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Minnesota
DEPARTMENT OF NATURAL RESOURCES

Itasca State Park

Unit Resource Management Plan

March 2012

Stantec

Consultant's Report

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March 1, 2012

Chris Weir-Koetter
MN DNR Itasca State Park
2115 Birchmont Branch Road NE
Bemidji, MN 56601

Reference: Itasca State Park Unit Resource Management Plan

Dear Chris:

Itasca State Park is a recreational and ecological icon for Minnesota's State Park system, and nothing less than a national treasure at the headwaters of the Mississippi River.

Itasca State Park is situated at the crossroads of three major North American biomes, resulting in a dynamic mosaic plant and animal communities that have responded to climatic changes through the millennia. The anticipated rate and magnitude of climate change for the region will challenge the resilience of natural systems at Itasca State Park, as well as how to manage these systems.

MN DNR Parks and Trails resource management program has been a leader among public conservation agencies in fostering quality natural systems. The attached report, developed with the input of multiple stakeholders within the MN DNR, is an important living document that will foster adaptive resource management through the next decade and beyond.

Thank you for the opportunity to be part of the team that developed the attached Itasca State Park Unit Resource Management Plan. It's been a profound pleasure to have been involved in this project.

Best regards,

STANTEC CONSULTING SERVICES INC.

Paul Bockenstedt
Ecologist
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C: file – 549/549101290/Reports

Acknowledgments

The Itasca State Park Unit Resource Management Plan was developed through collaborative and cooperative efforts between several Divisions within the MNDNR. The following individuals shared their knowledge and expertise to help develop a thoughtful and thorough management plan for Itasca State Park. Their input is gratefully acknowledged:

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Cathy Handrick	Division of Parks and Trails
Chris Gronewold	Division of Parks and Trails
Matthew Snyder	Division of Parks and Trails
Cindy Lueth	Division of Parks and Trails
Ed Quinn	Division of Parks and Trails
Dave Radford	Division of Parks and Trails
Ron Danielson	Division of Parks and Trails
Kurt Rusterholz, Forest Ecology & Policy	Division of Ecological Services & Water Resources
Erik Thorson, Forest Wildlife Coordinator	Division of Fish and Wildlife
Jon Drimel, Program Forester	Division of Forestry
Joe Rucinski, Forester	Division of Forestry
Ryan Anderson	Division of Parks and Trails
Shelley Becklund	Division of Ecological Services & Water Resources

Preparation of this document was completed with the assistance of the following individuals through a contractual agreement between the MN DNR and Stantec:

Paul Bockenstedt	Ecologist
Ben Meyer	Natural Resources Scientist

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Introduction

PURPOSE AND NEED

The Itasca State Park Unit Resource Management Plan (URMP) is intended to provide park staff with the guidance, direction, and framework needed to manage the diverse natural and cultural resources within the park. The plan will set an overall management direction based on realistic long-term goals, 50-year objectives, and 10-year strategies developed by the interdivisional work group. Final approval for goals, objectives, and strategies is through the MNDNR Division of Parks and Trails. The URMP, along with annual work plans for individual parks, communicates the expectations for natural and cultural resource management at the park. The life of the plan is anticipated to be 10 years.

The URMP is intended to be an internal working document that addresses known natural and cultural resources in the park and identifies management strategies to be implemented for protecting (as appropriate) these resources. Although the MNDNR is incorporating a 50 year vision for resource management, the plan is meant to focus on resource management priorities in the next 10 years. The Itasca State Park URMP project was initiated in spring 2010 and completed in March 2012. To prepare the URMP, several other key MNDNR publications and related plans were considered (see Literature Cited, Appendix A). DNR PAT resource management program staff utilizes information from researchers at colleges and universities. Resource management staff will continue to seek out these opportunities to partner with universities and other research organizations, when feasible.

MNDNR POLICY AND PARTNERING AGENCIES

POLICY

Minnesota Statutes, and Departmental and Division direction as well as applicable laws and regulations provide the overall framework for management of natural and cultural resources in state parks, and therefore impact development of the URMP. In light of the points listed below, MN DNR Parks & Trails Division views "preservation" as active management. Minnesota Statutes (M.S.) 86A.05 subd. 2c directs that state parks will be managed to:

- Preserve, perpetuate, and interpret natural features that existed in the area of the park prior to settlement.
- Preserve, perpetuate, and interpret other significant natural, scenic, scientific, or historic features that are present.
- Maintain a balance among the plant and animal life of the park.
- Re-establish desirable plants and animals that were formerly indigenous to the park area but are now missing.

State or federal laws and related departmental policies governing management of the natural and cultural resources in the park include, but are not limited to the following significant policies:

- MN Wetland Conservation Act (MN Rule, Chapter 8420)
- Federal Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended
- DNR Old-Growth Forest Guideline (1994) and Amendments (2002)
- Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers and Resource Managers (June 2005)
- MN Endangered Species Act: MS 084.0895

- Minnesota State Parks Strategic Plan (2007)
- Minnesota Field Archaeology Act (MN ST 138.31-.42)
- Minnesota Private Cemeteries Act (MN ST 307.08)
- National Historic Preservation Act of 1966, as amended (Public Law 89-665; 16 U.S.C. 470 et seq.)
- Minnesota Historic Sites Act (MN ST 138)

IMPORTANT RESOURCE AREAS

Itasca is Minnesota's oldest state park. It was established in 1891 to preserve remnant stands of virgin pine that were disappearing at an alarming rate in Minnesota at the time due to unrestricted logging. Another important goal for establishing the park was to protect the basin around the headwaters of the Mississippi River as it begins the 2,552 mile journey from Itasca State Park to the Gulf of Mexico. Itasca State Park is a gem in Minnesota's State Park system and is iconic not just for the region, but the nation.

Itasca State Park is located between Park Rapids and Bemidji, in northwestern Minnesota. The park encompasses over 32,000 acres within Minnesota's Pine Moraines and Outwash Plains Ecological Subsection in portions of Clearwater, Hubbard and Becker Counties.

Because Itasca State Park lies at the ecological crossroads of prairie, hardwoods, and conifer forest, it supports a rich assemblage of plants, plant communities and wildlife. Some of the more prominent and significant natural resource features at the park include:

- Old-growth conifer and hardwood forests are found throughout the park, some of which are over 250 years old.
- Within Itasca's old-growth pine forests-some of the state's largest red and white pines exist and are some of the largest blocks of contiguous old-growth pine in Minnesota.
- The Itasca Wilderness Sanctuary is a designated National Natural Landmark and a State Scientific and Natural Area located on the northwestern corner of Lake Itasca. This area protects old-growth pines, Bohall Lake and habitat for numerous significant species.
- Over 20 federal- and/or state-listed endangered, threatened or species of state special concern are known to exist within Itasca State Park.
- Over 100 fresh water lakes offer habitat to many aquatic species as well as recreational opportunities to a range of visitors.
- A total of 68 Species in Greatest Conservation Need, as defined in Minnesota's Comprehensive Wildlife Conservation Strategy *"Tomorrow's habitat for the wild and rare: An action plan for Minnesota wildlife"* (MN DNR 2006) are known to occur within ISP

The park is also rich with cultural history, including:

- The Headwaters of the Mississippi River, at the outlet of Lake Itasca.
- The search for the Headwaters of the Mississippi began with the discovery of the river's mouth and basin in the mid - 1600s by French explorers and was not concluded until Jacob Brower's late 1800s surveys. During this time period, several attempts were made to identify and document the source of the river. The search involved controversy as well as adventure that are chronicled through the many interpretive programs, displays, and exhibits at the park.
- The entire park is listed on the National Register of Historic Places and several sites within the park that are designated as National Register Sites and State Historic Places.
- The Itasca Bison Kill Site, one of Minnesota's oldest known archaeological sites, contains evidence of human activity in the area from approximately 8,000 years ago.

- Woodland Indian and pioneer burial sites along Lake Itasca's east shoreline offer evidence of the area's early human activity.
- Douglas Lodge an early 20th century resort complex is listed on the National Register of Historic Places, offers visitors lodging, dining, and gift shop facilities on the south shore of Lake Itasca.
- Works Progress Administration (WPA) and Civilian Conservation Corps (CCC) era buildings are found throughout the park representing some of the most complete WPA and CCC sites remaining in Minnesota.

Natural Resources

The Resource Inventory portion of the URMP describes natural and cultural resources within the park. Natural resources include native plant communities, biota, geography, geology, soils, and water resources. Cultural resources include extensive Pre-Euroamerican Contact and historic uses of the area by of Native Americans, the fur trade, and later by lumber industry including the CCC and WPA.

Based on MNDNR information, Itasca State Park land within the Statutory Boundary encompasses 33,249 acres. Of this land, 32,836 acres are MNDNR park land and 413 acres are non-park land. The area within the Statutory Boundary of the park not currently in MN DNR ownership includes private lands, as well as other non-MN DNR property.

These non-park lands are identified on select figures included in this report. Because these non-park lands are not currently managed by MNDNR Division of Parks and Trails, they are included to provide context for DNR-owned park land.

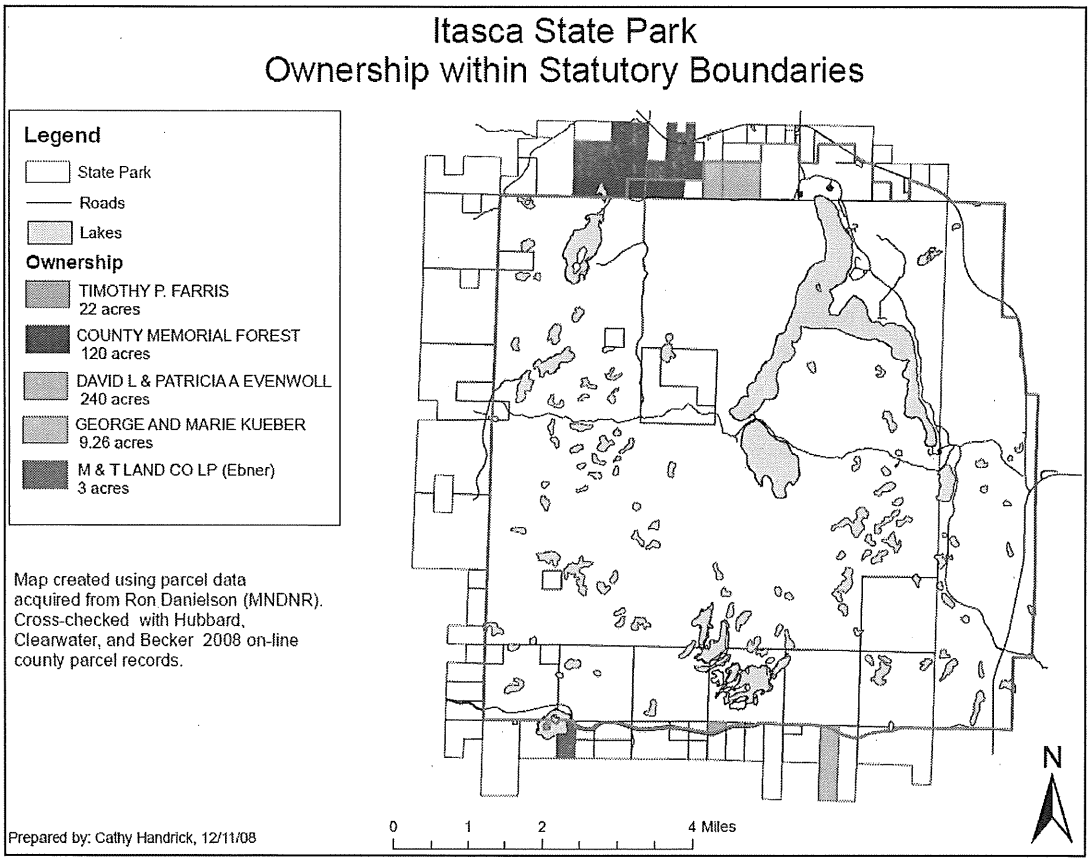

Figure 1 – Source: MN DNR (2010)

RESOURCE INVENTORIES

This section includes summaries of natural resource inventory efforts that have been conducted at Itasca State Park and information on change factors that impact natural plant communities, especially forests. Studies are cited in an appendix at the back of this report. Species lists and other inventory results are included in the appendix. In addition, this section also includes a summary of anticipated "Inventory Needs". This includes a brief summary of inventory and research that natural resource managers believe will contribute to the greater understanding and improved management of park resources.

LAND COVER

This section summarizes the land cover of Itasca State Park, including statutory acreage, acres of private lands, areas/acreage. The section also includes summaries of native plant community types, and class, and acreage, as well as areas classified as of moderate, high or outstanding statewide biodiversity significance by the Minnesota County Biological Survey (MCBS). This section also describes the current and historic disturbance regimes that helped form or maintain the major native plant communities in the park. In addition, this section of the report also summarizes land cover within the park that is classified as "use areas", including roads, trails, buildings and other similar cover types that have been highly modified and developed through human activity.

HISTORIC VEGETATION

During the pre-European settlement period, the area that is now Itasca State Park was dominated by mixed pine and hardwood forests, including white, red, jack pine as well as aspen, paper birch and other hardwoods. Hardwoods were often mixed with conifers in the region, creating a mosaic of different species rather than large homogenous stands of a single species. Historically, these mosaics have shifted with changing climate since the recession of the most recent ice sheets from the region approximately 8,500 years ago.

As the glaciers retreated, spruce trees and tundra colonized the periglacial environment throughout much of Minnesota. This process was later followed by pine barrens and forests with a bracken fern-dominated ground layer. As the climate of the region warmed about 9,000 years ago, pines began to decline, and prairie expanded its range eastward. At this time, elm and oak became the prominent tree species of forests in the region. The climate remained in this warm period until about 7,000 years ago, when midgrass prairie reached its maximum eastern extent in Minnesota.

After that time period, the climate become gradually cooler and moister, enabling oak woodlands and brushlands, and oak savanna consisting of scattered trees with a prairie-like ground cover to expand westward in Minnesota until about 4,000 years ago. During this time period white and red pine migrated into the region from the east with their current range representing the farthest western migration of both species. About 300 years ago, there was a period when the climate became especially moist and cool, and fires became less frequent throughout much of Minnesota. As a result, more extensive forests developed in the region. In Minnesota, this cooler climate, coupled with displacement of Native Americans and their traditional use of fire and other cultural practices on the landscape enabled forests to develop.

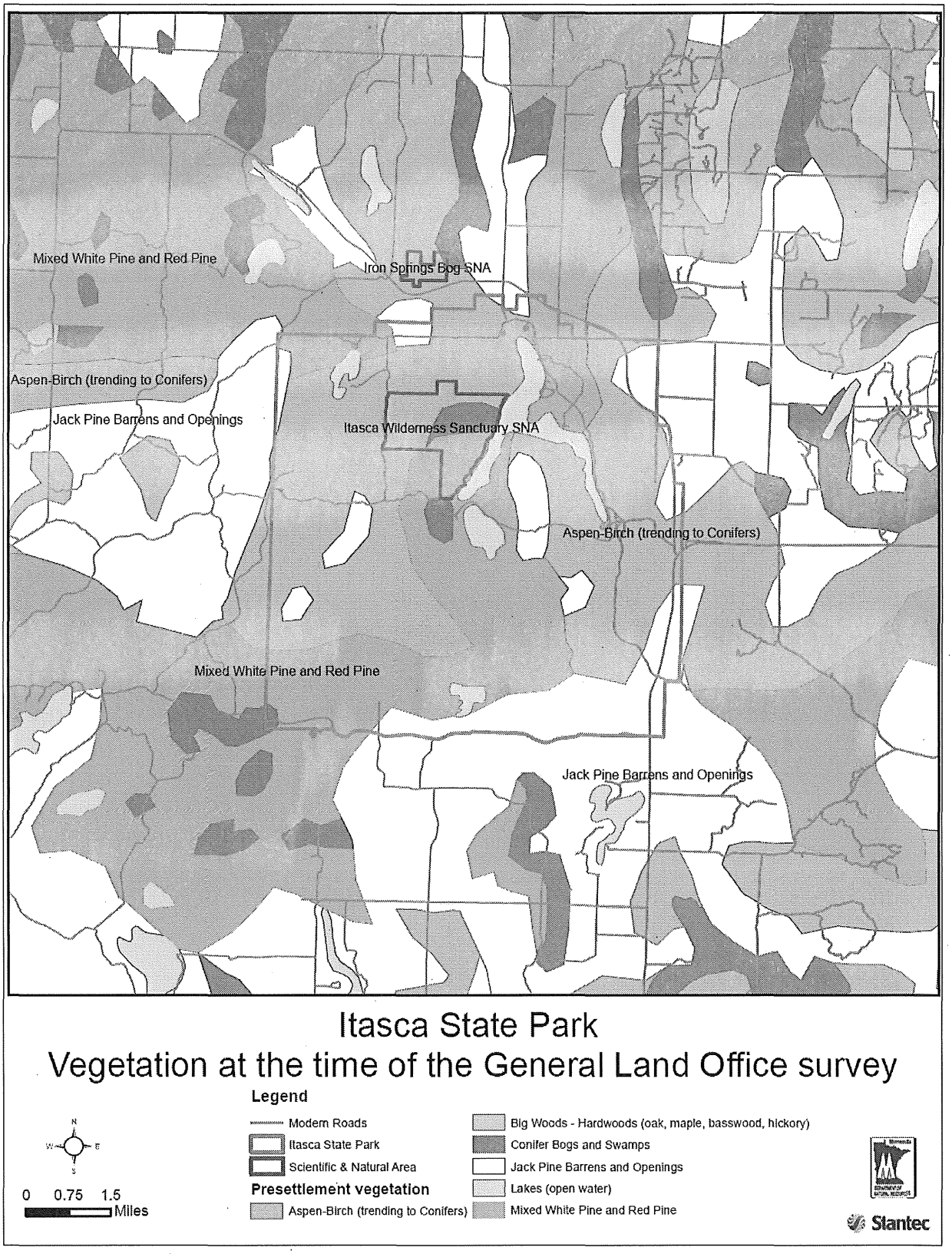
Mixed White Pine and Red Pine
Iron Springs Bog SNA
Aspen-Birch (trending to Conifers)
Jack Pine Barrens and Openings
Itasca Wilderness Sanctuary SNA
Aspen-Birch (trending to Conifers)
Mixed White Pine and Red Pine
Jack Pine Barrens and Openings
Itasca State Park
Vegetation at the time of the General Land Office survey
Legend
Modern Roads
Itasca State Park
Scientific & Natural Area
Presettlement vegetation
Aspen-Birch (trending to Conifers)
Big Woods - Hardwoods (oak, maple, basswood, hickory)
Conifer Bogs and Swamps
Jack Pine Barrens and Openings
Lakes (open water)
Mixed White Pine and Red Pine
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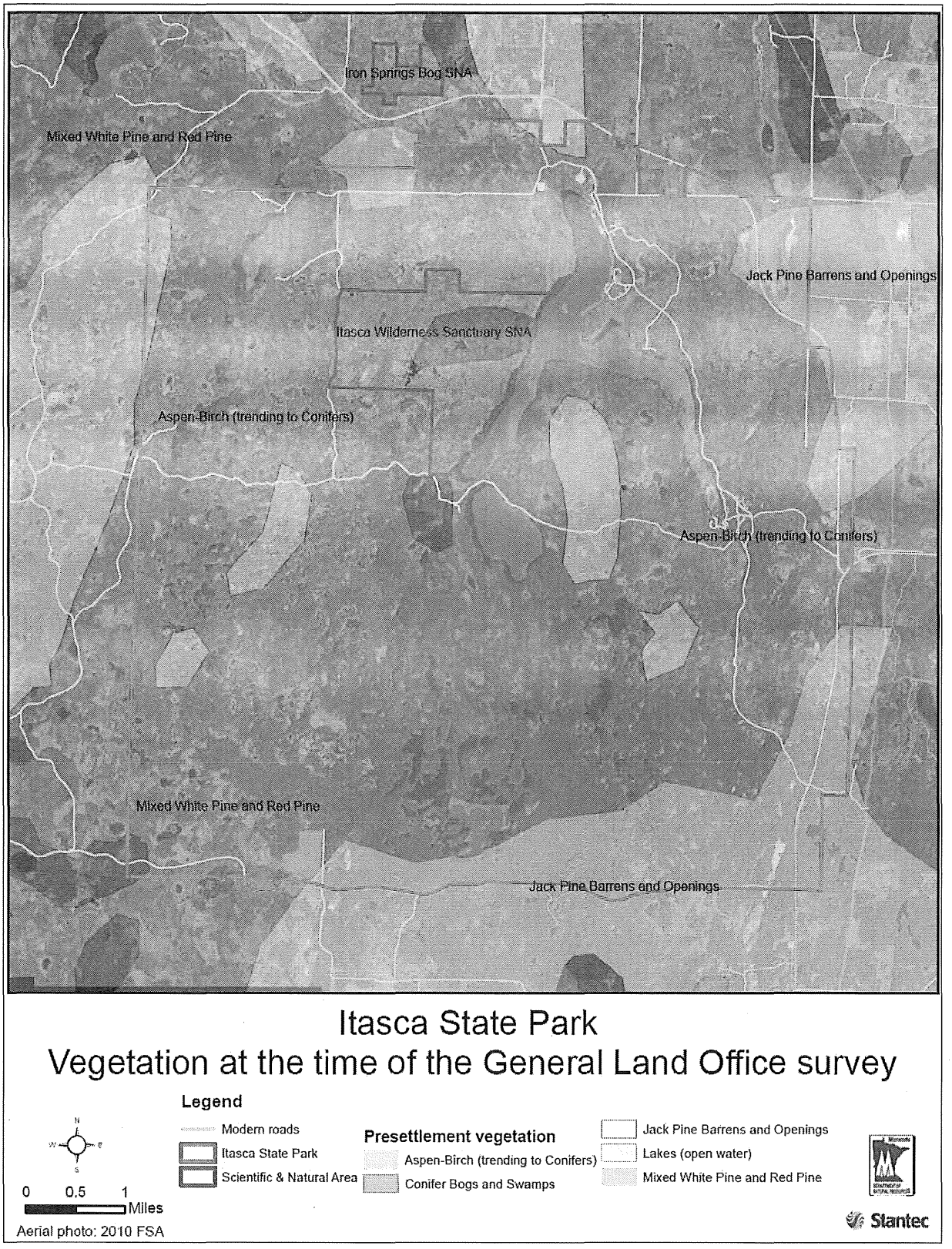
Figure 2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Aerial photo: 2010 FSA
Stantec

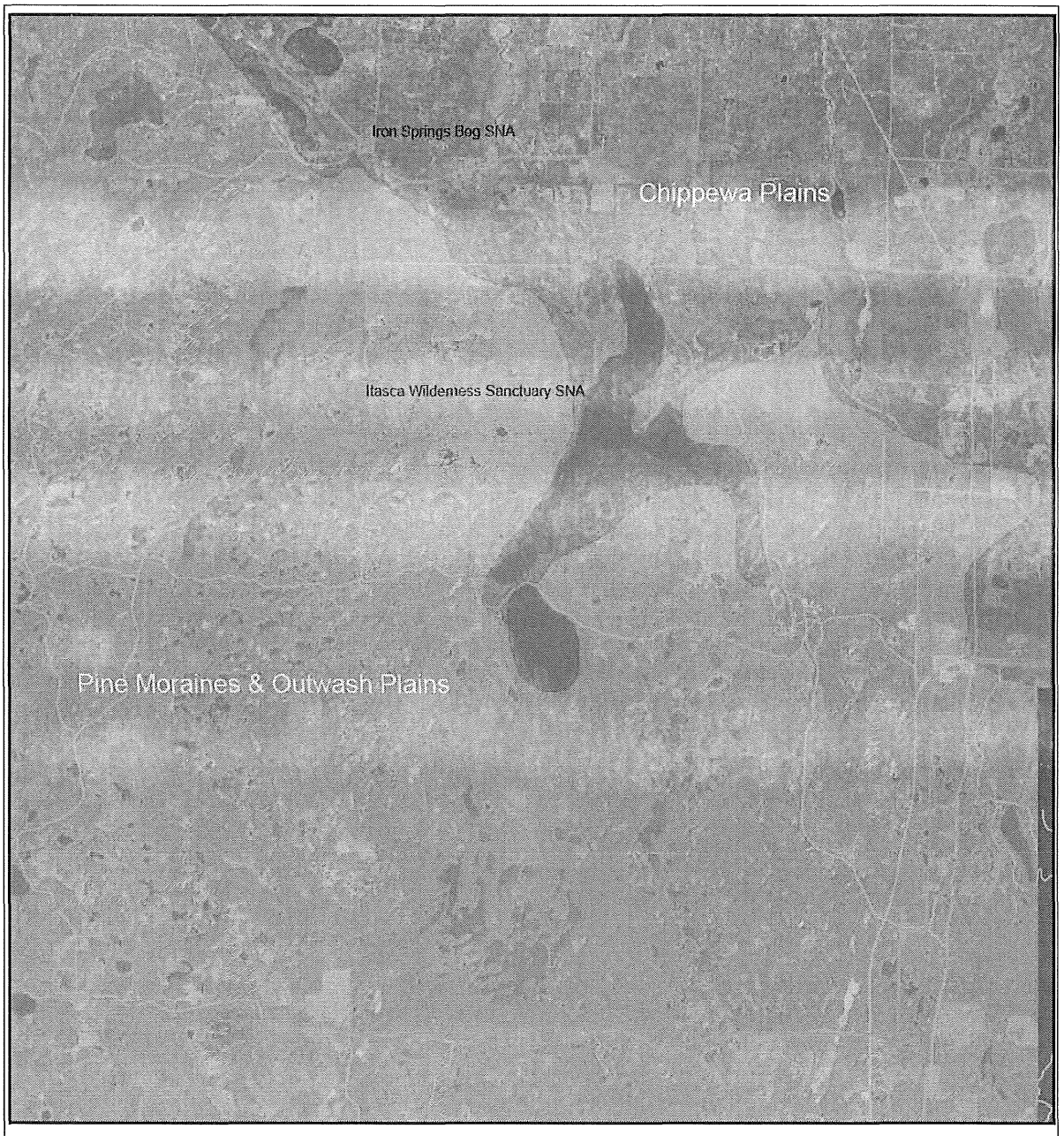
Figure 3

At the time of Euroamerican settlement which began in earnest in the 1870s and 1880s, the region of Itasca State Park supported a mosaic of plant communities, including jack pine (Pinus banksiana) and northern pin oak (Quercus ellipsoidalis) on the excessively drained areas of broad outwash plains. Aspen-birch (Populus sp. - Betula papyrifera) and pine forests dominated large areas of the other landforms. Red pine (Pinus resinosa) and white pine (Pinus strobus) forests were found on the rolling irregular-sloped end moraines. Forests composed of a diverse mix of northern hardwoods and white pine were located in fire protected areas. Irregular topography, broad wetlands, and large lakes provided this fire protection (Hargrave, 1996).

As well, marsh and swamp dotted the landscape, and lowland forests supported tamarack, spruce and balsam fir. Pre-Euroamerican settlement vegetation appears to have been much as it is today with the exception that logging selectively removed most pine from what had been mixed pine/hardwood forests. Figures on the preceding pages illustrate the presettlement vegetation in the area of Itasca State Park, as interpreted by Francis Marschner.

LANDFORM AND LAND COVER

The Ecological Classification System (ESC) utilized by MN DNR divides Minnesota into 23 distinct Subsections. Itasca State Park is mostly located in the northwestern portion of the Pine Moraines and Outwash Plains Ecological Subsection. The Pine Moraines and Outwash Plains Subsection comprise approximately ten percent of Minnesota. It stretches from north of Bemidji to south of Wadena and Brainerd. This subsection is composed of a mix of end moraines, large outwash plains, narrow outwash channels, till plains, and drumlin fields. Most of the subsection is covered by thick glacial drift with underlying Precambrian bedrock. The till is generally sandy but there is loamy drift to the north (Hargrave, 1996).These surficial glacial deposits, together with climate, biotic influences and other factors have strongly influenced the past and current vegetative land cover of the region of Itasca State Park.



Itasca State Park
Ecological Classification System Subsections

Legend

- Scientific & Natural Area
- Itasca State Park

ECS Subsection

- Chippewa Plains
- Pine Moraines & Outwash Plains

0 0.5 1 Miles

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Figure 4

CURRENT LAND COVER

Native plant communities (NPCs) were mapped by S.C. Zager in 2006. This effort resulted in mapping of a total of 6,261 polygons. The vegetation within these polygons was classified according to 27 NPC types and 25 non-natural or disturbed cover types (52 total). The total area of the park is calculated to be 33,249 acres or approximately 52 square miles. There were over 250 separate lakes and open ponds covering 3,681 total acres or 11% of the park (map unit "5.7"). The largest lake is 1,064 acres. Shallow water and/or open marshes with aquatic plants include an additional 770 acres.

Native plant community stands historically identified as predominately aspen/birch may also contain more oak, maple and basswood today than they did a few hundred years ago. As well, very little of the jack pine communities remain today as a result of aging jack pine falling out and being replaced by other forest tree species.

The most frequent System cover types are wet meadows/shrub carr (WMn82) with 1,691 distinct polygons and a total acreage of 2,883. White and Red pine predominated in two NPC Systems (FDc34a and FDn33a). These polygons – where pines are most abundant – cover 7,530 total acres or 21.6 % of the park. It is estimated that a total of 1,973 acres are available for pine restoration (the best potential NPC types for natural pine restoration include: blow-down, cut and burn areas (2.4) – 603 acres; open oak and aspen forest (FDc34b) – 1,089 acres; and Beaver Disturbed Areas on well-drained slopes surrounding wetlands (BD_CX) – 281 acres). The Mesic Hardwood Forest System, MHc26, covers 12,239 acres and contains red and white pines present in groves or as scattered individual trees. Much of the white and red pine were logged from the MHc26 cover type in the early 1900's and now provide good opportunity for pine restoration. Developed and disturbed areas were mapped with over 2,380 acres or about 7.2 % of the total park.

Park-specific descriptions of the NPCs listed above are included in an appendix at end of report and are excerpted from the Itasca State Park Native Plant Community Cover Types report (Zager, 2006).

Itasca State Park NPC System summary

NPC Name	Count	Sum Acres
Natural Community System		
Acid Peatland System	89	158.0
Beaver disturbed/Beaver wetland complex	288	394
Fire-dependent Forest	779	8652
Forested Rick Peatland	131	587
Mesic Hardwood Forest System	1,338	12,239
Marsh System	655	770
Open Rich Peatland System	76	222
River Shore System	1	10
Wet Forest System	545	1,273
Wet Meadow/Carr System	1,691	2,883
Open Water/Lakes	251	3,681
Natural Community Subtotal	5,844	30,869

NPC Name	Count	Sum Acres
Non-Natural Community System/Developed & Use Areas		
Campground	6	72
Recreational Activity Area	17	27
Administrative Area	23	210
Old use area/dump site	12	33
Roads/Trails - Buffered	31	127
Water/Residential, Farmstead, Commercial, Pond, Dam	8	43
Old Field, Cropland, Utility corridors/Open, Non-developed	34	73
Clear cuts, Blow-Downs	84	554
Young forest	121	841
Planted trees	72	379
Gravel Pit/Quarry	9	16
Disturbed or Managed Subtotal	417	2,380
TOTAL	6,261	33,249

NATIVE PLANT COMMUNITY SYSTEMS

Below are summaries by native plant community systems that occur at Itasca State Park. The information below is excerpted from, and more complete summaries of native plant communities are contained within the *Itasca State Park Native Plant Community Cover Types* report (Zager, 2006). The native plant community type categories listed below are consistent with those outlined in the *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (2003).

ACID PEATLAND (AP) SYSTEM

The Acid Peatland (AP) System is characterized by conifer-, low-shrub, or graminoid-dominated communities that develop in association with peat-forming species of sphagnum moss. AP communities are acidic (pH < 5.5), extremely low in nutrients and have hydrological inputs dominated by precipitation rather than groundwater.

In the absence of external influences, such as flooding by beaver activity or changes in hydrology, the succession of peatlands in the Laurentian Mixed Forest Province moves in the direction of conversion of rich peatlands to acid peatlands because of accumulation of sphagnum peat. Within the AP System, the successional trend is also from less acidic to more acidic communities, (e.g., from Northern Poor Fen to Northern Poor Conifer swamp to Northern Spruce Bog).

A total of 89 polygons totaling 158 acres of native plant communities in the Acid Peatland System occur within the park.

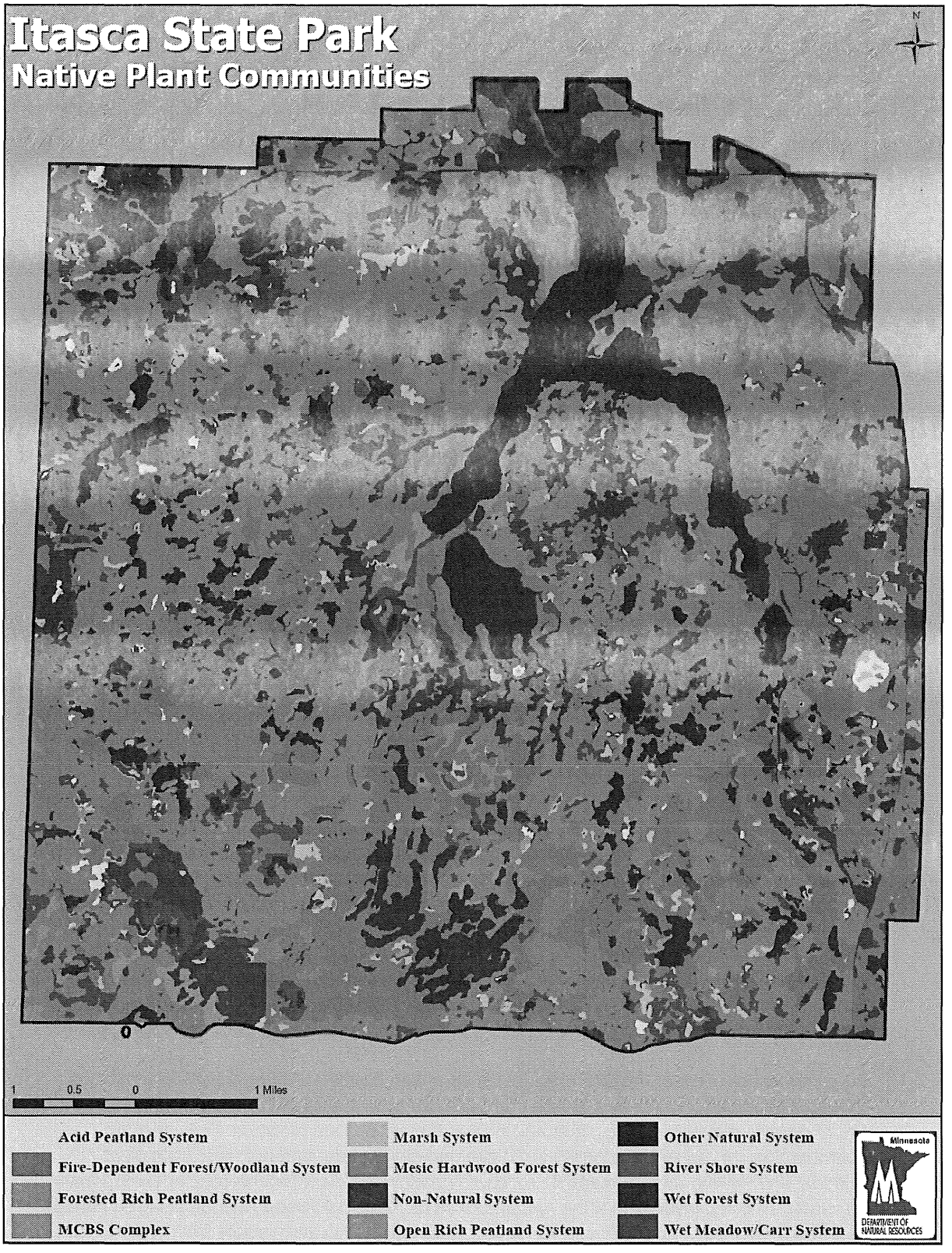


Figure 5 – Source: MN DNR (2012)

Acid peatland System summary

NPC Code	NPC Name	Count	Sum Acres
APn81b	Poor Tamarack - Black Spruce Swamp	2	5.0
APn91a	Low Shrub Poor Fen	46	72.0
APn91b	Graminoid Poor Fen (Basin)	41	81.0
	Acid Peatland System Total	89	158.0

SPARSE VEGETATION TYPES & MCBS COMPLEXES

There were two sparse vegetation and MCBS complex cover types documented at Itasca State Park. These habitat types are specifically related to habitat modification activities carried out by beaver. The description of the MCBS complexes BD_CX (281 acres) are Beaver Disturbed Areas where trees have been selectively harvested or completely removed by beavers, which results in a deforested habitat dominated by dense brush and small openings with prairie species. Complex BW_CX (113 acres) refers to wetlands whose character has been altered by beaver-created impoundments, that is, flooded by beaver activity.

Sparse vegetation System and MCBS complexes cover types summary

NPC Code	NPC Name	Count	Sum Acres
BD_CX	Beaver Disturbed Area	272	281.0
BW_CX	Beaver Wetland Complex	16	113.0
	Beaver Disturbed/Wetland complex Total	288	394

FIRE-DEPENDENT FOREST/WOODLAND (FD) SYSTEM

Fire-dependent FD communities are common across the Laurentian Mixed Forest (LMF) Province, even after nearly 100 years of wildfire suppression. As the name implies, Fire-Dependent Forest/Woodland communities are strongly influenced by wildfires. Fires are the major source of species mortality and exert strong influence on patterns of plant reproduction by exposing mineral soil seedbeds, triggering dispersal of propagules, and increasing the amount of light reaching the ground or understory. Fires periodically remove much of the litter, duff, and other organic material from the community and can have a significant effect on nutrient cycling and nutrient availability. In the LMF Province, FD communities are characterized by prevalence of conifer species, most visibly pines. These species, like most of the species characteristic of FD communities, are adapted to survive repeated fires or to regenerate successfully following fire.

FD communities occur in the LMF Province on sites with coarse sandy or gravelly soils or with thin soils over bedrock. These sites are often drought prone, a condition enhanced by removal by fire of organic material, such as litter and humus that retains soil moisture. Fires also can contribute to low nutrient availability in FD communities by releasing nutrients from plant material and making them susceptible to leaching below the plant rooting zone or carried away by runoff. In comparison with other systems, such as Mesic Hardwood Forests, in which nutrient availability changes predictably over each year and remains relatively stable from year-to-year, the random behavior of wildfires causes nutrient availability in FD communities to be episodic and unpredictable (MNDNR 2003).

Fire-dependent forest/woodland System summary

NPC Code	NPC Name	Count	Sum Acres
FDc24a	Jack Pine - (Bush Honeysuckle) Woodland	9	29.0
FDc34a	Red Pine - White Pine Forest	498	6,134.0
FDc34b	Oak - Aspen Forest	116	1,089.0
FDn33a	Red Pine - White Pine Woodland	156	1,400.0
	Fire-dependent Forest Total	779	8,652

FORESTED RICH PEATLAND (FP) SYSTEM

The Forested Rich Peatland (FP) System communities are conifer- or tall shrub-dominated wetlands on deep [>15 in (40 cm)], actively forming peat. They are characterized by a mossy ground layer, often with abundant shrubs and forbs. The cool climate, abundant precipitation, and presence of poorly drained basins and glacial lake plains result in extensive peat development in the region. The environment in FP communities favors dominance by herbaceous vascular plants, brown mosses, minerotrophic sphagnum, and tree and shrub species that can survive periods of inundation or saturated substrates. Plants of FP communities are adapted to low-nutrient environments. Evergreen species, which conserve nutrients by retaining their leaves from year to year, are common and include conifers such as black spruce and ericaceous shrubs. Deciduous tree species are nearly absent from FP communities.

Three native plant community types in the FP System were recorded at Itasca State park. These are described in greater detail below.

Forested rich peatland System summary

NPC Code	NPC Name	Count	Sum Acres
FPn63b	White Cedar Swamp (North central)	2	9.0
FPn73a	Alder - (Maple - Loosestrife) Swamp	6	11.0
FPn82b	Extremely Rich Tamarack Swamp	123	567.0
	Forested Rick Peatland Total	131	587.0

MESIC HARDWOOD FOREST (MH) SYSTEM

The Mesic Hardwood Forest (MH) System communities are found on upland sites with moist soils, usually in settings protected from fire. They are characterized by continuous, often dense, canopies of deciduous trees, including sugar maple, basswood, paper birch, and northern red oak, and an understory with shade-adapted shrubs and herbaceous species. Plants in MH communities have access to predictable supplies of water and nutrients but are often limited by light because of the dense forest canopy.

Resource (nutrient) availability in MH communities follows a more predictable annual or seasonal pattern (versus fire-dependent communities that have nutrient releases mainly following episodic fires). Tree mortality in MH communities is also rather constant, with stand-regenerating disturbances (e.g., wildfires, windthrow) uncommon. The death of established trees most often involves individual canopy trees or small patches that are affected by minor windthrow, disease, or other fine-scale disturbances.

The primary difference between the northern and central floristic regions for the MH communities is that the northern MH (MHn) communities are wetter, falling mainly in the mesic and wet-mesic segments of the moisture gradient in the MH System. Central MH (MHc) communities are mainly represented in the mesic and dry-mesic segments of the MH System.

Historically, MH communities had low to very low rates of catastrophic disturbance from fires and windstorms (ranging in excess of 400 years to over 1,000 years). Moderate disturbances from light surface fires and patchy windthrow were frequent to occasional (rotation periods generally ranging between 40-300 years). Such moderate disturbances were more common among MHc than MHn communities, probably because of the warmer and drier climate in the southern and western parts of the LMF Province. A total of 1,338 Mesic Hardwood Forest polygons totaling 12,239 acres were mapped at Itasca State Park.

Mesic hardwood forest System summary

NPC Code	NPC Name	Count	Sum Acres
MHc26a	Oak Aspen - Red Maple Forest	452	5,909.0
MHc26b	Red Oak Sugar Maple - Basswood (Large-Flowered Trillium) Forest	434	3,757.0
MHc37a	Aspen - (Sugar Maple - Basswood) Forest	30	287.0
MHc37b	Sugar Maple - Basswood - (Aspen) Forest	61	542.0
MHn35a	Aspen - Birch - Basswood Forest	230	1,037.0
MHn44a	Aspen - Birch - Red Maple Forest	131	707.0
	Mesic Hardwood Forest System Total	1,338	12,239

MARSH (MR) SYSTEM

Communities in the MR System are tall forb- and graminoid-dominated wetlands that have standing (or slow flowing) water present through most of the growing season. The maximum water depth is typically sustained at 20-60 inches (50-150 cm) but may be higher, especially in marshes where the vegetation is rooted in floating mats.

Marshes dominated by non-native cattail species are considered to be low-quality or disturbed examples of MRn83. Marshes dominated by the native species broad-leaved cattail (T. latifolia) are considered higher-quality examples of MRn83 and are increasingly rare in Minnesota.

The following table summarizes the emergent marsh acreage and number of polygons for this community type within Itasca State Park.

Marsh System summary

NPC Code	NPC Name	Count	Sum Acres
MRn93b	Spikerush Bur Reed Marsh (Northern)	655	770
	Marsh System Total	655	770

OPEN RICH PEATLAND SYSTEM

Open Rich Peatland (OP) communities are graminoid- or low shrub–dominated wetlands on actively forming deep (>16in [40cm]) peat. The dominant graminoids most often are fine-leaved sedges (Carex spp.); shrubs, when present, typically include ericaceous species such as leatherleaf (Chamaedaphne calyculata) and bog rosemary (Andromeda glaucophylla), along with bog birch (Betula pumila).

Mosses are common in OP communities, with Sphagnum species (Sphagnum spp.) characteristic on hummocks and brown mosses characteristic in wet hollows. OP communities are widespread in the Laurentian Mixed Forest (LMF) Province, where cool climate, abundant precipitation, and the presence of poorly drained basins and glacial lake plains provide suitable conditions for peat development. They are particularly prominent in MOP and in the Tamarack Lowlands Subsection in MDL. OP communities also occur locally south of the LMF Province in settings where groundwater discharge is sufficient to offset higher rates of evapotranspiration caused by warmer temperatures.

Open rich peatland cover type summary

NPC Code	NPC Name	Count	Sum Acres
OPn92a	Graminoid Rich Fen (Basin)	10	40
OPn92b	Graminoid - Sphagnum Rich Fen (Basin)	66	182
	Open Rich Peatland System Total	76	222

RIVER SHORE (RV) SYSTEM

River Shore (RV) communities occur along the shorelines of rivers and streams in the riparian zone between annual low water level and the upper limit of impacts from currents and ice scouring. RV communities are inundated annually during spring flooding and following heavy rains. Willow Sandbar Shrubland (River) (RVx32a) is the only River Shore Community mapped within Itasca State Park. This community type tends to change size and shape over a relatively short period of time because of the dynamic character of river systems.

River shore System summary

NPC Code	NPC Name	Count	Sum Acres
RVx32	Sand/Gravel/Cobble River Shore	1	10
	River Shore System Total	1	10

WET FOREST (WF) SYSTEM

Wet Forest (WF) System communities occur commonly in narrow zones along the margins of lakes, rivers, and peatlands; they also occur in shallow depressions or other settings where the groundwater table is almost always within reach of plant roots but does not remain above the mineral soil surface for long periods during the growing season. WF communities are dominated mostly by black ash or white cedar, with an understory characterized by patches of shrubs such as speckled alder (Alnus incana) or mountain maple (Acer spicatum), mosses and upland forest herbaceous species on raised hummocks, and sedges and wetland forbs in wet or mucky hollows.

The most frequent natural disturbance in WF communities is flooding, typically resulting from periodic increases in precipitation of from beaver activity. If flooding is severe enough, it can kill canopy trees and bring about conversion to Wet Meadow/Carr or Marsh communities. Other potential disturbances include fire and wind throw. Historically, WF communities in the northern (WFn) and southern (WFs) floristic regions were affected by catastrophic fires very infrequently, with rotations of 800 to more than 1,000 years.

The groundwater is cold and its chemistry somewhat alkaline. Several plants with highest affinity for WFs communities are intimately associated with spring heads and cold-water runs (e.g., skunk-cabbage, Pennsylvania bitter cress, and true forget-me-not). Park-specific descriptions of the natural community types listed above are included below and excerpted from the Itasca State Park Native Plant Community Cover Types report (Zager, 2006).

A total of 545 occurrences of Wet Forest occur at Itasca State Park, as shown in the table below.

Wet forest System summary

NPC Code	NPC Name	Count	Sum Acres
WFn55a	Black Ash - Aspen - Balsam Poplar Swamp (Northeastern)	469	1,023
WFn64c	Black Ash - Alder Swamp (Northern)	10	119
WFn74a	Alder - (Red Currant Meadow-Rue) Swamp	66	131
	Wet Forest System Total	545	1,273

WET MEADOW/CARR (WM) SYSTEM

WM communities are graminoid- or shrub-dominated wetlands that are subjected annually to moderate inundation following spring thaw and heavy rains and to periodic draw downs during the summer. The dominant graminoids are broad-leaved species such as lake sedge (Carex lacustris), tussock sedge (C. stricta), and bluejoint (Calamagrostis canadensis). Shrubs such as willows (Salix spp.) and dogwoods (Cornus spp.) are likely to dominate drier sites. Peak water levels are high and persistent enough to prevent trees (and often shrubs) from becoming established. However, there may be little or no standing water present during much of the growing season. Soils range from mineral soils to muck and peat.

Wet meadow communities can develop from Wet Forest (WF) communities in areas flooded by beaver activity or from Forested Rich Peatland (FP) communities following catastrophic fires during severe droughts. WM communities can also develop from Marsh (MR) communities when siltation, accumulation of sedimentary peat, development of floating root mats, or lowering of water tables (commonly following disintegration of beaver dams) effectively lower the water level in relation to the substrate surface; this promotes invasion and dominance by sedges over emergent aquatic plants such as cattails (Typha spp.) or bulrushes (Scirpus spp.). In WM communities invaded by peat-producing bryophytes (particularly Sphagnum), nutrient levels decline causing conversion to Open Rich Peatland (OP) or Acid Peatland (AP) communities. WM communities can also succeed to WF communities if hydrological changes result in lowering of the water table, followed by an increase in dominance of shrubs and eventual establishment of tree seedlings.

The following table summarizes the native plant communities in the Wet Meadow/Carr System within Itasca State Park.

Wet meadow/carr System summary

NPC Code	NPC Name	Count	Sum Acres
WMn82a	Willow - Dogwood Shrub Swamp	286	424
WMn82b	Sedge Meadow	1,405	2,459
	Wet Meadow/Carr System Total	1,691	2,883

OPEN WATER/LAKES

This land cover type includes open surface water areas that lack significant vegetation such as open rivers, lakes. A total of 251 polygons were mapped as open water areas, totaling 3,681 acres.

Open water/lakes System summary

NPC Code	NPC Name	Count	Sum Acres
5.7	Open Water / Lakes	251	3,681
	Open Water/Lakes	251	3,681

OLD-GROWTH FOREST

Minnesota old-growth forests include the following traits, although some old-growth stands may lack one or more of these traits with the exception of the age criterion:

- Some trees at least 120 years old.
- Large, dead standing trees (snags) common.
- Large fallen trees and branches on the ground.
- Mix of young, old, and middle-aged trees (multi-aged).
- Canopy gaps visible between the tree crowns.
- Tip-up mounds and pits from tipped-over trees.

During the pre-European settlement period, the park was dominated by mixed pine and hardwood forests, including white, red, jack pine and aspen, birch and other hardwoods. Hardwoods were often mixed with conifers to create a mosaic of different species rather than large homogenous stands of a single species. Marshes and swamp dotted the landscape and lowland forests supported tamarack, spruce and balsam fir.

OLD-GROWTH FOREST

Taken from the Minnesota DNR website; "Old-growth forests are natural forests that have developed over a long period of time, generally at least 120 years (DNR definition and consistent with definitions for the eastern United States), without experiencing severe, stand-replacing disturbance--a fire, windstorm, or logging. Old-growth forests may be dominated by species such as sugar maple, white spruce, or white cedar that are capable of reproducing under a shaded canopy. These old-growth forests can persist indefinitely. Old-growth forest may also be dominated by species such as red pine, white pine, or red oak that do not reproduce as well under shade and that require disturbance to open the canopy. These old-growth forests will eventually be replaced by the more shade tolerant tree species in the absence of disturbance".

Itasca State Park contains a total of 4,160 acres of designated old-growth and 2,519 acres of candidate/pending old growth. Stand types consist of red pine, white pine, mixed red and white pine, lowland hardwoods and northern hardwoods, as shown in the figure on the following page. A description of each old-growth forest type is provided in the following subsections. References for management in old growth stands include the MNDNR publication "Old-Growth Forests Guideline Amendment #6", as well as "Old-growth Guideline Amendment # 2 Old growth management: Managing the old-growth network over time; Version 2, Revised April 2007". All acreages and ages are based on MNDNR GIS coverages and metadata; ages reported in the following paragraphs were calculated to reflect tree age in 2011.

Old-Growth Red Pine Forest – Itasca State Park contains 62 different stands totaling 2,322 acres of designated old-growth red pine forest. The age of these stands varies between 117 to 320 years old based on ages updated in 2011.

Old-Growth White Pine Forest – Itasca State Park contains 25 different stands totaling 656 acres of designated old-growth white pine forest. The age of these stands varies between 159 to 314 years old based on ages updated in 2011.

Old-Growth Mixed Red and White Pine Forest – Itasca State Park contains 14 different stands totaling 1,032 acres of designated old-growth mixed red and white pine forest. The age of these stands varies between 144 to 282 years old based on ages updated in 2011.

Old-Growth Lowland Hardwoods Forest – Itasca State Park contains two different stands totaling 13 acres of designated old-growth lowland hardwood forest. The age of these stands are 168 years old, based on ages updated in 2011.

Old-Growth Northern Hardwood Forest – Itasca State Park contains six different stands totaling 137 acres of designated old-growth northern hardwood forest. The age of these stands varies between 98 to 208 years old based on ages updated in 2011.

Old Growth Summary for Itasca State Park

Old Growth Type	Status	Acres	Age Range
Red Pine	Designated	2,322	117 to 320
White Pine	Designated	656	159 to 314
Mixed Red and White Pine	Designated	1,032	144 to 282
Lowland Hardwood	Designated	13	168
Northern Hardwood	Designated	137	98 to 208
	SUBTOTAL	*4,160*	
Red Pine	Pending	1,032	97 to 316
White Pine	Pending	190	91 to 277
Mixed Red and White Pine	Pending	305	99 to 242
Lowland Hardwood	Pending	190	148 to 270
Northern Hardwood	Pending	802	71 to 198
	SUBTOTAL	*2,519*	
	TOTAL	**6,679**	

Figure 6 – Source: MN DNR (2012)

There are 80 forest stands, encompassing 2,519 acres that have been evaluated for old growth characteristics and are in a "Pending Old Growth" status. These stands were initially evaluated in 1996/97, but a determination of old growth status/non-status was not made. The evaluation data and stands were examined in 2011 through a project contracted by MNDNR PAT (Peterson 2011 unpublished report). After analysis, the contractor recommended that 57 stands appear to be eligible for old growth designation and 23 stands are not eligible and are recommended for removal from the "Pending Old Growth" category. The outcomes of the report included:

- The stands in the pending old growth category will be designated/delisted according to DNR established procedures.
- Designated old growth stands are managed according to old growth management guidelines.

Rare Plant Species & Significant Native Plant Communities

This section includes state-listed plant species and other rare or regionally uncommon species that have been documented at Itasca State Park. It also includes information on the rare native plant communities such as jack pine woodlands.

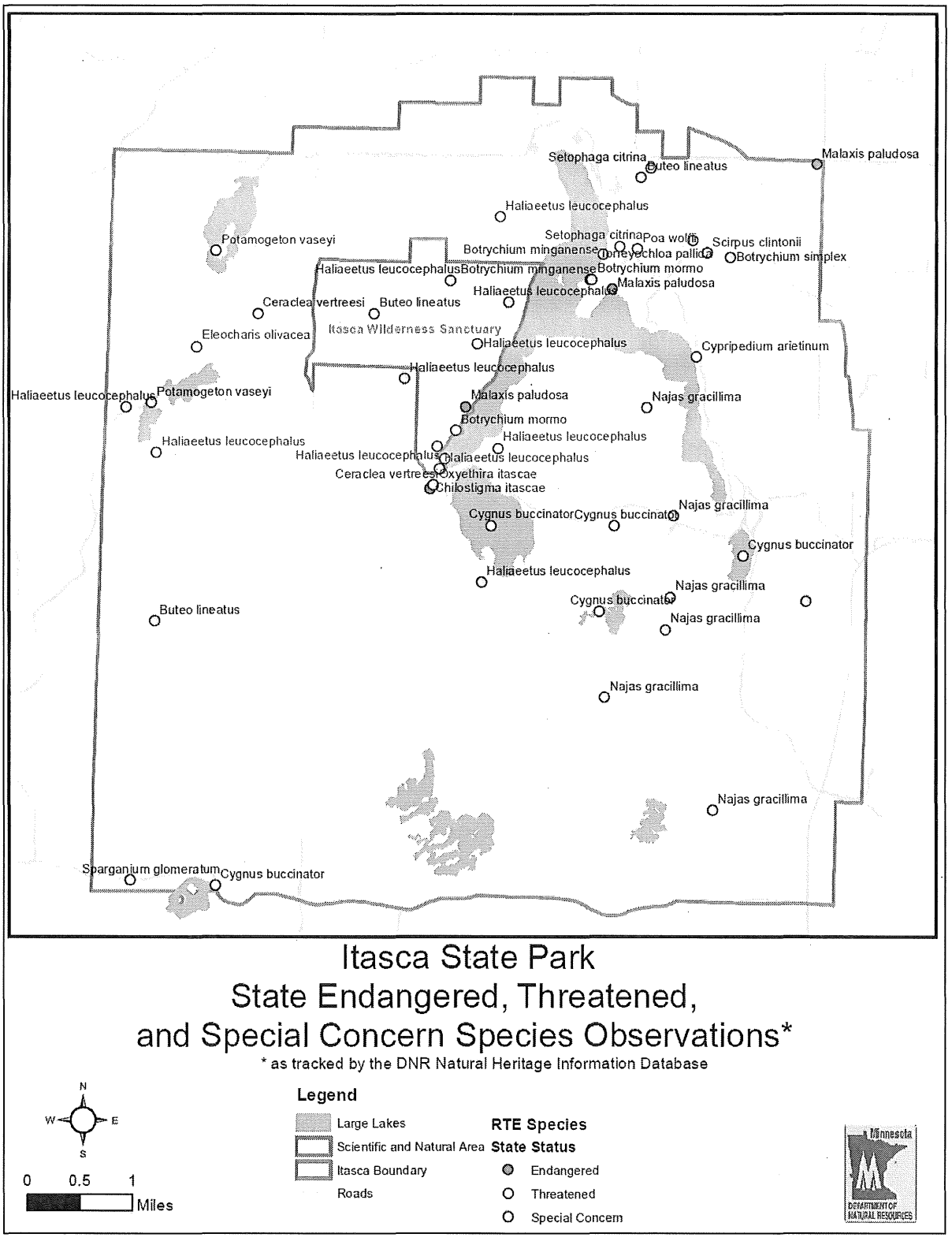
RARE PLANT SPECIES

A total of 19 rare plant species have been documented at ISP. None of these are federal-listed. One, the bog adder's mouth (Malaxus paludosa), is MN endangered, two are Minnesota threatened and 11 are Minnesota special concern. This list also includes five plant species that are non-listed, but tracked in the Natural Heritage Information System (NHIS). The table below includes a summary of these plants and their status.

Rare Plants Documented at Itasca State Park

Common Name	*Scientific Name*	Federal status	MN Rank
Cooper's milk-vetch	Astragalus neglectus	NFL	NON
Matricary grapefern	Botrychium matricariifolium	NFL	NON
Mingan moonwort	Botrychium minganense	NFL	SPC
Goblin fern	Botrychium mormo	NFL	SPC
Least moonwort	Botrychium simplex	NFL	SPC
Cuckoo flower	Cardamine pratensis var. palustris	NFL	NON
Hair-like sedge	Carex capillaris var. major	NFL	NON
Ram's-head lady's-slipper	Cypripedium arietinum	NFL	THR
Olivaceous spike-rush	Eleocharis olivacea	NFL	THR
White adder's-mouth	Malaxis monophyllos var. brachypoda	NFL	SPC
Bog adder's-mouth	Malaxis paludosa	NFL	END
Slender naiad	Najas gracillima	NFL	SPC
Wolf's bluegrass	Poa wolfii	NFL	SPC
Sheathed pondweed	Potamogeton vaginatus	NFL	SPC
Vasey's pondweed	Potamogeton vaseyi	NFL	SPC
Clinton's bulrush	Scirpus clintonii	NFL	SPC
Clustered bur- reed	Sparganium glomeratum	NFL	SPC
Torrey's manna-grass	Torreyochloa pallida	NFL	SPC
Humped bladderwort	Utricularia gibba	NFL	NON

Legal Status Legend: END-Endangered; THR-Threatened; SPC-Special Concern; NON-No Legal Status (elements that are tracked in the NHIS); NFL-No Federal Listing



Itasca State Park
State Endangered, Threatened, and Special Concern Species Observations*

* as tracked by the DNR Natural Heritage Information Database

Figure 7 (Source: MN DNR 2012)

WILDLIFE

This section summarizes the results of wildlife inventories conducted within Itasca State Park for different taxa (mammals, birds, reptiles, etc). Extirpated species of note are also included in this section, as well as wildlife of note that have colonized the area.

FISH

Since establishment as a state park in 1891 Itasca State Park has been the subject of a variety of fish stocking events, fishing partial closures, and surveys. Stocking was recorded as early as 1892 with 6,000 brook trout stocked in park streams, followed by CCC stocking of trout again in 1936 following beaver dam removal (channel restoration). Bass were stocked in DeSoto Lake in 1931. Fish kills are reported as periodic events in lakes of ISP. A number of fisheries surveys have been conducted at ISP over the course of the parks history. The most extensive of these was conducted on streams and lakes within the park in the mid-1960s, documenting 45 species of fish in 11 families.

A complete list of fish species can be found in Table 12 (pg. 70) of the 1998 Itasca State Park Natural Resource Management Plan. There are no current state-listed fish species documented at ISP. A fisheries survey was conducted by Konrad Schmidt of the MN DNR Divisions of Fisheries and Ecological Services in 1993. Ongoing snapshot information is gathered through creel surveys. Fish stocking, sport fishing, and fish rearing are all currently practiced at Itasca State Park.

BIRDS

A total of 222 species of birds have been documented at Itasca State Park (referenced from a criteria-based checklist documentation completed in 2002 by Robert Janssen). Of these, six are state-listed as threatened and eight are listed as special concern. A total of 66 bird species are listed as Species of Greatest Conservation Need within ISP. Two nonnative bird species, the house sparrow (a.k.a. Weaver's finch) and European starling are documented at ISP. The table below includes known state-listed species. A list of SGCN bird species can be found in the SGCN species table later in this section. In addition, Itasca State Park is also listed as an Important Bird Area (IBA) by the Audubon Society.

State-listed bird species documented at Itasca State Park

Common Name	Scientific Name	MN Rank	Spr	Sum	Fall	Wntr
Short-eared owl	Asio flammeus	SPC	U	U	U	-
Red-shouldered hawk	Buteo lineatus	SPC	O	O	O	-
Yellow rail	Cournicops noveboracensis	SPC	R	-	-	-
Trumpeter swan	Cygnus buccinators	THR	O	O	O	-
Peregrine falcon	Falco peregrines	THR	O	-	O	-
Bald eagle	Heliaeetus leucocephalus	SPC	U	U	U	O
Loggerhead shrike	Lanius ludovicianus	THR	R	-	-	-
Franklin's gull	Larus pipixcan	SPC	U	-	O	-
Marbled godwit	Limosa fedoa	SPC	O	O	-	-
Wilson's phalarope	Phalaropus tricolor	THR	O	O	-	-
Horned grebe	Podiceps grisegena	SPC	O	-	O	-
Forster's tern	Sterna forsteri	SPC	U	O	O	-
Common tern	Sterna hirundo	THR	U	U	-	-
Hooded warbler	Wilsonia citrina	SPC	R	R	-	-

Abundance codes (Janssen, 2002): C=common; U=uncommon; O=occasional; R=rare (few observations).

MAMMALS

A complete inventory of mammals has not been conducted within ISP. However, a list of mammals compiled in 1959 includes over 60 species. There are currently no known nonnative mammals documented within the park. Internal PAT correspondence indicates that additional survey work could result in further expansion of the mammal species list, with particular focus on the potential for the southern bog lemming within ISP. Wolverine (Gulo gulo), once relatively common in northern Minnesota and were possibly once present in ISP (Hazard 1982). Wolverine are likely extirpated from the state, although they may still be present in sparse number in remote areas of the northeastern counties.

Several mammals have received special attention within ISP. The white-tail deer has received special consideration due to their rise to exceptionally densities within the park by the 1930s. Annual deer hunts have been held within the park since the 1940s and is used as the primary tool for managing deer density. Deer exclosures have been built and monitored for the impact of browsed versus non-browsed areas and the implications for pine recruitment at ISP. Beaver have also received special attention at ISP, including some Civilian Conservation Corps work to re-channelize streams impounded by beaver dam building activity. Current population estimates for beaver range from 600-1,000.

REPTILES AND AMPHIBIANS

A comprehensive survey of reptiles and amphibians has not been completed for ISP. However, a list of species observed in the park was developed in 1968 and includes 18 total species. Of these, the common snapping turtle is the only state-listed species (special concern). Two are considered Species in Greatest Conservation Need, including the smooth green snake and common snapping turtle. Records indicate that as many as six species could be potentially added to this list with additional field survey work.

- Western Painted Turtle (Chrysemys pictabelli)
- Black-band [prairie] Skink (Eumeces s. septentrionalis)
- Red-bellied Snake (Storeria occipitomaculata)
- Common Garter Snake (Thamnophis s.sirtalis)
- Red-sided Garter Snake (Thamnophis s.parietalis)
- Smooth green Snake (Opheodrys v.vernalis) (SGCN)
- Blue-spotted Salamander (Ambystoma laterale)
- Tiger Salamander (Ambystoma t. tigrinum)
- Rough-skinned Central Newt (Diemictylus viridescens ssp. louisianensis)
- American Toad (Bufo americanus)
- Spring Peeper (Hyla c. crucifer)
- Common Tree Frog (Hyla v. versicolor)
- Boreal Chorus Frog (Pseudacris t. triseriata)
- Green Frog (Rana clamitans melanota)
- Leopard Frog (Rana p. pipiens)
- Mink Frog (Rana septentrionalis)
- Wood Frog (Rana sylvatica)
- Snapping Turtle (Chelydra serpentina)

INVERTEBRATES

Insects -There have been a number of survey efforts for invertebrates within ISP, including efforts to document terrestrial gastropods (1992), Plecoptera, dragonflies, and Lepidoptera. One rare invertebrate has been documented at ISP: the headwaters chilostigman (Chilostigma itascae), listed as state endangered. Previous efforts to inventory Lepidoptera at ISP have resulted in the documentation of 232 species.

Freshwater mussels – While there have been some fisheries surveys conducted, no mussel survey work has been completed within ISP.

RARE WILDLIFE SPECIES

A total of five rare wildlife species have been documented within ISP. One is MN endangered, one MN threatened, and four are MN Special Concern. One is federally listed as endangered, the gray wolf.

Rare wildlife species of Itasca State Park

Common Name	Scientific Name	Fed. Status	MN Rank
Trumpeter swan	Cygnus baccinator	NFL	THR
Bald Eagle	Haliaeetus leucocephalus	NFL	SPC
Red-shouldered Hawk	Buteo lineatus	NFL	SPC
Headwaters chilostigman	Chilostigma itascae	NFL	END
Snapping turtle	Chelydra serpentina	NFL	SPC

END - Endangered
THR - Threatened
SPC - Special Concern
NON - No legal status (but tracked by MN DNR NHP)
NFL - No Federal Listing

SPECIES OF GREATEST CONSERVATION NEED

Itasca State Park contains extensive high quality examples of several "Key Habitats" for Species of Greatest conservation Need (SGCN) as defined in Minnesota's Comprehensive Wildlife Conservation Strategy (MN DNR 2006). A total of 68 species of mammals, birds, reptiles, fish and insects that the MN DNR defines as SGCN have been documented within the park. A summary table of SGCN species for Itasca State Park is below.

Itasca State Park - Species in Greatest Conservation Need (SGCN)* for the Chippewa Plains (CP) and Pine Moraines & Outwash Plains (PMOP) Ecological Classification System Subsections.

Taxa	Scientific name	Common Name	ECS Subsection	
			CP	PMOP
Mammals	Canis lupus	Gray (Timber) Wolf	X	X
	Myotis septentrionalis	Northern Myotis	X	
	Spermophilus franklinii	Franklin's Ground Squirrel	X	X
	Spilogale putorius	Eastern Spotted Skunk	X	X
Birds	Accipiter gentilis	Northern Goshawk	X	X

Taxa	Scientific name	Common Name	ECS Subsection	
	Aechmophorus occidentalis	Western Grebe	X	X
	Ammodramus leconteii	Le Conte's Sparrow	X	X
	Anas rubripes	American Black Duck	X	
	Asio flammeus	Short Eared Owl	X	X
	Aythya affinis	Lesser Scaup	X	X
	Bartramia longicauda	Upland Sandpiper	X	X
	Botaurus lentiginosus	American Bittern	X	X
	Buteo lineatus	Red-shouldered Hawk	X	X
	Calidris alpina	Dunlin	X	X
	Calidris fuscicollis	White-rumped sandpiper	X	X
	Calidris pusillia	Semipalmated sandpiper	X	X
	Caprimulgus vociferus	Whip-poor-will	X	X
	Catharus fuscescens	Veery	X	X
	Chlidonias niger	Black Tern	X	X
	Chordeiles minor	Common Nighthawk	X	X
	Circus cyaneus	Northern Harrier	X	X
	Cistothorus palustris	Marsh Wren	X	X
	Cistothorus platensis	Sedge Wren	X	X
	Coccyzus erythropthalmus	Black-billed Cuckoo	X	X
	Contopus cooperi	Olive-sided Flycatcher	X	X
	Contopus virens	Eastern Wood-Pewee	X	X
	Coturnicops noveboracensis	Yellow Rail	X	X
	Cygnus buccinator	Trumpeter Swan	X	X
	Dendroica tigrina	Cape May Warbler	X	
	Dolichonyx oryzivorus	Bobolink	X	X
	Empidonax minimus	Least Flycatcher	X	X
	Euphagus carolinus	Rusty Blackbird	X	X
	Falcipennis canadensis	Spruce Grouse	X	X
	Falco peregrinus	Peregrine Falcon	X	X
	Gavia immer	Common Loon	X	X
	Haliaeetus leucocephalus	Bald Eagle	X	X
	Hylocichla mustelina	Wood Thrush	X	X
	Lanius ludovicianus	Loggerhead Shrike	X	X
	Larus pipixcan	Franklin's Gull	X	X
	Limosa fedoa	Marbled Godwit	X	X
	Limnodromus griseus	Short-billed Dowitcher	X	X
	Melanerpes erythrocephalus	Red-headed Woodpecker	X	X
	Melospiza georgiana	Swamp Sparrow	X	X
	Nycticorax nycticorax	Black-crowned Night-Heron	X	X
	Oporornis agilis	Connecticut Warbler	X	X
	Phalaropus tricolor	Wilson's Phalarope	X	X

Taxa	Scientific name	Common Name	ECS Subsection	
	Pheucticus ludovicianus	Rose-breasted Grosbeak	X	X
	Picoides arcticus	Black-backed Woodpecker	X	
	Podiceps auritus	Horned Grebe	X	X
	Podiceps grisegena	Red-necked Grebe	X	X
	Poecile hudsonica	Boreal Chickadee	X	
	Protonotaria citrea	Prothonotary Warbler	X	X
	Rallus limicola	Virginia Rail	X	X
	Scolopax minor	American Woodcock	X	X
	Seiurus aurocapilla	Ovenbird	X	X
	Sphyrapicus varius	Yellow-bellied Sapsucker	X	X
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	X	X
	Sterna forsteri	Forster's Tern	X	X
	Sterna hirundo	Common Tern	X	X
	Sturnella magna	Eastern Meadowlark	X	X
	Toxostoma rufum	Brown Thrasher	X	X
	Tringa melanoleuca	Greater Yellowlegs	X	X
	Troglodytes troglodytes	Winter Wren	X	X
	Tympanuchus phasianellus	Sharp-tailed Grouse	X	X
	Vermivora chrysoptera	Golden-winged Warbler	X	X
	Wilsonia canadensis	Canada Warbler	X	X
	Wilsonia citrina	Hooded Warbler		X
	Zonotrichia albicollis	White-throated Sparrow		X
Reptiles	Chelydra serpentina	Common Snapping Turtle	X	X
	Liochlorophis vernalis	Smooth Green Snake	X	X
Fish	Moxostoma valenciennesi	Greater Redhorse	X	X
Insects	Ceraclea vertreesi	Vertrees's Ceraclean Caddisfly	X	X
	Chilostigma itascae	Headwater Chilostigman Caddisfly		X
	Oxyethira ecornuta	A Caddisfly	X	X
	Oxyethira itascae	A Caddisfly	X	X
	Phyciodes batesii	Tawny Crescent	X	X

** as defined by Minnesota's State Wildlife Action Plan (MN SWAP) 2005*
-Updated 1/27/2012 by: Chris A. Gronewold - Resource Specialist
-Includes species known to inhabit the park and documented by reliable observers

WATER RESOURCES

Itasca's surface water resources include more than 100 lakes, as well as streams and wetlands. Many of the lakes in the park are ice block lakes formed when blocks of ice left by retreating glaciers melted. Others are tunnel valley lakes also formed by retreating glaciers. Lake Itasca is the largest body of water in the park with approximately 1,100 acres of surface water area, a maximum depth of 40 feet and an average depth of 14 feet. The northern outlet of this lake is the Headwaters of the Mississippi River. Other major bodies of water include Elk, Ozawindib, Morrison, DeSoto, and Mary Lakes. Several small lakes (i.e., Deming, Josephine, and Arco) are also among the deepest in the park.

Most of the park is within the Lake Itasca Drainage Basin, which is almost entirely within the park boundary. The Lake Itasca Drainage Basin flows into the Mississippi River Headwaters Major Watershed and includes the park's four major lakes, the portion of the Mississippi River found within the park, and most of the park's other lakes except for those in the extreme southwestern and southeastern corners of the park. The extreme southwestern and southeastern corners of the park are within the northernmost portion of the Crow Wing Major Watershed, which flows south into the Crow Wing River.

Dams have been constructed at the outlets of Lake Itasca, Elk Lake and Lake Ozawindib. These have affected conditions of the aquatic systems of these lakes and connected streams. The Elk Lake dam has perhaps the most storied history of the created lake outlet structures in the park. The elk Lake dam was first built by CCC crews in 1935 and then rebuilt by CCC in 1938. The Elk Lake dam was later reconstructed with an operable weir system in 1967 and then replaced with the current fixed elevation outlet dam.

Water quality in the park's lakes is generally good, largely because there is no significant residential, agricultural or industrial development along the park's lakeshores to produce major runoff. In addition, water quality remains good because surface water generally flows away from the park and not into it. However, recent water quality testing conducted by Itasca State Park resource management staff and trained volunteers in cooperation with the University of Minnesota has indicated a reduction in water clarity in Lake Itasca whose cause is not completely understood.

SOILS & GEOLOGY

SOILS

The United States Department of Agriculture, Natural Resources Conservation Service has recently completed soil surveys for Clearwater, Becker and Hubbard Counties (1997, 1995, and 1997, respectively). Final reports from the surveys are in various stages of completion. Soil survey data is collected and mapped in 5 acre plots that are 5 feet deep. The information in this section is based on these soil surveys. Copies of the soil surveys can be obtained from the USDA, Natural Resources Conservation Service or local Soil and Water Conservation District staff.

The soils found in Itasca State Park have been formed through the interaction of five major factors: parent material left by glacial activity; climate; plants and animals living in the area; topography; and the length of time these factors have acted on the parent materials (USDA NRCS, 1995, 1997). The parent material for the majority of the park's soils is either glacial till or glacial outwash. Glacial deposits as deep as 300-500 feet cover substantial portions of all three counties. The park's continental climate characterized by cold winters and warm to humid summers with wide temperature variations throughout the year has subjected the parent

material to shrinking and swelling associated with freezing and thawing. These climatic influences have aided in breaking up the parent materials and developing the park's current soil textures. A variety of plant and animal organisms have inhabited the park since the glacial period and left their impact on the soil types through formation of organic material. The park's knob and kettle topography has had a major impact on the formation of soil types found within the park. In level areas, precipitation generally does not run off and is absorbed through the soil profile. This process creates soils that are often permanently or seasonally saturated. In the steeper areas, soils are generally better drained, associated with lower water tables, and brighter in color with thinner soil horizons than soils in level areas. Temporally, the soils in the park are relatively young and have been formed in the last 10,000 - 20,000 years (USDA NRCS, 1997).

The interaction of these soil formation factors has created a mosaic of over 60 different soil types within the park. Within this mosaic, the Sol - Sugarbush Complex, the Sugarbush - Two Inlets Complex, and the Two Inlets - Eagleview - Steamboat Complex are the three most dominant soil types in the park's upland areas. The park's lowland areas are dominated by two soil types (ponded Haslie, Seeleyville and Cathro muck; and Mooselake and Lupton muck). A brief description of these five soil types follows. For purposes of this management plan, the park's soil types have also been grouped according to soil texture, slope and upland conifer suitability. A discussion of these characteristics follows the descriptions of the park's five major soil types.

Sol - Sugarbush Complex - Commonly found on the summits and back slopes of moraines, this soil type is characterized by a moderate amount of organic material, a sandy loam surface, glacial till parent material, a very deep profile (in excess of 60 inches), and good drainage. The dominant parent material for this soil type is glacial till. This is the most dominant soil type found in Itasca State Park and is commonly found in many of the park's upland areas. Although the soil type is dispersed throughout the park, its heaviest concentrations are in the Clearwater and Becker County portions of the park. Many of the park's existing facilities are constructed on this soil type.

Sugarbush - Two Inlets Complex - This soil type is commonly found on the summits and back slopes of outwash plains and moraines and is characterized by a moderately low amount of organic material, a sandy loam surface, a very deep profile, and good drainage. The dominant parent material for this soil type is glacial outwash. Pockets of this soil type are found throughout the park, but its largest concentrations are found in the southern Clearwater and northern Becker County portions of the park. A variety of land uses occur on this soil type from trails and roads to various forest habitats.

Two Inlets - Eagleview - Steamboat Complex - Commonly found on the summits and back slopes of moraines, this is a dry soil type characterized by a low amount of organic material, a loamy sand surface, a very deep profile, and good drainage. The dominant parent material for this soil type is glacial outwash. This soil type is not found in the Clearwater and Becker County portions of the park but it is the dominant soil type found in the Hubbard County portion of the park. Among the land uses that occur on this soil type are the park's east and south entrance roads, trails adjacent to these roads and forest habitats surrounding these roads.

Haslie, Seelyeville and Cathro Muck - This is a ponded soil type commonly found in lake plains, outwash plains, and moraines that is characterized by a very high amount of organic material, a muck surface layer, a very deep profile and very poor drainage. The dominant parent material for this soil type is organic material, glacial till or glacial outwash. This soil type is dispersed

throughout the park but is concentrated in the lowlands surrounding the park's lakes and wetlands.

Mooselake and Lupton Muck - This soil type is commonly found on lake plain depressions and moraines and is characterized by a very high amount of organic material, a mucky peat surface layer, a very deep profile, and very poor drainage. The dominant parent material for this soil type is organic material. This soil type is dispersed throughout the park but is concentrated in the lowlands surrounding the park's lakes and wetlands.

SOIL GROUPS

Most of the soils in the park are within the complex or muck texture groups with 15 percent or less slope. However, several smaller pockets of silt loams, sandy loams, and very fine sandy loams are located throughout the park. There are also several areas with slopes in excess of 15 percent dispersed throughout the park. Many of the park's soils have good potential to support upland conifer growth (conifer suitability). Those soil types that have "fair" to "poor" upland conifer suitability are primarily located in low areas dominated by mucks and sandy loam soils.

Soil texture, slope, and conifer suitability are important soil characteristics to consider when making management decisions. These and other soil characteristics make certain soils more suitable for particular resource management activities and recreation facility development than other soil types. The full soil survey report includes summaries of the major soil characteristics and facility limitations for each of the park's soil types.

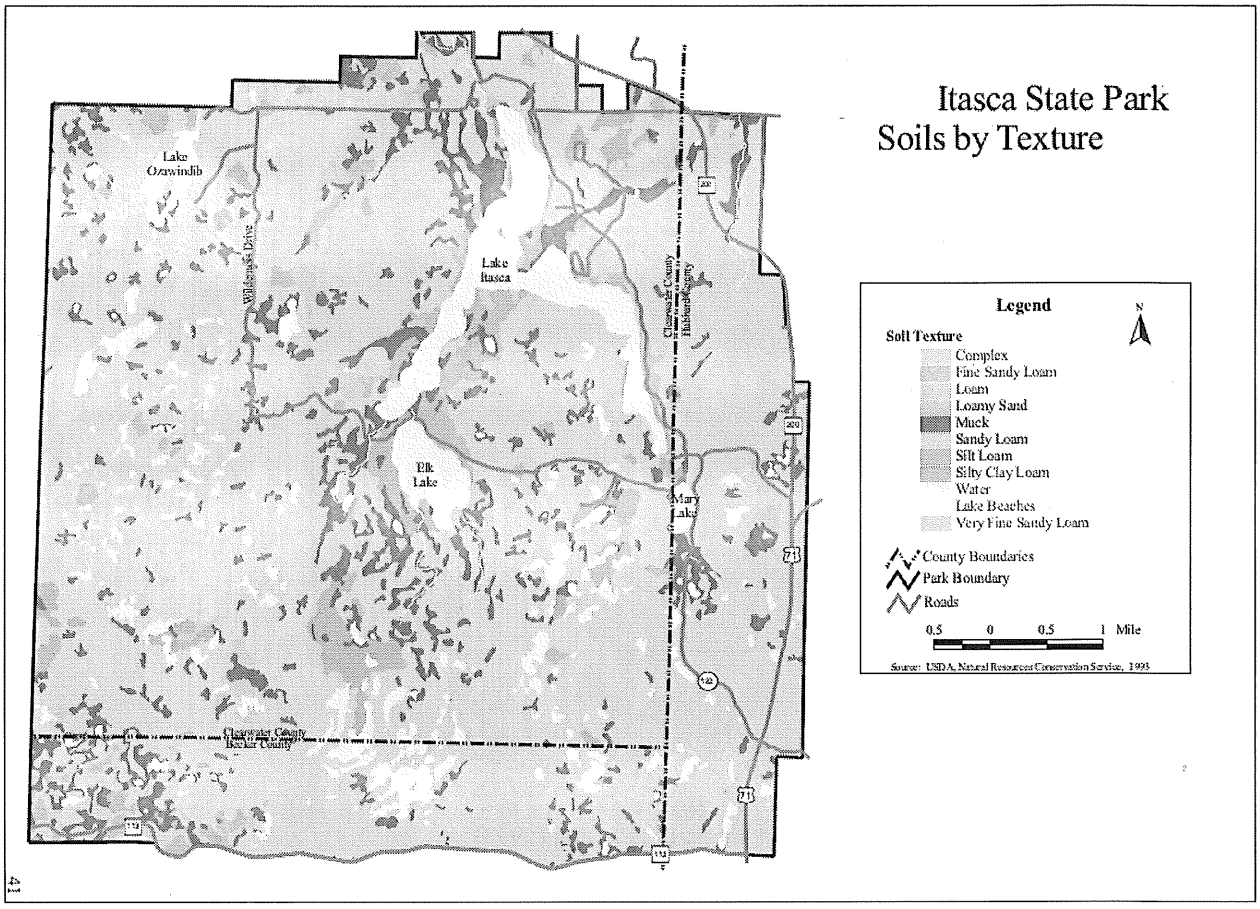


Figure 8 - Source: Itasca State Park Plan, MN DNR (1998)

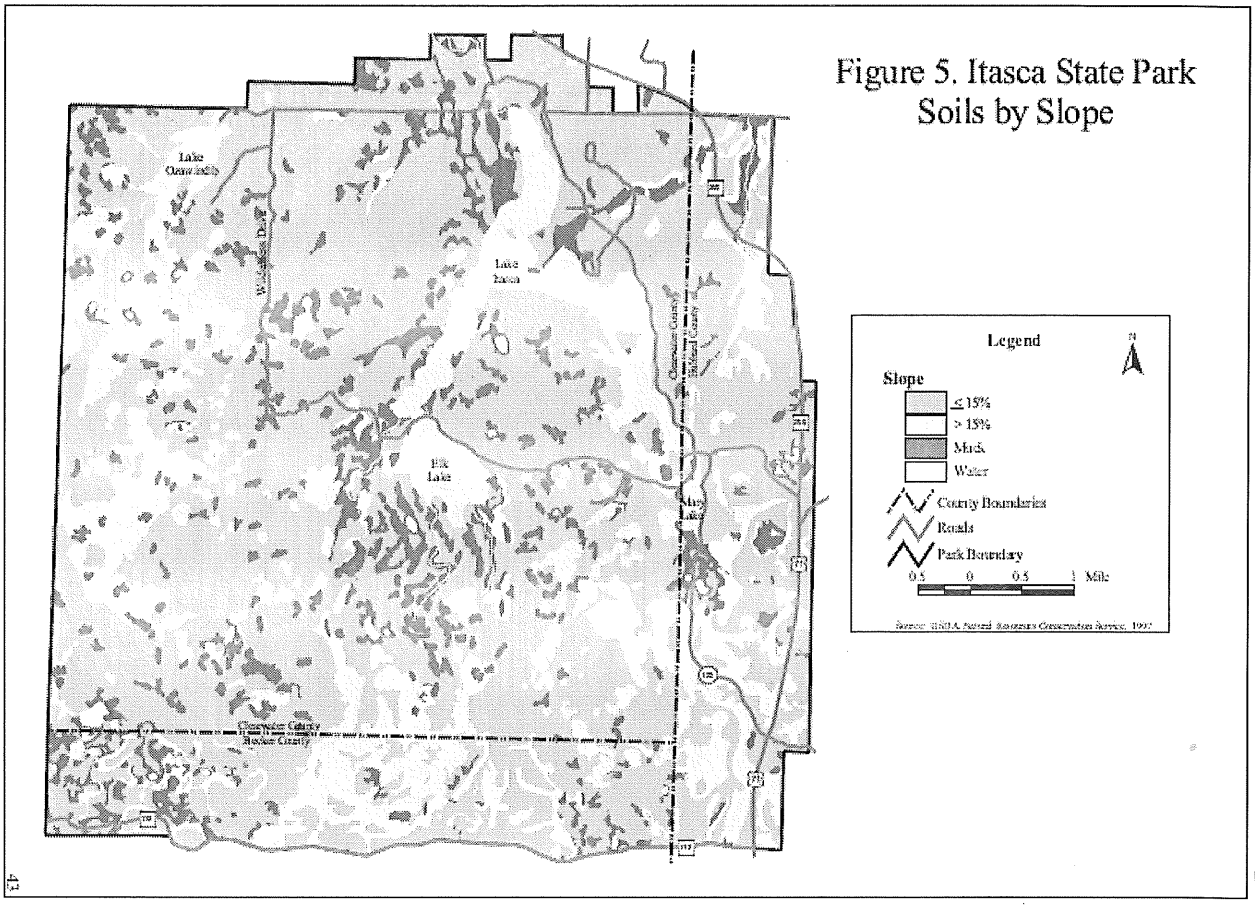


Figure 9 - Source: Itasca State Park Plan, MN DNR (1998)

GEOLOGY

Itasca State Park's surficial landscape was shaped by primarily by glacial activity. Examination of the glacial features that remain in the park provide scientists with clues on how the Itasca region was formed, but the complexity of the region's landscape makes a precise geologic history of the area elusive. As scientists continue to study the region and learn more about glacial activity in Minnesota, more comprehensive explanations will be possible. The following description of the park's geology is based on the best information currently available.

During the Wisconsin glacial period, Itasca State Park, like most of Minnesota, was covered by glaciers. Each of these glaciers followed the path of least resistance as they advanced and retreated. Moving under the control of gravity and topography, they flowed through depressions in the bedrock. The final glacial advance into the Itasca region (the Wisconsin Glaciation), is the advance that permanently left its mark on Itasca State Park. This glacial period began about 75,000 years ago when the ice sheet slowly flowed south from Canada to cover most of Minnesota. This ice sheet, commonly called the Laurentide Ice had multiple lobes. The last lobe to cover the Itasca region was the Wadena Lobe. It stagnated over the region, creating the Itasca Moraine. It is estimated that formation of the Itasca Moraine occurred between 14,000 and 20,000 years ago, while the glacier was potentially at a standstill over the region for several hundred years.

While the Wadena Lobe covered Itasca, surface melting of the glacier also occurred. This additional glacial activity also helped shape the Itasca region. Meltwater from the glacier's surface seeped through crevasses in the ice and flowed south under the ice cover. These subglacial streams carried large amounts of sediment, and flowed with tremendous velocity. The streams also traveled through ice tunnels and eroded valleys (tunnel valleys) 15 - 60 m deep into the drift (debris left by previous glaciers) below the ice.

Eventually the climate changed, and the glacier's standstill ended. The ice began to thin, the glacier began to retreat, and the water flowing from the ice decreased in volume and velocity over time. Because of this, the streams no longer had the energy to keep all the ice tunnels open, carry all the heavy, coarse material, or erode the substratum. Some of the ice tunnels became occupied by smaller streams that continued to deposit sand and gravel. As ice walls surrounding these tunnels melted away, water in the tunnels eventually disappeared. This left behind sinuous ridge-like mounds of sand and gravel, called eskers, winding down the old tunnel valleys.

At the same time, other tunnels were no longer used by the underground streams. These tunnels filled with ice chunks which were buried by rocks and sediment when the ice tunnel walls and roofs collapsed. When the ice eventually melted (often many hundreds of years later), a series of depressions were left, creating the region's present day lakes and wetlands. Most of the lakes and wetlands in Itasca State Park are believed to have been formed by this process. Certainly, Lake Itasca occupies one of these depressions. The Mississippi River also occupies one of these depressions.

Approximately 12,000 years ago, another glacial lobe came close to Itasca State Park. This lobe did not cover the park, however, its glacial drift left a thin coating over much of what had been deposited by the Wadena Lobe, and its meltwater used some of the old abandoned tunnel valleys, including those of Lake Itasca and Elk Lake (Wright 1993). All of this glacial activity created the diverse and irregular landscape found in Itasca State Park today. This irregular landscape is often referred to as "knob and kettle" topography where the knobs are mounds of debris and the kettles are depressions.

MODERN CLIMATE

Itasca State Park's climate is an important factor in maintaining the park's forest and aquatic ecosystems. The park lies within a broad geographic area in central North America where three dominant air masses interact:

- Arctic air pushing south from Canada into the north central United States, especially during the winter months
- Pacific air that follows the path of zonal flow across the northern United States, and
- Tropical air that flows north from the Gulf of Mexico, especially during the summer months.

Depending on the season, these air masses characterize the climate of northwestern Minnesota. The arctic air mass prevails during the winter months and produces extremely cold temperatures. Heavy snowfalls are common as a result of the interaction of Pacific air masses and moist Gulf air over the area.

The average annual snowfall recorded at the University of Minnesota, Itasca Station for the 1971-2000 time period was 48.2 inches (Midwest Climate Center, 2011). Incursions of arctic air often closely follow heavy snowfalls to produce severe blizzard conditions with deep snow drifts.

Summer conditions are characterized by warm, moist tropical Gulf air mass combines with westerly winds that result in warm to hot days. The average maximum daily temperature recorded at University of Minnesota, Itasca Station during July for the 1971-2000 period was 78.4° Fahrenheit (Midwest Climate Center, 2011). When the summer Gulf air combines with a blast of arctic air, heavy rain showers and thunderstorms can result. The average annual rainfall recorded at University of Minnesota, Itasca Station for the 1971 - 2000 period was 27.04 inches (Midwest Climate Center, 2011).

The result of these seasonal fluctuations is a climate characterized by cold winters and warm summers, with significant precipitation and relatively short growing seasons. Itasca's first frost normally occurs in late September or early October and the park's first frost-free days usually occur in mid-May or early June. At the University of Minnesota, Itasca Station during the 1971 – 2000 period the median period where base temperature exceeded 32° Fahrenheit was 120 days per year, with the shortest being 97 days and the longest 155 days (Midwest Regional Climate Center, 2011).

NATIVE PLANT COMMUNITY CHANGE FACTORS

INTRODUCTION

The establishment of Itasca State Park in 1891 was intended in large part to protect the remnant pine forests that still existed in the Mississippi headwaters area. Large scale clearing of forest throughout the lake states made these remaining virgin pine forests an important legacy to protect, and the "big pines" continue to be an attraction for many of the park's visitors. Most of Itasca's pine stands originated following five "stand replacing" fires in the years 1712, 1772, 1803, 1811, 1820. Regeneration of pine species failed to occur following other catastrophic fires in the 1700's and 1800's.

Shortly following the establishment of the park, a vigorous and very effective campaign of fire suppression began and has continued for the most part to this day (Tester and Kenyon 1994). Similarly, much of the large old white pine within the park boundary has died or was lost to selective logging in or before the early days of the park.

The red and white pines are not being naturally replaced by other pines due to a number of factors (seedling diseases, herbivory, changes to the natural disturbance regime), and most pine dominated stands are being replaced by natural succession to hardwoods. Several researchers have noted that at the current rate of decline without replacement, the park may lose its pine legacy in only decades (Hansen et al. 1974, Kurmis 1985, Zenner and Peck 2009). Although losses of pine have been noted throughout the park's history, few attempts at regeneration have been successful. In order to preserve the park's pine legacy, a well planned and tenacious campaign of reforestation will need to be implemented.

CLIMATE CHANGE

In planning for the management of Itasca's natural resources over the next 50 years, it is essential that current and future climate change effects be considered. Although research and information in the field of climate change and our knowledge of impacts to ecosystems and plant and animal species will change as time goes on and more knowledge becomes available, we need

to consider appropriate adaptation strategies for resource management objectives and actions. Climate change may have an even more profound impact at Itasca, given the park's location of 18 miles from the Eastern Broadleaf Forest province and 25 miles from the Prairie Parkland province.

The temperature in the Central Lakes landscape region where the park is located has increased an average of 2.1 degrees Fahrenheit over the last 100 years. Using an ensemble of 16 climate change models, researchers such as Galatowitsch et al. (2009) predict that the average temperature in the region of Minnesota that includes Itasca State Park will increase by approximately 7.0 degrees Fahrenheit during the 100 year period from 1970 to 2070. Annual precipitation over the same time period is anticipated to be similar to present, but expected to increase in winter and decrease in summer. Increased rates of evapotranspiration are anticipated to outstrip modest increases in precipitation, resulting in drier landscapes. It is predicted that the climate in the Itasca State Park region in 2060 will resemble that found today in northwestern Iowa. Researchers suggest that the most significant climate impacts in Minnesota will be:

- Increased large-scale tree mortality
- Loss of boreal forests
- Expansion of weedy grassland species
- Influx of non-native submersed aquatics
- Lower water tables in peatlands
- Increased number and intensity of peat fires

With significant changes in climate expected in the region, successful management of natural resources at Itasca State Park will require adaptive management planning be employed in a manner that enables resilience of natural systems. Galatowitsch points out that considering resistance, resilience, and facilitation actions is an important first step for effective climate change planning.

DISTURBANCE BY WIND AND FIRE

Disturbance by wind and fire has occurred in northwest Minnesota and the forests of Itasca for thousands of years. A review of the research of forest regeneration and succession, disturbance, and the impact of climate change on the pine forests of Itasca was compiled for DNR Parks in 1994 by Tester and Kenyon. Depending on climate conditions, fire frequency intervals across the northwestern Minnesota landscape were found to range from 8.6-10 years (warm/dry period) to 13-43 years (cool/moist period). Heinselman 1973, determined that in general, over the pre-settlement forests of Itasca, moderate intensity surface fires occurred at 20-40 year intervals, and stand replacing fires occurred at 150-300 year intervals.

The DNR Field Guide to the Native Plant Communities of Minnesota, 2003, compiled disturbance frequencies from an analysis of Public Land Survey records and other sources for many of the natural community systems. A table of the disturbance intervals of natural plant communities found in Itasca is shown below.

DISTURBANCE INTERVALS FOR THE NATURAL SYSTEMS FOUND IN ITASCA STATE PARK

NPC Name	Sum Acres	Catastrophic Fire/ Wind Disturbance Interval (Years)	Light Surface Fire/Moderate Windthrow Interval (Years)
Natural Community System			
Acid Peatland System	158.0	570	90
Beaver disturbed/Beaver wetland complex	394	na	na
Fire-dependent Forest	8652	110-220	30-77
Forested Rich Peatland	587	360-600	na
Mesic Hardwood Forest System	12,239	400-1,000	40-300
Marsh System	770	na	na
Open Rich Peatland System	222	na	na
River Shore System	10	na	na
Wet Forest System	1,273	370-1,000	110-370
Wet Meadow/Carr System	2,883	na	na
Open Water/Lakes	3,681	na	na

Seeding and growth strategies after disturbance are important in conifers as they cannot re-sprout from roots as do hardwoods. Red and white pines develop fire resistance as they age and produce thicker bark. Fire resistance is dependent on factors such as timing and intensity of the fire and pre-fire conditions such as fuel buildup and fuel moisture in the stand. Red pine does not have a reliably fire resistant bark until about the age of 50 years and the trees are about 60-70 feet tall. Fire resistance in young white pine is low and fire can eliminate stands of white pine saplings and seedlings. Fire resistance is moderate in older white pine where the bark is thicker. Red pine is favored by fire cycles of 100-150 years and white pine is most abundant with a period of 150-300 years between catastrophic fires.

Fire was important in past jack pine regeneration because the serotinous pine cones require heat, either from fire or intense sunlight, to open and disperse their seeds. However, good regeneration does not necessarily follow fire, unless other conditions for germination and seedling survival (moisture, lack of herbivory) are favorable.

For red pine, besides disturbance by fire, several factors are critical for successful natural regeneration, including adequate seed production and dispersal, appropriate seedbed conditions, competitive edge over other vegetation, and adequate moisture. In north-central Minnesota, a combination of adequate conditions for red pine to naturally regenerate may occur only about once in 75-100 years (Rudolf 1990). Many of the historic fires in Itasca as well as recent prescribed burns did not result in red pine regeneration.

White pine establishment results from some type of disturbance that opens the overhead canopy such as fire or windfall in areas that have seed sources. Fire is not essential for seedbed preparation or white pine regeneration, at least in some habitat conditions. White pine seedlings can germinate and survive on both disturbed and undisturbed litter layers.

Since 1995, prescribed burning has been conducted in Itasca. The following table shows the prescribed burn history.

ITASCA STATE PARK PRESCRIBED BURN HISTORY 1995-2011

Date	Unit	Acres		Date	Unit	Acres
1995	Preachers Grove	20		2001	East Twin Lakes	1200
	Schoolcraft Island	2				
	*Krysel Burn	2		2002	Green Lake	1900
	Hernando deSoto Islands (3 of 4)	20			Bear Paw South	65
1996	Mershman/Thompson	200		2008	Tree Nursery	7
	Krysel Burn	2				
	Preacher's Grove	2				
1997	**East Twin Lakes	600/1220				
	Preachers Grove	30				
	Park Headquarters	2				
1998	***Landmark	3500				
	Schoolcraft Island	2				
	DeSoto Islands 1/4	5				
1999	****Green Lake	1900				
	East Twin Lakes	1200				
	^Mary Lake Knob	22				
	^^Bear Paw S	65				
2000	Landmark	3500				
	Preachers Grove	80				
	Schoolcraft Island	2				

*across from Aiton Heights Fire Tower; incorporated into Green Lake site in 1999
** interior from east and south entrance roads; E Twin Lake Site
***Inside Wilderness Drive west of Lake Itasca
****Green Lake=between the arms of Lake Itasca
^NW edge of the East Twin Lake Site
^^Bear Paw South = south side of Bear Paw Campground entrance road

Figure 10 – Source: MN DNR (2012)

Wind Event

From July 9-14, 1995, a tornado and several wind storms caused extensive forest blow down across northern Minnesota including a western blow down unit of 165,000 acres between Detroit Lakes and Bemidji and an eastern blow down unit near Grand Rapids covering 113,000 acres. The western blow down unit included approximately 3,000 acres of forest in Itasca State Park. The level of disturbance in the park was spotty, with the northwestern corner of the park sheared off and other scattered areas in the park with pockets of wind damaged trees. To reduce fuel buildup in high use areas, some of the damaged trees were removed in a salvage operation. A total of 101,000 board feet of pine saw logs, 46 cords of aspen and jack pine, and 10 cords of firewood were removed from the park.

INVASIVE, NONNATIVE SPECIES

Itasca State Park is fortunate to have relatively low levels of noxious invasive plant species compared to other areas in north-central and northwest Minnesota. However, because Lake Itasca is the headwaters of the Mississippi River, the introduction of harmful Aquatic Invasive Species (AIS) in Itasca State Park is of national concern. Invasive, nonnative species introduced to the park could spread downstream throughout the state, as well as the Mississippi River watershed that drains much of the nation. For this reason, prevention of new introductions and management of existing invasive, nonnative species are important resource management activities within the park.

Although terrestrial nonnative species are not yet a major threat in Itasca State Park, some do currently exist in the park. The size of individual species populations and the extent to which individual species pose future threats to the park's natural systems varies by species.

Plant species such as common tansy (Tanacetum vulgare) and Canada thistle (Cirsium arvense) have relatively large populations within the park. Spotted knapweed (Centaurea maculosa) posed a significant threat in the drier, sandy soils of Itasca until recently, when park staff began an aggressive and highly effective control program.

Other plant species, such as bull thistle (Cirsium vulgare), yellow sweetclover (Melilotus officinalis), are present in the park but appear not to be spreading much beyond their existing locations. Still other plant species, such as exotic honeysuckle (Lonicera spp), Siberian pea-shrub (Caragana arborescens), leafy spurge (Euphorbia esula) have populations that have remained small and localized in recent decades.

Several highly invasive, nonnative plant species that are not yet present in the park, have been found in areas near the park. Many of these species have been found to be invasive to other forested ecosystems in Minnesota and nearby states. Among these are European buckthorn (Rhamnus cathartica), glossy buckthorn (Rhamnus frangula), and garlic mustard (Alliaria petiolata). Populations of wild parsnip (Pastinaca sativa), orange hawkweed (Hieracium aurantiacum) and Queen Ann's lace (Daucus carota) are located within 30 miles of the park and should be considered a threat to open areas of the park.

Aquatic invasive species have not been observed within Itasca State Park. However, an assortment of aquatic invasive species that are currently not present in the park are known to have the ability to establish and prosper in settings similar to the park's lakes and wetlands. Purple loosestrife (Lythrum salicaria), is in nearby lakes and could establish in the park's wetlands or shorelines. Other invasive, nonnative aquatic plant and animal species, such as ruffe

(Gymnocephalus cernuus), round goby (Neogobius melanostomus), Eurasian watermilfoil (Myriophyllum spicatum), spiny water flea (Bythotrephes cederstroemi), and zebra mussels (Dreissena polymorpha) could be transported to the park on trailered boats and equipment, bait containers, or other vectors.

Itasca State Park is known to have several terrestrial nonnative, invasive animal species such as night crawlers (Lumbricus terrestris) and other worm species. Such worms degrade herbaceous plant communities, especially in the hardwoods. No complete assessment has been made at Itasca to measure the impacts these non-native worm populations have on native plant communities. Currently, there are no known widespread control methods for non-native earthworms.

Invasive species prevention and management within the park focuses on locating occurrences of these species, preventing their spread and disseminating information to park visitors regarding invasive species to help prevent introduction of new species. Invasive species and "Stop Aquatic Hitchhiker" signs are posted at all park boat access points, brochures are distributed to visitors at the park's contact stations, park staff discuss invasive species prevention and management with visitors when opportunities arise, and visitors are encouraged to report questionable species to park personnel for identification. In addition, the concessionaire who operates the park's boat and canoe rental provides information regarding invasive species to their customers on a regular basis.

Itasca State Park invasive, nonnative species

Species	Acres infested	Comment
Amur maple	< 1	A few plants at Mary Gibbs V.C.
Birdsfoot trefoil	Extent unknown	Along roadsides and in use areas
Common tansy	> 70	Infestations diminishing with treatment, but occasional scattered individuals extensive along roadsides and trails
Leafy spurge	< 1	Less than 10 known plants in 2011
Orange hawkweed	< 3	Scattered small populations
Oxeye daisy	< 5	2 – 3 small populations with some scattered individuals on roadsides
Reed canary grass	Extent unknown	In disturbed wet areas throughout park
Siberian peashrub	10 – 15	Confined to 3 locations
Spotted knapweed	> 60	Infestations diminishing with treatment, but occasional scattered individuals extensive along roadsides and in use areas
Tartarian honeysuckle	3 – 5 acres	Some scattered pockets near old homestead sites
Thistles (Canada, bull)	Extent unknown	Common along roadsides, some pockets in wet or disturbed areas
Yellow and white sweetclover	Extent unknown	Along roadsides and in use areas

LOGGING HISTORY OF ITASCA

The prime white pine forests of Minnesota were logged by the end of the 19th century. As the major pinelands were depleted, lumber companies sought out the marginal and scattered stands of red and white pine in north central Minnesota, including Itasca. Factors including glaciation,

climate, and disturbance produced the scattered mosaic of pine stands on the Itasca forest landscape. Following the general land survey of Itasca in 1879, timber cruisers began locating the best stands of pine for land purchases. As pine stands were scattered throughout aspen, birch and hardwoods, land purchased for timber value was non-contiguous (Aaseng, 1976). The establishment of the park in 1891 prevented further acquisitions within the original park boundaries.

In a study of tax records, deeds, logging company records and other sources of information, Aaseng, 1976, described and quantified the extent of logging in the current park acreage from the major logging era of 1901-1919. From this information, it was possible to determine specifically which of the park's 763 lots and forties had been logged.

In the 18 years of the logging era, the overwhelming majority of timber cut (85-100% annually) was red and white pine, with small amounts of spruce, balsam, cedar, tamarack and jack pine. The ratio in board feet of red to white pine cut was 3 to 1, from one company's records from 1910-1919. Eight lumber companies logged (all merchantable timber removed) or partially logged 44% or 13,109 acres of what is now park land. It is of interest that some timber was logged in salvage operations of pine that had been killed by fires that occurred in 1894, 1899, and 1905 and possibly following additional fires in 1911, 1913, and 1917.

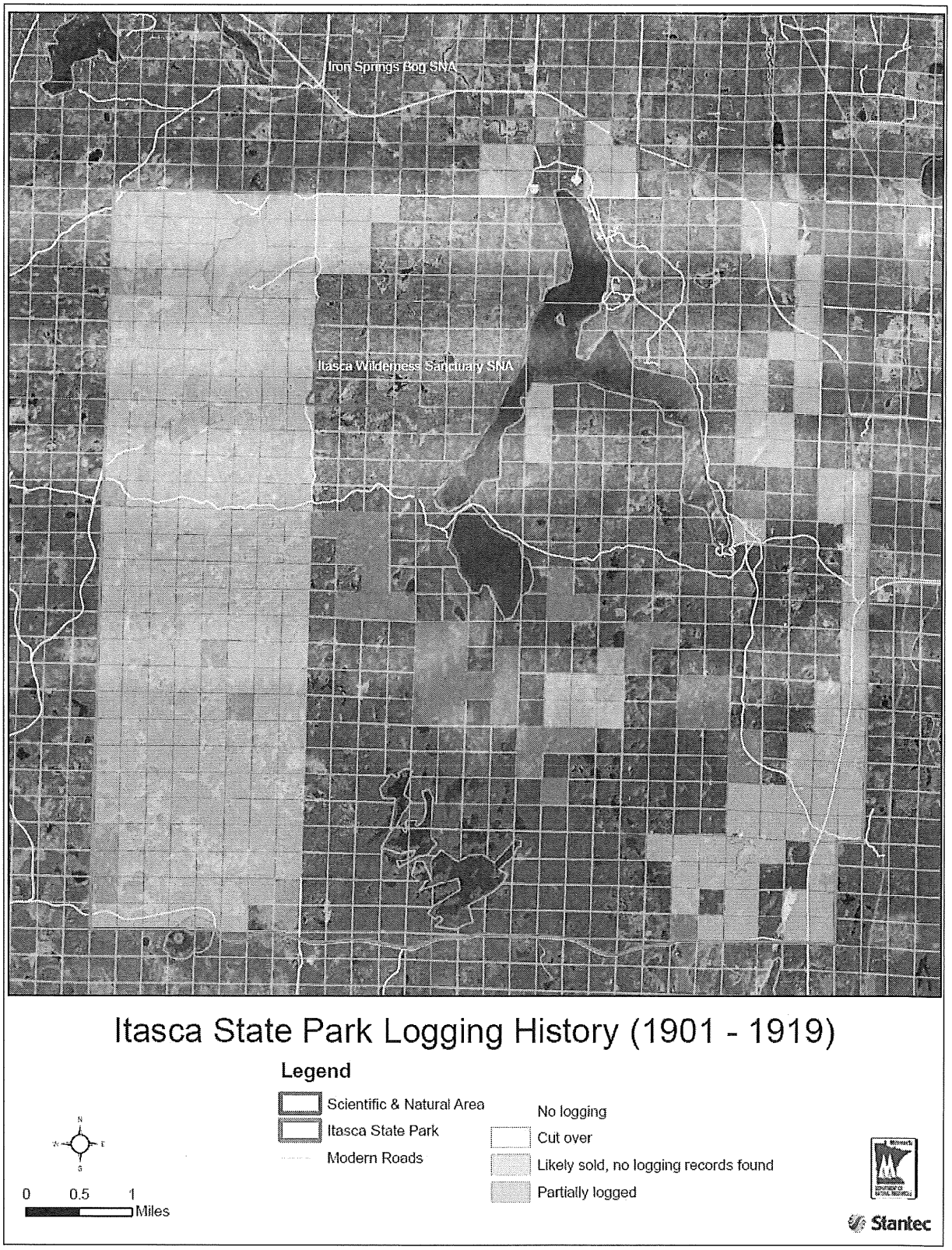

Iron Springs Bog SNA
Itasca Wilderness Sanctuary SNA
Itasca State Park Logging History (1901 - 1919)
Legend
Scientific & Natural Area
Itasca State Park
Modern Roads
No logging
Cut over
Likely sold, no logging records found
Partially logged
0 0.5 1
Miles
Stantec

Figure 11

FOREST INSECTS AND DISEASES

Several forest insects and diseases have particular influence on forest management practices. Several invasive, nonnative pests are likely to impact the forests in the Park as they are introduced and spread into Minnesota.

PINE MORTALITY DUE TO PINE BARK BEETLES (Ips spp.)

Under some conditions, epidemic populations of bark beetles can overwhelm defenses of live trees and produce extensive mortality. The risk of tree mortality from bark beetles is exacerbated during prolonged drought and populations of bark beetles can also dramatically increase when numbers of pine are downed by wind. In addition there is a positive feedback between fire, bark beetles, and tree mortality. Scorching of the outer bark that accompanies ground fires likely produces physiological trauma to the inner bark that compromises the ability of trees to exude resin from wounds and defend themselves from bark beetle attacks. Bark beetles have evolved the ability to detect fire volatiles, fly to trees that have sustained fire damage and preferentially attack scorched areas. The beetles have a limited window of opportunity to successfully colonize fire-damaged trees because red pines increase their resin flow within 30 days after the fire (Ruel et al. 1998).

Due to the implications of mature red pine forest blow-downs in the late 1990s, significant effort has also been made to better understand the dynamics of pine bark beetle species on pines within the park. Research has indicated that old growth trees are not more susceptible to pine bark beetle infestations than are younger trees (in part based on resin flow monitoring), and that even the oldest red pines at Itasca show continuing growth and high defense mechanisms (resin flow) against insect, disease and drought effects. In the absence of mortality from disturbances such as prolonged drought, windstorms, bark beetles, fires, or lightning strikes, it seems realistic to expect many mature red pines in Itasca could live for another century or more, although there is a predicted 50% loss of red pine at ISP in 139 years (at late 1990s pine pathogen levels, with no regeneration of pine) (Ruel et al. 1998). Studies show a relationship between fire, bark beetles, and tree mortality as a positive feedback loop in which increased fire frequency promotes beetle attacks, which increases tree mortality.

Management recommendations (Ruel et al. 1998) to minimize tree mortality associated with prescribed fires include:

- Limit fire intensity to minimize the number of new scars that are initiated with each fire.
- Limit fire intensity in areas with scarred trees.
- Increase duration between fires as much as possible especially in areas with scarred trees.
- Limit intensity and frequency of fires in stands where pine trees have low resin flow.

PINE BLIGHT AND MORTALITY DUE TO (Diplodia pinea)

The Diplodia (Diplodia pinea) fungus is an invasive species not native to Minnesota. The fungus infects red and jack pines and produces spores on red pine needles, twigs and cones. This disease causes tip blight, especially in stressed trees. In young red and jack pines it causes blight and mortality. This disease is having a huge effect on red pine nursery seedlings and the success of red pine seedling recruitment under mature red pine. A study of Diplodia at Itasca State Park in 2004 determined that its spores are present in the over-story red pine trees and is likely precluding the natural regeneration of red pine in the Park. Forest health specialists have recommended that red pine seedlings have a greater chance of survival if planted or regenerated

200 feet or more from over-story red pines. Growing red or jack pine seedlings in the understory of mature red pine trees has a very small chance of success due to this disease. White pine seedlings are much less susceptible to Diplodia blight and mortality and, as such, are good candidates for natural regeneration under any mature red pines in the Park.

WHITE PINE BLISTER RUST (Cronartium ribicola)

White pine blister rust (Cronartium ribicola) is a non-native fungus first detected in Minnesota in 1916 and is found in white pine throughout the state. The fungus requires white pine and an alternate host, species of *Ribes* to complete its life cycle. Injury to infected trees includes dead branches, stem cankers, and mortality. Levels of infection can vary greatly between sites due to micro-site climate differences, age of trees, presence and abundance of Ribes, topography, and forest stand structure.

Itasca State Park is within the Pine Moraines and Outwash Plains ecological subsection which is in the High Risk Zone for white pine blister rust and the probability of blister rust injury and/or mortality is great in this zone. Establishing white pine as an under-story tree, rather than in open sites will help mitigate the impacts from blister rust (Stand Damage and Mortality Assessment, DNR Report 2009).

INVASIVE, NONNATIVE INSECTS AND DISEASES

It is also probable that other invasive, nonnative species and diseases will eventually threaten native species. Among these are the emerald ash borer (Agrilus planipennis), gypsy moth (Lymantria dispar), Asian long-horned woodborer (Anoplophora glabripennis), and Annosum root disease (Heterobasidion annosum).

Herbivory at Itasca

It is well understood and thoroughly documented that herbivores have a significant impact on not only pine regeneration, but also on a variety of plant species and communities in forest ecosystems (Rawinski 2008). Herbivory has been a well known challenge to pine regeneration at Itasca over the last hundred years. Rodents and deer both do considerable damage to green pine seedlings particularly in the winter when the available browse is limited primarily to hardwood buds and other shoots. Although quantification of seedling browse has been limited, evidence that deer have a deleterious effect on pine regeneration is apparent at several deer exclosure sites in the park.

The Mary Lake exclosure is the typical example given where it is obvious that pines have readily regenerated in the old exclosure where deer were excluded and in the adjacent forest there has been no regeneration. Deer also have impacts on hardwoods and herbaceous species. Past park managers have noted that orchids seem particularly palatable to deer. Tester and Kenyon (1994) do a thorough review of the history of deer herbivory and deer management at Itasca. Deer hunting has been used as a management tool to control deer since the 1940's.

Although hunting has been somewhat effective at controlling deer populations in the park, reducing the population to a level that will alleviate the herbivory to for a long enough period that pines can successfully establish without costly tree protection measures has not been attained. Several methods are currently being used to protect young pine trees from deer browse including: bud-capping, deer repellents, fenced exclosures, and individual tree cages.

INVENTORY NEEDS

Cultural Resources

CULTURAL RESOURCES

Because of its national cultural and historical significance, all of Itasca State Park was designated as a National Register Historic District and placed on the National Register of Historic Places in 1973. The entire park as it was in 1973 is also listed on Minnesota's State Register of Historic Places (Radford and George, 1991). As such, the entire park is managed as a significant cultural resource. Itasca State Park is a significant cultural resource for both Minnesota and the nation. Presence of the Headwaters of the Mississippi River within the park makes the park a national cultural and historic treasure.

Itasca State Park is also the oldest state park in Minnesota and one of the oldest state parks in the nation. Archaeological survey work has documented human activity in the park as old as 8,000 years. Human activity in the park spans historical periods from the Early Eastern Archaic (8000 Before Present), through the Archaic 8000 - 2500 Before Present) and Woodland (2500 – 250 Before Present) periods to the present and includes American Indians, European explorers, Euroamerican settlers, loggers, early park development workers (1891 - 1932), Works Progress Administration/ Civilian Conservation Corps (WPA/CCC) workers and present day visitors.

Most of the park's documented archaeological sites relate to the early periods of American Indian activity. Work camps and numerous park buildings were constructed in the 1930s - 1940s by the WPA/ CCC. Many of the WPA/ CCC structures still exist as functioning buildings within the park. Most of the known sites are also located near the park's four major lakes, park facilities, or visitor use areas. Most of the archaeological survey work that has been completed in the park has been related to a facility development project. Additional sites are likely to exist in the large areas of the park that have not been surveyed.

ARCHAEOLOGICAL & CEMETERY SITES

There are over 30 known archaeological and cemetery sites within Itasca State Park. Archaeological study of the park was begun in the late 1800s by Jacob Brower before the park was actually established and has continued into the present (Radford and George, 1991). The amount of archaeological exploration and documentation available for these sites varies depending upon the specific site. Brief descriptions of some of the park's most significant archaeological sites follow. More complete records, field notes, and documentation for these sites are available through the Minnesota Historical Society or Minnesota State Park staff.

TRADITIONAL USE AREAS

Other cultural landscapes within the park include traditional use areas – those areas that have been historically used by one or more groups of people for some type of activity, very often related to vegetation of the area. Examples of traditional use areas include wild rice beds, berry gathering areas, and locations where plant materials were gathered for craftwork or medicinal purposes. Good documentation of the traditional use areas within the park is lacking.

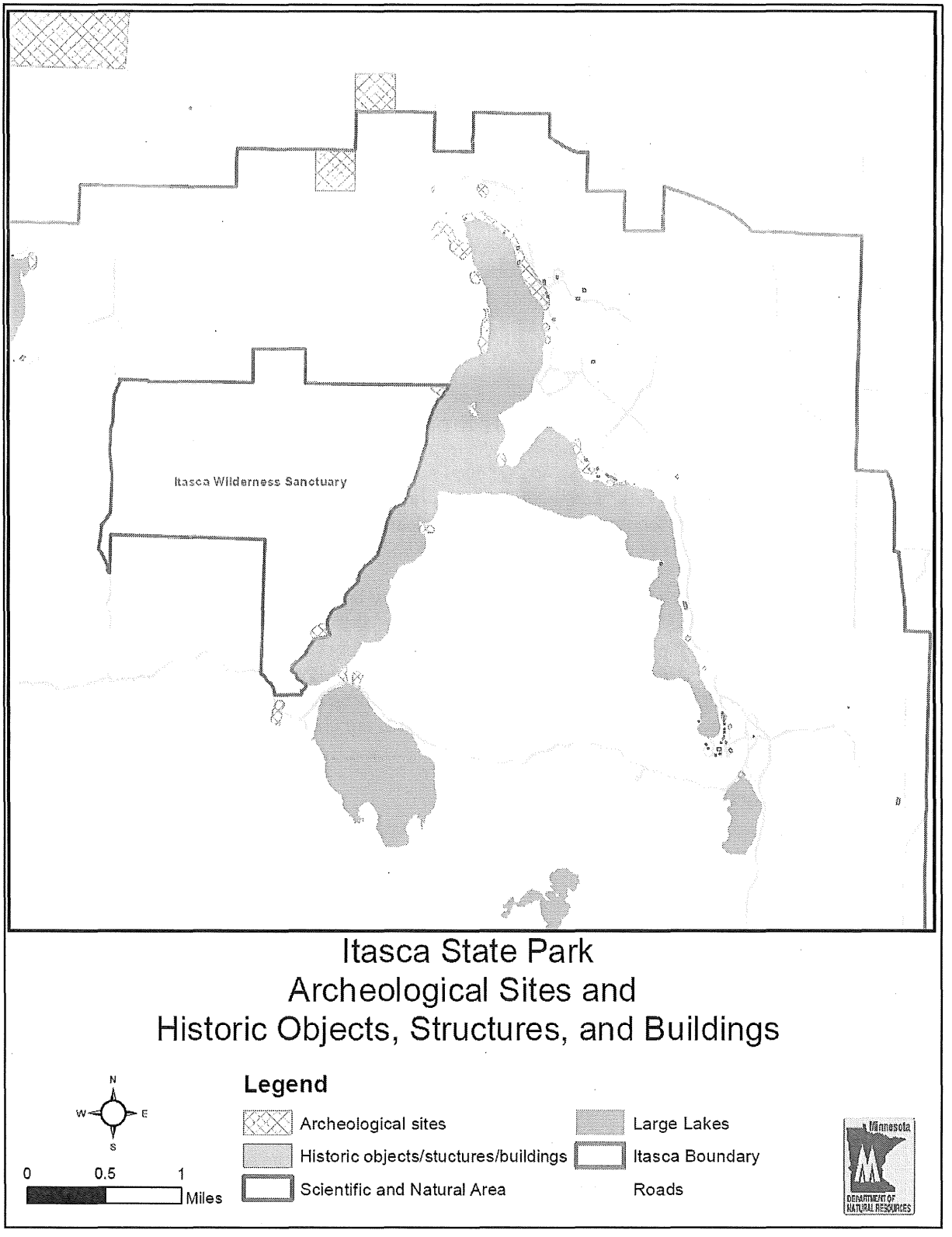


Figure 12 Source: MN DNR (2012)

NATIONAL REGISTER HISTORIC FEATURES & OTHER HISTORIC STRUCTURES

The Itasca State Park CCC/WPA/Rustic Style historic resources include 45 contributing buildings, 16 contributing structures, 11 contributing objects, and one contributing site.

These resources are located within Itasca State Park, which encompasses Lake Itasca, the official source of the Mississippi River, and a scenic area of northern Minnesota that has remained relatively unchanged from its natural state. The park includes 157 lakes covering over 3,000 acres, as well as 27,500 acres of upland and 1,500 acres of swamp. Most of the area has a heavy growth of timber that includes stands of virgin red or Norway pine, some of which are over 200 years old.

The development of recreational facilities in the park began in 1905 with the construction of Douglas Lodge, the first Rustic Style building in the state park system. Subsequent construction over the next 20 years added 12 more Rustic Style buildings to the park.

With the Rustic Style already firmly established, the federal work programs of the 1930s continued the tradition when they began large-scale recreational development in the park. Development was undertaken by two CCC camps as well as two WPA transient camps. Architects for this later development were from the Minnesota Central Design Office of the National Park Service with Edward W. Barber and V.C. Martin serving as principal architects for the park buildings. Log construction was generally used because timber was easily available in the area.

The park's historic resources include:

East Entrance
Entrance Portals
Entrance Pylon

Douglas Lodge Area
East Contact Station
Drinking Fountains
Douglas Lodge
Cellar
Stairway
Nicollet Court
Dormitory
Clubhouse
Cabin 11
Old Timer's Cabin
Forest Inn
Latrine
Stone Curb
Multiple Cabin
Cabins 5, 6, 7, 8, 9, 10 and 12
Pump House

Preacher's Grove
Retaining Wall

Turnbull Point Trail Shelter
Trail Shelter

Civilian Conservation Corps SP-19 Camp Site
Pump House
Fechner Plaque

Incinerator

Park Headquarters
Old Park Headquarters
Water Tower
Headquarters Building
Stone Curb
Superintendent's Residence and Garage
Power House
Warehouse
Water Tower

Mississippi Headwaters
Drinking Fountains
Bath House and Shelter
Stone Steps
Museum
Foot Bridge
Pageant Grounds Latrine
Water Tower
Concession Building

Mississippi Headwaters Dam

Bear Paw Campground
Campground Registration Building
Stone Curb
Pump House
Cabins #s 1-6
Pump House
Stone Steps
Comfort Station
Drinking Fountains
Combination Building
Ice & Wood House

Lake Ozawindib Cabin

Lake Ozawindib Transient Camp
Foreman's Quarters
Pump House
Footing and Foundations

Elk Lake Transient Camp
Mess Hall/Shelter
Staff Quarters

HISTORICAL SIGNIFICANCE

Itasca State Park Rustic Style historic resources are historically significant for their association with the development of recreational facilities in the oldest permanent state park in Minnesota. Itasca was also one of the first state parks in the United States. Created by an act of the Minnesota Legislature in 1891, the park was established to preserve the historic Headwaters of the Mississippi and to "maintain intact, forever, a limited quantity of the domain of this commonwealth, seven miles long and five in width, in a state of nature." This was the first action by the state to provide recreational areas, protect natural and geologic features of the Itasca Basin, and preserve some of the largest stands of virgin Norway and White pine in the United States.

ARCHITECTURAL SIGNIFICANCE

Itasca State Park Rustic Style historic resources are architecturally significant as the largest collection of log-constructed buildings in the state park system. Constructed over a 37-year period from 1905 through 1942, these Rustic Style buildings include many of the finest log structures in the state.

The park contains the first examples of Rustic Style state park design and the largest concentration of Rustic Style buildings that predate the Depression Era. These structures represent a remarkably diverse and well developed collection of buildings featuring irreplaceable labor-intensive construction and finely crafted detailing.

The Landscape Architecture for Itasca State Park is significant as one of the most comprehensive park designs from the period which successfully incorporated new expansion and construction with the existing Rustic Style buildings of the park.

PARK HISTORY

Evidence of people in Itasca dates back 8,000 years. They lived in permanent settlements and hunted, trapped, harvested wild rice and buried their dead in mounds located adjacent to the Headwaters.

The story of the European discovery of the headwaters began more than 300 years before the park was established. Spanish and French explorers traveled the Mississippi River looking for the river's head and at least six claimed the honor of discovering it. It remained for an American, Henry Rowe Schoolcraft, to claim discovery of the true source of the country's greatest river.

Schoolcraft first visited the upper river in 1820 as a member of an exploring party headed by Gov. Lewis Cass of Michigan. Cass was satisfied that he had found the source of the Mississippi in Cass Lake, but Schoolcraft did not agree. He believed that it lay farther to the southwest, and he privately resolved to return some day to find it. His opportunity came 12 years later when he joined an expedition in June 1832. Guided by Ojibwe leader Ozawindib, Schoolcraft reached Lake Itasca one month later and raised the American flag on the island which today bears his name. Schoolcraft coined the term Itasca from the Latin phrase *veritas caput*, or "truth head."

By the late 1800s, Minnesota's logging era was at its peak and many companies moved north in search of prime timber. The Headwaters were threatened with deforestation when Jacob Brower, a land surveyor and historian, began his heroic battle to establish the park. Brower became Itasca's first superintendent and devoted the last 14 years of his life to acquiring land for the park and enhancing its beauty until his death in 1905.

1905 also marked the year of the construction of Douglas Lodge, a pivotal development in the park's history. The Lodge is significant as the oldest building in the state park system and the first example of Rustic Style design. The building is also significant for is association with the first major development of recreational facilities in a state park.

During the next 20 years more Rustic Style buildings were constructed. The buildings range from the Clubhouse, one of the most unusual rustic buildings in the state, to the finely crafted Old Park Headquarters.

CCC Camp SP-1 was the first state park CCC camp approved in Minnesota and was assigned to Itasca State Park. The camp occupied a site just north of the park beginning on June 27, 1933. One of the camp's more notable projects was the construction of the Old Timer's Cabin built in the summer of 1934. The cabin was the first CCC-constructed building in the park and it represents a spectacular example of Rustic Style log construction with walls only four logs high.

Transient relief camps located at Lake Ozawindib and Elk Lake were also involved in the expansion of the park. Workers from these camps improved trails, built bridges and worked on reforestation and landscaping.

CCC camp SP-1 closed in 1937 and was replaced by CCC camp SP-19. One of the projects the CCC workers constructed, the Forest Inn, is one of the largest buildings in the state park system. CCC camp SP-19 closed on July 15, 1942, the last Civilian Conservation Corps state park camp in the United States.

ITASCA STATE PARK - NATIONAL NATURAL LANDMARK

Itasca State Park is listed as National Natural Landmark (NNL) which is defined as a nationally significant natural area that has been designated by the Secretary of the Interior. To be nationally significant, a site must be one of the best examples of a type of biotic community or geologic feature in its physiographic province. Such examples include terrestrial and aquatic ecosystems; geologic features, exposures, and landforms that record active geologic processes or portions of earth history; and fossil evidence of biological evolution.

It is a goal of the program to identify, recognize, and encourage the protection of sites containing the best remaining examples of ecological and geological components of the nation's landscape. Landmarks are designated on both public and private land, with the program designed to have

the concurrence of the owner or administrator. To date, 587 sites have been designated as National Natural Landmarks.

The park is also rich with cultural history, including:

- The Headwaters of the Mississippi River, at the outlet of Lake Itasca.
- The search for the Headwaters of the Mississippi began with the discovery of the river's mouth and basin in the mid - 1600s by French explorers and was not concluded until Jacob Brower's surveys (late 1800s). During this time period, several attempts were made to identify and document the source of the river. The search involved controversy as well as adventure that are chronicled through the park's many interpretive programs, displays, and exhibits.
- Nearly all of the park is listed on the National Register of Historic Places and several sites within the park that are designated as National Historic Areas or State Historic Places.
- The Itasca Bison Kill Site is one of Minnesota's oldest known archaeological sites, contains evidence of human activity in the area from approximately 8,000 years ago.
- Woodland Indian and pioneer burial sites along Lake Itasca's east shoreline offer evidence of the area's early human activity.
- Douglas Lodge an early 20th century resort complex is listed on the National Register of Historic Places, offers visitors lodging, dining, and gift shop facilities on the south shore of Lake Itasca.
- Works Progress Administration (WPA) and Civilian Conservation Corps (CCC) era buildings are found throughout the park representing some of the most complete WPA and CCC sites remaining in Minnesota.

Goals, Objectives, Strategies & Implementation

This section includes long-term goals, 50 year objectives, and 10 year strategies and implementation for Itasca State Park's plant communities (including native and non-native communities, rare species, and invasive species), wildlife, fisheries, water resources, and cultural resources. This report is intended to be a living document, with an approximate 10-year life span. This approach recognizes the need to update the plan as conditions change over time. Factors such as climate change and work accomplished will influence future goals, objectives, and strategies. A timeline for implementation is included as an appendix to this report.

Meeting the goals and objectives outlined in this section will require taking an Adaptive Management approach that integrates a variety of tools and techniques for information gathering and on-the-ground implementation. These activities should be integrated and based on the best current science and restoration methods. Forest management may include harvest, mechanical and chemical release, site preparation, browse protection, plantings and direct seeding, prescribed burning and soil scarification. Forest management practices will work toward retaining and enhancing natural characteristics of the plant communities.

Division operational orders, policies, guidelines and procedures regarding protection of natural and cultural resources such Operational Orders 113, 47 and 59, Wetland Conservation Act, PAT natural and cultural resource assessments, as well as other required regulations and operational procedures are considered part of our regular work and therefore are not listed in the objectives below.

NATIVE PLANT COMMUNITIES & PLANT SPECIES

FORESTS

Overarching goals of forest management at ISP is to, at a minimum, follow the MNDNR Old Growth Policy Amendment #6 to preserve all designated old-growth forest, as well as conduct ongoing invasive, nonnative species inventory and on-the-ground management.

UPLAND FORESTS GOAL

Upland forests consist of both mesic hardwood and fire dependent ecological system groups at ISP (see NPC cover type summary table on p. 6 of this report).

- Restore Native Plant Communities to increase pine component where it is sparse or lacking entirely, including stands where pine was logged and those where pine was/is being lost through passage of time.

OPEN & FORESTED WETLAND GOAL

- Perpetuate existing peatlands, marshes, river shores, wet forests, and wet meadows/carrs.
- Maintain back country beaver wetland complexes and minimize conflicts with human infrastructure.
- Evaluate beaver disturbed areas for potential management and/or restoration; or NPC maintenance needs.

50 YEAR OBJECTIVES

- Rehabilitate NPCs of fair or poor condition to good or excellent ecological integrity. This includes plantation forests.
- Focus on MS 86A.05 direction to restore/preserve pre-settlement conditions.
- Control, manage & prevent the spread of invasive species.
- Restoration of non-native areas of the park such as old fields
- Preserve and manage old-growth forest stands, Old Forest Management Complexes (OFMC), and manage adjacent forests to protect and enhance old-growth complexes.
- Monitor the impacts of climate change - ISP is well located on transition zones and thus may have resilience for climate change.
- Preserve populations of Endangered, Threatened, Special Concern and other rare or vulnerable plant species which persist or become established as climate change occurs, are maintained or increased.

10 YEAR STRATEGIES/IMPLEMENTATION

1. Initiate 500 acres of pine forest restoration (new seedlings) in areas with obvious restoration/reconstruction needs, such as: areas of blow down, non-native areas, beaver halos, and declining aspen in areas where NPC pine dominated communities existed.
2. Assess & evaluate ecological integrity of NPC's and update PAT land cover data set on 1,000 acres/yr, using remote sensing techniques and ground surveys to update existing information on NPC quality and forest stand structural status.
3. Within the life of this URMP, all plantations (@ 384 acres) will be managed for characteristics of a natural origin stand.
4. By 2020, identify and restore an additional 80 acres of jack pine-dominated woodlands in the appropriate NPC. Current inventory lists only 40 acres of jack pine dominated NPCs; historical documents indicate that much more once existed at ISP.
5. As current science and on-the-ground conditions inform, integrate prescribed fire with other tools to mimic natural disturbances. Prescribed burning may be used to reintroduce the natural disturbance regime when this tool can be used to effectively meet forest restoration and maintenance goals. A 10 year goal of prescribed burning treatment (low to moderate intensity) on up to 2,600 acres spread between FD and MH communities will approximate historic fire disturbance intervals. 6,715 acres have been burned in the last 17 years.
6. ISP contains 1,036 acres of WFn55 and only 106 acres of WFn64. These two black ash-dominated communities will be at risk of complete loss in the event of an emerald ash borer (EAB) infestation. By 2013 site evaluate the quality and complete an inventory of trees in all WFn64 communities, and the largest WFn55 communities.
7. At a minimum, follow the MN DNR Old Growth Policy Amendment #6 (Appendix C) to preserve all designated old-growth forest.
8. Forest management may include harvest; mechanical and chemical release and site preparation browse protection, plantings, and soil scarification. Forest management practices will work toward retaining and enhancing natural characteristics of the plant communities.
9. Invasive species management will be conducted annually as outlined in the plan. Evaluate acres treated, annually.

10. Within the statutory boundary of Itasca State Park lies the 1,601 acre Itasca Wilderness Sanctuary Scientific and Natural Area. The site is primarily managed for its Old Growth forest characteristics, and future management decisions will likely focus on promoting natural processes including regeneration that maintains old growth, removal of exotics and minimizing edge effects.

WILDLIFE & FISHERIES

WILDLIFE BIODIVERSITY GOAL

ISP will maintain or enhance its native wildlife biodiversity.

50-YEAR OBJECTIVES

- Preserve and perpetuate the 6 species of endangered and special concern wildlife known to occur in the park and any other rare wildlife species that are discovered in the future.
- Preserve and perpetuate the wildlife species designated as Species of Greatest Conservation Need (SGCN) with focus on managing key habitats for SGCNs, including 66 species of birds, one mammal, two species of reptile, (incorporate BCM focus species).
- Evaluate terrestrial gastropod populations and potential management strategies/tools.
- Manage white-tailed deer populations so negative impacts to native vegetation and tree regeneration are minimized and kept at an acceptable level.
- Maintain conditions that perpetuate mature forest obligate wildlife species.
- ISP will manage wildlife populations for ecological sustainability create and implement management strategies to maintain ecosystem sustainability.
- Maintain an appropriate suite of native wildlife species considering climate change predictions including possible reintroductions of historically present species
- Monitor for and implement management actions as needed to control invasive animal species, such as gypsy moth & EAB.

10-YEAR STRATEGIES/IMPLEMENTATION

1. By 2015, utilizing surveys, literature reviews, and taxa experts, determine if any Species of Greatest Conservation Need in ISP require species-specific management and begin to implement management. Use the information gained to help direct tools, timing of management strategies.
2. By 2018, update the mammal database by reviewing survey work completed by MN County Biological Survey (MCBS), Division of Wildlife, and U of MN Biological Station, and supplement with additional fieldwork.
3. Document any new rare animal occurrences using accurate mapping and fieldwork. Update the MNDNR Natural Heritage Information System accordingly.
4. Review the effect of management activities like prescribed fire and timber harvest on rare wildlife populations, including SGCN, in order to minimize the negative impacts of management activities on these species.
5. By 2020, determine which wildlife species require mature forests.
6. Annually assess the need for reduction of deer or other game species. Conduct and administer controlled hunts as needed in coordination with the Section of Wildlife. (incorporated old #5)

7. By 2015, evaluate methods for assessing deer populations and impacts to vegetation. If a successful method is developed, implement as needed to aid in management decisions.
8. As-needed, address infrastructure problems caused by beaver through trapping and dam removal.

FISHERIES GOAL

ISP will preserve and restore quality native fisheries/habitats while providing for compatible sport fishing opportunities. Work with MNDNR Fisheries to identify and implement strategies that protect and maintain the park's fishery while protecting other park resources. Monitor for the presence of aquatic invasive species in cooperation with other Divisions and the U.S. Fish and Wildlife Service.

50-YEAR OBJECTIVES

- Preserve and restore native fish ranges, aquatic communities, and habitats when appropriate and desired.
- When possible, implement strategies to prevent the establishment or introduction of carp, zebra mussels or other invasive aquatic species into the waters of the park.
- When consistent with state park-enabling legislation (86A.05 Subd. 2C), manage for quality sport fisheries and support statewide fisheries management

10-YEAR STRATEGIES/IMPLEMENTATION

1. In cooperation with FAW, identify & evaluate the current/historical usage and effects of fisheries rearing ponds in the park by 2016.
2. By 2016, complete literature review of aquatic invertebrates/amphibians/fish species surveys at ISP.
3. By 2018, assess known information on aquatic invertebrates/amphibians/fish, and create plan for further inventory. Develop an objective around establishing a baseline for the aquatic species (invertebrates, amphibians) utilizing water bodies.

WATER RESOURCES

WATER RESOURCE GOAL

Itasca State Park will prevent the decline of water quality within the park boundary.

50-YEAR OBJECTIVES

- Prevent, control and monitor aquatic invasive species
- Safeguard water quality from recreational use and/or resource management impacts, including prescribed fire, forest management, shore and bank erosion
- Continue or initiate appropriate stormwater management practices
- Retain the location of the outlet of Lake Itasca because of its historic significance
- Determine and address likely effects of climate change on water resources in the park

10-YEAR STRATEGIES/IMPLEMENTATION

1. Ensure the Department Guidelines for preventing the spread of aquatic invasive species are followed at Itasca State Park
2. Adequately monitor for new infestations of aquatic invasives and follow best management practices to control problem species

CULTURAL RESOURCES

CULTURAL RESOURCES GOAL

ISP will preserve cultural resources.

50-YEAR OBJECTIVES

- Protect all known cultural resources at ISP from degradation.
- Prevent or minimize soil erosion in known cultural resource areas.
- Preserve and restore significant "use area" openings in vegetation and significant views related to
- Preserve landscape design of the National Register Historic District (NRHD).
- Manage and preserve all vegetation that contributes to the NHLD.

10-YEAR STRATEGIES/IMPLEMENTATION

1. During 2012, finish in-depth archaeological field reconnaissance of proposed bike trail rehabilitation/reroute.
2. Annually evaluate the condition of structures, landscapes, and features of the NRHD.
3. Consult with State Park archaeologists before conducting resource management activities involving soil disturbance.
4. In those cases where impacts cannot be avoided, conduct mitigation to preserve data related to the affected cultural resources.
5. As cultural projects occur, document known or recently identified cultural field locations using accurate mapping and fieldwork. Enter data into a DNR-accessible Cultural Resources database.
6. Coordinate the appropriate activities in annual work plans with the State Park archaeologists.

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Appendix A

NATIVE PLANT COMMUNITY DESCRIPTIONS

Acid Peatland System / Northern Poor Conifer Swamp / Poor Tamarack - Black Spruce Swamp (APn81b) – Sphagnum-dominated, acid peatlands with a patchy to closed canopy of trees comprised of black spruce and tamarack, which are often stunted. Species diversity is low and characterized by leatherleaf (Chamaedaphne calyculata) and Labrador tea (Ledum groenlandicum). No data collected on this NPC type. Community surmised from aerial photo interpretation of a polygon adjacent to a poor fen (APn91b).

Acid Peatland System / Northern Poor Fen / Low Shrub Poor Fen APn91a - Low shrub poor fens (APn91a) are open peatlands with a significant cover of leather leaf and bog birch. Stunted tamarack and black spruce are common. Sphagnum hummocks are moderately well-developed. APn91a occurs on small basins perched within depressions on moraine hills, on floating mats within and adjacent to small ponds and inlets of lakes; or within strings of larger wet meadows/poor sedge fens. Air photo signatures suggest that Sphagnum moss has developed into a low mound arising above the surrounding wetland, which is typically a graminoid poor fen (APn92b) or wet meadow (WMn82b).

Acid Peatland System / Northern Poor Fen / Graminoid Poor Fen (Basin) (APn91b) - Graminoid poor fens (APn91b) are open peatlands dominated by sedges and other grass-like plants, such as, wiregrass (Carex lasiocarpa) and bog wiregrass sedge (Carex oligosperma). Leatherleaf and Labrador tea, and other ericaceous subshrubs, are present to infrequently scattered throughout. APn91b occurs in small basins, on floating mats in ponds and inlets of large lakes and on margins of larger peatlands. The substrate is slightly acidic, organic muck and is sometimes ponded.

Other Natural Community System / MCBS Complex / Beaver Disturbed Area (BD_CX) – Beaver Disturbed Area is a complex of several upland and lowland, forest classes and types, where deciduous trees and shrubs have been selectively harvested, or completely removed, by beavers. The result is a deforested habitat often dominated by dense brush, and occasionally, with small herbaceous openings with prairie species (see description for FDc24a). The remaining canopy – if any - is a sparse scattering of trees comprised of unpalatable species, such as pines. Characteristically these NPC types were formerly aspen, birch and oak dominated woodlands or forests on moderate to well drained slopes adjacent to wetlands, ponds and lakes where beavers dwell. Lowland forests can be impacted as well, although it appears that black ash may not be a preferred food source.

Beaver cut areas are readily observed on air photos within Itasca State Park, where beavers removed forests on one-tenth of one-percent (0.1%) of the total area of the park. GIS polygons of these areas average about 1 acre in size, but affected areas range from 0.1 to 7.4 acres. Occasionally, beavers are forced to harvest trees on upper slopes and hill crests some distance from the water. Field ecologists working at Itasca described such areas as having a "beaver halo", referring to the cleared ring observed around kettle-hole lakes and ponds. NPC classes on several soil types were observed to be affected by beavers, including FDc24, FDn33, FDc34, MHc26 and MHn44. Presumably other forest classes near beavers are also affected.

It was observed that white, red and jack pine trees were not affected and that pine saplings were observed growing in thick hazel patches along with oak saplings. Such thickets were very difficult to traverse and may actually restrict deer browsing. Beaver disturbed areas may be significant safe sites for young pines that could potentially maintain a pine population within forest types that otherwise hinder new pine recruitment. Some ecological models describe wetland borders as "fire shadow" areas where pines survive large catastrophic fires. According to these models, Fire-Shadows became important sources for dispersing propagules capable of establishing pine forests within large interiors some distance from wetlands.

Other Natural Community System / MCBS Complex / Beaver Wetland Complex (BW_CX) – This mapping unit consists of a complex of small to medium-sized wetlands whose character has been altered or is influenced by beaver-created impoundments, usually along watershed drainages. These are generally unforested wetlands, even though trees and shrubs may have been common prior to flooding. Standing dead trees (snags), shrubs and downed wood are common in many of these wetlands. Patches of open water occur directly behind the dam (often mapped separately as open water). Cattails, lake sedge, and other tussock-forming sedges are often dominant in the wettest zones near the dam. Slightly drier zones often support speckled alder or bluejoint. Remnants of the wetland communities present before flooding by beaver dams are sometimes found at higher elevations in the watershed upstream from the dam. Wetland NPC Types that are frequently inundated by beavers include alder forest (WFn74a), sedge meadow (WMn82b), shrub carr (WMn82a) and Northern Wet Ash Swamp (WFn55a or WFn64c).

Fire-Dependent Forest/Woodland System / Central Rich Dry Pine Woodland / Jack Pine - (Bush Honeysuckle) Woodland (FDc24a) - Open canopied forests where jack pine, in the canopy, is present to occasional - never dominant - with red pine and open grown oaks. FDc24a characteristically has a patchy to dense shrub layer and with prairie species sometimes dominating small areas. Typically on sandy loam on southfacing slopes and crests. Well drained to somewhat excessively drained; coarse-loamy, mixed to sandy loam with many rocks and few boulders. The best example in Itasca State Park is associated with beaver-cut slopes on steep, narrow ridges between open water where the sand banks are eroding.

Fire-Dependent Forest/Woodland System / Central Dry-Mesic Pine-Hardwood Forest / Red Pine – White Pine Forest (FDc34a) - Dry-mesic pine forests dominated by a dense - interrupted to closed - canopy cover of red and white pines but relative abundances vary. Associates include paper birch, red maple, quaking aspen, big-toothed aspen, jack pine, red oak or bur oak. The subcanopy is characteristically poorly-developed, and the shrub layer is patchy to dense. The forb layer is a blend of prairie species listed for FDc24a and mesic hardwood species MHc26a. Northern species are merely present or are infrequently scattered – seldom with more than a few species and notably lacking in Lycopodium species. Found on hummocky moraines and well-drained portions of outwash plains. Usually on moderate, well-drained or somewhat excessively drained soils comprised of fine sandy loam or loamy sand over fine loamy sand or coarse sand with gravel and cobblestones.

Fire-Dependent Forest/Woodland System / Central Dry-Mesic Pine-Hardwood Forest / Oak - Aspen Forest (FDc34b) - Dry-mesic hardwood forests or woodlands with scattered pines. The canopy layer is patchy to interrupted, dominated by a combination of open-grown trees of northern red oak, quaking aspens, paper birch, red maple, bur oak, big-toothed aspen, basswood or green ash. Subcanopy is poorly developed. Shrub layers can be patchy to thick. The forb layer is a blend of prairie species listed for FDc24a and mesic hardwood species MHc26a. Northern

species are merely present or are infrequently scattered – seldom with more than a few species and notably lacking in Lycopodium species. Found on hummocky moraines and well-drained

portions of outwash plains. Usually on moderate, well-drained or somewhat excessively drained soils comprised of fine sandy loam or loamy sand over fine loamy sand or coarse sand with gravel and cobblestones.

Fire-Dependent Forest/Woodland System / Northern Dry-Mesic Mixed Woodland / Red Pine - White Pine Woodland (FDn33a) - Dry-mesic conifer forests or woodlands dominated by a dense - interrupted to closed - canopy of red or white pine. Associate species include balsam fir, black spruce, white spruce, quaking aspen, red oak, basswood, sugar maple, red maple, black ash, bur oak and rarely in Itasca, jack pine. Mountain maple and balsam fir are often common in the shrub layer. Northern species are occasional or frequent throughout the polygon with many northern herbs and subshrubs – notably present are several species of Lycopodium and Lonicera (a thick thatch of pine needles creates a slightly acidic soil in the upper soil horizons that appear to favor species like Linnaea borealis, Goodyera repens and Coptis trifolia).

FDn33a is especially found on north- and east-facing, lower slopes and toes of stagnation moraines, glacial till, eskers, islands and slight rises on lake plains. FDn33a is also present on narrow ridge crests of eskers and broad-level moraine crests with semi-impervious subsoil layers. Substrates tend to be mesic to wet-mesic soils on moderate to well drained lower slopes with fine silty loam, fine sandy loam to sandy loam, often with numerous rocks and boulders; often proximal to mucky depressions associated with wetland forests and wet meadows.

Forested Rich Peatland System / Northern Cedar Swamp / White Cedar Swamp (Northcentral) (FPn63b) - White cedar swamps on wet peat soils over impermeable loam or clays, often with mineral-rich, groundwater seepages from hillsides. This cover type often occurs in small basins of moraines and near margins of streams and lakes. Saturated soils range from shallow to deep muck and peat, mostly circumneutral pH; often with pools of shallow water in hollows between root masses. Sphagnum covers the substrate and root masses, often with low hummocks and shallow, water-filled hollows supporting submergent mosses and emergent aquatic plants.

Forested Rich Peatland System / Northern Rich Alder Swamp / Alder - (Maple - Loosestrife) Swamp (FPn73a) – Wetlands dominated by speckled alder either on shallow muck or peat over mineral soil next to large peatlands; or on very deep peat within a large peatland complex. FPn73a is found on large moraine basins, till plains, or outwash plains along streams and drainage ways; or in laggs/moats surrounding peatlands between the uplands. The herbaceous and graminoid floras are a mixture of peatland and lowland hardwood species (see species list FPn82b). No data in Itasca State Park. Compare this description with WFn74a.

Forested Rich Peatland System / Northern Rich Tamarack Swamp (Western Basin) / Extremely Rich Tamarack Swamp (FPn82b) – Tamarack swamps on peat in shallow basins on moraines, glacial till or glacial fluvial outwash; or on margins of large open peatlands or rich meadows and floating mats bordering lake shores. Tamarack dominates the canopy. Other associates include white cedar, black spruce, black ash and red maple. Bog birch, red-osier dogwood and speckled alder are common. Species diversity is high. Typically mineral-rich, alkaline water derived from groundwater seepage from adjacent slopes.

Mesic Hardwood Forest System / Central Dry-Mesic Oak-Aspen Forest / Oak - Aspen - Red Maple Forest (MHc26a) – Aspen forests dominated by quaking aspen and sometimes groves of big-

toothed aspen. Associate canopy species include various amounts of bur oak, red oak, green ash and small amounts of sugar maple and basswood. Red and white pines are present in groves or as scattered individual trees, which are remnants of past cuts. Mature aspen stands probably originated after the pine canopy was removed. Younger forests are likely to be second or third generation cuts. Subcanopy is distinct and well developed in contrast to FDc34. Shrub layer tends to be thick – interrupted to closed – except beneath darkly-shaded forests. Herbaceous flora tends to be sparse in deeply shaded habitats. Partially open forests or woodlands, tend to have scattered remnants of fire dependant indicator species. Soils include loamy sand to loamy coarse sand or sand, subsoil often very gravelly, Bt layer often lacking clay or dense loam that are very permeable to ground water.

MHc26a is mostly on upper slopes and crests on dry-mesic and well drained substrates. Mhc26a is found on top of kames, narrow ridges of eskers and moraines, broad-flat crested hills and on mid-to-upper slopes, especially with south-to-west facing aspects. Sometimes on broad level crests and moraine flats with scattered subsurface wet pockets supporting inclusions of wet-mesic and wet species - but these tend toward MHc26b or MHc37b. MHc26a is distinguished by having an aspen dominated canopy on dry-mesic substrates where fire-dependant herbs are more frequent. Northern herbs and subshrubs of indicator species tend to be merely present – frequently they are often lacking in MHc26a forests.

Mesic Hardwood Forest System / Central Dry-Mesic Oak-Aspen Forest / Red Oak - Sugar Maple - Basswood - (Large-Flowered Trillium) Forest (MHc26b) - Aspen dominated forests but with increased amounts of sugar maple (which is most abundant in the subcanopy). Canopy also with bur oak, red oak, green ash and basswood. Red and white pines are present in groves or scattered individual trees that are remnants of past cuts. Mature aspen probably originated after pine canopy was removed.

Abundant amounts of sugar maple in the subcanopy layers suggest shade-tolerant succession, which proceeds more rapidly on moist substrates. MHc26b is mostly on upper to middle slopes and lower slopes (and toe) with dry-mesic to mesic - moderate to well drained substrates. Mhc26b is also common on broad-flat hill crests pitted with Type I and II wetlands. Herbaceous flora tends to be richer than in MHc26a in deeply shaded habitats with several mesic to wet-mesic herbs present to occasional, which are more characteristic of MHc37 or MHn35. Open canopied forests tend to have scattered remnants of fire-dependant communities.

Slopes of kames, narrow ridges of eskers and moraines, broad-flat crested hills and on mid- to upper slopes, especially with east to north facing aspects. Common on broad level crests and moraine flats with scattered subsurface wet pockets supporting inclusions of wet-mesic and wet species - which tend toward the wet-mesic, MHc37b or the wet, WFn55a. Northern herbaceous and subshrub indicator species tend to be present to occasional but not frequent. MHc26b is distinguished by increased amounts of sugar maple in the canopy and subcanopy with mesic/wet-mesic herbs occurring more frequently than in MHc26a.

Mesic Hardwood Forest System / Central Mesic Hardwood Forest (Western) / Aspen - (Sugar Maple - Basswood) Forest (MHc37a) - Mesic hardwood forests dominated by quaking aspen and paper birch with lesser amounts sugar maple with red oak, bur oak, basswood and black ash. Sugar maple is abundant in the subcanopy beneath the aspens. MHc37a is found on lower slopes, broad level crests or flats with swales, depressions and outwash terraces on glacial outwash, and stagnation moraines with small knolls and irregularly shaped ridges and eskers -

occasionally lake plains and alluvium. Soils are moderate to well-drained (often with inclusions of - or peripheral to - poorly drained soil types).

MHc37a is considered an early successional unit to MHc37b, which has abundant sugar maple in the canopy tends to be more mesic to wet-mesic. Both types lack a significant presence of northern indicator species characteristic of MHn44a. MHc37a is intermediate between MHc26b and MHc37b. The designation of MHc37a is used to classify polygons on landscapes intermediate between these two classes in order to represent a continuum; or MHc37a was used in landscape settings typical of MHc37b (small moraine basins, lower slopes near wetlands, etc), except these areas are dominated by quaking aspen and lack northern species, which are characteristic of MHn44a.

Mesic Hardwood Forest System / Central Mesic Hardwood Forest (Western) / Sugar Maple - Basswood - (Aspen) Forest (MHc37b) - Mesic to wet-mesic forests with diverse canopies primarily dominated by sugar maple with lesser amounts of quaking aspen and birch than found in MHc37a. Common associates include red oak, bur oak, basswood and black ash. MHc37b is found in small basins on moraine hills; lower slopes, broad level-crests or flats with swales and depressions; outwash terraces and stagnation moraines with small knolls and irregularly shaped ridges and eskers. MHc37b is occasionally found on lake plains and alluvium. Soils are moderate to well-drained (often with inclusions of – or peripheral to - poorly drained soil types). Northern herbaceous species tend to be rare to infrequent - tending to be local and not dispersed throughout the polygon. Aspen dominated MHc37a is considered an early successional unit to MHc37b, which has abundant sugar maple in the canopy and tends to be more mesic to wet-mesic. Both types lack a significant presence of northern indicator species characteristic of MHn44a, which has a heterogeneous canopy, primarily dominated by quaking aspen with noticeable amounts of balsam fir and white spruce.

MHc37a is intermediate between MHc26b and MHc37b. The designation of MHc37a is used to classify polygons on landscapes intermediate between these two classes in order to represent a continuum; or MHc37a was used for polygons in landscape settings typical of MHc37b (small moraine basins, lower slopes near wetlands, etc), where these areas are dominated by quaking aspen as indicated by air photos and field data showing a lack of northern species. MHc26b is an aspen dominated forest on dry-mesic, well-drained landscapes that is sometimes pocked with small wet meadows and forest. MHc37b is distinguished from other northern NPC classes, dominated by sugar maple, by its landscape settings in depressions and along wetland basins. MHn35a is sugar maple dominated forest of steep (mostly north-facing) slopes and ravines that are always well-drained with rapid runoff. Of coarse, northern species are merely present in MHc37b and frequent in MHn44a and MHn35a.

Mesic Hardwood Forest System / Northern Mesic Hardwood Forest / Aspen - Birch - Basswood Forest (MHn35a) - Dry-mesic hardwood forest, primarily dominated by sugar maple on well-drained soils with rapid runoff. Sugar maple abundant in canopy to dominant, with red oak and basswood common. MHn35a has a diverse canopy with a well-developed subcanopy. The canopy is composed of variable mixtures of sugar maple,, aspen basswood and red maple. Associates include bur oak, white and red pine. Northern herbaceous species occasional to frequent (Streptopus, Clintonia, Trientalis, Linnaea borealis, Cornus canadensis, Lycopodium spp.). MHn35a forests are on well-drained soils with moderate to very rapid impermeability. Soils are either fine sandy loam, coarse loamy sand, fine loamy sand or pure sand often with gravel in the subsoil. Characteristically, MHn35a was mapped on sugar maple - quaking aspen forests on steep side-slopes of ice block depressions within broad-level hill crests of stagnation moraines; or

north-facing ravines on upper slopes, crests and steep upper slopes of narrow ridges (eskers) and knolls; and on north to east-facing, lower slopes especially with steep gradients (15-45% slopes). MHn35a is generally on dry mesic steep slopes while MHn44a is on broad, moraine crests or gentle lower slopes (1-15% gradient) near wetlands. MHc37 is primarily on shallow basins on broad, hill crests, outwash terraces and lower slopes lacking northern indicator species.

Mesic Hardwood Forest System / No. Wet-Mesic Boreal Hardwood- Conifer Forest / Aspen - Birch – Red Maple Forest (MHn44a) – Wet-mesic or mesic hardwood and hardwood-conifer forests, most commonly on level, clayey sites with high local water tables associated with glacial lake deposits, broad, level crests of stagnation moraines and till plains. MHn44a was mapped on mesic to wet-mesic soils comprised of fine silty loam, fine sandy loam or sandy loam, moderate to well drained, on lower slopes; often near mucky depressions associated with wetland forests and wet meadows. Soils mostly have a low to moderate amount of organic content. Quaking aspen is the most dominant species in the canopy, which tends to be open and heterogeneous with varying amounts of sugar maple, basswood, black ash, white spruce, balsam fir, white and red pine.

MHn44a is a rich forest with diverse canopy and subcanopy layers. It has a diverse herbaceous flora of mostly mesic woodland species but with infrequent occurrences of both dryer uplands and wet-mesic depressions that is attributed to the varied microtopography and proximity to wetlands. MHn44 forests are often mapped at the confluence of well-drained soil units with fine silt loams and moderate organic content, which are found in depressions with ground water within a couple of feet of depth. Northern indicators are frequent and very diverse with several species of *Lycopodium, Lonicera*, etc.

Marsh System / Northern Bulrush-Spikerush Marsh / Spikerush - Bur Reed Marsh (Northern) (MRn93b) – Emergent, submergent and floating vegetation in shallow water typically dominated by bulrushes or spike rushes. Present along lakeshore, within shallow inlets, stream borders and within perched open water marshes on stagnation moraines. Data collected at only one location in Itasca Park. Selected comments from Itasca data include: Open water pools (deep water marsh) on moraine drainage way with *Carex lacustris* mats and tussocks. Water body is shaped like an hour-glass. (Megalodotia beckii) is flowering above water surface with (Sparganium flucuans and Salix bebbiana) on margins.

Open Rich Peatland System / Northern Rich Fen (Basin) / Graminoid Rich Fen (Basin) (OPn92a) – Open peatlands on deep, well-decomposed peat or floating peat mats in basins and within lakes and ponds. Sedge and grass dominated fens with limited Sphagnum cover (especially low green species and few hummocks). Found in landscape settings with circumneutral pH due to mineral-rich subsurface water and runoff.

Selected Comments From Itasca Data include:

- Rich Fen / Poor Fen (intermediate), [with] moat of lakebank sedge (Carex lacustris). Interior wetland with (Carex chordorrhiza), (Carex canescens), scattered (Carex lacustris), etc.

- Rich Fen dominated by sedges and Fowl Manna grass (Glyceria canadensis). Dense carpet of sphagnum blanketing floating mat. Bordered by steep slopes with red pine and low flat area with wet forest. At center is a somewhat elevated dome with low *Carex* and a few tall graminoids.

Fen has a circular base with a narrow neck. The base is dominated by (Carex oligosperma) with (Carex chordorhizza). The neck is dominated by (Glyceria canadensis) and (Carex utriculata). *Carex lacustris* dominates within the lagg/moat.

Itasca State Park River Shore System / Sand/Gravel/Cobble River Shore (RVx32) – Sparsely to densely vegetated plant communities on sand, gravel or cobbly, river shores. Characterized by annual herbaceous species, firmly rooted perennial species. Scoured annually during high water by ice and high currents, and following heavy rains. Also in association with small insignificant bands of floodplain forests. No Itasca data. Polygon designation surmised from air photo interpretation of the headwaters of the Mississippi River.

Wet Forest System / Northern Wet Ash Swamp / Black Ash - Aspen - Balsam Poplar Swamp (Northeastern) (WFn55a) – Wet hardwood forests on mucky mineral soils in shallow basins receiving groundwater seepage from adjacent slopes. WFn55a is also on level terrain in small basins, near rivers, lakes or surrounding other wetlands. WFn55a typically has standing water in the spring that later drains away by late summer. Wet-mesic to wet deciduous forests with scattered conifers. The canopy is typically dominated by black ash and several other hardwood species. Grasses and sedge are relatively important in the ground layer and the herbaceous layer is very diverse (some 90 species listed for Itasca Park - see below). WFn55a occurs in shallow basins and level to gently slope groundwater seepage areas on lower slopes and within ravines or on outwash terraces. WFn55a is distinguished from WFn64a by the duration of standing water throughout the growing season. WFn55a tends to drain late season to leave broad flats of saturated muck with a few, scattered pools. Small micro ridges provide habitat for many upland species requiring aerated substrates.

Wet Forest System / Northern Very Wet Ash Swamp / Black Ash - Alder Swamp (Northern) (WFn64c) –Wet hardwood forests on peaty soils in small closed depressions or around edges of large wetlands. Typically with permanent standing water. Black ash dominants canopy with conifers present to frequent. Contains many species common in forested peatlands (FPn82b). Flora similar to WFn55a, except the abundances of aquatic and emergent species are higher in WFn64a, reflecting a larger percentage of substrate permanently covered by standing water. Large areas are comprised of an open black ash canopy with a sparse woody subcanopy over a dense sward of sedges, such as lake sedge *Carex lacustris*.

Wet Meadow/Carr System / Northern Wet Meadow/Carr / Willow - Dogwood Shrub Swamp (WMn82a) – Shrubby wetlands dominated by a dense – patchy to closed – cover of willows, alder or red-osier dogwood within a matrix of broad-leaved grasses. Present within small basins or ravines as inclusions within larger upland soil types; and also, is found within larger basins on glacial outwash plains, along streams or around lakes. Soils are either thin layers of organic muck and mineral soil over a water-impeding substrate (clay, clay loam, etc); or deep muck. Selected Comments From Itasca Data:

- Shrub swamp: willow, dogwood, and some tamaracks. Upper drainageway to large wetland. Braided brooks fed by local groundwater into reticulate pools with orange-red from oxidized particulate. Dead tamaracks creating frequent standing snags and tipups. *Alnus rugosa* covers 75% cover leaving small gaps for bluejoint, marsh marigold (Caltha palustris), porcupine sedge(Carex hystericina), (Petasites sagittatus). Bluejoint 50-75(100)% cover. See species list.

- Wet meadow with scattered tamarack, black spruce, immature black ash. Shrub layer with alder and willows, dominated by bluejoint with tussock sedge (Carex stricta), horsetail (Equisetum fluviatile), Swamp candles (Lysimachia thyrsiflora), and (Carex echinata).

Wet Meadow/Carr System / Northern Wet Meadow/Carr / Sedge Meadow (WMn82b) – Open wetlands dominated by a dense cover of broad-leaved grasses and sedges with an insignificant cover of tall shrubs. Present within small basins or ravines, which are inclusions within larger upland soil types. WMn82b is also found within larger basins on glacial outwash plains, along streams or around lakes. Soils are either thin layers of organic muck and mineral soil over a water-impeding substrate (clay, clay loam, etc); or deep muck.

Appendix B

Implementation Table – Pine NPC Restoration

Itasca State Park - Pine NPC Restoration Actions

Year	Acres site prepped	Acres planted	Acres Protected	Acres Released
2012	75	75	200	25
2013	100	0	200	0
2014	0	100	300	35
2015	100	0	300	75
2016	0	100	400	0
2017	100	0	400	135
2018	0	125	525	75
2019	100	0	525	100
2020	0	100	625	100
2021	100	0	500	125
Plan totals	*475*	*500*	*3475*	*545*

Implementation Strategies Table

STRATEGIES	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
UPLAND FORESTS										
Strategy 1 (see Table - Pine NPC Restoration)	NPC restoration (new seedlings) 75 acres		NPC restoration (new seedlings) 100 acres.		NPC restoration (new seedlings) 100 acres.	Jack Pine Restoration 80 acres.	NPC restoration (new seedlings) 125 acres.		NPC restoration (new seedlings) 100 acres.	
Strategy 2	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)	Assess 1000 acres (NPC, Inventory, Structure)
Strategy 3	Begin Plantation Assesments			Assessed and managed (if applicable) 130 ac of plantations			Assessed and managed (if applicable) 130 ac of plantations			Assessed and managed (if applicable) 130 ac of plantations
Strategy 4	In 10 years use Prescribed Fire (Up to 2600 ac)	See 2012	See 2012	See 2012	See 2012	See 2012	See 2012	See 2012	See 2012	See 2012
OPEN & FORESTED WETLANDS										
Strategy 1	See 2013	Inventoried all WFn64, largest WFn55 NPCs	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013
Strategy 2	See 2015	See 2015	See 2015	Identify opportunities to restore impacted wetlands	See 2015	See 2015	See 2015	See 2015	See 2015	See 2015
TERRESTRIAL INVASIVE PLANTS										
Strategy 1	Control spread and prevent further introduction of invasive species using proven management	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013

STRATEGIES	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	techniques									
PROTECTED/RARE PLANT SPECIES										
Strategy 1	Monitor existing populations as opportunities arise, document newly discovered populations, and protect or relocate individuals that are in danger.	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013	See 2013
WILDLIFE BIODIVERSITY										
Strategy 1	See 2015	See 2015	See 2015	SGCN Habitat needs assesed. Begin applicable species specific management.	See 2015	See 2015	See 2015	See 2015	See 2015	See 2015
Strategy 2	See 2018	See 2018	See 2018	See 2018	See 2018	See 2018	Mammal Database Updated			
Strategy 3	See 2020	See 2020	See 2020	See 2020	See 2020	See 2020	See 2020	See 2020	Determined which wildlife species require mature forest	
Strategy 4	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.	Controlled hunts for animals that need population reduction.

STRATEGIES	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.	Annual assesment of need for hunts.
Strategy 5	See 2015	See 2015	See 2015	Assessed methods for evaluating deer populations and impacts to NPCs. Implement as needed.	See 2015	See 2015	See 2015	See 2015	See 2015	See 2015
FISHERIES										
Strategy 1	See 2016	See 2016	See 2016	See 2016	Evaluate usage and effects of rearing poonds.					
Strategy 2	See 2016	See 2016	See 2016	See 2016	Literature review of aquatic invertebrates/amphibian/fish species at ISP.					
Strategy 3	See 2018	See 2018	See 2018	See 2018	See 2018	See 2018	Asses know information about aquatic invertebrates/amphibian/fish species at ISP, develop objective for baseline.			
WATER RESOURCES										
Strategy 1	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.	Prevent, monitor, and control aquatic invasives.
CULTURAL RESOURCES										

STRATEGIES	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Strategy 1	Complete bike trail archeology survey.									
Strategy 2	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.	Annual evaluation of condition of features in the NHLD.
Strategy 3	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.	Maintain cultural resources database as new information is available.

Appendix C

Select Old Growth Forest guidelines: Amendments 2 & 6

Old-growth Guideline Amendment # 2

OLD-GROWTH MANAGEMENT: MANAGING THE OLD-GROWTH NETWORK OVER TIME

Version 2

Revised April 2007

This amendment clarifies, supplements, and amends the 1994 DNR Old-growth Forests Guideline and the 1995 addendum to the Guideline. That Guideline was intended to be a "living" document, to be revised as we learn more about how to effectively implement DNR's old-growth policy. This amendment will be incorporated into the next revision of the Guideline.

DNR's Old-growth Forest Policy

The goal of DNR's old-growth forest policy is to maintain a viable statewide network of high quality old-growth forest sites along with relatively undisturbed, natural-origin younger stands that will be managed to promote old-growth characteristics in the future (i.e., future old growth). The DNR will manage this old-growth forest network to ensure that its quality is maintained over time and it has the acreage necessary to:

1. Adequately represent old-growth forests as an element of the state's biodiversity;
2. Provide habitat needed for wildlife and plants associated with old forests;
3. Maintain benchmark sites for natural processes that we are only beginning to understand; and
4. Guarantee Minnesotans the opportunity to enjoy old-growth forests now and in the future.

Acreage Goals for the Old-growth Forest Network

The 1994 DNR Old-Growth Forests Guideline estimated that 27,000 acres of DNR-administered land qualified for protection as old-growth forest. The DNR and stakeholders based that estimate on preliminary but incomplete old-growth inventories. The guideline established old-growth protection goals for each subsection of the state. A subsection is an ecological region (larger than county-sized area) defined by biological and geologic features as well as local climate. Minnesota has 26 subsections.

Beginning in 1994, DNR undertook a more intensive field inventory of candidate old-growth stands. Over 60,000 acres of old-growth candidates have been examined in the field to measure old-growth characteristics and determine if they meet old-growth protection criteria. This effort provided more accurate estimates of old-growth acreage at the subsection level. From 1998 to 2003, DNR field teams - using the more complete subsection inventories - designated the highest-quality stands for protection and de-listed non-qualifying stands for other uses. These designations, based on updated information, differed from the earlier 1994 estimates. The updated acreage is larger in some subsections but smaller in others. By 2006, DNR

interdisciplinary teams designated approximately 44,000 acres of old-growth and potential future old growth stands in 22 subsections (including 4000 acres in Itasca State Park). Each team decision to designate or de-list candidate old-growth sites was based on the most current available information and is documented in an integrated database that can be presented in map and table formats.

Stakeholder Consultation on Acreage changes to the Old-growth Network

The initial designation process was completed in 2003. The resulting acreage replaced the 1994 acreage goal. The 2006 designated network represents the highest-quality old-growth forest known to exist on state-administered land. Any changes proposed to the 2006 acreage that would modify the protected statewide old-growth forest network (total acreage of all cover types) by more than 10% will require involving stakeholders to reach consent on management direction. The 2006 designated old-growth acreage is provisional; it will be revisited and, if needed, revised based on new information and on evolving old-growth policies developed by other land owners e.g. federal and county agencies.

Adaptive management and cooperative planning will be required to meet the statewide old-growth policy goals over the long term. Old-growth forest management will occur at both landscape and site levels.

- At the landscape level, decisions will focus on maintaining the necessary acreage, quality, and geographic distribution of old-growth stands in the network.

- At the site level, management decisions will focus on promoting natural processes including regeneration that maintains old growth, removal of exotics, and minimizing edge effects.

The DNR Old-Growth Forests Guideline, which establishes a network of protected old-growth sites on DNR- administered lands, is part of broader efforts to manage old growth on all forestlands in Minnesota. *"The guideline should be considered as an interim policy as planning efforts at the landscape level evolve to integrate goals and coordinate management on all ownerships"* (DNR Old-Growth Forests Guideline, page 1).

Adaptive Management at the Landscape Level

The sites in the DNR's old-growth forest network are not static, nor is the surrounding landscape static. DNR manages a dynamic landscape that continually changes. DNR will make needed adjustments and modifications to the old-growth network in order to maintain adequate acreage to meet the above goals and protect overall old-growth quality. Future management changes may result for three major reasons:

1. *Stand-Replacing Disturbance*: When forest stands within the network are severely disturbed by fire, wind, or flood and stands meeting old-growth criteria outside the network are available as substitutes. (Note: given the scarcity of

relatively undisturbed forests with old-growth characteristics for replacement, this option may be limited in some subsections and for certain forest types.)

2. *Collaborative Management*: Opportunities for developing more viable old-growth management complexes arise through cooperative efforts with other landowners.

3. *New Information*: New information (e.g., new scientific understanding of old-growth forests, old-growth inventories, changing public values, and other feedback) call for modifying DNR's old-growth network.

STAND-REPLACING DISTURBANCE

The dynamic nature of old growth. On the natural forest landscape, stand-replacing natural disturbances create a shifting mosaic of forest stands of different ages. **Stand-replacing** disturbances are those that kill most trees in a mature forest stand and convert it to a younger stand. It is important to distinguish stand-replacing disturbances from stand-maintenance disturbances. **Stand-maintenance** disturbances within old-growth forests kill only a small percentage of trees in a stand at any one time and are essential for maintaining the health and diversity of the old-growth stand. Small-scale blowdowns result in uneven canopies and a diverse spectrum of tree sizes, along with snags, downed logs, and tip-up mounds that provide microhabitats for plants and animals. Small-scale blowdowns also provide regeneration sites for trees that cannot grow in dense shade. Low-intensity fires remove underbrush and create essential regeneration sites for some tree species.

Stand-replacing disturbances ensure that old-growth stands are not permanently fixed on the landscape. In fact, given enough time, all old-growth stands will be disturbed and replaced by younger stands. Given what we know about disturbance frequency, we can predict how much old-growth forest will likely remain on the landscape in a given area. For example, the Range of Natural Variability model developed by Lee Frelich and others predicts that 70-90% of acreage capable of producing old-growth northern hardwood will eventually stabilize as old growth. This means that over time, we will likely lose 10-30% of northern hardwood old-growth acreage to younger age-classes. DNR's goal is to maintain a stable amount of designated old growth in the face of future stand-replacing disturbances. One option to sustaining old-growth forests in the network is to release stands that experience a stand-replacing disturbance and replace them with new old-growth stands. However, given the scarcity of high-quality old-growth stands outside the designated network, finding replacement stands may be difficult. Another option is to keep naturally disturbed stands in the old-growth network, and accept that a certain percentage of the old-growth network will always be in a "future-old-growth" status. DNR will need to use a combination of these two options to meet the goal of maintaining a viable network of old-growth sites.

Retaining or de-listing stands that experience stand-replacing disturbance. When a stand-replacing disturbance occurs in a designated old-growth site, managers must determine whether to keep the disturbed stand and manage it as future old growth, or find a replacement. The following general guidance applies:

When a severe, stand-replacing disturbance occurs in a designated old-growth site, the stand can be removed from the network if it can be replaced by a stand of similar quality. Given the scarcity of relatively undisturbed forests with old-growth characteristics for replacement, this option may be limited in some subsections and for certain forest types. If a suitable replacement cannot be found, the disturbed site will remain in the network to be managed as future old growth by allowing natural processes to promote stand recovery.

Old-growth stands on **school trust lands** require special attention. If stands on school trust lands lose their old-growth characteristics due to stand-replacing disturbance they will either:

1. Be released for other uses if they can be replaced by a new stand of equal or higher quality outside the old-growth network; or
2. Lacking a suitable replacement, be retained in the network with the school trust compensated for its value.

See "Adaptive Management: Process and Criteria for Modifying the Old-growth Network" below for detailed criteria for responding to stand-replacing disturbance within the old-growth network.

Importance of Old-growth Sites as Sustainable Forest Management Benchmarks

One of the purposes of establishing the old-growth network is to maintain examples of forests that have not experienced substantial logging or have otherwise been heavily modified by human actions. Forests with such old-growth characteristics, once common, are today rare landscape features. These ecologically significant lands therefore act as important benchmarks that can be studied to measure the effects of more intensive management on adjacent forests. If a designated old-growth stand is subject to a stand-replacing natural disturbance, the site can still serve as an important benchmark because natural disturbances affect the forest in different ways than man-made disturbances. Naturally disturbed stands in the network can be managed for natural regeneration as part of the natural disturbance-recovery cycle.

COOPERATIVE MANAGEMENT

Changes in individual old-growth site designations on DNR administered lands may be stimulated by cooperative management projects with other landowners aimed at creating more viable old-growth complexes that cross management jurisdictions. As the 1994 DNR Old Growth Forests Guideline stated: *"The guideline should be considered as an interim policy as planning efforts at the landscape level evolve to integrate goals and coordinate management on all ownerships"* (DNR Old-Growth Forests Guideline, 1994: page 1). For example, the Nature Conservancy purchased a 2,000-acre site in the North Shore Highlands, and the DNR has several designated old-growth stands adjacent to their site. Lake County also manages forest in the area, and the three landowners have agreed to develop a collaborative management plan for the area. As the partners explore options for the management plan, they may find that designating additional stands in the area may contribute to the viability of an older forest complex.

Conversely, some designated sites that are small, more isolated, of lower-quality, or lacking unique features may be best managed on extended rotations rather than as old-growth forest.

NEW INFORMATION

New information may also stimulate changes in old-growth designations on DNR-administered lands. More thorough inventory efforts may find high-quality old-growth stands that have never been evaluated. Newly acquired state lands may also meet old-growth criteria that upon evaluation may warrant inclusion in the old-growth network. The 1994 Old-growth Guideline states: *"As new information becomes available (i.e., County Biological Survey), this guideline will be revised."* Conversely, new information may show that some designated stands do not represent high-quality old growth, and if so, these stands may be removed from the network. DNR will be responsive to advances in forest science that give us better knowledge of the role of old growth in sustainable forest management and to questions of how much old growth is enough to maintain desired values. DNR will be responsive to changing public values and will adjust the proportion of state land dedicated to old-growth management according to public priorities.

Decision Process and Criteria for Modifying the Old-growth Network

This section is divided into two parts. Part A. describes a process and criteria for determining whether designated old-growth stands should be de-listed following stand-replacing disturbance. Part B. describes a process and criteria for adding or removing stands from the old-growth network when the potential for such changes is stimulated by new information or collaborative management efforts.

A. DECISIONS STIMULATED BY STAND REPLACING DISTURBANCE

The general process for determining whether a stand-replacing disturbance event should result in de-listing a candidate or designated old growth stands is as follows:

1. As soon as possible after the disturbance event, the discipline responsible for administering the land where the disturbance occurred will notify the chair of the regional old-growth committee (regional managers from Forestry, Fish & Wildlife, Ecological Services, and Parks will appoint the team chair and a representative from each division). The administering discipline will establish a reasonable decision deadline that will allow enough time for evaluation but will not foreclose options for other uses such as salvage. The decision must be based on degree of disturbance and the availability of a replacement stand (see decision tree and criteria in Box 1.).

2. The disciplines will work together to make a decision by the deadline, using the criteria listed below. If the disciplines cannot reach consent, they should follow the dispute resolution process outlined in the Forest Management Coordination Policy.

3. The regional old-growth committee will document the decision and criteria used to make the decision, and provide this documentation to the Regional Director, the statewide Old Growth Committee and the statewide old-growth data coordinator (Clarence Turner). Appropriate staff will update TBR (Timber Management Status) codes in the FIM (Forest Inventory Management) database. Correct codes will be "5" for designated old-growth, "7" for designated potential future old growth, or code used prior to nomination if de-listed. Comments on reasons for decisions are added to Dsgncomm field in the old-growth table in the FIM database.

If a large number of stands are affected by an extraordinary disturbance event, and pending salvage auctions or threats to safety require immediate decisions, the above process may be modified as follows:

1. The administrative discipline will notify the other disciplines that immediate action is needed. If an interdisciplinary team cannot be rapidly convened, the administrative discipline will ensure that the criteria listed below are used to make a preliminary decision on whether the stand should be de-listed and made available for other uses. The administrative discipline will notify the other disciplines of the preliminary decision and will request a response by a specified date. If the other disciplines do not respond by the

deadline, the administrative discipline can move ahead with its proposed course of action. If the disciplines cannot reach consent, the RMT will resolve the issue by the original deadline date.

2. The administrative discipline will document the decisions and criteria used to make the decision, and provide this documentation to the Regional Director, the statewide Old Growth Committee, and the statewide old-growth data coordinator (Clarence Turner). Appropriate staff will update TBR codes in FIM (5 for designated old-growth, 7 for designated potential future old growth, or code used prior to nomination if de-listed). Comments on reasons for decisions are added to Dsgncomm field in the old-growth table in the FIM database.

BOX 1. Decision Tree for Determining Old-growth Designation Status After Disturbance

The following decision-tree, along with professional judgment, will be used to determine whether disturbed stands will be retained or removed from the designated old-growth network. Additional criteria that may apply to the decision are listed below the decision tree.

1. Is the stand "primary forest" (no evidence of previous harvesting)?
   - A. NO — Go to 2.
   - B. YES — Retain stand in old-growth network as required by FSC Principle 9.

2. Is the majority of the stand disturbed (i.e., stand-replacing disturbance)?
   - A. NO — Retain stand in old-growth network.
   - B. YES — Go to 3.

3. Is the stand on school trust land?
   - A. NO — Go to 4.
   - B. YES — Go to 5.

4. Is a similar quality replacement stand available in the subsection?
   - A. NO — Retain stand in old-growth network as future old growth.
   - B. YES — Consider de-listing disturbed stand and designating replacement.

5. Is a similar quality replacement stand available in the subsection?
   - A. NO — Retain stand in old-growth network as future old growth; compensate the trust.
   - B. YES — De-list stand and designate replacement stand.

6. Additional criteria to consider:

Criteria in favor of removing stand from old-growth network	Criteria in favor of retaining candidate or designated status
▪ Not salvaging poses significant fire/disease/insect risks to adjacent non-designated stands or risks to homes or buildings near the site.	▪ Retaining the site as future old growth does not pose significant fire/disease/insect risks to adjacent non-designated stands or risks to homes or buildings near the site.
▪ There is not good regeneration of the old growth type in the understory and regeneration would be difficult to establish through fire or other management efforts.	▪ There is good regeneration of the old growth type in the understory or good regeneration could be established through fire or other management efforts.
▪ Stand is not used for ongoing research, or release or salvage will be problematic for the research.	▪ Stand is used for ongoing research, release or salvage will be problematic for the research.
▪ Stand is not being considered for an SNA.	▪ Stand is being considered for an SNA.

B. DECISIONS STIMULATED BY COLLABORATIVE MANAGEMENT AND NEW INFORMATION

This section is divided into two parts. Part B.1 describes a process for considering potential additions to the old-growth network, and part B.2 describes a process for considering potential removals. There is no automatic requirement for removing stands from the network when new stands are added, or adding stands when currently designated stands are removed. However, the following guidance applies to this issue:

When new, high quality stands are added to the network, staff *may* remove lower quality stands, under the following circumstances:

a) **The stand being added is a covertype that is well represented in the subsection's protected old-growth network. This means multiple locations currently ensure adequate representation, redundancy, and resiliency allowing for the maintenance of sufficient habitat in the face of succession and disturbance (e.g., fire and windstorm); and**

b) **The proposed removals are lower quality, lack unique features, and are small (<20 acres) and/or isolated. Forest stands that are both "primary" AND "old-growth" cannot be removed from DNR's protected old-growth forest network[1]**

B.1: Process for considering potential additions to the old-growth network:

1. DNR staff nominate stand (s) using the Old-Growth Stand nomination form (Attachment 1); requires field visit and basic data collection.

2. Field forms are forwarded to the chair of a regional old-growth committee (regional managers from Forestry, Fish & Wildlife, Ecological Services, and Parks will appoint the team chair and a representative from each division).

3. The regional old-growth committee screens nominated stand (s) using the decision tree below (Box 2). The team determines (by consent) which stands become old-growth candidates requiring full field evaluations.

4. The committee chair sends list of candidates to appropriate area or regional staff, ensuring that candidates are coded as "8" in TBR_CD field of FIM database.

5. Regional old-growth committee appoints two-person interdisciplinary team (s) to conduct field evaluations. Contact Clarence Turner for an electronic location for field evaluation forms and instructions.

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[1] "Primary" stands have no history of logging or development; old-growth stands have old-growth characteristics as defined in DNR's 1994 Old-growth Guideline (generally over 120 years old, with large old trees, large snags, downed logs, and complex vertical structure).

6. Interdisciplinary field evaluations are conducted, and data is entered into the evaluation database (MS access). Contact the Statewide Old-growth data coordinator (Clarence Turner) for information on how to access and use the database.

7. The regional Old-growth committee prepares necessary information (scores, GIS maps, etc.) and holds decision meeting. They review information and either de-list or designate the candidates. Comments on reason for decisions are added to Dsgncomm field in the old-growth table in the FIM database. If the regional old-growth committee cannot come to consent on stand decisions, they should follow the dispute resolution process outlined in the Forest Management Coordination Policy.

8. Appropriate staff will update TBR (Timber Management Status) codes in the FIM (Forest Inventory Management) database. Correct codes will be "5" for designated old-growth, "7" for designated potential future old growth, or code used prior to nomination if de-listed..

Box 2.

Decision Tree Determining Old-Growth Candidate Status (Candidate or removed from nomination list)

The following decision-tree will be used to determine whether nominated stands will be listed as candidate old-growth (to get full old-growth evaluations) OR will be removed from the nomination list.

1) Is the stand potentially primary forest? (no evidence of previous harvesting).

   a) No. Go to 2.

   b) Yes. Consider the stand "candidate old growth" and conduct field evaluation.

2) Has the stand been evaluated before?

   a) No. Go to 3.

   b) Yes. Unless the stand has something exceptional that was missed in the previous evaluation, remove the stand from the nomination list.

3) Does the stand meet general characteristics of old growth candidates described on p. 4-6 of the 1994 Old-growth Forests Guideline?

   a) No. Remove the stand from nomination list.

   b) Yes. Consider the stand "candidate old growth" and conduct field evaluation.

B.2 Process for considering potential removals from the old-growth network

1. DNR staff nominate stand (s) using the Old-Growth Stand nomination form (Attachment 1); requires field visit and basic data collection.

2. Field forms are forwarded to the team chair of a regional old-growth committee (regional managers from Forestry, Fish & Wildlife, Ecological Services, and Parks will each appoint a representative).

3. Regional old-growth committee screens nominated stand (s) and determines whether stand (s) should be candidates for removal from the network. Professional judgment and interdisciplinary consent will be used to make this decision.

4. The regional old-growth committee prepares necessary information (scores, GIS maps, etc.) and holds decision meeting. They review information and either de-list or retain stand as old-growth. Comments on reasons for decisions are added to Dsgncomm field in the old-growth table in the FIM database. If the regional old-growth committee cannot come to consent on stand decisions, they should follow the dispute resolution process outlined in the Forest Management Coordination Policy.

5. Appropriate staff will update TBR (Timber Management Status) codes in the FIM (Forest Inventory Management) database. Correct codes will be "5" for designated old-growth, "7" for designated potential future old growth, or code used prior to nomination if de-listed.

Old-Growth Forests Guideline Amendment # 6

Site-level Management of Candidate and Designated Old-growth and Future Old-growth Stands

20 January 2002

This amendment clarifies, supplements, and amends the 1994 DNR Old-growth Forests Guideline and the 1995 addendum to the Guideline. That Guideline was intended to be a "living" document, to be revised as we learn more about how to effectively implement DNR's old-growth policy. This amendment will be incorporated into the next revision of the Guideline.

Candidate and Designated Stands

At the site-level, the focus will be on managing natural processes to promote regeneration and maintain or restore the integrity of the old-growth communities. In general, management should strive to maintain the current old-growth cover-type. However, this may not be practical for some stands, where natural succession is changing the stand to another type (e.g., white pine or oak converting to northern hardwood). Periodic monitoring of designated stands is essential to identify problems (e.g. exotic species, lack of regeneration) and set priorities for management. Site management plans will be developed for sites needing the most attention. As management plans are carried out, documentation and monitoring of results are an essential part of the planning process.

General guidance for candidate or designated stands (1994 Old-Growth Forests Guideline):

1. These stands will not be selected for harvest or forest development work including salvage[1] and timber stand improvements.
2. Wildlife opening and browse regeneration development will not occur in these stands.
3. Pesticides will not be used in these stands except when necessary to protect forest stands from a serious exotic threat (e.g., gypsy moth, European buckthorn).
4. New road development should not occur in these stands. Access through these stands may be permitted on a case-by-case basis to address existing uses or to meet legal obligations (e.g., prior timber permit sold in vicinity). Wherever possible, such access or use will be restricted to corridors or sites offering the least disturbance to the ecological integrity of the stand. In some cases, it may be necessary to partition a stand for management purposes.

Suggested Management Tools:

In general, management activities should use the least intensive methods available to achieve objectives. Use of hand tools (including chain saws, hand cutters, etc.) are preferred over mechanized equipment (equipment that is driven). Mechanized equipment is more likely to compact soils and is more difficult to limit damage to non-target items. In specific cases, the extent and the scope of the activity may necessitate the use of more mechanized means. The land manager should provide justification of such methods in the management plan.

The following management tools and activities can be used in designated old-growth stands (see Table 1 for an overview). These are not prescriptive management guidelines - staff responsible for old-growth management plans should follow these broader guidelines and document rationale for any adjustments or additions to these activities.

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[1] Salvage may occur if it is decided that the stand will no longer be part of the old-growth network following a stand-replacing disturbance.

A. Maintaining natural processes and regeneration:

For fire-dependent systems (oak and pine), **prescribed burning** is a primary management tool. All prescribed burns will be conducted in compliance with DNR's prescribed burning guidelines (Operational Order number 47). DNR's Prescribed Fire Handbook provides information on developing prescribed fire plans. Where fire suppression has resulted in a build-up of ladder fuels (usually balsam fir), **ladder-fuel removal** is allowed if deemed necessary for a safe and successful burn. If **fire line construction** is necessary, every effort should be made to place the lines outside of the old-growth stand.

B. Exotic Plant Control/Removal:

Mechanical removal using hand tools may be used to control exotic species, such as European buckthorn. **Herbicides**, generally used in conjunction with mechanical removal, are allowed for the control of serious exotic threats. Application of herbicides should generally be directed to specific plants or sites and not indiscriminately broadcast.

C. Herbivore control:

Budcapping is appropriate where seedling and sapling survival is compromised as a result of deer herbivory. **Exclosures** can also be used to promote tree regeneration, especially in pine and cedar stands, and/or herbaceous plant survival. **Hunting** of deer and small game can be promoted, in accordance with local regulations. Permanent deer stands and site-line clearing are discouraged.

D. Exotic Disease/ Pest control:

Where white pine blister rust has infected stands, **pruning** branches of younger trees (< 25 feet tall) can be used to reduce infection rates. **Insect traps** can be used where appropriate to control exotic insect species. **Insecticides** are allowed only for the control of serious exotic threats (e.g. Gypsy moth outbreaks).

E. Other activities that may affect old-growth stands:

Seed Collection - is allowed on a case-by-case basis through the permitting process established by the administrating unit in which the old-growth stand is located. All such activities should be documented.

Research - is allowed on a case-by-case basis through the permitting process established by the administrating unit in which the old-growth stand is located. All such activities should be documented.

New trail construction – is discouraged, but permitted if educational value is gained from increased access to the stand. New trails should be narrow and carefully designed so as not to disturb the canopy and minimally disturb the ground. Maintenance of trails should be minimal with no mowing and limited blow down clearing.

Posting –of old-growth stand boundaries may be necessary in certain areas and should be placed at the edge of the stand. Educational signs posted within an old-growth stand should be determined on a case-by-case basis.

Stands Adjacent to Candidate and Designated Stands

The ecological sensitivity of candidate old-growth and future old-growth stands should be considered when planning adjacent timber, habitat, or recreational developments. The minimum size necessary to maintain the ecological integrity of a forest stand depends on 1) the nature of the surrounding vegetation, 2) the degree of isolation of that stand from similar vegetation (e.g., mature or old forest stands), and 3) habitat requirements and population structures of the species found in that stand. The nature of the vegetation that surrounds an old-growth stand is extremely important. In general, a small stand will probably maintain its ecological viability if it is part of a larger block of mature or old forest. (See also *Old-growth Amendment #5 – Old Forest Management Complexes*). Management of adjacent lands should consider measures to avoid exposing an old-growth stand to the effects of wind, sun, and invading edge species. Attempts should be made to maintain most of the surrounding canopy to avoid isolating the stand from similar forest cover, especially when the candidate or future old-growth stand is less than 20 acres in size.

To minimize the probability of catastrophic windstorm damage to candidate or future old-growth stands, an area of at least 330 feet around any candidate or future old-growth stand shall be considered as a special management zone (SMZ). Guidelines for management within the SMZ are:

1. If a stand is over-mature and minimally merchantable, prescriptions that promote the development of the existing understory should be considered if silviculturally sound (e.g., white pine beneath old aspen).
2. SMZ's should be managed under the Extended Rotation Forest Guideline and through all aged management prescriptions where forest cover types allow. The remainder of a forest cover type outside the SMZ should be managed under the same prescription as that part of the type within the SMZ when it would provide significant additional protection and/or would result in a small unmanageable stand outside the SMZ if the stand were partitioned.
3. Where even-aged management by clear cutting in a SMZ is prescribed, harvests should be designed to minimize wind damage by initiating the clear cut on the leeward side first. Subsequent regeneration from a clear cut should reach 1/3 its potential mature height before an adjacent portion of the SMZ is harvested by clear cutting. No more than 25% of the protected stand's perimeter should be exposed to regeneration less than 1/3 its potential height.

Table 1 – Examples of anticipated management activities in old-growth stands. Note, this list is not intended to be prescriptive nor exhaustive; rather it highlights the most common activities associated with broader management objectives. Staff responsible for old-growth management should follow these guidelines and will document the rationale for any adjustments or additions to these activities.

Activity	Allowed?	Objective(s) : Code(s) (see page 2)		Conditions
Prescribed fire	Yes	Maintain natural processes, promote regeneration	A, B	Except in unique cases determined by land manager, construct fire breaks outside of old-growth stand boundaries.
Removal of ladder fuels	Yes – given certain conditions	Part of prescribed burn, maintain natural processes.	A	In cases where fuel build-up creates hazardous burning conditions. Encourage use of hand tools, but extreme cases may require more mechanized methods.
Mechanical removal of exotic species	Yes	Control of exotic species such as buckthorn	B	Use of hand tools encouraged.
Animal exclosures	Yes	Herbivore control to ensure seedling, sapling, and understory species survival	C	Constructed so as to not degrade the integrity of the forest community.
Bud-capping	Yes	Herbivore control to ensure seedling and sapling survival	C	
Insect traps	Yes – given certain conditions	Control of exotic pests such as gypsy moth	D	Exotic pests only.
Pesticide use	Yes – given certain conditions	Control of exotic species such as buckthorn or gypsy moth	D	Not allowed for reducing competition by non-exotic species. Site specific application only – no general broadcasting.
Pruning	Yes – given certain conditions	Reduce infection by white pine blister rust	D	Pruning of younger trees (<25 feet tall). Use of hand tools encouraged.
New trail construction	Yes – given certain conditions	Educational benefits of increasing public access to stand.	E	Narrow and carefully designed.
Research	Yes – given certain conditions		E	Permitting process as established by DNR land administrator.
Seed collection	Yes – given certain conditions		E	Permitting process as established by DNR land administrator.
Harvesting	No			
New road development	No			
Salvage harvesting	No			
Timber stand improvements	No			
Wildlife opening and browse regeneration	No			