ST. LOUIS RIVER HYDROELECTRIC

FERC PROJECT NO. 2360

LAND MANAGEMENT PLAN

ALLETE, INC.

(d.b.a. Minnesota Power)

March 30, 2007

Updated
January 19, 2022

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INTRODUCTION

ALLETE, Inc., doing business as Minnesota Power (MP), Licensee for the St. Louis River Project (SLRP), FERC License No. 2360, submitted a Non-Capacity Amendment application to adjust the project boundary to more accurately reflect lands needed for project purposes. The project boundary adjustments were around the Island Lake Reservoir, Fish Lake Reservoir, and Whiteface Reservoir within the SLRP. FERC approved the project boundary adjustment in a July 26, 2021 Order. The FERC Order requested updating the 2007 land management plan to incorporate the changes to the Natural Character Area and the nature and amount of lease lots in MPs Lease program that will be removed from the project boundary. The purpose of this update is to comply with the FERC order and to fulfill the requirements under License Article 427, which includes the following:

- Description of licensee-owned land in the Project Boundary
- Consultations with Interior, Minnesota DNR, the Tribe, St. Louis and Carlton Counties, and agencies with planning and zoning authority in the area.
- Copies of comments and recommendations on the plan (Appendix E)
- Illustrate how to manage Licensee-owned lands to protect environmentally sensitive habitat and land use is compatible with wildlife management
- Preservation of Natural Character Area's at Wild Rice, Island, Fish , Whiteface, Scanlon and Thomson, and consideration of new NCA at Knife Falls on licensee-owned lands
- Illustrate how the plan is consistent with 1993 and 2001 Wolf Management Plans
- Discussion of Forestry/Timber Management Practices, including locations
- Discussion of Land Development Plans, including development of leases
- Relevant information previously filed with the Commission
- Preservation of BLMA as filed on June 11, 1993

I. SLRP Project Description

Due to the extensive nature of the SLRP, land use and development of the land surrounding the four hydroelectric developments and the five storage reservoir developments are described separately in this report. MP has extensive ownership of land surrounding each of the five storage reservoirs as well as the Thomson Hydroelectric Development reservoir. At the Knife Falls, Scanlon, and Fond du Lac reservoirs MP's ownership is more limited.

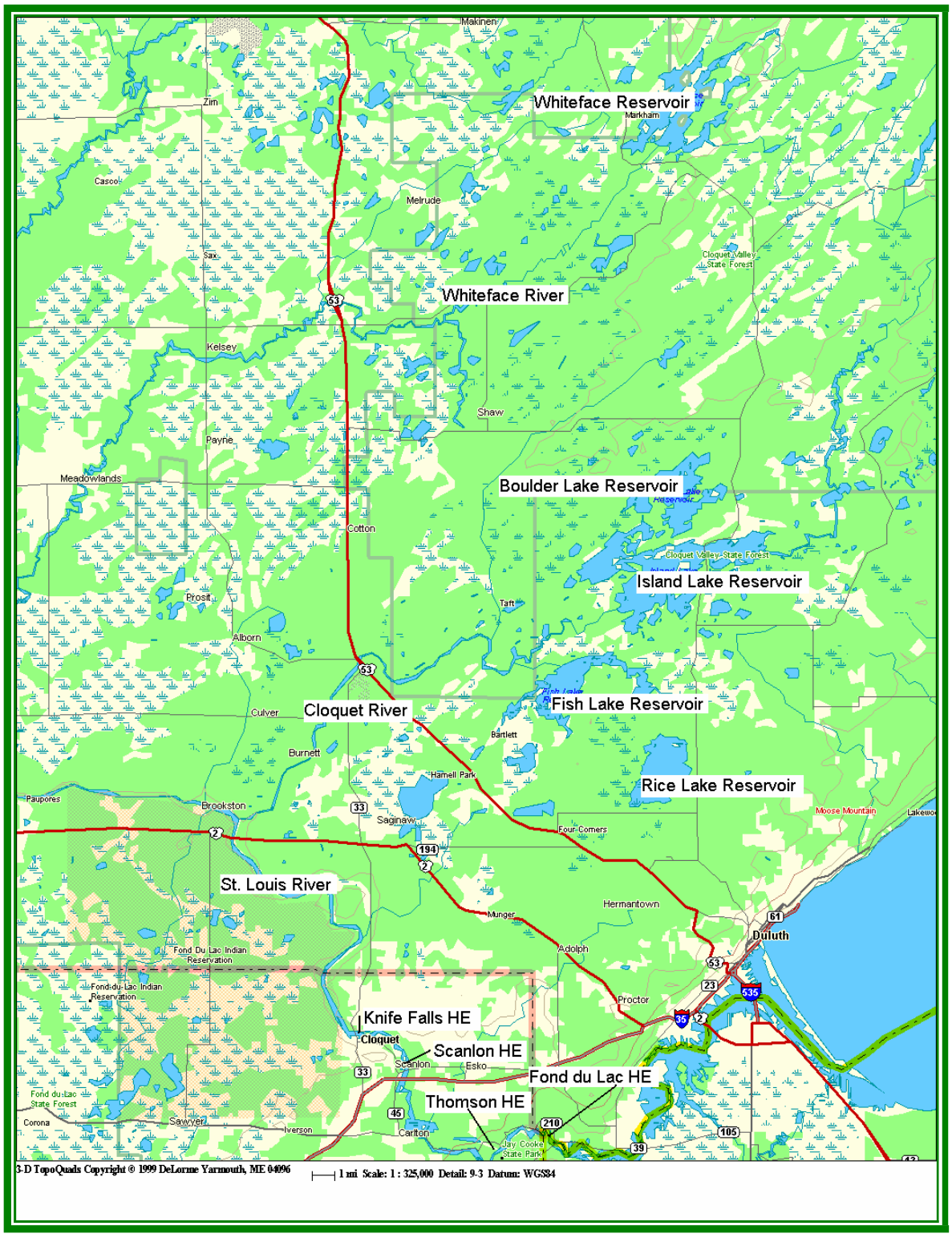
The project boundary on Island Lake Reservoir, Fish Lake Reservoir and Whiteface Reservoir, was reduced in most recreation lease lots from a 25 feet horizontal setback to a 3 foot horizontal setback from full pond elevations. The revised project boundaries are described on the figures in the non-capacity application and on the revised Exhibit Gs. MP

will continue to retain the fee-owned frontage of the revised project boundary. The remaining storage reservoirs were not adjusted and the project boundary range from 25 to 75 feet of fee-owned frontage in most areas. The project boundary encompasses all hydro facilities and structures, existing and proposed recreation facilities, Boulder Lake Management Area and areas designated as Natural Character Areas (NCA's). Fee land ownership within the Project also includes islands and flooded lands.

Lands managed for recreational lease lots around Island Lake Reservoir, Fish Lake Reservoir, and Whiteface Reservoir, in nearly all cases will include only the front 3 feet of frontage as project land, where development generally is limited to landscaping, seasonal docks, and erosion control measures. Some of the lease lots will not be sold and will maintain a 25 foot frontage if there is or has a potential to be eligible as a National Register of Historic Property (NRHP). Homes, cabins, garages, and most other buildings are located on non-project lands. MP will start selling the recreation lease lots on the three reservoirs starting in 2022. There uses will continue as residential and in limited cases commercial uses.

NCA's that are established throughout the reservoir system and the majority of Boulder Lake Reservoir shoreline, (designated as the Boulder Lake Management Area (BLMA)), were established to provide a balance between developed and undeveloped uses of Project lands. With the project boundary adjustment an additional 469 acres of NCAs were added around the three reservoirs with project boundary adjustments. The NCAs provide a balance to the Project includes recreational uses, wildlife habitat, dam spill safety, and aesthetics. The existing development, future use and management of MP's Project lands are described separately for each reservoir.

Key Features of the St. Louis River Hydroelectric FERC Project No. 2360:



II. Recreation Lease Lot Program

MP has been leasing shoreline property to the public at the SLRP reservoirs for over 90 years, using a program now known as ShoreLand Traditions (Program). This Program has flourished over the decades and established cabins and homesites throughout the region, to the benefit of the region's economy, cabin and homesite heritage and public recreational values. MP has decided to start divesting lands in much of its leasing program and will start selling recreation lease lots in 2022.

Management of the Program will continue on remaining lease lots that are not sold in the divesture. The Program is effective due to a strictly worded and governed lease agreement (previously approved by the Commission) that ensures that leaseholders work directly with MP staff regarding their occupancy and use of their lease lot. The lease agreement protects against environmental harm and reaffirms the overriding authority of MP on its fee-owned property and the Commission's authority on Project lands. Lands that are not part of the Program, continue to have protection against environmental harm through strict, federal, state, county, and local regulations on shoreland protections and development.

The Program is also noted for its cooperative management with the St. Louis County Planning and Zoning Department, the St. Louis County Health Department, Gnesen Township Planning and Zoning, and Canosia Township Planning and Zoning. MP works together with local zoning authorities on a daily basis to ensure leaseholders are adhering to Minnesota state shoreline permits and local zoning rules as well as obtaining permits for activities on their lease lots or when any shoreline alteration occurs in what the MDNR considers public waters.

NCAs are set-aside from individual/single-family lakeshore lease lot development. Institutional leases (granted to schools, organizations, or agencies, etc.) may be established from time-to-time within NCAs or within the BLMA if MP deems that use to be compatible with the NCA or the BLMA.

MP has nearly 1,000 leases in the SLRP. A majority of these leases will be sold over the next 2 to 3 years starting in 2022. MP does not plan to develop additional recreational leases. The vast majority of shoreline that was previously authorized under the SLRP relicensing process has been developed for leases, with a few undeveloped smaller areas remaining. Details of reservoir land uses are described in later sections.

Article 430 of the SLRP license, allows MP to convey certain property rights on project lands that are consistent with approved plans. Different types of conveyances require various levels of agency consultation or Commission notification/filing. In order to eliminate duplicative consultation and streamline the notification process, MP will provide notification to the Commission on any section (d) conveyances for leasing of new recreational lots in those areas as filed in Exhibit E and subsequent application filings, including this plan, as required under section (c). No later than January 31 of each year MP will then be required to file with the Commission three (3) copies of a report that describes

each recreational lease lot conveyance. MP is required to obtain and follow necessary permits and approvals from local planning and zoning authorities prior to establishing these types of leasing conveyances.

The 2007 management plan was routed for comment to the same agencies and Tribe that would most likely have interest in these conveyances. There were no changes to the land conveyance requirement with this update. State Historic Preservation Office notification is managed under the SLRP Cultural Resource Management Plan (CRMP) of May 15, 2001 (and approved by the Commission). The SHPO was consulted during the non-capacity amendment application process and determined a "no effect" to NRHP or potential NRHP would occur with the project boundary adjustment plan.

III. Natural Character Areas

Throughout most of the SLRP, MP has agreed to designate areas of shoreline that would not allow further single-family lease lot development as a balance to areas that were agreed to be open for development by the Company. These lands are called Natural Character Areas (NCAs).

The NCAs occur on each of the five water storage reservoirs, and the BLMA encompasses Boulder Lake Reservoir. NCAs are also designated at Scanlon and Thomson Reservoirs. MP ownership at Knife Falls Reservoir is not enough to warrant a NCA designation, and Fond Du Lac Reservoir lands are managed as part of Jay Cooke State Park.

In general, the NCAs are open for recreation use and include or will include recreation facilities, such as campgrounds, primitive campsites, and recreational trails and will continue to have on-going forest management activities. Institutional leases (granted to schools, agencies or other organizations or institutions) may be established from time-to-time in NCAs as MP determines compatible with the NCA.

Detailed explanations of each reservoir NCA is included in Appendix A, and include the additional 469 acres of NCA lands added in 2021 around Island Lake Reservoir, Fish Lake Reservoir, and Whiteface Reservoir.

IV. Forest Management Program

MP has a long history of forest management on Company-owned lands. The forests around the SLRP support a multitude of uses, including forest products, wildlife habitat, watershed protection and recreational opportunities.

MP will continue to maintain the productivity of the forest system at the SLRP through the continued use of sound silvicultural practices, which includes periodic timber sales through a variety of methods, sustaining buffer strips on lakeshore or streambank areas, leaving areas for seed production or re-vegetation, and establishing wildlife enhancement areas.

The vast majority of lands in the SLRP are within a shoreline strip between the ordinary high water mark and 25 to 75 feet inland. Timber management would not likely occur in this zone and would most likely occur where land ownership is far greater, such as within the BLMA (see below) or in the NCAs.

In keeping with current forest management practices throughout northern Minnesota, MP will continue efforts to perpetuate the existing stands of white pine where possible and attempt to maintain and expand the abundance of the species in shoreline areas. White pine also provide important nesting and perching habitat for bald eagles. Perpetuation of white pine will occur through the use of the shelterwood technique (leaving parent trees to naturally reproduce) and thinning at periodic intervals to remove competitive trees to reduce the spread of white pine blister rust. As technology, research and techniques mature over time, MP may utilize alternative methods of white pine management.

V. Bald Eagle and Grey Wolf Management and Lynx

Land management activities will also be consistent with the SLRP management plan for Bald Eagle and Grey Wolf of March, 1993 (attached as Appendix B).

Adjustments to the management plan will occur as populations continue to increase beyond the point of concern. Minnesota contains a considerable population of grey wolf (the largest population of resident grey wolf in the lower 48 contiguous states) and nesting bald eagles. Both species have been delisted by the US Fish and Wildlife Service. Management adaptations shall change as agency guidelines are adjusted as well.

Since the Bald Eagle and Grey Wolf Management Plan of 1993 is almost thirty years old, some adjustments need to be pointed out from the original plan. On Thomson Reservoir, the whitewater river public take-out location has been moved to just east of the most easterly spillway at the dam. On Wild Rice Lake Reservoir, the proposed new public access has been dropped from consideration in favor of upgrading the existing boat launch at the dam.

The Canadian Lynx is currently listed as a Threatened Species in Minnesota and, as a result, the US Forest Service has been conducting research on the lynx since 2003. Since then, 33 lynx have been radio collared with more than 15,000 tracking locations being recorded.

Minnesota Power will remain abreast of the ongoing research and public debate, and will consider management recommendations for the lynx that are suggested by their Threatened Species status, as that information comes forward.

VI. Land Disturbing Article 402

License Article 402 for the SLRP requires MP to file with the Commission three months (90 days) prior to the start of any land disturbing or land clearing activities that requires a state issued stormwater pollution prevention plan permit, a plan to control dust and erosion, to stabilize slopes, and to minimize the quantity of sediment and other potential air or water pollutants likely to result from site access, project construction, spoil-disposal, and project operation.

The erosion control plan(s) shall, at a minimum, include:

(1) Description of the actual site conditions;

(2) Measures proposed to control erosion, to prevent slope instability, and to minimize the quantity of sediment resulting from project construction and operation;

(3) Detailed descriptions, functional design drawings, and specific topographic location of all control measures; and

(4) A specific implementation schedule and details for monitoring and maintenance programs for project construction and operation

MP shall prepare the plans after consultation with the Minnesota DNR, Interior, the US Forest Service, and the Tribe. MP shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' and Tribe's comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies and Tribe to comment and make recommendations before filing the plan with the Commission. If MP does not adopt an agency's or Tribe's recommendation, the filing shall state MP's reasons, based on geological, soil and groundwater conditions at the site.

Management of the approximately 30,000 acres within the SLRP can at times be a daunting task for both MP as well as agencies working in cooperation with the Company. In order to more effectively manage activities and reduce substantial duplicative paperwork and permitting for agencies, the Tribe and the Company, MP will establish the following threshold for activities that are considered "land disturbing", since no definition exists for the term: MP will submit erosion control plans to the Commission on new construction activities that requires a State of Minnesota Storm Water Permit (thus meeting the state's established threshold). Examples of this would be the development of a large new public recreation facility, or road or other maintenance or construction activity that will disturb one acre or greater of land. That type of activity would also require agency and tribe review and comment (fulfilling the 30 day comment period requirement as defined in Article 402). The Minnesota

Pollution Control Agency's (PCA) Minnesota Storm Water Permit is the state's standard erosion and storm water control permit and includes information on soil conditions, and an explanation of control features, detailed descriptions, functional design drawings and specific topographic location of all control measures, along with schedules for monitoring/maintenance. The latest information on storm water permits is available from the PCA website: http://www.pca.state.mn.us/water/stormwater/index.html

Erosion control on reservoir shorelines has been ongoing since about the time the water storage reservoirs were formed in the first few decades of the 1900's. The development of lakeshore leases also contributed greatly to shoreline erosion protection as leaseholders worked to develop shoreline protections on their lakeshore properties. Island Lake Reservoir alone possesses about 600 lakeshore leaseholders that have done some erosion protection, and has been an ongoing process for over 90 years.

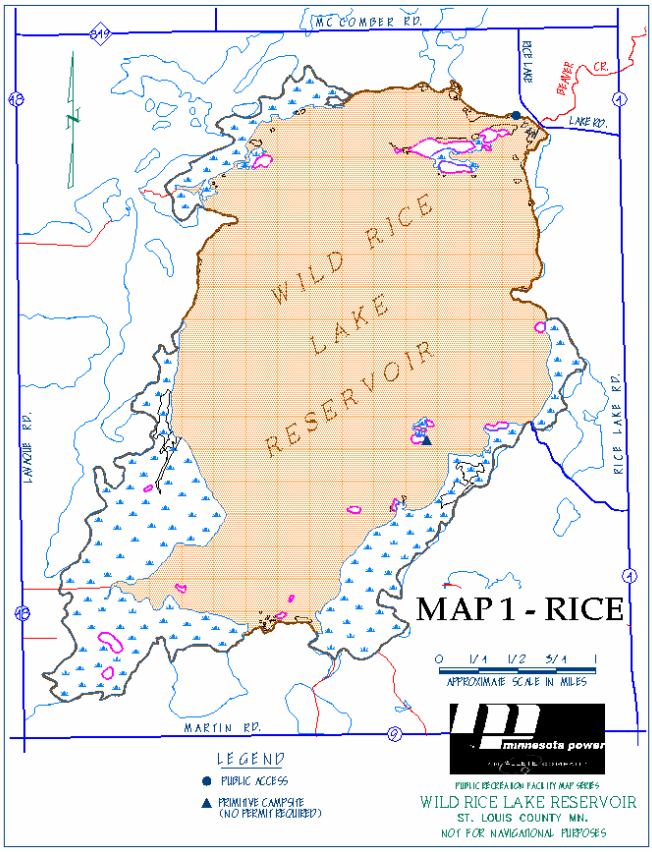
Most shoreline work on lakeshore lease lots is composed of placing geo-textile fabric backing and surfacing with softball to volleyball sized rip-rap rock revetment upon eroded shoreline areas. MP, in its own land management efforts, has also found this technique to be the most effective method for controlling erosion on lakeshore at the reservoirs. Where feasible, MP has also reintroduced native plant species to reestablish shoreline vegetation. MP has been careful to not introduce non-native species into these shoreline areas.

Article 401 requires the development of an Erosion Control and Monitoring Plan, which MP finalized in 1998 and updated with Commission approval on March 30, 2004 (see Appendix D).

VII. LAND MANAGEMENT BY RESERVOIR

A. WLD RICE LAKE RESERVOIR

Wild Rice Lake Reservoir is located approximately seven miles from the downtown Duluth, Minnesota. The reservoir is the smallest of the five storage reservoirs on the SLRP (see **MAP 1 – RICE**), with a total surface area of 2,133 acres at full pond elevation. The reservoir discharges into the Beaver River which eventually flows into Fish Lake Reservoir, about two and one-half miles downstream.



Wild Rice Lake Reservoir is a relatively shallow reservoir, with much of the shoreline protected as wetlands. Approximately two-thirds of Wild Rice Lake Reservoir shoreline is owned by MP, and approximately one-third is private or owned by St. Louis County.

Development is very limited on Wild Rice Lake Reservoir. The largest area of development occurs on the west shoreline, covering about three-quarters of a mile in length. The Project shoreline in this area is owned by MP and leased to private individuals. Several of theselots are leased to adjacent private landowners, allowing them access to the reservoir. The other lots are leased for recreational purposes and include cabins or homes constructed on non-project lands. In addition, a few scattered private homes and cabins occur along the eastern shore. The only other developed area of the

reservoir is the dam and the adjacent public boat launch.

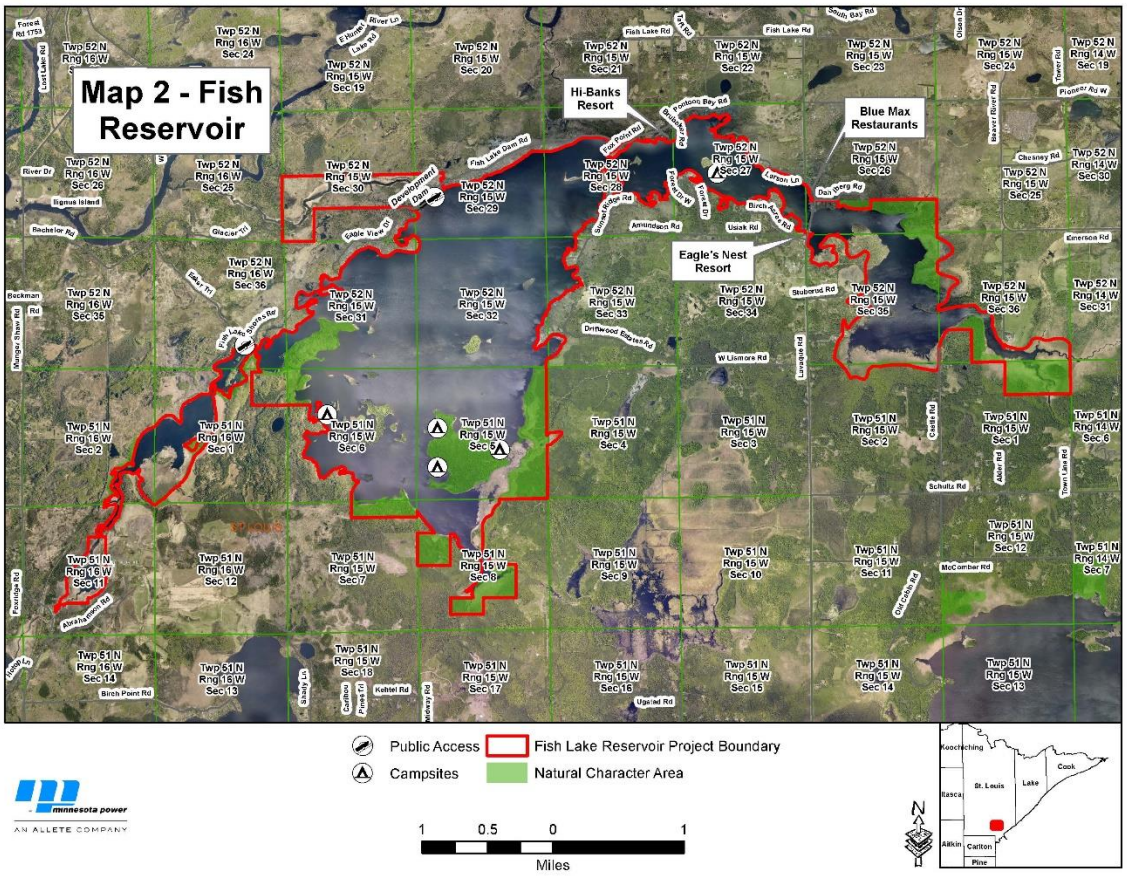
The south half of the reservoir is to remain as NCA as well as portions in the northwest corner and a single forty acre parcel on the northeast corner of the reservoir.

The area just west of the public boat launch, which was previously proposed for relocating the existing public dam boat launch, has been eliminated from further consideration by MP and the MDNR. This conclusion was reached due to the realization of limited space on the site following field survey, and the adjoining land owners having developed their homes on the adjacent private property, which would cause homeowner-public conflicts. To avoid such likely conflicts with neighbors, MP paid to resurvey the existing public launch and found additional property available to allow the facility to be reconfigured and enhanced. The formerly proposed public access site has limited usable shoreline and backland due to brush filled wetlands, but the high ground will be considered for shoreline leasing management, of which only one or two lots may prove viable.

B. FISH LAKE RESERVOIR

Fish Lake Reservoir is located approximately 15 miles northwest of Duluth on the Beaver River and the reservoir discharge eventually flows into the Cloquet River, about two miles downstream of the reservoir. Fish Lake has a total surface area of 5,120 acres at full pond elevation.

Fish Lake Reservoir is composed of a larger main body in the center and two long tails on the east and west ends. The east bay described here is defined to be the narrow portion of the reservoir lying east of County Highway 48. The north portion of the main body of the lake is developed as private and leased shoreline lots. The southerly portion of the main body and the two bays of the lake contain very little development. **MAP 2 - FISH** outlines the types of land uses on Fish Lake Reservoir. Two-thirds of the shoreline on Fish Lake Reservoir is owned by MP and approximately one-third is private, State, or St. Louis County owned property.



The southerly portion of the main body of Fish Lake Reservoir is completely undeveloped. Most of the lands in this area are gently rolling and contain considerable wetlands. MP owns the majority of this shoreline, which is also

managed for watershed protection, wildlife habitat, and dispersed public recreation. In addition to MP lands, the St. Louis County Northeast Regional Corrections Center (NERCC) owns approximately one and one-half miles of undeveloped shoreline in this area, which is maintained as forest subject to grazing by their livestock.

The northerly portion of the main body of the reservoir, including the narrows just west of County Highway 48, is heavily developed in all ownership categories. Much of this shoreline is very steep, particularly in the area of the dam. MP leases recreational lots to private individuals in this area. In addition, MP leases two large lots on the eastern shore to the Duluth National Guard and one large lot to the Hi-Banks Resort. In addition to lands owned by MP, private lands and St. Louis County lands (privately leased) are generally developed as private residences and recreational cabins.

The major concentration of MP lease lots on Fish Lake occurs from a point just west of the dam in an easterly direction across the north shoreline of the main body of the reservoir to County Highway 48. This area includes the public boat launch at the dam and the Hi Banks resort. Other MP lease lots occur along the south shore of the reservoir narrows, approximately one-quarter mile west of County Highway 48, and along the east shore of the main body of the reservoir from a point beginning at the two National Guard leases, continuing in a northerly direction up through the narrows, Most of the lease lots will be offered for sale to the leases. A few lots will continue to be retained by MP and managed as recreation lease property under the Program.

Ownership of lands surrounding the east bay of Fish Lake Reservoir is split evenly between MP and private owners. With the exception of private residences located within one-quarter mile of County Highway 48, the area is primarily undeveloped, and most shoreline is bordered by wetlands. The vegetative cover in this area is mostly forested, with some open wetlands and pasture land. A small pasture lease on MP property occurs in Section 36 (Twp. 52N, Rge. 15W).

NCAs cover the south and westerly portion of the reservoir as well as the eastern end of the reservoir. The project boundary adjustment added an additional 57 acres of undeveloped mixed wetland and forested areas on the southeast peninsula of Fish Lake reservoir.

C. ISLAND LAKE RESERVOIR

Island Lake Reservoir is located approximately 15 miles north of Duluth and is the largest of the five storage reservoirs. This impoundment on the Cloquet River submerged several small lakes, creating a very irregularly shaped body of water. The surface area of the reservoir at full pond elevation is approximately 8,280 acres. Over 90 percent of the land surrounding Island Lake Reservoir is owned by MP. The balance of the land is almost exclusively privately owned. The State of Minnesota and St. Louis County each own less than one-half mile of shoreline. Nearly all of the reservoir shoreline is forested.

Island Lake is the largest and most heavily used inland lake near Duluth. In addition to the numerous public recreation sites, private recreational facilities, and institutional group lease, approximately 700 individual lakeshore lots are found on Island Lake Reservoir. Of these lots, approximately 600 are leased from MP, six lots are leased from St. Louis County, and the balance is privately owned. MP will be offering all of leases for sale to the current tenants, with the exception of a few institutional leases and cultural resource sites. The project boundary adjusted along the shoreline of these lease lots reduced the residential property by approximately 125 acres around Island Lake Reservoir. The project boundary adjustment added approximately 92 acres of undeveloped NCA lands below the dam and approximately 169 acres below the North Dike area around the reservoir. This is in addition to the several large undeveloped areas on MP property within the project boundary that are being maintained as NCAs.

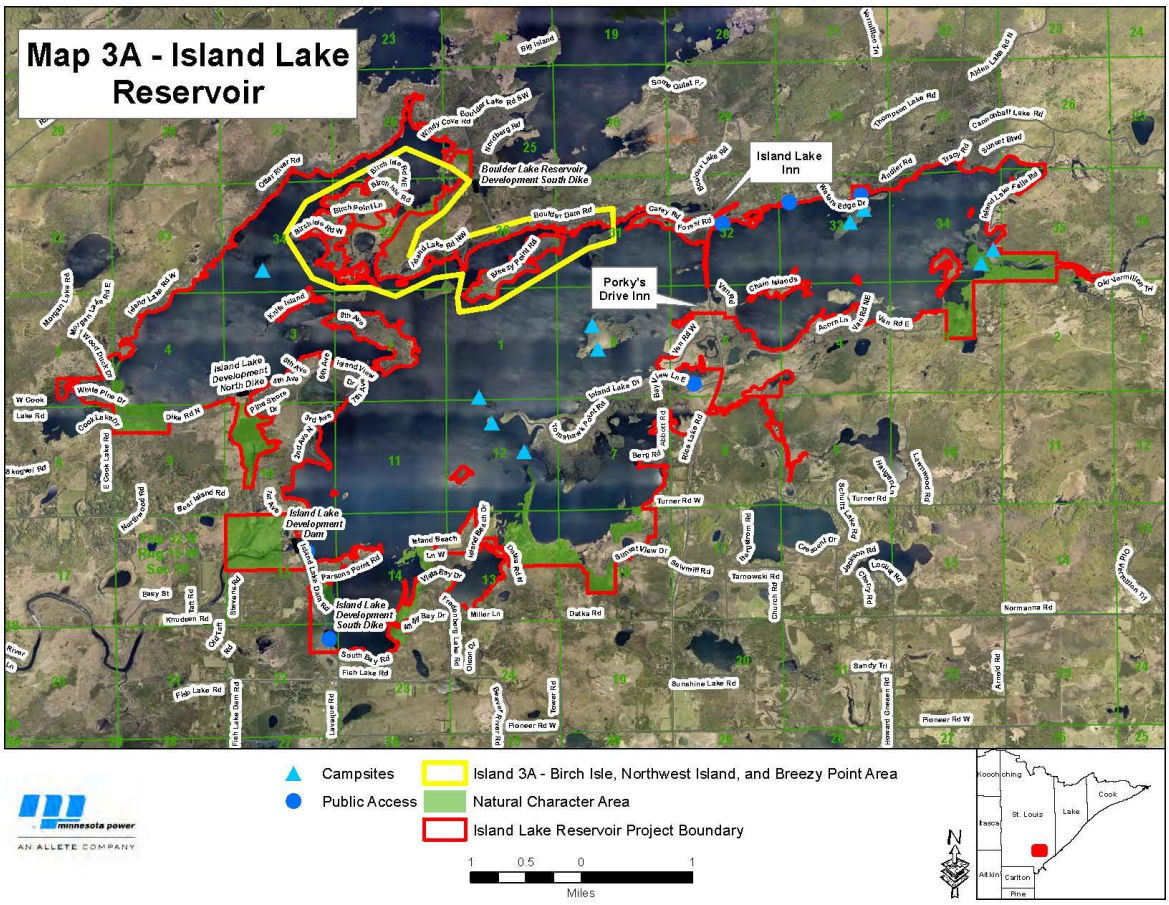
For purposes of discussing land use on Island Lake, the reservoir is divided into the following areas (see Maps 3A-3H):

Map 3A:	Birch Isle, Northwest Island, and Breezy Point Area
Map 3B:	West Island & Otter River Area
Map 3C:	North Dike & Bear Island Area
Map 3D:	Island Lake Dam Area
Map 3E:	South Bay & Tomahawk Point Area
Map 3F:	Causeway & Highway #4 Corridor Area
Map 3G:	Southeast Island Lake Area
Map 3H:	Northeast Island Lake Area

ISLAND LAKE: ***Birch Isle, Northwest Island, and Breezy Point Areas***

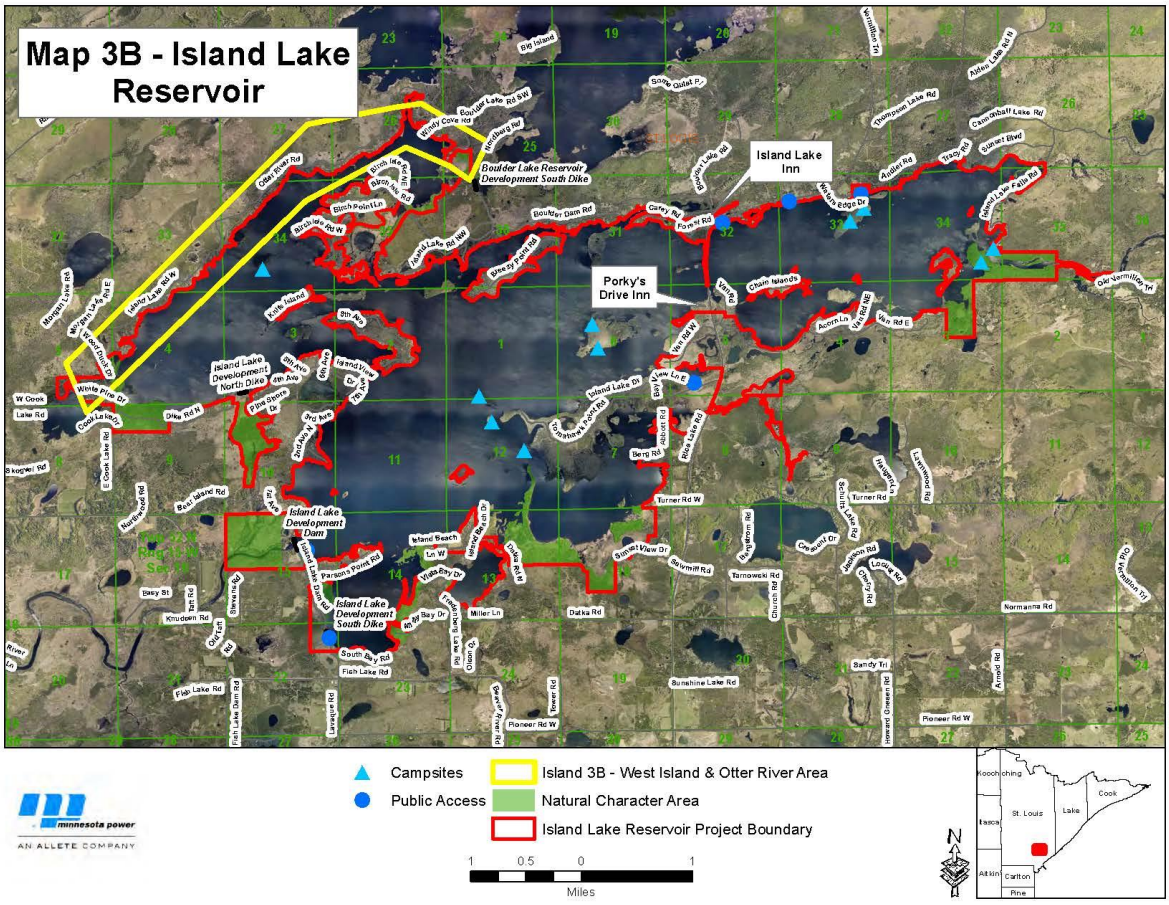
These three contiguous areas in the northwest section of Island Lake Reservoir (see **MAP 3A - ISLAND**). MP owns all of the shoreline in this area except a one-quarter mile segment of undeveloped State land. These areas are primarily flat to gently rolling, and they are entirely forested except for open wetlands.

The majority of the shoreline in this area is developed as MP lease lots and was part of the project boundary adjustment and future sales to the current occupants. The large undeveloped areas of Birch Isle and Northwest Island Lake are primarily wetlands and will be managed as an NCA for the benefit of wildlife and for the enjoyment of the public.



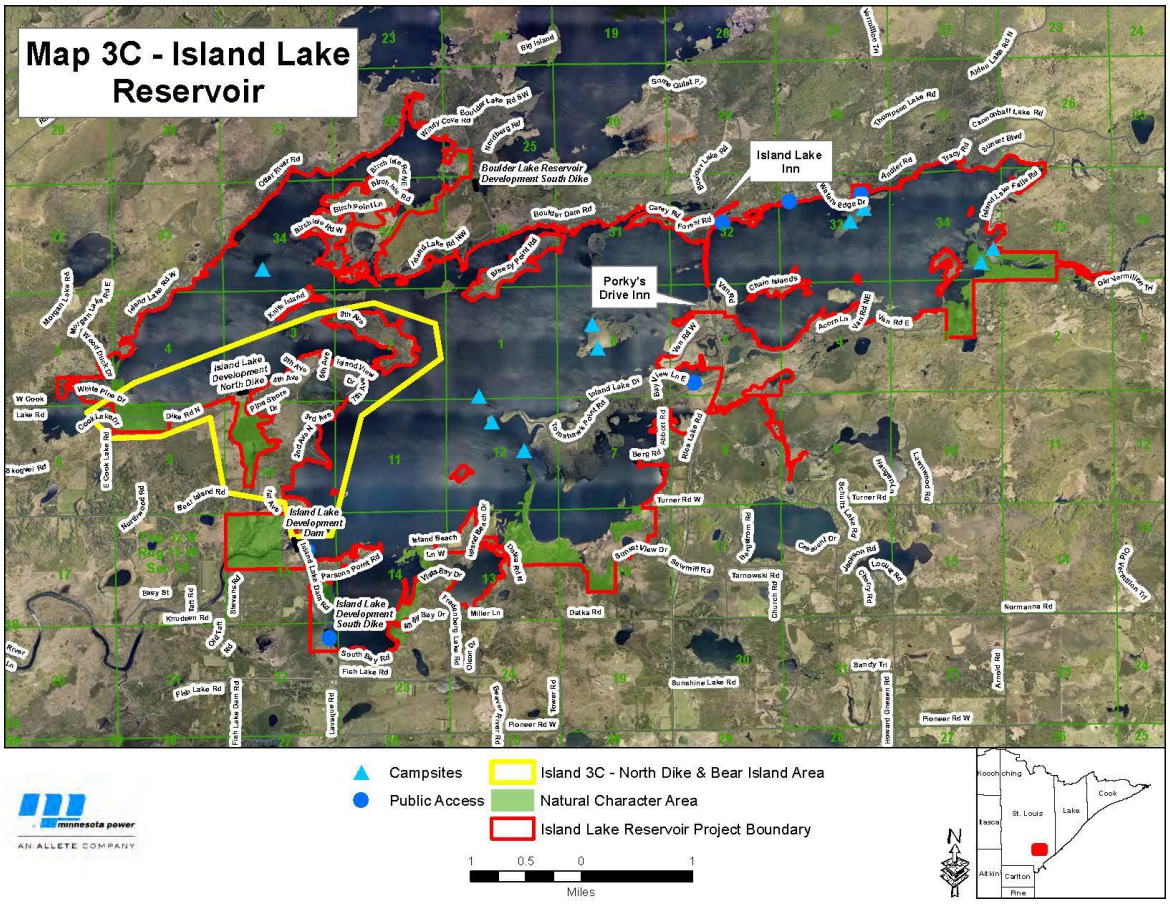
ISLAND LAKE: ***West Island & Otter River Area***

MAP 3B - ISLAND identifies land in the western end of Island Lake Reservoir which is entirely owned by MP, except for a few hundred feet of private undeveloped property in the extreme south. This area is generally flat or gently rolling, with a few steep shoreline areas on the south end. The land surrounding the reservoir in this area is entirely forested. The shoreline is largely leased for recreational lots and is part of the project boundary adjustment and sale offer in these areas. A one-half mile segment of undeveloped shoreline on the extreme south end will be managed as NCA.



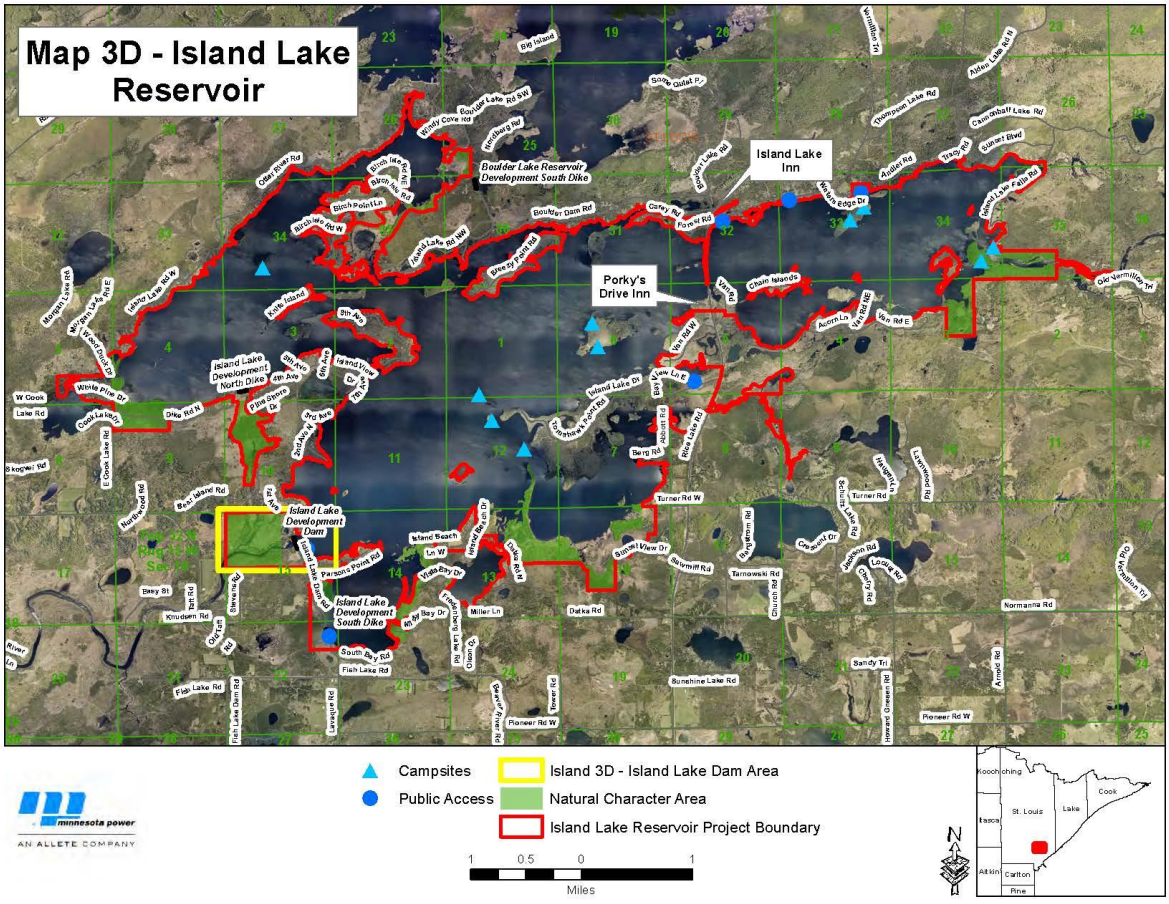
ISLAND LAKE: ***North Dike & Bear Island Area***

MAP 3C - ISLAND identifies this location in the southwest section of Island Lake Reservoir. Shoreline topography in this area includes rolling terrain (primarily the North Dike area) and steep banks (parts of Bear Island area). MP owns all of the shoreline in these areas, except for a one-quarter mile segment of private developed property (approximately one mile north of the Island Lake reservoir dam). The majority of the shoreline is developed as recreational lease lots and is part of the project boundary adjustment and lot sale starting in 2022. The north dike occupies nearly one-quarter mile of shoreline. The most westerly portion of this area is a designated NCA. MP added 169 acres of undeveloped mixed wetland and forested areas downstream of the North Dike as designated NCA land.



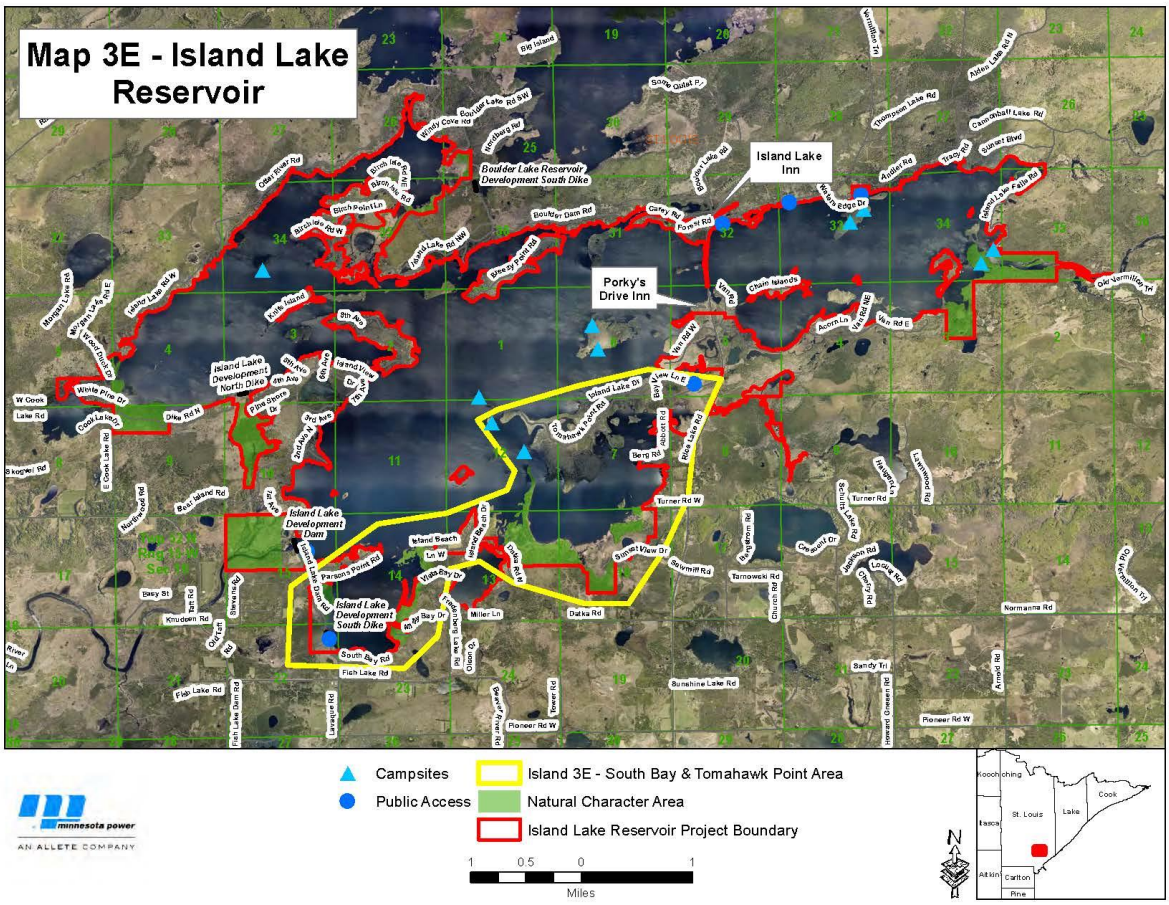
ISLAND LAKE: ***Island Lake Dam Area***

MAP 3D - ISLAND identifies the area located within approximately one-quarter mile of the dam, all of which is owned by MP. North of the dam, the shoreline topography is very steep in most areas. The shoreline east of the dam varies from steep to gently rolling. With the exception of the area adjacent to the dam, the entire area is leased for recreational lots which will be offered for sale starting in 2022 and was part of the project boundary adjustment. The area surrounding the dam is managed as a public recreation area for access to the reservoir and Cloquet River. MP added 92 acres of undeveloped mixed wetland and forested areas downstream of the dam as NCA lands into the project boundary.



ISLAND LAKE*: South Bay & Tomahawk Point Area*

These two areas are located south and east of the dam (see **MAP 3E - ISLAND**). The topography is generally level to gently rolling, and many shoreline areas are bordered by wetlands. MP owns the majority of the shoreline, but this area also includes the largest concentration of private lands on the reservoir. Private lands located in this area extend for over four miles. St. Louis County's ownership occupies approximately one-fourth of a mile.



The west shore of South Bay contains a public angling access site directly north of the dike. The north and south shores of South Bay are developed as MP recreational lease areas which will be offered up for sale and are part of the project boundary adjustment. The east shore of South Bay contains scattered MP property (all NCA), the small St. Louis County frontage, and much of the private property that has been developed for cabin/homesites.

The area directly east of South Bay is primarily privately owned and is developed as home sites and seasonal residences. This area also includes the Island Beach Campground. This private campground was sold to a developer who constructed townhomes on the property. A small undeveloped area of MP property lies directly west of the private development described above, and is a NCA. Directly to the east of the private

development, there is an extensive area of land owned by MP, which leads into the bay located south of Tomahawk Point. The first quarter mile of this section of shoreline is developed as recreational lease lots.

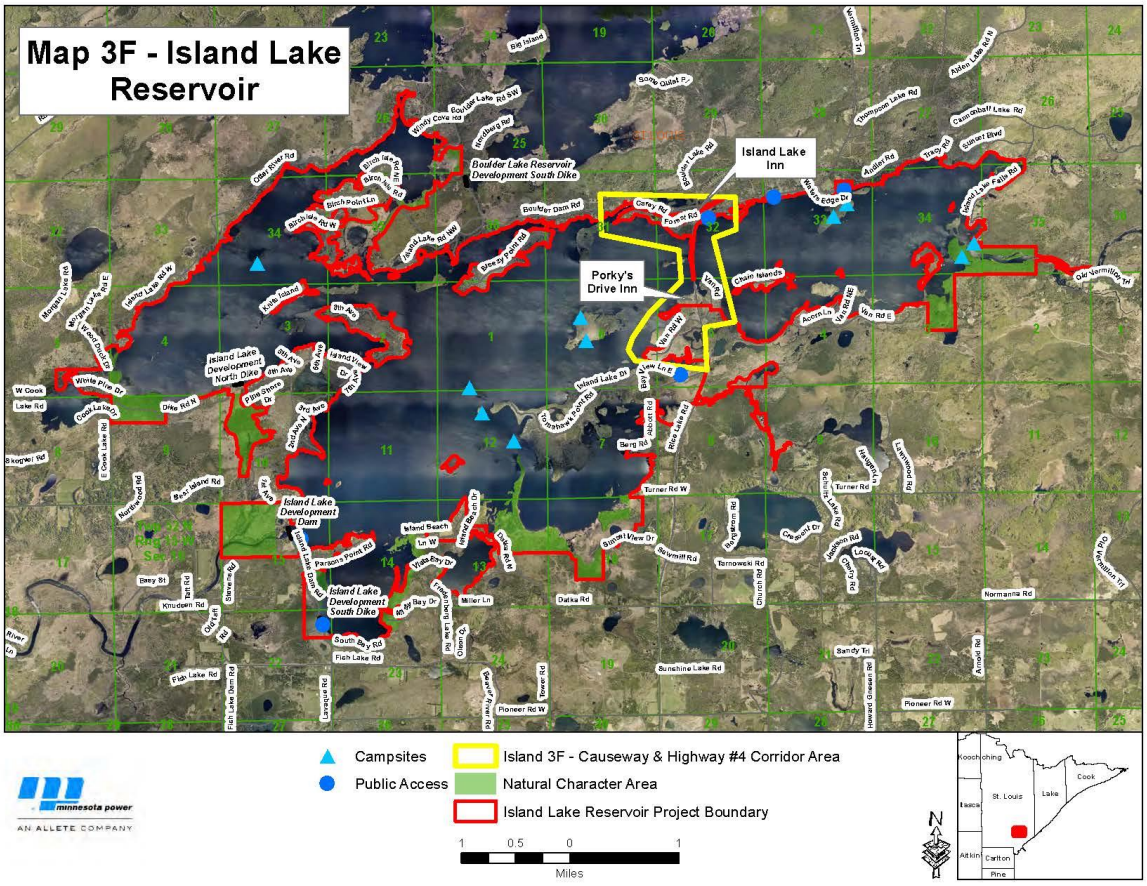
This large undeveloped area contains a long narrow point which is oriented north-south, and separates Hay Bay from the rest of Island Lake Reservoir. Hay Creek, a small tributary to Island Lake Reservoir, drains into Hay Bay. The majority of south shore of Hay Bay is a designated NCA.

The east shoreline of the bay, which includes the Abbott Road causeway is nearly all privately owned and is partially developed as private home sites. Three small points of land in this east shoreline area are owned by MP, two of which are undeveloped, and one which is privately leased. The undeveloped areas will continue to be managed as NCAs. The extreme east shoreline of the bay, where Hay Creek enters the reservoir, fronts on a narrow bay and includes the County Highway No. 4 stream crossing. This area includes extensive wetlands which are primarily owned by MP and will continue to be managed for wildlife and fisheries habitat. The north shoreline of this bay, adjacent to and west of the Abbott Road causeway is privately owned and largely undeveloped.

Tomahawk Point forms the western land mass bordering this bay and also directly fronts the main body of Island Lake Reservoir to the north. The area is entirely forested with rolling and steep terrain. With the exception of about a mile of developed private shoreline in the extreme northeast corner of the peninsula, all Tomahawk Point lands are owned by MP. Two private lease lots are located on the western part of the peninsula. The development of a limited number of non-profit group leases in a very low density arrangement is planned for the main body of the peninsula. The MDNR was concerned in their comments on March 29, 2007 of the reference here to non-profit groups being located in this location, but MP believes their use could work in tandem with the required recreation development, or independently if the recreation requirements of Tomahawk Point are located elsewhere, as have been contemplated. The Recreation Plan for the SLRP (previously filed with the Commission) relocating the proposed facilities at Tomahawk Point and several additional campsites were located elsewhere and the Island Lake Pavillion/Picnic area was developed.

ISLAND LAKE: ***Causeway & Highway No. 4 Corridor Area***

MAP 3F - ISLAND identifies the area which includes the corridor along St. Louis County Highway #4, and is called the Island Lake Causeway. This section also includes lands directly to the northwest of the Causeway, leading westerly to the Breezy Point area, described earlier. The shoreline is generally level, with scattered areas of steeper topography.



The Causeway is the most heavily developed commercial recreation area on the reservoir system. The Island Lake Inn, a private business, is located directly north of the Causeway, and Porky's Drive Inn and Smokehouse, another private business, is located south of the Causeway. In addition, the Island Lake Picnic Area is located directly northeast of the Causeway.

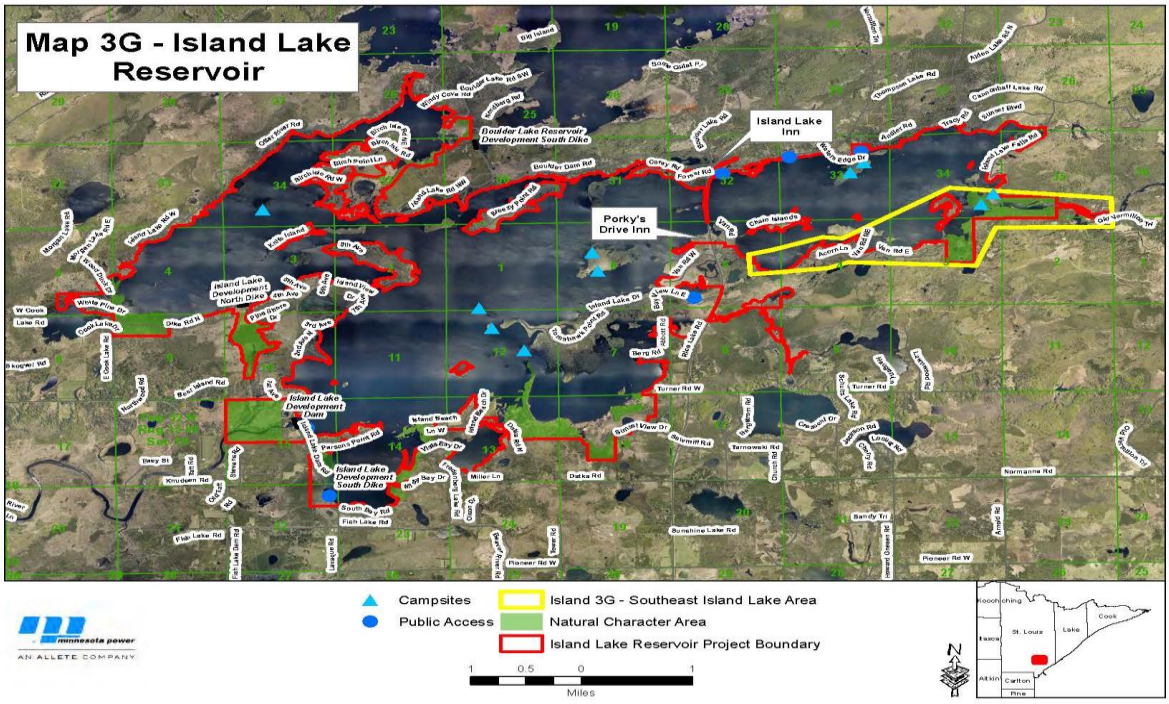
At the south end of the Causeway, approximately three-quarters of a mile of shoreline are privately owned. The private land east of the highway is developed as private

residences and cabins. On the west side of the highway and south of the private land shoreline owned by MP is leased for cabin and home sites which will be offered for sale starting in 2022 and part of the project boundary adjustment.

Directly northwest of the Causeway is a one mile long peninsula, accessed by the Carey Road. The south shoreline of this peninsula, which fronts the main body of Island Lake, is owned entirely by MP, except for a few hundred feet of private shoreline developed as two residences. MP shoreline is leased for cabin and home sites. The north shoreline of this peninsula fronts on a narrow bay. The north shoreline on the west one-half mile of this peninsula is owned by MP, and due to the narrowness of the peninsula, these lands essentially serve as the ''back yards" of the leases fronting on the south shoreline. The north shoreline on the east half of the peninsula, together with the shoreline located directly north across the bay, is privately owned and partially developed as home sites. Further to the west and north of this peninsula, the shoreline is again owned by MP. Most of this shoreline is leased for cabin and home sites will be offered for sale beginning in 2022 and the project boundary was adjusted.

ISLAND LAKE: ***Southeast Island Lake Area***

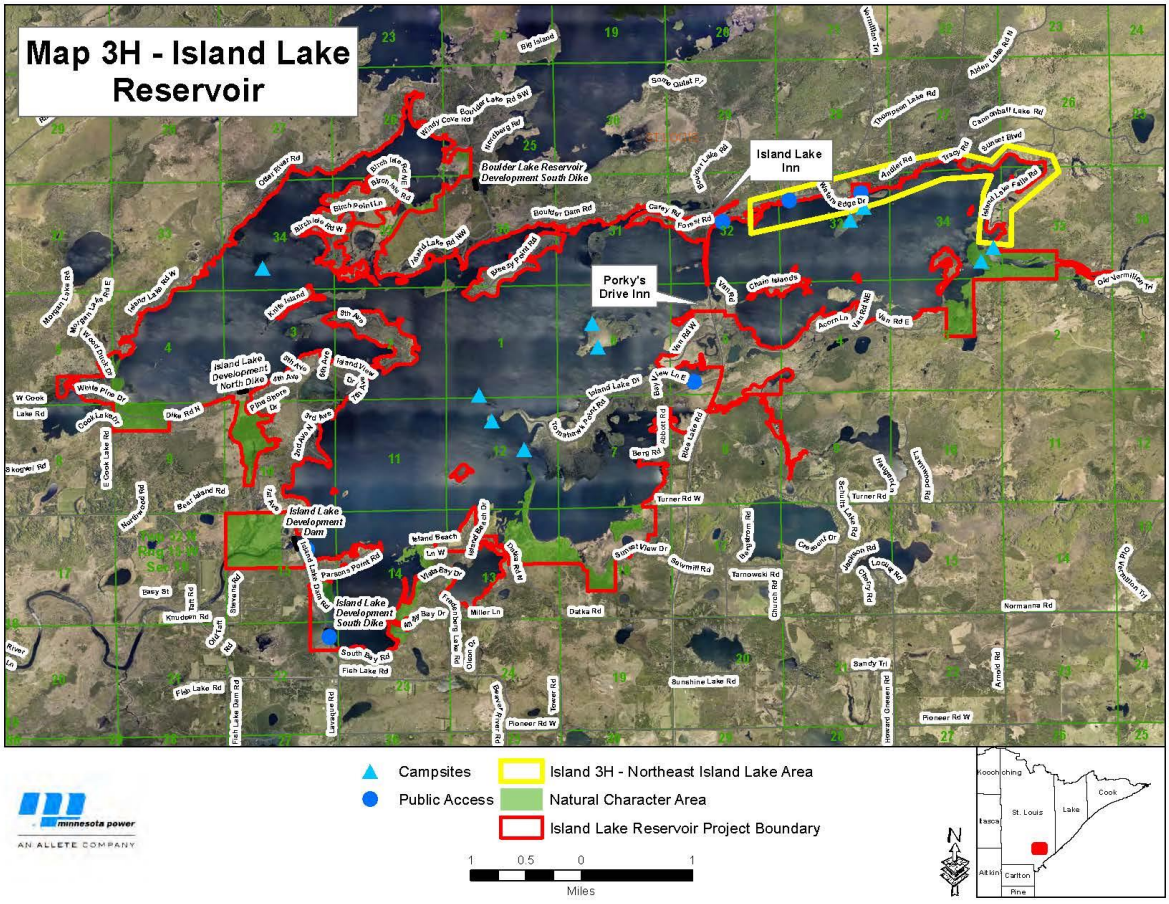
This area is one of the steeper areas of shoreline on Island Lake (see **MAP 3G - ISLAND**). With the exception of about one-half mile of private shoreline, developed as a residence and hobby ranch, the shoreline is owned entirely by MP. The western part of this shoreline is leased for homes and cabins, except for approximately one-half mile of steep shoreline. The lease lot shoreline was reduced in the project boundary and are going to be offered for sale in 2022. The entire eastern part of this shoreline (more than three miles, including the Cloquet River inlet) is part of a NCA, except for two lease lots. The lease lots will be offered up for sale and the project boundary was adjusted.



ISLAND LAKE: ***Northeast Island Lake Area***

The shoreline in this area is primarily owned by MP. The lease lots will be offered for sale and the project boundary has been reduced. MP also manages properties for public recreation such as at the Island Lake Picnic Area and Hideaway Boat Launch. In addition, about 100 feet of lake frontage owned by a private owner and two small areas are owned and leased by St. Louis County (6 lease lots). The topography along the shoreline is generally steep and rugged, but several moderate and flat areas occur (see **MAP 3H - ISLAND**).

The lands bordering the Cloquet River inlet are designated as a NCA. Most of the remaining lands are privately owned or leased for residences and cabins, except for the Hideaway Recreation Area.



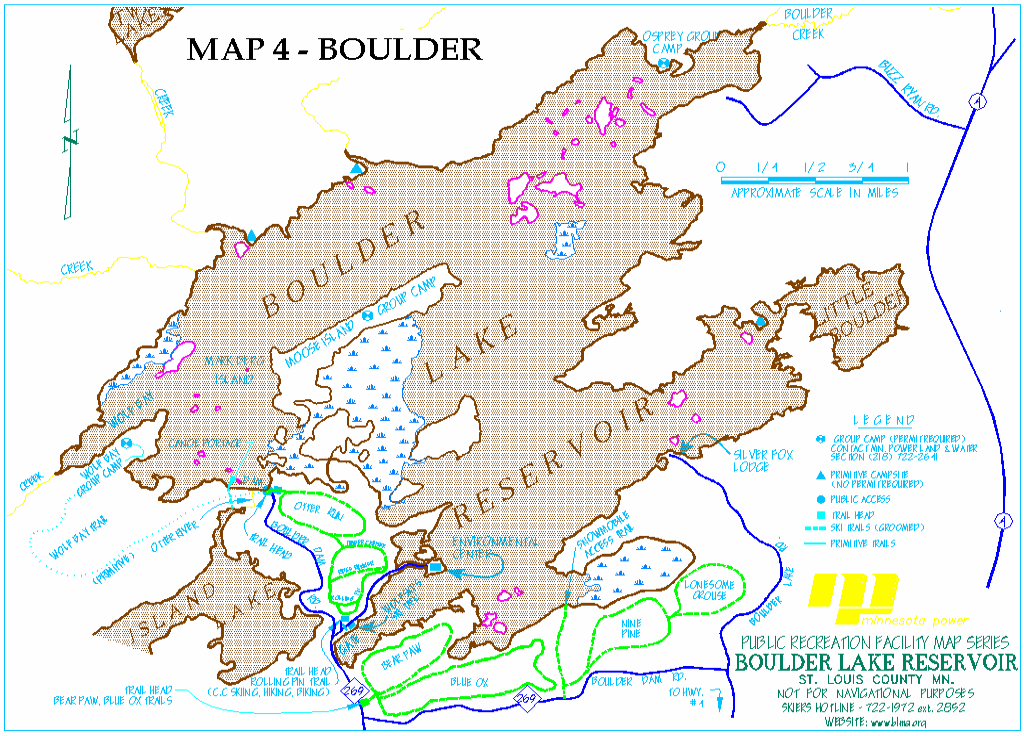
ISLAND LAKE: ***Islands***

Island Lake Reservoir contains a large number of islands, ranging in size from less than one acre to a maximum of more than 50 acres. The majority of the islands are undeveloped and open for public use, including primitive campsites. Approximately 20 private and non-profit group leases are located on islands. The private lease lots will be offered for sale and the project boundary has been reduced. No additional single-family leases will be developed on islands, and institutional leases may be considered from time-to-time where appropriate.

D. BOULDER LAKE RESERVOIR

Boulder Lake Reservoir was formed by the construction of a dam on Boulder Creek (a.k.a. Otter River) and encompasses two natural lakes that were known as Boulder Lake and Otter Lake. At full pond elevation, Boulder Lake Reservoir has a surface area of 4,450 acres.

The land surrounding Boulder Lake Reservoir is primarily undeveloped and owned by MP (see **MAP 4 - BOULDER**). Most of the recreational lease lots on Boulder Lake Reservoir are concentrated in the southeasterly end of the reservoir. Most of these leases are located on a small peninsula southeast of the dam. In addition, there is one private resort lease (Silver Fox Lodge), and several private homes adjacent to the resort.



Through the creation of the Boulder Lake Management Area (BLMA), a nearly 18,000 acre cooperative management area that includes land owned and managed by MP, St. Louis County and the State of Minnesota, no additional single-family lease lots are permitted. One remaining lease on the northerly end (a.k.a. "the Otter Lake end") of the reservoir may eventually be moved to the southerly end (a.k.a. "the Boulder Lake end") to keep development concentrated to the southeasterly portion of the reservoir. The intent being that the Otter Lake end of the reservoir is the least developed portion of the reservoir and shall be enhanced by moving these leases to the Boulder Lake end. Other institutional or hunting leases may be determined advantageous or beneficial to the area,and may also be established from time to time in the forest areas of the BLMA or at the reservoir shoreline.

Overall management of the BLMA has been established by the Boulder Lake Management Area Stewardship Plan (Boulder Lake Conservation Area Management Plan, See Appendix C), and will be updated at least every 10 years with relevant information, but consistent with the intent of the original 1993 application plan.

Forest management will continue to occur throughout the BLMA and public recreational development will be established to fulfill the goals of the management plan.

E. WHITEFACE RESERVOIR

Whiteface Reservoir is located about 35 miles north of Duluth on the Whiteface River, a tributary of the St. Louis River. This is the only storage reservoir which did not originally contain one or more natural lakes. At full pond elevation, the surface area of Whiteface Reservoir is about 4,980 acres.

The Whiteface Reservoir area contains a wide diversity of shoreline topography and forest vegetation. Land ownership surrounding Whiteface Reservoir is the most varied of all reservoirs in the project. MP owns slightly less than one-half of the shoreline. The balance is owned by private owners, USFS, MDNR, and St. Louis County. In addition to the MP recreational lease sites and private lots, the three agencies also have recreational lease lots scattered about the reservoir. Since the original license application, the MDNR has sold most of their lease lots on the reservoir to private individuals. The private land is largely developed as seasonal residences. MP is planning on offering all of leases for sale to the current tenants, with the exception of a few institutional leases and cultural resource sites as part of the divestiture plan. The project boundary on these lease lots was reduced from a 25 foot horizontal setback to a 3 foot horizontal setback from the full pond elevation. With the 2021 project boundary adjustment, MP added an additional 151 acres of undeveloped mixed wetlands and forested areas as NCAs around the north bay of the reservoir.

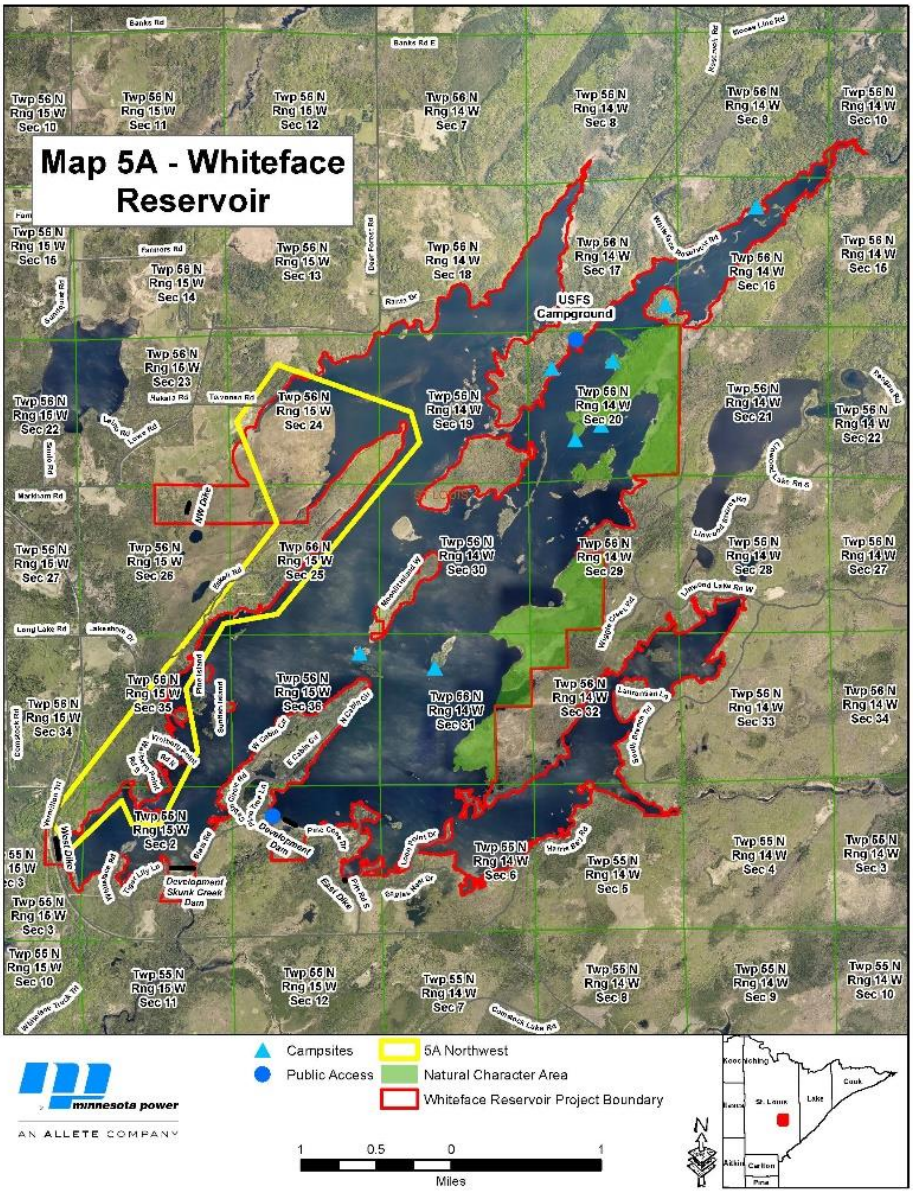
For purposes of discussing land use on Whiteface Reservoir, the reservoir is divided into the following areas:

5A. Northwest Whiteface Area

5B. South Whiteface Area
5C Harris Bay & Peninsula Area
5D North Bays

WHITEFACE: ***Northwest Whiteface Area***

The northwest area of Whiteface Reservoir is located northeast of the West Dike (see **MAP 5A - WHITEFACE**) which is directly adjacent to St. Louis County Highway No. 4 This area includes over four miles of shoreline, and terminates in a large wetland which is located north of a narrow peninsula in Section 24 (Twp. 56N. R 15W).

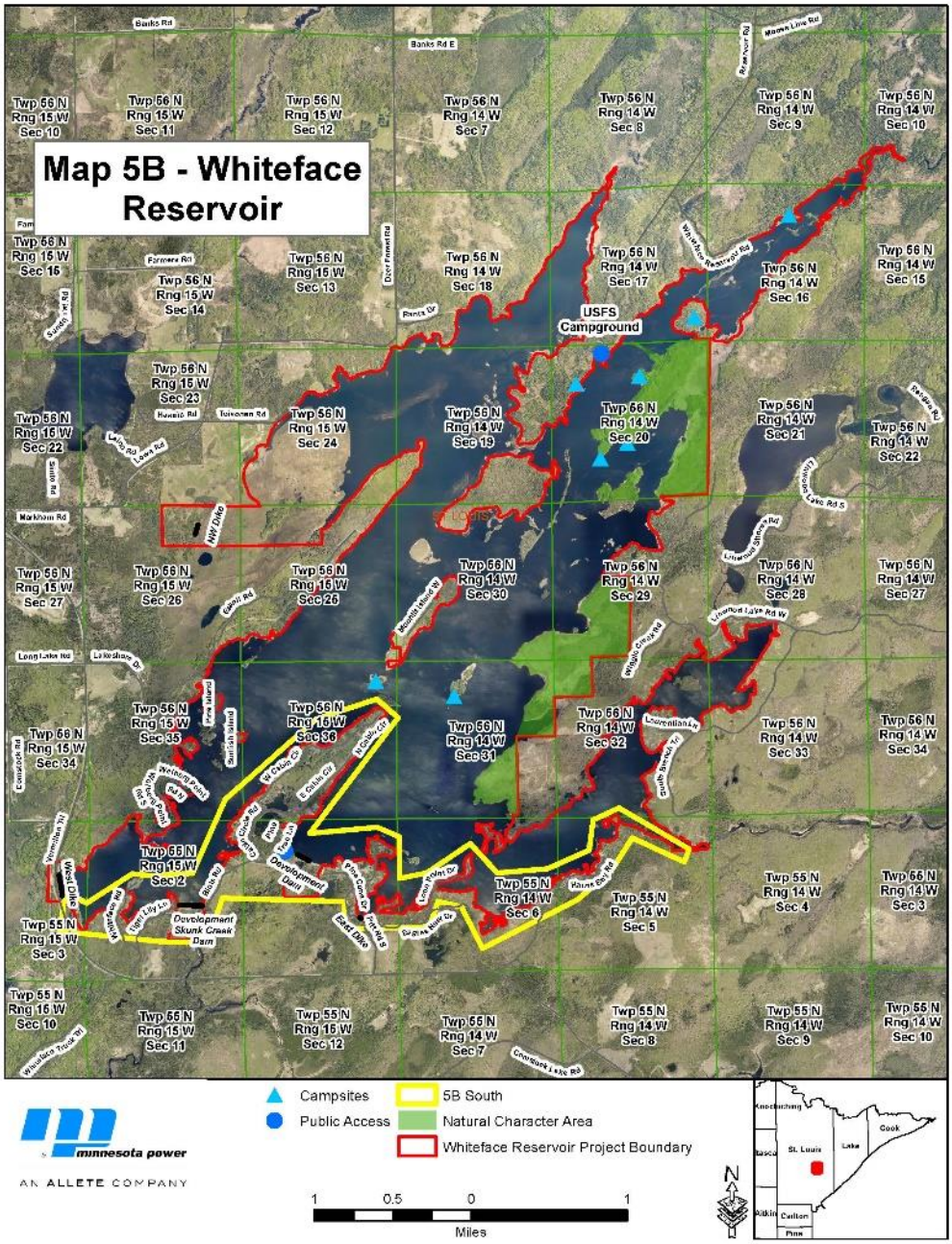


About two-thirds of the shoreline is owned by MP, and one-third is owned privately. Most of the MP shoreline is leased for private seasonal cabins which had the project boundary adjusted and is intended for sale. Scattered undeveloped shoreline remains within the

lease areas. The private shoreline in this area varies considerably. The area near the tip of the peninsula is developed, and the rest is largely undeveloped.

WHITEFACE: ***South Whiteface Area***

This area includes the most developed portions of Whiteface Reservoir, including both dams (see **MAP 5B - WHITEFACE**). MP owns the majority of the shoreline, which is largely developed as recreational leases and MP plans to offer the lease lots for sale.

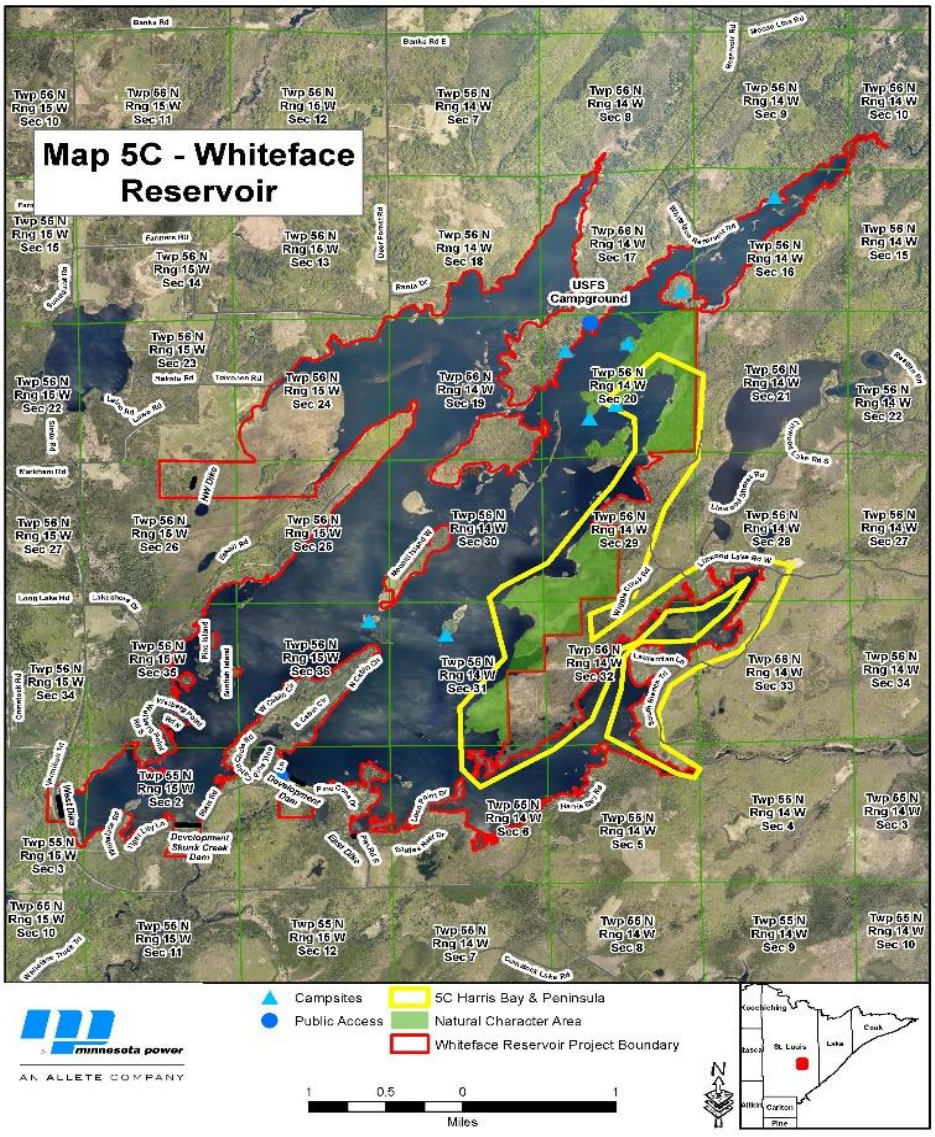


About one-half mile of private land in this area is also largely developed as seasonal residences. St. Louis County owns nearly one mile of shoreline, about half of which is

also leased. Over two miles of shoreline, located north of the dam, formerly owned by the State of Minnesota (now private), is developed as seasonal residences.

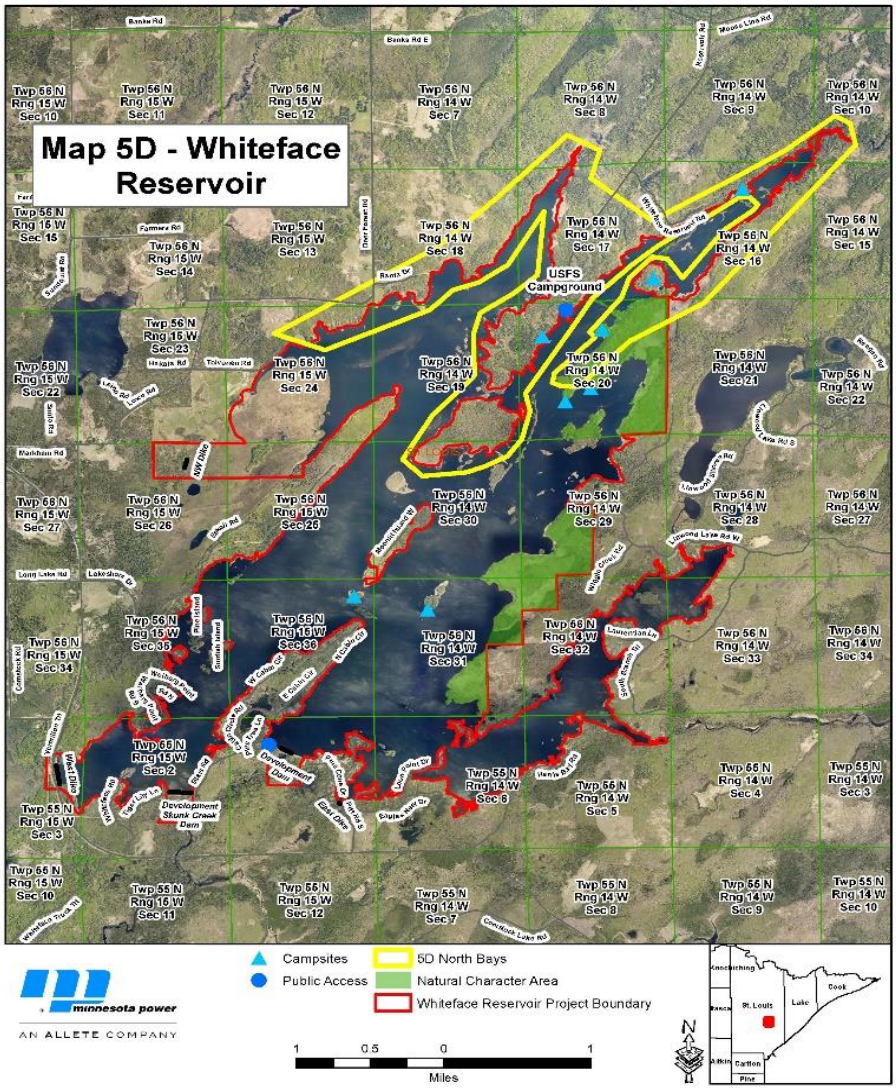
WHITEFACE: ***Harris Bay & Peninsula Area***

The northeast area of the reservoir borders a long narrow bay in the south and also fronts the main body of the reservoir in the north (north shore of the peninsula, see **MAP 5C - WHITEFACE**). Most of the shoreline in the southeastern portion of this area is owned and leased by MP and will be mostly included in future land sales. The project boundary was adjusted for the recreational lease lots that will be sold off. The USFS owns considerable undeveloped land in this area including shoreline in the west and north. Throughout the area, several large wetland areas owned by MP will be protected from development, as will the entire northwest face of the peninsula, since it is under NCA designation.



WHITEFACE: ***North Bays***

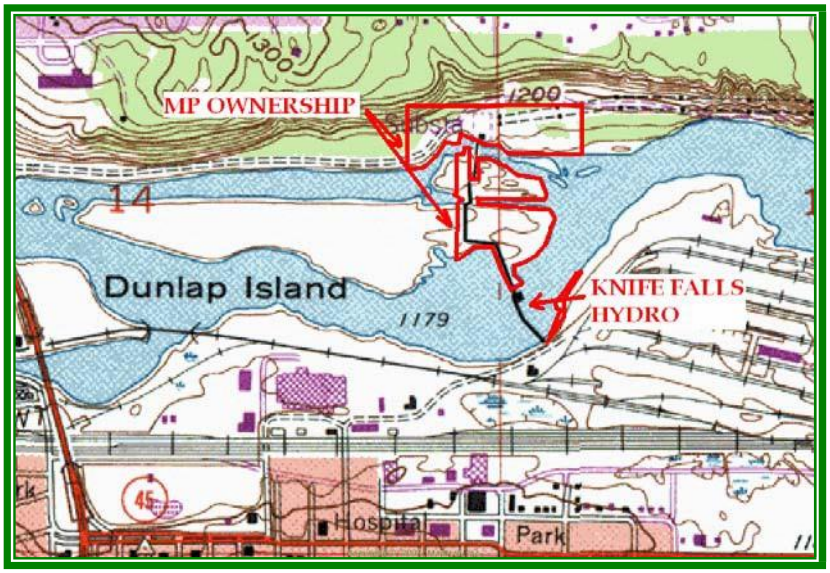
The north end of Whiteface Reservoir contains two very large bays (see **MAP 5D - WHITEFACE**). MP ownership is very small in this area (less than one-half mile of shoreline). MP has several lease lots in this area that had the land adjusted for the project boundary and future sale. About one mile of private shoreline is located in this area, which is moderately developed. Most of the land is owned by the USFS and the MDNR. The USFS has their Whiteface Recreation Area, including campground, beach, shorefishing, boat launch and picnic area. The MDNR has an area leased for seasonal residences. Most of the public land is undeveloped and open to the public. In 2021, the project boundary was extended to include additional NCA lands on the western peninsula in this area. With the inclusion of NCA around Whiteface Reservoir, about half of the reservoir shoreline is open to the general public. No specific recommendations have been received about public boating traffic being a current problem. Current demand for boat launching does not exceed the public boat launches.



F. KNIFE FALLS RESERVOIR

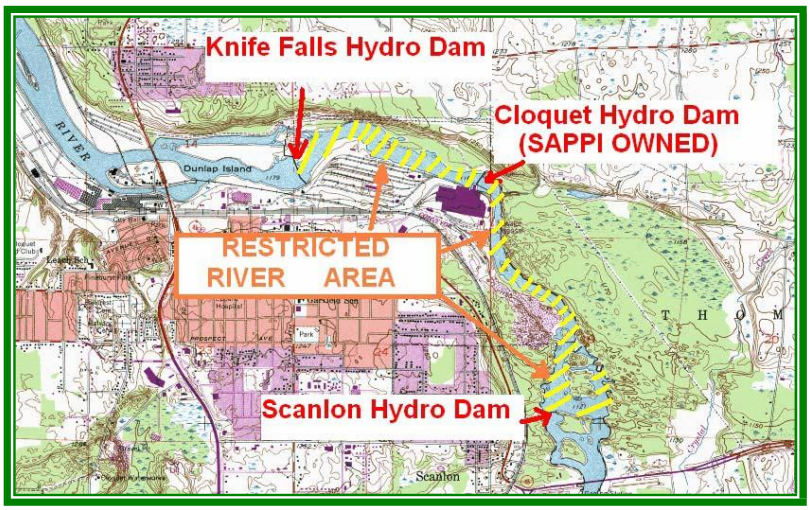
Knife Falls Reservoir is a small generating reservoir located in the City of Cloquet, Minnesota. Approximately 17 acres of land are owned by MP at the dam, and the remaining shoreline is mostly privately owned and developed as industrial or railroad property. The property is to remain in its current use. At some future date a canoe portage may be established between the Knife Falls Reservoir and the SAPPI (formerly Potlatch) Reservoir. Currently, public health issues related to the SAPPI pulp mill prevent the introduction of public access to this stretch of the river. MP ownership at the reservoir is limited to the dam site and does not lend itself to NCA designation

As required under License Article 427, MP has considered designating additional Natural Character Areas on licensee-owned lands at Knife Falls Reservoir. Due to the limited amount of MP land ownership at the Knife Falls Reservoir, MP has determined that it is not feasible to create a Natural Character Area at the reservoir. MP ownership is only located at the hydro dam, an area that is primarily industrial. MP's land ownership encompasses the hydro facility and appurtenant structures, including spillways, concrete dikes, substation and transmission lines. Knife Falls Hydro is located in the industrial zone of the City of Cloquet, Minnesota. No development is planned for the MP property, however, if air quality issues with the SAPPI paper mill (formerly Potlatch) are effectively eliminated, MP is required to provide a canoe portage across its land ownership in this location.



G. SCANLON RESERVOIR

Scanlon Reservoir is a small generating reservoir located downstream of Cloquet, just below the SAPPI (formerly Potlatch) dam. MP owns approximately 33 acres of land surrounding the dam and reservoir. No other private land adjoins the reservoir, although SAPPI owns land behind MP's 75 foot strip of ownership north of the dam on the west shoreline. This land is used for an industrial landfill.



The entire shoreline owned by MP is undeveloped. The eastern shore is under NCA designation.

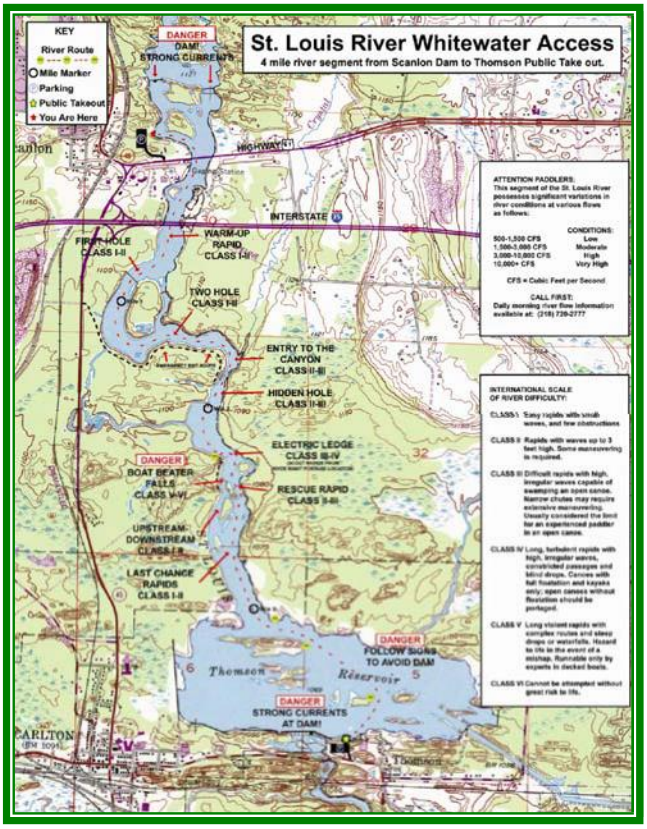
A recreational trail may be established in the future by the city of Scanlon along the shoreline. A canoe portage around the Scanlon Dam (if developed in the future) may use this same trail and link to the Scanlon Riverside Park Whitewater Access, downstream. A canoe portage may be established in the future connecting the SAPPI Reservoir with the Scanlon Reservoir, if air quality/public health issues related to the SAPPI pulp mill are resolved.

H. THOMSON RESERVOIR

The Thomson Reservoir is located about two and one-half miles below Scanlon Reservoir. The Thomson Powerhouse is located about five miles below Thomson Reservoir in Jay Cooke State Park, and is connected by a diversion canal. Thomson Pond covers approximately 384 surface acres, and all of the shoreline is owned by MP. The land along the diversion canal and adjacent to the powerhouse is limited and utilized in its entirety for hydroelectric power facilities.

The west and south shores of the reservoir contain a series of dikes and rock ledges, as well as the dam itself. The east shoreline contains the Upper Gate House, which discharges water into the Forebay Canal diversion. The Village of Thomson borders MP lands along the southeast part of the reservoir. The City of Carlton borders the lands along the southwest part of the reservoir. The north portion of reservoir shoreline

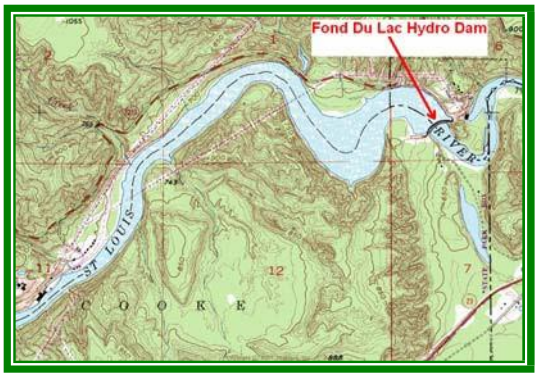
is completely undeveloped and is very attractive due to its rock outcroppings and tree cover. The vast majority of Thomson Reservoir is designated as a NCA. Recreational development is limited to the Public Whitewater Takeout to the east of the Thomson Dam. The MDNR references this change in its March 29, 2007 letter as to the map that is included in Appendix A: Natural Character Areas.



Since the Appendix map shows the Thomson Reservoir Whitewater Takeout as it was originally depicted in the original 1993 filing, it does not show the more current location of the Whitewater Takeout just east of the Thomson Dam.

We are providing the updated map here for clarity (at right). This map was also included in the recently filed Recreation Plan for the Project to depict the entire whitewater boating route from just below Scanlon Dam to Thomson Reservoir.

I. FOND DU LAC RESERVOIR



Fond du Lac Reservoir is located within Jay Cooke State Park and begins directly below the Thomson Powerhouse. MP owns a narrow strip of shoreline around the entire reservoir, and all of the surrounding lands are part of Jay Cooke State Park.

MP shoreline is managed as part of the state park. The north shoreline is accessible from State Highway #210, which is a main public thoroughfare through Jay Cooke State Park. The south shoreline is completely undeveloped and adjoins rugged park land which is used for hiking and cross country skiing. Information about Jay Cooke State Park is available online at the MDNR's website at: http://www.dnr.state.mn.us/state_parks/jay_cooke/index.html . MP's canoe portage on the reservoir is the only designated public access to the reservoir.

APPENDIX A

NATURAL CHARACTER AREAS

(Originally submitted in 1993, and updated January 19, 2022)

NATURAL CHARACTER AREAS

This appendix describes in more detail the management that will occur on the major stretches of undeveloped shoreline for each reservoir, known as Natural Character Areas (NCAs) Also included in this appendix are a set of maps for reference. Descriptions of management may also include lands beyond the project boundary, but contiguous with the undeveloped shoreline, in order to more fully describe these areas.

The NCAs provide the appropriate balance between developed and undeveloped uses of all project lands by managing these undeveloped lands for recreation, wildlife habitat, and protection of scenic, cultural, dam safety, and watershed resources, protections. Approximately 469 acres of NCA lands were added to the project boundary in 2021 as part of the project boundary adjustment. These lands included approximately, 261 acres on Island Lake Reservoir, 57 acres on Fish Lake Reservoir, and 151 acres on Whiteface Reservoir.

WILD RICE LAKE RESERVOIR

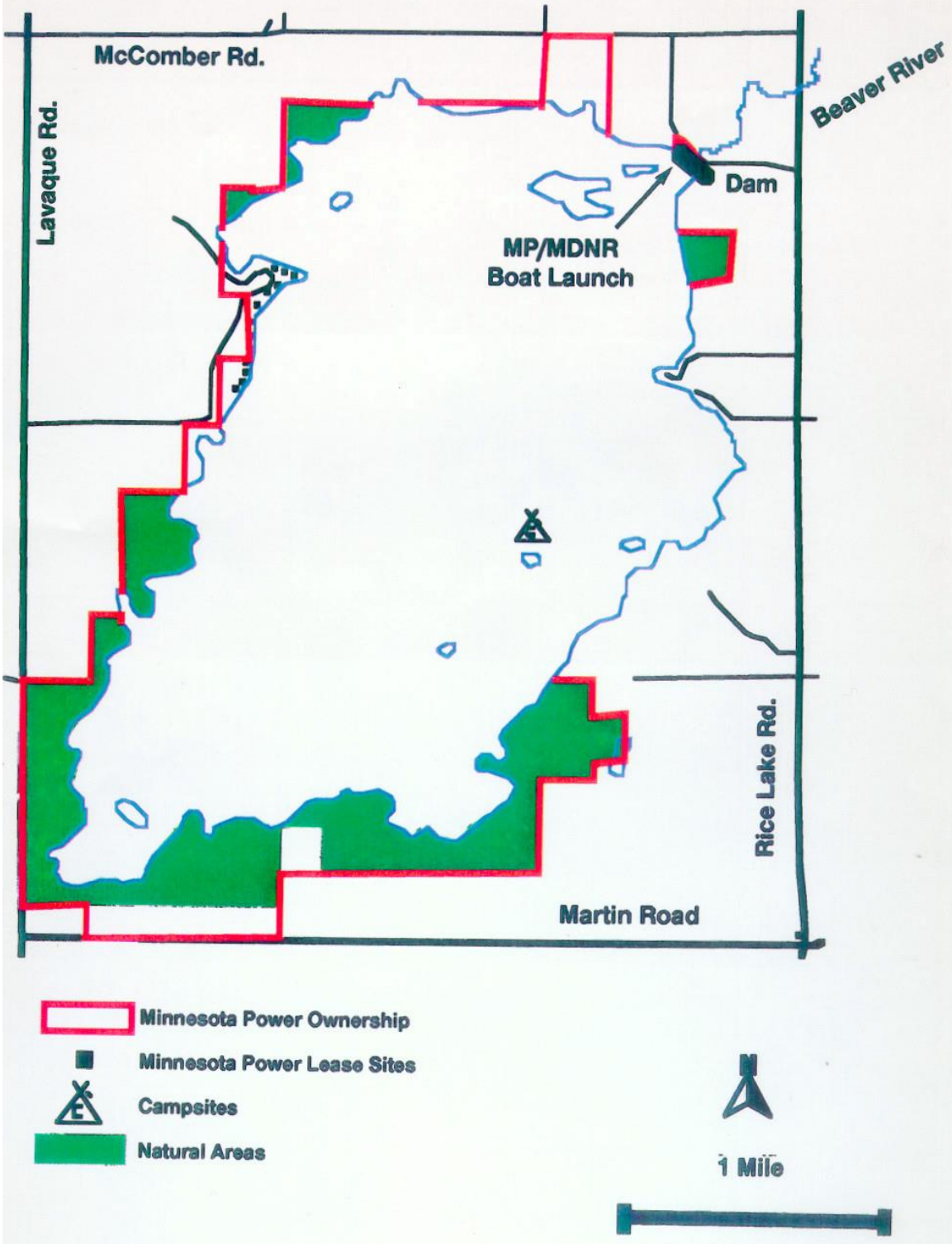
Most of Wild Rice Lake Reservoir is undeveloped. All of the shoreline owned by Minnesota Power on the south one-half and significant portions of the ownership on the north one-half of the reservoir will remain as NCA, approximately seven and one-quarter miles of shoreline. This shoreline is generally low and marshy and contains large areas of wetlands which are considered valuable to waterfowl. These undeveloped areas on the reservoir will be preserved in a natural state to uphold the integrity of wetlands and their value to waterfowl, and to keep the reservoir attractive to bald eagles. Although Rice Lake Reservoir has no active eagle's nests, the reservoir may be an important foraging area for local eagles because it supports good populations of fish and waterfowl. Eagles have often been observed foraging on the reservoir. The upland surrounding Wild Rice Lake Reservoir is comprised largely of second growth stands of paper birch and does not contain an abundance of the large trees that are preferred by eagles for nesting and perching. However, some potential nest and useable perch trees do exist, and the secluded nature of this property may be important to eagles. In addition to waterfowl and eagle habitat, any significant archaeological resources will be protected by managing the current undeveloped shorelines of Rice Lake as natural areas. The proposed project boundary includes most of the backlands associated with the undeveloped shoreline. The project does not include some land on the south side of the reservoir where there is a private hunting lease, and frontage along a public highway (Martin Road).

As in the past, the public will be allowed access to the undeveloped stretches of shoreline on Wild Rice Lake for recreational activities such as hunting, trapping, fishing, and wildlife observation. Most public access to these areas will occur via the water because there are no developed access routes to these areas on the upland. MP does not plan to develop any access routes on the upland, however some recreational trails could be developed in the future if the need arises. For example, a Minnesota Department of

Natural Resources managed snowmobile trail was recently developed along the south shore. Access to areas that contain critical wildlife habitat (eagle nests) or significant cultural resources may need to be restricted.

The backland areas beyond the shoreline will continue to be managed for timber production, where it is economically feasible, using sound forest management practices. Timber management on these lands will include plans for wildlife habitat enhancement and protection. For example, trees with potential for eagle nesting and perching will be protected during harvesting operations and encouraged through thinning practices. Logging operations are generally conducted away from the shoreline of the reservoir. When timber management plans include land within the shoreland zone logging will be of a selective nature and will be done to protect the health of the stand or to enhance wildlife habitat.

Rice Lake Reservoir



FISH LAKE RESERVOIR

Fish Lake Reservoir contains large areas of undeveloped shoreline, nearly all of which are owned by Minnesota Power. Approximately 15-1/4 miles of shoreline will be designated as NCAs The largest concentration of undeveloped shoreline is along the southerly portion of the main body of the reservoir and around the southeasterly tail of the reservoir. An additional 57 acres of NCAs were added in 2021, consisting of undeveloped mixed wetlands and forested areas. The NCAs also contain several undeveloped islands owned by Minnesota Power. Most of the lands in these areas are gently rolling and contain considerable wetlands, which are considered important to waterfowl. The NCA lands also provide bald eagle nesting and perching trees and several breeding pairs of bald eagles and osprey nest in and around the reservoir. Much of the NCA is heavily wooded with native tree species, supports an abundance of wildlife, and has considerable aesthetic appeal. In general, the area in the vicinity of the south part of Fish Lake Reservoir is unique and natural for an area so close to a major population center such as Duluth. Relatively few roads exist in the area, and there is a large concentration of public land. The Canosia Wildlife Management Area, located within one-half mile of the southeast shore of Fish Lake, is an area of approximately 2,300 acres managed by the Minnesota Department of Natural Resources, and is very popular with the local public.

In order to satisfy the public need to preserve the natural character of the south end of Fish lake, as well as to protect important wildlife habitat and scenic and cultural resources Minnesota Power plans to designate the undeveloped shoreline around the south end of the reservoir for natural character management. Except for lands around the extreme southeast tail of Fish Lake the proposed project boundary includes all Minnesota Power land contiguous with the undeveloped shoreline. These lands include all lands located south of the existing National Guard leases.

Fish Lake lies along the east tail of the reservoir east of the Highway No. 48 causeway. This area contains an active eagle nest (on an island), and is associated with significant wetlands. The Flowage lakes Association has also expressed a desire that this area remain in a natural condition. As with the southerly portion of the main body of Fish Lake, most shoreline owned by Minnesota Power along the reservoir east of the causeway will remain in an undeveloped natural state. The proposed project boundary includes most backland property contiguous with this shoreline (see map). Non project ownership in Section 36, Township 52N, Range 15W, is excluded from this addition to the project boundary. This non-project land is leased to an adjoining farmer.

A discussion of the management of Minnesota Power lands dedicated to non-development on Fish Lake Reservoir follows:

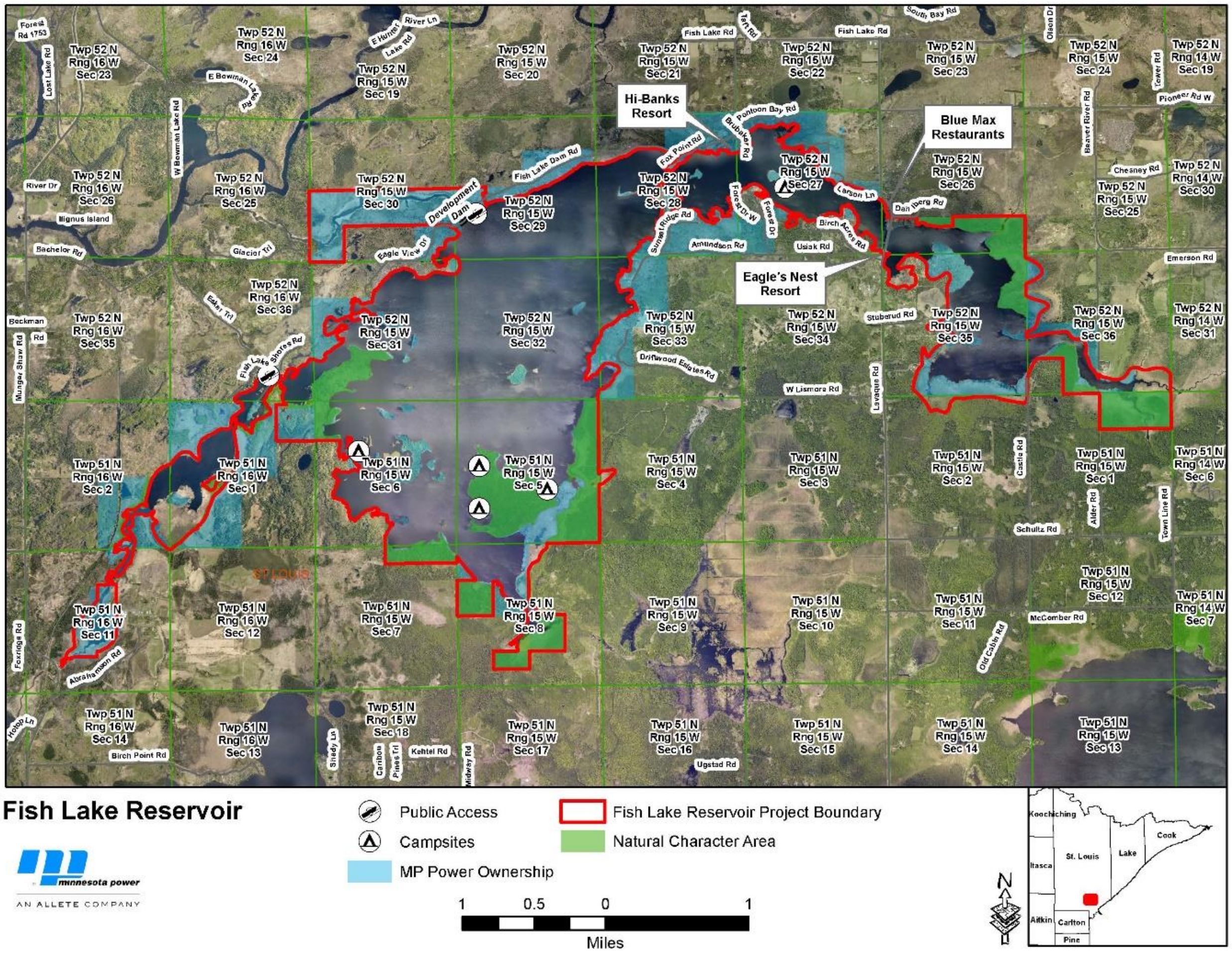
Timber management- Where it is economically feasible these lands will continue to be managed for timber production using sound forest management practices that will insure watershed protection. Timber management operations will plan for the protection of scenic, cultural and botanical resources as well as the enhancement of wildlife habitat.

Where possible the creation and development of recreational opportunities will be coordinated with timber harvesting operations.

Wildlife Management- There are many opportunities for enhancement of wetlands such as nest box placement, pothole creation, and backwater impoundment. MP has placed serveral wood duck boxes in these areas and performs routine inspection and maintenance when needed. MP continues to review and implement wildlife management enhancement techniques on and around Fish lake Reservoir when appropriate. Wildlife management on the upland portions of the Fish Lake property will continue to be coordinated with timber management activities and promotion of pollinator habitat preservation or improvements. Management of endangered, threatened. Or protected species such as the bald eagle will be a priority.

Recreation Management- All undeveloped Minnesota Power lands around Fish Lake will continue to be open to the public for recreational pursuits. Access may need to be limited in areas with significant cultural resources, or critical wildlife habitat (i.e. eagles). There are no plans to develop any recreational sites in these areas, however, some type of dispersed recreation such as a limited number of primitive campsites, and a low impact nature trail system may be developed in the future if the need arises.

Management of cultural resources- Any significant cultural resources discovered on the Fish Lake property will be protected, and will comply with the requirements described in the 2001 Cultural Resource Management Plan (CRMP).


Hi-Banks Resort
Blue Max Restaurants
Eagle's Nest Resort
Development Dam
Fish Lake Reservoir
Public Access
Campsites
MP Power Ownership
Fish Lake Reservoir Project Boundary
Natural Character Area
1 0.5 0 1
Miles
minnesota power
AN ALLETE COMPANY
Koochiching
Itasca
St. Louis
Lake
Cook
Aitkin
Carlton
Pine

ISLAND LAKE RESERVOIR

Island Lake, the most heavily developed of the five storage reservoirs still contains significant sections of undeveloped shoreline (approximately ten miles) which will be designated for natural character management by Minnesota Power to protect wildlife habitat, scenic and cultural resources, and to enhance public recreation. These areas contain a variety of landscapes which will be described in more detail below. Some of these undeveloped areas are associated with wetlands which are considered important to waterfowl. A good portion of the areas contain potential eagle habitat. The natural stretches of shoreline on Island Lake also add to the scenic beauty of the reservoir. The major sections of shoreline set aside as natural areas are described below individually along with the management practices which will take place in each area.

Birch Isle/West Island Lake - The south side of Birch Isle contains a large expanse of undeveloped backwater wetland approximately 50 acres in size. Just north of this area across the Birch Isle causeway is another undeveloped wetland that spans approximately one-half mile of shoreline. These areas constitute the largest concentration of wetlands on the northwest part of Island Lake, and are considered important habitat for waterfowl. These wetland areas have been set aside from development and will be managed to protect wildlife, water quality, and the natural character of the area. The areas will continue to be open for the enjoyment of the public. The backlands will be managed for timber production which will be coordinated with the enhancement of wildlife habitat, and protection of water quality and scenic resources.

Hay Creek/Tomahawk point area - Minnesota Power's ownership around the bay where Hay Creek enters Island Lake is currently undeveloped. This large expanse of shoreline contains a long narrow point of undeveloped land which runs in a north south direction and separates the bay from the rest of the Island Lake. This point of land is scenic and heavily wooded with upland stands of paper birch. To the east of the point along the south shore of the bay are steep to rolling uplands which are heavily forested with native tree species, and contain habitat with good potential for eagle nesting. Much of the shoreline in this area is associated with extensive wetland vegetation of the type which is considered attractive to waterfowl. To preserve the natural character, and scenic beauty of the area, as well as to maintain the integrity of the wildlife habitat, the long narrow point, and all Minnesota Power land to its east along the south shore of the Hay Creek Bay will remain in an undeveloped condition. The proposed project boundary includes all backlands associated with this property. These undeveloped lands will remain open to the general public. No recreational facilities are being planned for this area. The backlands will continue to be managed for the production of timber. Timber management plans will provide for the protection of water quality, and scenic resources, as well as the maintenance of potential eagle nesting habitat in the area. Any significant cultural resources will be protected through use of the CRMP.

The Hay Creek Bay area is bounded on the north by a large relatively undeveloped mass of land called Tomahawk Point which is completely within the project boundary. As the name implies this land mass is shaped much like a tomahawk. Tomahawk Point is very

scenic and heavily forested with stands of aspen, paper birch, sugar maple, and basswood. The terrain is steep to gently rolling and supports an abundance of native wildlife. Minnesota Power owns all the property on the main body of Tomahawk Point. This property will be managed to provide public recreation while maintaining its natural character through a low density non-profit group lease arrangement.

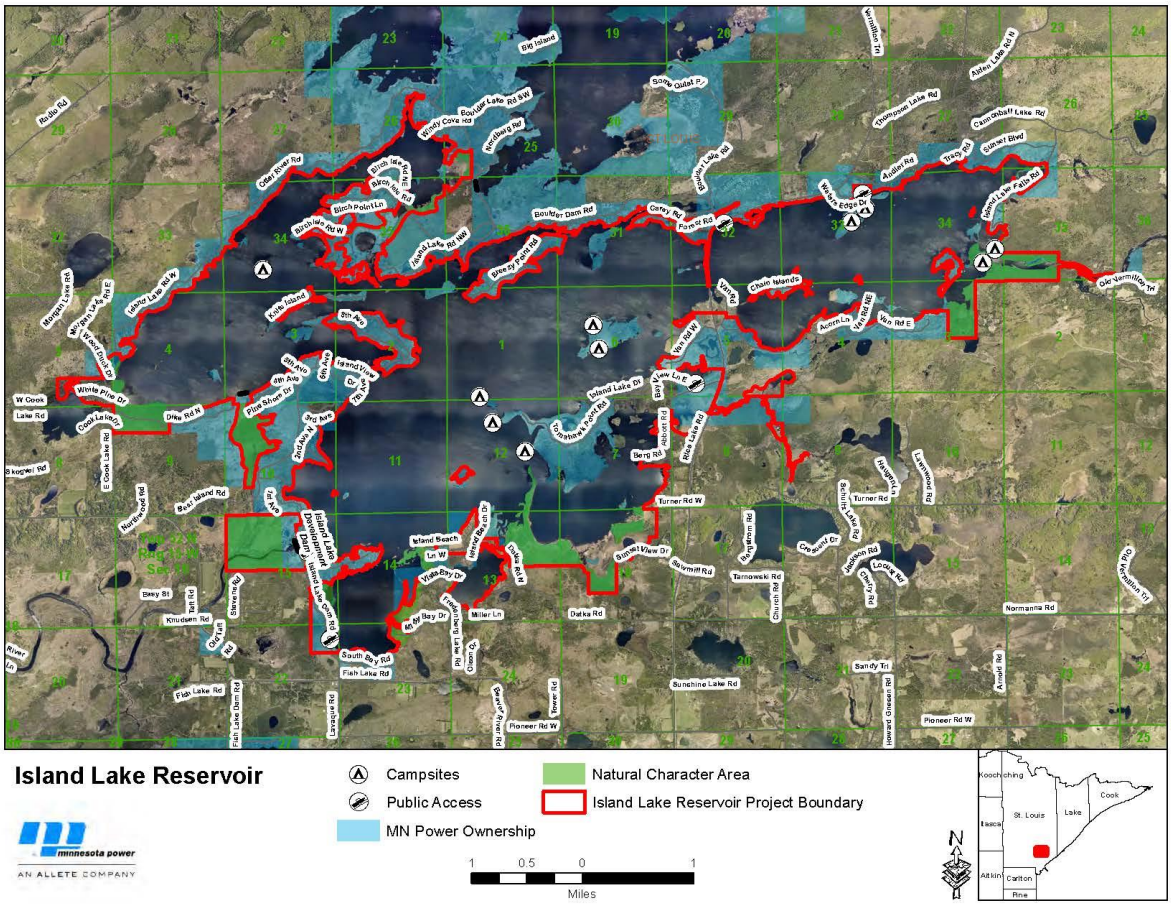
Cloquet River Inlet - The Cloquet River flows into Island Lake on the eastern most end of the reservoir. Minnesota Power owns nearly all the property in this vicinity including about one-half mile of upstream river frontage. This property, including most of a large point of land jutting out into the main body of Island Lake and two large islands are currently undeveloped. The area is very scenic with limited access. The terrain is steep to rolling and heavily forested with native tree species, including some stands of large red and white pine. The inlet area contains potential eagle nesting habitat, and some valuable wetlands in the backwater areas. The area surrounding the Cloquet River inlet is very popular to recreationists, especially anglers who fish for walleyes which congregate near the inlet in the spring after spawning in the river. At low water, a waterfall is visible where the Cloquet River spills into Island Lake, and attracts sightseers who visit the area by boat.

Minnesota Power plans to leave the currently undeveloped shoreline in the vicinity of the Cloquet River inlet in the natural state to protect scenic resources and wildlife habitat. No development of this area and the contiguous backlands is planned. The proposed project boundary includes the shoreline as well as the backland property. All land will remain open to the public. Two primitive campsites near the mouth of the river will continue to be maintained by Minnesota Power. No additional campsites or recreational facilities are planned, however, additional or alternate campsites, along with other low impact dispersed recreation, such as nature trails may be considered in the future if the need arises. Access may need to be restricted if it is necessary to protect critical wildlife habitat. Where economical, the backland areas will continue to be managed for timber production. Timber management plans will consider the protection of water quality and wildlife habitat, as well as the maintenance of valuable scenic resources. The CRMP will be used for any significant cultural resources discovered in the area.

Northeast Island Lake - In the extreme northeast corner of Island Lake there is a stretch of undeveloped shoreline approximately one mile in length. This area lies between areas that are extensively developed with cabin and home sites. This undeveloped region is scenic and wooded with native tree species. The terrain is steep to rolling and, and undeveloped point of land separates two quiet bays. The area has some potential for eagle nesting. Minnesota Power plans to protect the natural character of this area by not developing it. As with the other areas designated for non-development on Island Lake, this area will be open to the public. The backlands may be managed for timber production which will maintain scenic values and wildlife resources.

Island Lake Dam and North Dike Areas – Approximately 92 acres downstream of the Island Lake Dam and 169 acres downstream of the North Dike of a mixed undeveloped wetland and forested lands were added to the project boundary in 2021. This land will remain

undeveloped to protect the natural character of this area and provide a dam safety buffer downstream of the spill ways. The backland areas may be managed for timber production which maintain scenic values and wildlife resources.

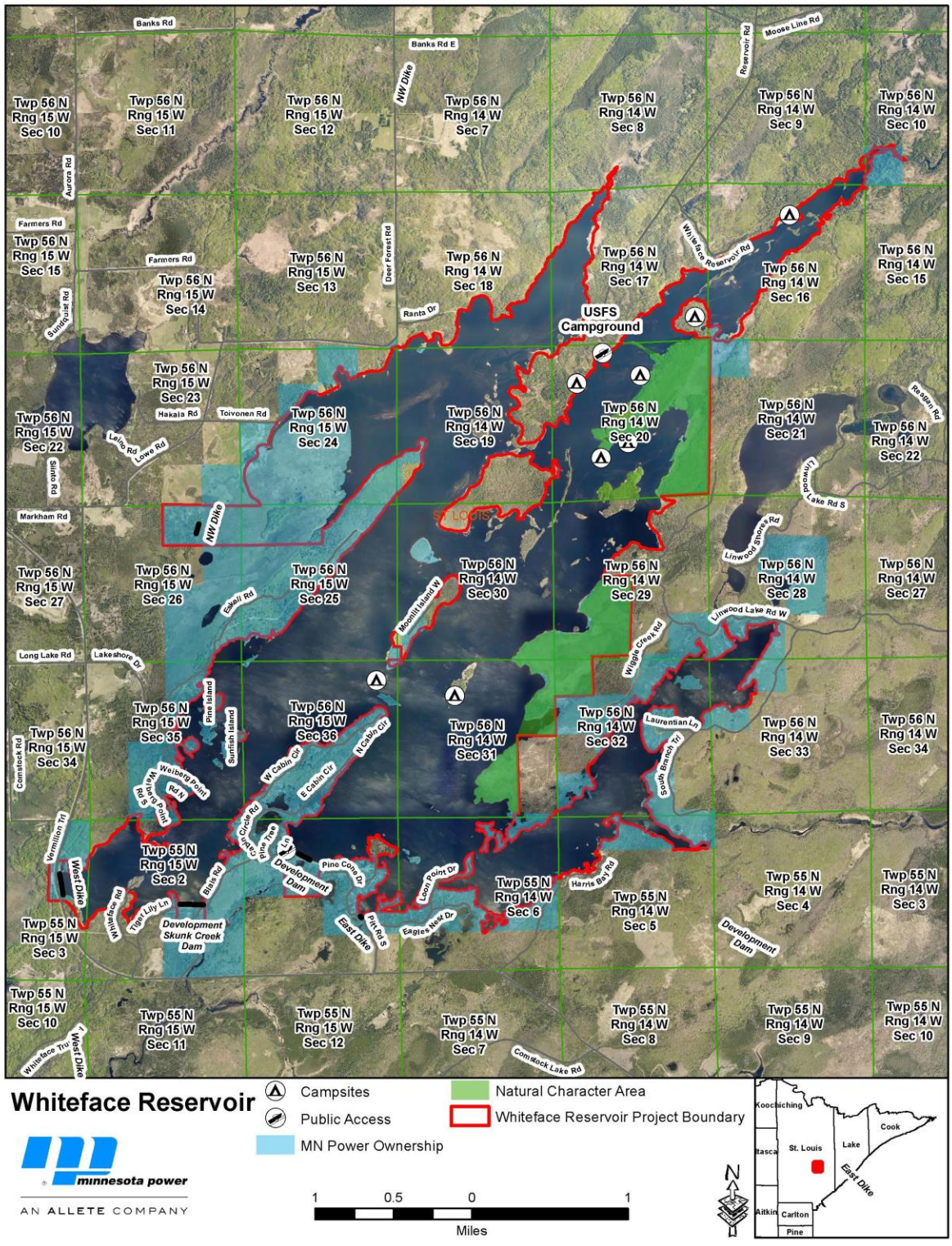


WHITEFACE RESERVOIR

Most Minnesota Power property along the northwest shore of the large peninsula that dominates the western half of Whiteface Reservoir is currently undeveloped and will be managed to maintain the natural character of the area. Approximately six and one-half miles of shoreline are designated as NCAs. The land along this northwest part of the peninsula consists of gently rolling uplands forested with stands of aspen and paper birch interspersed with lowlands forested with spruce, cedar, tamarack and black ash. In 2021, MP added 151 acres to the project boundary in this area to preserve additional undeveloped land as NCAs. The shoreline is scenic and in many cases is associated with wetland vegetation considered important to waterfowl. The added NCA lands preserve potential eagle habitat within the undeveloped area of the peninsula. The eastern one-half of Whiteface Reservoir was identified by the Minnesota DNR as a Draft Recovery Plan area for the grey wolf. The grey wolf has since been delisted from the Federal Endangered Species Act (ESA) and Minnesota DNR is in the process of updating it's 2001 Wolf Management Plan. Wolves are frequently observed around the Whiteface reservoir area and the relatively undeveloped area in and around the reservoir provides ideal habitat for the grey wolf. The Whiteface Reservoir campground, operated by the USFS, on the north end of the reservoir faces an undeveloped island owned mostly by Minnesota Power which is connected to the mainland by a large wetland area. The undeveloped natural character of this island undoubtedly adds value to the campground.

A large portion of Minnesota Power Property along the northwest shore of the large peninsula on Whiteface Reservoir will be dedicated for non-development to protect valuable wildlife habitat and important scenic resources. The proposed project boundary also includes the backland area for the southwestern block of Minnesota Power ownership along this peninsula (see map). All property designated to remain undeveloped will continue to be open for the enjoyment of the public. Currently no recreational facilities exist in these areas, however, some sort of dispersed recreation such as primitive campsites and nature trails will be considered in the future if the need arises. Access may need to be restricted in areas with critical wildlife habitat (eagle nests, wolf dens), or significant cultural resources. The backland areas will continue to be managed for timber production. Timber management plans will account for the protection and enhancement of wildlife habitat, and maintenance of scenic resources. For example, potential eagle nest and perch trees will be protected during harvesting operations, and a scenic no cut or selective cut buffer zone will be kept along the shoreline of the reservoir. A CRMP has been developed for the management of archaeological sites that are discovered.

The southern most tip of the peninsula which is currently undeveloped. The shoreline surrounding the bay east of the peninsula, has scattered lease which will be offered for sale.


Whiteface Reservoir
Campsites
Public Access
MN Power Ownership
Natural Character Area
Whiteface Reservoir Project Boundary
minnesota power
AN ALLETE COMPANY
1 0.5 0 1
Miles
USFS Campground
Development Dam
Development Skunk Creek Dam
NW Dike
West Dike
East Dike
Banks Rd
Banks Rd E
Farmers Rd
Ranta Dr
Hakala Rd
Toivonen Rd
Markham Rd
Long Lake Rd
Lakeshore Dr
Linwood Lake Rd W
Linwood Lake Rd S
Comstock Lake Rd
Moose Line Rd
Reservoir Rd
Whiteface Reservoir Rd
Deer Forest Rd
Aurora Rd
Lowe Rd
Eskeli Rd
Moonlit Island W
Wiggle Creek Rd
Laurentian Ln
South Branch Trl
Pine Island
Sunfish Island
N Cabin Cir
W Cabin Cir
E Cabin Cir
Weiberg Point Rd N
Weiberg Point Rd S
Vermilion Trl
Pine Cone Dr
Loon Point Dr
Harris Bay Rd
Eagles Nest Dr
Pitt Rd S
Whiteface Rd
Tiger Lily Ln
Blais Rd
Comstock Rd
Whiteface Trl
Koochiching
Cook
Itasca
St. Louis
Lake
Aitkin
Carlton
Pine
N
Twp 56 N Rng 15 W Sec 10
Twp 56 N Rng 15 W Sec 11
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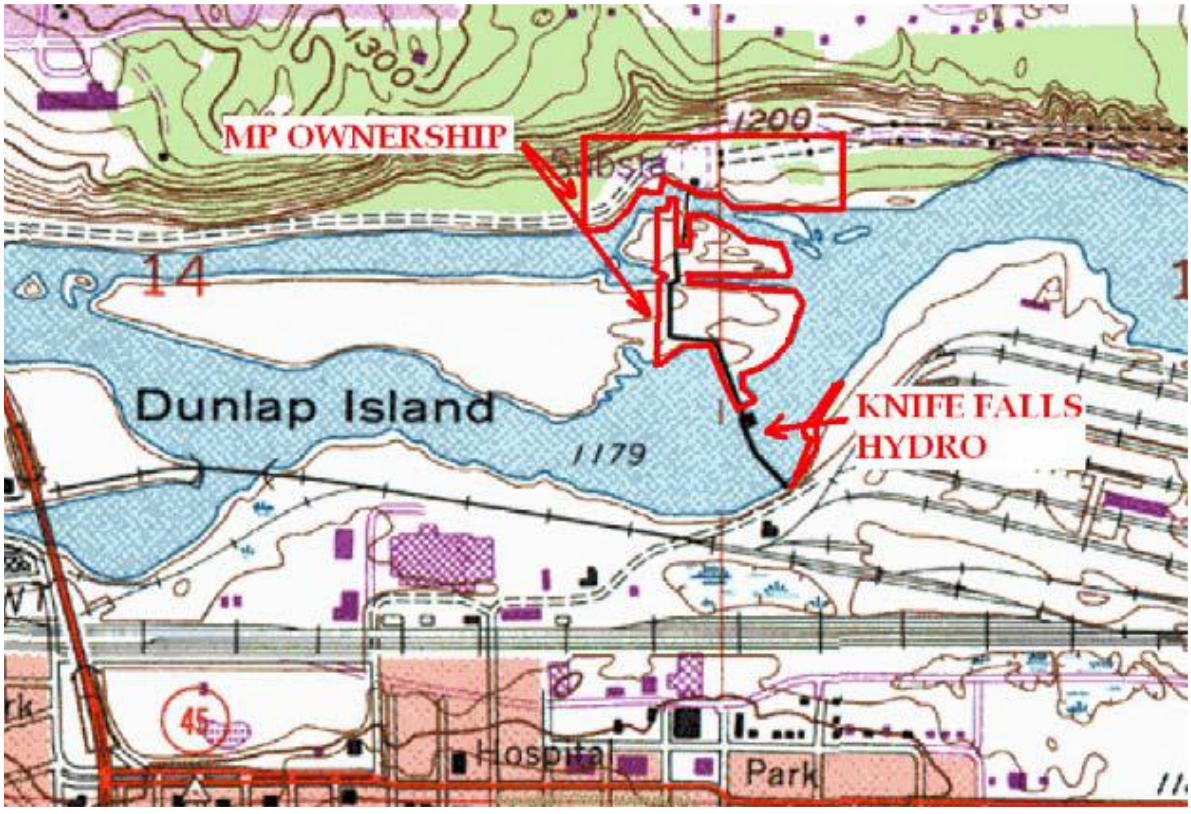
KNIFE FALLS RESERVOIR

[The following was not included in the original 1993 filing application, but is provided here in response to the Article 427 requirement to consider NCA designation at Knife Falls Reservoir.]

As required under License Article 427, MP has considered designating additional NCA's on licensee-owned lands at Knife Falls Reservoir. Due to the limited amount of MP land ownership at the Knife Falls Reservoir, MP has determined that it is not feasible to create a Natural Character Area at the reservoir. MP ownership is only located at the hydro dam, an area that is primarily industrial. MP's land ownership encompasses the hydro facility and appurtenant structures, including spillways, concrete dikes, substation and transmission lines. Knife Falls Hydro is located in the industrial zone of the City of Cloquet, Minnesota. No development is planned for the MP property, however, if air quality issues with the SAPPI paper mill (formerly Potlatch) are effectively eliminated, MP is required to provide a canoe portage across its land ownership in this location.

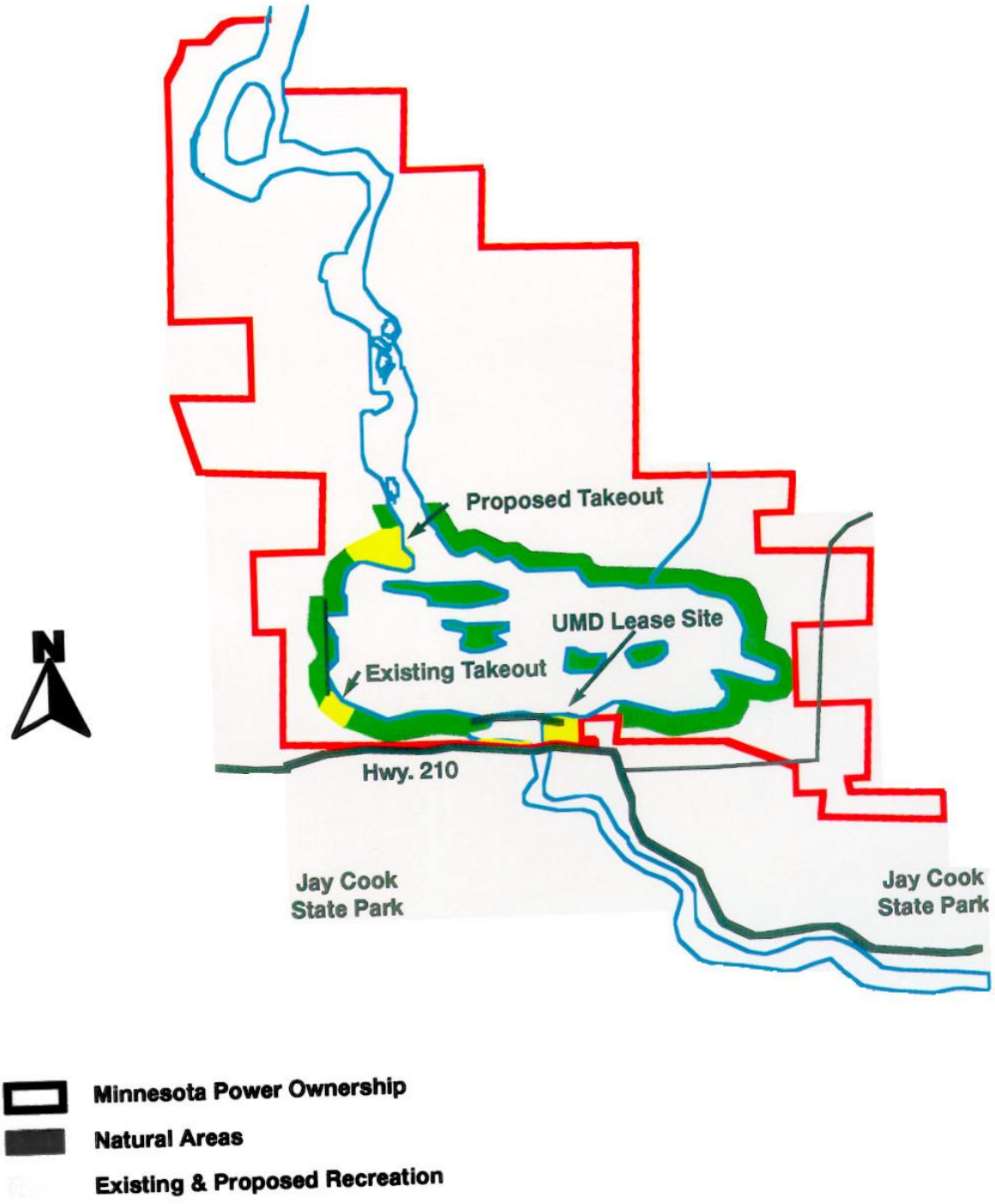


THOMSON RESERVOIR

Almost the entire shoreline of Thomson Reservoir is undeveloped. Two and one-half miles are designated as Natural Character Management Area. The shoreline generally consists of high rocky pine studded banks. Although there are no active eagle nests on the reservoir, it appears that adequate nesting habitat is available. Because of the high rocky banks there is little waterfowl habitat on Thomson Reservoir.

Minnesota Power plans to leave the currently undeveloped areas of Thomson reservoir in an undeveloped condition, and manage the area to preserve its natural character, and value as wildlife habitat. These areas will continue to be open for the enjoyment of the general public. Backlands will be managed for timber production which will take into account the protection and enhancement of wildlife habitat, and maintenance of scenic resources. Primitive campsites may be added if the need is documented. Any significant cultural resources will be protected, and a managed through the CRMP.

Thomson Reservoir

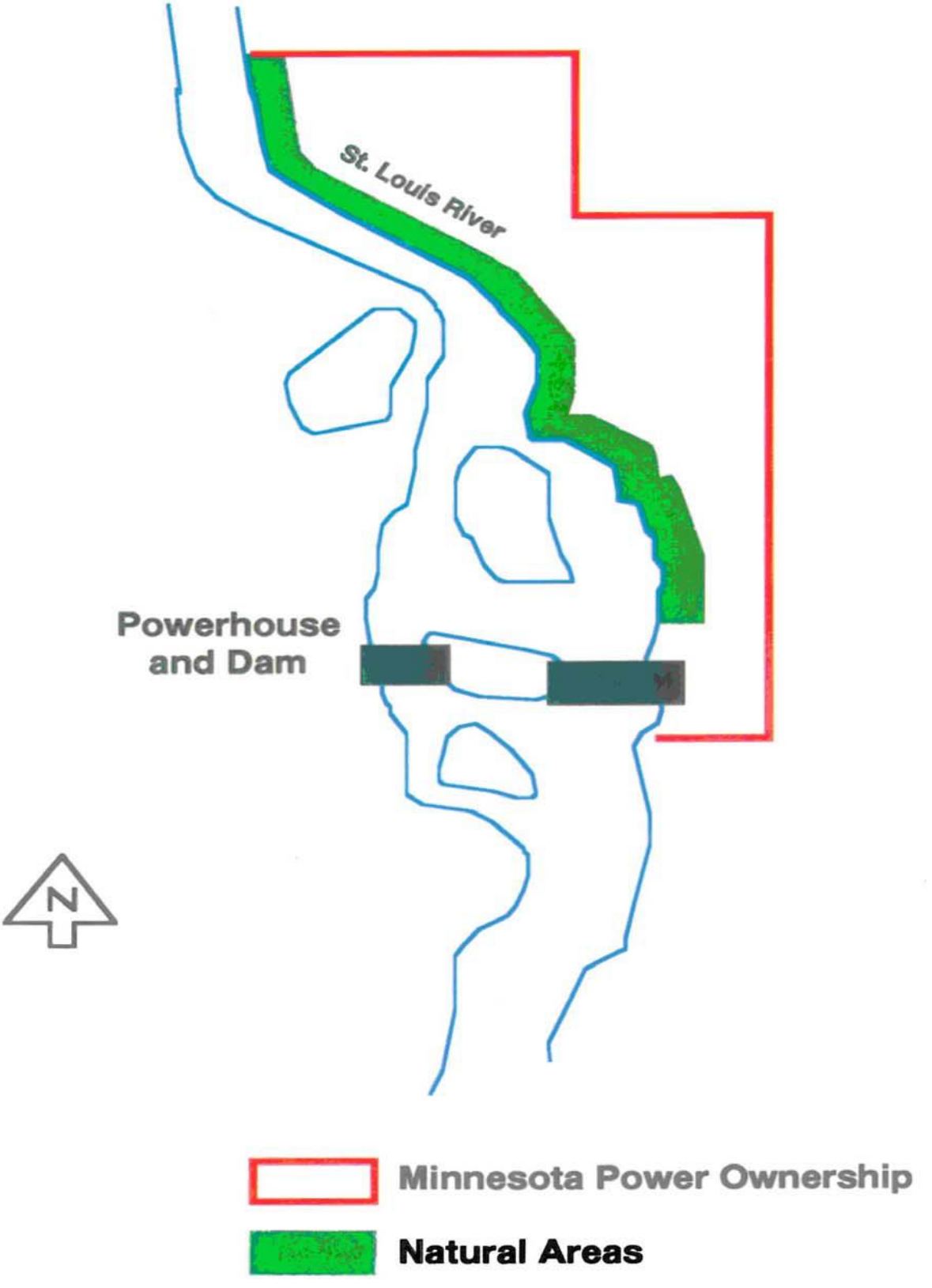


SCANLON RESERVOIR

Except for the land occupied by the dam, the entire shoreline owned by Minnesota Power on Scanlon Reservoir is undeveloped (approximately one and one-quarter miles). The land in this area is steep, rocky, and pine studded.

This shoreline will remain undeveloped and will be managed by Minnesota Power to preserve its natural character. The land will continue to be open to the general public. Backlands will be managed for timber production, which will plan for the protection of scenic resources.

Scanlon Reservoir



APPENDIX B

As filed in 1993: Bald Eagle and Grey Wolf Management Plan

ST. LOUIS RIVER PROJECT MANAGEMENT PLAN

for the

Bald Eagle and Grey Wolf

March 1993

Confidential: Not for Public Distribution

Confidential- Not for Public Distribution

St. Louis River Project Management Plan for the Bald Eagle and Grey Wolf

Bald Eagles

MDNR's Forestry-Wildlife Guidelines to Habitat Management include management recommendations for the bald eagle (Appendix 1) and grey wolf (Appendix 2). MDNR's eagle guidelines are essentially the same as those contained in FWS's Bald Eagle Management Guidelines (Appendix 3) in that they establish buffer zones around nests which restrict various activities during certain times of the year. For example, essentially all activities except those which protect the nest or the nest habitat are prohibited within 330 feet of a nest. Activities such as trail, road, campsite, or home building are not allowed within 660 feet of a nest. Other restrictions occur within one quarter mile of a nest depending upon topography. MDNR prepares bald eagle management plans which incorporate these guidelines for all eagle nests in the state. MDNR has provided MP the plans for nests on the headwater reservoirs (Appendix 4). MP has, and will adhere to the recommendations in them, and will cooperate with MDNR in the development of plans for nests which may be found in the future. Figures 10-1 through 10-7 show locations of known eagle nests on St. Louis River Project lands in relation to existing and proposed project developments.

As described in Exhibit E, MP identified potential nesting, feeding, and roosting areas early in the relicensing process. These areas have been designated as Natural Character Areas to protect eagles and other wildlife, and to maintain scenic and cultural resources as described in Appendix E-20 of Exhibit E. A total of 2311 acres will be managed as Natural Character Areas including 772 acres on Fish Lake, 255 acres on Whiteface, 592 acres on Rice, 674 acres on Island, 15 acres on Thomson, and 3 acres at Scanlon. In addition to the Natural Character Areas, MP has designated approximately 3000 acres of land surrounding Boulder Lake Reservoir to be managed as part of the Boulder Lake Conservation Area (BLCA). Appendix E-19 of Exhibit E is the draft BLCA management plan. Although some development for recreation and environmental education will occur in the BLCA, the bald eagle

guidelines discussed above would be adhered to. As a matter of procedure, all proposed trail, access, or other developments will be surveyed for evidence of listed species prior to the initiation of construction of the development. The presence of listed species will result in alteration of the plan, consistent with MDNR guidelines for the species.

Grey Wolves

MDNR recommends a road density no greater than one mile/square mile in suitable habitat as a guideline for the protection of grey wolves. The calculation is based on a minimum 100 square mile area. It is not possible to apply this guideline to MP-owned properties since MP-owned land is linear or in relatively small blocks along the reservoir shorelines. MDNR also recommends the gating or blocking of roads and trails to reduce access by motorized vehicles. Roads are defined as permanent roads requiring routine maintenance that are accessible year-round by two wheel drive vehicles. MP has evaluated its ownership for existing and proposed roads, trails, and road blocks and has identified these features in Figures 10-1 through 10-7. MP has also determined that road densities are less than one mile/square mile. MP currently gates many of its access roads, and will continue to assess the feasibility of gating additional roads on an ongoing basis.

MP's headwater reservoirs occur within the range of the grey wolf. MP initiated winter track surveys in 1993. Survey results show that a pack (or packs) may exist to the east of Whiteface Reservoir. Signs were found indicating that another pack (or packs) may exist adjacent to Boulder Reservoir. Additional surveys will be conducted in these areas in late March to try to assess wolf densities.

As a matter of procedure, all proposed trail, access, or other developments will be surveyed for evidence of listed species prior to the initiation of construction of the development. The presence of listed species will result in alteration of the plan, consistent with MDNR guidelines for the species. MP is not aware of specific agency guidelines regarding den locations. However, MP would propose the same restrictions

that apply to eagle nestsites.

Figures 10-1 through 10-7 show existing and proposed development areas in relation to existing eagle nest sites and the management zones around them. Natural character areas are also shown and, as stated earlier, these areas were set aside to provide areas where eagles can roost, feed, and nest. As stated above, wolf packs occupy portions of the project area, however, the data needed to map their territories or densities are presently not available.

The implementation schedule for proposed project developments is outlined in Table 1. Additional developments proposed for 1993 are hiking and cross-country ski trails in the BLCA. The development of lease lot sites on the reservoirs is ongoing, on an annual basis. Wolf and eagle surveys will be undertaken annually in areas where current year developments are planned. Wolf surveys are conducted in February and March. Eagle surveys can occur on a year-round basis.

MP field personnel will be provided information to help them identify, and increase their awareness of listed species so that field observations can be incorporated into planning decisions. As stated above, as a matter of procedure, all proposed trail, access, or other developments would be surveyed for evidence of listed species prior to the initiation of construction of the development. The presence of listed species would result in alteration of the plan, consistent with MDNR guidelines for the species. This mechanism should be suitable for identifying and protecting new or previously unknown and potential nesting, roosting, feeding, or other habitat sites.

MP also suggests that FERC request the resource agencies to advise MP, as a standard practice, of the results of fish and wildlife research and surveys applicable to project lands so that this information can be incorporated in planning decisions involving project lands.

Table 1. Implementation Schedule for Proposed Project Developments.*

Reservoir/Facility:	Commencement Date	Completion Date
Wild Rice Lake Reservoir		
Boat Launch	June 1, 1995	December 30, 1995
Additional Campsites	January 1, 1993	ongoing
Fish Lake Reservoir		
Picnic Facilities	June 1, 1995	December 30, 1995
Additional Campsites	January 1, 1993	ongoing
Additional Lease Lots	1994	ongoing
Island Lake Reservoir		
Hideaway Boat Launch:		
Add'l Parking/Boat Dock	June 1, 1992	December 30, 1994
Island Lake Picnic Area:		
Pavilion/Gazebo/Handicapped Pathways	June 1, 1995	December 30, 1995
Causeway Beach	June 1, 1992	December 30, 1992
Boat Launch at Dam	June 1, 1993	December 30, 1993
Additional Campsites	January 1, 1993	ongoing
Additional Lease Lots	1993	ongoing
Boulder Lake Reservoir	(Schedules to be developed in management plan, which will be completed by June 17, 1993)	
Whiteface Reservoir		
Additional Campsites	January 1, 1993	ongoing
Additional Lease Lots	1993	ongoing
Thomson Reservoir		
Canoe Take-out Access	June 1, 1994	December 30, 1994
Primitive Campsites	June 1, 1995	December 30, 1995
Fond du Lac Reservoir		
Canoe Carry-down Access	June 1, 1994	December 30, 1994
Knife Falls Reservoir	June 1, 1995	December 30, 1995
Island Access & Portage		

* This schedule expands upon the implementation schedule presented in Exhibit E for proposed project recreation development by adding tentative schedules for additional lease lot developments.

FIGURE 10-1A. BOULDER RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES

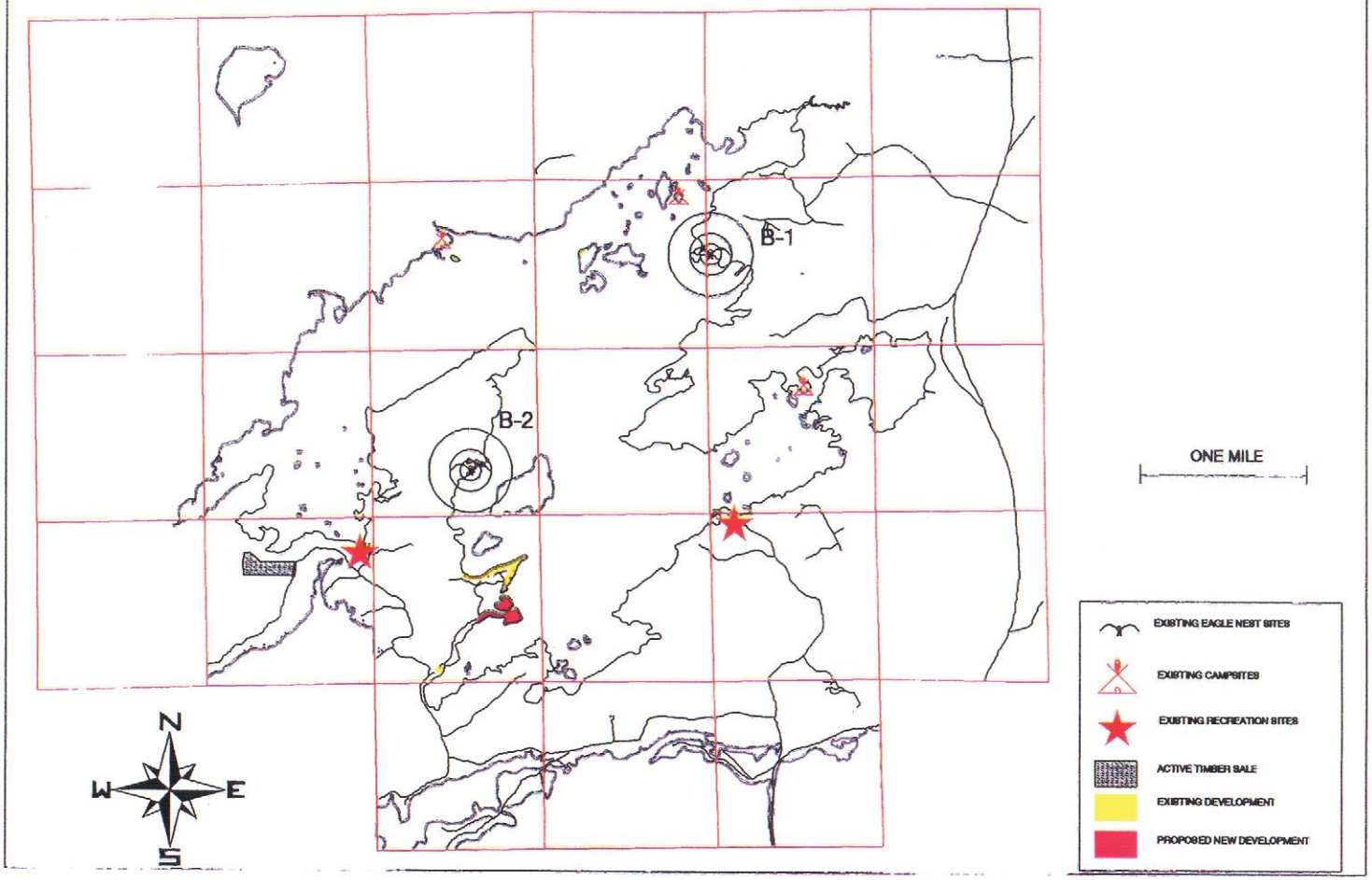


FIGURE 10-2A FISH LAKE RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES

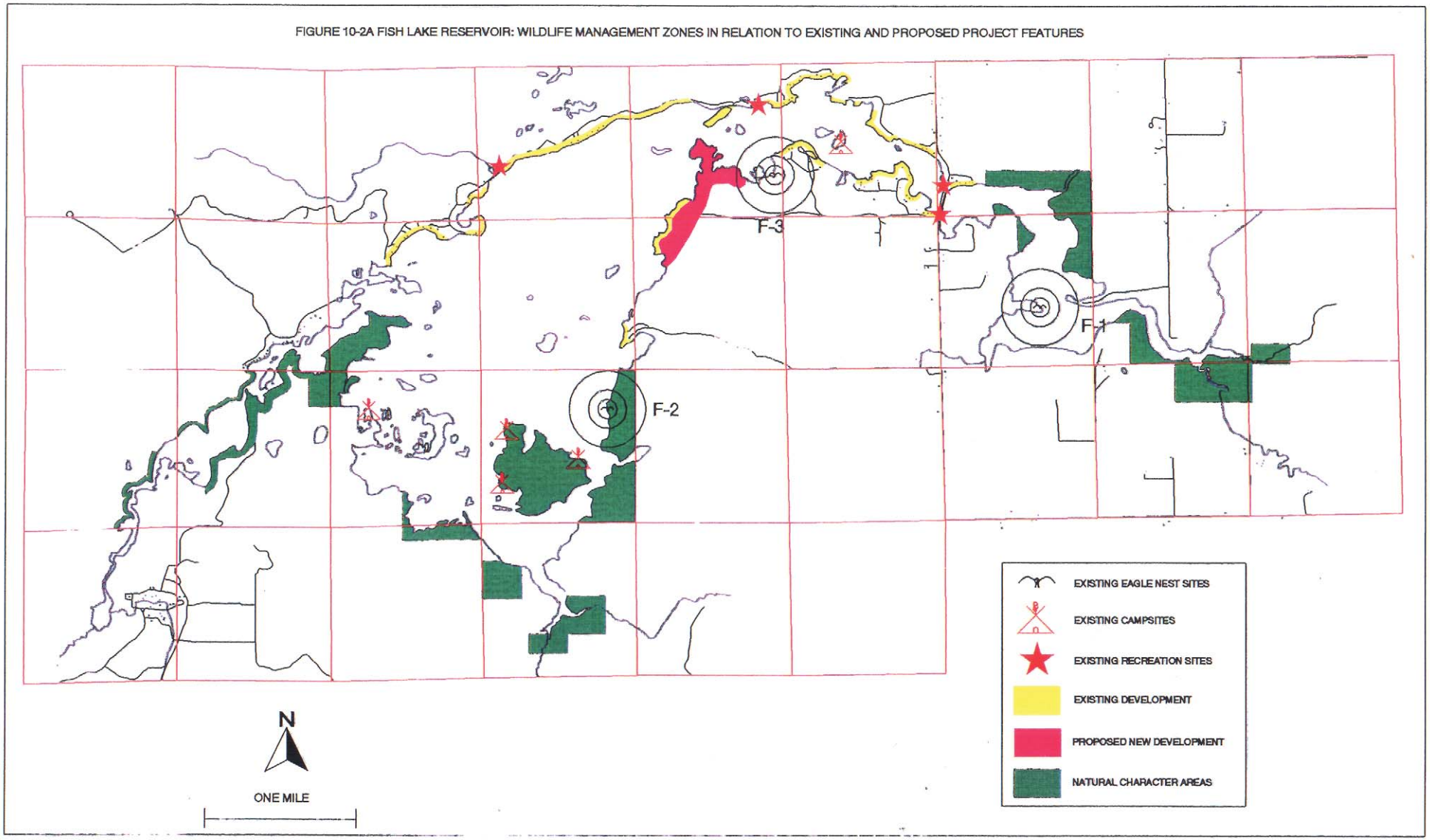


FIGURE 10-3 ISLAND LAKE RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES.

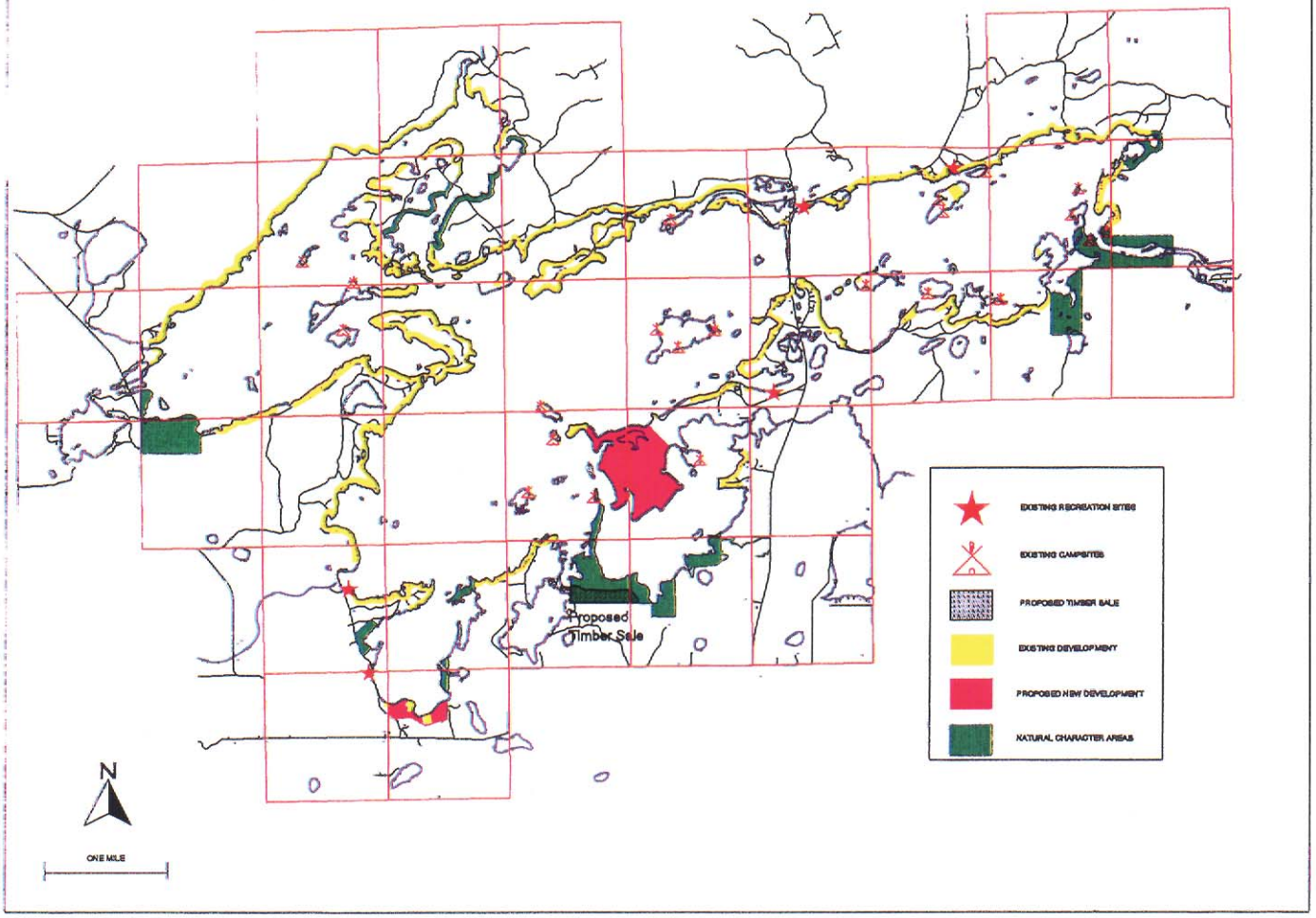


FIGURE 10-4 RICE LAKE RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES.

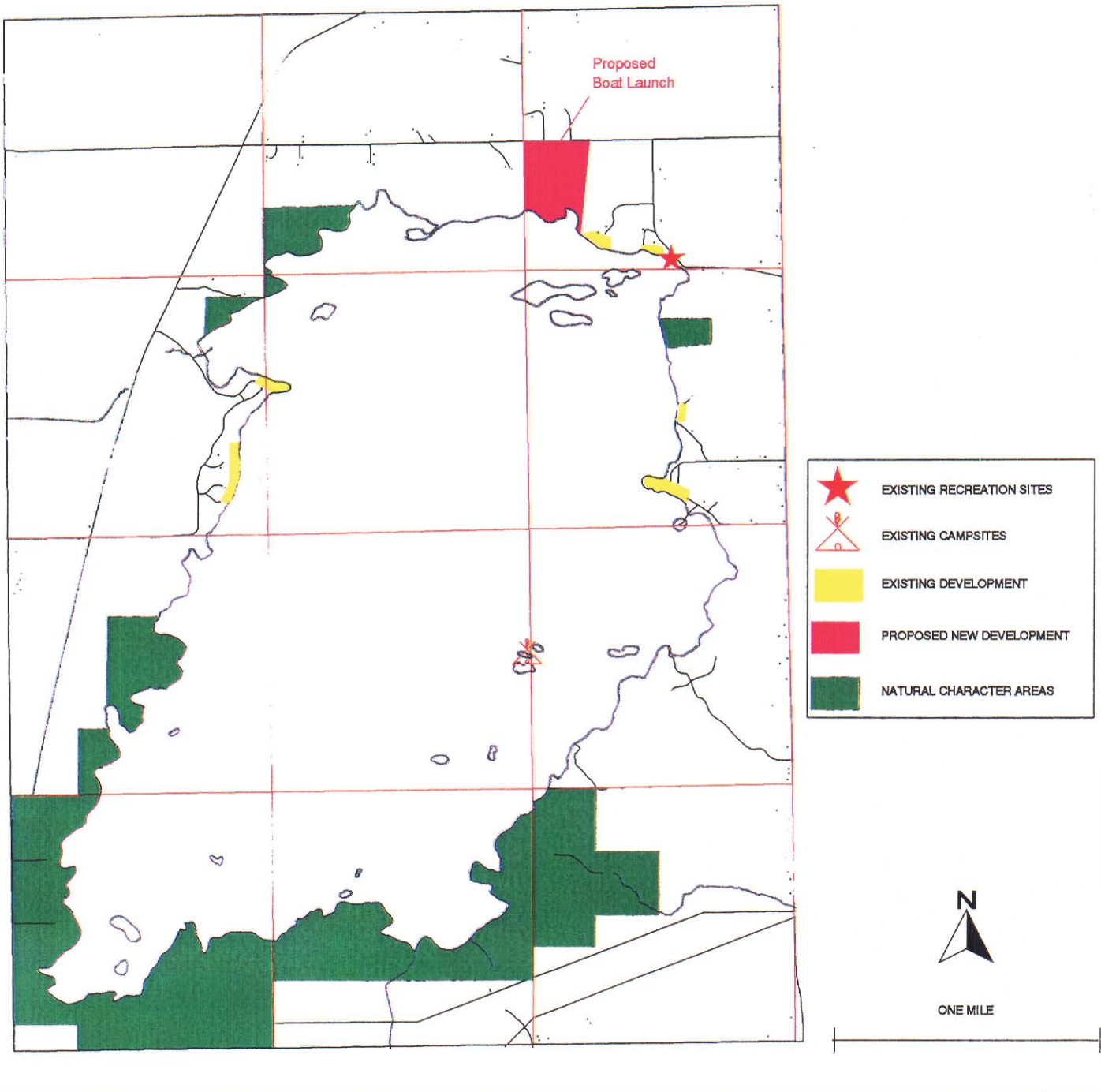


FIGURE 10- 5A. SCANLON RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES.

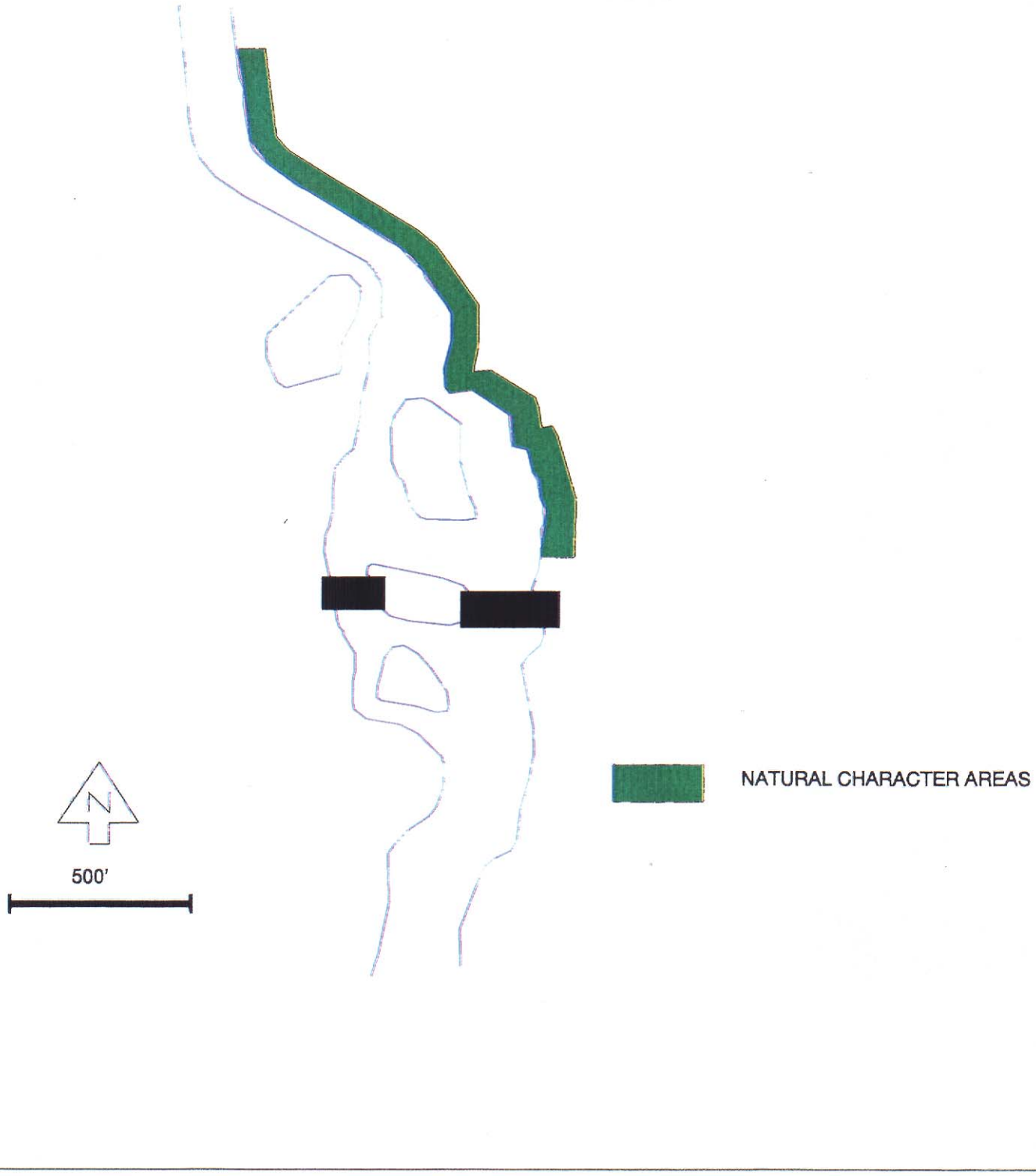


FIGURE 10- 6A WHITEFACE RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES.

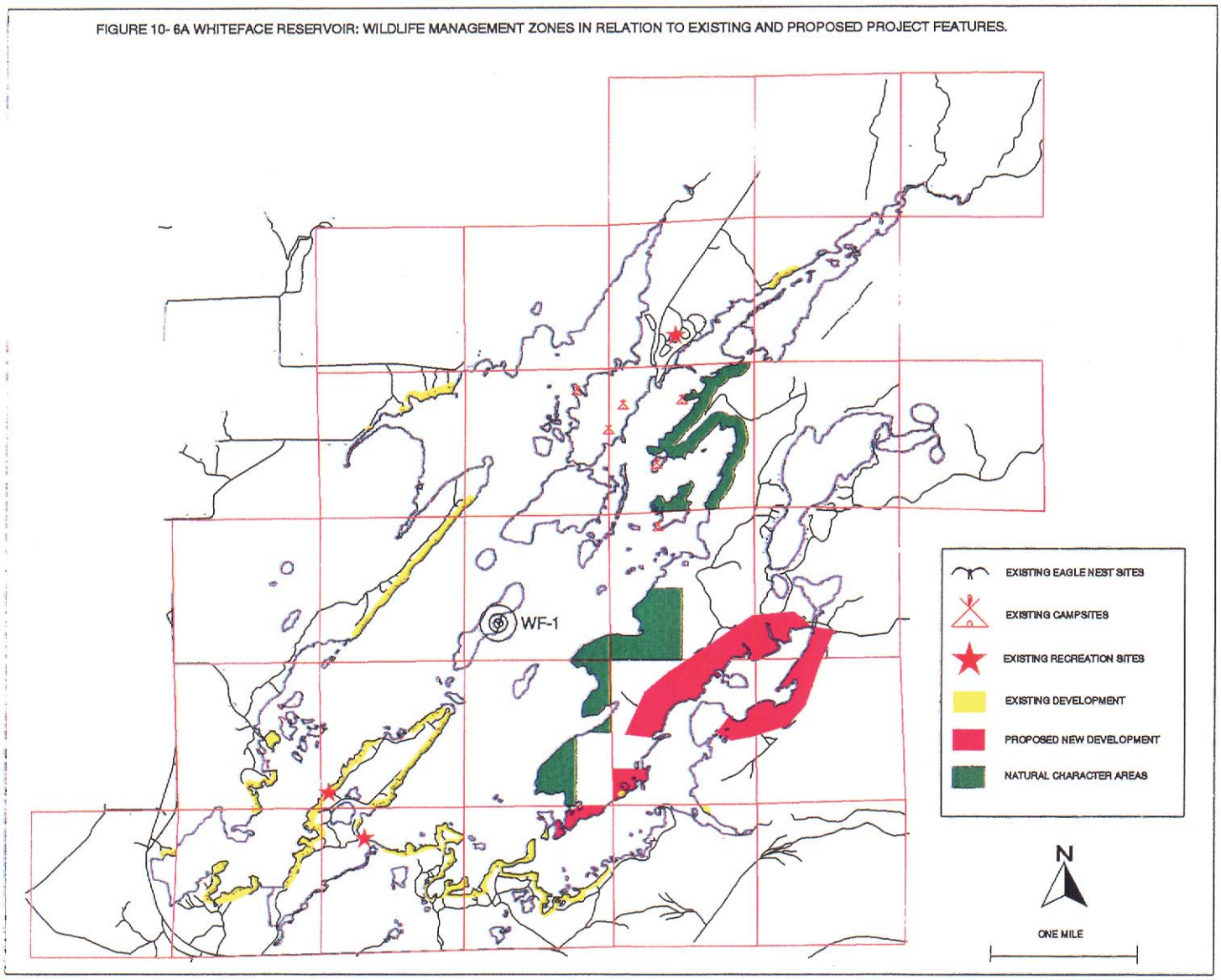
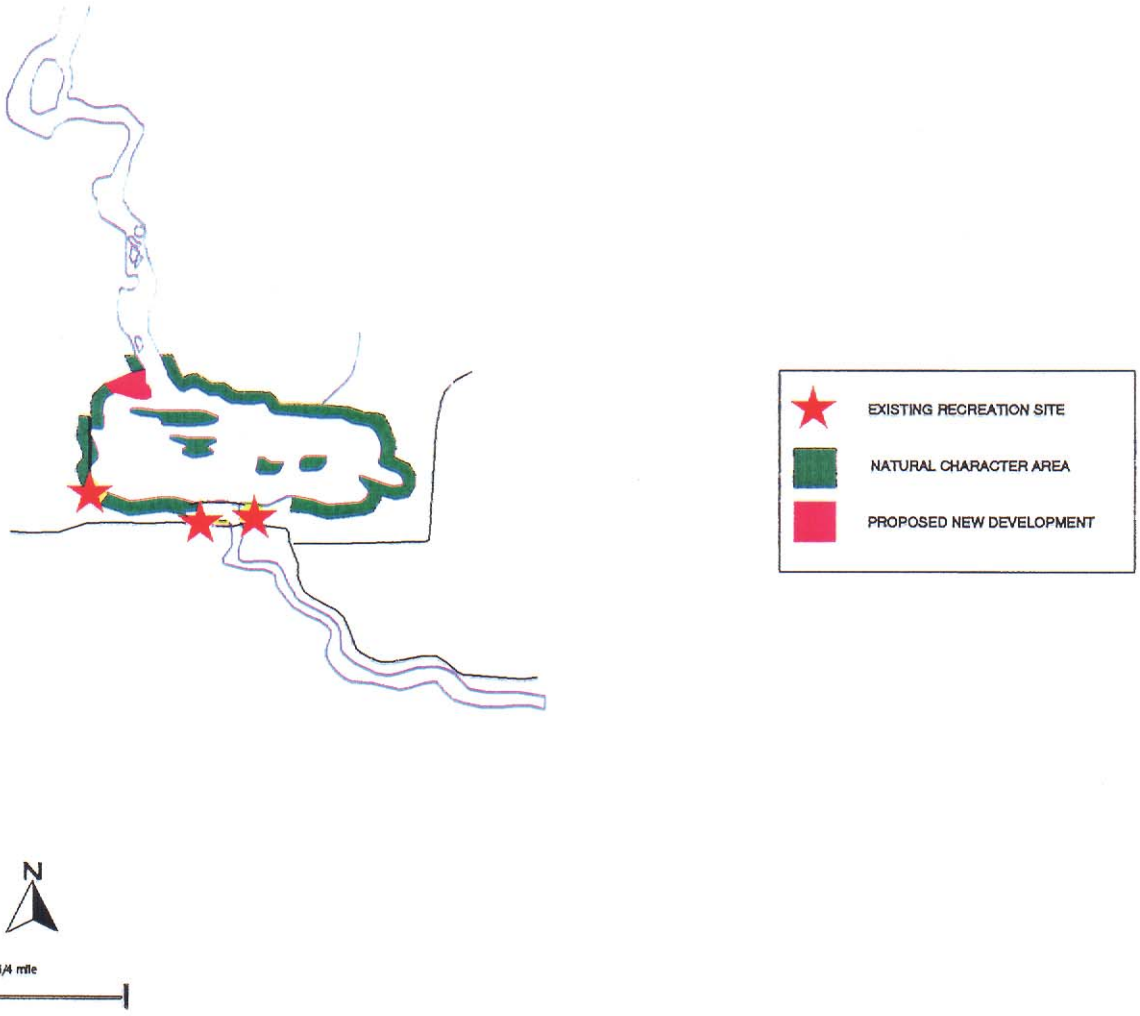


FIGURE 10-7A. THOMSON RESERVOIR: WILDLIFE MANAGEMENT ZONES IN RELATION TO EXISTING AND PROPOSED PROJECT FEATURES.



APPENDIX 1

APPENDIX E
Minnesota Department of Natural Resources Management Guidelines for Bald Eagle Breeding Areas

These guidelines were developed to provide minimum criteria for protecting bald eagles at their breeding areas from human disturbance and to preserve and enhance important habitat features of these areas. The basic criteria and information contained in these guidelines are adopted from Appendix E of the Northern States Bald Eagle Recovery Plan and the U.S. Forest Service - Eastern Region Management Guidelines.

The bald eagle population in Minnesota is now stable, with some recent indications suggesting that the species may be expanding its current range and numbers within the state. Although eagles often use particular nests for several years, the turnover of existing nests from losses to wind, changes by the eagles, and other natural factors may be as much as 12% of the sites per year. Thus, the conservation and management of nesting habitat is more important than the identification and preservation of specific nest sites.

Eagle Sensitivity to Human Disturbance

Eagle tolerance of human presence varies highly, both seasonally and among different individuals or pairs of eagles (Mathisen 1968). Some bald eagles accept people, boaters, hikers, cabins, roads, and other human presence in very close proximity to their nests, possibly as a result of habituation. On the other hand, some may be extremely intolerant and readily disturbed. Management should be conservative and assume that intolerant birds may be present now or in the future.

All nesting eagles are disturbed more easily at some times of the nesting season than at others. Because eagles tend to breed earlier farther south, Minnesota has been arbitrarily divided into north and south by State Highway 210. The dates provided are to be used as guidelines. The actual nesting dates for each specific breeding area may vary. Four periods of sensitivity to disturbance can be identified for nesting areas. These are as follows:

1. Most critical. Prior to egg laying, bald eagles engage in courtship and nest building activities. During this and the incubation periods, they are most intolerant to external disturbance and may readily abandon the area. The most critical period for disturbance, therefore, extends from approximately one month prior to egg laying through the incubation period.

   Dates: Northern Minnesota March 15 - May 15
   Southern Minnesota Feb. 10 - May 1

2. Moderately critical. This period extends from about one month prior to the above period to about four weeks after hatching. The earlier period of moderate sensitivity provides a buffer period for early birds coming into physiological condition for breeding. After hatching, the chicks require frequent brooding and feeding. Disturbance can keep adults from nesting and thus weaken or kill chicks. Disturbance at this time is less critical, although still potentially detrimental, than during the pre-laying and incubation period.

Dates:		
	Northern Minnesota	Feb. 15 - March 15
		May 15 - June 15
	Southern Minnesota	Jan. 10 - Feb. 10
		May 1 - June 1

3. Low critical. This period extends from the time chicks are about one month of age until six to eight weeks after fledging. During this time adults are still quite attached to nesting areas but tolerate moderate amounts of human presence. Restriction should be decided on a case by case basis.

Dates:		
	Northern Minnesota	June 15 - Oct. 1
	Southern Minnesota	June 1 - Sept. 15

4. Not critical. The existence of this period depends on whether adults are permanent residents in their nesting areas. In most regions adults leave the vicinity for a few weeks or months each year. During the time they are gone, be concerned only with activities that alter the habitat in ways that would make it unsuitable for future nesting.

Dates:		
	Northern Minnesota	Oct. 1 - Feb. 15
	Southern Minnesota	Sept. 15 - Jan. 10

SITE SPECIFIC MANAGEMENT ACTIONS WITHIN ONE BREEDING AREA

Active Nest Sites

In order to minimize disturbance of eagles during critical nesting periods, each nest within a breeding area will be protected by three zones that become less restrictive to human activity as the distance from the nest increases. These buffer zones must be established around all nest sites in the breeding area regardless of their activity status, since alternate nests are often used as feeding platforms or roosting sites.

1. Primary Zone. The boundary of this zone should be 330 feet (5 chains) from the nest. All land use except actions necessary to protect or improve the nest site should be prohibited in this zone. Human entry and low-level aircraft operations should be prohibited during the most critical and moderately critical periods, unless performed in connection with eagle research or management by qualified individuals. Motorized access into this zone should be prohibited. Restrictions on human entry at other times should be

addressed in the breeding area management plan, considering the types, extents, and durations of proposed or likely activities.

2. Secondary Zone. This zone should extend 660 feet (10 chains) from the nest. Land use activities that result in significant changes in the landscape, such as clearcutting, land clearing, or major construction should be prohibited. Actions such as thinning tree stands, pruning, permanent opening maintenance, or maintenance of existing improvements can be permitted, but not during the most and moderately critical periods. Human entry and low-level aircraft operations should be prohibited during the most critical period unless performed in connection with eagle research or management by qualified individuals. Roads and trails in this zone should be obliterated, or at least closed during the most and moderately critical periods. Restrictions on human entry at other times should be addressed in the breeding area management plan, considering types, extents, and durations of proposed or likely activities.

3. Tertiary Zone. This zone should extend one-quarter mile (20 chains) from the nest, but may extend up to one-half mile (40 chains) if topography and vegetation permit a direct line of sight from the nest to potential activities at a distance. The configuration of this zone, therefore, may be variable. This is the least restrictive zone. Major land use activities such as clearcutting, land clearing, or major construction will only be permitted during the noncritical period. Other activities are permissible in this zone except during the most critical period. Each breeding area management plan may identify specific hazards that require additional constraints.

Inactive Nesting Sites

1. When a tree containing an eagle nest has blown down or has been damaged so that it can no longer support a nest, all buffer zones can be removed.

2. When a nest structure disappears but the tree remains standing, the buffer zones should remain in effect through at least the following three breeding seasons. If the nest is not rebuilt, the zoning should be removed but the area should still be considered essential habitat and protected accordingly.

3. When a nest is classified as a remnant, that is, one that has been unoccupied for five consecutive years, and is not being maintained by eagles, only the primary zone should be retained.

Essential Habitat

In Minnesota, essential nesting habitat for eagles may be found within one-half mile of a major river or lake supporting an adequate prey base. Efforts should be made to identify essential nesting habitat, and where possible, the following guidelines should be used in land use management to preserve or enhance important habitat features.

1. Four to six overmature trees for every 320 acres within one-quarter mile of a major river or lake larger than 40 acres should be maintained as potential nest trees. These trees should be either super canopy trees or located at the edge of a forest stand with clear flight paths.

2. Additional super canopy trees (preferably dead or with dead tops) located in the area or near the shoreline providing commanding views of the area should be preserved as possible perching or roosting trees.

3. Artificial nest structures may be provided where suitable nest sites are unavailable in occupied or potential habitat. Structures may be placed in trees containing delapidated nests; in trees without existing nests, but which otherwise appear suitable; or in manmade structures such as powerlines or tripods. Nest platforms should be approximately 5 to 6 feet in length and width (25-36 square feet and be made to last for several years. Roosting structures may be erected power poles with several horizontal perches near the upper end.

MANAGEMENT CONSIDERATIONS FOR CONTIGUOUS BREEDING AREAS

Management of nesting areas will depend on the amount of suitable habitat, numbers of pairs present, extent of the areas used by nesting eagles, and present land uses. Individual plans should be prepared for each breeding area, but planning should encompass larger units when habitat is suitable and many nesting pairs are present. In planning for a large region, particularly if major changes in land use or development are anticipated, the following major items should be addressed:

1. Distribution of habitat modification. Large contiguous areas of habitat should remain suitable, not just small specific sites where nests are currently located.

2. Upper limit to habitat modification. Limits on habitat modification should be clearly established in advance, and unplanned development should be discouraged or prohibited. Limits set in advance are generally more acceptable to persons desiring further development; the process permits reasonable negotiation and compromise and limits are easier to enforce.

3. Rate of development. Development should only be allowed to approach the upper limit slowly, over a period or years. Sudden, large-scale development should be prevented if possible.

4. Seasonal timing or human activity. Construction and related activities should be confined to the low or non-critical periods of the year as described above.

5. Human attitudes toward eagles in the area. Much human-eagle interaction depends on the predominant attitude of human residents or each area. Residents and visitors of some areas are very favorably disposed toward the birds, if not proud and quite protective. They may be careful not to disturb the birds and may help prevent disturbance or destruction by other persons. Such attitudes should be encouraged through education and law enforcement.

POTENTIAL HABITAT

Potential habitat contains the necessary habitat features and conditions that are described in essential habitat, but there are presently no eagles utilizing the area. Management strategies for potential eagle habitat should acknowledge its status as such, and if compatible with land use objectives, manage as for essential habitat.

DEVELOPMENT OF BREEDING AREA MANAGEMENT PLANS

Site specific management plans will serve to preserve and enhance the important habitat features of a breeding area and should address such factors as feeding areas, nest success history, potential nest trees, essential habitat, buffer zone configuration, and special hazards. The management plans will be prepared by the Regional Nongame Specialist with the cooperation of the Area Wildlife Supervisor and the District Forester. The County Wildlife Biologist will also be included if county land is involved. If private land is involved, the landowners will be notified. A field review of the site with a discussion of management strategies and special problems will be held prior to the development of the plan and will include all interested parties.

Management plans will be developed according to the following priorities. Eagle breeding areas that are located on:

1. State forestry or wildlife lands that are currently involved in developing a management plan for the entire area.
2. Private lands that are threatened by some type of development or disturbance.
3. State, county or private lands that are near areas of land development or disturbance.
4. State, county or private lands that are contiguous with other eagle breeding areas.

5. State lands that are not threatened by development or habitat disruption.
6. County lands that are not threatened by development or habitat disruption.
7. Private lands that are not threatened by development or habitat disruption.

The management plans will be maintained by the Regional Nongame Specialist who will also have responsibility for updating the plans as necessary. Each management plan should be reviewed at three-year intervals to determine if management constraints are being complied with and if modifications are needed. Copies of the plans and any modifications will be sent to the Nongame Supervisor, Area Wildlife Supervisor, District Forester, U.S.F.W.S. Biologist, and if County land is involved, the County Wildlife Biologist.

APPENDIX 2

ZONE
Forest
Transition

WOLF MANAGEMENT - ROAD DENSITIES

Wildlife/Forestry Coordination Policy Reference:

Specific Procedural Policy No. 6 - Significant Wildlife Conditions

General Statement

Minnesota wolf populations are most affected by prey availability and human-caused mortality. Recent findings have indicated that road densities are an available widely-applicable indicator of potentially negative human impacts on wolf populations.

These studies suggest that individual wolves or pairs of wolves likely can survive for some time in areas with high road densities, but overall, there seems to be a road density above which wolf population survival (i.e., reproducing packs) is negatively impacted. The limiting factor is not the roads per se, but rather accessibility to humans who kill wolves. Prior to the early 1970's when wolves were unprotected, the number of wolves killed by humans was high, and many forested areas with suitable habitat and prey had no wolves. Since protected, wolves have re-occupied most of the forested portion of the state where suitable prey exists (Fig. 20-1-A) except areas where killing by humans is prohibitively high. These areas appear to be those with high densities of (1) roads, (2) permanent and seasonal residences, and (3) hunters and trappers.

General Guidelines

1. Road Densities - Road densities in areas of actual or potential wolf habitat should be maintained at an average density of no higher than 1.0 mi/mi^2 over sufficiently large areas (see specific guidelines) to allow wolves to meet their biological needs. This will ensure that viable wolf populations are maintained until such time as new data allow refinement of management procedures. This should not adversely affect timber harvest rates.

2. Coordination of efforts - In many areas, a mosaic of various public and private land ownerships exist. Coordination of efforts concerning habitat manipulation, management of population and harvest levels of prey species, and road construction and maintenance should be emphasized to ensure adequate wolf management throughout its range.

3. Management of large prey - Efforts should continue to manage deer and moose according to species and habitat goals.

Specific Guidelines

1. Definitions

a) Road: For wolf management purposes, these are permanent roads requiring routine maintenance that are accessible year-round by 2 wheeled-drive vehicles. All other roads are not to be included in road density calculations. This equates with the following agency road classifications:

MNDNR Division of Forestry classification (MNDNR 1982)	Classes 1, 2, 3, 4
U.S. Forest Service classification (Anonymous 1986)	Levels A, B, C
MN DOT classification (U.S. Dept. of Transportation)	Arterial Collectors Locals

b) Actual or potential wolf habitat - This includes sufficiently large areas that currently have breeding packs of wolves, or those that have adequate prey populations and could have wolves if human-caused mortality of wolves was lower. This includes management zones 1, 2, 3 and 4 designated in the recovery plan for the Eastern Timber Wolf (Bailey, 1978) (Fig. 20-1-B).

c) Sufficiently large areas - At a minimum, this is the average area of a wolf territory and is about 40-120 mi^2 in Minnesota, depending on deer density. Because an isolated wolf pack may have more difficulty sustaining itself than if it were adjacent to other packs, a minimum of 100 mi^2 is the recommended area over which to calculate road densities.

2. Factors influencing calculation of road densities

a) Road closure - Effective closure methods that eliminate use of roads may be used to reduce road densities. These may include gates, mounds, barriers, tree drops, winter access roads through wet areas, etc. Because most human-caused wolf mortality occurs during the fall hunting seasons (September-December), seasonal closure of roads or road networks may be used in some areas to effectively reduce illegal killing of wolves. During the rest of the year, such roads could be opened and utilized for other activities.

b) Road reclamation - Returning road rights-of-way to their original condition by revegetation, much the same as for mine reclamation, is a viable method to reduce overall road density. This may also include eliminating maintenance of a road so that, in time, it would not be classified under one of the above-designated definitions of a road.

c) Non-wolf habitat - Some forest lands are adjacent to towns, cities, populated rural areas, and dense resort or seasonal residential areas, and have high road densities. These areas are not potential wolf habitat and the 100-mi^2 road management zone used to calculate road densities should not include such areas.

3. Calculation of road densities

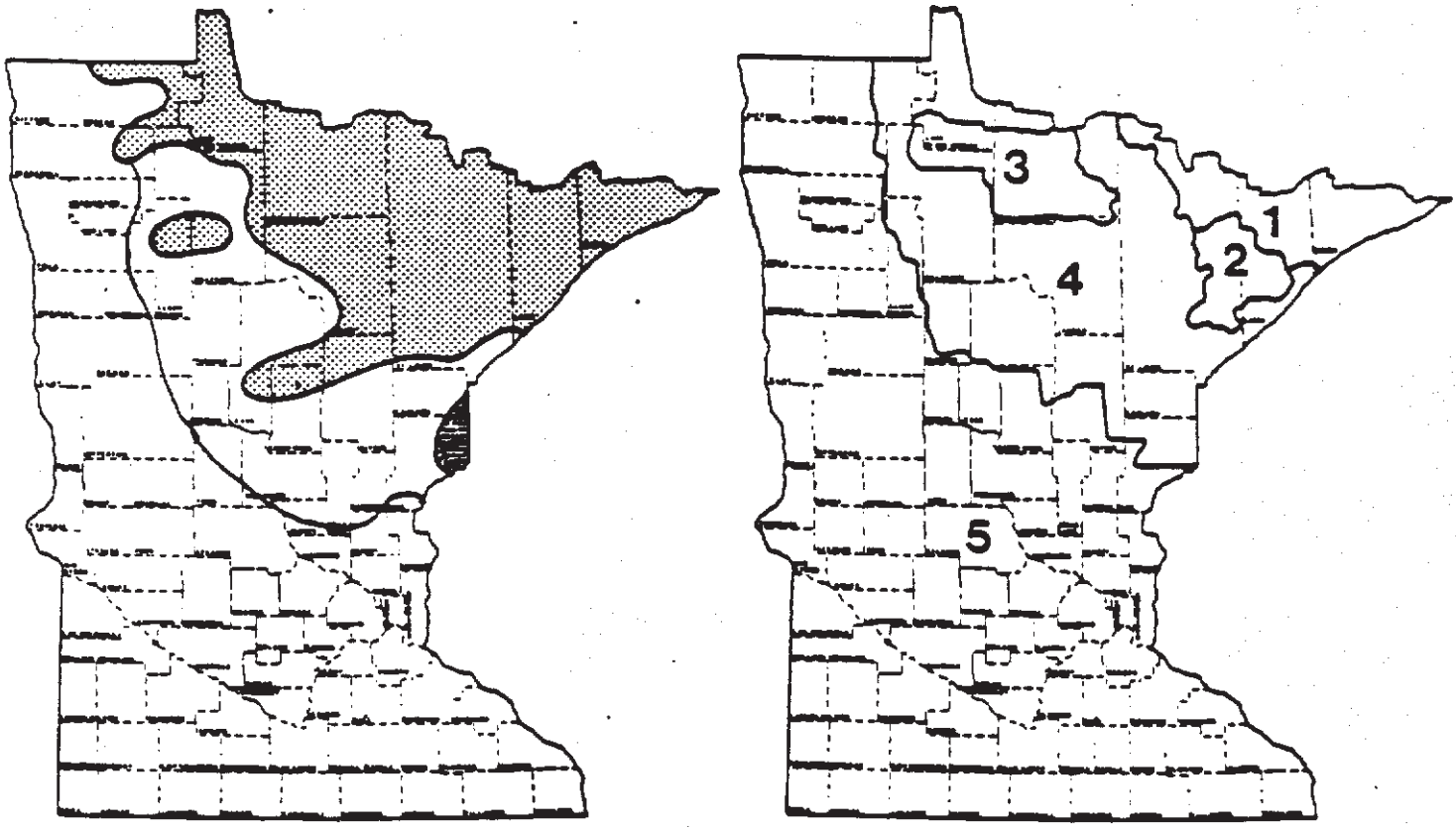
a) Straight line distance of proposed road is less than 10 miles - Determine the road's appropriate geographic center. Using a compass, draw a circle with a radius of 6 miles, using this point as its center to outline an area of about 113 square miles (3.14×6^2). Determine the number of sections (1 mi^2) within this circle that are non-wolf habitat (towns, cities, etc., and lakes >2 mi^2; see guidelines), and subtract the total from 113. If there is still >100 mi^2 of wolf habitat within the circle, use a map measure to determine the total miles of road. Divide this total, plus the total miles of road proposed to be built, by the number of square miles of wolf habitat within the circle. If it is less than 1.0, the project is within acceptable road densities and the project can be completed. If there are more than 1.0 miles of road/$mile^2$, no construction can take place unless the proposed road can be gated, or other roads gated, closed, or reclaimed (see guidelines).

If, after subtracting non-wolf habitat from the total of 113 square miles in the circle, there is less than 100 square miles, draw another circle with the same center but with a radius of 6.5 miles to outline an area of about 133 mi^2. Again, subtract non-wolf habitat from this total, and if there is more than 100 square miles left, determine road density as above. If not, continue to enlarge the circle until the total area minus non-wolf habitat is greater than 100 square miles. Such a procedure would be necessary, for instance, near Lake Superior, where nearly half of the circle might be comprised of the lake.

b) Straight line distance of proposed road is more than 10 miles - Determine its approximate geographic center and roughly draw the smallest ellipse possible around the road such that no part of the road is closer than 1 mile to the edge of the ellipse, and the longer axis of the ellipse is no more than twice the greatest width. To determine the area of the ellipse, multiply the maximum length by the maximum width by 0.785. The resultant figure will be the total number of square miles encompassed by the ellipse. Subtract non-wolf habitat as outlined above, and if the area is >100mi^2, determine the number of miles of roads present and then the road density.

If the area of wolf habitat in the ellipse is >250mi^2, divide the ellipse into 2 halves along the line of the greatest width, and determine road densities for each half. If road density in one half is low enough such that additional road building is acceptable, but is too high in the other half, the road, as originally proposed, could not be built in the half with high road density without changes.

Figure 20-1



A B

A) Approximate distribution of wolves (shaded) in Minnesota. Solid lines indicate southern boundary of forested areas and limit of wolf habitat.

B) Wolf management zones and density goals as delinated by the Eastern Timber Wolf Recovery Team.

Wolf Management Zone	Area (mi^2)	Desired Wolf Density (mi^2/wolf)
1	4462	Fluctuate naturally
2	1864	10
3	3501	10
4	20901	50
5	54603	>50

APPENDIX 3

BALD EAGLE MANAGEMENT GUIDELINES

GENERAL: The purpose of these guidelines is to maintain the environmental conditions that are required for the survival of bald eagles. The emphasis will be on preventing human disturbance to eagles, particularly during the nesting season. The ultimate objective is to preserve at least present populations of eagles.

Thus, certain human activities which are likely to disturb eagles are specified in the following sections as recommended restrictions. Although these guidelines are based on available ecological information, one cannot predict with certainty the effects of a given amount of disturbance on a particular pair of eagles. Therefore, even strict adherence to these guidelines does not guarantee continued eagle use of an area. Whoever makes specific land use decisions will need to take into consideration variations in topography and the behavior of individual eagles, so that these general management guidelines can be tailored to suit local conditions.

For management purposes, the following guidelines are divided into sections on Nesting, Feeding and Roosting. Except as otherwise noted, the guidelines apply to both public and private lands.

1. NESTING. Bald eagles often use alternate nests in different years. The following guidelines apply equally to all nests used by any particular pair of eagles, even though a nest may not have been used for raising young for one or more years.

Eagle-nesting territories are here divided into primary and secondary management zones, within each of which certain human activities have been found to disturb the nesting process. Such disturbance is defined by the restrictions recommended for each zone.

a. Primary Zone: This is the most critical area immediately around the nest.

(1) Size: Except under unusual circumstances (e.g., where a particular pair of eagles is known to be tolerant of closer human activity), the boundary of the primary zone shall not be less than 330' (5 chains) from the nest. The size should be adjusted by the actual use of the area around the nest tree, to include frequently used perch trees. Where isolated groups of trees are likely to blow down, the primary zone should not be less than 20 acres, and the opinion of a qualified forester should be obtained in order to take measures to minimize that likelihood.

(2) Recommended Restrictions:

(a) The following human activities are likely to cause disturbance to eagles and, therefore, should not occur within the primary nesting zone at any time:

1. Major land uses such as logging, the development of new commercial and industrial sites, the building of new homes, road and other construction, and mining.

2. Use of chemicals toxic to eagles. These include DDT, other persistent organochlorine pesticides, PCB, mercury, and lead.

(b) In addition, certain human activities are likely to disturb eagles during the critical period. The critical period is the time between the arrival of adults at the nest site and three weeks after the fledging of any young. In the Upper Midwest, the critical period will usually fall between March 1 and July 31. During the first twelve weeks of the critical period, eagles are most vulnerable to disturbance.

The following human activities, therefore, unless performed in connection with eagle research and management by qualified individuals, should be restricted during the critical period:

1. Human entry into the primary nesting zone.

2. Low level aircraft operations.

However, if a pair of eagles chooses to establish a new nest in an area already receiving human use, the human activities occurring at that time can continue except the use of toxic chemicals. Any expanded human activity should be avoided.

(3) Additional Management Recommendations:

(a) On public land, close land and water access to nest. Post the boundary only if necessary to reduce travel near the nest. Signs should not mention eagles or eagle nesting.

(b) On private land, the landowner might voluntarily agree to protect the primary zone; or, if the integrity of the zone cannot be otherwise preserved, the area should be acquired in fee, by easement, or by exchange--by either a private or public conservation agency. Easements should be for ten years and be renewable.

b. Secondary (Buffer) Zone: The purpose of this zone is to further minimize disturbance.

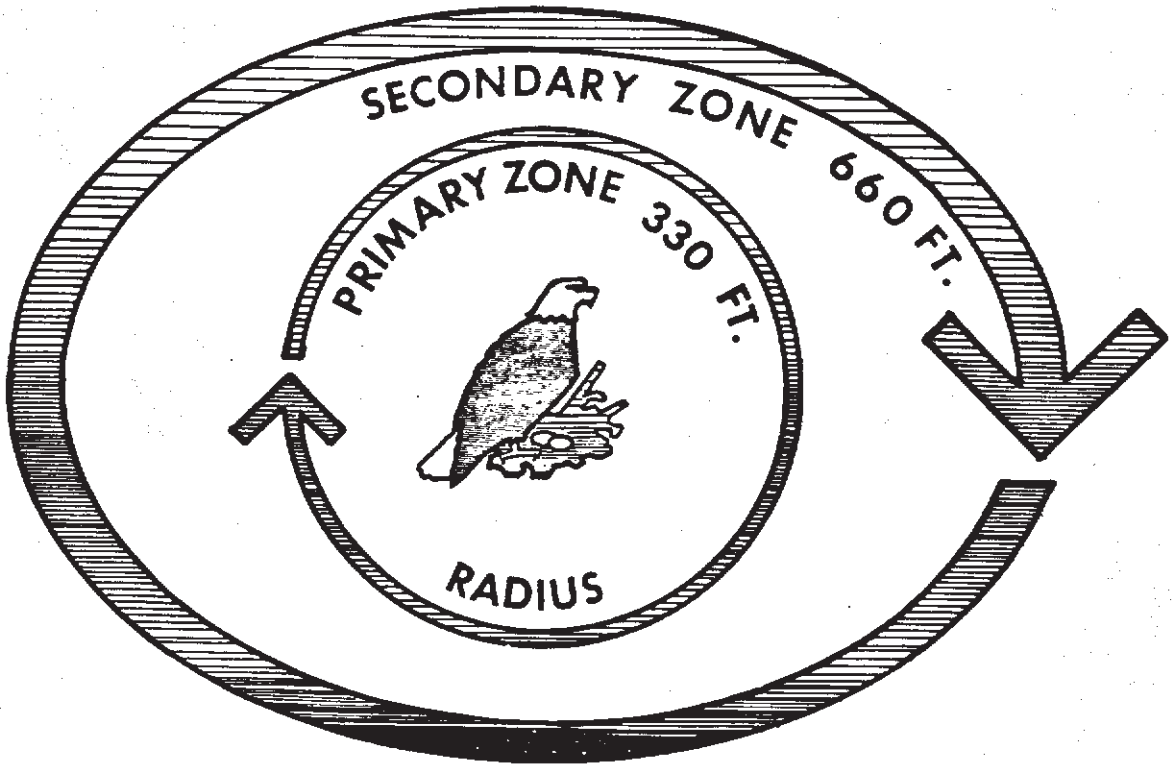
(1) Size: The size of the secondary zone will be determined by local topography and resulting visibility from the nest. It shall lie outside the primary zone and be approximately circular, with a minimum boundary of 660' (10 chains) from the nest. If disturbance would be clearly visible from the nest in a particular direction, the secondary zone should extend 1/4 mile (20 chains) in that direction.

(2) Recommended Restrictions:

(a) Certain human activities of a permanent nature are likely to disturb eagles, and they should not, therefore, occur within the secondary zone at any time. These include the development of new commercial and industrial sites, the building of new homes, the building of new roads and trails facilitating access to the nest, and the use of chemicals toxic to eagles (see above).

(b) Certain human activities have time-limited effects but are likely to disturb eagles when they are nesting. Therefore, human entry into the secondary zone should be avoided during the critical period. Examples of this kind of disturbance are logging (including selective cutting), mining, low level aircraft operations, use of firearms, camping, and picnicking.

If a pair of eagles chooses to establish a new nest in an area already receiving human use, the human activities occurring at that time can continue, except the use of toxic chemicals. Any expanded human activity should be avoided.



(3) Additional Management Recommendations:

(a) On public land, close land and water access to nest. Post boundary only if necessary to reduce travel near the nest. Signs should not mention eagles or eagle nesting.

(b) On private land, the owner might voluntarily agree to protect the secondary zone; or if the integrity of the zone cannot be otherwise preserved, it should be acquired by easement or by exchange, by either a private or public conservation agency. Easements should be for ten years and be renewable.

c. Potential Nest Sites: A small but significant percentage of a bald eagle population nests in new habitat every year. Therefore, to satisfy the future nesting needs of bald eagles, it is essential to preserve suitable habitat in addition to that which is being presently used. Therefore, the following guidelines are recommended:

(1) In potential or traditional eagle nesting habitat, where no nest now exists, for every 320 acres less than 1/4 mile from a river, or lake larger than 40 acres, leave 4 to 6 over-mature trees in the stand with an open view of and clear flight path to the water, in an area free of human disturbance. These should be the largest trees in the stand and preferably have dead or broken tops. In addition, 4 to 6 mature (80 year old) trees should be left to provide nesting sites over the long-term (50 to 100 years).

(2) Old Nests: Since eagles have been known to reoccupy a nest unused for several years, do not remove old nest trees, even though they have been seemingly abandoned.

2. FEEDING. The objective of this section is to allow eagles access to and use of feeding areas by instituting measures to eliminate or minimize human disturbances which prevent eagles from using such feeding areas. The following measures should be instituted by public land-managing agencies and are recommended for use on private lands:

a. Eliminate the use of chemicals toxic to eagles in the watersheds of lakes and rivers where eagles feed. These include DDT and other persistent organochlorine pesticides, PCB, mercury, and lead.

b. Prohibit clear-cut logging within 200' of the shoreline of such feeding waters.

c. Discourage the construction of buildings within 1/4 mile of the shoreline of feeding waters.

d. Maintain, restore if necessary, or manage fish populations or other primary food supplies to sustain eagles.

e. Limit fishing, recreational boating, water-skiing, and other human disturbance if adversely affecting eagle use of the feeding water.

f. Along rivers where water flow is controllable, maintain flow rates which will not cause the loss of shoreline roost or perch trees through shoreline erosion.

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3. ROOSTING.

a. Within 1/4 mile (20 chains) of existing nests, outside the primary and secondary zones save 3 to 5 old-growth trees for potential roost and perch trees during the breeding season.

b. Any winter eagle roosting concentration should be brought to the attention of the landowner or land-managing agency, the U.S. Fish and Wildlife Service or State Wildlife Department, so that a public or private conservation agency can preserve the roost, by purchase, easement, or land exchange if necessary, subject to the availability of funds. There should be no logging within a communal roosting area. There should be no other human activity during the period of eagle use until specific management recommendations have been made.

c. Along rivers where water flow is controllable, maintain flow rates which will not cause the loss of shoreline roost or perch trees through shoreline erosion.

LEGAL CONSISDERATIONS: The preceding guidelines are advisory. The law on this subject is set forth in the Act for the "Protection of Bald and Golden Eagles" (16 USC 668-668d) and the regulations that have been derived therefrom (Title 50, Code of Federal Regulations). The Act states in part that no person "shall take...any bald eagle...or any golden eagle, alive or dead, or any part, nest, or egg thereof..." (16 USC 668). The Act further states that "take" includes also pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb..." (16 USC 668c). Whoever violates any part of the Act could, under certain conditions, be fined up to $10,000 and imprisoned for two years.

Compliance with or disregard for these guidelines does not, of itself, show compliance with or violation of the Act or derived regulations. It is advisable that Law Enforcement, U. S. Fish and Wildlife Service, Minneapolis, Minnesota, be contacted if there is any question about an activity to be conducted in the vicinity of an eagle nest, or the nest of any other large bird. The mailing address is: Federal Building, Fort Snelling, Twin Cities, MN 55111, telephone Area Code 612-725-3530.

These guidelines are a modified version of guidelines previously issued by the Portland Regional Office of the Fish and Wildlife Service.

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

APPENDIX 4

647

Fish Lake (East)

BALD EAGLE - OSPREY
NEST RECORD

Nest Number SL-31 MPcode = F-2

Species ☐ Bald Eagle ☐ Osprey

Prepared By _____ Date _____

State MN | County St Louis | Legal Description T52N R15W NWSE Sec 35

LANDOWNERSHIP
- ☐ National Forest
- ☐ Other Fed. or State
- ☐ County, City, etc.
- ☒ Private

NEST TREE
Species ASPN DBH _____ HT. _____
Condition of tree _____
Remarks:

NEST
Ht. _____ Apx. Size _____
Date Constructed _____
Accessibility: ☐ D ☐ M ☐ E
Visibility

NEST HABITAT

Timber type, size & density _____
Distance to open water (.1 mi.) _____ mi.
Dist. to lake-100 Ac. or larger(.5 mi.) ___ mi.
Dist. to major river(.5 mi.) _____ mi.
Dist. to swamp (.1 mi.) ___ mi. T.S.A.D. _____
Dist trees available? _____ Apx. No. _____
Remarks:

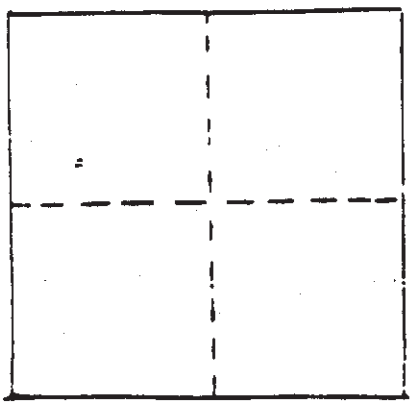
DEVELOPMENT

Distance to nearest main road (.1 mi.) _____ mi.
Dist. to woods (LUR) road (.1 mi.) _____ mi.
Structural developments nearby _____
Wild Mod.developed Well developed
Timber cutting in area? _____
T.S.I. Planting, etc.? _____
Remarks:

MANAGEMENT CONSIDERATIONS AND REMARKS:

MAP

Scale -



DIRECTIONS TO REACH NEST

CUMULATIVE NEST HISTORY

647

Date	Observer	ACTIVE NEST: Adults	Incubating	Eggs	Young	Fledged	Not Active	Remarks
1987	USFWS ERIC NELSON	X						Failed
1988	Found	X				?		

est or nest tree destroyed (detail):

BALD EAGLE BREEDING AREA MANAGEMENT PLAN

BREEDING AREA NAME	NEST CODE	STATE	COUNTY	TOWNSHIP
Fish Lake #3	MP Code = F-3 SL-16	Minnesota	St. Louis	Fredenberg

LEGAL DESCRIPTION	STATE FORESTRY DIST.	PREPARED BY	DATE
SWSW Sec. 27 T52N R15W	Cloquet Valley	J. Hines	4-23-92

LAND OWNERSHIP

____Federal
____State
____County
____City
_X_Private
____Other

Remarks:
Minnesota Power

NEST TREE

Species white pine
DBH _____
Height _____
Condition of tree:

Remarks: tree in good condition

NEST

Height in tree _____
Date Constructed unknown*
Accessibility _____
Visibility _____
Relation of nest height to surrounding canopy:

*found 4-17-92

NEST HABITAT

Timber type _____
Dist. to open water _____
Dist. of lake > 100 acres _____
Dist. to major river _____
Dist. to swamp _____

Remarks:

Nest trees available? yes
Approx. no.\Species
10-12 white pine
Perch trees available? yes
Approx. no.\Species

DEVELOPMENT

Dist. to nearest main rd. 1 miles
Dist. to woods rd. .2 mile
Type and location of nearby structural developments. summer homes

_____Wild _____Mod. dev. _X_Well dev.

Remarks:

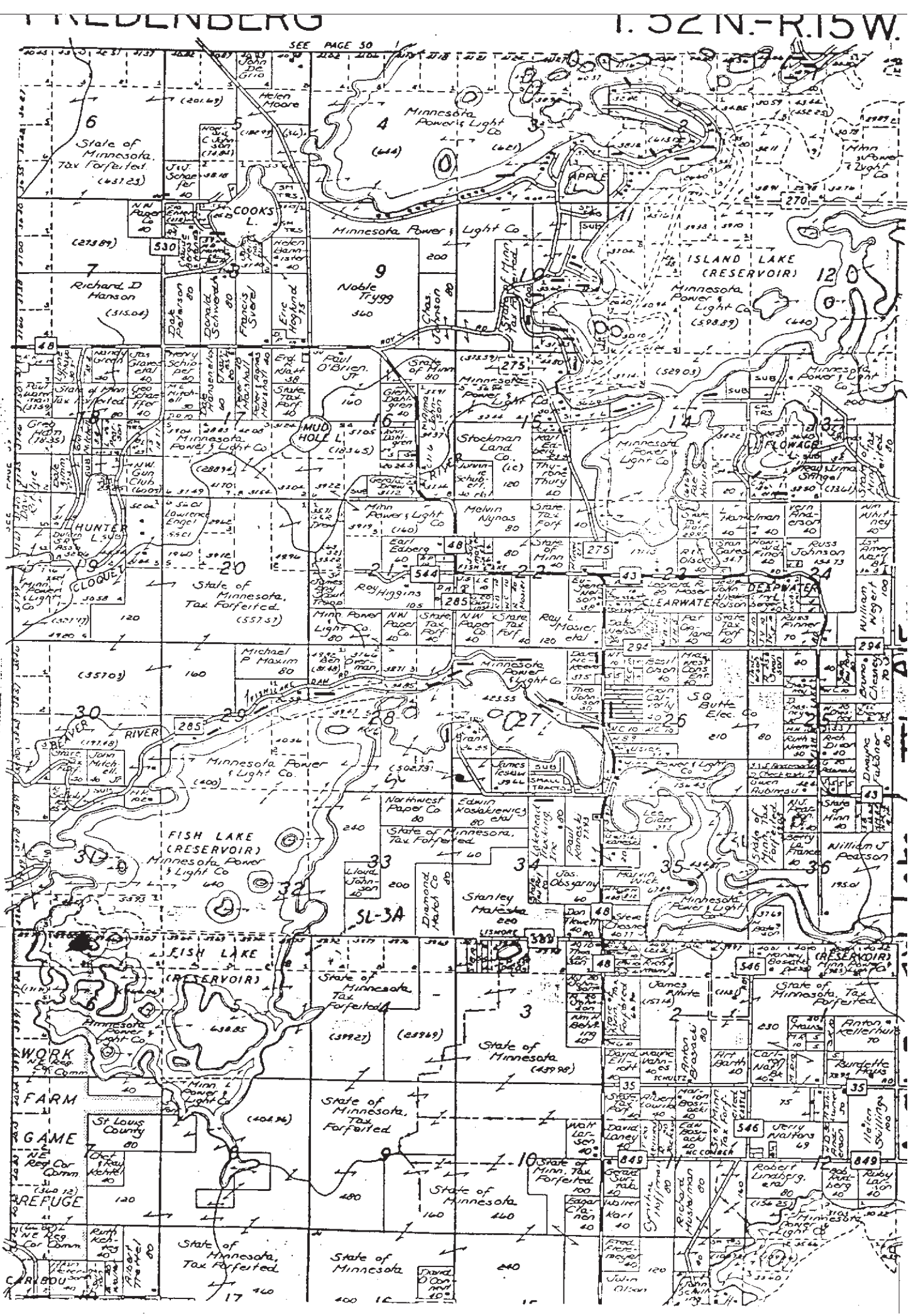
Timber cutting in area? yes
Agency:
T.S.I., planting, etc? _____
Agency:

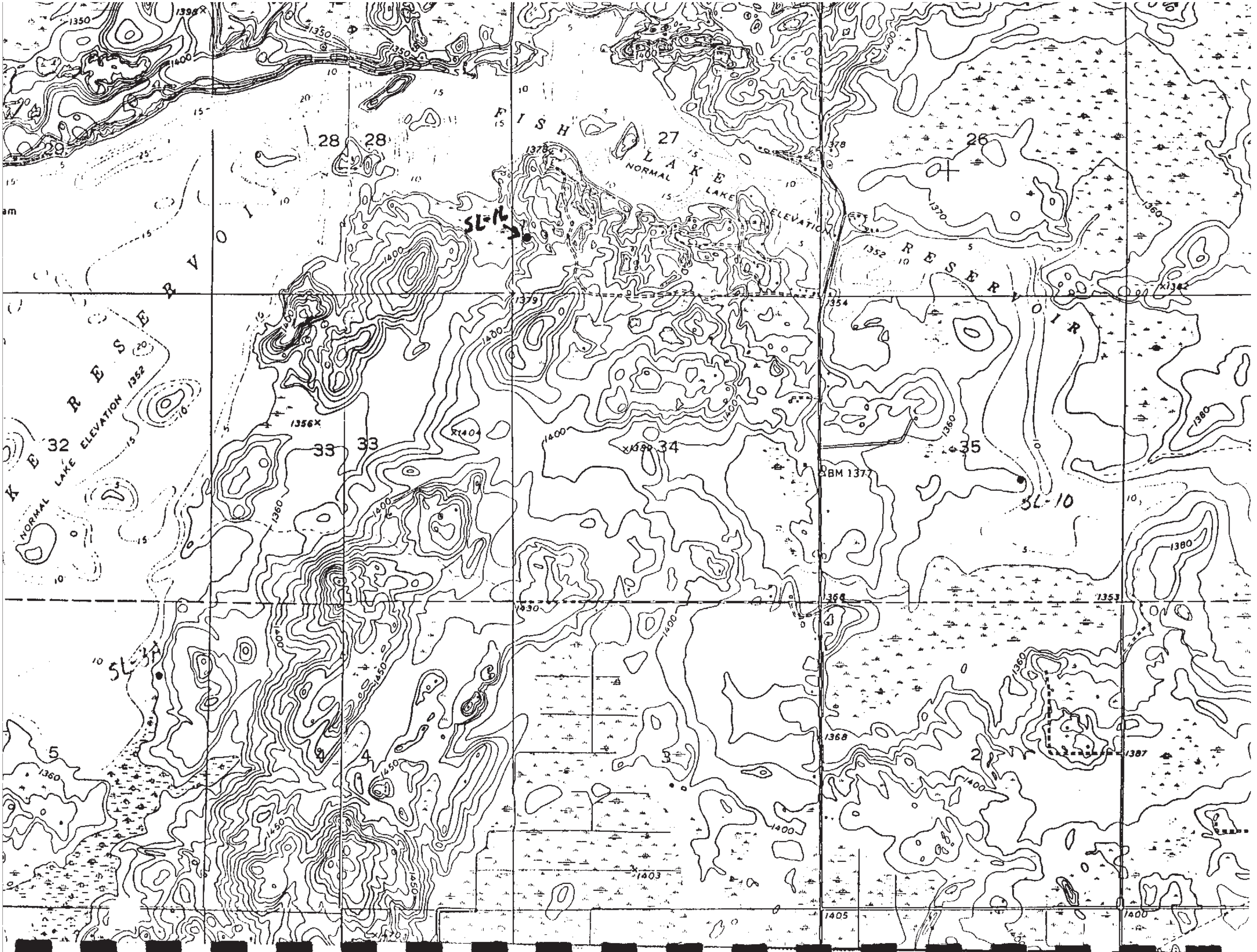
FEEDING AREAS: Fish Lake

MANAGEMENT CONSIDERATIONS:

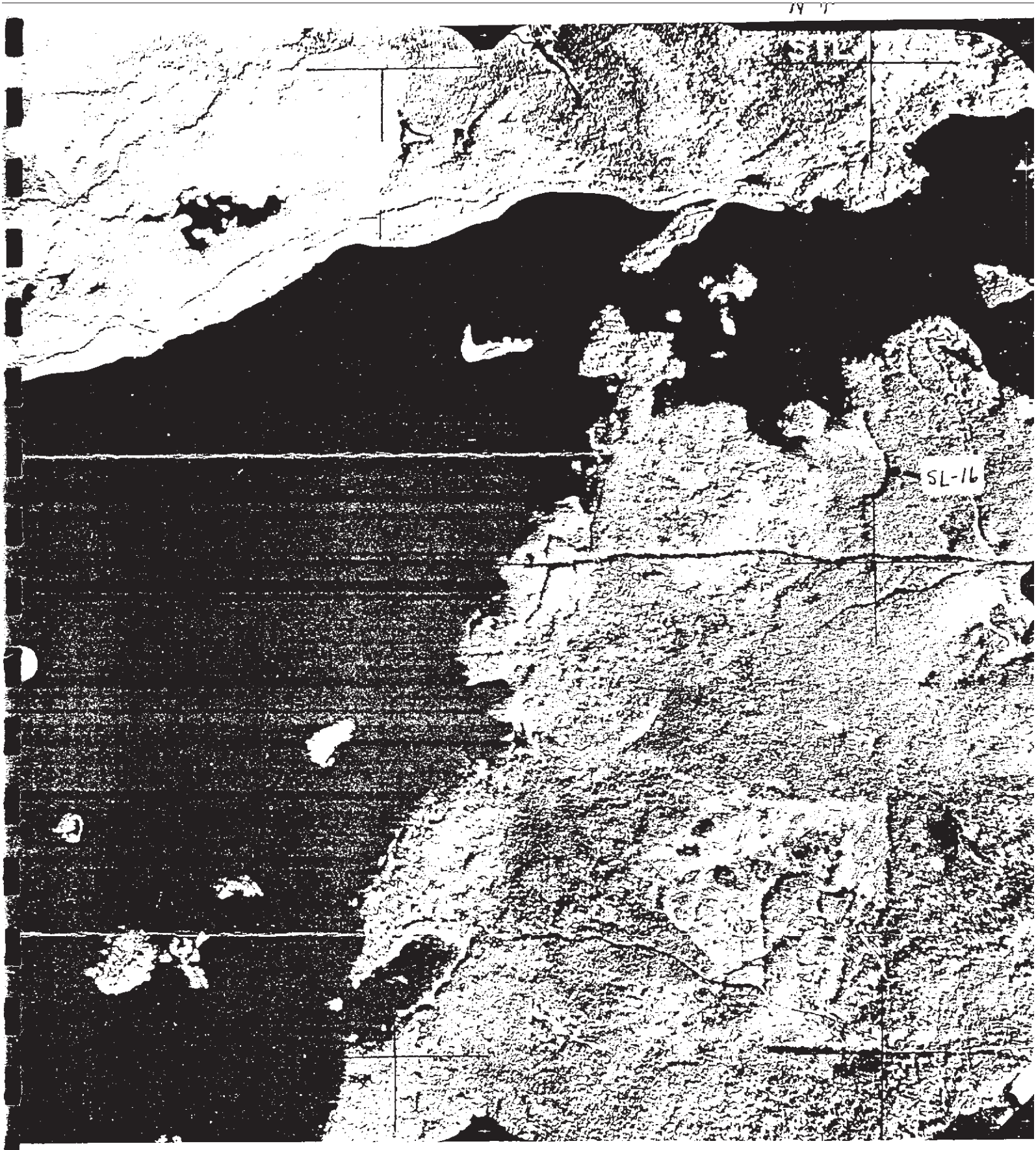
Existing or potential disturbance hazards:
Info. on post-nesting use of habitat: none
Special hazards:
Rds. & trails to be closed or rerouted: none
Buffer zone configuration: standard
Modification of timber sales, rec. dev.: none

OVERVIEW OF HABITAT AND LAND USE: Fish Lake is a recreational lake. There are many homes on the lake and also resorts. This is the third eagle breeding territory on the lake.


FREDENBERG
T. 52N.-R.15W.
SEE PAGE 50
COOKS L.
MUD HOLE L.
HUNTER L SUB
CLOQUET
RIVER
BEAVER
FISH LAKE (RESERVOIR)
FISH LAKE (RESERVOIR)
ISLAND LAKE (RESERVOIR)
CLEARWATER
DEERWATER
FLOWAGE
WORK FARM
GAME REFUGE
CARLTON
Minnesota Power & Light Co
State of Minnesota, Tax Forfeited
St Louis County
NW Paper Co
NW Gun Club
Richard D Hanson
Noble Trygg
Paul O'Brien Jr
Stockman Land Co. (Lc)
Melvin Nynas
Roy Higgins
Michael P Maxim
Edwin Koskiekewicz et al
Northwest Paper Co
Stanley Matcheko
Diamond Match Co
Lloyd Johnson
Ray L Mosier et al
Leonard R Moser
Russ Johnson
William Nygert
Anton Kellerhuis
Robert Lindsberg et al
Ruby Larson
Walter Karl
Sagar Clanen
Richard Mustonen
Julia Olson
SL-3A



FISH LAKE
NORMAL LAKE ELEVATION
RESERVOIR
NORMAL LAKE ELEVATION 1352
SL-16
SL-31
SL-10
BM 1377
32
33
33
34
35
28
28
27
26



SL-16

Fish Lake #3

52-15- Sec 27

BOULDER LAKE BALD EAGLE MANAGEMENT PLAN

Nest Number: St. L. - 2a mp code = B-1

Location: SW¼ SW¼ NW¼ Sec. 17 T53N R14W

Fieldwork done by: Ken Soring Date: 5 February 1985

Written by: J.S. Boe Date: 25 June 1985

I. Breeding Characteristics

A. General Description

Nest Site Relationships

Overview of Habitat and Land Uses

St. L-2a is a partially defunct nest located in a white pine within an overaged white spruce stand on the shore of Boulder Lake Reservoir. There is one timber cutting .6 mile to the east of the nest.

B. Feeding Areas (known and/or assumed)

Feeding areas include the Boulder Lake and Island Lake Reservoirs.

See St. L-2a file for note regarding quality of prey base in reservoirs.

Island Lake is listed in the most recent (May 1985) Fish Consumption Advisory for Minnesota Waters published by the Minnesota Dept. of Health. The pollutant is mercury. A copy of this report is on file at the Nongame Wildlife Program office in Grand Rapids.

C. Known or Potential Perch/Roost Trees

The Northern States Bald Eagle Recovery Plan indicates that three or more super-canopy trees (preferably dead or with dead tops) should be identified and preserved within .25 mile of each nest for roosting and perching.*

There are many white pine potential perch trees nearby. See map on attached form.

D. Potential Nest Sites Available

Potential nest trees should be taller than surrounding trees or at the edge of the forest stand, and there should be clear flight paths to them.*

There are about 30 large-crowned white pine along the shoreline of much of the reservoir.

E. Land Ownership within Breeding Area

Acquisition Needs

The land on which the nest and buffer zones are located is owned by Minnesota Power.

The U.S. Fish and Wildlife Service brochure explaining beneficial eagle management practices for landowners should accompany a letter informing landowners of the presence of the nest.

F. Post-nesting Use of Habitat

Information on post-nesting use of this area is not available.

Observation forms with a request for mid and late season sightings should be sent to likely observers.

II. Nest Site Characteristics

A. Tree Measurements: See attached form.

B. Condition of Nest Tree

The nest tree is in excellent condition.

C. Date Constructed

The nest was constructed in 1979 or before.

D. Timber Type, Size and Density

The nest tree is in an overaged white spruce stand (9"-15" dbh) with white pine and aspen. There is a thick balsam fir and spruce understory.

E. Distance to Water

St. L-2a is 35' from Boulder Lake Reservoir.

F. Distance to Roads and Other Development

The nest is 1.5 miles from County Highway 4 and .8 mile from a forest road.

G. Accessibility

Relation of Nest Height to Surrounding Canopy

The nest is moderately accessible. It is not easily visible since it is 30' below canopy.

H. Precise Directions for Reaching Nest

See directions on attached form.

III. Pair Behavior and Biology

A. Response to Human Intrusions and Potential Disturbance Hazards

Eagle tolerance of human presence is highly variable, both seasonally and among different individuals or pairs of eagles. Management should be conservative and assume that intolerant birds may be present now or in the future.*

The response of these eagles to intrusion is unknown.

Analysis of Existing and Potential Disturbance Hazards

Standard buffer zones will protect the nest site from any timber harvesting; there is little danger of other disturbance.

B. Summary of Nesting History

Year	1979	1980	1981	1982	1983	1984
# Young	2	1	F	2	NA	2

Key: 1,2,3 = successful nest, number of young; F = nest failed; NA = nest not active; NF = nest not found on survey; NC = nest not checked; D = nest defunct; OC = territory occupied by adult(s).

C. Research and Study Data Available

A number of studies of bald eagle ecology have been conducted in nearby Chippewa National Forest. For information contact the U.S. Forest Service, Cass Lake, MN 56633.

IV. Management Constraints

A. Roads and Trails to be Closed or Rerouted

No roads or trails need to be closed or rerouted.

B. Buffer Zone Configuration

Each nest within a breeding area should be protected by three buffer zones that become less restrictive to human activity as distance from the nest increases.

Within these buffer zones there are temporal restrictions as well that coincide with different periods of sensitivity to disturbance during the breeding cycle.*

Establishment of standard buffer zones will protect this site from disturbance.

Primary Zone (0-5 chains from nest)

All land use except actions necessary to protect or improve the nest site should be prohibited in this zone. Human entry and low-level aircraft operations should be prohibited from Feb. 15 to June 15, unless performed in connection with eagle research or management by qualified individuals. Motorized access into this zone should be prohibited.

Secondary Zone (6-11 chains from nest)

Land use activities that result in significant changes in the landscape such as clearcutting, land clearing, or major construction should be prohibited at all times. Work such as stand thinning, pruning, and maintenance of existing improvements can be permitted from June 15 to February 15.

Tertiary Zone (11-40 chains from nest)

This is the least restrictive zone. It should extend one-quarter mile (20 chains) from the nest, but may extend up to one-half mile (40 chains) if topography and vegetation permit a direct line of sight from the nest to potential activities at that distance. Work such as clearcutting, land clearing and major construction can be permitted from October 1 to February 15.

C. Modification of Existing or Proposed Timber Sales, Roads, Recreational Development, etc.

Standard buffer zones will protect the nest from timber harvesting.

Cooperation of private, state and/or county foresters as well as landowners should be sought in an effort to maintain stands of timber suitable for bald eagle nesting near these lakes.

D. Essential Habitat

Essential habitat is the area considered necessary for meeting the basic needs of the pair.*

The essential habitat for this nest includes the buffer zones around the nest and the waters and shoreline of the northern third of Boulder Lake Reservoir.

V. Special Hazards

No special hazards are known for this nest site.

Heavy metal and chlorinated hydrocarbon accumulations in the prey base of bald eagles threaten the species' survival. Acid rain resulting from the burning of fossil fuels could destroy the fish that are the foundation of the bald eagle diet. Efforts to decrease environmental pollution should continue, and levels of contaminants in the prey base should be monitored.

VI. Natural Resource Personnel Relevant to This Nest

Jack Mooty, Nongame Specialist
MnDNR, 1201 East Hwy. 2
Grand Rapids, MN 55744 218-327-1721

Eric Nelson, Biologist
U.S. Fish and Wildlife Service
P.O. Box 845
Bemidji, MN 56601 218-751-3926

Dave Duncan, Special Agent
U.S. Fish and Wildlife Service
515 West 1st Street
Duluth, MN 55802 218-727-6692 ext. 357

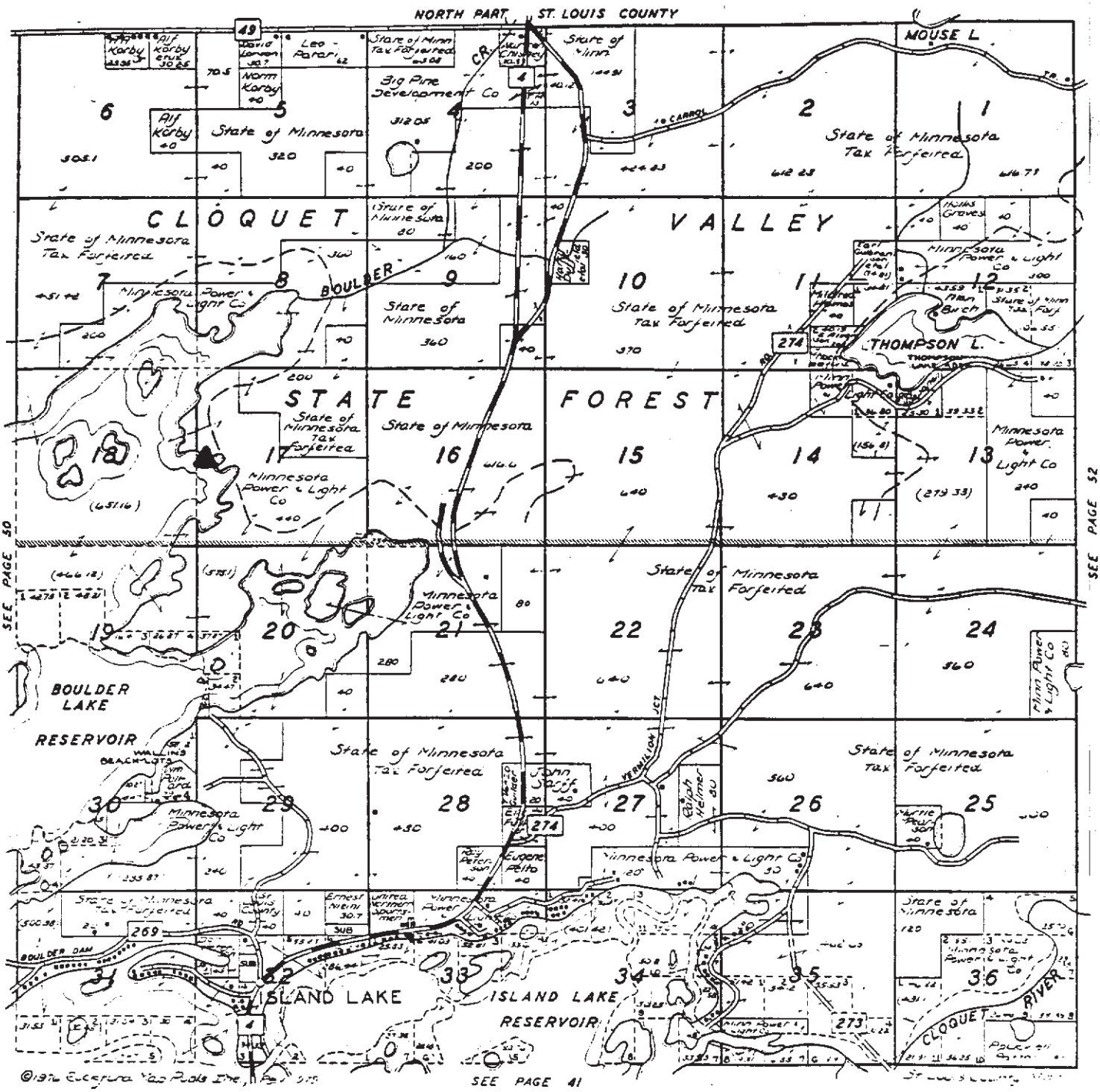
Rich Staffon, Area Wildlife Manager
MnDNR, South Highway 33
Cloquet, MN 55720 218-879-4544

Les Miller, District Forester
MnDNR, 6163 Rice Lake Road
Duluth, MN 55803 218-723-4669

Don Polovina, Conservation Officer
MnDNR, 6924 Arrowhead Road
Duluth, MN 55811 218-729-9474

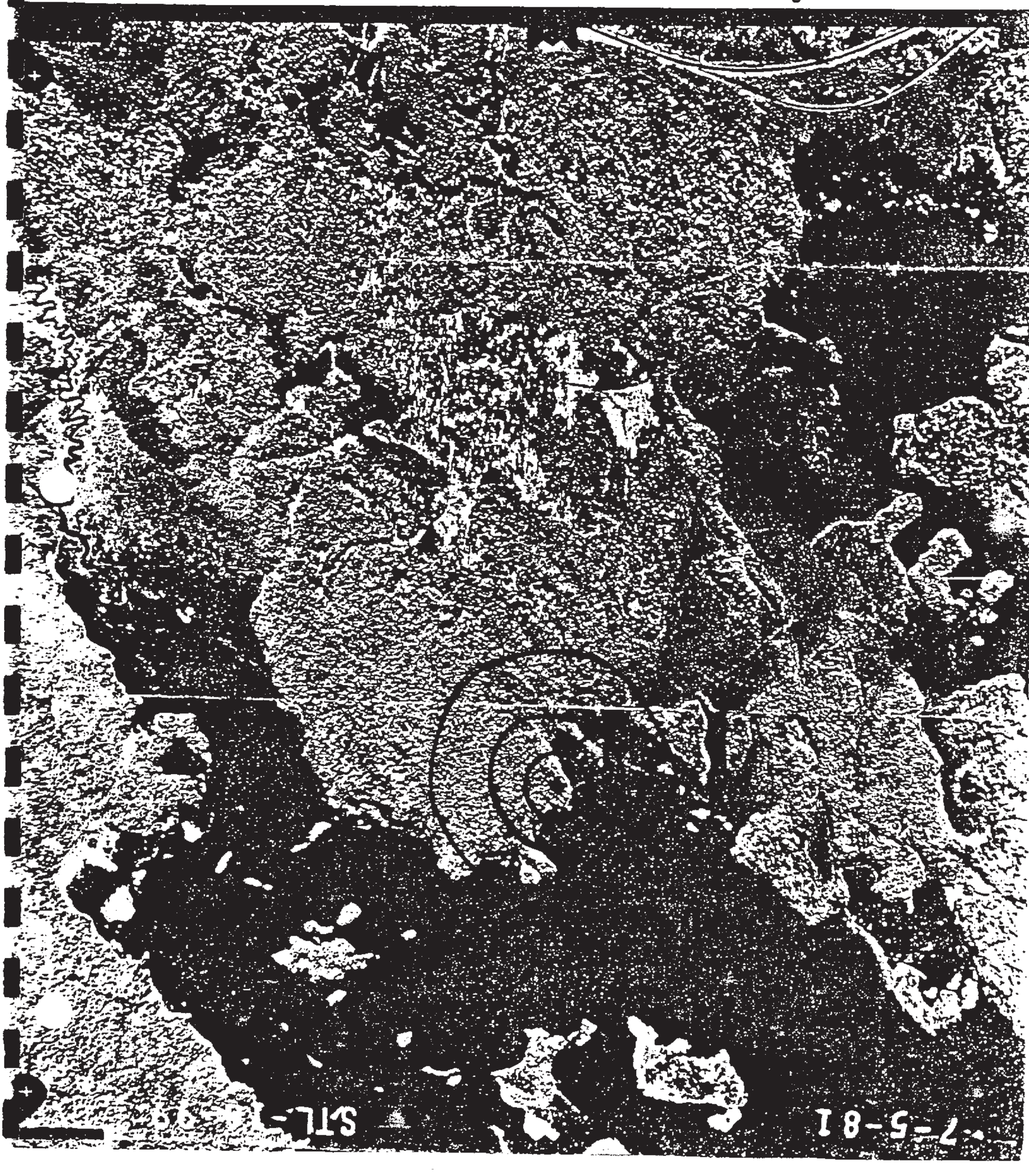
* Northern States Bald Eagle Recovery Plan. 1983. Northern States Bald Eagle Recovery Team. U.S. Fish and Wildlife Service, Denver, Colo.

NORTH PART **GNESEN** **T. 53 N.-R.14W.**



▲= St.L. 2a
Boulder Lake

St. L- 2a
Boulder Lake
Buffer Zones



USDA - Forest Service R9-2630-1 (6/11/70)

ADMINISTRATIVELY CONFIDENTIAL

BALD EAGLE - OSPREY
NEST RECORD

(Ref. FSM 2633.4, Par. 1b)1/

Territory Name: Boulder Lake

Nest Code: St L. - 2a

Prepared By: Ken Soring

Date: 2/5/85

State: MN

County: St. Louis

Forest: Cloquet Valley

District: Cloquet Valley

Legal Description: SWSWNW17 53-14

LANDOWNERSHIP
- [ ] National Forest
- [ ] Other Fed. or State
- [ ] County, City, etc.
- [X] Private Minn Power

NEST TREE State forest
Species WP DBH 39" Ht. 85'
Condition of Tree excellent
Remarks: Very thick crown. *Nest partially Defunked!

NEST 1' deep
Height 60' Apx. Size 2'x3'
Date Constructed Prior to 1979
Accessibility: [ ] D [X] M [ ] E 2/
Visibility: Low / Partially Defunked

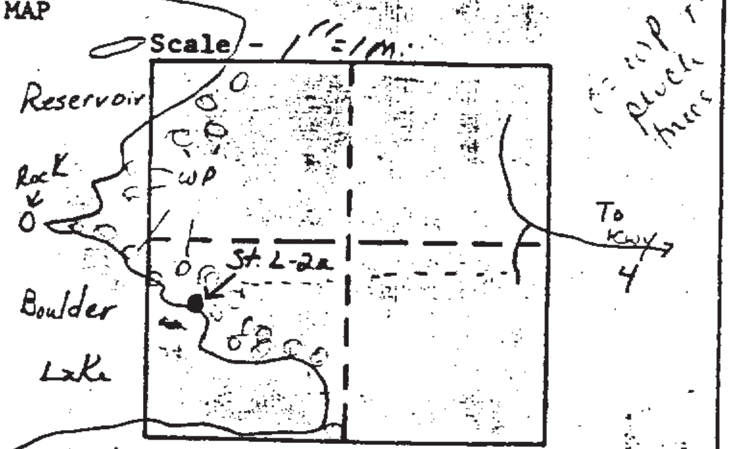
NEST HABITAT Overaged 9-15", many blowdowns thick balsam spruce regeneration.
Timber type, size, & density W. spruce, WP, B, A
Distance to open water (.1 mi.) 35' mi.
Dist. to lake-100 Ac. or larger (.5 mi.) 35' mi.
Dist. to major river (.3 mi.) ——— mi.
Dist. to swamp (.1 mi.) ——— mi. T.S.&D. ———
Nest trees available? yes Apx. No. 30+
Remarks: There are many large crowned WP along the shoreline of much of the reservoir.

DEVELOPMENT
Nest 30' below canopy (may have fallen)
Distance to nearest main road (.1 mi.) 1.5 mi.
Distance to woods (LUR) road (.1 mi.) .8 mi. mi.
Structural developments nearby none
[X] Wild [ ] Mod. developed [ ] Well developed
Timber cutting in area? yes 6 mi. to east
T.S.I. Planting, etc.? yes 1 mi. to east
Remarks: Area is overaged to spruce with many downed trees thick balsam spruce under story.

FEEDING AREA:
Boulder Lake and Island Lake Reservoirs } thousands of perch } Northern pikes

MANAGEMENT CONSIDERATIONS AND REMARKS:

MAP



DIRECTIONS TO REACH NEST

Take Hwy #4 2 1/4 mi North of Island L. Recreation Area (Hideaway) Thence West on logging road to Second Y in trail, park at Y and walk west to lake, nest. Easier access by snowmobile, from road in Sec. 20, around point to nest.

1/Submit one copy to Forest Supervisor for Forest Wildlife Management Plan. Retain one copy in Ranger District Current Action Plan (FSM 2624.4).
2/D-Difficult to reach; M-Moderately easy to reach; E-Easy to reach nest site.

(Over)

ADMINISTRATIVELY CONFIDENTIAL

BALD EAGLE - OSPREY NEST RECORD

(Ref. FSM 2633.4, Par. 1b)1/

Territory Name: WHITEFACE

Nest Code: #439 MP Code=WF-1

Prepared By: DENNIS FITZPATRICK

Date: 06/24/87

State: MN | County: ST. LOUIS | Forest: SUPERIOR | District: AURORA | Legal Description: T56N R14W Sec 30 NE

LANDOWNERSHIP
- [ ] National Forest
- [ ] Other Fed. or State
- [ ] County, City, etc.
- [x] Private

NEST TREE
Species WP DBH ____ Ht. ____
Condition of Tree HEALTHY
Remarks:

NEST
Height ____ Apx. Size ____
Date Constructed 1985
Accessibility: [ ] D [x] M [ ] E 2/
Visibility: CAN BE SEEN FROM WATER

NEST HABITAT
Timber type, size, & density ____
Distance to open water (.1 mi.) .1 mi.
Dist. to lake-100 Ac. or larger(.5 mi.) .1 mi.
Dist. to major river (.5 mi.) ____ mi.
Dist. to swamp (.1 mi.) ____ mi. T.S.&D. ____
Best trees available? YES Apx.No. ____
Remarks:

DEVELOPMENT
Distance to nearest main road (.1 mi.) 2.0 mi.
Distance to woods (LUR) road (.1 mi.) 1.0 mi.
Structural developments nearby 1.0 mi
[ ] Wild [x] Mod. developed [ ] Well developed
Timber cutting in area? 1.0 mi
T.S.I. Planting, etc.? ____
Remarks:
- ISLAND IS .75 MI FROM MAINLAND
- BECOMES PENINSULA WHEN WATER LEVEL LOW.

FEEDING AREA: WHITEFACE RESERVOIR, LINWOOD LAKE

MANAGEMENT CONSIDERATIONS AND REMARKS:

PRIVATE LAND: J. WEBERG. ALSO STATE AND MP&L. OWNERSHIP

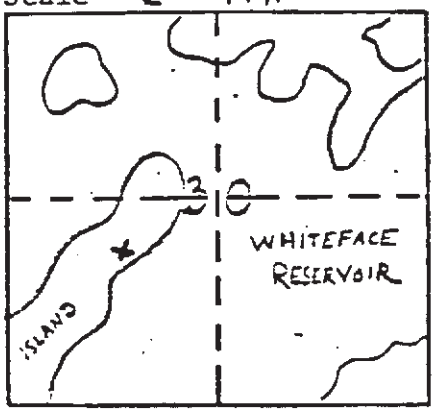
MOTORIZED FISHING AND RECREATION ACTIVITY ON LAKE

USER DEVELOPED PICNIC SITE ON ISLAND - NEEDS FIELD CHECK

WHEN WATER LEVEL IS EXTREMELY LOW, ISLAND IS ACCESSIBLE BY ATV's.

MAP

Scale - 2" = 1 mi



DIRECTIONS TO REACH NEST

2 MILES SW OF WHITEFACE CAMPGROUND

1½ MILES S. OF COUNTY 340 ROAD

'81 B&W PHOTO STRIP 56 #80

'81 COLOR PHOTOS LINE 41 #42
LINE 42 #56

1/ Submit one copy to Forest Supervisor for Forest Wildlife Management Plan. Retain one copy in Ranger District Current Action Plan (FSM 2624.4).

2/ D-Difficult to reach; M-Moderately easy to reach; E-Easy to reach nest site.

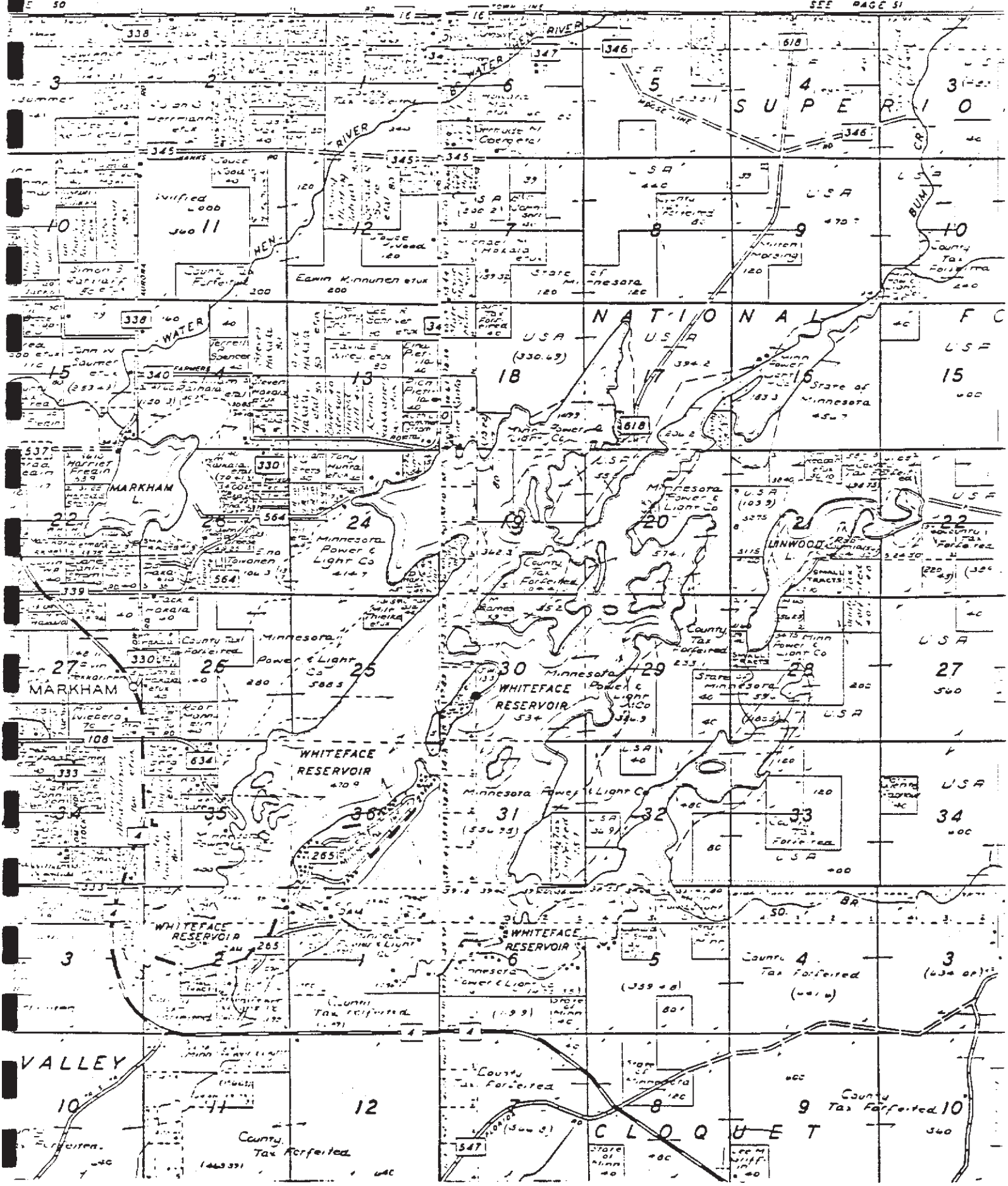
(Over)

CUMULATIVE NEST HISTORY

Date	Observer	Territory Occupied	Adults	ACTIVE NEST				Inactive Nests	Remarks
				Incubating	Eggs	Downy Young	Fledged		
06/23/87	D. FITZPATRICK	+	2	+	✓	2	2		BREEDING AREA SURVEYED FOR SEVERAL YEARS PREVIOUS.
06/28/88	D. FITZPATRICK	+	2	+	✓	2	2		SUCCESSFUL IN SPITE OF WILDFIRE AND ATV DISTURBANCE

Nest or nest tree destroyed (detail):

GPO 801-544


T. 56 N. - R. 15 W.
T. 56 N. - R. 14 W.
SEE PAGE 51
MARKHAM
MARKHAM L.
WHITEFACE RESERVOIR
NATIONAL
SUPERIOR
LANWOOD
VALLEY
CLOQUET
Minnesota Power & Light Co
County Tax Forfeited
State of Minnesota
USA

#-37 WHITEFACE

APPENDIX C

As filed in 1993: Boulder Lake Conservation Area Management Plan (should now be referred to as the Boulder Lake Management Area Management Plan)

Boulder Lake Conservation Area

Management Plan

June 11, 1993

written by:

Minnesota Power - Environmental Resources Department

Saint Louis County Land Department - Pike Lake Area Office

Minnesota Department of Natural Resources - Division of Forestry

Boulder Lake Conservation Area Management Plan

Table of Contents

Page

I. INTRODUCTION:

1.1 DESCRIPTION OF AREA/PLAN

The Boulder Lake Conservation Area is comprised of approximately 8,250 acres owned and cooperatively managed by Minnesota Power, St. Louis County, and the Minnesota Department of Natural Resources (MDNR). Each of the three partners are responsible for managing their own lands within the area in cooperation with the other partners. The area is managed under dedicated land management principles which reflect the environmental stewardship of each partner. In addition, the area will incorporate education/interpretation of land management practices, geology, archaeology, and terrestrial/aquatic ecology.

1.2 COOPERATIVE MANAGEMENT OBJECTIVES

The concept for establishing the Boulder Lake Conservation Area was developed recognizing the opportunity to continue to manage the area in its present state through a coordinated effort between Minnesota Power, St. Louis County, and the MDNR. The lands surrounding Boulder Lake Reservoir include a wide diversity of forest types, aquatic environments, and animal species, all of which occur in a largely undeveloped and natural setting. One of the most unique opportunities of this cooperative approach is the environmental education opportunities available to the public at a location near a relatively large population center.

The partners have managed their respective lands within the area under similar land management philosophies. In 1991, a partnership was formed among the three groups to establish the Boulder Lake Conservation Area, provide management continuity in the area, and create a public setting in which to interpret land and reservoir management on a large scale.

1.3 DESCRIPTION OF LANDS

a. Site location

The Boulder Lake Conservation Area is located approximately 15 miles north of Duluth, Minnesota. The area includes Boulder Lake Reservoir (approximately 4,100 acres), approximately 3,000 acres of Minnesota Power land and wetlands surrounding the reservoir, 450 acres of adjacent tax forfeit land administered by the St. Louis County Land Department, and 704 acres administered by the Minnesota Department of Natural Resources. Figure 1 is a map of the Boulder Lake Conservation Area.

Boulder Lake Reservoir was created in 1919 when a dam was built on the Otter River. Boulder is one of four storage reservoirs operated by Minnesota Power in the Cloquet River Drainage Basin. The other reservoirs are Island, Fish, and Wild Rice Lakes (See Figure 2). The water flowing into Boulder Reservoir is generally held in storage until November then released into Island Lake Reservoir throughout December each year. The water eventually flows 30 miles down the Cloquet River into the St. Louis River, continues downstream to hydroelectric generating facilities at Cloquet, Scanlon, Thomson and Fond du Lac (all in Carlton Co., Minnesota) before emptying into Lake Superior at Duluth.

The landscape of the Boulder Lake Conservation Area is characteristic of that found in northeastern Minnesota's Cloquet River Valley. The gently rolling terrain is of glacial origin, and the forests consist of a varied vegetation typical of the region.

Designated public access to the Boulder Lake Conservation Area is provided in three areas: south--from the Boulder Dam Road approximately 1.5 miles west of County Highway 4; west--from the public boat launch at the end of the Boulder Dam Road; east--from CSAH 4 about 3.5 miles north of the Island Lake Causeway.

b. History of Ownership

State of Minnesota All the land in Section 16, Township 53 N. - Range 14 W. was granted to the State of Minnesota by the United States . The Organic Act passed by Congress in 1849 established a territorial government for Minnesota and reserved sections 16 and 36 of each township for the purpose of schools and education in the territory. These lands are called Trust Fund School Lands and are held by the State in trust for the public. Proceeds from the use of these lands are deposited into a trust where the principal is reserved forever and income from the fund is distributed to school districts. Trust fund lands are managed by the Minnesota Department of Natural Resources - Division of Forestry. State of Minnesota lands in Section 9, Township 53 N. - Range 14 W. also have trust fund status. These lands were acquired by exchange for other trust fund lands in St. Louis County and are also managed by the MDNR Division of Forestry.

St. Louis County Tax Forfeit The St. Louis County Land Department manages the tax forfeit property within the Boulder Lake Conservation Area. This property was forfeited to the State of Minnesota years ago for non-payment of real estate taxes. Title to the land is held in trust by the State of Minnesota for the benefit of the taxing districts and is managed by St. Louis County.

Minnesota Power Lands surrounding the Boulder Lake Conservation area owned by Minnesota Power & Light Company were acquired in the early 1900's for the purpose of developing a storage reservoir for hydroelectric power production. In general these lands were acquired by the Great Northern Power Company (a predecessor of Minnesota Power) who got them from the St. Louis River Power and Improvement Company (also a predecessor company which was owned by the Weyerhaeuser family then located in Cloquet, Minnesota).

c. Future expansion and exchange

The Boulder Lake Conservation Area could be expanded in the future to include additional land administered by the St. Louis County Land Department and the Minnesota Department of Natural Resources. The partners have agreed to explore the feasibility of adding more acreage to the area after approximately five years of management. Lands considered for expansion are additional County lands east of Boulder Reservoir to Highway 4, and State and County land north of Boulder Lake Reservoir and East of the Twin Lakes Chain.

St. Louis County has agreed to explore the possibility of exchanging the SW1/4 of NW1/4, and the NW1/4 of SE1/4, all in Section 25, T.53N. - R.15W. to Minnesota Power for some Minnesota Power lands outside the BLCA. An exchange in Section 25 has been discussed by the two parties in the past and the discussion will continue as part of the Boulder Lake Conservation Area Management Plan.

1.4 HISTORY/ARCHAEOLOGY

The history and archaeology study of the region surrounding the Boulder Lake Conservation Area identifies the relationship of past cultures and their activities throughout the region to those in the vicinity of Boulder Lake Reservoir. A broad-based examination of the region also shows how these groups interacted and provides an understanding of geographic locations and activities of prior cultures.

A comprehensive historic and archaeological report of the Boulder Lake Conservation Area region, (Appendix F), is included in this plan and is fully excerpted from the Report on Stage I Cultural Resources Survey for the St. Louis River Hydroelectric Project in Northeastern Minnesota, written by Susan C. Mulholland, George Rapp, Jr., Stephen L. Mulholland, Walt Okstad and Elizabeth Dahl, and conducted for Minnesota Power, under the Federal Energy Regulatory Commission relicensing process, April 1990.

1.5 MANAGEMENT PHILOSOPHY

Minnesota Power, St. Louis County, and the MDNR have created the Boulder Lake Conservation Area to provide a "real world" example of how comprehensive land management can sustain our natural resources while meeting a wide diversity of management objectives. In general, each partner will continue to manage their lands within the Boulder Conservation Area under the same principles as before the area was created.

All three partners recognize that the Boulder Conservation Area lands are subsets of larger ownerships. The management of the BLCA lands are therefore subject to the broader management scope of these larger ownerships. For Example: The Pike Lake Area office of the St. Louis County Land Department manages approximately 650,000 acres in southern St. Louis County. Their lands within the BLCA represent only about 0.07% of this ownership.

In many conservation areas, due to their relatively small sizes management activities are conducted on small scale parcels, which is seldom typical of "real world" land management. This will not be the case at Boulder. The management efforts of each partner will be coordinated to provide for the efficient, practical use and protection of all natural resources in a broad context that will go beyond the boundaries of the Boulder Lake Conservation Area. This "real world" example of sustainable natural resource management will then be displayed to the general public on a realistic scale through interpretational trails, exhibits, and educational programs further discussed below.

II. SITE ANALYSIS

2.1 ANALYSIS SCOPE FOR PLANNING PROCESS

All Minnesota Power, St. Louis County, and State lands within about two miles of Boulder Reservoir were analyzed for inclusion in the Boulder Lake Conservation Area. The analysis included aerial and field reconnaissance as well as sharing information among the partners. Past management practices, current management activities, and future management plans were all studied to determine which properties were best suited for inclusion into the area.

2.2 ANALYSIS METHODS

The first step in the site analysis was to compile all available information on Boulder Lake Reservoir and the surrounding lands. Aerial photography was extensively used and consisted of: 1: 15,840 scale summer black and white photos from 1972, 1981, and 1989 for the entire area surrounding Boulder Lake Reservoir. Also used were 1:600 scale color infra-red photos from July 1990, covering the reservoir and lands between 1/4 and 1/2 mile back from the shoreline, and 1978 color photos which generally covered Minnesota Power ownership. This photography was useful for determining general vegetation patterns and interpreting past land use activities; but was not sufficiently recent enough to document management activities such as active timber sales. As a supplement to the existing aerial photography Minnesota Power photographed selected areas in August of 1991 using 35 mm color obliques shot from a helicopter.

All three partners had Geographic Information System (GIS) computer data available on lands surrounding the reservoir. St. Louis County had

information on property lines, roads, forest stands, and water in an ARC-INFO format. ARC-INFO is a popular vector based GIS system adaptable to large land ownerships such as those found in St. Louis County.

The MDNR had forest stand information available in an EPPLE 7 format. EPPLE 7 is a grid (raster) based GIS system also adaptable to large land bases. Minnesota Power has the vector based MAPGRAPHIX system for use on its MacIntosh PC system.

Neither the St. Louis County or MDNR systems provided adequate shoreline detail for Boulder Lake Reservoir, so, Minnesota Power contracted with the University of Minnesota's Natural Resources Research Institute (NRRI) to computer digitize in detail the shoreline of the reservoir. NRRI used the 1990, 1:600 scale color infra-red photos and fit them to USGS quadrangle maps utilizing a stereo-zoom transfer scope. The information was received in a computer file which is compatible with MAPGRAPHIX. The greater shoreline detail will be helpful in managing shoreline areas in the BLCA.

All three GIS systems are in the early stages of development. Much of the information contained in the GIS data bases, such as forest stand data and road location have not been completely verified in the field. Also the level and types of data collected across ownerships are inconsistent. These factors limited the usefulness of GIS in the initial analysis of the Boulder Lake Conservation Area. In the future GIS will be an important tool for managing the BLCA (see discussion of information needs under "Resource Management").

In addition to aerial photography and GIS data, there was a wealth of shared information which proved useful in analyzing the resources of the area. Included in the shared information were timber sale records, recreational data, archaeological findings, historical maps, fisheries and wildlife data, wetlands classification and water quality information. The observations of field personnel were also used in evaluating information on the resources of the area. The same personnel

recommended the lands to be initially included in the area and were instrumental in developing the resource management philosophy.

2.3 SITE INVENTORY

a. General Ecology

Areas adjacent to Duluth and extending northward through the Island Lake area are quite heavily developed for year-round residences. The BLCA is a transitory zone, with the southern portions (adjacent to Island Lake) receiving heavy human-use and the northern portions being undeveloped and relatively remote. The remote character of the northern two-thirds of the BLCA allows for the presence of animals such as moose and timber wolves within 15-20 miles of Duluth, a major population center. Lands located to the east, west and north of the BLCA are equally as undeveloped and serve to buffer the ecological viability of the area by providing a continued source of sexually mature, dispersing individuals.

Naturally occurring processes along with the varied land management activities of the BLCA partners have created an ecologically diverse landscape surrounding the reservoir.

Specific forest types of the BLCA are discussed in the forest management section. The major vegetational communities of the BLCA include mature second growth aspen and birch stands, young aspen and birch stands following recent timber harvests, mature red and white pine stands, pine plantations, forest openings, and wetland and aquatic vegetation.

The terrestrial vegetation of the BLCA is dominated by either second-growth forests or of aspen regeneration following their harvesting. Forest openings, pine plantations, and old-growth stands of pine are dominant in localities. Second-growth forests and the various stages of aspen regeneration benefit those fauna such as deer and grouse which

depend upon early successional forests during much of their life cycle. Areas that are actively harvested support increased populations of these game and other non-game species.

Most forest openings are the product of logging activities and are log landings, turn-around areas, etc. that are partially occupied with encroaching vegetation. Forest openings are of special value in the spring and fall as the grasses and clovers that they contain green up sooner and freeze out later than is the case with forest herbs. These areas are of special value to herbivores (deer, hare, rodents) and bear for forage and provide unique nesting niches for some species of songbirds.

Pine plantations are inter-mixed throughout the BLCA and provide an element of diversity in otherwise unbroken blocks of second-growth forest. Plantations are used by many species of wildlife as areas of shelter during inclement weather. Old-growth white and red pine are found primarily on the state owned land in the northeastern portion of the BLCA. These stands are representative of how portions of the area looked prior to the logging of the virgin forests and have been undisturbed long enough to allow natural forest succession to reach a more advanced stage. As the mature timber dies and decays cavity nests are provided for the many bird and mammal species that depend upon them.

There are approximately 33 miles of shoreline ecotone (convergence of different vegetational communities) around Boulder Lake Reservoir. The vegetation communities present in these areas often contain a greater floral and faunal diversity than any other cover-type. Aquatic vegetation is of special significance to waterfowl and rodents such as muskrat and beaver. Dead trees and snags which abound along the reservoir shoreline provide food for woodpeckers, nuthatches and chickadees as well as nesting cavities for swallows. The insect life so abundant over the reservoir surface inturn supports large populations of red-winged blackbirds, swallows and chimney swifts. The grasses, sedges and other shoreline vegetation present create a rich ecosystem with high populations of small mammals (mice, moles, shrews, hare) that inturn form the base for a good predator population (fisher, fox, bobcat,

coyote, wolves). Bog wetlands or cedar/spruce/tamarack wetlands are of special ecological significance in that they often contain rare plant species. One notable example are orchids, some of which are found solely in these wetland types.

The BLCA is also of ecological significance in that it supports populations of both wolves and moose. Those parts of the area that are of value to these species include the relatively undeveloped lands in the northern and western regions. The vast area to the west and north of the BLCA is especially undeveloped and appears to be of significant value to timber wolves. Wolf ecology is further discussed below.

The high degree of natural diversity of the BLCA along with the results of a wide range of land management activities applied by the partners involved has created a ecologically diverse landscape surrounding Boulder Lake Reservoir.

b. Timber

A recent comprehensive inventory of the timber resources within the Boulder Lake Conservation Area has not been completed; however, each partner has an individual inventory of their forest holdings. These inventories were completed in different years, and include a range of information. Minnesota Power last completed a systematic inventory of its Boulder Lake Conservation Area timber resources in 1981. This inventory includes timber type and volume information for each timber stand along with average stand diameter and basal area per acre. The Minnesota Department of Natural Resource conducted an inventory of its forest holdings near Boulder in 1983. The major information contained in the DNR inventory is timber type, volume, age, basal area, stand diameter and site index for each forest stand. In 1991, and 1992 St. Louis County visited each of its forest stands within the BLCA and recorded current timber type and volume information as well as prescriptions for future management.

The BLCA partners timber inventories are combined below in Table 1, and Table 2. Adjustments have been made to reflect timber sales and plantings subsequent to the respective inventory dates:

TABLE 1

BLCA FOREST COVER TYPES BY ACRES

1993

COVER TYPE *	ACRES	PERCENT OF TOTAL
aspen	1335	38.4%
red and white pine	801	23.1%
paper birch	618	17.8%
balsam fir	302	8.7%
swamp conifer**	287	8.3%
sugar -red maple	85	2.4%
black ash	45	1.3%
total	3,473	

* each stand was assigned a cover type based on the predominate species in the stand

** black spruce, tamarack, northern white cedar

TABLE 2

BLCA MERCHANTABLE TIMBER VOLUME BY SPECIES

1993 estimate

SPECIES *	VOLUME IN CORDS	% OF TOTAL
Paper birch	8,300	20.6%
white pine	8,200	20.3%
aspen	7,300	18.1%
red pine	6,300	15.6%
balsam fir**	5,800	14.4%
maple	900	2.2%
white cedar	900	2.2%
white spruce	700	1.7%
black spruce	600	1.5%
black ash	200	0.5%
miscellaneous ***	1,100	2.7%
total	40,300	

* minor species in a timber stand were not always included in the county volume information.

** Balsam fir mortality from recent spruce budworm attacks not accounted for

*** DNR inventory includes a miscellaneous category

The forest inventory information reveals that aspen, birch, and red and white pine account for about 79 percent of the current forest cover on the BLCA. These types dominate most of the upland sites, and occur in nearly pure stands or in association with each other , and with balsam fir, white spruce, and occasionally maple as well. Stands of northern white cedar, black spruce, tamarack, black ash, and lowland brush (primarily alder and willow) grow in lowland areas. Figure 3 is the forest cover type map for the entire Boulder Lake Conservation Area.

The age of the forests surrounding Boulder Reservoir range from one year old stands of aspen that are regenerating following recent forest harvesting to stands of red and white pine nearly 100 years old. Table 3 below outlines the age structure of the BLCA forest.

TABLE 3

BLCA FOREST AGE STRUCTURE
ALL OWNERSHIP
1993

AGE CLASS *	ACRES	% of Total Acreage
0-10 years	751	22.3%
10-20 years	408	12.1%
20-40 years	117	3.5%
40-60 years	990	29.4%
60-80 years	405	12.0%
80 + years	699	20.7%
	total 3,370**	

* exact age information was available for all State of Minnesota stands. The age of many Minnesota Power and some St. Louis County stands was estimated.

** some stands were not aged so there is a difference in total acres between Table 3 and Table 1

As with many areas in the region the pre-settlement forest around the original Boulder and Otter Lakes was dominated by stands of large red and white pine. These stands were logged extensively during the big pine logging era near the turn of the century. Afterwards much of the area burned during several major fires. Minnesota DNR fire records which start in the 1920's record a large fire which started about one mile east of Boulder Lake in May, 1923. In August, 1936 a fire started north of the Three Lakes Road (County Road No. 49) and burned south until it hit the north end of Boulder Lake. The natural stands of red and white pine growing in the BLCA today were either too young to harvest in the early part of the century or developed following the forest fires.

Although pine dominated the pre-settlement forest around Boulder, aspen and birch were an important component of the forest cover. After the loggers were gone and the fires burned out, some areas which contained significant amounts of aspen and birch grew back to nearly pure stands of these pioneer species. As these aspen and birch stands matured, they became an important timber resource, resulting in much of the forest harvesting activity which has recently taken place in the area.

Balsam fir and white spruce grew along side and underneath the pre-settlement pines. These shade tolerant species are prolific seeders and were able to maintain themselves as part of the forest community following the early logging and wildfires. In the early 1980's many areas of northern Minnesota, suffered an infestation of the spruce budworm. This defoliating insect killed nearly all the mature balsam fir and many white spruce in the BLCA. Many dense stands of young balsam fir are now starting to occupy those sites which suffered heavy mortality. Many forest ecologists consider the spruce-fir forest community to be a major element of the climax upland vegetation for the region including the BLCA. In other words, given sufficient time and an absence of disturbance(fire, logging, windstorm, insect infestation) this forest community would eventually dominate and be self perpetuating in many parts of the region.

c. **Soils**

The USDA Soil Conservation Service is currently in the process of surveying and classifying the soils in St. Louis County including those in and around the BLCA. In 1991 they surveyed the soils in T.53 N. - R. 14 W. which includes roughly the east one-half of the BLCA. About 20 different soil types were identified and mapped for this township. The Soil Conservation Service is now in the process of developing soil interpretation records for these soils which will include a detailed analysis and interpretation of the soil properties for each type. Township 53N. Range 15W. which includes the west one-half of the BLCA will be surveyed in 1993 and 1994. The Soil Conservation Service has furnished the soil type map for the east half of the BLCA, and a preliminary soil type map for the west half of the area. These maps and the eventual soil interpretation records will be utilized by the partners in their management of the BLCA lands, along with other soil information which is or will become available.

The BLCA soils are of glacial origin being laid down as the glaciers retreated after the last ice age approximately 10,000 years ago. In very general terms there are three major soil groups in the BLCA: glacial outwash soils, glacial till soils, and waterlogged soils under wetland vegetation. These groups are briefly described below.

glacial outwash soils- These soils have formed in sediments washed out from underneath the glaciers. At Boulder, the outwash soils are most like the Emmert Soil Series which contains a surface layer of black gravely coarse sand, a subsoil of dark brown and dark reddish brown gravely loamy coarse sand, and a substratum of reddish brown very gravely coarse sand. These soils are moderately well drained to excessively drained The water table is generally greater than 6 feet deep and the depth to bedrock is greater than 60 inches... Glacial outwash soils are found primarily in the eastern region of the BLCA.

glacial till soils- These soils have formed in material deposited directly from the glacier and sometimes overlay glacial outwash sediments. They range from somewhat poorly drained to moderately well drained. At Boulder the till soils are most like the Ahmeek Soil Series in combination with the Toimi and Brimson Soil Series. The Ahmeek Series consists of a dark brown silt loam surface layer, a dark grayish brown silt loam subsurface, and a dark brown silt loam and a reddish brown sandy loam subsoil. The Toimi Series has a very dark brown fine sandy loam surface soil, a dark brown and dark yellowish brown fine sandy loam and a dark brown mottled gravely fine sandy loam subsurface. The substratum is a firm gravely fine sandy loam. The Brimson Series has a surface layer of very dark brown stony sandy loam. The subsoil is dark brown and very dark grayish brown stony sandy loam and stony silt loam and a dark grayish brown gravely sandy and fine sandy loam. Glacial till soils predominate in the western region of the BLCA.

waterlogged soils- These soils are very poorly drained muck and peat soils formed in organic material in depressional areas within glacial moraines or outwash, or in lacustrine plains. These are the soils of the wetland areas of the BLCA.

d. Wildlife

The Boulder Lake Conservation Area is home to wildlife types similar to those generally found in the northeast region of Minnesota. Mammals include white-tailed deer, moose, black bear, timber wolves, members of the weasel family, snowshoe hare, many species of rodents, and bats. A variety of bird species including waterfowl inhabit the area. The diversity of the ecosystem, ranging from extensive wetlands to forested uplands also provides habitat for a variety of reptiles, amphibians, insects and other invertebrates.

A wildlife assessment of Boulder Lake Reservoir, along with the other Minnesota Power reservoirs, was performed in 1988 to collect current data on threatened and endangered species, and waterfowl. This

information was collected by Minnesota Power for the FERC relicensing of the St. Louis River Hydroelectric Project.

Two known bald eagle nests exist on Boulder Lake Reservoir and were mapped and monitored for eagle activity. In addition, potential eagle nesting areas were identified. Because the shoreline surrounding Boulder Reservoir is relatively undeveloped it appears likely there is room for more breeding pairs of eagles (see discussion on "Threatened and Endangered Species").

Grey (Timber) wolf packs cover large territories in Northern Minnesota. It is known that one or more of these packs travel the undeveloped regions, particularly north and west of Boulder Reservoir (see discussion on "Threatened and Endangered Species").

Boulder Lake Reservoir received the most waterfowl use of any MP storage reservoirs studied, excluding Wild Rice Lake. Waterfowl observations were recorded during the mid-May through mid-July period of 1989. Although the entire shoreline was not surveyed, efforts were concentrated in the areas that appeared to be the most suitable for waterfowl. Observations totaling 16 hours were spent on Boulder Reservoir. Objectives of the observations were to determine relative abundance, and to document the presence of broods. Since the observations were made after the spring migration, it is assumed that the species present were resident nesting species. Species observed on Boulder Reservoir in declining order of abundance were mallards (Anas platyrhynchos), common merganser (Mergus marganse), common loon (Gavia immer), blue winged teal (Anas discors), and common goldeneye (Bucephala clangula).

Additional waterfowl observations were conducted during the last week of September in 1989 to determine if fall waterfowl concentrations were present. Large concentrations were not observed; however, some smaller flocks were seen. New species noted during the fall survey included gadwalls (Anas strepera), double breasted commorants (Phalacrocorax auritus), and black ducks (Anas rubripes). A spring 1990 survey completed just after ice out recorded a flock of about 100 diving ducks

on Boulder Reservoir. New species observed in the spring included buffleheads (Bucephala albeola), American widgeon (Mareca americana), and horned grebes (Podiceps auritus).

e. Wetlands

The BLCA contains extensive wetlands areas. The majority of these wetlands are associated hydrologically with Boulder Reservoir and occur mostly on Minnesota Power property. However, some inland wetlands are present on all ownerships.

Wetlands on Minnesota Power property have been delineated using the eight types described in USFS Circular 39. Wetlands on State of Minnesota, and St. Louis County property are delineated but not classified beyond the forest cover types identified in the forest inventory (ie. lowland brush, black spruce, stagnant spruce, tamarack, white cedar, and black ash).

The BLCA wetlands are typical of those found in northeastern Minnesota. They are predominated by Types 7 and 8. Type 7 is a wooded lowland which in this region contains black spruce (Picea mariana), tamarack (Larix laricinia), northern white cedar (Thuja occidentalis), and black ash (Fraxinus nigra). Type 8 is essentially open or sparsely treed, ericacious (heath family) bog. Wetlands 3-6 occur in lesser amounts. These types are briefly described below:

Type 3- Inland fresh water marsh with waterlogged soil and up to a few inches of standing water. Vegetation such as cattails sedges, rushes, arrowhead, burreed, and smartweed may occur. This type along with Type 4 and 5 are considered important to waterfowl.

Type 4- Inland deep fresh water marsh. Water depth is six inches to three feet. Vegetation such as cattails, reeds, arrowhead, bulrushes, and submergent or floating leafed aquatic plants such as waterlilies may occur.

Type 5- Inland fresh open water less than 10 feet deep. Contains emergent aquatic vegetation such as pond weeds, wild celery, waterlilies, and coon tail.

Type 6- Shrub swamp. Waterlogged soil with lowland brush vegetation such as alders, willows, and dogwood.

Figure 4 is a wetlands map of the Boulder Lake Conservation Area. Table 4 below shows the acreage's for each type of wetland in BLCA.

TABLE 4

BLCA WETLAND TYPES BY ACRES
All OWNERSHIP
1993

TYPE	ACRES	% of Total
3	225	15.0%
4	248	16.5%
5	124	8.3%
6	233	15.5%
7	300	20.0%
8	323	21.5%
Unclassified*	50	3.3%
total	1503	

* Undifferentiated State and County Wetlands.

f. Fisheries

A fish population assessment of Boulder Lake Reservoir was performed in 1988 to collect fishery data for the FERC relicensing of Minnesota Power's St. Louis River Hydroelectric Project. Established MDNR lake

survey methods were employed so that the sample results could be directly compared to previous surveys and regional catch rates. Test netting with trapnets, gillnets and shoreline seines was performed cooperatively with MDNR personnel. An effort was also made to set nets and seine at established sample locations from previous surveys to maintain consistency with previous work.

In general, the population assessment showed a healthy diverse population of gamefish including walleye, northern pike, yellow perch, pumpkinseed, and rock bass. White suckers are present in Boulder Reservoir as are black bullheads in large enough numbers to represent a nuisance population.

Trapnet Survey. Twenty trapnet sets (ten sets in each basin) during August and September 1988 resulted in a total catch of 92 fish comprised of eight species. Nearly one-half of the catch by number consisted of walleye (44.6%) followed by rough fish species (27.1%), panfish species (16.3%), yellow perch (6.5%) and northern pike (5.4%). The combined weight of walleye and northern pike (99.1 pounds) comprised 65.7% of the total catch. Species composition, relative abundance and weight of the catch were similar between the north basin and the south basin.

Walleye average length was 16.7 inches (range 7.0-26.2 inches) with a mean weight of 2.1 pounds (range 0.1 to 7.4 pounds). Northern pike average length was 22.4 inches (range 20.2-26.1 inches) with a mean weight of 2.3 pounds (range 1.9-3.5 pounds). Black crappie, pumpkinseed and rockbass average length was small at 3.8, 4.1, and 6.8 inches, respectively. The average white sucker was 16.9 inches and weight 2.3 pounds. The average yellow perch was 5.8 inches and weighed 0.08 pounds. All yellow perch caught were between 4.0 and 6.0 inches in length.

Gillnet Survey Twenty gillnet sets (10 in each basin) during August and September 1988 yielded a total catch of 6,268 fish comprised of six species. Rough fish species, primarily black bullhead, comprised over

90% of the gillnet catch in number (5,969) and weight (2,945.2 pounds). Walleye (2.7%) ranked second in the catch followed by yellow perch (1.4%), northern pike (0.6%) and rock bass (0.1%). Species composition, relative abundance and weight were comparable between the north and south basins of the reservoir.

Walleye mean length and weight was 13.1 inches (range 7.1 to 26.5 inches) and 0.90 pounds (range 0.07 to 7.28 pounds). All one inch size groups of walleye from 7.0 through 26.9 inches were caught with modes at 9.0 - 9.9, 11.0 to 11.9, 14.0 to 14.9 and 17.0 to 17.9 inch length intervals. Northern pike mean length and weight was 21.7 inches and 2.2 pounds. Northern pike from 18.0 to 29.9 inches were caught with the greatest number captured in the 19.0 to 20.9 inch length interval. Panfish species, represented only by rock bass, had a mean length of 6.9 inches and a mean weight of 0.3 pounds. White sucker mean length and weight was 14.4 inches and 1.6 pounds. However, the dominant size groups captured were the 8.0 to 9.9 and 16.0 to 18.9 length intervals. Yellow perch mean length and weight was 7.6 inches and 0.2 pounds. Yellow perch from 5.0 to 10.9 inches in length were fairly well represented in the catch with the greatest number caught in the 6.0 to 6.9 inch length group.

Boulder Lake Reservoir Historical Catch Walleye catch data over the past 34 years (1954, 1968, 1978 and 1988 surveys) indicates that there has been fluctuations in the population. Walleye gillnet catch rates (No./set) were comparable in 1968 and 1988 with 6.6 and 8.5 walleye per set. The lowest catch rates occurred in 1954 and 1978 and 3.8 walleye per set. Trapnet catch rates ranged from a low of 1.4 walleye per set in 1968 to a high of 4.6 walleye per set in 1978. It is noteworthy that the highest trapnet catch rates occurred in the 1954 and 1978 surveys in which the lowest gillnet catch rates were found.

The northern pike gillnet catch rate was highest in the 1954 survey with 3.0 fish per set. In 1968, 1978 and 1988 the catch rates were relatively stable at 1.4, 2.3 and 1.7 fish per set. The trapnet catch

rates for this species was less than one fish per set in 1954, 1968 and 1988 with greatest number of northern pike per set occurred in 1978 with 4.6 fish per set.

Yellow perch abundance has been highly variable over the period of record. No yellow perch were caught in 1978. Peak yellow perch occurred during the 1968 survey in which 17.6 and 4.0 yellow perch were caught per gillnet and trapnet sets, respectively. In the most recent survey during 1988, 4.6 and 0.3 yellow perch were caught per gillnet and trapnet set, respectively.

The black bullhead population is at an all time high in Boulder Lake Reservoir. No bullhead were reported in the earlier surveys conducted in 1954, 1968 and 1978. However, in 1988, 300.5 bullhead per gillnet lift was recorded. It is also noteworthy that even with the apparently high black bullhead population, the trapnet catch rate for this species was low at 0.2 fish per trapnet lift.

Boulder Lake Walleye Young of Year (YY) Abundance Shoreline seining on the headwater reservoirs has been performed annually by the MDNR since 1972 primarily to monitor walleye reproduction in the five headwater reservoirs. Every effort was made by the MDNR to sample the same locations at the same time of year to standardize the survey, but weather conditions, for example, can influence fish location and distribution. What typically occurs is that one or two sample locations in a given year usually have the highest catches for the reservoir, and when weather conditions are unfavorable prior to or during sampling, the fish may simply not be present. Despite these inherent sample problems, the MDNR seine data represent an index of walleye YY abundance over a long period of time.

Boulder Lake walleye YY density has ranged from 0 YY/acre in 1978 to a high of 2,809 YY/acre in 1984. Nearly three million fry were stocked in 1979, in response to the poor YY assessment found in 1978. Another two million fry were stocked in 1985, but the justification is not readily

apparent from the data because the highest YY abundance (2,810 YY/acre) for the period of record was recorded the previous year in 1984.

The highest average density of walleye YY of the five reservoirs occurred in Boulder Lake which is an indication that spawning conditions for this species and the survival of walleye fry is excellent during certain years. However, the walleye YY abundance is also the most variable of the five headwater reservoirs.

Samples of walleye and northern pike were collected in Boulder Reservoir to supplement the existing fish consumption advisory database published by the Minnesota Department of Health. The following consumption advisory is currently established for Boulder Lake Reservoir:

LENGTH OF FISH	WALLEYE	NORTHERN PIKE
12-15 inches	1 meal per week	1 meal per week
15-20 inches	1 meal per week	1 meal per week
20-25 inches	1 meal per month	1 meal per week
25- 30 inches	1 meal per month	1 meal per month
30+ inches	-	1 meal per month

Specific detailed data on the trapnet and gillnet survey results are located in Appendix D, Fish Survey Data. A discussion on fisheries management at Boulder is included in the section titled Fisheries Management.

g. Water Quality

Boulder Lake Reservoir is classified as moderately soft, dark colored, and slightly eutrophic (nutrient rich) with moderate to good fertility. Boulder Lake waters have typically met applicable water quality standards except for dissolved oxygen (DO) at some sites during winter

months. Low winter DO (less than 5 milligrams per liter) is not uncommon for comparable lakes in this region. The purpose of the DO standard is for the protection of fisheries. However, the fish population assessment described previously indicates that the decreased DO levels do not adversely impact game fish populations in the reservoir because fish move to areas of higher DO. Boulder Lake Reservoir general water quality data are summarized in Appendix E. A discussion of future water quality monitoring and management is in the section on Water Quality Management.

h. Cultural Resources

A standard archaeological survey of Boulder Lake Reservoir was performed in June and July of 1991. The survey was conducted for Minnesota Power by Susan C. Mulholland and George Rapp, Jr. as part of FERC relicensing of the company's St. Louis River Hydro electric project.

A total of 15.62 miles of existing shoreline, including islands, were examined. The remaining shoreline was swampy and unsuitable for survey. Shovel testing on transects 50 feet apart was the method used in shoreline areas. Inland areas were surveyed by helicopter for sites with surface expression. The standard survey method used covered only inventory; evaluation of any sites discovered during the inventory process will be started in 1993. Twenty sites with cultural material were identified during the survey. This is a relatively large number of sites for the size of the area surveyed and indicates a high potential for archaeological sites in the region (see "Cultural Resources Management").

i. Hydrology and Hydro Power

Two small natural lakes, Boulder lake and Otter Lake are flooded by Boulder Lake Reservoir. The reservoir has a normal maximum surface area

of 4,100 acres at elevation 1391.5 which is normal maximum surface elevation with a gross and usable storage capacity of 30,300 acre feet. The watershed drainage area for Boulder Lake Reservoir is approximately 63 square miles. This watershed is a sub watershed of the 792 square mile Cloquet River watershed, which is a sub watershed of the 3,647 square mile St. Louis River watershed.

The Boulder Lake Dam and Reservoir has no hydroelectric generating equipment and is used solely for the purpose of storing water to supplement low winter stream flow for hydroelectric generating facilities on the lower St. Louis River. Boulder Lake Reservoir is one of four storage reservoirs operated by Minnesota Power on the Cloquet River system which collectively control more than 3/4 of the river's total watershed runoff.

In 1919 a dam was constructed on the Otter River along with three remote dikes to contain water in Boulder Lake Reservoir. Due to its small drainage area the reservoir was not filled to full stage until 1927.

Under ideal runoff conditions the discharge gates on Boulder Dam are closed April 1, allowing the reservoir to fill up by June 1. Excess water is discharged throughout the summer while maintaining the reservoir at full pond (1391.5). The discharge gates are then opened around November 1 allowing water stored in Boulder Reservoir during the summer to flow down Otter River into Island Lake to augment stream flow in the Cloquet River and eventually the St. Louis River (See "Reservoir Management for Power Generation").

j. Recreation Uses

Current use of the Boulder Lake Conservation Area includes fishing, boating, hunting, hiking, snowmobiling, camping, and sightseeing.

Current daytime annual use, (estimated from annual recreation surveys), of all recreation areas on Boulder Lake Reservoir is estimated to be 4,000 recreation days; peak weekend average is estimated to be 400

recreation days. Current nighttime annual use of all recreation areas on Boulder Lake Reservoir is estimated to be 1,000 recreation days; peak weekend average is estimated to be 100 recreation days.

Future recreation use for the area is expected to increase several fold over a ten year period as the plan is implemented. Planning beyond the ten year period would be only speculation; however, actual future recreation use will continue to be monitored on a daily basis to determine the best means to manage increases in traffic.

Water-based Recreation

Recreational opportunities of the BLCA are varied with most activities being water-based.

Users of the reservoir are the general public, users of the two resorts on the lake, private property owners (located on the eastern shore), and both Minnesota Power and St. Louis County seasonal leaseholders whose lots are located on, or very near the shoreline.

Due to the reservoir's relatively shallow depths, combined with its stump and rock strewn lake bottom, water-based recreation opportunities are more limited than on Island Lake and Fish Lake reservoirs. Few owners of large motor watercraft use the reservoir, and safety concerns over water hazards invariably eliminate water-skiing.

In addition, the generally shallow, muddy bottom, and dark-stained water, combined with no natural beach on the reservoir, does not make swimming a pleasurable experience.

The number one recreational use of the reservoir is fishing, followed by, or in conjunction with boating.

Boat access to fishing is centered at three locations: to the west Boulder Lake Reservoir Dam Boat Launch; east, Silver Fox Lodge; southwest, Boulder Lake Resource Center (old Nordberg's Resort). Each

of these sites has a boat launch facility with parking adjacent to the site. Minnesota Power maintains the Boulder Lake Reservoir Dam Public Boat Launch in cooperation with the MDNR, located at the westerly shore of the reservoir at the end of the Boulder Dam Road. This site provides parking for approximately 20 vehicles, sanitary facilities and trash receptacles.

The dam site and the west dike, just off the Boulder Dam Road, also provide good locations for shorefishing. The dam site averages three to five vehicles with boat trailers per day and one to three vehicles whose occupants are shorefishing. Silver Fox Lodge experiences similar launching activities, while The Boulder Lake Resource Center has little boat launching activity. Leaseholders and private property owners access the reservoir from their individual properties.

Pleasure boating and canoeing also occurs but less frequently then boat or canoe fishing. Some camping also occurs on several islands.

Waterfowl hunting (accessed by boat) also occurs on the reservoir; however, the numbers of hunters has dropped significantly in recent years due to regionally low waterfowl numbers.

Winter recreation users access the reservoir from the same boat launch sites as described above. Snowmobilers and four-wheel drive vehicles drive onto the reservoir from these access points to reservoir fishing locations or connect with trails on adjacent shorelines. At times, winter vehicle use can be similar in numbers to summer parking at the same sites.

Leaseholders

As stated above, St. Louis County and Minnesota Power leaseholders make up a portion of the users of the reservoir and surrounding forest lands.

There are 15 Minnesota Power lease lots on the reservoir shoreline granted to individuals and one hunting lease located to the east of the reservoir. Three of the 15 lakeshore lots are located on islands (two

situated in the Otter Lake end and one in the Boulder Lake end). Eleven of the lots are located on or near a peninsula on the southwest shoreline near the resource center, accessed from the Timberlane Road, and one lot is located off the beginning of the resource center access road. With most of the leases concentrated in one area, the rest of the reservoir retains a very undeveloped, natural shoreline character.

St. Louis County also grants several hunting leases in scattered locations within close proximity to the reservoir, but away from shoreline areas. These leases are issued for a building site only and do not include any acreage.

Since the leases for both Minnesota Power and St. Louis County are seasonal use only, recreational use by leaseholders tends to occur on weekends, holidays and hunting seasons.

While the leaseholders use the entire reservoir area for recreation, use is obviously concentrated near the lease area.

Scenic and Aesthetic Leisure

Boulder Lake Reservoir and the surrounding backlands include a varied topography, tree cover, and relatively undeveloped shoreline.

The reservoir can be split into two separate geographic areas with varying aesthetic values. The Otter Lake end, to the north, is nearly all undeveloped and contains the largest portion of natural shoreline character. The Boulder Lake end, to the south, contains Silver Fox Lodge, the Boulder Lake Resource Center, and the majority of developed shoreline. The Boulder Lake end of the reservoir, however, does contain some elements of natural shoreline character (mostly located in the Little Boulder Lake portion of the reservoir, to the far east), but not nearly to the extent as the Otter Lake end.

Those fishing or boating who are looking for a quieter experience, generally seek the back bays of the Otter Lake end for more solitude.

Camping

Overnight camping takes place in small numbers on several shoreline locations and islands. There are currently no designated campsites on the reservoir. The non-designated campsites are located mostly in the Otter Lake end of the reservoir, and the main users of these sites access the reservoir from the dam boat launch. Use of these sites appears to be light in nature, and the users tend to keep the sites clean, with limited impact on the environment.

Trails

Trails and existing timber sale roads continue to provide public recreational access to much of the lands in the area. The trail use is heaviest in the southern and eastern portions of the reservoir, due to its close proximity to roads and Island Lake residents. Other trails, such as those off the Three Lakes Road are used less intensively.

Trail access points on the southern portion of the BLCA are located at four to five points along the Boulder Dam Road. These trails are used throughout the year, and include snowmobile access to the reservoir in the winter on at least three of the trails.

The trails on the eastern portion of the BLCA are accessed from Highway No. 4. and are used heavily by hunters in the fall. Hunters tend to drive the main access road, parking their vehicles along the way, then hunt adjacent logging skid trails or roads for grouse and deer.

Private Business Use

Silver Fox Lodge is the only private business on the reservoir serving a public demand for camping and boat access, and promoting a variety of recreational opportunities on Boulder Lake Reservoir.

Silver Fox Lodge, located on Minnesota Power leased land at the eastern end of the reservoir, is a privately managed business, located at the end of the Boulder Lake Road on the southeast shore of Boulder Lake

Reservoir. A portion of the resort property is leased from Minnesota Power. The lodge offers, to the public, camping sites, picnic facilities, boat launching for a fee, sanitary facilities, drinking water, boat rental, groceries, supplies, and cabin rental.

Boulder Lake Resource Center

The Boulder Lake Resource Center at the site of the former Nordberg's Resort is located off the Boulder Lake Dam Road on the southwest shore of the reservoir.

In 1992 MP purchased the resort and made improvements to the buildings and site to create The Boulder Lake Resource Center and offers a meeting/conference room, office, MP employee residence, drinking water and sanitary facilities. Cabins located at the site may be used in the future for program development.

2.4 SITE ANALYSIS SUMMARY

The analysis and inventory of the Boulder Lake Conservation Area reveals a diversity of natural resources, wildlife and recreational opportunities. The partners recognized these qualities of the area and resolved to incorporate their management objectives in order to maintain the present natural character around the reservoir, enhance wildlife conditions, and inform the public on land management activities in a context of environmental stewardship.

III. RESOURCE MANAGEMENT

3.1 MANAGEMENT SCOPE AND PHILOSOPHY

The natural resources of the Boulder Lake Conservation Area will continue to be managed on a full working scale basis, typical of large ownerships. This "real world" philosophy will be interpreted for the public as part of the environmental education program to be developed for the area. Resource management activities and land uses not suited to the area will not be introduced. Careful planning and management will protect environmentally sensitive areas from adverse effects from additional recreation use and public interpretation/education activities. To achieve this objective, each partner will continue to manage its lands in the area under existing their individual and existing management plans. The individual partners will view the lands in the Boulder Lake Conservation Area, therefore, as part of their larger ownerships and conduct resource management activities on a realistic economic scale.

Having synthesized a philosophy for the area, common goals have been formulated, however, some fine-tuning and further coordination of management plans and objectives will occur as the plan is implemented and as conditions change.

a. Information needs

In order to facilitate management coordination within the Boulder Lake Conservation Area, natural resource management information will need to be collected into a common data base.

Minnesota Power has agreed to coordinate the development of a common data base for the Boulder Lake Conservation Area lands utilizing a

MAPGRAPHIX GIS. St.Louis County and the MDNR will furnish their existing natural resource data for the area to Minnesota Power for assimilation into the GIS database. The partners will then work together to coordinate future natural resource data collection.

In addition to providing a framework for efficient management coordination within the area, a common GIS database will be useful in interpreting natural resource management to the public. The area GIS will give the partners access to maps which can display vegetation, trail networks, and a variety of other natural resource features.

b. Management Coordination

In the interest of providing useful interpretation to the public, the partners in the Boulder Lake Conservation Area have agreed to coordinate their individual natural resource management efforts. For example, the timing of timber sales in certain areas could be coordinated to allow for the effective interpretation of timber management. Expertise in recreational trail, and road development could be shared among the partners to ensure efficient and economical travel throughout the area.

The partners have agreed to keep the others informed of all management plans and activities within the area. Regular meetings will be scheduled to discuss management of the area, and to explore the possibilities for coordination of activities.

The partners have agreed to share some management costs such as those for upgrading the east access road, and those incurred for the development of some interpretational signs. Opportunities to share other costs will be explored by the partners in the future.

3.2 FOREST MANAGEMENT

The forests of the BLCA are managed by the professional forestry staffs of Minnesota Power, St. Louis County, and the Minnesota Department of Natural Resources. These forests support a multitude of uses, including

the production of timber and wildlife, protection of watershed, and the creation of recreational opportunities.

The basic focus of forest management on the Boulder Lake Conservation Area will be to maintain the productivity of the forest ecosystem through the continued use of sound silvicultural practices. The interpretive programs which are being developed for the Boulder Lake Conservation Area will afford the public an opportunity to learn how forest management provides a landscape that not only produces timber but also benefits wildlife, protects the watershed, and maintains important scenic and scientific resources.

In keeping with the "real world" philosophy of management each partner will continue, for the most part, with existing forest management plans for their lands. The area will not become a unique forest management unit on to itself. For example: forest acreage within the area will not be regulated to provide a sustained even-flow yield of timber in the classic sense of the term. Harvest schedules for the area lands will continue to be based on forest management plans that include much larger acreages. There will, however, be cooperation among the three partners to provide a continuity of management which will facilitate useful interpretation of forest management practices to the public.

Outlined below is general forest management information for the major tree species on the Boulder Lake Conservation Area:

Quaking aspen (Populus tremuloides)- This tree predominates on approximately 38% of the acreage in the BLCA. It is a relatively fast growing species which is intolerant of shade. Because aspen grows best in full sunlight it is generally clear cut at maturity (40-60 years) to regenerate a new even-aged stand of trees. Aspen timber is an important resource to the local paper making and particle board making industries. Common diseases include Hypoxolyn canker, a fungal stem disease, and heart rot decay, a fungus which attacks the interior of the tree. The Forest tent caterpillar is the most important defoliating insect which attacks aspen. In general the tent caterpillar does not kill a stand of aspen, but only slows down its growth. The incidence of disease and

insect attacks in a stand of aspen will have an influence on the management plan for that stand.

Paper birch (Betula papyrifera)- Paper birch predominates on about 18% of the BLCA acreage. Like aspen, birch is intolerant of shade. Stands of birch are usually maintained in an even-aged condition by clear-cutting at maturity (50-80 years). The new stand arises from sprouting of the cut stumps and seeds blown in from adjacent stands. Some birch stand on very high quality sites may be thinned during the rotation to produce high quality sawtimber. Birch timber is utilized for fuelwood and pulpwood, as well as sawtimber, which is used primarily in making small dimension wood products such as match sticks and dowels. Demand for birch is generally less than that for aspen because of the difficulty in removing the bark in pulping and board making operations.

Many of the birch stands in the BLCA have recently suffered from birch dieback following drought years in the 1980's. Birch dieback is a condition where drought stress causes root mortality in birch trees. Affected trees loose their overall vigor and ability to fend off insect and disease attacks. The bronze birch borer, a wood boring insect, is a common enemy of paper birch. Attacks from this insect killed many of the stressed birch trees on the BLCA. Many stands of dead and dying birch are now naturally converting to balsam fir.

Red pine (Pinus resinosa)- Red pine, also known as Norway pine, along with white pine, represents about 23% of the forest cover on the BLCA. Most plantations on the BLCA are red pine. Red pine is intolerant of shade and grows best on well drained sandy or sandy loam soils. Stands of red pine are managed on an even-aged basis with rotation ages of 80-100+ years. Plantations or natural stands of red pine are usually commercially thinned at age 25-30, with repeated thinning occurring at 10-20 year intervals. Pulpwood, posts, poles, cabin logs, and sawtimber are obtained from these thinnings. The final harvest will yield very high quality large cabin or sawlogs. After final harvest, the area is usually replanted with red pine and the cycle is repeated. Red pine stands in some locations are highly regarded for their aesthetic beauty.

Often times management plans for these stands are altered to maintain aesthetics.

Diplodia and Sirococuss are fungi that can cause mortality in young red pine stands. Scleroderris canker, and Armillaria root rot are other fungal diseases important to consider in the management of red pine. The major insect pests of red pine are the Saratoga spittlebug, which attacks young plantations, and Bark Beetles, which can be a problem in older stands.

White pine (Pinus strobus)- White pine and red pine together account for approximately 23% of the forested acreage on the BLCA. White pine can grow on a wide range of site conditions and is intermediate in its tolerance to shade. White pine can be managed on a strict even-aged basis, much the same as red pine or with a silvicultural system known as the shelterwood method. With the shelterwood method, new stands of white pine reproduce naturally from the seeds of the parent stand, and a portion of the parent stand is retained for a period of time to shelter this reproduction. Eventually, most or all of the parent stand is removed to give the new stand a chance to develop. White pine timber is used for pulpwood, cabin logs, and is prized for its high quality sawlogs.

White pine blister rust, white pine weevil, and deer and browsing by deer and hare are limiting factors in the management of white pine. White pine blister rust, introduced from Europe in the early 1900's, is a serious fungal disease which attacks the stems and trucks of white pine. This disease can eventually girdle and kill the tree. The overstory parent trees in stands undergoing shelterwood management often trap dew creating drier conditions in the understory which can limit the transmission of blister rust. Additionally, rust resistant seedlings are now becoming available for planting. White pine weevils are insects that attack the growing terminal shoots of young white pine. White pine weevils thrive in full sunlight, and can be controlled by maintaining overstory shade on young seedlings. Deer and hare browsing is difficult to control. Enclosures placed around seedlings and various chemical repellents can be effective but are very expensive and time consuming to

apply. Control of deer populations through hunting, and timing white pine management to coincide with periods of low hare populations may be the most effective way of dealing with the browsing problem.

Balsam fir (Abies balsamea)- Balsam fir trees dominate on approximately nine percent of the BLCA. Balsam fir is a relatively short lived species that is very tolerant of shade. It is present in the understory of many aspen, birch, and pine stands and given enough time would eventually replace these less shade tolerant species. Stands of balsam fir are primarily managed for pulpwood on an even-aged basis with harvesting being performed in clear cut strips or patches every 40-45 years. The new stand is reproduced by seed from adjacent stands, or from seeds dispersed during the harvesting of the stand.

Spruce budworm is an insect that commonly attacks mature balsam fir and was responsible for much of the mature balsam fir mortality on the BLCA in the early 1980's. Continued management of balsam fir to reduce extensive continuos acreage in the mature and overmature age class (over 40-45 years) may limit the intensity of budworm attacks.

White spruce (Picea glauca)- White spruce does not show up as a forest cover type on the BLCA. This species typically does not grow in dense stands, but instead is found dispersed within other forest types. Management prescriptions for the main cover type usually dictate the management plans for white spruce present in the stand. White spruce can be long lived and is tolerant of shade. It is often planted by itself or intermixed with red pine. The species is used for high quality pulpwood and sawtimber. Principal enemies are the yellowheaded spruce sawfly and the spruce budworm.

Northern White Cedar (Thuja occidentalis)- Northern white cedar is part of the swamp conifer cover type which comprises about 8.3% of the forest cover on the BLCA. White cedar usually grows in wet areas but is seen on the upland as well. White cedar is in demand for its lumber which is very resistant to decay. Stands of white cedar are also very important winter cover for wildlife species. Most stands of cedar on the BLCA are currently reserved from harvest because of the trees value to

wildlife and the difficulty of regenerating this species (because of deer and hare browsing), once harvested.

Black Spruce (Picea mariana)- Black spruce is also a component of the swamp conifer forest cover type on the BLCA. Black spruce is a slow growing, moderately shade intolerant species that is managed on an even-aged basis for high quality pulpwood production. Stands of black spruce are harvested by clear-cutting strips or small patches on a 60-120 year rotation, depending upon the quality of the site. The new stand is regenerated naturally by seed from adjacent stands, or artificially by seeding the cutover from airplanes or snowmobiles. Some stands of black spruce never reach commercial size (known as stagnant spruce), these trees are sometimes used for Christmas trees.

Dwarf mistletoe, a parasitic plant is the most common enemy of black spruce. This parasite is responsible for the "witches broom" often seen on black spruce trees.

Appendixes A through C are the individual forest management plans of St. Louis County, the Minnesota Department of Natural Resources, and Minnesota Power for their respective forest holdings in the Boulder Lake Conservation Area. The individual forest stands referenced by these plans have been mapped in the GIS system and will eventually be linked to a common data base. The partners have agreed that these plans are preliminary and are subject to change as management objectives of any single cooperator change. Also, it is recognized that these plans may be revised if all three mutually agree that a change is in the best interest of the area. However, each partner will retain the sole right for management decisions on their property.

3.3 THREATENED AND ENDANGERED SPECIES MANAGEMENT

EASTERN TIMBER WOLF (Canis lupus) ECOLOGY AND MANAGEMENT

Wolf Distribution and Legal Status

The Eastern Timber Wolf (Canis lupus), also referred to as the Grey Wolf, was historically perceived as evil and as a competitor with man for prey species such as the white-tailed deer. Systematic efforts, including publicly funded bounties, were undertaken for many years in an attempt to eradicate the wolf. Today, the most significant populations of eastern timber wolves in North America are found in Canada and Alaska. Wolves are also present in portions of Minnesota, Wisconsin, Michigan, Montana and perhaps Idaho (Thiel 1986). The Minnesota population received protection in 1970 when the Superior National Forest was closed to the taking of wolves. The eastern timber wolf is currently classified as threatened in the State of Minnesota by both the MDNR and the United States Fish and Wildlife Service. The present Minnesota population is primarily limited to the northeastern portion of the state. Whiteface Reservoir, located at the northern extreme of the Minnesota Power St. Louis River Project (SLRP) area, is considered to be within "critical" wolf habitat. Boulder Lake Reservoir, located near the project's geographical center, is on the periphery of the Minnesota wolf range and is listed as "primary" habitat (Draft Recovery Plan For the Eastern Timber Wolf 1978). This plan sets specific goals for the recovery of viable wolf populations in the state of Minnesota.

Wolf Ecology

Wolves are social animals and live in family groups, referred to as packs. Wolf packs are highly structured with a dominant male and female, referred to as the "alpha pair". Communication within wolf

packs is well developed and may be vocal (howl, bark, whimper, growl, social squeak), through eye contact or through the positioning and movement of the entire body or its parts, especially the head or tail (Mech 1970, pages 82 and 95). Wolves are constantly communicating with either themselves or with members of adjacent packs. Communication is essential for the maintenance of pack structure, territoriality and day to day survival. Wolf packs normally consist of six to ten individuals including the alpha pair, pups and yearlings. Wolves are sexually mature at two years of age but generally do not breed until they attain alpha status. Alpha status may be attained by animals who disperse to form their own packs or by subordinates who move up the peck order as the result of the death of an existing alpha animal (Thiel 1986).

Timber wolf packs occupy areas of land, known as territories, that are both well-defined and defended. Wolves mark territories by defecating and urinating and will aggressively pursue any outside wolf who may venture in. Territory size is often in the range of 50-70 square miles, depending on the size of the pack, the quality of the habitat and the overall density of wolves in the larger area. For management purposes, the MDNR assumes territory size to be 100 square miles. Thiel (1986) has also suggested that average territory size is about 100 square miles. Thiel (personal communication 1993) noted that certain portions of wolf territories appear to receive higher concentrations of use. The present author concurs, having studied the same Wisconsin wolf pack referred to by Thiel (Fraundorf: personal observation 1988, 1989). I refer to these areas as territory "focal points".

The primary food of Minnesota timber wolves is white-tailed deer. Other prey species include moose, hare, beaver and smaller rodents. Prey of importance to Wisconsin wolves is similar (Thiel 1986), with the exception of moose which do not exist in the state to any significant degree. Thiel (1986) further notes that the relative importance of prey species varies over the course of the year. During winter, deer and snowshoe hare are most available and compose the bulk of the wolves' diet. Beaver are important prey species during the spring and fall when they are most active on land, and therefore easily caught. The wolves diet becomes more diverse during the summer with the increasing

availability of smaller mammals (squirrels, muskrats and smaller rodents).

There is a good prey base for timber wolves in the BLCA. Portions of the area forest have recently been harvested, improving habitat conditions for many of the wolves' prey species, most importantly, deer, hare and beaver. Over-winter draw-down of Boulder Lake Reservoir probably increases the vulnerability of beaver, and therefore their value as prey to the area wolf population. The shoreline vegetation of the reservoir supports good populations of smaller mammals, adding to the wolves summer prey base. The very nature of reservoirs (relatively high mileage of shoreline and fluctuating water levels) most likely makes them of greater ecological significance to wolf populations than comparable areas of inland lakes.

Wolves in northern Wisconsin breed in February and March (Thiel 1986). Breeding times for Minnesota wolves are similar (Mech 1970, page 117). Breeding is done primarily by the alpha pair, who also suppress attempts by subordinates to engage in the same (Thiel 1986). Blood may appear in the urine of the alpha female anywhere from one week to 1.5 months pre-estrus (Mech 1970, page 117). In Wisconsin, blood is most commonly found in the urine during the period from late January to mid or possibly late February (Thiel: personal communication 1993). A gestation period of 63 days follows estrus and breeding, with an average litter size of five to six pups (Mech 1970, page 119 and Thiel 1986). The alpha female excavates a den site generally in mid to late March, about three to four weeks prior to parturition (Thiel: personal communication 1993). Pups are weaned at about six weeks of age and leave the den site, for a rendezvous site, at six to eight weeks of age. The rendezvous site serves as the family headquarters until fall when the pups are strong enough to begin roaming with the rest of the pack (Thiel 1986).

Humans and Wolves

The wolf is a highly social animal as is indicated by the fact that they live in family units or packs. Wolves generally present themselves in an agreeable manner to other pack members and seldom engage in vicious fighting. The wolf has a remarkable ability to learn, remember, and to adapt to rapidly changing situations. Aggressive behaviors may be shown when wolves 1) are harassing prey, 2) meet strange wolves and 3) need to protect their den or young from other predators (Mech 1970, page 7). Mech (1970, page 5) goes on to describe the responses of wolves to humans. When approached or confronted by humans, wolves generally display a submissive personality. The wolf is considered to be one of the wildest and shyest of all animals in the northern wilderness and actively avoid being seen by humans. Humans who have seen wolves in the wild often express their amazement at how quickly and silently the animal vanishes from their sight. On the other hand, wolves can occasionally become habituated to human dwellings or to domestic stock.

The wild and shy character of wolves has been observed in a northern Wisconsin pack where radio telemetry data demonstrated that their territory generally avoided areas frequented by humans. Maps constructed from these data indicated that their territory basically paralleled and remained approximately 1/4 to 1/2 mile inland of the area's principal roadways (Thiel: personal communication 1988). On another occasion the present author was with Thiel as he howled in an attempt to arouse a response from a Bayfield Co. (WI.) wolf pack. The alpha male responded from a distance of about one mile. Thiel turned on the radio receiver and verified that the animal was approaching. Within minutes the wolf approached to the point that each footstep was audible. The animal came to within 30 yards and then vanished without a sound, presumably after he identified us as humans.

Human behavior is of great consequence to timber wolf populations. Mech (1970, page 325) states that through the centuries wolves were able to deal with all natural causes of mortality and still survive as a species. Only man has been so effective in almost totally eliminating

the wolf from certain areas. Thiel (1986) found that half of all wolf mortality in Wisconsin was attributable to shooting by humans. Eight of the eleven wolves that died just prior to the date of his publication were killed by guns, traps or motor vehicles. Reasons for this human behavior are many. Some people have a basic intolerance for wolves, perhaps others see the wolf as a competitor for deer and others may fear it because of its strength and physical abilities. With the rare exception of a wolf taking domestic stock, these fears and perceptions are unfounded. Hopefully, humans can come to a more accurate understanding of the wolf through exposure and educational programming.

Wolves in the Boulder Lake Conservation Area

As stated above, the BLCA lies within the periphery of the Minnesota wolf range and has been designated as "primary habitat" in the Draft Recovery Plan (1978). Historical data of wolves on the BLCA are not available, although their presence has long been suspected based upon incidental observations of prints and occasional wolf sightings. Minnesota Power recognized the need for more detailed information on area wolf ecology and as a result has recently initiated a wolf research effort. The objectives of this research effort were to 1) document the presence of an established wolf pack on the BLCA, and if wolves are present, then 2) investigate areas within the BLCA which are proposed for recreational trail development to assess for the presence of active wolf den sites. If den sites were identified, then development plans would be altered to provide them protection. Research methodology was designed to maximize the amount of attainable information and is described below for each research objective.

Objective number one: topographic maps of the larger area surrounding and including Boulder Lake Reservoir were obtained and were cut and pasted to form one large composite map. Based on an analysis of available wolf habitat (large tracts of undeveloped land) a theoretical wolf territory was drawn on the map in such a way that it included the BLCA. It was assumed that if wolves occupied any portion of this theoretical territory, then they occupied the BLCA as well. Research

efforts were to begin within the BLCA, but would spread to outlying portions of the theoretical wolf territory if wolf sign was not found in the BLCA. Research was to be conducted between the period of late January to late February. This time frame was selected as snow is on the ground and it is also the only time of the year that pre-estrus data on wolves is available. As discussed above, the alpha female will blood spot if she is in a pre-estrus condition. This blood-spotting occurs during this time of the year. Once in the field, the personnel involved drove area roads looking for wolf tracks, urine or feces. Tracks would verify the presence of a wolf (wolves). Displays of territorial behavior, such as urine found high on a snow bank (or other object) and large amounts of feces on the roadway would indicate that the wolves present are residents and are occupying the area as part of their established territory. Urine found was to be examined closer to see if any blood was present within it. To summarize, the information potentially obtainable from this technique includes 1) the documentation of the presence of an established wolf pack, 2) a track count (tally of the minimum number of animals present) and 3) confirmation of a pre-estrus condition in the alpha female if blood is found in her urine. If this condition exists, then a den will likely be present somewhere in their territory come spring.

Minnesota Power personnel studied the BLCA on 11 February and again on 2 March 1993. A total of 32.5 person-hours were invested over a total of approximately 77 in-field miles. Snow conditions on 11 February were poor. Urine and feces, believed to be wolf were found within the northeast portion of the BLCA. A re-assessment of the BLCA was undertaken on 2 March. Snow conditions were fair. Large amounts of wolf tracks, feces and aggressive displays of urine (high on snow banks with ground scratching) were found on the lands of St. Louis County adjacent to and west of the BLCA. The level of activity suggests that this area may serve as the pack's "focal point" (discussed above). These observations verified the presence of an established wolf pack in the BLCA. A minimum track count of three animals was obtained in the northern portion of the BLCA. Information indicative of pre-estrus conditions was not found. These findings necessitated the undertaking of den site surveys in the spring.

Objective number two methodology: areas proposed for trail development on the BLCA were drawn on the composite topographic map. Proposed trail areas had previously been flagged and were examined by Minnesota Power personnel on 15 and 20 April 1993 to assess for the presence of wolf den sites.

Trail areas studied were in Sections 8, 9, 16, 17, 20, 30 and 31 of T 53 N R14 W and in Section 36 of T 53 N R 15 W. Small amounts of wolf scat were found in the SW 1/4 of Section 16, in the NW 1/4 of Section 20 and in the NE 1/4 of Section 31 all being in T 53 N R 14 W. Wolf prints were dispersed throughout most of the areas studied. No areas of concentrated wolf activity or den sites were found. Moose prints were dispersed throughout Section 17 T 53 N R 14 W. These survey results place no restrictions on the proposed development of non-motorized recreational trails as described above. Personnel involved in future trail construction will check these areas again, prior to beginning their work.

Timber Wolf Management on the BLCA

As a result of the field work described above, those areas of land along the Boulder Dam Road corridor, beginning in mid-Section 31 T 53N R 14 W and then proceeding to the west and north to the Boulder Lake dam are used heavily enough by humans (cabins, roads, off-road vehicles) that they are of little, if any value to timber wolves (this description does not include the islands located in Section 24 T 53 N R 15 W). The land area from mid-Section 31 T 53 N R 14 W, then proceeding to the east and north appears to be suitable wolf habitat. Those areas of land located in and adjacent to the north and west portions of the BLCA appear to be prime timber wolf habitat. Based on the studies Minnesota Power personnel have conducted to date, it is felt that those land areas located in and adjacent to the west side of the BLCA serve as the wolf pack's "focal point" (discussed above in wolf ecology). It is recognized that most of these lands (primarily County administered) are not a part of the BLCA and furthermore, that they do not fall within the

jurisdiction of the FERC. However, it is also understood that wolf pack territories are expansive and that managerial actions on these lands will have an effect on the wolf population which also inhabits the BLCA. With this in mind, it is recommended that those lands located adjacent to the west, as well as those located adjacent to the north side of the BLCA be managed with a consideration for the timber wolf. Management recommendations for these lands are presented below.

The majority of these lands are County administered tax-forfeit properties which are managed primarily for the production of timber. Forest harvesting improves habitat conditions for many of the wolves principal prey species and as such is also beneficial to wolves as well. The trails associated with forest harvesting (or other backwoods activities) are also beneficial to wolves in that they reduce the energy required to travel, something wolves do a lot of. Actions detrimental to wolf populations would include any activity which serves to increase the overall motorized accessibility of area lands to the general public. A significant percentage of all wolf mortality is the result of illegal shooting, trapping or of being hit by moving vehicles. Increases in area vehicle accessibility or speed would therefore negatively impact the wolf population. Specific management recommendations include:

1) adhere to the MDNR guidelines regarding road density. Maximum road densities are noted as one mile of road per square mile of wolf habitat. These management recommendations are discussed in detail in the MDNR's Forestry-Wildlife Guidelines to Habitat Management: Specific Procedural Policy No. 6 - Significant Wildlife Conditions and are also included as Appendix 2 in the MP St. Louis River Project Management Plan for the Bald Eagle and Grey Wolf, submitted to the FERC in March 1993.

2) restrict access to forest roads as is possible. Some existing forest access roads including the North Radio and North Boulder Roads (presently contain gating structures) appear to be 25 years old or older. Precedents may therefore be set and access expectations may be so established that it may be unwise to close these roads to public vehicular access if the same hasn't been the case during the road's history. Discretion should be applied in these cases so that people are

not subsequently incited to become aggressive and increasingly antagonistic toward timber wolves. When forest access roads are created in areas which were previously inaccessible to motor vehicles, then it is recommended that they be gated and signed and that all personnel involved in the logging operation be instructed to lock such structures when ever they are not in there working. Conceptually, these roads should function solely to facilitate the removal of timber. If any existing forest road is utilized, or any new forest road is created for the purpose of providing access for BLCA recreational opportunities, then such road should be securely gated at such point beyond which motor vehicle access is not intended. For example, if an existing forest access road were to double as a trail-head access for an interpretive trail, then such road should be gated and signed immediately beyond the parking area that is designated for interpretive trail users.

3) County Highway 49 (Three Lakes Road), while wide, is relatively unintrusive and does not unnecessarily detract from the wild character of the area. The road is presently surfaced with a coarse gravel which tends to reduce vehicle speeds. There is adequate road noise produced by passing vehicles so as to alert crossing wolves in a timely manner. Any resurfacing which would allow for the quieter and faster use of this roadway would likely result in increased wolf mortality due to their being hit by moving vehicles.

4) the Radio Road, which accesses the lands west of the BLCA, and the North Boulder Road, which comes in off of Hwy. 49, are presently not connected. These roads traverse areas of prime importance to the BLCA wolf pack. If these roads were connected the area traffic load would increase dramatically, and would likely result in substantial increases in wolf mortality due to shooting and other human related activity. The integrity of this area of land is believed to be essential for the long-term survival of the BLCA wolf pack.

5) foster the development of environmental education programming on the BLCA. An educated public will posses a more accurate understanding of the nature of timber wolves. As such, education is essential to the survival of wolves as a species.

BALD EAGLE (Haliaeetus leucocephalus) ECOLOGY AND MANAGEMENT

Distribution and Legal Status

The bald eagle is currently listed as "threatened" in Minnesota by both the state and federal governments. The primary bald eagle range in Minnesota consists of the lake regions of north central and northeastern counties. In recent years, however, range expansion has occurred along the Mississippi River in central and southeastern Minnesota, and along the Minnesota River in southwestern Minnesota. The number of occupied territories in the state has increased from less than 50 in the early 1960's, to approximately 400 in 1989; occupied territories are currently increasing at a rate of about 30 per year.

The population increase is due to the reduction of environmental contaminants such as DDT, management of nestsites, greater public awareness, as well as legal protection and enforcement.

Bald Eagles Present on the Boulder Lake Conservation Area

MP and agency records were used to map known eagle nest locations on or near Boulder Lake Reservoir. During the past several years Boulder Lake Reservoir has had two active nesting territories. Aerial nest productivity surveys by various agencies are available from the mid 1970's.

Potential nesting areas on Boulder Lake Reservoir were located using aerial and ground surveys. Initially, known nest locations were marked on topographic maps. Nest records were also reviewed to identify the locations of "defunct" nests (those which had fallen down or no longer existed). Records indicated that two defunct nests were located near Boulder Lake Reservoir. Existing and defunct nests sites, as well as

other suitable reservoir shoreline, were surveyed by helicopter during the winter of 1988-89. Large stick nests, especially if in deciduous trees, are easier to locate during the winter due to a white background and less foliage. A previously unknown nest on Boulder Lake Reservoir was found during this inspection. Survey efforts were concentrated on undeveloped shoreline areas with large trees since nests usually occur in these localities. In northern Minnesota most eagle nests are in large canopy or super-canopy trees such as white pine (Pinus strobus), red pine (Pinus resinosa), or aspen (Populus spp.), and are located close to water. Most nests are also located in undeveloped areas, although tolerance to human activities may vary. The survey for potential nest sites was finalized in Spring 1989 by inspecting the entire shorelines of the reservoir by boat.

The reservoir was evaluated for nesting potential, the occurrence of existing territories, and the suitability for new nests based upon the shoreline surveys and existing nest records.

Boulder Lake Reservoir currently contains a high percentage of natural, undeveloped shoreline. Fishing pressure, compared to the other reservoirs, is moderate. Road access to the Reservoir is limited, especially from the west and north. The shoreline also contains many potential nest trees, primarily large white and red pine, but also large aspen. The active eagle territories in 1989 were in the central and northeast sections of the lake. Considering the existing conditions, there may be room for additional territories on or near the reservoir (See response to question 10 of the FERC request for additional information. Response dated March 1993).

Bald eagle nest productivity was determined in 1989 and 1990 for Boulder Reservoir by helicopter survey. The survey flights were flown on 25 June 1989 and 2 July 1990. During both years the young appeared to be 5-6 weeks old at the time of the survey. On Boulder Lake Reservoir, single young were fledged from two active nests in 1989. Neither of these nests produced young in 1990. The northeast nest produced one or two young as early as 1979, and was successful during nine of the 11 years, these eagles may have moved to an alternate nest site or may no

longer exist. The second Boulder Lake nest was discovered during a helicopter survey during the 1988-89 winter. It fledged one young in 1989. The nest was ground checked in late April 1990, and no adults were observed in the vicinity. This was not an encouraging sign since many eagles in the area are incubating eggs in mid-April. The nest was checked by boat in early June, and an adult was observed perched in a tree on a nearby island. A second adult was seen soaring a considerable distance to the southwest. The nest seemed to be active and was not approached closer to avoid disturbing it. No young or eggs were seen during the 2 July helicopter survey, and it was assumed that the nest was inactive. An adult eagle was observed near this nest on 2 March 1993. The reason for the lack of production from the Boulder Lake nests in 1990 is not known.

One of the objectives of the above study was to attempt to identify feeding and perching areas of the adult eagles by observing eagle behavior at active nest sites. This aspect of the study was less successful than hoped because the amount of time necessary to make enough behavioral observations was underestimated. Even though observations were made during different times of the day, it was not unusual for adults to remain perched in one location for several hours. This limited the number of individual observations; nevertheless, a number of areas used by eagles were identified. Both Boulder Lake Reservoir nesting pairs seemed to have favorite perch areas relatively close to their nests.

Bald Eagle Management on the BLCA

The management guidelines described in the St. Louis River Project Management Plan for the Bald Eagle and the Timber Wolf will be adhered to for existing and future eagle nests on Boulder Lake Reservoir. This self-contained plan was submitted to the FERC on 19 March 1993 in response to FERC's request for additional information (Question # 10) dated 22 September 1992. This plan also contains the MNDNR's management recommendations for project area Bald Eagle nests. Minnesota Power will adhere to the recommendations of these MDNR plans.

All existing bald eagle habitat will be protected in a non-developed state, and selective planting of white pine may occur in certain areas to ensure that nest trees will be available in the future. Areas adjacent to existing white pine super-canopy trees may also be scarified to encourage the natural regeneration of white pine. Following a period of advanced regeneration, these white pine saplings would then be released by the removal of competing vegetation (also see Appendix C, Minnesota Power Forest Management Plan for the BLCA).

The same degree of protection afforded bald eagles will also be extended to osprey nests or great-blue heron rookeries, should any be identified within the BLCA. Nest posts with platforms may be erected to facilitate osprey nesting if future studies indicate that natural nesting areas are inadequate. Informational materials on great-blue heron rookeries and on artificial nesting structures could then be assembled and would serve as valuable additions to the BLCA environmental education program.

Figure 6 shows the square mile sections where the eagle nests on Boulder Lake Reservoir are located. The exact locations are not shown to protect the nesting birds.

3.4 OTHER WILDLIFE MANAGEMENT

a. Minnesota Department of Natural Resources

Lands administered by the state of Minnesota in the BLCA are to be managed for compatible multiple use benefits. The divisions of forestry and fish and wildlife are chartered jointly with the responsibility of integrating forest and wildlife management activities as outlined in the Department of Natural Resources Wildlife and Forestry Coordination Policy, 1980.

b. St. Louis County Land Department

Wildlife management considerations for St. Louis County administered lands in the BLCA are included in Appendix A (St. Louis County Land Department Forest Management Plan, Boulder Lake Conservation Area).

c. Minnesota Power

GAME SPECIES

The primary game species found in the Boulder Lake Conservation Area and the surrounding area are white-tailed deer, black bear, ruffed grouse, woodcock, snowshoe hare, and waterfowl. Fur bearers include beaver, muskrat, mink, fisher, and pine marten. The primary focus of game management on Minnesota Power lands within the BLCA is to maintain enhance, or control populations of game species through habitat manipulation and timber harvesting. Management of game species will be coordinated with the management of non-game species to provide a diversity of wildlife types on the BLCA. The following discussion will focus on on white-tailed deer, ruffed grouse, and wildlife openings.

White-tailed deer (Odocoileus virginians)- White tailed deer benefit from the early successional forests that follow disturbances such as fire, windthrow, or logging. Habitat conditions on the BLCA are very favorable for deer. The many acres of aspen regeneration, and associated woody and herbaceous browse following recent timber harvesting, are important food resource for deer. Stands of white cedar and other conifers which are reserved from harvest provide the deer with winter cover. The Minnesota Power Forest Management Plan for the BLCA (Appendix C) provides for continued aspen management and the retention of many lowland conifer stands which will in turn benefit white-tailed deer populations. In addition, the establishment and maintenance of several permanent wildlife openings will provide early spring food resources for deer.

White-tailed deer populations can conflict with white pine management. Deer seem to prefer browsing on young white pines over other conifers (except white cedar) and can have an impact on the success of white pine regeneration and plantings. Continued deer hunting in and around the BLCA may help keep deer populations at a level that will allow white pine management projects to be successful. Additionally, it is hoped that the establishment of several permanent wildlife openings will attract deer away from white pine management areas.

Ruffed grouse (Bonasa umbellus)- Careful management of aspen stands is the key to success in creating and maintaining habitat conditions that are favorable to ruffed grouse populations. Ruffed grouse utilize different age stands of aspen throughout their life cycle. Two to five year old aspen regeneration is used by grouse for spring brood cover -- sapling size aspen 5-15 years old is important for drumming and nesting success -- and mature aspen is an important winter food resource. Ideally all of these age classes of aspen should occur within close proximity to one another. A breeding male ruffed grouse's territory is approximately 8-10 acres in size, and ideally all the age classes of aspen mentioned above should be included within this area (Gullion, no date).

Minnesota Power's Forest Plan for the BLCA (Appendix C) has identified six aspen stands, covering approximately 160 acres, for specific ruffed grouse management in combination with pulpwood production. These aspen stands, located primarily in the southern region of the BLCA, range from two to approximately 20 years of age and are about 15-60 acres in size. The plan is to harvest portions of these stands in 2-10 acres blocks over a number of years to improve habitat conditions for ruffed grouse. The goal is to create and maintain a spatial pattern of different age aspen stands within a relatively small area, while still providing for the economical harvesting of pulpwood. Ruffed grouse habitat management is also beneficial to woodcock populations (Gullion, no date).

Harvesting operations in the areas identified for ruffed grouse management will commence in about 2010, when the older aspen stands

reach maturity (40 years). Additional acreage may be identified for ruffed grouse management in the future. Intensive ruffed grouse management activities will be concentrated in the southern region of the BLCA because of the high level of human use this area is expected to receive. This use allows more opportunity for the interpretation of ruffed grouse management and ecology, and more chance for hunters to benefit from increased grouse populations.

Continued aspen management activities in other areas of the BLCA is also expected to benefit ruffed grouse and woodcock populations, but not to the degree as in the intensively managed stands.

Wildlife openings - Openings in the forest benefit game animals such as white-tailed deer and black bear as well as non-game species. A permanent wildlife opening is an upland area perpetually covered with grasses and herbaceous vegetation and generally devoid of trees and shrubs. Wildlife openings are used by many species of wildlife. Vegetation in these areas usually greens up early in the spring and insect populations are high. Forage is provided for a variety of wildlife, including white-tailed deer, black bear, and others. Additionally, small mammals attracted to the openings become prey for raptors. Some animals use these areas for courting and nesting activities.

Minnesota Power's Forest Management plan for the BLCA (Appendix C) considers about seven areas for the construction and maintenance of permanent wildlife openings one to five acres in size. Generally, these areas are abandoned log landings located in recent logging areas. The log landings identified for wildlife openings will be expanded if necessary and treated mechanically to remove logging slash. The openings will then be seeded with a mix of grasses and clovers attractive to wildlife. The areas will be maintained on a regular schedule by removing encroaching trees and shrubs, and reseeding as necessary.

NON-GAME SPECIES

The diversity of plant and animal life on the BLCA was discussed above in the section on general area ecology. The present discussion is a more detailed treatment of the impacts of MP forest management on non-game wildlife of the BLCA.

There are no comprehensive studies available regarding non-game species presence on the BLCA. Incidental observations by Minnesota Power personnel indicate that many of the species known to occur in northern hardwood-conifer forests are present on the BLCA. This species richness is the result the area's natural diversity (discussed above under general area ecology) in combination with the habitat diversity that results from Minnesota Power's forest management activities.

A total of 95 forest stands were identified on the Minnesota Power ownership within the BLCA. Descriptions of these stands, as well as management prescriptions for each are presented in Appendix C. These management prescriptions allow for the harvesting of forest products while simultaneously creating or maintaining a high degree of diversity within BLCA vegetative communities. A high degree of floral diversity will subsequently be of benefit to a wide variety of fauna as well.

Management prescriptions which will benefit non-game wildlife species include the reservation (little or no harvesting proposed) of some old age stands of birch, aspen, hardwoods (maple, basswood, yellow birch), pine (red and white), spruce (white and black) and cedar. Some stands of black spruce and tamarack will also be reserved. These areas will remain in a largely undisturbed condition, with natural succession serving as the primary agent of change. Those faunal species which will benefit include those requiring mature forests as well as those who are components of intricate ecosystems which require extended periods of time to develop.

Some large stands of young aspen regeneration are prescribed to be harvested in their entirety once they reach maturity. Other stands, upon attaining maturity, will be harvested in smaller blocks over longer periods of time. This block harvesting will result in staggered age classes of regeneration and will provide a wider range of vertical habitat and floral density within the stand. The increased diversity of habitat will enhance both game and non-game wildlife diversity. Islands of less merchantable timber, currently present within some other stands of aspen, will also be reserved to foster habitat diversity.

Habitat diversity is further enhanced by the maintenance of shoreline buffer zones when establishing timber sales, by prescriptions allowing for the retention of snags in most area stands and through the coppice with standards approach to forest management which is prescribed for some stands in the BLCA. The coppice with standards approach involves the management of two merchantable species simultaneously with different rotation periods. This silvicultural technique is further described in the prescription for stand number 60 (see Appendix C). Protection will be afforded to the BLCA watershed by the reservation of some forest stands bordering Boulder Creek and other area waterways. Protecting these habitats will benefit the many unique forms of wildlife that live within them. Area diversity would also be enhanced by the maintenance of forest openings in several areas around the BLCA. The value of forest openings was discussed above in the section on Game Management, and in General Area Ecology.

In addition to the above, Minnesota Power has also recently cooperated with non-game research being conducted by the University of Minnesota-Duluth's Natural Resources Research Institute on Boulder Lake Reservoir. Island populations of black-capped chickadees were studied with Minnesota Power facilitating access for the researchers.

WATERFOWL

Nest Boxes - Approximately 24 waterfowl nest boxes have been installed at Boulder Lake to date. BLCA species which use nest boxes in this area include common goldeneyes, woodducks, and common, red-breasted, and hooded mergansers, as well as other types of wildlife. Eighty to one hundred boxes will eventually be installed. In addition to being beneficial to wildlife, projects such as this will be incorporated into BLCA environmental education programs. The boxes will be maintained and monitored on an annual basis. Nesting platforms for other species, such as mallards, and Canada geese, may also be installed where needed. Figure 7 shows the location of existing nest boxes on Boulder Lake Reservoir.

Tern nesting Islands - In 1992, MP cooperated with the MDNR to clear the trees and woody vegetation from a small MP-owned island in Fish Lake Reservoir. The intent was to provide nesting habitat for the common tern, a relatively rare species in northern Minnesota. Common terns require sandy, sparsely vegetated areas in which to nest. These areas are not as common as one might expect, and they are also attractive to common species such as ring billed gulls which out-compete common terns. Common terns did find and nest on the Fish Lake island in 1992. This same technique may also be employed on some of the islands of Boulder Lake Reservoir.

Wetland Enhancements for Waterfowl - Wetland enhancements for waterfowl will also be evaluated for the BLCA. Possible activities include the creation of dugouts or open water areas in the extensive cattail stands in the back bays, the seeding of wild rice, or the creation of wetlands by impoundment or excavation. These techniques benefit waterfowl and other wildlife associated with wetlands, and may also serve as additions to BLCA environmental education programs.

3.5 WETLAND MANAGEMENT

The partners of the Boulder Lake Conservation area will follow all applicable Federal, State, and local laws regarding management activities in wetland areas. In general these laws prohibit the draining or filling of wetlands. If draining or filling of a wetland is unavoidable, a permit may be issued if proper mitigation procedures are followed. In many cases forest management activities are exempt from wetland rules and regulations as long as certain management practices are followed.

Environmental education activities may include materials on wetland types to help the public better understand the differences in wetlands and the functions and values of each type. For example, natural wetlands could be compared to created wetlands by constructing a small dam on an inflowing stream. This could serve as a model environmental education module, and may include the concepts of mitigation and banking, the identification of problems, problem solving, and values clarification.

A factor complicating the classification of the Boulder Lake Reservoir wetlands is that the fact that water level within the Reservoir varies depending upon the time of the year and the drawdown schedule. The goal of MP water level management is to have the Reservoir nearly full by the opening of fishing season (mid-May) and full, if possible, by June 1.

3.6 FISHERIES MANAGEMENT

The long term MDNR fisheries goal for Boulder Lake is to manage the reservoir for walleye. A fish population assessment of Boulder Lake was performed in 1988 to collect fishery data for the Federal Energy Regulatory Commission (FERC) relicensing of the St. Louis River Hydroelectric project. The walleye net catch rate (gill net and trap nets) was the highest recorded for the 35 years that surveys have been performed. Walleye abundance was average to above average when compared to the local median catch rate. Walleye gillnet catch rates of 8.5 fish

and 7.7 lbs. per lift were above the local median of 7.1 fish and 7.2 lbs. per lift.

The 1988 survey indicated a high black bullhead population which represents a nuisance rough fish population. The MDNR has recognized this rough fish problem and has implemented commercial netting of the species to reduce their abundance in the Reservoir.

Minnesota Power will cooperate with the MDNR in meeting their management goal for Boulder Lake Reservoir. As part of FERC relicensing of the St. Louis River project, Minnesota Power will be developing a fisheries enhancement plan with the MDNR, other resource agencies and the Fond du Lac Tribe based on their stated management goals for the watershed. Control and reduction of nuisance rough fish populations will be evaluated as a fishery enhancement option for Boulder.

3.7 WATER QUALITY MANAGEMENT

Management activities on the land can have an impact on the water quality of Boulder Lake Reservoir in the form of non-point source pollution (NPS). One example would be building a road or trail across a drainage in an improper manner, allowing sediments to move and wash into the reservoir. Another example of NPS pollution would be that which could result from the improper use of herbicides or pesticides.

In 1987 Congress passed amendments to the Clean Water Act which required States to develop specific non-point source pollution control programs. Since forest management was identified as a potential source of NPS pollution the state developed Best Management Practices (BMP) for Water Quality in Forest Management. These BMP's are voluntary measures useful in minimizing the impact of forest management activities on water quality.

All three partners in the BLCA employ BMP's for forest management activities. These measures are followed when conducting all forest management activities on the Boulder Lake Conservation Area. The

recommended BMP's are contained in the handbook, Best Management Practices in Minnesota, Water Quality in Forest Management.

It is likely that specific BMP's will eventually be developed for recreation management. In the meantime, the best available information on how to minimize the impact of recreation on water quality will be utilized on the BLCA.

Minnesota power is currently assessing the need for ongoing water quality monitoring on the headwater reservoirs, including Boulder. At a minimum, it is anticipated that the company will conduct routine dissolved oxygen monitoring.

3.8 CULTURAL RESOURCE MANAGEMENT

An archeological survey of the Boulder Lake Shoreline revealed a number of archeological sites (See 2.3h). All of these sites yielded surface, or subsurface material, and will need to be excavated to determine the extent and content of the intact material. All the sites will require formal testing to determine National Historical Register significance.

Minnesota Power has entered into a Programmatic Agreement with the Federal Energy Regulatory Commission (FERC), The Advisory Council on Historic Preservation, and The Minnesota State Historic Preservation Office (MnSHPO) for the management of cultural resources affected by the St. Louis River Hydroelectric Project, including Boulder Reservoir. Following this agreement Minnesota Power will work consultation with the MnSHPO to develop a cultural resource management plan for the archeological sites discovered near Boulder Reservoir. The plan is expected to be completed by 1994. Once complete the plan site locations will remain confidential to protect the integrity of the archeological sites.

The location of the archeological sites near Boulder will remain confidential and will be mapped on a limited access layer in the GIS. Minnesota Power's management staff will consult these maps when planning

all management activities in the BLCA. By doing this, potential disruption of the site will be avoided. Any new sites discovered in the coarse of managing the BLCA will be reported to the MnSHPO. Management activities will be adjusted to protect the new site until a determination can be made about its archeological significance.

3.9 RESERVOIR MANAGEMENT FOR POWER GENERATION

Boulder Lake, as we know it today, was created in 1919 by Great Northern Power Company. This was accomplished by constructing several dikes and an outlet dam on Otter River, near where the public boat launch is now located. These structures prevented outflow from Otter River, which served as the outlet for three small natural lakes upriver -- Otter Lake, Boulder Lake, and Little Boulder Lake. As the water level rose, these lakes became part of one larger body of water -- Boulder Lake Reservoir.

The purpose of the reservoir was to provide power generation at several hydroelectric dams located downstream on the St. Louis River. Reservoir management consisted of beginning a straight-line drawdown during the fall and through the winter months. At spring breakup, the gate of the dam was closed and the reservoir was allowed to refill to full pool, usually June 1.

Reservoir operation changed very little over the years 1989-90, when Minnesota Power adjusted the drawdown schedule, leaving higher water levels in the reservoir over the winter. The purpose of the change was to attempt to enhance water quality and to lessen the potential for low water stream flow in the spring. As part of the FERC relicensing process, minimum flows will be provided from the reservoir outlet dam for fisheries enhancement. Some winter drawdown will still occur for power generation. Minnesota Power's reservoir management, then, will be and approach which balances environmental, recreation, and power generation needs.

3.10 RECREATION MANAGEMENT

a. Management Philosophy

Recreation management for the Boulder Lake Conservation Area incorporates a philosophy of meeting public recreation needs while promoting public knowledge and participation in sound environmental stewardship ethics and resource management objectives.

This philosophical approach permits the greatest flexibility to achieve resource management objectives while promoting public education and participation in resource management practices and environmental stewardship. The public, therefore, is viewed as a fourth partner working with the three managing partners to help promote and understand a more complex perspective of resource management needs and environmental stewardship ethics and the public's role in these concepts.

The coordination between recreation management and the interpretive/educational programs is one of the most important aspects of the plan. This section of the management plan explains public recreation management in a working forest, followed by a description of the public interpretation/education programs in Section IV.

The partners are intent on managing the area in a manner which does not adversely impact the present natural character of the reservoir area, nor change present resource management objectives. In addition, while the Boulder Lake Conservation Area is decidedly not a wilderness area, it is recognized that the outdoor experiences found in this "working forest" environment can be very similar to those found in a true wilderness. One of the management and environmental educational objectives will demonstrate how these recreational experiences can be enjoyed in these different environments.

Therefore, recreation management of the area will permit increases in recreation use; however, recreation use will not be permitted to damage

the very essence of what makes this area unique, or adversely impact on-going resource management needs.

b. Increased Use

Recreation use of the Boulder Lake Conservation Area is expected to increase rapidly due to the additional opportunities provided for public recreation and resource management interpretation.

Management of the increase will require channeling recreation use to the existing recreation areas in the short run, while phasing in several new locations and opportunities over several years.

This phased-in process will allow for adjustment or deterrence of any adverse impacts from increased recreational use. Adjustments for increased use will include, but is not limited to designating trail use (ie. snowmobile/driving access versus skiing/hiking trails), limiting or eliminating certain public access locations, designating campsites, enforcement, micro-managing concentrated use areas, and avoiding specific areas.

c. Water-based Recreation

Management of water-based recreation will be consistent with the interests of the current and expected users of Boulder Lake Reservoir.

The overall shallow depths of the reservoir, combined with its stump and rock strewn lake bottom, will continue to limit water-based recreational opportunities. Thus, management of water craft access points will take into consideration the special needs of users of smaller sized boats and canoes. While current boat launch sites may require some upgrading to accommodate an increase in users, the relatively smaller size of the ramps may be adequate for the types of water craft in use on the Reservoir. In particular, the Boulder Dam Boat Launch may require some dredging to eliminate water hazards such as boulders and stumps in close proximity to the launch.

Since the character of the reservoir is not conducive to quality swimming, plans do not include public swimming facilities.

Access to shore fishing will continue at the Boulder Lake Reservoir Dam, and the West Dike off the Boulder Dam Road. In addition, other locations will be considered for potential shore fishing access. Facilities such as trails and fishing piers may be included in future shore fishing accesses.

Snowmobile access to the reservoir will continue to be managed in a way which best benefits users, the general public and resource objectives. One trail has already been designated to allow snowmobilers access to Boulder Lake Reservoir on the south shore.

d. Leaseholders

No additional private recreational leases will be added on Minnesota Power lands, thus retaining the current scenic and aesthetic values. Current leaseholders in the Boulder Lake end of the reservoir will continue to lease their sites for seasonal occupancy only.

The two leaseholders on islands in the Otter Lake end of the reservoir will be given the option to move to alternate sites Minnesota Power has identified in the Boulder Lake end of the reservoir. They will also be given the alternative to occupy their existing leases for twenty-five years, while being restricted in their activities on the islands. These two leaseholders, however, will be required to move from the islands to alternate sites in the Boulder Lake end of the reservoir at the conclusion of the twenty-five year term. All structures on the islands will have to be relocated or removed at that time. Figure 5 is the recreation map for the BLCA.

f. Camping

Management for overnight camping will include designating campsites on the reservoir area and eliminating several sites located in poor locations. The sites will be open to the public on a first-come, first-serve basis.

Several sites may be connected with the interpretive trail system further discussed in Section IV of this plan.

Designated sites will be chosen for best possible environmental, scenic, fishing, and access considerations. Each campsite will also include a firegrate, tent pads and a box latrine. Management of these sites will continue throughout each recreation season. Figure 8 shows the design of a typical primitive campsite planned for the BLCA.

g. Trails

Management of the area will include maintaining and/or upgrading many of the existing trails and roads and incorporating these in the interpretive/educational trail system (further discussed in Section IV below). Many of these trails and roads will continue to be used for current and future forest management activities. Other trails will be eliminated or gated to discourage vehicle traffic, while redirecting use elsewhere. In general, the area to the east of the reservoir, off of Highway 4, as well as the area to the south of the reservoir, off the Boulder Dam Road, will contain the majority of permitted trail use. Figure 9 shows the typical trail types planned for the BLCA.

h. Private Business Use

Silver Fox Lodge is expected to continue to meet public demand for private resort business on the reservoir. Minnesota Power will continue leasing land to this business for their recreational facilities, and will allow expansion of those facilities as such expansion is compatible with the management plan. Continued management of the area will incorporate the owners of the business in the planning process.

The former Nordberg's Resort was purchased by MP in 1992 and is being developed into a year-round resource center, which includes a meeting/classroom, field office, and staff residence. Additional discussion of this site follows in Section 4.2 (a).

IV. INTERPRETATION/EDUCATION

4.1 EDUCATION FOCUS AND OPPORTUNITIES

The Boulder Lake Conservation Area will utilize the interpretive tools discussed in section 4.2, below, to provide educational information to the public on the general subject of natural resource management utilizing environmental stewardship ethics in a working forest environment.

Designated satellite centers, geographically situated around the reservoir, will provide a focus of information in a relatively short distance for users of the area, all of which will be connected by the trail network.

In addition, education for the public will include information on the area's natural characteristics, including, the forest ecosystem, wildlife, vegetation, forest history, human activity in the forest, recreational education, environmental ethics, geology, archaeology, climate and weather. Information on each subject will be distributed through a variety of methods as outlined below.

a. Target Audiences

Educational opportunities will target specific audience-types. Several "built-in" audiences already use the area and will likely take advantage of the trail network and recreation opportunities provided. Year-round residents and seasonal cabin owners, primarily located on adjacent Island Lake Reservoir, account for an estimated 1000 potential users in the immediate vicinity. Public recreation users who take advantage of the local recreation opportunities on the surrounding reservoirs would account for many thousands of potential built-in visitors throughout the year.

Specific programs offered at the interpretive center will be targeted to the built-in audiences as well as the general populace of the Duluth/Superior metropolitan area. In addition, school age audiences from 5th grade to the collegiate levels will be targeted for specific program opportunities.

Other organizations may also be interested in conducting their programs and meetings at the interpretive center and use the surrounding trail network and recreation facilities to provide unique learning experiences for their constituents.

b. Naturalist

A part-time naturalist, who will provide balanced interpretation of the natural environment and resource management, will be instrumental in developing the education needs of the area in conjunction with all other management objectives.

A curriculum will begin to be developed in 1993 for implementation in 1994. It will be coordinated by the naturalist to meet the needs of management and provide environmental education opportunities to the public.

The position of naturalist will be evaluated after several years to determine whether a full-time position is needed at that time.

c. Individual self-guided education

Education, at the most basic level, will be formalized by signage at the satellite centers and the trail network. The signage will allow self-guided education to users.

Education at the satellite centers will include information carried over from the resource center, such as water related recreation at the dam site, and forest and wildlife management at the resource center.

Each trail will incorporate a variety of educational information, including specific management activities, such as: aspen management, pine plantation management, wetlands or wildlife. In so doing, users will be able to obtain an in-depth education on a specific type of information they are interested in, while still receiving related general environmental information.

By incorporating a variety of educational information along each trail, the users will recognize that a managed forest is a complex ecosystem yet retains much of its natural character. In contrast, since certain human activities do impact the forest, a variety of educational information integrated into the trail network will show what changes take place in the forest based on the type of human activity occurring.

The public will receive information about the variety of vegetative and wildlife types which occur in each forested area. Each type will continue to be identified throughout the trail system as users pass from one area to another.

Other educational tools will focus on recreation activities such as hiking, camping, recreational vehicle use, fishing, and hunting within the context of environmental stewardship ethics.

d. Group self-guided tours

The Boulder Lake Conservation Area will provide an excellent opportunity for special interest groups and schools to educate members or students on their specific programs within the context of information provided in the working forest through self-guided tours of the area.

For example, classes conducted by the United Northern Sportsman, or the MDNR Advanced Hunter Education Program could include education on how timber sale activity enhances wildlife habitat diversity. Fishing camps and hunter safety courses could also include field days in the area to help students internalize environmental stewardship ethics.

Snowmobile groups may choose to tour the resource center to better understand the requirements of multiple-use in the area and help promote good trail ethics among members.

School groups could learn a variety of environmental lessons provided in the area including hydroelectric power generation, timber sale activity, ecology, and environmental stewardship.

Since the area is open to the public, each group could provide field day education in the area at their convenience and adjust the information provided based on their own needs.

e. Environmental Education Networking

Ultimately, the goal of the education initiative for the Boulder Lake Conservation Area has been to compliment other EE initiatives by networking with the other environmental education providers in the Arrowhead Region of Minnesota. These include Wolf Ridge Environmental Learning Center, The University of Minnesota Outdoor Program, and the proposed Hartley Nature Center in Duluth. In early 1993, a network was created among these groups and included the Boulder Lake Conservation Area. The Boulder Lake Conservation Area will be able to provide principles of sound natural resource management activities in a "full scale" working forest to the network environmental educators, thus providing an even greater variety of educational opportunities for the region.

Common educational tools and information would inevitably be shared among each program, while each specific area would still maintain its particular focus.

4.2 SITE SELECTION AND DESIGN

Selection and design decisions for the interpretive/educational facilities of the Boulder Lake Conservation Area include consideration for overall management objectives. The need to phase in additional recreational/interpretive facilities will be incorporated to avoid adverse impacts from expected increased use.

Specifically, management will phase in additional public use opportunities at centralized locations at the southern and eastern boundaries of the area. The north and west portions of the area will not be included in the first phase of interpretive/recreational implementation due to inaccessibility, environmental considerations, and management objectives.

a. Resource Center

The Boulder Lake Conservation Area requires a centralized location to provide classroom activities at a more accommodating site, increase interest by promoting the diverse educational opportunities and facilities available, and consolidate management activities and objectives.

The purchase of Nordberg's Resort in 1992, and the improvements made to the site and buildings provides a classroom/meeting facility for the Area. The first stage of the center will be completed by 1993 and will include a main building used for group meetings and programs, a parking lot for users, a boat launch/lake access, primitive camp sites for individual group programs, a trail head, three small cabins, and shorefishing opportunities. As use and management evolve, the need for expansion of the center will be evaluated and necessary changes will be added to meet any increased need and objectives for the area.

The center is located two and one-quarter miles from Highway 4 on the southwest side of the Reservoir. The location was selected for several reasons including access, natural resource management activities, security, geographic, environmental considerations, and recreational opportunities.

First, the center has good road access. The Boulder Dam Road is paved to the access road turn off and is only a short distance from Highway 4, thus the center will be accessible to most motor vehicles. The site also provides good access for Minnesota Power leaseholders on Island Lake Reservoir. Leaseholders will be able to enjoy the area by simply

walking across the road to the trail network. Several other access points will be created for the leaseholders which are further discussed in Section 4.1 c.

Secondly, the site provides an excellent variety of natural resource management activities and concentrated land ownership. While most of the property in this area is owned by Minnesota Power, there are several large blocks of St. Louis County ownership. Active timber sale activities in the area include a pine thinning, located along the Boulder Dam Road near the center and several aspen management units to the south. In addition, St. Louis County manages a gravel pit to the east of the center site location. Since the center is located on a peninsula, additional opportunities for aquatic environmental education are available.

Thirdly, the topography, forest types, wetlands and wildlife varieties are diverse, yet concentrated in a relatively small area, thus providing easy trail access for interpretation and environmental education. The topography in the area is gently rolling interspersed with several steep grades and wetlands. Forest types in the area include pine, aspen, maple and birches in significant quantities and diversities. Several unique ponds and wetlands, attract waterfowl, such as woodducks, teal, and mallards. These locations are within several hundred yards of the center and are included in the trail network discussed in Section 4.1 c, below. All of these factors combine to allow for easy access on varied trail configurations for interpretation of the unique wetlands, natural resource activities and environmental education and recreational opportunities.

Analysis of four sites surrounding the reservoir was completed in 1992 to determine the most appropriate location for a resource center using the above stated criteria. The four sites selected for analysis were West Boulder Dam Satellite, the former Nordberg Resort Site, The South Boulder Satellite, and the East Boulder Satellite. Each of these sites have unique qualities which would make excellent interpretive centers; however, the West Boulder Dam Satellite was selected as the most appropriate site for an interpretive center using several methods of

analysis. Yet, the window of opportunity to immediately develop Nordberg's Resort site and buildings into an interpretive center in 1992, which includes a classroom/meeting room facility at nominal cost, greatly outweighed the lack of facilities available and the understandably limited market draw at the dam site (the site currently has only a primitive boat launch and outhouse). While the resource center is currently situated at the resort site, it may be necessary in the future to evaluate the needs of the management area as it grows, and determine whether the dam site, or perhaps another site, should be developed as the interpretive center. Meanwhile, each of the sites included in the analysis will be developed as satellites and work as an interconnected network surrounding the management area. Additional discussion of the satellites follows in Section 4.2 b.

Through the use of the resource center, management will be able to consolidate users, to avoid and or eliminate detrimental recreational use to the area, while also simplifying environmental education objectives. The interests of Minnesota Power, St. Louis County and the MDNR will be reflected in the management of the center and the area as a whole.

The resource center will incorporate the three partners management philosophy yet, by virtue of the unique physical attributes of the center's location, will likely emphasize both land and water based resource management, wetland interpretation and a variety of recreational opportunities.

Future enhancement to the site may include, but is not limited to, additional parking, signage as well as the construction of a shelter/building. As management of the area progresses, the site will be reevaluated to determine the exact needs for the center.

Operations of the resource center will be coordinated between the MP's Boulder Lake Conservation Area project team, the project team leader, and resident employee living on site.

The resource center building includes an apartment residence with office for an MP resident employee who is directly involved in the management of the area, as well as MP's public recreation management program and the cabin-site lease program; a meeting/class room for approximately 50 people is located in the main floor level which can double as a visitor's center/staging area and includes washroom facilities and access to AV equipment for programs.

The project team includes a diverse selection of MP environmental professionals and personnel who are responsible for the resource center programs and management activities. The project team leader coordinates all meetings of the project team and ensures management objectives are met, including development, construction and maintenance of environmental education programs, facilities and recreation opportunities. The on-site resident employee will help coordinate these same objectives with the project team leader, make available the grounds and meeting/class room at the interpretive center, and ensure the facility is properly equipped for scheduled programs. Figure 10 is a plan drawing of the Boulder Lake Resource Center.

b. Satellite Centers

In keeping with the decision to phase in changes to the area, the resource center will eventually be linked with three "satellite centers": East Boulder Satellite, South Boulder Satellite and West Boulder Satellite. Trails will begin from the resource center and eventually link with the three satellite centers in order to provide management continuity between various locations in the area.

Satellites will exhibit the same management philosophy as the Main Interpretive Center, but will emphasize different aspects of the resource management, environmental education and recreation opportunities due to each center's individual qualities.

The EAST BOULDER SATELLITE, located one and three-quarters of a mile off C.S.A.H. No. 4, on what is now designated as the Buzz Ryan Road, will

feature large scale aspen clear cuts on varied land ownership, bald eagle nesting interpretation, a canoe portage and access and wider recreational trails to accommodate hunting and cross-country skiing.

This satellite site location was selected for its easy access from the highway and the variety of natural resource objectives which can be interpreted for the public. The partners have agreed to upgrade the Buzz Ryan Road for better access during the 1992 construction season. The road will be named to honor Buzz Ryan, a pioneer forester in the area.

The East Boulder Satellite, is scheduled to be implemented in conjunction with the resource center off the Boulder Dam Road. The satellite center will include parking, signage, trails and a canoe portage with access to the east shore of the reservoir. Sections of existing timber sale roads and skid trails will be integrated into a trail system further discussed in the following section. Some trails will be gated to eliminate vehicle use, but will allow foot traffic to continue.

The partners will evaluate the needs of the East Boulder Satellite by considering increased recreational use and management objectives which benefit all parties concerned.

The SOUTH BOULDER SATELLITE, located approximately one mile from County Highway No. 4, on the Boulder Dam Road, will feature a parking facility and trail head in a pine thinning, large scale aspen management on varied land ownership, gravel sale interpretation, unique wetland ponds, snowmobile access and wider recreational trails to accommodate hunting and cross-country skiing. The majority of recreational users will utilize the trail network at this satellite center due to its close proximity to cabin owners and year-round residents adjacent to the site on the opposite side of the Boulder Dam Road.

The South Boulder Satellite, is scheduled to be implemented in conjunction with the resource center. Some trails will be gated to

eliminate vehicle use, but will allow foot traffic and cross-country skiing to continue.

The WEST BOULDER SATELLITE will be integrated into the management plan under the first phase of implementation. The site is located at the end of the Boulder Dam Road at the dam site. While this location is an existing public recreation site, the need to implement interpretation/education facilities will be required to inform the public on a variety of topics related to the management of the area.

Upgrading of the site will include evaluating the need for dredging the Reservoir bottom at the launch to permit easier access to and from the Reservoir, upgrading parking, and determining the need for additional shorefishing facilities. The dam boat launch will continue to be the main public boat access for the reservoir, and will provide the most convenient access to the Otter Lake end.

The West Boulder Satellite will emphasize boat and fishing recreation. Trails will be linked to the dam site from the trail network, discussed in the following section. Figure 11 shows a typical Satellite Center planned for the BLCA.

c. Trail Network

The management objective for the trail network is to provide needed access for recreation and to help interpret and educate the public on land management principles in the context of environmental stewardship within an existing working forest.

In conjunction with this objective, is the firm management commitment to avoid or eliminate any existing or possible adverse environmental or aesthetic impact to the area by increased public use. To achieve this commitment, management will utilize signage, monitoring, and enforcement.

c.1. Trail types

The trail network will incorporate a variety of standard and experimental trail types. Trails will include, but are not limited to, hiking/walking, traditional style cross-country skiing, skating style cross-country skiing, interpretive/educational, snowmobiling/ATV, handicapped accessible, handicapped-guided, mountain biking, primitive, camping access, remote, self-guided tours, compass-guided tours.

c.2. trail design and construction

Trails will be designed through the use of mapping and aerial photo information and field identification. Field crews will generally identify the location of the proposed trail by the use of plastic flagging or paint. Tree and brush clearing will follow with the use of chainsaw and hand labor, with disposal of cut material well off the trail to avoid adverse visual impacts.

Much of the preliminary earthwork construction on the new hiking/walking trails will be performed by contractors using small bulldozers. Most of the trails will be maintained each year by seasonal work crews.

The finishing work will be completed by the work crews. Several trail types, such as remote, primitive and camping access trails will be constructed by hand labor only to keep use and visual impacts reduced.

A variety of trail construction materials, such as gravel, topsoil and woodchips will be utilized to provide the best trail conditions possible for users and meet management objectives. Many of the trails will be reseeded after construction, yet several skid trails and roads will remain gravel.

Several techniques for water crossings will be utilized, including culverts, bridges and floating walkways.

In addition, use of existing skid trails and timber roads will lessen the amount of construction needed to be performed. Since the skid trails are wider, they will tend to be utilized as hiking/walking trails.

The trails will highlight land management practices in the context of environmental stewardship, varied tree cover, wildlife, unique ponds and wetlands, and recreation. Trails will also be signed to control traffic flows and will be linked or designed to allow users to continue further on each trail or return to the starting point at various points.

c.3. trail types defined and locations

Hiking/walking trails

The hiking/walking trails will draw the largest percentage of use and represent the standard designated trail type for the management area. The trails will be constructed using a MDNR standard with variances to the design where conditions and objectives dictate.

The hiking/walking trails will be open to the public throughout the year and will be open to hunters as well. Signage will be installed to inform the public that firearm hunting and discharging of firearms is permitted in the area during the fall hunting season.

Trail locations will remain flexible, and will be adjusted or eliminated based upon land management objectives. Gates will be placed on skid trails to eliminate conflicting uses, and traffic flows will be redirected to new or existing trails.

Rest areas will be incorporated into the trail network and may include extra trail width for ease of traffic flow, pull-offs, latrines, ski rests, and interpretive/educational signs.

For the resource center, the trails will begin at the parking lot and spread out from The Ridge Trail, located six-hundred feet down the access road at the trail head. Alternate access points will be located along the north and south branches of The Ridge Trail. The trail branching north from The Ridge Trail will be The Dam Trail and the trail branching south from The Ridge Trail will be the South Boulder Satellite Connector Trail. Several lesser trails will branch from The Ridge trail and stay in close proximity to the resource center.

The trails at the resource center will highlight the following:

- natural resource management philosophy
- timber management
- environmental stewardship ethics
- bog development and ecosystems on the reservoir
- recreation
- gravel operations on county land
- wetlands
- vegetation types
- wildlife
- forest history and ecology
- human history and archaeology

For the East Boulder Satellite, the trails will begin at the parking lot at the end of the Buzz Ryan Road. Alternate access points to other trails will occur at several points along the road. Small parking lots for one or two vehicles will be established along each access point, and gates may be installed to deter vehicle traffic on side trails where necessary.

The trails at the East Boulder Satellite will highlight the following:

- land management philosophy
- timber management
- environmental stewardship ethics
- pine thinning at the beginning of the Buzz Ryan Road
- aspen management and buffer strips on varied ownership
- wetlands on the reservoir
- multiple use trails
- eagle nesting
- vegetation types
- wildlife
- portage and canoe access to the Otter Lake end of the reservoir

The South Boulder Satellite trails will begin at the parking lot/trailhead just off the Boulder Dam Road. In general, the trails will spread out along the forested corridor between Boulder Lake Reservoir and the Boulder Dam Road. These trails will be networked with the trails at the other satellites and the resource center through the use of connector trails. The trails at the South Boulder Satellite will highlight the following:

- natural resource management philosophy
- timber management
- environmental stewardship ethics
- bog development and ecosystems on the reservoir
- recreation
- gravel operations on county land
- wetlands and unique ponds
- vegetation types
- wildlife
- forest history and ecology
- human history and archaeology
- recreation
- snowmobile access the Boulder Lake Reservoir

The West Boulder Satellite trails will begin at a parking lot/trailhead and will follow the west and northwesterly shoreline of the reservoir into the most undeveloped shoreline in the area. Most of the trails will be very primitive in construction to maintain the present natural character of the shoreline. Connector trails will also link the site with the resource center. Interpretation at the site will invariably emphasize water related subjects, but will also include:

- land management philosophy
- environmental stewardship ethics
- hydroelectric power generation
- wetlands on the reservoir
- timber management
- multiple use trails
- eagle and loon nesting
- vegetation types
- wildlife

- alternate boat and trail access points on the reservoir
- water recreation
- campsite information

Cross-country skiing trails

Cross-country skiing will be designated on the hiking/walking trails during the winter months. Several trail loops will be groomed for both traditional style and skate-skiing. The parking lot will also be snowplowed for easy access to the trail heads. Leaseholders on Island Lake Reservoir just across the Boulder Dam Road will be able to access the trails at the same walk-in access points along the road.

Snowmobile trails

A thoroughfare for snowmobile traffic is now permitted to pass through the parking lot at the South Boulder Satellite and continue to Boulder Lake Reservoir to the north for approximately one-half mile on an existing trail. The snowmobile trail will be maintained by local snowmobile groups. Intersections of this trail with other trails will be well marked for safety. No other trails are planned for designation in the South Boulder Satellite area at this time.

Snowmobile traffic at the East Boulder Satellite Area will be monitored to determine the needs of users and its relation to management objectives.

ATV trails

ATV use of existing trails does occur in both the South Boulder Satellite and the East Boulder Satellite areas. The use will be monitored to determine users needs and management objectives. Some use will be eliminated on hiking/walking trails by the use of signage, gates and enforcement.

Interpretive/Educational trails

Since the Boulder Lake Conservation Area is a working forest, a major management objective will emphasize interpreting for the public the ongoing land management practices occurring in the area within the

context of environmental stewardship. This objective will be achieved mostly through the use of signage on the trail network.

Interpretation of land management practices and environmental information will be included into the entire trail network.
The hiking/walking trail network will include the largest percentage of interpretive signage.

A higher percentage of interpretive signage will be concentrated on those trails which are in close proximity to the resource center, where the highest use is expected, to reach the largest number of users.

On remote and primitive trails, signage will be included, but will be less conspicuous than the signage used on the hiking/walking trails to retain the primitive nature of these trail locations. Experimentation with a variety of signage will provide the best solution to interpretation while avoiding any adverse impact to aesthetic quality in remote or primitive areas.

Handicapped accessible trails

A portion of the hiking/walking trails very near the South Boulder Satellite will be modified for handicapped accessibility to ensure that those who are physically challenged receive equal consideration. More intensive leveling and trail work will be conducted to ensure safe, easy passage, and interpretive signing will be positioned to make reading accessible to those with special needs.

Handicapped-Guided Trail Tours

With the understanding that a variety of physically challenged people require different levels of trail modification to allow for accessibility, management will study the possibility of handicapped-guided tour trails geared to match each individual's physical challenge. Some users who have a specific physical challenge may be able to use some trails that have restrictive physical characteristics, such as possessing steeper topography or a primitive quality, others would have to avoid.

Ultimately, a rating system could be developed, or an existing rating system could be used, for the trail network to inform the physically challenged as to each trails' characteristics to help them gauge their own abilities with those of a particular trail. Therefore, each user would be able to maximize their ability and experience based upon trail information provided. In essence, this will give the users the freedom to choose trails for themselves.

Unique opportunities could be provided for friends and health professionals to assist some of the physically challenged experience forested areas without an unduly modified trail. The handicapped accessible trail tours would be created with the help of health professionals to best meet the needs of the physically challenged and make this unique trail rating system possible for them.

Mountain bike trails

While mountain bike use in the area is very limited at this time, use will be monitored to determine user needs and management objectives. Use of mountain bikes may be permitted on some skid trails and access roads, but will be prohibited on hiking/walking trails.

Primitive trails

In contrast to the highly modified hiking/walking trails, will be the primitive trail system. These trails will be located generally in more environmentally sensitive areas such as shoreline locations, and will be designed in such a fashion as to avoid adverse impacts to the area.

An example of a primitive trail location would be in a timber sale buffer strip along a shoreline area. Primitive trails will likely permit single-file, one-way traffic only, and may be designed in a looped fashion, leading to and from a hiking/walking trail. The primitive trail network will emphasize low-impact use techniques, and will include less conspicuous signage to reduce adverse visual impacts.

Remote trails and camping access trails

Subsets of the primitive trail network are the remote trail and the camping access trail.

Remote trails are generally defined as those trails located in areas less likely to be traveled, perhaps due to geographic or topographic restrictions. While the user traffic will be less than the other trail types, the remote trails will provide a unique experience for more experienced hikers and campers who wish to visit some of the less accessible natural character areas.

The remote trails would likely be located well away from the satellite centers, and would retain only the basic characteristics of the primitive trail network. For example, the remote trails would be constructed for single-file traffic only, yet would permit two-way traffic due to low use. Because of this unique two-way, single-file trail system, access from the hiking/walking trails will require design considerations for users returning from the remote trails to ensure traffic flow direction.

In addition, little to no signage will be used on the remote trails, unless absolutely required, to reduce adverse visual impacts and retain the area's natural character.

c.4. Overlooks, Blinds, Docks, Shelters, Sitting Stands

A variety of additional devices may be utilized to assist in the interpretation/education objectives for the area, and will also reduce use impacts on environmentally sensitive areas.

Overlooks

Overlooks will provide good vantage points for viewing the surrounding area, wildlife and environment. Design for these facilities will incorporate the characteristics of the site to reduce their visual impact.

Blinds

Blinds in areas frequented by wildlife, such as waterfowl and beaver, will allow users to view the wildlife in their natural environment. The blinds will be located and designed to best meet management objectives and eliminate the possibility of adverse visual and environmental impacts.

Docks

Docks can be utilized as fishing piers and viewing platforms for wetlands and peat bogs. Various configurations will be considered for each situation to meet the management objective wile reducing adverse visual and environmental impacts.

Shelters

Management will consider constructing shelters to be utilized along the hiking/walking trail network for users to escape from weather conditions while hiking the trail. The shelter would likely be a three-walled, open front structure with a bench and cooking grill provided.

Sitting Stands

Used as rests and interpretive/educational tools, sitting stand may be constructed along the hiking/walking trails network system. The sitting stands may provide a unique experience for users who tend to stay near the main trails.

V. SUMMARY

The management objective of the Boulder Lake Conservation Area represents a new kind of partnership between government agencies and private industry which combines a common focus to provide economic, and unique educational and recreational opportunities for the public.

By communicating common management objectives, Minnesota Power, St. Louis County and the Minnesota Department of Natural Resources are able

to educate the public on land management within the context of environmental stewardship occurring in an existing working forest, for the first time.

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Thiel, R. P. 1986. Eastern Timber Wolf (Canis lupus lycaon). WI. Dept. of Nat. Res. Publ.-ER-500 86 Rev. Madison, WI. 6 pp.

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Fig. 1 BOULDER LAKE RESERVOIR OWNERSHIP .

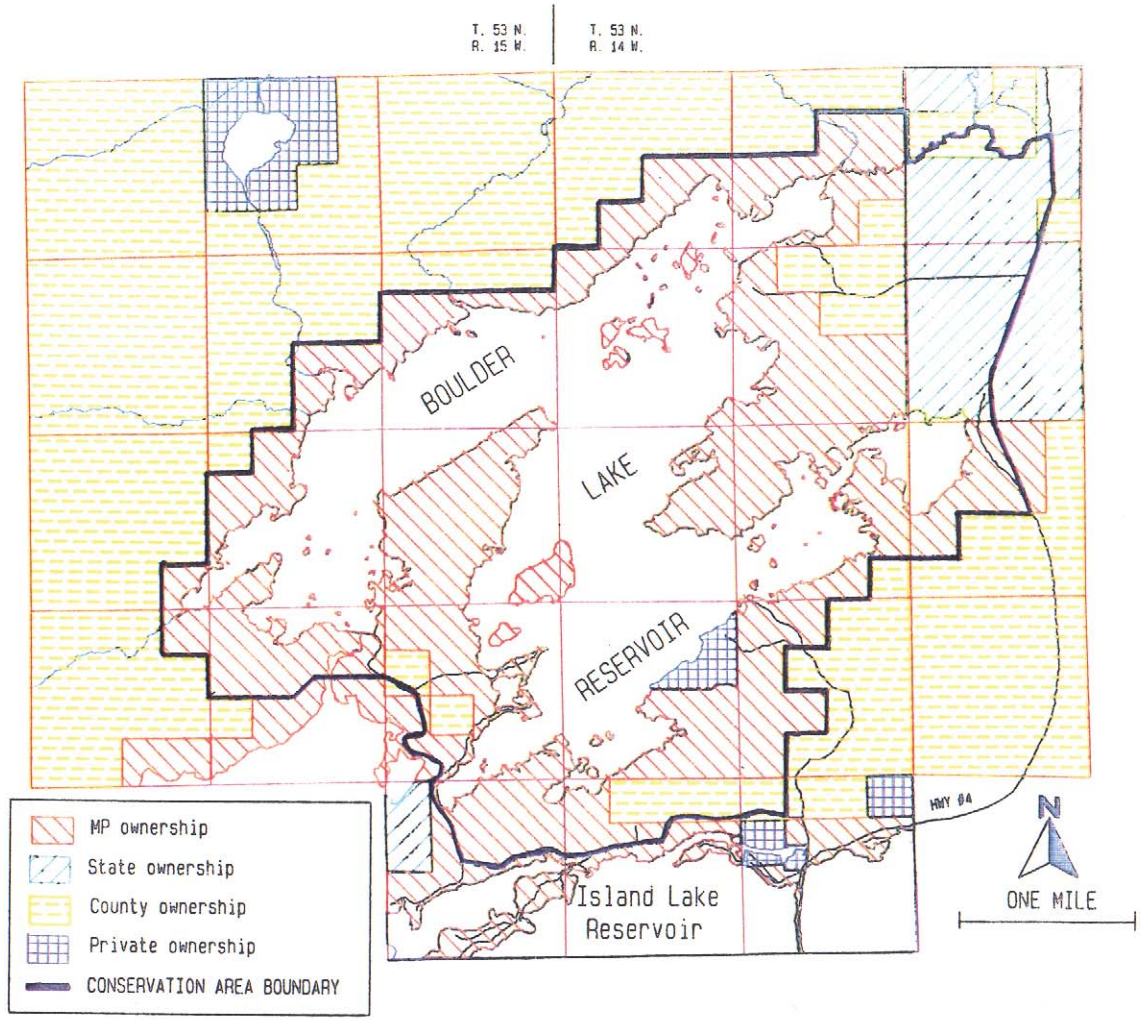


Fig. 2 St. Louis River Project

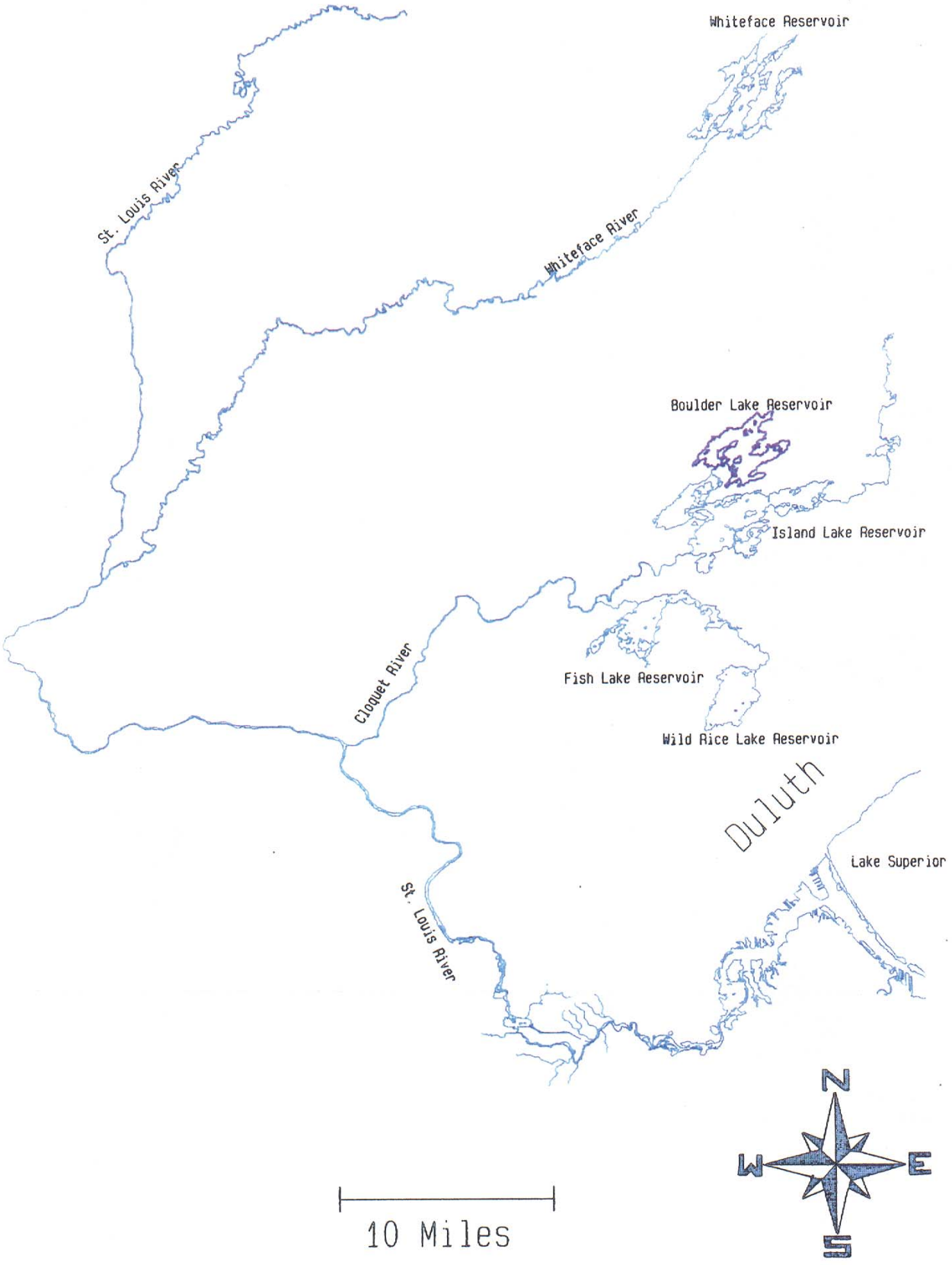


Fig. 3 Boulder Lake Conservation Area Forest Types All Ownerships.

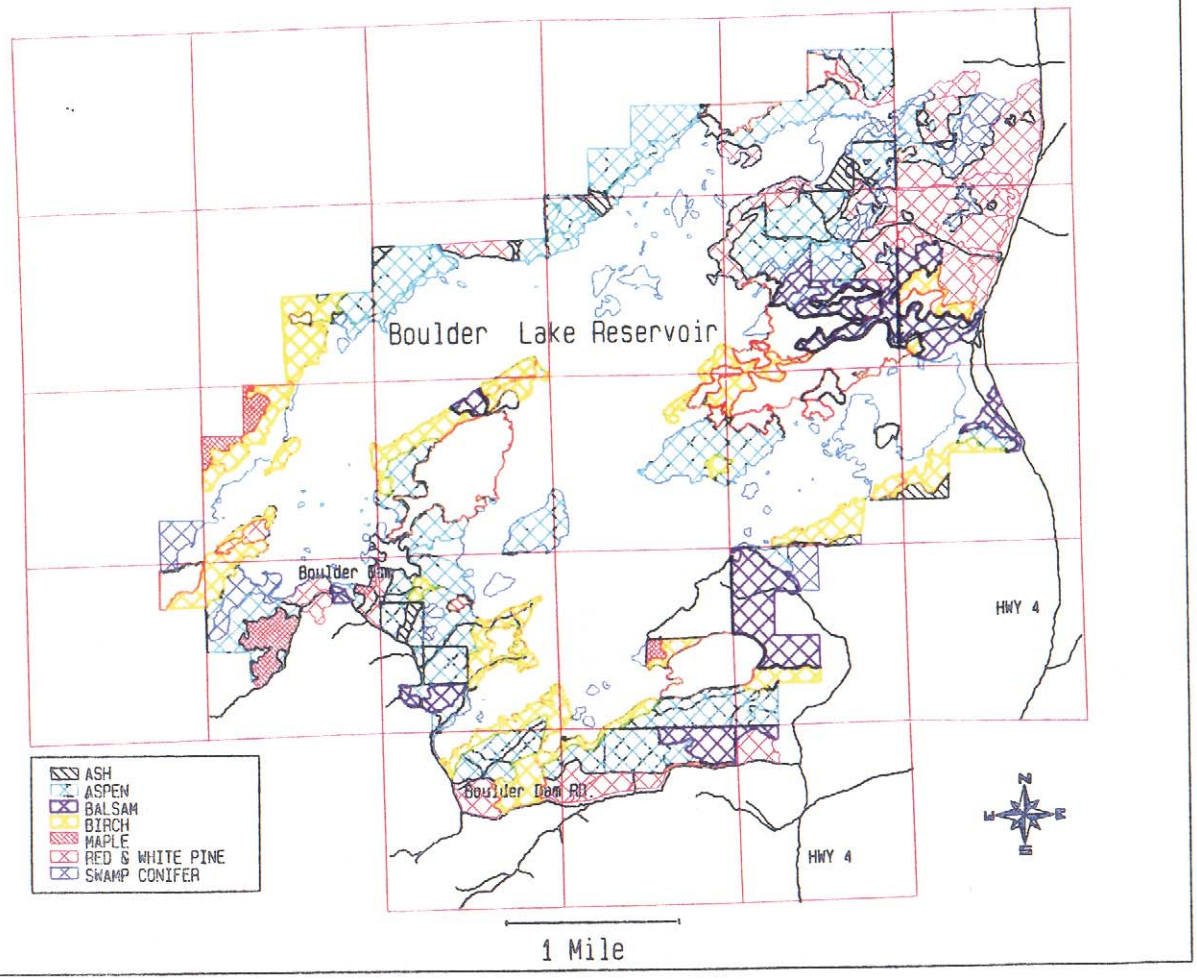


Fig. 4 Boulder Lake Conservation Area Wetlands Minnesota Power Ownership.

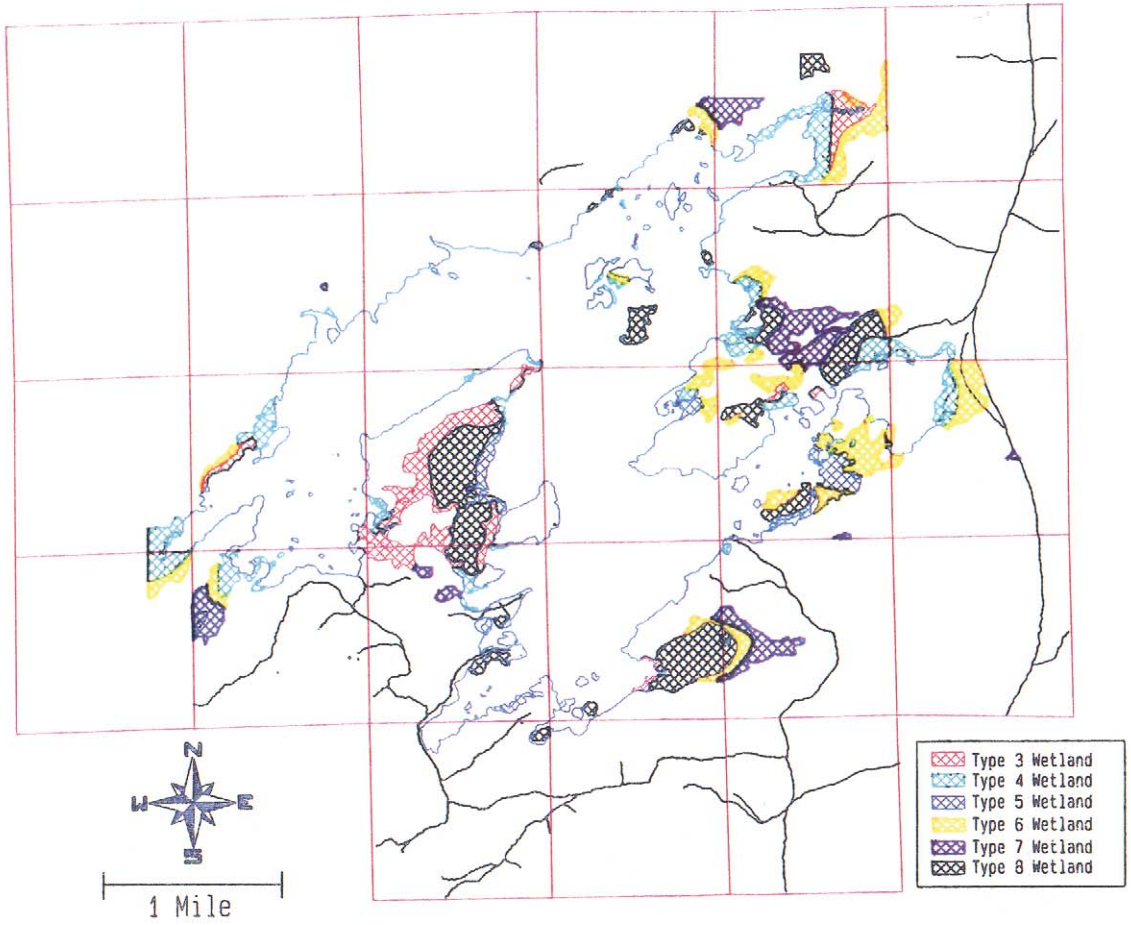


Figure 5 Boulder Lake Conservation Area Recreation Site Map

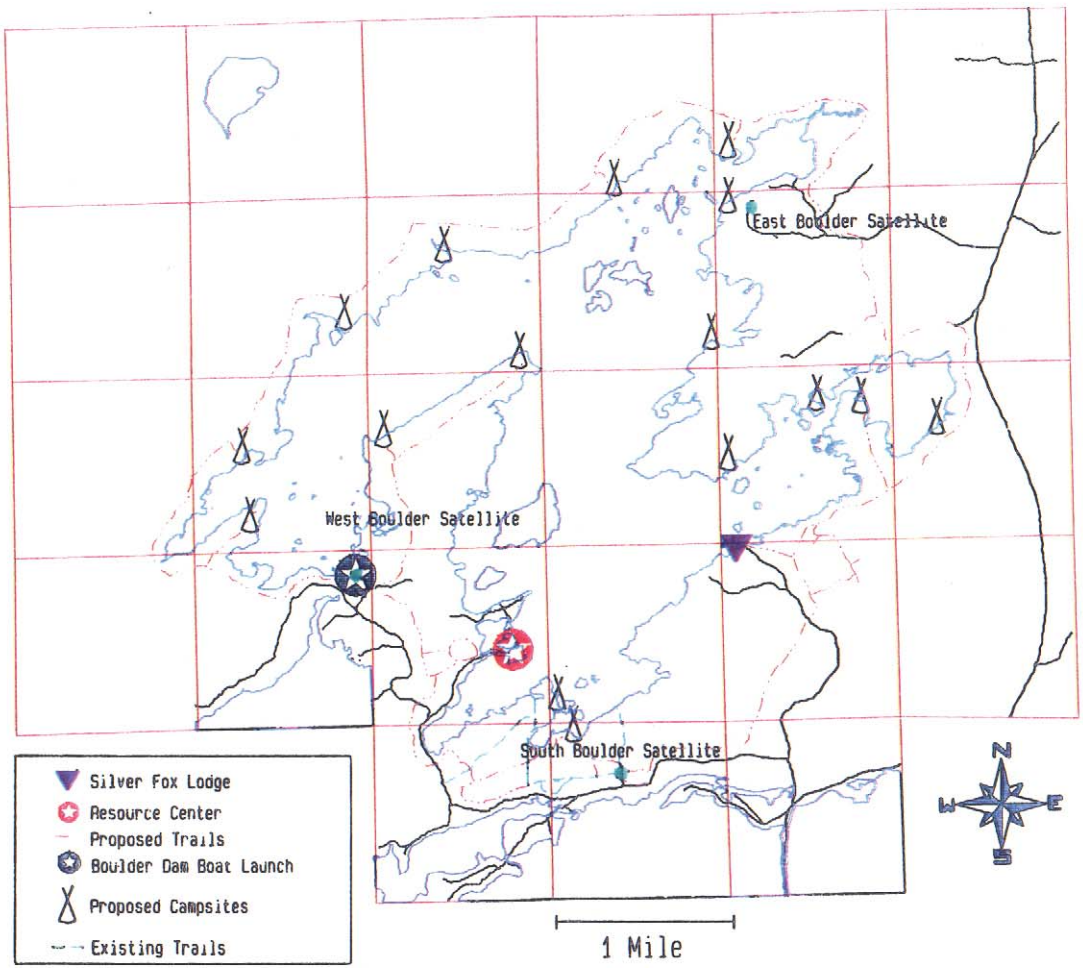


Fig. 6 Boulder Lake Reservoir Sections Where Eagle Nests Exist.

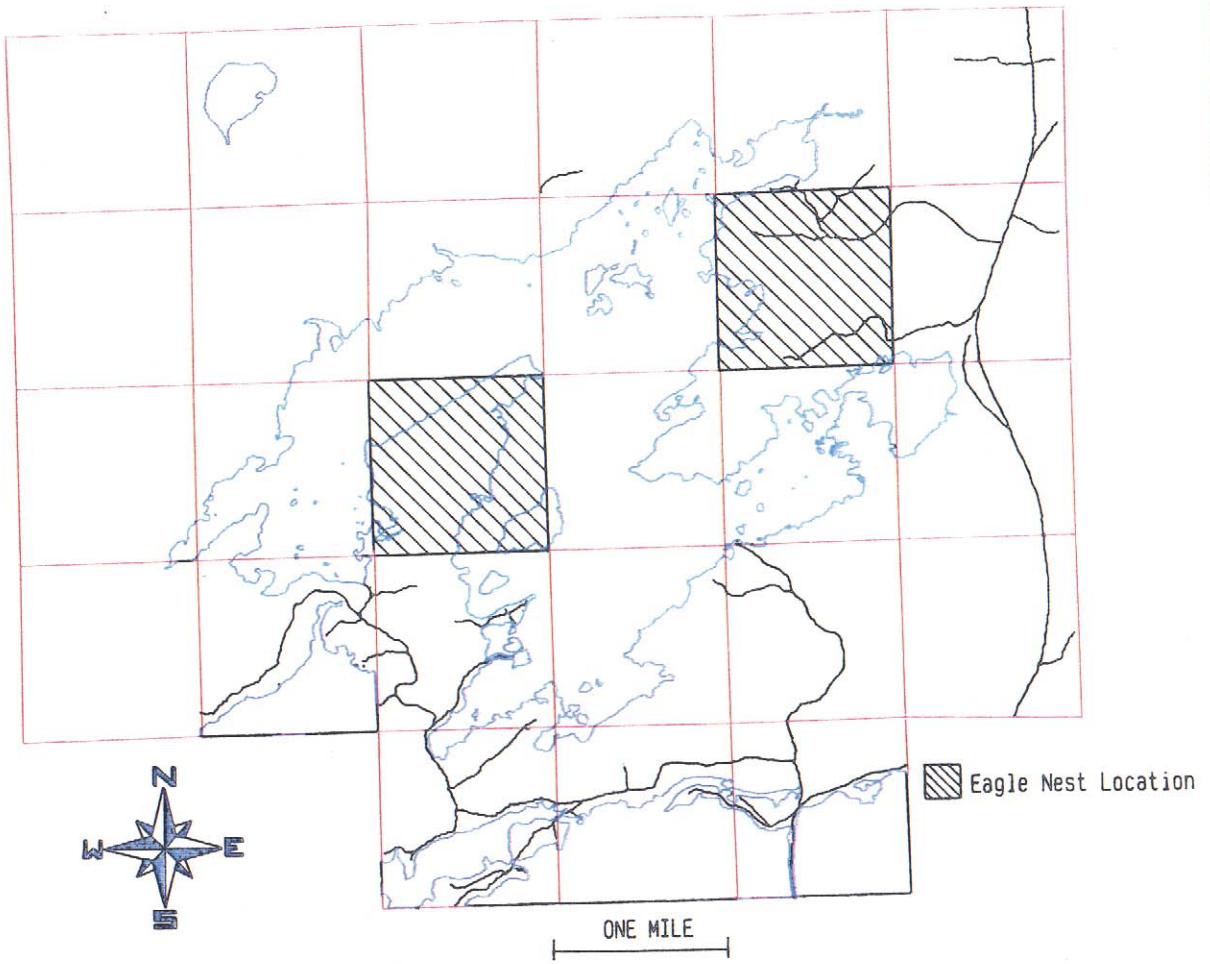


Figure 7 Minnesota Power Cavity Nest box Locations

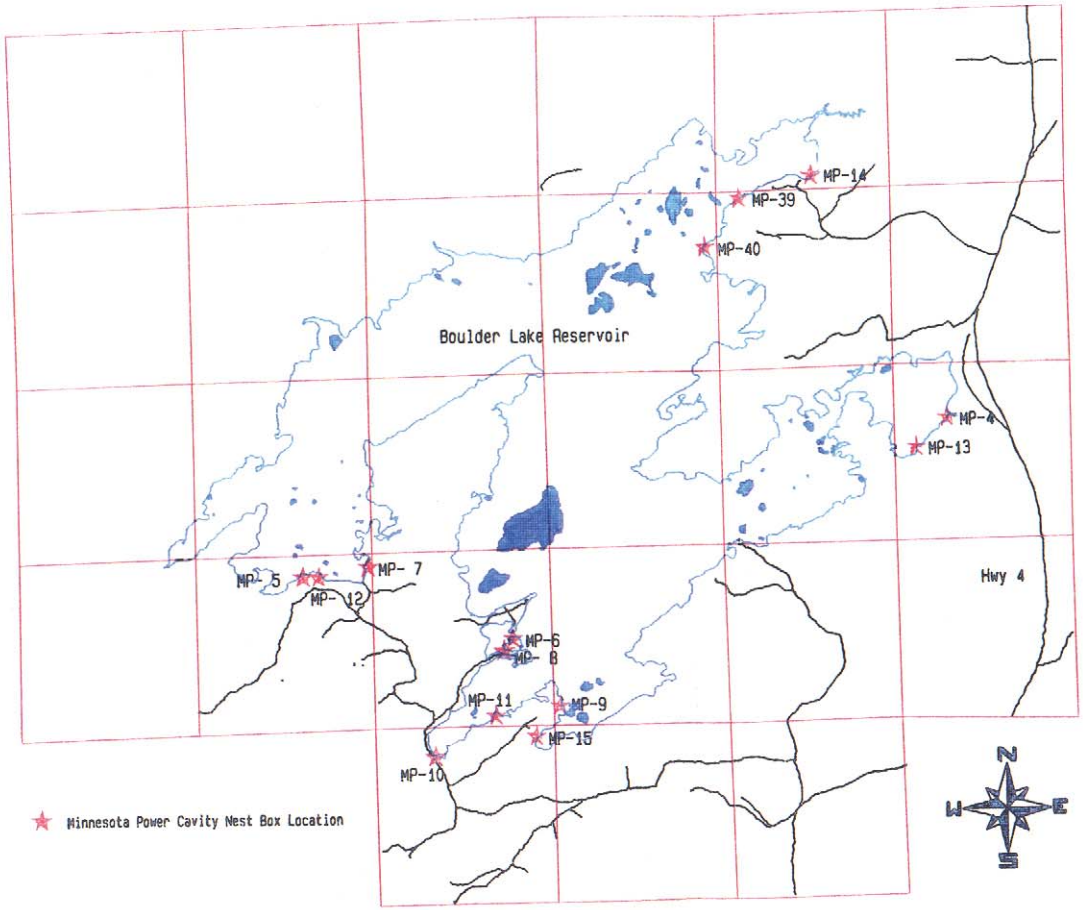
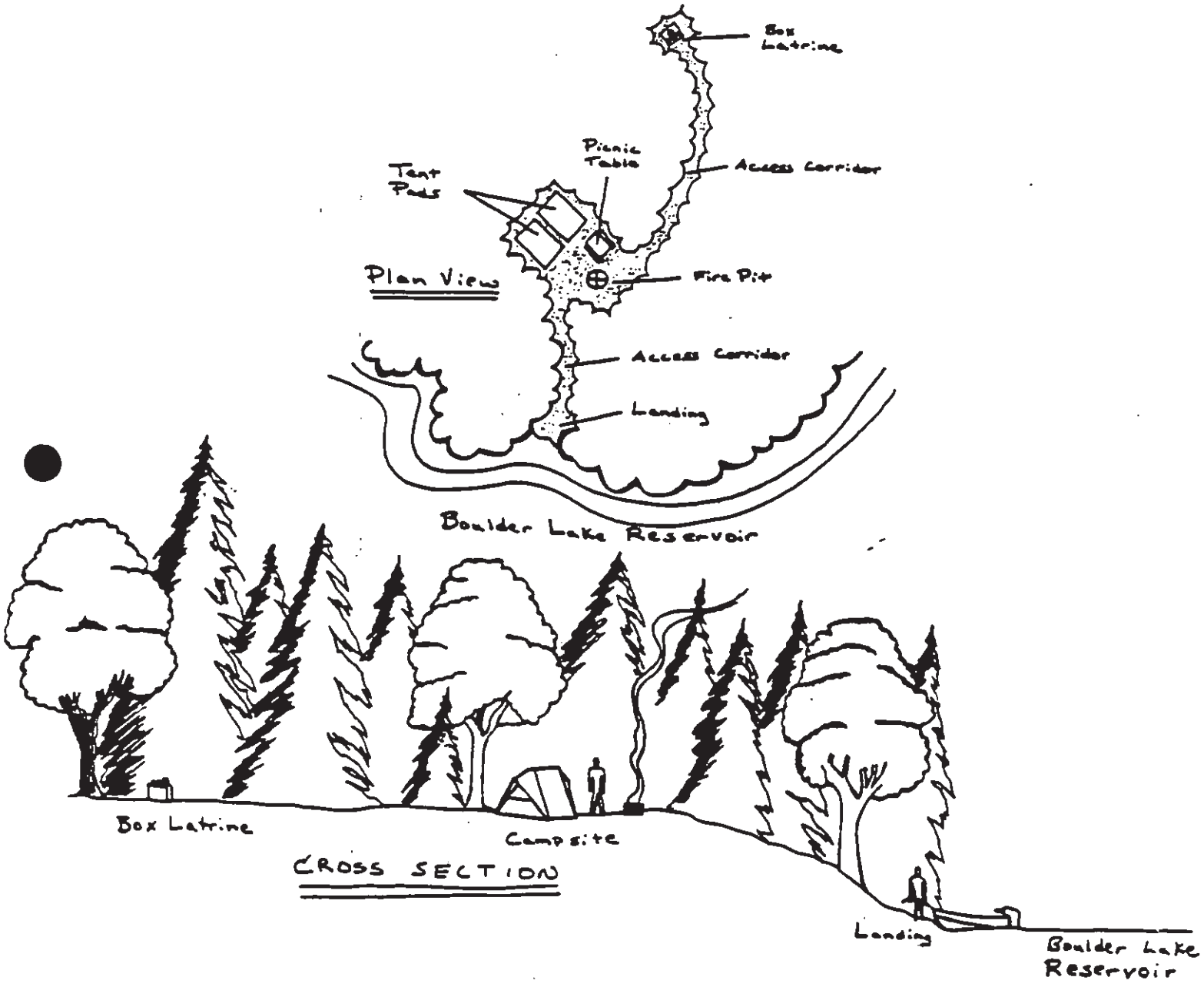


FIGURE 8

Typical Primitive Campsite



Typical Trail Types

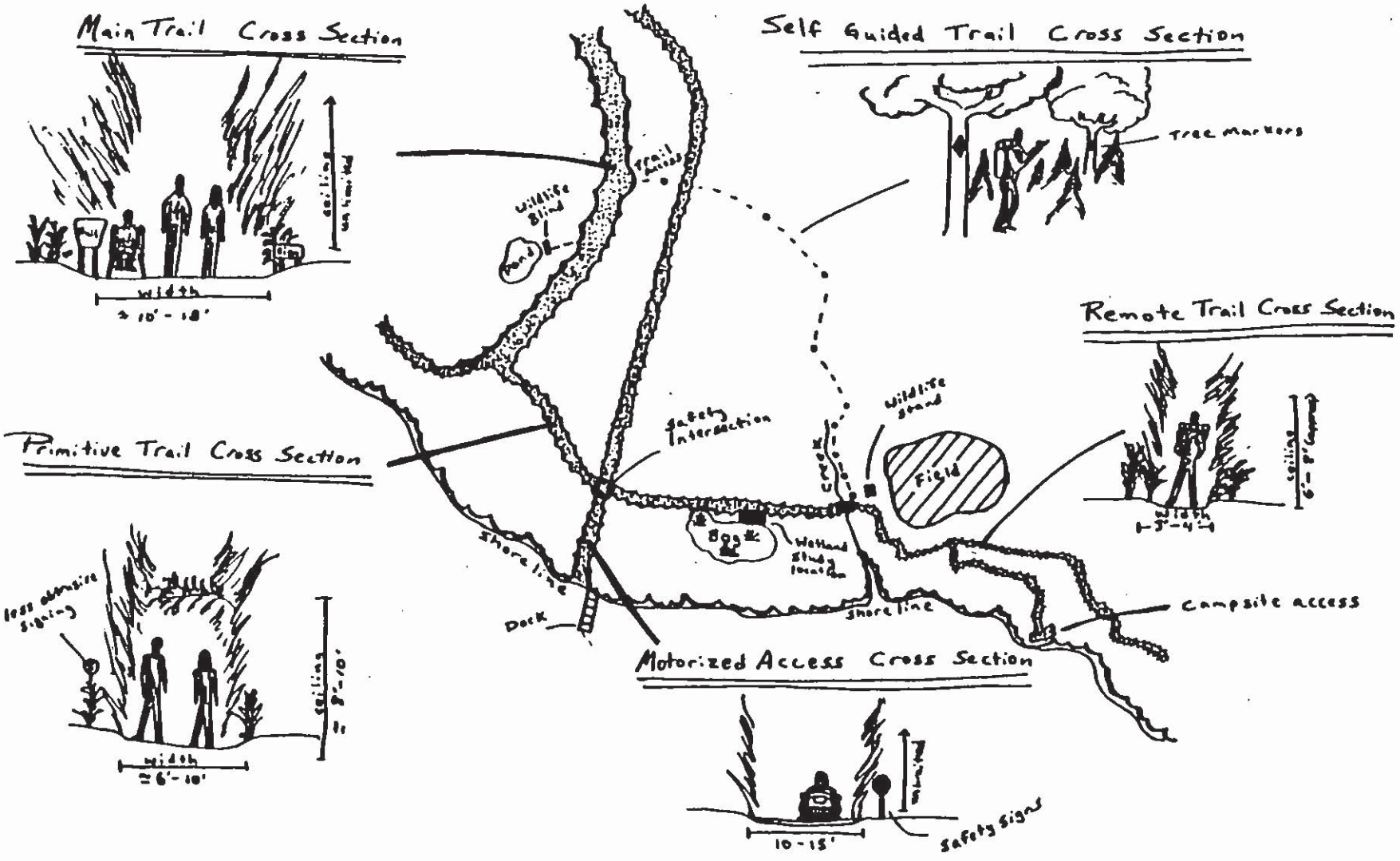


FIGURE 9

FIGURE 10

Boulder Lake Resource Center

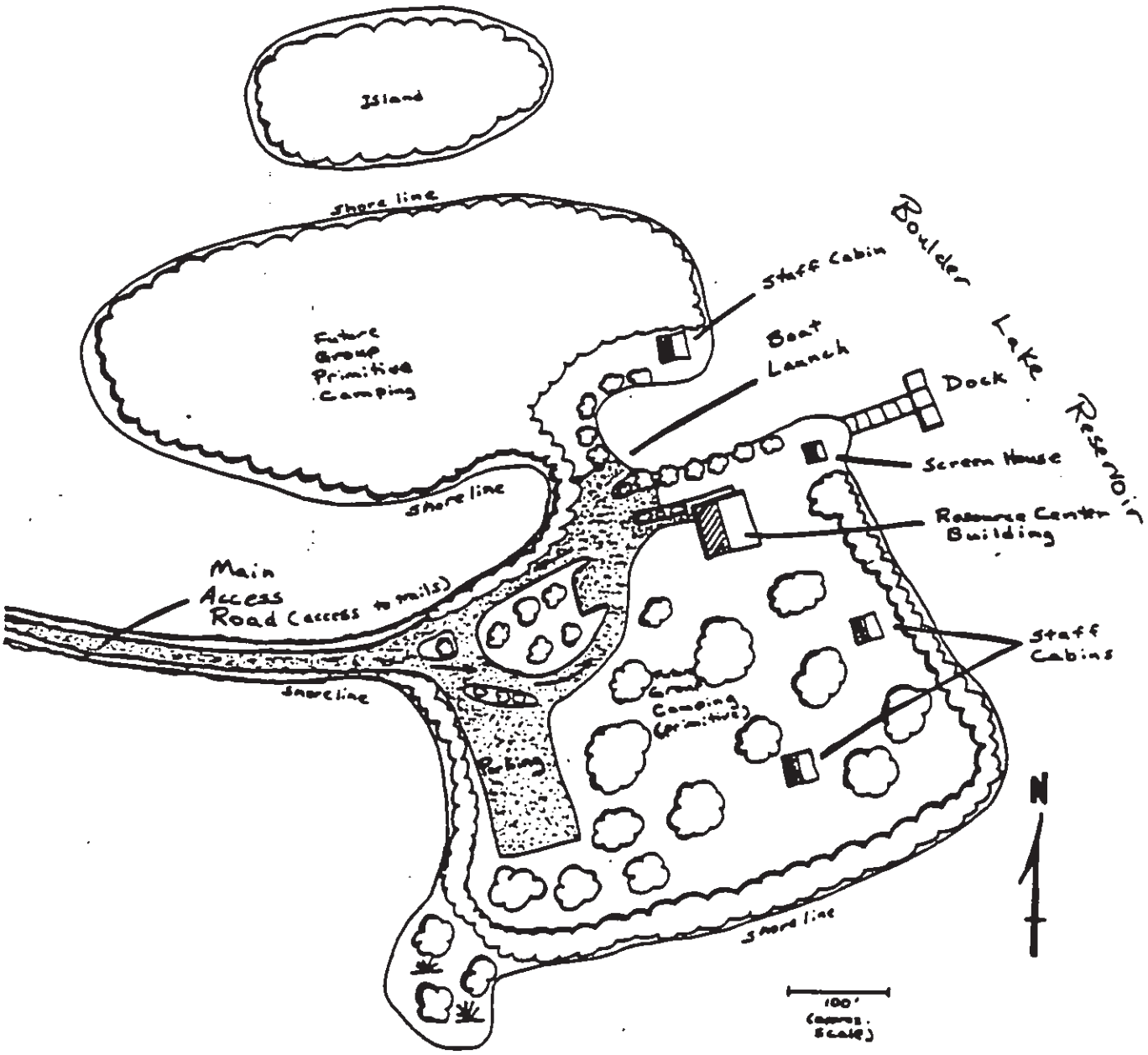
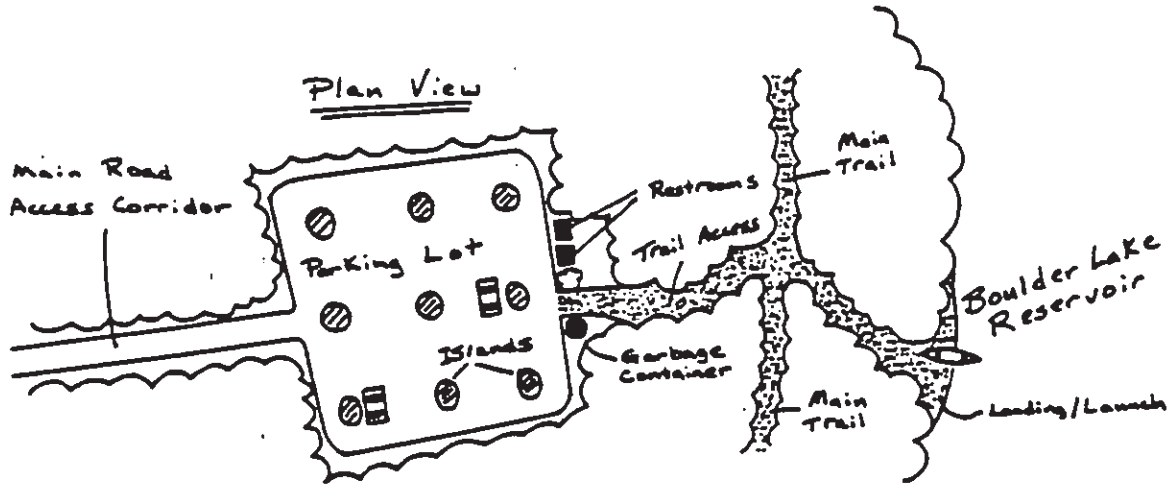
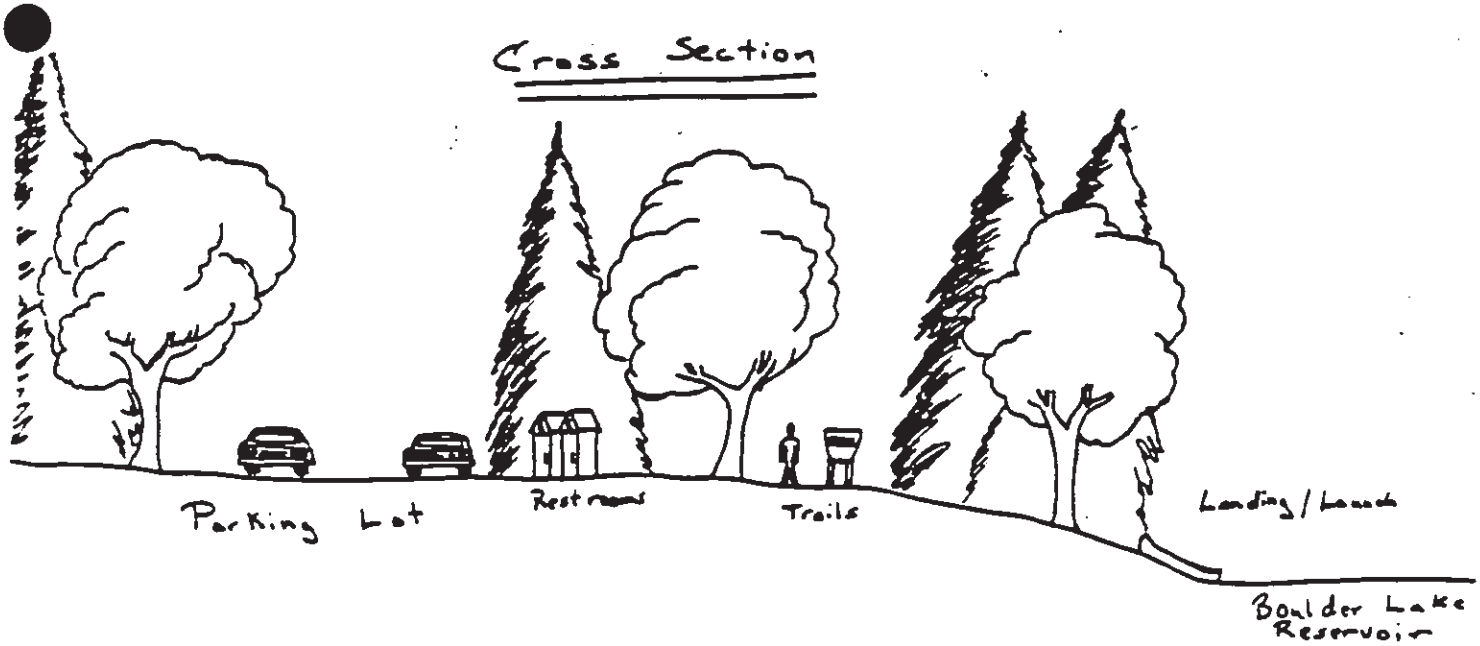


FIGURE 11

Typical Satellite Center





APPENDIX A

St Louis County Land Department Forest Management Plan
Boulder Lake Conservation Area

The St. Louis County Land Department manages approximately 480 acres of tax forfeit land within the BLCA. In St. Louis County there are approximately 900,000 acres of tax forfeit lands which are managed by St. Louis County in trust for the taxing districts. Management of these lands includes a forest management program which supplies a sustained yield of forest resources. Those tax forfeit lands within the BLCA are managed by a professional forestry staff headquartered at the St. Louis County Land Departments South Area office at Pike Lake approximately 20 miles Southwest of Boulder Lake Reservoir.

The aspen and pine forest types predominate the county lands at Boulder. Stands of balsam fir, black spruce, northern white cedar, and black ash also occur in declining order of abundance. Table 1 shows the forest cover types by acres for Tax Forfeit land in the BLCA.

TABLE 1

FOREST COVER TYPES

ST. LOUIS COUNTY TAX FORFEIT - BLCA

1993

Cover Type	Acres	% of Total
aspen	235	49.6%
red and white pine	117	24.7%
balsam fir	52	11.0%
stagnant black spruce	14	3.0%
black spruce	14	3.0%
white cedar	16	3.4%
lowland brush	26	5.5%
total	474	

Table 2 gives a rough estimate of growing stock timber volumes for County tax forfeit lands in the BLCA. These volumes are approximate and do not represent a complete inventory. Only rough timber volume information was collected in 1990 -1993 by county foresters as they visited each stand to prescribe management plans.

TABLE 2

ST. LOUIS COUNTY TAX FORFEIT

ROUGH ESTIMATE

MERCHANTABLE GROWING STOCK TIMBER VOLUME - BLCA

1993

SPECIES	VOLUME IN CORDS
white pine	1,600
red pine	1,500
aspen	600
birch	600
white spruce	200
black spruce	200
white cedar	100
total	4,800

Table 3 shows the age distribution for forest stands on St. Louis County tax forfeit land in the BLCA.

TABLE 3

ST. LOUIS COUNTY TAX FORFEIT

FOREST STAND AGE DISTRIBUTION - BLCA

1993

AGE CLASS	ACRES	% OF TOTAL
0 - 10 years	88	19.3%
10 - 20 years	71	15.5%
20 - 40 years	21	4.6%
40 - 60 years	23	5.0%
60 - 80 years	93	20.4%
80+ years	161	35.2%
total	457	

The Management discussion for individual St. Louis County forest stands is arranged below by geographical location starting with county ownership near the Boulder Dam and continuing in a counterclockwise manner to the east. Figures 1-3 are the St. Louis County forest stand management maps for the BLCA. Stand numbers referenced in the following discussion correspond to numbers on the map.

STANDS

Stand 1 - A 53 acre stand of mature aspen, white spruce, birch, and white pine. It is scheduled to be harvested in 1997. By then, most of the birch is expected to have died. Healthy disease-free white pine will be reserved. It is estimated that 210 cords of aspen, 190 cords of white spruce and 35 cords of white pine will be harvested. This area should regenerate naturally to aspen, spruce, white pine and balsam fir following harvest.

Stand 2 - A 10 acre aspen stand scheduled to be harvested in 2007 when it will be approximately fifty years old. At that time, most of the conifers in the stand may be reserved from harvest to increase diversity in the resulting natural regeneration. The estimated volume to be harvested is 180 cords of aspen.

Stand 3 - A 52 acre stand of balsam fir and aspen, scheduled for harvest in 2030. It is approximately 10 years old now. At time of harvest the stand is expected to yield 440 cords of balsam fir and 340 cords of aspen.

Stand 4 - A 28 acre stand of Norway and white pine. part of this stand will be lost to gravel pit expansion. Timber will be sold periodically before the pit is expanded. This gravel is sold

mostly to residents around Island Lake for driveway and other construction needs. The pine in this stand will be managed by periodic thinnings and removals of diseased white pines. Eventually the Norway pine will all be harvested when vigor declines (20-50 years from now). This area would then be replanted with Norway pine. Eventually the gravel pit will be reclaimed by sloping and planting pine.

Stand 5 - A 14 acre stand of white cedar. This stand is reserved for winter shelter for deer and other wildlife.

Stand 6 - A 19 acre aspen stand scheduled for harvest in 2025 at approximately fifty years of age. It is estimated that it will yield 500 cords of aspen and 300 cords of balsam fir. This stand will be allowed to regenerate naturally.

Stand 7 - 3 acres of lowland brush. Wetland Conservation Act rules apply.

Stand 8 - 7 acres of lowland brush. Wetland Conservation Act rules apply.

Stand 9 - A 35 acre stand of white and Norway pine. This stand was thinned about 1980. This stand will be periodically thinned in the future with the ultimate goal of regenerating white pine.

Stand 10 - A 14 acre stand of non-productive stagnant black spruce. No harvesting is planned for this stand at this time. It is possible that some Christmas trees may be harvested.

Stand 11 - A 4 acre stand of lowland brush. Wetland Conservation Act rules apply.

Stand 12 - A 66 acre aspen stand scheduled to be harvested in 2036. It is estimated the stand will yield 1600 cords of aspen at harvest.

Stand 13 - A 7 acre stand of mature Norway pine. This is scheduled to be harvested in 2010. However, conditions may alter this plan. it may be thinned at that time. The ultimate goal is to regenerate white pine naturally.

Stand 14 - A 6 acre stand of mature black spruce. This will be clear-cut within ten years. It will then be reseeded to black spruce. It is estimated that this stand will yield 130 cords of black spruce.

Stand 15 - Part of stands 10 and 14

Stand 16 - An 11 acre stand of mature white pine. This is scheduled to be thinned in 2000. Diseased trees will be removed. Goal is to regenerate white pine naturally.

Stand 17 - A 2 acre stand of lowland brush. Wetland Conservation Act rules apply.

Stand 18 - An 8 acre stand of black spruce and cedar. Black spruce will probably be harvested in the next 10 years. Cedar will be reserved for winter shelter for deer and other wildlife.

Stand 19 - A 2 acre stand of cedar and black spruce. There is also steep terrain in this stand. This stand will be reserved from harvest for wildlife shelter.

Stand 20 - A 22 acre stand of aspen. Scheduled to be harvested in 2040. It is estimated this stand will yield 600 cords of aspen at that time.

Stand 21 - A 4 acre stand of black ash 4-8 inches in diameter. No management plans at this time. The stand will be reevaluated in 2020.

Stand 22 - A 10 acre stand of white pine and Norway pine. This stand was thinned in 1991 to remove diseased white pine. It will be checked periodically and maintained as old white pine as long as possible. The goal is to eventually regenerate white pine naturally.

Stand 23 - An 8 acre stand of white and Norway Pine. This stand will be monitored and a thinning to remove diseased white pine will be done, probably not later than 2005. Portions may then be replanted with Norway pine and others will be maintained in white pine with the goal of natural regeneration of white pine.

Stand 100 - An 11 acre aspen stand. Plans are to clear-cut this in 2012. it is estimated it will yield 165 cords of aspen and 40 cords of balsam fir at that time.

Stand 101 - A 14 acre black spruce, aspen stand. Plans are to clear-cut this in 2012. It is estimated it will yield 215 cords of black spruce, 150 cords of aspen and 45 cords of red maple.

Stand 102 - A 40 acre aspen, birch stand. plans are to clear-cut this stand in 1997. It is estimated it will yield 350 cords of aspen and 345 cords of birch. This stand contains some good gravel and some of this stand will probably be lost to a gravel pit.

Stand 103 - A 10 acre mixture of upland and lowland brush with some ash and balsam fir. This stand will probably be reserved for wildlife.

WILDLIFE CONSIDERATIONS
ON ST. LOUIS COUNTY TAX FORFEIT LANDS ON THE BLCA

Wildlife considerations will be on a site by site basis. When timber sales are designed, the potential for improving wildlife habitat will be analyzed and incorporated into the timber sale.

These considerations are expected to include reserving some large canopy trees for eagle nesting sites. Snags left standing for raptor perches. Cedar and undersized conifers will usually be reserved for winter shelter and to add diversity to developing regeneration. Some wildlife openings may be maintained following harvest.

FIGURE 1
APPENDIX A

FIGURE 2
APPENDIX A

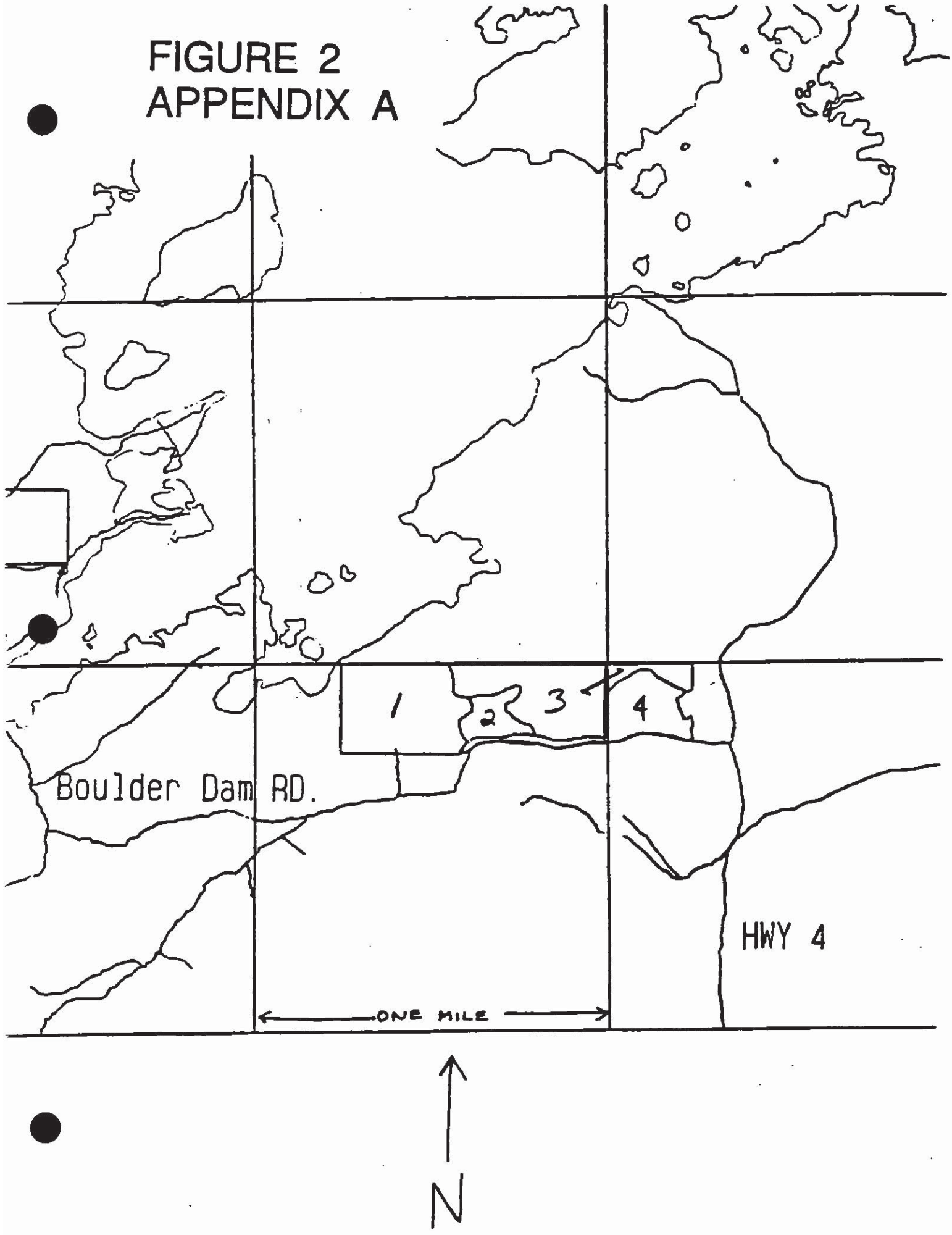


FIGURE 3
APPENDIX A

APPENDIX B

Minnesota Department of Natural Resources Forest Management Plan
Boulder Lake Conservation Area

The MDNR Division of Forestry manages approximately 704 acres in the Boulder Lake Conservation Area (BLCA). These lands are located within the Cloquet Valley State Forest where the MDNR manages approximately 39,630 acres. In general, MDNR forest management planning occurs on a district level. Three MDNR Division of Forestry Districts over lap the Clouqet Valley State Forest. The Duluth District in which the State BLCA lands lie, is headquartered at 4805 Rice Lake Road, Duluth, Minnesota, approximately 20 miles south of the BLCA.

There are approximately 645 acres of productive forest land and 59 acres of non timber producing wetlands managed by the MDNR within the BLCA. The majority of the timber land is classified as red (Norway) pine or white pine which together account for 67% of the productive forest acreage. In declining order, aspen, northern white cedar, birch, black spruce, balsam fir, and tamarack occupy the remaining MDNR timber land within the BLCA. Table 1 below outlines the MDNR BLCA forest cover types based on the 1983 forest inventory adjusted to reflect changes in forest cover type resulting from forest management activities since 1983.

TABLE 1

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

FOREST COVER TYPES - BLCA

1993

FOREST COVER TYPE	ACRES	% of TOTAL ACRES
PRODUCTIVE		
white pine	273	38.8%
Norway(Red) pine	160	22.7%
aspen	53	7.5%
white cedar	47	6.7%
paper birch	44	6.2%
black spruce	32	4.5%
balsam fir	25	3.6%
tamarack	11	1.6%
NON PRODUCTIVE	-	-
stagnant spruce	14	2.0%
lowland brush	16	2.2%
other wetlands	29	4.1%
total	704	100%

Based on the 1983 MDNR forest inventory which has been adjusted to account for removals through recent timber harvesting activities (but not for growth or mortality since 1983) the state land within the BLCA contains a growing stock volume of approximately 9,100 cords and 730,700 board feet of merchantable timber. Table 2 shows the approximate merchantable growing stock timber volume by species for MDNR lands in the BLCA.

TABLE 2

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

MERCHANTABLE GROWING STOCK TIMBER VOLUME - BLCA

1993 approximate

SPECIES	VOLUME IN CORDS	VOLUME IN BOARD FEET
red(Norway)pine	3,040	320,300
white pine	2,515	404,400
aspen	738	-
birch	729	-
white cedar	367	-
balsam fir	231	-
black spruce	218	-
tamarack	55	-
maple	52	-
white spruce	37	6,000
black ash	14	-
balm of gilead	13	-
miscellaneous*	1091	-
total	9,100	730,700

* not differentiated in MDNR inventory

Table 3 shows the forest age class structure for MDNR lands in the BLCA.

TABLE 3

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

PRODUCTIVE FOREST AGE CLASS STRUCTURE - BLCA

AGE CLASS	ACRES	% OF TOTAL
0-10 years	100	15.5%
10-20 years	103	0.4%
20-40 years	0	0
40-60 years	75	11.6%
60-80 years	139	21.6%
80+ years	328	50.9%

The following management discussion for individual MDNR - BLCA timber stands is arranged by forest cover type. Figure 1 is the preliminary individual stand management map for the MDNR timber in the BLCA. Numbers referenced in the following discussion roughly correspond to stand numbers on the map. The MDNR is in the process of developing a final forest stand management map for the BLCA.

white pine: approximately 185 acres. Most white pine stands contain a substantial component of Norway pine.

The Division of Forestry intends to re-introduce fire to the white and Norway pine stands. This will be done to restore the present fuel to their natural (lower) level. It will also facilitate natural regeneration in the stands.

All non-old growth white and Norway pine will be managed on a 150 year rotation.

Stands one and two in section 9 - 45 acres of white of natural origin, 92 years old. These stands have been selected as old growth replacement stands.

Stand three in section 16 - a 7 acre white pine stand approximately 84 years old and of natural origin. This stand has been thinned periodically since 1960. The next thinning is planned for the fall of 1994. Future plans are to maintain pine on this site.

Stand 8 in section 16 - a five acre stand of white pine regeneration four years old on the average. The aspen overstory will be removed in about 2023

Stand 16 in section 9 - a 27 acre stand of white pine aged 109 years and of natural origin. It has been thinned periodically since 1960. The next thinning is planned for the fall of 1993

Stand 11 in section 9 - a 29 acre white pine stand 96 years old and of natural origin. This stand was thinned at least once prior to its last thinning in 1988. Plans are to maintain the pine type on this site.

Stand 25 in section 9 - a 10 acre area of natural white pine regeneration. The seedlings average age is about two years. Adjacent stands are providing the seed source.

Stand 18 in section 9 - a 22 acre white pine stand of natural origin, 105 years old. It has been periodically thinned since 1960 with the next thinning planned for fall of 1993. pine will be maintained on this site in the future.

Stand 23 in section 9 - a 12 acre white pine stand approximately 84 years old and of natural origin. This stand has not been thinned in the past and has been selected as an Old Growth replacement stand.

Stand 14 and 15 in section 9 - a 57 acre white pine stand approximately 109 years old and of natural origin. This stand

shows very little evidence of past management and has been selected as an Old Growth replacement stand.

Stand 30 in section 16 - a five acre pine stand dominated by white pine. This stand is about 85 years old and of natural origin. It has been thinned periodically since 1960. The next thinning is planned for the fall of 1994. Plans are to maintain the pine type on this site.

Stand six in section 16 - a 54 acre white pine stand approximately 81 years old and of natural origin. Thinned periodically since 1960 this stand will be thinned again in the fall of 1994. Plans are to maintain the pine type on this site.

Norway(red) pine: approximately 160 acres

Stands 27 and 28 in section 9 - 30 acres of Norway pine plantations established in 1988 following an aspen harvest in 1987. Future management will include periodic thinning starting at about age 30.

Stand 13 in section 16 - a 39 acre Norway pine and white spruce plantation planted in 1992. In 1990 the birch and budworm damaged balsam fir was harvested from this area. In 1991 it was prepared for planting. Future management for the plantation will include periodic thinnings starting at about age 30.

Stand 5 in section 16 - a three acre red pine stand planted in 1978. This stand is located next to CSAH 4. Competing vegetation was removed and the stand was thinned of dead and dying trees in 1990 to increase the stands visual appeal. This stand will be managed much the same as other Norway pine plantations including emphasis on roadside aesthetics.

Stand 9 in section 16 - a 22 acre Norway pine plantation established in 1941, by the Civilian Conservation Corps (CCC). This stand is the site of a historic monument dedicated in June 1992 to J.C. "Buzz" Ryan a pioneering MDNR forester and the CCC, who together planted this plantation and may others.

Stand one in section 16 - a 53 acre Norway pine stand approximately 84 years old. This stand was established naturally probably following early forest fire. The stand has been thinned periodically since the early 1960's -- with the last thinning in 1988. Future plans are to maintain the Norway pine type on this site.

Stand 10 in section 16 - a 13 acre Norway pine stand of natural origin and approximately 83 years of age. The stand has been thinned periodically since 1960. the next thinning is planned for the fall of 1994. Future plans are to maintain the Norway pine type on this site.

Aspen: 53 acres

Stands 12 and 13 in section 9 - 37 acres of 65 year old aspen. This stand will be harvested in ten years and the site will be managed for pine through prescribed fire and natural seeding by white and Norway pine residuals.

Stand 26 in section 9 - a 16 acre stand of aspen allowed to regenerate naturally after a 1987 timber harvest. A one acre stand of red oak is planted adjacent to this stand for mast production. the aspen will be managed on a 50 year rotation and will likely be clear-cut in 2037 to maintain the aspen type.

Northern White Cedar: 47 acres

Stand 15 in section 16 - A 47 acre stand of white cedar approximately 79 years old. Birch, maple, and white pine are mixed with the cedar. The timber quality is generally low. The stand will be managed for wildlife habitat.

Paper Birch: 44 acres

Stand 12 in section 16 - a 39 acre poor site paper birch stand approximately 65 years old. This stand will be harvested within the next ten years and the site will be converted to pine and spruce.

Stand 16 in section 16 - a 39 acre stand of 75 year old birch. This stand is in a riparian zone and will be underplanted to white pine at a future date.

Balsam Fir: 25 acres

Stand seven in section 16 - a 25 acre stand of balsam fir, aged 60 years. Fifteen acres of this stand will be cleared and planted to tamarack in the late 1990's.

Black spruce, Stagnant Black Spruce, and Tamarack: 57 acres

Stands 7 and 8 in section 9 - 14 acres of non productive stagnant (stunted and very slow growing) black spruce approximately 109 years old. No management is planned for these stands.

Stand 9 in section 9 - a 28 acre stand of black spruce approximately 58 years old and of natural origin. In general

black spruce is grown on a 100 -120 year rotation. This stand will likely be harvested between 2034 and 2054, and regenerated to black spruce

Stand 10 in section 9 - a 4 acre black spruce stand approximately 83 years old and of natural origin. This stand will likely be harvested between 2010 and 2030, and regenerated to black spruce.

Stand 4 in section 16 - a 11 acre stand of tamarack approximately 70 years old and of natural origin. No plans have been made to harvest this stand.

MDNR OLD GROWTH MANAGEMENT
BOULDER LAKE CONSERVATION AREA

The Boulder Lake Conservation Area lies within the Laurentian Divide landscape region. The MDNR old growth task force has determined that there should be 54 old growth and future old growth white and Norway pine stands on state land in the landscape region.

Old growth stands have developed over a long period of time essentially free from catastrophic disturbance. They contain large old trees of long-lived species that are far beyond their economic rotation ages. These stands experience frequent ongoing mortality and contain many snags and large diameter downed logs in various stages of decay.

Old growth forest communities of fire dependent species are becoming increasingly rare in Minnesota. Remaining old growth forests are valuable for their scientific and educational values and provide special habitats for native plants and wildlife.

Old growth red and white pine stands include one, two or more age classes of pines. These stands are of natural origin, are at least

120 years old or have a average stand diameter over 20 inches, and have experienced little or no management activity. The stands must also be at least 20 acres in size.

The pine stands on state land within the BLCA that have experienced little or no past management were not quite old enough to fit the definition of old growth. These stands total 95 acres and have been selected instead as Old Growth Replacement Stands. Management of Old Growth Replacement Stands is the same as for Old Growth. Eventually these stands will qualify as Old Growth under the MDNR criteria.

MANAGEMENT REQUIREMENTS AND RECOMMENDATIONS FOR OLD GROWTH

- stands are reserved from harvest.

- wildlife openings and browse regeneration developments should not occur.

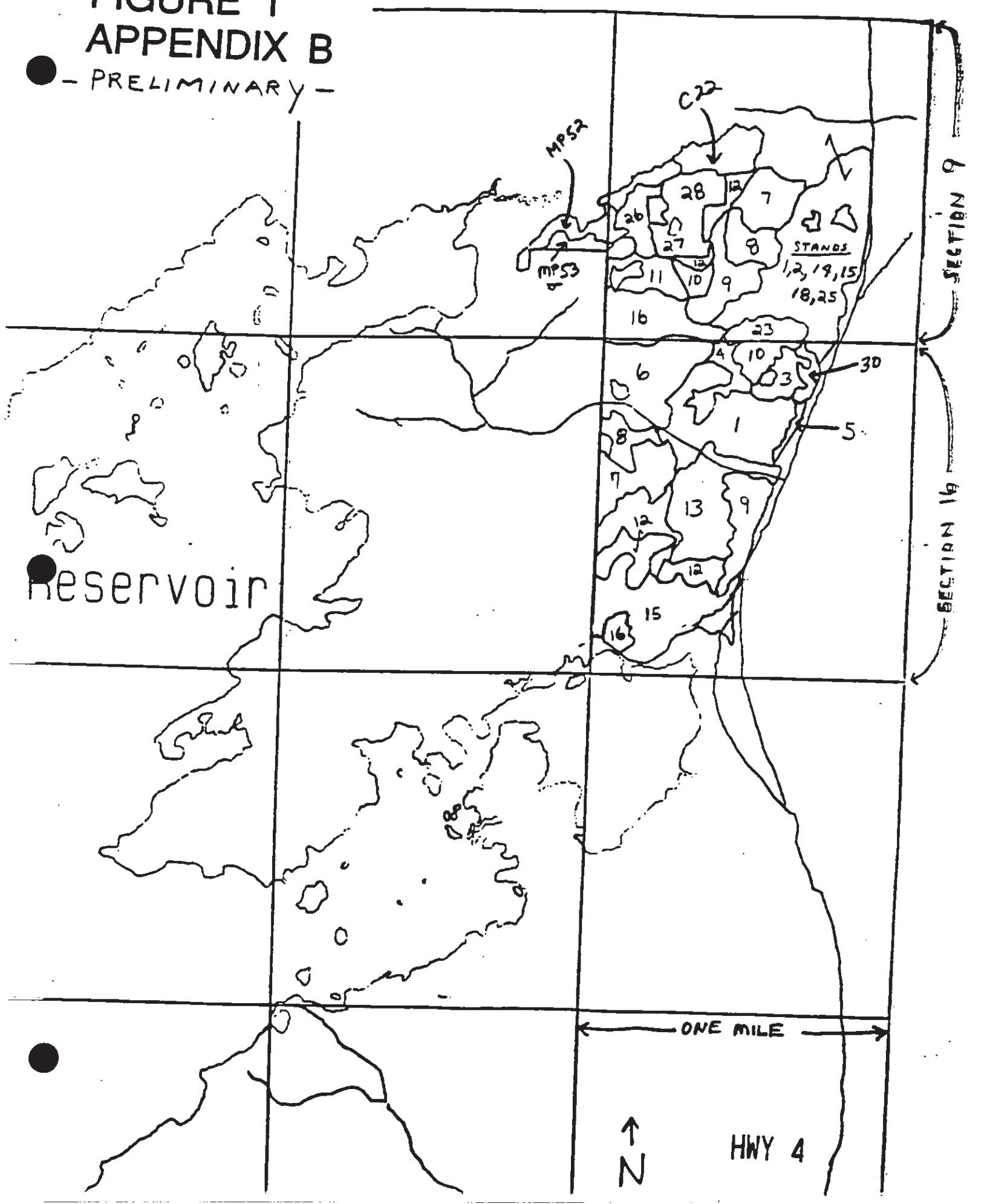
- New roads and trail development should not occur in old growth and old growth replacement stands.

- Salvage of timber and stand improvements should not occur.

- Pesticides should only be used to protect the adjacent forest from a serious exotic pest.

- Stands adjacent to Old Growth.- Management for understory species or extended rotations should be considered for stands of intolerant species adjacent to old growth stands. If clear cutting is necessary no more than 25% of the perimeter of the old growth stand should be treated during a 10 year period. Buffers of at least 1.5 times tree height should be considered when harvesting stands adjacent to old growth stands.

FIGURE 1
APPENDIX B
– PRELIMINARY –



APPENDIX C

Minnesota Power Forest Management Plan
Boulder Lake Conservation Area

Minnesota Power manages approximately 2,226 acres of forests, and 1,000 acres of wetlands in the BLCA. These lands are part of the St. Louis River Hydroelectric Project licensed by the Federal Energy Regulatory Commission (FERC). The St. Louis River project includes five storage reservoirs and four generating reservoirs, which together encompass approximately 7,477 acres of land within the project boundary. Minnesota Power's BLCA forests are being managed along with the other project lands to conserve and protect natural resources and to provide a balance between the developed and non developed uses of project lands. St. Louis River Project lands are managed by Minnesota Power's Environmental Resources Department located in Duluth approximately 20 miles south of the BLCA.

The majority of the Minnesota Power's forest in the BLCA is classified as aspen or birch that together account for nearly 70% of the company's forest acreage within the area. In declining order, balsam fir, red and white pine, swamp conifers, sugar and red maple, and black ash occupy the remaining acreage. Table 1 outlines Minnesota Powers forest cover in the BLCA according to the 1981 forest inventory. Types and acreage's are adjusted to reflect changes in forest cover resulting from forest management activities since 1981.

TABLE 1

MINNESOTA POWER

FOREST COVER TYPES - BLCA

1993*

COVER TYPE	ACRES	% OF TOTAL ACRES
aspen	1,047	44.6%
birch	574	24.4%
balsam fir	225	9.4%
red and white pine	251	10.6%
swamp conifer**	139	5.8%
maple(sugar,red)	85	3.6%
black ash	45	1.9%
Total	2,226	

* 1981 cover types adjusted to reflect recent stand observations and forest management activities through 1993.

** black spruce, northern white cedar, tamarack

Minnesota Power's 1981 forest inventory for the Boulder Lake area resides on hard copy in the Minnesota Power Forest Inventory Island Lake Area cruise sheets and Island Lake Area computer data entry sheets. This information was reworked in 1993 to account for timber harvested from the property since 1981 and entered into a Microsoft Excel electronic data base. Stand numbers in the Excel data base correspond to stand numbers in the 1981 inventory -- not those referenced later on in this document. A new data base will be created when Minnesota Power's BLCA forest land is re inventoried.

On the basis of the 1981 inventory that was adjusted to reflect removals through logging activities but not for any in growth or mortality since that date the merchantable growing stock timber volume on Minnesota Power's BLCA Lands is approximately 23,000

cords of roundwood and 1,070,000 board feet of sawtimber. At 1993 prices, Minnesota Power's BLCA timber stumpage is worth approximately $215,000 or about $96 on the average for each forested acre. This value includes timber that is inaccessible or otherwise unavailable due to management considerations.

Table 2 shows Minnesota Power's merchantable growing stock timber volume by species for the BLCA from the re-worked 1981 forest inventory.

TABLE 2

MINNESOTA POWER
MERCHANTABLE GROWING STOCK TIMBER VOLUME - BLCA
1981 VOLUMES ADJUSTED FOR LOGGING REMOVALS

SPECIES	VOLUME IN CORDS	VOLUME IN BOARD FEET
birch	6,990	-
aspen	5,939	-
balsam fir*	5,637	-
white pine	1,605	646,853
red pine	770	372,406
maple	837	-
white spruce	405	49,935
white cedar	405	-
black spruce	207	-
black ash	161	
total	22,956	1,069,194

* Does not reflect balsam mortality from spruce budworm attacks since 1981

Table 3 shows the age distribution of forest stands on Minnesota Power land within the Boulder Lake Conservation Area. Stand ages were not recorded for all forest stands in the 1981 inventory. The age was estimated from field observations or gathered from harvest records for those stands where age data was missing.

TABLE 3

AGE DISTRIBUTION
MINNESOTA POWER FOREST STANDS
BLCA
1993

AGE CLASS	ACRES	% OF TOTAL ACRES
0 - 10 years	563	24.7%
10 - 20 years	234	10.8%
20 - 40 years	96	4.4%
40 - 60 years	894	41.2%
60 - 80 years	173	8.0%
80+ years	210	9.7%

Minnesota Power's forest holdings within the Boulder Lake Conservation Area will be re-inventoried in 1993-1995. The new inventory will be designed to collect traditional forest cover type and volume information as well as information that will be useful in interpreting forest ecology, and managing wildlife.

Figure's 1-3 are the forest stand management maps for Minnesota Power ownership in the BLCA. The stand numbers on the maps correspond to the stand numbers in the following discussion. Included in the discussion is a stand management implementation schedule and a description and management prescription for each Minnesota Power forest stand.

Minnesota Power
Forest Stand Management Implementation Schedule

Listed below is the implementation schedule by year for each forest stand. Implementation activities include scheduled stand evaluations as well as scheduled harvest or other cultural activities. Only the earliest year of the first scheduled activity in each stand is included. The schedule will be revised each year. Revisions will reflect the accomplishment of a scheduled activity, the next scheduled activity, or any changes to the management schedule. Stand numbers correspond to the stand description and management prescription discussion, and Figures 1-3.

1993-1995 - Design, implement, and complete new inventory.
1993 Stands 10,11,28,38,39,,20,21,22,36,37,40,41,42,43,57,58,59,68, 74,78,79,80,82,83,90,91,92
1994 - Stands 5,6,8,29,31,33,34,35
1995 - Stands 3,14,15,16,47,50,60,62,69
1997 - Stand 55
1998 - Stand 65
2000 - Stand 63
2005 - Stand 49
2010 - Stands 25,26,27.73,75,76
2013 - Stand 2,4,13
2024 - Stands 12, 19

2030 - Stands 23,36,45,47,53,71

2040 - Stand 30,32

2060 - Stand 54

2060 - Stand 54

Minnesota Power
Forest Stand Description and Management Prescription

Following is the a description of Minnesota Power forest stands in the BLCA, along with a discussion of the proposed management prescription for each stand. It is anticipated that some stand descriptions will change once the new inventory is completed, and over time as management objectives or stand conditions change. Also, final management plans for some stands depend upon review of certain stand conditions at some date in the future. This plan will be updated each year to reflect and document management activities, and to record any changes in stand conditions or management objectives.

Stand 1 A 5 acre stand of mixed species typed as maple.

Prescription: Manage to maintain aesthetics near the dam site. encourage perpetuation of maple type through selective thinning if necessary.

Stand 2 A three acre stand of aspen approximately 20 years old.

Prescription: Same as Stand 4

Stand 3 A 20 acre white pine stand with pockets of 20 year old aspen and balsam regeneration.

Prescription: Perpetuate current type with the Shelterwood system (See Minnesota Power White Pine Management). This stand suffered windstorm damage in 1992. Windblown and blister rust infected white pines will be salvaged in 1993. Additional soil scarification will be performed in conjunction with the next good white pine seed crop expected in 1995-1998. Aspen portions of the stand will be managed along with Stands 2 and 4.

Stand 4 A 15 acre stand of aspen approximately 20 years old.

Prescription: Manage for aspen pulpwood. Next scheduled harvest 2013-2023.

Stand 5 A 7 acre mature birch stand.

Prescription: Much of the birch in this stand is dead and dying. Clear cut harvest in 1994 along with Stand 8. Check stand in 1999 for adequacy of regeneration. If regeneration is inadequate the stand will be considered for conversion to conifers.

Stand 6 A 67 acre stand of old age aspen. Most of the aspen in the south half of this stand has blown over. Some birch remains but not in merchantable quantities. This part of the stand is converting naturally to upland brush and balsam fir. The north half of the stand is actually an island separated from the mainland by wetlands. This part of the stand has an overstory of old age aspen and scattered white spruce and an understory of balsam fir and white spruce.

Prescription: South part- clear-cut portions of the stand in 1994 (see stands 5 and 8) which contain sufficient amounts of aspen to assure adequate regeneration. Manage balsam understory in the remainder for pulpwood to harvest in approximately 2040. North part- Reserve stand from harvest allow natural succession to occur and use stand as an environmental learning tool to help explain forest succession.

Stand 7. A 5 acre stand of low production black ash and lowland brush.

Prescription: Reserve for wildlife and wetland values.

Stand 8. 46 acre stand of mature aspen and birch with pockets of black ash.

Prescription: Manage for aspen and birch pulpwood. Clear-cut aspen and birch in the winter of 1994-95. Reserve ash swales, maple, and healthy white pine. Incorporate non-game wildlife values into harvest design.

Stand 9 7.2 acres of lowland black spruce approximately 80-100 years old.

Prescription: Reserve from harvest to maintain conifer cover and enhance forest age diversity in the area.

Stand 10 A 16 acres stand of mature balsam fir and mixed species.

Prescription: Review and write prescription in 1993.

Stand 11 A 16 acre stand of mature aspen and mixed species.

Prescription: same as Stand 10

Stand 12 and 19 Approximately 61 acres of 8 year old aspen regeneration resulting from a clear-cut aspen harvest in 1984. Scattered large white pines were reserved from this harvest.

Prescription: Manage for aspen pulpwood and the creation and maintenance of ruffed grouse habitat through small block harvests The proposed harvest sequence for these stands will begin in approximately 2024. (See Minnesota Power Wildlife Management, Ruffed Grouse). Most of the scattered white pines will be reserved from future harvests.

Stand 13 A 16 acre aspen stand approximately 20 years old.

Prescription: manage for aspen pulpwood and ruffed grouse and woodcock habitat. (See Minnesota Power Wildlife Management, Ruffed Grouse) This stand will be clear-cut in approximately 2013. Management will be coordinated with Stands 12 and 19.

Stand 14 A 27 acre stand of mature white pine.

Prescription: manage to perpetuate the white pine type through a shelterwood silvicultural system (See Minnesota Power White Pine Management). The first shelterwood cut and forest floor scarification is planned to coincide with the next good white pine seed crop (1995-1998) . Inclusions of aspen and black ash within this stand will be reserved from this harvest.

Stand 15 (West 1/3 of Stand 16) Is a 12 acre stand typed as birch. Much of the overstory birch is now dead or dying and balsam fir is occupying the understory.

Prescription: Manage the balsam fir understory for pulpwood. Estimated harvest 2033. Release of the balsam understory from remaining birch and other competition will be considered in 1995-1998 along with the shelterwood cut in stand 14 or in 2013 in conjunction with the harvesting of stand 13.

Stand 16 A 25 acre mature birch stand with scattered pockets of aspen regeneration approximately 15 years old and mature white pine and white spruce. Much of the birch is dead and dying and is being succeeded by upland brush.

Prescription: This stand will be evaluated in 1995 for possible site conversion to conifers in conjunction with the harvest of stand 14. The aspen pockets will be managed for ruffed grouse and aspen pulpwood in coordination with Stands 12 and 19 . Healthy white pine and white spruce will be reserved and utilized as a seed source to aid in possible conifer conversion.

Stand 17, Stand 18, Stand 24 Approximately 79 acres of mature birch and aspen reserved as a reservoir buffer zone when adjacent stands were harvested.

Prescription: Continue to reserve these stands from harvest. Some selective harvesting to benefit wildlife may be considered when adjacent stands are harvested again, or for release of natural white pine regeneration.

Stands 20, Stand 21, Stand 22 54 acres of red and white pine. These stands were thinned in 1981 and 1990.

Prescription: Maintain pine type with the shelterwood silvicultural system (See Minnesota Power White Pine Management). Survey stands for understory pine regeneration in 1993 and evaluate for the possibility of mechanical and chemical release in fall of 1993. Evaluate for additional overstory removal and scarification of areas which are under stocked with pine regeneration to coincide with the next expected good white pine seed crop in 1995-1998.

Stand 23 54 acres of two year old aspen regeneration following an aspen and white pine harvest in 1990. Several Large white and red pines were reserved in the eastern part of this stand as a seed source.

Prescription: This stand will be managed for aspen pulpwood and ruffed grouse and woodcock habitat (See Minnesota Power Wildlife Management , Ruffed Grouse). The first harvest in this stand is expected in about 2030. White pines will continue to be reserved in future harvests. If white pine regeneration is successful in portions of the stand it is expected that some white pine may be available for harvest in about 2070. Consider establishing a permanent wildlife opening at the old log landing site.

Stand 25 and 26 27 acres of aspen approximately 20 years old.

Prescription: Manage for aspen pulpwood and grouse and woodcock habitat in coordination with stand 23 (See Minnesota Power Wildlife Management , Ruffed Grouse). One half of the stand will be harvested in about 2010 and the remainder in about 2020.

Stand 27 A 26 acre stand of mature birch with a young balsam fir understory.

Prescription: Manage understory balsam for pulpwood production. The low total volume of birch in this stand makes harvesting unfeasible at this time. This birch overstory will be evaluated for removal along with the harvesting of portions of Stand 25 and Stand 26 in 2010. The understory balsam fir is expected to be harvested in about 2030.

Stand 28 101 acres of balsam fir , aspen and mixed species, approximately 15-25 years old.

Prescription: Review and write prescription in 1993.

Stand 29 13 acres of mature aspen.

Prescription: Harvest about 3/4 of this stand in 1994. reserve the remainder as a buffer zone around Silver Fox Lodge.

Stand 30 25 acres of black spruce approximately 70 years old and lowland brush.

Prescription: Maintain type. Manage productive black spruce in coordination with adjacent St. Louis County black spruce stand scheduled for harvest in about 2040.

Stand 31 39 acres of mature birch and upland white cedar, with an understory of young balsam fir in many portions of the stand.

Prescription: Selectively harvest some of the mature birch in conjunction with recreational trail construction in about 1994-1998. Manage balsam understory for pulpwood with harvest expected in about 2040. Reserve and protect upland white cedar component of stand. Consider low density hand under planting white pine, white spruce, and some red pine in the stand to add diversity, especially near the shoreline zone of the stand. The under plantings, if successful, will also increase the future management options for the stand.

Stand 32 Same as Stand 30.

Stand 33 9 acres of mature birch.

Prescription: manage the same as Stand 31.

Stand 34 14 acres of mature black ash of generally low quality.

Prescription: Maintain ash type. Examine stand for possible selective cutting in conjunction with future harvesting of adjacent stands.

Stand 35 Approximately 36 acres of mature birch with a young balsam fir understory.

Prescription: Manage the same as stand 31.

Stand 36 17 acres of aspen approximately 10 years old with several scattered large red and white pine.

Prescription: Manage for aspen pulpwood. Next harvest approximately 2030. Reserve scattered large pines from future harvest. Evaluate westerly portions of stand in 1993 for hand planting of conifers in 1994 where aspen regeneration is poor. Consider maintaining about two acres as a permanent wildlife opening.

Stand 37 Approximately 19 acres of young balsam fir, mature tamarack, black spruce, white cedar, and balm of gilead.

Prescription: Manage balsam fir for pulpwood production in conjunction with stand 36. It is anticipated that most of this stand will be reserved for wildlife habitat, and as a scenic buffer along highway 4. garbage dumped in this area will be cleaned up in 1993, and further dumping will be discouraged through signage or blocking access as necessary.

Stand 38 117 acres if mature aspen, birch, and mixed species.

Prescription: Review and write prescription in 1993

Stand 39 7 acres if nature birch.

Prescription: Same as Stand 38

Stand 40 14 acres of mature birch.

Prescription: Same as Stand 38

Stand 41 56 acres of mature birch.

Prescription: Same as Stand 38

Stand 42 68 acres of mainly dead balsam fir, and mixed species.

Prescription: Same as Stand 38

Stand 43 Approximately 11 acres of red pine planted in 1981.

Prescription: This stand will be maintained as red pine through periodic thinning. A non commercial thinning and pruning will be evaluated in 1993 for completion in 1994 or 1995. The first commercial thinning is expected in about 2020.

Stand 44 Approximately 9 acres of lowland white cedar.

Prescription: Reserve for wildlife habitat.

Stand 45 Approximately 16 acres of balsam fir regeneration following a spruce budworm attack on the mature balsam and spruce in the stand around 1980. Most of the mature aspen and salvageable white spruce were removed from this stand in 1991.

Prescription: Manage stand for balsam fir pulpwood on about a 40 year rotation. Harvest in approximately 2030. Reserve all white spruce if possible in the balsam harvest area to maintain future stand diversity. Harvest white spruce on an 80 year sawtimber rotation. Expected spruce sawtimber harvest will be in 2070 along with the second balsam fir rotation. reserve younger spruce.- repeat cycle.

Stand 46 Approximately 14 acres of lowland white cedar.

Prescription: Approximately two acres of this stand was harvested in the winter of 1989-90. The remainder will be reserved for wildlife habitat.

Stand 47 55 acres of aspen and balsam fir regeneration following a clear-cut aspen harvest in 1989 and 1990.

Prescription: Manage most of the stand for aspen and balsam fir pulpwood on a 40 - 50 year rotation. Clear-cut harvest stand again in 2030-2040. Reserve snag and cavity nesting trees as necessary. The northerly 5 or so acres of this stand will be managed for red and white pine. The adequacy of natural pine regeneration from adjacent stands will be evaluated in 1995. If regeneration is not adequate the area will be hand planted with red and white pine to achieve desired stocking in 1996. Consider establishing a permanent wildlife opening at the old log landing site.

Stand 48 Approximately 19 acres of mature red and white pine, white spruce and aspen.

Prescription: This stand buffers an active eagles nest and will be reserved from harvest (See Bald Eagle Management). If the eagles nest becomes inactive for a number of years, or blows down it will be considered defunct. The stand will then be managed as potential eagle habitat and some selective thinning to encourage white pine regeneration will be contemplated (See Bald Eagle Management and White Pine Management).

Stand 49 Approximately 24 acres of mature red and white pine.

Prescription: This stand will be managed to maintain the pine type for aesthetics and potential eagle habitat through periodic thinning and eventually natural regeneration of the pine type via the shelterwood method(See Minnesota Power White Pine Management). The first periodic thinning is planned for about 2005-2010, once the adjacent stands have matured enough to maintain the aesthetics of stand 47 as viewed from Boulder Lake Reservoir.

Stand 50 Approximately 6 acres of red and white pine.

Prescription: Maintain pine type. A seed tree cut was performed in this stand in 1991. Most pine was harvested at that time and several trees were left as a seed source. In 1995 the resulting natural pine regeneration will be evaluated for adequacy. If Inadequate the area will be hand planted to achieve desired stocking of pine in 1996.

Stand 51 Approximately 13 acres of black ash. There are no management plans for the stand at this time. The stand will be given a prescription at a later date.

Stand 52 Approximately 11 acres of black spruce.

Prescription: Maintain black spruce type. It is likely that this stand will be reserved from harvest to maintain wildlife cover and riparian vegetation along Boulder Creek.

Stand 53 Approximately 6 acres of 3 year old aspen following a harvest in 1990. Pulpwood size white spruce and smaller balsam fir were reserved from harvest in this stand.

Prescription: Manage for aspen and balsam fir pulpwood on a 40-50 year rotation and white spruce sawtimber on a 80 year rotation. management is similar to Stand 45 except a higher proportion of aspen is expected. Next harvest scheduled for 2030-40.

Stand 54 16 acres of mature red and white pine.

Prescription: This stand was reserved for aesthetics along Boulder Reservoir and as a seed source for stand 55. Maintain as pine and carry on an extended rotation of about 160 years to coincide with the management of Stand 56. The ultimate goal is to regenerate pine naturally through the Shelterwood Method (See White Pine Management).

Stand 55 Thirty seven acres of aspen regeneration following a pine, aspen and white spruce harvest in the winter of 1991-92.

Prescription- Restore stand to a mixture of pine and aspen, and white spruce It is expected that overall aspen regeneration will be poor in the stand and that white and red pines will seed in from adjacent stands. Adequacy of pine regeneration will be evaluated in 1997. If the area is under stocked with pine it will be hand planted in 1998 with pine and white spruce. Next harvest is expected to be a pine thinning or shelterwood cut in about 2060-2080.

Stand 56 5 acres of low production black spruce and tamarack.

Prescription: This stand will be reserved from harvest.

Stand 57 60 acres of aspen and mixed species approximately 30-40 years old.

Prescription: Review in 1993 and write prescription.

Stand 58 14 acres of mature white pine.

Prescription: Maintain white pine type for potential eagle nesting habitat. It is expected that this stand will be reserved except for harvest that necessary to insure perpetuation of the pine type through selective release of white pine regeneration or plantings (See White Pine Management).

Stand 59 37 acres of mature aspen, pine, birch, balsam, and white spruce, reserved as a shoreline buffer zone when Stand 60 was harvested.

Prescription: Manage for wildlife, primarily bald eagles (See Bald Eagle Management). The goal will be to maintain a mature forest canopy along this riparian zone and to maintain or increase the white pine component of the stand for bald eagles and aesthetics (See Minnesota Power White Pine Management). Current white pine recruitment and the feasibility of under planting some areas with white pine will be assessed in 1993.

Stand 60 83 acres of aspen regeneration resulting from a timber harvest in 1990 and 1991. Red pines and some white pines were reserved from harvest in areas of this stand.

Prescription: Manage for aspen pulpwood and to enhance the riparian values for wildlife by creating a gradual transition from Stand 59 which is managed for wildlife and aesthetics and Stand 60 which is managed for aspen pulpwood. Those areas of Stand 60 which are within about 500 feet of the edge of 59 will be managed by exploring the possibility of introducing a coppice with standards silvicultural system. In a coppice with standards system a high forest of trees of seedling origin (conifers) are managed simultaneously with a low forest of trees able to reproduce vegetatively (aspen). The high forest is carried through a much longer rotation than the low forest. In 1995 the stand will be surveyed for adequacy of conifer regeneration likely to become components of the high forest. If natural conifer regeneration is inadequate the area will be considered for hand planted with white pine, white spruce, and red pine in about 1996 to achieve desired stocking. Plantings would be concentrated in areas or in pockets that have poor aspen regeneration. Some limited site preparation may be considered. The aspen "low forest" would be managed on a 40 - 50 year rotation with the next harvest expected in 2030-40. The conifer "high forest" would be managed on a sawtimber rotation of 80 - 160 years with a partial harvest expected at 80, 120, and 160 years. Some trees will be reserved indefinitely to retain old tree values in the stand. Wildlife will benefit because of the structural stand diversity provided by the coppice with standards approach. The remainder of Stand 60 will be managed for aspen pulpwood with the next harvest expected in 2030. Consider establishing permanent wildlife openings at the old log landing sites.

Stand 61 Approximately 8 acres of black ash.

Prescription: Maintain ash type. No harvesting is planed for this stand, however some selective cutting may be considered in the future.

Stand 62 Approximately 11 acres of aspen, birch, white pine, red pine, and white spruce which was reserved as a reservoir buffer zone when Stand 64 was harvested.

Prescription: Same as Stand 59

Stand 63 Approximately 9 acres of mature aspen and other species similar in composition to Stand 62.

Prescription: Same as Stands 59 and 62. Except some selective pulpwood harvesting may be considered in about 2000 in conjunction with possible harvesting in Stands 65 and 67.

Stand 64 Approximately 20 acres of 3 year old aspen regeneration.

Prescription: Same as Stand 60

Stand 65 Approximately 18 acres of mature aspen and mixed species.

Prescription: No plans at this time. Evaluate in 1998 for possible harvesting in about 2000.

Stand 66 Approximately 5 acres of black ash.

Prescription: Maintain ash type. It is anticipated that this stand will be reserved from harvest.

Stand 67 20 acres of mature white pine.

Prescription: Review and write prescription in 1993.

Stand 68 Approximately 31 acres of mature aspen with some pine and spruce mixed in.

Prescription: Same as Stand 59

Stand 69 Approximately 70 acres of aspen regeneration following a timber harvest in 1991.

Prescription:Same as Stand 60.

Stand 70 Approximately 3 acres of mature black spruce and tamarack.

Prescription: This stand will be reserved from harvest to maintain wildlife cover and diversity.

Stand 71 Approximately 64 acres of mature birch, aspen, white spruce, and white pine.

Prescription: Most of this stand lies between the creek draining Twin Lakes and another large drainage. The majority of this stand

will be reserved from harvest to protect the integrity of the stream courses. the northeast portion of the stand will be reviewed for harvest along with Stand 68 in approximately 2030.

Stand 72 Approximately 2 acres of mature black spruce.

Prescription: This stand will be reserved from harvest indefinitely to preserve diversity and provide wildlife cover.

Stand 73 Approximately 27 acres of mature birch.

Prescription: Reserve stand from harvest indefinitely to provide a buffer zone for the reservoir and stand 74. This stand will be allowed to succeed naturally to sugar maple and basswood and balsam fir. Some under planting of white pine will be considered when the birch overstory begins to deteriorate in approximately 2010-2020. The management of this stand will focus on the interpretation of forest succession.

Stand 74 Approximately 32 acres of multi-aged sugar maple basswood, red maple, and mixed species.

Prescription: This stand will be reserved from harvest indefinitely to protect aesthetic values along the reservoir shoreline and to maintain an example of an all aged sugar maple-basswood climax forest community. The sugar maple type occupies about 3.6 % of Minnesota Power ownership in the BLCA and represents the only shade tolerant upland hardwood climax forest community in the area. In 1993 the stand will be extensively surveyed to obtain information which will be useful in interpreting the stand to the public.

Stand 75 Approximately 13 acres of mature birch.

Prescription: Same as Stand 73

Stand 76 Approximately 8 acres of mature birch.

Prescription: Same as Stand 73

Stand 77 Approximately 28 acres of mature low production swamp conifer.

Prescription: This stand will be reserved for wildlife and to maintain aesthetics along the reservoir shoreline.

Stand 78 Approximately 7 acres of mature birch.

Prescription: Reserve from harvest to protect scenic resources along the reservoir shoreline. Allow natural succession to take place. In 1993 evaluate for feasibility of under planting white pine at a yet to be determined future date to enhance aesthetics and perpetuate eagle habitat (See Minnesota Power White Pine Management and Bald Eagle Management).

Stand 79 Approximately 14 acres of mature white pine.

Prescription: Tentatively reserve from harvest to protect scenic and recreational resources. Removal of diseased white pine may be considered in conjunction with the management of Stand 80 which is yet to be determined. Examine in 1993.

Stand 80 Approximately 47 acres of birch and aspen which appears to be 30-40 years of age. This stand suffered some windstorm damage in 1992.

Prescription: No management plans at this time. Visit stand in 1993 along with Stands 78 and 79 to prescribe management.

Stand 81 Approximately 35 acres of swamp conifers, primarily white cedar.

Prescription: Most of this stand will be reserved for wildlife habitat. Some harvesting of white cedar may be considered for small portions of the stand in conjunction with the management of Stands 80 and 82.

Stand 82 Approximately 54 acres of aspen, maple, and birch. This stand suffered windstorm damage in 1992.

Prescription: Currently being harvested (1993). Wind thrown timber is being harvested along with mature aspen, birch and some of the maple. Portions of the stand with a large aspen component are being clear-cut to perpetuate the aspen type. Areas that are heavy to maple are being reserved or selectively harvested of aspen birch and some larger mature maple, with the intention of perpetuating the maple cover type. Harvesting operations are expected to be completed in 1993.

Stand 83 Approximately 41 acres of all age sugar and red maple, basswood, and yellow birch.

Prescription : Same as stand 74. Windblown aspen were salvaged in some areas on the edge of this stand in 1992. Windblown trees in the interior of the stand will not be salvaged. The stand

will be surveyed in 1993 to collect information which will be useful for interpretation of forest ecology to the public.

Stand 84 and Stand 85 Approximately 26 acres of mature white pine. This stand suffered extensive wind throw in 1992.

Prescription: Maintain white pine .Wind damaged and diseased white pine and other species were salvaged in the winter of 1992 and 1993. In 1993 a shelterwood cut will be performed in the stand to prepare for natural regeneration of white pine (See Minnesota Power White Pine Management). Some planting of red and white pine will be considered in 1994 for the portions of stand 84 which suffered the heaviest wind throw.

Stand 86 Approximately 5 acres of mature balsam fir and mixed species.

Prescription: Reserve stand for protection of Otter River.

Stand 87 Approximately 4 acres of aspen and mixed species at the site of Boulder Dam.

Prescription: Reserve to protect the dam site.

Stand 88 Approximately 52 acres of mature aspen

Prescription: This stand is located on the largest island in Boulder Reservoir. Reserve from harvest because of difficult access and use to interpret natural forest succession in an aspen type.

Stand 89 Approximately 42 acres of mature birch.

Prescription: Reserve from harvest along with Stand 88. In 1993 evaluate the feasibility of under planting white pines to enhance future eagle habitat. Also survey existing white pine regeneration in 1993 for possible hand release at a future date. (See Minnesota Power Eagle Management, and White Pine Management).

Stand 90, Stand 91, Stand 92 Approximately 43 acres of mature birch.

Prescription: Same as Stand 89

Stand 93 Approximately 7 acres of maple.

Prescription: reserve stand from active management indefinitely because of difficult access.

Stand 94 Approximately 13 acres of mature birch.

Prescription: Reserve stand from active management indefinitely because of difficult access.

Stand 95 Approximately 49 acres of mature aspen and mixed species.

Prescription: Reserve stand from active management. This stand is located on an island with an active cabin site lease.

White Pine Management
Minnesota Power
Boulder Lake Conservation Area

As with many areas in northern Minnesota, white pines once dominated much of the forest landscape in the area surrounding what is now Boulder Lake Reservoir. Early logging, the introduction of white pine blister rust , the white pine shoot weevil, and an increase in the deer population have all lead to a general decline in the abundance of this species. Pine (white and red) still predominates on approximately 710 acres or about 21% of the total BLCA forestland. About 250 acres of this pine is located on Minnesota Power land.

One of Minnesota Powers forest management goals at Boulder is to perpetuate the existing stands of white pine wherever possible and attempt to maintain and expand the abundance of white pine in shoreline areas. White pines provide important nesting habitat for bald eagles, offer an outstanding scenic resource to visitors of the area, and are a source of valuable sawtimber.

Following is a description of the silvicultural techniques that may be employed by Minnesota Power to manage its white pine resource in the BLCA.

THE SHELTERWOOD SYSTEM

The shelterwood method is a silvicultural system where a new stand of trees is reproduced from the seeds of a parent stand, and a portion of the parent stand is retained for a period of time to shelter the reproduction. Eventually all or most of the parent stand is removed to give the new stand a chance to fully develop.

White pine lends itself well to the shelterwood method. The species establishes itself under a variety of canopy conditions including shade and is fairly shade tolerant in its early development. The ability of white pine to survive under the shelter of the parent stand is important. Since less dew will form under a forest canopy, the incidence of infection with white pine blister rust will be reduced, because blister rust spores germinate more readily on wet needles. Also, shade will reduce attacks by the white pine tip weevil because the insect prefers full sunlight. In addition the retention of the parent stand for a long period of time maintains the aesthetic value afforded by large mature white pine trees.

Approximately 170 acres of white pine are scheduled for shelterwood type management on Minnesota Power property in the BLCA. A generic three cut shelterwood plan is described below. This may be modified depending upon the conditions of the individual stand scheduled for management.

SEEDLING CUT - Remove trees with poor form or poorly developed crowns, and those which are infected with blister rust. Remove additional white pine and other trees as needed with the goal of leaving a parent stand of dominant or co-dominant white pines of good health and form spaced at about 40% of their height. Other species may be used when adequate spacing can not be achieved with healthy white pines.

Scarify the ground surface as much as possible during or immediately following harvesting operations. Try to use methods that will incorporate the organic layer with the mineral soil. This cut should be timed about 2 years in advance of an expected good white pine seed crop year (Every 3-5 years for white pine). The last good seed year was 1992.

VEGETATION CONTROL - Depending upon the site it may be necessary to control understory hardwood and herbaceous competition to the establishing white pine seedlings. Hardwood sprouting and other competition should be evaluated one season after the seedling cut. If necessary, some mechanical and chemical control should be performed prior to the seed fall in the expected good seed year. Further release will be considered as necessary in following years. Planting of blister rust resistant pines could be considered to supplement areas which do not become adequately stocked with natural regeneration after about 5 years.

1ST REMOVAL CUT - Once the new white pine stand is established and about 15 to 20 years old the first removal cut will be scheduled. Harvest trees from parent stand and other species to achieve a residual stand with trees spaced at about 60% of their height. The remaining canopy from the residual stand will capture dew and reduce rust infections as well as shade the young white pines therefore reducing weevil attacks.

FINAL REMOVAL CUT - At 35 to 40 years of age the removal cut is made. Theoretically the entire parent stand is removed with the final cut. Remove a majority of the parent stand and reserve some large old white pines for old growth, aesthetics, and wildlife diversity. If feasible the final removal cut could be split into to or more cuts about 10 to 20 years apart to allow for a more gradual transition from the old stand to the new stand.

WHITE PINE MANAGEMENT IN SHORELINE AREAS

White pine trees along the shoreline of Boulder Reservoir provide important nesting and roosting habitat for bald eagles as well as a significant visual resource. Many areas along the Boulder shoreline not classified as white pine contain large mature white pine trees 80-100 years old. These trees occur in small groups or as individual trees in birch, aspen or mixed forests.

In the Superior National Forest 80% of the bald eagle nests and 77% of the osprey nests were located in white pines. This is evidence of those species preference for white pine. Both existing eagle nests at Boulder are located in white pines.

Following are the elements of a plan to maintain or increase the presence of white pine on the shores of Boulder Lake Reservoir.

CULTURE OF EXISTING WHITE PINE REGENERATION

Consider this technique in areas which have been identified for bald eagle habitat management. About 135 acres.

Survey the stand and calculate the number of white pine seedlings, saplings, pole timber, and mature trees per acre. Classify the number of saplings and pole timber white pines according to their degree of healthiness and the likelihood that they will eventually reach a dominant or co-dominant position in the canopy. If the number of saplings and pole timber trees likely to survive to maturity meet or exceed the number of existing mature trees then it is possible that the presence of large white pines will be somewhat self perpetuating. If there is an insufficient number of healthy white pines which are recruiting into the canopy then consider the following:

Release healthy white pine saplings or poles sized trees which are suppressed by felling or girdling trees that are competing for sunlight or a position in the canopy. Release could also be performed in areas with adequate white pine recruitment where a decision is made to increase the presence of white pine. Release operations should be done on a very selective tree by tree basis, keeping in mind the overall management goal for the stand stands. For example, a decision may be made not to fell or girdle an large old aspen that may be contributing to the overall wildlife habitat in the stand. Likewise, if many trees of merchantable value need to be felled in a single location a commercial timber harvest may be considered. Visual values should also be considered when making decisions to release white pines.

If little white pine regeneration is present in the stand consider scarifying the forest floor near mature trees as described in the Shelterwood System above, in combination with under planting as described below.

The goal with this type of management is to allow established white pines to gain a position in the canopy to insure the species continued presence along the shoreline areas of Boulder. It is hoped that may of these white pines will eventually reach super canopy status and be of benefit to bald eagles, and other wildlife. .

Stands that are undergoing this form of white pine management will need to be surveyed every few years to monitor the success of the program. Release work will continue as white pine seedlings grow to sapling and poletimber size. Pruning the lower branches of selected young white pines should also be considered to remove blister rust cankers, and reduce the incidence of infections.

UNDER PLANTING WITH WHITE PINE

Containerized white pine planting stock is now available which shows resistance to white pine blister rust. Although not necessarily immune to infection, this stock shows some promise in reducing the number of trees in a planting that will become infected with the disease.

Many stands of birch stands in the BLCA are mature and will eventually decline from old age or disease. Some of these stands have already suffered substantial mortality due to the recent birch dieback caused by drought stress and subsequent bronze birch borer attacks. These areas offer excellent opportunities for low density under planting of white pines (200 - 450 trees per acre). In theory, the canopy of the older birch stand will provide a shelterwood for the planted white pines reducing the incidence of blister rust and white pine weevil attack. As the overstory birch stand declines the young white pines are naturally released.

Consider this type of management for birch stands being evaluated for under planting with white pine, and in areas designated for bald eagle habitat management. Parts of approximately 223 acres.

Review the stand and evaluate the health of the birch. Estimate a date to under plant with resistant white pines to coincide with the eventual demise of the birch. Most of the birch canopy should be expected to be gone within about 40 years to adequately release the pine at the proper time. Consider the potential to commercially harvest part of the birch overstory in areas where trails are being developed or harvesting is being undertaken in adjacent stands. Evaluate the nature of the understory in the stand and plan planting density accordingly. Plant only in areas of the forest floor where competition from understory brush and balsam fir are not expected to be a problem. Target an average planting density of 200-450 for the area being planted. Plantings

may be clustered to take advantage of areas free from understory competition. In shoreline stands concentrate plantings within about 300 feet of the shoreline of the reservoir. Evaluate the possibility of planting some white spruce and red pines along with white pines to diversify the plantings.

The success of this program will be monitored carefully. Planting survival rates and the incidence of white pine blister rust and deer browsing will be checked on a regular basis. If results are not encouraging the under planting program will be delayed or curtailed until better more resistant stock is available, or will be concentrated on islands or other areas where deer browsing may be less of a problem.

FIGURE 1
APPENDIX C

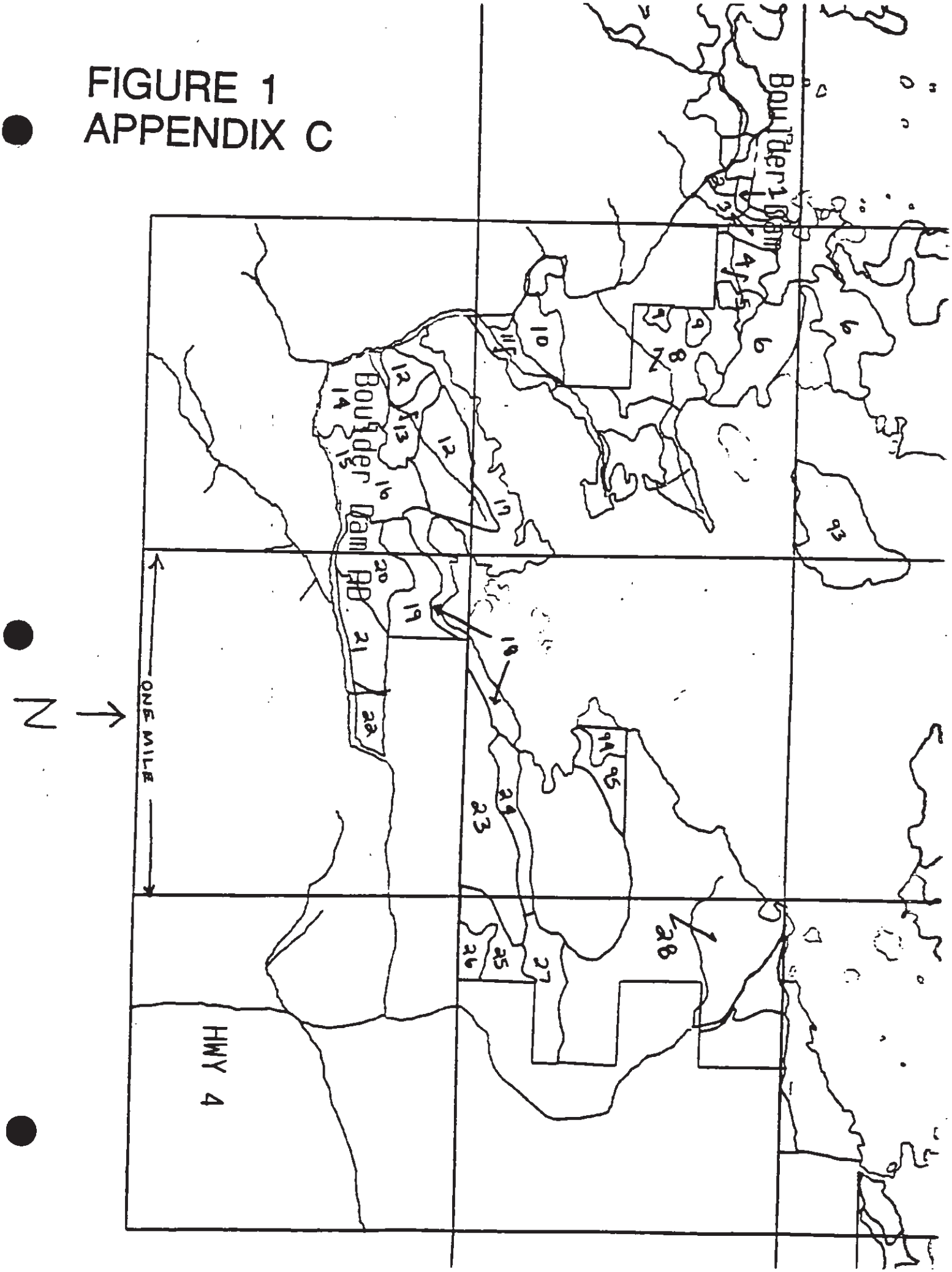


FIGURE 2
APPENDIX C

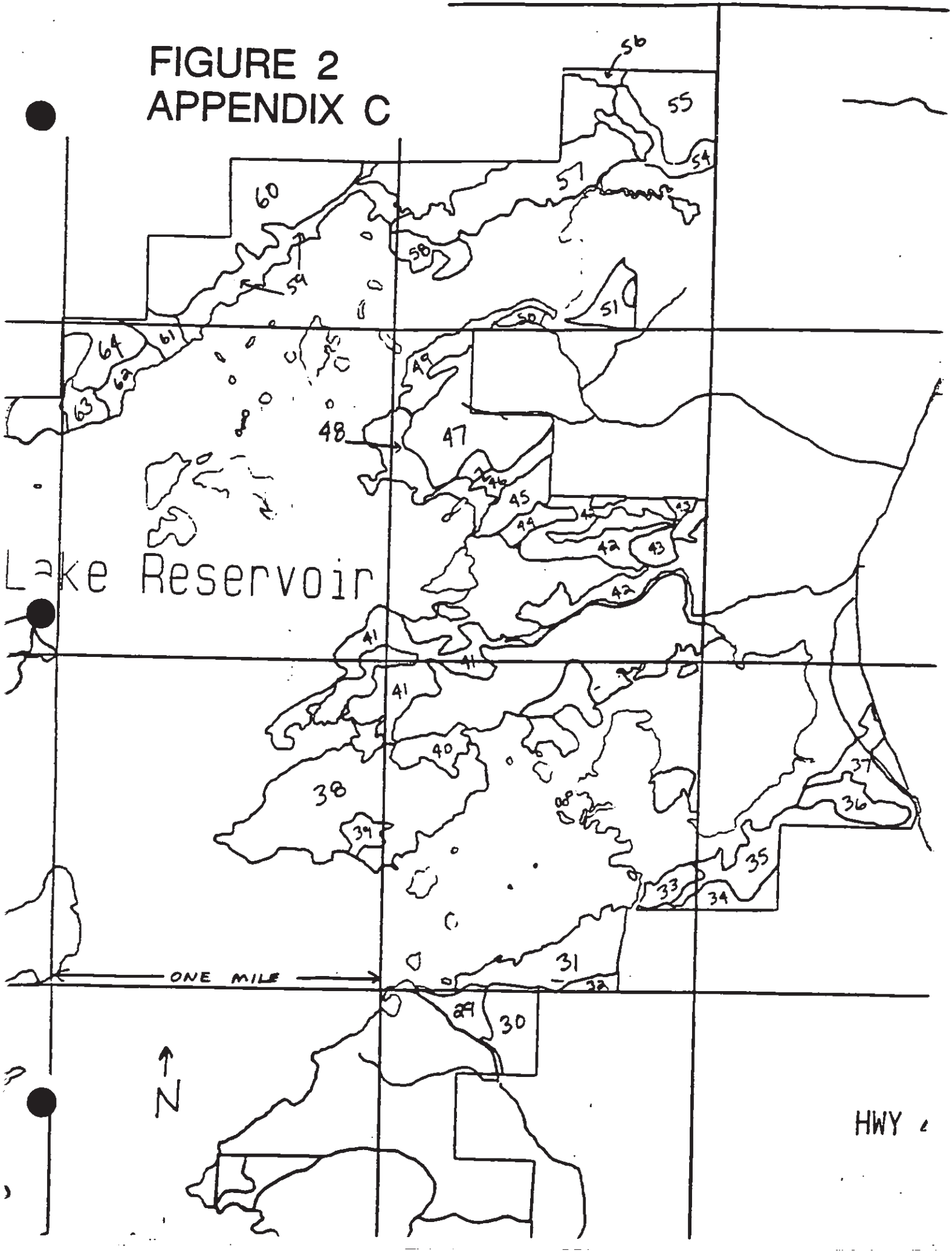
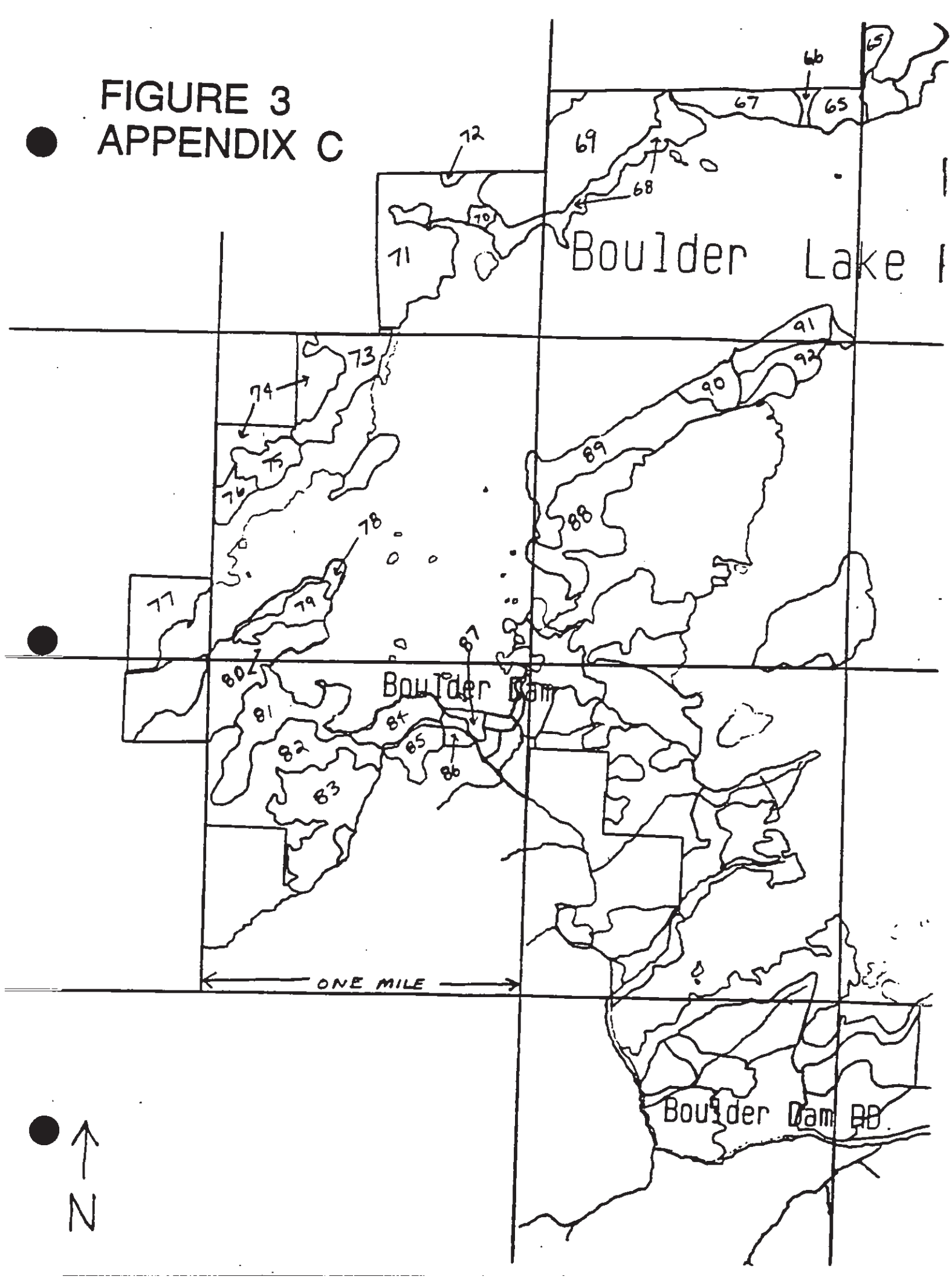


FIGURE 3
APPENDIX C



APPENDIX D

FISH SURVEY DATA

BOULDER LAKE RESERVIOR

TABLE 11

BOULDER LAKE(ENTIRE BASIN) TRAPNET SUMMARY-1988
LENGTH=INCHES WEIGHT=LBS
ALL SAMPLES COMBINED

	LENGTH				WEIGHT		
	N	MEAN	MIN	MAX	MEAN	MIN	MAX
SPECIES							
BLACK BULLHEAD	4	9.8	9.3	9.7	0.40	0.35	0.44
BLACK CRAPPIE	1	3.8	3.8	3.8	0.03	0.03	0.03
NORTHERN PIKE	5	22.4	20.3	26.1	3.32	1.85	5.53
PUMPKINSEED	8	4.1	3.6	5.0	0.06	0.03	0.09
ROCK BASS	6	6.8	4.6	8.7	0.19	0.06	0.29
WALLEYE	41	16.7	7.0	26.2	2.13	0.09	7.39
WHITE SUCKER	21	16.9	8.3	23.2	2.29	0.19	4.08
YELLOW PERCH	6	5.8	4.9	6.7	0.08	0.03	0.13

BOULDER LAKE(ENTIRE BASIN) GILLNET SUMMARY-1988
LENGTH=INCHES WEIGHT=LBS
ALL SAMPLES COMBINED

	LENGTH				WEIGHT		
	N	MEAN	MIN	MAX	MEAN	MIN	MAX
SPECIES							
BLACK BULLHEAD	299	9.8	8.8	11.3	0.46	0.04	0.87
NORTHERN PIKE	38	21.7	18.1	29.4	2.21	0.98	5.38
ROCK BASS	4	6.9	5.2	9.3	0.27	0.08	0.66
WALLEYE	170	13.1	7.1	26.5	0.80	0.07	7.28
WHITE SUCKER	90	14.4	7.2	20.7	1.01	0.11	4.37
YELLOW PERCH	90	7.6	4.8	13.1	0.19	0.04	0.88

TABLE

BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF TRAPNET CATCH-1988

TABLE OF SPECIES BY LENGTH

SPECIES / LENGTH FREQUENCY	3-3.9	4-4.9	5-5.9	6-6.9	7-7.9	8-8.9	9-9.9	11-11.9	12-12.9	13-13.9	TOTAL
BLACK BULLHEAD	0	0	0	0	0	0	4	0	0	0	4
BLACK CRAPPIE	1	0	0	0	0	0	0	0	0	0	1
NORTHERN PIKE	0	0	0	0	0	0	0	0	0	0	5
PUMPKINSEED	4	3	0	0	0	0	0	0	0	0	7
ROCK BASS	0	1	0	2	2	1	0	0	0	0	6
WALLEYE	0	0	0	1	1	2	2	2	3	1	38
WHITE SUCKER	0	0	0	0	0	3	0	0	0	0	21
YELLOW PERCH	0	1	2	3	0	0	0	0	0	0	6
TOTAL	5	6	2	6	3	6	6	2	3	1	88

(CONTINUED)

TABLE OF SPECIES BY LENGTH

SPECIES / LENGTH FREQUENCY	15-15.9	16-16.9	17-17.9	18-18.9	19-19.9	20-20.9	21-21.9	22-22.9	25-25.9	26-26.9	TOTAL
BLACK BULLHEAD	0	0	0	0	0	0	0	0	0	0	4
BLACK CRAPPIE	0	0	0	0	0	0	0	0	0	0	1
NORTHERN PIKE	0	0	0	0	0	2	0	2	0	1	5
PUMPKINSEED	0	0	0	0	0	0	0	0	0	0	7
ROCK BASS	0	0	0	0	0	0	0	0	0	0	6
WALLEYE	4	3	4	2	3	2	1	2	3	2	38
WHITE SUCKER	1	4	5	2	2	1	2	1	0	0	21
YELLOW PERCH	0	0	0	0	0	0	0	0	0	0	6
TOTAL	5	7	9	4	5	5	3	5	3	3	88

FREQUENCY MISSING = 4

TABLE 13

BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF GILLNET CATCHES IN 1988

TABLE OF SPECIES BY LENGTH

SPECIES / LENGTH FREQUENCY	4-4.9	5-5.9	6-6.9	7-7.9	8-8.9	9-9.9	10-10.9	11-11.9	12-12.9	TOTAL
BLACK BULLHEAD	0	9	12	3	33	128	106	5	0	292
NORTHERN PIKE	0	0	0	0	0	0	0	0	0	35
ROCK BASS	0	1	3	0	0	1	0	0	0	4
WALLEYE	0	0	0	3	6	21	16	30	28	170
WHITE SUCKER	0	0	0	3	15	6	1	4	3	89
YELLOW PERCH	1	12	34	12	5	8	10	2	0	90
TOTAL	1	22	49	21	52	172	133	41	31	680

(CONTINUED)

TABLE OF SPECIES BY LENGTH

SPECIES / LENGTH FREQUENCY	13-13.9	14-14.9	15-15.9	16-16.9	17-17.9	18-18.9	19-19.9	20-20.9	21-21.9	TOTAL
BLACK BULLHEAD	0	0	0	0	0	0	0	0	0	292
NORTHERN PIKE	0	0	0	0	0	4	7	9	4	35
ROCK BASS	0	0	0	0	0	0	0	0	0	4
WALLEYE	11	13	7	9	11	6	5	0	1	170
WHITE SUCKER	3	1	3	17	18	9	5	1	0	89
YELLOW PERCH	1	0	0	0	0	0	0	0	0	90
TOTAL	15	14	10	26	29	19	17	10	5	680

(CONTINUED)

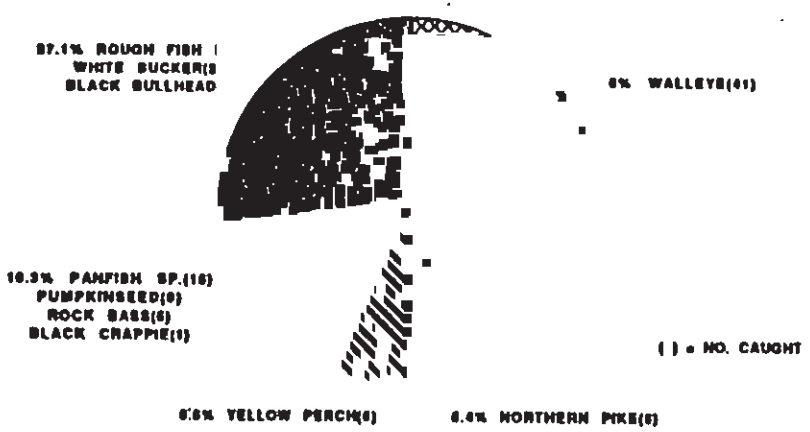
BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF GILLNET CATCHES IN 1988

TABLE OF SPECIES BY LENGTH

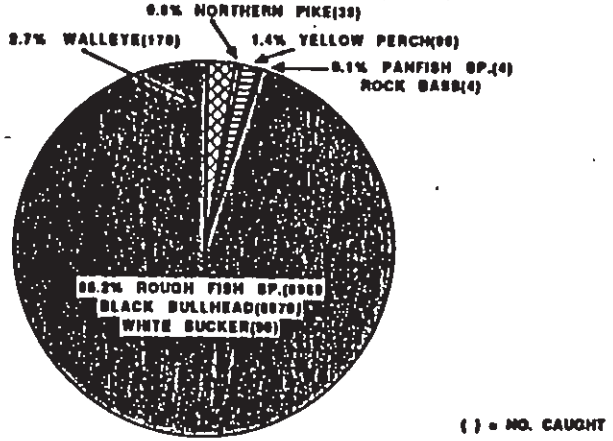
SPECIES / LENGTH FREQUENCY	22-22.9	23-23.9	24-24.9	25-25.9	26-26.9	27-27.9	28-28.9	TOTAL
BLACK BULLHEAD	0	0	0	0	0	0	0	292
NORTHERN PIKE	0	4	3	1	1	1	1	35
ROCK BASS	0	0	0	0	0	0	0	4
WALLEYE	1	0	0	0	2	0	0	170
WHITE SUCKER	0	0	0	0	0	0	0	89
YELLOW PERCH	0	0	0	0	0	0	0	90
TOTAL	1	4	3	1	3	1	1	680

FREQUENCY MISSING = 0

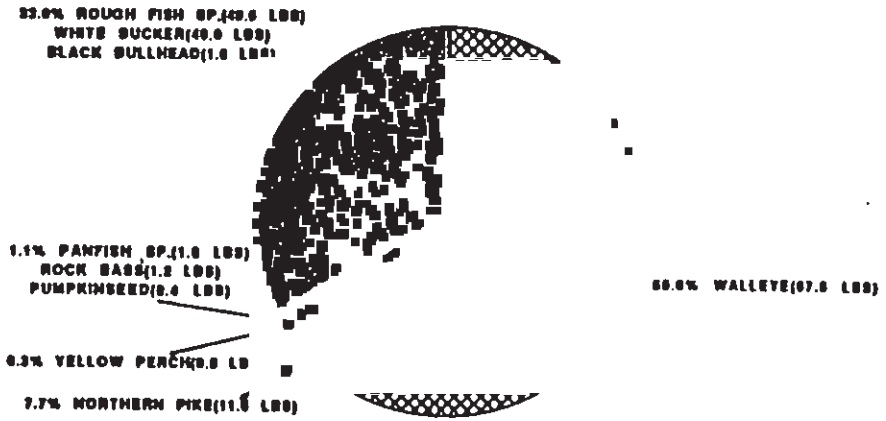
BOULDER LAKE(ENTIRE BASIN) TRAPNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER



BOULDER LAKE(ENTIRE BASIN) GILLNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER



BOULDER LAKE(ENTIRE BASIN) TRAPNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY WEIGHT



BOULDER LAKE(ENTIRE BASIN) GILLNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY WEIGHT

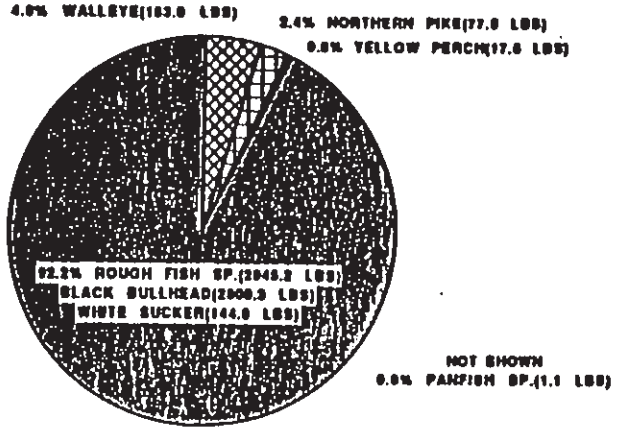
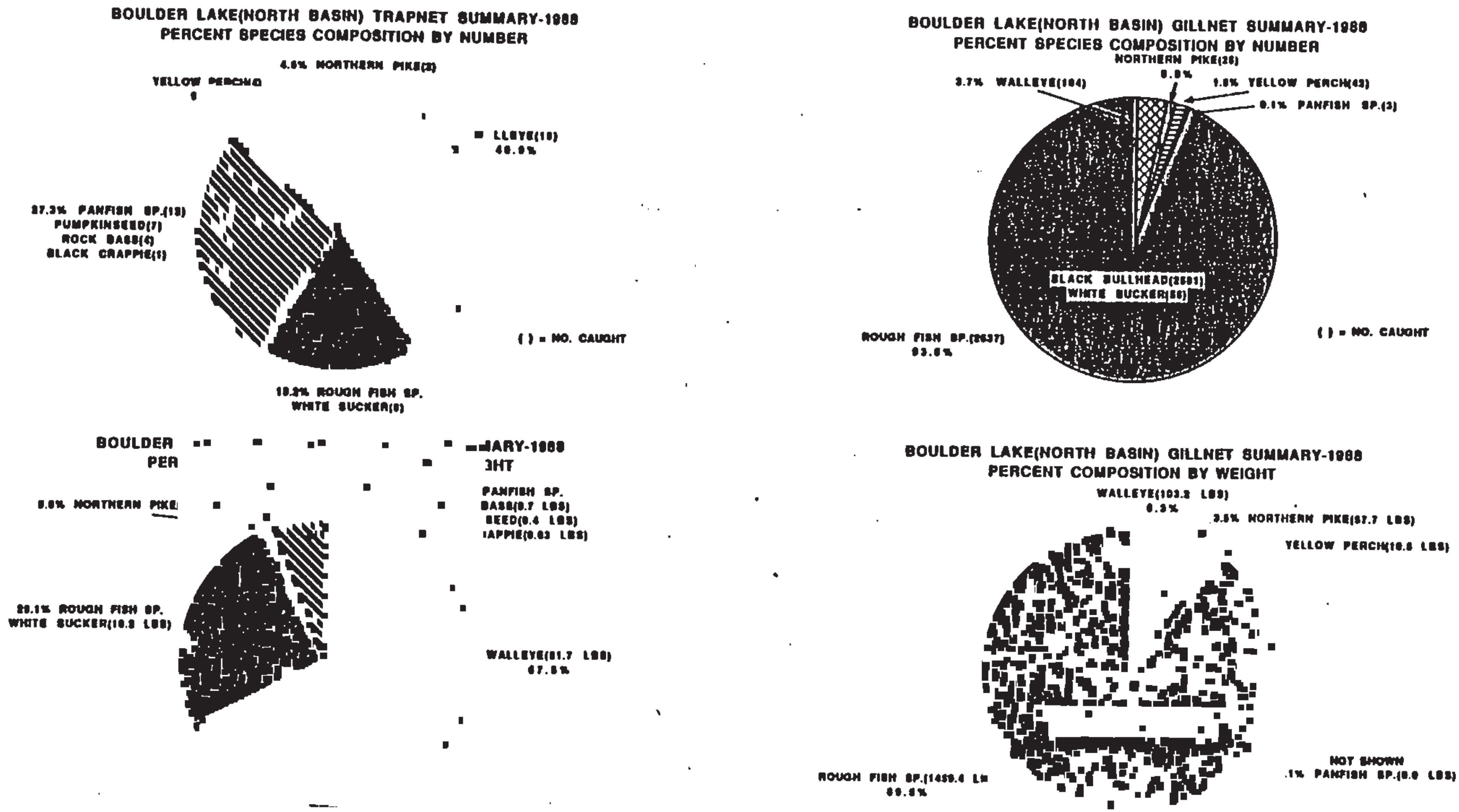
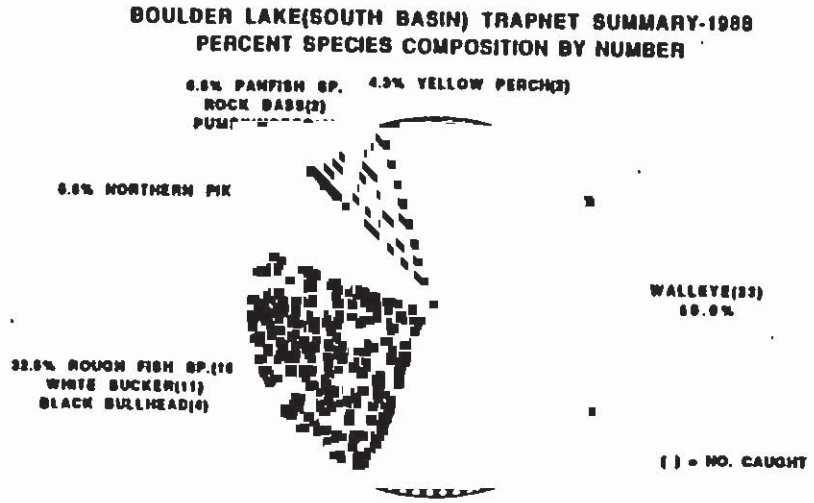


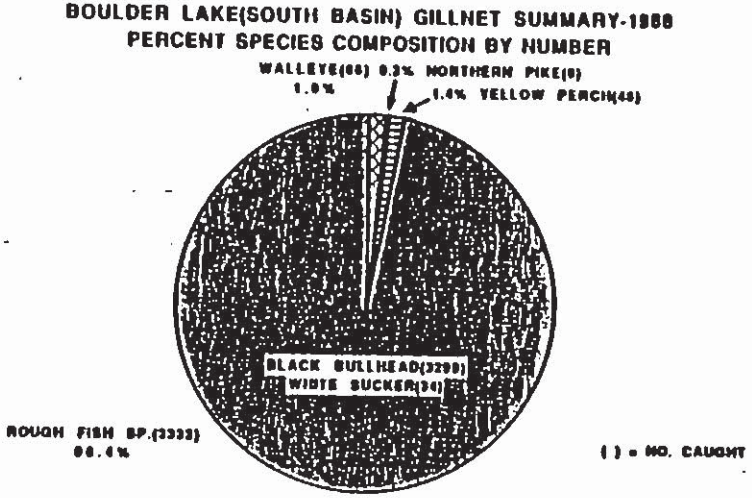
FIGURE 16

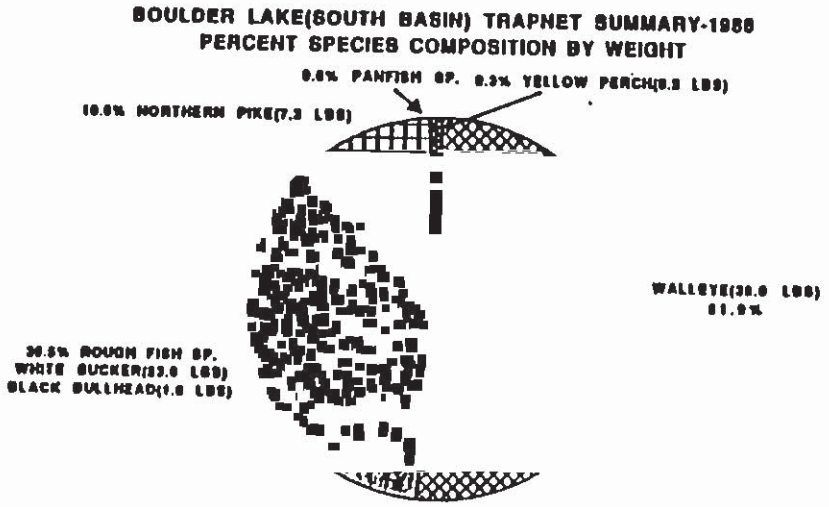


BOULDER LAKE(NORTH BASIN) TRAPNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER
NORTHERN PIKE
YELLOW PERCH
PANFISH SP.
PUMPKINSEED
ROCK BASS
BLACK CRAPPIE
ROUGH FISH SP.
WHITE SUCKER
( ) = NO. CAUGHT
BOULDER
PER
ARY-1988
HT
NORTHERN PIKE
PANFISH SP.
ROUGH FISH SP.
WHITE SUCKER
WALLEYE
BOULDER LAKE(NORTH BASIN) GILLNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER
NORTHERN PIKE
WALLEYE
YELLOW PERCH
PANFISH SP.
BLACK BULLHEAD
WHITE SUCKER
ROUGH FISH SP.
( ) = NO. CAUGHT
BOULDER LAKE(NORTH BASIN) GILLNET SUMMARY-1988
PERCENT COMPOSITION BY WEIGHT
WALLEYE
NORTHERN PIKE
YELLOW PERCH
NOT SHOWN
PANFISH SP.
ROUGH FISH SP.

FIGURE 17


BOULDER LAKE(SOUTH BASIN) TRAPNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER
4.3% YELLOW PERCH(2)
6.5% NORTHERN PIK
WALLEYE(33)
69.6%
32.6% ROUGH FISH SP.(15
WHITE SUCKER(11)
BLACK BULLHEAD(4)
( ) = NO. CAUGHT


BOULDER LAKE(SOUTH BASIN) GILLNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY NUMBER
WALLEYE(66) 0.3% NORTHERN PIKE(6)
1.0%
1.4% YELLOW PERCH(45)
BLACK BULLHEAD(3299)
WHITE SUCKER(34)
ROUGH FISH SP.(3333)
98.6%
( ) = NO. CAUGHT


BOULDER LAKE(SOUTH BASIN) TRAPNET SUMMARY-1988
PERCENT SPECIES COMPOSITION BY WEIGHT
0.6% PANFISH SP. 0.3% YELLOW PERCH(0.2 LBS)
10.6% NORTHERN PIKE(7.3 LBS)
WALLEYE(38.0 LBS)
51.9%
30.5% ROUGH FISH SP.
WHITE SUCKER(23.0 LBS)
BLACK BULLHEAD(1.0 LBS)

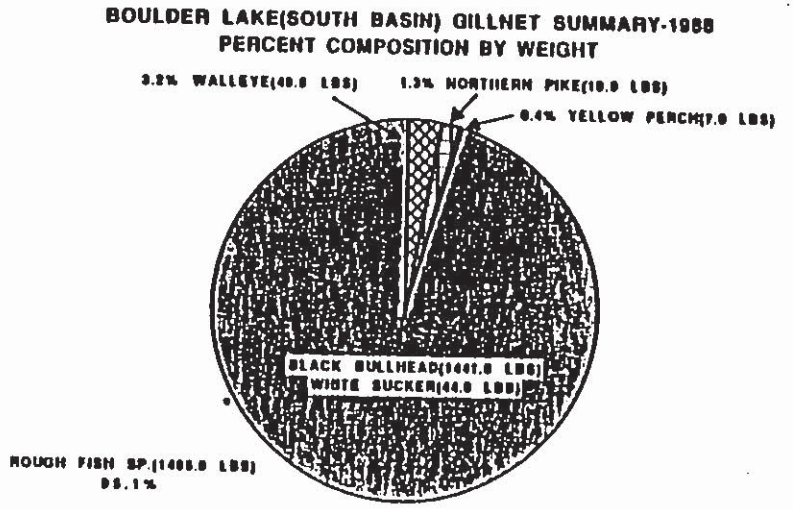
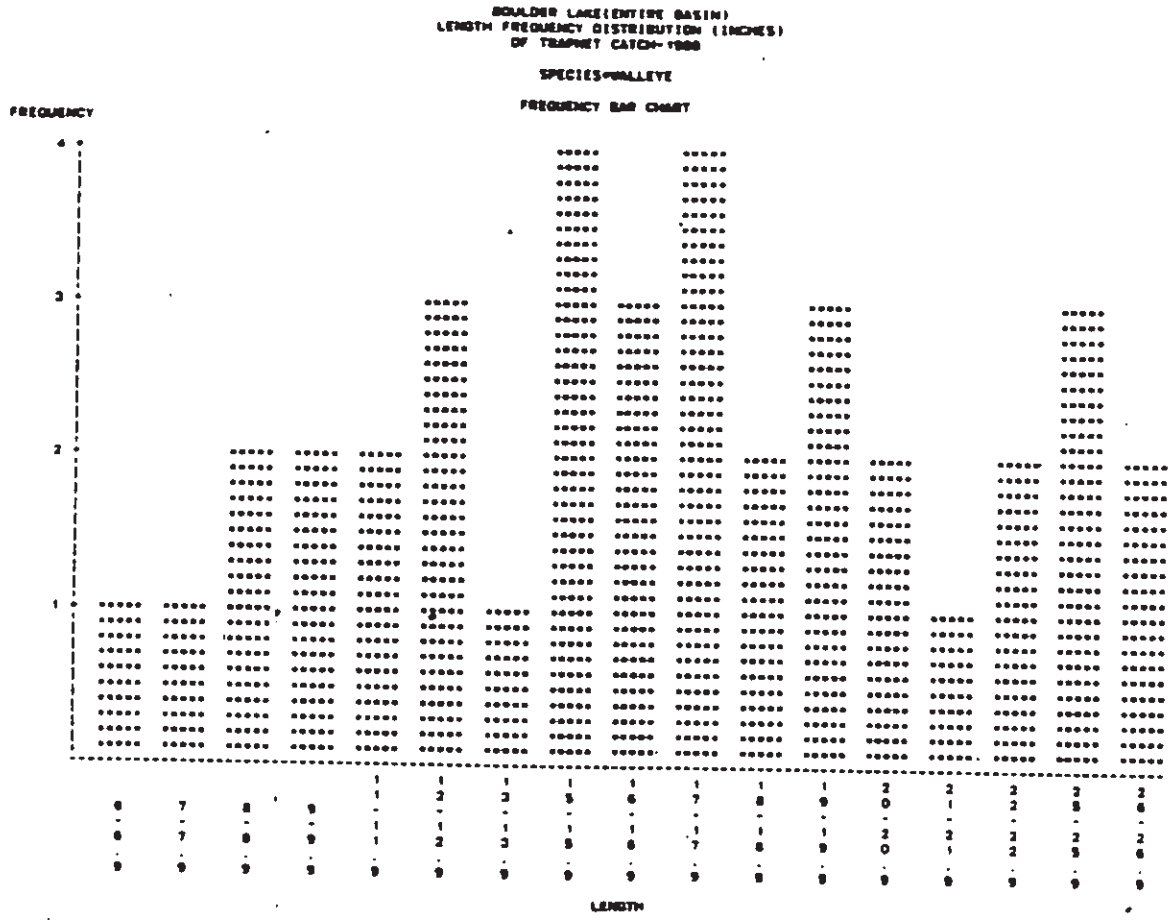

BOULDER LAKE(SOUTH BASIN) GILLNET SUMMARY-1988
PERCENT COMPOSITION BY WEIGHT
3.2% WALLEYE(49.0 LBS)
1.3% NORTHERN PIKE(19.0 LBS)
0.4% YELLOW PERCH(7.0 LBS)
BLACK BULLHEAD(1441.0 LBS)
WHITE SUCKER(44.0 LBS)
ROUGH FISH SP.(1485.0 LBS)
95.1%

FIGURE 18


BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF TRAPNET CATCH- 1988
SPECIES=WALLEYE
FREQUENCY BAR CHART
FREQUENCY
LENGTH

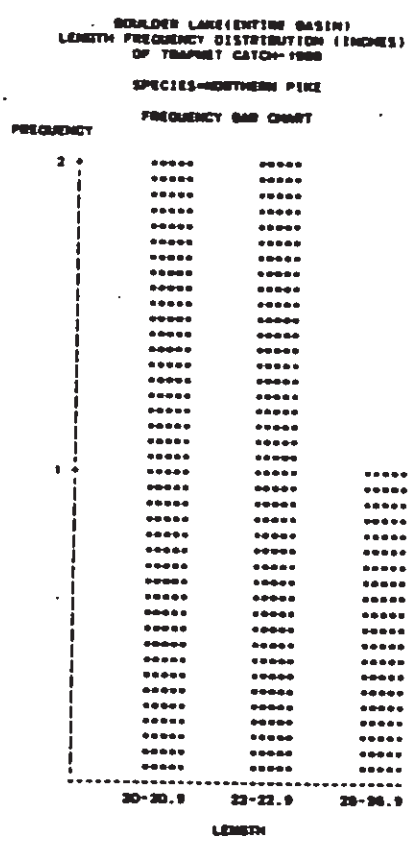

BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF TRAPNET CATCH- 1988
SPECIES=NORTHERN PIKE
FREQUENCY BAR CHART
FREQUENCY
20-20.9
22-22.9
28-28.9
LENGTH

FIGURE 19

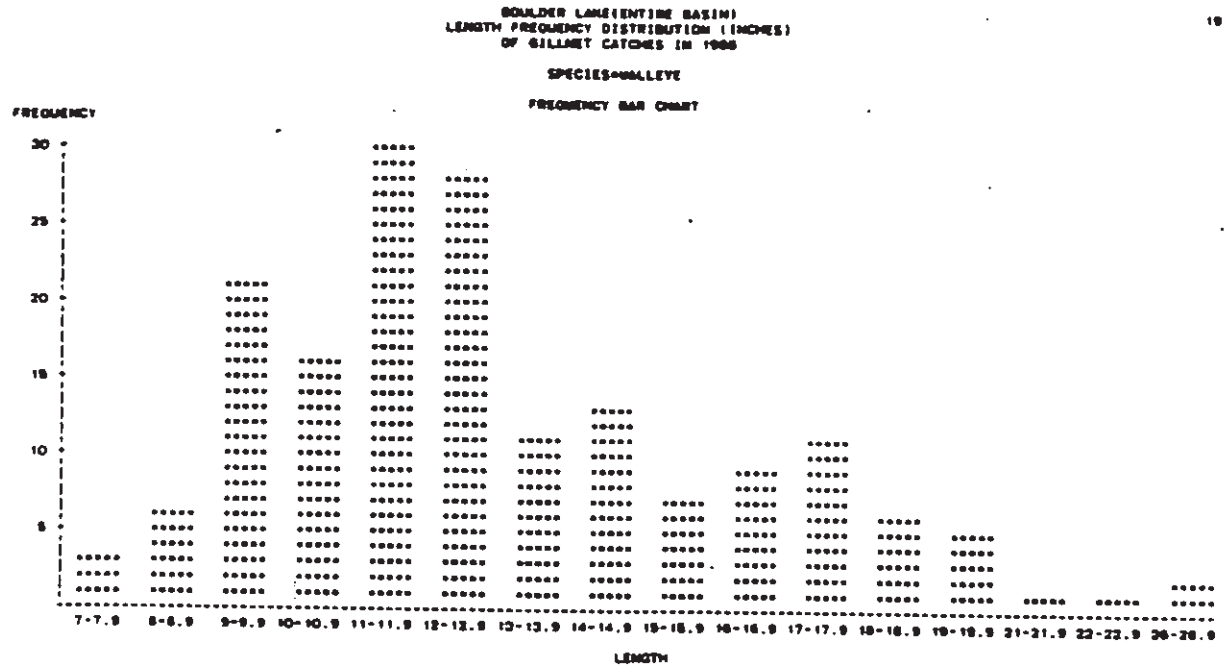
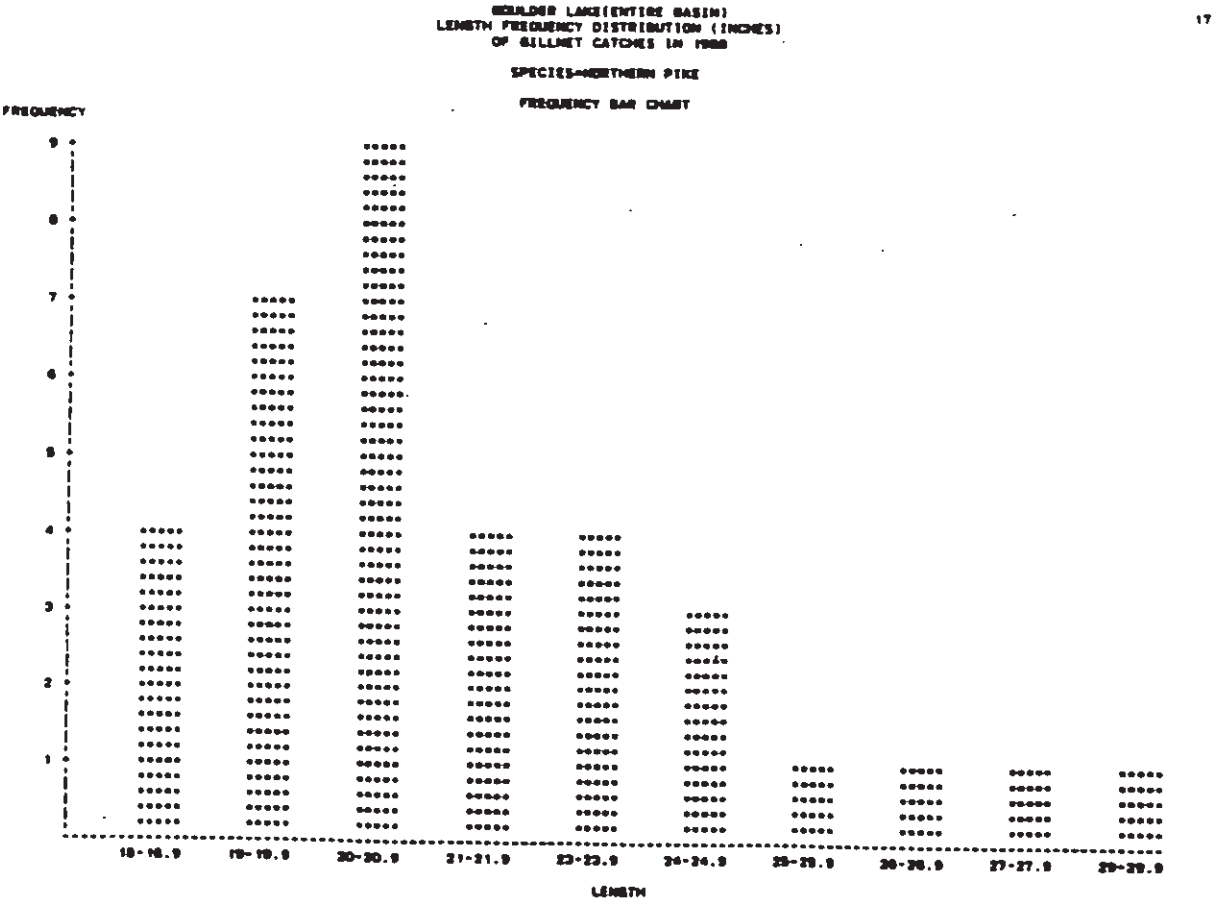
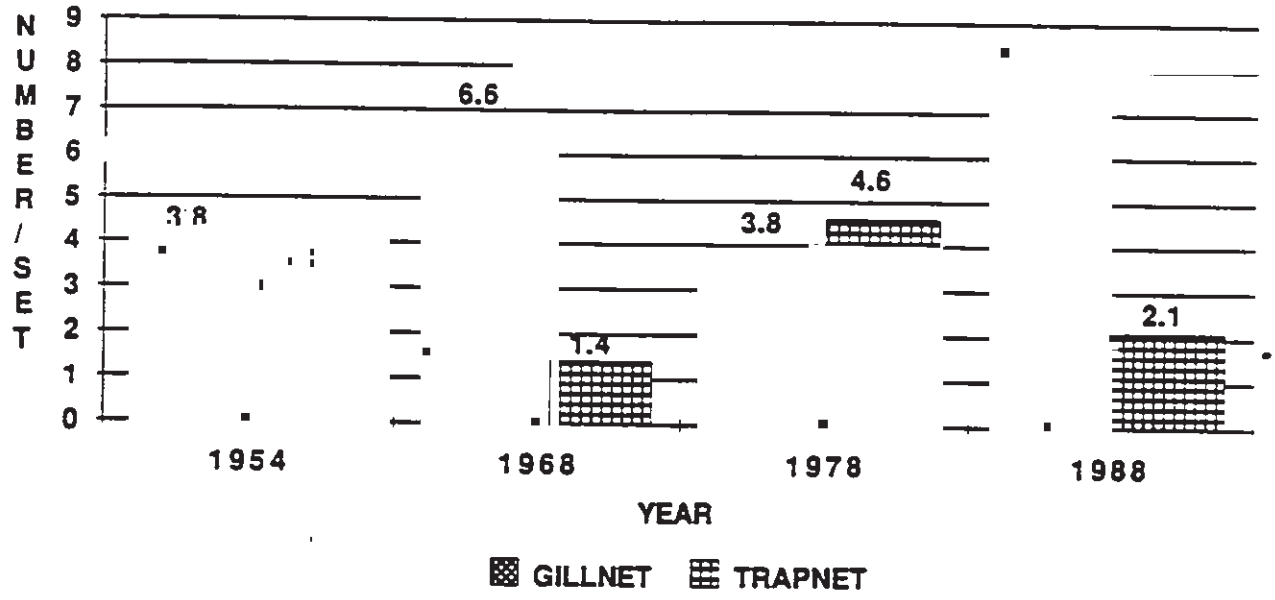

BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF GILLNET CATCHES IN 1988
SPECIES=WALLEYE
FREQUENCY BAR CHART
FREQUENCY
30
25
20
15
10
5
7-7.9
8-8.9
9-9.9
10-10.9
11-11.9
12-12.9
13-13.9
14-14.9
15-15.9
16-16.9
17-17.9
18-18.9
19-19.9
21-21.9
22-22.9
26-26.9
LENGTH

FIGURE 20


BOULDER LAKE(ENTIRE BASIN)
LENGTH FREQUENCY DISTRIBUTION (INCHES)
OF GILLNET CATCHES IN 1988
SPECIES=NORTHERN PIKE
FREQUENCY BAR CHART
FREQUENCY
9
8
7
6
5
4
3
2
1
18-18.9
19-19.9
20-20.9
21-21.9
23-23.9
24-24.9
25-25.9
26-26.9
27-27.9
29-29.9
LENGTH

BOULDER LAKE HISTORICAL WALLEYE CATCH(NO./SET)



BOULDER LAKE HISTORICAL NORTHERN PIKE CATCH(NO./SET)

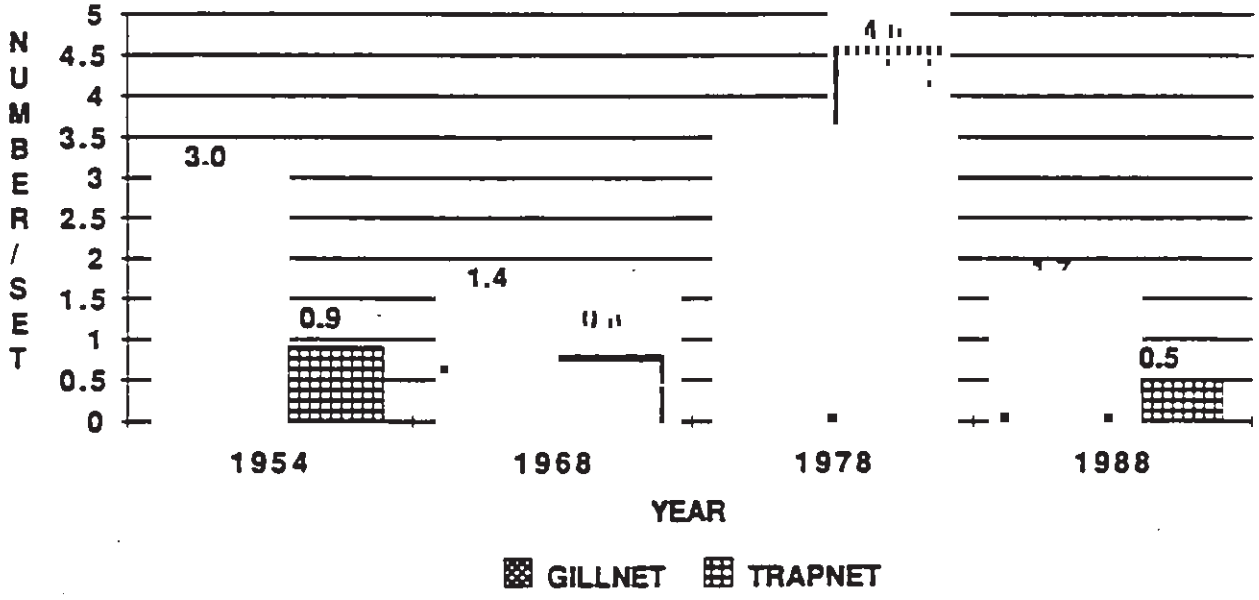
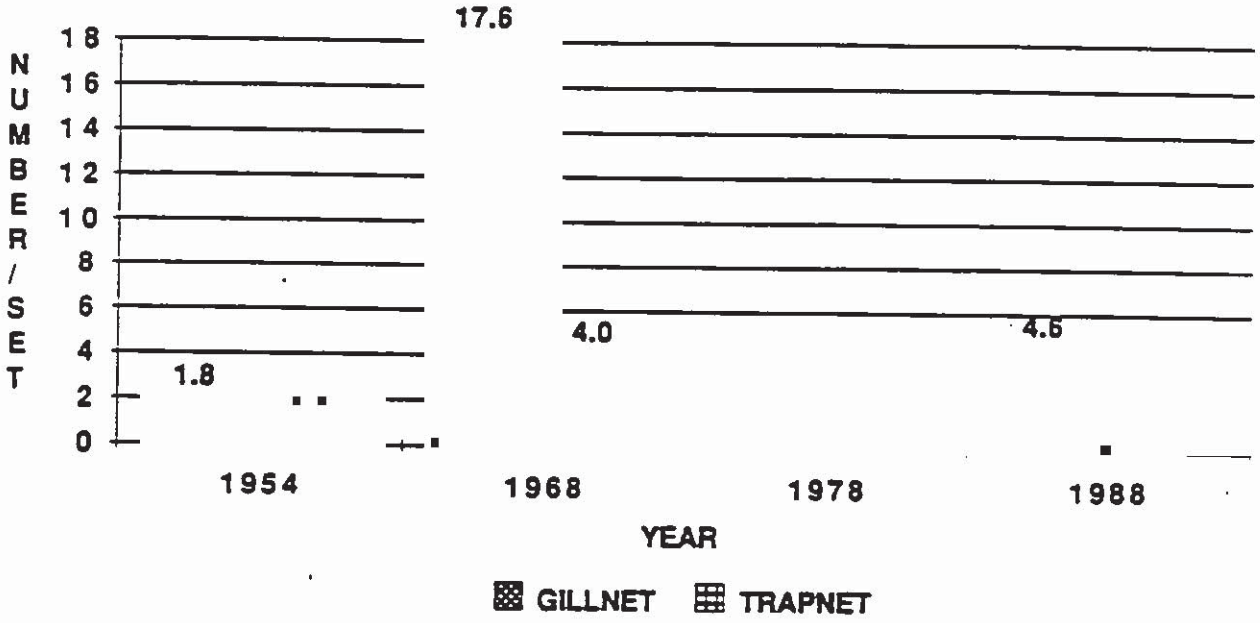


FIGURE 21

BOULDER LAKE HISTORICAL YELLOW PERCH CATCH(NO./SET)



BOULDER LAKE HISTORICAL BULLHEAD CATCH(NO./SET)

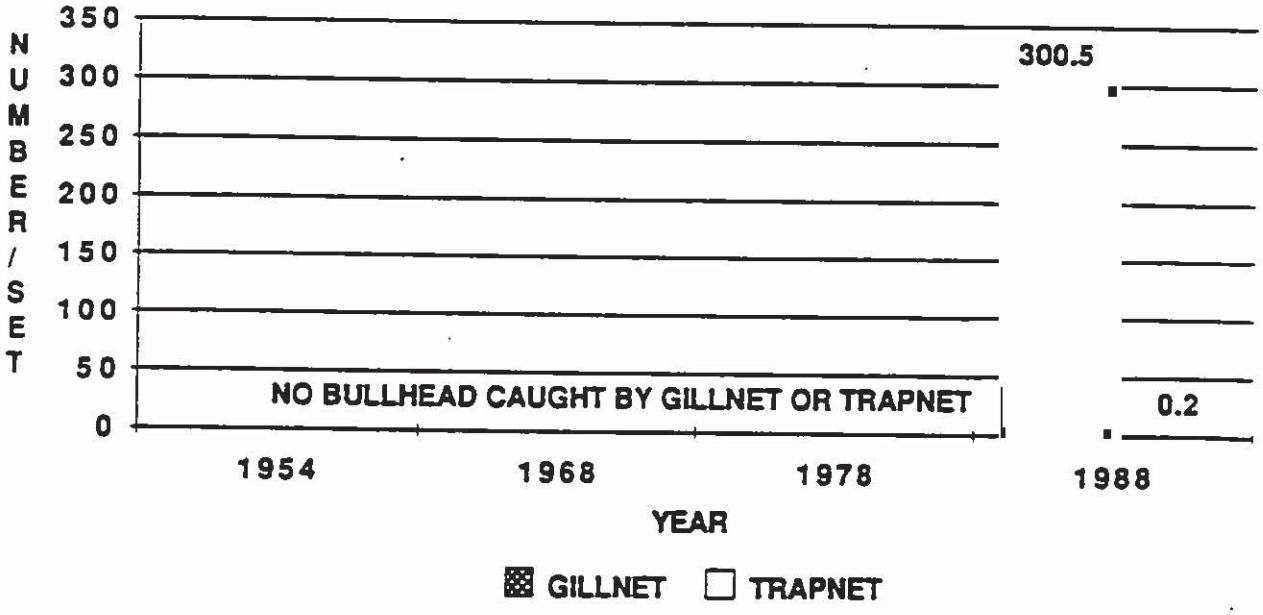


FIGURE 22

APPENDIX E

WATER QUALITY DATA
BOULDER LAKE CONSERVATION AREA MANAGEMENT PLAN

Table E.1 Boulder Water Quality (May 1989—March 1990 data in mg/l).

			Applic. Water Qual. Standards					
Parameters	Median	Range	2B(CC)	3B	4A	4B	5	6
pH (units)	7.5	6.7 - 8.2	6.5-9.0	6.0 - 9.0	6.0 - 8.5	6.0 - 9.0	6.0 - 9.0	
NH3, Unionized	<0.001	<0.001 - <0.00	0.040[3]					
Chloride	0.78	0.62 - 1.88	230	100				
Copper	<0.003	<0.003 - 0.030	0.010*					
Hardness	40.6	29.7 - 67.4		250				
Specific Conductance	66	45 - 113			1000	1000		
Sodium	1.74	0.55 - 3.12			**			
Sulfate	3.2	2.7 - 5.5			10#			
Total Dissolved Solids	70	54 - 114			700			
Dissolved Oxygen	see DO section		5##					
Alkalinity	32	25 - 59						

Calcium	10.3	6.6	- 14.6
Iron	0.41	0.16	- 4.19
Nitrate	0.04	<0.01	- 0.28
Orthophosphate	<0.01	<0.01	- 0.02
TSS	3	< 1	- 312
Magnesium	3.59	3.21	- 7.51
Ammonia	<0.04	<0.04	- 0.11
Potassium	0.59	0.48	- 1.35
Parameters	Mean	Range	
Secchi Disk (meters)	1.7	1.3	- 2.3
Chlorophyll a (ug/l)	6.9	2.6	- 10.1
Total Phosphorus	0.03	0.02	- 0.05
Total Nitrogen	0.82	0.62	- 1.08
Color (Pt-Co units)	71	67	- 75

* hardness dependent - calculated for 100 mg/l hardness

** 60% of total cations as meq/l

applicable to water used for wild rice production

as a daily minimum

DO above and below dam

Date	Upstream	Downstream
May	7.4 - 8.9	9.0
June	1.0 - 7.6	4.5
Aug.	5.6 - 6.1	6.2
Oct.	9.8 - 9.8	10.4
Feb.	2.7 - 7.1	5.5

+ Range of values in profile

Carlson Trophic State Index (TSI)

1989	TSIC	TSIP	TSIS	AVTSI
Oligotrophic (0-40)				
Mesotrophic (41-50)	49			
Eutrophic (>51)		54	53	52

C = chlorophyll a, P = T. phosphorus, S = secchi, AV = average

APPENDIX F

Boulder Lake Conservation Area Management Plan

History/Archaeological Description

The following report is fully exerpted from the Report on Stage I Cultural Resources Survey for the St. Louis River Hydroelectric Project in Northeastern Minnesota, written by Susan C. Mulholland, George Rapp, Jr., Stephen L. Mulholland, Walt Okstad and Elizabeth Dahl, and conducted for Minnesota Power, under the Federal Energy Regulatory Commission relicensing process, April 1990.

Overview of Northeastern Minnesota

Archaeological Review

The prehistory of Northeastern Minnesota, with emphasis on the southwestern part of that area, is at best poorly understood. The majority of professional archaeological work conducted in the area has occurred in the northern and eastern portions by the Superior National Forest cultural resources staff (Peters, ed., 1982-1989). Additional relevant archaeological information is available from work on sites in the Province of Ontario, Canada.

Most of the information pertaining to the area of concern, the southwestern portion of northeastern Minnesota, has come from private individuals interested in archaeology.
These individual have, for the most part, maintained artifact location records and, more importantly, have been willing to share this information with professional archaeologists. In particular, Elaine Redepenning has diligently recorded sites in Island Lake and Boulder Lake Reservoirs (Harrison et al., in prep.).

From these three information sources, a cultural sequence can be constructed that is composed of three major periods:

Paleo-Indian, Archaic, and Woodland. The Paleo-Indian period was until recently believed to be represented in the region only by the late Plano phases. Recent discoveries indicate that the earliest occupation of this region may be older. The Archaic period is the least understood of the three periods in the region, with only surface finds of diagnostic artifacts reported. The Woodland period is the best understood period, with intact sites being reported.

A brief discussion of each of the three periods is presented, focusing on current information of the period and distinctive characteristics. Evidence of each period in the project area is briefly presented.

Paleo-Indian

The Paleo-Indian period in Minnesota encompasses a time span from approximately 10,000 BC to 6000 BC (Peters and Motivans, 1985). In northeastern Minnesota, the Paleo-Indian period was represented until recently only by artifacts dating to the latter half of the time span. Two recent discoveries may push the Paleo-Indian presence in this part of the state into the 10,000 BC range (Peters, pers. comm.; Romano, pers. comm.).

The people who inhabited the region during this period of time were nomadic big game hunters, probably following large herds of caribou. The environment may best be described as cold and damp, with vegetation more like that of a taiga than a boreal forest. Evidence from work done in the Superior National Forest seems to indicate a preference for campsites on high gravelly terraces overlooking water (Peters, pers. comm.). The majority of Paleo-Indian sites identified in the Superior National Forest occur on the higher terraces, not at the current water level.

In the project area, the majority of the diagnostic artifacts of this period are classified as late Paleo-Indian, or Plano. These Plano points are lanceolate (a long linear leaf shap) and appear to be variations of the Agate Basin and Scottsbluff styles (Harrison et al., in prep.). All artifacts identified as Paleo-Indian hav been surface finds (with one

exception discussed below) and as such lack associated carbon-14 dates. However, a 9000 - 7000 BC time range is probably the best estimate of age (Harrison et al., in prep.).

Knife Lake siltstone and jasper taconite are the preferred lithic material types used in this area for projectile points and other tools. Other lithic material types used to a lesser degree include cherts, Gunflint silica, Knife River flint, and others (Harrison et al., in prep.: Peters, pers. comm.).

A major source of information for this period has come from analysis of the Redepenning collection by Christina Harrison. The Redepenning material is a collection of Paleo-Indian artifacts, as well as material from other periods, that was found primarily during periods of low water on Island Lake Reservoir by Elaine Redepenning (sites 1-14, 17-26, 28030, 32-35, 37, 39-41; Maps 8, 10, 11, 13). This material served as the basis for the Reservoir Lake Phase of the late Paleo-Indian period defined by Steinbring (1974,1980).

The analysis by Harrison indicates not so much as distinct cultural phases but one that appears to have stylistic connections with northern Wisconsin, southern Manitoba, and northwestern Ontario (Harrison et al., in prep.).

Until recently, the only Paleo-Indian material recovered from northeastern Minnesota dated to the latter half or Plano period. Two recent discoveries, one on Island Lake Reservoir and one on East Bearskin Lake, may push the Paleo-Indian presence in this part of the state farther back in time.

The artifact from Island Lake Reservoir is a fluted projectile point of Gunflint silica. The point has a large distinct channel flute and may be best described as a Clovis style projectile point (Romano, pers. comm.).

The second artifact was recovered in 1989 during excavation by the Superior National Forest at the Bearskin Point site (02-315) on East Bearskin Lake north of Grand Marais, Minnesota. The base of an Holcombe point (Peters, pers. comm.), an eastern variant of Clovis was found in association with five buried fire hearths. Carbon-14 samples will be submitted for dating.

These two discoveries indicate an earlier use of the area than previously believed, possibly extending to immediate post-glacial times. In addition, the volume of artifacts recovered at Island Lake Reservoir indicates extensive use of the area during the Paleo-Indian period. The project area has a high potential to contain significant Paleo-Indian sites.

Archaic

The Archaic period in northeastern Minnesota encompasses a time span from approximately 6000 BC to 300 BC (Peters and Motivans, 1985). Major climatic and vegetational changes occurred during the initial stages of the Archaic period, resulting in a warmer and drier environment that encouraged the development of the red and white pine forest. This warming and drying of the environment is often referred to as the Altithermal.

The results of this environmental change apparently forced the people living in the region to adapt to a new lifestyle. Hunting practices changed from following large herds of animals to hunting individual animals. Aquatic and other seasonal resources appear to have been utilized more extensively than in the Paleo-Indian period.

Changes also occurred in the tool assemblage of this period. The projectile points became smaller in size and were side-notched. Ground stone tools such as adzes first appear during the Archaic. Probably the most significant new addition to the Archaic tool assemblage is the appearance of copper tools. Copper occurs locally and was hammered into spear points, knives, gaff hooks for fishing, awls, and wedges and spuds for wood woodworking.

Lithic material types used during the Archaic remain similar to those used during the Paleo-Indian period. However, a shift in preference occurs from siltstone materials towards cherts and other material higher in silica content. This shift is most noticeable in the choice of material used in the manufacture of projectile points.

The Archaic period in this region is very poorly known. All artifacts identified to the Archaic are isolated finds, materials from heavily disturbed areas, and surface collection from heavily eroded shoreline deposits (Harrison et al., in prep.). The South Fowl Lake site, the Fish Lake Dam site (Steinbring and Whelan, 1971), and sites from the Redepenning collection (Appendix IV:1, 2, 4, 6, 11, 12, 14, 23, 28-30) comprise the extent of known Archaic sites in northeastern Minnesota. All artifacts from these three sites are from heavily impacted or deflated shoreline deposits.

Archaic and late Paleo-Indian artifacts from the Redepenning collection have been found to occur together in a number of sites on Island Lake Reservoir (Harrison et al., in prep.). Such sites have been suggested to represent a transitional period between the Archaic and Paleo-Indian periods. However, the disturbed nature of the sites do not exclude separate occupations of the same site over two different times (Harrison et al., in prep.).

Woodland

The Woodland period in northeastern Minnesota encompasses a time span from approximately 200 BC to European contact in the first half of the 17th century (Peters and Motivans, 1985). The Woodland period is divided into two sub-periods, Initial and Terminal, based primarily on morphological and decorative characteristics of pottery.

The environment shifted from the warmer and drier conditions during the Archaic to slightly cooler and more moist conditions similar to the present. With the cooler, wetter environment more emphasis was placed on the use of water resources during this period. Reflecting this orientation, sites clustered around navigable waterways.

The Woodland period is noted for two major cultural innovations: manufacture of pottery and construction and use of burial mounds (Peter and Motivans, 1985)

Initial Woodland:

The Initial Woodland period dates from approximately 200 BC to AD 900 (Peters and Motivans, 1985). Initial Woodland pottery, referred to as Laurel ware (Wilford, 1955), represents the first known pottery type in this part of Minnesota. Laurel pottery is differentiated from later Terminal Woodland pottery by three characteristics: vessel shape surface treatment, and vessel decoration. The shape of a Laurel vessel is conoidal with little to no neck constriction. Surface treatment of the vessel is smooth in all areas lacking decoration. Vessel decoration occurs on the upper rim and neck, consisting primarily on punctates, dentate stamping, incising, push-pull bands, and bossing (Anfinson, 1979).

A primary use of this pottery, aside from cooking purposes, may have been for parching wild-rice grains. The first evidence for use of wild-rice as food source occurs in the Initial Woodland (Valppu, 1989). Laurel sites, as well as Terminal Woodland sites, cluster around areas where stands of wild-rice are present now or in the past (Rajnovich, 1984). Use of wild-rice, as well as availability of fishing resources, indicates an emphasis on water derived resources during the Woodland period.

Trends in lithic use continues those established in the Archaic. A marked preference for high silica material, especially cherts, and further reduction in the size of projectiles points is noted. Early Laurel projectile points are corner-notched, in some cases stemmed in appearance. Towards the end of the period, projectile points become more triangular and lack notching, similar to Terminal Woodland points. The number of small tools such as awls, drills, wedges, and scrapers show marked increase from the Archaic period, suggesting an extensive use of wood and fiber materials (Peter and Motivans, 1985)

Copper use continues during the Initial Woodland. The number of copper tools gradually disappear from use during the Terminal Woodland.

The second major characteristic of the Initial Woodland period is the construction of burial mounds. These earthen mounds

occur most frequently along or near waterways, again emphasizing the importance of the resource during this period.

Terminal Woodland:

The Terminal Woodland period dates from approximately AD 700 to European contact in the first half of the 17th century (Peters and Motivans, 1985). A further subdivision of this period into cultural groups - Blackduck, Sandy Lake, Selkirk, and variations - is based on morphological and decorative characteristics of the pottery. Environmental adaptations and resource exploitations that developed during the Initial Woodland continue during the Terminal Woodland.

Terminal Woodland pottery differs from the earlier Initial Woodland types in vessel shape, surface treatment, and decorative techniques. The vessel shape is more globular with a rounded base and, in most cases, a marked constriction at the neck of the vessel. Surface treatment on the body of the vessel is a fabric to cord-marked impression. The major new addition in decorative techniques is the addition of cord-wrapped stick impressions (Anfinson, 1979).

Shape and decorative characteristics of pottery is also the basis for distinction between the cultural groups of the Terminal Woodland. Blackduck vessels are generally round and globular with constricted necks, a fabric impressed surface treatment, and decoration on the upper portions of the interior and the exterior of the rim and neck (Anfinson, 1979). The primary decorative techniques employed on Blackduck pottery are cord-wrapped stick impressions, punctuates, and brushing. Sandy Lake vessels generally have rounded bottoms with straight out-flaring walls and a fabric or cord-marked surface treatment. The decorative style, when present, is usually some form of lip notching (Anfinson, 1979). Selkirk vessels have a globular to elongated globular shape with slight neck constrictions and outflaring rims, a fabric

impressed surface treatment, and, if decorations are present, punctuates and bossing (Anfinson,1979).

Lithic material and tool types used during the Terminal Woodland remained the same as for the Initial Woodland. The projectile point style for all three cultural groups is a small triangular shaped arrowhead. Locally available cherts and other high silica material were preferred for the manufacture of arrowheads (Peter and Motivans, 1985).

Copper continues to decline in use, until almost virtually absent towards the end of the period.

Mound burials continued to be used, frequently making use of existing Initial Woodland mounds. This practice is far more common for the Blackduck cultural group than the Sandy Lake or Selkirk groups.

Evidence that the project area was used during the Woodland period is indicated by projectile points, both Initial and Terminal Woodland styles, from the Redepenning (site 4, map 10) and other private collections. Waterworn Terminal Woodland pottery, Blackduck or a variant by decorative type, has been found on Island Lake and Boulder Lake Reservoirs; additional pottery is reported from Wild Rice Lake Reservoir. Some of the copper artifacts recovered on the reservoir system may be Woodland.

Use of the area by Woodland groups is to be expected since the original waterways were navigable and contained wild-rice in parts of the system. The presence of Initial and Terminal Woodland style projectile pointsand reports of wild-rice stands indicates a high potential for recovery of additional evidence of Woodland period groups.

Historical Review

Little historical information is available that specifically addresses the project area. Site specific information is especially rare in traditional research materials. Several good general works have synthesized the history of periods relating to the project area. From a historic viewpoint these periods may be

separated into two broad subjects: European contact/ fur trade and settlement/industry. It is important to note that these subjects are not necessarily mutually exclusive in a chronological sense. For instance, settlement in the Fond du Lac area was in direct association with the fur trade and in a general sense the fur trade could certainly be considered an industry.

European Contact/Fur Trade

The contact period can best be described as the transition period between the prehistoric and historic periods in a given area. It is uncertain as to the exact date of contact between European explorers or Jesuit missionaries and Indian groups in northeastern Minnesota. The first mention of the river at the head of the lakes is the Jesuit map of 1670.

Most later maps refer to the area as Fond du Lac, which means "the Head of the Lakes." Daniel Greysolon Sieur du Lhut (Duluth) was the leader of the first group to leave a record of a visit to the area now referred to as Fond du Lac. He may have continued up the St. Louis River to the Savannah Portage enroute to the Mississippi River. He returned to Fond du Lac in 1680 to oversee a peace conference he had arranged between warring tribes in the area (Sioux, Ojibway, Cree, Assiniboin). The purpose of the peace conference was to establish a war-free zone allowing free access for all parties to trade in furs. The conference was a limited success but nonetheless the fur trade in the region was frequently interrupted by warfare, particularly between the Sioux and the Ojibway.

A hiatus exists in the knowledge of the area until the 1700's. Alexander Henry sent a clerk with trade goods to Fond du Lac in 1767. The first officially logged transaction in furs involved the exchange of trade goods for 150 packs of beaver pelts and 25 packs of otter pelts. In 1767 Janthan Carver noted 12 Ojibway families encamped at Fond du Lac. A wintering house of the Northwest Company on Rices Point was recorded by a traveler in 1784. This was the first recorded dwelling associated with the

fur trade in the study area. The continuing warfare between the Sioux and the Ojibway caused the Northwest company to build Fort St.Louis in the area that is now Superior, Wisconsin in 1792.

By 1816 the Northwest Company facility at Fond du Lac was being operated under a five year partnership with Astor's American Fur Company (under the name Southwest Company). This short-lived partnership was interrupted by Lord Selkirk's War with the Northwest Company. The Fond du Lac post, personnel, and fur were seized by Selkirk's men. The Northwest Company interest in the Southwest Company was bought out by Astor's American Fur Company, who operated the Fond duLac post from 1817 to 1842. In 1842, the diminishing profitability of fur trade in the region inspired sale of the post to the Missouri Company, which in turn ran it into the late 1840's.

European activity was not limited to the Fond du Lac area. The lower St. Louis River valley area was included in the exploratory expeditions of Lewis Cass in 1820 and Schoolcraft in 1832. Each of the fur trading companies mentioned as well as a number of unnamed independent trappers used the St. Louis River routes to access inland trading posts and/or to establish contact and trade with the natives in the area. The area affected by contact with these traders includes all of the major tributiaries of the St. Louis River and the areas most immediately adjacent to the center of activity at Fond du Lac. Areas of heaviest fur trade impact would have been along the St. Louis River to the Savanah Portage and along the St. Louis River-Embarrass River-Eshquagmama Lake-Pike River Portage to the north. These routes were used to actually transport the bulk trade goods to outpost areas as well as to convey furs back to the east.

It is safe to conjecture that the St. Louis, Cloquet, and Whiteface River drainage areas must have been a premier trapping area for contact period natives. No fur posts are known to have existed in the specific project area but most of the area has the potential for contact period sites, especially native habitation sites. Areas of particularly high potential include both ends of portages, terraces suitable for camping, and confluences of rivers

and lakes or major tributaries. Original shorelines contain the highest potential for sites.

Settlement and Industry

The majority of historic settlement activity associated with the project area involves population centers that originated as milling centers for the lumber industry. Numerous support industries and smaller industrial activities were also involved. Primary population centers of concern include Thomson, Scanlon, and Cloquet (zones A and B, Maps 2 and 3).

Thomson:

The village of Thomson was established in 1870 along the first railroad developed in the area (the Lake Superior and Mississippi Railroad from St. Paul to Duluth, completed in 1870). A town site grew up in support of the A.M. Miller Sawmill which operated from 1872-1891, producing around 10,000,000 board feet of white pine lumber per year. A smaller sawmill also operated in Thomson around the same time (Labois Mill). The only other major industry in the village was the St. Louis Slate and Brick Company which produced 8-10,000,000 bricks per year.

When the mill closed after 1891, the town of Thomson diminished in size and population. Construction of the power plant and dam at Thomson is the only significant subsequent development in the area. The hydroelectric facility was constructed from 1904-1907. Part of the platted village of Thomson was inundated by the Thomson Reservoir upon completion of the dam. The community of Forbay was built at the power plant site by the power company (ca.1907), consisting of a superintendent's dwelling, seven houses, a boarding house, and a school.

Logging activity in the Thomson area was primarily dependent on river driving and would have had the associated sites and

features of camps, boom areas, ponds and docking facilities, etc. Many of the sites and features are probably now under the Thomson Reservoir.

Scanlon

Scanlon grew up around the site of the Brooks-Scanlon Lumber Company, built in 1901. The town was named after the president of the company, Michael J. Scanlon. The mill employed around 500 men and the town's peak population was about 1500 people. The mill closed in 1909 and the town has diminished in size since. All of the milling equipment was shipped to Florida to support Mr. Scanlon's lumbering interests. A historical marker identifies the brick foundation of the sawdust burner.

Scanlon was the terminus of a large system of logging railroads constructed by the Brooks-Scanlon Lumber Company. Features and sites associated with the townsite, mill, and railroad operations undoubtedly exist in the area. Field survey will be required to determine if any remain in the actual project area.

Cloquet

Cloquet originated as three smaller communities clustered around sawmill sites (Shaw Town, Nelson Town, and Johnson Town), which is known as Knife Falls. The village of Cloquet was platted in 1883. Cloquet became a city in 1904.

Sawmilling and attendant wood products were the main industry in Cloquet from 1880's to the present. Five major milling operations existed in Cloquet, employing thousands of men in the mills during the summer to early fall and in the logging and driving camps during the winter and spring. Most who worked in the mills also worked in the camps depending on the season. The five Weyerhaeuser mills produced 250,000,000 board feet of lumber per year.

Camps associated with the mills in Cloquet were located primarily along the Whiteface, Cloquet, and St. Louis Rivers

during the early years and were almost exclusively dependent on river driving to get the logs to the mills. The unreliability of flowage and the loss of several year's harvest due to fluctuations in water level by both flood and drought encouraged the development of an extensive logging railroad network access company timber lands. Much of the project area was accessed by logging railroads around or subsequent to the turn of the century (ca. 1900-1920). Numerous camps associated with driving or railroad logging should be located along the principle waterways within the project area, primarily on original shorelines.

Dunlap Island in the St. Louis River was heavily developed as the loggers' unofficial recreation area. Saloons, hotels, bawdy houses, etc. were numerous. A railroad repair and staging center was also located on the island along with grain elevators and a few homes. Early photos of the city of Cloquet show extensive booming activities in the riverfront of the city as well as upstream and downstream. There may be remnants of these features still present under current water level.

Cloquet was virtually destroyed by the Fire of 1918 with great loss of life. Dunlap Island was on of two areas saved. The city was subsequently rebuilt and continued as a major center ofmilling activity.

Reservoir Areas:

The reservoir lakes near Duluth were logged over just before and just after the turn of the century. Island Lake was accessed by the Cloquet Companies railroad ca. 1898-1900. The other lakes in the area accessed by the Mitchell and McClure logging railroad as well as by a Brooks-Scanlon line, also around the turn of the century. There were some small sawmills in the area as well but not in the immediate project area. Most of the camps within the project area were probably located on original lake shores and are hence underwater now. There is very little in the written record dealing with the area.

The Palo-Markham community at the time of reservoir development could best be described as a rural agricultural area in the vicinity of what is now the Whiteface Reservoir. Most of the early settlement of the area occurred around 1900. Six former farmsteads are currently under the waters of the reservoir. A sawmill operated in the Palo-Markham area and a great deal of logging was done locally from about 1916 until 1926. The logging activity was probably associated with timber salvage from the proposed Whiteface Reservoir. Most of the logging sites and homesteads that were immediately adjacent to the Whiteface River in the period before ca. 1924 are probably underwater now.

General Land Office records for the area encompassed by this project are notoriously undependable. More than 80% of the early claims filed in the area under various land acquisition programs were fraudulent. These claims were filed primarily to secure timber lands for the numerous lumbering concerns. Air photos and field survey are the only dependable means to identify homesteads within the project limits, with archival verification as a follow-up activity

Mineral exploration of lands in the region began as early as the 1850's primarily for copper, gold, and silver. Traces of the metals were located in the St. Louis River valley but not enough to justify commercial development. A great deal of mineral exploration, particularly for iron, was conducted in the Whiteface area but also failed to find any exploitable ore in the immediate vicinity of the project. Several stone quarries were located on the St. Louis River in the area just downsteam from Thomson. Northeastern Minnesota is littered with holes left by mineral exploration but there are seldom any features associated with them.

Mainline (common carrier) railroad right of ways abut some of the project area. These railroads frequently represent the earliest development in the area. Features most likely associated with this early railroad development are the remnant of trestles, bridges, abandoned sections of right-of-way, cuts, grades, and other engineering features peculiar to the industry.

All of the sites and features produced by hydroelectric development prior to 1940 must be recorded as sites. A current statewide survey of such sites by Jeffery Hess of Historical Consultants includes the project area. Any future determinations of eligibility will be made under that study.

Ethnographic Review

Considerable evidence exists for the location of habitaiton sites and seasonal camps of early people within the project area. The Terminal Woodland period has evidence of several cultures living within Northeastern Minnesota coincident with the fur trade. The native peoples living in the region at this time, the late 1600's were the Dakota (Sioux) and the Ojibwa (Chippewa)

Many battles were fought between these groups over hunting and fishing territories. The coming of the fur trade to the region brought additional conflict over trapping areas, trade rights, and payments. The Sioux left the region in the late 1700's following many severe battles with the Ojibwa. The Ojibwa or Chippewa tradition relates the coming of the Chippewa into the region from the East Coast in the late 1400's or early 1500's (Warren, 1974). They remain in the same region today.

The fur trade flourished for about 100 years in this region. When the demand for fur ended, the Chippewa were left with an altered lifestyle. The animals were depleted, reducing the supply of food and other materials; the Chippewa were left with no means of income.

The Treaty of 1854 designated reservations for the Chippewa within the region: Fond du Lac near Cloquet, Grand Portage near Pigeon River, Nett Lake near Orr, and Vermilion near Tower. The Chippewa living along the St. Louis River went either to White Earth Reservation in west-central Minnesota or to Fond du Lac near Cloquet. Those living around the Reservoir Lakes in many cases went to Nett Lake, Vermilion, or Grand Portage.

The lands adjacent to water have always been of prime importance to the people in northeastern Minnesota, both as a source of livilihood and as a means of transportation. Wild rice grows in water of shallow lakes and river lakes, including Wild Rice Lake. The Chippewa name of this lake is "Megwewudjiwmanominikan", meaning the place of wild rice amidst the hills (Gilfillan, 1976). Wild rice is also harvested in some places along the St. Louis River.

A government survey in 1857 noted many Indian trails leading between Lake Superior, the St. Louis River, the lakes of the reservoir system, the Whiteface River, and the northern, western, and eastern regions of northeastern Minnesota. Also marked was the "Lake Superior to Mississippi Road", a "well traveled" wagon road from Minnesota Point to the site of the present dam on Wild Rice Lake and continuing on to Norwood on the Mississippi River (Trygg). The road was built to facilitate trade with the Indians and provide a means of transport of goods down the Mississippi River. Since the road was present in the government survey of 1857, considerable activity with tribes prior to 1856 is indicated (Carey, 1922)

The 1857 government survey opened the lands to white settlers. Soon after, claims were taken up along the St. Louis, Cloquet, and Whiteface Rivers. Descendants of many of the early homesteaders still reside on family lands. Listed below is some information received from interviews with long-time residents, Chippewa traditions, and various written sources (including maps).

St. Louis River

The Grand Portage Trail has been retraced and mapped (Fritzen, 1935). The Woman's Portage Site, the Pause One site, the Roche Galet Pause, and Canoe Cache (1899) are located in T48N, R15 and 16 W. The Knife Portage ended at Maple Island, with a trail along the west side of the river to Knife Falls. Dunlap Island was a fur trade site and many of the portage trails led there. Indian villages are reported along the banks of the St.

Louis River. European settlers founded towns at Thomson and Knife Falls (now Cloquet). Posey Island was inhabited by the Posey family ca. 1882. Mr. Posey was reportedly a blacksmith employed by the Government to teach the trade to Indians. He also kept the government warehouse for distribution of goods to the Indians.

Fish Lake

A large Indian village was noted at the present site of the Fish Lake Dam. Many artifacts were uncovered when t he dam and road were built. Archaeological excavation of the Fish Lake Dam site (Steinbring and Whelan, 1971) and artifacts in the Redepenning Collection indicate occupation of this area. Artifacts have also been reported from other areas around the lake, including pottery. The first settlers of record in the area were the Jonaliks who took up land in 1887. There was considerable lumbering around Fish Lake and several lumbering camps have been reported. The Weyerhauser Company built a 10 foot log dam on the Cloquet River in 1890. It was replaced in 1915 by a concrete dam.

Wild Rice Lake

The area surrounding Wild Rice Lake has been inhabited for hundreds of years by Indians and white settlers. Indians came to the lake to gather wild rice and wild plums. There are references to a village on the west side and camps on the east side; other references are to Indians living "all around the lake." Burials have been mentioned on the west side of the lake. Many artifacts have been found on the shoreline and inland around Wild Rice Lake. Thirteen trails are reported around the lake. The Beaver River was an early canoe route to the Cloquet River. Most homesteads were away from the lake while Indians lived around the shorelines. The lake continued to be used for ricing until the game and fish became depleted. Millers and Beyers were early homesteaders on

the east shore. Descendants of early homesteaders still live in the area.

Island Lake

Early maps and surveys report Indians living around the lake (Trygg, 1966). An early Indian trail led from Minnesota Point to the Island Lake vicinity and on to the Vermilion Range. It was called the Duluth to Vermilion Road, later the Vermilion Trail. Many artifacts have been recovered from the area. The Redepenning Collection contains many artifacts from sites in Island Lake Reservoir. Other collectors as well have numerous artifacts. In the summer 1958, drought lowered the water level and exposed original land surface as small islands. Artifacts recovered from these elevations indicate that the Indians used many for camps. The area also had many semi-permanent encampments since it was at the junction of the Cloquet River and Island Lake transportation system. Other small lakes (including Alden Lake) were also sites of Indian habitations. Early writings and maps mention trappers and homesteaders living near these waterways after the Indians left. Jake Fredenberg may have been the first settler in the area. He was living on Fredenberg Lake while employed in the logging camps. Logging was extensive in the area. The first dams on Island Lake were built by loggers about 1890 for transportation of logs.

Boulder Lake

Artifacts have been recovered around the lake, including some in the Redepenning Collection. Pottery sherds have also been reported in the lake banks. There is a report of an Indian family living near the site of the present dam during settlement of the area by whites.

[The Stage II Archaelologic Report on the St. Louis River Project, entitled: Archaelological Survey of Aerial Portions of the Boulder Lake Reservoir, St. Louis County, Minnesota, by Susan C. Mulholland and Geroge Rapp, Jr. September 1991, includes an on-site archaeological survey of Boulder Lake Reservoir shoreline. The findings of this survery includes twenty archaeological sites were located at Boulder Lake Reservoir, of which sixteen were on islands. This number of sites in a relatively small area indicates a high potential for additional sites to exist, according to the survey report.]

Whiteface Reservoir

Artifacts have been reported from around this reservoir. Vermilion Trail appears to cross this area. Early Indian camps and Euro-American sites from various activities (trapping, trading, logging, homesteading) are often located near trails (Trygg, 1966).

APPENDIX D

As updated/approved on March 30, 2004: Erosion Control and Monitoring Plan

minnesota power / 30 west superior street / duluth, minnesota 55802-2093 / 218-722-2625 / www.mnpower.com

VIA: FEDERAL EXPRESS on December 19, 2003

December 19, 2003

Project No. 2360 Minnesota
St. Louis River Hydroelectric Project
ALLETE, Inc. (d.b.a. Minnesota Power)

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Update of the Erosion Control and Monitoring Plan for the St. Louis River Hydroelectric FERC Project No. 2360

Dear Secretary Salas:

Enclosed, please find one original and three copies of the St. Louis River Hydroelectric FERC Project No. 2360 Erosion Control and Monitoring Update as required of the Project license.

If you should have any questions, feel free to contact me at 218-722-5642, extension 3569, or e-mail at jpaulson@mnpower.com.

Best Regards,

John J. Paulson
Supervisor Land and Property Management

Encl: One Original and Three Copies of SLRP Erosion Control and Monitoring Plan

cc: Pat Grant – FERC Chicago Regional Office

Update of the Erosion Control and Monitoring Plan
for the
St. Louis River Hydroelectric Project No. 2360

December 2003

Pursuant to Article 401 of the St. Louis River Hydroelectric FERC (Commission) Project No. 2360 (Project) License Order dated July 13, 1995, and upon subsequent Commission license order dated November 12, 1998, Minnesota Power (MP) is hereby submitting the following update of the Erosion Control and Monitoring Plan for the Project.

INTRODUCTION

The purpose of the Erosion Control and Monitoring Plan is to comply with the requirements of Article 401 of the Commission license to operate and maintain the Project. The Project consists of five headwater storage reservoirs and four hydroelectric developments located in the St. Louis River basin in St. Louis and Carlton Counties, Minnesota.

The original plan was filed with the Commission on August 11, 1998 and was approved pursuant to Commission Order Modifying and Approving Erosion Control and Monitoring Plan on November 12, 1998.

The plan requires periodic updates be filed with the Commission on five-year intervals throughout the term of the license, and consultation with the US Fish and Wildlife Service (USFWS), US Forest Service (USFS), the Minnesota Department of Natural Resources (MDNR), and the Fond du Lac Band of Lake Superior Chippewa (FDL). A draft of the plan was mailed to the consulting agencies and tribe, above, and we have received comments back from the MDNR and the USFS. Their comments are addressed in this final plan, now being filed with the Commission. Correspondence between MP and the agencies are included in Appendix A.

MP concurs with the USFS's and MDNR's comments and have made the corresponding changes to this final document.

As far as the MDNR's request to replace campsites that are closed due to human caused erosion, MP agrees that alternate sites should be established on the reservoirs. We will continue to identify new sites and begin to address this issue. . MP will consult with the USFS local staff on reseeding/replanting of primitive campsites. In addition, MP is intending to draf its Recreation Plan for the Project in the near future and will further address how primitive campsites will be managed for the term of the license.

This update is submitted to illustrate the activities and protection measures enacted to date, the monitoring actions being measured, demonstration activities being enacted for education purposes, and a schedule for continued erosion control and monitoring measures.

I. PROCEDURES AND MONITORING

Several procedures and methods are in place to ensure erosion protections are established at the Project.

MP's Construction Request Form procedure for leaseholders who are looking to perform shoreline revetment on their lease lots is the primary procedure that insures proper methodology is employed. In this procedure, leaseholders are required to obtain preliminary approval from MP before seeking agency zoning and/or DNR permitting for any given shoreline erosion project. MP ensures these permits are in place and the plans for each erosion project will satisfactorily accomplish the task. Most erosion control projects utilize standard rip-rap and geo-textile fabric techniques.

MP has also begun a comprehensive review of all primitive campsites, whether they are designated sites or non-designated sites, and have begun closing those that are causing erosion problems that are not manageable, or the use of the sites poses a risk to cultural resources. To date, six such campsites have been closed by MP (one on Island Lake Reservoir and five on Fish Lake Reservoir).

In December of 2002, MP established the Monitoring Plan for Archaeological Sites on Existing Shorelines for the Project, as required under the Project's Cultural Resource Management Plan (CRMP), and on file with the Minnesota State Historic Preservation Office (SHPO). This monitoring effort evaluates the effects of erosion on cultural resources (primarily archaeological) at the Project and includes annual visits to known archaeological sites that are receiving erosion impacts. The base monitoring visits began in 2002 and continued into the 2003 field season. Specifically, these monitoring visits included assessing current conditions, producing new site maps, verifying locations, and establishing datum points. This effort creates the baseline for future visits and helps staff determine the rate of erosion or other impacts and will help lead to management considerations to protect these sites.

II. EROSION MANAGEMENT BY RESERVOIR

A. Whiteface Reservoir

Whiteface Reservoir has areas of erosion in scattered locations along the reservoir shoreline. Areas where erosion does occur are typically small stretches of shoreline where the soil is a combination of sand and rock. In addition, most of the erosion is in

areas free from emergent aquatic vegetation, and banks are between one and ten feet high in most areas of soil instability on the reservoir.

Approximately 60 percent of the erosion on Whiteface Reservoir is located adjacent to seasonal residential sites or public recreation developments. In general, the topography of the land surrounding the eroded sites is gently rolling, with a moderate slope that minimizes the long-term impacts of erosion. In addition, soil types are generally a combination of relatively clean sand, gravel, and rock and do not pose a significant threat of suspended solids loading in the reservoir.

A significant portion of the shoreline of the USFS campground in the northern part of the reservoir has bank erosion. The eroded banks are sandy and up to 2 to 3 feet high. The cause of this erosion is a combination of human activity (boating and foot traffic), wave action, and the non-cohesive bank material. Any corrective action to address this erosion must account for use of the area by campers.

2003 Update: MP has worked with the USFS in protecting the erosion sites at the Whiteface Reservoir Campground in the past. In addition, MP helped sponsor improvements to the campground in developing the handicapped shorefishing pier, which has helped funnel use away from eroding banks, thus reducing impacts. MP also assisted the USFS in the removal of a large floating bog from the campground in 2000.

In the spring 2000, MP and the USFS cooperatively agreed to perform shoreline erosion work at the Whiteface Campground. MP assisted by providing $5,000 to the USFS for the project. The USFS, in turn, performed the erosion protection measures to areas at the beach and campground (See Appendix B). MP has not performed any monitoring on the campground erosion protection site project.

No new leaseholder shoreline protections measures have occurred since 1999. Most are well-established on the reservoir.

MP has made improvements to the company managed boat launch site at the Whiteface Reservoir Dam that eliminated erosion occurring at the recreation facility. Specifically, the company reworked the cement pads, added coarse fill material and bermed the parking lot to channel water into the surrounding woods. In addition, MP added a dock for ease of access for boaters, that helps eliminate foot traffic at the launch.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

B. Boulder Lake Reservoir

Boulder Lake Reservoir has small amounts of erosion dispersed along its shoreline. Areas where erosion does occur are typically short stretches where the soil is composed of sand and gravel. Field stone within the bank material has fallen to the toes of the

eroded slopes to form a natural erosion protection. Most of the erosion is in areas free from emergent aquatic vegetation. Banks are typically less than seven feet high in areas of soil instability on the reservoir. The topography of the land surrounding the eroded sites is relatively flat, minimizing the potential for the introduction of suspended solids into the reservoir. Nó bank stabilization measures have been implemented.

No bank stabilization has been implemented on non-leaseholder lands. There is relatively low potential for impact to property or the environment.

2003 Update: MP has continued to work with the 17 leaseholders on Boulder Lake Reservoir in finding ways to minimize shoreline erosion. In particular MP has established an erosion protection demonstration site at the Boulder Lake Environmental Learning Center (ELC) that has been used to illustrate to residents at all of the reservoir lakes the proper materials and measures needed to stop erosion from occurring on their own properties. This demonstration site utilizes standard methodology of geotextile fabric backing behind installed rip-rip, and shows the differences between shoreline that is protected versus that which is not.

In it's December 11, 2003 letter to MP, the MDNR recommends that the Boulder Lake ELC erosion protection demonstration site illustrate biological erosion control measures. MP concurs, and has previously established (a couple years ago) natural vegetation plantings on the shoreline zone of the Boulder Lake ELC with the assistance of the Minnesota Extension Service, via their Master Gardener Education Program. While this vegetation project was not an erosion control measure, it reaffirms the importance of re-vegetating shoreline areas that were previously denuded of vegetation. In addition, MP will explore a demonstration of natural vegetation on a portion of shoreline at the Boulder Lake ELC.

MP is also working with one leaseholder on a small, remote island that has an eroding bank from overuse, and is looking to relocate them to a better location on the reservoir, thus eliminating further erosion occurring on their current lot. The current site will be revegetated and monitored.

No new leaseholder permits were issued on Boulder Lake Reservoir by MP for rip-rap protections since 1999.

MP also established a handicapped shorefishing facility at the Boulder Lake Reservoir Dam that eliminated a long-standing erosion problem. Specific improvements to the site include the addition of geotextile fabric, additional rip-rap and containment timbers to ensure the pathways do not erode into the reservoir.

In addition, the MDNR made improvements to the Boulder Lake Reservoir Boat Launch that included adding additional cement planking to the existing launch, shifting large boulders out of the way of the primary boat lane and added a boat dock for ease of launching and thus reducing foot traffic on shoreline areas.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

C. Island Lake Reservoir

As the largest of the Project reservoirs, Island Lake Reservoir contains the most erosion of all the storage reservoirs. Eroded stretches of shoreline occur throughout the reservoir in areas of loose gravel soils and rolling topography. Vegetation on the reservoir consists primarily of aspen, paper birch, white spruce, and red pine. Heavy underbrush grows in areas of little or no human activities. Many of the eroded areas are beginning to naturally stabilize as slopes decrease, beaches form, and brush becomes established. Additionally, in areas that contain rocky soils that accumulation of larger material at the toes of the eroded banks has started to stabilize the shoreline.

Island Lake Reservoir contains approximately 700 seasonal and year-round residences of which about 600 are located on MP lease lots. Over the past 50 years, leaseholders have implemented a variety of shoreline stabilization measures ranging from collecting driftwood to pouring reinforced concrete retaining walls. In recent years however, geotextile fabric covered by six to 12-inch rock has proven to be the most effective and most popular method of erosion control. This same method is used at the MP-maintained recreation facilities.

2003 Update: MP has permitted 24 leaseholders to perform rip-rap erosion controls on their lease lots since 1999. In 2000, MP has also worked with one leaseholder whose choice of shoreline erosion protection was considered an environmental issue (a previous leaseholder had installed 50 year-old empty oil barrels along the shoreline) and performed a clean-up of the materials (fortunately no oils were detected) and cost-shared to establish shoreline rip-rap with geotextile fabric along the shoreline.

Boat docks were installed by MP at the Hideaway Boat Launch and Island Lake Dam Boat Launch, thus reducing foot traffic at the shoreline. MP also berms these parking lots to channel stormwater into the surrounding woods as part of the Company's ongoing maintenance program.

MP closed one primitive campsite across from the Hideaway Boat Launch that has been the cause of erosion due to foot traffic and boat mooring.

At the Island Lake Picnic Area swimming beach, MP has opted to reduce shoreline vegetation removal to increase the likelihood of vegetation rooting taking hold and protecting the shoreline from erosion.

Gabbion Baskets (rock filled) were established in 1993 and additional rip-rap in 1994 on the downstream side of the Island Lake Reservoir Dam to reduce impacts from seepage-caused erosion, and have proven to be quite effective.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

D. Rice Lake Reservoir

Rice Lake Reservoir has small areas of soil erosion totaling approximately 800 feet. Areas where erosion does occur are typically short stretches of shoreline where the soil is composed of sand and gravel. In addition, most of the erosion is in areas free from emergent aquatic vegetation, and banks are between 1 and 3 feet high for all areas of soil instability on the reservoir. In all cases, the topography of the land surrounding the eroded sites is relatively flat, minimizing the potential for the introduction of suspended solids into the reservoir.

No bank stabilization measures have been implemented on non-leaseholder land. There is relatively low potential for impact to property or the environment.

2003 Update: The MDNR improved the Rice Lake Boat Launch by sloping the grade at the launch to channel stormwater away from the launch, added additional cement planking and added a boat dock for ease of launching, and thus reducing shoreline erosion activity due to foot traffic.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

E. Fish Lake Reservoir

Fish Lake Reservoir has erosion scattered along the shoreline. The height of the eroded banks varies between two (2) and forty (40) feet. Soil in the eroded areas is generally sandy loam or gravel. Eroded shore locations in Fish Lake Reservoir occur intermittently and typically on islands. Vegetation on Fish Lake Reservoir consists primarily of aspen, paper birch, white spruce, and red pine. Naturally occurring underbrush is located in areas where recreational or residential development is not present. Topography varies from relatively flat land in the extreme east and the extreme west portions of the reservoir to very steep and rolling in portions of the main body of the reservoir.

A significant erosion site is located east of the dam at the boat landing along a steep-bank portion that extends a mile and one-half along the north shore of the reservoir. The eroded bank adjacent to the boat land is up to 40 feet high and is characterized by a steep, clean, coarse sand embankment, capped by a thin layer of topsoil, and at the bottom, a flat sandy beach. The cause of this erosion is a combination of human activity (foot traffic and boating), wave action, and coarse, non-cohesive sand bank material. Any corrective action to address this erosion must provide and control access from the parking area to the waterfront to keep foot traffic off the slopes.

Bank stabilization measures currently in place at Fish Lake Reservoir are predominantly those implemented by leaseholders to protect their leased shoreline. The most common type of erosion control used on the lake is geotextile mattering with six to 12 inch rock riprap. Other types of erosion control used are treated wood timber retaining walls and interlocking masonry retaining walls. In the past, some leaseholders have used driftwood along the shoreline to control erosion by lessening the effects of wave action. The use of fabric and rock rip-rap have proven to be the most effective. Also, many of the eroded areas on Fish Lake Reservoir are continually accumulating the larger rock that has fallen from the banks at the toes of the slopes. This naturally occurring process will eventually stabilize most of the eroding areas on the reservoir.

2003 Update: MP has been working on extensively on Fish Lake Reservoir due to its combination of shoreline erosion sites in conjunction with public recreation activities.

Specifically, the Fish Lake Dam Public Boat Launch has had significant mitigation efforts, including the placement of large rock and improvement to stairs to reduce erosion occurring on this significant cultural resource site. In recent years, the MDNR has improved the site for the public, including rerouting the Fish Lake Dam Road and paving the boat launch parking lot. The paving of the parking lot eliminated erosion occurring on the old road location and parking lot. The MDNR also established silt fencing and hay bale checks during construction activities and has installed a long-term stormwater run-off system that includes gutter, ditching and an enclosed retention basin to reduce hydraulic energy.

For its part, MP contributed to protecting the widely known significant cultural resource site located on MP property downstream of the dam by establishing a large rock barrier and maintaining adequate screening. The large eroding bank on the reservoir side at this location has been addressed by MP by eliminating grass mowing activities that allows better plant rooting in the sandy soils. Also, since the grass now tends to grow to a higher level, the public has avoided walking down the face of the bank. This technique has proven to be a very good success and will continue to be employed, as the bank has started to stabilize and plants and trees are rooting.

On the reservoir, MP has closed five non-designated primitive campsites located on islands. These sites have been overused and banks have been eroded due to foot traffic. MP has installs signs at designated primitive campsites and will continue to monitor the use of these non-designated sites.

In addition, MP has issued five permits since 1999 for leaseholders to establish standard rip-rap shoreline protection measures on their lease lot shoreline.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

F. Knife Falls Reservoir

The bank erosion along the Knife Falls Reservoir is typical of that due to river meandering. Soil types in eroded areas are primarily clean sand and gravel typically two feet high. Reservoir operations do not vary the water surface levels in excess of six inches and there is little recreational use of the reservoir due to the industrial areas along the bank (limited boat wakes).

No bank stabilization measures have been implemented. There is relatively low potential for impact to property or the environment.

2003 Update: No bank stabilization measures have been implemented. There is relatively low potential for impact to property or the environment.

We are not aware of any new bank stabilization measures that have been implemented on privately-owned land on the reservoir.

G. Scanlon Reservoir

The majority of the Scanlon Reservoir shoreline is bedrock and erosion is minimal. No bank stabilization measures have been implemented. There is relatively low potential for impact to property of the environment.

2003 Update: MP embarked on an ambitious public recreation development on the St. Louis River, downstream of the Scanlon Reservoir. This project amounted to the establishment of a whitewater river public access and shorefishing/river viewing platform. During construction, MP employed Best Management Practices (BMP's) that included silt fencing, hay bale checks, sodding and seeding. The two primary facilities also were established on sites that the public has been using for years, and that had been causing substantial erosion along the river bank. The whitewater access construction included building a cement slab and attaching cement planks for the access. This site alone eliminated the public's activity of walk down steep banks along the river and causing erosion. The shorefishing facility also was located in an area where historic use of the river bank was causing erosion. The establishment of a formalized facility has significantly reducéd these effects. During construction, MP also utilized BMP's including silt fencing and bale checks. Paths within the recreation sites at this location were stabilized with crushed limestone, and have proven to be excellent at reducing further erosion from foot traffic.

H. Thomson Reservoir

The shoreline of the Thomson Reservoir is composed mainly of bedrock and man-made dikes resulting in little, if any erosion. Erosion occurring on the rip-rapped dikes is repaired with regular maintenance.

2003 Update: No change.

I. Fond du Lac Reservoir

Portions of the shoreline of the Fond du Lac Reservoir have bank instability. The soil types of the eroded banks are a combination of red clay, sand and rock. Erosion on the reservoir is similar to that which is abundant on most of the St. Louis River and adjacent Nemadji River Watersheds in the area (or tributaries feeding the St. Louis River downstream of Fond du Lac) due to their clay soils and steep river banks, characteristic of areas both upstream and downstream of the reservoir. The erosion is often caused by failure of the steep slopes due to saturated conditions at times of the year when vegetation doesn't offer protection. The foot traffic on the slopes is minimal. There is little or no boat traffic, and no wind induced waves due to limited fetch in the deep, narrow gorge.

Most of the shoreline of Fond du Lac Reservoir is relatively inaccessible by road and any excavating to provide access would dramatically alter the rugged landscaped surrounding the reservoir. Also, the land surrounding the reservoir is part of the Jay Cooke State Park making the natural character of the topography even more valuable. As a result of these factors, no bank stabilization measures have been implemented.

It is likely that the intrusions caused by conventional erosion techniques will cause more damage to the environment than the erosion it is intended to stop. Therefore, the only practical way of dealing with the erosion on Fond du Lac Reservoir, according to the US Natural Resource Conservation Service (NRCS), is to employ bioengineering methods to provide bank stability through re-vegetation.

2003 Update: In April of 1993 MP and officials with the NRCS conducted field aerial inspection at the Project. The NRCS indicated there is not likely any practical method of stabilizing clay banks of the magnitude and inaccessibility of those found in the Fond du Lac Reservoir. The agency suggested that the planting of willows along the toe of an eroding bank for stabilization and establishing aquatic vegetation along the shore to help reduce wave action, might be employed. MP has confirmed through field observations in consideration of this option and believes that matted vegetation and live rooting plants already exist along the toe of these slopes (having sloughed to their current state of repose from much higher terrain) and does not plan any additional plantings at this time.

III. SCHEDULE

MP is continuing the procedures for leaseholder shoreline management requests and will continue annual monitoring efforts for cultural resource protection.

In addition, over the next five years, MP will continue it's evaluation and closure (if necessary) of primitive campsites that are subject to erosion that is determined to be

unmanageable. For those sites that are closed, MP staff will be returning and reseeding or planting as reasonably possible at those sites that have been closed.

In 2008, MP will be required to submit an update of the Project's Erosion Control and Monitoring Plan and will include information on these continuing efforts.

MP will be consulting with and forwarding a copy of the Draft Erosion Control and Monitoring Plan for agency review and comment prior to the 2008 submittal date, as required, and as requested by the USFS in their December 9, 2003 letter to MP.

APPENDIX A

Agency/Tribe Consultation Correspondence

United States Department of Agriculture | Forest Service | Superior National Forest

8901 Grand Ave. Place
Duluth, MN 55808-1122
Phone: (218) 626-4300
Fax: (218) 626-4398

File Code: 2530/2550
Date: December 9, 2003

John J. Paulson
Supervisor, Land and Property Management
Minnesota Power
30 West Superior Street
Duluth, MN 55802-2093

Dear Mr. Paulson:

Thank you for requesting our review of the draft update of the Erosion Control and Monitoring Plan for the St. Louis River Hydroelectric Federal Energy Regulatory Commission (FERC) Project No. 2360. Our comments pertain mainly to the Whiteface Reservoir Campground:

In Part IIA, pertaining to the 2003 update and working with USDA-FS in protecting erosion sites, we recommend adding the date to your document of when erosion work was completed and actions taken, when monitoring was accomplished and observations from that monitoring (status of effectiveness of work accomplished).

Under Part III, Schedule, we recommend providing a monitoring report and observations to USDA-FS when accomplished prior to 2008 updates.

When doing general evaluations and closure of primitive campsites subject to erosion, reseeding or planting, we would like to be "in the loop" regarding reseeding or planting, so we can comment or make suggestions as to seed sources, types, etc. Some user-developed campsites probably do not have wilderness latrines. Providing something like that for those campsites would be a good step toward water quality protection.

If you have any questions, please contact Sherry Phillips at the Laurentian Ranger District at (218) 229-8814.

Sincerely,

For JAMES W. SANDERS
Forest Supervisor

cc: David Schmidt, Allan Bier, Sherry L Phillips, Barbara Leuelling, Barbara Stordahl

Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-40__

December 11, 2003

Mr. John Paulson
Supervisor, Land and Property Management
Minnesota Power
30 West Superior Street
Duluth, MN 55802

Subject: St. Louis River Hydroelectric Project (FERC Project No.: 2360)
Draft 5-Year Update to the Erosion Control and Monitoring Plan

Dear Mr. Paulson:

The Minnesota Department of Natural Resources (MDNR) has reviewed Minnesota Power's Draft 5-Year Update to the Erosion Control and Monitoring Plan for the St. Louis River Hydroelectric Project and submits the following comments and recommendations for your consideration. We understand that Article 401 of the Federal Energy Regulatory Commission (FERC) license requires this report and requires the updates. We also understand from your correspondence that may provide these comments to the FERC along with other comments you receive about this Draft Update.

Generally our review indicates that Minnesota Power has taken appropriate action to control erosion at the recreation sites identified. As noted in the Draft Update, work performed at several sites was completed by or in cooperation with the MDNR. Areas of these cooperative improvements include at the Boulder Lake Reservoir Boat Launch, the Rice Lake Boat Launch, and the Fish Lake Dam Boat Launch.

The Draft Update in Section I on Procedures and Monitoring also states that Minnesota Power has closed six primitive campsites due to "erosion problems that are not manageable" or because "the use of the sites poses a risk to cultural resources." One of these primitive campsites is located on Island Lake Reservoir and the other five are on Fish Lake Reservoir. (Page 2, Section I, Paragraph 3.) To assure that camping opportunities for the public are retained, the MDNR requests that Minnesota Power replace these sites with new campsites.

The MDNR recommends that Minnesota Power qualify the statements made in the Draft Update that "no bank stabilization measures have been implemented on non-leaseholder land" (Page 3, Section II.A. on the Whiteface Reservoir update, Paragraph 3; and suggested in some of the other reservoir updates including those for Boulder Lake, Rice Lake, Knife Falls, and Fond du Lac Reservoirs). We recommend the language be clarified and revised to read, "[w]e are not aware of any bank stabilization measures implemented on non-leaseholder land." It is likely or possible that the MDNR has issued permits for bank stabilization measures on some of these reservoirs and this revision would be less limiting than the language currently in the Draft Update.

The MDNR also recommends that Minnesota Power encourage biological erosion control on their reservoirs and also recommends that Minnesota Power have a demonstration of biological erosion control at the Boulder Lake Environmental Learning Center. For further information, the MDNR has a brochure on lakescaping "Shoreline Alterations: Lakescaping". This brochure can be accessed from the MDNR's Division of Waters website at http://www.dnr.state.mn.us/waters/index.html.

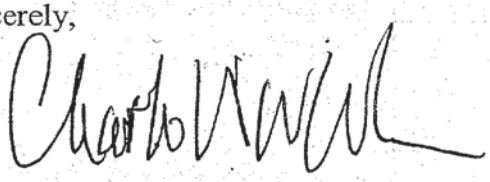
There are also some minor editorial or typographical inconsistencies that we noticed during our review and recommend clarifications or revisions as follows:

- In the Introduction, the plan is referred to as the "erosion monitoring and control plan" (Page 1, Introduction, Paragraph 1), while throughout most of the document the plan is referred to as the "Erosion Control and Monitoring Plan" or the "erosion control and monitoring plan." A consistent term or phrase should be used throughout the document.
- In Section II, discussing Erosion Management by Reservoir, the description for the Whiteface Reservoir states, "... has areas of erosion scatted along the shoreline" (Page 2, Section II.A., Paragraph 1). This appears incorrect and should be revised or clarified.
- In Section II, discussing Erosion Management by Reservoir, the description for the 2003 update for the Boulder Lake Reservoir states, "... has continued to work with the 17 leaseholders on Boulder Lake Reservoir in finding ways to minimize shoreline protections" (Page 3, Section II.B., Paragraph 3). Some clarification or revision to this sentence is needed. It appears more likely you would be working with landowners to minimize erosion, or to provide shoreline protections, or to provide erosion protection measures.
- In Section II, discussing Erosion Management by Reservoir, the description for the 2003 update for the Island Lake Reservoir states, "... has also worked with one leaseholder who's choice of shoreline erosion was considered an environmental issue ..." (Page 4, Section II.C., Paragraph 3). A small revision should be made so this sentence reads, "... has also worked with one leaseholder whose choice of shoreline erosion was considered an environmental issue ...."

Thank you for the opportunity to provide comments on this Draft 5-Year Update to the Erosion Control and Monitoring Plan for the St. Louis River Hydroelectric Project. The MDNR would like to receive a copy of the final Erosion Control and Monitoring Plan (as well as relevant and related correspondence) that Minnesota Power provides to the FERC.

Please contact me at the above address, at 651-296-4790, or by e-mail to charlotte.cohn@dnr.state.mn.us if you have further questions or concerns. Please contact Steve Mueller in the MDNR's Division of Trails and Waterways (651-297-4955 or by e-mail at steve.mueller@dnr.state.mn.us) to discuss retaining public recreation opportunities and the replacement of campsites.

Sincerely,

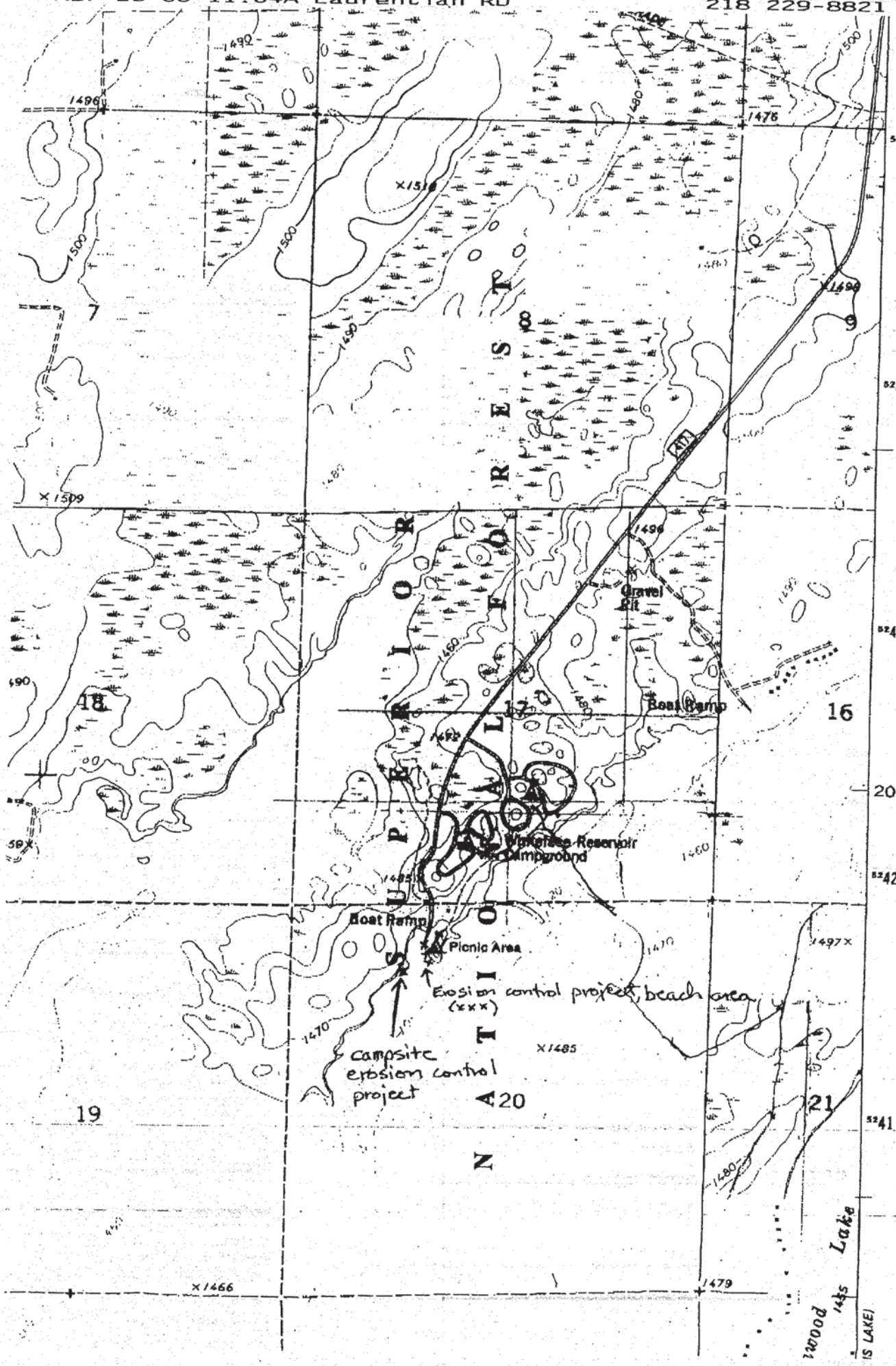


Charlotte W. Cohn
Environmental Planner
Environmental Policy and Review Unit
Division of Ecological Services

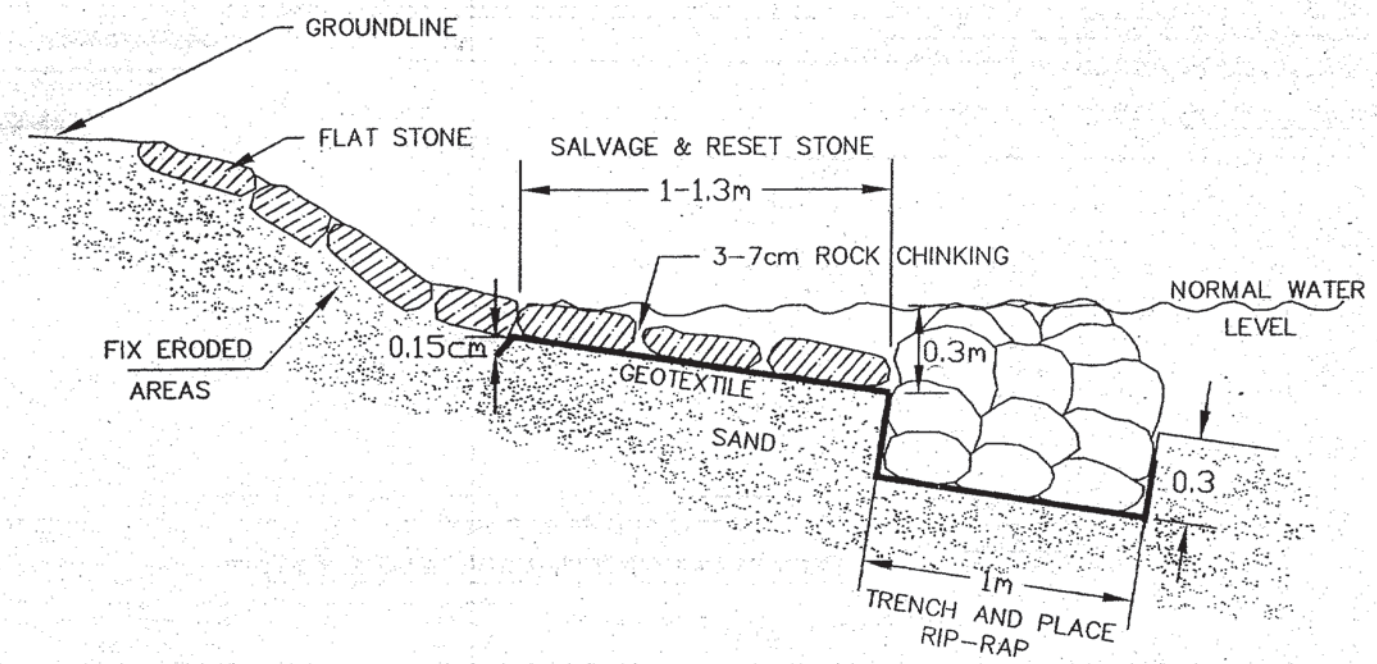
c: Judy Boudreau
Ian Chisholm
Steve Mueller
Tom Balcom
Judy Mader, MPCA

APPENDIX B

Map and Typical Drawing of Whiteface Reservoir Campground Erosion Project


Whiteface Reservoir Erosion Control / US Forest Service
xx - project location
Gravel Pit
Boat Ramp
Whiteface Reservoir Campground
Boat Ramp
Picnic Area
Erosion control project, beach area (xxx)
campsite erosion control project
Lake
(S LAKE)

WHITEFACE EROSION PROJECT
TYPICAL CONSTRUCTION
(NO SCALE)



ESTIMATE OF QUANTITIES

3-7 cm CRUSHED ROCK[1]	4 cubic meters
CRUSHED GRAVEL[1]	2 cubic meters
RIP-RAP[1]	25 cubic meters
FLAT STONE[2]	39 sq. meters
GEOTEXTILE[3]	105 sq. meters

37 lineal meters of shoreline work is required starting at the swimming beach.

[1]ON SITE STOCKPILED MATERIAL

[2]SALVAGE & RESET STONE

[3]GOVT. FURNISHED MATERIAL

01

APPENDIX E

AGENCY CONSULTATION RECORDS