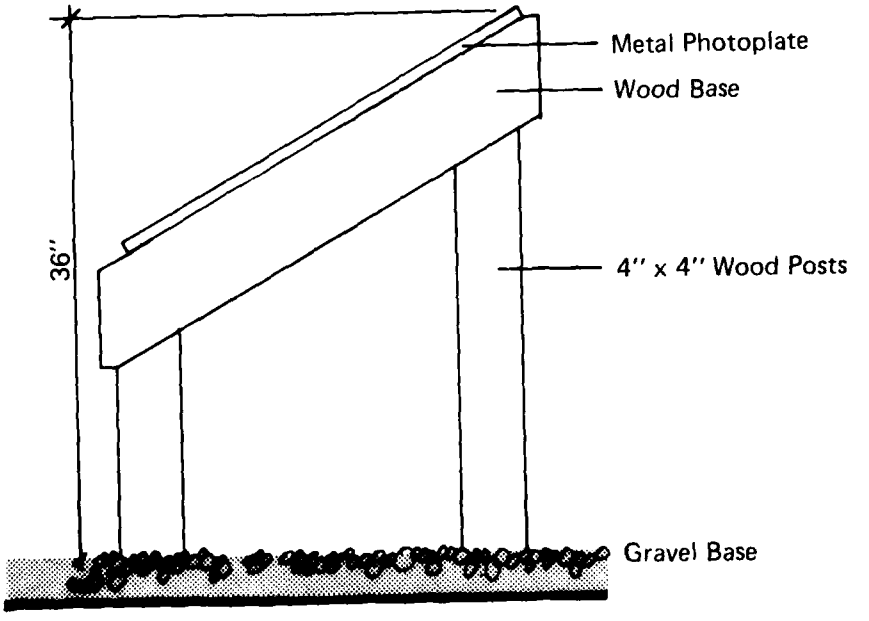
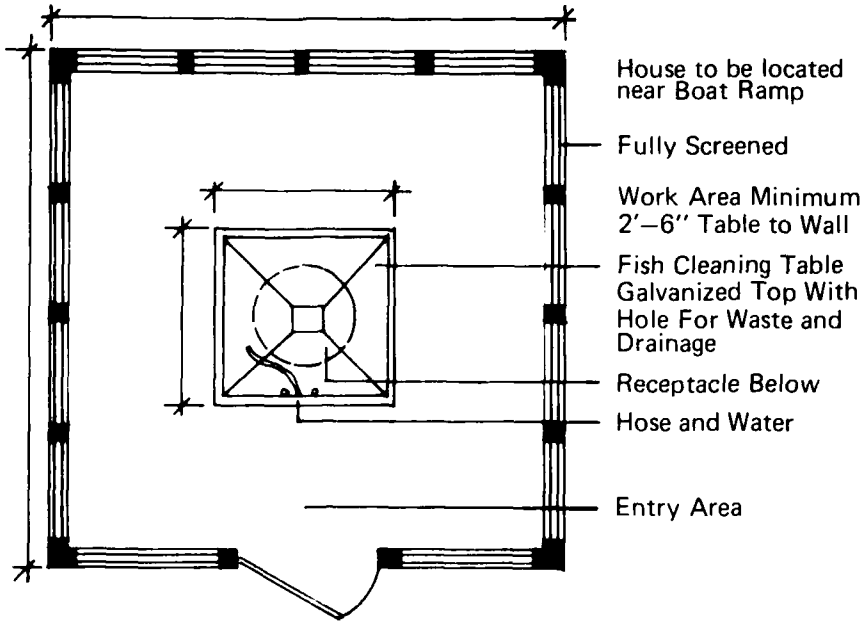


L

EXHIBIT

36 Fish Cleaning House–Plan



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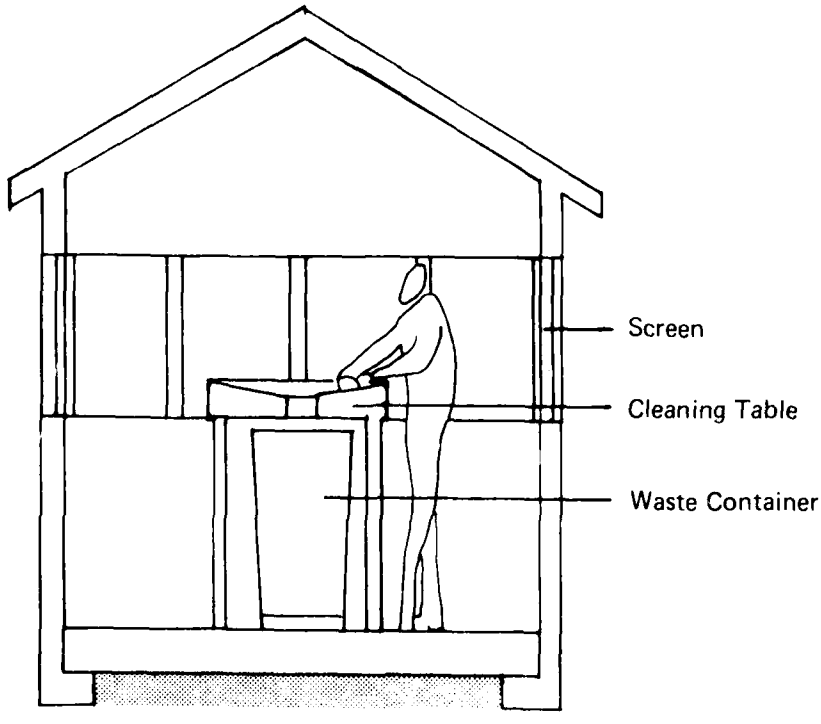
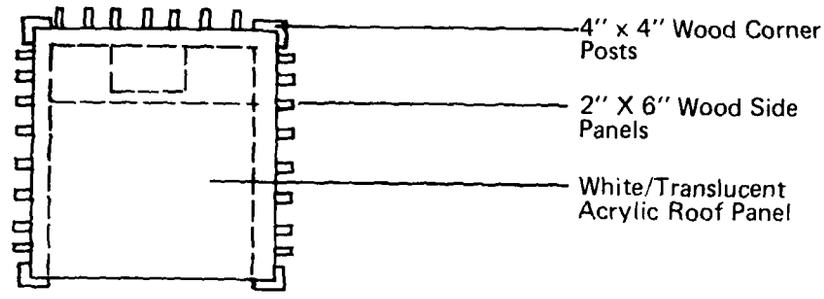


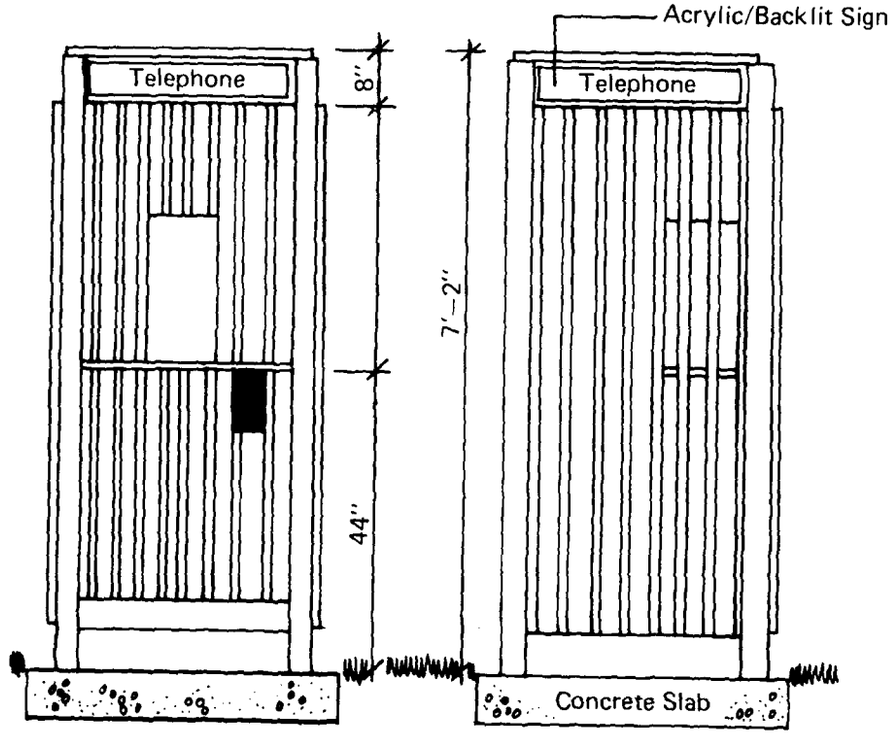
EXHIBIT

37 *Telephone Booth – Plan*



Front

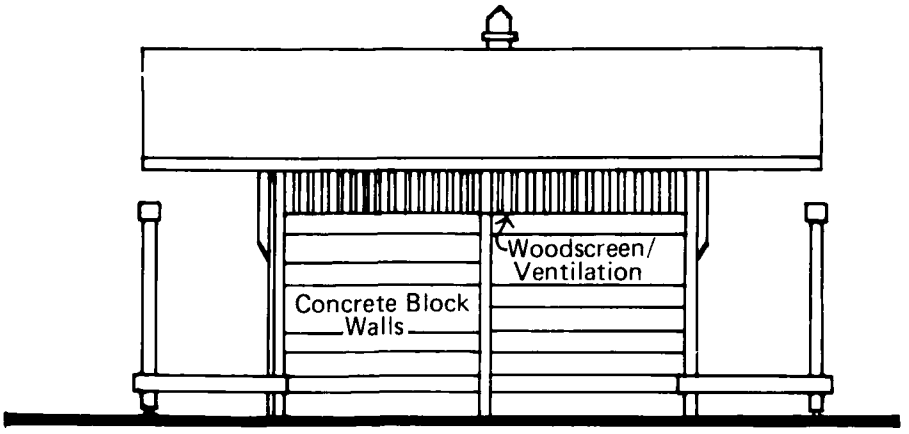
Side



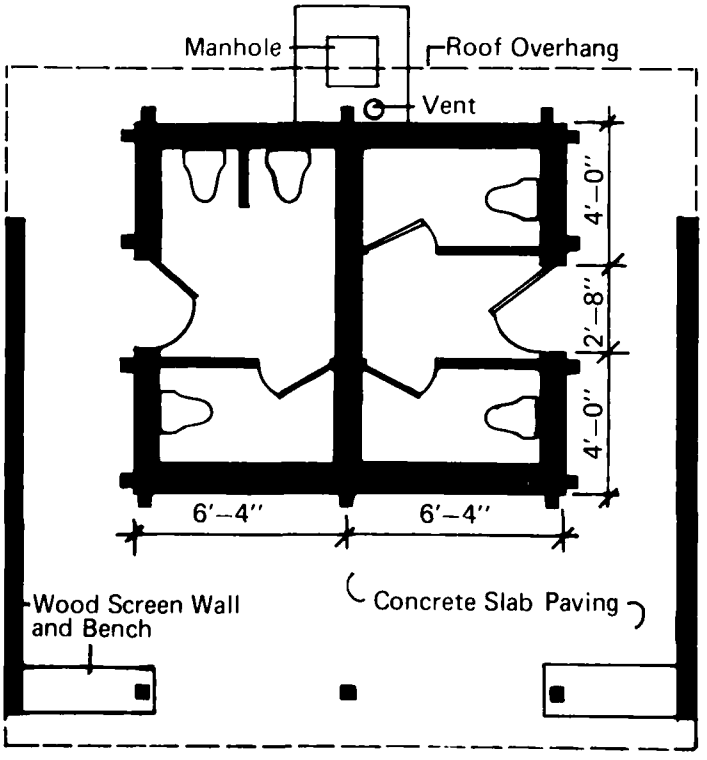
L

EXHIBIT

38 Vault Restroom–Elevation



Plan

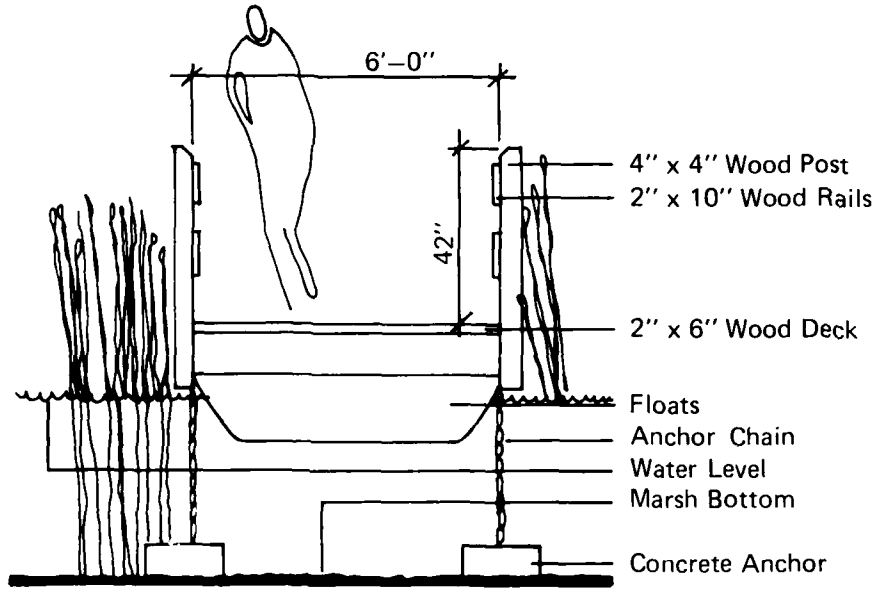


L

EXHIBIT

39

Interpretive Marsh Walkway–Section



Elevation

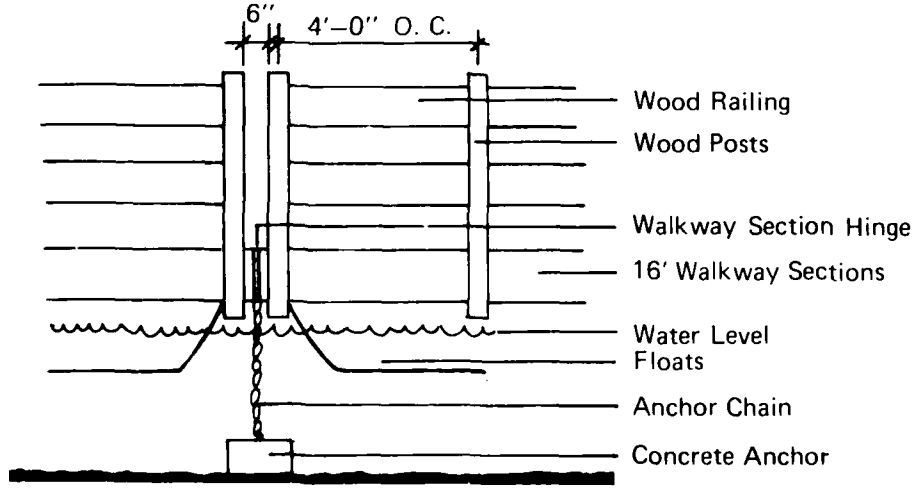


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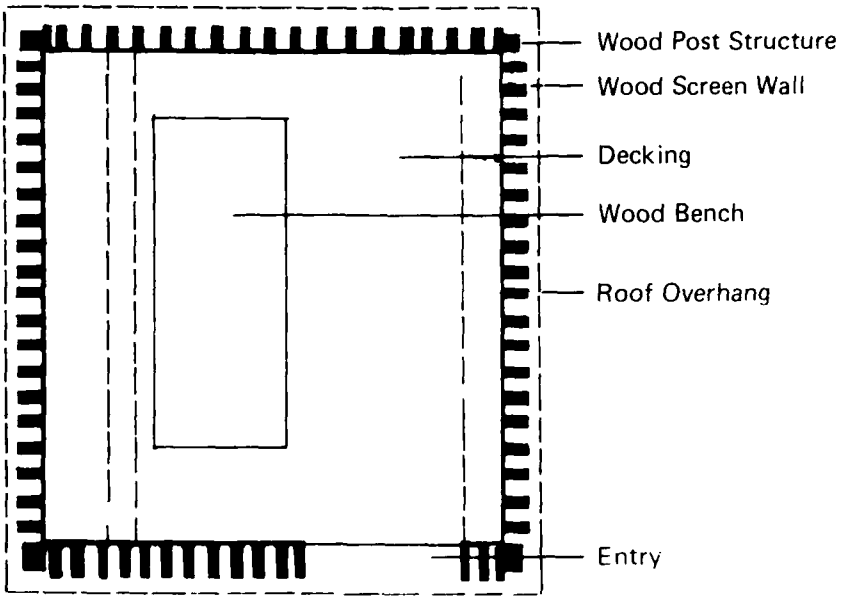
EXHIBIT

40

Observation Blind–Plan



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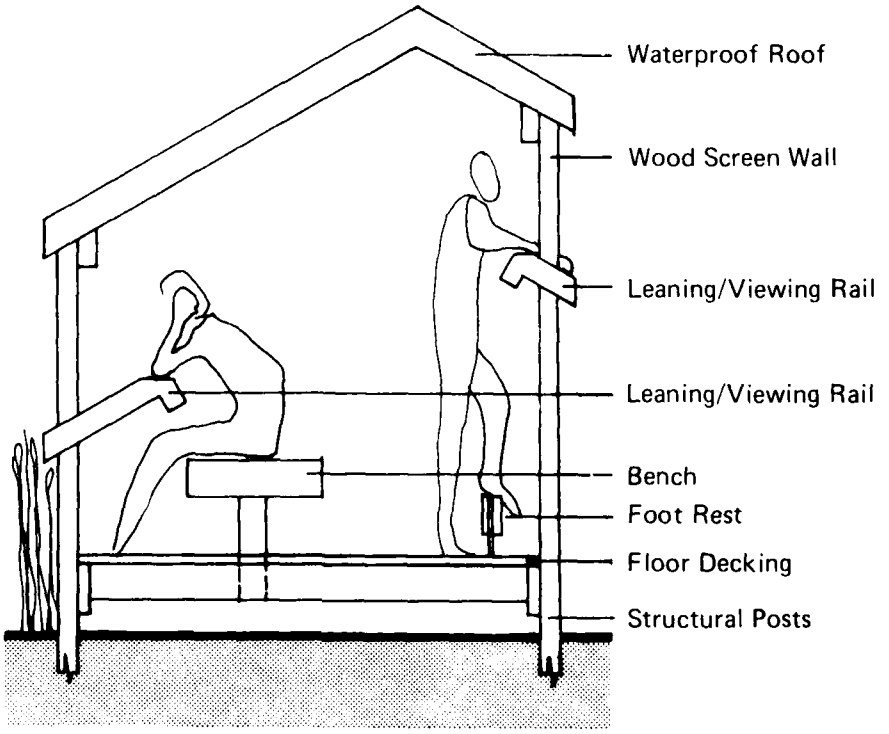


EXHIBIT M

PUBLIC COMMENTS ON THE DRAFT MASTER PLAN

The following agencies and organizations were supplied with a copy of the draft master plan. The astericked agencies and organizations responded with comments to the St. Paul District. The remaining agencies and organization reviewed the draft master plan but had no comments.

Auditor
Crow Wing County
County Courthouse
Brainerd, Minnesota 56401

Chairman, Board of
County Commissioners
Crow Wing County
County Courthouse
Brainerd, Minnesota 56401

Chairman, Board of
County Commissioners
Itasca County
Grand Rapids, Minnesota 55744

Hon. Robert Horn
Mayor of Grand Rapids
City Hall
Grand Rapids, Minnesota 55744

Congressman Arlan Stangeland
House of Representatives
Washington, D. C. 20515

Congressman James L. Oberstar
House of Representatives
Washington, D. C. 20515

Mr. Milt Stenlund, Regional
Administrator, MDNR
Box 388
Grand Rapids, Minnesota 55744

Ms. Mary Bjerke
Headwaters Mississippi Council
Route 3, Box 231
Bemidji, Minnesota 56601

Mr. Richard Hickman
Mississippi Headwaters Association
Greater Pokegama Lake Association
1721 LaPlant Road
Grand Rapids, Minnesota 55744

Mr. Byron Schlegel, Jr.
Route 3, Box 15
Aitkin, Minnesota 56431

Mr. Oliver Carlson
Zion Harbor
Federal Dam, Minnesota 56641

Mr. Gary Verrips
Verrips Resort, Big Sandy Lake
Rural Route 4
McGregor, Minnesota 55760

Mr. Chet Snyder
Route 10
Brainerd, Minnesota 56401

* Commissioner
Minnesota Department of
Transportation
Attn: Environmental Services
Minnesota Highway Building
461 Rice Street
St. Paul, Minnesota 55103

* Dr. Charles Fuchsman
Director, Center for Environmental
Studies
Bemidji State University
Bemidji, Minnesota 56601

Mr. Vel Blank
248 Classroom Office Building
University of Minnesota
St. Paul, Minnesota 55108

Grand Rapids Public Library
21 East 50th Street
Grand Rapids, Minnesota 55744

Kitchigami Regional Library
Pine River, Minnesota 56474

Mr. Roger Lorenz
Regional Administrator
Region 3, MDNR
217 N.W. Fourth Street N.W.
Brainerd, Minnesota 56401

Mr. Earl F. Machart, Jr.
Macharts Landing
P. O. Box 715
Federal Dam, Minnesota 56641

M

EXHIBIT

Mr. Rudy Esala
Executive Director,
Arrowhead Regional Development Commission
200 Arrowhead Place,
211 West 2nd
Duluth, Minnesota 55802

Mr. Robert T. Benner
Executive Director
Region 5 Regional Development Commission
102 6th Street North
Staples, Minnesota 56479

Mr. Claude E. Titus
Mississippi Headwaters Association
Chamber of Commerce
Welcome House
Grand Rapids, Minnesota 55744

* Professor Elden Johnson
State Archeologist
Department of Anthropology
University of Minnesota
215 Ford Hall
Minneapolis, Minnesota 55455

Mrs. Orena M. Fogelberg
Crosslake, Minnesota 56442

Mr. Waldo C. Lohrke
Route 6
Box 232
Brainerd, Minnesota 56401

Mrs. Nancy Henninger
Box 505
Cass Lake, Minnesota 56633

State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
200 Federal Building
316 North Robert Street
St. Paul, Minnesota 55101

Regional Forester
Eastern Region, Forest Service
U. S. Department of Agriculture
633 West Wisconsin Avenue
Milwaukee, Wisconsin 53203

* Forester, Forest Service
U. S. Department of Agriculture
Chippewa National Forest
Cass Lake, Minnesota 56633

Mr. Warren Bridge
Federal Dam, Minnesota 56641

Terry McArdle
Mississippi Headwaters Association
Star Route
Bena, Minnesota 56626

Mr. Jacob L. Ramp
Mississippi Headwaters Commission
Rural Route 13
Onigum Road
Walker, Minnesota 56484

Mr. George A. Rossman
Mississippi Headwaters Association
406 Pokegama Avenue North
Grand Rapids, Minnesota 55744

Mr. Merrill E. Stodghill
Whitefish Area Property Owners Association, Mississippi Headwaters Association
Star Route 1, Box 169
Cross Lake, Minnesota 56442

Mr. Terrence L. Staley
Guide
Wescott's Launch Service
P. O. Box 763
Federal Dam, Minnesota 56641

* Regional Director
U.S. Fish & Wildlife Service
Federal Building
Fort Snelling
Twin Cities, Minnesota 55111

* Director, Midwest Region
National Park Service
U.S. Department of the Interior
1709 Jackson Street
Omaha, Nebraska 68102

Commissioner, Minnesota
Department of Economic Development
480 Cedar Street
St. Paul, Minnesota 55101

Director
Minnesota State Planning Agency
101 Capitol Square Building
550 Cedar Street
St. Paul, Minnesota 55101

M

EXHIBIT

Director
Minn--Wis District Office
U.S. Environmental Protection Agency
7401 Lyndale Avenue South
Minneapolis, Minnesota 55423

Regional Administrator
Region V
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

* Area Director, Bureau of Indian Affairs, Minneapolis Area Office
U.S. Department of the Interior
831 Second Avenue South
Minneapolis, Minnesota 55402

Mr. Edward Demery
Superintendent
Bureau of Indian Affairs
Federal Building
Bemidji, Minnesota 56601

Regional Director, Lake Central Region, Bureau of Outdoor Recreation
U.S. Department of the Interior
3853 Research Park Drive
Ann Arbor, Michigan 48104

Director
Minnesota Historical Society
Main Historical Building
690 Cedar Street
St. Paul, Minnesota 55101

* Commissioner
Minnesota Department of Natural Resources
Third Floor
Centennial Office Building
St. Paul, Minnesota 55155

Mr. Gordon W. Stobb
Area Extension Agent
503A Washington Street
Brainerd, Minnesota 56401

Chairman, Board of County Commissioners
Aitkin County
County Courthouse
Aitkin, Minnesota 56431

Chairman, Board of County Commissioners
Cass County
Walker, Minnesota 56484

M

EXHIBIT

Minnesota Department of Transportation

Transportation Building, St. Paul, MN 55155

Phone 6-5771

September 20, 1977

Mr. Frank Star
U.S. Army Engineer District, St. Paul
1206 U.S. Post Office and Custom House
St. Paul, MN 55101

Re: Mississippi River Headwaters Reservoirs, Master Plan
for Public Use Development and Resource Management, August 1977

Dear Mr. Star:

We have reviewed the above report and find it to be an excellent document. It has impressive graphics and the master planning a comprehensive and thorough approach.

Because the Corps project sites are all near the Mississippi River, we anticipate they will be important use areas for the Great River Road (GRR), a national scenic and recreational highway. The specific sites which might be on the GRR or located off spurs from it are the Sandy Lake, Lake Winnibigoshish and Pokegama Lake Recreation areas. We expect these sites to complement the GRR facilities planned by our Department and would not duplicate them. We will be holding an information meeting at Pallisades on September 20, 1977 to gain public input as to the location of the GRR. We expect closer contact with your office after the route is designated.

Specifically, signing off T.H. 65 for Sandy Lake Recreation as stated in the report is inadequate. We expect our District Traffic Engineer would review this situation and make recommendations to upgrade the signage.

Thank you for the opportunity to review this report and we look forward to a close working relationship with regard to the Great River Road activities. Your name is being added to our GRR mailing list.

Sincerely,

Lawrence E. Foote

Lawrence E. Foote, Manager
Planning and Development Section
Office of Environmental Affairs

M

EXHIBIT

United States Department of the Interior

NATIONAL PARK SERVICE
MIDWEST REGION
1709 JACKSON STREET
OMAHA, NEBRASKA 68102

IN REPLY REFER TO

L7423 MWR DCL

JUL 22 1977

Colonel Forrest T. Gay, III
District Engineer
St. Paul District, Corps of Engineers
1135 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

Dear Colonel Gay:

Upon review of the Master Plan for Public Use Development and Resource Management, Mississippi River Headwaters Reservoirs, we have the following comments.

On page 52, Figure 35 is outdated. There are numerous sites in Minnesota listed in the National Register of Historic Places that are not mentioned in this section according to the Federal Register, Tuesday, February 1, 1977, and monthly supplements thereto. Although it seems that this plan will have no effect upon these sites, we suggest you mention them.

We assume that a copy of this plan has been sent to the Lake Central Region, Bureau of Outdoor Recreation for review and anticipate that they will comment on the Upper Mississippi Wild and Scenic River study. If not, we call this study to your attention and the possible effects, if authorized, that this wild and scenic river may have upon this plan.

We thank you for the opportunity to comment on this plan.

Sincerely yours,

Merrill D. Beal

Merrill D. Beal
Regional Director

M

EXHIBIT

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
Space Center Building · 444 Lafayette Road · St. Paul, Minnesota 55101

August 16, 1977

Colonel Forrest T. Gay, III
Corps of Engineers
District Engineers
U.S. Army Corps, St. Paul District
1135 U.S. Post Office and Custom House
St. Paul, MN 55101

Dear Colonel Gay:

U.S. ARMY ENGINEER DISTRICT DRAFT MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT AT THE MISSISSIPPI RIVER HEADWATERS RESERVOIRS

The Department of Natural Resources (DNR) recognizes the importance of providing for the full spectrum of recreational opportunities. We are concerned, though, by the reference in Section 6 to facilities being provided by other recreational developments. The Department feels that the assumptions outlined in paragraphs 6.06 and 6.09 should be fully described and substantiated.

State Canoe routes are designated only by the Minnesota Legislature (M.S. 85.32, 1976). Even lacking designation, the Pine River is a frequently used canoe route and we would encourage development of portages around the dam on this watercourse. We also feel that the development of a portage on the Mississippi River (Lake Winnibigoshish Recreation Area) will facilitate accessibility to this already established State Canoe route.

The Department is also aware of the Corps' increasing concern with the access channel to Leech Lake; particularly in reference to increased water surface use. We hope you will keep us appraised of any future proposals for the deepening of this channel as such work may require a permit from the DNR.

The importance of coordination with other governmental units and private interests involved in the development of public use and recreational facilities in this region could be further stressed in the document.

We thank you for the opportunity to review and comment on this draft document and look forward to working with you towards the development of resource management policies in this region.

Sincerely,

DIVISION OF WATERS

Gerald D. Seinwill, Director
By: James M. Wright, Supervisor
Land Use Management Section

JMW/cc:ds
cc: Alan Wald
Bob Knepper

M

EXHIBIT

Bemidji State University BEMIDJI, MINNESOTA 56601

DIVISION OF SCIENCE & MATHEMATICS
218-755-2920

August 11, 1977

Colonel Forrest T. Gay, III
District Engineer
U.S. Army Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, MN 55101

Dear Sir:

In response to your letter of 5 July 1977, requesting review of the Draft Master Plan for Public Use Development and Resource Management, I am only able to commend you for the job done so far.

I did not find reference to the "Great River Road" project now being developed by the Department of Transportation. Since the road designations expected for the Great River Road may affect tourist travel in the area of interest to the Corps of Engineers, some recognition of the impact of such increased travel might be appropriate for inclusion in the Master Plan.

The staff responsible for the physical arrangement of the Draft Master Plan deserves special approbation.

Sincerely yours,

Charles H. Fuchsman

Charles H. Fuchsman, Director
Center for Environmental Studies

CHF:jer

M

EXHIBIT

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

CHIPPEWA NATIONAL FOREST
CASS LAKE, MN 56633

September 22, 1972

Mr. Forrest T. Gay, III
Department of the Army
St. Paul District, Corps of Engineers
1135 U. S. Post Office and Custom House
St. Paul, MN 55101

Dear Mr. Gay:

We have reviewed the Draft Master Plan for Public Use Development and Resource Management for the Mississippi River Headwaters Reservoirs and were impressed with both the thoroughness of the document and the detail within it.

Based on our review, we have several comments and suggestions to make:

Combining the day use and camp area entrance roads at the Lake Winnie campground appears to be a logical and necessary change.

In addition, we suggest that the parking lot on County Road 9, next to the Dam, be relocated a short distance to the east, with the entrance to it being located on the proposed new campground entrance road. This would eliminate the safety problem which presently exists in that area.

Also, at the Leech Lake Recreation Area we doubt whether there is any real need for 15 primitive campsites in a campground which is as highly developed as this one is proposed to be. It would seem that people looking for such a primitive campsite would look for it in surroundings which are also primitive and natural-appearing.

Thanks very much for the opportunity to comment.

Sincerely,

James K. Lyle

JAMES K. LYLE
Forest Planner

M

EXHIBIT

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
MINNEAPOLIS AREA OFFICE
831 SECOND AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55402

IN REPLY REFER TO:
Land Operations

AUG 1 : 1977

Colonel Forrest T. Gay, III
District Engineer
Corps of Engineers
1135 U. S.Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Gay:

Reference is made to NCSED-ER, Draft Master Plan for Public Use Development and Resource Management at the Mississippi River Headwaters Reservoirs.

The Draft Master Plan is satisfactory and will be useful to the Minnesota Chippewa Tribe.

We have been advised that most of the questions raised by the Tribe were resolved by Tribal representatives and members of your staff.

If we can be of further assistance, please advise.

Sincerely,

George V. Bearskin

Area Director

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

IN REPLY REFER TO:

Colonel Forrest T. Gay, III
District Engineer
U. S. Army Engineer District, St. Paul
1135 U. S. Post Office & Custom House
St. Paul, Minnesota 55101

July 29, 1977

Dear Colonel Gay:

Review of the Draft Master Plan for Public Use Development and Resource Management for the Mississippi River Headwaters Reservoirs has been completed. The Fish and Wildlife Service is in agreement with the resource use objectives for development and management of the six recreation areas to obtain the greatest possible public benefit while preserving and enhancing the environmental quality. At this time we have no substantial comments on the Draft Master Plan, but we will continue to review and provide input for projects in the Mississippi River Headwaters as plans are developed.

Sincerely,

George G.P. Bekeris
Area Manager

M

EXHIBIT

Whitefish Area Property Owners Ass'n

CROSSLAKE, MINNESOTA 56442

August 11, 1977

Colonel Forest T. Gay III, District Engineer
Department of the Army
St. Paul District, Corps of Engineers
1135 U. S. Post Office and Custom House
St. Paul, Minnesota 55101

Dear Colonel Gay:

This Association was represented at the Grand Rapids meeting on Wednesday, August 3, and several of us have reviewed carefully the *Mississippi Headwaters Reservoirs Draft Master Plan for Public Use Development and Resource Management.*

Per your invitation we would like to make the following comments relative to the Ronald Louis Cloutier Recreation Area at Crosslake, Minnesota.

1. We support a single entrance to this area as proposed, to coincide with the present entrance to the picnic area and dam office and maintenance building.

2. We believe an improved network of footpaths is a critical need to reduce or eliminate pedestrian traffic on the paved roadways.

3. We propose that electric outlets be placed at approximately 1/3 of the campsites. *(See comment #7 below.)*

4. Because of confusion generated by the name "Pine River Reservoir", we strongly recommend this be officially renamed "Whitefish Chain Reservoir".

5. We urge that the Corps "find" the way to mark or, better still, remove hazards to navigation in this reservoir and keep open the navigational channels between the principal lakes.

M EXHIBIT

Whitefish Area Property Owners Ass'n

CROSSLAKE, MINNESOTA 56442

6. Because of the splendid boat launching facilities at this site we urge a change in your seasonal operations plan to keep at least 1 ramp on Cross Lake and the Clamshell Lake ramp open well into the fall and make them operational shortly after ice is out in the spring.

7. We suggest a 2-3 year trial at keeping the Crosslake site open the year around. Ice fishing and snowmobiling are major winter sports attracting thousands of participants. We have numerous snowmobile trails in this area. The lake surfaces are heavily traveled. Resorts are now staying open to accommodate visitors. We believe motor home owners, trailer owners as well as some hardy-soul tent campers would use this facility extensively if it were open. Electric outlets could service car engine heaters.

Please be assured of the great interest of this association in this project.

Sincerely yours,

Merrill E. Stodghill

Merrill E. Stodghill
President

MES:ljb

M

EXHIBIT

UNIVERSITY OF MINNESOTA
TWIN CITIES

Office of the State Archaeologist
215 Ford Hall
224 Church Street S E
Minneapolis, Minnesota 55455
(612) 376 1352 (612) 373 7601

July 18, 1977

Col. Forrest T. Gay III
District Engineer
Corps of Engineers, St. Paul District
U.S. Post Office Building
St. Paul, Mn 55101

Dear Col. Gay:

I have read the "Master Plan for Public Use Development and Resource Management" with great interest and am particularly pleased with the discussion of cultural resources and the recommendation for urgency in completing the inventory for the entire headwaters reservoir system. It would be impossible to implement many of the recommended recreational and public use development projects until accurate information exists on the location and significance of archaeological and historic sites to avoid their destruction in the development process or to include one or more in interpretation plans.

I am happy to participate in this important study and appreciate the concerns expressed for the cultural resources of the various areas.

Sincerely,

Elden Johnson
State Archaeologist

EJ/len

M EXHIBIT

Potlatch

Potlatch Corporation
Wood Products, North Central Division

Avenue L and Arch Street
Cloquet, Minnesota 55720
(218) 879-6784

August 16, 1977

Department of the Army
St. Paul District Corps of Engineers
1135 U. S. Post Office & Custom House
St. Paul, MN 55101

Dear Sir:

On August 3 and 4, the Corps of Engineers held hearings in Brainerd and Grand Rapids relative to certain recreation areas on the Mississippi River. We were unable to attend these hearings but would much appreciate what action is contemplated by your agency in the future regarding future development of these facilities. Our interest stems from the fact that we are major owners of timberlands in the vicinity of some of your developments and we are concerned about possible impacts on our forest management programs.

Any information you can furnish will be greatly appreciated.

Sincerely,

E. J. Jankowski
Chief Forester

EJJ:kjh

M EXHIBIT

Itasca County
Environmental Council
c/o County Administrator
Itasca County Courthouse
Grand Rapids, MN 55744

September 9, 1977

Col. Forrest T. Gay III
St. Paul District Engineer
U.S. Corps of Engineers
1135 U.S. Post Office & Custom House
St. Paul, MN 55101

Dear Col. Gay:

The Itasca County Environmental Council was represented at the open house sponsored by the Corps of Engineers in the Grand Rapids City Hall on August 3.

The Council would like to be placed on record in support of the statement made by George Rossman of the Mississippi Headwaters Commission to the effect: To reduce the maximum stay at the Pokegama Dam Campgrounds from 14 days to five days.

We would be interested in any other information or meetings to be held pertinent to this subject, or if you have a mailing list we would like to be placed on it. Thank you.

Sincerely,

WILLIAM POWERS, CHAIRMAN

by:

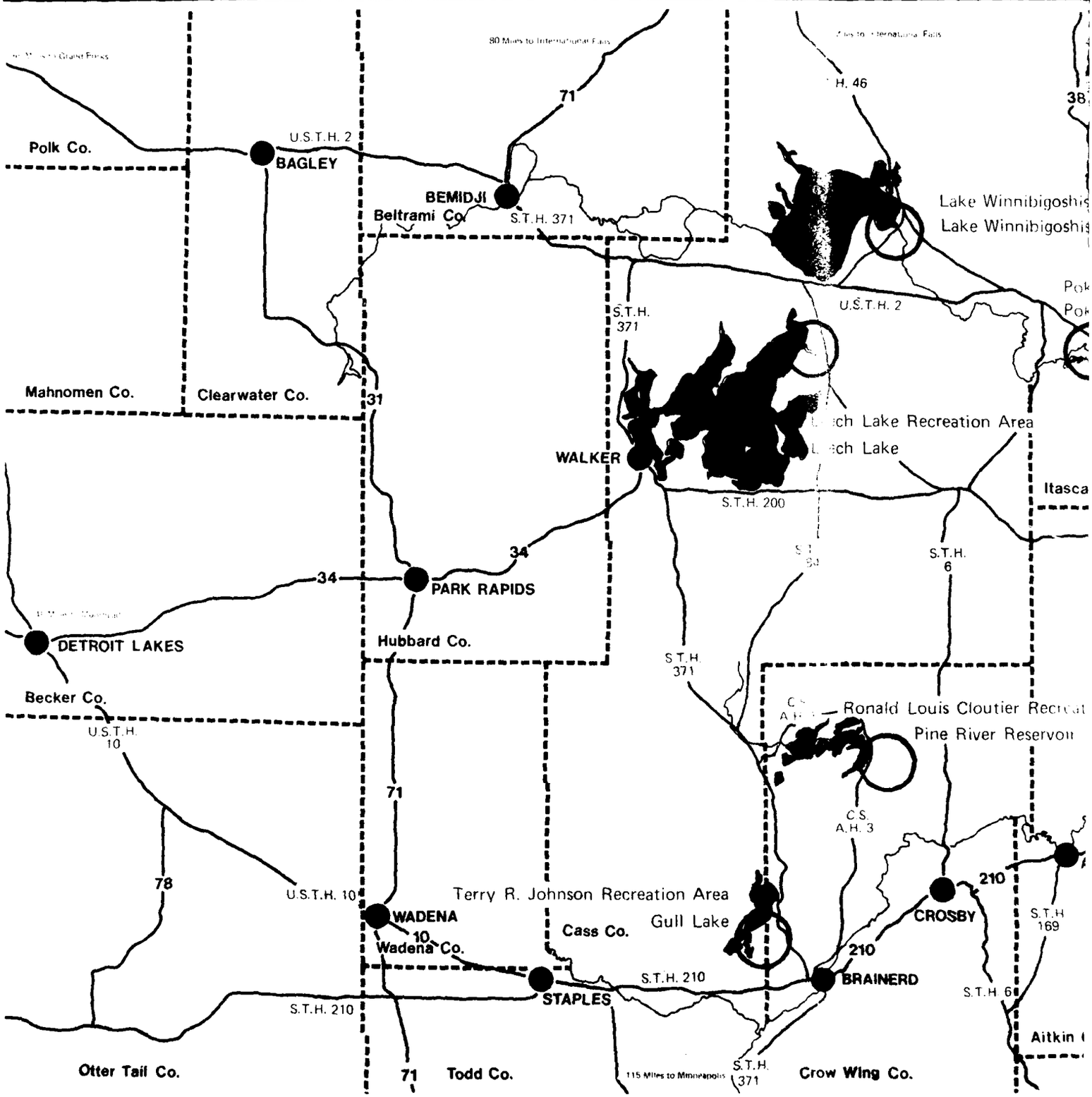
Carole Pion
Carole Pion
Recording Secretary

EXHIBIT N

SIGNAGE DESIGN SCHEDULE[1]

Sign Type	Size	Shape	Materials	Color	Lettering Size	Corps Identification	Placement
entrance & identification	varies	varies	wood stone brick	white on brown	8" - 10"	yes	main access road
directional, off-project	varies	rectan-gular	metal	white on brown	varies	yes	one mile from main access road
directional, on-project	varies	rectan-gular	wood	white on brown	4"	no	adjacent to feature or nearest intersection
interpretive	varies	varies	wood	white on brown	3"	no	adjacent to feature
symbol	6"x6" to 24"x24"	square	wood	white on brown	varies	no	adjacent to feature or at nearest intersection
regulatory & protective	varies	varies	wood	white on brown	varies	no	
traffic control	varies	varies	metal	varies	varies	no	
boundary	4"x12"	rectan-gular	metal	black on white		yes	boundary/ property lines
waterway signs & markers						no	appropriate locations
navigation project signs		rectan-gular	metal	black on red	varies	no	above and below the dam, 300' away
concession & cooperative agency signs	varies	varies	wood	brown on white	varies	no	appropriate locations
construction project	varies	rectan-gular	wood	black on white	varies	yes	adjacent to feature

[1] Corps of Engineers, Sign Handbook, NCDP 1130-2-1



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

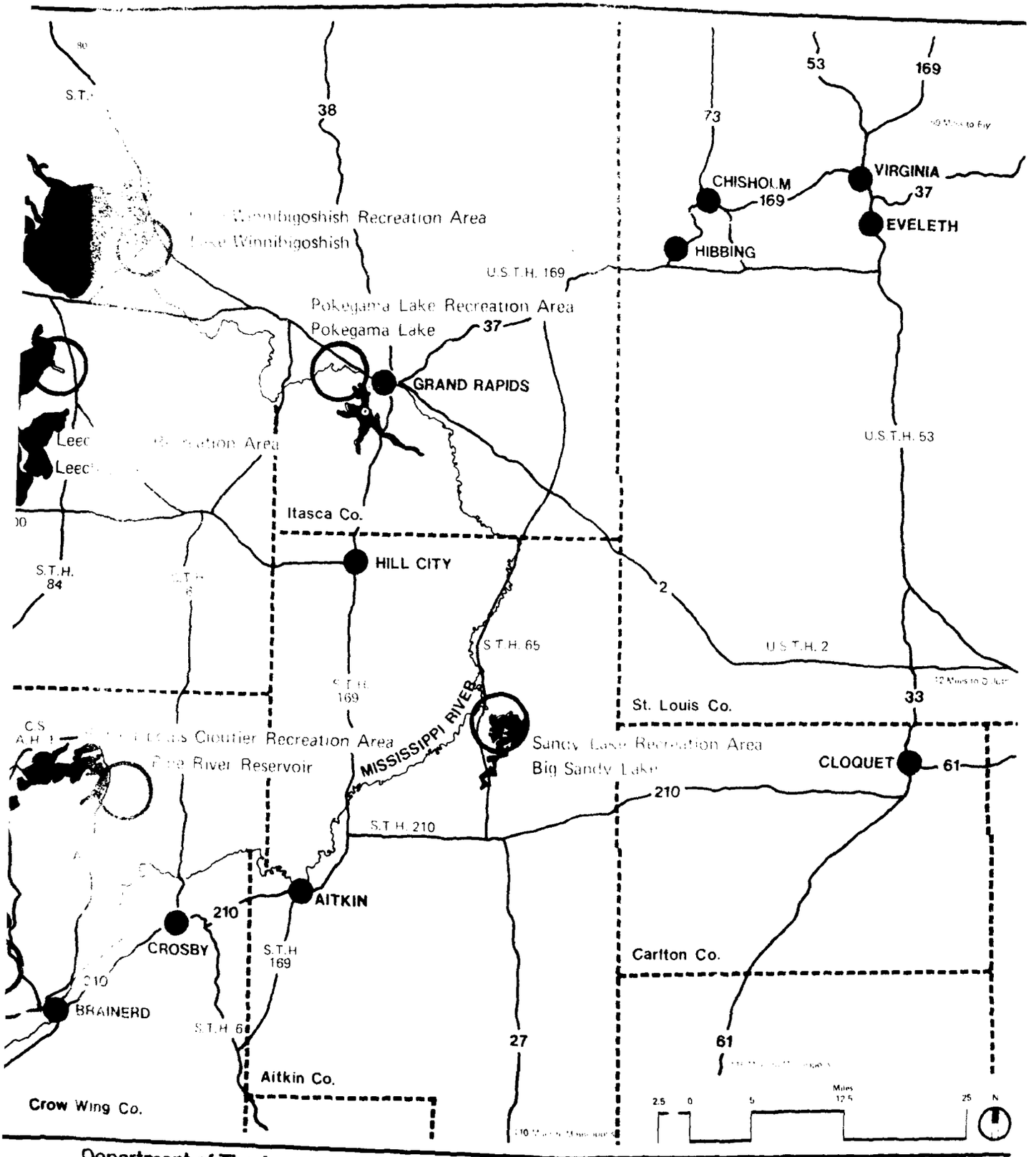
Legend

Major Water Body

C. O. E. Recreation Area

Department of The Army
St. Paul Distnct Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis, Minnesota



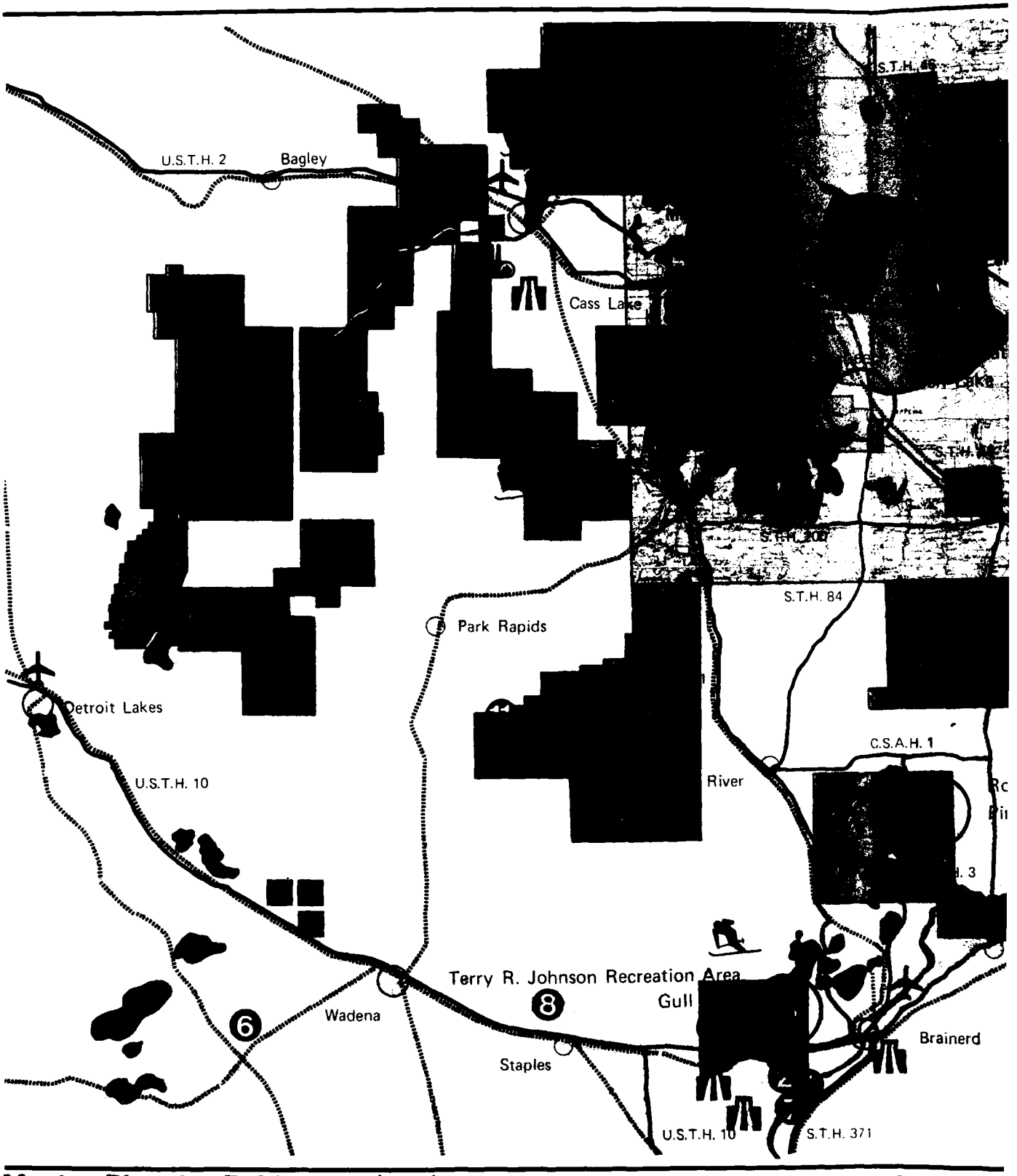
Department of The Army
St Paul District Corps of Engineers
St Paul Minnesota

InterDesign Inc.

Drawn by
Checked by
Submitted by
Approved by
Date January 1977

Regional Location Map

1



Master Plan for Public Use Development and Resource Management

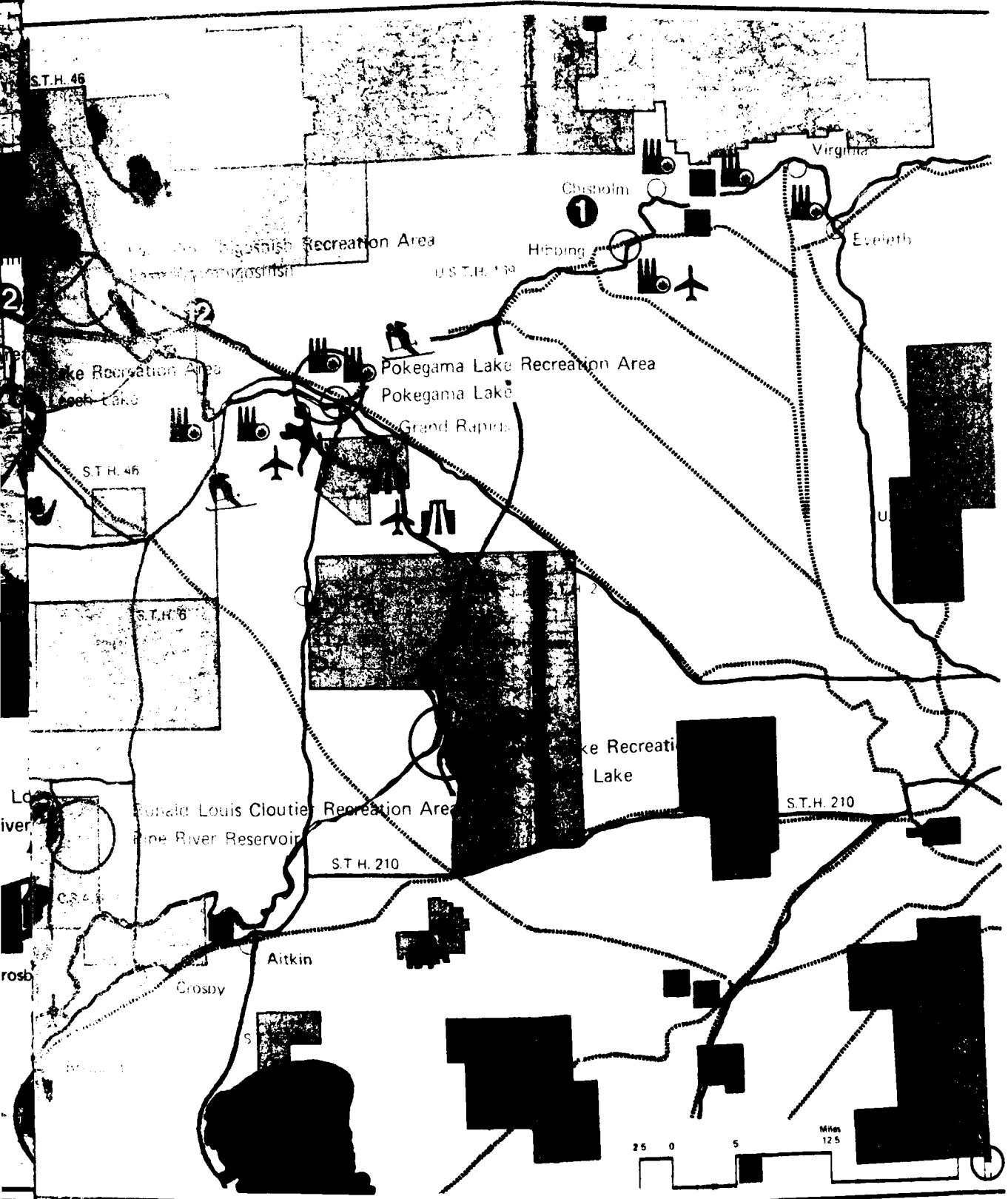
Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C. O. E. Recreation Area
- National Forest
- Wildlife Refuge
- State Forest
- State Park
- Historic Site
- Hydro Electric Power Plant
- Steam Power Plant
- Other Type Power Plant
- Airport
- Ski Area
- Railroad
- Major Road

Department
St. Paul District C
St. Paul, Minneso

Inter
Recreation
Landscape
Minneapolis



Department of The Army
District Corps of Engineers
Minnesota

InterDesign Inc.

Drawn by DF/HD/MH

Checked by

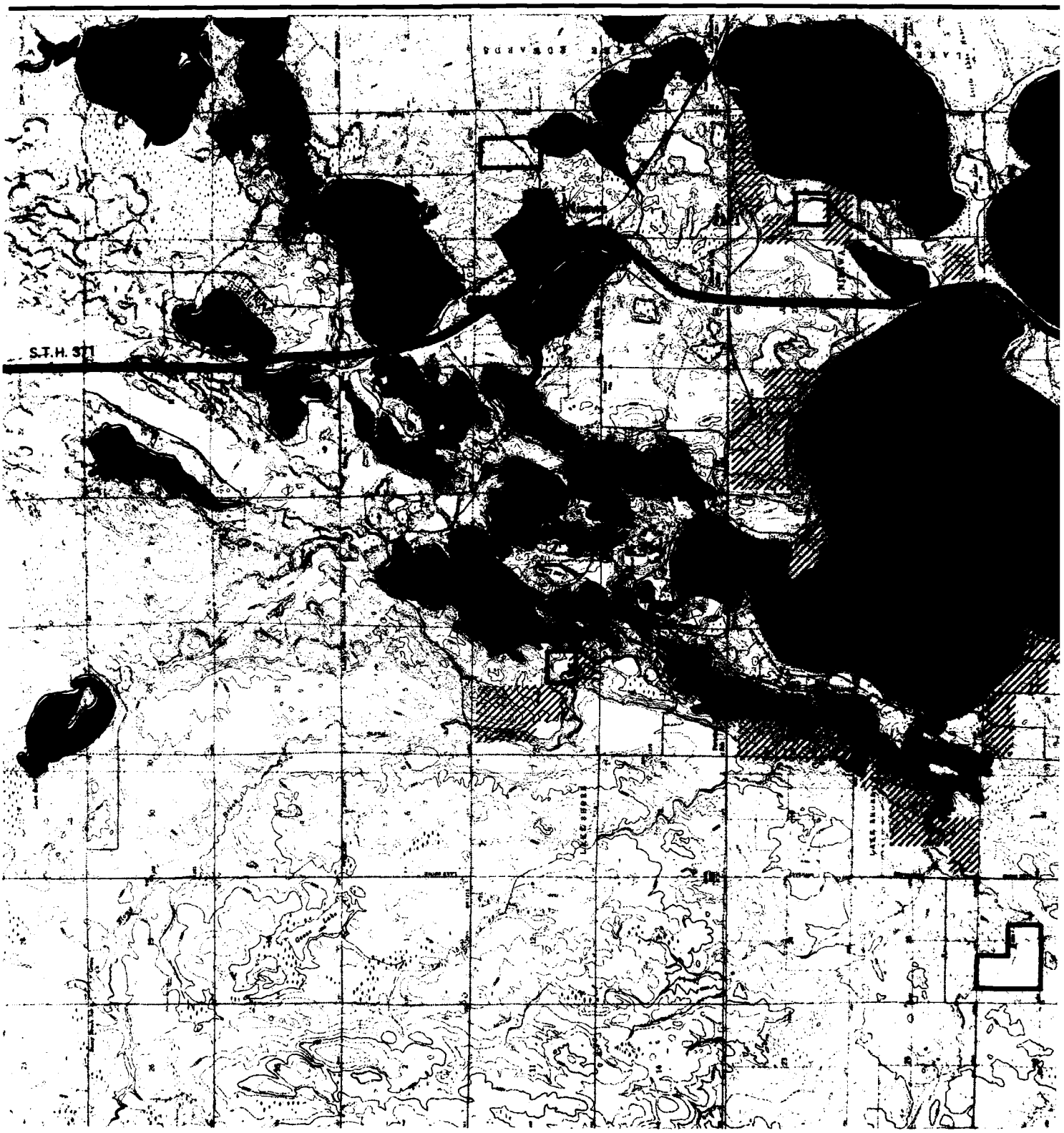
Submitted by

Approved by

Date January 1977

Regional Land Use Map

Plate No 2



Master Plan for Public Use Development and Resource Management

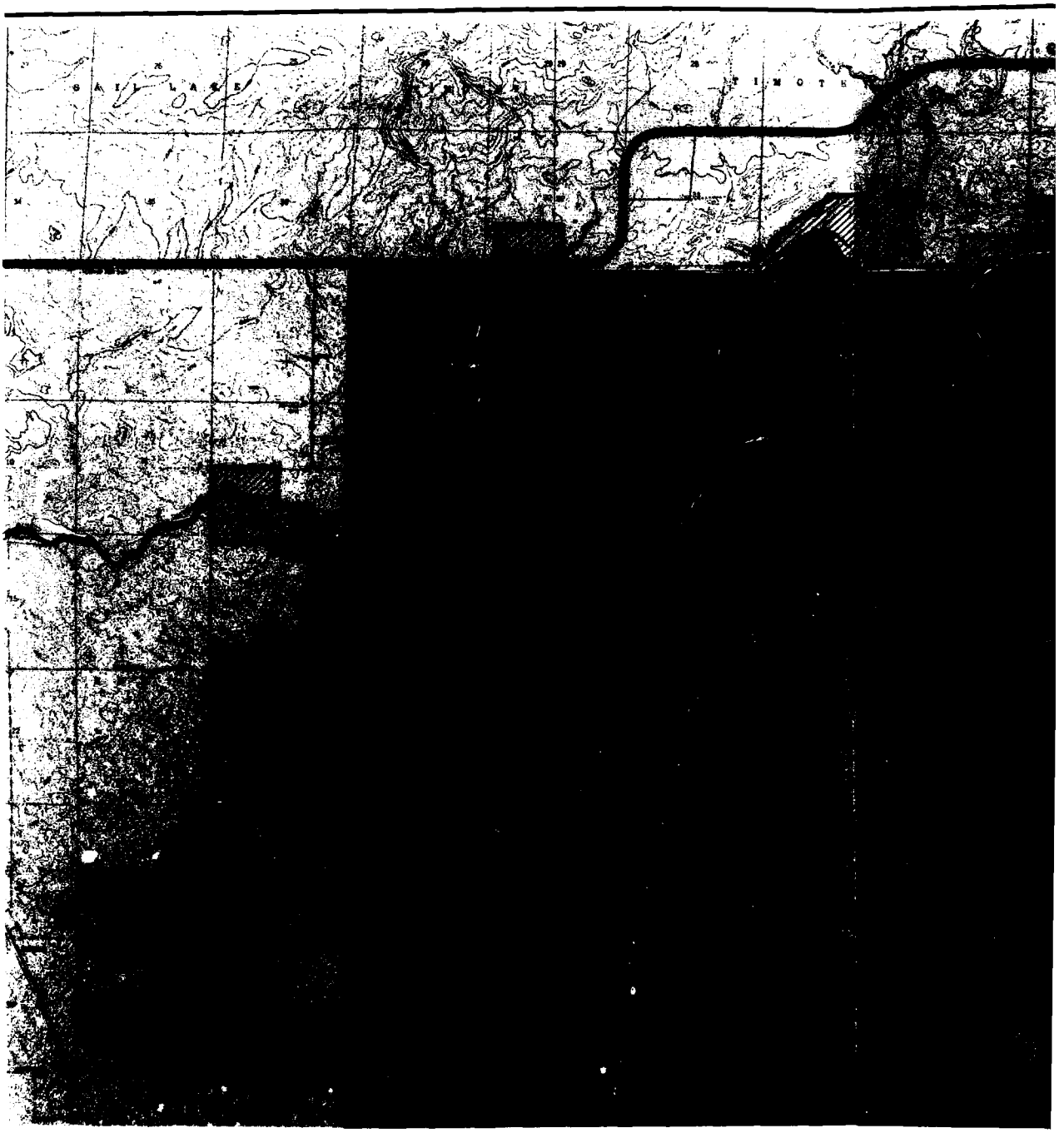
Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C. O. E. Recreation Area
- Corps of Engineers Land
- State Owned Land
- Municipal Land
- Flowage Easement
- State Forest
- Other Land
- S.T.H. — State Trunk Highway

Department of The
St. Paul District Corps of E
St. Paul, Minnesota

InterDesign I
Recreation Planners
Landscape Architects
Minneapolis Minnesota



Master Plan for Public Use Development and Resource Management

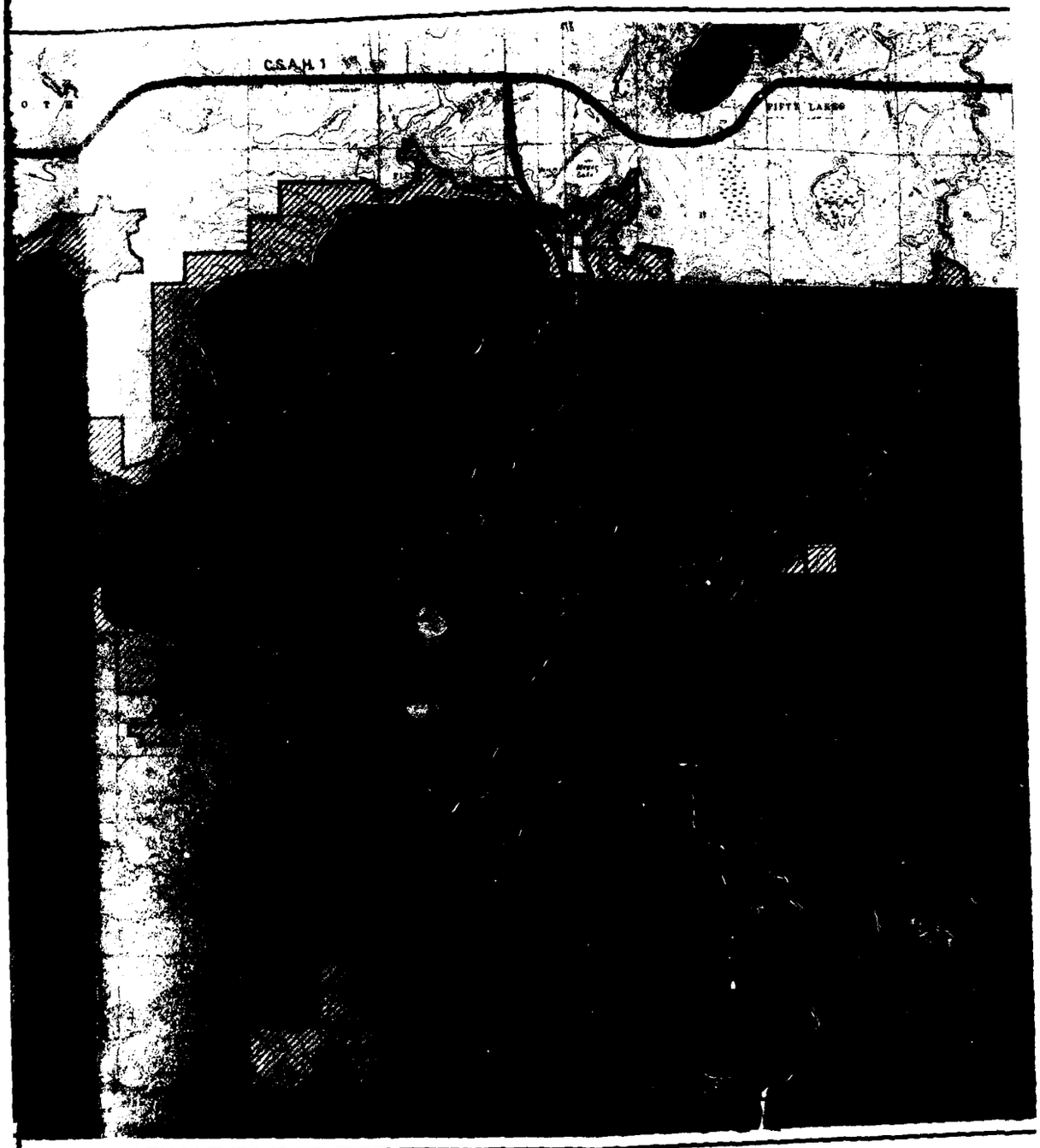
Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C. O. E. Recreation Area
- Corps of Engineers Land
- State Owned Land
- Municipal Land
- Bureau of Indian Affairs Land
- Flowage Easement
- State Forest
- Other Land
- CSAH — County State Aid Highway

Department of The
St. Paul District Corps of En
St. Paul, Minnesota

InterDesign In
Recreation Planners
Landscape Architects
Minneapolis, Minnesota



Department of The Army
St. Paul District Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis Minnesota

Drawn by: DF/AB/MH
Checked by: Roger B. Martin
Submitted by:
Approved by:
Date: January 1977

Pine River Land Use Map

Plate No. 4

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C. O. E. Recreation Area
- Corps of Engineers Land
- State Owned Land
- Municipal Land
- Bureau of Indian Affairs Land
- State Forest
- National Forest
- Other Land
- S.T.H. — State Trunk Highway

Department of The
St. Paul District Corps of E
St. Paul, Minnesota

InterDesign I
Recreation Planners
Landscape Architects
Minneapolis, Minnesota

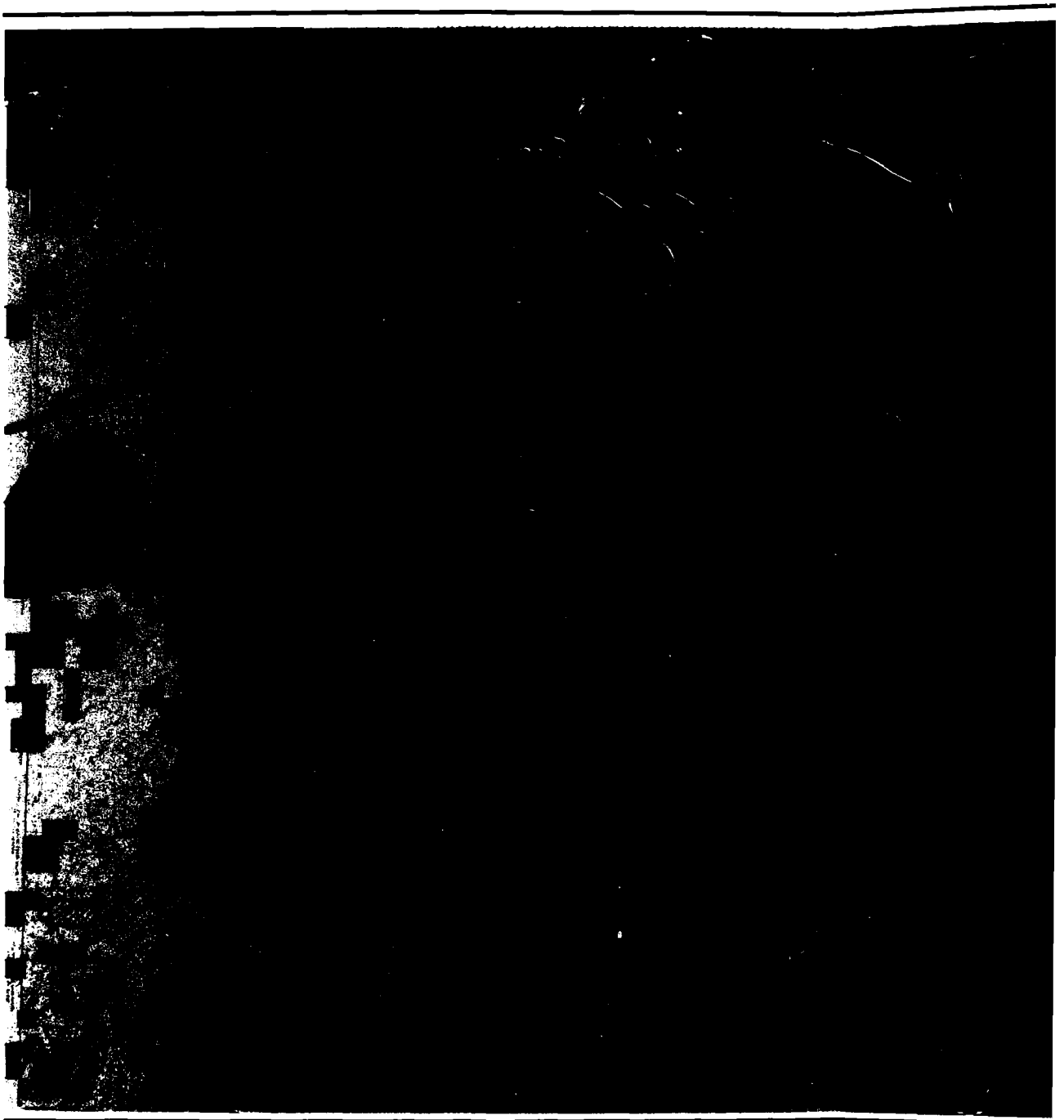
Department of The Army
St. Paul District Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis Minnesota

Drawn by: DF/HB/MH
Checked by: Roger B. Martin
Submitted by:
Approved by:

Leech Lake Land Use Map

Date January 1977 Plate No 5



Master Plan for Public Use Development and Resource Management

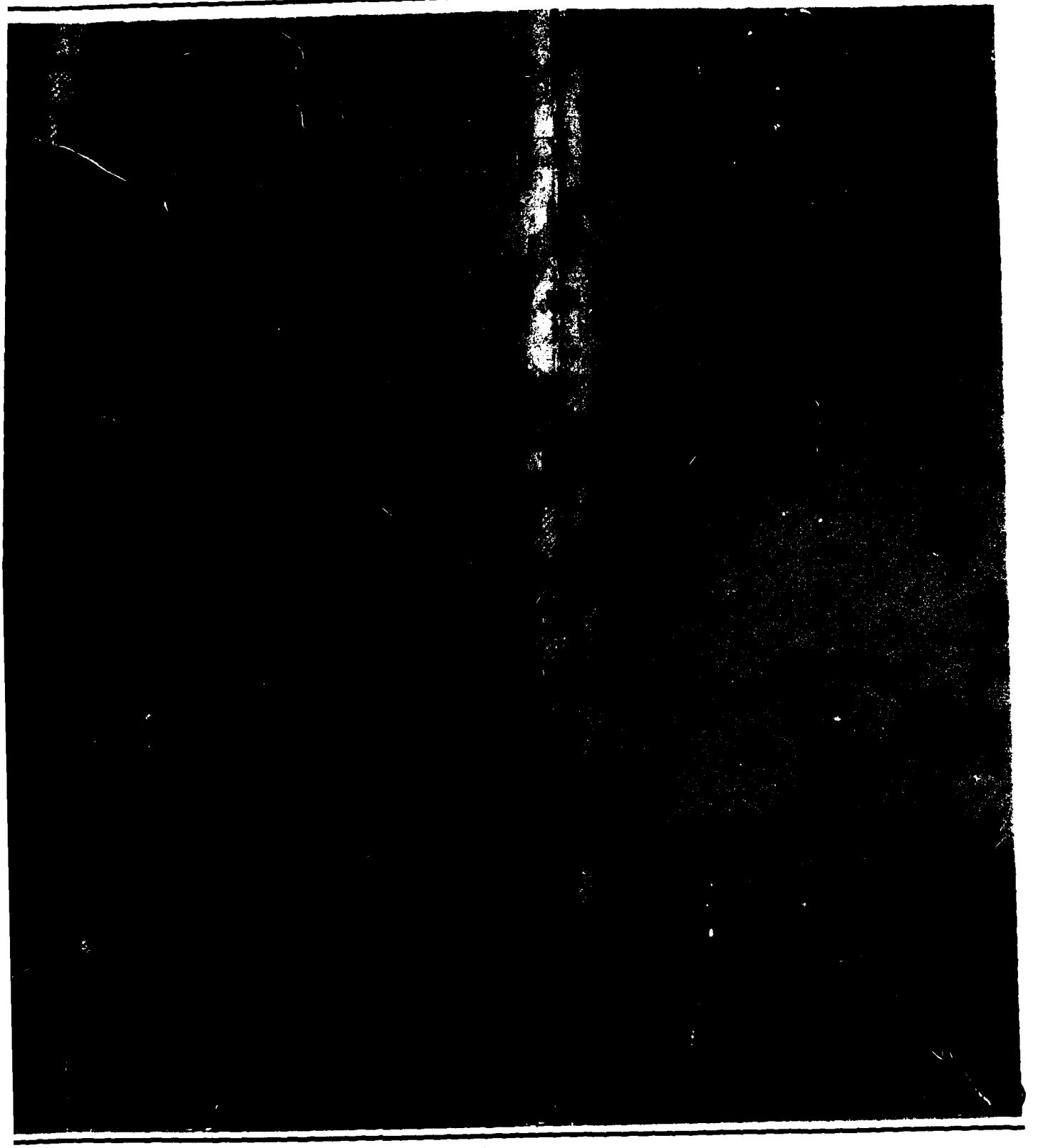
Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C. O. E. Recreation Area
- Corps of Engineers Land
- State Owned Land
- Municipal Land
- Flowage Easement
- National Forest
- Other Land
- Bureau of Indian Affairs Ownership Unavailable

Department of The Ar
St. Paul District Corps of Engine
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis Minnesota



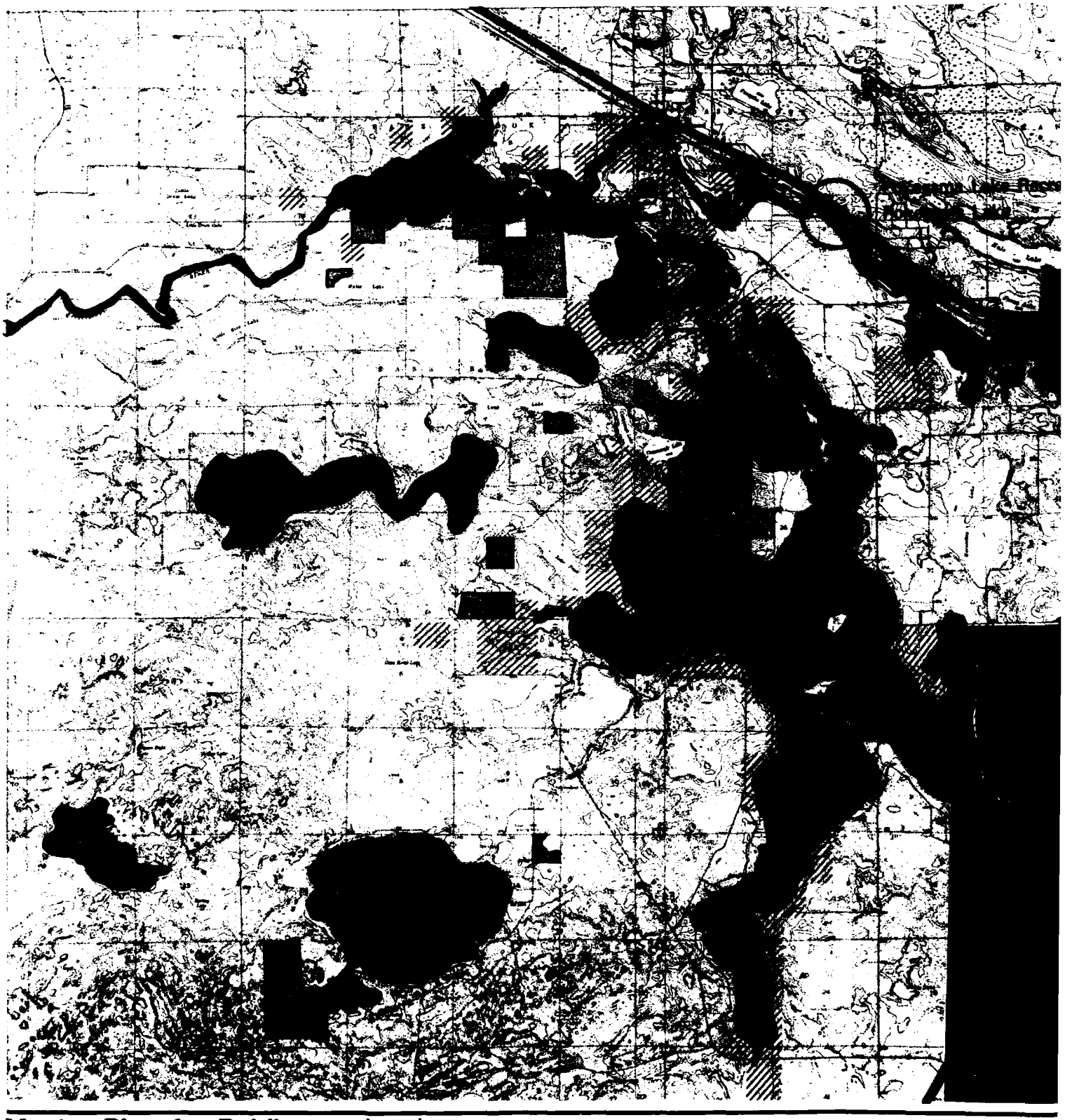
Department of The Army
St. Paul District Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis Minnesota

Drawn by: DF/HS/MH
Checked by: Roger B. Martin
Submitted by:
Approved by

Lake Winnibigoshish Land Use Map

Date January 1977 Plate No 6



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

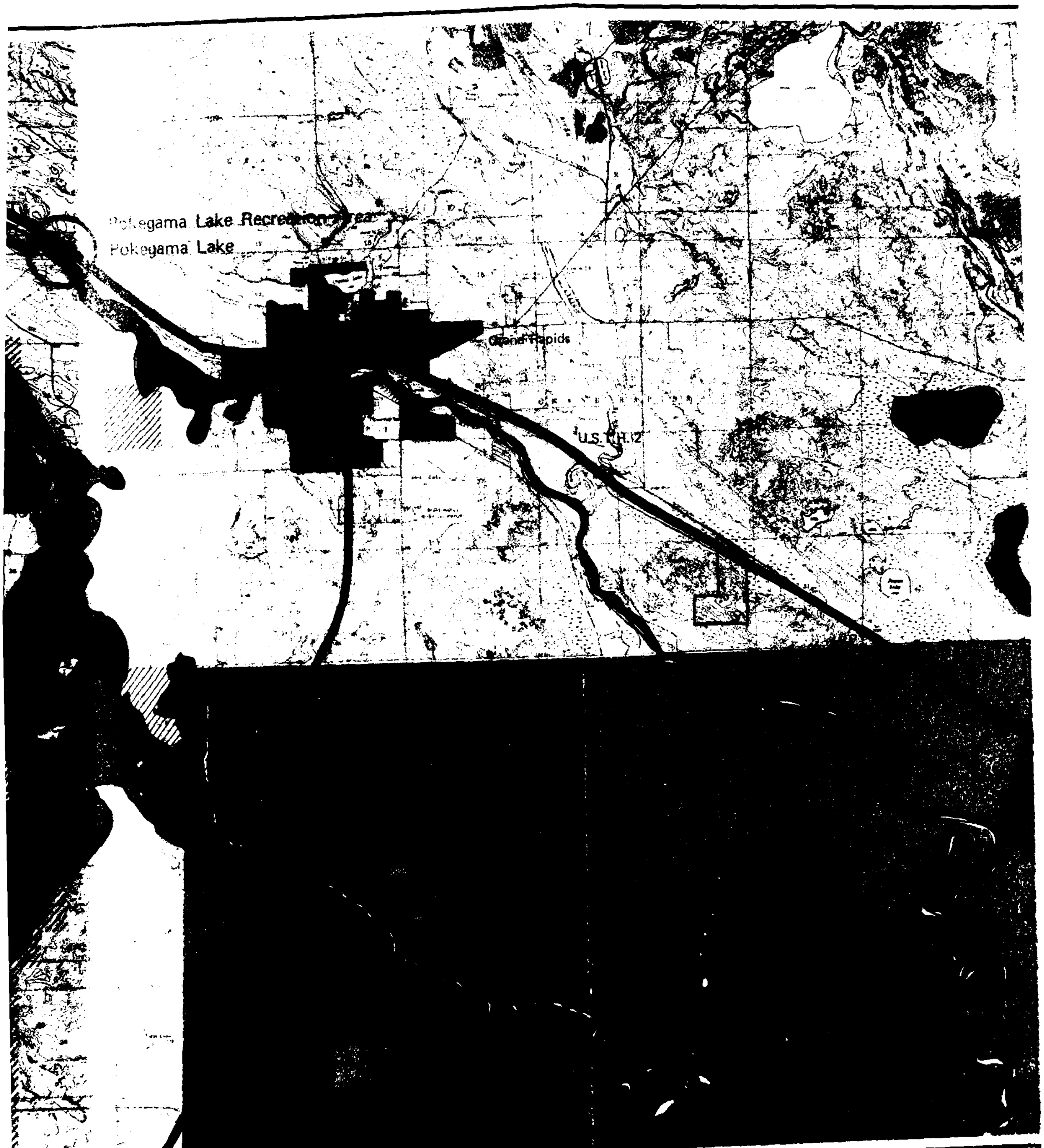
- Major Water Body
- C.O.E. Recreation Area
- Corps of Engineers Land
- State Owned Land
- Municipal Land
- Flowage Easement
- State Forest
- Other Land
- U.S.T.H. — United States Trunk Highway

Department of The A

St. Paul District Corps of Engr
St. Paul, Minnesota

InterDesign Inc

Recreation Planners
Landscape Architects
Minneapolis, Minnesota



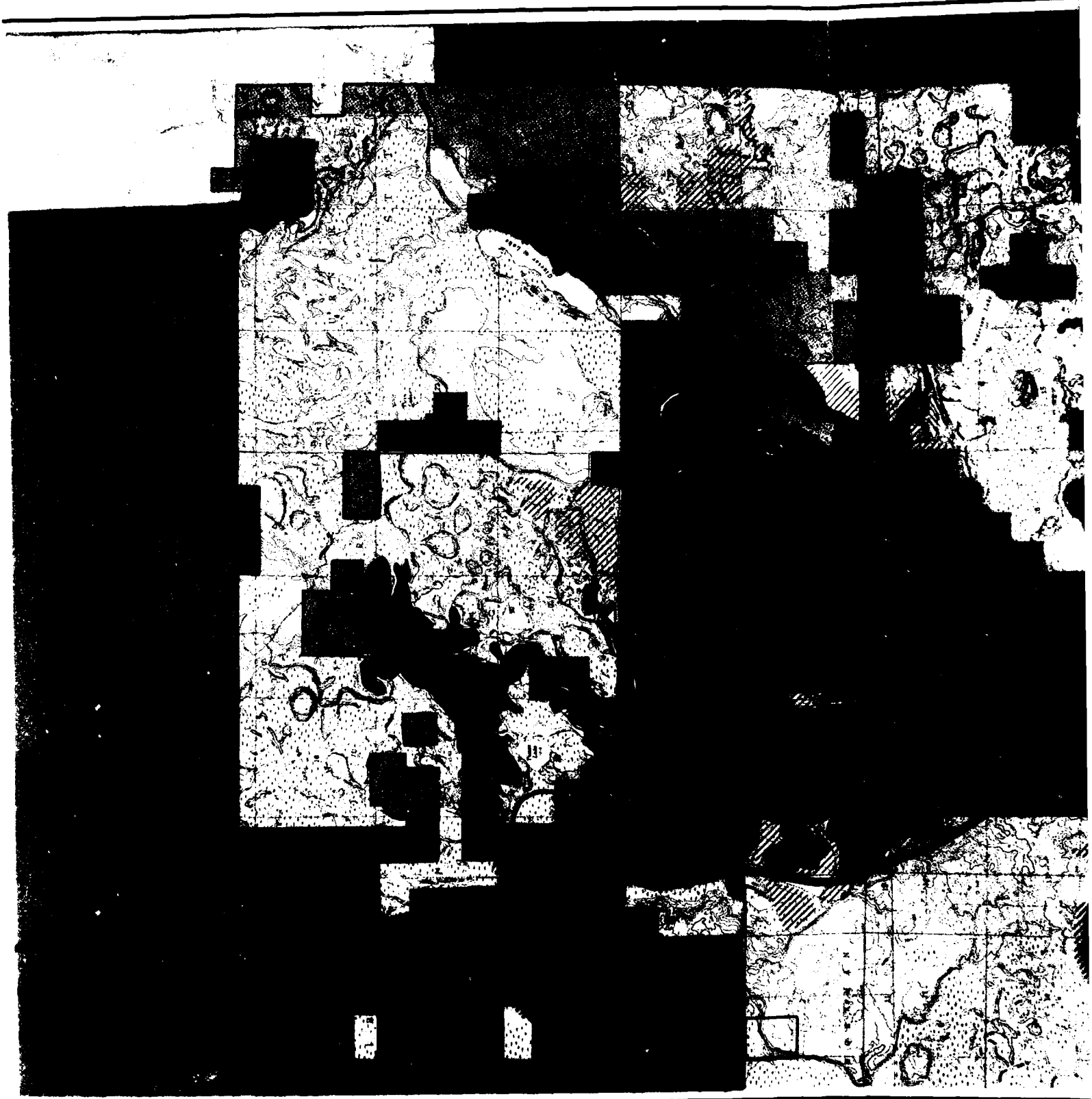
Department of The Army
St Paul District Corps of Engineers
St Paul Minnesota

InterDesign Inc.

Drawn by DF/HB/MH
Checked by [signature]
Submitted by
Approved by

Pokegama Lake Land Use Map

Date January 1977 Plate No 7



Master Plan for Public Use Development and Resource Management

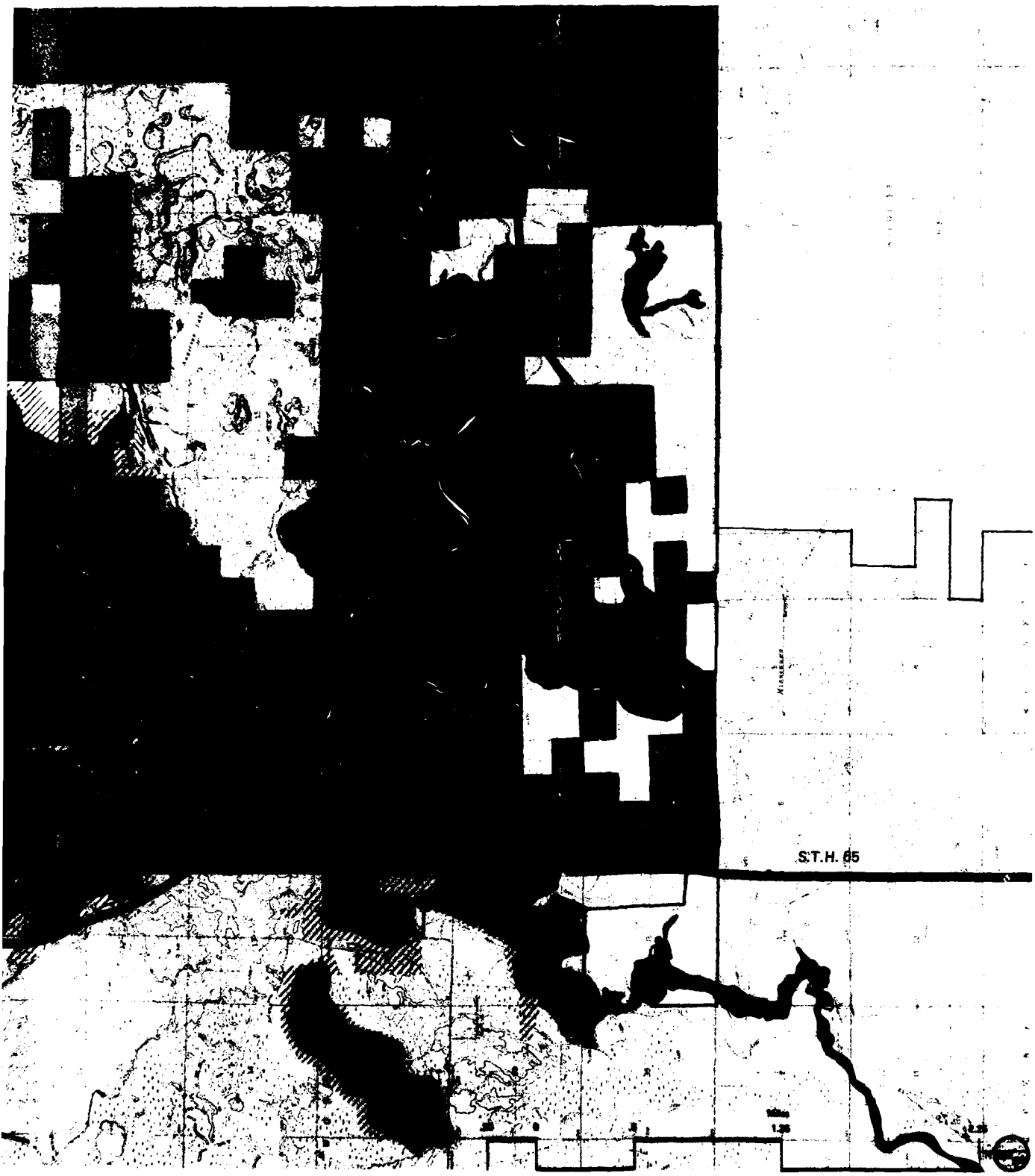
Mississippi River Headwaters Reservoirs

Legend

- Major Water Body
- C.O.E. Recreation Area
- Corps of Engineers Land
- Other Land
- Bureau of Indian Affairs Land
- Flowage Easement
- State Forest
- State Park
- Wildlife Refuge
- Other Land
- C.S.A.H. County State Aid Highway
- S.T.H. State Trunk Highway

Department of The Army
St. Paul District Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis, Minnesota



Department of The Army
St Paul District Corps of Engineers
St Paul, Minnesota

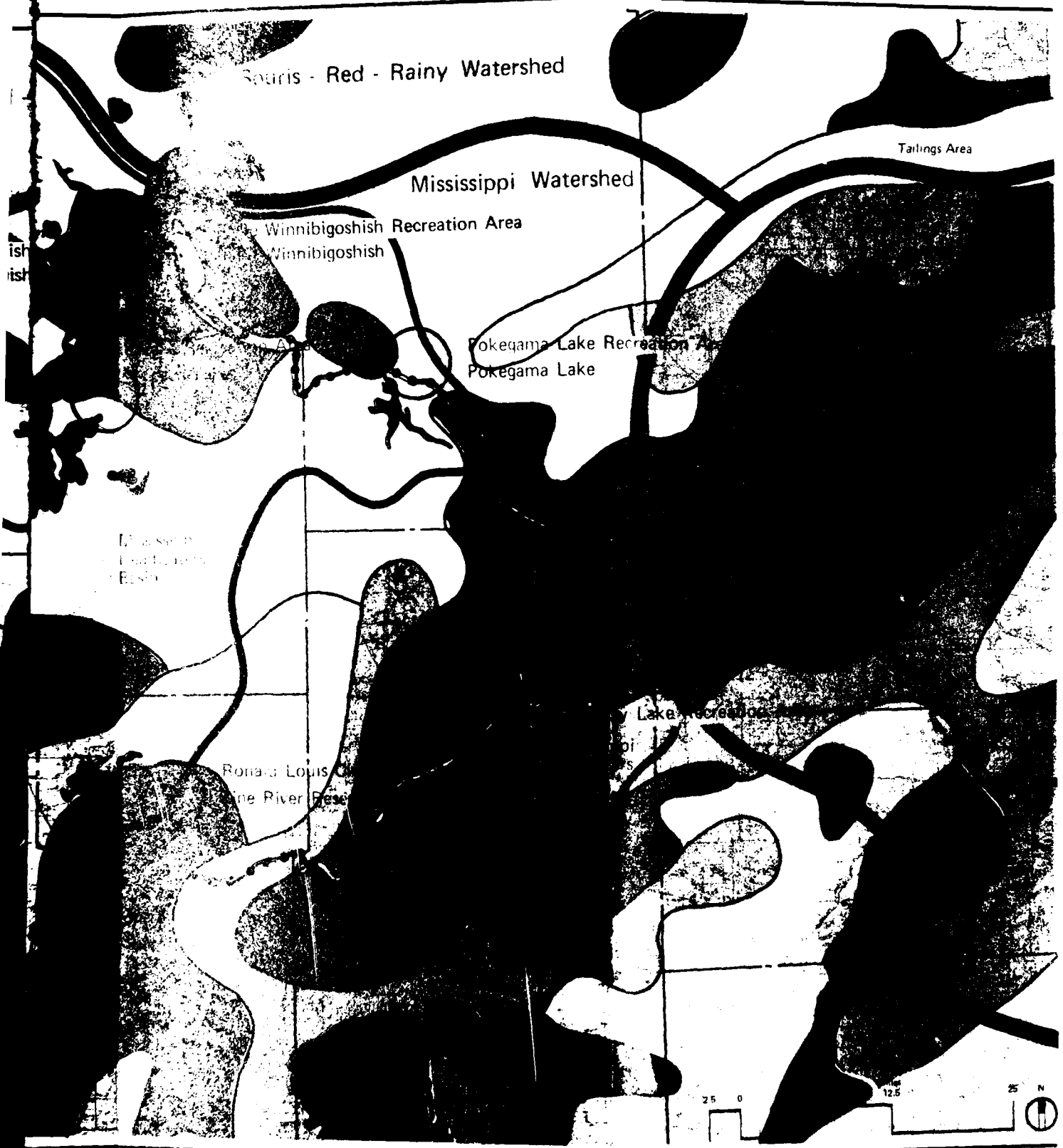
InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis, Minnesota

Drawn by DF/HS/MH
Checked by
Submitted by
Approved by
Date January 1977

Big Sandy Lake Land Use Map

Plate No. 8


Mississippi
Headwaters
Basin



Department of The Army

InterDesign Inc.

Drawn by

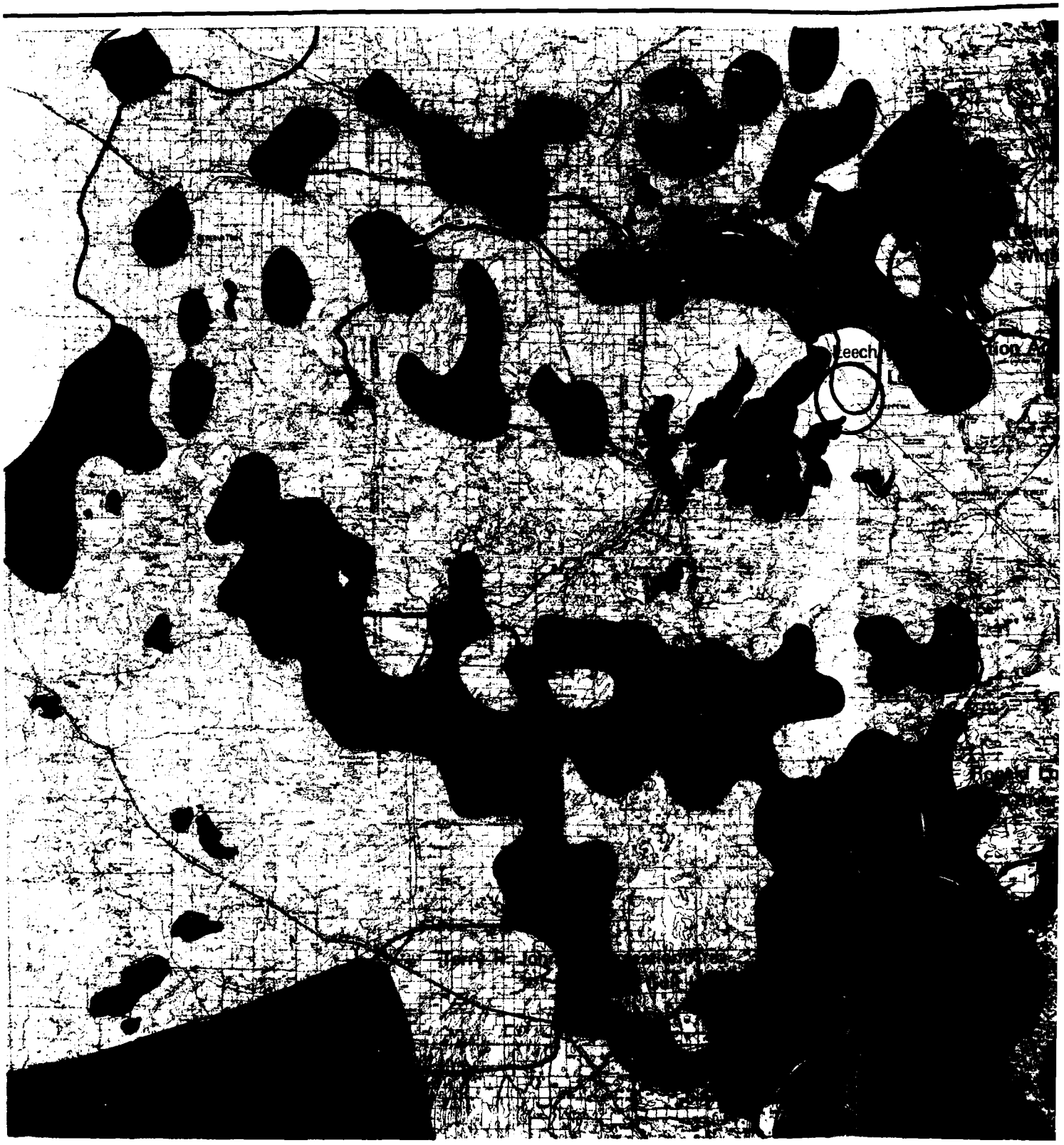
Checked by

Submitted by

Approved by

Regional Soil Grouping Map

1977 Plate No.



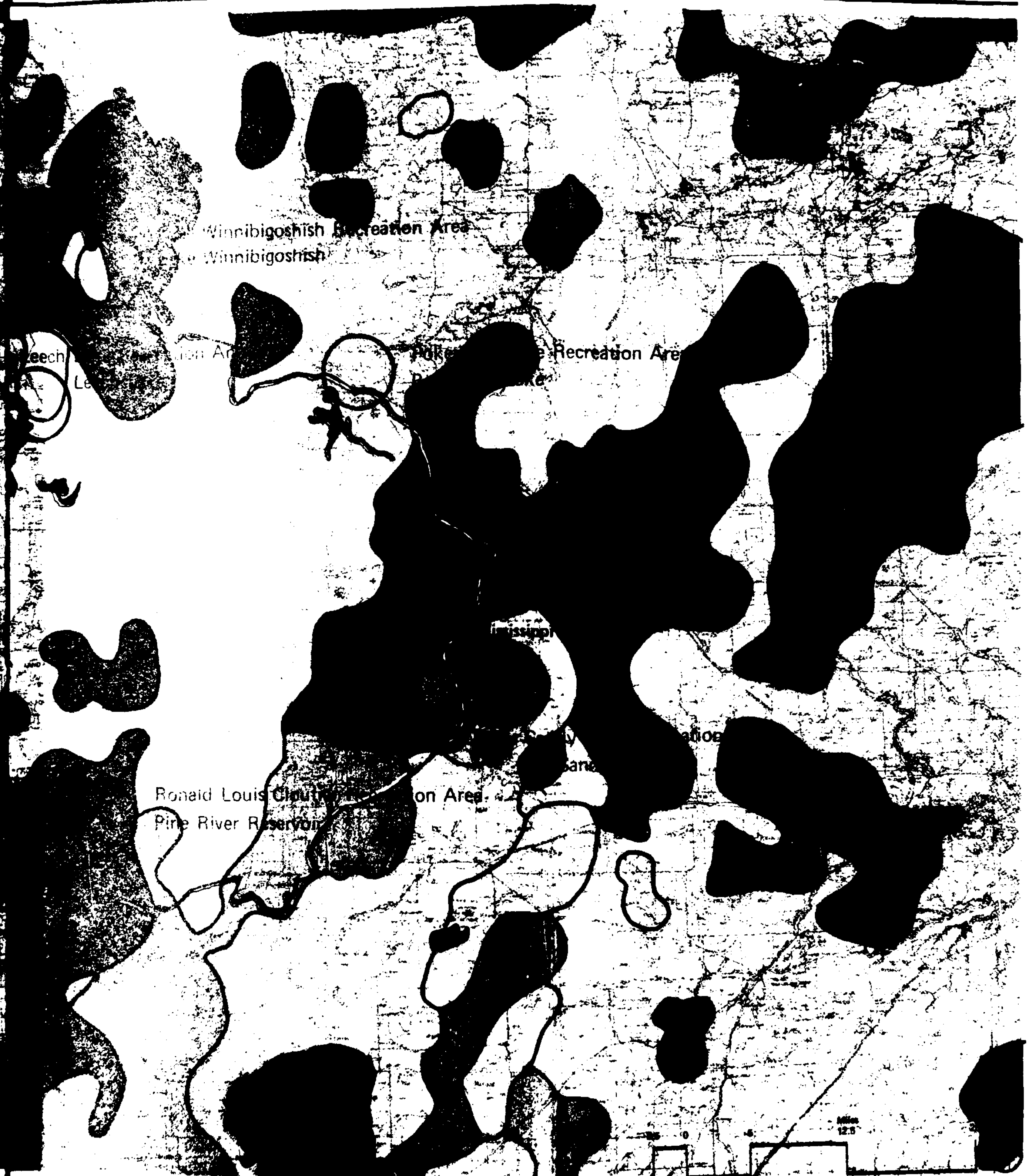
Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

Department of The
St. Paul District Corps of Er
St. Paul, Minnesota

InterDesign Ir
Recreation Planners
Landscape Architects
Minneapolis Minnesota



Department of The Army
District Corps of Engineers
Minnesota

InterDesign Inc.

Drawn by

Checked by

Submitted by

Approved by

Regional Vegetation

Date January 1977

Plate No 10

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Slope 0-6%
- Slope 6-19%
- Slope 20+%
- Archeological
- 1 Elm Ash Association
- 2 Maple Basswood Association
- 3 Birch Aspen Association
- 4 Pine Mixed Hardwood Association
- 5 Cedar Fir Spruce Tamarack Association
- 6 Open Recreation

Department of The Ar

St. Paul District Corps of Engine
St. Paul, Minnesota

InterDesign Inc.

Recreation Planners
Landscape Architects
Minneapolis Minnesota

Department of The Army
St Paul District Corps of Engineers
St Paul Minnesota

InterDesign Inc.

Drawn by
Checked by
Submitted by
Approved by

Date January 1977 Plate No

Gull Lake Vegetation Map

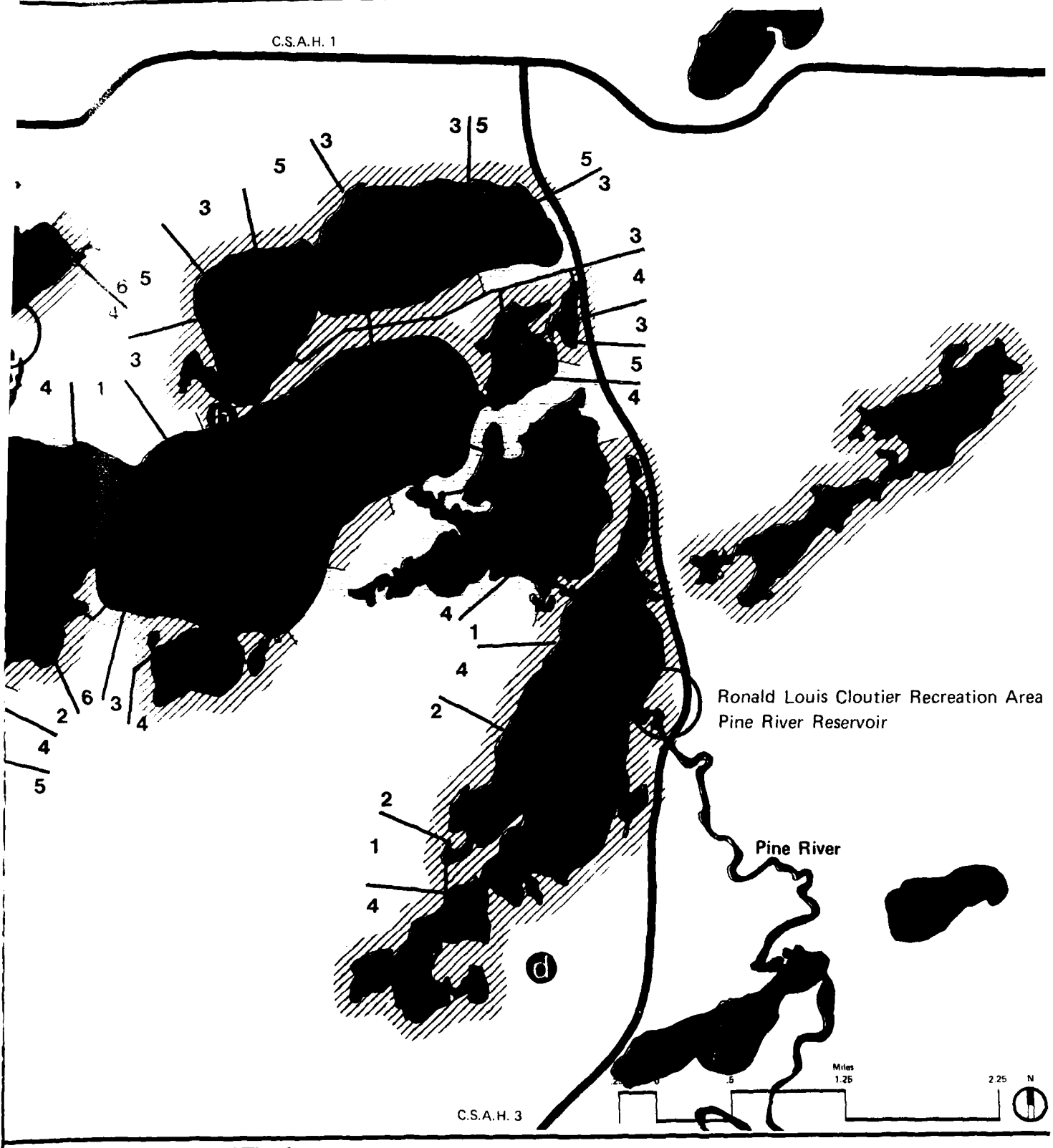
Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

Department of The
St. Paul District Corps of E
St. Paul, Minnesota

InterDesign I
Recreation Planners
Landscape Architects
Minneapolis, Minnesota



Department of The Army
St. Paul District Corps of Engineers
St. Paul, Minnesota

InterDesign Inc.
Recreation Planners
Landscape Architects
Minneapolis, Minnesota

Drawn by DF/HS/MH
Checked by
Submitted by
Approved by
Date January 1977

Pine River Vegetation Map

Plate No **12**

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Slope 0-5
- Slope 6-19
- Slope 20+
- Archeological
- 1 Elm Ash Association
- 2 Maple Basswood Association
- 3 Birch Aspen Association
- 4 Pine Mixed Hardwood Association
- 5 Cedar Fir Spruce Tamarack Association
- 6 Marsh Bog Association

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Submitted by
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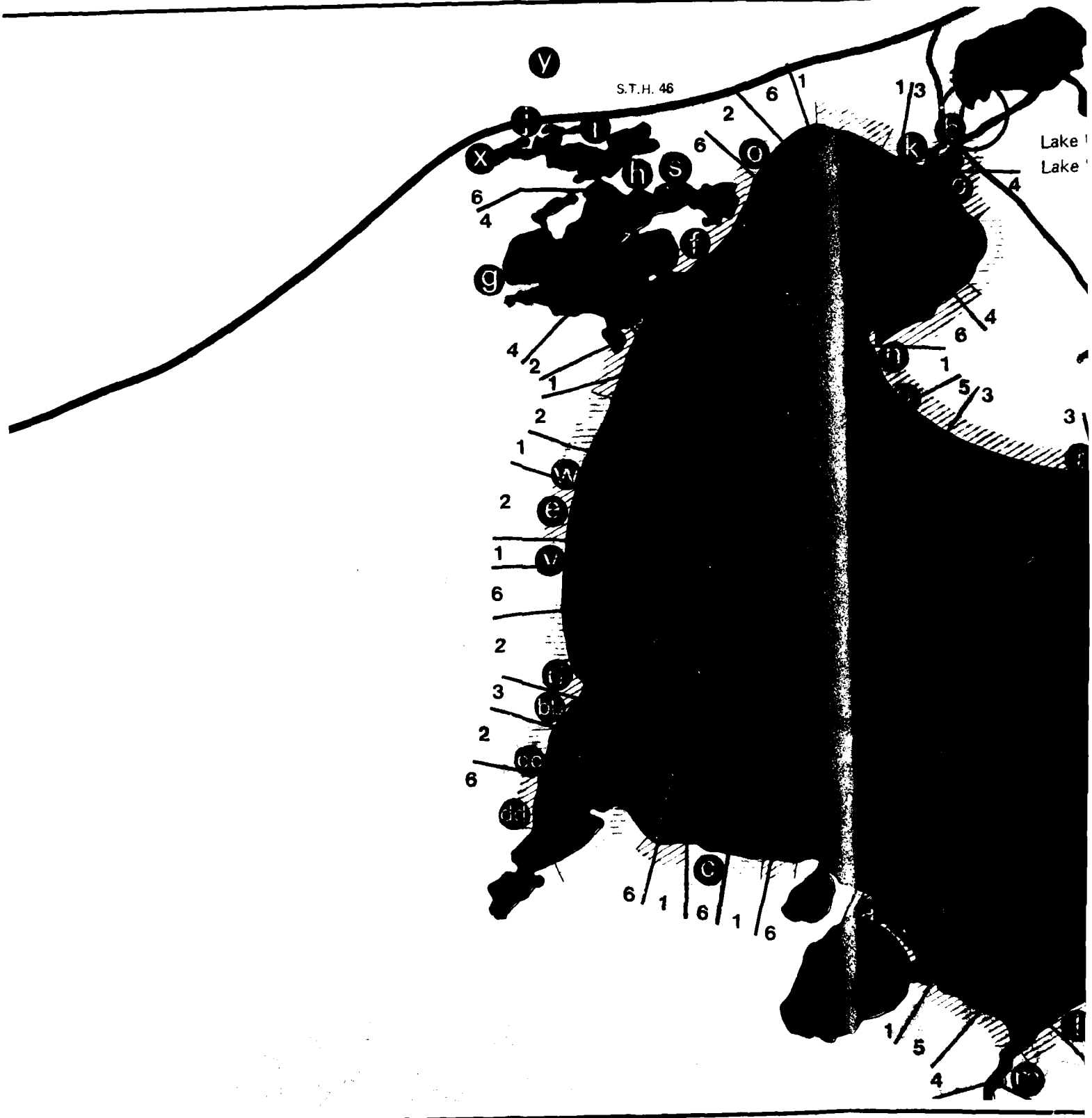
Date January 1977

Leech Lake Vegetation Map

Plate No. 13



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

Water Body

Slope 0-5

Slope 6-19

Slope 20+

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Submitted by

Approved by

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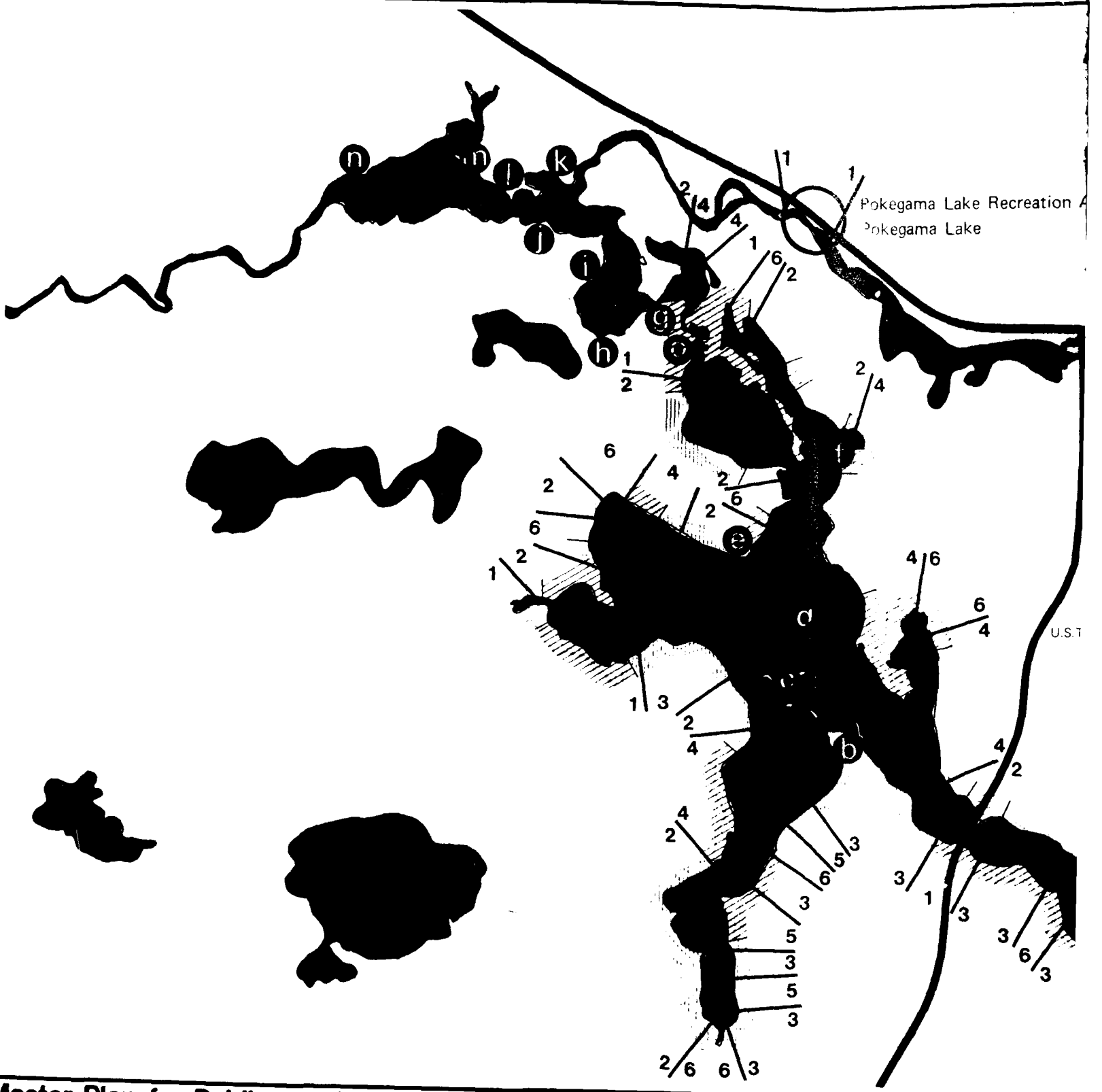
Lake Winnibigoshish Vegetation Map



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

Water Body

Slope 0-5

Slope 6-19

Slope 20+

Archeological

1 Elm-Ash Association

2 Mixed Basswood Association

3 Birch-Aspen Association

4 Pine-Mixed Hardwood Association

5 Cedar-Fir Spruce-Tamarack Association

6 Mixed Boreal Association

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Pokegama Lake

AD-A171 125 MISSISSIPPI RIVER HEADWATERS RESERVOIRS MINNESOTA MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT(U) INTERDESIGN INC MINNEAPOLIS MN 06 DEC 77 4/4

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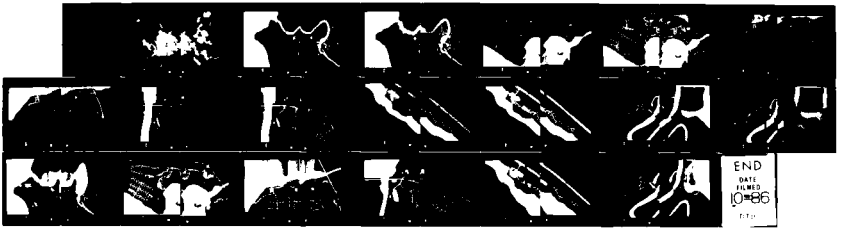

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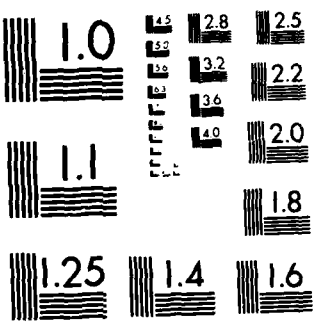

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Slope 0-5%
- Slope 6-19%
- Slope 20%+
- Archeological
- 1 Elm Ash Association
- 2 Maple Basswood Association
- 3 Birch Aspen Association
- 4 Pine Mixed Hardwood Association
- 5 Cedar Fir Spruce Tamarack Association
- 6 Marsh Bog Association

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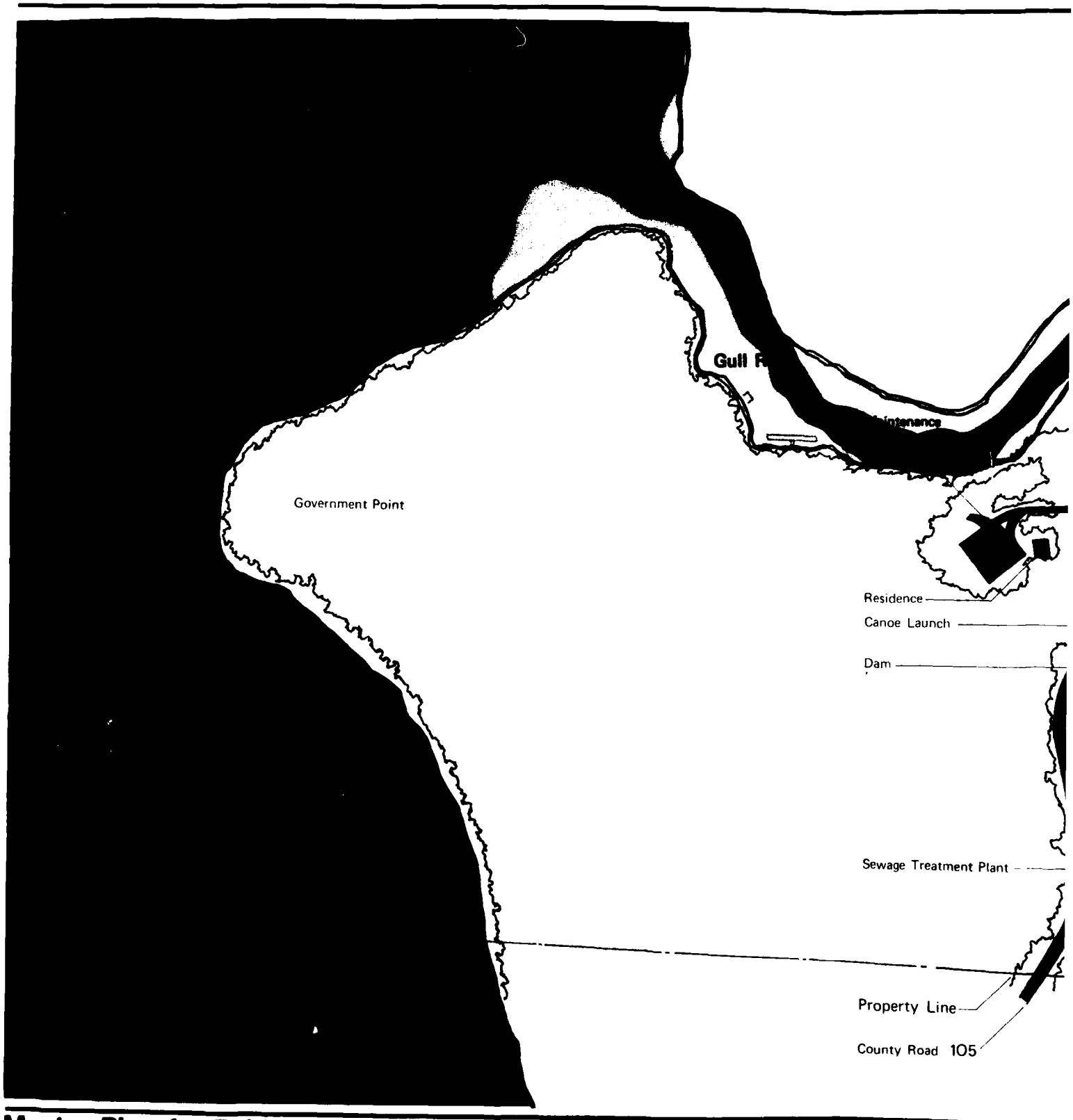
Drawn by: DF/HD/MH
Checked by:
Submitted by:
Approved by:

Big Sandy Lake Vegetation Map

Date: January 1977 Plate No: 16



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Masterplan
- Marsh

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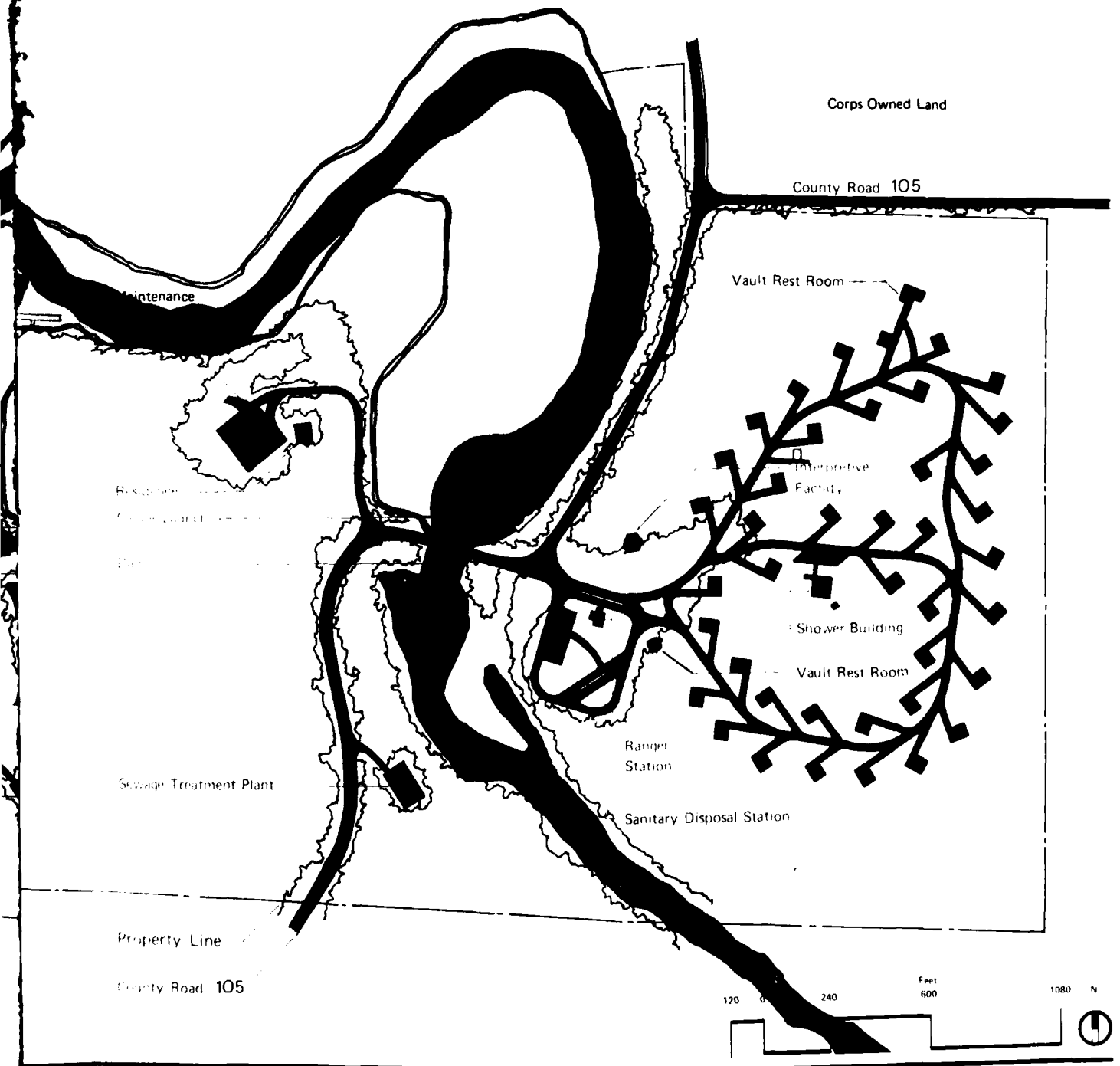

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Submitted by
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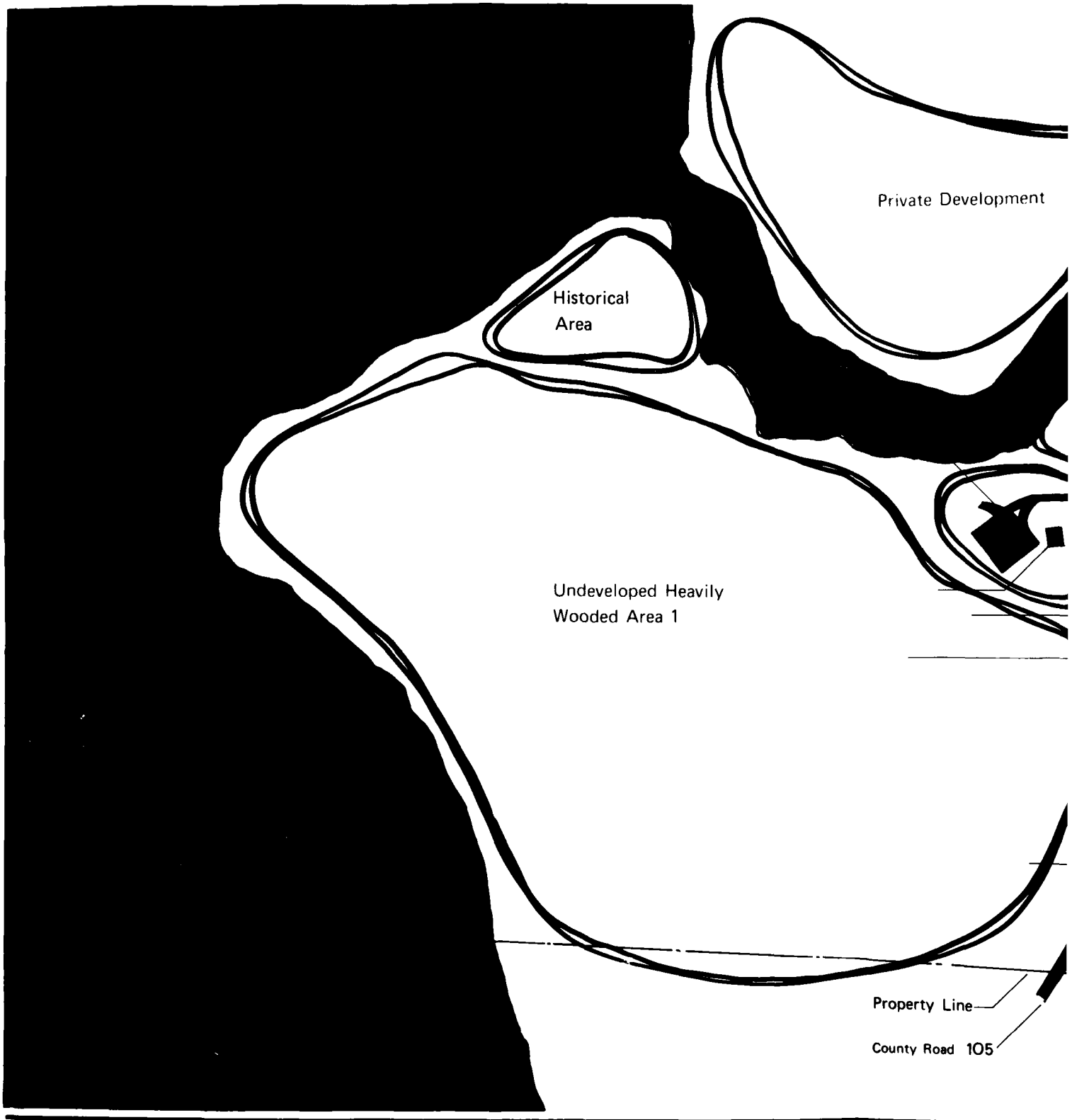
Terry R. Johnson Recreation Area
Comparative Site Analysis

Date January 1977 Plate No. 17



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Marsh

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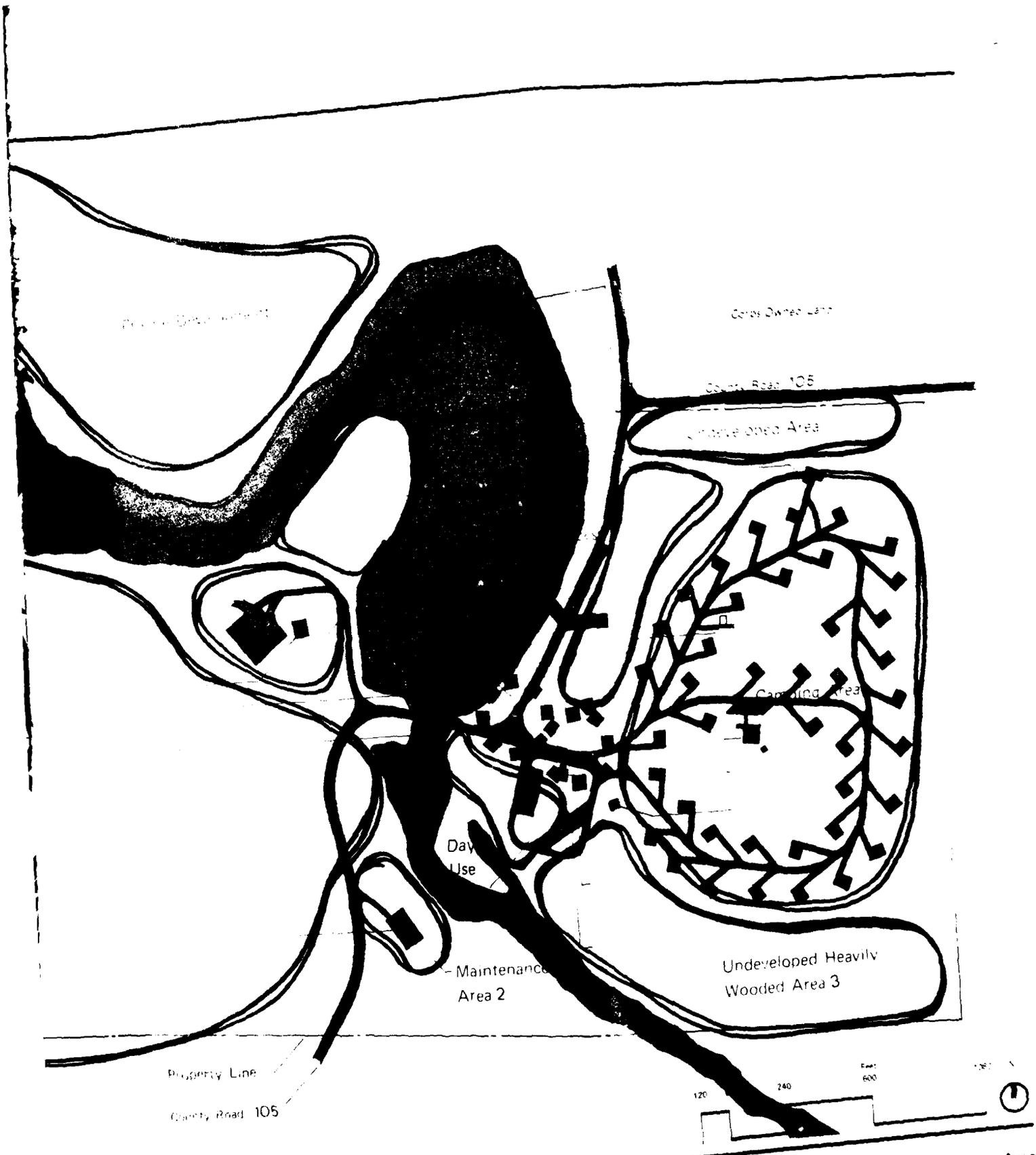

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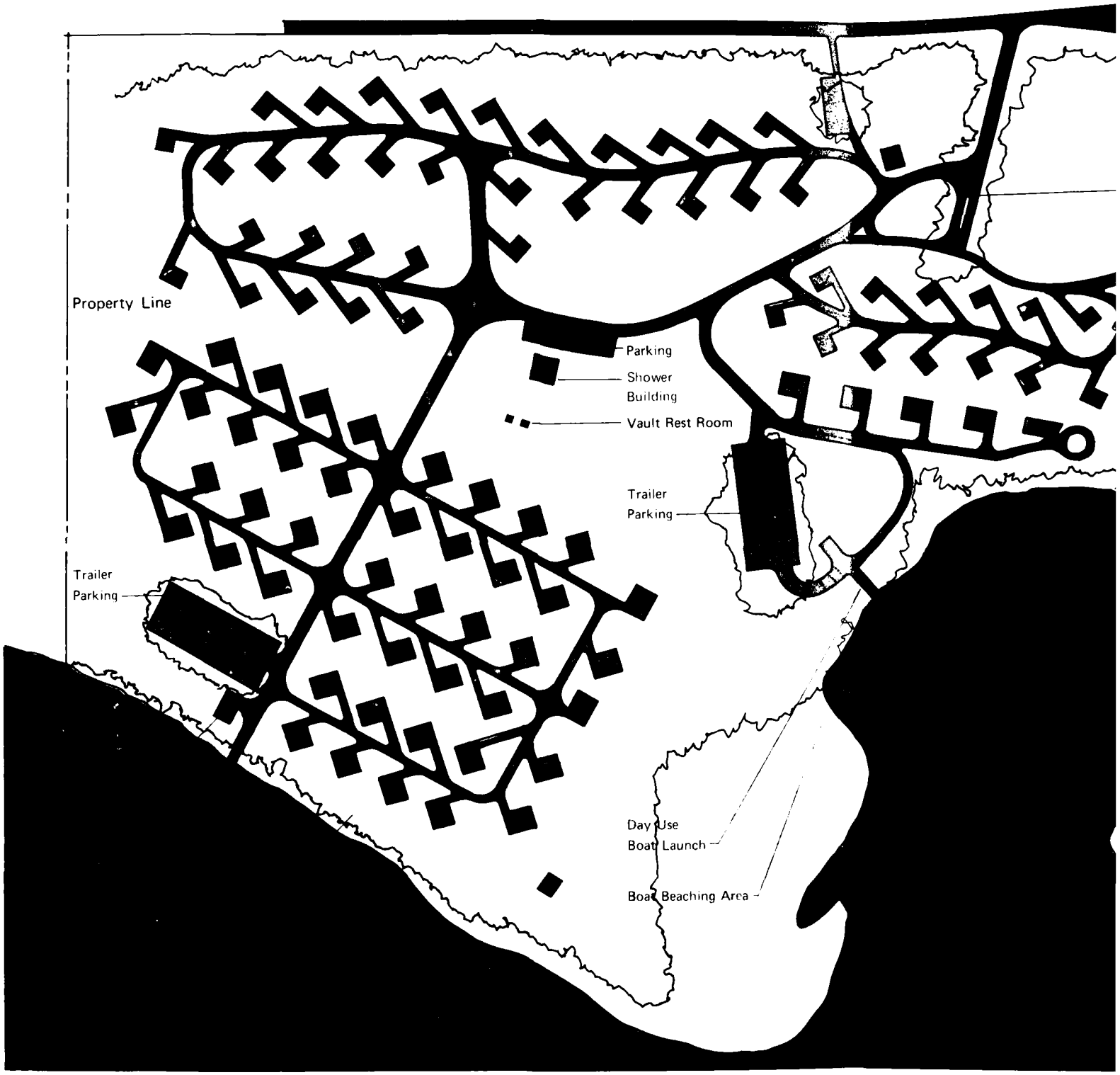
Date January 1977

Terry R. Johnson Recreation Area
Land Use Relationships

Plate No 18



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Master plan

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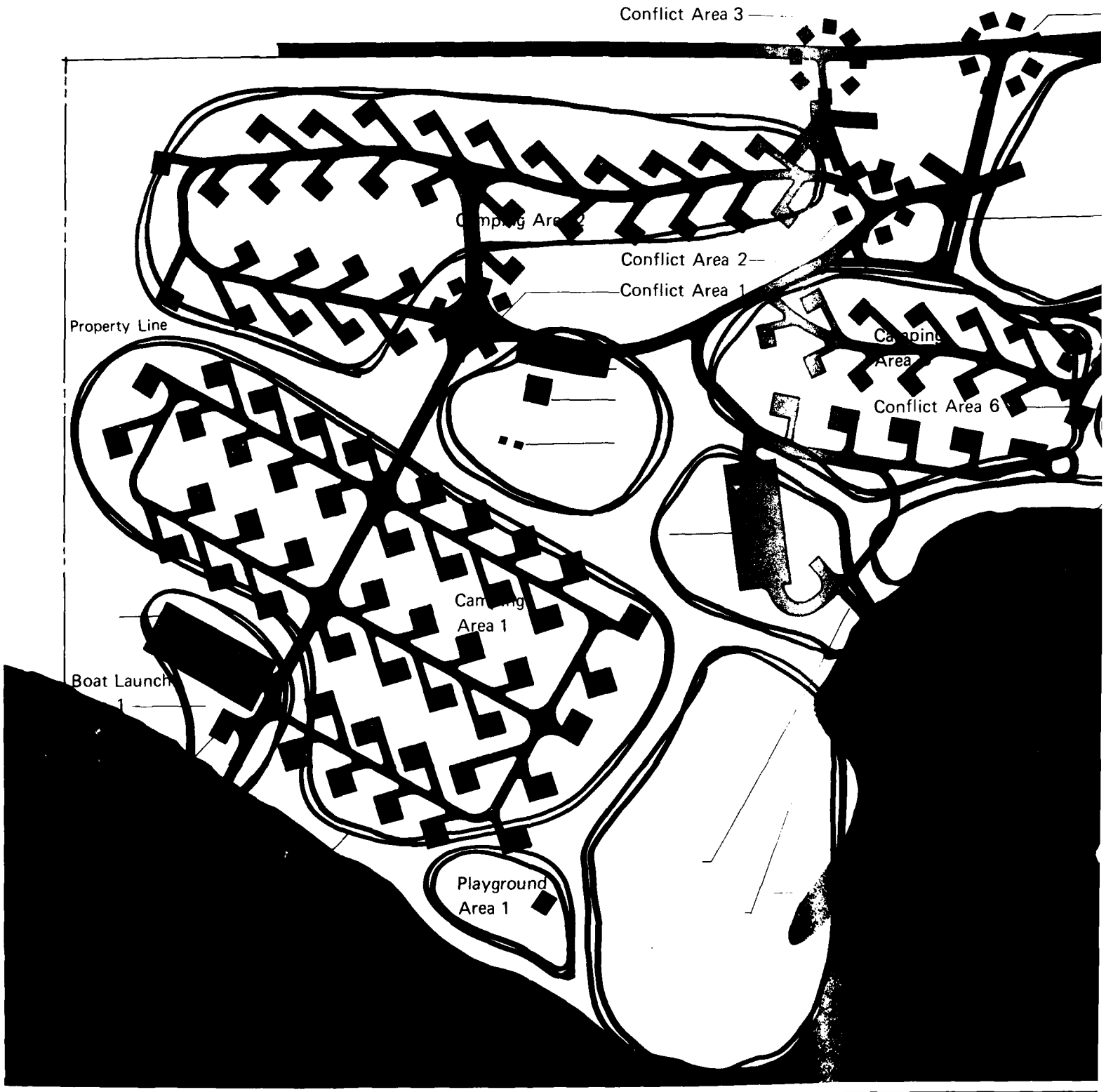
Ronald Louis Cloutier Recreation Area
Comparative Site Analysis

Date January 1977 Plate No. 19



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Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure

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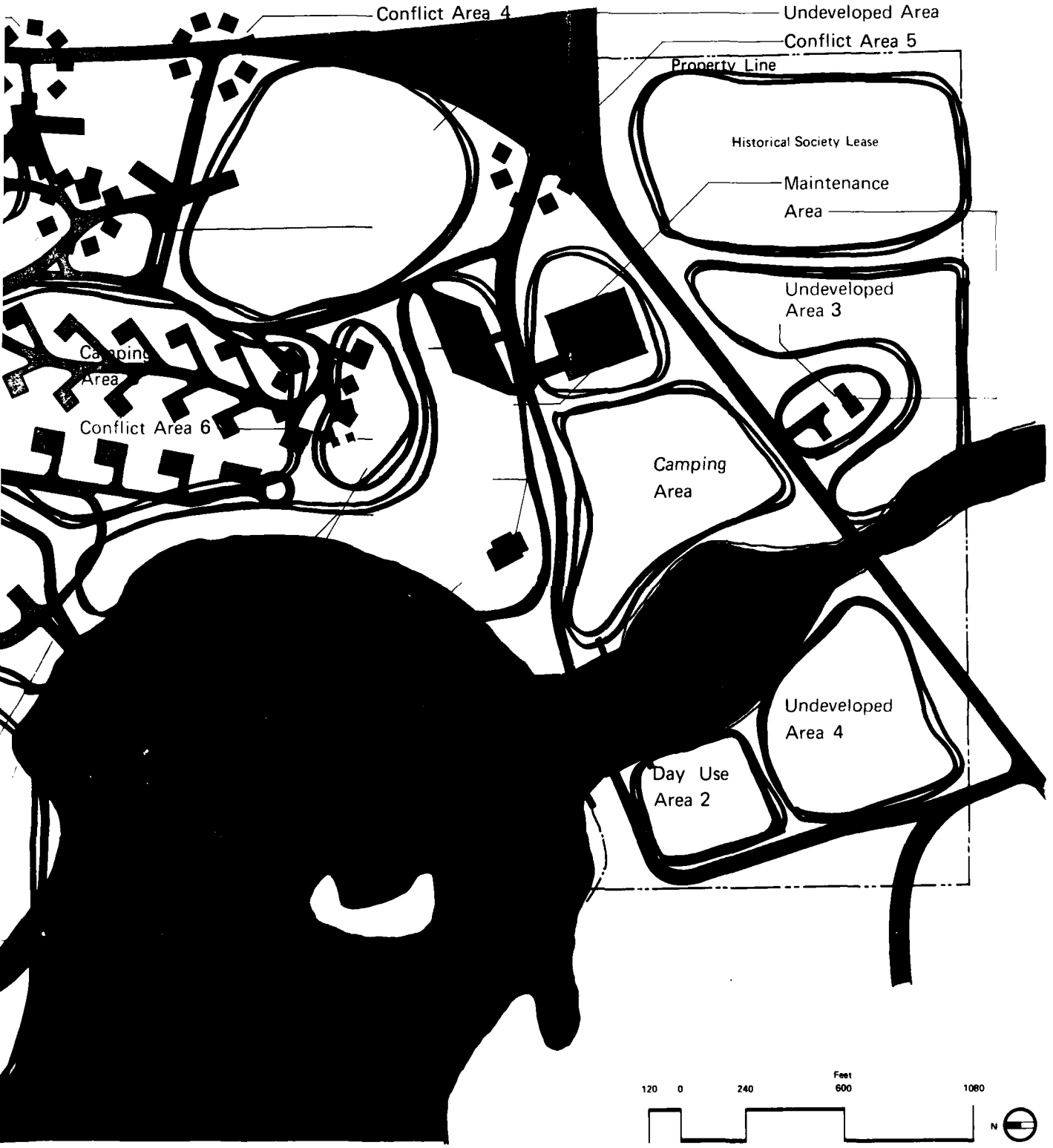

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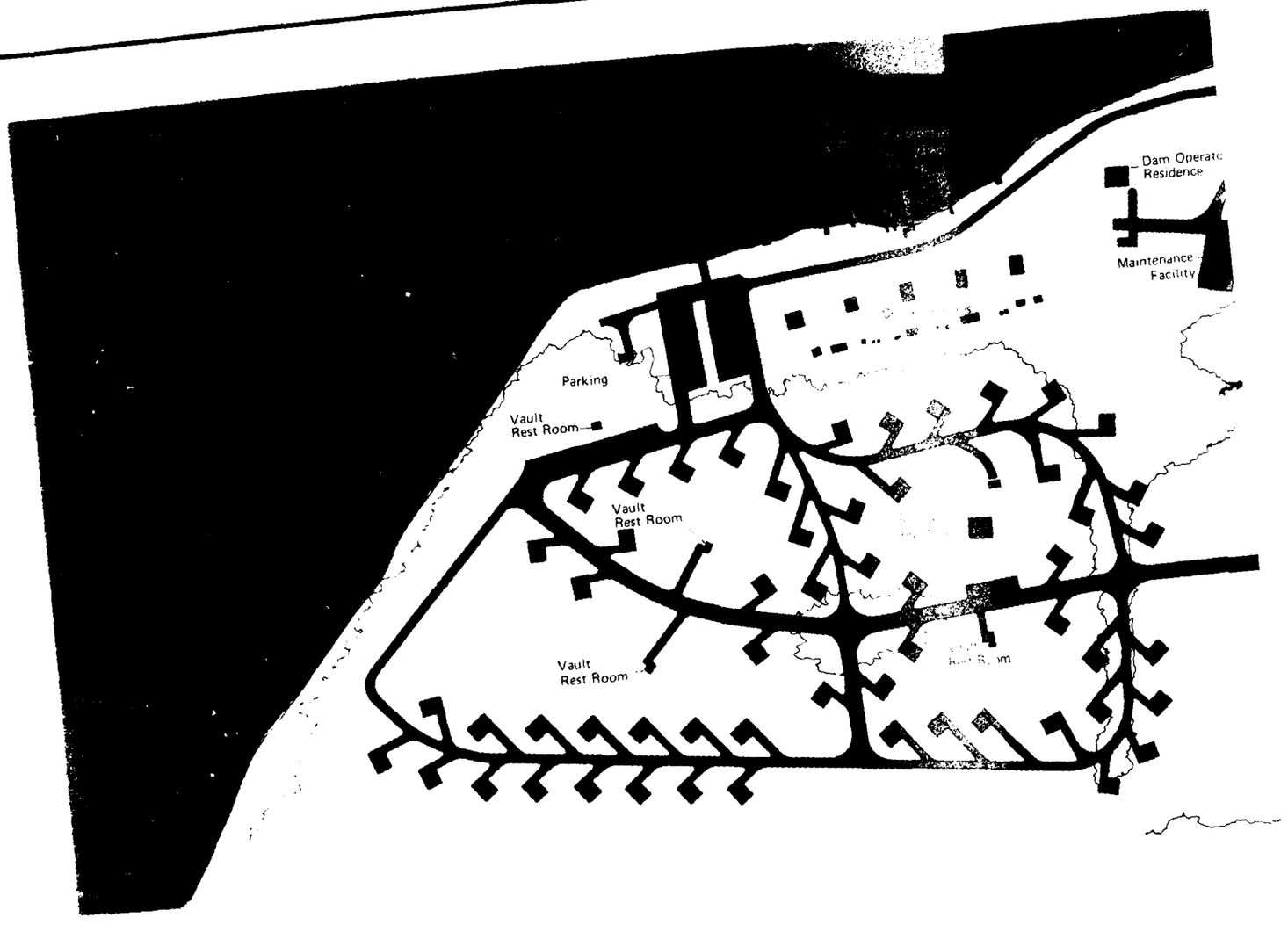
Submitted by:
Approved by:

Ronald Louis Cloutier Recreation Area
Land Use Relationships

Date: January 1977 Plate No: 20



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Masterplan
- Marsh

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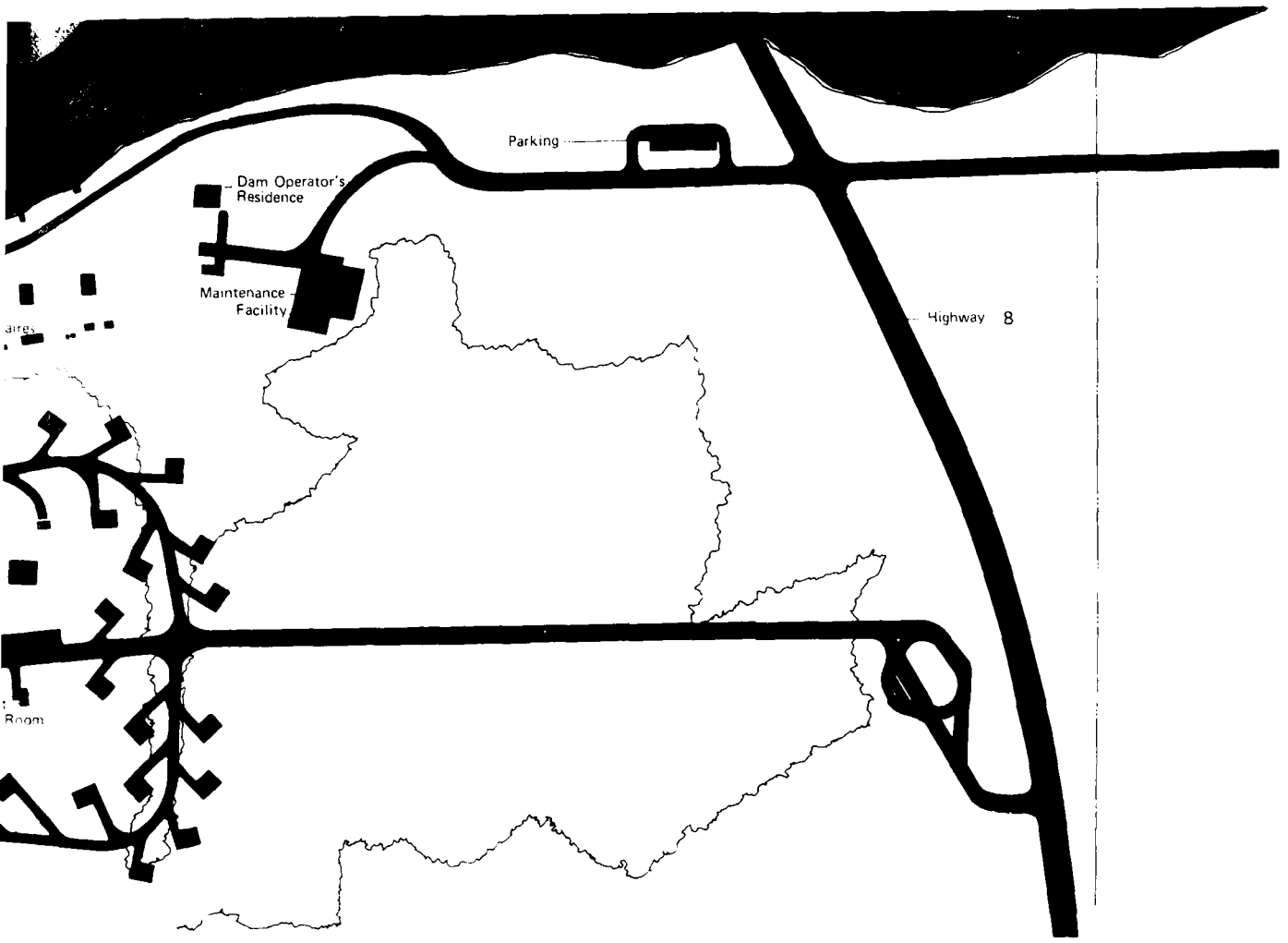

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Landscape Architects,
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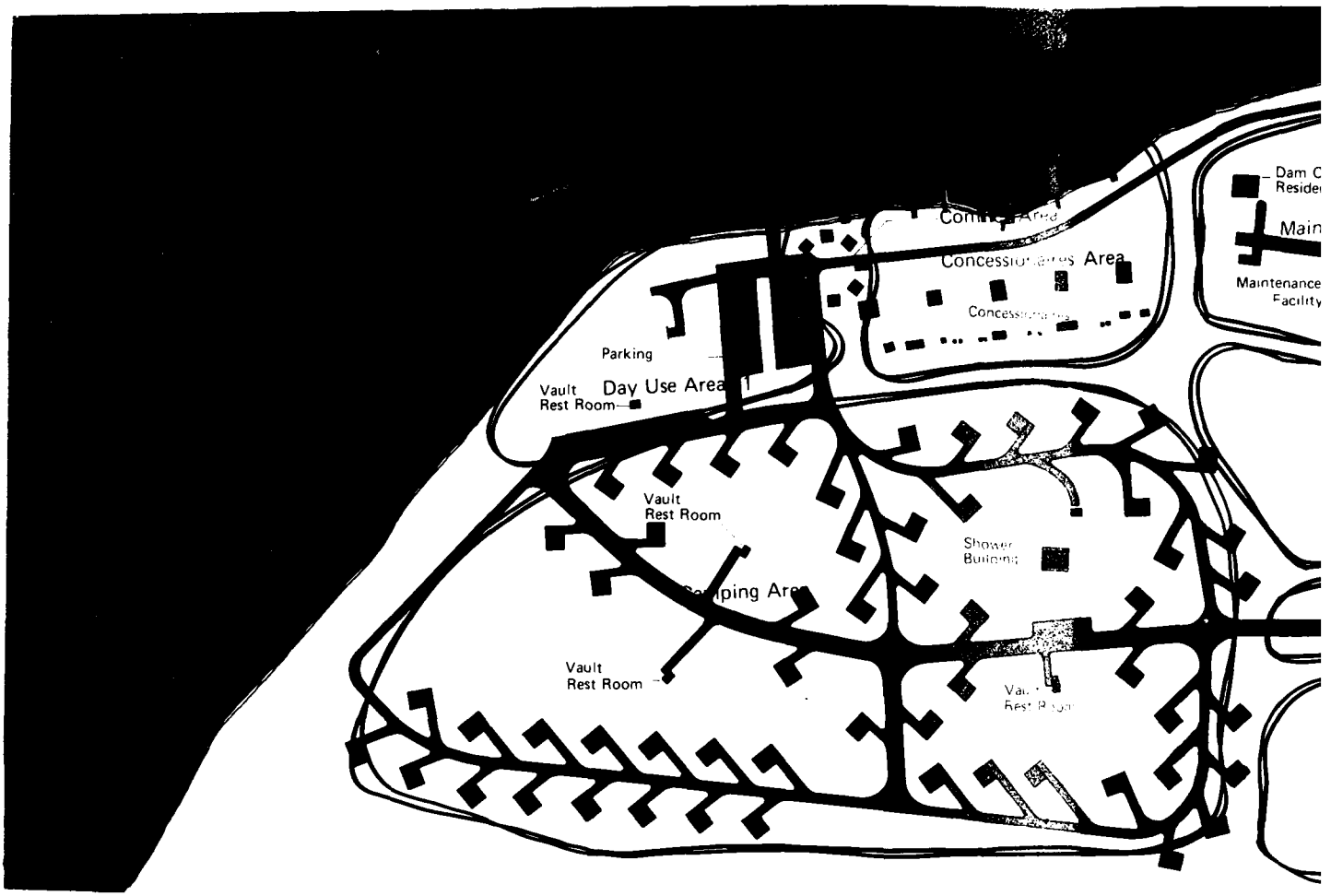
Submitted by
Approved by
Date January 1977

Leech Lake Recreation Area
Comparative Site Analysis

Plate No **21**



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Marsh

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St. Paul District Corps of I
St. Paul, Minnesota

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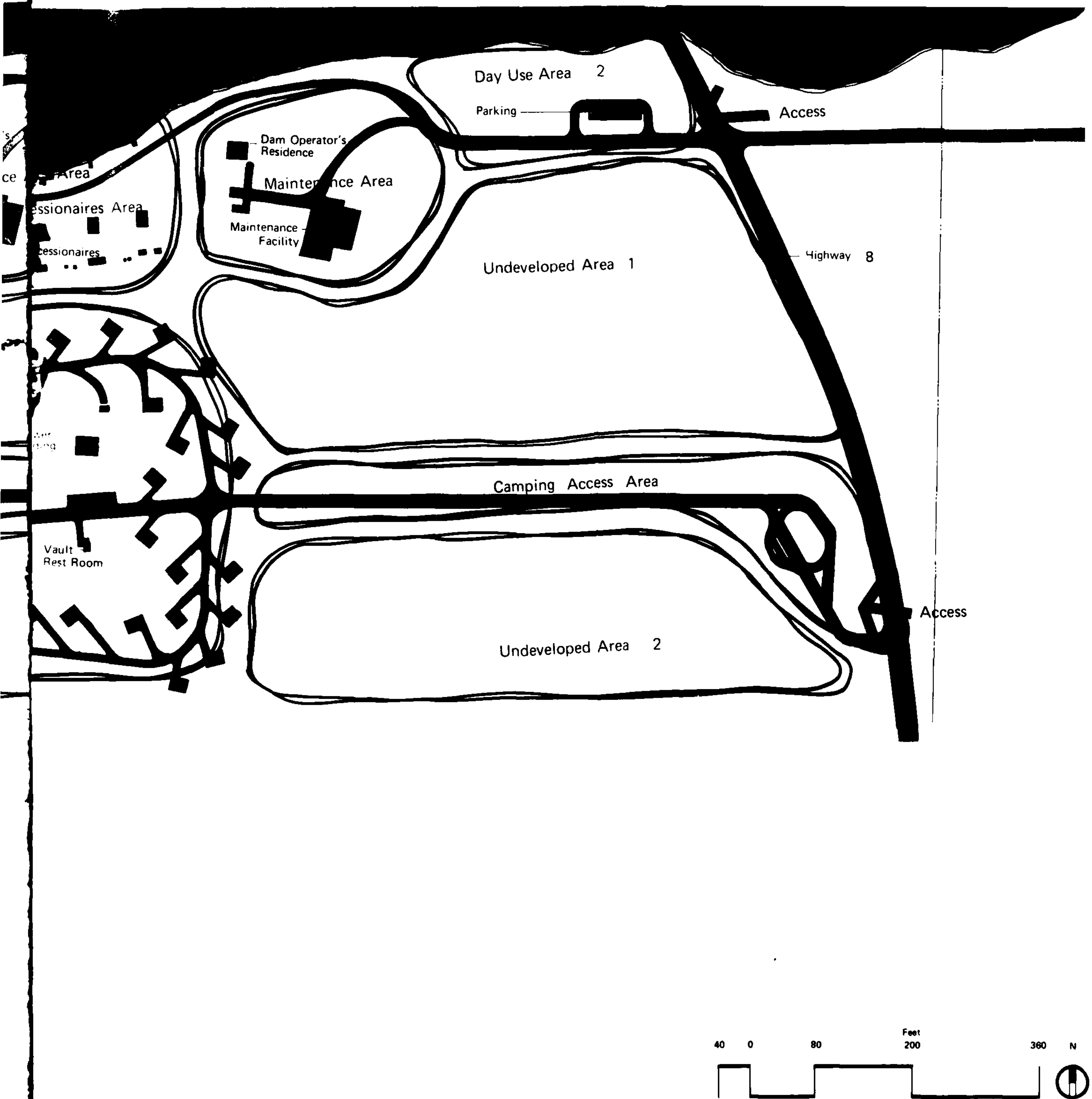
Landscape Architects
Minneapolis, Minnesota



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Checked by: [signature]

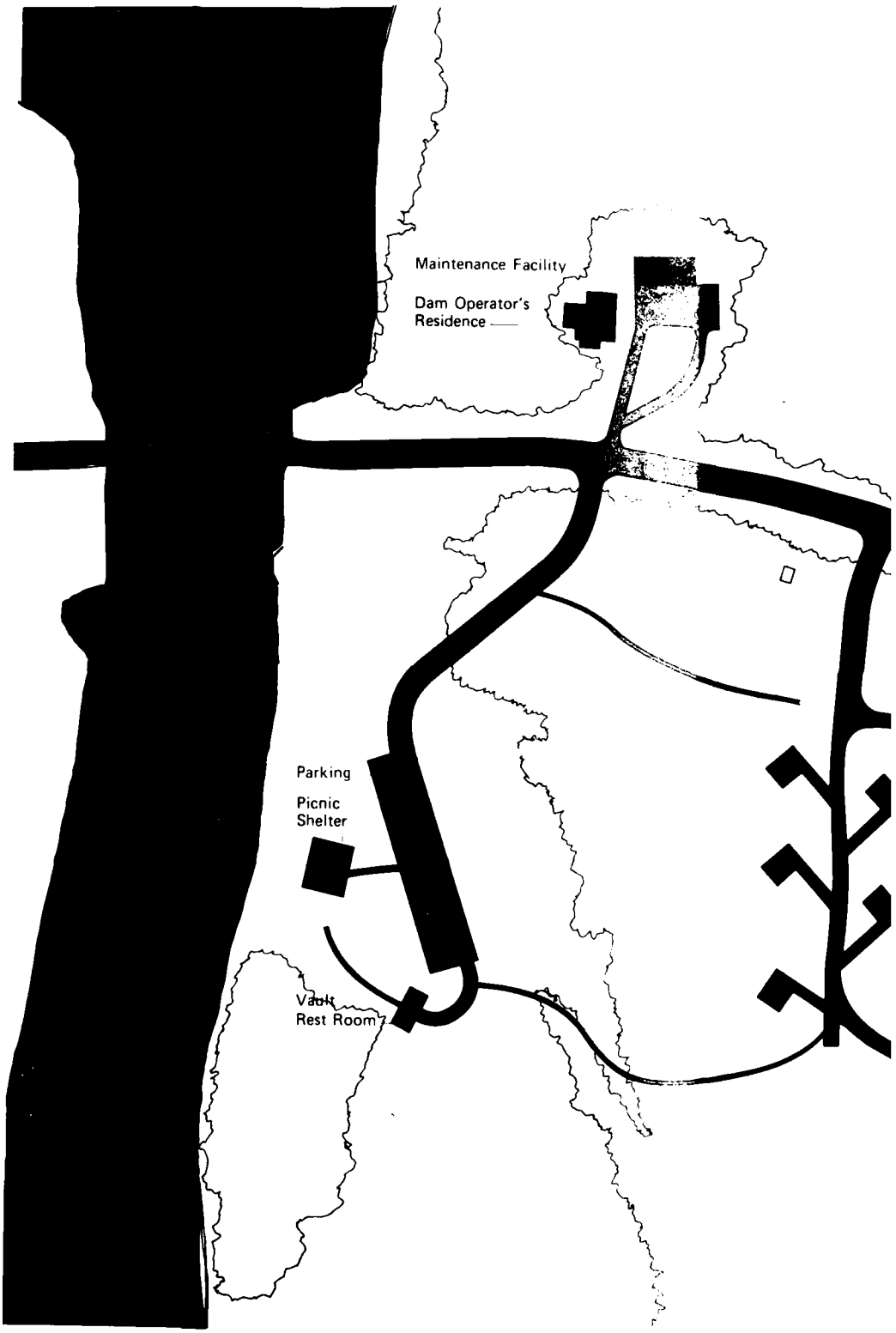
Submitted by:

Approved by:

Date January 1977

Leech Lake Recreation Area
Land Use Relationships

Plate No. 22



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Masterplan

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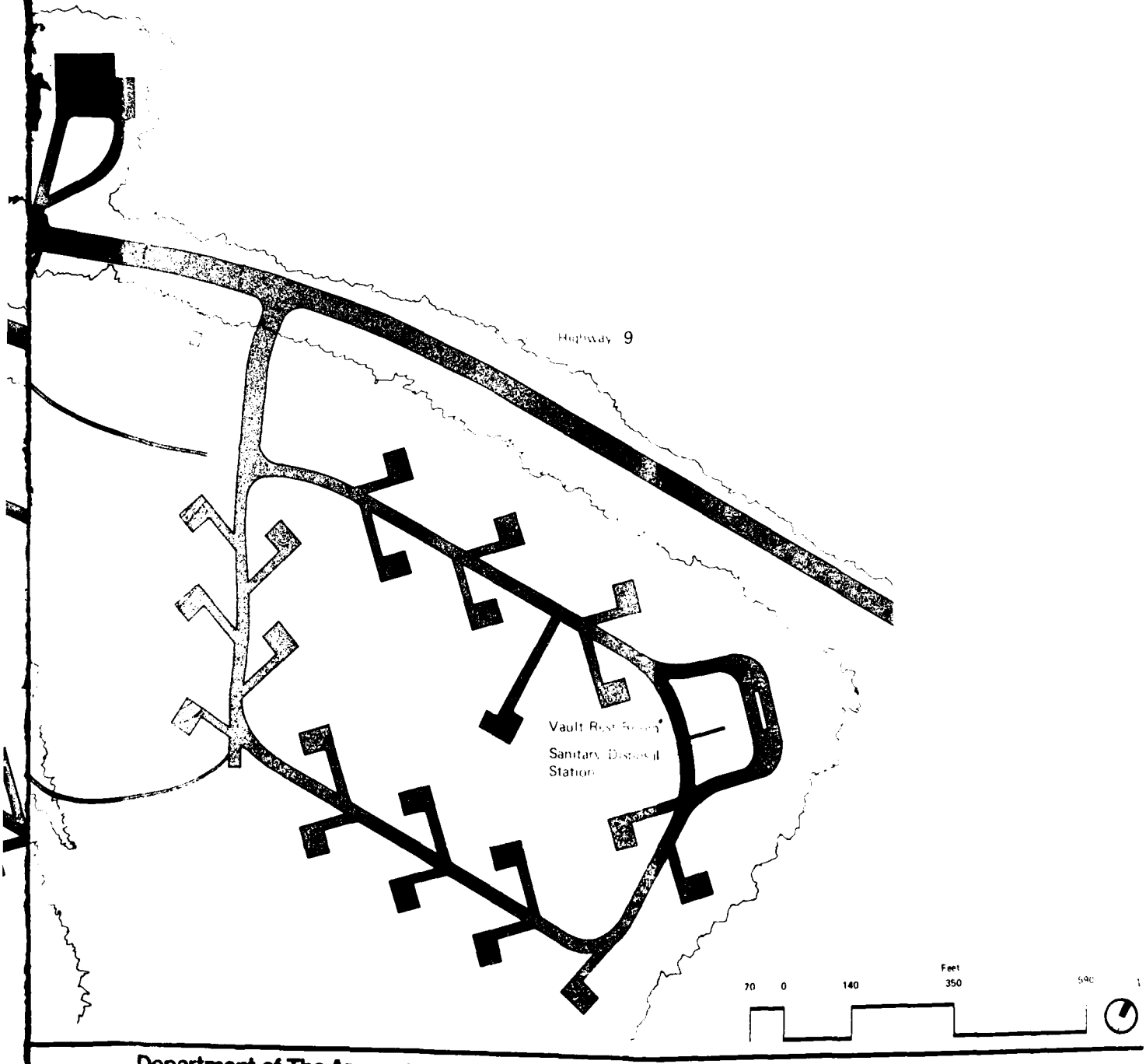
Minneapolis, Minnes



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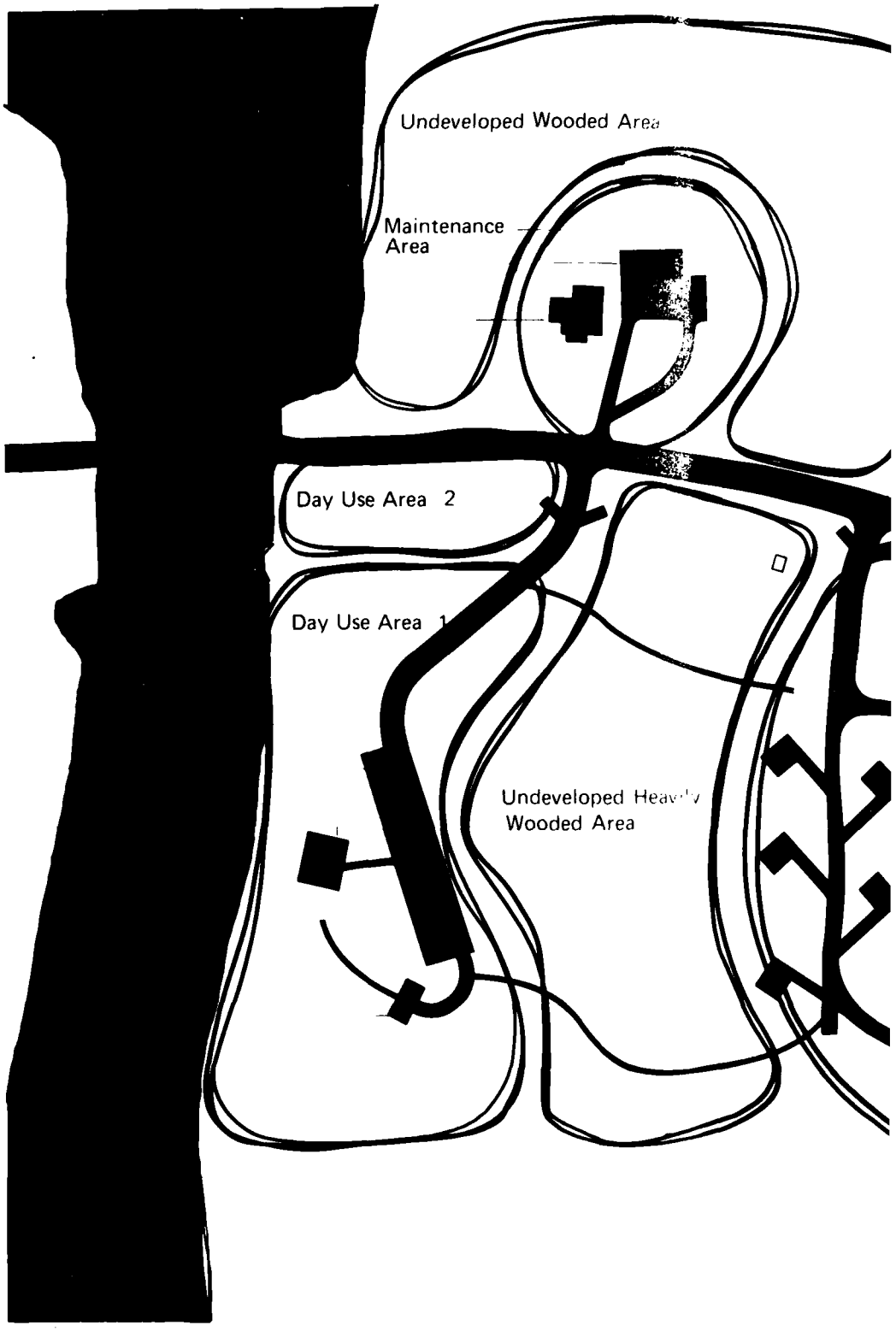
Checked by
Submitted by
Approved by

Lake Winnibigoshish Recreation Area
Comparative Site Analysis

Date January 1977 Plate No 23



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure

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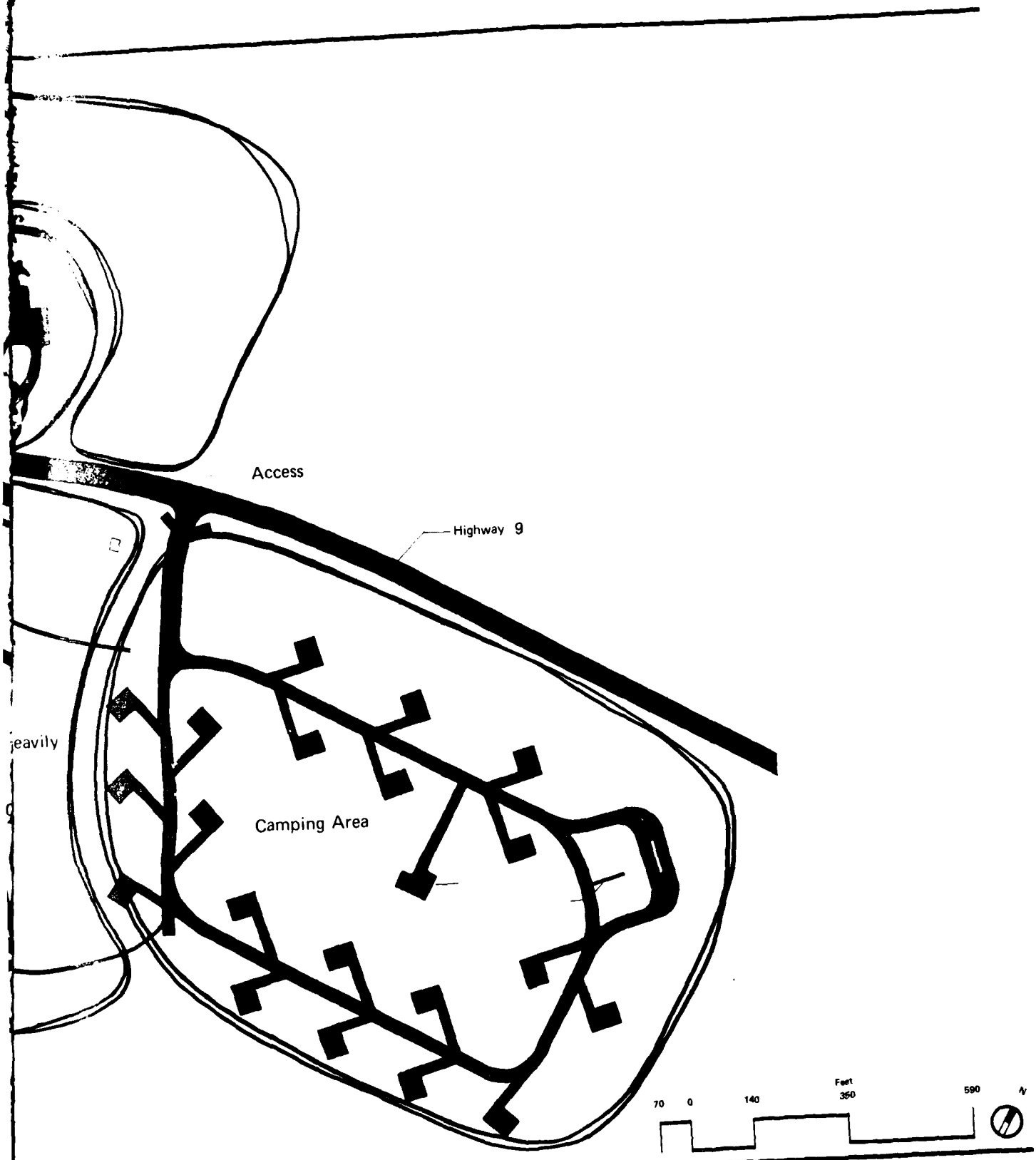
Minneapolis, Minnes



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Checked by: Roger B. Mecker
Submitted by:
Approved by:

Lake Winnibigoshish Recreation Area
Land Use Relationships

Date January 1977 Plate No 24

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Masterplan

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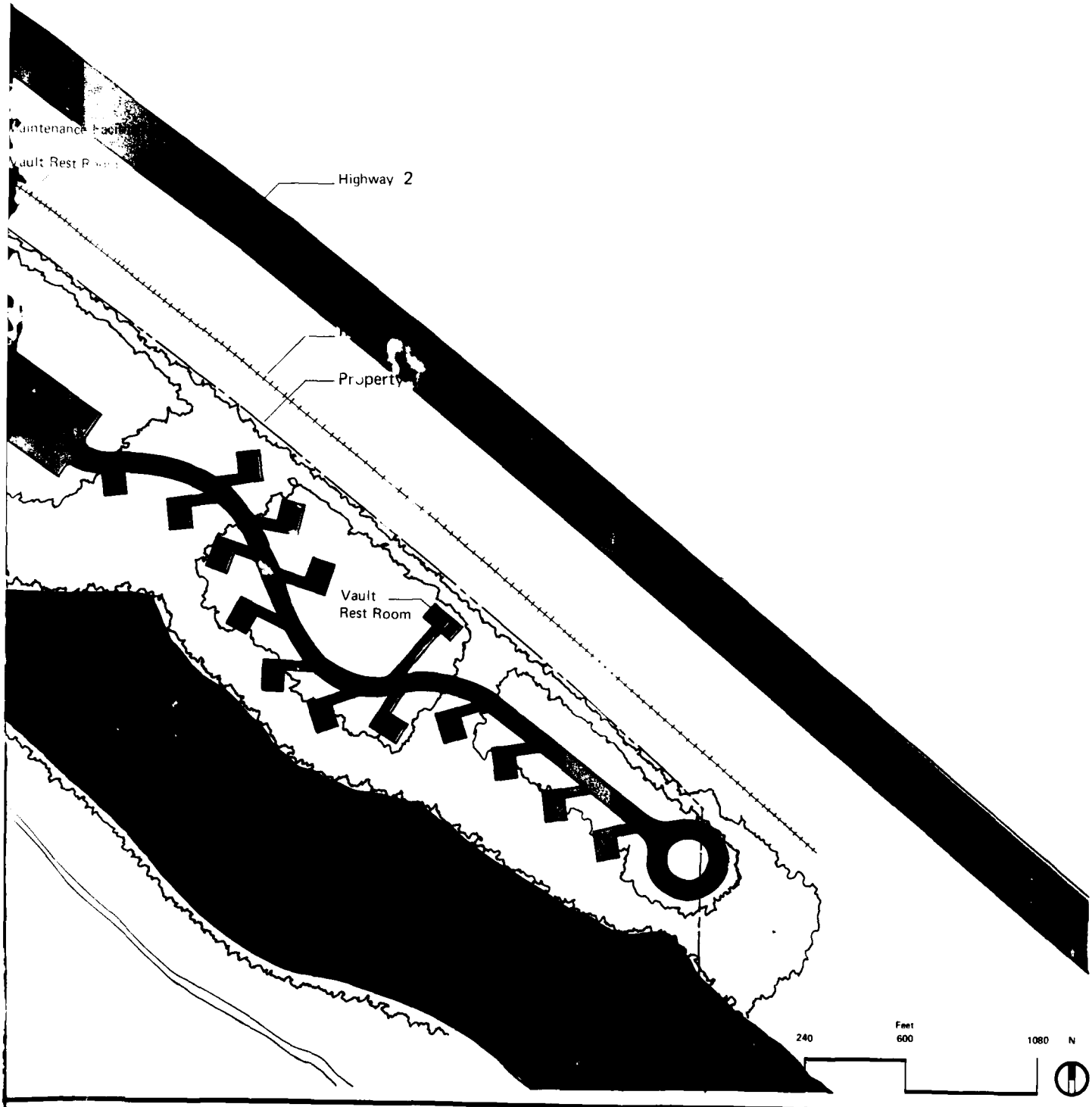

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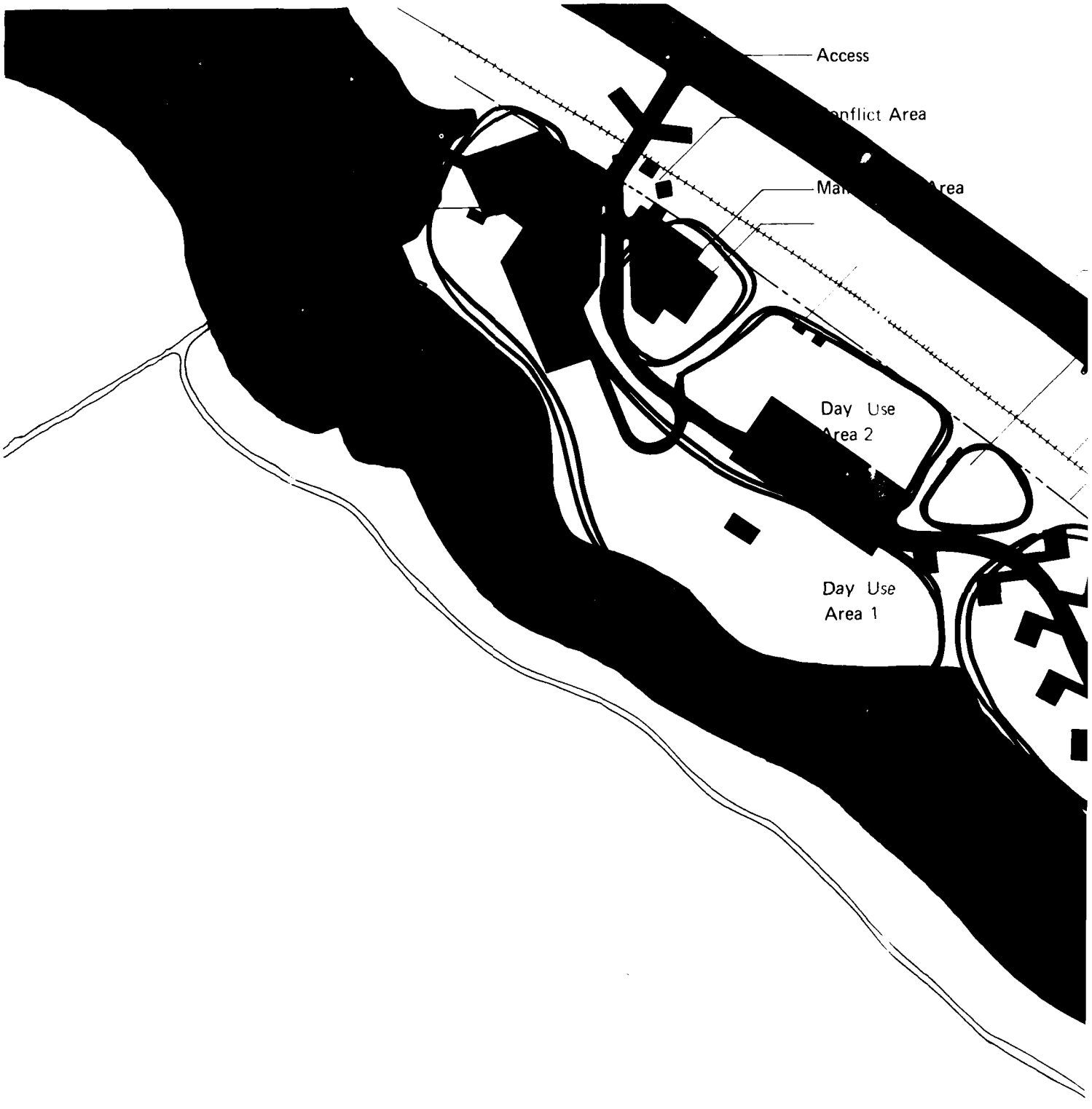
Checked by: Roger B. Martin
Submitted by:
Approved by:

Pokegama Lake Recreation Area
Comparative Site Analysis

Date: January 1977 Plate No: **25**



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure

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Landscape Architects
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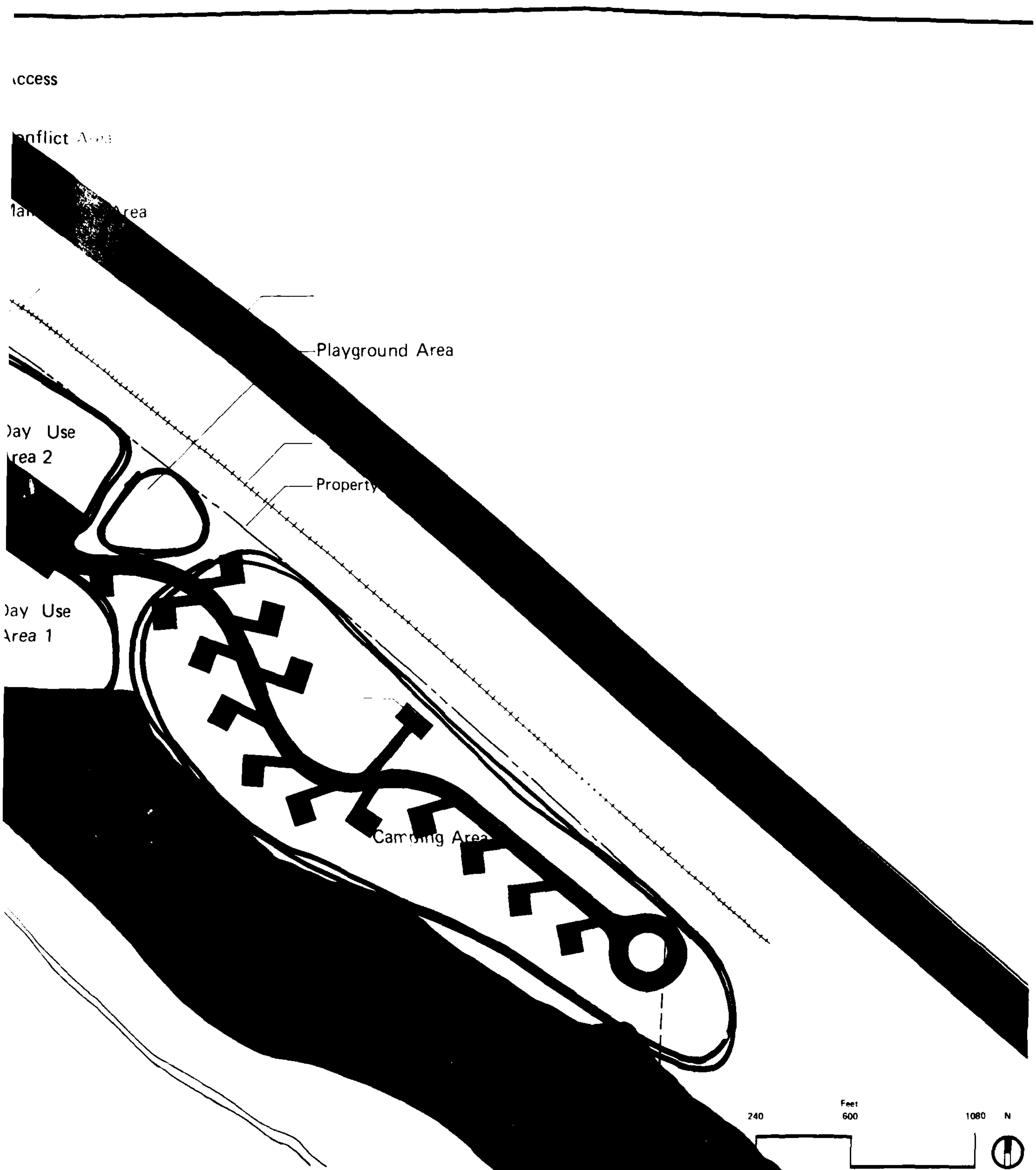

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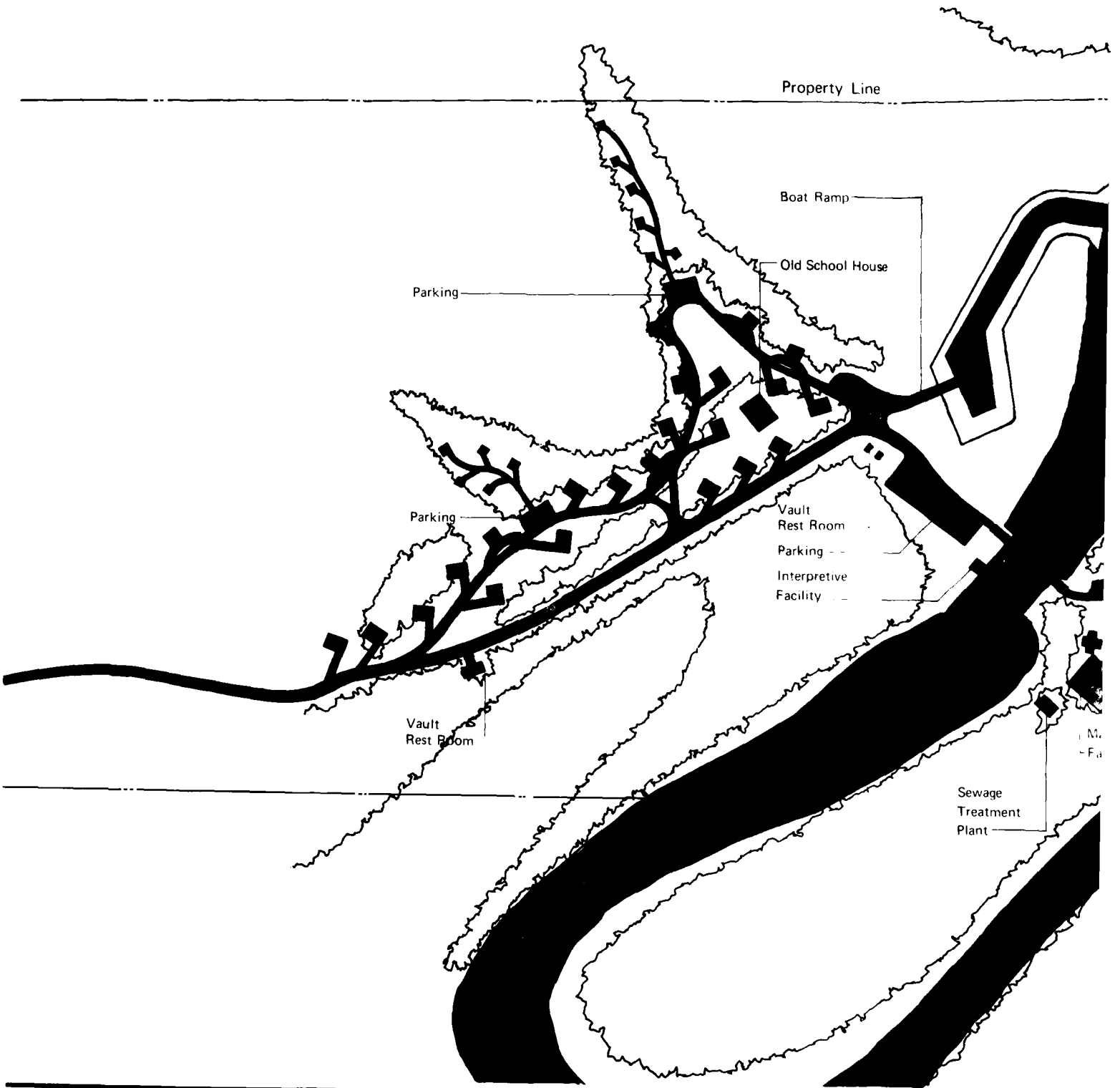
Drawn by: DF/HB/MH
Checked by: [signature]
Submitted by:
Approved by:

Pokegama Lake Recreation Area
Land Use Relationships

Date January 1977 Plate No **26**



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Roadway
- Structure
- Masterplan
- Marsh

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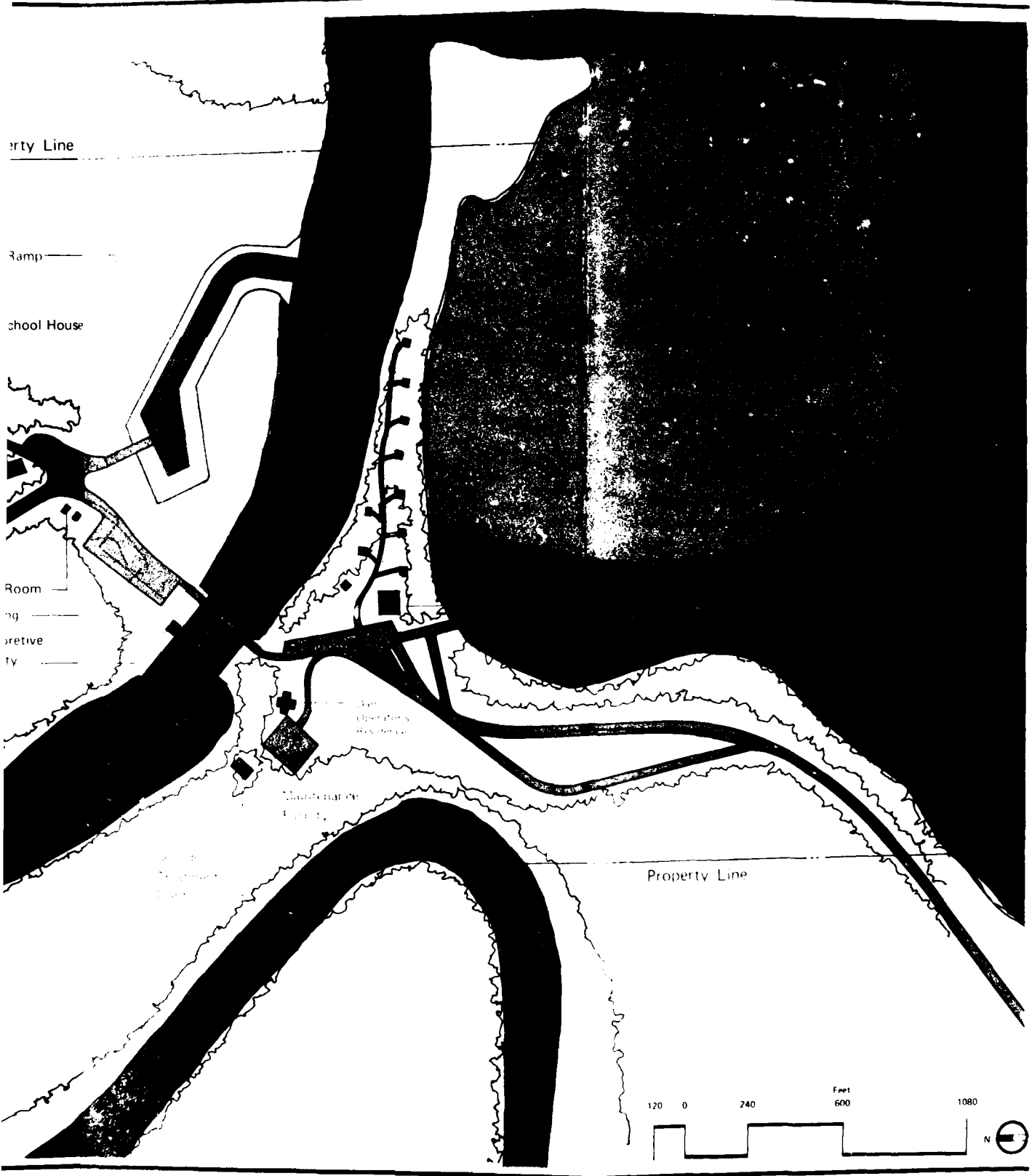

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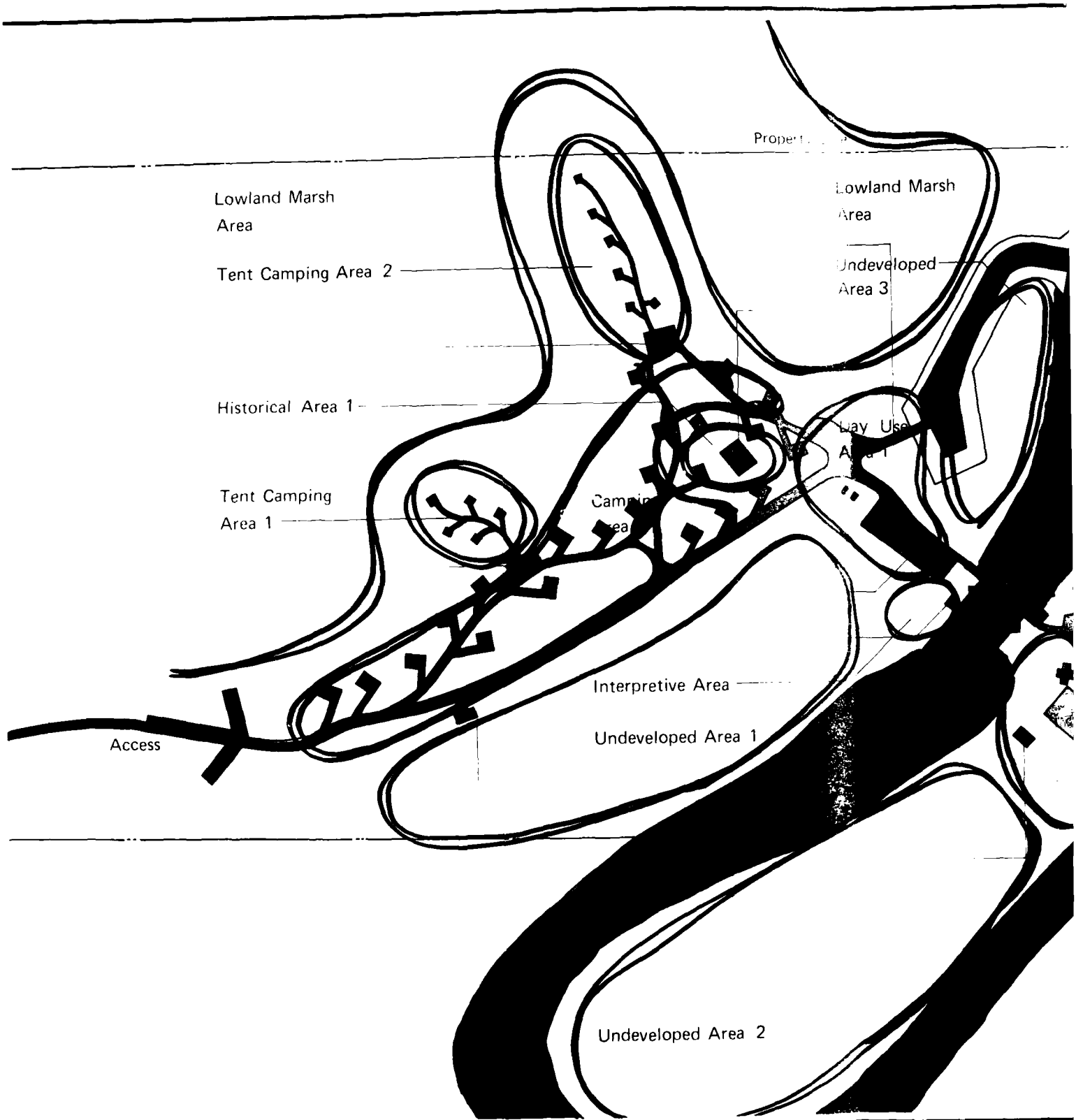
Submitted by

Approved by

Date January 1977

Big Sandy Lake Recreation Area
Comparative Site Analysis

Plate No **27**



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- Water Body
- Boundary
- Other Info
- Marsh

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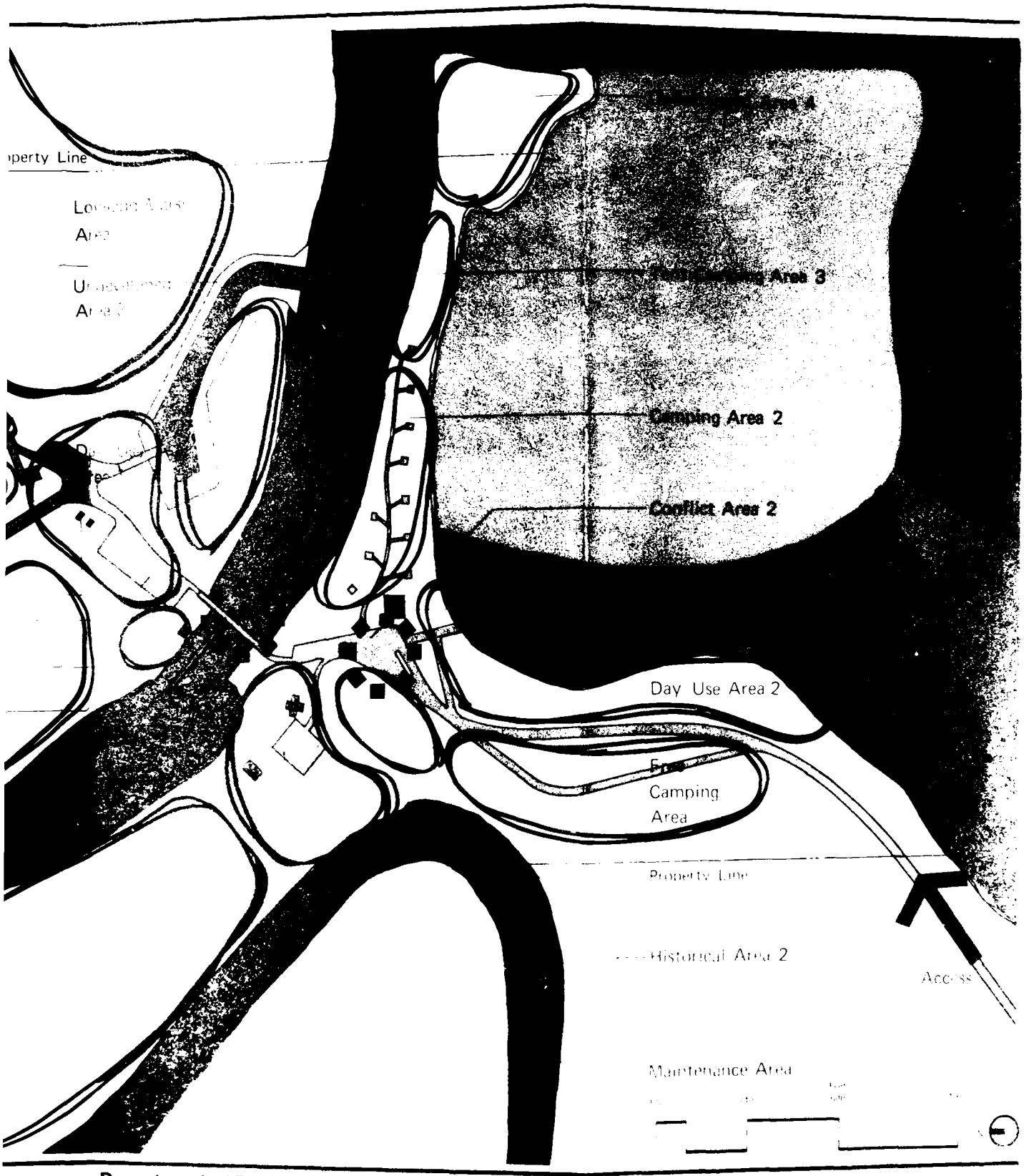
Minneapolis Minnesota



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St Paul Minnesota

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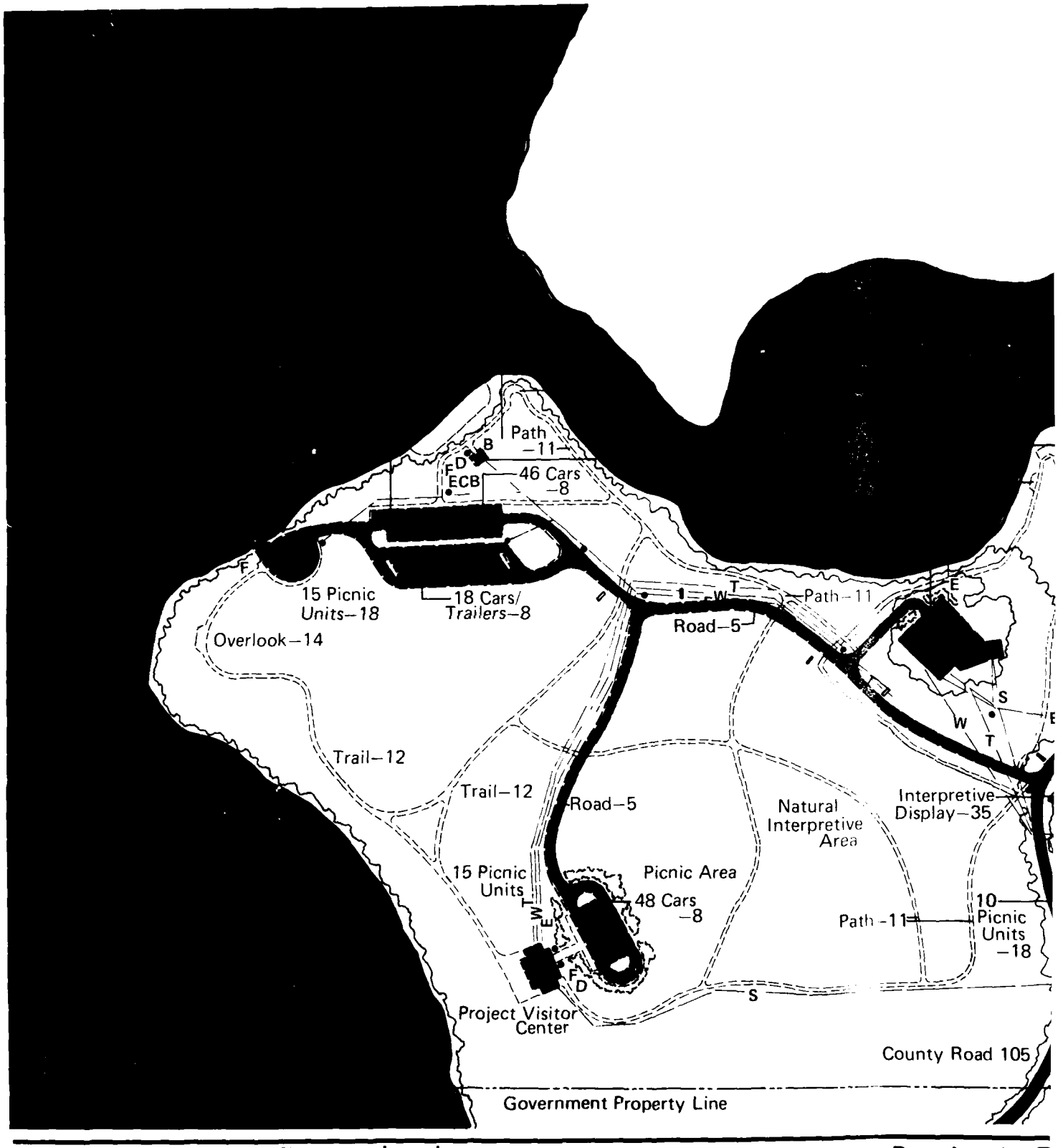
Checked by
Submitted by
Approved by
Date

Big Sandy Lake Recreation Area
Land Use Relationships

19 Plate No.



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

WATER BODY

MARSH

PROPOSED

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St. Paul, Minnesota

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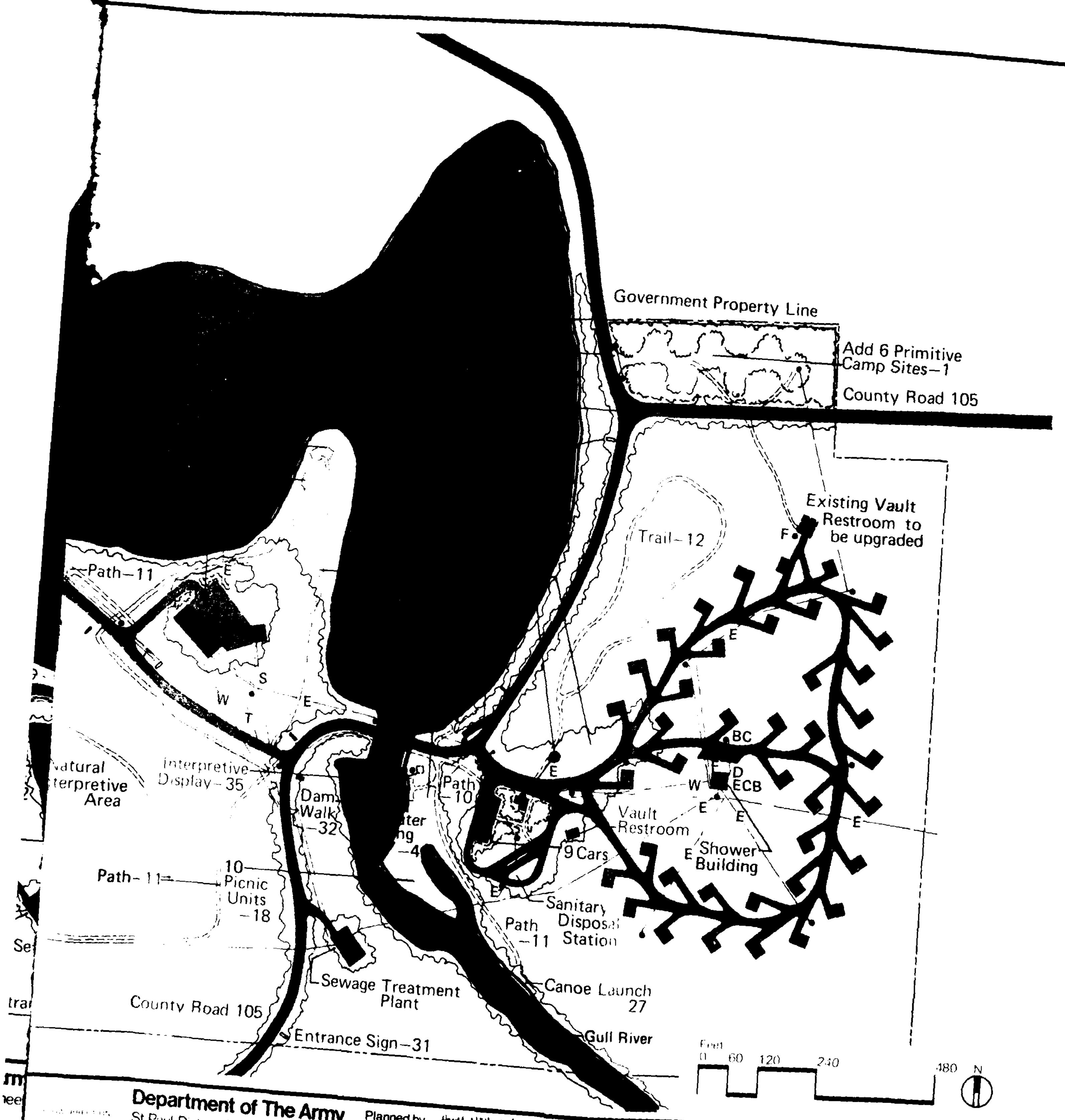
Landscape Architects
Minneapolis, Minnesota



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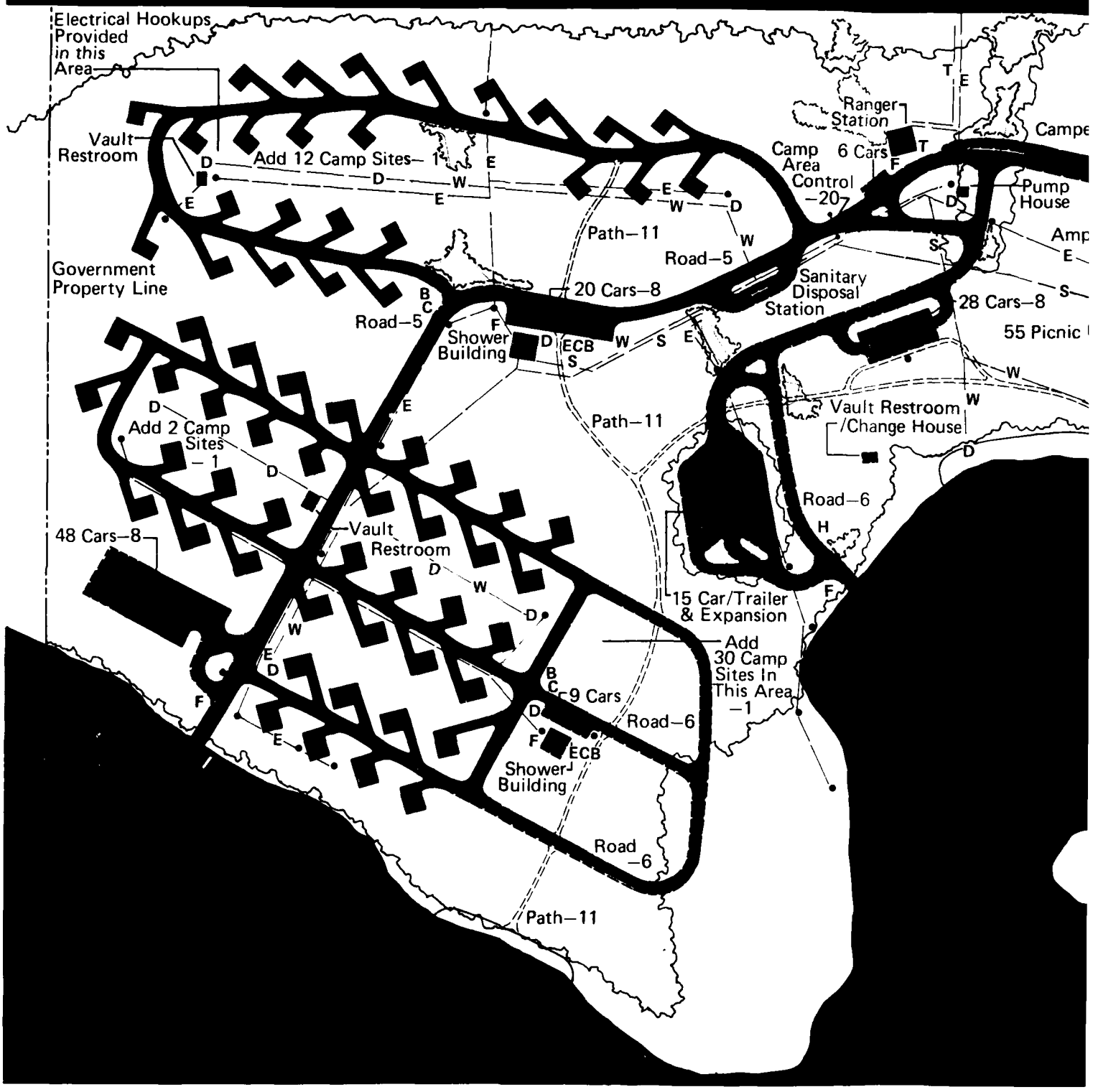
Planned by: InterDesign Landscape Architects
Checked by: InterDesign Landscape Architect
Reviewed by: Chief, Public Use Development Section
Submitted by: Chief, Environmental Resources Branch
Approved by: Chief, Engineering Division

Terry R. Johnson Recreation Area
Site Plan

Date August 1977 Plate No 29



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

- WATER BODY
- MARSH
- STRUCTURE
- EXISTING TO REMAIN
- PROPOSED
- EXISTING TO BE REMOVED
- PROPOSED PLANTING
- Road 5 — DETAIL NUMBER
- ONE WAY ROAD
- TWO WAY ROAD
- WATER FLOW DIRECTION
- ECB — EMERGENCY CALL BOX

Base information: St. Paul District as built drawings adjusted according to 1976 color infrared aerial photography

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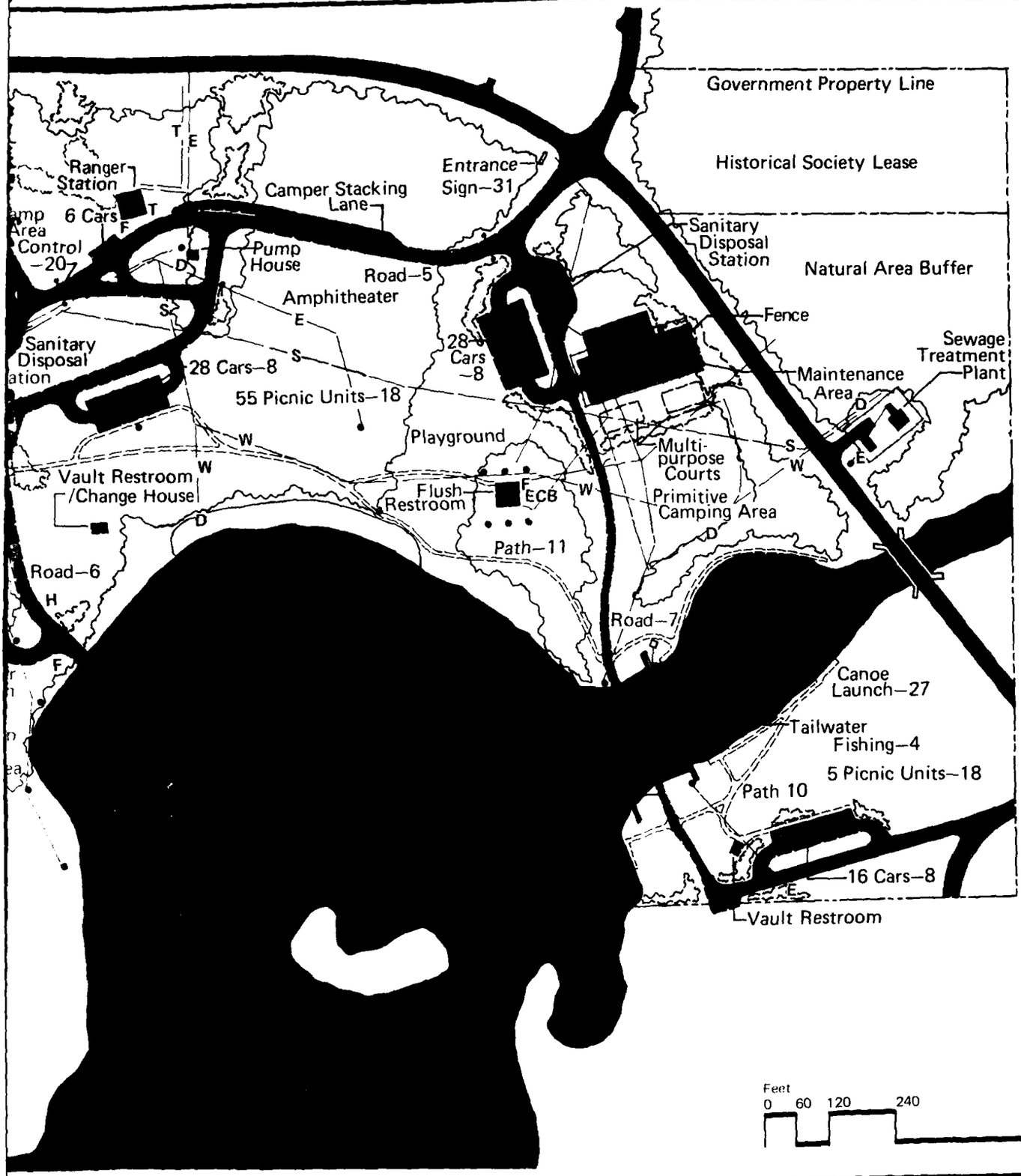
Landscape Architects
Minneapolis Minnesota



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St. Paul, Minnesota

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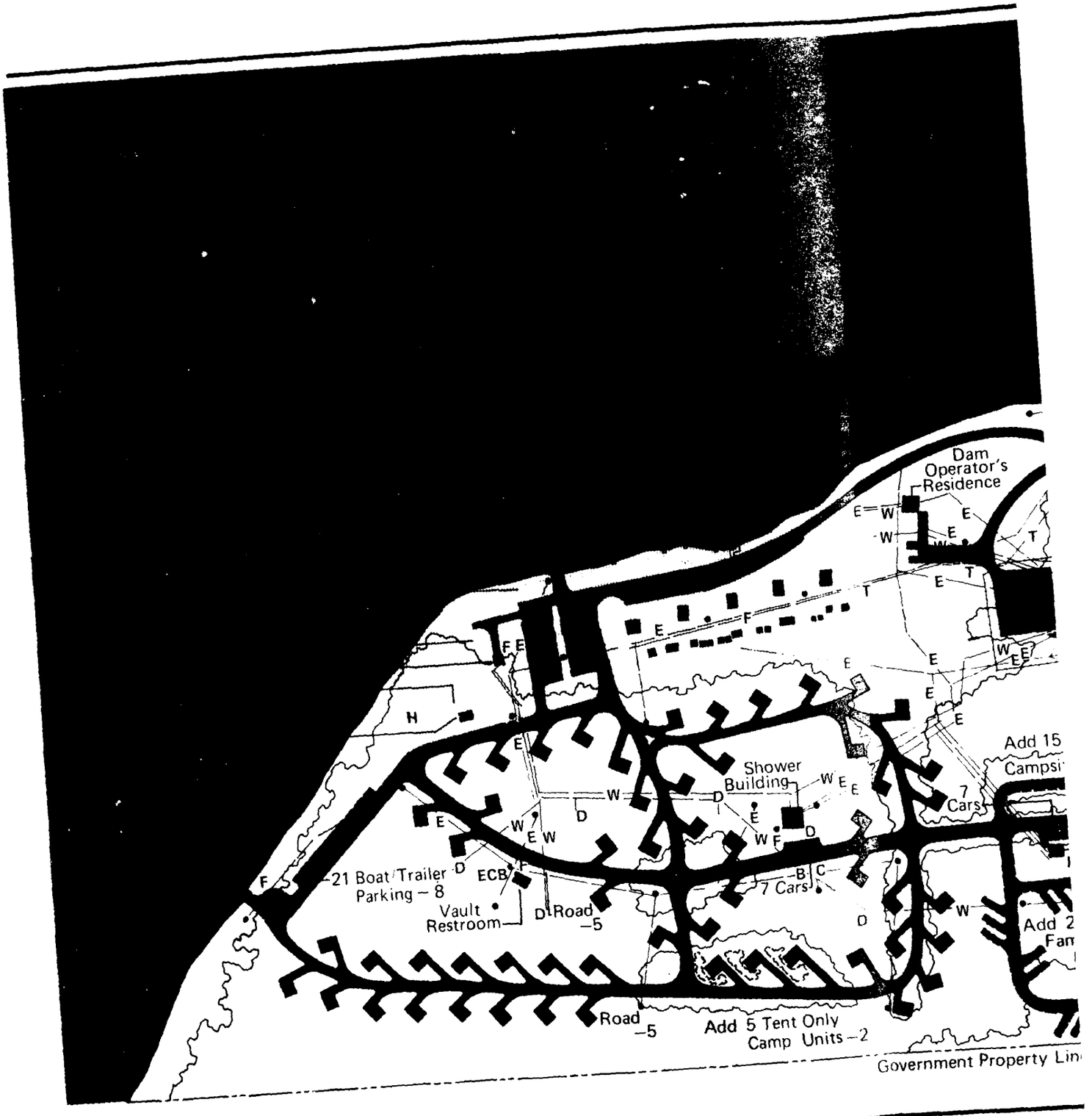
Recreation Planners
Landscape Architects
Minneapolis, Minnesota

Planned by: InterDesign Landscape Architects
Checked by: InterDesign Landscape Architect
Reviewed by: Chief, Public Use Development Section
Submitted by: Chief, Environmental Resources Branch
Approved by: Chief, Engineering Division

Ronald Louis Cloutier Recreation Area
Site Plan

Date: August 1977 Plate No. 30



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

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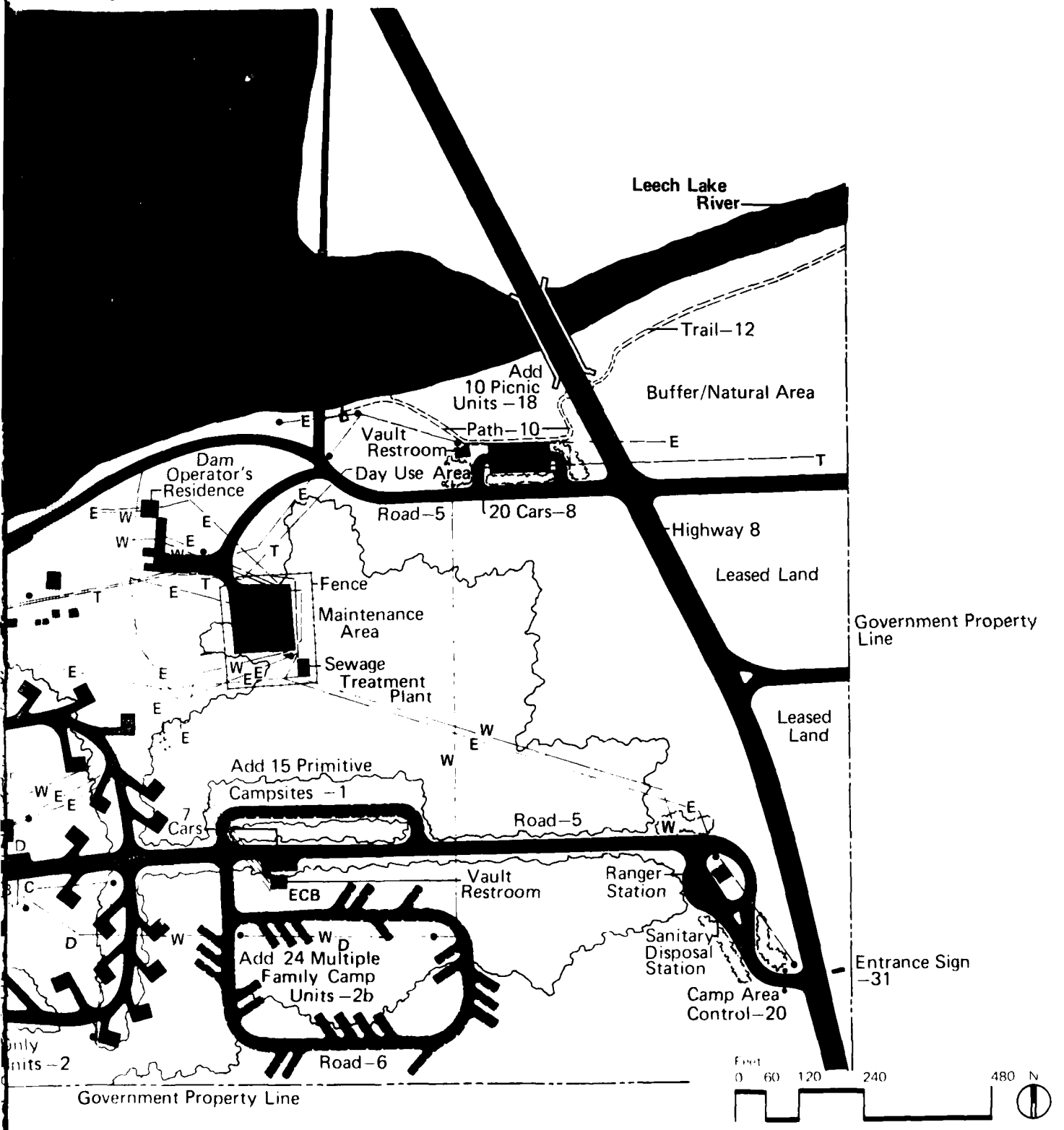

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St Paul Minnesota

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Submitted by
Approved by

Leech Lake Recreation Area
Site Plan

Date August 1977 Plate No 31

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

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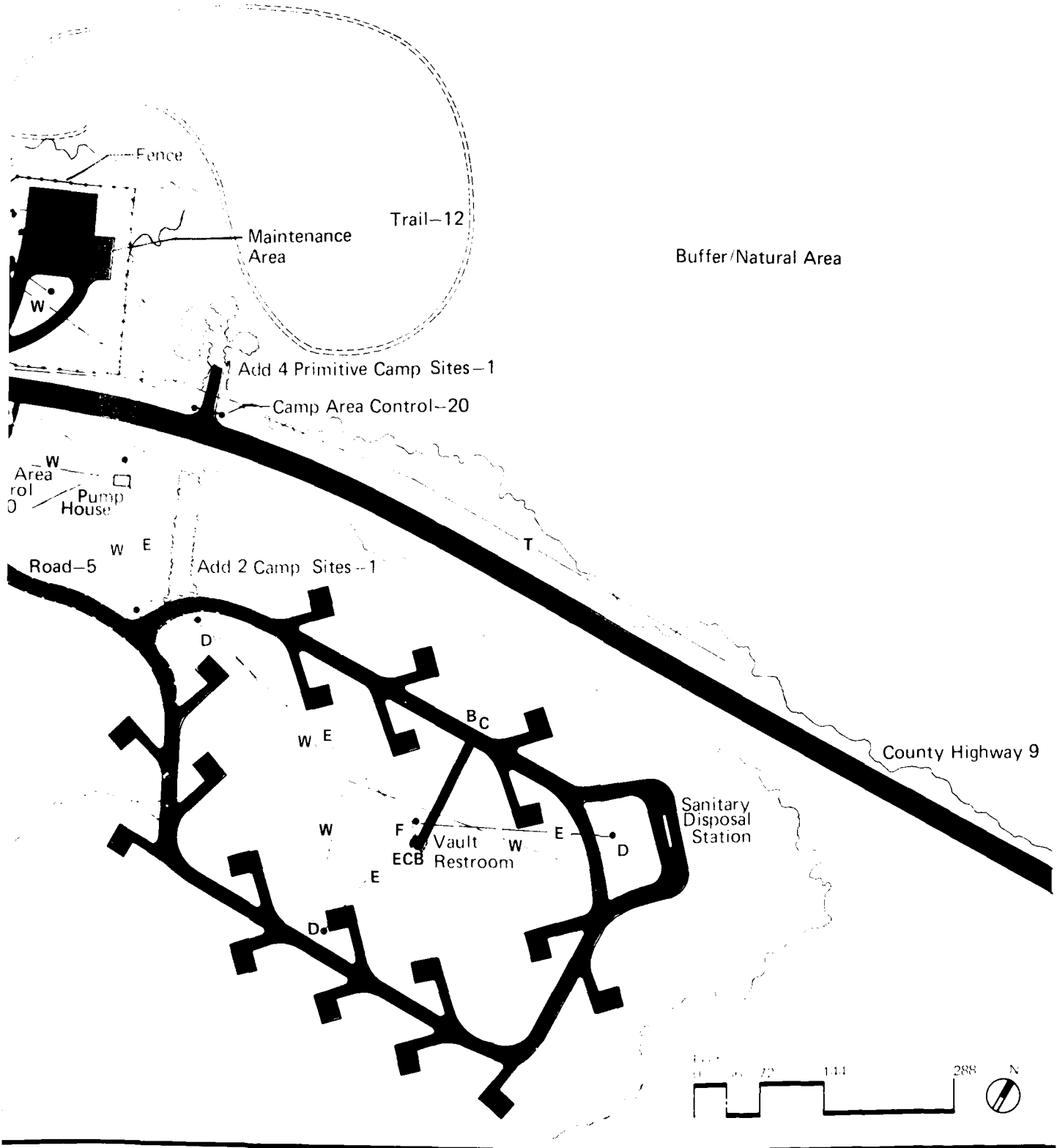
Minneapolis, Minnesota



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St Paul Minnesota

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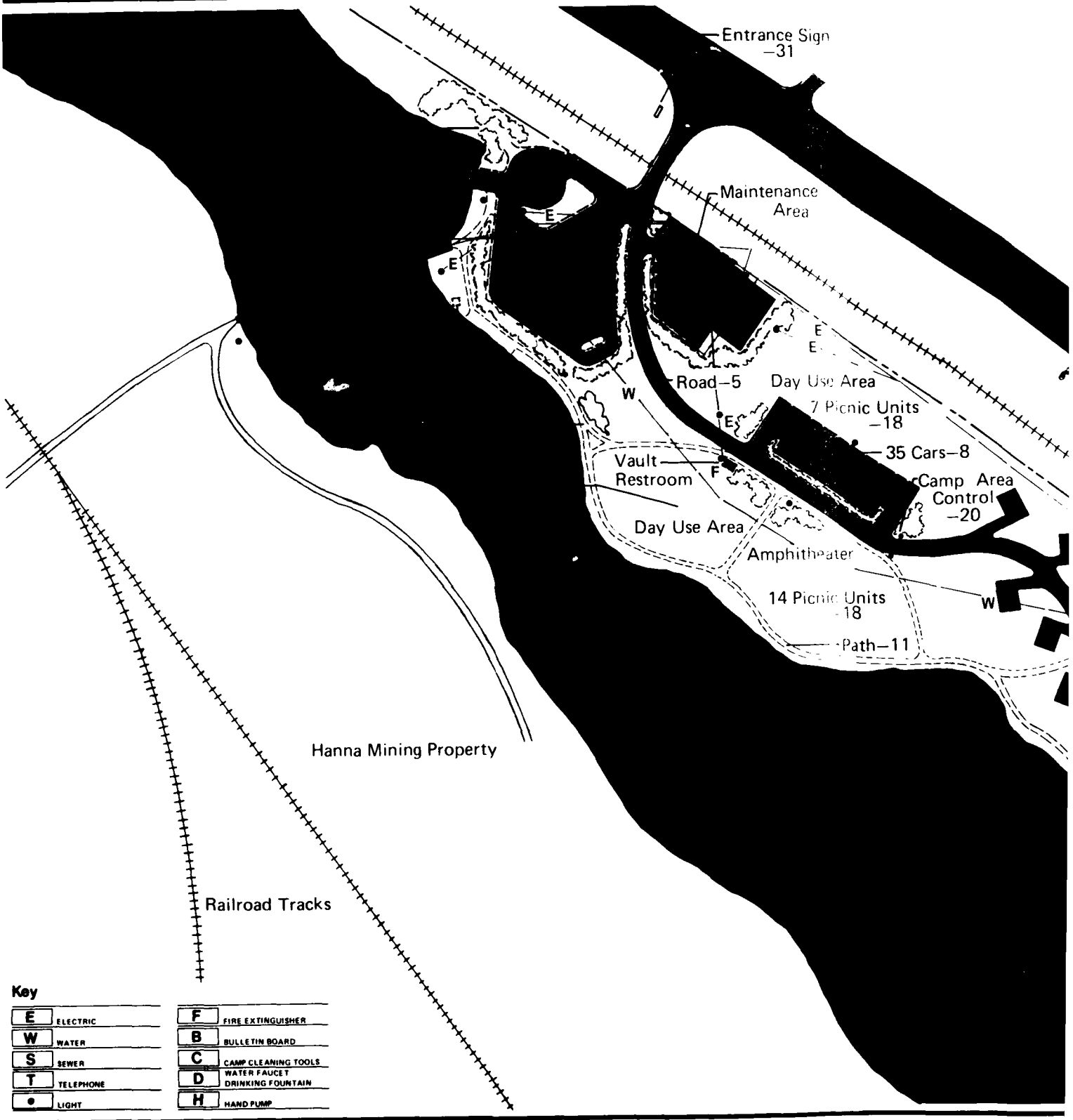
Planned by
Checked by
Reviewed by
Submitted by
Approved by

Lake Winnibigoshish Recreation Area
Site Plan

Date August 1977 Plate No 32



Key

E	ELECTRIC	F	FIRE EXTINGUISHER
W	WATER	B	BULLETIN BOARD
S	SEWER	C	CAMP CLEANING TOOLS
T	TELEPHONE	D	WATER FAUCET DRINKING FOUNTAIN
•	LIGHT	H	HAND PUMP

Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

WATER BODY
MARSH
STRUCTURE
EXISTING TO REMAIN
PROPOSED
EXISTING TO BE REMOVED
PROPOSED PLANTING
Road 5 DETAIL NUMBER
ONE WAY ROAD
TWO WAY ROAD
WATER FLOW DIR.
EOR EMERGENCY OVERFLOW

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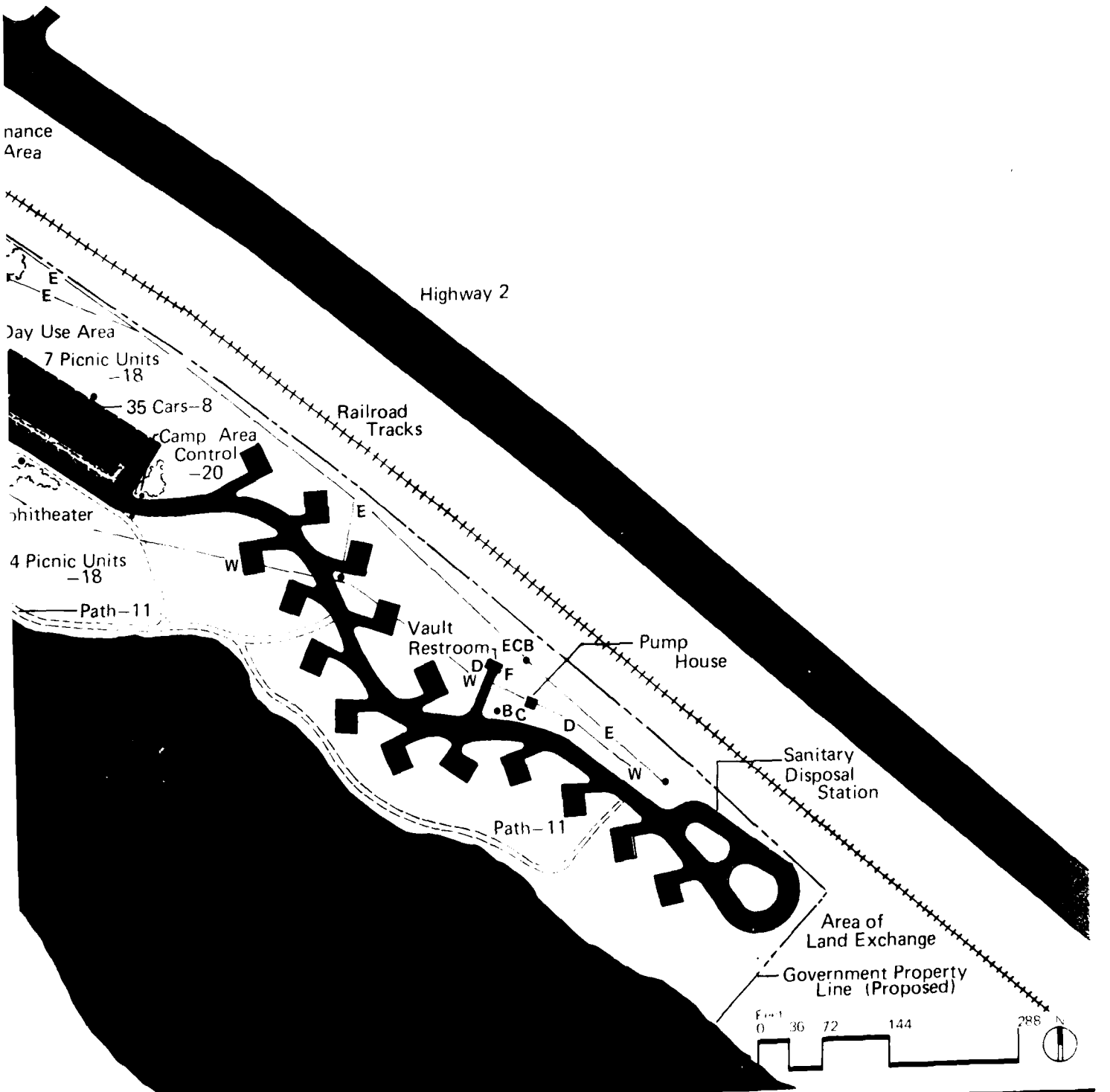
St. Paul, Minnesota

InterDesign Inc
Recreation Planners
Landscape Architects
Minneapolis, Minnesota



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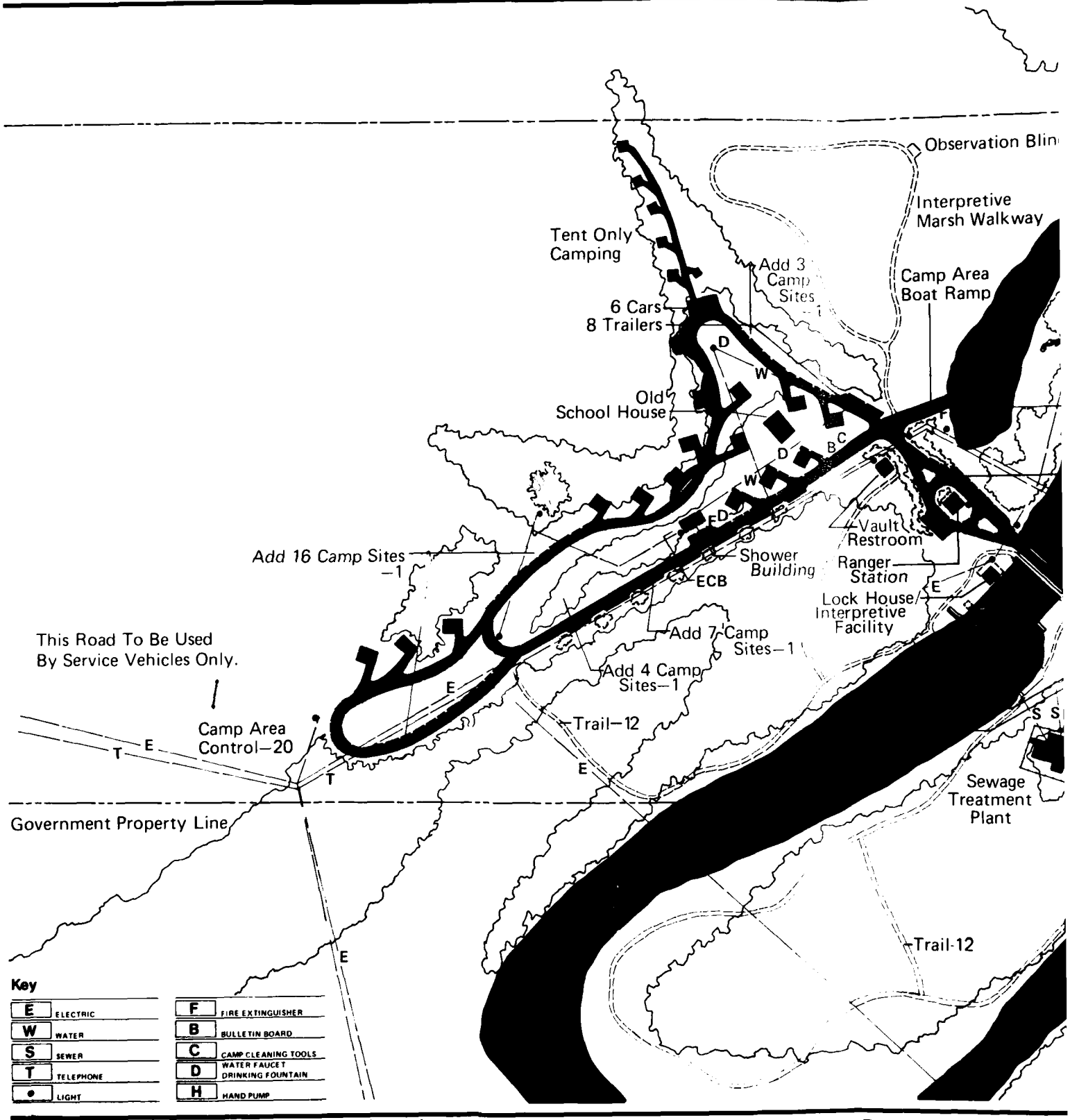
St Paul District Corps of Engineers
St Paul Minnesota

InterDesign Inc.

Planned by
Checked by
Reviewed by
Submitted by
Approved by

Pokegama Lake Recreation Area
Site Plan

Date August 1977 Plate No 33



Master Plan for Public Use Development and Resource Management

Mississippi River Headwaters Reservoirs

Legend

WATER BODY
MARSH
STRUCTURE
EXISTING TO REMAIN
PROPOSED
EXISTING TO BE REMOVED
PROPOSED PLANTING
WATER FLOW DIRECTION
ECB EMERGENCY CALL BOX

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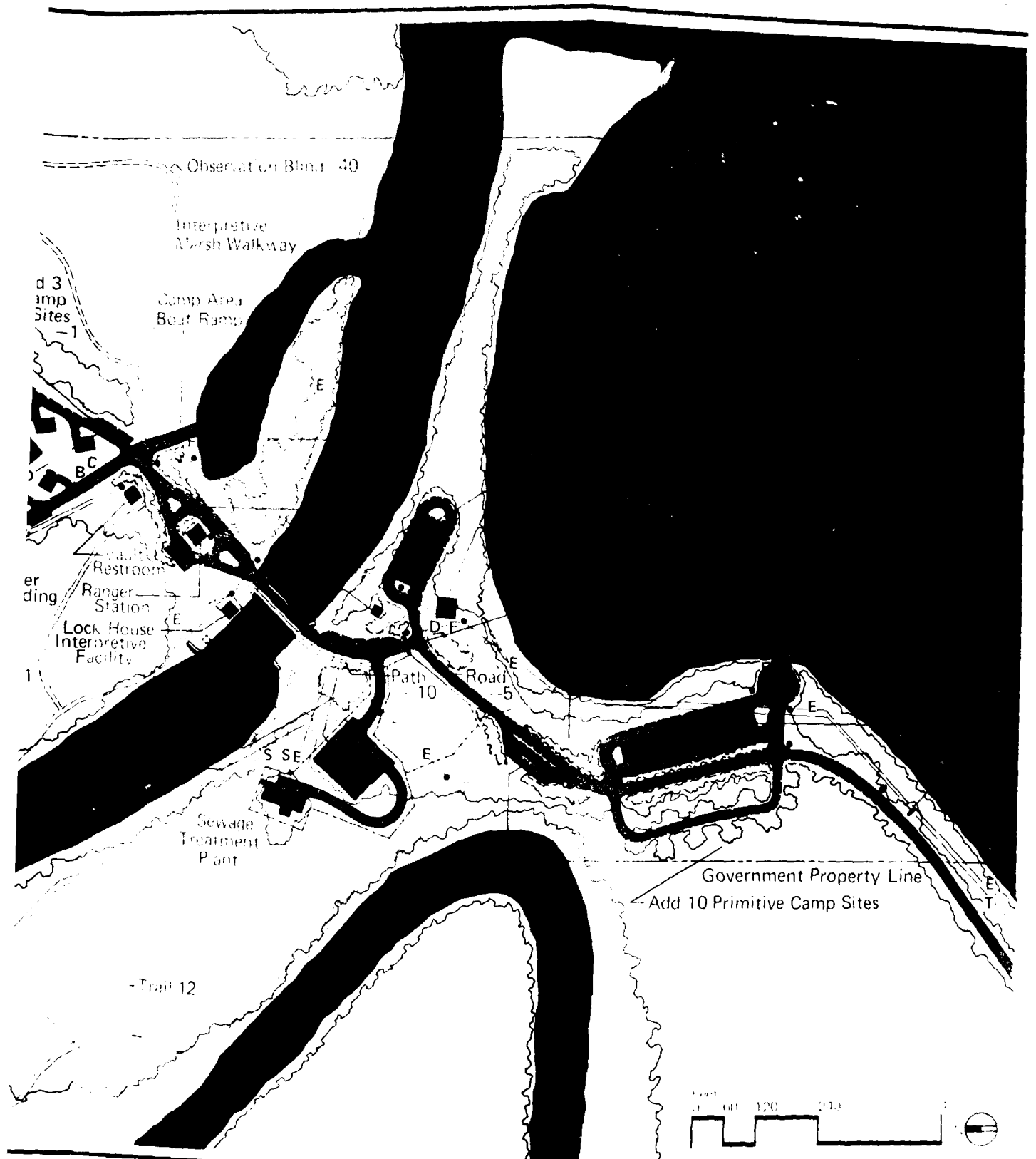

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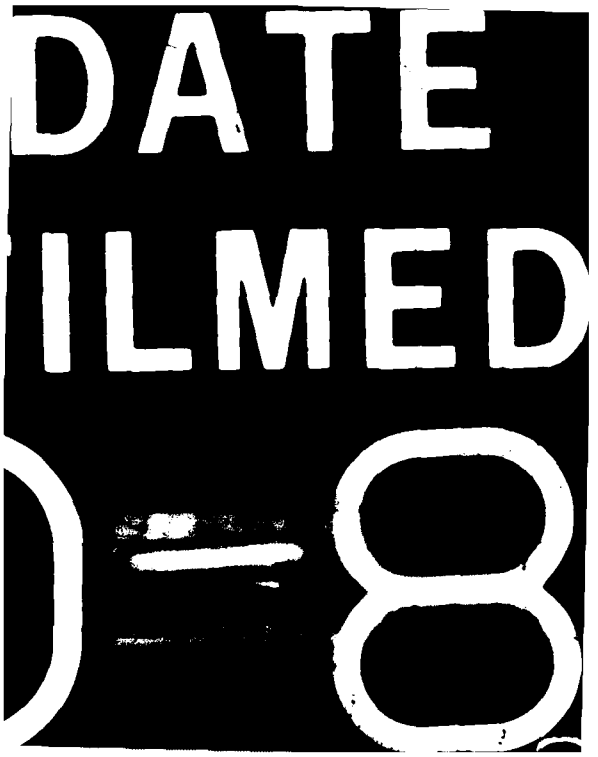
Sandy Lake Recreation Area
Site Plan

Date August 1977 Plate No 34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