

FIRE MANAGEMENT PLAN

for

SLEEPING BEAR DUNES NATIONAL LAKESHORE

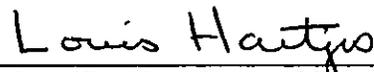


United States Department of the Interior
National Park Service
Sleeping Bear Dunes National Lakeshore
Empire, Michigan

FIRE MANAGEMENT PLAN
for
SLEEPING BEAR DUNES NATIONAL LAKESHORE

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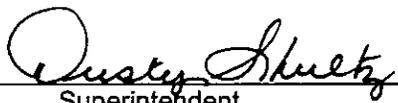
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TABLE of CONTENTS

I.	INTRODUCTION.....	1
A.	REQUIREMENTS	1
B.	GOALS AND OBJECTIVES TO ACHIEVE	1
1.	Unit Objectives	1
2.	National Fire Plan Goals.....	1
C.	NEPA AND OTHER COMPLIANCE	2
D.	AUTHORITY FOR IMPLEMENTATION	2
1.	Section 102	3
2.	Public Law 101-121.....	3
3.	31 USC 665 (E) (1) (B).....	3
II.	COMPLIANCE WITH POLICY AND RELATION TO OTHER PLANS.....	4
A.	NPS AND 2001 FEDERAL FIRE MANAGEMENT POLICY	4
B.	RELATION TO ESTABLISHING LEGISLATION	4
1.	Establishment.....	4
2.	Purpose	4
3.	Administration	5
4.	Significant Resources	5
5.	Threatened or Endangered (T&E) Species	6
6.	Cultural Resources.....	6
C.	OBJECTIVES OF GENERAL MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT	6
D.	GUIDANCE OF RESOURCE MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT	7
1.	Problem Identification	7
2.	Solution Identification	7
3.	Solution Requirements.....	7
4.	Actions	7
E.	ACHIEVING GMP AND RMP OBJECTIVES THROUGH THE FMP.....	7
F.	FMP PROGRAM STATEMENT	7
III.	SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM	8
A.	SLEEPING BEAR DUNES NATIONAL LAKESHORE FIRE MANAGEMENT GOALS	8
1.	Preparedness and Suppression.....	8
2.	Hazard Fuels Management	8
3.	Vegetation Management	8
4.	Public Use/Interpretation.....	8
B.	WILDLAND FIRE MANAGEMENT ELEMENTS	9
1.	Wildland Fire	9
2.	Fuels Management.....	11
C.	FIRE MANAGEMENT UNITS (FMUS).....	11
1.	Unit I – Island	11
2.	Unit II – Mainland	22
IV.	WILDLAND FIRE MANAGEMENT	31
A.	GENERAL IMPLEMENTATION PROCEDURES.....	31
B.	WILDLAND FIRE USE	32

1.	Objectives of Wildland Fire Use.....	32
2.	Decision Criteria for Wildland Fire Use.....	33
3.	Preplanned Implementation Procedures	33
4.	Non-Preplanned Implementation Procedures	34
5.	Potential Impacts of Plan Implementation.....	34
6.	Staff Responsibilities for Wildland Fire Use Implementation.....	34
7.	Public Information	36
8.	Wildland Fire Plans and Documentation	36
9.	Cost Tracking.....	37
C.	WILDLAND FIRE SUPPRESSION	37
1.	Fire Behavior	37
2.	Preparedness	37
3.	Pre-Attack Plan	39
4.	Initial Attack	39
5.	Extended Attack and Large Fire Suppression.....	41
6.	Exceeding Existing WFIP.....	42
7.	Minimum Impact Suppression Tactics (MIST)	42
8.	Fire Rehabilitation	42
9.	Records and Reports	43
V.	FUELS MANAGEMENT	44
A.	LONG-TERM FUELS MANAGEMENT	44
B.	PRESCRIBED FIRE.....	44
1.	Annual Preparation	44
2.	Long-term Prescribed Fire Relation to FMUs	45
3.	Personnel Requirements	45
4.	Fire Behavior and Fire Effects Monitoring.....	45
5.	Critique of Prescribed Fire Operation.....	45
6.	Documentation and Reporting	46
7.	Historic Fuel Treatments	47
C.	PRESCRIBED FIRE PLAN	47
D.	EXCEEDING PRESCRIBED FIRE PLAN	47
E.	AIR QUALITY AND SMOKE MANAGEMENT.....	47
1.	Air Quality Issues	47
2.	Smoke Management	47
F.	NON-FIRE APPLICATIONS	50
1.	Annual Preparation	50
2.	Restrictions	50
3.	Effects Monitoring.....	51
4.	Mechanical Treatment Critique Format.....	51
5.	Cost Accounting	51
6.	Documentation and Reporting.....	51
7.	Annual Planned Project List	52
VI.	FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES	53
A.	ORGANIZATIONAL STRUCTURE	53
1.	Superintendent or Designee	53
2.	The Area Fire Management Officer (FMO)	53
3.	Park Fire Coordinator (PFC)– Chief of Natural Resources	53
4.	Chief Ranger	54

5. Great Lakes Fire Ecologist	54
B. FIREPRO FUNDING	54
C. INTERAGENCY COORDINATION AND AGREEMENTS	54
VII. FIRE RESEARCH.....	56
A. PREVIOUS AND ONGOING FIRE RELATED RESEARCH.....	56
B. FIRE RESEARCH NEEDS	56
VIII. MONITORING.....	57
A. SHORT AND LONG-TERM MONITORING.....	57
B. THE FIRE MONITORING HANDBOOK.....	58
C. FIRE MONITORING PLAN.....	58
IX. PUBLIC SAFETY.....	59
A. ISSUES AND CONCERNS	59
1. Island Issues.....	59
2. Mainland Issues	59
B. MITIGATION.....	59
X. PUBLIC INFORMATION AND EDUCATION.....	61
A. CAPABILITY AND NEEDS.....	61
B. RESPONSE TO INCREASING FIRE ACTIVITIES.....	61
XI. PROTECTION OF SENSITIVE RESOURCES	62
A. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES	62
B. NATURAL RESOURCES	66
1. Resources	66
2. Mitigation.....	66
C. INFRASTRUCTURE/INHOLDINGS.....	66
1. Improvements	66
2. Mitigation.....	66
XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW	67
A. INTRODUCTION	67
1. Scope.....	67
2. Reviews.....	67
3. Authority.....	67
4. Incident Types.....	67
5. Associate Director.....	67
6. Purpose	68
B. FIRE REVIEWS.....	68
1. "Hotline" Review	68
2. Incident Management Team (IMT) Closeout and Review	68
3. Unit Level Review	68
4. Regional Level Review.....	68
5. National Level Review	69
6. Entrapment and Fire Shelter Deployment Review	69
C. PROGRAM REVIEWS.....	70
1. Operations Evaluations	70
2. Annual Fire Program Review	70

3.	FIREPRO Review.....	70
4.	Fire Readiness Review.....	70
XIII.	CONSULTATION AND COORDINATION.....	71
	REFERENCES CITED OR REVIEWED	72
XIV.	APPENDICES.....	75
A.	ACRONYMS AND ABBREVIATIONS.....	76
B.	DEFINITIONS	78
C.	SPECIES LISTS	82
D.	NEPA AND NHPA COMPLIANCE.....	84
E.	ANNUAL REVISION DOCUMENTS.....	85
	1. Fire Call-up List.....	85
	2. Preparedness Inventory	86
	3. Cooperative Agreements.....	86
	4. Contact List.....	87
	5. Sample Limited Delegation of Authority.....	88
F.	WILDLAND AND PRESCRIBED FIRE MONITORING PLAN.....	90
G.	PRE-ATTACK PLAN.....	91
H.	STEP-UP PLAN.....	92
I.	FIRE READINESS REVIEW CHECKLIST	94
J.	LONG-TERM PRESCRIBED FIRE AND HAZARD REDUCTION PLAN.....	96
	1. Multi-Year Prescribed Fire Schedule.....	96
	2. Hazard Fuel Reduction Areas	96
K.	FIRE PREVENTION PLAN	98
L.	RENTAL EQUIPMENT AGREEMENTS	99
M.	CONTRACTS FOR SUPPRESSION AND PRESCRIBED FIRE RESOURCES	100
N.	WILDLAND FIRE IMPLEMENTATION PLAN.....	101
O.	WILDLAND FIRE SITUATION ANALYSIS FORM.....	103

List of Tables

TABLE 1 – REAL PROPERTY LIST FMU I	15
TABLE 2 – REAL PROPERTY LISTING FOR FMU II	27
TABLE 3 – DECISION CRITERIA CHECKLIST.....	32
TABLE 4 – MONTHLY RISK ANALYSIS.....	38
TABLE 5 – CHECKLIST OF WILDLAND DOCUMENTATION.....	43
TABLE 6 – CHECKLIST OF PRESCRIBED FIRE DOCUMENTATION	46
TABLE 7 – CHECKLIST OF NON-FIRE TREATMENT DOCUMENTATION	51
TABLE 8 – TABLE OF COOPERATIVE AGREEMENTS	54
TABLE 9 – T&E SPECIES LIST	82
TABLE 10 – PRE-ATTACK PLAN.....	91
TABLE 11 – STEP-UP PLAN.....	92
TABLE 12 – RECOMMENDED STAFFING LEVELS FOR STEP UP PLAN	93
TABLE 13 – NON-FIRE PROJECT SCHEDULE	96

List of Figures

FIGURE 1 – GENERAL MAP.....	10
FIGURE 2 – FMU I – ISLAND.....	12
FIGURE 3 – TRAVERSE CITY, MI CLIMATOLOGY.....	19
FIGURE 4 – FIRE OCCURRENCE SLEEPING BEAR DUNES.....	20
FIGURE 5 – FMU II – MAINLAND.....	24
FIGURE 6 – KNOWN CULTURAL RESOURCES.....	65

I. INTRODUCTION

A. REQUIREMENTS

The Fire Management Plan (FMP) is an addendum to Sleeping Bear Dunes National Lakeshore's Resource Management Plan. This plan outlines a detailed program of actions to be taken by the park to meet their established fire management goals.

The plan is also guided by Director's Order-18 (DO-18) which requires that all park units with vegetation capable of sustaining fire develop a FMP. Until a FMP is approved, the Lakeshore will aggressively suppress all wildland fires, taking into account the safety of firefighting personnel, the visiting public, area residents, and protection of all resources at risk on the unit.

B. GOALS AND OBJECTIVES TO ACHIEVE

Overall resource management objectives for the Sleeping Bear Dunes National Lakeshore (referred to as "Lakeshore" or SLBE") guide the FMP. Resource management objectives determine whether fire may be used as a tool to manipulate vegetation and how it will be managed.

1. Unit Objectives

The following goal is taken from the Management Objectives section (Resources Management) of the Sleeping Bear Dunes National Lakeshore 1993 Statement for Management:

"Provide for the inventory, study/description, monitoring, restoration, and protection of the natural flora, fauna, geological features, and the natural systems endemic to the area. Take preventive and corrective action for incidents harmful to these webs of life – such as all fires not identified as "allowable" in fire management plans, establishment of an alien species, or spills of hazardous material."

2. National Fire Plan Goals

In addition to existing planning document objectives, there are 4 goals in the National Fire Plan (NFP) that are addressed in unit fire management plans.

Goal 1. Improve Prevention and Suppression – Improvements in cooperative efforts with local and state units of government and other Federal agencies will result from direction in this plan.

Goal 2. Reduce Hazardous Fuels – Projects proposed in this plan, both mechanical and prescribed fire will assist meeting this goal at Sleeping Bear Dunes.

Goal 3. Restore Fire Adapted Communities – Projects proposed for Goal 2 will be a starting point for the restoration of fire to the vegetative community at the

Lakeshore.

Goal 4. Promote Community Assistance – Through the Rural Fire Assistance Program, funding may be provided to local Volunteer Fire Department's (VFD) for wildland equipment, and wildland fire training. The potential exists for additional VFD support including technical assistance to the community for risk reduction in the wildland urban interface.

C. NEPA AND OTHER COMPLIANCE

An Environmental Assessment (EA) guides the FMP and complies with National Environmental Policy Act (NEPA) requirements and National Park Service (NPS) policy. The completed EA analyzes environmental impacts of the operations detailed in this plan.

The FMP will implement activities in accordance with the regulations and directions governing the protection of historic and cultural properties as outlined in the Department of Interior Manual, Part 519 (519 DM), and Code of Federal Regulations (36 CFR 800). The National Historic Preservation Act of 1966 (NHPA), as amended, Section 106, sets the requirements for the protection of cultural properties found on the unit.

Sleeping Bear Dunes National Lakeshore provides habitat for several federally listed species. Federally endangered species include Piping Plover (*Charadrius melodus*) which nest on the beaches, and the Michigan monkey flower (*Mimulus glabratus* var. *michiganensis*). Critical habitat for Piping Plover is designated for certain beaches within the park. Federally threatened species include Bald Eagles (*Haliaeetus leucocephalus*) which nest on the area and Pitcher's Thistle (*Cirsium pitcheri*), a plant found in the Lakeshore dunes. These species are all listed as threatened or endangered under the Endangered Species Act of 1973. In addition, several state Threatened & Endangered (T&E) species are found in the Lakeshore, including the endangered Prairie Warbler (*Dendroica discolor*) and the Common Loon (*Gavia immer*), a threatened species. Section 7 consultation with U.S. Fish and Wildlife Service has been completed.

The EA, State Historic Preservation Officer concurrence and Section 7 consultation results will be found in [Appendix D](#).

D. AUTHORITY FOR IMPLEMENTATION

The legal authority for the operation of the fire management program is found in 16 U.S.C. Chapters 1 and 3. The specific authorities can be found in Department of Interior Manual 620 (620 DM 1.1). The Organic Act of the National Park Service (August 25, 1916, Section 102) provides the authority for implementation of this plan.

The authority for FIREPRO (Normal Fire Year Programming) funding and all emergency fire accounts is found in the following authorities:

1. Section 102

General Provisions of the Department of the Interior's annual Appropriations Bill provide the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

2. Public Law 101-121

Department of the Interior and Related Agencies Appropriation Act of 1990 established the funding mechanism for normal year expenditures of funds for fire management purposes.

3. 31 USC 665 (E) (1) (B)

This section of the United States Code provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

II. COMPLIANCE WITH POLICY AND RELATION TO OTHER PLANS

A. NPS AND 2001 FEDERAL FIRE MANAGEMENT POLICY

This FMP is prepared to meet the policy requirements of Director's Order 18, Wildland Fire Management dated November 17, 1998. The primary NPS policy consideration from DO 18 is: "Wildland fire may contribute to or hinder the achievement of park objectives. Therefore, park fire management programs will be designed to meet resource management objectives prescribed for various areas of the park and ensure that firefighter and public safety are not compromised." In addition, preparation of this plan meets the requirements set forth in 620 DM 1 and the requirements of the Federal Fire Policy update of 2001.

The goals of the NPS wildland fire management program are to:

- Conduct a vigorous and safe wildland fire management program with the highest professional and technological standards.
- Identify the type of wildland fire that is most appropriate to specific situations and areas.
- Efficiently accomplish resource management objectives through the application and management of prescribed and wildland fires.
- Continually evaluate the wildland fire program operations and accomplishments to better meet program goals by refining treatment and monitoring methods, and by integrating applicable technical and scientific advancements.

The 2001 Federal Fire Management Policy update addresses 17 distinct items, the foremost being safety; all Fire Management Plans and activities must reflect to meet this commitment. The full text of the policy, Secretarial Transmittals, and Appendices may be found at (<http://www.nps.gov/fire/fire/policy/rm18/index.htm>).

The four goals of the National Fire Plan are also addressed in this plan (see [Section I.B.2.](#))

B. RELATION TO ESTABLISHING LEGISLATION

1. Establishment

Sleeping Bear Dunes National Lakeshore, containing more than 71,000 acres, including 14,000 acres of non-federal land, was established by Public Law 91-479 on October 21, 1970.

2. Purpose

16 USC § 460x-1(a) states the purpose of establishment: "The Congress finds that certain outstanding natural features, including forests, beaches, dune formations, and ancient glacial phenomena, exist along the mainland shore of Lake Michigan

and on certain nearby islands in Benzie and Leelanau Counties, Michigan, and that such features ought to be preserved in their natural setting and protected from developments and uses which would destroy the scenic beauty and natural character of the area. In order to accomplish this purpose for the benefit, inspiration, education, recreation, and enjoyment of the public, the Secretary of the Interior (hereinafter referred to as the "Secretary") is authorized to take appropriate action, as herein provided, to establish in the State of Michigan the Sleeping Bear Dunes National Lakeshore. In carrying out the provisions of this subchapter, the Secretary shall administer and protect the Sleeping Bear Dunes National Lakeshore in a manner which provides for recreational opportunities consistent with the maximum protection of the natural environment within the area.”

3. Administration

Sleeping Bear Dunes National Lakeshore is administered under the Organic Act of August 25, 1916, which established the National Park Service. This act states the purpose of the National Park Service is, “...to conserve the scenery and natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations”.

4. Significant Resources

The Lakeshore contains over 70,000 acres (28,00 hectares) of land and water, including two islands (North and South Manitou) a combined 20,000 acres (8,000 hectares) in size, about 11,000 acres (4,400 hectares) of Lake Michigan waters, as well as scenic beaches, dunes, beech/maple forests, lakes, and streams (Figure 1). The park’s striking landforms were shaped by the vast glaciers that blanketed the area thousands of years ago during the Pleistocene Era, as well as by melt water from these glaciers and subsequent wind erosion. These landforms include the beaches, moraines, dunes, perched dunes, kettles, truncated headlands, drainage channels, embayment lakes, streams, bogs and springs. Each landform has its own characteristic vegetative cover and corresponding wildlife resources. Former land uses and resource exploitation or extraction, such as gravel pits, dumps, farming, logging, and grazing, have all impacted the park’s landforms and vegetative cover.

Fauna of note that occur in the park include the endangered Piping Plover that nests on the beaches, the threatened Bald Eagle that both passes through and nests at the Lakeshore, and the Upland Sandpiper, which nests in open fields and is considered a rare species in Michigan. Other grassland-nesting birds include the Savannah Sparrow, Grasshopper Sparrow, Vesper Sparrow and Bobolink, which are in nationwide decline but are stable or increasing in the park because of the absence of agriculture and grazing and the open field management plan, which protects the habitat of meadow-dwelling wildlife. Prairie Warblers, a Michigan threatened species, have excellent habitat in the pine/juniper vegetation behind the beaches. In addition, the park is used by ducks and geese that nest in the small lakes and ponds;

it also provides habitat for owls and hawks, as well as for such mammals as badgers, river otters, fox, mink, flying squirrels and many others.

Sleeping Bear Dunes National Lakeshore contains rare orchids and ferns, a grove of giant white cedar trees on South Manitou Island, and an array of plants of special interest including the federally listed threatened Pitcher's thistle and endangered Michigan monkey-flower.

Cultural Resources include archeological sites, historic structures and cultural landscapes. Archeological sites date from 3000 B.C. to the 20th century. There are more than 350 historic structures in the park are eligible for the National Register of Historic Places. The Lakeshore landscape includes historic farmsteads, barns, outbuildings, inns, cottages, schoolhouses, log cabins, lighthouses, and open fields.

5. Threatened or Endangered (T&E) Species

The implementation of the Lakeshore's fire management program will not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat. Fire management operations will consider appropriate actions to identify and protect from adverse effects any rare, threatened or endangered species, or their habitat, currently or subsequently located within the unit.

6. Cultural Resources

Park cultural resources will be better protected throughout the implementation of this plan. Pretreatment of hazard fuels and the involvement of cultural resources staff in planned prescribed fire operations will better preserve these resources than they would encounter during a wildland fire if no action were implemented.

C. OBJECTIVES OF GENERAL MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT

The park is currently operating under a General Management Plan dated 1979, that is silent on wildland fire. A new plan is expected to be completed within the next several years. The 1993 Statement for Management provides land management objectives for the Fire Management Plan. In addition to the statement cited in Section I.B.1 above, the following statement also provides FMP direction: Participate in regional programs with neighboring agencies that share in the responsibilities for these resources to ensure that efficient, effective preservation programs are in place. Where consumptive uses are mandated, ensure that resource bases are not harmed.

**D. GUIDANCE OF RESOURCE MANAGEMENT PLAN RELATED TO
FIRE MANAGEMENT**

The following objectives from the 2000 Resource Management Plan (RMP) can be related directly to fire management.

1. Problem Identification

To identify and describe natural resource problems which need attention in order to preserve the natural character of the Lakeshore.

2. Solution Identification

Identification of alternative solutions for solving resource problems with an assessment of the potential impacts of the alternatives.

3. Solution Requirements

A selection of alternatives and the requirements for solutions. Requirements may be for research, monitoring protection or management action and mitigation.

4. Actions

Detailed management action plans will describe procedures to accomplish resource management tasks.

**E. ACHIEVING GMP AND RMP OBJECTIVES THROUGH THE
FMP**

With proper planning and execution, wildland fire use and prescribed fire can be used to manage vegetation to produce healthier habitats as a background for the mainland and island areas of the Lakeshore. At the same time fuel management, using both mechanical means and prescribed fire, can reduce the risk to the cultural and historic resources and NPS infrastructure on the unit. Implementation of the FMP will achieve both GMP and RMP objectives listed under items C and D above.

F. FMP PROGRAM STATEMENT

The FMP is a detailed description of the actions necessary to carry out fire management policies and achieve both GMP and RMP objectives. Legal mandates related to the unit's establishment are also supported by the FMP. Further development of the fuels management program will assist in reducing levels of hazardous fuels, thereby reducing the risk of large, catastrophic fires; providing an acceptable level of safety to visitors, area residents and employees; providing increased defensibility of NPS infrastructure on the Lakeshore; and reducing the risk of wildland fire in the wildland-urban interface.

III. SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

A. SLEEPING BEAR DUNES NATIONAL LAKESHORE FIRE MANAGEMENT GOALS

The following goals, consistent with current Federal Wildland Fire Management Policy, have been developed for fire management and planning at the Lakeshore:

1. Preparedness and Suppression
 - a. Public and firefighter safety is the highest priority of every fire management activity.
 - b. Reduce the number of human-caused fires.
 - c. Suppress all human caused wildland fires to protect private property and park resources including archeological, historic, cultural landscapes, vegetative, wildlife, and infrastructure.

2. Hazard Fuels Management
 - a. Use appropriate methods of fuel management to reduce risk of fires in wildland-urban interface areas on the boundary and around inholdings/life estates.
 - b. Reduce the potential for large wildland fires which could adversely affect private property and unit resources.
 - c. Use mechanical means to reduce fuels in locations where fire use would adversely affect private property and unit resources.
 - d. Apply prescribed fire to maintain cultural landscapes and maintain reduced fuel loads.

3. Vegetation Management
 - a. Restore fire as an ecological disturbance process to appropriate vegetative communities.
 - b. Encourage growth of beneficial forest understory species.
 - c. Control exotic plant species.
 - d. Control or mitigate insect and disease attacks by providing a healthy diversity of forest age classes.

4. Public Use/Interpretation
 - a. Protect the visiting public and provide services traditionally found on the unit.
 - b. Increase public awareness of the role of fire in natural processes through interpretation.

B. WILDLAND FIRE MANAGEMENT ELEMENTS

A general reference map of the Lakeshore is found in Figure 1.

1. Wildland Fire

a. Suppression

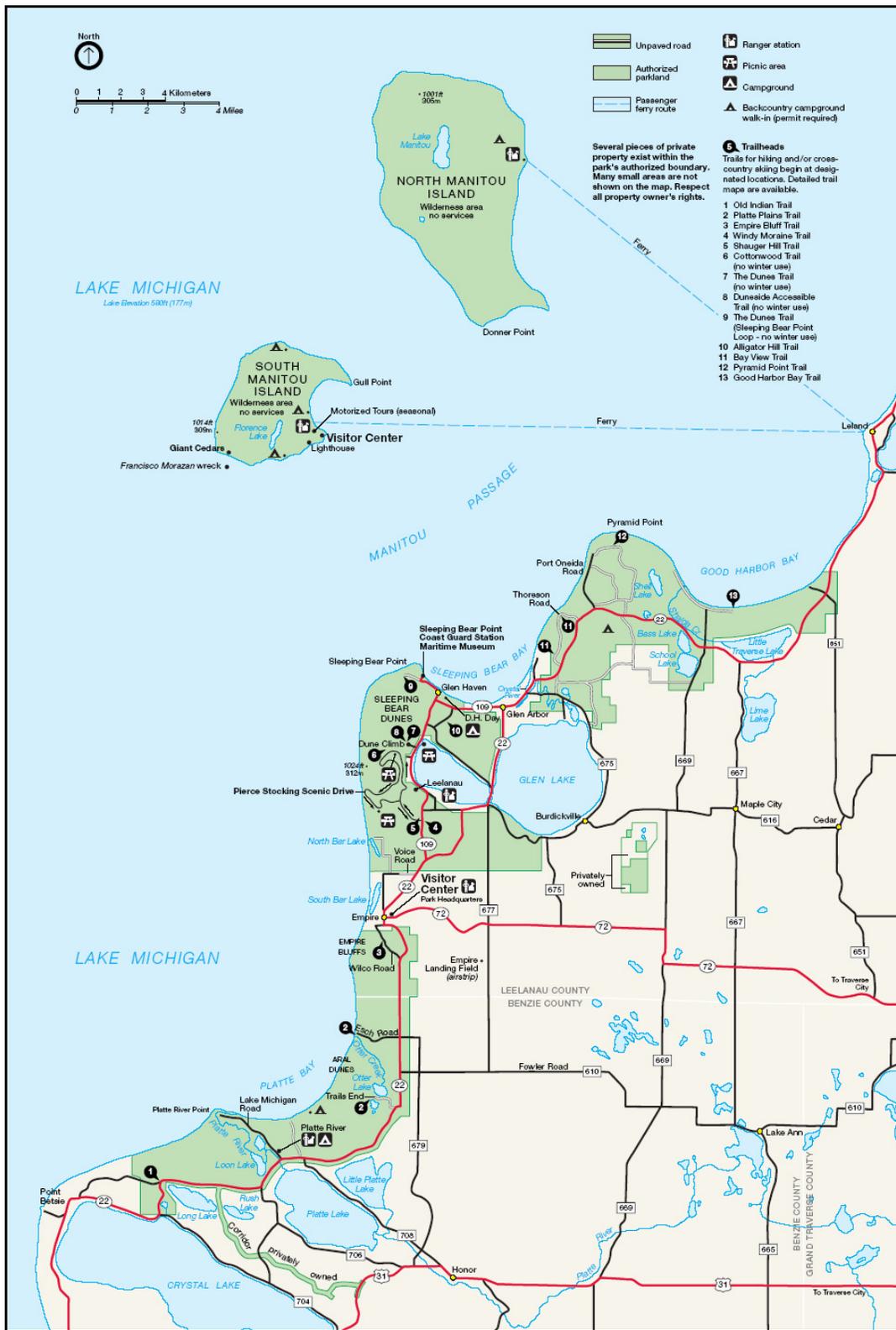
On the mainland all wildland fire regardless of cause will be suppressed using an appropriate management response. It is anticipated that local fire departments will continue to cooperate in this effort.

On the islands all human-caused fires will be suppressed . Lightning caused fires will be treated as described in [Section C](#).

b. Wildland Fire Use

There will be no wildland fire use on the mainland. Both North and South Manitou Islands will have portions of the island designated for wildland fire use from natural (lightning) ignitions only.

Figure 1 – General Map



2. Fuels Management

a. Prescribed Fire

Prescribed fire may be used for a variety of purpose at the Lakeshore including:

- hazard fuel reduction
- restoration/ maintenance of vegetation composition and structure
- improvement of wildlife habitat
- restoration/ maintenance of cultural landscapes.

b. Non-Fire Treatments

Mechanical means may be used to reduce hazard fuels. Mechanical treatment may stand alone or be an interim step prior to application of prescribed fire. Chemical means of vegetation control may be used when not in conflict with basic management policy. Use of chemicals adds dead vegetation fuel to the environment and will usually be followed by mechanical removal or prescribed fire treatment to reduce the fuel load.

C. FIRE MANAGEMENT UNITS (FMUS)

Two Fire Management Units have been identified at Sleeping Bear Dunes National Lakeshore. They are the Island and Mainland.

1. Unit I – Island

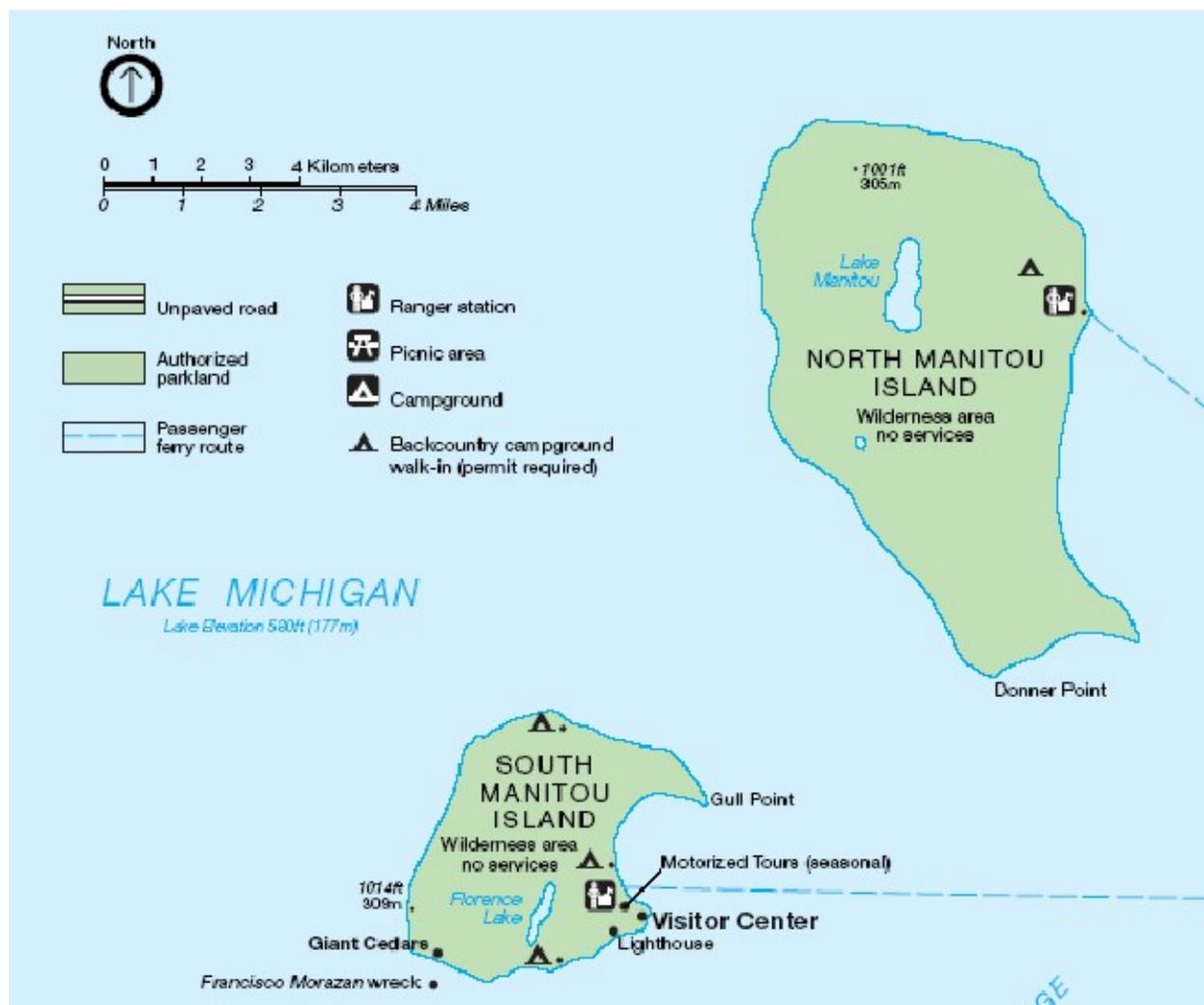
a. Description

The Island FMU contains approximately 20,000 acres with 5,000 acres located on South Manitou and 15,000 acres on North Manitou. Both islands are topographically similar with the high points being about 400 feet above Lake Michigan. The terrain is mostly gently rolling except for some steep dune areas on the west side of both islands. Figure 2 shows the islands in the FMU.

Access to both islands is by boat. Land access on the north island is limited to foot travel or all-terrain vehicles (ATV) on existing trails for emergency situations.

North Manitou Island (NMI) is approximately 7.75 miles long by 4.25 miles wide and has 20.7 miles of shoreline. The highest point on the island is in the northwest corner, 1,001 feet above sea level or 421 feet above Lake Michigan. The topography varies considerably on the island. Low, sandy, open dune country on the southeast side grades into high sand hills and blowout dunes on the southwest side of the island.

Figure 2 – FMU I – Island



South Manitou Island (SMI) is approximately 3 miles long by 3 miles wide and has 12.6 miles of shoreline. The high point is on the west side with an elevation of 1,014 feet above sea level or 434 feet above the lake. Topography is similar to North Manitou.

Land access on SMI is limited to foot travel or ATV use on existing trails for emergency situations. The road going to and through the cultural landscape in the center of the island will support light truck traffic and is a county road. Several other roads/trails on the island are also county road rights-of-way.

b. Vegetation

South Manitou Island –Most of the island is covered with northern hardwoods with scattered eastern hemlock (*Tsuga canadensis*) and eastern white pine (*Pinus strobus*) except for the cultural farmsteads which are maintained as open fields. There are several areas where abandoned agricultural fields have

grown up with heavy stands of common juniper (*Juniperus communis*). There is one red pine (*Pinus resinosa*) plantation just east of the old school. The southwest corner of the island contains a grove of old growth northern white cedar (*Thuja occidentalis*). One of the fallen trees showed 528 growth rings, dating its existence to before Columbus. This small area of virgin giant cedars escaped logging. One of these trees is the largest northern white cedar in the United States at 110 feet tall with a girth of 206 inches.

The coastal forest on the lake plain of the island's east side is a diverse mixture of conifers and deciduous trees occurring on a series of concentric ridges which formed as higher Lake Michigan levels receded. Drier sites are dominated by white pine, Jack pine (*Pinus banksiana*), and red pine. Some of the troughs retain moisture throughout the year and in moister sites balsam fir (*Abies balsamea*), white cedar, quaking aspen (*Populus tremuloides*), and hemlock are common. Occasionally beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), or red oak (*Quercus rubra*) are found. Common understory species include red maple (*Acer rubrum*), yew (*Taxus canadensis*), white birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*). The northern forests, generally found west of the coastal forest, are predominantly composed of sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), and hemlock. Unlike the mainland and North Manitou Island, black cherry (*Prunus serotina*) is rare on South Manitou. Understory species include red elderberry (*Sambucus pubens* Michaux), yew (*Taxus canadensis*), wild gooseberry (*Ribes cynosbati*), and saplings of overstory species. A band of northern conifers occurs on the steep, dune-exposed slopes bordering the east edge of the open perched dunes. Characteristic overstory species of this conifer forest include a dense growth of white cedar, balsam fir, and white birch with an occasional white spruce (*Picea glauca*). Such lake-exposed sites on the Manitou Islands are the only locations for naturally occurring white spruce in the National Lakeshore (Hazlett, 1991).

North Manitou Island – The majority of the island is covered by northern hardwood forests composed predominately of sugar maple, beech, black cherry, basswood, and white ash. Secondary associates include white birch, yellow birch (*Betula alleghaniensis*), hemlock, and big-tooth aspen (*Populus grandidentata*). Red oak (*Quercus rubra*) is most abundant in the woods north of the airstrip (abandoned) and near the tops of hills on the island's east side. There was an unnatural park like-setting of these forests, first noted in the 1940's by the Michigan Department of Natural Resources, attributed to a white-tailed deer population established on the island in the 1920's. A browse-line about six feet high is readily visible at the edges of fields and along the shorelines. Cedar swamps exist on the ends of Lake Manitou, noted by the General Land Office Survey in 1847. Some species such as yew, false spikenard (*Aralia racemosa*), bellwort (*Uvularia grandiflora*), staghorn sumac (*Rhus typhina*), blue cohosh (*Caulophyllum thalictroides*), highbush

cranberry (*Virburnum trilobum* Marshall), round-leaf dogwood (*Cornus rugosa*), bearberry (*Arctostaphylos uva-ursi*), white baneberry (*Actaea pachypoda*), dune cherry (*Prunus pumila*), buffaloberry (*Shepherdia canadensis*), and cow-parsnip (*Heracleum maximum* Bartram), common on South Manitou are either rare or apparently absent on North Manitou (Hazlett, 1991).

On the northern two-thirds of the island the forest cover is mainly northern hardwoods. The southern one-third is mixture of red and white pine and hardwoods. The southern portion contains several open grasslands, once used for agriculture, abandoned apple orchards are found in several locations, including the historic 180 acre Beuham orchard in the center of the island and a nearby American chestnut (*Castanea dentata*) grove.

c. Wildlife

South Manitou Island – The island supports only eleven species of mammals, compared to about forty species on the mainland. Island mammals include fox, beaver, coyote, chipmunk, fox squirrel, snowshoe hare, deer mouse and four species of bats. The small size and isolation of the island make it difficult to maintain a diverse mammal population.

North Manitou Island – The mammal population is similar to that found on South Manitou with one important exception. In 1927 four male and five female deer were introduced to the island with the hope that they would multiply to a number large enough for hunting. Since then the deer population has grown significantly due to lack of predation and artificial winter feeding supported for many years by the island owners. In 1981, 2,000 deer were counted during the fall and winter. The large number of deer and their overbrowsing modified the plant community extensively. Through management of the deer herd by hunting, the understory vegetation is increasing and beginning to return to its pre-1927 density and composition. Raccoons are another introduced species found on North Manitou, but not on South Manitou.

d. Threatened or Endangered Species

There are several state and federal threatened or endangered species found on the Manitou Islands. Among the Federally listed endangered species is the Piping Plover which uses the beach and dune portion of the Lakeshore. The dune plant Pitcher's thistle is federally listed as threatened. Bald Eagles have established nests on both islands.

e. Hydrology

Both islands contain natural lakes. There are several areas containing small wetlands. Soils are sandy for the most part and drainage is good.

f. Archeological Sites

There are numerous archeological sites, both historic and prehistoric, scattered around the unit. As is typical in the Great Lakes area, aboriginal use of the shore, interior lakes, ponds and streams was common. Mitigation actions, primarily identification and avoidance, will be necessary to protect archeological sites from damage due to fire and suppression activities.

g. Historical Sites (mid 19th to early 20th century)

South Manitou Island – There are two historical sites on this island. First is the village complex including the 1871 lighthouse. The second area is the farm loop consisting of several historic buildings and former farm fields managed as an historic landscape. This area is remote enough that a wildland fire from any cause could have significant impacts. In addition, individual historic buildings are scattered outside of these two principal areas.

North Manitou Island – The situation is similar to the south island. The village complex is maintained with trails going through it and wildland fire could be quickly suppressed because it is readily accessible and is generally maintained by mowing. Several historic landscapes with associated objects are also located on the island but are quite remote from the village area where suppression equipment is stored. These include the 180 acre Beuham Orchard and nearby American Chestnut grove, Crescent Barn and the Bournique site.

h. Unit Infrastructure

There is a seasonal Visitor Center located in the Old Post Office on South Manitou Island, and a visitor contact station located near the dock on North Manitou. Most of the National Park Service owned infrastructure is located relatively close to the shore. The primary exception is the property located on the farm loop on South Manitou Island. Between them, North and South Manitou Islands contain two ranger stations and four campgrounds. South Manitou Island has several miles of county road rights-of-way, but there are none on N. Manitou.

Table 1 shows the approximate number and value of real property on the islands including the inholdings.

Table 1 – Real Property List FMU I

Owner	# of Units	\$ Value
NPS – North Manitou Island	23	1,930,000
NPS – South Manitou Island	28	2,757,000
Federal Totals	51	4,687,000
Inholdings – North Manitou Island	1	56,000
Inholdings – South Manitou Island	2	111,000
Inholding Totals	3	167,000

i. Cultural Landscapes

The Lakeshore's historic maritime, recreation, and agricultural landscapes are of a size and quality that are unique on the Great Lakes and rare elsewhere on the United States coastline. Unit I Cultural Landscape Districts, Landscapes, or sites include:

- South Manitou Island Lighthouse and Coast Guard Station and Village
- North Manitou Cottage Row
- Bournique Cottage Complex
- North Manitou Island Life-Saving Station Complex
- Beuham Orchard and American Chestnut Grove
- North Manitou Island Sawmill Complex
- South Manitou Island Rural Historic Landscape
- Manitou Island Association Historic Landscape
- North Manitou Island Swenson (Westside) Barn Site
- North Manitou Island Cemetery Site
- South Manitou Island Henry Haas House Site
- South Manitou Island Theodore Beck House Site

Within these areas are multiple historic buildings, numerous cultural landscape features, prehistoric and historic archeological sites, and possible ethnographic resources. Cultural landscapes outside of the villages are predominantly fallow farm fields and associated orchards. The target condition for some of these areas is maintenance in their historic (open field) condition, rather than allowing reclamation by natural vegetative succession. These open field areas to be maintained are located on South Manitou Island. Current management of the areas also includes brush clearing around structures to mitigate potential fire risk.

j. Fire Management Objectives

- Ensure all fire operations cause no injuries to firefighters, park staff and members of the public.
- Ensure fire does not destroy any administrative or private structure, nor incur costly damage (rehabilitation costs over \$10,000) to any private, cultural or historical site or structure.
- Ensure initial appropriate management response strategy on unwanted wildland fires is successful 97% of the time.
- Contain 95% of unwanted wildland fires at less than 10 acres.
- Select wildland fire use as the appropriate management response in the Island FMU whenever possible, and manage these wildland fire use fires within the conditions of the Wildland Fire Implementation Plan (WFIP) 98% of the time.

k. Management Considerations

This unit includes the areas designated to be managed as wilderness on both islands. Areas on the islands that would not be managed for wildland fire use include the village areas and established campgrounds. Identified cultural landscape areas may be treated with prescribed fire but will not be included in wildland fire use fire perimeters. These landscapes and appropriate treatments will be identified through consultation with an Interdisciplinary Team that will include a historic landscape architect as well as fire management staff. Fuel reduction activities may also be undertaken to protect cultural resources from both wildland and prescribed fire, in consultation with the Park Cultural Resource Specialist.

Cultural resources will be adequately safeguarded from all wildland fires, prescribed fires and wildland fire use.

l. Historic Role of Fire

The fire ecology and the fire return interval of forests bordering the eastern shore of Lake Michigan are not well established. The moist maple-beech forests that predominate in the park generally appear less fire-prone or fire-dependent than jack pine and other conifer-dominated forests in the northern Great Lakes region. One recent study of upper Great Lakes coastal pine forests concluded that American Indians probably accounted for the majority of ignitions prior to Euro-American settlement in the region and later fire suppression (Loope and Anderton, 1998).

The number of forest fires and the acreage burned in Michigan dropped precipitously from the 1940's onward (MDNR, 2003). Nevertheless, rare but extreme droughts in Michigan have produced several large, catastrophic fires over the last 130 years. For the foreseeable future, these infrequent meteorological episodes can be expected to recur, bringing sharply increased risk of major wildland fires, a situation exacerbated by fuel accumulation from years of suppression.

Based on the information in Loope and Anderton (1998), few fires of other than anthropogenic origin would have occurred on these units prior to settlement. Their conclusion is that anthropogenic fires occurred primarily in the pine "bays" along the shore. These areas are generally isolated from other forest areas by wetlands or moist hardwood stringers. While fires in the hardwood areas probably occurred, it seems likely they were infrequent and small in extent. Hardwood stands located on drier sites may be affected more frequently and on a larger scale by fire.

Fire is likely to have occurred during the early settlement years but there is little available evidence of numbers or extent. In the last 50-60 years records from the State of Michigan and NPS indicate that most fires are human

activity related and have been relatively small due to aggressive initial attack policies.

m. Wildland Fire Management Situation

(1). Historic Weather

Climatic conditions in the vicinity of Sleeping Bear Dunes National Lakeshore are strongly influenced by Lake Michigan, which has a moderating effect on air temperatures. Because of the prevailing westerly winds, winters (November through March) are milder and summers (June through August) are cooler along the shoreline than in the interior areas. The moderating effect on the air temperature combined with the local air drainage patterns result in a growing period of approximately 150 days. This compares to a growing period of 100 days several miles inland.

Temperature and precipitation data are available from Traverse City which is approximately 20 miles west of the Lakeshore at the head of the West Arm of Grand Traverse Bay. Average high temperatures range from 26°F in January to 81°F in July. Average lows range from 11°F in February to 57°F in July. Record temperatures include -37°F in February, 1979 and 105°F in July, 1936. Due to the moderating effect of the lake it is expected that the Lakeshore temperatures would be slightly cooler in summer and warmer in winter. This climate provides a strong controlling influence on Lakeshore resources. The maritime climate helps to keep fire danger lower than further in on the mainland.

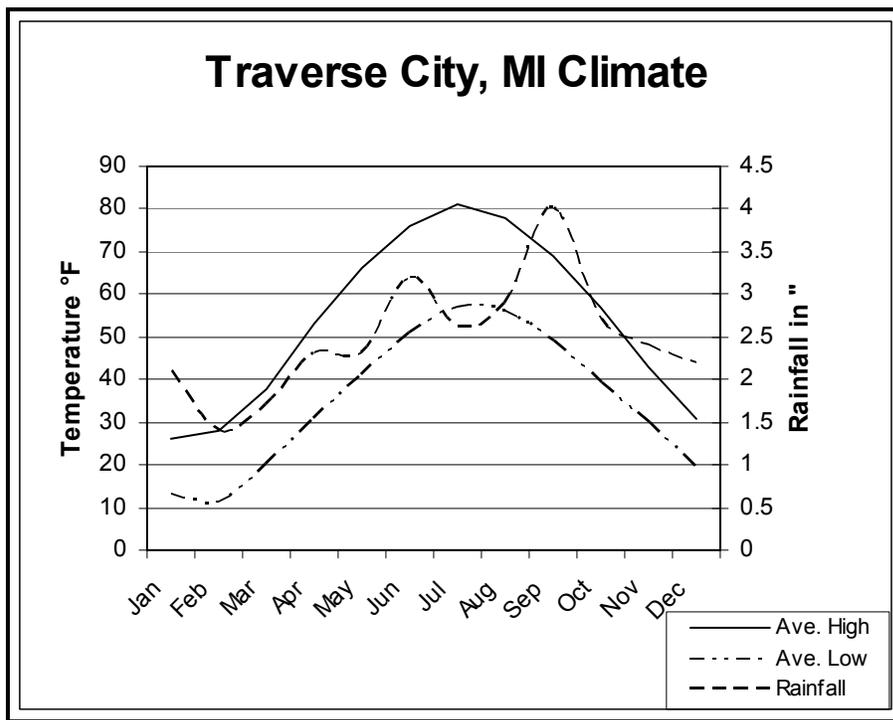
Precipitation averages 29.8" annually at Traverse City. Snowfall along the shore is approximately 160" annually.

Climate data is displayed graphically in Figure 3 below.

(2). Fire Season

A fire season has not been established through FIREPRO analysis due to the limited occurrence on the Lakeshore as a whole. The information for the last 20 years (1982-2001) has been extracted from the Shared Applications Computer System in Boise and is displayed graphically in Figure 4 below. Chart values are not averaged, but are totals for the 20 year period.

Figure 3 – Traverse City, MI Climatology



A review of one 10 year period indicated that perhaps 3 of 12 fires occurred in this FMU. Using the same percentages it is likely that less than 10 of the fires over the last 20 years occurred in the Island FMU.

Fires can be expected to occur from March through November with the peak occurrence coming prior to green-up in mid to late May.

(3). Fuels

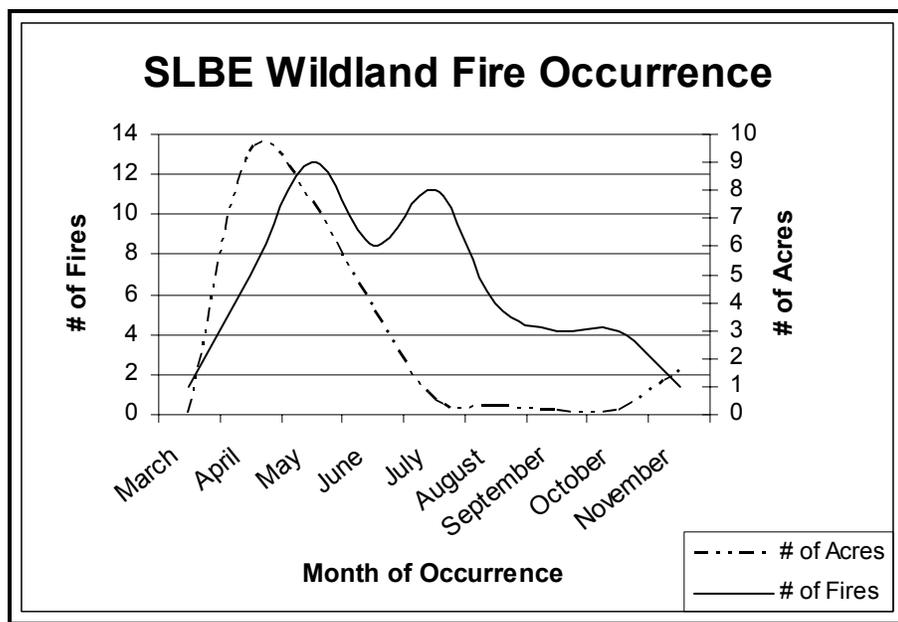
On South Manitou Island most of the fuel consists of a northern hardwood cover with occasional hemlock and eastern white pine, which is well represented by Northern Forest Fire Laboratory (NFFL) fuel models 8 and 9, hardwood and long-needle timber litter, National Fire Danger Rating System (NFDRS), (Deeming et al, 1977) fuel models R and E, hardwood litter summer and fall, and Canadian Forest Fire Danger Rating System (CFFDRS) fuel types M-1, M-2, and D-1, boreal mixed wood leafless and green and leafless aspen. Cultural landscapes consisting of herbaceous and shrub fuels, represented by NFFL fuel models 1 and 3, short and long grass, NFDRS fuel models A and L, annuals, and perennials, and CFFDRS fuel type O-1, grass, are scattered throughout the island. On the southwest portion of the island a stand of old growth northern white cedar exists, but because this area tends toward wetland conditions it is unlikely to burn. There is one red pine plantation of approximately 20 acres within the FMU, represented by NFFL fuel model 9, NFDRS fuel model U,

western long-needle pine, and CFFDRS fuel type C-5, red and white pine. Lake Florence is found in the southern part of the island; no other major sources of water exist on this island.

North Manitou Island contains approximately 10,000 acres of northern hardwoods; the remaining 5,000 acres is a mixed pine hardwood and grassland cover type. Both cover types are represented by NFFL fuel models 8 and 9 and NFDRS models R and E, and by CFFDRS fuel types M-1, M-2, and D-1. Cultural landscapes consisting of herbaceous and shrub fuels, represented by NFFL fuel models 1 and 3, short and long grass, NFDRS fuel models A and L, annuals, and perennials, and CFFDRS fuel type O-1, grass, are scattered throughout the island. A small lake (Lake Manitou) is located in the northern part of the island. A second smaller lake (Tamarack) is located in the southwest quadrant.

All of these fuels are normally at their driest in late fall and early spring. Drought conditions could occur during the summer but the maritime influence of Lake Michigan would, under most conditions, mitigate low fuel moistures. The highest risk of fire ignition and spread is between the time snow melts off until green-up occurs.

Figure 4 – Fire Occurrence Sleeping Bear Dunes



(4). Fire Behavior

Mixed Conifer/Hardwood. Mixed conifer/hardwood stands include aspen, birch, and conifers in any combination. Depending upon fuel loading, stands of mixed conifer/hardwood are represented by NFFL fuel models 8 or 10 (Anderson, H.E., 1982). Surface and/or crown fires can occur in any of these types. Conifer areas provide ladder fuels with low-hanging

branches and birch bark provides the ideal vehicle for spotting long distances. Periodic insect infestations create jackpots of dead aerial and surface fuels. Mop-up efforts can be hampered by the heavy fuels and soil conditions. Representative CFFDRS fuel models include M-1 and M-2, mixed wood leaf off and green up respectively.

Hardwood. During the leaf-off period, dead grass, leaf litter and other surface fuels provide the primary means for fire spread in hardwood stands. Increased solar radiation and unrestricted wind movement accelerate the drying of dead and down fuels. Fires are normally surface fires representative of NFFL fuel model 2. When hardwood leaves are present, however, surface fuels are generally unavailable due to shading and the resultant higher fuel moistures. At this time, NFFL fuel model 8 is more representative. Representative CFFDRS fuel model is D-1.

Grass. These fuels are of most concern in the spring and fall. In the spring, before growth begins and fuel moistures increase, these fuels dry out and can burn quickly with high rates of spread. After the growing season, plant moisture tends to decrease and particularly after a frost the fuel behaves as in the spring. NFFL fuel model 3 is representative of the grasses on the unit. The equivalent CFFDRS fuel model in O-1a (matted) for spring conditions and O-1b (standing) for fall conditions.

(5). Fire Regime Alteration

While the historic fire regime is unknown, it is likely that human use and development on the islands has modified the historic fire patterns. Additional research should be conducted to further define the role of historic fires. Historic fire patterns have been modified in several ways. Loope and Anderton (1998) suggest that fires are less frequent since Euro-American settlement. It is speculated that this is due to the fact that native people used fire to dry meat and foodstuffs, for preservation, to clear land and to stimulate berry production. When European settlement of the area occurred, this type of use was displaced and wildland fire was eventually controlled through more effective techniques.

(6). Control Issues

Control actions on the islands are guided by the existing requirement that the majority of land on the islands be managed as wilderness. There are few NPS staff on the islands and the equipment available consists of all-terrain vehicles with trailer mounted slip-on pumpers. Access is via trails on North Manitou Island; South Manitou Island has some road mileage outside of the proposed wilderness as well as trails. A few of the trails are too narrow to safely allow passage of existing equipment.

(7). Values at Risk

Cultural – This unit contains a number of cultural landscapes and historic structures. On South Manitou there is an 1871 lighthouse which is listed on the National Register of Historic Places. The U.S. Life Saving Station on North Manitou is a National Historic Landmark. Both of the islands contain other historic buildings listed on, or eligible for, the National Register of Historic Places. Where historic structures exist full suppression action would occur to protect those structures. Historic buildings and identified cultural landscape features such as fences, orchards, windbreaks and former garden sites will be protected by fire lines (hand or foam) and isolated from burnable fuels where possible. This may entail use of fire to blacken a safe area around these resources. Individual burnable features such as buildings and fence posts may be pre-treated with foam applications to prevent burning. More details are found in section [III.C.1.g.](#)

Infrastructure – On each island there are NPS structures used as administrative facilities. In areas with these structures full suppression would occur. Table 1 lists the structures and values for both NPS and inholding ownerships.

Natural Resources – On South Manitou Island a grove of old growth northern white cedar could be damaged or destroyed by fire occurring during drought conditions. There may be some risk to a Bald Eagle nest and Pitcher’s thistle but the risk is not excessive based on historic occurrence as deduced from Lakeshore records, and not likely to adversely affect those species.

Inholdings – There are a total of three inholdings on the two islands. These are located in the village areas where the response would be full suppression.

2. Unit II – Mainland

a. Description

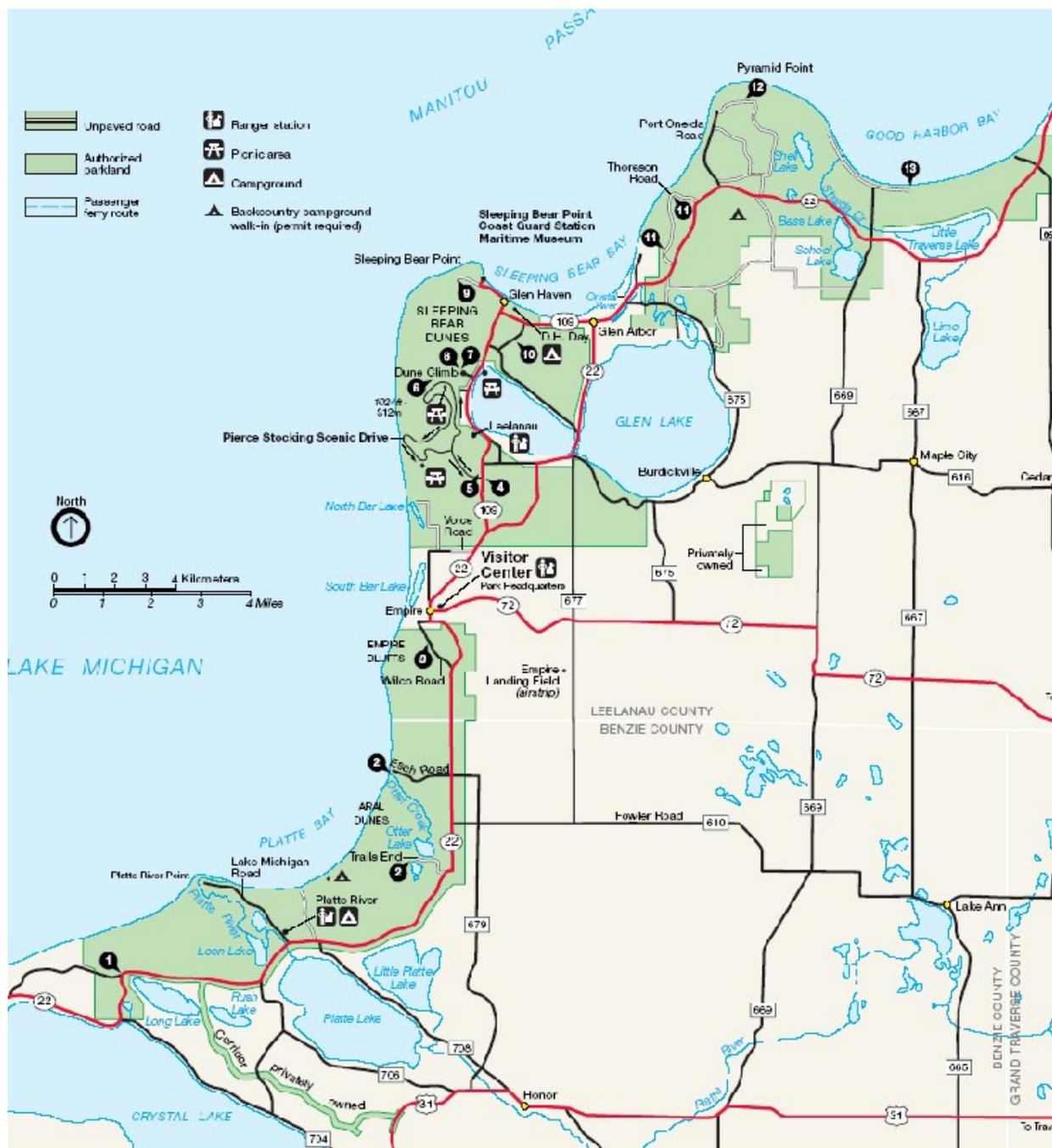
This unit includes the mainland portion of the Lakeshore which is located in the northwest portion of Michigan’s Lower Peninsula approximately 22 miles west of Traverse City. The unit extends along approximately 31 miles of Lake Michigan shoreline. Figure 5 illustrates the FMU.

The mainland portion consists of 4 distinct units. Along the lake from south to north are the Platte River Unit, Sleeping Bear Unit, and Good Harbor Unit. Lying inland is the Bow Lakes Unit. The unit is a full suppression unit with regards to all wildland ignitions. Prescribed fire is acceptable and expected to be used to support management needs. There are numerous inholdings and

adjacent properties that create a significant Wildland-Urban Interface (WUI) issue.

The Mainland FMU contains approximately 39,000 acres of generally rolling lands. Several areas on the face of the dunes and along the Pierce Stocking Scenic Drive have quite steep slopes. This unit contains numerous ponds, wetlands, roads and trails that may potentially act as barriers to fire spread. The area is relatively narrow from lakeshore to inland boundary, ranging in width from about ½ mile to 4½ miles. The detached Bow Lakes Unit which is located southeast of Glen Lake is also part of this FMU. Elevations in the FMU range from Lake Michigan at 580 feet above mean sea level (MSL) to 1,024 feet MSL near Sleeping Bear Point.

Figure 5 – FMU II – Mainland



Access for equipment is available on roads and trails found throughout the unit. In most cases any point in the Mainland FMU is less than .5 miles from road or trail access.

Political boundaries are numerous due to the linear nature of the Lakeshore. The boundary line between Leelanau and Benzie County is located just south of the town of Empire.

b. Vegetation

Mainland vegetation is primarily northern hardwoods, similar to that described for the vegetation in Unit 1 – Island, including the coastal forest composition. A transition zone exists between the beach/dune areas and the northern hardwoods. This transition zone is found widely throughout the park. Species common to this transition zone include conifers such as Jack pine, common juniper, red pine and white pine. Many of the wetland and damp margin areas support other conifer species, such as northern white cedar, hemlock and balsam fir, as well as alder (*Alnus rugosa*), willow (*Salix* spp.) and other shrub species common to wetland areas. Several large conifer plantations exist, with some of the most common being red pine, scotch pine (*Pinus sylvestris*) and white spruce. Low protected pockets of the perched dunes find woody species as cottonwood (*Populus deltoides*), buffaloberry, red osier dogwood (*Cornus stolonifera* Michaux), bear berry, dune cherry, common juniper and grape (*Vitis riparia*). Open sand is often colonized by dune grasses such as *Agropyron dasystachyum*, beach grass (*Ammophila breviligulata* Fern.), little bluestem (*Andropogon scoparius* Michaux), *Calamovilfa longifolia* and June grass (*Koeleria macrantha*). Other dune plants include Pitcher’s thistle (*Cirsium pitcheri*), pucoon (*Lithospermum caroliniense*), common milkweed (*Asclepias syriaca*) and wormwood (*Artemisia caudate*)(Hazlett, 1991).

A total of 4 sensitive biological communities have been identified. Two of those communities are related to the Michigan monkey-flower and Pitcher’s thistle which are federally listed as endangered and threatened respectively. In addition, the Michigan Natural Features Inventory lists several state T&E species or species of concern. The complete list is found in [Appendix C](#). Many of the plant species listed are found in habitats that do not burn readily.

c. Wildlife

The mainland has a diverse wildlife population. Forty-two species of mammals have been reported on the Lakeshore. Mammals range from the black bear (*Ursus americanus*) to several species of bats. The bird list contains over 200 species. Detailed species lists may be found in the NPS online species database, NPSpecies or in Lakeshore resource management files. Most species found on the Lakeshore are adapted to disturbance and are not expected to suffer adverse effects from occasional wildland fires.

d. Threatened or Endangered Species

There are several state and federal listed T&E species found within the Lakeshore. Among the federally listed species is the Piping Plover which uses the beach and dune portion of the Lakeshore. The Michigan monkey-

flower is on the Federal endangered list. Pitcher's thistle is widespread through the unit and is federally listed as threatened. There have been numerous reports of cougar sightings. Cougars are listed as extirpated on the federal list of threatened and endangered species, but listed as endangered by the State of Michigan. Some reports from the state indicate that gray wolves may have crossed from the Upper Peninsula to Lower Michigan making them a potential visitor to the area. Bald eagles have established nests within this unit.

e. Archeological Sites

There are numerous archeological sites scattered around the unit. As is typical in the Great Lakes area, aboriginal use of the shore, interior lakes, ponds and streams was common. Of particular importance is the evidence of human occupation with a number of the earliest archeological sites dating to the Late Archaic period (3000 BC-50 BC) (Zedeno et al., 2001) and sites associated with the Woodland and Historic aboriginal periods. There are Woodland and Historic aboriginal sites that would possibly be more threatened by the impacts of fire, since they contain fragile pottery fragments, and occasionally contain preserved faunal remains, in close proximity to the current ground surface.

f. Historical Resources

Mainland cultural resources include structures and landscapes associated with agricultural, recreational and maritime themes. Mainland areas that have historical sites are generally associated with early farming developments. The area known as Point Oneida Rural Historic District is one example. In addition, there are several other qualifying areas on the mainland including the Maritime Museum. There are specific management documents for these sites available in the Lakeshore office.

g. Cultural Landscapes

Unit II Historic Districts, cultural landscape, or historic sites include:

- Sleeping Bear Point Life-Saving Station
- Glen Haven Village Historic District
- Port Oneida Rural Historic District
- Boekeloo Historic Landscape
- D.H. Day Campground and Log Cabin Landscape
- Bufka Farmstead
- Ken-Tuck-U-Inn Historic Landscape
- Tweedle/Treat Farmsteads Historic Landscape
- Bufka/Kropp/Eitzen Rural Historic Landscape
- Shalda Cabin Site
- Esch House Yard
- Empire Air Base Housing Complex
- Historic Aral Townsite

These areas are predominantly farm fields and a few orchards. Many of these landscapes are managed as open fields through the Lakeshore’s Open Fields Management Plan (NPS, 1990). As additional planning is completed, there is some potential for prescribed fire to be considered as a management tool to assist in the management of these landscapes. These landscapes and appropriate treatment will be identified through consultation with an Interdisciplinary Team that will include a historic landscape architect as well as fire management staff. Fuel reduction activities may also be undertaken to protect cultural resources from both wildland and prescribed fire, in consultation with the Park Cultural Resource Specialist. Within the identified areas are multiple historic buildings, numerous cultural landscape features, prehistoric and historic archeological sites, and a large potential for ethnographic resources. The sensitivity of many sites requires careful application of suppression actions and detailed planning, which includes the park Cultural Resource Specialist, should prescribed fire be used as a management tool.

h. Unit Infrastructure

Sleeping Bear Dunes National Lakeshore’s Philip A. Hart Visitor Center and park headquarters is located in the village of Empire, toward the middle of the park along its north-south axis. Other park facilities on the mainland include two ranger stations, several picnic areas, two developed campgrounds (Platte River and D.H. Day) and two hike-in campgrounds (White Pine and Valley View), the Pierce Stocking Scenic Drive and overlooks (SLBE, no date). In addition, other park or nearby facilities that welcome visitors are the Dune Center, the Sleeping Bear Point Maritime Museum, the Cannery (a historic boat collection), and the historic village of Glen Haven. Numerous state and local roads crisscross the mainland portion of the park.

Mainland structures include a number of farm buildings, operations structures, a major Midwest Federal Aviation Administration (FAA) facility and campground facilities. Table 2 shows approximate numbers and estimated values of improvements as of the FY2002 FirePro analysis.

Table 2 – Real Property Listing for FMU II

Owner	# of Units	\$ Value
Federal Aviation Administration	6	21,150,000
NPS – Leelanau	119	11,730,000
NPS – Platte	65	5,630,000
NPS – Empire Maintenance	28	2,890,000
NPS – North Manitou Island	23	1,930,000
NPS – South Manitou Island	28	2,757,000
Federal Totals	269	46,087,000
Inholdings – Leelanau	61	5,380,000

Owner	# of Units	\$ Value
Inholdings – Platte	35	3,087,000
Inholding Totals	96	8,467,000

j. Fire Management Objectives

- Ensure all fire operations cause no injuries to firefighters, park staff and members of the public.
- Ensure fire does not destroy any administrative or private structure, nor incur costly damage (rehabilitation costs over \$10,000) to any cultural or historical site or structure.
- Contain 95% of wildland fires at less than 5 acres.
- In the next five years, treat 20% of total identified designated WUI areas with mechanical treatment and/or prescribed fire to reduce hazard fuels and fire risk.
- Allow for annual use of prescribed fire to manage up to 20% of fields identified in the Lakeshore’s Open Field Management Plan annually. This should provide a 5-7 year fire rotation.

k. Management Considerations

Cultural resources will be adequately safeguarded from all wildland fires and prescribed fires.

l. Historic Role of Fire

Historic role of fire for Unit II is identical to that outlined in Unit I, see [Section III. C.1.1](#)

m. Wildland Fire Management Situation

(1). Historic Weather

The historic weather information is the same as that for Unit I, see [Section III.C.1.m.\(1\)](#) for weather analysis.

(2). Fire Season

Fire season information is the same as that of Unit I, see [Section III.C.1.m.\(2\)](#).

(3). Fuels

A large percentage of the fuel on the mainland is derived from the northern hardwoods forest type. These fuels are best represented by NFFL Fuel Model 9, (hardwood litter), NFDRS fuel models R and E, hardwood litter summer and fall, and CFFDRS fuel types M-1, M-2, and D-1, boreal mixed wood leafless and green and leafless aspen. Because most of the stands have closed canopies, fire risk and fire behavior considerations are

important in both spring and fall with leaf litter providing adequate fine fuels for rapid fire spread.

A lesser amount of mixed pine-hardwoods type is represented by NFFL Fuel Model 8 (closed timber litter). Behavior predictions are less than for FM 9. This fuel model is found in small blocks on the mainland.

Among the more hazardous fuels on the mainland are scattered stands of jack pine. This type, NFFL fuel model 10 (timber-litter and understory), also represented by NFDRS fuel model G and CFFDRS fuel type C-5, carries a fuel load of branch wood and fine fuels on the ground as well as dead branches upward into the tree crown. The jack pine type occurs on drier, sandy, sites generally close to the beach areas. Many of the inholdings and use and occupancy tenants are located in these areas, making it important to address fuel loadings in this wildland-urban interface.

The final fuel to be considered is the grass on the many cultural landscape areas that were formerly farmed. NFFL fuel model 3 (tallgrass) and NFDRS model L represents the fuels on these sites most accurately.

All of these fuels are normally at their driest in late fall and early spring. Drought conditions could occur during the summer but the maritime influence of Lake Michigan would, under most conditions, mitigate low fuel moistures. The highest risk of fire ignition and spread is between the time snow melts off until green-up occurs.

(4). Fire Behavior

Same as Unit I, see [Section III.C.1.m.\(4\)](#).

(5). Fire Regime Alteration

Same as Unit I, see [Section III.C.1.m.\(5\)](#).

(6). Control Issues

The primary control issue is generally related to response times. Lakeshore fire equipment is stored in the town of Glen Haven so that a fire at either extreme of the unit would be 20-40 minutes away. Another issue is the Lakeshore's current reliance on the cooperation and assistance of the many local volunteer fire departments along this very linear FMU. A third issue is the wildland-urban interface challenge posed by the many private residences within and adjacent to the Lakeshore boundary.

(7). Values at Risk

Cultural Resources— This unit contains a number of cultural landscapes and historic structures. Many of the historic buildings are listed on, or eligible for, the National Register of Historic Places. Historic buildings and

identified cultural landscape features such as fences, orchards, windbreaks and former garden sites will be protected by fire lines (hand or foam) and isolated from burnable fuels where possible. This may entail use of fire to blacken a safe area around these resources. Individual burnable features such as buildings and fence posts may be pre-treated with foam applications to prevent burning. As most historic buildings are located adjacent to roads, local fire departments are generally able to provide a high level of protection.

Natural Resources – The primary natural resource at risk from wildland fire, or the lack of wildland fire, in Unit II are the jack pine stands near the Lakeshore. Most jack pine are dependent on fire for reproduction. Stand-replacing fires are not only natural but crucial to the species. Under drought conditions some loss of northern hardwoods or mixed conifer-hardwoods stands could occur.

Infrastructure –The NPS maintenance facility is located in this unit. In addition a major Federal Aviation Administration radar facility is adjacent to the maintenance facility. There are a number of campgrounds with facilities as well as the boardwalks and other visitor facilities near the scenic drive. Because many of these facilities are used by visitors, protection of the public is a major concern. Table 2 lists the structures and values for both NPS and inholding ownerships.

Inholdings and WUI – There are numerous private inholdings in this unit, as well as use and occupancy tenants. A list of inholdings is on file at park headquarters. In addition, many private residences are located adjacent to the Lakeshore boundary.