George H. Crosby Manitou

State Park Management Plan

Draft

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SUMMARY

A natural state park classification is proposed for George H. Crosby Manitou State Park. The natural state park classification directs the park's development and resource management toward providing for the use and enjoyment of the park while at the same time protecting and perpetuating resources for future generations.

Vegetation and wildlife management reflect the overall low intensity of existing and proposed development in the park. Maintenance and protection of the yellow birch stand along Yellow Birch Trail is a paramount concern. Monitoring (and possibly reclaiming) the gravel pit areas, identifying forest diseases and pests, developing a firewood policy, and following the policy guidelines of the Division of Parks and Recreation concerning the TH 61 powerline right-of-way are also included in vegetation management.

Wildlife management includes providing educational pamphlets on black bears, erecting bear poles on which visitors can hang their food packs, and maintaining an abundance of snags (dead standing and downed trees) for wildlife habitat enhancement. The plan also continues to recommend boiling all water taken from park streams for drinking and cooking purposes.

Recreation management will continue to support non-motorized, backpack camping only. Two to four new campsites have been identified, with a possibility of adding eight more when land exchanges are implemented. Ten additional miles (16 km) of hiking trails will be developed through the new park lands. Metal fire rings will be added to ~~each~~ selected sites to reduce fire size and conserve firewood. A small trail/picnic shelter will be constructed near the picnic ground. A primitive, narrow, suspension bridge will be constructed to provide access to the eastern portion of the park. A primitive group camp with a maximum capacity of 14 people will also be developed. A self-guided trail is proposed for the trail loop system of Sidewinder, Cedar Ridge, and Yellow Birch trails.

One of the major problems that arose during the planning process for Crosby Manitou was the statutory boundary of the park. The existing statutory boundary is difficult to manage because it encompasses of several

noncontiguous land parcels that were donated by George Crosby in 1954. This plan recommends a land exchange involving the DNR, Division of Parks and Recreation, the DNR, Division of Forestry, and Lake County. The ultimate goal is to create a contiguous, manageable park by exchanging existing park land for state trust fund and county tax-forfeit lands. Because land is traded on a value for value basis, the ultimate size of the park cannot be predicted at this time. However, the total park size should remain approximately the same as it is today (3,400 acres/1,376 hectares).

INTRODUCTION

THE PLANNING PROCESS

The variety of outstanding natural, cultural, and historical resources of Minnesota provide abundant opportunities for outdoor recreation and education. In order to ensure that present and future generations will have the opportunity to enjoy these resources, we must plan now to protect, perpetuate, and provide access to these resources. For this reason, the Minnesota Legislature passed the Outdoor Recreation Act of 1975 (ORA '75).

This act mandated that a comprehensive management plan be completed for each of the major units in the state recreation system. In the source of this planning process, each park will be classified in recognition of its resources and its role in the statewide system.

This plan sets the long range goals and objectives for resource management and recreational development which are appropriate for the park's classification. The actions that should be taken to move toward fulfilling these goals and objectives are then stated and scheduled.

The planning process consists of six steps:

1. An inventory of natural resources, visitor use, and existing facilities is compiled. Specialists from other DNR divisions and sections assist in collecting pertinent data. At this point the first public workshop is held.

2. Alternatives for park management and development are developed. A second public workshop may be held to review these alternatives and invite further public comment. These alternatives are then reviewed by the Park Planning staff and the DNR, Division of Parks and Recreation.

3. The recommendation for park classification is made, the park goal is developed, and the draft plan is written. This step culminates in the first interdepartmental review.

4. The draft plan is revised as the result of the interdepart- mental review. The revised plan is made available to the public for a 30 day review period, after which the final public meeting is held.

5. The draft plan is revised according to information received from the public review. The plan is then sent to the Department of Energy, Planning, and Development for a 60 day reviewal period. (This management plan was approved in July, 1981.)

6. The plan is implemented by the DNR, Division of Parks and Recreation.

REGIONAL ANALYSIS

INTRODUCTION

In order to determine a park's potential role in perpetuating natural resources and fulfilling recreational needs, a regional analysis process has been initiated. The analysis is designed to look at a park's interrelationship with factors such as: accessibility, population, economy, transportation, and other recreational facilities nearby.

Recognition of a state park's interrelationship with these components will help to ensure that park development will be planned to protect natural and historic resources, meet appropriate recreational demands, and avoid competition with other recreation providers.

THE SURROUNDING AREA

Accessibility

It is important to evaluate how accessible Crosby Manitou is to its users when planning for future use. Alternative methods of transportation must also be considered in light of increased energy costs.

Crosby Manitou State Park is located in Lake County, 7 miles (11 km) northeast of Finland, Minnesota. Duluth is 73 miles (117 km) southwest of the park and the Twin Cities are about 220 miles (352 km) to the southwest. Trunk Highway 61 (TH 61) is the main travel corridor along the North Shore of Lake Superior. Although TH 61 passes through the park, the park entrance is reached by turning north on TH 1 to Finland, then northeast on County Road 7 (Cty Rd 7).

TH 61 is a busy thoroughfare carrying a substantial amount of tourist and commercial traffic. By turning off this busy highway and driving through the inland forests, park visitors are more prepared for a primitive backpack camping experience than if the park entrance was directly off TH 61.

The dramatic increases in gasoline prices in the last few years have affected recreation travel patterns. Many people who once traveled longer distances to recreate are now staying closer to home. The use Crosby Manitou receives has continually increased even with the increased costs of driving. This may mean that some of the people who enjoy backpacking and who have previously camped in other parts of the U.S. or Canada are now staying in Minnesota and visiting Crosby Manitou.

Another potential result of higher gasoline prices is the increased use of alternative types of transportation. TH 61 north of Duluth receives considerable use by bicyclists. A bikeway suitability analysis conducted by the Minnesota Department of Transportation has rated Highway 61 from Two Harbors to just north of Silver Bay as unsatisfactory for bicycling. Also, access to the park by bicycle is very poor, with the last 6 miles (9.5 km) being gravel with many large stones. There is a commercial bus route along TH 61, but the closest stop to the park entrance is Silver Bay. Another method of transportation would be needed to travel the remaining 18 miles (29 km) to the park.

Population

The area around Crosby Manitou supports a very low population base. The 1981 census shows 6,147 people living within 25 miles (40 km) of the park. local residents make up a fairly small percentage of the total park use. They use the park primarily for trout fishing.

Economy and Land Use

The majority of Lake County is publicly owned. The following figures represent the approximate land ownership percentages (1978).

	Percent
National forest	30
BWCA	25
DNR Parks and Recreation	.8
DNR forestry	11
County forests	2
Other county lands	9
Private ownership	21
Miscellaneous	1.2

The economy of the area is highly influenced by timber production, the mining industry, and tourism.

Publicly owned forests are managed for multiple use. Timber production, wildlife habitat enhancement, and recreation management are stressed. Finland State Forest is adjacent to the northern park boundary. Most of Finland State Forest lies within the Superior National Forest. Of the four state forests located along the North Shore (Cloquet Valley, Finland, Pat Boyle, and Grand Portage), Finland ranks the highest in timber productivity. It also contains the greatest number of campgrounds (4) and campsites (65).

Finland is a small village located 7 miles (11 km) from the park. Silver Bay is situated 18 miles (29 km) from the park entrance. This community was built around a large taconite plant on the shore of Lake Superior. This is the only plant of its type on the shore. The employment of an estimated two-thirds of the community is related to the taconite industry.

Recreation and tourism play an important role in the North Shore economy. The abundance of public lands (especially the BWCA and county, state, and national forests) and the North Shore Drive attract thousands of tourists each year. The high quality and unique character of the natural resources in this region have resulted in the development of a wide variety of recreational facilities and opportunities. During 1979, tourist travel expenditures (recreation related services such as lodging, transportation, food, and beverage sales) accounted for nine percent of the total services sold within Lake County. The statewide average of tourist travel expenditures is three percent.

SUPPLY AND DEMAND OF RECREATIONAL FACILITIES

Thousands of tourists visit the North Shore area each year. This geographical area is both a destination and a travel route. It is therefore very important to analyze how Crosby Manitou fits into this recreation system. The recreational system includes federal, state, county, municipal, and private recreation facilities which are linked into a corridor by TH 61. Recreational use of the North Shore area is most intense close to the shore of Lake Superior and decreases inland. Use is also highest at those facilities closest to Duluth and decreases further north toward the Canadian border.

The State Comprehensive Outdoor Recreation Plan of 1979 (SCORP '79) is a four year study which identifies recreation patterns and activity preferences on state and regional levels. SCORP '79 surveys were done on the basis of economic development regions. George Crosby Manitou State Park is located in Economic Development Region #3. [redacted] This region includes the counties of Cook, Lake, St. Louis, Aitkin, Carlton, and Koochiching. SCORP '79 has ranked the following recreational activities according to Minnesotans' desire for more opportunities to do them.

Summer Activities

All Minnesotans	Region #3 Residents
1. Bicycling	1. Camping
2. Camping	2. Fishing
3. Fishing	3. Bicycling
4. Tennis	4. Tennis
5. Swimming	5. Swimming
6. Hiking	6. Boating
7. Picnicking	7. Picnicking
8. Boating	8. Hiking
9. Golfing	9. Golfing
10. Park facilities	10. Canoeing
11. Canoeing	11. Baseball/softball
12. Horseback riding	12. Horseback riding

Winter Activities

All Minnesotans	Region #3 Residents
1. Hunting	1. Hunting
2. Ski touring	2. Ski touring
3. Snowmobiling	3. Snowmobiling

Some recreational facilities such as tennis courts and golf courses are not appropriate for state parks and are better provided by municipalities or the private sector.

Picnicking

There are several picnic areas within a 25 mile (40 km) radius of the park. The following chart summarizes these facilities; it includes the picnic ground in Crosby Manitou.

Administration	Number of Areas	Number of Picnic Sites
MN/DOT	5	6
Municipal	1	13
US Forest Service	6	16
DNR, Forestry	2	14
DNR, Parks and Recreation	4	15
Private	6	42
Totals	24	106

The small picnic ground in the park receives light use, primarily by people fishing on Bensen Lake and people who come to hike park trails.

Camping

The following table illustrates the camping facilities located within a 25 mile (40 km) radius of the park and includes the sites in Crosby Manitou.

Administration	Number of Campgrounds	Number of Sites
U S Forest Service	6	40
DNR, Forestry	3	61
DNR, Parks and Recreation	3	72
Private	8	114
Totals	20	287

Although there are many state and private camping opportunities available within 25 miles (40 km) of the park, none of the other campgrounds provide the same type of campsites that Crosby Manitou has. The experience of walking through a forest to a secluded campsite removed from other people does not exist in any of the other campgrounds. The most comparable experience available is hiking into U.S. Forest Service or DNR, Forestry land and camping in an undesignated campsite. Many people feel more secure in the park with its well marked trails and designated campsites.

Crosby Manitou can, in the future, supply information to campers who desire more remote, secluded campsites than the park provides. With the approval of the agency managing the surrounding land, the park could be used as a trail head from which campers can hike out into DNR, Forestry or county tax forfeit lands to camp.

Trails

Several different agencies provide recreational trails within 25 miles (40 km) of Crosby Manitou.

	Trail Type (in miles)			
Land Administrator	Hiking	Ski Touring	Snowmobiling	Horseback Riding
Municipal	2		2	
U S Forest Service	11	44	30	0
DNR, Trails and Waterways	125*		125*	125*
DNR, Forestry	25	0	25	0
DNR, Parks and Recreation	28	20	0	0
County	0	41.4	30	0
Private	31	0	16	0

*These mileage figures include the North Shore Trail which is not completed, but is scheduled to be completed in 1983.

The trails provided in Crosby Manitou are intentionally rustic in nature. This helps to maintain the overall character of the park.

The North Shore State Trail passes through the park. This trail is used by snowmobilers, hikers, and horseback riders. Eleven miles (18 km) of ski touring trails are currently provided in the park. Two miles of these trails are rated "easy", four miles are rated "more difficult", and five miles rated "most difficult". None of the ski trails are groomed. Groomed trails will be provided in both Tettegouche and Temperance River State parks. The trails in Manitou will not be groomed to assure so that a variety of trail types are available in this area.

Swimming

There are no designated public swimming beaches within 25 miles (40 km) of Crosby Manitou. There are six private swimming beaches and one swimming pool, all of which are associated with resort or motel facilities. Although there is a need for a public swimming facility in the area, there is little potential for developing one in Crosby Manitou.


THE
PARK
USER

Park Visitation

Although the park was established in 1955, reliable park user data were not available until 1973.

Year	Day Use (estimates)	Backpack Camping Occasions	Total Visitor Days
1973	2143	1622	3765
1974	2314	1282	3596
1975	2367	1348	3715
1976	1509	1045	2554
1977	2983	2333	5316
1978	4280	1754	6034
1979*	3441	1699	5140
1980**	4484	1379	5863
1981	5123	1999	7122

* This year camping occasions were not documented from Jan.- April 15th

** This year a fire ban was in effect from Feb.- May, and the park was closed from August through December.

A general trend of increased day use has been shown the last few years. Campsite use has increased significantly in 1981 after two low years due to shortened seasons.

Day use accounts for about 70 percent of the total park use. Many of the day users come to fish trout, both in Bensen Lake and the Manitou River. Some come to use the trails-ski touring in the winter and hiking in the summer. Picnicking is usually combined with fishing or hiking.

The high use period for camping is May 15-October 30. During this period in 1979-1980, an average of 20 percent of the available campsites were being used. Weekend use frequently reached 50 percent occupancy and holidays about 90 percent. During 1981, there was a significant increase in use. The total visitor days (see chart above) was the highest in the park's history. The park was at capacity on the major holidays, in fact, on July 4, 1981, 12 parties were turned away after all the campsites were assigned.

The park also receives consistent camping use during the winter. Normally one or two campsites are used each weekend and occasionally three or four sites.

Camper Profile

Camper registration cards are completed each time a campsite is used. This card records camper name and address, number in party, length of stay, and dates the campsite was used. A sample of these cards for the three year period 1977-79 was taken. The following information on campers at Crosby Manitou was drawn from this sample. This information does not necessarily provide data on individual campers. Information gathered is on each group of campers who register for a campsite.

The majority (69 percent) of people who camp in Crosby Manitou live in the twin city metropolitan area. About 7 percent of the campers live in Duluth. The rest of the campers who live in Minnesota (18 percent) are distributed throughout the state. Approximately 6 percent of the campers live in other states, about one-fourth of these live in Wisconsin.

According to the park manager, the majority of campers are young adults in their twenties. Many are small groups or young couples without children. In this park only .2 percent of the campers are senior citizens. The following chart shows the size of camping groups who used the park in 1977-1979.

Number in Party	Percent of Total Camping Parties
1	10.8
2	56.4
3	11.0
4	11.9
5	3.1
greater than 5	6.8

A much higher percentage of users camp in groups of 2 or as individuals in this park than in a typical state park campground. Throughout the state park system only 3.4 percent of the campsites were used by a party of one compared to 10.8 percent at Crosby Manitou. Also, although camper parties of two is the most common, they average only 40 percent statewide where in this park they make up 56.4 percent of the camper parties.

The Office of Planning, in a 1977 SCORP supplement report "Minnesota Campers", analyzed information collected from a statewide questionnaire survey. The study estimated that 1,444,400 campers live in Minnesota. Approximately 8.6 percent of the campers, or approximately 124,000 Minnesotans, when describing their ideal campsite wanted it accessible only by a hiking trail. This is the type of campsite offered at Crosby Manitou.

The study also looked at the number of years a person had been camping. One-third of the campers who said they backpacked had been camping three years or less. Also many (17 percent) of the backpackers were very experienced campers, having camped for 15 years or more. This type of camping can be expected to continue to grow, because it attracts both new and experienced campers.

Most Minnesota campers who backpack live in Regional Development Commission 11 (RDC 11) (Twin Cities). Of all the RDCs, RDC 3 (Arrowhead) had the highest proportion of backpackers (30 percent) to total camper population. RDC 1 (northwestern Minnesota) was a close second with 28 percent.

CLASSIFICATION

THE STATE RECREATION SYSTEM

Minnesotans are fortunate to live in a state with such a wide variety of natural, scenic, and historic resources. To ensure public access and to prevent inappropriate development, the state has set aside lands which exemplify these outstanding resources. It is the management goal for all state recreational lands, including state parks, to protect and perpetuate these resources for use by the citizens of Minnesota.

There is a delicate balance which must be maintained when recreational facilities are provided for large numbers of people in areas of outstanding and often sensitive resources. Inappropriate development can result in irreparable damage to the resource. To help ensure this recreation/resource balance, the Minnesota State Legislature established, through the Outdoor Recreation Act of 1975, a classification process whereby each unit in the state recreation system can be identified as one (or more) component in the system. These components are: natural state park; recreational state park; state trail; state scientific and natural area; state wilderness area; state forest and state forest sub-area; state wildlife management area; state water access site; state wild, scenic, and recreational rivers; state historic site; and state rest area. Included in this legislation are general criteria for classifying, planning, and managing each of these components.

Through this classification system the role for each recreational unit in the system is identified. The two primary classifications for state parks are natural and recreational. These two, along with other classifications, are considered during the planning process. The most appropriate is recommended for the park. If a state park does not meet the established classification criteria, the DNR will consider the possibility of eliminating the park from the state recreational system.

LANDSCAPE REGION SYSTEM

The landscape region system divides the state into 18 regions. These regions are differentiated according to the characteristic plant and animal life, landforms, and cultural patterns which existed before, during, and after European settlement. The landscape region system is a framework which provides valuable information useful in the planning of Minnesota's state parks.

George Crosby Manitou State Park is located in the North Shore Highlands Landscape Region [redacted]. This region is famous for its bare rock cliffs along the Lake Superior shoreline and for its rushing streams with many waterfalls. This region is a band 6 to 13 miles (10 to 20 km) wide, extending along the North Shore of Lake Superior from Duluth to the Canadian border. The area is bounded on the west by the drainage divide between streams emptying directly into Lake Superior and those emptying into the headwater streams of the St. Louis and Pigeon rivers.

Prior to European settlement, this region was covered with four vegetation types. Aspen-birch with scattered conifers and white and Norway pine vegetation types were common. Mixed hardwood-pine and conifer bog swamp were less extensive, yet still common. Due to lumbering activities, slash fires and later fire suppression, the dominant forest cover today is aspen-birch regrowth.

Crosby Manitou is a representative example of the outstanding topography and vegetation of the North Shore Highlands Landscape Region.

CLASSIFICATION RECOMMENDATION

In accordance with ORA, the DNR has formulated policy which establishes the management goal and classification criteria for all units in the state recreation system. George Crosby Manitou State Park is recommended for classification as a natural state park because it best fulfills the criteria for this designation.

According to policy, it is the goal of the Department of Natural Resources in natural state parks to:

"Protect and perpetuate extensive areas of the state possessing resources which illustrate and exemplify Minnesota's natural phenomena, and provide for the use, enjoyment, and understanding of such resources without impairment for the enjoyment and recreation of future generations."

CLASSIFICATION JUSTIFICATION

In order to be classified as a natural state park, George Crosby Manitou must meet or have the potential to meet the following classification criteria.

"Depict most of the major components characteristic of the landscape region, or contain a natural component(s) of statewide significance representing a feature of the presettlement Minnesota landscape."

Crosby Manitou State Park is located in the North Shore Highlands Landscape Region. The rugged topography, rushing Manitou River and thousands of acres of forest makes this park an excellent example of the North Shore Highlands Landscape Region. The mature stands of yellow birch found in the park are significant statewide. The Minnesota Natural Heritage Program has included one yellow birch stand in the park on its register of significant vegetation communities in the state.

"Contain natural resources sufficiently diverse and interesting to attract people from throughout the state."

The people who camp in George Crosby Manitou come from thoughout the state, although most reside in the Twin Cities area (see Park User, Section p 13). The wilderness character and scenic resources of the park are the main attractions for park visitors.

"Be sufficiently large to provide for the maintenance of ecosystems and the protection of other natural features which give an area its special qualities."

With careful development, the park is large enough to protect natural resources and provide for primitive types of recreational activities.

"Be sufficiently large and durable so as to provide opportunities for enjoyment of their special natural qualities by significant numbers of people now and in the future."

Many areas of the park are steep and could become eroded if subjected to intensive use. However the area is sufficiently durable for the current and proposed development and levels of use.

RECOMMENDED CLASSIFICATION

Crosby Manitou's recomended for classification as a natural state park.

PARK RESOURCES

CLIMATE

Although George Crosby Manitou State Park is subject to the strong continental weather patterns that influence all of Minnesota, the local climate is moderated by Lake Superior. The water temperature of the lake remains relatively constant throughout the year. The park receives warming breezes off Lake Superior in the winter and cooling breezes in the summer. Generally, temperatures in Crosby Manitou are 10 degrees warmer in the winter and cooler in the summer than inland areas of northeastern Minnesota. The following temperatures recorded at Two Harbors, Minnesota should reflect the temperature variations to be expected near Lake Superior in the park. The inland portion of the park is somewhat cooler and is more accurately reflected in temperatures documented at the Duluth airport.

Temperature Variations

	Two Harbors	Duluth Airport
Mean January Maximum	22°F (-6°C)	18°F (-8°C)
Mean January Minimum	2°F (-17°C)	-1°F (-18°C)
Mean July Maximum	76°F (24°C)	76°C)
Mean July Minimum	53°F (12°C)	53°F (12°C)

Mean Average Extremes/Frequency
Less than 0°F (-18°C) 55 days/year
More than 90°F (32°C) 0 days/year

Precipitation
Annual Total 28 in. (71 cm)
Annual Snow 65-70 in. (165-179 cm)

Prevailing Winds
Northeast - exceeding 30 mph (48 kmph) an average of 30 days during the period from May through September.

The climate of Crosby Manitou is ideal for recreation throughout the year. The cool summers along Lake Superior make the area ideal for picnicking, hiking, and camping. The moderating effect of Lake Superior tends to extend the normal summer recreation season well into the fall.

Winter recreation conditions are ideal. The season is long, mild, and has abundant snowfall. The area usually has a suitable snowcover for winter

sports from the beginning of December until the middle of April. Snowcover in the metro area is usually not suitable until near the end of December and is gone by mid-March.

Source: Kuehnast, Earl L., 1959. Climate of Minnesota. United States Department of Commerce.

Geology

Crosby Manitou State Park is underlain by basalt bedrock. The basalt is exposed in many places in the park, but particularly along the Manitou River and the bluff tops. Basalt is dark in color, black to brown, some dark red-brown. It was formed from lava about 1.1 billion years ago. At that time, this part of North America was subject to great tensional forces from beneath, which pulled the earth's surface apart along a zone of fractures which extended from the Lake Superior area southwestward into Kansas and Oklahoma. The lava which formed the basalt flowed up out of these fractures to the surface and cooled rapidly. Because of this rapid cooling basalt is fine grained with closely spaced joints and fractures. Also gas bubbles formed which tended to float to the top leaving small pores (vesiculs) in the upper levels, much like the upper surface of an ice cube. These lava flows were then buried under several thousands of feet of lava flows. Over time, water slowly seeped down through the upper flows, picking up minerals and depositing them in the pores of the early lava flows. The rocks formed in these pores are of many different types, but two types of particular interest to collectors are agates and Thomsonite. Through time, the upper layers of rock were removed by glaciers, weathering, and stream erosion, exposing the areas where agates and thomsonite were formed.

The last glacier started to recede 13,000 years ago. As it receded east into the Lake Superior basin, lakes developed around its margin from melted ice and rain. About 10,500 years ago glacial Lake Duluth was formed. This large lake was about 500 feet (152 m) higher than Lake Superior. While glacial Lake Duluth existed, clay sediment was deposited on the lake bottom; deltas of sand and gravel were formed at the mouths of rivers feeding into it; and the waves removed loose materials from the shoreline. As the glacier retreated to the northeast, lower outlets were uncovered and the water level began dropping. Beaches and deltas were formed at many different levels as the water level

slowly dropped. The area along TH 61 near the Manitou River is a gravel deposit formed at a higher water level and was once part of a delta of the Manitou River.

The rock ridges and hills in the park are made of erosion-resistant bedrock. Typically, the hardest bedrock was formed when the lava pushed up near the surface and stopped. Because it was insulated by the surface lava, it cooled slowly and had widely spaced fractures, making it more erosion resistant. The softer surface lava has since been eroded.

The general mineral potential in the Crosby Manitou area has been rated as "fair" with good geologic reliability. The major metals which may occur in this area are copper, silver, nickel, titanium, iron, and platinum group elements.

SOILS

In general, the soils along the North Shore are poor for development. Most are shallow and often moist, containing springs and seepages. This is especially true for the areas which have detailed soil type information available (see Soils Map, p25). The Soils Map and soil type descriptions were adapted from "Soil Survey of North Shore of Lake Superior Coastal Zone Management Area, 1977." This document was written by the USDA Conservation Service in cooperation with Minnesota Agricultural Experiment Station.

Hibbing Silt Loam (map code #254B)

This deep well-drained soil composed of clayey lake sediment is found on gently sloping areas. Most areas of this soil are in forest comprised primarily of aspen, Norway pine, eastern white pine, white spruce, paper birch, and balsam fir. This soil has a slow percolation rate which poses problems for septic tank absorption fields. Structures with either floating concrete slabs or basements need bases and backfill of gravel for good drainage. Hibbing silt loam is suitable for dispersed campsites and trail development although it compacts fairly readily in high use areas and becomes slippery and muddy when wet.

Seelyeville Muck (map code #540)

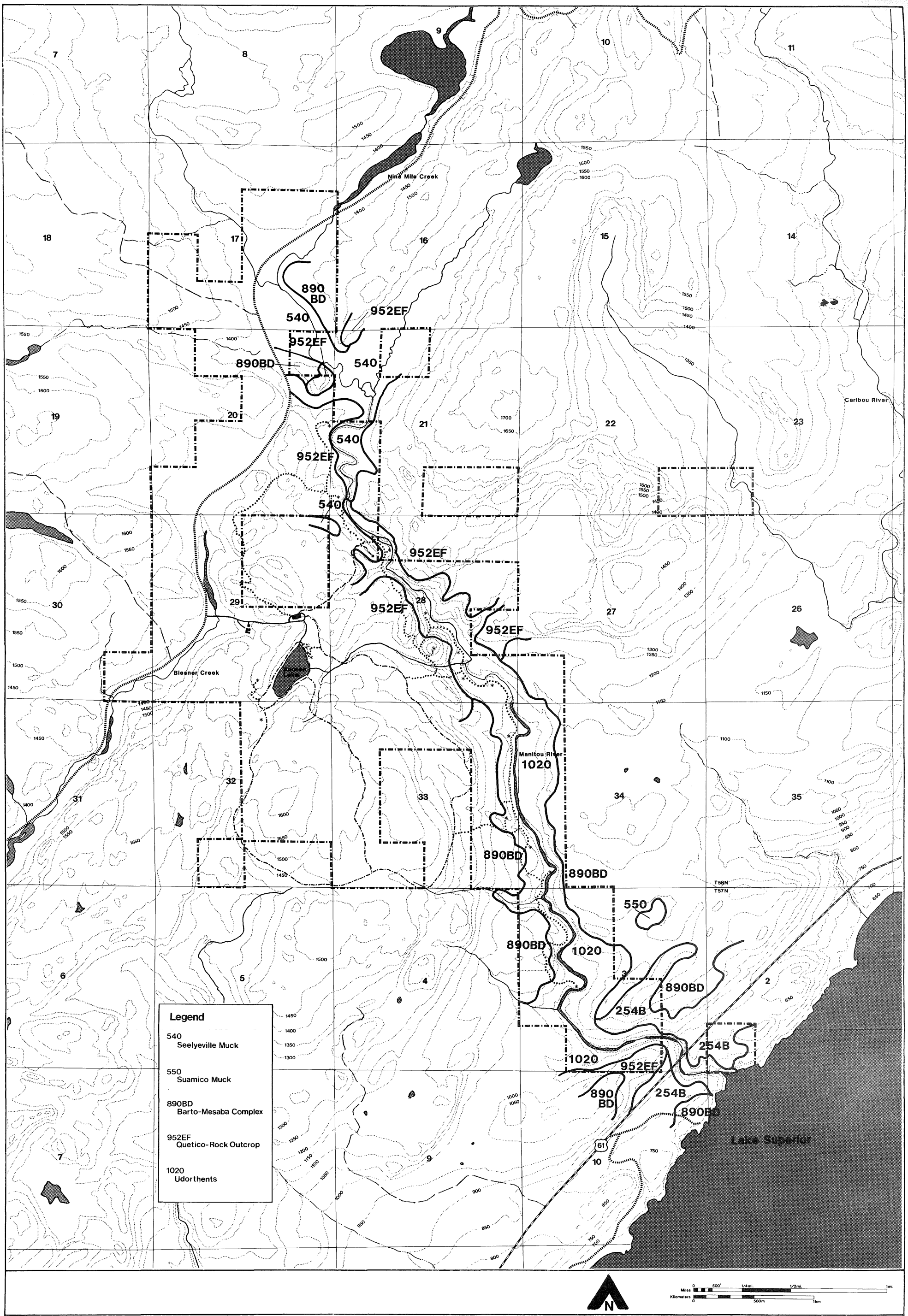
This soil type is very poorly drained. It is formed in organic material that is more than 51 inches (130 cm) thick and has a low fiber content. It is usually nearly level and is found in depressions. Surface runoff is very slow and natural fertility is high. Most areas are undrained and covered with marsh and bog vegetation. Construction of any facilities on this soil type is very difficult. The problems are flooding, wetness, excess humus, and low bearing strength.

Suamico Muck (map code #550)

Suamico muck is a very poorly drained soil formed in 16-50 inches (40.6-127 cm) of organic material over clay. This soil is formed in depressions on lake plains. The main tree species found on this soil type are black spruce, white cedar, and tamarack. Water moves quite quickly through the organic material, but very slowly through the clay. Construction of any facilities on this soil type is very difficult. The problems are flooding, wetness, excess humus, and low bearing strength.

Barto-Mesaba Complex Gravelly Silt Loams (map code #890BD)

This mapping unit consists of Barto soil (8-20 in./20-51 cm to bedrock), Mesaba soil (21-40 in./53-102 cm to bedrock), and Quetico soil (4-18 in./10-46 cm to bedrock) in such a complex pattern that it is not practical to separate them in mapping. They are gently sloping to rolling areas and very well-drained, although seepage over solid bedrock is common. The main tree species growing on these soils are aspen, Norway pine, eastern white pine, jack pine, balsam fir, and paper birch. Depth to bedrock and slope are often major problems for construction of many structures. This soil complex is so variable in depth to bedrock that test holes may reveal isolated areas which are suitable for most structures. These soils have only moderate limitations for campground or picnic area development and are good for trail construction. Large openings in the crown cover should be avoided, because tree root growth is restricted by bedrock and large rock fragments allowing more chance of wind throw.



George H. Crosby Manitou State Park Soils

Quetico-Rock Outcrop (map code #952 EF)

This mapping unit consists of very shallow Quetico soils and rock outcrops in such a complex pattern that it is impractical to separate them in mapping. The Quetico soils mainly occupy the concave more gentle segments of slopes. They make up about one-third of the area. Rock outcrops occupy the convex and steeper segments of the slopes. Quetico soil is a gravelly silt loam 8-24 in. (20-61 cm) thick. Surface runoff is rapid and seepage over bedrock is common. North facing slopes support upland timber and south facing slopes are bare to brushy. Main species are aspen, Norway pine, jack pine, eastern white pine, and paper birch. Construction of structures on this soil type is very difficult. Recreational uses, such as hiking trails and dispersed campsites are possible, if the site is selected carefully. Erosion is a major problem on steep slopes and should be a major consideration in all facility designs.

Udorthents - 18-45 percent slopes (map code #1020)

These steep soils are formed in clayey sediment. They are found in long, narrow, V-shaped valleys. In places where the river is undercutting the valley wall, there are landslides and slumping with little soil material or vegetation. Only those stream valleys with an average top width of 300 ft (91 m) or more are mapped. This soil has severe limitations for most uses because of the steep slopes. Recreational uses such as trails are possible. Erosion control is a major consideration when selecting trail alignments.

VEGETATION

Vegetation History

Since the retreat of the last glacier, the vegetation of northeastern Minnesota has been slowly changing. Tundra occurred after the most recent glacial period, followed by a period dominated by spruce forests. Between 10,000 and 11,000 years ago, a general warming trend resulted in a decline in spruce and an increase in Norway pine, jack pine, and birch. During the peak of the warming trend (about 7,000 years ago), white pine began to appear in Minnesota. Since this migration into the area, pine species have remained a part of the regional vegetation. Pine stands were generated by recurrent fires until extensive cutting, slash fires, and fire suppression occurred between 1880 and 1930 (Wright 1971). The vegetation prior to European settlement is described in the General Land Office survey records. These

records are the field notes of the original surveyors from the mid 1800s. As the surveyors walked along the section lines of each township, they recorded tree species and size at one mile and one-half mile intervals. The size, species, location, and frequency of occurrence indicates that the present forest composition in the area of the park is quite similar to what existed prior to settlement. The following table is a representation of the species frequently mentioned by the original surveyors. Tree size was recorded by the diameter of the tree at breast height (DBH).

Lowland Species	DBH	Upland Species	DBH
tamarack	7-12"	sugar maple	6-12"
spruce (black?)	6-10"	aspen	6-12"
cedar	8-18"	birch (white?)	6-17"
yellow birch	10-24"	fir	6-12"
		spruce (white?)	5-18"
		white pine	6-16"

Understory shrub species were typically alder, hazel, and "spotted" maple (probably mountain maple). Cedar and fir were often mentioned as regenerating understory species.

Marschner (1930) used the General Land Office survey notes to develop a map, of the "Original" Vegetation of Minnesota. Marschner mapped the entire park area as aspen-birch, a vegetation type dominated by trembling and big tooth aspen and paper birch. Conifer elements existed either as codominants (Norway and white pine and white spruce) or in the understory (balsam fir, white and black spruce, and/or white cedar). Heinselman's (1975) interpretation of Marschner's notes suggested that the successional direction of the aspen-birch type was toward a forest dominated by conifers, if natural fires were not controlled. Although the park itself was mapped as aspen-birch, nearby communities adjacent to the eastern park boundary included a large area (about 2,500 acres/1012 hectares of mixed hardwood and pine and two smaller areas

the park are young to middle-aged, with only a few reaching a large, mature stage. In the slightly wetter "wet-mesic" areas, yellow birch becomes more prominent along with white cedar. White birch, balsam fir, and white spruce are associates in this community. Large, scattered white pine can be found in some areas. The composition of the overstory in this community tends to be:

Sugar maple (c)	
Yellow birch (c)	(c) common
White cedar (c)	(o) occasional
White spruce (o)	(r) rare
White birch (o)	
White pine (r)	

One aspect of this community that makes it significant is its yellow birch stands. The range of yellow birch in Minnesota is limited, with the majority of existing stands found along the North Shore and a scattering of occurrence in the north central and east central portions of the state. Because yellow birch is a valuable timber tree, it is unusual to find large stands that have reached maturity. Although the park has several hundred acres which contain yellow birch, one area in particular has been noted for its large yellow birch and cedar. This 100+ acre (40 hectare) stand is situated between Bensen Lake and the Manitou River. It is included on the official register of significant vegetation communities of the Minnesota Natural Heritage Program. The area is shown on the Vegetation Map, p 34. An analysis of this stand in 1976 estimated the average size of both cedar and yellow birch to be 14 in. DBH and the average age was about 126 years. According to Curtis (1959), yellow birch is a potentially long-lived species, reaching a maximum size of 4 ft DBH and maximum age of 300 years.

Another interesting component of the NHC community is a scattering of large white pine, concentrated primarily along the steep river gorge in the vicinity of campsites 10, 11, and 12. Presettlement survey records and existing stumps indicate that the entire park area had a scattering of white pine, however, the majority were logged at the turn of the century. Even at that time, hardwood stands with only 2 or 3 white pine per acre were highly profitable because the trees were often between 3-6 ft in diameter. The relatively small area (about 30 acres/12 hectares) of scattered pines in the park was apparently overlooked because they were situated on steep river gorge slopes. Most of these trees are towering forest giants, reaching several feet in diameter.

The most dominant species in this community is sugar maple. Because of its ability to grow under very shady conditions, sugar maple has become the most important species in the seedling and sapling layers in many areas. For example, the 1976 analysis of the yellow birch stand showed an average of 7,000 maple seedlings per acre. This was an estimated 92 percent of total seedling reproduction.

Ground cover is sparse in much of this community. Common species include sugar maple seedlings, large-leaved aster, twisted stalk, bear's tongue, and sarsaparilla. In the wet-mesic (yellow birch-white cedar) areas, club moss, lady fern, and ground pine are more common. Shrub species include mountain maple, thimbleberry, and speckled alder. Mountain maple is the most prevalent shrub species and in some cases becomes dominant where there is a break in the canopy from select cuttings or natural disturbances.

Some NHC communities have only been selectively logged, but others have been cut more intensively and/or more recently. The stand adjacent to the Cedar Ridge Trail is an example of a more disturbed site.

Mixed Hardwood/Conifer (MH/C)

The MH/C community has the most extensive coverage in the Crosby Manitou study area. Paper birch is dominant in this community, with white spruce, balsam fir, white cedar, and trembling aspen commonly occurring among the birches. The canopy is more open than in the NHC community, allowing the shrub layer to become more prevalent. Beaked hazelnut is the most common shrub species, with balsam fir seedlings and thimbleberry also abundant. Elderberry, hazel, and various brambles can also be found in the shrub layer, especially when the shrubs become thicker in areas where the canopy is more open.

The most common ground layer species include large-leaved aster, sarsaparilla, bear's tongue, bedstraw, and virgin's bower. Also present are club moss, northern bush honeysuckle, violets, and spreading dogbane. Of special interest in these areas are the chlorophyll-free seed plants, which take advantage of the rich constantly moist, organic soil. Chlorophyll-free plants in this area include Indian pipe and coral root.

One variation in this community are stands of young sugar maple, about 2-7 in. DBH. One 5 in. maple which was bored during 1981 was approximately 42 years old. These stands are almost completely dominated by sugar maples, and virtually no shrub coverage is present because of a lack of light through the canopy. Shade tolerant ground layer species such as bedstraw, red baneberry, twisted-stalk, bloodroot, and wood anemone can be found on the forest floor. The most prolific ground layer species in these areas are the sugar maple seedlings, which commonly occupy 50 percent of the total ground coverage. Balsam fir seedlings are also common in these areas. The duff layer (decomposing organic matter) reaches several inches over most of the ground in this community.

In direct contrast to the shaded sugar maple variation of the MH/C type, another variation is present which is affected by an abundance of light. Several rock outcrop areas, usually on steep slopes or on ridge tops, have a maximum canopy coverage of 30 to 50 percent. Trembling aspen grows well under these conditions, and occasionally jack pine and white pine are found growing here also. The shrub layer increases under these light conditions, with elderberry, hazel, dogwoods, sumac, and hoary willow, commonly occurring. High bush honeysuckle is frequently the most characteristic shrub in the area. Other common species in these areas include thimbleberry, blueberry, juneberry and bracken fern.

The MH/C community seems to be composed of relatively young stands dating from some recent disturbance. The disturbance factor in this instance was probably fire.

Aspen-Birch (AB)

This community occurs in the southern portion of the park (near TH 61). The composition of this vegetation type is similar to the MH/C community. Although paper birch is the dominant tree, trembling aspen is often mixed in and it sometimes becomes the dominant canopy tree. In the latter case, the aspen often reach 8-10 in.DBH and can be found in groups of several hundred trees. In places where birch is dominant, white spruce is commonly interspersed. Occasionally balsam fir and white cedar are associates. Very scattered white pine 18-24 in. DBH can be found in this community, especially

along the river slope. Common shrub layer species include speckled alder and gray dogwood. Regenerating birch, spruce, and balsam fir are common, with occasional white cedar seedlings in the riparian areas (near water). Ground cover species include a large amount of bunchberry, with ground pine, club moss, and strawberry.

Lowland Conifer (LC)

This wet, boggy community is dominated by black spruce and white cedar, with tamarack becoming abundant in riparian areas. Black ash and balsam poplar become more apparent in the drainage areas. The shrub layer depends on the canopy coverage, with little shrub development in cedar stands and species such as labrador tea and leatherleaf occurring in spruce stands. The ground layer in these areas is most likely dominated by sphagnum mosses.

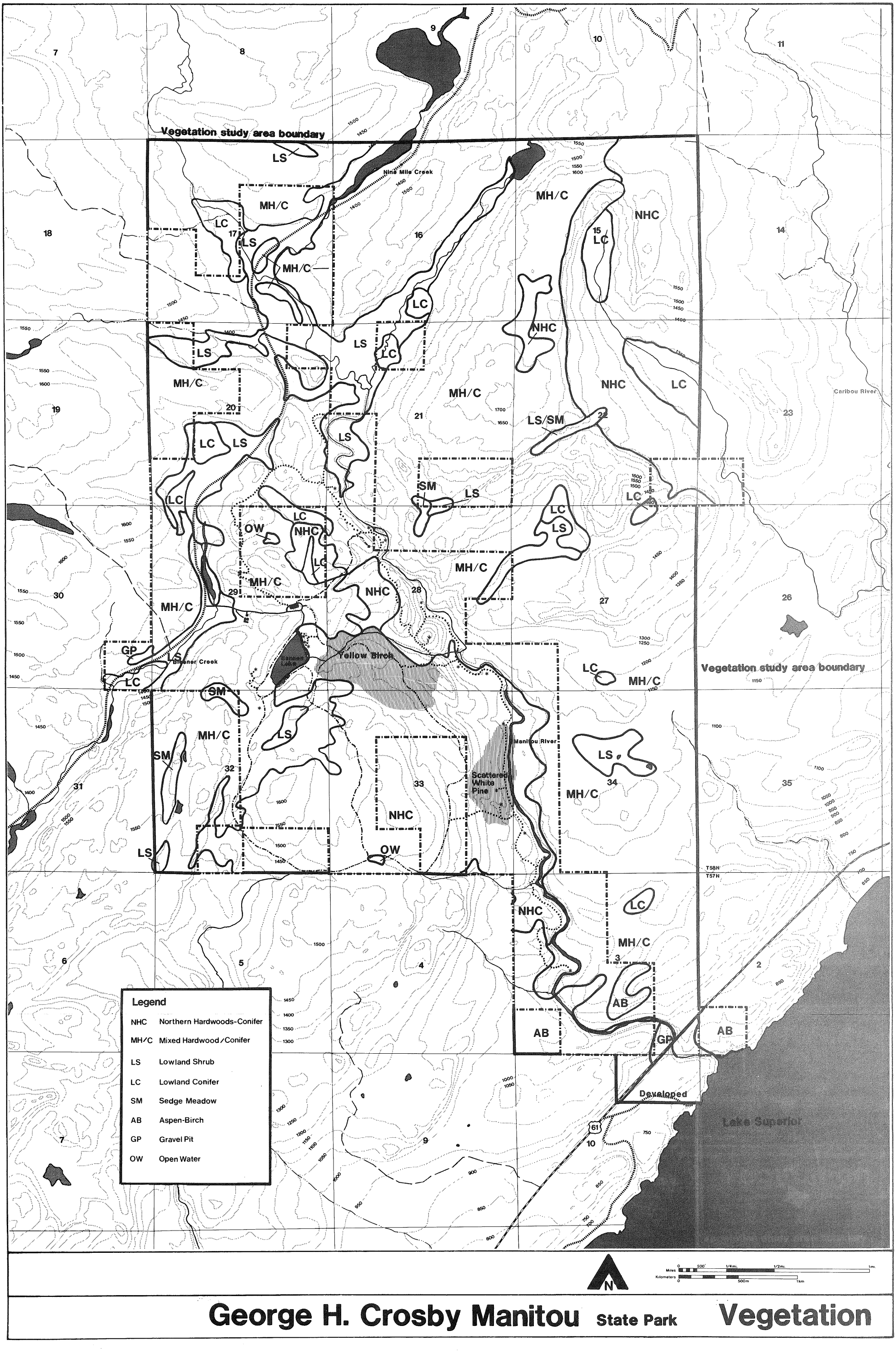
Lowland Shrub (LS)

This fairly stable tall shrub community is successional in nature, probably an intermediate stage between the sedge meadow (SM) and lowland conifer (LC) vegetation types. This community occurs primarily around beaver ponds and near waterways.

Two main variations of this community are common: one is dominated by speckled alder; the other is dominated by leatherleaf. Sometimes referred to as an alder thicket, the alder dominated variation contains an abundance of speckled alder 6-17 ft (2-5 m) high, with red osier dogwood more common in the wettest areas. Common herbs in these areas include tall meadowrue, sensitive fern, bedstraw, dewberry, and monkey flower. In areas where leatherleaf is the most abundant shrub, red osier dogwood and willow species occasionally occur. Other common shrubs in the leatherleaf areas include sweet gale and meadowsweet.

Sedge Meadow (SM)

This wet community is dominated by sedge species and is often bordered by shrubs similar to those described in the lowland shrub (LS) community. Occasional scattered black spruce and tamarack occur in these areas. The intriguing pitcher plant is also known to inhabit portions of the sedge meadow areas.



George H. Crosby Manitou State Park Vegetation

Gravel Pit (GP)

There are two gravel pits in the Crosby Manitou study area. The pit adjacent to Cty Rd 7 is currently on park property and is being reclaimed and revegetated. The pit just off of TH 61 is under the custodial control of MN/DOT and is in active use.

Open Water (OW)

These are seasonally open water areas, frequently adjacent to LS, LC, or SM communities.

Developed Area

This area is on the mouth of the Manitou River adjacent to TH 61. It is currently a privately owned campground and resort.

Latin names of species cited in the text:

Trees

Sugar maple	Acer saccharum
Yellow birch	Betula lutea
Trembling aspen	Populus tremuloides
White birch	Betula papyrifera
White cedar	Thuja occidentalis
White pine	Pinus strobus
White spruce	Picea glauca
Balsam fir	Abies balsamea
Jack pine	Pinus banksiana
Black spruce	Picea mariana
Tamarack	Larix laricina
Black ash	Fraxinus nigra
Balsam poplar	Abies balsamifera
Red pine	Pinus resinosa
Heartleaf birch	Betula cordifolia

Shrubs

Blueberry	Vaccinium spp.
Sumac	Rhus spp.
Beaked hazelnut	Corylus cornuta
Mountain maple	Acer spicatum
Thimbleberry	Rubus parriflorus
Chokecherry	Prunus spp.
Mountain ash	Sorbus Americanna
Brambles	Rubus spp.
Elderberry	Sambucus spp.
Leatherleaf	Chamaedaphne calyculata

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Mountain ash	Sorbus Americanna
Brambles	Rubus spp.
Elderberry	Sambucus spp.
Leatherleaf	Chamaedaphne calyculata

Labrador tea	Ledum groenlandicum
Red osier dogwood	Cornus stolonifera
Sweet gale	Myrica gale
Meadowsweet	Spiraea latifolia
Hoary willow	Salix candida

Herbs

Large-leaved aster	Aster macrophyllus
Twisted stalk	Streptopus roseus
Bear's tongue	Clintonia borealis
Sarsaparilla	Aralia nudicaulis
Virgin's bower	Clematis spp.
Club moss	Lycopodium spp.
Bedstraw	Galium spp.
Northern bush honeysuckle	Diervilla lonicera
Violet	Viola spp.
Spreading dogbane	Apocynum androsaemifolium
Red baneberry	Actea rubra
Bunchberry	Cornus canadensis
Goldenrod	Solidego spp.
Bristly sarsaparilla	Aralia hispida
Tall meadow rue	Thalictrum dasycarpum
Dewberry	Rubus spp.
Monkey flower	Minulus spp.
Grasses	Poa spp.
Evening primrose	Oenothera biennis
Daisy fleabone	Erigeron annuus
Pitcher plant	Sarracenia purpurea
Sensitive fern	Onoclea sensilibis
Bracken fern	Pteridium aquilinum
Juneberry	Amelanchier spp.
Bloodroot	Sanguinaria canadensis
Wood anemone	Anemone quinquefolia
Indian pipe	Monotropa uniflora
Coral root	Corallorhiza spp.

Vegetation Management

Since the park's establishment, the vegetation has remained in a natural, undisturbed state. The only development in the entire area is the manager's residence, the shop complex, and the trail/campsite system. Most current users of the park would like to see this policy of minimal development continue. Some state park management plans call for intensive vegetation management. Because of the relatively natural and representative vegetation patterns, and the unmanaged, natural setting which is essential to the recreational experience of the typical user, very little intensive vegetation management is recommended. The general vegetation management direction will be to monitor the progress of existing conditions.

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Objectives:

To protect and perpetuate significant vegetation communities

To protect the resources in overused areas

To monitor ongoing park resource problems

Action #1. Maintain, protect, and monitor the yellow birch stand on the Yellow Birch Trail.

The yellow birch stand outlined on the Vegetation Study Area Map (p34) has been included in the Minnesota Natural Heritage Program Register of significant vegetation areas in the state. This register identifies significant natural areas and features in the state. This designation affords the area special management consideration and protection through an agreement between the DNR, Division of Parks and Recreation and the Minnesota Natural Heritage Program. (See p 30 for a description of the area.) At present, the stand is healthy and regenerating successfully. Yellow birch is intermediate in its shade tolerance and requires an opening in the canopy for successful establishment. Wind throw and "gap phase" areas (from natural distubances such as uprooted trees) will naturally provide these openings. Yellow birch is known to regenerate successfully on decomposing, downed logs. An effort should be made to ensure that all downed logs in this area are left where they fall. Although yellow birch and white cedar are the dominant canopy species in this area, considerable amounts of white spruce and heartleaf birch also occur. All of these species have grown to sizes considered quite large for this portion of their respective ranges. The heartleaf birch is of considerable significance because its range is very limited in Minnesota. Heartleaf birch is thought to be a hybrid of white and yellow birch.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #2. Monitor the two gravel pit areas.

County Road #7 Gravel Pit. Because gravel supplies along the North Shore are limited, most parks along the TH 61 corridor that contain gravel areas have been mined at one time or another. This small pit has not been mined for several years. It is covered with various grass species, goldenrod, evening primrose, and daisy fleabane. In addition, several Norway pine seedlings were planted about 3 years ago and are doing well. This pit is in an area that is being considered for exchange with the county or DNR, Division of Forestry (See Ownership and Boundary Section, p68). For this reason, no additional reclamation monies should be put into this pit until the boundary situation is determined.

TH 61 Gravel Pit. This gravel pit is located just south of the Manitou River adjacent to TH 61 (See Vegetation Map, p34). The pit is situated at the end of the old TH 61 alignment and is currently owned by MN/DOT as a provision of the old TH 61 right-of-way. The pit was tested during the summer of 1981 and was found to contain a fair amount of gravel. MN/DOT plans on using this pit as long as there is gravel available. The existing mining operation is digging into the side of a steep hill, and the top of the hill is eroding severely. The erosion is slowly moving toward the signed state park boundary. The DNR, Division of Parks and Recreation should survey this boundary and work with MN/DOT in determining a point at which they will stop mining gravel in pits #1080 and #961. Depending on where the actual park boundary is, the mining or erosion from the mining may have already reached the park boundary. The legal description of the area that should be surveyed is the SW 1/4 of SE 1/4 of Section 3, T57N, R6W. The southeast corner of the quarter previously described is the area in question. The DNR, Division of Parks and Recreation and MN/DOT should enter into an agreement to restore the eroded hillside to an acceptable parklike condition.

The old highway alignment that is currently used by MN/DOT to reach the gravel pit has been used as an unauthorized access to the park. In the past, visitors have pulled off TH 61 onto the MN/DOT gravel pit road and parked in the gravel pit. From the pit, a trail follows the south side of the river, passes through a private parcel of land, and joins the park trail system at

campsite #16. There have been instances where park visitors who register at the park office have walked into a site only to find that their site is already occupied by people who entered from TH 61. Two measures are recommended to alleviate this problem:

1) As part of the agreement mentioned above, the Division of Parks and Recreation and MN/DOT should install a vandal-proof gate on the gravel pit road just north of a point that allows access to the privately owned acreage in the NW 1/4 of the NE 1/4 of Section 10, T57N, R6W. Both MN/DOT and DNR should have keys to this gate. Current MN/DOT contact positions for this project are cited in the MPD.

2) A sign should be placed at the beginning of the trail which adjoins the gravel pit. The sign should state that this is not a park entrance and it should direct people to the authorized park entrance. In addition, it should warn the visitor that if they occupy a campsite after entering from this point, that they will be asked to give up their site and enter the park from the Cty Rd 7 entrance.

	1	2	3	4	5	TOTAL
COST	Survey by DNR, Bureau of Engineering - Gate and gravel pit restoration cost possibly shared with MN/DOT; to be determined in agreement - Sign by DNR, Parks and Recreation operation budget					

Action #3. In areas where firewood has been overscavenged, provide downed wood or prohibit open fires.

Since the park was opened for use roughly 15 years ago, attendance has increased steadily. More people visited Crosby Manitou in 1981 than in any previous year on record. This continued pressure has resulted in a depletion of available firewood adjacent to several campsites. Although the majority of sites still have available dead and downed wood within a reasonable distance, the wood supply near some sites (such as the ones adjacent to Bensen Lake) has nearly been exhausted. In these areas, inexperienced campers are sometimes tempted to use live trees for firewood. In order to protect the resource, dead and downed wood should be gathered and sold or given to the campers at firewood depleted sites. If this option is not workable, open fires should be

banned at these sites and only campstoves permitted. To reduce this problem in the future, fire rings to reduce the size of fires will be provided at each campsite (Proposed Development Section, see action #3 p60).

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #4. Monitor forest diseases and pests.

The main insect pest in recent years in the Manitou area has been the spruce-budworm. Spruce budworm affects balsam fir and white spruce. In the mid 1970s there was significant dieback but the situation has been improving since 1977. The most severe dieback in the state occurred just south of the park, in the southern portions of Lake and St. Louis counties.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #5. Management of the powerline right-of-way paralleling TH 61 will be determined in accordance with the permit negotiated between the DNR and the Minnesota Power Company.

A powerline parallels TH 61 from Silver Bay to Taconite Harbor. It passes through the park. The capacity of this line is being increased. A permit is being renegotiated between the DNR and the Minnesota Power Company which will involve right-of-way management within three North Shore parks. Vegetation management in the powerline corridor will reduce the visual impact of the straight, abrupt, cleared swath through the woods. Shrubs and low growing trees will be planted in natural clumps along the corridor edge and near the power poles. High use areas will also be planted. Powerline right-of-way management within state parks will directly involve the park manager and regional park supervisor.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

WILDLIFE

The variety of plant communities in the park provides habitat for a diversity of wildlife species. Lowland conifer, lowland shrub, and open water areas provide a direct contrast to the northern hardwood conifer and mixed hardwood/conifer communities. No formal records of wildlife abundance or occurrence have been kept for the park. The DNR Nongame Program, the DNR Forest Wildlife Research Program, and inventories conducted by the nearby Superior National Forest staff were used to compile wildlife information for Crosby Manitou. The management plan details (MPD) contain the comprehensive 1981 wildlife species lists that were compiled for the Superior National Forests (includes birds, mammals, amphibians, and reptiles).

Game Species

An overview of some of the larger, more common mammals found along the North Shore is outlined below. In addition to an estimation of the population dynamics of each species, special management considerations are discussed. Much of the following information has been provided by the DNR, Forest Wildlife Populations and Research Group.

Beaver. In general, beaver populations have been high in recent years. Beaver census routes on the North Shore streams indicate an average population of one colony per two miles of stream. These populations fluctuate between .4 and 1.5 colonies/mile of stream from year to year.

Moose. The moose population immediately adjacent to the shore is low considering the quality of available habitat. The average density for this area is 0.3 moose per sq. mile. However, the area just over the North Shore ridge (inland) is relatively good moose habitat and has densities of 1-2 moose per sq. mile. The DNR, Section of Wildlife is currently developing moose management zones and a moose management policy along the North Shore.

White-tailed deer. The North Shore of Lake Superior has been a traditional yarding (wintering) area for white-tailed deer since the turn of the century. Population densities in peak population periods in the 1940s and 50s exceeded 300 deer/sq mile. Current wintering densities may reach 100 deer/sq mile in some areas along the North Shore. Summer densities range from 10-20 deer/sq mile.

One of the major causes of mortality in the deer population along the North Shore is highway roadkill along TH 61. Several previous North Shore park management plans have called for actions relating to this problem. If these actions are successful, they should also be implemented at Crosby Manitou.

Black bear. Bear density in the vicinity of the park ranges from .5 to 1 bear/sq mile. Seasonal concentrations can be higher around desirable areas such as blueberry patches, dumps, and campsites. These seasonal concentrations will also vary according to the amount and availability of foods over a wide area. It is not unusual for bears to move from 50-75 miles (80-120 km) to find food during years of short supply.

In The Superior National Forest, bear problems occur most frequently in years when wild fruit and nut crops fail due to drought or frost. Despite frequent nuisance problems (such as bears marauding around campsites or scattering garbage) in years of scarce food, injuries to humans have been rare. Nuisance bears are best managed on an individual basis.

Keeping park areas free of garbage and teaching park visitors about the behavior of black bears may help to alleviate future bear problems.

Nongame Mammals

The DNR, Nongame Program has developed a preliminary guide to the nongame mammals of northeastern Minnesota. This guide covers DNR, Region #2, which includes Carlton, Aitkin, St. Louis, Lake, Cook, Itasca, and Koochiching counties. The following list is adapted from the guide, however it includes species found in Lake and Cook counties. Both counties were included because of the park's close proximity to the Lake-Cook county line.

Species List of Nongame Mammals from Lake and Cook counties

Insectivores
- Masked shrew
- Arctic shrew
- Northern water shrew
- Pygmy shrew
- Short-tailed shrew
- Star-nosed mole

Bats
- Little brown bat
- Keen's little brown bat*
- Silver-haired bat
- Big brown bat*
- Red bat
- Hoary bat

Other Rodents
- Deer mouse
- Southern bog lemming
- Gapper's red-backed vole
- Heather vole**
- Meadow vole
- Rock vole**
- Meadow jumping mouse
- Woodland jumping mouse
- Porcupine
- Norway rat - E
- House mouse - E

Carnivores
- Marten*
- Short-tailed weasel
- Least weasel*
- Long-tailed weasel*
- Spotted skunk*
- Striped skunk
- Wolverine (?)*
- Cougar (?)*
- Gray wolf*
- Coyote

Squirrels
- Woodchuck
- Thirteen-lined ground squirrel
- Franklin's ground squirrel
- Eastern chipmunk
- Least chipmunk
- Red Squirrel
- Northern flying squirrel*

Ungulates
- Caribou (p)*

Key

* - Priority species-reports needed

** - Priority species-known only in Region #2

E - Exotic species (not native)

? - Hypothetical species (reports not confirmed)

P - Peripheral (edge of range-one siting during winter of 81-82)

Reports of the rock vole and heather vole in Minnesota are limited to the St. Louis, Lake, and Cook county area. The spotted skunk is catagorized as "rare" by the Minnesota Natural Heritage Program. Any sighting of these or any of the other species listed as "priority species" should be reported to the DNR, Section of Wildlife, Nongame Program.

The timber or gray wolf is officially listed by the U.S. Fish and Wildlife Service as a threatened species. Since the early 1940s, Minnesota has had the largest population of timber wolves in the contiguous United States. Crosby Manitou is in the primary Minnesota range of the timber wolf, which includes the Arrowhead Region northeast of a line from Lake of the Woods to Two Harbors. A 1979 survey estimated the total population of timber wolves in Minnesota at about 1200. The DNR, Section of Wildlife, has developed a management plan for the timber wolf (1980). In the plan, the estimated timber wolf population in the Superior Management Unit (Cook, Lake, and northern St. Louis counties) is approximately one wolf per 17 sq miles. The Superior Management Unit contains some of the best timber wolf habitat in the state. Wolves in Minnesota prey primarily on white-tailed deer. The secondary prey species include moose and beaver. Timber wolves are known to inhabit Crosby Manitou State Park, and their howling calls add much to the experiences of many park visitors.

Reptiles and Amphibians

The following list is adapted from a preliminary guide to the reptiles and amphibians of Region #2 by the DNR, Nongame Program.

Species List of Reptiles and Amphibians from Lake and Cook Counties

Turtles
- Common snapping turtle
- Western painted turtle

Lizards
- None

Salamanders
- Central (common) newt *
- Blue-spotted salamander
- Eastern tiger salamander
- Red-backed salamander *
- Mudpuppy (?)

Snakes
Red-bellied snake
Eastern garter snake)
Northern ringneck snake

Toads
American toad

Frogs
Northern spring peeper
Common (gray) treefrog
Boreal chorus frog
Mink frog
Northern leopard frog
Green frog
Wood frog

Key

(?) - hypothetical species (reports needed)
* - special interest species (reports needed)

Any sightings of the species listed as "special interest species" should be reported to the DNR, Nongame Program. All special interest species noted above are catagorized as "rare" by the Minnesota Natural Heritage Program.

Birds

The diversity of habitat described in the Vegetation Section provides for a great variety of bird species. Each of the communities discussed contains an avian population that has adapted to that particular community type. An excellent guide to the birds of the area and their respective habitat types is available from the U.S. Forest Service. The booklet is titled the "Birds of the Superior National Forest" by Janet C. Green, Gerald J. Niemi and Karl P. Siderits. This comprehensive guide covers many habitat types including mature deciduous, black spruce-tamarack, and mixed deciduous-coniferous communities. It is available from the U.S. Government Printing Office: 1978-753.965.

Breeding bird surveys conducted by the U.S. Fish and Wildlife Service between 1975 and 1979 suggested that 33 species that occur in Minnesota reach their highest relative abundance in Region #2E (Lake and Cook counties).

These 33 species are listed below:

Common loon
Herring gull
Downy woodpecker
*Gray jay
Red-breasted nuthatch
Hermit thrush
*Golden-crowned kinglet
Solitary vireo
*Red-breasted merganser
Yellow-bellied sapsucker
Yellow-bellied flycatcher
Common raven
Winter wren
Swainson's thrush
Ruby-crowned kinglet
Red-eyed vireo

Philadelphia vireo	Black-and-white warbler
Nashville warbler	Northern parula
*Magnolia warbler	*Black-throated blue warbler
Yellow-rumped warbler	Black-throated green warbler
Chestnut-sided warbler	Northern waterthrush
Connecticut warbler	Mourning warbler
Canada warbler	American redstart
*Pine siskin	*Dark-eyed junco
White-throated sparrow	

* Considered uncommon and/or of limited distribution in Minnesota (DNR, Nongame Program).

The Minnesota Natural Heritage Program recognizes several bird species within Region #2E as "Elements". An Element is a natural feature of particular interest because it is exemplary, unique, threatened, or endangered on a statewide or national basis. These bird elements are listed below.

Common Name	Status
Peregrine falcon (migrant)	endangered
Bald eagle	threatened
Goshawk	rare
Cooper's hawk	rare
Merlin	rare
Great gray owl	rare
Black-throated blue warbler	rare
Common loon	special concern
Osprey	special concern

Several of the above species may frequent the park. Both goshawks and loons have been observed in the park in recent years.

The North Shore is a corridor route of one of the largest raptor (birds of prey) migrations in North America. During September of each year, hundreds of people gather at Duluth's Hawk Ridge to observe thousands of migrating broad-winged and sharp-shinned hawks. Almost every raptor species known to inhabit or visit Minnesota can be seen during this fall migration. Many of these raptor species pass though the park, however, the most common residents in the area are probably broad-winged hawks, barred owls, and great-horned owls.

Wildlife Management

The philosophy of minimal development and impact on the Manitou area which was described in the Vegetation Management Section relates to the following

wildlife management proposals. While many northern parks have small areas which are cleared for wildlife openings, no such recommendations will be made at Crosby Manitou. The Finland State Forest adjacent to the northern boundary of the park is currently harvesting areas within its forest boundary which provide wildlife openings. Should the Lake County Board designate the township surrounding the park as memorial forest, many small tracts will be harvested, creating wildlife openings in the process. Also, many small openings are created naturally by wind throw, forest diseases and pests, and lightning.

Objectives:

To educate park users to enhance their experience

To enrich the natural habitat which currently exists in the park

Action #1. Prepare an informational pamphlet to familiarize visitors with the black bear.

Because of the many reports of encounters with black bears, backpackers may find it helpful to read about black bear habits and behavior. Inexperienced campers will benefit the most. The brochure should describe how to store food during the day and how to suspend food at night. The leaflet could also be mailed to prospective campers to further prepare them for their backpacking experience at Manitou. This information could be included in the upgraded park handout map (see Interpretive Services, p65).

	1	2	3	4	5	TOTAL
COST	500					500

Action #2. Provide a horizontal pole between two trees near each campsite for suspending food out of the reach of bears.

Backpackers should suspend their food between two trees at least 75 to 100 feet from their campsite. Food should be suspended well above the height that a human or bear could reach (many managers recommend at least 12 feet). It would be helpful to cut a pole size tree (preferably cedar) and lodge it between two trees at a specified height to encourage people to suspend their food.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #3. Maintain a maximum abundance of snags (dead standing and downed wood).

In recent years, it has been recognized that snags are a valuable part of wildlife habitat. Dead standing and downed trees provide nest sites and dens for many cavity-nesting birds and mammals. Raptors and woodpeckers use snags for perching, feeding, and roosting. As many as 30 mammal species and 13 reptile and amphibian species have been identified as known users of either standing or fallen snags in northern Minnesota (Niemi 1979). Many of these species are known to inhabit the Crosby Manitou area. Hazardous limbs in recreational use areas should be trimmed for visitor safety. Leaving an abundance of snags, unless they pose visitor safety or physical obstruction problems, will enhance wildlife observation for park visitors.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #4. Continue to recommend that visitors boil all water for 2 minutes before using it for cooking or drinking.

There are two main parasitic infections that backpackers should be concerned about in the Crosby Manitou area. While picking up an egg or cyst is only a remote possibility, the cycles are currently documented in this area and there is a chance of being infected.

Water in the Crosby Manitou area may be contaminated with the eggs of the tapeworm Echinococcus granulosis. The parasitic cycle of this tapeworm involves timber wolves and moose in their natural predator-prey relationship. The adult tapeworm lives inside of the wolf and the wolf passes eggs fecally into the water. The moose (or human) drinks the water and becomes infected in the lungs (the liver is more often infected in humans). When an infected moose is eaten by uninfected wolves, the cycle starts over. Moose lungs have been tested for Echinococcus in the Arrowhead Region (Region #2) by DNR forest wildlife biologists over the last 10 years. Between 1971 and 1979, 85 percent of the moose examined in the DNR region that surrounds Crosby Manitou (Region #2) have been infected. The Minnesota Department of Health, Division of Disease Prevention and Control reports no formal records of E. granulosis infections in humans in Minnesota. In most cases, however, infected persons may never know they are infected. In isolated cases, the infection may become serious after a number of years.

The other main concern for backpacking at Crosby Manitou is a protozoan called Giardia lamblia. The Minnesota Department of Health has recorded cases of Giardia contracted in the BWCA, and there is a chance of contracting it in the Crosby Manitou area as well. Giardia does not have a complicated cycle. It lives in the small intestine of its host and passes cysts fecally into the water for another host to pick up. A variety of vertebrates can harbor this parasite including fish, rodents, and mammals. Beaver populations are known to be good hosts for Giardia. Depending on the person, symptoms range from virtually nothing to severe abdominal pain, diarrhea, and loss of appetite.

The best protection from contracting Echinococcus, Giardia, or any other enteric infections is to boil all water for at least two minutes. Water filters are available which will filter out Echinococcus eggs if the screen is 25 microns or less, however this will not guard the user against smaller parasites like Giardia. Water treatment pills such as halozone may kill Giardia cysts, but they will not effect Echinococcus eggs.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

GROUND WATER

Ground water along the North Shore varies greatly in quality and quantity but is generally inadequate. Many of the wells are artesian or flowing wells. Some of the bedrock wells contain high concentrations of salt. The well near the park manager's residence was drilled to a depth of 155 ft (47 m). The volume of this well is low. During the summer, water is pumped into a holding tank. This allows for high use periods and for more efficient use of the portable electrical generator.

SURFACE WATERS

Three main water bodies enhance the scenic qualities of Crosby Manitou State Park. These are the Manitou River, Bensen Lake, and Lake Superior.

The portion of the Manitou River in the park is a rushing trout stream. The river and its tributaries drain an area of 103 sq miles (267 sq km). The upper portion of the water shed has many lakes and swamps which increase the water storage and decrease the rate of runoff. There are 11 small lakes with a total area of about 2 sq miles (5 sq kms) and an estimated 10 sq miles (26 sq km) of tamarack, spruce, cedar, and alder swamps that help store water in the watershed. But, even with this storage capacity, there is considerable fluctuation in water flow. The only documented discharge rates available are from 1920-31. During those years, the rate of flow varied from 6 cubic ft/sec to a maximum of 498 cubic ft/sec. The highest rate of flow can be expected in May and the lowest in February. Most of the streams in the upper watershed have a moderate gradient. However, in the park the Manitou River has a very

rapid descent. The river drops about 600 ft (180 m) in the 5 miles (8 km) which are within the park. There are several waterfalls, the largest called High Falls is 60-70 ft (18-21 m) high.

Bensen Lake is only about 20 acres (8 hectares) in size, and about 30 ft (9 m) deep. The bottom is very soft with little potential for swimming. A boat access suitable for small boats is provided. The lake is a scenic focal point for four campsites.

Lake Superior is visible from the high overlooks in the park. It has a major impact on the park's weather, influencing both the temperature and amount of precipitation. Lake Superior covers 31,700 square miles and contains 2,985 cubic miles of water. This makes Lake Superior the second largest lake in the world. The only larger lake is the Caspian Sea.

Management

Objectives:

To maintain high quality ground water

To maintain high water quality in all park rivers and lakes

To maintain the remote scenic qualities of the Manitou River

Action #1. Continue to enforce a no motor policy on Bensen Lake.

Bensen Lake is small enough so that the entire lake can easily be fished without motor boats. The noise of outboard motors would have a detrimental impact on the the campsites and trails near the lake.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Fisheries

Both Bensen Lake and the Manitou River provide good fishing opportunities.

Bensen Lake has been stocked with brook trout since 1932. In August 1955, the lake was poisoned to eliminate noxious fish species and parasites. This was

followed by stocking of brook trout. The most recent fish survey in 1978 showed that both the population and size of brook trout was greater than local and statewide medians. Although the majority of trout were from 7 to 9 inches (17 to 22 cm) long, some trout over 16 inches (40 cm) were also netted.

The Manitou River is one of the best brook trout streams on the North Shore. It has a more uniform flow of water than most, an abundance of good pools, ample shade, and favorable stream bottom. The water is soft, ranging in alkalinity from 17.5 to 37.5 ppm, with a pH ranging from 6.8 to 7.4.

Brook trout are abundant in the cooler streams in the watershed and brown trout are common in the warmer, wider, lower river stretches in the park. An unusual strain of rainbow trout have developed in the section of the river in the park. These rainbow trout don't migrate in spawning runs which members of this species typically do.

Trout have been stocked in the Manitou River since 1945. Mainly brook and brown trout have been stocked, although rainbow trout were stocked in 1959, 1966 and 1968. Also, steelhead were stocked in 1973 and 1974.

Fisheries Management

Objectives:

To maintain the present level of fishing opportunities

To protect game fish habitat

The DNR, Division of Fish and Wildlife is responsible for fisheries management of Bensen Lake and the Manitou River. This plan recommends a continuation of the management programs which are currently being implemented by the Fisheries Section.

HISTORY/ARCHAEOLOGY

Prehistory

Prehistoric settlement along the North Shore is not well documented because the rocky country and thin soils have not preserved many archaeological remains. Very few remains were discovered during the construction of TH 61.

Evidence of prehistoric settlement along the southern shore of Lake Superior (Wisconsin) suggests that humans inhabited this area prior to 5,000 B.C. Very little is known of these cultures except that they worked native copper into spear points and various other objects.

History

Pierre Esprit Radisson and Medard Chouart, Sieur des Groselliers were probably the first European visitors to the North Shore. They travelled up the shore of Lake Superior in 1660. Along with the Ojibwa Indian tribe, the French controlled the North Shore area until 1763. From 1763 to 1803, the British were in control of the North Shore. The first white residents to Lake and Cook counties were probably clerks at American Fur Company posts along the shore in the 1830s.

The Manitou River is one of the few North Shore streams which has retained its Ojibwa name, which means "spirit." In 1854, the Ojibwa tribe ceded their North Shore lands to the United States.

Commercial fishing along the shore produced millions of pounds of whitefish and lake trout between 1880 and the 1920s. After this time, the fishing industry turned to the Superior herring (or cisco), which is still the mainstay of the industry.

The most extensive early settlement and organization of the North Shore area took place as a result of the logging industry. (See Vegetation History, p28 for additional discussion.) Most of the logging took place between 1890 and 1910 when railroads were constructed all along the North Shore between Duluth and the Cross River. The increased accessibility afforded by the railroads resulted in extremely heavy logging at the turn of the century.

The city of Cramer was developed as a transfer point for the Alger-Smith Logging Railroad. At this point, all southbound lumber was transferred to a different train to complete the journey south. Cramer was also a rest point for train passengers. The town had a hotel, general store, water supply tower, and a few residences. Lake County Road 7 (Cty Rd 7) from Cramer to Finland is the original railroad grade for the Alger-Smith Railroad. This

road passes through the northwestern portion of the park and serves as the access to the park entrance. With the decline of the fishing and logging industry, the economy of the North Shore corridor turned to the tourism trade. In 1925, TH 61 was completed. The automobile began to replace the trains, steamboats, and dog teams which were previously the main forms of transportation to this isolated area. Along with the taconite and forest products trade, tourism is still a leading factor in the economy of the North Shore.

George H. Crosby donated 3,318 acres (1343 hectares) to the state in 1954 with the intention of creating a new state park. Mr. Crosby was born in Hastings, Minnesota in 1865 and later resided in Minneapolis and northeastern Minnesota. His ore discoveries included the Hawkins Mine (the city of Nashwaulk was later founded at this site), the LaRue Mine, and the Crosby Mine. Mr. Crosby was a civic leader in Duluth for many years and was one of the first proponents of the St. Lawrence Seaway.

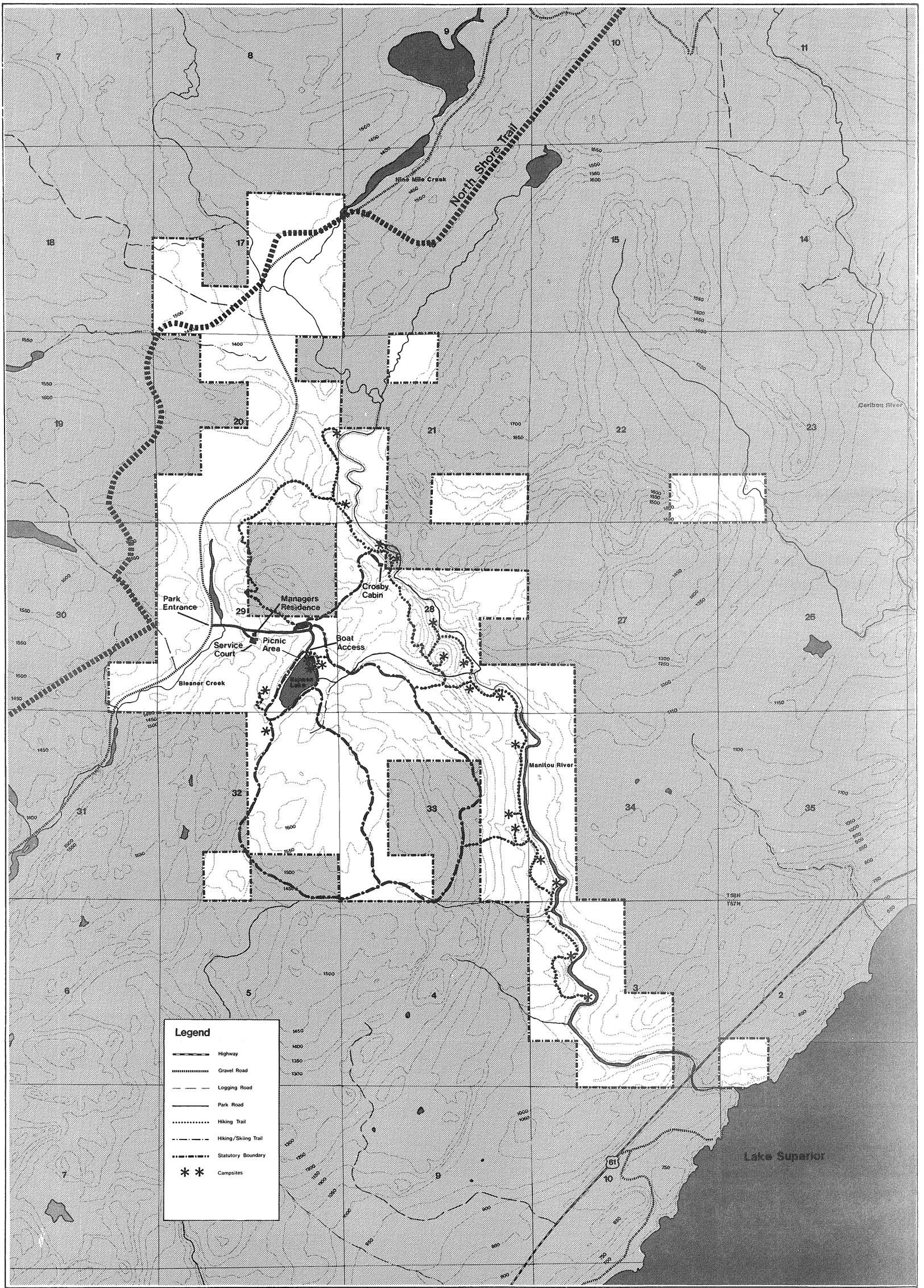
Management

Objectives:

To interpret the historic use of the park and surrounding area for park visitors.

The Interpretive Services Section of this plan (see p 65) includes a proposal for a self-guiding trail. The pamphlet used with this trail will describe some of the aspects of the logging industry at the turn of the century. A general history of the area is included in the park handout map.

PHYSICAL DEVELOPMENT AND RECREATION MANAGEMENT



George H. Crosby Manitou State Park — Existing Development

RECREATION MANAGEMENT OBJECTIVE

To provide those facilities necessary to protect the environment, provide primitive hiking access, and provide minimal user convenience.

EXISTING DEVELOPMENT

Development at Crosby Manitou has intentionally been kept primitive.

Manager's Residence/Park Office/Contact Station

All these activities are housed in one building. No telephone or electric service is provided, although communications with other local park managers is possible via a battery operated shortwave radio.

Shop A garage and attached lean-to is currently used as a park shop.

Backpack campsites There are 21 sites which are accessible by hiking trails only. Most sites provide only a signed clearing for the campsite, a wilderness toilet, log benches, and a loose stone fire ring.

Parking Lot This 30 space, gravel parking lot is used by both campers and day users.

Carry-in Boat Access A service road provides access down to Bensen Lake. From this road, visitors can carry small boats or canoes to the lake. A boat ramp is not provided. After dropping off the boat and equipment, cars must be returned to the parking lot.

Entrance Road A half mile gravel road provides access past the contact station to the parking lot.

Trails

A hiking trail system 23 miles (37 km) of hiking trails traverses very rugged topography. Log steps are provided on steep slopes and narrow half log treadways are provided through wet areas. There is an 11 mile (17.6 km) cross-country ski trail system. Two miles of trail are rated "easy", four miles are rated "more difficult" and five miles are rated "most difficult". None of the ski trails are groomed.

Crosby Cabin a small frame cabin built many years ago sits on a rocky point in the park. It is used as a trail shelter.

PROPOSED DEVELOPMENT

Action #1. Develop approximately 12 new backpack campsites.

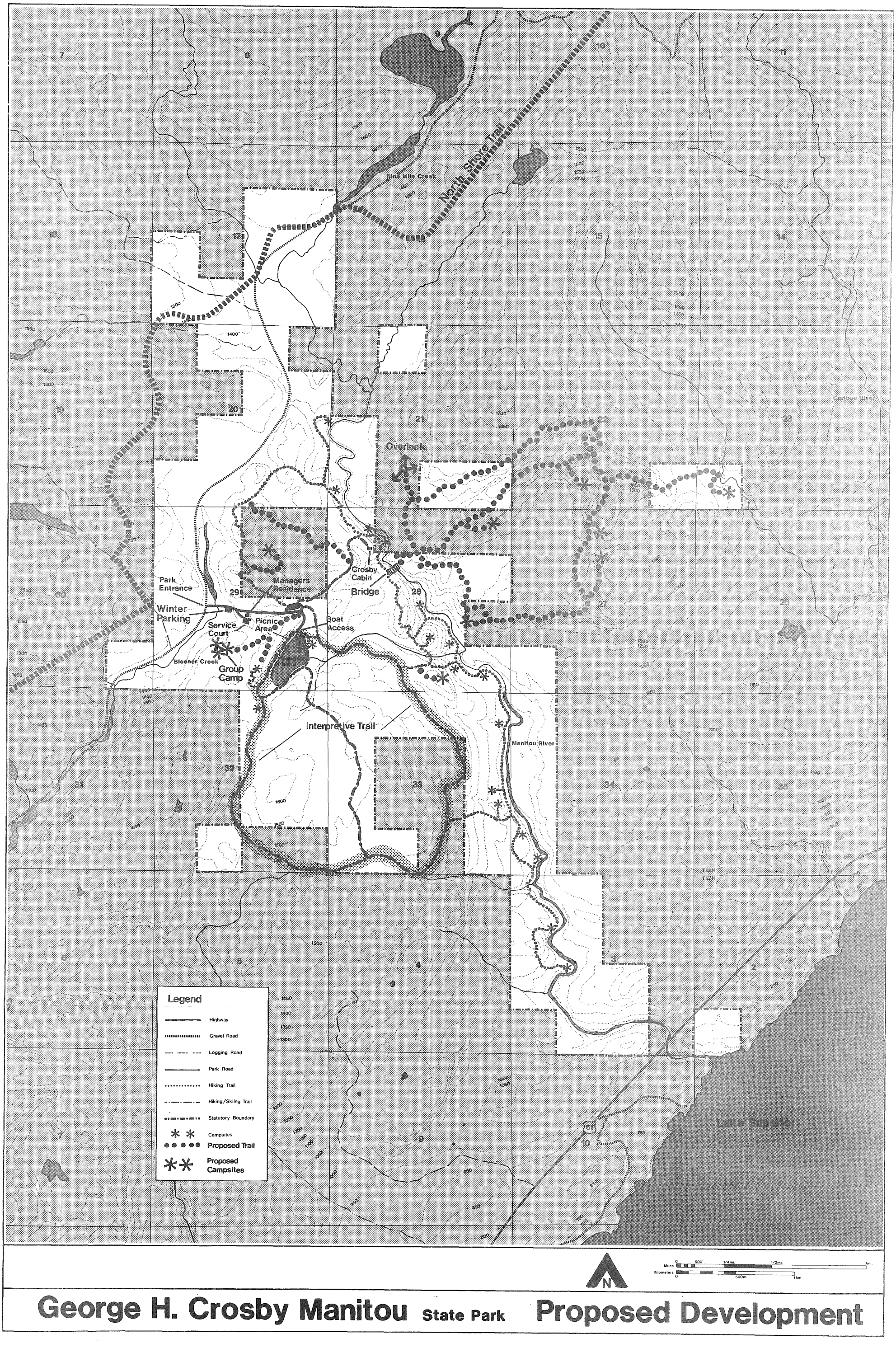
Camping use at Crosby Manitou is at or beyond capacity on holiday weekends and is expected to increase in the future (See The Park User p 12). The existing campsites have been developed on the prime campsite locations. Only 2-4 more campsites can be developed on state park land and even these will have a lower scenic quality than existing sites. A land exchange is proposed (See Boundary Modification p 68) which, when completed, would allow for the development of 8-10 more campsites. These campsites would not have good access to water, but would afford very scenic vistas.

Development of these new sites is not expected to relieve the use pressure which some of the existing campsites are receiving. Site rotation was considered during the planning process, but is not proposed. If enough new sites are developed to allow several of the existing sites to rest. That much more of the park would be heavily impacted. There are very few potential campsites that would compare with the quality of existing sites. Also, recent studies show that the highest impact on a site occurs in its first year of use. Future years increase the total impact only slightly. Soil compaction in the campsite area is the most destructive. By natural process alone, it takes longer than any other impact for recovery (estimates vary depending on soil type, but range from 8-15 years).

	1	2	3	4	5	Conditional	TOTAL
COST	1,000		1,000			3,000	5,000

Action #2. Restore and maintain existing campsites.

Many of the 21 existing campsites are showing the effects of several years use. Most sites have bare compacted earth in the main area of use. Many compacted areas are growing larger as campers move further into the woods for tent locations that are not muddy, or when more room is needed if several tents are used on the same site. Closing sites and allowing them to restore themselves naturally is not recommended because of the limited number of suitable sites and the extended period of time necessary for natural



George H. Crosby Manitou State Park Proposed Development

reclamation. One action that should be taken to help slow the spread of soil compaction in the campsites is to set a maximum for the number of tents allowed at each site. Most sites should not have more then one or two tents. Only one or two campsites should allow three tents. The proposed group camp (See [redacted], Action 5 p 61) should be used by visitors with three tents or more who wish to camp together.

There is no one answer that will stop campsite degradation, therefore the following suggestions should be considered. The most practical in each situation should be implemented.

1. Grade level and build up well-drained areas for tent pads.

2. Transplant saplings and shrubs into beaten areas around the actual campsite area. Stake up transplants so campers understand the intent.

3. Grade campsites to allow for good drainage.

4. Surface the high use areas around fire rings with gravel, when small amounts are available nearby.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #3. Install metal fire rings at selected campsites.

Metal fire rings are slightly more development than most campers would prefer to see in this park but the smaller diameter of the rings and the grill bars limit the size and amount of firewood that can be used. Firewood supply is limited near some of the sites and can be expected to continue to decline, unless disease or storm damage significantly increases the amount of dead wood available. Metal fire rings will reduce the total amount of wood being used for fires. Selection of which sites should have fire rings will be at the discretion of the park manager.

	1	2	3	4	5	TOTAL
COST		1,500				1,500

Action #4. Provide a horizontal pole between two trees near each campsite for suspending food out of the reach of bears. (See Wildlife p 47, Action #2.)

	1	2	3	4	5	TOTAL
COST						

Action #5. Construct a group camp.

Several requests are made each year for a campsite where a small group can camp together. Three of the existing campsites (10,14, & 21) have been used ocassionally by groups with three or more tents. None of the existing sites were designed to accommodate groups and the campsite openings have continued to grow as more and more area is flattened by tents. Also, groups tend to make more noise than individuals or couples. The solitude of other campsites can be disturbed by a noisy group in either of the three large campsites.

Therefore, a group camp should be developed that is separate from the rest of the campsites. Any group with three tents or more wishing to camp together will be assigned this group campsite. The group camp should be designed with a central fire ring and pit toilets, with tent pads screened from the central area to allow some privacy.

Also some campsites should be fairly easily accessible from the parking lot for use by campers who arrive in the early evening. Many of the campsites are too far away to hike to before dark if campers arrive in the evening. If the group camp is located within a half mile of the parking lot, it could be used as a staging site for visitors to camp one night before hiking on to another site for the rest of their stay. Any groups wishing to camp together would have priority over a person using this site only as a staging area. Another alternative for late arrivals is to suggest that they use the state forest campground at Finland.

People requesting group camp information should be sent a letter describing the limited development and hiking distance to the camp. A maximum group size of 14 people should be set. This maximum group size is not determined for the carrying capacity of the camp site, but rather to ensure that the size of groups on the trail system is not so large that other park users will be disturbed.

	1	2	3	4	5	TOTAL
COST				4,000		4,000

Action #6. Construct a small trail/picnic shelter.

The only winter shelter now provided is the Crosby cabin. A shelter is also needed near the parking lot where people can meet after a day of skiing or for a lunch break. If this shelter is constructed at the edge of the picnic ground, it can also serve as a picnic shelter during the summer. The shelter should be constructed on the north end of the picnic ground, where it is easily accessible from the parking lot. This shelter should not be large or elaborate. A simple 3-sided adirondack shelter should be considered.

	1	2	3	4	5	TOTAL
COST			4,000			4,000

Action #7. Remove the Crosby cabin and replace with an adirondac shelter.

The Crosby cabin is an old frame structure built on a grassy bluff top overlooking the Manitou River. The intended use of this structure at present is as a winter trail shelter, although some visitors have camped in it.
The location of the cabin allows a spectacular view of the park, but it is also very cold and windswept. The cabin is visable from many of the other overlooks in the park. It is usually the only visual evidence of human presence.

Rather then continuing to repair the Crosby cabin, it should be removed and a simple three sided adriondac shelter constructed. The new shelter should be located in an area that is protected from winter winds and hidden from the view from the other overlooks. It should be close enough to the existing cabin site to provide easy access to the overlook.

	1	2	3	4	5	TOTAL
COST	(action in process)					

Action #8. Construct 9-10 miles (14.4-16 km) of hiking trail.

Hiking is one of the main activities for campers in this park. Although the existing trail system is enjoyable to hike, many campers have asked for more hiking trails.

People generally enjoy trails that follow the shoreline of water bodies. The trails adjacent to the Manitou River are heavily used for this reason and because they provide access to the campsites along the river. There is the potential to develop another trail along the east side of the river. A trail is not proposed here because the narrowness of the river would make hikers on either side of the river visible to each other and greatly reduce the remote feeling hikers now experience.

Another trail experience hikers enjoy is variety of long and short distance views. A horseshoe-shaped rock ridge east of the Manitou River provides spectacular views of the surrounding area and Lake Superior in the distance. Trails will be developed in this area after the land is acquired (See Boundary Modification p 73). The Proposed Development Map (see p 59) shows a double loop trail system. The large loop follows the horseshoe ridge and would be approximately 3 miles (5 km) in length. The second loop returns near the middle trail but is separated by a deep ravine. The alignments for both these trails should be carefully selected so that hikers on one trail are not visible from the other. Both loops will provide a scenic hiking opportunity and access to new campsites (See Action #1 p 58). A dead end trail will extend from the double loop to the West Branch of the Caribou River, providing access to a campsite and a site to collect water. The water quality and flow of this branch will have to be checked. Approximately one-half mile of trail will be needed to connect the proposed group camp to the parking lot. A quarter mile spur off this trail would provide access to campsite #19 along a gentle gradient rather than the steep access trail now used.

	1	2	3	4	5	Conditional	TOTAL
COST		3,500				24,000	27,500

Action #9. Construct a narrow bridge across the Manitou River.

A bridge across the Manitou is needed to provide easy access to the proposed trails and campsites on the east side of the river. Fording the river is possible during periods of average or low flow but not in the spring or after heavy rains. This action was discussed at length with a group of 25 to 30 park users. The consensus was that a rustic bridge was desirable, but no bridge was preferred over a wide heavily constructed bridge with a high visual impact.

The only measured flow data on this river is very old (1920-31). Both the data and the general observations of park staff and local residents infer that there is a great fluctuation in water levels. This would therefore require that a bridge be constructed well above normal water levels. A narrow, (approximately 2 ft/6 m wide) suspension bridge would be the most desired by park users, if it is feasible in this area from an engineering perspective. The most feasible site for the bridge is between campsites 4 and 5. The river is relatively narrow here, and bounded by steep banks on both sides. A bridge at this site could be constructed without losing a campsite and would fit well into the trail system.

	1	2	3	4	5	TOTAL
COST			15,000			15,000

Action #10. Construct a shop at the park service area.

The existing shop is very small and in poor condition. A large shop is not needed, because the amount of equipment in this park will always be limited. However, it is necessary to have enough room for storage and equipment repair. A structure about the size of a 2 1/2 car garage would be sufficient.

A gas powered generator is currently providing the electrical power for the park. During 1981, consideration was given to providing electricity along Cty Rd 7 from Finland. Providing power by this method is cost prohibitive, and it does not fit into the overall character of the park. In the future, strong consideration should be given to purchasing a windmill power and storage system for the park (wind conditions are very good in this area). In addition, a remote telephone system that requires no connecting lines would be ideal. Neither of these proposals (electric or telephone) are included in the cost phasing below.

	1	2	3	4	5	TOTAL
COST		13,000				13,000

Action #11. Expand the summer parking lot to accommodate 15 more cars.

The existing 30 car parking lot is often used to capacity. Day use is continually increasing. Camping use will increase when the new campsites and the group camp are constructed. Therefore, additional parking spaces will be

needed. The additional parking spaces should not be constructed adjacent to the existing parking lot. Retaining undisturbed areas of trees between the parking areas will reduce the visual impact of a larger lot.

	1	2	3	4	5	TOTAL
COST			3,000			3,000

Action #12. Expand the winter parking lot to accommodate 6 more cars.

The existing 4 car winter parking lot will not be adequate in the future. This minor expansion would allow for future increased winter park use, and for some parking for access to the North Shore Trail.

	1	2	3	4	5	TOTAL
COST				1,000		1,000

Interpretive Services

Crosby Manitou is an exceptional park in many ways. In contrast to other state parks, it offers separated, primitive campsites accessible only by hiking trail. Traditional state park interpretive programs involve buildings, film programs, and hikes that were conceived and prepared with the smi-modern vehicular camper in mind.

This kind of program is not in keeping with the character of Crosby Manitou and is not desired by the kind of user the park attracts. For this reason, the interpretive program at Crosby Manitou should focus on hand-out interpretive pamphlets and a self-guided trail.

Objective:

To provide an interpretive services program that best fits the Crosby Manitou visitor.

Action #1. Continue to use and upgrade the existing handouts.

The current park map meets the basic needs of park users. When this map is upgraded, the following suggestions should be considered:

- Make sure that the actual park boundaries are clearly defined and that private ownership parcels are identified.

- The text should emphasize the rugged nature of the park and that preparation is the key to an enjoyable stay in the park - this is implied by the current text and should be emphasized even more.

- Low impact camping techniques should be discussed.

- Consider putting bear and drinking water warnings on the front of the map. (See Wildlife Management, Actions #1 and #4, p .)

This handout should be mailed in response to all inquiries relating to visiting Crosby Manitou.

"A Guide to 15 of the Most Common Plants in the Park" was compiled by two naturalists in 1973. This handout works well at Crosby Manitou and its use should be continued. The regional naturalist should edit the text and make any other improvements deemed necessary. One suggestion might be to add sugar maple and yellow birch to the text.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #2. Develop a self-guided nature trail along the Sidewinder, Cedar Ridge, and Yellow Birch trails.

One of the most popular daytime activities at Crosby Manitou is hiking. Both campers and day visitors use the trails. This self-guided trail will be a loop which starts and ends at the parking lot (See the Proposed ~~Trails~~ Development Map, p 59). Walking south from Bensen Lake, the following highlights should be included in the self-guided trail pamphlet. A map in the pamphlet should identify each area (numbered posts would be too obtrusive).

Abandoned Beaver Pond. This grown over area is just west of the trail near Campsite #19.

Sugar Maple Area. There is an abrupt change in community composition at this point on the Sidewinder Trail. The trail lowers slightly into a stand dominated by sugar maple (birch/spruce dominates the slightly higher ground surrounding this stand). The ground is covered by a duff layer (organic

matter) several inches thick, there are no shrubs present and the stand's dominating sugar maples provide very heavy shade. Composition of this stand includes a canopy of sugar maple (2 to 7" DBH - diameter at breast height/a 5" tree was bored and found to be 42 years old) and ground cover composed of sugar maple seedlings (up to 50 percent coverage), bear's tongue, and Solomon's seal.

Pine Ridge Overlook. Two vistas facing west overlook a valley and the rising hills on the other side. White pines and anorthocite rock outcrops are typical of these vista areas.

Large White Pine Stump. There is a large stump over 4 feet (1.2 m) wide just north of the trail that follows the southern border of the park. This tree was probably cut in 1957.

Old Logging Road. Around the corner heading north along the Cedar Ridge Trail, the trail aligns with an old logging trail.

White Pines. The largest white pines in the park are situated near site #12 which is a short walk from the self-guided loop trail. (For further discussion on these pines, see Vegetation Section, p30.) At this point the pamphlet text should discuss the logging industry along the North Shore at the turn of the century.

Logging Disturbance. Several portions of the Cedar Ridge Trail were logged over, some areas as recently as 1957. Some lands which were privately owned were cut and later traded to state trust fund status. Some trespass cutting on park lands also took place at that time. (See the Vegetation Section, p29 for further discussion.)

Yellow Birch Area. The yellow birch stand along the Yellow Birch Trail is perhaps the most interesting and significant tree community in the park (See the Vegetation Section, p30). This area should be highlighted in all interpretive projects at Crosby Manitou.

	1	2	3	4	5	TOTAL
COST		2,500				2,500

BOUNDARY MODIFICATION

Nine Mile Creek

Caribou River

Bleasner Creek

Manitou River

Lake Superior

Legend

- Tax Forfeit
- Trust Fund
- Private
- Statutory Boundary

N

Miles 0 500' 1/4mi. 1/2mi. 1mi.

Kilometers 0 500m 1km

George H. Crosby Manitou State Park Ownership

BOUNDARY MODIFICATION

In January of 1954, George H. Crosby donated 3,319 acres (1,343 hectares) to the state of Minnesota for use as a state park. The park was established by the 1955 Minnesota Legislature. In most cases, the Minnesota statutes will identify both the owned (donated in this case) lands and any adjacent lands for which the department may negotiate for purchase from willing sellers. The statutes thereby identify a park boundary which may include private land, county land, municipal land, or land owned by other interests. This park boundary is referred to as the park's statutory boundary. The Division of Parks and Recreation may then purchase lands that come up for sale within the statutory boundary on a willing seller basis.

In the case of Crosby Manitou State Park, however, there was never an attempt to discern which lands adjacent to the donated lands should be included in the statutory boundary. Instead, the 1955 Minnesota statute which officially and legally defines the park was copied directly from George Crosby's 1954 quit claim deed. The land that George Crosby donated is quite irregular in shape and it is fragmented into several pieces. There are several 40 and 80 acre parcels that are completely separated from the main park body. Fortunately, the donated land does contain the great majority of the Manitou River from TH 61 to just south of Cty Rd 7 (Cramer Road). (See Ownership Map, p69.)

The park handout map that has been used since the park was opened in the early 1970s shows an arbitrary boundary that encompasses over 5,200 acres (2,104 hectares). The remaining lands within that boundary included 440 acres (178 hectares) of private land, 780 acres (316 hectares) of county tax forfeited land, and 600 acres (242 hectares) of state trust fund land. While this arbitrary proposed boundary pulls together the potential park ownership, it also includes many acres of land that are not optimal park quality lands. In addition, it also excludes many areas that would be more in keeping with the overall character of this backpacking park. At this point it would be best to set the handout map aside, and define those areas surrounding and adjacent to the park that should be included in an overall park proposal. Park lands which are not necessary for park use will also be identified.

Objective:

To consolidate park lands into a contiguous unit that contains the lands most suitable for trails and backpack campsites.

Action #1. Initiate a land exchange to consolidate and enhance the existing park.

In order to accomplish the ultimate goal of a contiguous park, the most plausible option at this point is to initiate a series of land exchanges involving the DNR, Division of Parks and Recreation; the DNR, Division of Forestry, and Lake County. This plan will identify certain parcels of land which were donated by George Crosby that are considered expendable lands, if more usable properties can be obtained. These expendable lands should be traded for priority acquisitions which are mostly tax forfeited lands (Lake County, Minnesota) and state trust fund lands (administered by the DNR, Division of Forestry). The expendable acreage has been set up on a priority basis (See text map code below), with some parcels under a definite "should be traded" heading and others on a "may be traded" or "may be considered for trade" basis.

PARK LAND CONSOLIDATION
2,470 acres to be retained

TRADING PRIORITIES	Acres	ACQUISITION PRIORITIES	Acres	
May be considered for trade if necessary to acquire critical or very desirable lands	± 85	Critical	640	340 County tax forfeit 240 State trust fund 60 Private
May be traded if trail and/or scenic easements can be retained	±110	Very Desirable	360	County tax forfeit
Should be traded	±735	Desirable	200	80 County tax forfeit 40 State trust fund 80 Private
Potential trade 930 acres		1200 acres potential acquisition		

The total state owned park land that should be considered as expendable constitutes about 930 acres (376 hectares). This leaves about 2470 acres (1000 hectares) of the original donated land that should be retained as park land. (See Boundary Modification Map, p73.)

The North Shore Trail passes through the portion of the park west of Cty Rd 7 (see Existing Development Map, p56). The trail passes through both "may be traded" and "should be traded" lands. Before any existing park lands that have the North Shore Trail on them are traded, a trail easement should be attached to the land abstracts. This action will ensure protection of the current North Shore Trail alignment.

The adjacent lands that would be considered for acquisition through exchange have also been prioritized. The "critical acquisition" lands are those which are currently being used to some degree and/or would geographically consolidate the remaining "retained" park land discussed in the previous

PARK LAND CONSOLIDATION
2470 acres to be retained

TRADING PRIORITIES	Acres
May be considered for trade if necessary to acquire critical or very desirable lands	± 85
May be traded if trail and/or scenic easements can be retained	±110
Should be traded	±735
potential for trade 930 acres	

ACQUISITION PRIORITIES	Acres	
Critical	640	County tax forfeited 340 State trust fund 240 Private 60
Very Desirable	360	County tax forfeited
Desirable	200	County tax forfeited 80 State trust fund 40 Private 80
1200 acres potential acquisition		

Miles 0 500' 1/4 mi. 1/2 mi. 1 mi.
Kilometers 0 500m 1km

George H. Crosby Manitou State Park Boundary Modification

paragraph. The "very desirable" lands are those which have outstanding scenic qualities that would add significantly to the existing park unit. The third acquisition priority, or "desirable" category, is land that would add to the parks scenic quality and manageability by further consolidation, but are not as essential in the overall view of the project. Because land trades are made on a value for value basis, existing park land identified for trade may or may not be available by the time that the lands identified as "desirable" are being considered for a trade.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #2. Amend the existing statutes which define the park to include the 80 acre (32 hectare) Willis-Lohman tract.

Since the parks inception, only one land purchase has been made in the Manitou area, with the intention of eventually incorporating it into the park. In 1960, this tract was purchased, making the total park acreage 3,399 (1,376 hectares). This acreage consists of the N 1/2 of the SE 1/4 of Section 29 (T58N, R6W). The legal statutory boundary of the park should be amended to include this acreage by legislative action.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #3. Correct the mistake in the existing statutes which legally defines the park boundary.

When the 1954 quit claim deed describing the donated land was copied into the 1955 statutes, one particular parcel in Section 29 (T 58N, R 6W) was copied incorrectly. The SE 1/4 of the SE 1/4 is named twice in the statutes, leaving out the SW 1/4 of the SE 1/4. The SW 1/4 of the SE 1/4 is indeed in the quit claim deed and should be incorporated into the statutes by legislative action.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #4. Resurvey the SW 1/4 of the SW 1/4 of Section 3 (T57N, R6W) and ultimately include the parcel into the legal statutory boundary.

This 40 acre (16 hectare) parcel is in private ownership and comes close to or crosses the Manitou River. A 1958 survey contracted by the DNR (then Department of Conservation) showed the northeast corner of the parcel to lie across the river, however, the accuracy of this survey should be verified and brought up-to-date. Because the parcel is so close to (or includes a part of) the river, it should be included in the statutory boundary. Another reason to make sure of the accuracy of the survey is to determine if the parcel does include part of the river. This would affect any land exchanges involving this land.

	1	2	3	4	5	TOTAL
COST	DNR, Bureau of Engineering					

Action #5. Support Lake County in designating the entire township (T58N, R6W) which surrounds the park as a county memorial forest.

Lake County has already designated two townships as county memorial forests, and it is currently considering the township surrounding the park for the same designation. This action would preserve the county tax forfeit land for county forest management practices. With Lake County's approval, there is the possibility that the park trail system could extend onto adjacent tax-forfeited land within the county memorial forest.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #6. Do not recommend the inclusion of the mouth of the Manitou River in the statutory boundary.

At one time the entire mouth of the Manitou River was considered for inclusion in the statutory boundary so that it could eventually be purchased as a part of the park. After careful consideration, it was determined that this area does not fit the character of a remote backpacking park. Although it has spectacular and outstanding scenic amenities, its access to TH 61 would require an additional park entrance from the highway corridor. The current

access to the interior North Shore highlands via Finland, Minnesota, is more suited to the experience that the DNR would like to provide at Crosby Manitou. The Manitou mouth area is currently owned and operated as a private resort.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #7. Pursue a viable exchange alternative for SW 1/4 of SW 1/4, Section 2 (T57N, R6W), a 40 acre (16 hectare) parcel adjacent to both TH 61 and Lake Superior.

This 40 acre (16.2 hectare) parcel was one of original donated by George Crosby. It is separated from the main park body by a privately owned 40 acre parcel through which TH 61 passes. The 40 acre (16.2 hectare) park parcel is situated just north of the mouth of the Manitou River. This parcel has access to TH 61 on the NW corner, about 175 feet (53 m) of the Manitou River in the SW corner, and about 225 feet (69 m) of Lake Superior shoreline on its SE corner. In terms of real estate value, this parcel is one of the most valuable portions of the original Crosby gift.

Under state law, state-owned riparian (adjacent to lakes or rivers) lands may not be exchanged for non-riparian lands. A state-owned riparian land trade must involve lands which are in the same general vicinity and they must both afford about equal water access to the public. Because none of the acquisition priorities at Crosby Manitou are riparian lands, an alternative land trade must be pursued in the same general vicinity. Ideally, this parcel should be traded for priority acquisition lands at Crosby Manitou. If this option is not possible, however, this parcel should be traded for lands needed within other North Shore parks.

	1	2	3	4	5	TOTAL
COST	No Development Cost					

Action #8. Survey and post the park boundary.

Once the land exchanges proposed in Action #1 have been implemented, the boundary should be surveyed and posted. A posted boundary is necessary to avoid trespass timber harvest problems and to enforce park rules and regulations.

	1	2	3	4	5	TOTAL
COST					28,000	28,000

OPERATIONS AND STAFFING

OPERATIONS

Maintenance is an essential responsibility of the DNR, Division of Parks and Recreation. It is responsibility that often goes unnoticed by the park visitor in comparison with new developments. Yet, the park and the DNR are continually judged by the appearance of the park and its facilities.

The task of providing services to the public and security for park facilities and resources 24 hours a day, 12 months of the year is monumental. During the busy season, park operations and supervision of park facilities is necessary 98 hours per week (8:00 a.m. to 10:00 p.m., seven days a week). During the other seasons the park maintains the same hours, but significantly decreases in visitation, which allows operation of the park by a reduced staff. However, even during the off season, maintenance, repairs and park security are ongoing responsibilities which account for many work hours.

There are four basic aspects to maintenance and operations:

1. Maintaining resources
2. Maintaining facilities
3. Providing services to the park visitors
4. Enforcing rules and regulations which protect park visitors, resources, and facilities

One of the major maintenance problems of parks is the heavy impact of large numbers of people concentrated in specific locations. These areas include: campsites, trails, lakeshores, river banks, areas around buildings, and scenic points of interest. This overuse affects the ground cover and frequently exposes tree roots to damage from foot traffic. The eventual result may be erosion, slides, disfigured sites, and even danger to park visitors. A regular maintenance program with adequate personnel, supplies, and equipment controls damage, thereby, avoiding future reconstruction expenditures.

STAFFING

One of the staffing problems in all state parks is the heavy reliance on federally funded work programs, such as the Comprehensive Employment and

Training Act (CETA) and the Young Adult Conservation Corps (YACC). The low cost personnel provided by these programs makes it possible for parks to offer programs and services which would otherwise be impossible. However, these employees are hired on a short-term basis, usually 8 to 10 weeks and often do not have the training and experience necessary to provide needed services without constant supervision in already understaffed parks. To avoid these problems, funding should be made available to hire trained personnel for major public service and maintenance programs. Temporary employees should only be hired for minor maintenance and special projects.

The YACC program will be drastically reduced in the coming year (60%+ reduction in personnel in 1982). Beyond 1982, the availability of YACC personnel is also questionable.

The following chart summarizes the existing staff at Crosby Manitou State Park. Becuase of the seasonal nature of park operations, the positions in each staffing category have been grouped into total "staff months." Staff months is a common denominator which reflects the amount of time spent in each area of park maintenance and operations.

Existing Staff (1980)	Staff Months
Management	
1 seasonal park manager	9
Maintenance and Operations	
2 seasonal laborers	4
1 seasonal park worker	6

This plan recommends that the existing seasonal manager position be upgraded to a full time position. Plowing the park road and parking lot, assisting skiers and winter campers, and patrolling park lands during the winter months necessitates a full time manager. The manager at Crosby Manitou would be available to assist in the winter management of Tettegouche and Temperance River state parks.

COST AND PHASING SUMMARY

The following cost estimates were generated in January, 1982. These cost estimates are based on current prices and available information. As new information is made available and as new or modified programs are initiated, revised cost estimates will be prepared to more realistically represent costs at that time. This plan is intended to be implemented in ten years. The phases noted suggest the level of funding to be requested each biennium. But there is no guarantee that this amount of funding would be received from the legislature. Therefore, some change to these phases can be expected. The conditional column includes those actions which cannot be implemented until land exchanges have been completed.

Action	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Conditional	Total
PROPOSED DEVELOPMENT							
1 Develop approximately 12 new backpack campsites	1,000		1,000			3,000	5,000
2 Restore and maintain existing campsites		No development cost					
3 Install metal fire rings at selected campsites		1,500					1,500
4 Provide horizontal poles for suspending food out of reach of bears		No development cost					
5 Construct a group camp				4,000			4,000
6 Construct a small trail/ picnic shelter			4,000				4,000
7 Replace the Crosby Cabin with a trail shelter		(Action in Process)					
8 Construct 9-10 miles of hiking trail		3,500				24,000	27,500
9 Construct a narrow bridge across the Manitou River			15,000				15,000
10 Construct a shop at the park service area.		13,000					13,000
11 Expand the summer parking lot to accommodate 15 more cars			3,000				3,000
12 Expand the winter parking lot to accommodate 6 more cars				1,000			1,000

INTERPRETIVE SERVICES							
1 Upgrade and continue to use the existing handouts			No Development Cost				
2 Develop a self-guided trail along the Sidewinder, Cedar Ridge, and Yellow Birch Trails		2,500					2,500
BOUNDARY MODIFICATION							
8 Survey and Post the Park Boundary					28,000		28,000
TENTATIVE TOTAL DEVELOPMENT COSTS	1,000	20,500	23,000	5,000	28,000	27,000	104,500