

# Soudan Underground Mine State Park Management Plan



**Minnesota Department of Natural Resources  
Division of Parks and Recreation**

**January 2002**





## Minnesota Department of Natural Resources

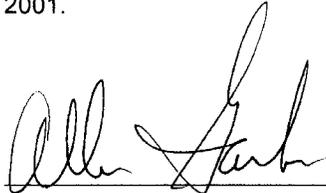
OFFICE OF THE COMMISSIONER  
500 Lafayette Road  
St. Paul, Minnesota 55155-4037

### Department of Natural Resources Approval of Management Plan for Soudan Underground Mine State Park

Minnesota Statutes 86A §09, Subdivision 1, requires that a master plan be prepared for units of Minnesota's outdoor recreation system, including state parks and state recreation areas. The Laws of Minnesota for 1963 (chpt. 790, art. 6) established Soudan Underground Mine State Park as part of Minnesota's Outdoor Recreation System (MS 85.013, subd.20a).

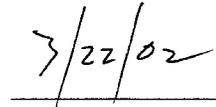
The Minnesota Department of Natural Resources worked in partnership with Minnesota citizens and an interdisciplinary resource team to develop a management plan for Soudan Underground Mine State Park.

The management plan was approved by the Division of Parks and Recreation management team, and has been approved through the DNR's Statewide Interdisciplinary Review Service/Senior Managers' review process during December 2001.



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Allen Garber, Commissioner  
Minnesota Department of Natural Resources



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Date



# Soudan Underground Mine State Park Management Plan



## State of Minnesota Department of Natural Resources Division of Parks and Recreation

This management plan has been prepared as required by 1999 Minnesota Laws Chapter 86A.09, Subdivision 1.

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# I. INTRODUCTION

## Park Description

Soudan Underground Mine State Park (UMSP) is located in the Border Lakes Landscape Region of Northeastern Minnesota, twenty-three miles southwest of Ely in St. Louis County. The park was established by the Minnesota Legislature in 1963. The statutory park boundary includes 1189.55 acres, of which 973.68 acres are currently owned and administered by the DNR, Division of Parks and Recreation.

Soudan UMSP contains significant natural and cultural resources. It encompasses the oldest iron ore mine in the State of Minnesota - a National Historic Landmark on the National Register of Historic Places. The mine has numerous pits and shafts - including over 54 miles of tunnels. The deepest level of the mine is 2,341 feet below the surface at Level 27 in Number 8 shaft. The mine, its historic structures, and the changing technology of mining are the central interpretive themes of the park. The park also includes large stands of old growth forest on ridges overlooking and along the shore of Lake Vermilion. The mine hosts a large bat population including the Northern Myotis (Myotis septentrionalis) and Eastern pipistrelle (Pipistrellus subflavus), species of State Special Concern. The mine is the most important hibernaculum in the state, and also serves as habitat for migrating bats in the spring and fall. Recreational opportunities at the park include hiking, picnicking, and snowmobiling.

## Role of Soudan Underground Mine State Park in the State Park System

The primary role of Soudan Underground Mine State Park is the preservation and interpretation of the cultural resources in the park. The Soudan Mine is a National Historic Landmark, and contains significant cultural resources related to the history of iron mining in Minnesota as well as other cultural and archaeological resources. The majority of visitors to the park attend the underground tour of the mine.

Secondary roles of the park include protecting natural resources and providing recreation opportunities. Preserving the park's significant old growth forest stands is a central natural resource goal for the park. The park also provides a variety of recreational opportunities including hiking, picnicking, fishing, cross-country skiing, and others. An additional secondary role of the park is the hosting of physics-related research and experiments.

## Mission and Vision Statements

### Department of Natural Resources Mission

The mission of the Minnesota Department of Natural Resources is to work with citizens to protect and manage the state's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life.

### Division of Parks and Recreation Mission and Vision

#### *Mission:*

We will work with the people of Minnesota to provide a state park system which preserves and manages Minnesota's natural, scenic and cultural resources for present and future generations while providing appropriate recreational and educational opportunities.

#### *Vision:*

We will continue to work with the people of Minnesota to ensure that the Minnesota State Park system will be sensitive to the needs of current and future generations and guided by the following principles and values:

- A commitment to ensure deliberate and effective natural, cultural, historical and archeological resource management;
- A commitment to provide appropriate recreational opportunities;
- A commitment to maintain a proper balance between resource protection and recreational use of state park lands;
- A conscious recognition of our responsibility to the public for wise and prudent acquisition and development of state park lands;
- A recognition of our environmental education and interpretative roles;
- A pledge to provide high quality public service;
- A promise to consistently seek public involvement and support in decision making;
- A conscious and continuous effort to respect the valuable human resources embodied in our employees and the public;
- A commitment to manage state parks for the benefits that they provide to people, society, the environment and the economy;
- A continued desire to actively seek and adopt innovative, effective and efficient management practices; and
- A realization of our responsibility to secure and maintain the resources necessary to implement our mandates and mission.

## Soudan Underground Mine State Park Mission and Vision

The following statements were generated by planning process participants after reviewing the general Department of Natural Resources and Division of Parks and Recreation mission and vision statements.

### *Mission:*

We will work with the people to preserve, manage and develop the diverse cultural, scenic and natural resources for present and future generations while providing appropriate recreational and educational opportunities with an emphasis on mining history, technology and research.

### *Twenty Year Vision:*

- To make a commitment to interpret, preserve, restore and manage the park's natural, cultural, historical and geological resources as appropriate.
- To continue utilizing the unique mine facilities for further research and experimentation without altering the mine's historic integrity.
- To provide education and interpretation of the physics research and MINOS laboratory in the mine, and integrate it with the other technological and historical features in the park.
- To provide appropriate recreational opportunities while preserving historical heritage and cultural and natural resources.
- To promote the iron range area as a whole; its history, communities, activities and its people.
- To explore the possibilities of expanding the park's boundaries to provide additional visitor opportunities.

## History of Soudan Underground Mine State Park and Surrounding Communities

The Soudan Iron Mine is the oldest and deepest mine in Minnesota. Its opening in 1884 marked the beginning utilization of one of the richest iron ore deposits in the world and the emergence of Minnesota as the leading iron ore producing state in America.

There is evidence of a long history of human habitation in Soudan UMSP and the surrounding area. Archaeological evidence places a succession of American Indian cultures at Lake Vermilion, starting before 7000 B.C. and continuing to the present day. Archaeological and cemetery sites can be found throughout the area, and early prospectors noted evidence of jasper and quartz mining within the park that predated European exploration.

The story of the area since its exploration and settlement by Euro-Americans is also rich: from the French and British fur trade and colonial conflicts, to the arrival of American fur traders, loggers, miners, and eventually settlers. Rumors of gold first brought miners to the area in 1865, only no gold was found. Iron ore was found as early as the 1850s, but not until the 1880s did technological advancement and capital investment combine to begin Minnesota's iron industry and give birth to Minnesota's "Iron Range."

Soudan Mine was the first iron mine in Minnesota. The Minnesota Iron Mining Company, formed by Charlemagne Tower, owned and operated the mine. In 1887, Charlemagne Tower sold the mine and other holdings to Illinois Steel Company. Later, the mine would be owned by U.S. Steel Corporation through its subsidiary Oliver Mining Company.

Initial excavations were underway in 1882, the first shipments of ore being delivered via a newly completed rail line to Two Harbors in 1884. The first workings were open pits. The narrow, vertical shape of the ore lens (or ore body) meant the pits were also narrow and deep - creating safety and operational problems. Mine shafts were dug as the pit operations became more difficult; the shafts following the ore lens underground. Over time, the mine would include fifteen major open pits and shafts, with twenty other minor workings. By 1890, the above ground mining ceased and all operations were underground. Eventually, the main shaft extended to a depth of almost 2,400 feet. The mine reached its peak production in 1892, shipping over 568,000 tons of high-grade ore and employing over 1,800 men. The mine produced over 17.9 million tons of iron ore during its operation.

The Soudan mine was important far beyond the amount of ore that it produced. The ore from the mine had a very high oxygen content. Oxygen is a critical component in the steel-making process. Ore from the mine (with its high oxygen content) was used as a catalyst - added in small amounts to other ore (with lower oxygen content) to help burn off impurities in the ore and produce high-grade steel. Ore from the Soudan mine allowed for the production of high-grade steel with ore from many other mines across the country.

The Soudan mine was an experiment in nearly every element of its operation - many different mining methods and techniques were utilized or developed at the mine. Its history illustrates a wide range of the techniques and technologies of underground mining from its beginnings in the 1890s to the 1960s.

As the mine grew, so did the communities of Tower and Soudan. Founded at the very edge of the mine, Soudan was a classic company town - the mining company and the community almost indistinguishable. The town began as two sites named Stone and Breitung, each named for a nearby ore pit. The company managed the settlement and built houses, a hospital, a community center, and a sawmill as well as cleaned the streets and developed wells for clean water. Tower grew independent of the mine company, but still existed to serve the mine and its workers. It was the first village north of Duluth and grew with the success of the mine - 5,000 people lived in Tower in 1888 when the village was only five years old. The mine brought people to these communities from all over America and immigrants from many countries.

The mine ceased iron ore production in 1962 - a victim of rising mining costs and changing technologies in steel production. New technologies were developed for injecting oxygen into the steel-making process,

reducing the value of the Soudan mine's high oxygen ore. The high cost of extracting the ore meant the mine struggled to compete with mines using cheaper open pit methods. Mining operations ended in 1962, with the last stockpiled ore shipping the following year. The mine has a known reserve of over 1.5 million tons of ore still in the ground.

U.S. Steel Corporation donated the mine and surrounding lands - including shoreline along Lake Vermilion - to the State of Minnesota in 1963. That same year, the Minnesota Legislature created Tower-Soudan State Park with the land. The name was later changed to Soudan Underground Mine State Park. U.S. Steel made a second donation of land in 1965 which is also part of the current park.

In 1966, the Soudan Mine was designated a National Historic Landmark, recognizing its important role in the industrial development of the United States and its value for preserving and interpreting a piece of America's cultural heritage. (See IV. Cultural Resources)

Starting in 1979, the Division of Parks and Recreation began working with the University of Minnesota concerning the use of the Soudan Underground Mine as a laboratory for physics research. The mine offers a unique research environment. The depth of the mine shields equipment from cosmic radiation and other high-energy interference that would hamper data collection. Also, the age of the surrounding rock means it emits virtually no radioactive particles of its own. The first physics experiment, Soudan - 2, is intended to observe proton decay. It began operating in the mid-1980s in a cavern carved at the mine's 27<sup>th</sup> level. A second experiment - called Cryogenic Dark Matter Search or CDMS II - also operates in the Soudan - 2 cavern. A second cavern was excavated at the 27<sup>th</sup> level to house the Main Injector Neutrino Oscillation Search or MINOS experiment. The experiment detectors are being assembled underground and are scheduled to begin collecting data in 2004.

## Unit Planning Process

This management plan was developed through an open public process. A citizens advisory committee and a resource management advisory team were used during the process to provide input into the development of the plan.

The Citizens Advisory Committee (CAC) provided public input throughout the planning process. The committee consisted of people that are primarily from the local area and have an interest in the future of the park. These individuals represent a variety of perspectives that are intended to be representative the diversity of the public at large. The committee members spent many hours over the course of the planning process analyzing and providing recommendations on a variety of environmental, cultural, and recreational issues.

Citizen Advisory Committee included representatives from:

St. Louis County Historical Society	Iron Range Resources and Rehabilitation Board
U. S. Steel Corporation	City of Tower
Tower-Soudan Historical Society	Township of Breitung
Stuntz Bay Boathouse Association	Lake Vermilion Area Chamber of Commerce
National Park Service	Minnesota Historical Society
Sportsmen's Club of Lake Vermilion	United States Forest Service
Tower Outdoor Fitness Club	St. Louis County Board of Commissioners
St. Louis County Planning Commission	Vermillion Community College
University of Minnesota	

The Resource Management Advisory Team consisted of technical experts from the divisions and units of the DNR. Both of these committees helped identify the issues that needed to be addressed during the planning process.

An open house was held August 27, 2001 at the City of Tower Civic Center to review the draft plan and solicit public comments on the proposals. Copies of the draft plan were available for review and comment for 30 days following the open house. The revised draft plan received final review by DNR in December 2001 and was signed by the Commissioner of Natural Resources in March 2002.

Copies of this plan are available at Soudan Underground Mine State Park and the DNR central office, Division of Parks and Recreation, 500 Lafayette Road, St. Paul, MN 55155.

A complete park management plan and planning process files documenting the 2000-2001 planning process and pertinent background information were distributed to the following locations:

- Soudan Underground Mine State Park, Soudan, MN
- State Park Regional Park Manager's Office, Grand Rapids, MN
- State Park Planning Section, St. Paul, MN

The recommendations in this plan are the result of this partnership-based planning process. This plan provides a basic management direction for Soudan Underground Mine State Park and is not intended to provide specific management or development details.

## II. REGIONAL ANALYSIS

### Border Lakes Ecological Subsection

Soudan Underground Mine State Park is located in the Border Lakes Landscape Region in the northeastern part of Minnesota. (See Figure 1 - Ecological Subsections) Lakes and rocky ridges characterize this landscape of glacially eroded bedrock. Long east-west running lakes occupy valleys once created by the movement of glacial ice. Lakes cover about 13% of this area's surface. The natural communities in this region are characterized by fire dependence. Jack pine, white pine, red pine, and hardwood-conifer forests dominate the area with an average four-year interval between significant fire years in pre-settlement times. Current land uses include logging, recreation and tourism.

### Regional Population Analysis

Soudan Underground Mine State Park is located in St. Louis County, approximately 240 miles northeast of Minneapolis-St. Paul, MN and approximately 125 miles north of Duluth, MN. In 1990, St. Louis County's population was 198,213. The 1999 population estimate was 199,080 - an increase of less than 1%. The largest city in the county is Duluth with 84,691 residents.

### Regional Recreation and Tourism Opportunities

The following regional analysis focuses on opportunities within 50 miles of Soudan Underground Mine State Park. (See Figure 2 - 50 mile Radius for Recreation and Tourism Opportunities)

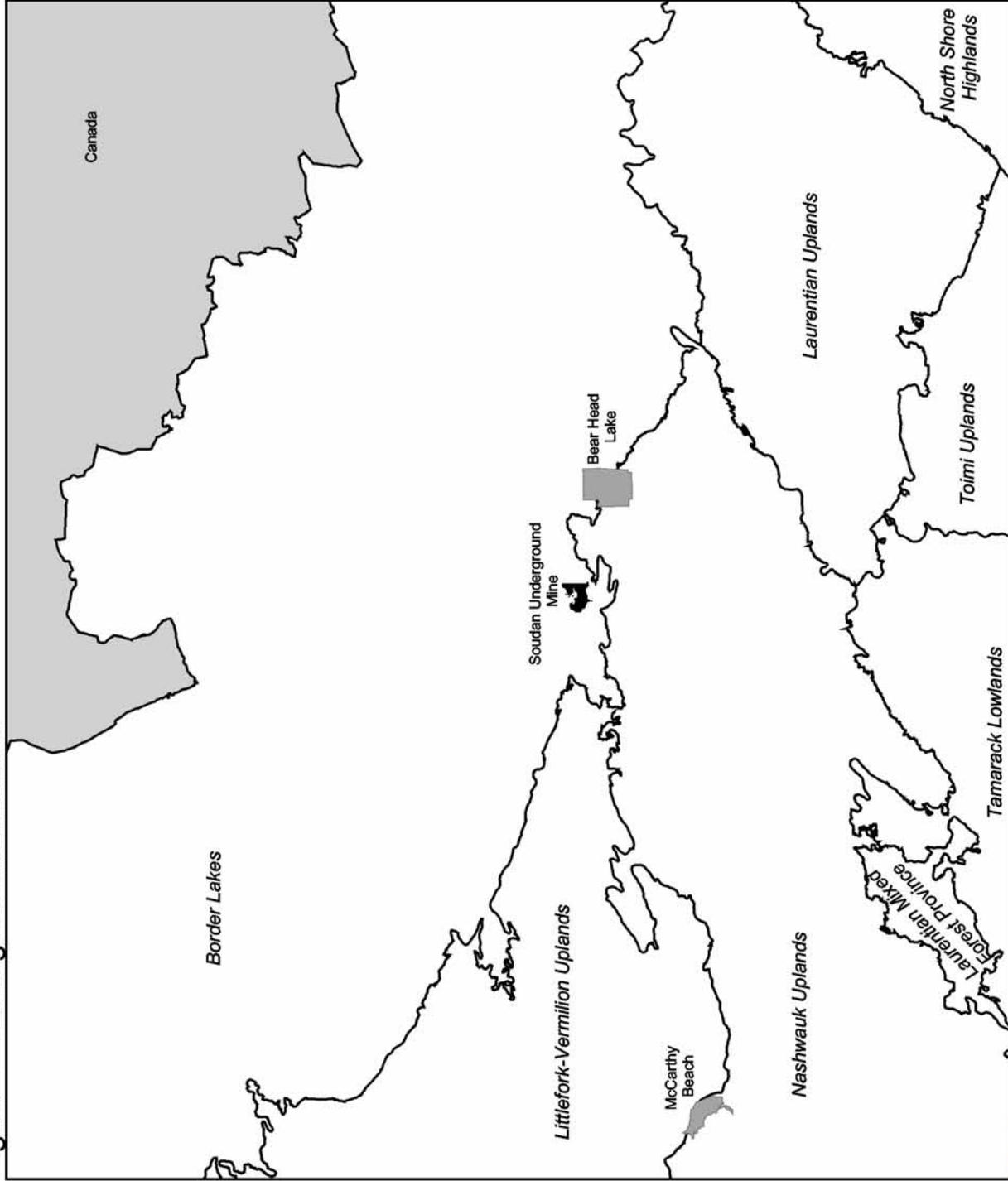
#### *Overnight Use*

*Campgrounds* - There are 77 developed campgrounds within a 50-mile radius of Soudan Underground Mine State Park. (See Table 1) Sixty-nine percent of the developed campgrounds are managed by private entities. Only three of the developed campgrounds in the region are located within State Parks. Walk-in/boat-in camping is available through the National Park Service, State Forests and several State Parks in the area. Group camping is offered at several State Parks in the area. Soudan UMSP does not provide any camping within the park, however Park staff is responsible for managing three Division of Forestry campgrounds in the area. In 2001, management of Division of Forestry campgrounds and day use areas was transferred to the Division of Parks and Recreation. (See IX. Operations, Staffing, and Costs)

*Non-Camp Lodging (Hotels/Motels/Resorts/Bed & Breakfasts)* - Over 140 privately owned businesses provide overnight accommodations for visitors within a 50-mile radius of Soudan UMSP. Facilities ranging from small cabins to large hotels can be found mainly in Ely and Virginia. The park does not provide any camping or other lodging for park visitors. However, facilities near Ely are less than 20 miles away.

# Soudan Underground Mine State Park

Figure 1 - Ecological Subsections

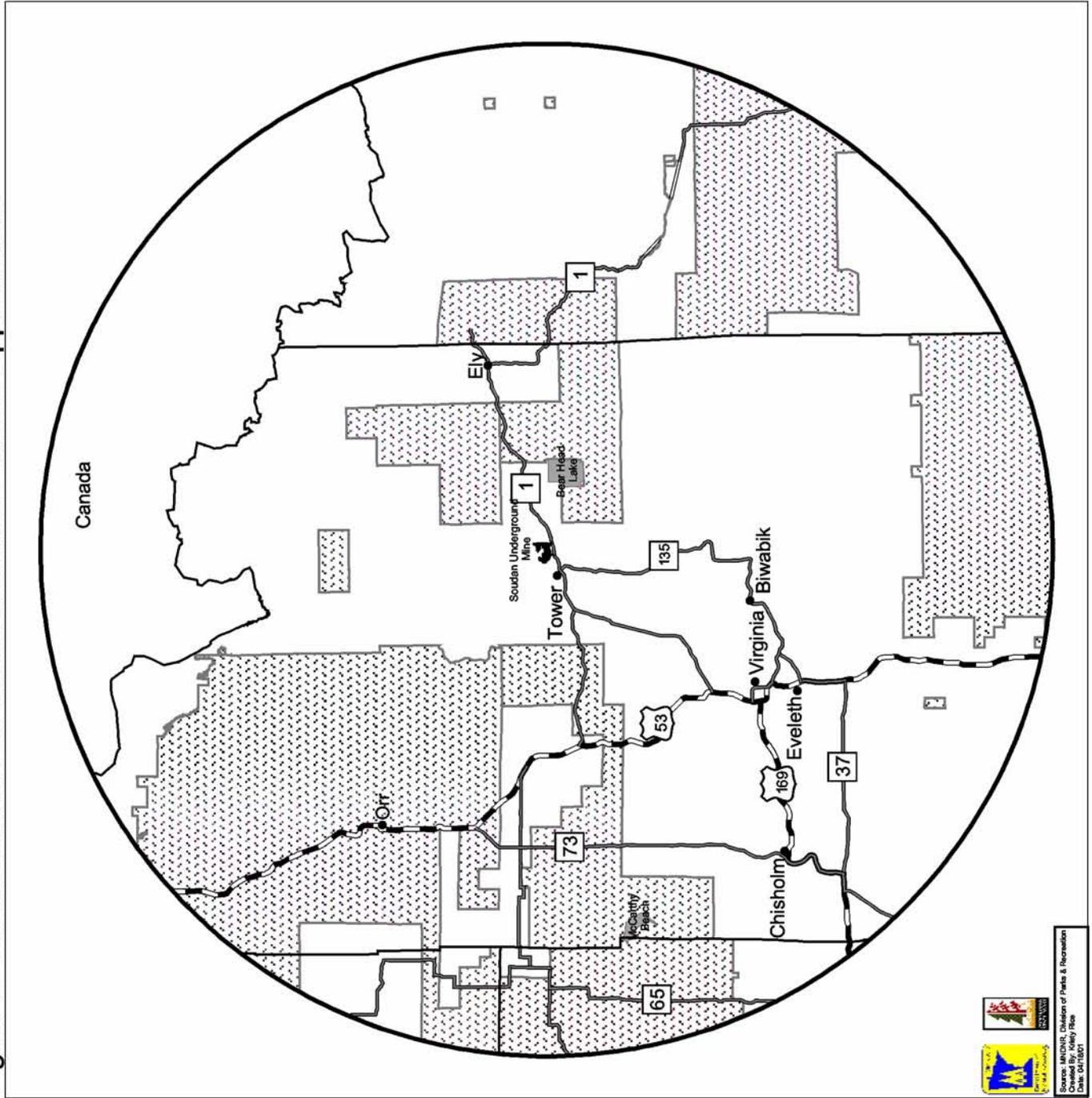


**Legend**

- Soudan Underground Mine State Park
- Other State Parks

Source: MNDNR, Division of Parks and Recreation  
Created by: Kelly Rice  
Date: 10/2011

**Soudan Underground Mine State Park**  
 Figure 2 - 50 Mile Radius for Recreation and Tourism Opportunities



**Legend**

-  Soudan Underground Mine
-  Other State Parks
-  State Forest
-  Federal Highways
-  State Highways



**Table 1. Camping Opportunities Within Fifty Miles of Soudan Underground Mine State Park.**

Managing Agency	# of Campgrounds	# of Sites			
		Drive-In w/ Electricity	Drive-In w/out Electricity	Walk-In/ Boat-In	Group
DNR Parks & Recreation	3	18	141	11	2
State Forests*	8	0	118	22	0
DNR Trails & Waterways	3	0	8	0	0
NPS - Voyageurs NP	0	0	0	64	0
USFS - Superior NF	10	0	259	0	1
Municipal	1	57	11	0	0
Private	53	938	246	0	0
<b>Total</b>	<b>77</b>	<b>1013</b>	<b>783</b>	<b>97</b>	<b>3</b>

\*State Forest campgrounds and day use areas are currently managed by DNR Parks and Recreation.

### *Trail Opportunities*

There are three long distance trails running through the 50-mile radius around Soudan UMSP: the Arrowhead and Taconite State Trails and the Mesabi Trail. The Arrowhead State Trail starts west of Tower and extends to International Falls. This trail is primarily used by snowmobiles, with sections near the City of Orr open for hiking. The Taconite State Trail runs between Ely and Grand Rapids. The main use on this trail is also snowmobiling, with some sections between Tower and Ely suitable for hiking. The trail section near McCarthy Beach State Park is used for horseback riding. Both of these trails are managed by the Division of Trails and Waterways. The Mesabi Trail is being developed by the Itasca County Regional Rail Authority and the St Louis and Lake Counties Regional Rail Authority. The paved trail is intended primarily for bicyclists and other non-motorized recreation, with some portions open to snowmobiles.

*Hiking* - There are 318 miles of hiking trails within a 50-mile radius of the park. The majority of these trails are managed by the U.S. Forest Service within Superior National Forest. There are 5 miles of hiking trails within Soudan UMSP.

*Horseback Riding* - There are approximately 101 miles of horse trails within 50 miles of the park. The main area of horseback riding centers on McCarthy Beach State Park, including portions of the Taconite State Trail. Division of Parks and Recreation manages twelve miles of horseback trails at McCarthy Beach State Park. There are no horseback riding trails in Soudan UMSP.

*Snowmobiling* - The majority of trails in the region are for snowmobiling. There are approximately 1,092 miles of snowmobile trails within the 50-mile radius of the park. Many of the trail miles are part of the grant-in-aid system. The grant-in-aid program provides for a system of trails which are initiated, planned and constructed by local user groups and funded through grants from the DNR. A local government unit (counties in most cases) serves as the sponsor for the local user group. Local municipalities also manage portions of snowmobile trail. Soudan UMSP has a three-mile snowmobile trail loop which connects to the Taconite State Trail.

*Cross-Country Skiing* - There are 130 miles of cross-country ski trails within 50 miles of Soudan UMSP. The Iron Range Resource and Rehabilitation Board (IRRRB) manages 36 miles of cross-country ski trails. St. Louis County manages 32 miles of trail. Division of Parks and Recreation manages 18 miles of the trails within the 50-mile radius, but none within Soudan UMSP.

*Recreational Motorized Vehicles (RMV)* - There are 52 miles of RMV trails within a 50-mile radius of Soudan Underground Mine State Park. RMVs included all terrain vehicles (ATV), off-highway motorcycles (OHM), and 4x4 trucks. These trails are managed by various agencies and fragmented throughout the area. Division of Trails and Waterways is developing the Iron Range Off-Highway Vehicle Recreation Area near Gilbert which will provide opportunities for ATVs, OHMs and 4x4 trucks and is working to provide additional opportunities in cooperation with grant-in-aid clubs, counties, and other local governments.

*Mountain Biking (off road)* - There are about 138 miles of off-road biking trails within 50 miles of Soudan. These areas are dispersed throughout several management jurisdictions. The Division of Parks and Recreation manages twenty-one miles within area State Parks, but none within Soudan UMSP.

**Table 2. Trail Opportunities within 50 miles of Soudan Underground Mine State Park\***

Managing Agency	Hiking	Horse-back Riding	Cross-Country Ski	Snow-mobile	RMV	Mountain Bike (Off Road)
DNR Parks & Recreation	35	12	18	13	0	21
DNR Trails & Waterways	33	33	0	193	0	33
USFS - Superior NF	200	0	5	34	20	0
NPS - Voyageurs NP	23	0	0	110	0	0
Municipal	0	0	8	131	0	0
County (Itasca, Lake, & St. Louis)	32	18	32	512	0	18
IRRRB	0	0	36	12	0	36
RRA**	30	38	30	30	0	30
Other	0	0	0	57	32	0
<b>Total</b>	<b>318</b>	<b>101</b>	<b>146</b>	<b>1092</b>	<b>52</b>	<b>138</b>

\*Many of these trails are multi-use, summing across category totals will overestimate total trail miles.

\*\*St. Louis and Lake Counties Regional Railroad Authority

#### *Other Day-Use Activities*

*Picnic Areas* - There are several picnic opportunities within 50 miles of the park. McCarthy Beach State Park and Bear Head Lake State Park provide picnic opportunities - picnic grounds with 175 tables and 115 tables respectively. Picnicking facilities are also available in many municipalities. Soudan UMSP provides two picnic areas and 20 picnic tables for visitor use.

*Swimming Beaches* - McCarthy Beach State Park and Bear Head Lake State Park maintain swimming beaches. Public beaches on Lake Vermilion include McKinley Park (Township of Breitung)

and Hoodoo Point (City of Tower). Other swimming beaches in the area are owned by private businesses and individuals. There are no swimming beaches within Soudan UMSP.

#### *Watercraft Access Facilities and Fishing Piers*

Within 50-miles of Soudan UMSP there are 109 carry-in boat launches and 147 boat launches designed for boats and trailers - several of which are on Lake Vermilion. These launches provide access for activities such as canoeing, kayaking, personal watercraft riding, and fishing. There are eight piers in this region that provide additional fishing access. There is no publicly managed access on Lake Vermilion within Soudan UMSP - the access at Stuntz Bay is private, operated by the Stuntz Bay Boathouse Association.

*Fishing* - There are numerous fishing opportunities within the 50-mile radius of Soudan UMSP. Lake Vermilion is adjacent to the park and provides one of the top walleye populations in the state. It is also the fifth largest lake in Minnesota, and has numerous public accesses - however, none within the park. There are also smaller lakes and streams in the area that provide additional opportunities for fishing. Ice fishing opportunities are also available on many area lakes.

*Hunting and Trapping* - Public hunting and trapping opportunities are available in St. Louis, Koochiching, Itasca and Lake Counties on state forest land. There are 11 state forests within a 50-mile radius of the park which provide opportunities for hunting and trapping within specified seasons.

*Interpretive Centers and Museums* - There are several museums in the region surrounding Soudan UMSP including the International Wolf Center (Ely), Vermilion Interpretive and History Museum (Ely), Dorothy Molter Museum (Ely), Ironworld Discovery Center (Chisholm), and the Minnesota Mining Museum (Chisholm). Several local communities have historical societies and heritage centers. McCarthy Beach and Bear Head Lake State Parks provide only occasional interpretive programs. Soudan UMSP provides interpretive services on a seasonal basis. The services include a 1½ hour tour of the underground mine

*Golf* - There are nine golf courses within the 50-mile radius of Soudan UMSP. Most of these courses are open to the public or are managed by municipal agencies. An additional course is under construction near Tower.

*Downhill Skiing* - There is one opportunity for downhill skiing within 50 miles of the park - Giant's Ridge in Biwabik.

*Casinos* - There is one casino within 50 miles of Soudan UMSP - Fortune Bay Resort and Casino in Tower. This casino provides gaming, lodging and access to other recreational opportunities.

*Outfitters and Guide Service* - There are many outfitters within 50 miles of the park, most located near Ely. The majority of the services available include fishing and hunting guides and canoe outfitting.

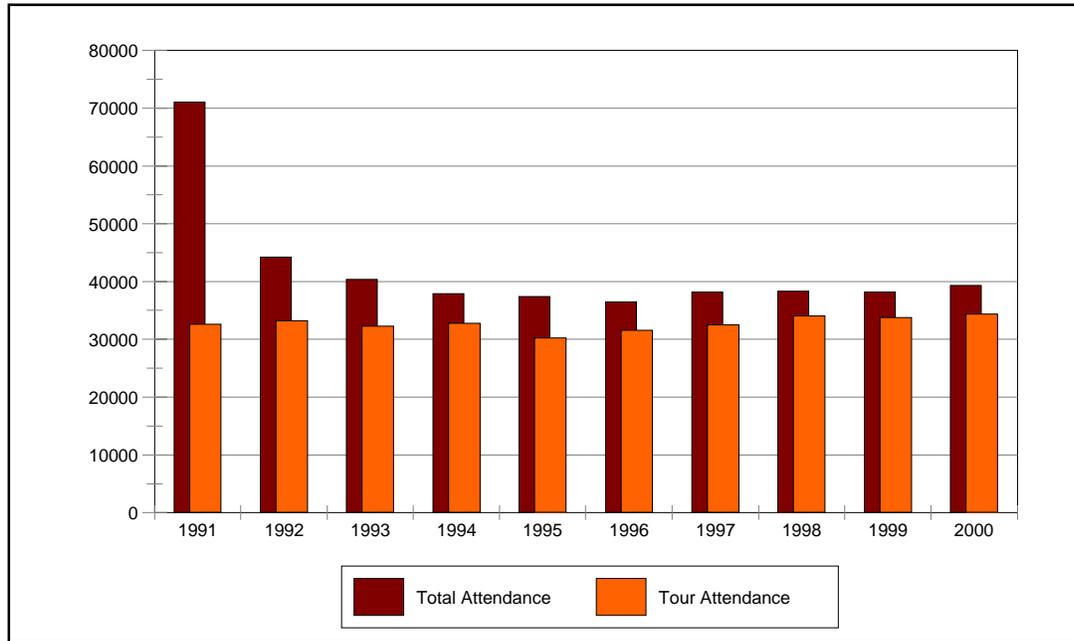
## **Visitor Use Patterns**

An estimated 39,298 people visited Soudan Underground Mine State Park in 2000. Most park visits occur in the summer months, from May to September, when the mine tours are being conducted. The underground mine tour accounts for the majority of park visits - 34,384 people attended an underground mine tour in 2000. All park use is currently day use - presently there are no camping opportunities within the park.

Chart 1 illustrates park visits and tour attendance at Soudan UMSP from 1991 to 2000. Tour attendance is tabulated from receipts, while overall park visits are estimated by a formula. The park visit formula was revised in 1992, resulting in the significant change in estimated visits from 1991. Since 1992, both mine tour attendance and overall park visits have been stable.

Park visits are anticipated to increase with the development of a new interpretive center and tour additions, such as a physics tour. Initiation of the outreach program would also likely increase park visits - including program participants as well as other visitors who learned about the park through the increased visibility brought on by the program.

**Chart 1 - Soudan UMSP Park Visits and Tour Attendance, 1991-2000**





### **III. NATURAL RESOURCES**

The goal of the resource management program at Soudan Underground Mine State Park is to sustain its healthy ecosystems into the future. Sustaining healthy ecosystems means not only keeping the land and water resources healthy; it means recognizing that Soudan Mine plays an important role in maintaining the ecological health of a much broader area. This goal cannot be achieved in isolation - the park is ultimately tied to its surroundings. Communication with and the support and cooperation of neighbors and neighboring public land managers is critical.

Division of Parks and Recreation's mandate for natural resources management is to manage the land to represent the range of native species and habitats that were present at the time of European settlement. Resources will be managed in ways that mimic natural processes, such as the use of prescribed burns. The park currently contains high quality forest, including old growth stands in excess of 100 years old. Continued development around the park - and throughout northeastern Minnesota - means these quality forest stands are increasingly more rare and more valuable to preserve.

#### **Climate**

Soudan Underground Mine State Park is subject to the strong continental weather patterns that influence all of Minnesota. The park is influenced by cold Arctic air during winter months and is frequently dominated by hot air masses from the Gulf of Mexico during the summer months. Total annual precipitation in the Soudan area is approximately 30 inches with an average growing season of 90 to 110 days, and an annual mean temperature of 49 degrees F.

#### **Topography**

The topography of the area is characterized by rock ridges and steep bluffs, with lakes and wetlands in the intervening depressions. Elevation within the park varies from 1,358 feet above sea level at Lake Vermilion to 1,620 feet above sea level. (See Figure 3 - Aerial Photo and Figure 4 - 20 Foot Contours)

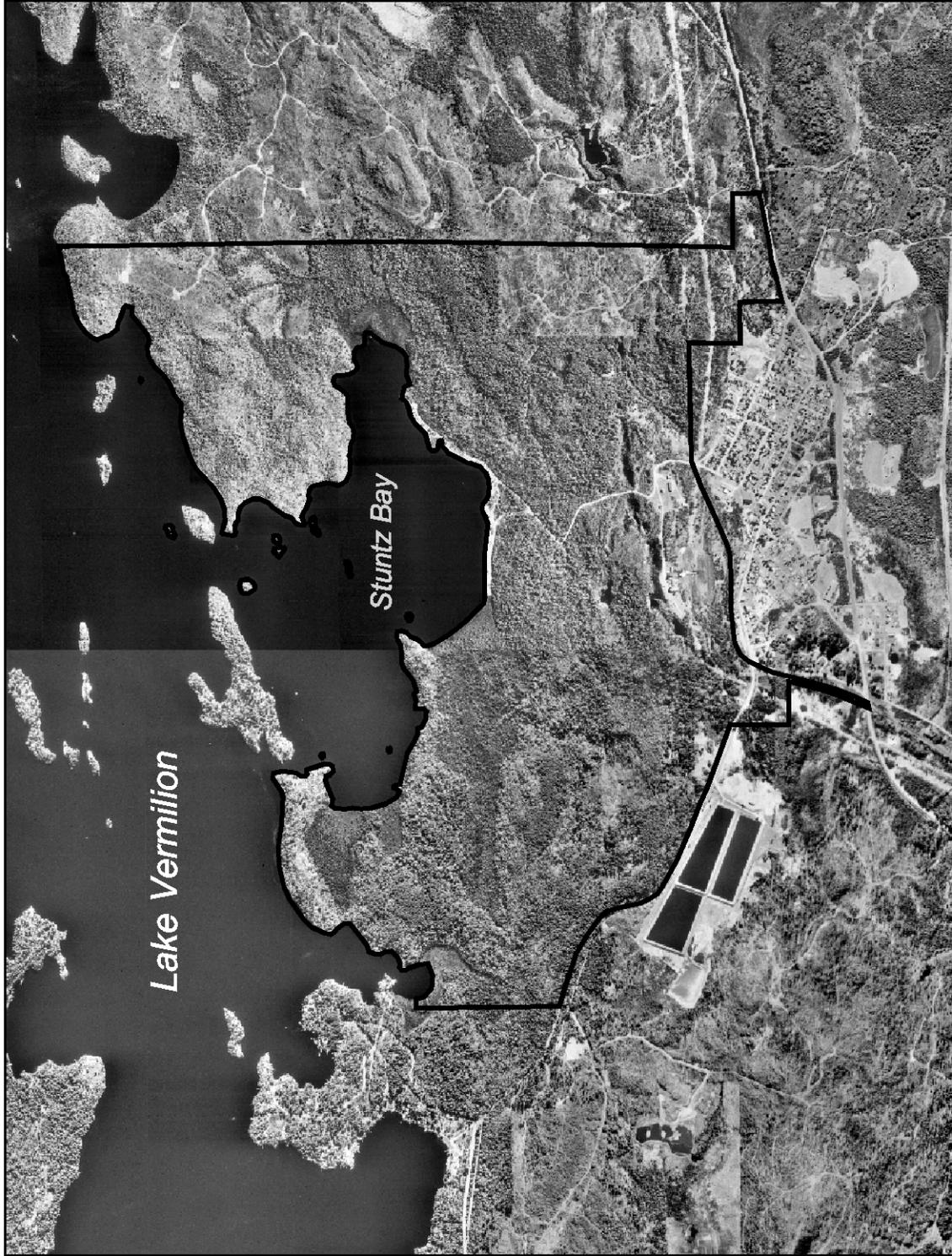
#### **Geology and Minerals**

Soudan UMSP has an interesting geologic history. The underlying bedrock formations in the park are estimated to be more than 2.7 billion years old. The two bedrock formations are an iron-bearing metamorphic formation and a metamorphosed sedimentary rock formation. These iron-bearing formations were created by volcanic activity at the bottom of an ancient ocean, the same type of activity observed around hydrothermal vents and suboceanic volcanoes on the ocean floor today.

The iron ore of the Vermilion Range district was first "discovered" in 1850, although there is evidence of quarrying for jasper and other minerals by American Indians that predate European settlement. Substantial exploration for iron did not start until 1875. The ore bodies within the park are irregular in shape and are mostly hard and dense bluish hematite and are of exceptionally fine material. The principal iron minerals of these ores are blue and dark red hematites with minor amounts of magnetite and siderite. The area was extensively mined, however substantial deposits remain. Deposits of other minerals such as nickel, lead, gold, silver and zinc are likely present. The State of Minnesota holds the mineral rights to the park.

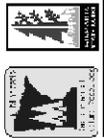
# Soudan Underground Mine State Park

Figure 3 - Aerial Photo



**Legend**

- State Park
- Statutory Boundary

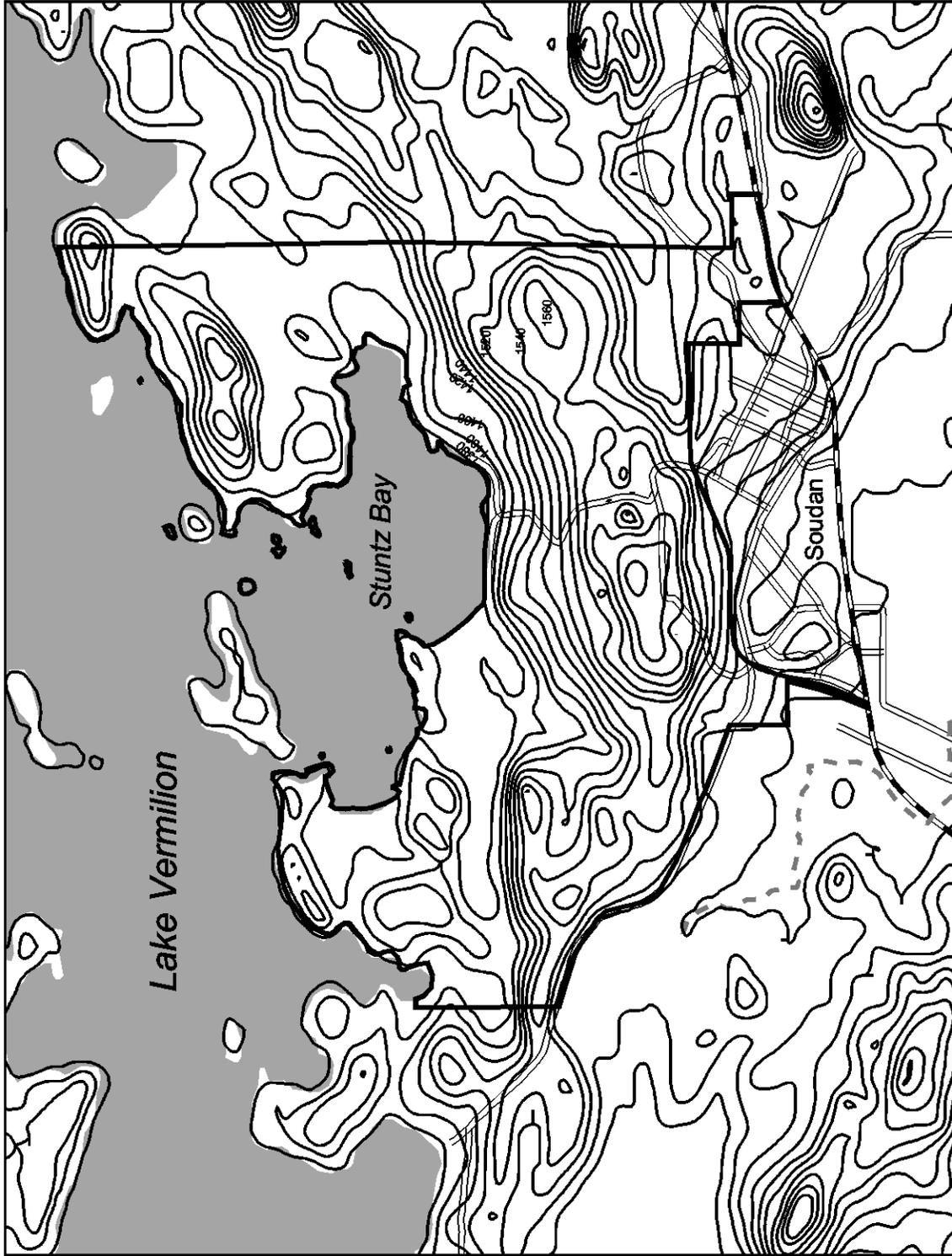


Minnesota Department of Natural Resources  
Soudan Underground Mine State Park  
Date: 04/08/01



# Soudan Underground Mine State Park

Figure 4 - 20 Foot Contours



**Legend**

- State Park
- Statutory Boundary
- 20' Contours
- Water
- Lakes
- Rivers
- Roads
- Highways
- Township Roads



Source: MNRMS, Division of Parks and Recreation  
 Created By: John Foss  
 Date: 04/03/01

An exposure of the Soudan Iron Formation can be found on the top of Soudan Hill, east of Stuntz Bay Road. This exposure is important in that it illustrates many of the significant characteristics of the Soudan Iron Formation's composition - alternating bands of steely-gray hematite, white to pink chert, and red jasper. The exposure also displays three distinct geological processes - folding, mineralization, and glacial erosion - that shaped and formed the outcropping. The Minnesota Natural Heritage Program qualifies the exposure as a Natural Heritage Program Registry site, describing it as an "igneous unit or sequence" occurrence that is "very significant in a nationwide or worldwide context."

## Soils

The soils data available for Soudan UMSP are at the general soils mapping level. A detailed soils survey has not been completed for St. Louis County. The general soils map indicates three soils groups in the park - two upland and one lowland. One upland group covers a majority of the park and nearly all of what is now in public ownership. This group is made up primarily of Quetico-rock outcrop. It is a very shallow loam over bedrock. It is characterized by numerous areas of exposed rocks and is generally unsuitable for development. Some small areas within the series may be suitable for siting facilities. The other upland group consists mainly of Newfound sandy loam. This soil is fairly good for park development on the less steep slopes. The lowland group consists primarily of Moose Lake peatland and is not suitable for development. (See Figure 5 - Soils)

There is some minor soil erosion present along trails within the park. Trail maintenance and discouraging volunteer trails will help minimize future erosion problems.

The soil associations found in Soudan UMSP are listed below. General association descriptions are included in Appendix A.

### *Soil Associations*

1-10B	Brickton-Dalbo-Hassman complex, 0 to 6% slopes.
1-15A	Bugcreek-Indus complex, 0 to 2% slopes.
1-16D	Conic-Insula-Rock outcrop complex, 8 to 25% slopes.
1-17D	Quetico-Rock outcrop complex, 15 to 35% slopes.
1-17F	Quetico-Rock outcrop complex, 35 to 60% slopes.
6-2D	Eveleth-Conic-Rock outcrop complex, 8 to 18% slopes.
6-2E	Eveleth-Conic-Rock outcrop complex, 18 to 30% slopes.
6-3B	Babbitt-Wahlsten-Rock outcrop complex, 1 to 8% slopes.
6-4D	Eveleth-Conic-Bugcreek complex, 0 to 18% slopes, bouldery.
7-3A	Unnamed Aeric Endoaquept, co-ly, SPD, 0 to 2% slopes.
7-11B	Cloquet-Emmert complex, 2 to 8% slopes, very stony.
7-11D	Cloquet-Emmert complex, 8 to 18% slopes, very stony.
541	Rifle peat
543	Markey muck
1041	Pits, iron mine
1042	Dumps, iron mine
1043	Udorthents, nearly level to very steep.



## Vegetation

### *Presettlement Vegetation*

Notes from early surveys give some detail as to the vegetation in the area surrounding the park. George Stuntz conducted surveys in the Tower and Soudan area in June 1880 as part of the development of the Soudan Iron Mine. Extensive fires had burned through much of the area that now encompasses the park, while stands of pine and cedar in the swamps survived the fires. Very little logging occurred in the immediate area of the mine, little timber was available because of recent fires. Much of the forest in the park today is the natural regrowth that followed those last series of fires, the area never having been logged. Excerpts from Stuntz's notes are included below.

"This land is at the east end of Vermilion Lake and is generally rocky with some very fertile levels in the valleys. There are several ranges of bluffs and hills in the southeastern part showing veins of iron ore on the islands. In the northern part there are numerous quartz veins carrying iron pyrites.

"Extensive fires have raged in former years, these burnt districts are now growing up rapidly with young birch, spruce, aspen, and other kinds of timber. The iron ore appears to be of excellent quality. Some of the quartz veins have been worked but never returns in gold or silver . . .

"Surface hilly, covered with boulders, soil 2nd rate. Ledges of Jasper & Metamorphic rocks. Veins of iron ore. Timber in swamp, cedar, black ash, rest of timber burnt out." (Line notes from between Sections 27 and 28 which extends through the middle of the park.)

### *Present Vegetation*

Stands of white and Norway pine mixed with balsam, aspen, and birch cover the upland areas. These stands are of high ecological quality and scenic beauty. The lowlands are dominated by white cedar interspersed with balsam, tamarack, black spruce, ash and muskeg. (See Figure 6 - Present Vegetation)

High quality old growth forest stands are present in the park. Old growth stands represent a significant portion of the forested area of the park and constitute a valuable reserve of an increasingly rare natural community. These stands have been identified and will be protected in accordance with the DNR's Old Growth Guidelines. Currently, there are no long-term management plans for the old growth stands within the park. (See Figure 7 - Old Growth Forest Stands and Buffer Areas)

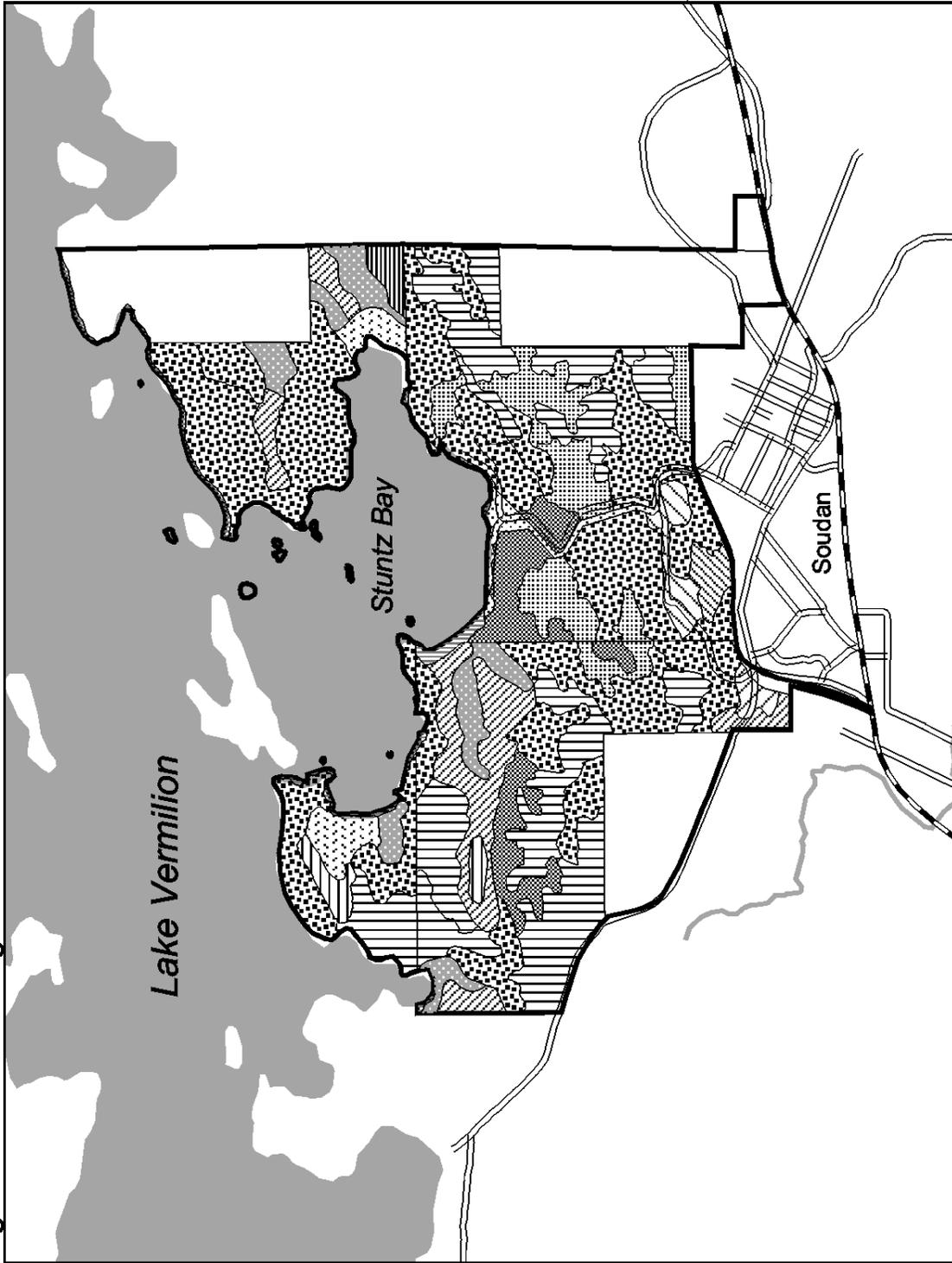
Also, vegetation has reclaimed much of the formerly cleared and mined area of the park. These second-growth stands are in some cases over eighty years old and have developed into quality forest stands. The open pits, mine shafts and other artifacts are obscured by vegetation, impacting the industrial character of the site. Selective removal of vegetation is necessary for the preservation and interpretation of some cultural resources. The vegetation removal areas are described and illustrated in VIII. Significant Areas Mapping. (See Figure 17 - Future Conditions - Significant Natural and Cultural Resources Map)

## Wildlife

Wildlife populations in Soudan UMSP have not been inventoried. The wildlife species known to inhabit St. Louis County include 113 birds, 37 mammals and 15 reptile and amphibian species. (See Appendix B for species listing.) The park contains significant acreage and habitat that can be expected to support many of these species. Animals that have been sighted in the park include northern songbirds, loons, hawks, owls, bats, white-tailed deer, black bear, timberwolves, fishers and many smaller animals.

# Soudan Underground Mine State Park

## Figure 6 - Present Vegetation



**Legend**

State Park  
Statutory Boundary

Vegetation Type

- No Data
- Ash
- Aspen
- Birch
- White Pine
- Norway Pine
- White Spruce
- Balsam Fir
- Lowland Black Spruce
- Northern White Cedar
- Upland Grass
- Lowland Brush
- Muskeg

Water

Lakes

Rivers

Roads

Highways

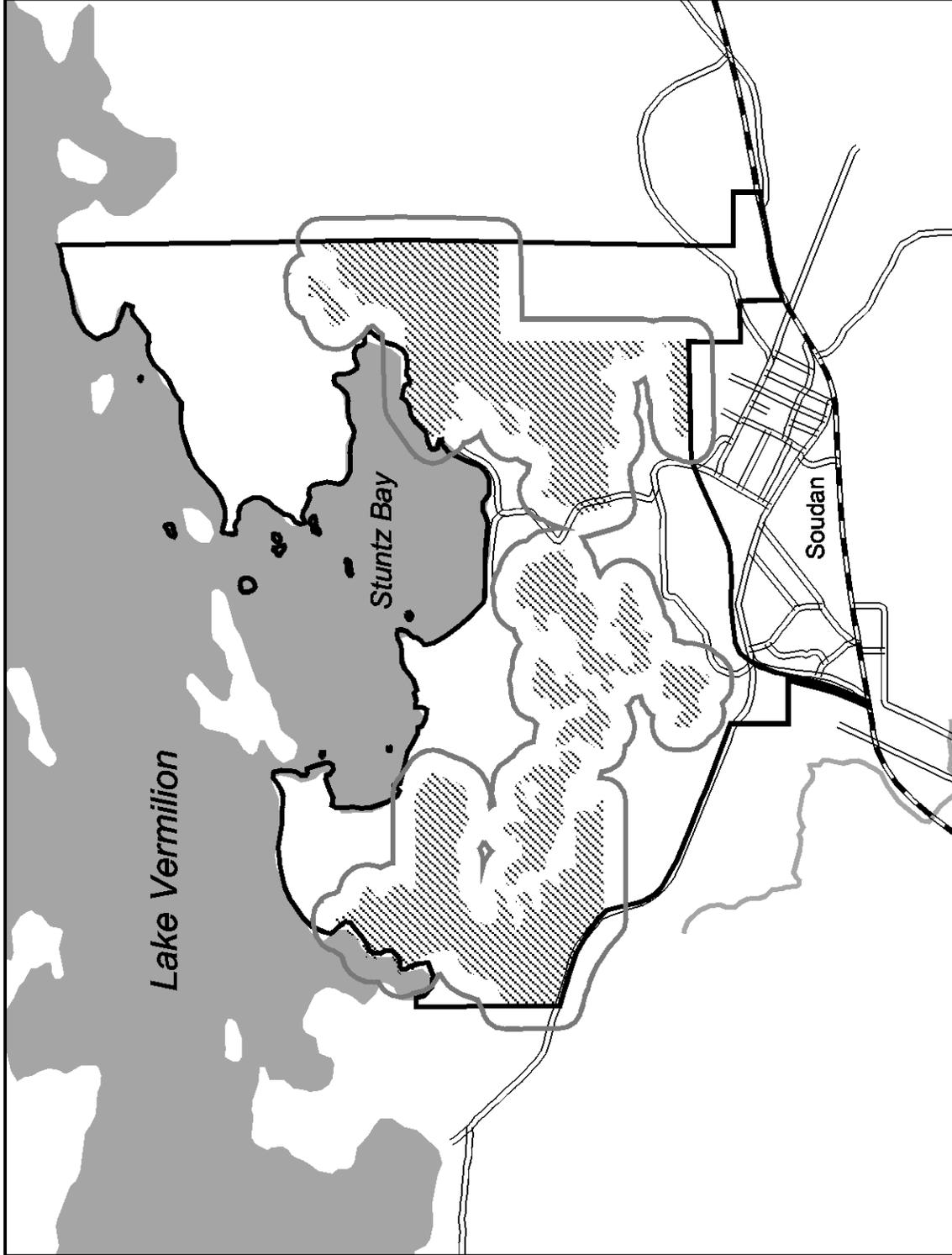
Township Roads

Source: MNDNR, Division of Parks & Recreation  
Created by: Kelley Rice  
Date: 04/01/01



# Soudan Underground Mine State Park

## Figure 7 - Old Growth Forest Stands and Buffer Areas



**Legend**

- State Park Statutory Boundary
- Old Growth Forest
- Buffer
- Stands
- Water
- Lakes
- Rivers
- Roads
- Highways
- Township Roads



Source: MNDNR/Division of Parks, Recreation and Historic Sites  
Date: 05/04/2011

One of the most important wildlife populations within the park is the several species of bats that use the mineshafts and tunnels. Hibernaculums are rarely found as far north as the Soudan area. Bats have been found throughout the mine, in every drift at every level. The bats tend to concentrate in areas of higher humidity in the mine. Three species of bats have been identified in the mine. Little brown myotis (Myotis lucifugus) is the most common species observed in the mine, both in hibernation and spring migration masses (approximately 90% of bats). Northern long-eared bat or northern myotis (Myotis septentrionalis) is a State Species of Special Concern. Eastern pipistrelle (Pipistrellus subflavus) is at the very northwest of its range at Soudan UMSP. Only a few individuals have been observed in the mine. The mine serves as very important winter habitat for bats - it is considered the most important hibernaculum in Minnesota. The mine is also important habitat for migrating bats in the spring. It serves as a stopping point and shelter - a place for migrating bats to roost while the weather stabilizes. The University of Minnesota and the Division of Parks and Recreation have been conducting winter counts since the mid 1980s and have also conducted banding surveys. A thorough survey of the mine in 1996 counted 4,000 individual bats, a number which was extrapolated to 10,000 bats to account for uncounted bat groups and bats in portions of the mine that were inaccessible for the survey. In 2001, over 10,000 bats were estimated in one concentration area in the mine.

## Endangered, Threatened, and Special Concern Species

The Minnesota Natural Heritage Nongame Research Program, Nongame Wildlife Program, and the Minnesota County Biological Survey document locations of rare features including rare plants and animals, natural communities, and selected animal aggregations and geologic features. The documentation is recorded as part of a Rare Features Database. Soudan UMSP hosts four animal species recorded in the database. (To date, plant species have not been inventoried.)

### *Known Rare Animals in the Park*

Gray Wolf (Canis lupus): State Special Concern, Federally Threatened

Gray wolves are sighted regularly in and around Soudan Underground Mine State Park. Their primary food source in Minnesota is deer and beaver. Principal causes of mortality for wolves involve people, either collisions with vehicles or shooting. Wolves are expected to be removed from the Federal List of Endangered Species in the near future.

Bald Eagle (Haliaeetus leucocephalus): State Special Concern, Federally Threatened

Bald eagles are sighted seasonally each year in the Soudan area. They use supercanopy trees as nesting sites, commonly white pines. Eagle population size in the Soudan area seems to be limited by availability of nest sites.

Northern Long-Eared Bat or Northern Myotis (Myotis septentrionalis): State Special Concern

The mineshafts at Soudan UMSP serve as an important habitat for this species - especially as a hibernaculum.

Eastern Pipistrelle (Pipistrellus subflavus): State Special Concern

The eastern pipistrelle is at the very northwest of its range at Soudan UMSP - only a few individuals have been observed in the mine.

## Groundwater

Potable water for the park is obtained from the Breitung Township municipal system. The water system consists of three wells located between Tower and Soudan with a pressure tank in the park. Water is adequate in both quality and quantity and requires no management at this time. The park's sewage

system consists of two Imhoff tanks and drainfields. The sewage systems are adequate and pose no threat to park water supplies.

Groundwater is continually pumped from the mine. Water seeps into the mine at several levels, and is removed to the surface by a series of pumps. The water removal is necessary to protect cultural resources in the mine, to maintain the mine for tours, and to protect the University of Minnesota physics projects. The water absorbs naturally occurring copper and cobalt as it moves through the rock prior to seeping into the mine. The levels of copper and cobalt measured in the water as it is pumped from the mine exceed the current standards for surface discharge. The annual average concentration of copper is .083 mg/l to .5 mg/l. The standard for copper is .020 mg/l. The annual average concentration of cobalt is .006 mg/l to .026 mg/l. The standard for cobalt is .005 mg/l. Discharge of the water requires a permit from the Minnesota Pollution Control Agency (PCA). (This and the following are from Eger, et al., 2001.)

The mine discharge averages 60 gallons per minute. The water is discharged into a surface drainage that flows through the community of Soudan and into a wetland south of State Highway 169. Water pumped from the mine has been discharged in this way at least since 1920, and likely since 1900 - nearly 100 years. The metals bind to the peat soils in the wetland, reducing the amount of metals in the water flowing out of the wetland to background levels. Once bound to the soil, the metals are unlikely to migrate further and are effectively removed from the water cycle. Despite at least 80 years of discharge, tests have demonstrated that all the copper and cobalt are removed from the water in about a five-acre portion of the twenty-acre wetland.

In 1998, the Division developed a proposal meet to the permit requirements - treat the water from 10NT (a site on Level 10 that contributes 94% of the total copper and 44% of the total cobalt in the discharge) in an organic substrate/limestone bed, then discharge this pre-treated water with the remainder of the water into the wetland where the remaining metals would be naturally removed. To compensate for the use of the wetland, the Division would restore equivalent acres of wetlands. PCA approved this proposal in 1999. The Division restored 5.6 acres of wetlands in Camden State Park that same year.

However, PCA has since withdrawn their approval of the proposal, stating that despite historic use of the area they could not issue a permit unless the DNR owned the wetland or had an agreement for its use. (United States Steel Group maintained ownership of the wetland at the time the mine was transferred to State ownership.) Further, the estimated cost of the organic substrate/limestone bed increased from \$150,000 to over \$200,000.

#### *Permit Issues*

There are two significant issues to resolve as part of the permit process and before selecting a treatment method. First, there are questions related to the cobalt and copper standards that should be applied to the discharge. Second, the point of compliance - where these standards must be met along the discharge drainage - needs to be determined. How these issues are resolved will have significant bearing on the choice among treatment options and overall cost of the treatment project.

#### *Treatment Options*

Four possible options have been identified for treating the mine discharge: natural wetland treatment, passive treatment with an organic substrate/limestone bed, active treatment, and use of the Tower wastewater treatment plant. Natural wetlands treatment involves the use of a wetland to remove the metals by binding them to the soil. PCA will not permit the use of this option without DNR ownership of the wetland, and also has concerns about the ability of the wetland to continue to bind metals in the future. Tests have demonstrated that passive treatment using an organic substrate/limestone bed (a constructed bed that functions similarly to natural wetland treatment) is a feasible but costly treatment option. Active treatment would use one of many treatment methods, such as lime treatment and ion exchange, but has high startup and operation costs. The Tower wastewater treatment ponds are capable of removing the metals, however PCA is concerned about the potential impact of the

elevated copper on algae in the lagoons - more research would be necessary for this option. Pre-treatment prior to discharge into the lagoon system would likely be necessary.

The likely treatment option will be a combination of a year-round ionization system located within the mine and an external lime filter to treat peak spring flows from level 10. If this combination successfully treats the discharge to acceptable permit standards, no further action will be needed. If this combination fails to meet discharge limits, secondary treatment at the Tower wastewater ponds may be warranted.

#### *Department Coordination*

At this time, the Division has not made a final selection of a treatment option or combination of options it will propose to treat the mine water to acceptable discharge levels. The Division of Parks and Recreation will work with the Bureau of Field Operations and Services, if warranted, on future implementation of the water treatment system.

### **Surface Water and Fisheries**

The park is located on the south shore of Lake Vermilion. Only a small portion of this large lake lies within the statutory boundary of the park, although the park lands include 12 islands. Management for water quality and fisheries is adequate and no additional actions are necessary at this time. Privately leased boathouses on Stuntz Bay have the potential to impact surface water quality through shoreline erosion and pollution. Division of Parks and Recreation and Division of Waters will monitor water quality in the area and work with leaseholders and Stuntz Bay Boathouse Association to address water quality issues.

### **Information Needs for Natural Resources Management**

There are two issues in which more research will be needed for natural resources management.

1. Monitoring vegetation removal in the mine area

The open pit mines and the area surrounding the mineshafts and buildings were devoid of vegetation during the mine's operation. Today, trees and shrubs block the view of the open pits and other areas. The vegetation alters the appearance of the mine area and hampers interpretation. Initial areas have been identified as part of this planning process. (See also VIII. Significant Areas Mapping and Figure 17 - Future Conditions - Significant Natural and Cultural Resources Map.) Success of clearing efforts will be monitored to evaluate removal techniques. Additional sites may also be considered as part of the cultural resources management plan or historic buildings management plan. (See IV. Cultural Resources.)

2. Bats

A better understanding of how bats use the mine is needed. The mine is a hibernaculum for large numbers of bats, including *Myotis septentrionalis* and *Pipistrellus subflavus*, species of State Special Concern. The bat population - its stability and long-term trends - is not well understood at this time. The bats use the Alaska and No. 8 shafts to enter and leave the mine. However if the bats can move between the shafts, what levels they use, and how human activities impact the hibernaculum is largely unknown. What other shafts or mine areas are being used by bats has not been determined. Further information about the bat population and its use of the mine is crucial to preserving the hibernaculum and managing human-bat interactions.

## Natural Resource Management Recommendations

The recommendations that follow are intended to provide general direction for the natural resource management activities that will be conducted in the park. Annual work planning meetings will use these recommendations to set short-term goals and priorities. Some management recommendations are very general and actions will be developed as more information is obtained.

### *Recommendations:*

*Conduct research, inventories, and monitoring of natural resource issues related to the long-term health of the park ecosystem.*

Conduct a park natural resource inventory. A comprehensive natural resource inventory of the park will assist in the development of priorities for managing and restoring flora and fauna in Soudan UMSP. It will establish a baseline inventory of species within the park. It will also be valuable information for evaluating potential facility sites and recreational use areas. Volunteers could be used to help in data collection for the inventory.

Expand the bat research being conducted in the park. Very little is currently known about the bat populations and the mine's role as a hibernaculum. However, the rarity of northern hibernaculum sites in general and the presence of *M. septentrionalis* and *P. subflavus* in particular means this area deserves more study. A better understanding of how the bats will be affected by the additional use of the shaft and excavation associated with the University of Minnesota experiments is also needed. More information on the bat populations and their activities in the mine will both help avoid potential bat-human conflicts.

Monitor use impacts and habitat conditions on the islands within the park. The islands within the park contain important habitat and high scenic value. They are also vulnerable to resource degradation from recreational use - especially the smaller islands. Recreational use and habitat conditions should be monitored to identify conflicts areas.

Monitor and gauge need for removal of aggressive non-native species. Non-native species identified within the park will be observed to evaluate the existing or potential impact they have on the native plants and animals in the park. If the non-natives have significant negative impacts on native species, management alternatives will be developed to combat the establishment and spread of the non-natives.

*Sustain a variety of healthy natural communities.*

Perpetuate and expand uncommon native forest types or components. White cedar, white pine, and red pine are examples of important native forest tree species that are becoming less common on the landscape. The basswoods and maples found along the Lake Vermilion shoreline are rare - these species are not usually found this far north in Minnesota but exist in the shoreline microclimate created by the lake.

Use natural management methods - primarily prescribed burns - and natural disturbance to maintain the health and diversity of the park's environment. Allow natural disturbances and processes to operate in the park - such as not salvaging timber after blowdowns. Fire is part of the natural system that created and sustained this type of forest. Controlled burning will be used to maintain the health and diversity of the forest stands within the park. Other management methods will still be used as warranted.

Conduct natural resource evaluations for new development proposals. The Division of Parks and Recreation follows a resource assessment process for all new development. Office research and field studies of proposed development sites are made to determine expected natural resource impacts. Recommendations for avoiding and minimizing resource impacts are then made, which may include no development or relocation to another site.

*Encourage the development and maintenance of older forests.*

Develop a management plan for the old growth stands within the park. Other than the cultural resource and visitor use areas, the park will be managed toward an old growth forest community. The management plan will follow the Department guidelines for old growth areas.

Locate park development to avoid impacts to existing old growth stands or further fragmenting old growth stands. The old growth stands in the park are high quality and increasingly rare in northeast Minnesota. The Division will follow statutory guidelines for protecting old growth stands and buffer areas. Park facilities, trails or other development should be located with sensitivity to protecting these forest stands. Areas between closely spaced old growth stands should also be protected to allow these areas, in time, to grow into continuous stands.

Limit activities that open the forest canopy. Volunteer trails, informal trail widening, or other activities that widen openings in the forest canopy will be limited to protect interior habitat and reduce negative edge effects.

*Sustain healthy and diverse native animal and plant populations.*

Remove aggressive non-native species that are, or have the potential to, impact native plant and animal communities. Appropriate management procedures will be developed and implemented to limit the negative impact of non-native species on the native plants and animals in the park.

Implement management strategies necessary to ensure the continued presence of known rare plants and animals in Soudan UMSP. Several rare and endangered species are known to live in or frequent the area of the park including the gray wolf, bald eagle, northern long-eared (or northern myotis) bat, and the eastern pipistrelle bat. More research may be needed in some cases to determine appropriate strategies. (See recommendation above.)

*Maintain healthy and diverse aquatic systems.*

Protect the undeveloped shoreline along Lake Vermilion. Undeveloped shoreline on Lake Vermilion is increasingly rare. Visual or structural impacts to the shoreline and lake viewshed in the park should be minimized. Any future shoreline development within the existing park boundary should be located in areas already impacted by development. Shoreline on property included with future acquisitions should be assessed and disturbance of undeveloped shoreline minimized.

Manage water quality impacts from the boathouse area on Stuntz Bay. Park staff will work with Division of Waters and the Stuntz Bay Boathouse Association to manage the shoreline within and adjacent to the boathouse area to minimize activities that negatively impact water quality (erosion, vegetation removal, gasoline/oil disposal, etc.).

Manage the islands within the park to protect the natural resources and undisturbed quality of the island environment. The protection of natural resources and habitat - including fish habitat in the shallows surrounding the islands - will be balanced with the increased use and pressure for greater recreation access to these properties.

*Maintain visitor use and cultural resource areas to minimize natural resource degradation while protecting cultural resources and visitor safety and enjoyment.*

Manage vegetation in high use areas to enhance the aesthetic qualities of views and settings. Because of the cultural history of the site, this may mean removal of vegetation from certain areas of the park. (See recommendation below.)

Prioritize park areas for vegetative removal to maintain the mine site's industrial characteristics. Vegetation is reclaiming much of the formerly mined areas in the park. The vegetation obscures the mine pits and other artifacts, impairing the site's value as an interpretive resource. Areas for vegetation removal will be identified and prioritized to restore industrial character of select viewsheds in the park. (See Figure 17 - Future Conditions - Significant Natural and Cultural Resources Map)

## IV. CULTURAL RESOURCES

Soudan UMSP possesses significant cultural resources, both above and below ground. The majority of these resources relate to the history of mining for iron ore. The timeframe of these resources is from prehistory through the 1960s.

American Indians mined for jasper within and surrounding the park before the arrival of European or American settlers. Early prospectors, searching for gold and iron ore in the 1850s and 1860s, documented multiple American Indian quarrying excavations, the scale of the workings pointing to habitation and mining over a period of many years. These sites - as well as the gold prospecting and early iron mining sites - have not been fully inventoried and are not included as part of the park's current interpretative program. (See Figure 8 - Cultural Features)

The majority of the cultural resources in Soudan UMSP relate to the iron ore mining that took place at the site from the 1880s to the 1960s. The mine is listed on the National Register of Historic Places as a National Historic Landmark - the highest designation that can be given. Of the over 71,000 sites on the National Register, only 2,300 or (3%) are designed as National Historic Landmarks. The Statement of Significance from the National Historic Landmark nomination describes the historic importance and resource quality that raises Soudan UMSP to National Historic Landmark status:

*The oldest and deepest in the state, Soudan Mine's opening in 1884 marked the beginning of the exploitation of one of the richest iron ore deposits in the world and the emergence of Minnesota as the leading iron-ore producing state in America. The mine remained active until 1962; a number of its original buildings survive.*

The Soudan Mine National Historic Landmark includes several buildings and structures associated with the mine, including the following:

- Engine House (1901)
- Crusher House (1904)
- Drill Shop (1917)
- Machine Shop (1925)
- Air Compressor Building - smokestack and foundation (1925)
- Dry House (1925)

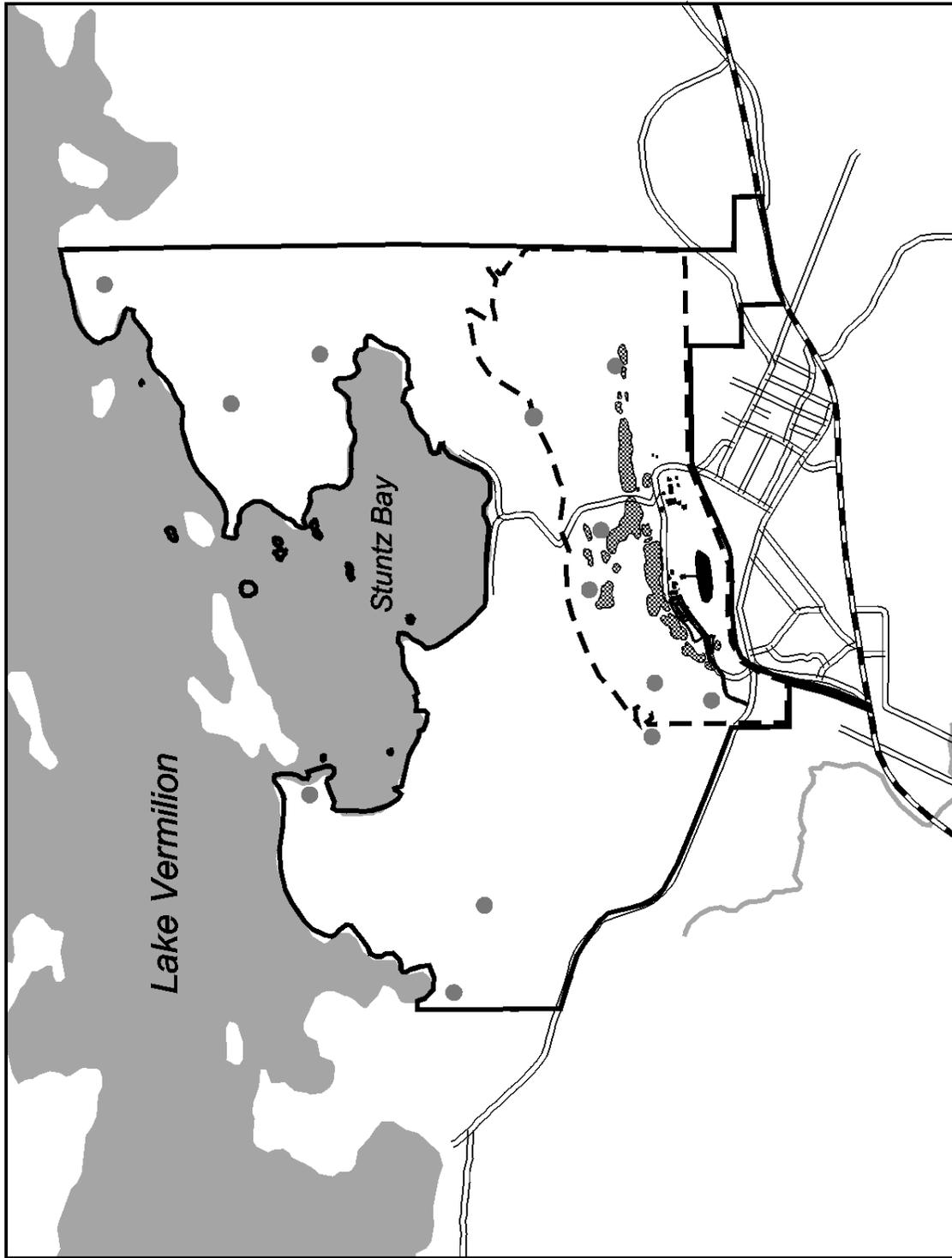
Other structures and buildings within the Landmark boundary are the open mine pits, Mine Shaft #8 and Headframe, Alaska Shaft and Headframe, the Ore Trestle and Stockpile, and the Mine Rescue Station. (See Figure 9 - National Historic Landmark - Historic Features Detail) The Minnesota Historical Society and National Historic Site monuments are also located nearby. However a number of cultural resources associated with the mine are known to be located outside the National Historic Landmark boundary, including the Air Compressor Building which is listed in the Landmark nomination.

The boathouses located on Stuntz Bay, although some date to the National Historic Landmark period of significance, are not identified in the Landmark nomination as contributing structures. They were considered temporary ancillary development and not an integral part of the mining activity. It is undetermined how many of the boathouses retain their historic appearance. The structures are privately owned. The status of the structures range from very well maintained to those receiving little or no maintenance.

The Division has limited funds to preserve the site and its associated resources. Restoration and maintenance projects are prioritized to protect the historic structures and other resources to the greatest extent possible within these constraints.

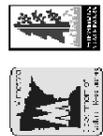
# Soudan Underground Mine State Park

Figure 8 - Cultural Features



**Legend**

	State Park Statutory Boundary		National Historic Landmark Boundary (NHL)		NHL Contributing Structure		Non-Contributing Structures		Cultural and Archeological Sites		Mine Pits		Water		Lakes		Rivers		Roads		Highways		Township Roads
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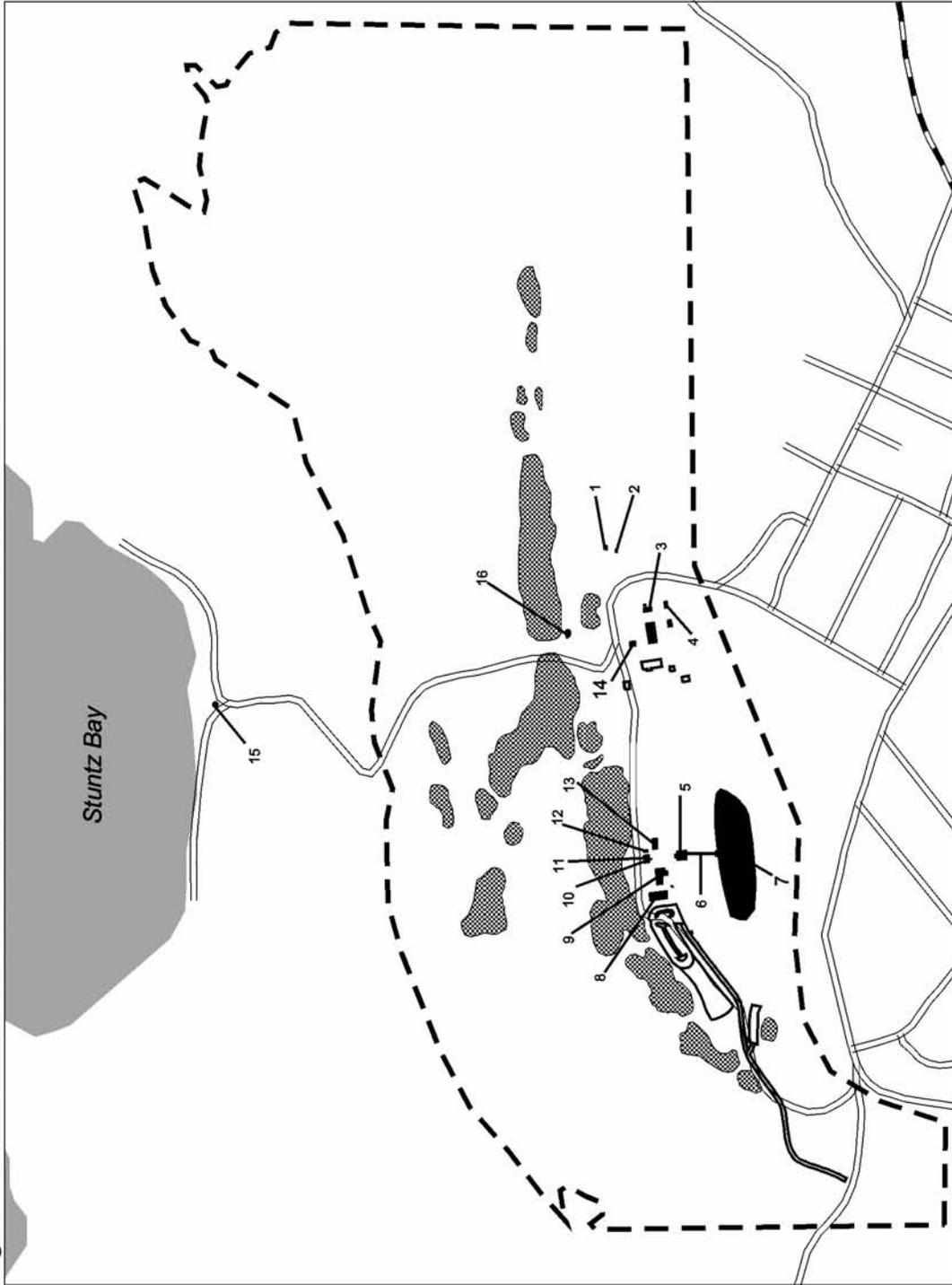


State Parks Division of Parks & Recreation  
 Created by: Kelly Fink  
 Date: 05/2011



# Soudan Underground Mine State Park

Figure 9 - National Historic Landmark - Historic Features Detail



## Legend

- Cultural Features**
- 1 Alaska Shaft Headframe
  - 2 Alaska Shaft Engine House
  - 3 Cage Shop
  - 4 Core Storage
  - 5 Crusher House
  - 6 Ore Conveyor
  - 7 Ore Storage Area
  - 8 Engine House
  - 9 Dry House
  - 10 Electric Rail Control Station
  - 11 No. #8 Shaft Headframe
  - 12 Mine Rescue
  - 13 Drill Shop
  - 14 Pump House
  - 15 Compressor House
  - 16 Soudan Iron Formation
- Water**
- Water
- Roads**
- Highways
  - Township Roads
- Other Features**
- Pits
  - National Historic Landmark Boundary
  - Lakes



Source: MNDNR Division of Parks & Recreation  
 Created by: Kelly Rice  
 Date: 06/23/01

The Dry House currently serves as the park visitor center and includes the underground mine information and ticket sales, gift shop, interpretive displays and theater, and employee locker room. The Dry House interior has been substantially altered to accommodate these uses. These alterations have also impacted its historic appearance and value for interpreting its function during the mine's operation. However, even with these alternations the Dry House still has insufficient space for the interpretive displays, visitor services, and other functions it houses.

Several of the historic buildings and Mine Shaft #8 are open to the public. An interpretive trail encompasses several of the historic buildings and the open mine pits. Other trails take visitors along the edges of open mine pits. An underground tour of Mine Shaft #8 takes visitors to the mine's 27<sup>th</sup> level - its deepest at nearly 2,400 feet - and over 3,000 feet along a drift to a stope where iron ore was extracted. (A drift is a horizontal tunnel that leads away from the vertical shaft. A stope is the place where the tunnel or "drift" meets the ore body and the mining of the iron ore takes place.)

The park also possesses historic materials - including drawings and diagrams of the mine and associated structures, donated artifacts, and other items - that are important to the understanding and interpreting the Soudan Mine. Currently, these items have not been fully cataloged. Storage space and display space for the collection is also inadequate. This compromises the preservation of these materials and limits their use for interpretive programs.

## **Cultural Resource Management Recommendations**

The cultural resources associated with the Soudan Mine are the key feature of the Soudan UMSP and the purpose for its inclusion in the State Park System. Preservation of these resources is a primary goal for the park - as they serve as the source material for the interpretive program.

The recommendations that follow are intended to provide general direction for the cultural resource management activities that will be conducted in the park. Annual work planning meetings will use these recommendations to set short-term goals and priorities. Some management recommendations are very general and actions will be developed as more information is obtained.

### *Recommendations:*

#### *Research and plan for the preservation of the park's cultural resources.*

Update the inventory the cultural resources in the park and locate the resources within the Geographic Information System. A complete inventory and accurate location of all the cultural resources in the park is crucial to developing management objectives and planning for future development within the park. The inventory will address buildings, structures, objects, archaeological sites and landscape components and will be used as a basis for the cultural resource management plan and consideration of the National Historic Landmark boundary revisions. (See below) The inventory will also be updated as new information is found - through additional survey work related to interpretive planning or new construction.

Investigate revising the National Historic Landmark nomination and boundary for the park. There is some question as to the exact boundary of the Landmark. This ambiguity should be resolved to ensure proper management of the Landmark resources. Also, several historic structures are known to be outside of the boundary. A revision of the nomination and a boundary adjustment should be investigated to ensure the appropriate management and preservation of the park's cultural resources.

Develop a cultural resource management plan to facilitate the preservation and protection of all cultural resources within the Soudan Underground Mine State Park. The management plan will help guide the inventory, preservation and protection of the cultural resources in the park,

including buildings, materials such as maps and documents, and the American Indian sites. Assistance from the State Historic Preservation Office and National Park Service should be sought in developing the management plan. The cultural resource management plan will consider *The Secretary of the Interior's Standards for the Treatment of Historical Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing historic Buildings* (NPS, 1995) and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS, 1996) when outlining maintenance of existing structures, construction of new facilities, and resource management within the NHL area.

Develop a historic building management plan. The building management plan will focus on the historic structures in the park - evaluating their condition and developing recommendations for their maintenance and preservation.

*Collect, maintain and preserve the cultural resources associated with the park.*

Prioritize the buildings and structures needing restoration and repairs to the Secretary of the Interior's Standards. The rules regarding building preservation at historic sites are very detailed and comprehensive. Following specified regulations for repairs and restoration will protect the integrity of the site. Assistance from the State Historic Preservation Office and National Park Service should be sought in developing the priorities and restoration techniques. Information gathered during development of the historic buildings management plan will be utilized in the prioritization process.

Manage the National Historic Landmark Area to conform to the National Historic Preservation Act guidelines to preserve the historic quality of the site. This is a fundamental task as it is the primary goal of the park. This portion of the park should be managed as a cultural landscape - decisions concerning development and resource management should be evaluated for their impact on the area's historic appearance.

Balance the historic integrity of the site with modernizing and making buildings and equipment efficient and code compliant. Replacement or upgrading of equipment or facilities has the potential to negatively impact the historic character and appearance of the site. Items such as lighting, electrical systems and other mechanical operations need to be efficient while still maintaining the historic integrity of the site. Finding solutions to keep the site looking historic while moving forward with faster and more efficient ways of performing daily park operations creates continual challenges.

Preserve the historic appearance of the underground areas at the site. As are the mine-related structures and landscape on the surface, the underground drifts and tunnels are valuable cultural resources. Maintaining the historic appearance of the underground areas is most important on the 27<sup>th</sup> level - the 1960s era appearance of the drifts, side cuts and stope along the tour route are key elements for the interpretive program. The removal of rock and debris that have built up in side cuts that was not present during the mine's operation and masking the entrances of the Soudan - 2 and MINOS chambers are two examples of important projects in this effort. Preserving the historic appearance may have to be balanced with safety improvements or operational needs. (See recommendation above.)

Conduct cultural resource reviews for new development proposals. Cultural resource surveys will be completed prior to development activities. Recommendations for avoiding or minimizing adverse effects to the National Historic Landmark and other cultural resources of the park will be made.

Prioritize park areas for vegetative removal to maintain the mine site's industrial characteristics. Areas for vegetation removal will be identified and prioritized to restore industrial character of select viewsheds in the park. (See Figure 17 - Future Conditions - Significant Natural and

Cultural Resources Map) Coordination of vegetation management and cultural resource management is important to recreating the cultural landscape surrounding the mine. This recommendation is discussed in greater detail in III. Natural Resources and VIII. Significant Areas Mapping.

Follow the Division of Park and Recreation's Collections Policy protocol. The Division Collections Policy sets the guidelines for acquiring artifacts - donated or otherwise - for park collections. Artifacts being donated to the state will be used as the state sees fit and will not be returned. (The Division Collections Policy is currently in draft form - all artifact collections will follow the most recent version of the draft until the policy is adopted.)

Inform local communities, mining companies, and equipment distributors of the Division Collections Policy. Mining artifact donations to the park can be used for existing and future exhibits and interpretation opportunities. The appropriateness of the item will be determined by staff and follow proper donation protocols.

Work with the local community to consider the protection of cultural resources outside of the park boundary associated with the history of the mine. Office buildings, employee housing and other structures from the mine era still stand within the community. The Division will consider potential preservation projects in cooperation with the local community.

## V. INTERPRETIVE SERVICES

The Division of Parks and Recreation mission for its interpretive services is:

*To provide accessible interpretive services which create a sense of stewardship for Minnesota's natural and cultural heritage by illuminating the changing relationships between people and landscapes over time.*

In pursuing this mission, the Division of Parks and Recreation designs its interpretive programs to achieve four goals:

1. To promote increased understanding, appreciation, and enjoyment of natural and cultural resources in Minnesota.
2. To assist in protecting each state park's resources.
3. To promote public understanding of, involvement in, and support for the Minnesota Department of Natural Resources and its Division of Parks and Recreation.
4. To increase public awareness of critical environmental problems on a local, state, national and worldwide scope.

This chapter identifies and describes interpretive themes for Soudan Underground Mine State Park based on its natural, cultural and recreational resources. The resources listed in this section reflect the importance of these themes as they fit into the *Minnesota State Park System's Interpretive Services Plan* (1995).

### Regional Analysis of Interpretive Services

There are many different types of interpretive services and environmental education facilities in the area around Soudan UMSP. Each of these facilities has its own unique type of program and mission. The park is not located near any major population centers, but it draws visitors from the immediate area and around the world. It is a very unique facility - one of the few underground mine tours in the country.

Soudan UMSP and the Division of Parks and Recreation have cooperated with many of these facilities to promote regional education opportunities and arrange trips to the park. A list of the area interpretive and environmental education facilities is included in Appendix C.

### Interpretive Themes

Soudan UMSP seeks to preserve, interpret and display the first iron ore mine in Minnesota and interpret the cultural heritage of the men and women who worked there. The Soudan UMSP interprets the mining history of the Soudan Mine from 1882-1962, with an emphasis on the 1950s-1962 period. The park has a primary interpretive theme, as well as several sub-themes.

*Primary Interpretive Theme:*

Soudan Underground Mine has seen many changes in technology over time.

*Sub-themes:*

- Minnesota's iron mining industry began at the Soudan Mine.

- Technological changes in iron ore mining and steel manufacturing impacted the Soudan Mine.
- Social and cultural interactions of a northern Minnesota mining community were reflected at the Soudan Mine.
- The changing environmental landscape at Soudan UMSP shows how nature reclaims the land.
- The physics experiments use the unique characteristics of the mine and surrounding geology to study the basic particles that make up the universe.
- Bats are an integral part of the Soudan UMSP's environment.
- Old growth forest patterns and development are visible at Soudan UMSP.
- American Indians lived along the shores of Lake Vermilion.
- American Indians mined jasper and other minerals in the Soudan UMSP area.

## **Existing Interpretive Services**

### *Personal: (guided)*

A tour of the 27<sup>th</sup> level of the underground mine is conducted from Memorial Day through September. At other times of year, group reservations are taken for underground tours. The underground tours are conducted seven days a week on the half hour from 10:00 am to 4 pm. The tour lasts approximately 1 ½ hours. The tour focuses on the development of the mine and mining techniques, with a focus on the mining methods used at the end of its operations.

Occasional surface programs are given by park interpretive staff or former miners who serve as volunteers. Programs topics vary. The programs are short - usually 5 to 15 minutes.

### *Non-personal: (self-guided)*

An interpretive trail circles the main group of historic structures surrounding Mine Shaft #8 and Headframe. The trail includes signs and kiosks that help explain the buildings and equipment in the area. The following structures along the trail have interpretive signs or materials:

Engine House - interpretive signs about the machinery.

Crusher House - a video explaining the crusher operations.

Drill Shop - a video explaining how the drills were sharpened and maintained.

Dry House - houses the visitor center - a small display area explaining the people, the mine, and geology of the area, and an introductory video about the mine and its history.

The trail also connects to an overlook of the Tower and West Tower open pit mines and an overlook of the town of Soudan.

### *Information and Publicity:*

The park brochure is widely distributed around the region. A description of the park and a park map are available on the DNR website. Park staff participates in a wide variety of promotional activities through local and regional tourism and chamber of commerce activities.

### *Park Interpretive Staff:*

Five groups are most closely involved in leading and supporting the current interpretive programs at Soudan UMSP.

- Park interpretive supervisor: (year-round) supervises the interpretive program in the park.
- Mine interpreters: (seasonal) group of 9-14 part-time interpreters that lead the underground tours.
- Hoist operators: (seasonal) provide information and answer questions about the operation of hoist and other mine machinery.
- Natural resource workers: (seasonal) group of part-time workers that assist in the underground tours by shuttling visitors during tours, etc.
- Volunteers: (seasonal) former miners that visit with park visitors about their experiences working in the mine, and conduct occasional short programs.

Park management staff and the Regional Naturalist also support the current interpretive programs.

## **Interpretive Service Proposals**

The Minnesota State Park System Interpretive Services Plan evaluated the current interpretive programs at each state park. Through analyzing resource significance and visitor use, proposed interpretive efforts were developed for the individual state parks. The Interpretive Services Plan describes Soudan UMSP: "this day-use only park is a significant interpretive site and its purpose as a park is interpretation."

The proposed interpretive effort in the plan calls out three points:

- 12 mine interpreters - currently the number fluctuates from 9 to 12 interpreters.
- A new interpretive center - the current visitor center, located in the Dry House, does not have adequate space for the existing interpretive displays or to expand the program. Use of the Dry House for visitor services and interpretive displays also hampers efforts to restore the building to reflect its historic use.
- Increased nonpersonal effort primarily on the surface - nonpersonal efforts on the surface are currently limited to the historic structures trail.

## **Outreach Program Proposal**

Expanding the outreach efforts for Soudan UMSP would diversify the types of visitors coming to the park and the range of interpretive themes explored during their visits. Key to expanding the outreach program is the development of a new visitor/interpretive center with classroom space to host additional programs.

The program envisions expanding the topics interpreted at the park. Currently, the focus is on the underground mine and mining history of the site. The outreach program would include topics on the park's geological and biological resources, and the MINOS and other physics experiments.

The Division would seek partnerships for the outreach program - local community colleges, universities and colleges throughout Minnesota, the University of Minnesota Physics Department and Fermi Laboratory.

The outreach program could involve several projects:

*Day visit project* - Cooperate with local middle and high schools, and other groups to expand their existing relationship with the park. Currently, most group's experience at the mine is limited to attending the mine tour. Information about the wider range of interpretive topics (mining, geology, biology) could be integrated into their curriculum and lesson plans to augment the activities during site visits to the park.

*Science camp project* - A summer program for middle and high school students could be developed focusing on one or more of the interpretive topics. Universities and community colleges are potential partners for developing programming and for instruction.

*Internship/coursework project* - A form of resident program could be developed, structured around a university or community college level course. This could take the form of an independent study project with some instruction in one of the topic areas. Universities and community colleges are potential partners for developing programming and for instruction.

*Community relations project* - This project captures some of the existing outreach efforts conducted by the park - participation in local fairs and community celebrations, etc. These efforts will advertise the mine tours and other programs offered at the park. Contacts with local businesses - especially service industries like restaurants, resorts and hotels - are also effective ways to promote the park.

## **Information Needs for the Interpretive Program**

There are four issues in which more research will be needed for park interpretive services.

1. **Historic buildings and materials**

The buildings and structures associated with the mine are the key component for the interpretive programs. There is a firm understanding of the historic uses and layouts of the structures. However additional work is needed to preserve - and in some cases restore - them for future generations. There are also a large number of artifacts in the park's collection relating to the mine. The cataloging of these materials is not complete, and both proper storage and display space is inadequate. Integrating more of the historic buildings and materials from the collections is a priority for expanding the interpretive program. (Recommendations related to this issue are also included in the Cultural Resources section.)

2. **Mine development description and timeline**

The stages of development of the mine - which levels were excavated when, how long individual tunnels or drifts were worked, what methods were used at each phase, etc. - are not fully documented or included in the current interpretive program. Additional information from mine documents or other sources would illustrate a more complete picture of the mine's development and provide a greater depth for interpretive programming about the working of the mine throughout its operational lifetime.

3. **Oral history project**

Some oral history information about the operation of the mine and the people who worked there has been collected. However as time passes, the opportunity to collect additional oral histories diminishes. The oral history work already begun should be continued to finish documenting the memories of those that worked at the Soudan Iron Mine during its operation.

#### 4. Physics experiments

The University of Minnesota and several other organizations are conducting particle physics experiments at Soudan UMSP. The mine at Soudan UMSP is ideal for these experiments - the age of the rock means there is little radioactive decay occurring, and the depth of the mine shields the experiments from nearly all cosmic radiation. Radioactive decay and cosmic radiation would severely complicate observations of the particles involved in these projects. To house the experiments, two large chambers have been excavated on the 27<sup>th</sup> level of the mine.

Three experiments are currently underway or in development. Two of the experiments are housed in the first chamber, which was excavated starting in 1984. Soudan - 2 is a proton decay observation experiment that attempts to detect the breaking down (or "decay") of an atom into other particles. CDMS II or Cryogenic Dark Matter Search will attempt to detect dark matter (matter theorized to have been created at the beginning of the universe but that has not been observed) that is thought to make up 90% of the mass in the universe. The third experiment will be housed in the second chamber, which was excavated starting in 1999. The Main Injector Neutrino Oscillation Search - or MINOS - is currently under development. Its purpose is to detect oscillation in a beam of neutrinos fired at Soudan from the Fermi National Accelerator and Laboratory near Chicago. Scientists believe that if they detect oscillation in the beam (neutrinos changing from one form to another), it means neutrinos have mass, and that neutrinos may account for a portion of the universe's mass that scientists theorize exists but cannot attribute to any known particles. The MINOS experiment is expected to begin operation by 2003.

More information is needed about the experiments to develop an interpretive program for visitors. Other questions include how this "physics tour" should be integrated with the historic mine tour or if they should be separate, and what logistical issues a second tour will raise.

Other areas that need further research and documentation are: archaeology, geology, photo collections, mine documents, settlement history, lifestyles in different time frames, changes in mining techniques, and mining town society.

### **Interpretive Services Recommendations**

Regional and park staff are constantly evaluating the interpretive program and are developing new proposals and projects for the park.

The recommendations outlined in this plan will be evaluated on an ongoing basis by the park management staff, regional manager, regional park operations supervisor, regional naturalist and interpretive operations coordinator. This plan is intended to be a guide for planning and implementing interpretive services. Position descriptions and work plans will be developed and consulted as necessary.

#### *Recommendations:*

*Interpret the history of mining at the Soudan Mine.*

Conduct a design study to determine the size and location of a new interpretive center. A new interpretive center is needed in the park. The historic Dry House building, presently being used as the visitor center, does not have adequate space for expanding interpretive displays nor can it comfortably meet the needs of the nearly 40,000 people that visit the park. Further, its use as a visitor center restricts the restoration of the Dry House to its historic appearance. The new facility is crucial for the park whose central role is interpretation - to protect and display its historic materials, and as a starting point for interpretive programs. The interpretive center will also focus on the current use of the mine as a physics laboratory. (See Proposed Development for discussion of design and siting process)

Continue the oral history project. Complete the collection of oral histories from mine employees, family members and others involved with the mine during its operation. The opportunity to document these personal histories is limited.

Construct viewing platforms on the West Tower Mine trail. The platforms will overlook the West Tower and Tower Mine open pits and provide an opportunity to interpret the surface mining history of the park. Interpretive displays will be developed and installed at the platforms.

Explore adding tours through other mine structures and on the surface as funding becomes available. The existing tour exemplifies the mining practices of the late 1950's. With additional tours through the blacksmith shop, machine shops and other structures, visitors would gain a better understanding of the full mining process. A trail leaving from the present tour area will also give visitors the opportunity to see the open mine pits as well as natural features of the park.

Interpret the underground history of the mine to include more than one era and more than one technology. The Soudan Mine encompassed much of the history of underground mining in Minnesota and in the United States. The tours and other interpretive programs should be expanded to interpret a broader perspective of the mine's history.

Interpret community life during the operation of the mine. The interpretation of Soudan as a "company town", the lives of the miners and their families, and the relationship between the mining company and its employees are important stories in the history of the mine and the surrounding community. The Division will work with Ironworld Discovery Center to develop compatible programs and displays related to this topic.

Explore the feasibility of an exhibit of working mine equipment. An outdoor exhibit of working mine equipment could be incorporated into the tours and would further educate visitors on the tools and techniques used in the mine.

Incorporate the importance of railroad haulage to the mining industry into interpretive programs. The railroads played an important part in the history of the mine, linking it to the shipping ports and ore processing centers.

Consider developing a display on the current iron mining industry. The display would link past mining practices to present day mining and help visitors see the continuing importance of the mining industry to national, regional and state economies.

Explore the possibility of adding a display on the maritime history of Lake Vermilion including how boats were used in the mining process. The mining companies operated a series of boats on Lake Vermilion to move supplies between the mine, sawmills, islands and other sites. These craft served an important function for the mine. Several wrecks of these craft have been located.

*Expand the interpretive program to address other resources and histories of the area.*

Increase the number of mine interpreters at the site from twelve to fifteen interpreters. As the park expands its interpretive programs and tours - both underground and above ground - additional staff will be needed. This also recognizes that scheduled leave, vacancies, and other circumstances often result in fewer than a full complement of interpreters being available.

Determine how to integrate the physics research into the interpretive program. The physics experiments and presence of the laboratory will be integrated into the interpretive programs, brochures and other elements of the visitor's experience at Soudan UMSP.

Develop tours of the physics research area. A tour of the physics laboratory area needs to be developed to educate visitors about this unique mine use.

Consider developing a tour or program concerning the geologic history of Soudan UMSP. The geology of the park offers an opportunity to learn about the natural forces that shape the earth and resulted in the iron and other minerals found in the area. The tour/program should include the Soudan Iron Formation.

Consider developing a tour or program concerning the history of American Indians in Soudan UMSP. American Indians inhabited the area surrounding the park and utilized minerals they found there. Several mining sites are known within the park, and habitation sites are also likely to exist within the park. The Division will work with the Bois Forte American Indian Community in developing these programs.

Develop a brochure and map of the park's natural areas and resources. Soudan Underground Mine State Park has several unique natural resources. Interpretive programs, brochures and nonpersonal tours about the bat hibernaculum, the old growth forest areas, and shoreland areas should be developed.

Explore the possibility of developing a self-guided tour of how shorelines can be improved and how people can apply this information to their own shorelines. Lake shorelines are rapidly being developed in Minnesota. This non-personal tour can educate visitors how natural shorelines prevent erosion and protect shoreline habitats, and what measures they can use on their own property.

*Expand the audience and diversify the delivery methods of the interpretive program.*

Expand non-personal interpretation at the park based on areas of visitor use. Non-personal interpretation should be developed to reach the largest proportion of park visitors possible with the available funds. Resources for providing non-personal interpretation should be prioritized into three general zones according to visitor use density: No. 8 Shaft Complex, open pit mining area and associated structures and sites, and the remote areas of the park (old growth areas, archaeological sites, etc.)

Pursue outreach and educational efforts with schools and community groups. Schools and community groups are a potential audience for interpretive programs at Soudan UMSP. The Division will work with teachers and other educators to develop interpretive programs for various age groups.

Pursue expansion of the outreach program to diversify the interpretive message and experiences for park visitors. Contacts should be made with local community colleges and universities to gauge interest in the proposal. Integration of the MINOS and other physics experiments with the University of Minnesota and Fermi Laboratory should be a priority effort. Expanding the outreach program should be a consideration in the design study for the visitor/interpretive center.

Explore the possibility of promoting the series of tours through the three mining parks. Using a series of tours venturing through Soudan Underground Mine, Hill Annex Mine and Cuyuna Country State Recreation Area, visitors would gain a better understanding of the Minnesota Iron Range area and the different mining techniques that were developed and utilized there.



## VI. RECREATIONAL USE AND VISITOR SERVICES

### Existing Facilities

Soudan UMSP has a mix of visitor use and recreation facilities. (See Figure 10 - Existing Development) Facilities are concentrated in two areas: No. 8 Shaft complex and the maintenance complex. No. 8 Shaft complex includes the shaft headframe, the Dry House, and other associated historic structures. It supports the majority of visits to the park. Tour sales, nature store items and the museum are located in the Dry House which presently serves as the visitor center. The maintenance complex includes the park office (containing staff offices and a public service counter), equipment storage and workshops, and the park manager's residence.

#### *Park Facilities and Programs:*

- Interpretive trail (.3 miles)
- Hiking trails (5 miles)
- Snowmobile trail (3 miles)
- Picnic area
- Visitor center
- Seasonal naturalist programs
- Interpretive exhibits
- Interpretive tour of mine

The trail system in the park is limited to the historic mine area and central portion of the park. There is no trail access to the western or northeastern sections of the park. Two other trail projects in place near Soudan UMSP connect to the park: the Mesabi Trail and the Taconite State Trail. The Mesabi Trail will be a paved trail for bicyclists and other non-motorized recreation (and in some places snowmobiles). It is being developed by the Itasca County Regional Rail Authority and the St. Louis and Lake Counties Regional Rail Authority. The Taconite State Trail is a multi-use trail - the non-paved route is used primary by snowmobiles.

The Lake Vermilion shoreline is a natural, pristine area within the park. With the exception of the boathouse area, there is no development along the shoreline. Currently, there is limited public use of the shoreline area - only a small segment of trail along the township road extends to the waters edge. There is no public boat access to Lake Vermilion within Soudan UMSP. A private access is leased from the DNR and managed by the Stuntz Bay Boathouse Association. (See below) Houseboats tie up along the shore in Swedetown Bay and on several islands in the park for day-use activities such as picnicking. These uses have some negative impacts - litter, damage to trees used as tie-ups and from firewood collection, and potential for fire from unattended or not extinguished campfires. Park staff will continue to work with the houseboat outfitter to identify appropriate places for boat tie-ups and educate renters to reduce resource impacts.

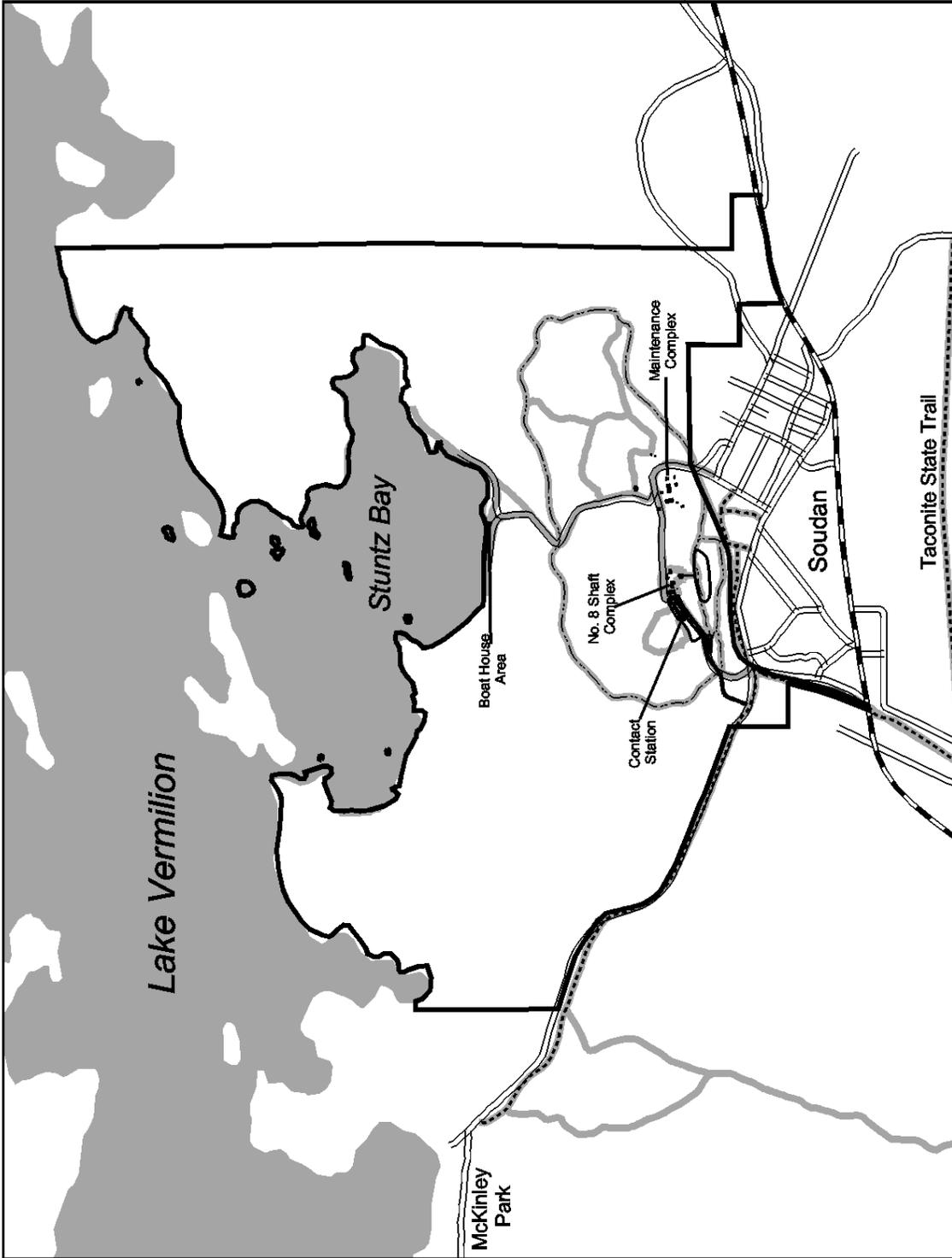
There are no camping opportunities in Soudan UMSP, limiting park visitors to day use. Other campground facilities exist nearby, including Hoodoo Point, McKinley Park, Bear Head Lake State Park, McCarthy Beach State Park, and sites within Superior National Forest and nearby state forests.

### Boathouses on Stuntz Bay

There are 158 lakeshore lots along Stuntz Bay on Lake Vermilion. (See Figure 10 - Existing Development) These lots were established by U.S. Steel Corporation during its ownership of the Soudan mine and surrounding property. The lots were leased to company employees for the construction of

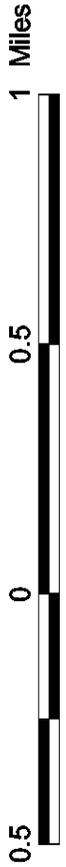
# Soudan Underground Mine State Park

Figure 10 - Existing Development



### Legend

- State Park
- Statutory Boundary
- Trails
- Hiking
- Snowmobile
- Facilities
- Buildings
- Parking and Open Areas
- Water
- Lakes
- Roads
- Highways
- Township Roads



Minnesota State Parks and Recreation  
 Soudan Underground Mine State Park  
 Planning and Design  
 2010

boathouses as a company benefit. These original leases were issued for a maximum period of 50 years or until the year 2015. If the original lessee died or the lease was transferred, the lease was to terminate 20 years following that event.

The leases were transferred to the State of Minnesota as a condition of the deed on the property transfer in 1965. The lease agreements upon transfer to the state contained the following conditions:

- If the original lessee should die prior to 2015, his/her beneficiary(ies) could sub-lease the lot for a 20-year period or until 2015, whichever came first.
- If the original lessee should sell his/her boathouse to another party, the second party could sublease the lot for a 20-year period or until 2015, whichever came first.
- Any subsequent sub-leases by either beneficiaries or second parties could only extend for the balance of the 20-year period or until 2015, whichever came first.
- No leases will extend beyond 2015.

Currently of the 158 lots, 147 lots are leased for boathouses, two lots leased seaplane tie-downs, and two lots leased for a boat landing operated by the Stuntz Bay Boathouse Association.

#### *Park Development and Management Concerns*

The boathouse leases have a negative impact on the public's ability to access Lake Vermilion and use the surrounding area of the park. Stuntz Bay is the most suitable lake access point within the current statutory boundary. The boathouse lease lots severely restrict the site for development of a public boat landing. Although the property is state owned, the private leases will forestall the general public's use of this area for the foreseeable future.

The boathouse leases have been a difficult management issue for the Department of Natural Resources. DNR has had difficulty tracking the leases as they are transferred within families or sold to other individuals. Some leases have expired without the lessee or current user of the boathouse applying for a new lease. In other cases, individuals currently using the boathouse are not the recorded lessee; further complicating lease and site management. During 2000, DNR worked with the lessees and the Stuntz Bay Boathouse Association to update its lessee records and to bring all the current boathouse owners onto valid leases.

The boathouse leases also create site management issues for the park. The township road provides round-the-clock access to Stuntz Bay and the interior of the park. Congestion and parking problems also occur at the boat landing, which is operated by the Stuntz Bay Boathouse Association. Park staff is often requested to resolve these conflicts. Park staff continues to work with the Association to address these and other issues related to the management and maintenance of the boathouse area.

#### *Recent Actions*

As lease expiration dates and 2015 have approached, boathouse owners have made attempts to secure their private use of public property into the future through their local legislators. During the 2000 Legislative session, the Minnesota State Legislature passed a law intended to extend all leases to the lifetime of the lessee (irrespective of the current lease or 2015 expiration) and to allow one transfer to a relative of third degree of kindred. However, the new statute recreated several problems related to the interpretation of who is considered the current lessee and who is an eligible "third degree of kindred". It was also unclear how the statute affects the current leases, which are binding contracts with different terms and conditions than those in the statute.

The Legislature amended the statute during the 2001 Legislative session. The new language clarified the definition of third degree of kindred and put the amended lease terms in effect at the time of a lease renewal.

The Division's intent is to work cooperatively with the Stuntz Bay Boathouse Association and the individual boathouse owners to effectively administer the boathouse leases, address traffic and other site-related concerns, and to protect the natural resources in the boathouse area. Park staff will continue to work closely with the Stuntz Bay Boathouse Association as the representative of the boathouse owners and support its efforts to manage the lessee activities in the boathouse area.

## Recreational Use and Visitor Services Recommendations

Soudan Underground Mine State Park provides park visitors with several recreation opportunities. The park's scenic and varied terrain provides trail users the opportunity to tour through old growth forests and near abandoned mine pits. Lake Vermilion provides opportunities for fishing and access to one of the largest lakes in Minnesota, however no public access currently exists within the park.

The following management recommendations are proposed to create additional appropriate recreational opportunities for park visitors:

### *Recommendations:*

*Provide and manage recreational opportunities for park visitors.*

Conduct a design study to determine the size and location of a new interpretive/visitor center. (See Interpretive Services Recommendations for further description.)

Consider realignment of the park entrance road in conjunction with the visitor center siting. The existing entrance road has several issues - steep grade, poor sightlines, and an offset from city street intersection. Siting of the interpretive/visitor center will also impact vehicle and visitor travel in the park. Two options for realigning the road are discussed below in the Proposed Development section.

Consider realigning the trail system to provide better access throughout the park. The existing trail system should be evaluated and relocation of some trails considered. Goals of the relocation should be to better link park facilities and interpretive opportunities, to improve access to desirable sites within the park (such as the Lake Vermilion shoreline), and improve connections to areas in the community outside of the park (such as McKinley Park). Other improvements, such as vegetation clearing to open vistas and additional interpretive signs, will also enhance the trail user's experience.

Improve trail system maps and brochures to facilitate greater use of the park by visitors. The current trail system in the park is not heavily used. There is some concern that the current maps do not reflect the actual trails throughout the park. Along with the improvements discussed in the recommendation above, updated trail maps and signage will encourage increased use of the trail system.

Work with the Stuntz Bay Boathouse Association on water access issues and transportation conflicts. Traffic flow, parking, blocked access to boathouses, and other issues related to the boathouse area should be managed in cooperation with the Association.

Explore the possibility of providing a fishing pier and picnic area near Lake Vermilion. Visitors without boats desire a way to access and experience the lake, including fishing from shore. A fishing pier and picnic area should be developed to allow the general public to use the lakeshore area of the park.

Explore developing a public boat access to Lake Vermilion. Lake Vermilion is a large lake that supports quality fishing and a high level of recreational boating. Currently there is no public

access in the park, nor any other public access in this area of the lake. A public access will open a whole additional range of activities for park visitors and diversify the recreational opportunities offered at the park.

Explore the possibility of providing designated boat tie-ups and fire rings on shoreline areas or island properties within the park boundary. Presently, there are no facilities for this type of use - boaters tie-up to trees and build fires where they please. Resource impacts should be monitored and the appropriate level of accommodation for these uses should be devised. Some areas need additional facilities to accommodate recreational use while use of other areas may need to be prohibited to protect resources. Designated sites would insure greater safety and reduce resource impacts. However, proper management of these remote facilities would necessitate greater staff and resources.

## **Proposed Development**

There are five main development projects identified in the plan recommendations: viewing platforms along the West Tower Mine trail, a public boat launch, a picnic area near the water, a new visitor/interpretive center, and a realignment of the park entrance road. (See Figure 11 - Proposed Development)

### *West Tower Mine interpretive trail viewing platforms*

Two viewing platforms will be built along the West Tower Mine interpretive trail. The platforms are sited to give trail users views of the West Tower and Tower mine open pits. The eastern platform will also provide views across the Tower Mine to the No. 8 Shaft Headframe and the historic structures surrounding it. Interpretive displays at the platforms will discuss the aboveground mining operations that predated the development of the underground mines.

### *Public boat launch*

Currently, there is no public access on Lake Vermilion within the park. The Stuntz Bay Boathouse Association leases and operates a boat launch in the boathouse area. The Association launch is minimally developed - a gravel ramp and small parking area. The Division will work with the Stuntz Bay Boathouse Association on the siting of the public boat launch and development of an adequate parking area. The public boat launch will be located within the boathouse area - this will avoid impacting undeveloped shoreline and use the existing access road. This development anticipates the eventual changeover of the boathouse area to public use. To preserve the undeveloped shoreline, the public boat launch should either be located in this area or within a future expansion area of the park.

### *Picnic area near the water*

Park staff has received many requests for picnic opportunities near the water. As with the boat launch, the picnic area will be placed in the boathouse area. This location will minimize impacts on the undeveloped shoreline and utilize the existing roadway. It will also then be convenient for use by the boathouse lessees as well as the general public. The Division will work with the Stuntz Bay Boathouse Association to place the picnic area with view of the water without impacting the remaining boathouse operations. To preserve the undeveloped shoreline, the picnic area should either be located in this area or within a future expansion area of the park. The Division will also consider picnic sites overlooking the shoreline if a feasible site can be located. Steep topography and road access issues limit feasible overlook sites.

### *Visitor/Interpretive center*

A new interpretive center has been identified through the park management plan process as a priority for Soudan Underground Mine State Park. Many issues will affect the siting and design of the center, including: size of structure and parking, physical site constraints, relationship to cultural resources, interaction between the center and tours, and staffing issues. The siting and design of the interpretive center is not part of the management planning effort. The Division of Parks and Recreation will undertake a detailed design study that will determine the layout, siting, materials, and other details of the building.

However, to prepare for the design study and as part of the management plan's significant areas mapping (SAM) process, the Division has identified several potential sites as part of the management plan process that may be considered during the design study. For management and staffing purposes, the Division favors sites within the existing boundary of the park. Siting the center within the existing park boundary would simplify movement of park visitors from the center to the tour area and other facilities within the park. Location near the existing tour area or park offices would also make it easier to staff the center and maintain longer operating hours. The design study process will likely identify and consider sites other than those below. *The final determination for the facility site will be made as part of the design study.*

Five sites were reviewed as part of the management plan process. (See Figure 11 - Proposed Development)

#### Site 1 - Park Entrance Area

The site includes the land on both sides of McKinley Park Road near the existing park entrance road. Positive features are that the site is within the existing park boundary and is owned by the state, and it is near the mine tour area at No. 8 Shaft. The site also has several constraints. It is within the National Historic Landmark (NHL) boundary, meaning an extra level of sensitivity must be exercised concerning the new building's impact on the Landmark's cultural resources. Physical constraints include steep slopes on portions of the property north of McKinley Park Road and wetlands on the south side of the road.

#### Site 2 - Shaft No. 8 Complex Area

The site included land west and east of No. 8 Shaft Complex - including the existing park areas. The center and parking could be located on either side of the No. 8 Shaft Complex. Positive features are that the site is within the existing park boundary and is owned by the state, and it is immediately adjacent to the mine tour area at No. 8 Shaft - allowing visitors to walk from the center to the tour area. This site may also make it possible to consolidate park access roads. (See below - *Potential Road Realignment*s) Constraints of the site include being within the NHL boundary, and scale and design issues related to complementing the adjacent historic buildings.

#### Site 3 - Highway 169 Intersection

The site includes land adjacent to the existing park boundary between Highway 169 and Site 1. Positive features of the site are frontage directly on Highway 169 which will increase visibility of the center and the park, and it is contiguous with the existing park boundary. Constraints for the site are it is outside the current park boundary and in private ownership, and has wetland issues.

#### Site 4 - School Site

The site is the former location of a community school. The site has several positive features. It is flat, easily developed - the old school buildings have been removed. It has a panoramic view of the mine, with frontage and easy access to Highway 169. The site is in public ownership - owned by the Township of Breitung. Site constraints include its separation from the rest of the park which complicating visitor movements between the center and the rest of the park. It is also on the edge of a residential area, with no direct road access to the rest of the park without use of city streets. To avoid use of residential streets, park visitors would be directed back onto Highway 169.

#### Site 5 - Soudan Mine 50-Year Monument

The site is the location of the wayside rest maker for the Soudan Mine, with the community ballfields to the north. The site has many of the positive features as Site 4 - panoramic view of the mine, access to and frontage on Highway 169, and public ownership (Township of Breitung). It has the added attraction of the monument. The site's constraints are also similar to Site 4 - not contiguous to the rest of the park, at the edge of a residential area, no direct road connection to the park. It has the added constraint of being a small site. The monument and existing parking take up a portion of the site - expansion of the site to the north is not possible without removal of the adjacent community ballfields.

#### *Road realignments*

There are two potential road realignments that have been considered as part of the park management plan process.

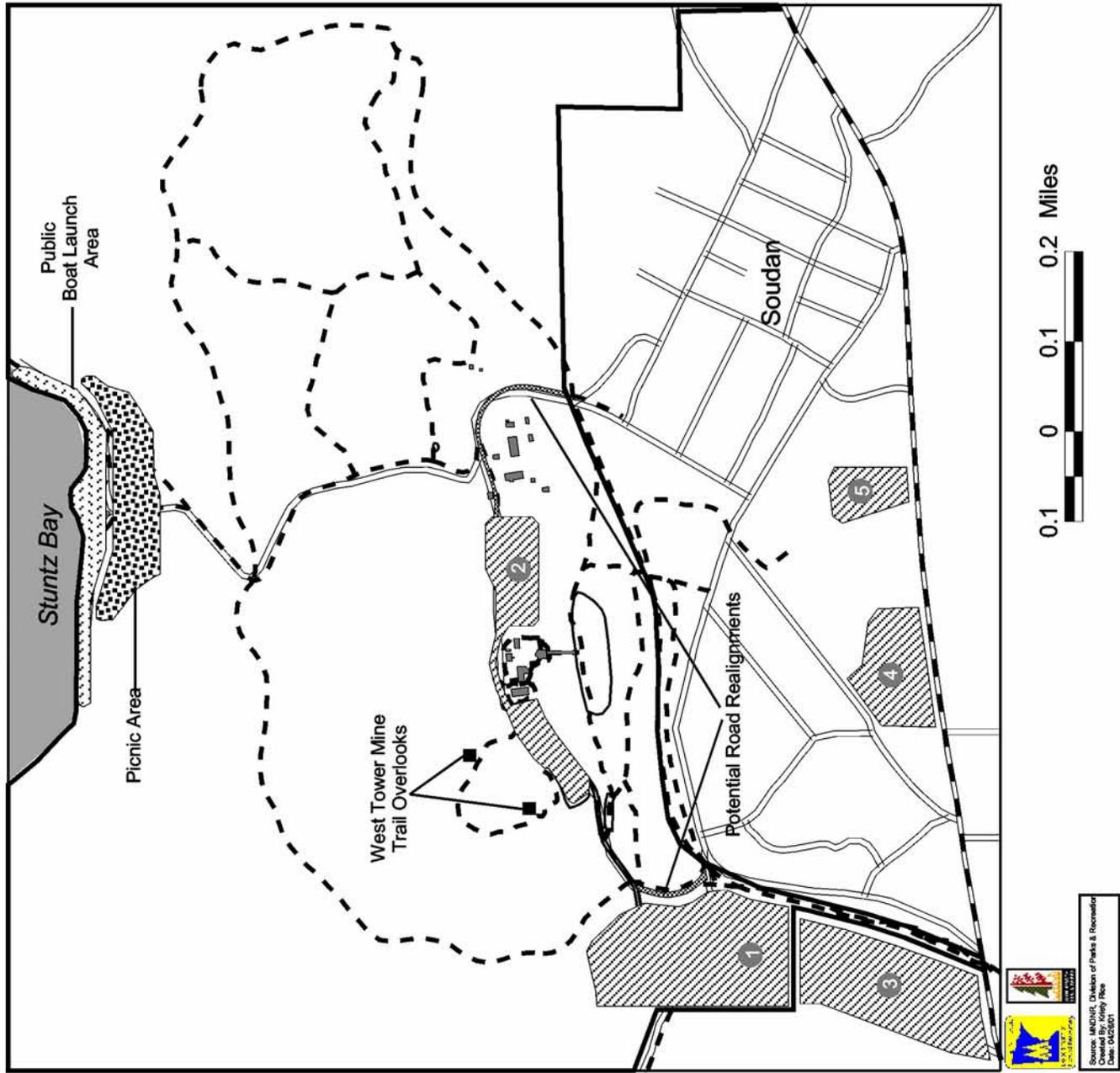
One potential project is realigning the existing park entrance road. The realignment would bring a portion of the road to the east, meeting McKinley Park Road at the intersection in front of the historic Soudan Store. This realignment would reduce the overall grade of the roadway, improve the sightlines at the intersection, and increase the visibility of the park entrance. It would also increase the undivided acreage of Site 1 for the proposed interpretive/visitor center.

The second potential project is to relocate the main park entrance to Stuntz Bay Road. This would consolidate park access - park visitors and Stuntz Bay users would be using the same road - simplifying security and visitor services management. This realignment would have the most obvious relationship to a center location at Site 2 or elsewhere east of the No. 8 Shaft Complex.

Realignment of the park entrance road (described as the first project above) is the recommended action from the management plan, unless placement of the interpretive/visitor center leads to the relocation of the park entrance road. These road projects will be considered as part of the design study for the interpretive/visitor center.

# Soudan Underground Mine State Park

Figure 11 - Proposed Development



## Legend

- State Park
- Statutory Boundary
- Proposed Development
- Potential Road Realignments
- Possible Interpretive Center Sites
- Overlooks
- Picnic Area
- Public Boat Launch Areas
- Trails
- Hiking (Existing)
- Buildings (Existing)
- Water
- Lakes
- Roads
- Highways
- Township Roads



Source: MNDNR, Division of Parks & Recreation  
 Created By: Jirney Noh  
 Date: 04/26/01

## VII. PARK BOUNDARY

The existing statutory boundary of Soudan Underground Mine State Park includes approximately 1,189.55 acres - including 12 islands on Lake Vermilion. Of the land within the statutory boundary; 973.68 acres is state owned and managed by the Division of Parks and Recreation and 215.87 acres are privately owned. (See Figure 12 - Land Ownership)

The Division of Parks and Recreation also manages 8 islands in Lake Vermilion owned by the U.S. Bureau of Land Management (BLM). The Division of Parks and Recreation oversees the property through a Challenge Cost Share Agreement between DNR and BLM. The management activities are primarily signage maintenance and visitor contacts.

### Proposed Boundary Modification

State Park boundaries are established by the Minnesota Legislature. Statutory boundaries serve to identify lands appropriate for inclusion in the park. State park staff is authorized to negotiate acquisition of land only within the boundary. The state does not have the authority to acquire park land except from willing sellers nor can they be required to sell to the state. Inclusion in a park boundary does not limit private landowner's use of their property.

Boundary modifications are considered during all state park management planning processes. Management plans recommend boundary changes, which must be approved by the Minnesota State Legislature. All boundaries are legally described in Minnesota Statutes. When an addition to a park statutory boundary is considered, the DNR Division of Parks and Recreation will contact private landowners that would be within the proposed boundary and ask for their documented support. Without the support of the landowner, the Division of Parks and Recreation will not request a statutory boundary change from the Minnesota State Legislature.

The following description lists lands identified by the Citizen Advisory Committee and Resource Management Advisory Team as of state park quality that should be added to the statutory park boundary. Two areas totaling 104.25 acres are recommended for addition to the park boundary. (See Figure 13 - Proposed Boundary Expansion)

- 1) Forty acres to the west of the current park boundary, owned by the Department of Natural Resources. This property is currently signed and managed as part of the park. The legal description for the property is:

*The Northeast Quarter of the Northeast Quarter of Section 29, Township 62, North, Range 15 West.*

- 2) Birch Island (64.25 acres) located north and east of the current park boundary in Lake Vermilion. The island is currently under private ownership. The island is undeveloped (with the exception of a cabin) and possesses significant forest stands and fisheries habitat. The legal description for the property is:

*Government Lots 5 and 6 in Section 11, Township 62 North, Range 15 West (containing 64.25 acres).*

Two other areas were identified during the planning process for inclusion into the park and were strongly supported by the Citizens Advisory Committee: a small parcel to the west and south of the current park boundary and a large area to the east of the current park boundary. The properties are owned by U.S. Steel Group. Acquisition of the small parcel would bring the park boundary adjacent to McKinley Park Road, simplifying boundary posting and natural resource management. Acquisition of the large property

to the east of the park would allow for the protection of extensive shoreline fisheries habitat and pine forest restoration. This property would be an opportunity to preserve undeveloped shoreline along Lake Vermilion, and also provide alternate location for a boat launch within the park. At this time U.S. Steel Group has requested that their property not be included in the statutory park boundary. The company expressed concerns as to the future use of their property if it was included in the statutory boundary. However, U.S. Steel Group was open to the possibility of including the lands within the park at a future date. Park staff will stay in contact with representatives from U.S. Steel Group concerning these properties.

## **Land Management and Boundary Recommendations**

### *Recommendations:*

*Establish a park boundary to protect significant natural resources and provide recreational opportunities.*

Continue cooperative agreement with U.S. Bureau of Land Management for supervision of federally owned islands on Lake Vermilion. The Division of Parks and Recreation will continue to work with BLM through a Challenge Cost Share Agreement to manage the islands with the primary goal to protect natural and cultural resources.

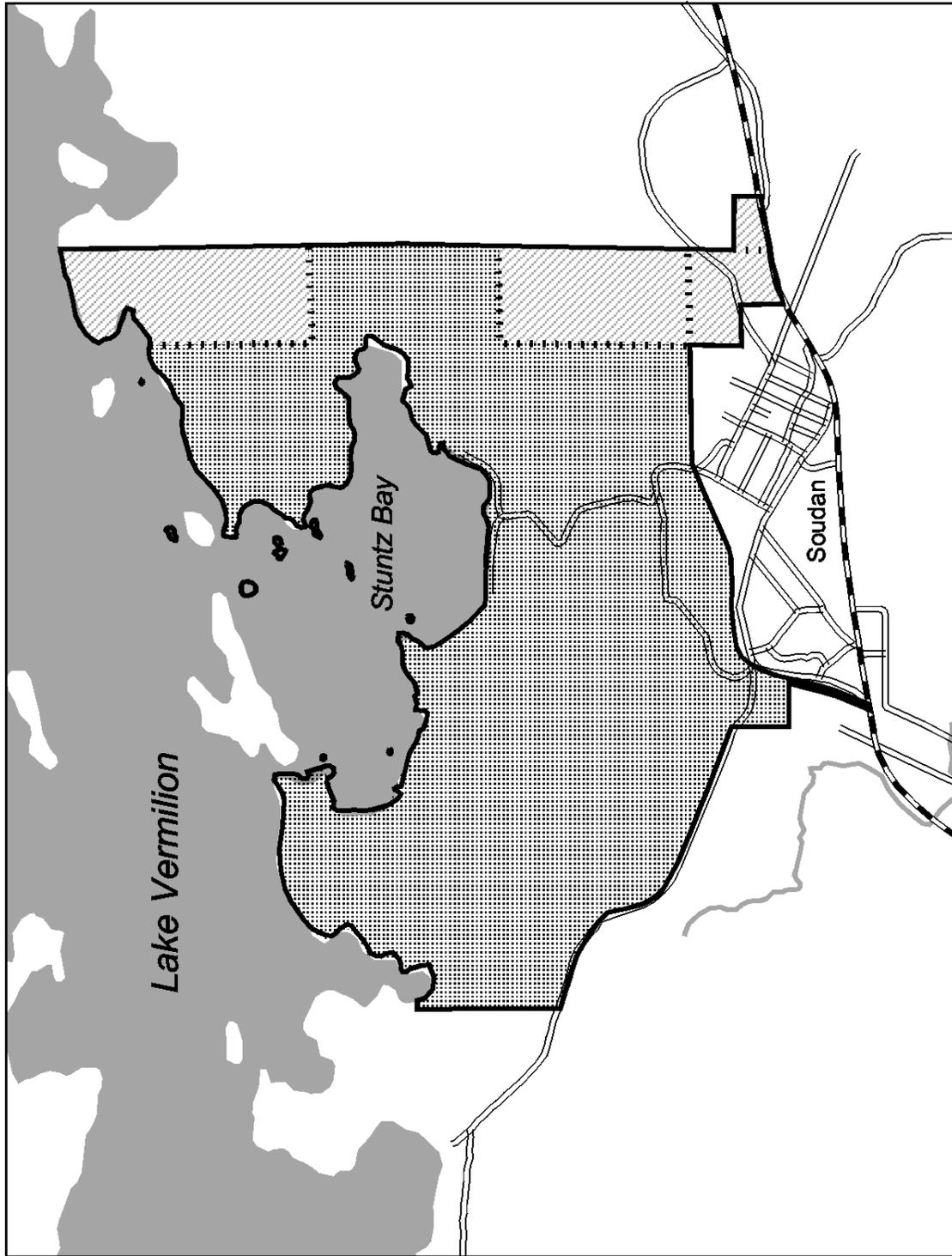
Add the two parcels described above to the statutory park boundary. These parcels will add quality natural resource areas to the park and simplify the park boundary for resource management and enforcement activities.

Cooperate with other Divisions and outside organizations concerning the acquisition and protection of the Birch Island property. The remote location and high natural resource quality of the property means it will fit the goals of several DNR program areas - Scientific and Natural Area program, wildlife or fisheries management area program, and the State Park system. Pooling resources across Divisions, or assistance from outside organizations, to acquire the Birch Island property would fulfill the objectives of several programs and help meet the anticipated high acquisition cost.

Continue to work with U.S. Steel Group concerning the possibility of adding the properties to the west and east of the park to the statutory park boundary. Park staff will maintain contact with U.S. Steel Group as their plans for and use of the property move forward and change over time. If the large property to the east of the park is acquired for the park in the future, the Division will work with the local community to consider the continuation of hunting and other existing local uses.

# Soudan Underground Mine State Park

Figure 12 - Land Ownership



**Legend**

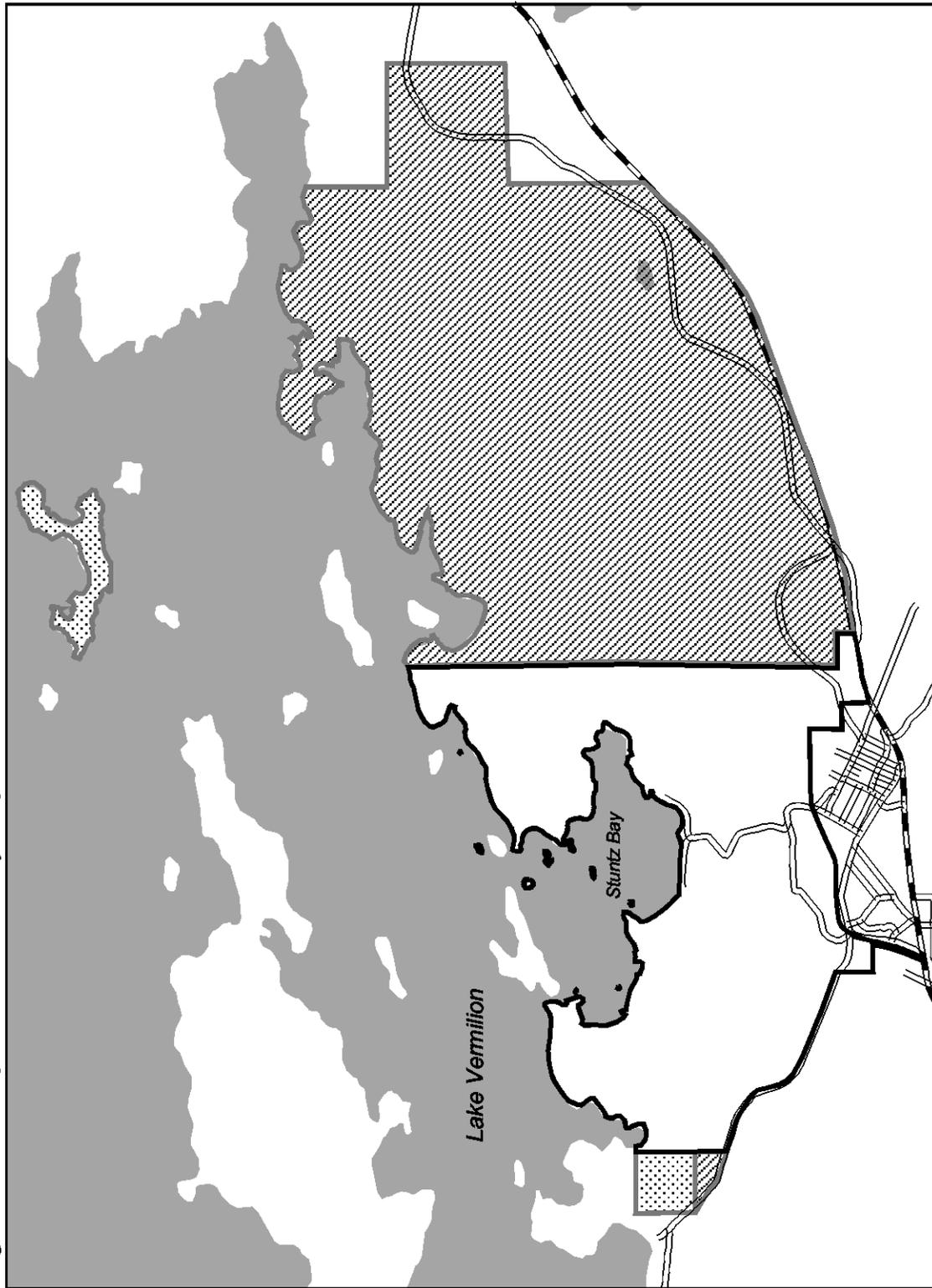
- State Park
- Statutory Boundary
- Land Ownership
  - State
  - Private
- Water
- Lakes
- Rivers
- Roads
- Highways
- Township Roads



Survey 1882-1925, Division of Parks & Recreation  
 Created by: Kathy Rice  
 Date: 05/20/01

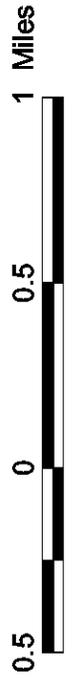
# Soudan Underground Mine State Park

Figure 13 - Proposed Boundary Expansion



**Legend**

-  State Park
-  Statutory Boundary
-  Proposed Boundary Expansion
-  Property Considered but not included
-  Lakes
-  Roads
-  Highways
-  Township Roads





Source: DNR, Division of Parks and Recreation  
 Date: 05/20/01

## VIII. SIGNIFICANT AREAS MAPPING

Significant areas mapping (SAM) is an integrated approach by which the natural and cultural resources in a park are first identified in terms of their regional significance and then assessed in terms of their capability to provide opportunities for visitor experiences.

The SAM process has two parts - assessing present conditions and assessing future conditions. In each part there are three steps - identifying significant natural and cultural resources, identifying levels of visitor use and experience, and overlaying the first two steps to assess opportunities and conflicts related to park resources and park visitors. Future conditions are those anticipated at the end of the 20-year lifetime of the management plan. Visitor use and experience is defined on a park-specific scale of low, medium, and high use based on the number and density of visitors using the area.

The purpose of the SAM process is to help identify areas for improvement in the way the Division manages how resources and people interact in the parks. It will aid the Division in addressing existing problems as well as in planning to avoid creating new ones. It also can help point out how the Division can take better advantage of the places where the interaction between people and the resources are positive - through interpretation and education.

With input from the public, the SAM process can lead to a discussion of how to resolve conflicts between resource protection and visitor use - possibly be relocating (or modifying) visitor use, or by monitoring resource impact and defining impact management strategies. Appropriate strategies for managing impacts can be determined using the SAM analysis along with the park's mission as guides. Specific management strategies may include:

- *site management* (facility design, site hardening, site closure, vegetation barriers, etc.)
- *rationing and allocation* (reservations, queuing, pricing)
- *regulation* (the number of people, the location or timing of visitors, visitor behavior)
- *deterrence and enforcement* (signs, sanctions)
- *visitor education* (interpretation that promotes appropriate behavior or provides information regarding use conditions)

### Assessing Present Conditions

#### *Significant Natural and Cultural Resources (Figure 14)*

##### National Historic Landmark (NHL) boundary

In 1966, the Soudan Mine was designated a National Historic Landmark. The landmark boundary was defined as part of the nomination. The boundary encompasses the majority of the cultural resources related to the iron mining history at Soudan.

##### NHL contributing structures

These are structures or buildings identified in the NHL nomination as contributing to the site's quality as a National Historic Landmark.

##### Cultural and archaeological sites

These are sites containing cultural or archaeological resources - gold mining sites, American Indian jasper mining, other structures - identified in studies or records not included in the NHL nomination. Many of these sites are not formally recorded or poorly understood - the exact location and extent of resources is not established.

#### Mine pits

The excavations are cultural resources - the result of the surface mining that took place at Soudan prior to the start of underground mining.

#### Bat congregating areas

The park hosts a large population of bats - including the Northern Myotis (*Myotis septentrionalis*) and eastern pipistrelle bat (*Pipistrellus subflavus*), species of State Special Concern - and is the most northern bat hibernaculum known in Minnesota. The bats are known to use the Alaska Shaft and No. 8 Shaft to enter and exit the mine. The extent of their use of the drifts and tunnels, if they can move between the two shafts, or their use of other shafts or pits in the park is unknown.

#### Shoreline along Lake Vermilion

Undeveloped shoreline on Lake Vermilion is increasingly rare. The SAM maps illustrate a 300-foot protection zone along the undeveloped shoreline within the park - all Lake Vermilion shoreline with the exception of the already developed boathouse area. This zone will be protected from development and use impacts to preserve its scenic quality. The zone also includes significant natural - and likely cultural - resources. Several stands of old growth forest extend to the shoreline. There is also a high probability of cultural resources within the zone - habitation and use sites are found along lakes and rivers. Limiting visitor use within the zone will help protect these resources.

#### Old growth forests (and buffer areas)

Old growth stands and buffer areas have been identified in Soudan UMSP following state statute. These stands contain trees that are at least 100 years old. They will be managed and protected in accordance with the Department of Natural Resources Old Growth Guidelines.

### *Visitor Use Levels and Experience (Figure 15)*

#### High visitor use areas

Areas identified as high visitor use include the No. 8 Shaft complex and picnic area, West Tower Mine Trail, and the Stuntz Bay Road and boathouse area surrounding the boat launch. These areas support the majority of park visits.

#### Medium visitor use areas

Areas identified as medium visitor use include those areas encompassed by the main trail loop in the center of the park, the remaining boathouse areas, and the area within Swedetown Bay used by rental houseboats. The trail loop supports moderate winter and summer use.

#### Low visitor use areas

Areas identified as low visitor use are those portions of the park with no formal access or facilities (trails, picnic shelters, etc.) and currently support almost no visitor use. These areas of the park are largely remote, and include large stands of old growth forest.

### *Overlay - Identifying Existing Opportunities and Conflicts (Figure 16)*

There are five areas of existing opportunities or conflicts identified through the SAM process. All five involve monitoring and management options for conflicts - none result in closure of an area or relocation of visitor use. Recommendations for addressing these areas are included in the related sections of the management plan.

#### Boathouse area

The boathouse area presents scenic impacts and potential resource impacts on the Lake Vermilion shoreline - including water quality impacts. The boathouse area is also adjacent to old growth stands and buffer areas. Park staff will work with other DNR divisions, the Stuntz Bay Boathouse Association and boathouse owners to manage these resource concerns.

#### Old growth stands and trails

Several trails cross through old growth stands and buffer areas. Potential resource impacts include stand fragmentation and introduction of non-native species. These trails are also an interpretive opportunity - a chance to educate park visitors about old growth forests. Management strategies will include minimizing trail treadways and discouraging volunteer trails, monitoring non-native species, and developing interpretive signage about the old growth ecology and ways to limit visitor impacts.

#### No. 8 shaft complex

This area contains the largest concentration of cultural resources and highest level of visitor use in the park. Although there are potential resource impacts, bringing people to this area to experience the historic buildings and the mine tour is the central purpose of the park. Management strategies include designating walkways to direct visitor movements, monitoring impacts on historic structures, and developing interpretive signage to educate visitors on historic preservation.

#### Soudan iron formation

The outcrop's proximity to Stuntz Bay Road and hiking trails is an opportunity to educate park visitors about the geologic history in the park. Signs and brochures will be used to interpret the formation and to minimize visitor impacts (marring or collecting activities). The area will be managed to keep encroaching vegetation clear of the formation.

#### Swedetown Bay

Boathouses and other boats use the Swedetown Bay area (as well as several park-owned islands) as a day-use area - tying up along the shore to picnic, build campfires, etc. These activities have negative resource impacts - girdled trees from rope tie-ups, vegetation damage from firewood collection and volunteer trails, litter, fire rings, and the potential for wildfires. Old growth stands and areas within the old growth buffer are impacted by these activities. The Division will work with the houseboat rental operator to direct renters to appropriate sites and to educate renters to minimize resource impacts. The Division will also consider providing mooring rings at authorized sites to minimize damage to large trees.

## Assessing Future Conditions

### *Significant Natural and Cultural Resources (Figure 17)*

The resource management efforts during the lifetime of the plan will be targeted at qualitative changes. Management directions for each resource are described below.

#### National Historic Landmark (NHL) boundary

Several historic mine structures and sites are thought to be outside of the boundary. A revision of the nomination and a boundary adjustment should be investigated to ensure the appropriate management and preservation of the park's cultural resources. The Division will carefully review any development projects within the NHL boundary to assess impacts to the Landmark status.

#### NHL contributing structures

The Division will develop a cultural resources management plan to help assess, prioritize and develop preservation strategies for these structures. Management activities will focus on maintaining the historic integrity of these buildings.

#### Cultural and archaeological sites

Many of the cultural and archaeological sites mapped in the SAM process have not been located accurately, nor are all of the site locations fully documented. Additional information related to these sites will help in developing management strategies for their preservation and interpretation. Like old growth forest management, these efforts will result in qualitative improvements to park resources.

#### Mine pits

Management will focus on maintaining stability of the pit edges for visitor safety, and selective vegetation clearing and signage for interpretation along the West Tower Mine trail and the south rim of the Tower Mine.

#### Bat congregating areas

Further research concerning the bat population size and trends, use of the mine, and affects of using of No. 8 shaft will provide information for developing management strategies. The management goal is for the mine to host a healthy, stable bat population.

#### Shoreline along Lake Vermilion

Guiding development projects away from the 300-foot protection zone and working with boathouse owners, the Stuntz Bay Boathouse Association, and houseboat vendors will help minimize negative impacts on the Lake Vermilion shoreline.

#### Old growth forests (and buffer areas)

The Division is developing resource management plans for the old growth stands within the park. The intent is to manage the entire park - with the exception of the cultural resource areas - to perpetuate old growth forest communities. These qualitative improvements do not show readily on a map, however the result should be over time, a greater amount of old growth forest within the park. The Division will use prescribed burns as part of its management regime.

#### Clearing vegetation for resource protection and interpretation

Future management of several of the resources above include discussion of clearing vegetation. Vegetation will be actively managed in these specific locations in the park to achieve cultural resource protection and interpretation goals. Six areas have been identified as part of the planning process. (See table below and Figure 17 - Future Conditions - Significant Natural and Cultural Resources) These sites will be in addition to the area around the No. 8 Shaft complex, picnic area, and park maintenance area which are currently managed.

**Table 3. Vegetation Management Areas**

Area	Purpose	Management
West Tower Mine platforms	View of pits & No. 8 shaft complex	Remove large trees
Tower Mine - south rim	View of mine pit	Remove large trees and brush
Compressor house & stack	Resource protection/interpretation	Remove large trees and brush
Alaska shaft	Resource protection/interpretation	Remove large trees and brush
Greenstone pile	Maintain industrial appearance	Remove all trees
Ore Stockpile	Maintain industrial appearance	Remove all trees and brush

#### *Visitor Use Levels and Experience (Figure 18)*

##### High visitor use areas

The future high visitor use area is anticipated to be very similar to the existing conditions. The potential interpretive/visitor center sites identified in the plan have been added to the high visitor use area - the final selection of a site will eliminate all of the other sites as high use areas.

#### Medium visitor use areas

The medium visitor use area is expected to be the same as in present conditions - with the exception of the final interpretive/visitor center site location.

#### Low visitor use areas

The low visitor use area continues to encompass the remote area of the park, and will include the areas added to the statutory park boundary.

### *Overlay - Identifying Future Opportunities and Conflicts (Figure 19)*

The opportunities and conflicts identified under Present Conditions will still be relevant in the future - management options for these areas will continue to be followed. In addition, several areas will also present themselves as opportunities and conflicts in the future. Recommendations for bringing these future conditions about are included in the related sections of the management plan.

#### Alaska shaft area

Stabilization of the cultural resources and vegetation clearing will improve the site for interpretation. However, future visitor use and vegetation management will have to be balanced with the use of the shaft by bats.

#### No. 8 shaft complex

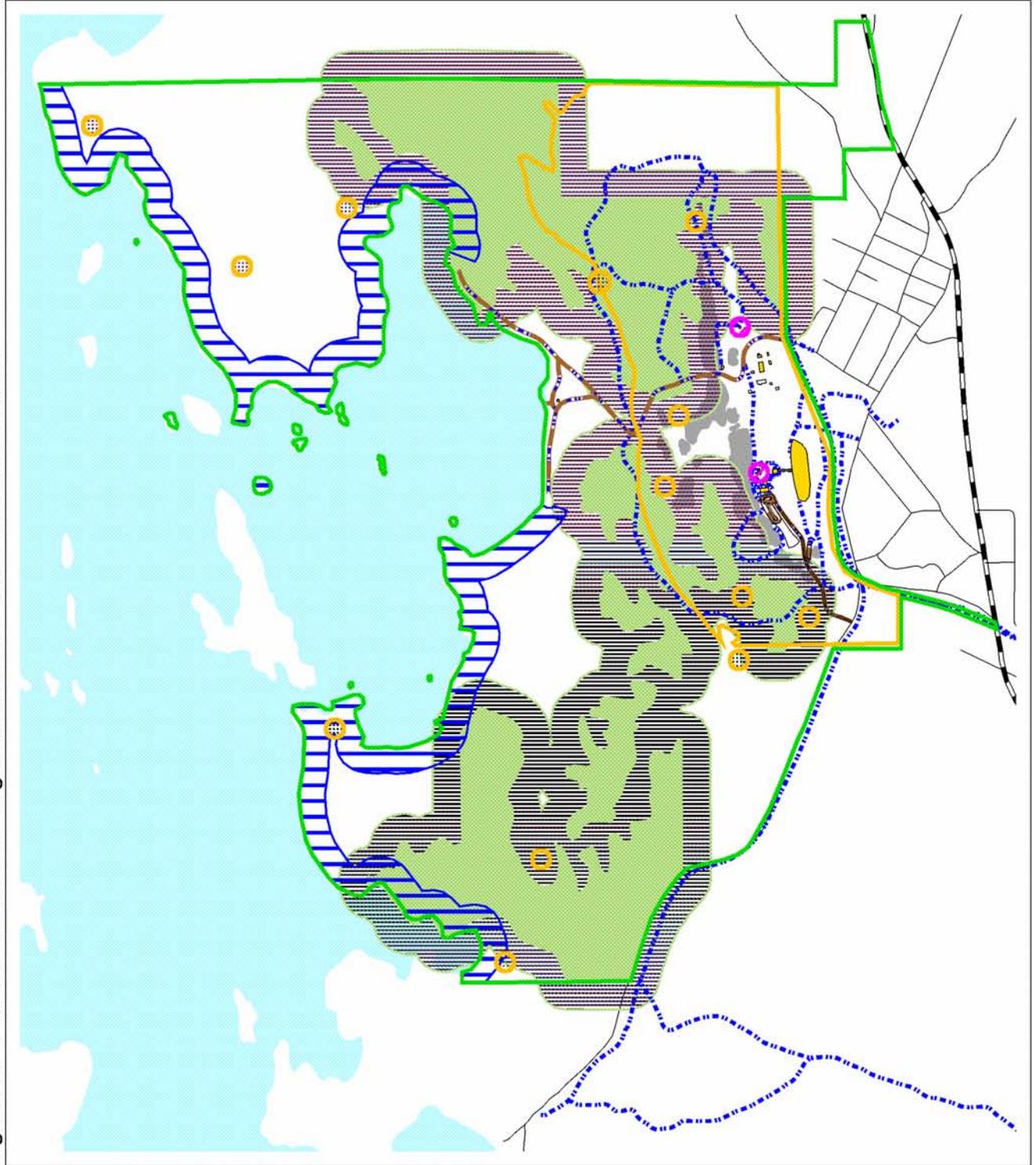
Vegetation clearing, interpretive trail improvements, restoration of the Dry House, and the new visitor center will all present significant improvements for interpretation and visitor experience.

#### Boathouse area

The development of a public boat launch and picnic area, and the reduction in boathouse structures in use, will increase the park visitor's ability to experience and enjoy this portion of the park. Park staff will work with the Stuntz Bay Boathouse Association and individual boathouse owners to manage their needs and the growing public use of this area.

# Soudan Underground Mine State Park

Figure 14 - Present Conditions - Significant Natural and Cultural Resources



- Legend**
- State Park Boundary
  - National Historic Landmark Boundary
  - NHL Contributing Structures
  - Other Structures
  - Cultural and Archeological Sites
  - Mine Pits
  - Bat Congregating Area
  - Shoreland Protection Zone
  - Old Growth Forest Stands
  - Old Growth Protection Zone
  - State Park Roads
  - Trails
  - Highway
  - County Highway
  - Township Road
  - City Street
  - Water



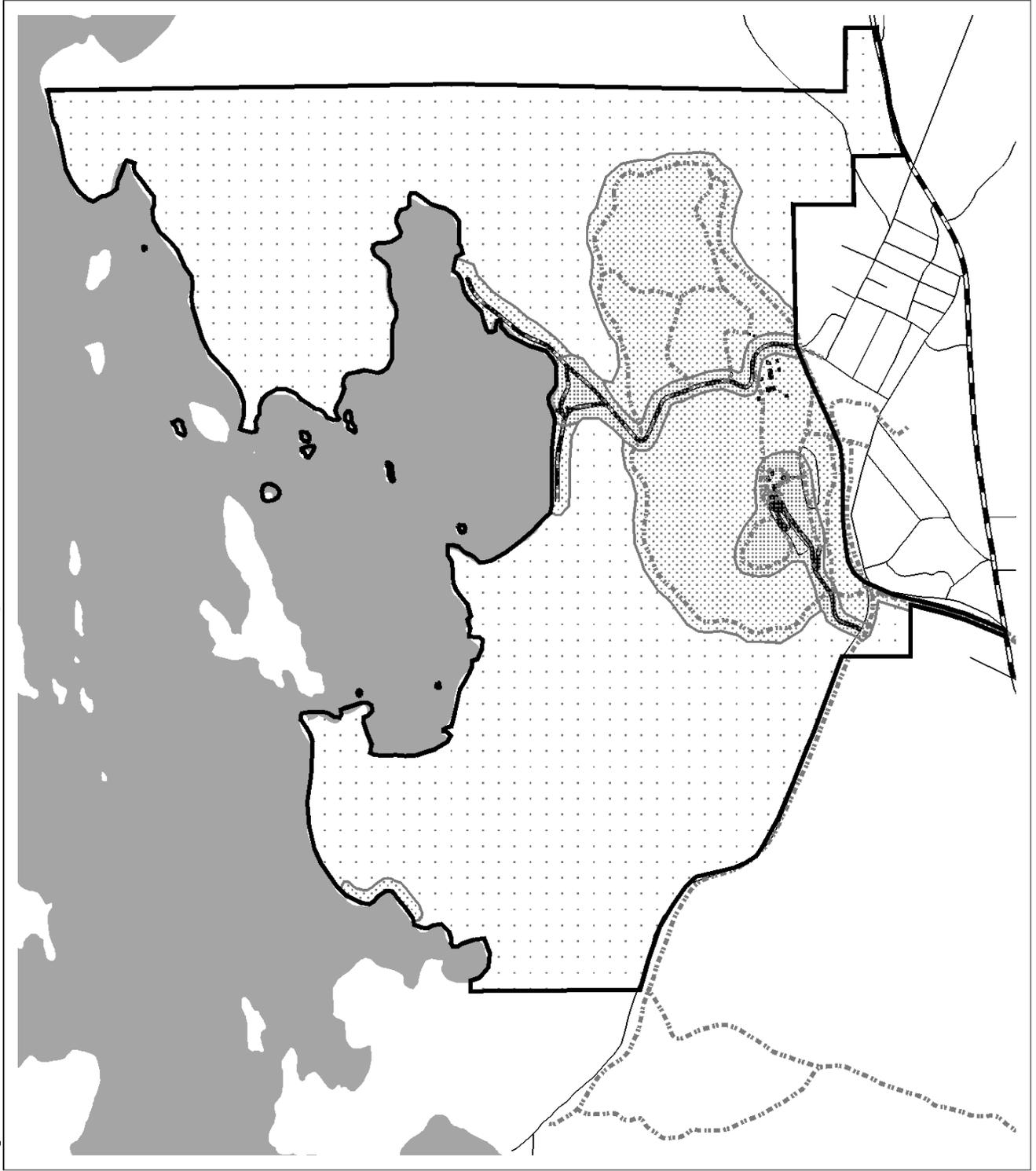
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Prepared by: Jade Templin 08/14/01

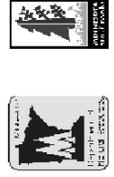
# Soudan Underground Mine State Park

Figure 15 - Present Conditions - Visitor Use and Experience



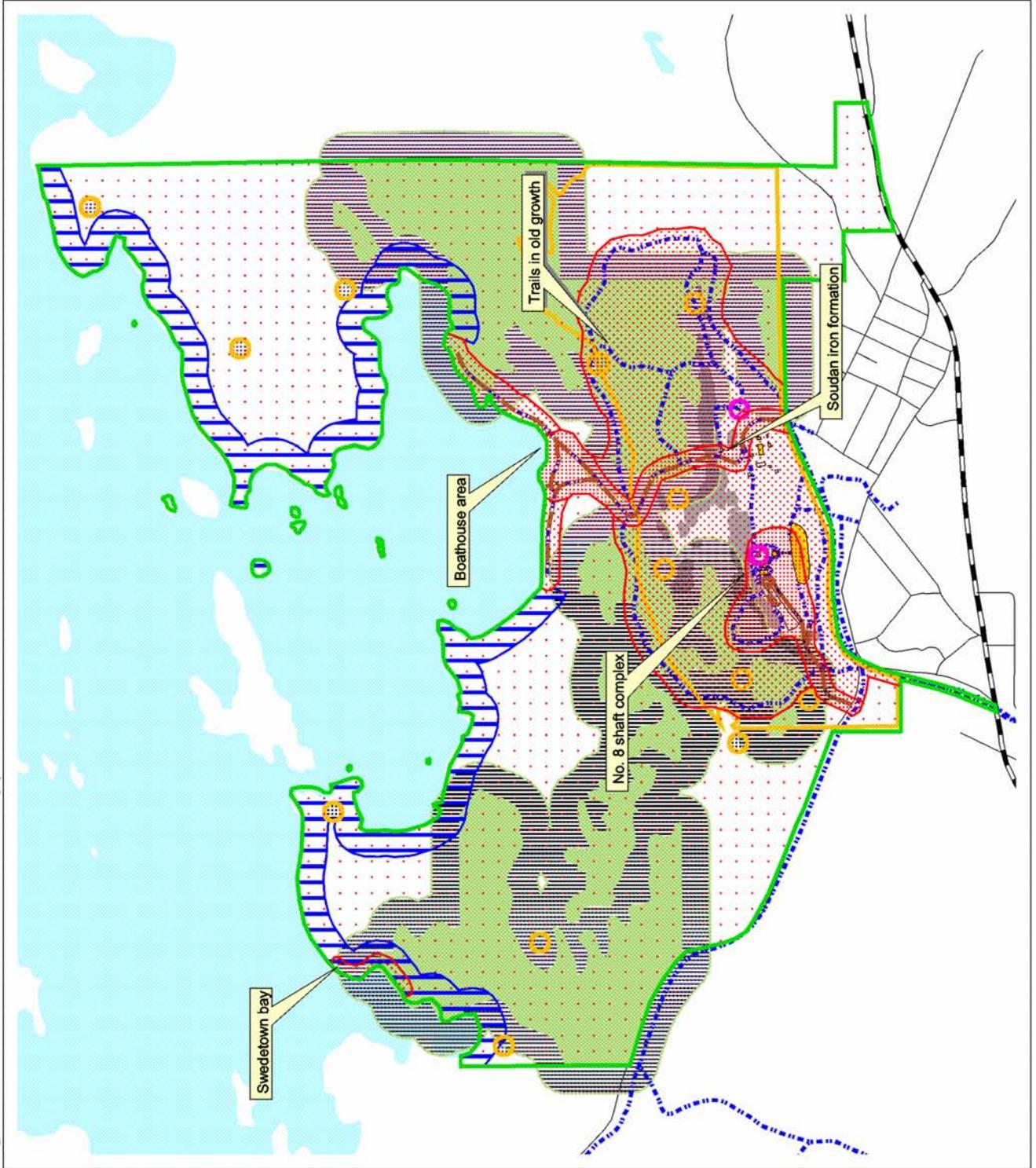
## Legend

- Visitor Use Levels
  - High
  - Medium
  - Low
- State Park Boundary
- Structures
- State Park Roads
  - Trails
  - Highway
  - County Highway
  - Township Road
  - City Street
- Water



# Soudan Underground Mine State Park

Figure 16 - Present Conditions - Opportunities and Conflicts



## Legend

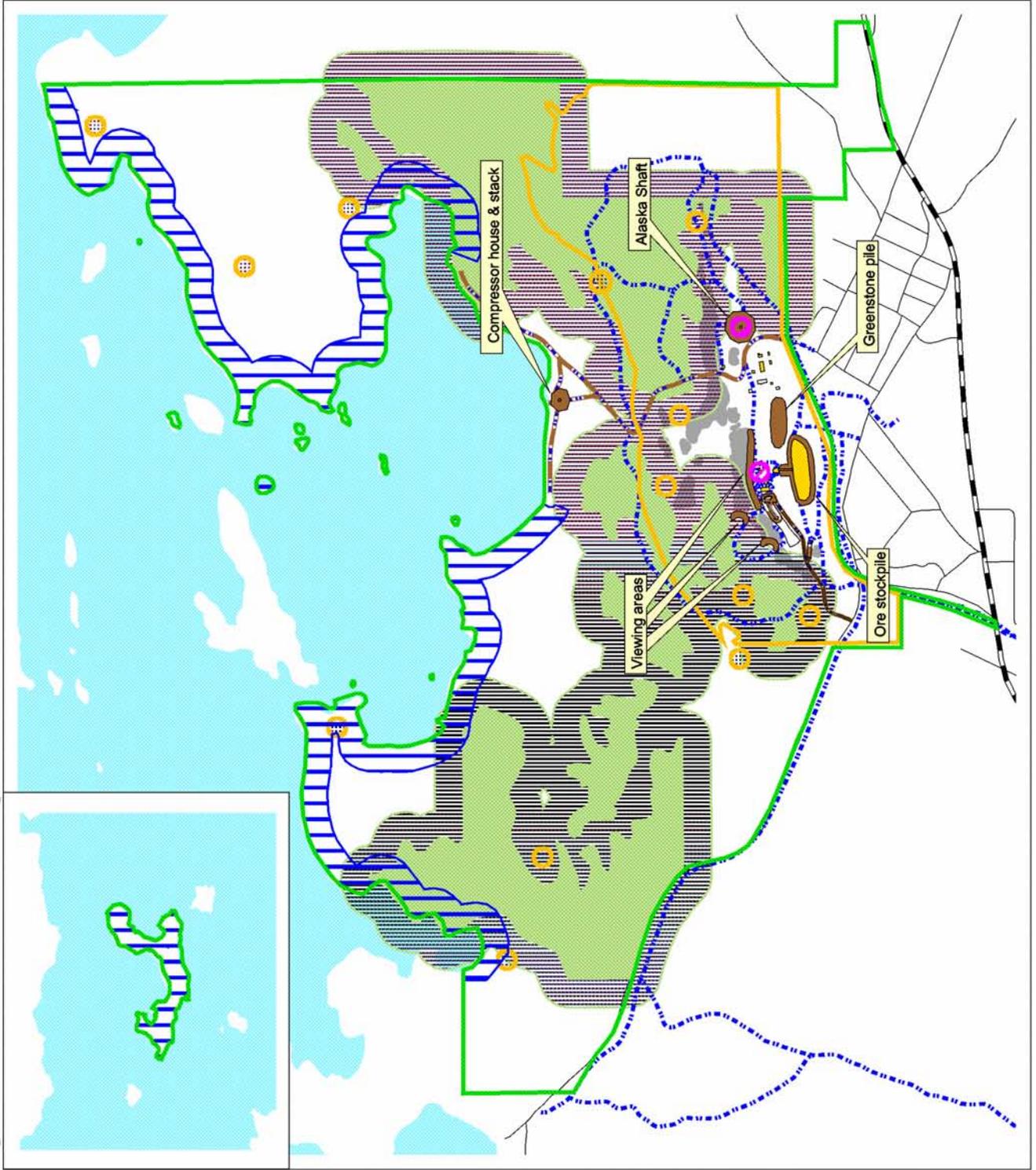
- Visitor Use Levels
  - High
  - Medium
  - Low
- State Park Boundary
- National Historic Landmark Boundary
- NHL Contributing Structures
- Other Structures
- Cultural and Archeological Sites
- Mine Pits
- Bat Congregating Area
- Shoreland Protection Zone
- Old Growth Forest Stands
- Old Growth Protection Zone
- State Park Roads
  - Trails
- Highway
- County Highway
- Township Road
- City Street
- Water



Prepared by: Jade Templin 06/14/01

# Soudan Underground Mine State Park

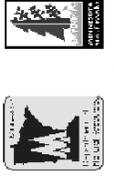
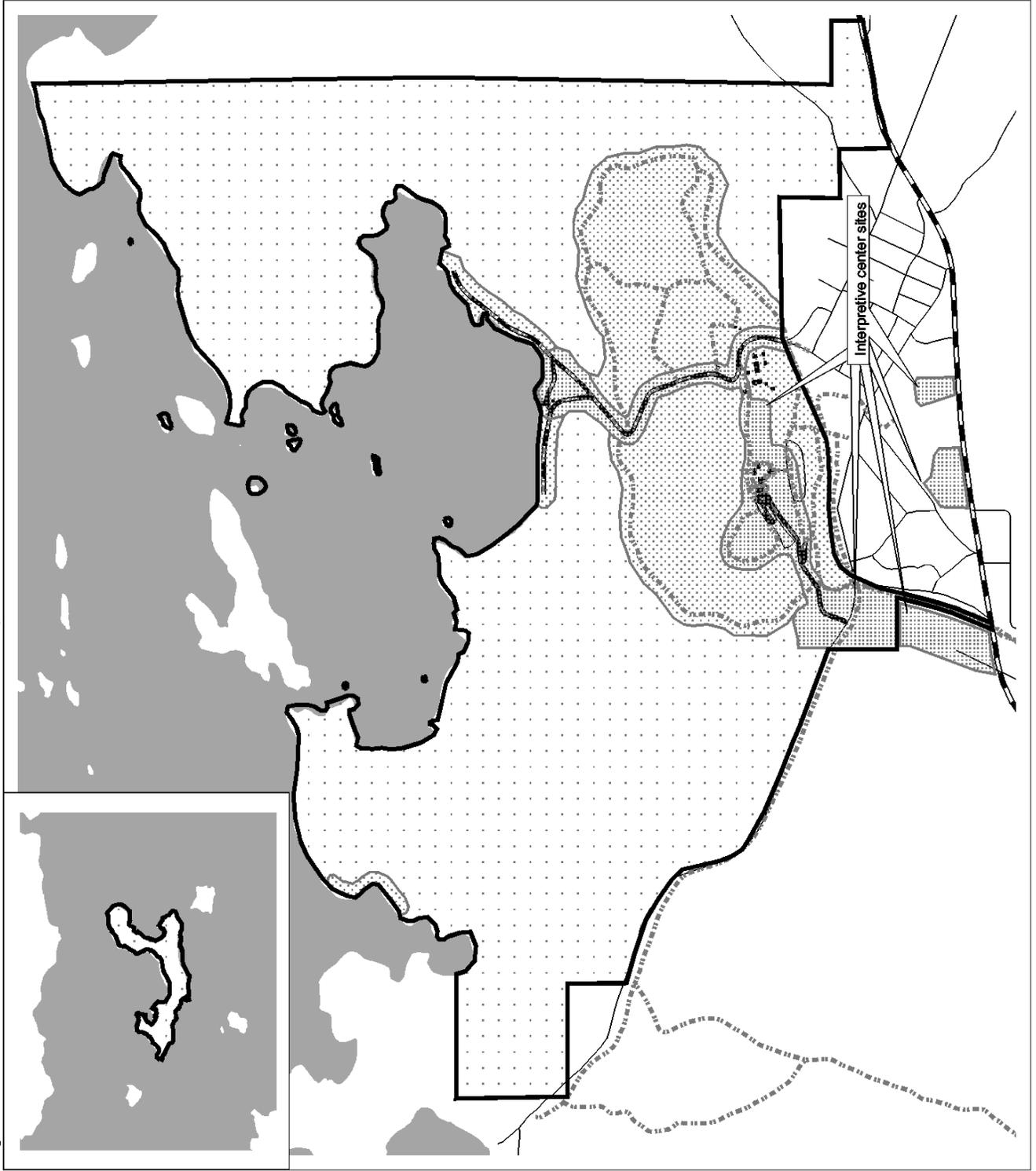
Figure 17 - Future Conditions - Significant Natural and Cultural Resources



Prepared by: Jade Templin 08/14/01

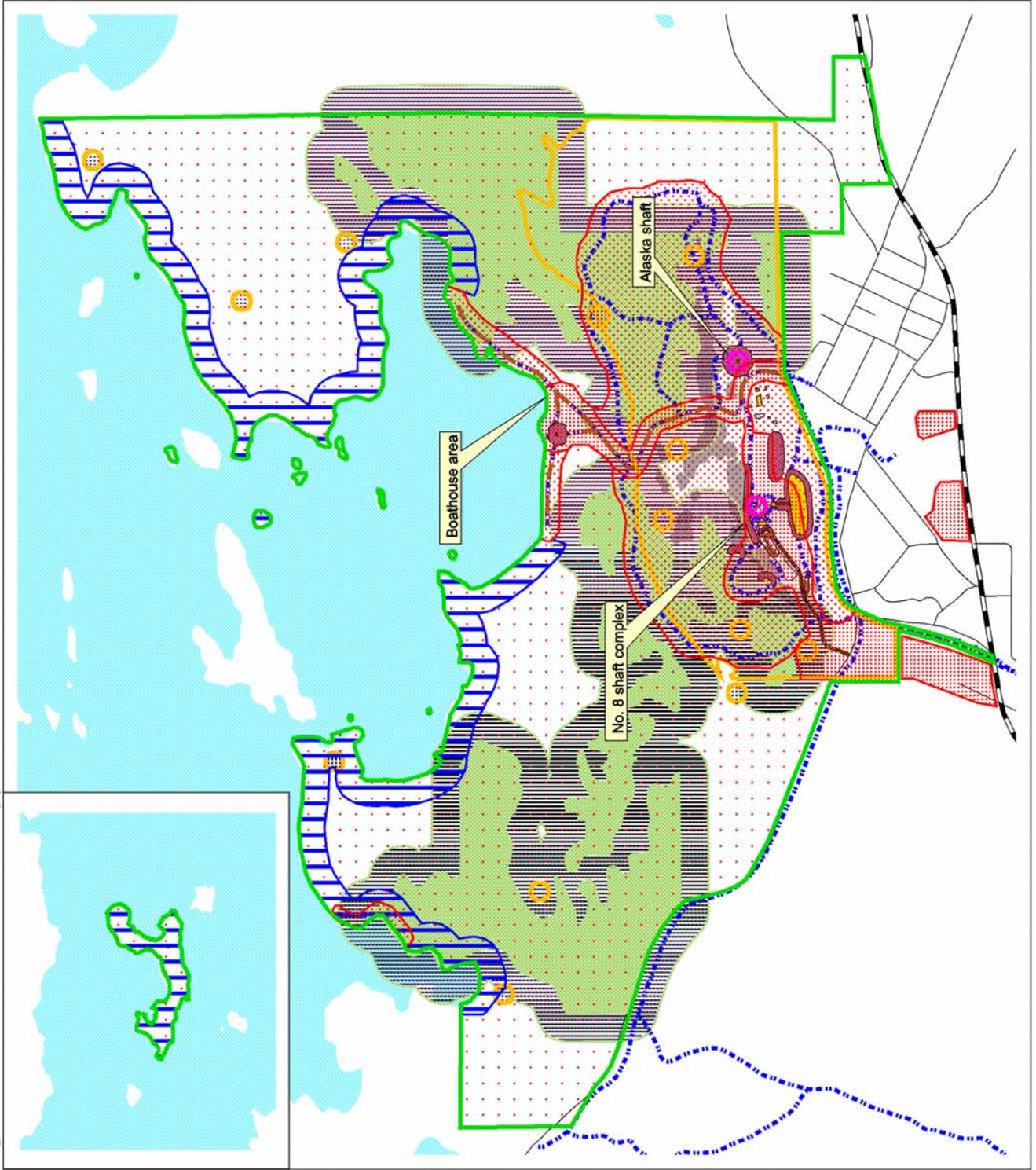
# Soudan Underground Mine State Park

Figure 18 - Future Conditions - Visitor Use and Experience



# Soudan Underground Mine State Park

Figure 19 - Future Conditions - Opportunities and Conflicts



## Legend

- Visitor Use Levels
  - High
  - Medium
  - Low
- Vegetation Clearing Site
- State Park Boundary
- National Historic Landmark Boundary
- NHL Contributing Structures
- Other Structures
- Cultural and Archeological Sites
- Mine Pits
- Bat Congregating Area
- Shoreland Protection Zone
- Old Growth Forest Stands
- Old Growth Protection Zone
- State Park Roads
  - Trails
- Highway
- County Highway
- Township Road
- City Street
- Water





# IX. OPERATIONS, STAFFING, AND COSTS

## Operations and Staffing

Soudan Underground Mine State Park currently faces operational constraints with its present staff levels. Presently, the majority of management hours are needed for staffing needs, operating the mine tours, structure and equipment maintenance. Very little time remains for the natural resources issues, vegetative management and trail maintenance in the park. For example, cultural resource degradation from minimal maintenance is occurring to some of the historic buildings. Several recommendations in the plan would require additional funding, staffing and enforcement hours. In addition, there are a number of recommendations which would result in additional maintenance staff needs. Examples include trail refurbishing and vegetative management.

Many of the development proposals would have initial start up costs, as well as long-term maintenance expenses. However, some of the proposals could be developed with minimal expenses using alternative labor, for example:

- Sentence to Serve (STS)
- Minnesota Conservation Corps (MCC)
- Other Volunteers

The Division of Parks and Recreation may experience increased staffing needs and work loads as a result of plan implementation. Other DNR disciplines may also experience some increased workload in the implementation of certain recommendations. For example, the Division of Enforcement, the Division of Forestry, the Division of Trails and Waterways, the Division of Fish and Wildlife and the Bureau of Real Estate Management, may experience increased workloads as a result of increased recreational opportunities and resolution of land issues. Local representatives of these disciplines participated in the planning process and are familiar with what their role may be in the future.

Soudan UMSP is receiving an additional staff position to aide with the management of the State Forest campgrounds and day use areas, and to oversee the boathouse lease program. (See below) This position is anticipated to start in 2002.

## Development Costs

Several recommendations in the plan propose projects that would result in development costs, as well as long-term maintenance and management costs. The following list represents recommendations which have these type of cost implications. The total cost to implement these recommendations is dependant on a wide range of variables - including site specific soil conditions, decisions related to site design, facility scale, septic system selection, distance to electrical service, etc. - and therefore has not been calculated.

- Remove vegetation to restore and maintain historic industrial character of the site.
- Construct a new interpretive center.
- Provide interpretive program of the physics experiments.
- Develop a public boat launch area
- Provide a fishing pier and picnic area near Lake Vermilion.
- Restore selected buildings and structures.
- Develop a self-guided interpretive trail system.
- Upgrade trail signage.
- Provide houseboat tie-ups and fire rings on selected islands.
- Develop additional brochures and maps for trails and park resources.

## **Operations Costs**

Implementing all of the recommendations in this management plan would require a significant increase in the park's annual operating budget. The level of this increase is difficult to estimate - at this time many of the recommendations lack detail concerning site design, scale, development timing that are necessary for accurate estimation. However, the development of facilities such as a visitor/interpretive center will obviously require additional staff and operations resources.

## **Division of Forestry Campgrounds**

In 2001, the Division of Parks and Recreation is assuming management of campgrounds and day use areas previously managed by the Division of Forestry. These campgrounds and other areas present logistic problems and cost issues for the Division. Many of the areas are remote from any state park site. Managing these areas will place additional oversight and cost burdens on individual parks and the Division operations budget as a whole.

Soudan UMSP will be responsible for overseeing three State Forest campground and day use areas - Wakemup Bay, Hinsdale Island, and Wooden Frog - totaling 94 campsites. Wooden Frog also includes a day use area, a swimming beach, a CCC-era building, and a double boat ramp that provides access into Voyagers National Park. One additional staff position will be added at the park to oversee management of the State Forest facilities (this position will also be responsible for overseeing the Stuntz Bay boathouse lease program). Other staff hours for enforcement, maintenance, and facility management that may be necessary to manage the State Forest facilities will need to be being taken from existing staff resources. Since Soudan UMSP does not have a campground, acquisition of additional equipment beyond what the park currently possesses may also be necessary.

The U.S. Bureau of Land Management (BLM) has in the past discussed with the Division of Forestry about cost sharing for improvements to the Hinsdale Island campground and day use area. BLM is interested in increasing the campground and other facilities' capacity to reduce pressure on other BLM-managed islands (which do not have camping or other facilities) on Lake Vermillion. With the Division of Parks and Recreation assuming management of Hinsdale Island, BLM has expressed a continued interest in the potential cost-share arrangement. The Division of Parks and Recreation will work with BLM to consider the possibility of improvements to the facilities at Hinsdale Island.

## **Enforcement**

Law enforcement within the park will comply with guidelines in the Minnesota Department of Natural Resources Park Enforcement Manual (March 2001) and with Minnesota State Park Rules (2000).

The park manager and assistant park manager are licensed law enforcement officers within the Soudan Underground Mine State Park boundary. They call on other law enforcement agencies including Township of Breitung Police and St. Louis Sheriff's Department to assist with law enforcement within the park as needed. Depending upon availability, DNR Conservation Officers are also be asked to assist with enforcement in the park. The Division of Parks and Recreation will continue to work with local authorities to assure effective law enforcement in the park.

## X. PLAN MODIFICATION PROCESS

State Park Management plans document a partnership-based planning process, and the recommended actions resulting from that process. These comprehensive plans recognize that all aspects of park management are interrelated, and that management recommendations should also be interrelated.

Over time, however, conditions change that effect some of the plan recommendations or even an entire plan. Plans need to acknowledge changing conditions, and be flexible enough to allow for modifications as needed.

There are two scales or types of plan modifications: plan revisions and plan amendments. Minor plan revisions concern less controversial issues and can generally be made within the Division of Parks and Recreation as plan modifications. Larger issues that represent changes in management direction or involve other portions of the Department or other state agencies are addressed as plan amendments. The Division of Parks and Recreation Planning Manager will make the decision of whether a plan amendment or plan revision is appropriate.

To maintain consistency between plans and processes, all revisions and amendments should be coordinated through the Division of Parks and Recreation planning section. Requests for planning assistance should be directed to the Division of Parks and Recreation Planning Manager in the Central Office, St. Paul.

### Plan Amendments

#### *Plan Amendment Criteria*

If a proposed change meets any of the following criteria, it must be approved through the management process below.

The proposed change:

1. Alters the park mission, vision, goals, specific management objectives, or proposed development plans outlined in the plan;
2. Is controversial between elected officials and boards, park user groups, the public, adjacent landowners, other DNR divisions or state agencies; or
3. Directly affects other state agencies (e.g., Minnesota Historical Society).

#### *Plan Amendment Process*

The plan amendment process has a series of steps.

1. Review the proposed change at the park and regional level. Determine which stakeholders potentially have a major concern and how those concerns should be addressed. If the major concerns are within the Division of Parks and Recreation, the issue should be resolved within the Division, with input from the public. The proposed change is then reviewed with the Division Central Office Management Team.
2. If the proposed change issue involves different DNR Divisions, the issue should be resolved by staff and approved by the Division Directors. This may require one or two area/regional integrated resource management team meetings. The proposed change will be reviewed through the Department's review process (Statewide Interdisciplinary Review Service or SIRS).

3. If the proposed change issue involves other state agencies, the issue should be resolved by staff and approved by the Division Central Office Management Team - with input from the public - and reviewed by SIRS.
4. If the proposed change is potentially controversial among elected boards, park user groups, adjacent landowners or the public, an open house will be held that is advertised in the local and regional area.
5. All plan amendments should be coordinated, documented, and distributed by the Division of Parks and Recreation planning staff.

## **Plan Revisions**

If a plan change is recommended that does not meet the amendment criteria above, and generally follows the intent of the park management plan (through mission, vision, goals, and objectives), the Division of Parks and Recreation has the discretion to modify the plan without a major planning process.

### *Revisions related to Physical Development Constraints and Resource Protection*

Detailed engineering and design work may not allow the development to be completed exactly as it is outlined in the plan. A relatively minor modification, such as moving a proposed building site to accommodate various physical concerns, is common. Plans should outline a general direction and document the general "areas" for development rather than specific locations. For the most part, plans are conceptual, not detail-oriented. Prior to development, proposed development sites are examined for the presence of protected Minnesota Natural Heritage Program elements and historical/archeological artifacts. If any are found, the planned project may have to be revised to accommodate the protection of these resources.

### *Program Revisions*

The resource management and interpretive services plan sections should be updated periodically as needed. The Division of Parks and Recreation's Resource Management and Interpretive staff will determine when an update is needed, and coordinate the revision with the park planning section. Program sections should be rewritten in a format consistent with the plan as originally approved by the DNR. To retain consistency, park planning staff should be involved in chapter revision review, editing and distribution.

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## XII. APPENDICIES

### Appendix A - Soudan Underground Mine State Park Soil Associations

#### Soil Associations

**1-10B** Brickton-Dalbo-Hassman complex, 0 to 6% slopes.

**Composition:** Brickton soil and similar soils, 55-60 percent  
Dalbo soil and similar soils, 15-20 percent  
Hassman soil and similar soils, 15-20 percent  
Contrasting inclusions, 0-10 percent

**Landform:** Glacial lake plains  
Brickton occurs on flats and footslopes  
Dalbo occurs on summits, shoulders and backslopes  
Hassman occurs in drainageways

**1-15A** Bugcreek-Indus complex, 0 to 2% slopes.

**Composition:** Bugcreek soil and similar soils 40-50 percent  
Indus soil and similar soils, 35-45 percent  
Contrasting Inclusions, 10-15 percent

**Landform:** Bedrock controlled uplands uplands within glacial lake plains  
Bugcreek occurs in drainageways, flats and depressions  
Indus occurs in drainageways, flats and depressions

**1-16D** Conic-Insula-Rock outcrop complex, 8 to 25% slopes.

**Composition:** Conic soil and similar soils, 40-50 percent  
Insula soil and similar soils, 20-30 percent  
Rock outcrop soil and similar soils, 10-20 percent  
Contrasting inclusion, 10-15 percent

**Landform:** Bedrock controlled uplands within glacial lake plains  
Conic occurs on backslopes  
Insula occurs on summits, shoulders and backslopes  
Rock outcrop occurs on summits, shoulders and backslopes

**1-17D** Quetico-Rock outcrop complex, 15 to 35% slopes.

**Composition:** Quetico soil and similar soils, 50-60 percent  
Rock outcrop soil and similar soils, 30-40 percent  
Contrasting inclusion, 10-15 percent

**Landform:** Bedrock controlled uplands within glacial lake plains  
Quetico occurs on summits shoulders and backslopes  
Rock outcrop occurs on summits, shoulders and backslopes

**1-17F** Quetico-Rock outcrop complex, 35 to 60% slopes.

**Composition:** Quetico soil and similar soils, 40-50 percent  
Rock outcrop soil and similar soils, 35-45 percent  
Contrasting inclusion, 10-15 percent

**Landform:** Bedrock controlled uplands within glacial lake plains  
Quetico occurs on summits shoulders and backslopes  
Rock outcrop occurs on summits, shoulders and backslopes

**6-2D** Eveleth-Conic-Rock outcrop complex, 8 to 18% slopes.

**Composition:** Eveleth soil and similar soils, 45-60 percent

- Conic soils and similar soils, 15-30 percent  
 Rock outcrop, 10-15 percent  
 Contrasting inclusions, 5-15 percent  
**Landform:** Till-mantled bedrock uplands.  
 Eveleth occurs on backslopes and footslopes  
 Conic occurs on summits, shoulders and upper backslopes  
 Rock outcrops occur summits and shoulders
- 6-2E** Eveleth-Conic-Rock outcrop complex, 18 to 30% slopes.  
**Composition:** Eveleth soil and similar soils, 40-55 percent  
 Conic soils and similar soils, 15-30 percent  
 Rock outcrop, 15-20 percent  
 Contrasting inclusions, 5-10 percent  
**Landform:** Till-mantled bedrock uplands.  
 Eveleth occurs on backslopes and footslopes  
 Conic occurs on summits, shoulders and upper backslopes  
 Rock outcrops occur summits and shoulders
- 6-3B** Babbitt-Wahlsten-Rock outcrop complex, 1 to 8% slopes.  
**Composition:** Wahlsten soil and similar soils, 40-50 percent  
 Babbitt soil and similar soils, 25-35 percent  
 Rock outcrop, 10-15 percent  
 Contrasting inclusions, 5-15 percent  
**Landform:** Till-mantled bedrock uplands.  
 Wahlsten occurs on summits, shoulders and backslopes  
 Babbitt occurs on flats, footslopes and low convex rises  
 Rock outcrops occur summits and shoulders
- 6-4D** Eveleth-Conic-Bugcreek complex, 0 to 18% slopes, bouldery.  
**Composition:** Eveleth soil and similar soils, 30-40 percent  
 Conic soils and similar soils, 25-35 percent  
 Bugcreek soil and similar soils, 15-25 percent  
 Contrasting inclusions, 5-15 percent  
**Landform:** Till-mantled bedrock uplands.  
 Eveleth occurs on backslopes and lower footslopes  
 Conic occurs on summits, shoulders and upper backslopes  
 Bugcreek occurs on swales and drainageways
- 7-3A** Unnamed Aeric Endoaquept, co-ly, SPD, 0 to 2% slopes.  
**Composition:** Aeric Endoaquept soil and similar soils, 85-95 percent  
 Contrasting inclusions, 5-15 percent  
**Landform:** Loamy-mantled outwash plains  
 Aeric Endoaquept occurs on flats, swales and footslopes
- 7-11B** Cloquet-Emmert complex, 2 to 8% slopes, very stony.  
**Composition:** Cloquet soil and similar soils, 40-60 percent  
 Emmert soil and similar soils, 30-50 percent  
 Contrasting inclusions, 5-15 percent  
**Landform:** Kames and Eskers  
 Cloquet occurs on summits and backslopes  
 Conic occurs on summits and backslopes

**7-11D** Cloquet-Emmert complex, 8 to 18% slopes, very stony.

**Composition:** Cloquet soil and similar soils, 40-60 percent  
Emmert soil and similar soils, 30-50 percent  
Contrasting inclusions, 5-15 percent

**Landform:** Kames and Eskers  
Cloquet occurs on summits and backslopes  
Conic occurs on summits and backslopes

**541** Rifle peat

**Composition:** Rifle soil and similar soils, 85-95 percent  
Contrasting inclusions, 5-15 percent

**Landform:** Glacial lake plains, outwash plains and moraines  
Rifle peat occurs in bogs

**543** Markey muck

**Composition:** Markey soil and similar soils, 90-95 percent  
Contrasting inclusions, 5-10 percent

**Landform:** Drumlins, lake plains, moraines and outwash plains  
Markey muck occurs in nearly level bogs and depressions

**1041** Pits, iron mine

This map unit consists of excavations from which earth spoil and iron ore have been removed.

**1042** Dumps, iron mine

This map unit consists of piles of low grade iron ore, other rock types and soil material.

**1043** Udorthents, nearly level to very steep.

This map unit consists of moderately well to excessively drained soils, adjacent to iron mines and urban areas where soil material has been removed and redeposited by earth moving machinery.

## Soil Types

Babbitt 1-4% slope

Brickton 0-2% slope

Bugcreek 0-1% slope

Cloquet 2-8% slope

Conic 8-25% slope; 8-18% slope; 18-30 slope

Dalbo 2-6% slope

Dumps, Iron Mines

Emmert 2-8% slope; 8-18% slope

Eveleth 8-18% slope; 18-30% slope

Hassman 0-1% slope

Indus 0-2% slope

Insula 8-25% slope

Markey Muck 0-1% slope

Pits, Iron Mine

Quetico 15-35% slope; 30-60% slope

Rifle Peat 0-1% slope

Rock Outcrop Variable slope

Udorthents 0-45% slope

Unnamed Aeric Endoaquept 0-2% slope

Wahlsten 3-8% slope

\*Note - Saint Louis county soil survey is incomplete at this time, therefore soil types have not yet been assigned ID's.

## Appendix B - Reptiles, Amphibians, Mammals, and Birds of St. Louis County

The species listed below have been observed or have current or historic ranges that include St. Louis County. However, some of these species may no longer be found in the county or in the vicinity of Soudan Underground Mine State Park.

### Reptiles and Amphibians in St. Louis County

Blue-Spotted Salamander	Western Chorus Frog	Common Garter Snake
Tiger Salamander	Green Frog	Snapping Turtle
Redback Salamander	Northern Leopard Frog	Painted Turtle
Eastern Newt	Mink Frog	Wood Turtle
American Toad	Wood Frog	Blanding's Turtle
Spring Peeper	Ringneck Snake	
Grey Tree Frog	Redbelly Snake	

### Mammals of St. Louis County

Opossum	Snowshoe Hare	Timber Wolf
Masked Shrew	Southern Bog Lemming	Red Fox
Woodland Deer Mouse	Eastern Chipmunk	Gray Fox
Water Shrew	Least Chipmunk	Black Bear
Arctic Shrew	Norway Rat	Raccoon
White-Footed Mouse	Woodchuck	Pine Martin
Pygmy Shrew	Thirteen-Lined Ground Squirrel	Fisher
Short-Tailed Shrew	House Mouse	Ermine
Southern Red-Backed Vole	Franklin's Ground Squirrel	Long-Tailed Weasel
Star-Nosed Mole	Gray Squirrel	Mink
Little Brown Bat	Meadow Jumping Mouse	Wolverine
Meadow Vole	Fox Squirrel	Badger
Silver Haired Bat	Red Squirrel	Eastern Spotted Skunk
Big Brown Bat	Jumping Mouse	Striped Skunk
Woodland vole	Northern Flying Squirrel	River Otter
Red Bat	Beaver	Canada Lynx
Hoary Bat	Porcupine	Bobcat
Muskrat	Coyote	White-Tailed Deer
Eastern Cottontail		

### Birds of St. Louis County

Common loon	Gray jay	Tennessee warbler
Red-necked grebe	Common raven	Nashville warbler
Common merganser	Boreal chickadee	Northern parula
Goshawk	Black-capped chickadee	Magnolia warbler
Bald eagle	Red-breasted nuthatch	Black-throated blue warbler
Osprey	Brown creeper	Yellow-rumped warbler
Merlin	Winter wren	Blackburnian warbler
Spruce grouse	Hermit thrush	Chestnut-sided warbler
Ruffed grouse	Swainson's thrush	Pine warbler
American woodcock	Golden crowned kinglet	Palm warbler
Common tern	Ruby crowned kinglet	Northern waterthrush
Black-backed 3-toed woodpecker	Solitary vireo	Connecticut warbler
Olive-sided flycatcher	Philadelphia vireo	Mourning warbler
	Black and white warbler	Canada warbler

Evening grosbeak  
Purple finch  
Pine siskin  
Red crossbill  
Dark-eyed junco  
White-throated sparrow  
Lincoln's Sparrow  
Pied billed grebe  
Red necked grebe  
Double crested cormorant  
American bittern  
Great blue heron  
Green backed heron  
Wood duck  
Mallard  
Blue-winged teal  
American widgeon  
Ring-necked duck  
Common goldeneye  
Hooded merganser  
Common merganser  
Northern harrier  
Broad-winged hawk  
Virginia rail  
Sora  
American coot  
Killdeer  
Spotted sandpiper  
Upland sandpiper

Common snipe  
Herring gull  
Black tern  
Black-billed cuckoo  
Great horned owl  
Great grey owl  
Long-eared owl  
Northern saw-whet owl  
Common nighthawk  
Belted kingfisher  
Red-headed woodpecker  
Yellow-bellied sapsucker  
Downy woodpecker  
Hairy woodpecker  
Blackbacked woodpecker  
Northern flicker  
Eastern wood peewee  
Alder flycatcher  
Least flycatcher  
Eastern phoebe  
Eastern kingbird  
Horned lark  
Tree swallow  
Bark swallow  
Barn swallow  
Ntrhrn rough-sided swallow  
Cliff swallow  
Blue jay  
American crow

Eastern blue bird  
Veery  
Wood thrush  
Gray catbird  
American robin  
Brown thrasher  
Cedar waxwing  
European starling  
Ovenbird  
Northern cardinal  
Rose breasted grosbeak  
Indigo bunting  
Chipping sparrow  
Clay-colored sparrow  
Savannah sparrow  
Song sparrow  
Swamp sparrow  
White-throated sparrow  
Bobolink  
Red-winged blackbird  
Eastern meadowlark  
Yellow-headed blackbird  
Brewer's blackbird  
Common grackle  
Brown headed cowbird  
American goldfinch  
House sparrow

## Appendix C - Overview of Area Interpretive Services

There are many different types of interpretive services and environmental education facilities in the area around Soudan UMSP. Each of these facilities has its own unique type of program and mission. Soudan UMSP and the Division of Parks and Recreation have cooperated with many of these facilities to promote regional education opportunities and arrange trips.

### *Interpretive and Environmental Education Facilities:*

Bear Head Lake State Park - Ely, MN

Bear Head Lake State Park offers self-guided interpretive facilities.

McCarthy Beach State Park - Side Lake, MN

McCarthy Beach State Park offers self-guided interpretive facilities.

Hill Annex Mine State Park - Calumet, MN

Hill Annex Mine State Park offers seasonal interpreter-led tours of the open pit mine, interpretive displays and films in its visitor center, and overlooks of the open pit mine.

Ironworld Discovery Center - Chisholm, MN

Ironworld Discovery Center interprets the full history of Minnesota's iron range, focusing on the early developments of the iron ore industry and the ethnic diversity that evolved along with the mining industry. It includes an interpretive center, interactive displays, exhibits, and living history demonstrations.

Minnesota Museum of Mining - Chisholm, MN

The Minnesota Museum of Mining focuses on the machines used to mine iron ore in Minnesota including displays and actual examples of ore trucks, steam shovels, and other equipment.

Voyageurs National Park - International Falls, MN

The park provides interpretive programming about the geology of the Canadian Shield and the ecological development of the boreal forests since the last glaciation.

Forest History Center - Grand Rapids, MN

This facility represents a winter logging camp at the turn of the century. It has an interpretive center that focuses on the use of Minnesota's forests from early American Indians to the present day.

Ely-Winton History Museum - Ely, MN

The Ely-Winton History Museum illustrates the local history of logging and mining through artifacts, photographs and displays. It is located on the Vermilion Community College campus.

International Wolf Center - Ely, MN

The International Wolf Center focuses on the survival of the wolf around the world by teaching about its life, its association with other species and its dynamic relationship to humans.

Wolf Ridge Environmental Learning Center - Finland, MN

Wolf Ridge Environmental Learning Center is an accredited residential environmental school. It offers immersion programs involving direct observation and participation in outdoor experiences, and focuses on ecology and science, human culture and history, personal growth, group building and outdoor recreation.

Laurentian Environmental Center - Virginia, MN

Laurentian Environmental Center offers an interdisciplinary hands-on exploration of the natural environment and the role of humans in the natural world. Both the residential and day-use formats are used.

YMCA Camp du Nord - Ely, MN

This YMCA camp features nature programs about the Ely area. Groups using the camp include Elderhostel, home-school programs, family and other groups. The camp's interpretive focus is on the Canadian Shield area of northern Minnesota.

