FIRE MANAGEMENT PLAN 2004

for

ISLE ROYALE NATIONAL PARK

United States Department of the Interior
National Park Service
Isle Royale National Park
Houghton, Michigan

FIRE MANAGEMENT PLAN 2004

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Prepared by: /s/ Cal Gale
Mangi Environmental Group — Date

Fire Management Officer
Border Waters Park Group — 2-4-04 Date

Reviewed by:
Park Fire Coordinator
Isle Royale National Park — 9/24/04 Date

Concurred by:
Fire Management Officer
Midwest Regional Office, National Park Service — 9/27/04 Date

Approved by:
Superintendent
Isle Royale National Park — 9/27/04 Date

Errata

Page 13: The following are additional fire management objectives, and correspond with the preferred alternative in the Environmental Assessment:

- **Protect human life, property, and irreplaceable natural and cultural resources from unwanted fire.**

- **To the extent possible given other objectives for protecting human life and property, allow fire to achieve its natural role in the ecosystem to perpetuate natural ecosystem processes.** This will assist in maintaining and restoring native wildlife species by maintaining a natural diversity of different kinds of plant communities. It will also limit opportunities for large, catastrophic fires, and disease and insect epidemics to spread by maintaining a representative natural mosaic of climax, sub-climax and seral forest vegetation of different ages.

- **Use prescribed fire to accomplish other specific resource management goals.** These goals may include the replacement of natural fire, protection or restoration of critical plant or animal habitats or communities, elimination of alien species, the restoration of historic scenes (e.g. Daisy Farm meadow), and/or the reduction in hazardous fuel conditions.

- **Minimize, and where necessary, mitigate unacceptable impacts of wildland fires and fire suppression.** This includes resource damage, aesthetic considerations, and waste of government funds.

- **Minimize unplanned human-caused ignitions.**

- **Promote public understanding of fire management programs and objectives.**

- **Integrate fire management with all other aspects of park management.**

- **Monitor and evaluate fire effects.**

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I. INTRODUCTION

A. REQUIREMENTS

The Fire Management Plan (FMP) is an addendum to Isle Royale National Park's Resource Management Plan (1999). This plan outlines a detailed program of actions to be taken by Isle Royale National Park to meet the fire management goals for the park.

The plan is guided by Director's Order-18 (DO-18) which requires that all park units with vegetation capable of sustaining fire develop a FMP.

B. GOALS AND OBJECTIVES TO ACHIEVE

Overall resource management objectives for the park 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. Park Goals

   Isle Royale National Park management goals that relate to wildland fire management follow (National Park Service, 1998):
   - Preserve and protect the park's wilderness character for use and enjoyment by present and future generations
   - Preserve and protect the park's cultural and natural resources and ecological processes
   - Provide park-related educational and interpretive opportunities for the public
   - Provide opportunities for scientific study of ecosystem components and processes, including human influences and use, and share the findings with the public

2. National Fire Plan Goals

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

   Goal 1. Improve Prevention and Suppression – Improvements in cooperative efforts with State and other Federal agencies will result from direction in this plan.

   Goal 2. Reduce Hazardous Fuels – No projects are proposed in this plan. Future projects, either mechanical or prescribed fire, that may be developed will assist meeting this goal at Isle Royale.

   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 Isle Royale.

Goal 4. Promote Community Assistance – As Isle Royale is an island wholly owned by the NPS there is no opportunity for assistance to rural fire departments. There is, however, potential for risk reduction in the areas surrounding concessions and NPS infrastructure as those areas are essentially wildland urban interface areas.

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 the cultural resources found in the park.

Threatened and endangered (T&E) species on the island include the Eastern timber wolf and bald eagle. The park's fire management program will be implemented so as to not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat.

This plan meets the requirements of the National Environmental Policy Act (NEPA) as documented in an environmental assessment's Finding of No Significant Impact (FONSI), which is located in Appendix D. Any additional prescribed burns and other fuels treatment projects will also have additional compliance work completed prior to project implementation, including biological assessments and cultural/historical site surveys as appropriate.

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

1. Section 102

Section 102 of the General Provisions of the Department of the Interior's annual Appropriations Bill provides 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 US 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 Department of Interior Manual 620 (620 DM) 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 this commitment.

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

B. RELATION TO ESTABLISHING LEGISLATION

Also considered policy to guide the development of the FMP are the following legal authorities:

1. Establishment

   Isle Royale was authorized by the Act of March 3, 1931. The purpose for establishment stated in 16 USC, Subchapter LII, Section 408 follows: "…shall be, and is established, dedicated, and set apart as a public park for the benefit and

enjoyment of the people, and shall be known as the Isle Royale National Park:… The park was officially established April 3, 1940 after all the land had been acquired.

2. Wilderness

   Additional direction for park management is defined with the passage of the 1976 legislation designating most of Isle Royale as wilderness. Approximately 99% of the land base of the park now has official wilderness designation.

3. Significant Resources

   Isle Royale (ISRO) is primarily a North Woods wilderness and maritime park. Moist, cool conditions near the shoreline and in the northeastern portion of the park support a northern boreal spruce-fir forest community, while somewhat drier conditions in the park's interior and southwestern portion favor northern hardwoods like sugar maple and yellow birch. In a classic illustration of island biogeography, fewer species of fauna are found on Isle Royale than on the mainland, because its isolation and size make it difficult for wildlife to reach and then maintain viable, healthy population sizes. The island's most famous residents are its moose and wolves, but at least 12 other mammals are present. Birds are similar to those of the mainland, but less is known of amphibians and reptiles. ISRO's fish, particularly its populations of lake trout, coaster brook trout, and herring, are one of its most outstanding attributes.

   Human activity on Isle Royale dates back more than four millennia, when Native Americans became the first to mine the island's copper deposits. Beginning in the 1800s, the island was subjected to a succession of commercial exploits by Europeans and Americans, including trapping, copper mining, fishing, logging, and vacationing.

   The park is accessible by means of ferry and seaplane from Michigan's Upper Peninsula and from Minnesota, as well as by private boat. It is open to the public from mid-April through October; harsh weather necessitates the park's closure from November into April. Visitors arrive to motorboat, canoe, kayak, fish, scuba dive, camp, hike and backpack. The park boasts 165 miles of hiking trails.

4. Cultural Resources

   Isle Royale contains a rich array of cultural resources. The National Park Service is mandated to preserve and protect its cultural resources through specific legislation such as the Antiquities Act of 1906, the National Historic Preservation Act of 1966, as amended in 1992, and the National Environmental Policy Act of 1969.

C. GOALS OF GENERAL MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT

There are four General Management Plan purpose statements that are directly related to implementation of a fire management program.

- Preserve and protect the park's wilderness character for use and enjoyment by present and future generations
- Preserve and protect the park's cultural and natural resources and ecological processes
- Provide park-related educational and interpretive opportunities for the public
- Provide opportunities for scientific study of ecosystem components and processes, including human influences and use, and share the findings with the public

D. GOALS OF RESOURCE MANAGEMENT PLAN RELATED TO FIRE MANAGEMENT

The Resource Management Plan restates the General Management Plan objectives and provides project funding requests to address knowledge needed to continue and enhance the fire management program. Among the needs addressed are:

- Continued monitoring of vegetative changes related to moose browsing.
- Complete research on the effects of moose browsing on vegetative composition in the park.
- Manage naturally ignited fires for resource benefit under existing guidance found in the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide (1998).
- Monitor fire effects using accepted NPS standards.
- Maintain existing air quality with proper planning of prescribed fire and wildland fire use operations.

E. ACHIEVING GENERAL AND RESOURCE MANAGEMENT PLAN GOALS IN THE FMP

Fire can be used to provide a natural vegetative setting for the park. Fuel management, using both mechanical means and prescribed fire, can reduce the risk to cultural and historic resources, and NPS infrastructure on the park. By incorporating information developed in ongoing research, implementation of the FMP will assist in achieving the General and Resource Management Plan 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 General and Resource Management Plan objectives. Legal mandates related to the park's establishment are also supported by the FMP.

III. SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

A. ISLE ROYALE NATIONAL PARK FIRE MANAGEMENT GOALS

Following are the park fire management goals:

- Firefighter safety is the highest priority of every fire management activity.
- Prevent all wildland fire related injuries to the visiting public by providing information and closing areas of the park as needed.
- To the extent possible, allow fire to play its role as a natural disturbance agent.
- Use appropriate methods of fuel management to reduce risk of fires in interface areas adjoining NPS infrastructure or inholdings/life leases.
- Apply prescribed fire to achieve specific resource management goals.
- Manage fire to prevent damage to cultural resources and sensitive natural resources.
- Increase public awareness of the role of fire in natural processes through interpretation.
- Preserve and protect the park's wilderness character for use and enjoyment by present and future generations
- Provide opportunities for scientific study of ecosystem components and processes, including human influences and use, and share the findings with the public

B. WILDLAND FIRE MANAGEMENT ELEMENTS

1. Wildland Fire

   a. Wildland Fire Suppression: All unwanted wildland fires will be suppressed using an appropriate management response. Management responses to specific wildland fires will be determined through evaluation of public and firefighter safety, fire behavior, values at risk, potential suppression damage, and availability of fire management resources. Management responses will vary from fire to fire and sometimes even along the perimeter of a fire. Appropriate management response options range from monitoring without on-the-ground disturbance to intense suppression actions on all perimeters of the fire.

   b. Wildland Fire Use (WFU)**:** Isle Royale National Park uses the strategy of managing some naturally-ignited wildland fires for resource benefits. This strategy is an option only in the Wildland Fire Use Unit. Wildland fire use is a strategy for allowing some lightning-caused fires to burn as long as the fire meets predetermined resource management objectives in a predetermined geographic area, and within prescribed weather and fire behavior parameters. An ongoing or potential "wildland fire use" fire that does not meet the

predetermined criteria or fails to meet resource management objectives will be suppressed using an appropriate management response. Current policy allows management for resource benefits of portions of a fire perimeter, while other portions of the perimeter of the same fire are managed with an appropriate suppression response.

Since 1976, Isle Royale has managed 17 naturally ignited fires as Prescribed Natural Fires (prior to 1998) or Wildland Fire Use fires (since 1998) for a total of 96 acres. Most of the 96 acre total came in 1988 when the Stanley Ridge fire burned 80 acres.

It should be noted that following the 1988 fire season, and until 1992, all use of the then-termed Prescribed Natural Fires (PNF) was suspended pending rewriting of the Fire Management Plan. During this period a total of 7 lightning ignited fires, potential PNFs, were suppressed.

2. Fuels Management

   a. Hazard Fuel Reduction: The intent of this strategy is to reduce hazardous wildland fuel situations (caused by insect, disease, wind or heavy biomass accumulation), and maintain a fuel level that ensures protection of life, property, cultural values, and natural resources. Methods for accomplishing hazardous fuels reduction include prescribed fire and mechanical treatments.

      (1) Prescribed Fire: No prescribed burn projects are currently being planned to mitigate hazardous fuels situations. In 2000 a research project was initiated to determine the extent to which moose browsing has altered the fuels composition and fuel loading on the island. Pending the final report of this project, a prescribed burning program may be initiated in the future for hazardous fuels mitigation or ecosystem management.

      (2) Non-Fire Applications: Mechanical treatments will be restricted to the developed areas of the park. The main purpose would be fuel reduction around buildings. No mechanical treatments are planned within the current planning horizon. A multi-year mechanical fuel treatment project was completed in 2000 at Mott Island and Rock Harbor to remove surface fuels and highly volatile balsam fir regeneration from around structures. These areas will be monitored for future maintenance treatments in the future. Given the extent of the treatment it is not anticipated that follow-up treatment will be needed for 5-10 years.

   b. Ecosystem Management: Prescribed fire may be used in the future in support of ecosystem management to maintain and/or restore plant communities, cycle nutrients, reduce or remove exotic plants, and for a variety of other resource management objectives.

C. FIRE MANAGEMENT UNITS (FMU)

Two fire management units have been identified at Isle Royale National Park. They are the Wildland Fire Use FMU and Suppression FMU. In the Wildland Fire Use FMU lightning-caused fires will be managed following the procedures found in the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide. Human-caused fires will be extinguished using the appropriate management response. The Wildland Fire Use FMU comprises a majority of the island. In the Suppression FMU, all fires will be suppressed using the appropriate management response. This unit contains park infrastructure, concessionaire facilities, and life lease areas. A map of the FMUs is found in Figure 1.

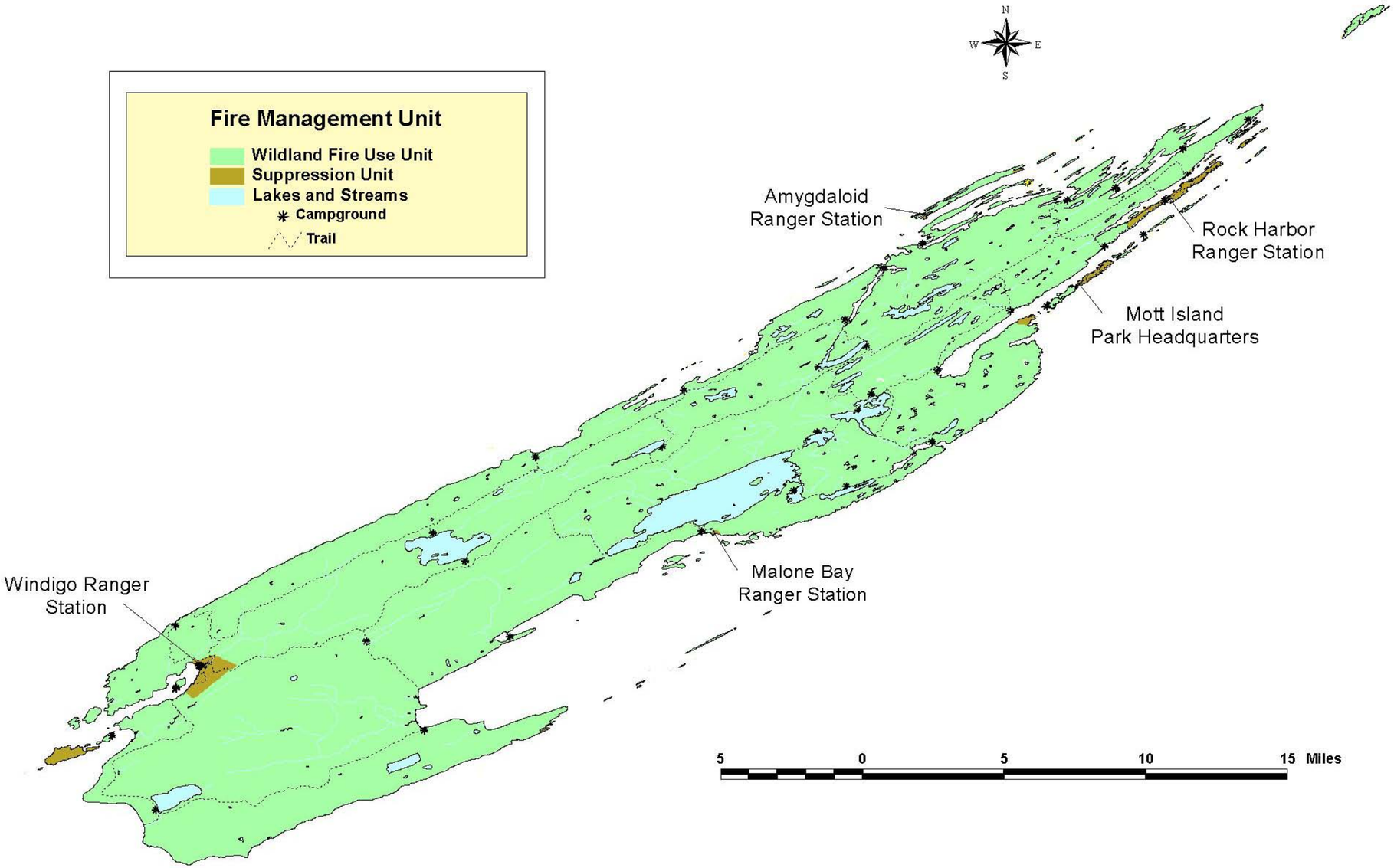
1. Unit I – Wildland Fire Use FMU

   a. Characteristics

      (1). Physiography – The main island is characterized by a series of parallel ridges and valleys and a shoreline marked by numerous islands, narrow peninsulas, and bays. Ridges run southwest-northeast, generally with moderate slopes on the southeast aspect and steep slopes or cliffs on the northwest side. Most of the land area is heavily forested, although numerous inland lakes, ponds, swamps, and bogs are found in the lowlands between the ridges. Lake Superior, inland lakes, wet areas, and rock outcrops provide many effective natural barriers to fire spread.

      The highest point in the park is 1394 feet (425 m) above sea level, 794 feet (242 m) above Lake Superior.

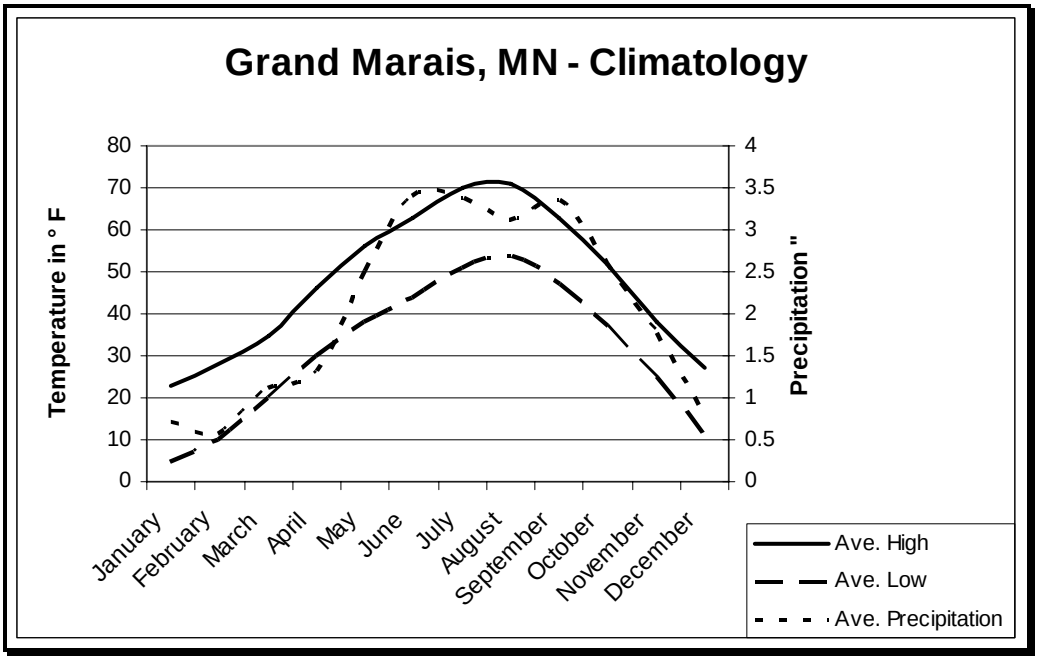
Figure 1 – Fire Management Units



(2). Climate – The climate of the park is dominated by the influence of Lake Superior. Short, cool summers and long, cold winters are normal. Winters are somewhat warmer and summers cooler than nearby inland sections of the mainland. Fog is frequent near the lakeshore, especially in the spring, and relative humidity normally recovers at night to high levels over most of the park, although ridge top humidity usually recovers less. The lake influence reverses the pattern seen in most places where temperatures fall and humidity rise with elevation. At Isle Royale this "marine inversion" (Schroeder and Buck, 1970) means that lakeshore environments are cool and humid, and inland, higher elevation areas are warmer and drier. Winds are usually higher on the exposed ridges, and south or southeast aspects are exposed to long hours of summer sun at the park's 48° latitude.

Climatic data at Grand Marais, MN (~40 miles (64 km) west-southwest) are illustrated in Figure 2 below. While this data does not reflect actual readings on the island, it is expected to represent the distribution of temperature and rainfall trends on an annual basis.

Figure 2 – Grand Marais, MN Climatology



(3). Soils: Huber (1983) describes the glacial history of Isle Royale. Soils in the northeastern section of the park are usually thin and highly organic. The naturally thin soil mantle, combined with the effects of erosion, have exposed large expanses of bedrock, especially on the ridges. Lack of soil is probably a limiting factor for vegetation in rocky areas, creating natural firebreaks and changes in fuel types.

Soils in the southwestern section of the park tend to be deeper, better developed, and less organic (Shetron and Stottlemyer, 1991).

(4). Vegetation: Isle Royale and the adjacent lake country of Minnesota and Ontario, with its continuous forest mantle, abundant wetlands and lakes, and sense of vastness, is closer to the true arctic environment than any other part of the contiguous 48 states (Isle Royale Fire Management Plan, 1992). Lake Superior "holds back" the arctic influence, and arctic-induced coolness provides a tension zone between the boreal forest and the northern hardwood forest. Balsam fir (*Abies balsamea*) and white spruce (*Picea glauca*), interspersed with pockets of paper birch (*Betula papyrifera*), comprise the so-called "climax" forest in the cooler, damper portions of the park (Cooper, 1913). Seral stages of this forest type are dominated by quaking aspen (*Populus tremuloides*) and paper birch, typified by the 1936 burn area, which affected about 20% of the main island. Frequent natural disturbance in the boreal forest, however, due to windthrow, insect and fungus attack, herbivory, fire, drought, etc., makes it a dynamic community.

Sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*) are dominant on warmer, drier sites with adequate soil. This community is more stable and less prone to disturbance, including fire, than the boreal forest. Xeric ridges are occupied by small, open stands of northern red oak (*Quercus rubra*), white pine (*Pinus strobus*), jack pine (*Pinus banksiana*), spruce, red maple (*Acer rubrum*), or an occasional red pine (*Pinus resinosa*). Swamps and wetland forests consist of black spruce (*Picea mariana*), white cedar (*Thuja occidentalis*), and tamarack (*Larix laricina*) (Shelton, 1975).

Non-forested areas on the ridges support patchy grasses and shrubs, primarily common juniper (*Juniperus communis*), serviceberry (*Amelanchier* spp.), honeysuckle (*Lonicera* spp.), hazelnut (*Corylus* spp.) and blueberry (*Vaccinium* spp.). These areas, because of their exposure, are subject to erosion by wind, leaving little soil and opportunity for forest encroachment. Bogs and beaver meadows are dominated by dense stands of sedges (*Carex* spp.), rushes (*Eleocharis* spp. and *Juncus* spp.), grasses, and shrubs such as alder (*Alnus* spp.) at the margins.

Passage Island deserves brief discussion here, as it is approximately four miles (6.4 km) northeast of the main Island and large enough to have significant vegetation that can burn. Moose (*Alces alces*) have never colonized Passage Island, and most of its vegetation is comprised of wind-dispersed species. Hence its vegetation is very different from the rest of Isle Royale National Park. While there is virtually no white spruce on Passage Island, it contains a large mountain ash (*Sorbus decora*) component. It is one of the most unique forest habitats in the state of Michigan (Crispin et al., 1985).

(5). Wildlife: Isle Royale's faunal assemblage is a classic of "island biogeography" theory (MacArthur and Wilson, 1967) which argues that the number and diversity of species on islands is "impoverished" compared to mainland areas, being dependent upon both distance from the mainland and the size of the island. There are only fifteen mammal species reported on the island, as compared to approximately three times that number on the Lake Superior north shore (Jordan, 1981). Moose colonized Isle Royale in the early 1900s, either by swimming or crossing ice from the Canadian mainland. Prior to the arrival of wolves (*Canis lupus*) in the late 1940s, the moose population built up, over browsed the vegetation, and died back twice. The second population increase was aided by the production of vast amounts of new browse after the 1936 fire (Peterson, 1977).

Woodland caribou (*Rangifer tarandus-caribou)* were extirpated from Isle Royale in the 1920s, perhaps in part due to habitat destruction caused by fire (Cochrane, 1996). Caribou are not being considered for restoration at Isle Royale.

(6). Endangered Species: Isle Royale National Park contains several endangered or threatened animal species, none of which is directly dependent on, or adversely affected by, fire. However, moose (state-listed as threatened in Michigan, and the principal prey of the federally-listed timber wolf) do best in the young forests of disturbed habitats. Reflecting that fact, the approved Recovery Plan for the Eastern Timber Wolf (U.S Fish and Wildlife Service,1992) recommends "Continue management to perpetuate natural conditions for the eastern timber wolf on Isle Royale National Park", and further includes a recommendation to "Permit natural fires to run their course".

Bald eagles (*Haliaeetus leucocephalus*) (federally listed as threatened) and osprey (*Pandion haliaetus*) (state listed as threatened) nest in mature trees in the park (Fettig, 1990) which are potentially vulnerable to fire, although other trees that survive fires would be available for new nest construction.

There are no plants on the federal endangered or threatened species lists, although one species, Auricled Twayblade (*Listera auriculata*) is of special concern. One species, One Leaf Orchid (*Amerorchis rotundifolia*), is on the Michigan state endangered species list, and 38 are on the state threatened list. Judziewicz (1995a, 1995b, 1999) conducted a park-wide survey for endangered, threatened, or special concern plants. His survey added significantly to the park's plant list. Species information is available in the NPSpecies Inventory and Monitoring database.

Lists of federal and state T&E species are included in Appendix C.

(7). Cultural Resources: This unit contains the majority of the park's 186 designated archeological sites and a number of undesignated sites. The archeological sites span a time period from 4500 years ago to the historic period and contain aboriginal mines and occupation sites, commercial fisheries, and historic mines. The Minong Mine Historic District (sites 20 IR 24 and 73) of approximately 275 acres is listed on the National Register of Historic Places. An additional 91 sites have been recommended for nomination to the Register. The unit also contains historic structures and cultural landscapes associated with logging, mining, fishing, lighthouses, and CCC and early park development. Most of the historic structures in this unit (approximately 120) have been declared eligible for the National Register.

(8). Air Quality: The park is a Class I airshed due to its wilderness designation and location. Some air quality problems have been noted but they are from off-park sources, primarily from industrial locations along the North Shore of Lake Superior.

b. Fire Management Objectives

(1) Strategic Objectives

Lightning-caused fires in the Wildland Fire Use FMU are allowed to burn in the unit under prescribed conditions unless they threaten human life, private property, other critical park resources and objectives, to escape from the management unit, or to violate air pollution control laws and regulations.

Wildland fires are managed with the appropriate management response as directed by this fire management plan and analysis of the specific situation.

Prescribed fires may also be used in the Wildland Fire Use FMU to accomplish vegetation management objectives, such as encouraging pine regeneration or creating wildlife habitat and fuel hazard reduction objectives, such as removing fuel ladders and downed woody debris from the sub-canopy of pine stands.

Promote public understanding of fire's role in the island ecosystem by preparing and distributing informational brochures with all camping permits.

(2) Measurable Objectives

Ensure all wildland fire and prescribed fire operations sustain no injuries to members of the public or to firefighters.

Initial Appropriate Management Response strategy for unwanted wildland fire is successful 97 % of the time.

Prevent 95% of wildland fires occurring in developed areas from spreading to wilderness.

When WFU fire is chosen as the Appropriate Management Response, the WFU is managed successfully within the conditions of the Wildland Fire Implementation Plan (WFIP) 98% of the time.

Reduce human-caused fires by 50% of the past 10 year average.

c.Management Considerations

Due to the island nature of the park and the wilderness constraints, the following restrictions will apply to all fire management operations in the park:

- Use water instead of fire retardant chemicals in bombers.
- Cold trail the fire-edge when practical.
- Wetlines, or environmental lines, will be used wherever possible in lieu of handline construction if water and pumps are available. Waterbars will be constructed on handlines on steep slopes.
- Utilize soaker hose or foggers in mop-up. Avoid "boring" and hydraulic action on shallow soils.
- Firelines will be kept to the minimum width necessary to allow backfiring or safe blackline to be created. Utilize natural barriers wherever possible.
- If a mineral soil line is needed, utilize fireline explosives whenever possible.
- Decisions on suppression practices will be made by the Incident Commander. Utilize his/her creativity.
- Minimize tree falling. If necessary to fall trees in visually sensitive areas (i.e., trails, lakeshores), utilize "slant cut" technique to face cut away from view, or recut later during rehabilitation activities.
- Known archeological and ethnographic sites will be identified prior to a fire and protected wherever possible. Minimize ground disturbance to protect cultural resources.
- Scatter or remove debris as prescribed by the Incident Commander.
- All firelines, spike camps, or other disturbance in visually sensitive areas will be rehabilitated to maintain a natural appearance.
- After the fire emergency is over, transport of personnel, equipment, and trash out of the park will be consistent with national park resource management objectives.
- Maintain Class I air quality.

- Provide information to backcountry users when wildland fires are burning or prescribed fires are planned.

All of the above restrictions are based on resource protection and values at risk, and can be modified in life-threatening situations, or with the express approval of the Superintendent.

d. Historic Role of Fire

The most comprehensive review of existing Isle Royale fire history information was done by Martin (1988). He compiled a list of all known fires in the park, before and after park establishment, from NPS files, historical records, and the scientific and popular literature. His record goes back to 1847, the year of the first General Land Office survey of Isle Royale. This record, with some additions from the Isle Royale Lighthouse lightkeeper's log is the basis for a computerized park fire history database maintained in the Natural Resource Management Office. Figure 3 shows the island fire history map from 1936-2001.

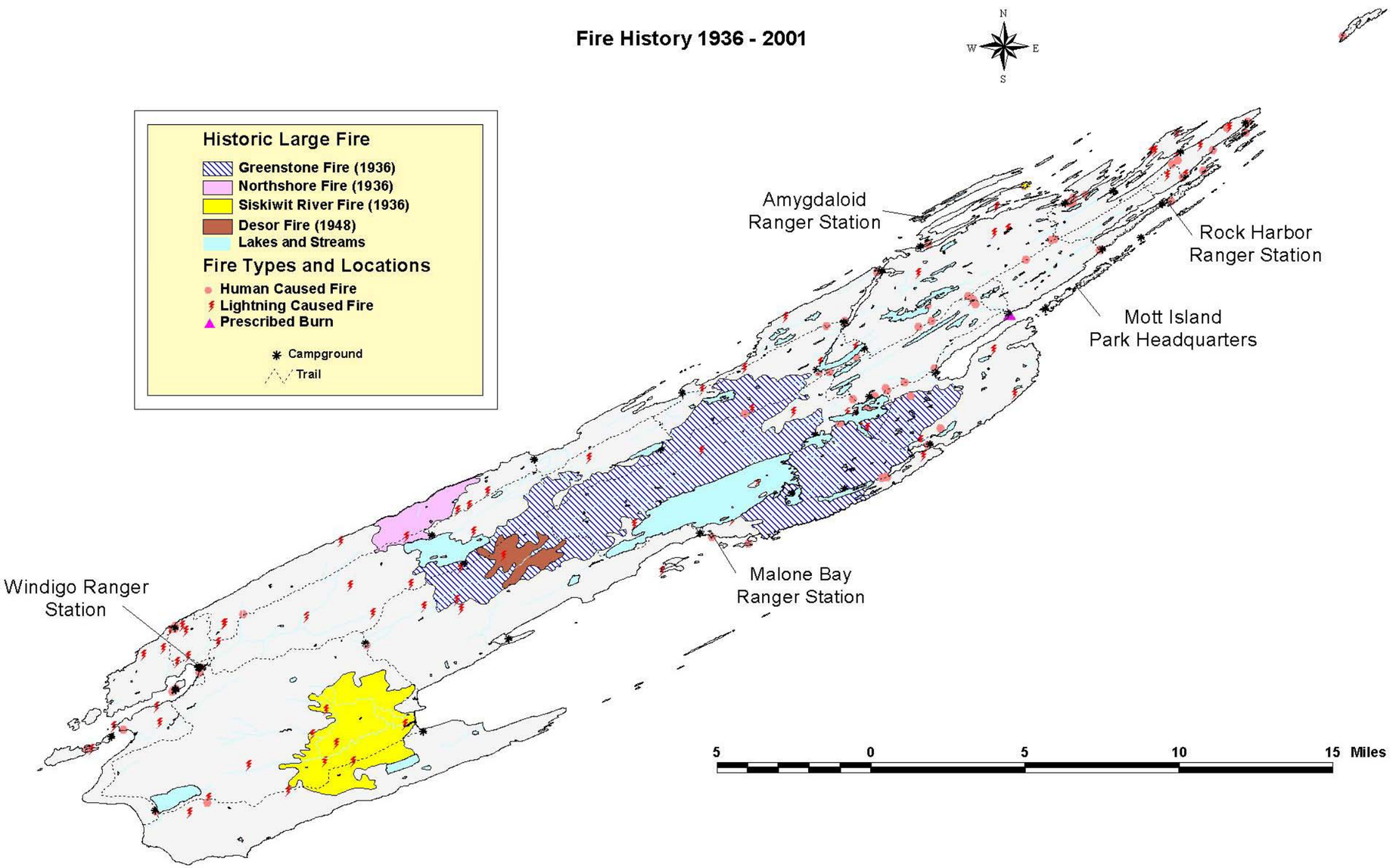
(1). Presettlement – Information on pre-settlement fire history is limited. Cole et al (1995) examined sediment cores from several Isle Royale lakes and found layers of charcoal indicating periodic fires in the post-glacial, pre-settlement history of the Island as well as in the post-settlement era.

Raymond (1975) summarized some of the literature of fire history and fire ecology from northern Minnesota. A natural fire rotation of about 100 years prevailed in the Boundary Waters Canoe Area of Minnesota, but many red and white pine stands remained largely intact for 150-350 years, and some jack pine and aspen/birch forests burned at intervals of 50 years or less (Heinselman, 1973 in Raymond, 1975). The unbroken pine stands and continental conditions on the mainland make fire regime comparisons with insular Isle Royale unreliable.

Evidence gathered by Cole et al (1995) indicates the southwest end of the island with a forest cover of northern hardwoods has seen little fire over the past 4,500 years. For the northeast end of the island, samples indicate that fire was more frequent and/or severe prior to settlement.

Aboriginal Indians frequented Isle Royale as early as 2500 BC to exploit copper, fish, and other island resources (Rakestraw, 1965). These early visitors may have increased the fire occurrence, but it is unknown to what degree.

Figure 3 – Fire History of Isle Royale



(2). Post-Settlement – Modern copper mining ventures began on Isle Royale beginning in the early 1840's. One common way to locate copper deposits was to burn the forests, exposing the surface rock. Hansen, et al. (1973) stated that "[t]he incidence of fire on the Island in the past 140 years has been greater than it would be from a natural consequence sequence of lightning."

The incidence of fire (or at least the recording of fire incidents) decreased after the mining boom ended in the late 1890s (Martin, 1988). National Park Service presence began in the mid -1930s, as planners and Civilian Conservation Corps (CCC) crews designed and constructed facilities for the future national park. A large fire in 1936 deserves particular mention in the fire history of Isle Royale.

On July 25, 1936, a human-caused fire started near Siskiwit Bay where extremely low fuel moisture conditions existed at the time due to an extensive drought. The fire spread quickly, aided by slash and timber harvesting operations being conducted in the Siskiwit Bay area and standing dead trees killed by several years of a spruce budworm (*Choristoneura fumiferana*) outbreak. Two other starts occurred, perhaps due to lightning. None of the fires burned together, but in the aggregate about 26,000 acres or 19 percent of the main Island burned.

The vast majority of fires of all causes have burned negligible area, although one lightning fire in 1948 (a "re-burn" of part of the 1936 fire) burned 1,440 acres. Isle Royale's usually wet fuels probably account for the small size of most fires, but aggressive suppression efforts were also the rule on all fires until the 1980's.

The presence of moose on the island during the 20th century has affected fuels, particularly on the northeast ½ of the island. Many of the ground plants now found on the island do not readily support fire spread. Cole (1996) indicates that the large-scale vegetation change due to moose browsing may well affect the natural frequency of fire occurrence.

e. Wildland Fire Situation

(1). Historic Weather Analysis – At Isle Royale, detailed historical weather records are scanty and there are no park records of synoptic conditions. Year-round precipitation records are meager, since the park is closed during the winter. Annual precipitation is approximately 30 inches (76.2 cm)/year. While the park receives a large amount of snow, it is usually dry snow and therefore does not constitute a majority of annual precipitation. Snow accumulates from mid-November to April, but may fall anytime from early September to late May. Once spring arrives, however, temperatures

sometimes rise rapidly, and it is not unusual to have the highest temperatures of the year occurring in May (USDI, undated), at or before greenup.

(2). Fire Season – Since the establishment of the park and subsequent record keeping, there have been a little more than two fires reported per year on average. Nearly 60 percent have been human-caused. It should be pointed out that for unknown reasons, no human-caused fires were reported in the lengthy period from 1942 to 1953.

The vast majority of ignitions occur in July and August, which coincides with both the high visitor use season and the warmest average temperatures. Analysis of historical fire weather records and fire danger indices suggest that ignitions and fire spread are certainly possible anytime from early May through the end of October. The length of the fire season is defined, by FIREPRO, as the cumulative 10-day periods during the year when a park experiences at least 10 unplanned ignitions based on ten years of record (RM 18, Chapter 17).

Although Isle Royale does not meet these criteria at any time during the summer, the fire history data does show that approximately 99 percent of all fires occur between mid-June and mid-September. For purposes of the FMP, Isle Royale's fire season will be defined as this period. Data collection for calculating fire danger rating indices begins as soon as possible in the spring, typically the first or second week in May continuing into the fall.

(3). Fuel Characteristics – Fuels within the park can be divided into two broad groups. Those in the southwest portion are not generally expected to burn during the peak of the fire season. The fuels found in the northeast section tend to be more fire prone and the vegetative species that generate those fuels tend to be fire adapted for reproduction.

The effect of moose browsing on vegetation in the northern portion of the park has, or is expected to have, an effect on fuel concentrations, arrangement and composition. Elimination (by consumption) of balsam fir ladder fuels is an important factor in the general reduction of the flammability of the forests. A study is underway to determine forest structure as part of the ongoing wolf study. Anecdotal observations from park personnel and researchers indicate that browsing habitats of moose may have actually reduced the potential for naturally occurring, large, fires. The reduction in quantities of American yew (*Taxus canadenis*) which is highly flammable reduces the potential for stand replacing crown fires. Yew has been replaced in most cases by Thimbleberry (*Rubus parviflorus*) which is not a preferred food of moose. Thimbleberry also

tends to hold moisture thus not supporting ground fire except under droughty conditions.
Accounts of slow, creeping, ground fires are most common in the historical record of fires at Isle Royale, the fire behavior that might be expected in the leaf litter of a northern hardwood forest and duff layer of a boreal coniferous forest.

It is extreme dry conditions or locations on droughty, southwest facing slopes that will be most likely to support wildland fires. The moderating influence of Lake Superior mitigates much of the normal drying expected in the predominant fuel types on the island. Visitation generally drops off at about the same time that leaf fall begins so the likelihood of human-caused fires is reduced. Lightning is generally less prevalent after August as well, further reducing ignition probabilities as the fuels increase in quantity.

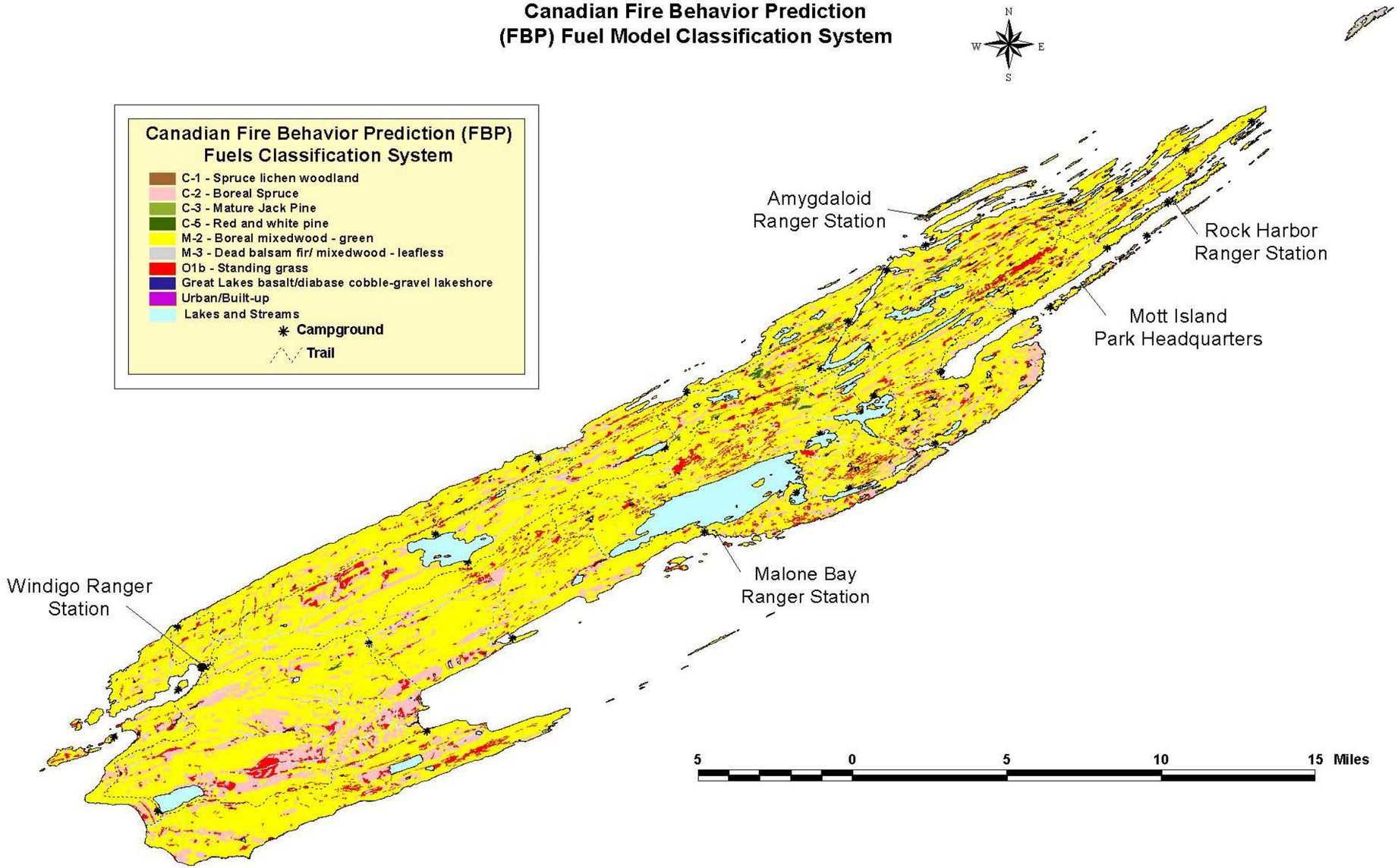
For fire danger ratings, Isle Royale uses the Canadian Forest Fire Danger Rating System (CFFDRS). The fuels on the island under this system are reflected in Figure 4 on the next page.

(4). Fire Regime Alteration – The island's fire regime has been altered by many factors including climate change, humans, and animals for as long as 4,000 years, but the most significant alterations appear to have occurred in the last 160 years. Copper exploration by European settlers began in the 1840's. One method of investigation for ore-bearing strata was to burn the vegetation, exposing the landform beneath. Along with this, fires inadvertently started by mining operations burned the surrounding landscape.

For example two fires started at Island Mine that destroyed buildings and burned some of the surrounding area. Since the early 20th century when moose first arrived on the island, significant changes have taken place in vegetative composition. The change in ground cover is particularly evident on the northeast portion of the island where American yew (very flammable) has been decimated by moose browsing. The replacement fuel has been thimbleberry, a fuel that maintains a high moisture content and is very fire resistant.

(5). Control Problems – The primary control problem is access to the fire area. Because the park is an island, access to portions of the park from the Mott Island headquarters is by boat followed by hiking to the fire. An additional consideration is whether sufficient staff is available on site. For extended attack fires help would be requested from the partners in Minnesota (closest forces) and, weather permitting, additional personnel could be flown to the island.

Figure 4 – CFFDRS Fuels



Another control consideration is the wilderness status of most of the island. This requires that close attention be paid to Minimum Impact Suppression Techniques (MIST) to avoid damage to the island resources. A detailed description of MIST is found in Section IV.C.7.

Finally, each of the developed areas (Mott Island, Rock Harbor and Windigo) are in fact wildland urban interface areas. In contrast to most parks the local fire department is the NPS staff. There are no utility companies to request assistance from as NPS manages all the usual infrastructure functions; electric generation and distribution, water supply and wastewater treatment as well as supplying bottled gas.

(6). Values at Risk

Cultural Resources – The Isle Royale story includes periods when it was used by Ojibwa people, voyageurs and fur trading, logging, extensive commercial fishing, Lake Superior shipping, and resort development. The park contains plant species used historically by the Ojibwa and possibly sites yet to be identified. Commercial fishing sites around the island have been identified as ethnographic resources. Many historic sites and structures still exist which are remnants of the past periods of human use.

Aboriginal prospecting for copper occurred from around 2,500 years B.C. More than 1000 pits and mining sites, scattered throughout the island, are attributed to these peoples.

More extensive mining was conducted in the 1840's by men of European origin, and sizeable communities were developed around places such as McCargoe Cove, Washington Harbor, Siskiwit, Smithwick and Island Mines. The copper mining era ended abruptly in the 1890s. The Edisen Fishery and Rock Harbor Lighthouse are managed as historic zones and are on the National Register of Historic Places. Today there are 13 National Registry properties, but it is very likely to increase dramatically when a thematic nomination for Woodland period sites is submitted. As many as 90 additional archeological sites could be listed on the national register in the future when they are nominated. The List of Classified Structures (LCS) stands at nine but an additional 140 structures have been declared eligible for the National Register and will be listed on the LCS when completed. Altogether, over 213 cultural sites (many include multiple buildings, pits, and/or sites) are presently recorded, with expectations of 25 more with further archeological work.

Little is currently known or documented on ethnographic resources/sites within the park and only preliminary Cultural Landscape inventories have been conducted. As more information is documented, these sites will be

mapped so that information will be available for fire management decision-making and protection.

Infrastructure/Improvements – Historic structures, known archeological, historic or ethnographic sites, backcountry facilities and life leases within the Wildland Fire Use FMU will be protected as though they were located in the Suppression FMU.

These improvements are listed in Table 1.

Table 1 – Real Property – Wildland Fire Use FMU

Facility	# of Units
Campground Shelters	69
Privies	64
Life Lease/Special Use Permittees	1
NPS/Concessionaire buildings	21
US Coast Guard buildings	0
Docks	23
Totals	**177**

Public Use – Annual visitation to the park averaged approximately 17,000 in the 1990's. While this not a high use area, access to and from the park is generally by scheduled boat service or private boat. This fact requires consideration of evacuation of the public in the case of extensive fire occurrence. Compounding this concern is the fact that a large portion of the visitor use is backcountry use with extremely limited means of contact with users.

2. Unit 2 – Suppression FMU

This unit contains all of the developed areas along the shore of the island. This includes the concession operations, ranger stations, island headquarters, most historic structures and the life lease area. Wildland fire use is not an option in this FMU and all unwanted wildland fires will be suppressed using the Appropriate Management Response.

a. Characteristics – See Section III.C.1.a above.

b. Fire Management Objectives

(1). Strategic Objectives:

The Suppression FMU will provide intensive protection for human life and property within park boundaries.

All lightning and human-caused unwanted wildland fires originating from within or that threaten the Suppression FMU from outside are suppressed

(managed) with the appropriate management response and analysis of the specific situation. Mechanical fuel manipulation with powered hand tools and prescribed fire may be used to reduce fuels and accomplish vegetation management objectives.

Mechanical fuel treatment methods may be used for hazardous fuel reduction in areas where safe and effective prescribed fire treatment is precluded by fuel loads, or is otherwise unfeasible.

Promote public understanding of fire's role in the island ecosystem by including fire information in interpretive programs.

(2). Measurable Objectives

Ensure all wildland fire and mechanical operations sustain no injuries to members of the public or to firefighters.

Initial Appropriate Management Response strategy for unwanted wildland fire is successful 97% of the time.

Ensure fire does not destroy any administrative structure, nor incur costly damage to any cultural or historic site.

Annually review and modify as necessary agreements with neighboring agencies.

Prevent 95% of wildland fires occurring in developed areas from spreading to wilderness.

Reduce human-caused fires by 50% of the past 10 year average.

c. Management Considerations – See Section III.C.1.c above.

d. Historic Role of Fire – See Section III.C.1.d above.

e. Wildland Fire Situation – See Section III.C.1.e above, except as noted in the following section.

f. Values at Risk – In addition to the information furnished in Section III.C.1.e.(6) above, the following information applies specifically to the Suppression FMU.

Infrastructure – There are three principal developed areas in the park and several small ranger stations, lookout towers, fisheries, and other structures scattered around the park. A concessionaire operates a lodge and restaurant at

Rock Harbor and a store at Windigo, although all concession buildings are government-owned. With the exception of the three lookout towers, all other structures in the park are located on the shores of Lake Superior. All these developments occupy only a small fraction of the land area of the park, approximately 99% of which was legally designated as wilderness in 1976. NPS real property grouped by location or category are found in the table below.

Table 2 – Real Property List – Suppression Unit

Facility	**# of Units**
Campground Shelters	19
Privies	36
Life Lease/Special Use Permittees	77
NPS/Concessionaire buildings	148
US Coast Guard buildings	11
Docks	66
Totals	**357**

A major consideration in the Suppression FMU is that no local fire departments are available to assist with suppression. In addition, there are no public utilities; NPS personnel manage the electrical distribution system, water supply and wastewater treatment facilities.

IV. WILDLAND FIRE MANAGEMENT

A. GENERAL MANAGEMENT CONSIDERATIONS

1. General Management Plan Direction

There are four purpose statements in the General Management Plan that are directly related to implementation of a fire management program.

- Preserve and protect the park's wilderness character for use and enjoyment by present and future generations
- Preserve and protect the park's cultural and natural resources and ecological processes
- Provide park-related educational and interpretive opportunities for the public
- Provide opportunities for scientific study of ecosystem components and processes, including human influences and use, and share the findings with the public

Regardless of the descriptions of wildland fire management in the following paragraphs, at no time will the safety of island visitors or employees be compromised. The following statements each support the direction of the General Management Plan.

In the Wildland Fire Use FMU lightning ignitions will be managed for resource benefits when meeting the "Decision Criteria" in the Wildland Fire Implementation Plan. Prescribed fire may also be used in this FMU.

In the Suppression FMU, all lightning and human-caused unwanted wildland fires originating from within, or that threaten the Suppression FMU from the outside, are suppressed (managed) using the appropriate management response and analysis of the specific situation. Some prescribed fire application may occur to reduce hazardous fuel accumulations.

2. Implementation Procedures

The Wildland Fire Implementation Plan (WFIP), Stage I, provides the decision framework for selecting the appropriate management response. The Stage I analysis includes the initial fire assessment and the go/no go decision criteria checklist. It documents the current and predicted situation and all appropriate administrative information. It also provides the manager with decision criteria to make the initial decision of whether to manage the fire for resource benefits or to take suppression action. (Refer to Chapter 4 Policy and Implementation Procedures of the Wildland and Prescribed Fire Policy Implementation Guide.) The same information is available in the WFSA Plus '99 software. Immediate suppression actions will not require either document.

B. WILDLAND FIRE USE

1. Objectives of Wildland Fire Use

   The primary objective of the Wildland Fire Use program is to allow restoration of naturally-ignited fire as an ecological process and natural disturbance agent within Isle Royale National Park

2. Decision Criteria for Wildland Fire Use

   Fires ignited by lightning in Isle Royale National Park's Wildland Fire Use FMU will be allowed to burn and managed as a WFU fire if they satisfy the Decision Criteria (initial Go/No-Go Decision) contained in the Stage One WFIP as found in the Implementation Guide. Reassessment of the WFU fire is made daily when the fire is actively burning (i.e. spreading) or as determined and documented in Stage II and/or Stage III of the WFIP. Periodic reassessment will be made when the fire is inactive but has not been declared out. Fires ignited by lightning outside of Wildland Fire Use FMU will be suppressed using the appropriate management response according to the procedures in the wildland fire mobilization section of this plan

   Lightning fires that are managed as a WFU fire will be continually monitored and evaluated, using the Periodic Fire Assessment Re-Validation Checklist within the WFIP, from the time of discovery until they are declared out. Lightning ignitions that do not satisfy these decision elements within the Re-validation Checklist will be reclassified as unwanted wildland fires and an appropriate management response will be taken according to a Wildland Fire Situation Analysis (WFSA). A variety of holding actions are appropriate to keep a fire managed for resource benefits within planned boundaries. The level of holding activity that will be acceptable before a fire is declared an unwanted wildland fire will be determined on a case-by-case basis and these thresholds documented within the Wildland Fire Implementation Plan. Local indicators of potential “watchout” situations when holding activities may threaten to become suppression actions include, but are not limited to: when more than two crews of 20 people each from outside the park are on the firelines; when aerial water or retardant drops are necessary, or when confinement strategies to keep a fire within maximum manageable area (MMA) boundaries fail and direct attack on the fire is necessary.

   If WFU fires remain within acceptable criteria as determined in the WFIP, some fires may be allowed to burn for several months or longer without direct control or until extinguished by rain or snow. It is important for the public to understand the National Park Service is not letting fires burn indiscriminately, but that fires are managed under strict predetermined criteria. The fire monitoring system described below will ensure that these criteria are met and will keep a close watch on a fire's progress.

Figure 5 – Decision Criteria Checklist

Is there a threat to life, property, or resources that cannot be mitigated?

- **Fire within WFU Fire Management Unit**
- **Unit (or MMA once established) boundary threatened and available holding resources not able to mitigate**
- **Threat to life and/or property within or outside the management unit**

Are potential effects on cultural and natural resources outside the range of acceptable effects?

- **Impacts of fire on natural and cultural resources, the public, & local economies are acceptable**
- **Fire in the vicinity of known active wolf den site during denning season.**

Are relative risk indicators and/or risk assessment results unacceptable to the appropriate Agency Administrator?

- **Projected fire perimeter locations are acceptable**
- **Equipment & personnel available to allow for an increase in fire size and complexity**
- **Local/regional/national fire situation stressing interagency resources**
- **Buildup Index (BUI) below 58 and Drought Code (DC) below 354 (both are used to evaluate fire starts only) (See also CFFDRS firefighter pocket card: Appendix G.5)**

Is there other proximate fire activity that limits or precludes successful management of this fire?

- **More than five 10+ acre fires within the park**

Are there other Agency Administrator issues that preclude wildland fire use?

- **Qualified Fire Use Manager available to manage fire**
- **Potential size of fires burning within the park is acceptable and manageable**
- **Short-term fire weather and/or fire behavior are acceptable**
- **Long-term fire weather and/or fire behavior are acceptable**
- **Effects of regional drought on fire behavior/size are acceptable**
- **Smoke dispersal and direction are acceptable**

The standard Decision Criteria Checklist in the Implementation Guide lists detailed

explanations of each of the decision elements. Isle Royale National Park has developed additional indicators to assist the decision maker in evaluating the Criteria. These elements are not hard and fast go/no-go items, but rather elements to be considered by the fire managers and the Superintendent when determining the acceptability of a Wildland Fire Use fire. These are listed in Figure 5 following each of the standard decision elements:

3. Preplanned Implementation Procedures

   Any WFU fire that has the potential (as determined by fire behavior predictions based on fire weather forecasts) to reach any portion of the Suppression Area FMU within two burning periods will automatically require a Stage III assessment.

4. Non-Preplanned Implementation Procedures

   In addition to the non-planned procedures and timelines which are followed as part of the WFIP process, the Isle Royale WFU Fire Decision Criteria Checklist (Figure 5) is utilized in both the Stage I GO/NO GO decision process and the periodic assessment process as identified in Stage II.

   a. Periodic assessment procedures – The Isle Royale WFU Fire Decision Criteria Checklist is used for daily revalidation while a WFU fire is active (i.e., actively spreading). When a WFU fire becomes inactive (non-spreading) but has not been declared out, re-assessment and revalidation will occur once a week until either the fire becomes active again or is declared out.

   b. Requirements for preparation of Implementation Plans – The Wildland and Prescribed Fire Policy Implementation Guide will be the source and reference for the preparation of all plans and documentation for wildland fire use with the exception of the Isle Royale WFU Fire Decision Criteria Checklist.

      WFIP – Stage I, II and III information requirements and outline needs are found in the Implementation Guide.

5. Potential Impacts of Plan Implementation

   Fire use can have both positive and negative impacts. Positive impacts are the benefits to forest habitat development when fire is part of the natural processes that help provide for a balanced ecosystem. Socially, there is the potential for water-borne visitors to witness a natural event not often seen by the public, in relative safety.

   Negative impacts for fire use at Isle Royale would be mostly of a social nature. Smoke impacts to concession facilities, campgrounds and life lessees as well as park visitors are a possibility although their effects are expected to be short-term and temporary. Some disruption of backcountry use is possible with restrictions in areas near fires or in areas where fire spread.

There are potential negative impacts from wildland fire to sensitive species or to cultural resources. Mitigation actions to protect these resources are addressed specifically in implementation plans such as Prescribed Burn Plans or WFIPS. To the extent that these resources and sites are known, their locations will be mapped and maintained in the park's GIS database.

Another potential negative impact is to park staff. Supporting these projects can require a substantial commitment of staff time. Use of outside resources and teams to supplement local staff will be necessary to minimize this impact.

6. Staff Responsibilities for Wildland Fire Use Implementation

If wildland fire use complexity escalates to Stage III of the WFIP, or during multiple Stage I/II fires, the staff of Isle Royale will require assistance to manage the fire (FUMA) and to complete fire spread modeling and Maximum Manageable Area development (LTAN). These positions may be ordered separately or as part of a Fire Use Team.

Superintendent – Responsible for making the Go/No Go decision, signing the WFIP and periodic assessment to validate the WFIP decision. Declares park closures when needed. Will issue a written delegation of authority in the event a Fire Use Management Team is assigned to a WFU fire at Isle Royale.

Fire Management Coordinator/Chief, Natural Resources Management – Ensures implementation of FMP and coordinates wildland fire and prescribed fire programs. Responsible for ensuring that the fire program is managed within RM-18 guidelines. Responsible for analyzing fire weather and fire season severity to support fire use decisions, preparing WFIP Stage I and Relative Risk Rating Chart on all candidate wildland fires. Prepares Short-Term Implementation Action, Stage II, for WFU fires. Provides technical assistance in respect to WFIP planning, staffing assistance in respect to monitoring and advisory assistance in terms of escalating staffing due to increases in complexity and fire behavior. Should be immediately notified of potential fire use projects during WFIP Stage I if not on location. If qualified, may serve as Fire Use Manager. Provides fire behavior predictions for Stage I and II Serves as Resource Advisor during Stage III development and implementation.

Chief Ranger – Evaluates fire activity in terms of public and employee safety and makes recommendations to the Superintendent for closures. Patrols to ensure closures are enforced. Designs and implements the park evacuation plan at the discretion of the Superintendent. Ensures that a comprehensive fire management program at the park is adequately planned for and implemented.

Area Fire Management Officer - Ensures implementation of FMP and coordinates wildland fire and prescribed fire programs. Responsible for ensuring that the fire program is managed within RM-18 guidelines. Responsible for providing technical

assistance for analyzing fire weather and fire season severity to support fire use decisions, and preparing WFIP Stages I, II and III. Provides staffing assistance in respect to monitoring and advisory assistance in terms of escalating staffing due to increases in complexity and fire behavior. Should be immediately notified of potential fire use projects during WFIP Stage I if not on location. Provides fire behavior predictions for Stage I and II WFU fires.

Ecoregional Fire Ecologist – Provides oversight to monitoring program. Provides input into MMA and long term risk assessment in accordance with Stage III.

Fire Use Management Team – The number of personnel required for an incident will vary. Management could range from a Stage I & II Fire Use Manager (Burn Boss II who has had S-580) and Fire Effects Monitor for a low complexity WFU fire; to a full Fire Use Management Team for a Stage III complexity fire. Staffing levels will be evaluated daily and adjusted as needed based on actual and predicted fire behavior, predicted weather, other fire activity, etc.

External Resources – Support will be needed for Isle Royale to implement stage III wildland fire use and many prescribed fires:

- NPS Fire Use Modules: can provide both planning and operational assistance related to wildland fire use and prescribed fires.
- Local MNICS crews can assist with implementing prescribed fires.
- An archeologist for fires in areas with known archeological sites. Preferably this person would come from Midwest Archeological Center in Lincoln, NE.

7. Public Information

When WFU fire projects are implemented, information will be made available to the public to ensure understanding, acceptance, and support. Local media (newspapers, radio and television) will be provided with briefings and photo/interview opportunities. Visitor information staff and rangers will be kept informed concerning WFU fire status. In addition, local cooperators will be kept informed. If WFU fire operations persist for extended periods and burn substantial areas, consider ordering a public information specialist.

8. Wildland Fire Plans and Documentation

All designated WFU fires will be documented for the record and for future reference. All WFU fires will be permanently mapped and the maps archived. Other records should include:

- WFIP and all amendments and revisions
- Wildland Fire Situation Analysis (WFSA) (if used)
- Monitoring reports and summaries of findings
- Revalidation and certification documents
- Fiscal reports
- Project maps

- Daily weather records
- Fire Behavior predictions
- Smoke emission and transport observations
- DI-1202
- Resource Orders used
- Other information as appropriate for the situation such as photos, video, photo points, etc.

9. Cost Tracking

   All WFU fire costs will be tracked and documented in the fire record. Costs will include all personnel services, service contracts, aircraft, supplies, and equipment procurement.

C. WILDLAND FIRE SUPPRESSION

1. Fire Behavior

   Due to the lack of complex topography, fires in Isle Royale National Park are essentially wind-driven. Slowly spreading surface fires with occasional torching are the norm with 20 foot windspeeds below 15 mph. Short-duration "mini-droughts" quickly dry out the thin ridge top soils and crown fires will develop on the ridges if crown closure and windspeeds are adequate.

   The 1988 Stanley Ridge Prescribed Natural Fire (prior to 1998 terminology change) illustrates well the range of fire behavior on the island. This fire, located on a ridge, was a creeping ground fire for approximately two weeks until a wind event occurred. The fire then made one major run through the jack pine crowns before fuel conditions changed and the fire moved off of the ridge.

2. Preparedness

   a. Prevention – The objectives of the park's fire prevention program are: to prevent human caused wildland fires and, to incorporate prevention messages into interpretive programs. The Fire Prevention Plan is found in Appendix J.

   b. Annual Training – Annual refresher training emphasizing safety will be required for park staff. Minimum training will include LCES, Standards for Survival, fire shelter training and other updates as appropriate. Because of the isolated nature of the park, training will also be provided to safely work around electrical facilities and deal with gas tanks and operations in the wildland urban interface. Requirements for annual firefighter refreshers are listed in DO-18.

      In addition, each year the Area Fire Management Officer, Chief Ranger and Fire Management Coordinator will assess the current qualifications of the park's fire qualified personnel. From this assessment, current and future training needs for both the park and individuals will be determined. Training

will be obtained in the most cost-effective manner through services of the Area Fire Management Office or through interagency training courses. Qualified instructors will be utilized for all courses.

c. Readiness – Each year prior to and after the fire season, the Fire Effects Monitor will conduct an inventory of the District fire caches. Any needed supplies or equipment will be requested through the Fire Management Coordinator or Area Fire Management office. The District Rangers will also be responsible for ensuring that park fire tools and equipment are maintained in a state of readiness, especially during the fire season.

d. Fire Weather and Fire Danger

(1) Weather Stations – The primary weather station is station number 200405, Ojibway. Information is archived in the Weather Information Management System (WIMS) and is used to derive fire danger indices.

Isle Royale National Park maintains three permanent fire weathers located at the Ojibway Tower (200405), Windigo (200403) and Mott Island (200401). The stations at Ojibway and Windigo are remote automated weather stations (RAWS) and the Mott Island station is a manual station. Weather is collected daily from early May when staff arrives on the island through mid October when the island closes for the winter. The primary station for staffing levels calculations is the Ojibway station. Catalog information for all three stations follows:

Table 3 – Weather Station Information

Station	Name	Elevation	Aspect	Slope	Climate	NFDRS Fuel Model
200401	Mott	602	Flat	1	3	H
200403	Windigo	700	Flat	1	3	H
200405	Ojibway	1040	Ridge	1	3	H

(2). Fire Danger Index – The Canadian Forest Fire Danger Rating System indicates the potential for and severity of an unwanted wildland fire occurrence (Stocks, et al 1989; Van Wagner 1987). The Fire Weather Index (FWI) will be used to indicate fire danger in the park. FWI is used as a numerical rating of fire intensity and is widely used as a general index of fire danger. The FWI indicates fire intensity by combining the rate of fire spread with the amount of fuel being consumed. It is similar to the NFDRS Burning index (BI) which most agencies use for staffing classes (Jakala, 2001). The fire weather index ranges in Table 4 were derived from a statistical analysis of data from 1987 to 2001 for the Ojibway station and 1966 to 2001 for the Mott and Windigo stations.

In addition to FWI, as stated in Section IV.B, Buildup Index (BUI) and Drought Code (DC) will be used in the Go/No Go decision process to determine Wildland Fire Use. DC and BUI are excellent indicators of drought and long-term fire danger.

While CFFDRS indices will be the primary indices utilized for decision making at Isle Royale, NFDRS indices will be tracked as well since they are familiar to most fire use and incident management teams coming from other parts of the country. The following chart displays 90th and 97th percentile thresholds of often used NFDRS (Fuel Model H) as well as CFFDRS indices for Isle Royale National Park.

e. Step up Plan – The Step up Plan provides a guide for actions to take as fire danger indices increase. Specific actions and trigger points are listed in the table in Appendix H.

Table 4 – Fire Index Thresholds for Isle Royale National Park
Ojibway Station 1987-2001
May15-October 15

INDEX	FIRE DANGER RATING SYSTEM	90TH PERCENTILE	97TH PERCENTILE
Fire Weather Index (FWI)	CFFDRS	18	27
Buildup Index (BUI)	CFFDRS	58	78
Duff Moisture Code (DMC)	CFFDRS	43	59
Drought Code (DC)	CFFDRS	354	423
Burning Index (BI)	NFDRS (Fuel Model H)	19	25
Energy Release Component (ERC)	NFDRS (Fuel Model H)	19	24
Thousand Hour Fuel Moisture (1000 Hr.)	NFDRS (Fuel Model H)	18	17
Keetch-Byram Drought Index (KDBI)	NFDRS (Fuel Model H)	179	241
Hundred Hour Fuel Moisture (100 Hr.)	NFDRS (Fuel Model H)	14	12

3. Pre-attack Plan

The Isle Royale National Park pre-attack plan is considered a “work in progress,” that is, it is constantly being upgraded as staff time permits utilizing the suggested checklist from Reference Manual -18, chapter 7. The Pre-Attack Plan can be found in Appendix G of this FMP.

4. Initial Attack

a. Suppression FMU – All fires will be suppressed with the Appropriate Management Response with due consideration of firefighter and public safety. Priority will be given to fires threatening National Register listed or eligible buildings, concession facilities, NPS residences, life leases historic buildings, and other infrastructure in that order.

b. Wildland Fire Use FMU – Unwanted, human-caused wildland fires within established camp areas or on cultural sites will receive first priority for suppression and will be aggressively suppressed. The Stage I, Initial Fire Assessment, of the WFIP provides the decision framework for selecting the appropriate management response for all wildland fires. If the decision is to manage a lightning-caused fire as a WFU fire, a fire monitor will be assigned to the fire to gather necessary information to guide periodic reassessments. Prior to the second burning period a Stage II Short-term Implementation Action Plan will be completed. At any time a WFU fire is predicted to threaten a developed area within two burning periods, a detailed assessment of predicted behavior, weather, fuel conditions and current visitation will be completed. This assessment will suggest appropriate action to take to extinguish, initiate holding actions to contain the fire to areas away from the protected area, or continue to monitor burning conditions.

d. Confinement as an Initial Attack Suppression Strategy – A confinement strategy may be selected for initial attack as long as it is not being used solely to meet resource management objectives. Resource benefits may be a side benefit but the strategy must be based upon the criteria listed above. A confinement strategy will follow the same management process as for wildland fire use decisions with a WFIP prepared in stages as the fire or management considerations dictate.

   Confinement strategies may be used in either FMU if, in the opinion of the Initial Attack Incident Commander, direct suppression would put firefighters at risk due to terrain considerations, lack of adequate IA staffing, other safety issues, or if damage to the resource from direct suppression efforts outweighs the increase in burned acres.

e. Response Times –Because the park is an island, access to portions of the park from the Mott Island headquarters is by boat followed by hiking to the fire. An additional consideration is whether sufficient staff is available on site. For extended attack fires help would be requested from the partners in Minnesota and, weather permitting, additional personnel could be flown to the island.

e. Management Constraints – Refer to the Management Constraints listed in section III.C.1.c. In addition, due to extensive water resources in the park, the following special restrictions will apply with regard to aerially applied retardant and foam use:

- *Retardant* – No retardant drops within 400 feet of open water.

- *Foam (aerial delivery)* – Aerial delivery of foam requires park Superintendent approval on a case-by-case basis. When approved, the following guidelines apply:
  - Foam concentrate will only be injected into the holding tank after the water pick-up operation has been completed.
  - Drops from Beaver, T2 & T3 helicopters – no drops within 200 feet of open water.
  - Drops from Scoopers, heavy air tanker or heavy helicopter – no drops within 400 feet of open water.

- *Foam (ground delivery with motorized pumps)*:
  - No application within 25 feet of open water when using small pumps (waterbug, Mk 26, Shindawa, etc.)
  - No application within 50 feet of open water when using Mk III or equivalent pumps.
  - All foam concentrate used for injection will be located in impermeable containment basins, i.e. visqueen (plastic sheet) spread over rocks or logs to form a catch basin.

- *Foam (ground delivery with backpack pumps):*
  - No application within 10 feet of open water.
  - All backpack pumps will be filled a minimum of 10 feet from open water. A separate, uncontaminated container must be used to transport water from source to backpack pump. This container must be kept uncontaminated by concentrate.

All of the above restrictions are based on resource protection and values at risk, and can be modified in life-threatening situations, or with the express approval of the Superintendent.

f. Local Issues – Because the island is entirely federally-owned, there are no known inter-governmental issues related to wildland fire management. Close communication with life lease holders and concessionaires should reduce wildland fire controversy to a minimum.

5. Extended Attack and Large Fire Suppression

a. Extended attack needs – Based on the fire history few fires will remain uncontrolled past the first burning period. While the largest fire on the area in the 20th century was 26,010 acres in 1936, most fires have been less than 0.1 acre in size. For extended attack needs, cooperators include the Minnesota Incident Command System (MNICS) partners. Minnesota is the closest source for support with seaplane facilities and USFS offices near the Lake

Superior shore. Personnel from other land management agencies are also quickly available through MNICS.

For large fires requiring large numbers of personnel or other resources, contact with the Minnesota Interagency Coordination Center at Grand Rapids, MN will bring any necessary resources from regional sources and if needed nationally.

b. Implementation Plan Requirements – WFSA development will be required after the first operational period if the fire escapes initial attack. At this point a WFSA will be completed or reviewed each day until the fire is surrounded by firelines or natural or other barriers that will stop fire spread.

c. Complexity Decision – When a WFSA has been completed for use during the operations on a second operational period the fire will be considered to be an extended attack fire.

d. Delegation of Authority – A sample delegation of authority to an Incident Commander is included in Appendix E.

6. Exceeding Existing WFIP

When wildland fires cannot be controlled during the initial suppression action or when the appropriate management response in a fire use area has not been successful, the WFIP is considered to have been exceeded. The WFSA is initiated at this stage. Initiation of the WFSA is also necessary when implementation of a prescribed fire plan is not successful and the fire must be suppressed. The following parameters and considerations will be used in WFSA preparation at Isle Royale National Park.

Situations that could require selection of a new strategy through the WFSA include but are not limited to:

- Exceeding periodic assessment criteria, i.e. trigger points, air quality;
- Unacceptable risk to firefighter safety, natural or cultural resources, improvements;
- Fire leaving or threatening to leave MMA boundary or park boundary;
- Fire exceeds prescribed fire plan;
- Increasing demand on local and/or national fire management situation

7. Minimum Impact Suppression Tactics (MIST)

Director's Order #18 states that: "Methods used to suppress wildland fires should minimize impacts of the suppression action and the fire, commensurate with effective control and resource values to be protected."

Minimum impact suppression tactics are required policy for all fire management activities on National Park Service lands. Fire management activities within the

park will be carried out in a manner that minimizes impacts to Isle Royale' natural and cultural resources. Fire camp facilities, when practical, will be located in already developed areas of the park. Of primary importance is the need to impart upon suppression forces a minimum impact fire suppression philosophy. Suppression forces will choose methods and equipment commensurate with suppression needs and the appropriate management response strategy which least alters the landscape or disturbs park natural and cultural resources. This policy is an attempt to take the national park ethic into account in firefighting practices; it is not a reason to relax normal safe firefighting practices. Some examples of minimum impact firefighting include:

- Use water instead of fire retardant chemicals in bombers.
- Cold trail the fire-edge when practical.
- Wetlines, or environmental lines, will be used wherever possible in lieu of handline construction if water and pumps are available. Waterbars will be constructed on handlines on steep slopes.
- Utilize soaker hose or foggers in mop-up. Avoid "boring" and hydraulic action on shallow soils.
- Firelines will be kept to the minimum width necessary to allow backfiring or safe blackline to be created. Utilize natural barriers wherever possible.
- If a mineral soil line is needed, utilize fireline explosives whenever possible instead of heavy equipment. As a general rule, heavy equipment will not be used in the park and only used in the most worst case scenario and with the written approval of the Superintendent.
- Decisions on suppression practices will be made by the Incident Commander. Utilize his/her creativity.
- Minimize tree falling. If necessary to fall trees in visually sensitive areas (i.e., trails, portages, lakeshores), utilize "slant cut" technique to face cut away from view, or re-cut later during rehabilitation activities.
- Archeological sites will be identified prior to a fire and protected wherever possible. Minimize ground disturbance to protect cultural resources.
- Scatter or remove debris as prescribed by the Incident Commander.
- All firelines, spike camps, or other disturbance in visually sensitive areas will be rehabilitated to maintain a natural appearance.
- After the fire emergency is over, transport of personnel, equipment, and trash out of the park will be consistent with national park resource management objectives.

8. Fire Rehabilitation

On Isle Royale the only rehabilitation needs anticipated are those associated with fireline construction and mop-up activities. Proper placement of hand constructed firelines should reduce the need for major work. Areas with handlines will be restored to their pre-fire condition as soon as possible. The nature of fires on the park indicates that long term rehabilitation should not be necessary. Should a Burned Area Emergency Rehabilitation Team (BAER) be required on the park an archeologist or cultural resource specialist should be part of the team.

9. Records and Reports

The Superintendent is ultimately responsible for fire reporting and fiscal accounting. Individual report assignments may be made by the Superintendent. The table below is a checklist of possible wildland fire documents and the individual usually responsible for completing them.

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

Table 5 – Checklist of Wildland Fire Documentation

Checklist of Wildland Fire Documents and Reports		
Document	**Revision or Preparation Frequency**	**Responsible Party**
DI-1202	Each incident	Incident Commander
WFSA	As needed	Unit management/IC
Fire Weather	Daily in season	Fire Management Coordinator (FMC)
Fire Situation Report	Daily in season	FMC
Fire Danger	Daily in season	FMC
Fire Complexity Analysis	Per Incident as Needed	Incident Commander
Monthly Risk Analysis	Monthly	FMC/Chief Ranger
Pre-Attack Plan	Annually	FMC/Chief Ranger
Wildland Fire Critique	Each Incident	On site suppression staff

V. FUELS MANAGEMENT

A. LONG-TERM PRESCRIBED FIRE

In the past, Isle Royale National Park has used prescribed fire infrequently. Past projects have included a small broadcast prescribed burn at Daisy Farm and pile burning associated with mechanical treatments in the developed areas. It is the park's intention to continue application of WFU fire and potentially expand the use of prescribed fire if future research and monitoring indicates the need. Potential goals of expanding prescribed fire program could include but are not limited to:

- Reduction in hazardous fuels around park-developed areas or cultural sites
- To accomplish specific vegetation management objectives such as restoring or maintaining jack pine (Pinus banksiana) stands or increasing red pine (P. resinosa) and white pine (P. strobus) abundance since they are declining species regionally.
- Cultural scene maintenance.
- To achieve specific other Resource Management objectives if future monitoring or research indicates that WFU fire is insufficient.

B. PRESCRIBED FIRE PLANNING

1. Annual Preparation and Long-term Prescribed Fire Relation to FMU's

   As stated above and previously in the document, the development of a Fuels Management Plan and 5-year prescribed burn schedule is pending the results of ongoing research in the park. Possible objectives of a Prescribed Burning Program are listed above. Following the completion of the research and if deemed appropriate, a Fuels Management Plan will be written identifying specific Prescribed Burn Units. This plan and specific burn units will be subject to the appropriate level of NEPA and National Historic Preservation Act cultural resource protection compliance. The Fuels Management Plan and accompanying documentation of compliance will become an unattached appendix to this Fire Management Plan.

2. Personnel Requirements

   Assistance from outside the park may be needed for successful execution of the prescribed fire program. Assistance from nearby parks may be sufficient; for complex burns requiring significant resource commitment, use of existing NPS Fire Use Modules may be the most efficient method of accomplishment.

   To adequately manage the prescribed fire program and make most effective use of WFU fires the following skills are necessary:

   1 Prescribed Fire Burn Boss, Type II

1 Fire Use Manager II
1-2 Fire Effects Monitors
1-2 Ignition Specialists, Type II

Other skills needed are generally available by using suppression qualified individuals, i.e., Firefighters, Crew Bosses, etc.

3. Fire Behavior and Fire Effects Monitoring

All prescribed and wildland fire use fires will be monitored. Information gathered during fire monitoring is needed to keep fires within predetermined criteria, to identify trigger points for suppression action, to protect human life and property, and to increase knowledge of fire behavior in park fuel types and of fire effects on the park ecosystems. A fire monitor or monitoring team (NWCG qualification FEMO) will observe the fire, assess its potential and provide a historical record. Monitoring will include documenting the fire environment (weather, fuels, topography), fire behavior (manner and rate of spread, flame length, etc.), and fire effects (percent of fuels consumed, changes in plant and animal community composition and structure, etc.). Photographs may be taken. Weather readings will be made periodically with a belt weather kit at the fire site. Fire weather data is routinely entered into the Weather Information Management System (WIMS) and provides inputs for the Canadian Fire Behavior Prediction (FBP) System modeling tool. Forms for recording data will be supplied to monitors.

The National Park Service Fire Monitoring Handbook (U.S. NPS 2001) will be the primary source for protocols for monitoring fire weather and fire behavior. The Isle Royale Vegetation Core Field Monitoring Guide will be the primary source for protocols for monitoring fire effects. The Isle Royale National Park Fire Effects Monitoring Plan is an unattached appendix (Appendix F) to this Fire Management Plan. It defines for, the park, fire monitoring goals and objectives; monitoring types; minimum qualification standards for fire monitors; monitoring levels; long-term and post-fire monitoring protocols; and minimum acceptable standards for documenting fire weather, behavior and effects.

4. Critique of Prescribed Fire Operation

The following items, as a minimum, will be reviewed following each prescribed fire operation.

- Were any unsafe acts noted?
- Were burn objectives met within an acceptable range of results?
- What should be done differently to obtain desired results or get better results?
- Was there any deviation from plan? If so, why?
- Was prescription appropriate?
- Were weather changes a factor in accomplishing burn?
- Problems and general comments.

5. Documentation and Reporting

The following table lists the reports and other documents required for prescribed fire operations as well as the individual/position responsible.

Table 6 – Checklist of Prescribed Fire Documentation

Checklist of Prescribed Fire Documents and Reports		
Document	**Revision or Preparation Frequency**	**Responsible Party**
FIREPRO Project Submission	Annual	FMO
Original Signed Prescribed Fire Plan	Each Project	Superintendent
Checklist of Pre-Burn Prescribed Fire Activities (no specific form)	Each Project	Prescribed Fire Burn Boss
All Reviewer Comments	Each Project	Reviewers
All Maps	Each Project	FMC\Prescribed Fire Burn Boss
Notification Checklist	Each Project	Prescribed Fire Burn Boss
Permits such as burn, smoke, etc.	Each Project	FMC\Prescribed Fire Burn Boss
Monitoring data	Each Project	Prescribed Fire Monitor
Weather forecasts	Each Project	FMC\Prescribed Fire burn Boss
Agency Administrator Go/No-Go Pre-Ignition Approval	Each Project	Superintendent
Operational Go/No-Go Checklist	Each Project	Prescribed Fire Burn Boss
Incident Action Plan(s)	Each Project	FMC\Prescribed Fire Burn Boss
Unit logs, Daily Validation or other unit leader documentation	Each Project	FMC\Prescribed Fire Burn Boss
Press Releases, Public Comments, and Complaints	Each Project	Local Park Staff
Smoke dispersal information	Each Project	FMC\Prescribed Fire Burn Boss
Post fire analysis (Critique)	Each Project	All Participants in Operation
Fire Occurrence (DI-1202) report (Must also be reported in SACS)	Each Project	Prescribed Fire Burn Boss

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

C. PRESCRIBED FIRE BURN PLAN

Prescribed burn plan requirements at Isle Royale are similar to the requirements at other NPS units. A detailed outline and discussion is found in RM-18, Chapter 10, Fuels Management.

D. EXCEEDING PRESCRIBED FIRE PLAN

In instances where the Wildland Fire Transition Plan is implemented, a WFSA will be completed and suppression action will be initiated based on the WFSA.

E. AIR QUALITY AND SMOKE MANAGEMENT

1. Air Quality Issues

   Protection of Isle Royale National Park's clean air and good natural visibility is a high priority for park management, and therefore must be considered in fire

management planning as fire can be a major source of visibility impairment, though it is usually of short duration. Emissions from fires can also be a source of discomfort or a threat to human health or safety.

Wildland fires are probably the most significant internal air pollution sources in the park, but they are not covered under Prevention of Significant Deterioration of Air Quality (PSD) regulations (Haddow, 1985). Nevertheless, good stewardship and the Clean Air Act (PL 88-206, as amended) section 118 requires that all federal actions comply with applicable state and local air pollution control requirements, even those areas (like Isle Royale) with exclusive federal jurisdiction. Regulatory requirements of the park smoke management program are limited to state requirements (there are no local regulations).

In the early 1980s, in compliance with PSD regulations, the NPS identified one "Integral Vista" at Isle Royale that was an important viewshed deserving special protection even though it extended beyond park boundaries. In this case, it extends beyond national boundaries, as it encompasses the Canadian shore vista from Greenstone Ridge.

2. Smoke Management

Under the Clean Air Act, (PSD) sections (160-164), Isle Royale has been designated a "Class I" area, meaning that the area has the maximum air quality protection afforded to any area by law. Federal land managers have a responsibility to protect the air quality and air quality related values within Class I areas. At Isle Royale this has resulted in an extensive monitoring program for visibility, ozone, SO_2, and particulates, programs which have been occasionally supported by the NPS Air Quality Division. Normally, island air quality concerns relate to external sources of pollution and their impact on park resources.

Michigan does not have specific visibility regulations, and its air pollution rules that relate to fire are aimed at protecting the public from the nuisance of smoke as much as the health or aesthetic effects. Open burning regulations permit the burning of "trees, logs, brush, and stumps..." in remote areas such as Isle Royale provided the fire does not become a nuisance. . The Michigan Department of Environmental Quality has requested that the National Park Service contact the Air Quality District Supervisor in Marquette, MI if a WFU fire or unwanted wildland fire is of sufficient size or smoke generation resulting in health concerns to the public, nuisance complaints, or media interest. (Fitzner, pers. comm. 2002)

a. Class I Areas – The entire park is classified as a Class I airshed. Planned fire operations will consider this designation in all prescribed fire plans for either prescribed or WFU fires.

b. Smoke Sensitive Areas

Management recognizes areas where smoke problems are likely and takes steps to notify visitors and/or mitigate the smoke intrusion. At Isle Royale, the notification process will be part of the public information and interpretation program outlined in Section X of this plan. Information on the objectives of the park fire management program will be made available to visitors and residents exposed to smoke discomfort from any fires.

Within the park, developed areas at Mott Island, Rock Harbor, and Windigo commonly have between 50 and several hundred people in residence. Other potentially sensitive receptors are campgrounds, ranger stations, life lessee and fishery cabins. The most politically sensitive targets in the park would be the concession facility at Rock Harbor and the cluster of life lessees in Tobin Harbor.

Any or all of these targets could be affected by smoke produced from fires at Isle Royale, although past history suggests that the frequency of smoke events is extremely low. Areas most likely to be impacted by smoke are those within a thirty degree radius of the path of any smoke plume and within the specified distances for the type and size of the fire. Critical targets of special concern are those that are within ¾ of a mile of the plume.

Most of the problems associated with fire emissions are caused by particulates. At Isle Royale, smoke that remains near the ground from a smoldering fire is more likely to be a problem than the interception of smoke plumes. Drainages and valleys (e.g. Tobin Harbor) concentrate smoke at night, and smoke particles may serve as the nuclei for fog development. Smoke-generated fog may be uncomfortable, but it should not cause any dangerous visibility problems since there are no roads in the park and boaters are accustomed to navigating in fog at Isle Royale. Advisories will be made via marine radio if necessary.

c. Local and Regional Smoke Management Procedures

- All Wildland Fires, including WFU fires, that are of a size or generate sufficient smoke to attract media interest, generate public health concerns or nuisance complaints will be reported to appropriate state air quality officials.

d. Mitigation Strategies

(1). Prescribed fires and WFU fires – Fires to improve resource values will have a smoke dispersion component in the prescription. If smoke creates a prolonged hazard or significant nuisance, appropriate actions will be taken to mitigate the condition causing the problem or the fire will be suppressed.

(2). Suppression – Suppress or mop up smoldering fuels when they are likely to generate smoke management "problems."

(3). Ignition – Ignite smoldering fuels to get them to burn with an active flame, which generates less than half the emissions than smoldering combustion. Flaming combustion also generates convection columns, which raise smoke above ground level.

(4). Types of Fires – Use backing fires when possible.

(5). Dispersion – Recognize poor dispersion conditions that will last several days, such as the predicted passage of a slow-moving warm front; a lingering high pressure system with stable atmosphere; or high humidity conditions, and adjust burning strategies as necessary.

(6). Residual Smoke – When a fire has burned for an extended period of time and generated a lot of residual smoke, the NPS will consider suppressing all new starts to minimize additional smoke production.

(7). Firefighter Safety – During high smoke production phases of a fire suppression operation, crews will be rotated out of high smoke areas.

(8). Sensitive Areas – Prescribed fire ignitions in sensitive areas will be done either when visitation is low, or the Superintendent will restrict entry to areas potentially impacted by smoke.

F. NON-FIRE APPLICATIONS

During the current planning horizon (2002-2007), no mechanical fuel hazard treatments are proposed. In 1998-2000, mechanical fuels treatment projects were completed in the park's developed areas at Mott Island and Rock Harbor. These projects consisted of removal of balsam fir ladder fuels around structures and removal of heavy concentrations of surface fuels using hand crews with chainsaws and hand tools. Treatments of this type are limited to locations near the concessionaire facilities, historic properties, life leases, and NPS residences to reduce the threat of wildland urban interface fires and their consequences.

1. Annual Preparation

   Projects will be developed and submitted for approval each year in accordance with national guidance. Approved project preparation will involve scheduling labor and equipment for the time period of the project.

2. Restrictions

   Mechanical treatments are limited to the developed, non-Wilderness portions of the park. Given the logistics of an island park and the wilderness character of the park, no heavy equipment will be used for treatments. Mechanical tools are

limited to hand-held power tools. Flexible scheduling should allow for protection of natural resources with minimal disruption to visitor use.

3. Effects Monitoring

   Mechanical treatment short-term monitoring will address the amount of fuel removed while long-term monitoring will track regrowth of fuels in the treated area. Previously-completed treatment projects will be assessed annually to determine the need for follow-up treatment. As stated previously, it is not anticipated that projects will be necessary within the next 5-7 years.

4. Mechanical Treatment Critique Format

   The following items will be part of mechanical fuel reduction project critiques:
   - Were any unsafe acts noted?
   - Were project objectives met?
   - What should be done differently to obtain desired results or get better results?
   - Was there any deviation from plan? If so, why?
   - Were weather changes a factor in completing project?
   - Problems and general comments.

5. Cost Accounting

   All costs associated with an individual mechanical project will be charged to the project code provided with the funding.

6. Documentation and Reporting

   The following table lists the reports and other documents required for mechanical fuel reduction operations.

Table 7 – Checklist of Non-Fire Treatment Documentation

Checklist of Non-Fire Fuel Treatment Documents and Reports Document	Revision or Preparation Frequency	Responsible Party
FIREPRO Project Submission	Annual	FMO
Signed Project Plan	Each Project	Superintendent
Project Maps	Each Project	FMC\Project Manager
Notification Checklist	Each Project	Local Staff\Project Manager
Permits	Each Project	Local Staff
On-Site Effects Reporting	Each Project	Monitor
Other Documentation	Each Project	Local\Project Staff
Contracts	Each Project	Local\Project Staff
Project Critique	Each Project	Project Staff

Time and filing deadlines are associated with each of these reports and will control scheduling and response times.

7. Annual Planned Project List

Mechanical fuels treatment projects will be addressed and identified in the Fuels Management Plan referenced in section V.B.1. As stated previously, projects were completed in 2000 around the park's developed areas and it is not anticipated that additional projects will be necessary in the next 5-7 years. Should ongoing assessment of these treatment areas indicate that further treatment is necessary, the projects will be subject to the appropriate level of NEPA and National Historic Preservation Act cultural resource protection compliance.

VI. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

A. ORGANIZATIONAL STRUCTURE

1. Superintendent or designee

   Responsible for planning and directing all park operations and is ultimately responsible for any fire and management actions occurring in the park. S/he must explicitly approve, in writing, any decision to manage a wildland fire as Wildland Fire Use for Resource Benefit (WFU). The Superintendent must also approve all Prescribed Burn Plans prior to implementation. Also delegates all planning and operational responsibility for the park's wildland fire management program to the Chief, Ranger Activities and Cultural Resource Management (Chief Ranger).

2. Chief, Ranger Activities and Cultural Resource Management (Chief Ranger)

   Responsible for overall coordination and supervision of the wildland fire management program, and coordination of activities with the other park division chiefs. S/he delegates planning, financial management, and preparedness responsibility to the Chief, Natural Resources Management, (Fire Management Coordinator) and all Wildland Fire and Wildland Fire Use operations through the Fire Management Coordinator to a qualified Incident Commander (IC), Fire Use Manager (FUMA) or Prescribed Burn Boss (RXB2). S/he will insure that adequate NPS wildland fire qualifications ratings are attained and maintained by members of the park staff commensurate with their responsibilities.

3. Chief, Natural Resources Management

   Chief, Natural Resources Management serves as the park's Fire Management Coordinator. He/she is responsible for implementation of the Fire Management Plan. This responsibility includes coordination and supervision of all prevention, preparedness, detection, wildland fire, prescribed fire, monitoring, and post fire activities involving NPS land. The Fire Coordinator submits budget requests through the Area Fire Management Office for FIRERPO input and monitors FIREPRO funds allocated to Isle Royale. May serve as Incident Commander, Prescribed Burn Boss, or Fire Use Manager during fire operations within the park, if qualified.

   The Branch Chief, develops resource management objectives involving fire’s role in the ecosystem; working closely with the Ecoregional Fire Ecologist and Area FMO to identify priorities for the use of fire as a management tool, including planning, and compliance. With the Ecoregional Fire Ecologist, coordinates all fire related research within the park.

4 Forestry Technician/Fire Effects Monitor

Serves as the Fire Effects Monitor on all Wildland Fire Use actions. Provides input to the Fire Management Coordinator and/or Area FMO for WFU Decision Criteria and development of the WFIP.

S/he will maintain all park files, records and databases relating to wildland fire, including a fire atlas.

Serves as the park's Fire Cache Manager, directly responsible for maintaining the park's fire caches and equipment at the main cache at Mott Island and works with the District Rangers to ensure that the smaller, remote caches are in a ready condition according to the standards established by NPS-18 in quantities and locations enumerated in Appendix E to this plan.

The Forestry Technician is responsible for operating and maintaining the park's fire weather stations to high quality standards, working with the West District Ranger for the station at Windigo. S/he will develop procedures for and oversee daily input of fire weather into the Weather Information Management System (WIMS) and post daily indices. When fire danger reaches moderate levels or higher, s/he will ensure that the Chief, Natural Resources Management is notified and that the appropriate announcements are made in accordance with the Step-Up Staffing Plan found in Appendix H of this plan.

S/he will validate and revise the park's fire-related telephone list prior to May 1 each year and maintain and post an up-to-date list of the park's qualified fire team. Both lists will be distributed as Appendix E to all those maintaining copies of this plan.

5. Area Fire Management Officer

Responsible for providing technical and professional support to Isle Royale National Park. This includes preparing or review fire use implementation plans, preparing and submitting FIREPRO budget requests, annual reports, develops and implements cooperative fire management agreements with other federal, state, Canadian, and local agencies, maintains computerized training and qualification records for Isle Royale firefighters, and may serves in operations roles during wildland or prescribed fire incidents within the park.

The Area FMO prepares, in consultation with park Resource Management Staff, prepares implementation plans for prescribed fires, wildland fire use fires, and mechanical fuels treatments and/or designates a Burn Boss/Fire Use Manager to implement the plan. She/He is responsible for preparation of all required fire reports and reporting. The Area FMO maintains records for all personnel

involved in suppression and prescribed fire activities, detailing the individual's qualifications and certifications for such activities and updates all fire qualifications for entry into the NPS Shared Applications Computer System (SACS). The Area FMO nominates personnel to receive fire-related training as appropriate.

6. District Rangers

   District Rangers shall maintain wildland fire caches and equipment within their districts in a ready condition per NPS-18 and Appendix E to this plan. They shall ensure district staffing and operations in accordance with the Step-Up Plan in Appendix H of this plan.

7. Branch Chief, Interpretation

   This position is the park's Public Information Officer and is responsible for issuing press releases and fielding media contacts as appropriate on ongoing fires. S/he shall ensure that the park's interpretive program addresses the role of natural fire in the Isle Royale ecosystem and informs the public of management's fire management strategy in accordance with the guidelines enumerated in Section X of this plan.

8. Branch Chief, Cultural Resources

   Shall provide consultation and expertise regarding archaeological and historical resources in fire management planning, and will work closely with the Incident Commander/Prescribed Burn Boss to protect and preserve cultural resources during ongoing fires. S/he will direct the environmental compliance procedures for ground-disturbing presuppression activities and coordinate all activities of fireline archeologists with the IC/RXB2/FUMA.

9. Dispatcher

   Maintains a computerized log of all significant radio and telephone traffic during ongoing fires. S/he will log (as feasible) personnel, locations, times, and significant fire events as they occur. S/he will provide communications support for the Incident Commander/Prescribed Burn Boss and fire management operation as needed during ongoing fires, and will keep non-emergency radio traffic to a minimum when appropriate. S/he will make routine announcements of fire danger and restrictions in effect in accordance with the Step-Up Plan in Appendix H.

10. Administrative Officer/Assistant Superintendent

    Responsible for establishing fiscal work orders for fire management activities on an as-needed basis. During fire emergencies, s/he will provide the Incident Commander/Prescribed Burn Boss with procurement, contracting, transportation and logistical support of mainland and Ranger III staff as necessary. S/he may delegate some or all of these responsibilities to staff in the Division of Administration and Mainland Operations.

11. Facility Manager

Provides the Incident Commander/Prescribed Burn Boss with maintenance, repair, transportation, and logistical support of the Maintenance Division to any ongoing fire effort as necessary. S/he will encourage Maintenance personnel to become actively involved in the wildland fire program, and will set a target of at least four Firefighters Type 2 (or higher qualification) from the Maintenance Division to the park's wildland fire team each season.

12. Great Lakes Ecoregional Fire Ecologist

    Assists park resource management specialists and Area FMO develop resource management objectives involving fire's role in the ecosystem. Works closely with the Area FMO to identify priorities for the use of fire as a management tool, including planning, compliance, mitigation, and rehabilitation standards if indicated. With the park's Fire Effects Monitor, coordinates fire effects monitoring activities and data analysis within the park and makes recommendations regarding fire effects to the Area FMO.

    All personnel will meet the training, physical and experience requirements in the Wildland and Prescribed Fire Qualification System Guide PMS 310-1 (NFES 1414) for the fireline position they will fill.

B. FIREPRO FUNDING

Isle Royale National Park FIREPRO funding request submissions are updated annually per requirements in RM-18, Chapter 17. Budgets submissions for fuels treatment projects, staffing, and equipment are made by the Area FMO with input from the park Fire Management Coordinator.

C. RELATION OF FIRE MANAGEMENT TO ISLE ROYALE'S ORGANIZATIONAL STRUCTURE

At Isle Royale National Park the Fire Management Organization is recognized as a critical part of the park's natural resources program as reflected by its location in the Resource Management branch of the park organization. This reflects the understanding that the fire management role is one not only of resource protection, but one of ecosystem management as well.

D. PERIODIC ASSESSMENT OF FIRE USE ACTIONS

The Superintendent is responsible to periodically assess and certify, by signature, that continued management of wildland fire use actions is acceptable. The park Superintendent, under certain conditions, may delegate this responsibility to another organizational level.

E. INTERAGENCY COORDINATION

Isle Royale National Park is surrounded by Lake Superior, with the closest mainland area at least 14 miles (23 km) away. Access to the park is by boat, floatplane, or helicopter only and usually limited to daylight hours. There is no danger of fires spreading across the park boundary in any direction. Because the island is physically closer to Minnesota than Michigan, the closest forces concept dictates assistance from Minnesota.
In 1991 the park formally joined MNICS, providing an official link to all other firefighting agencies and their resources in Minnesota.

The park is an active participant in the interagency fire community and typically offers five to ten qualified firefighters each year for large fire dispatch. Experience gained by park staff on these fires contributes to Isle Royale's program to attract, train, and prepare qualified firefighters and overhead for fire management responsibilities at Isle Royale.

F. INTERAGENCY CONTACTS

Details are found in Table 12, Appendix E.

G. FIRE RELATED AGREEMENTS

Table 11 in Appendix E lists the current agreements that support or otherwise affect fire management operations at Isle Royale.

VII. FIRE RESEARCH

All fires in Isle Royale National Park will be managed; hence, there is a need for refined management programs based upon scientific information. Fire research performed at Isle Royale will provide information that will be used for making management decisions.

A. PREVIOUS RESEARCH

Bick et. al (1985) summarizes post-fire vegetation research done in the park prior to 1985. Janke (1983) completed a multi-year investigation of park vegetation, concentrating on post-fire succession. This was highlighted by the establishment and monitoring of plots on two small burns from the 1970s. Janke (1991) re-monitored these burns in 1990, fourteen and sixteen years after the fires. Janke also established plots in 1991 on the 1988 Stanley Fire. Martin (1988) developed the best ecological synthesis of the park's fire history, especially as it applied to open areas that provided habitat for the extirpated sharp-tailed grouse.

Very little has been done to document the park's pre-settlement fire history, with the exception of Raymond's (1975) introductory work with a few sediment cores and a follow-up study by Cole et al (1995) (see Section III.C.1.d for details).

Additional research is needed to better understand Isle Royale's fire environment, which will allow refinement of prescriptions and better management of fire to meet park objectives. These items are enumerated in the 1999 Isle Royale National Park Resource Management Plan (USDI, 1999):

B. NEEDED RESEARCH

1. Fire History

   Study pre-settlement fire history, through sediment, pollen, and tree cores, to determine the frequency, intensity, and extent of natural (or perhaps aboriginal) fires prior to EuroAmerican use.

2. Fuel and Fire Regime

   Using results of modern fuel survey, fire history research, and forest/herbivory ecology studies, quantify and describe the changes in fuels and fire regime due to the impacts of moose browsing.

3. Fire Modeling Tool

   Use fuel map and other natural, cultural, and administrative resource information to refine Fire Management Unit boundaries and develop an interactive fire management GIS modeling tool. Analyses will include values at risk, travel times to fire response, distance from water sources, etc.

All external research proposals will be evaluated and managed according to the Isle Royale National Park's Guidelines for Researchers, Standard Operating Procedure VS&RP-14 found in the Natural Resources Office.

4. Cultural Resources Effects

   Little is known about the effect of fire on cultural resources, other than the obvious threats to wooden structures. Research could be done to determine the effect of fire on mining remains such as mining poor rock piles and on archeological sites.

VIII. FIRE MONITORING

A. SHORT- AND LONG-TERM MONITORING

All wildland fires and prescribed fires, as well as wildland fire use fires, will be monitored. Information gathered during fire monitoring is needed to keep fires within predetermined criteria, to help identify trigger points for initiating holding and suppression actions, and to protect human life and property. On any fire that burns beyond the initial attack stage, a fire monitor will observe the fire, assess its potential and provide a historical record. Monitoring will include documenting the fire environment (such as weather, fuels, and topography), fire behavior (such as manner and rate of spread, and flame length), and fire effects (such as percent of fuels consumed and changes in plant and animal community composition and structure). Photographs may be taken. Weather readings will be made periodically with a belt weather kit at the fire site. Forms for recording data will be supplied to monitors.

Fire weather will be collected every day at 1400 hours (EDT) at the park's three weather stations from mid-May through mid-October. The weather station locations are located at the Ojibway Tower (primary), Windigo, and Mott Island. Daily fire weather records from the fire weather stations will be entered into the Weather Information Management System (WIMS). The weather station readings will provide the daily information required to calculate the prescribed indices under the Canadian Forest Fire Danger Rating System (CFFDRS). All data entered directly into WIMS will be automatically archived in the National Fire Weather Data Library (Bradshaw and Fischer 1984). The resultant time series data base of fire weather provides management a powerful foundation to assess the significance of current fire danger in comparison to historic trends and fire occurrence data using FIREFAMILY Plus software. Fire weather forecasts will be obtained from the NWS office in Marquette, MI.

In addition, fire weather for prescribed fires will be recorded by the Prescribed Burn Boss or a designee at least 14 days, and preferably 30 days, prior to the earliest ignition date of the burn. When possible, a portable, temporary weather station may be established for each prescribed fire so that CFFDRS indices can stabilize before the burn. The station will be positioned, and readings will be taken, in such a way as to reflect the average peak operational period conditions within the most flammable fuel type in the unit, as well as 24 hour variations. Fire danger indices will be calculated from these portable stations.

B. THE FIRE MONITORING HANDBOOK

This handbook, developed by the National Park Service (U.S. NPS, 2001) outlines protocols for monitoring fire weather, behavior and effects, and describes in detail all aspects of a comprehensive, state-of-the-art monitoring program. These protocols provide NPS standards for fire effects monitoring at Isle Royale National Park.

Specific protocols for monitoring effects of fire on vegetation are described in the Isle Royale National Park Vegetation Monitoring Core Field Guide.

C. FIRE MONITORING PLAN

The Isle Royale National Park Fire Effects Monitoring Plan is an unattached appendix (Appendix F) to this Plan. It defines for the park fire monitoring goals and objectives; minimum qualification standards for fire monitors; monitoring levels; and minimum acceptable standards for documenting fire weather, behavior and effects. Monitoring protocols adhere to those described in the Isle Royale Vegetation Core Monitoring Field Guide. In brief, fire effects monitoring in the park will consist of sampling permanent vegetation plots, which includes measurements of canopy and pole-size trees, ground cover, dead and down fuels, and duff, and taking photographs. Plots will be sampled pre-burn, immediately post-burn, and one, two, five, and ten years post-burn. Annual fire effects monitoring information will be provided to resource management staff to provide feedback on the success of fire use with respect to meeting park vegetation management goals and to approaching the desired future condition of park vegetation.

IX. PUBLIC SAFETY

Although fires are a natural part of the Isle Royale National Park ecosystem, they have not been part of the typical visitor experience because of infrequent occurrence and past suppression policies. Ideally, through education and experience, disruption in plans due to naturally occurring fires will become accepted as part of the risk associated with a national park visit, just as high winds, isolation and lightning storms are now. Visitors will occasionally ignore warnings or are unaware of potential dangers and wander into or through burning or burned areas.

Assuring visitor safety will take priority over fire suppression and monitoring activities. The Fire Management Coordinator will inform other divisions of all potentially hazardous fires in the park. The Chief Ranger and Branch Chief, Interpretation will then coordinate public notification efforts within and outside the park. The extent of public notice will depend on the specific fire situation. Public information and education is further discussed in Section XVI.

A. SAFETY ISSUES

1. Developed Areas

   Most visitor use occurs along shorelines near developed areas and campsites. Only one campground (Island Mine) is not located on a shoreline. All use of concession facilities, life leases, fisheries, park residences and administrative facilities (except lookout towers) is also concentrated along shorelines.

2. Backcountry

   The park's 165 miles (265 km) of trails are used by approximately 66 percent of park visitors. In addition, 90% of all visitor overnight stays are in the backcountry. Much of the trail traffic uses either Windigo or Rock Harbor to access the backcountry but users of the Greenstone Trail would be most at risk due to the ridge location and distance to the shoreline over most of its length.

3. Escape

   Opportunities for visitors and residents to escape a large, fast moving fire may be limited along trails away from shorelines. For those using facilities and trails along shorelines, opportunities for escape are readily available.

4. Unnecessary Assistance

   Some individuals will approach a fire, even a WFU fire or prescribed fire, and may attempt suppression action.

B. MITIGATION MEASURES

1. Closures

   a. Areas identified as high risk may be closed when the risk to visitors, life lessees, and residents is deemed unacceptable. While potential hazards exist, trails, campgrounds, and backcountry zones may remain closed until mitigation measures have been completed.

   b. When the hazards from a wildland fire or dense smoke are high, signs near the hazard area may be posted. Trails, campgrounds, docks, and backcountry zones may be closed if deemed necessary by the Incident Commander and as approved by the Superintendent. District Rangers will ensure that closure and/or informational signs are properly posted and that boaters are made aware of smoke hazards on waterways. If boating conditions deteriorate due to smoke, the park dispatcher will advise the Coast Guard and mariners via marine radio broadcasts.

   c. Visitor use may be limited or prevented near wildland fires and potentially affected areas. NPS personnel will patrol the perimeter of fires burning near visitor use areas to inform visitors about the role of fire in a natural area, explain the risks associated with approaching too close to a fire, and enforce visitor compliance with area closure orders.

2. Protection

   Any time human life is endangered, all necessary means will be taken to warn or evacuate visitors, life lessees, and residents. District Rangers and/or initial attack/monitoring/burn team members will determine the proximity of visitors, life lessees, and residents to the fire, inform them of potential hazards, and aid in their evacuation if necessary.

3. Communication

   a. Signs notifying the public about ongoing fires, area closures, dense smoke, or other special situations will be placed in appropriate places including the park web site.

   b. When a wildland fire is in progress for more than one operational period, information listing location, behavior, expected dangers, areas to avoid, and precautions to be taken will be posted at park information stations and distributed to life lessees in the vicinity. Information signs or fliers will be developed by the Branch Chief, Interpretation after consultation with the Incident Commander and Fire Management Coordinator, and will be posted by District Rangers. Interpreters will be utilized to inform the public of dangers as well as interpret either the role of fire in natural areas (for management fires) or the nature of the fire suppression effort.

c. Information about burned areas will be posted at information stations, trailheads, and/or campgrounds if potential hazards exist. Trails, campgrounds, and backcountry zones will remain closed until hazards are mitigated to an acceptable level. The public will be informed of hazards and appropriate safety precautions associated with traveling through or camping in burned areas.

X. PUBLIC INFORMATION AND EDUCATION

Isle Royale National Park has been disseminating information about its forest vegetation and fire management program since the park was established. Since the mid 1970s, this program has incorporated discussion of the ecological role of fire in park management and public acceptance of that message has been high. The park fire information and education program will continue to be factual, straightforward, and directed to the primary park users.

A. CURRENT PROCEDURES

1. Involved NPS Personnel

   The Chief Ranger and the Branch Chief, Interpretation (Public Information Officer) will be kept informed daily by the Fire Management Coordinator of management actions, and the status of fires in the park.

2. Ecological Information

   Ecological concepts upon which the wildland fire management program is based will be incorporated into information handouts, selected books written about the park, and wayside and visitor center exhibits. Fliers and brochures explaining the fire management program will be available for visitors. During periods when prescribed fires are burning, these handouts will be actively distributed to visitors at park information stations.

3. Interpretive Programs

   The fire management program will be incorporated into appropriate interpretative programs, printed materials, and wayside and visitor center exhibits. Particular attention will be given to these activities when active fires are conspicuous or when the national fire situation is in the news.

4. Media Information

   During ongoing fires, news articles will be written and released to local media.

5. Employee Awareness

   To effectively answer visitor questions, every NPS employee in the park will be made aware of the wildland fire management program during training. The status of ongoing fires will be available via park radio broadcasts.

6. Cooperating Association

   The Isle Royale Natural History Association will make relevant, factually accurate, publications that address fire's role in natural areas available to visitors at its sale outlets.

7. Informal Contacts

The wildland fire management program will be discussed in informal contacts with all divisions, park concessionaires, special use permittees, park neighbors, and park visitors.

B. STEP-UP ACTIVITIES

During periods of Very High or Extreme fire danger (Staffing Classes 4 and 5) additional information activities will be used to inform the visiting public, lessees, concession personnel and residents of fire risks, particularly in the backcountry.

1. Signing

   Signs notifying the public about ongoing fires, area closures, dense smoke, or other special situations will be placed in appropriate places.

2. Contacts

   When fire danger ratings indicate a SC 4 or 5 information listing expected dangers, areas to avoid, and precautions to be taken will be posted at park information stations and distributed to life lessees in the vicinity. Fire information or fire danger will be a topic item during visitor backcountry briefings. Information signs or fliers may be developed by the Interpretive Specialist after consultation with the Fire Management Officer, and will be posted by District Rangers.

3. Closures

   Visitor use may be restricted or prevented during extended high fire danger conditions. NPS personnel will patrol closed areas to enforce visitor compliance with area closure orders.

4. Cooperator/Concession Contacts

   The Fire Management Coordinator will inform park concessionaires, and Area Fire Management Officer about Very High or Extreme fire danger in the park. The Fire Management Coordinator or designee will notify MNICS agencies of Very High to Extreme fire danger by completing and submitting the MNICS Situation Report.

XI. PROTECTION OF SENSITIVE RESOURCES

A. ARCHEOLOGICAL/CULTURAL/HISTORIC RESOURCES

The aboriginal and historic resources of Isle Royale span from Archaic times (ca. 3000 BC) to the 1900s and trace a rich story of human activity. Evidence of human use – chipped stone tools, mining pits, lighthouses, fishing camps, boats, cabins, domestic flowers, medicinal plants – is found across the island and in the surrounding waters. Extensive mining was conducted in the 1840s, 1870s, and 1890s. Island history also includes periods when it was used by Ojibwa, Cree, Huron and other native peoples, voyageurs and fur traders, and for logging, extensive commercial fishing, Lake Superior shipping, and vacationing and resort development. Many sites and resources still exist which are remnants from those periods of use.

1. Archeological Sites

   Aboriginal prospecting for copper occurred as early as 3000 BC. More than 1000 pits scattered throughout the island are attributed to these groups. The park has 186 designated archeological sites, which represent prehistoric and historic use around the island. Some archeological sites contain historic remains along with prehistoric evidence. Fur trade and Native/European contact trade goods have been found at six sites. The fishery bases of the American Fur Company and the camps of commercial fishing families often occur near or on prehistoric sites. Mining pits and settlements and lighthouse-associated sites have all been identified from the historic period.

   Most of the known sites are along the shorelines, in developed areas such as campgrounds, and in known copper mining areas. Most inland portions of the park have not been formally surveyed. Archaic period groups faced a lake level as much as 60 feet higher than today. Many Archaic sites, located well away from our modern shoreline, undoubtedly remain undiscovered.

2. Historic Structures

   The park contains approximately 180 structures that are over 50 years old; these are some the most visible cultural resources. The structures stand as reminders of the island's maritime heritage (lighthouses and fishery sites), the resort era, and the early development of the park. The oldest existing structure on the island is the 1855 Rock Harbor Lighthouse, which is listed on the National Register of Historic Places. During the List of Classified Structures update (2001) 145 park structures were declared eligible for the National Register. The majority of these structures are summer cabins and commercial fishing bases.

3. Cultural Landscapes

   Many areas in the park have cultural significance: fishing camps, life lease cabins,

resorts, CCC camps, and historic mining sites, including features such as mine shafts and trenches, poor rock piles, dams, wells, roads and tramway remains. Inventory of the cultural landscapes is underway and has identified 108 potentially significant landscapes.

Several sites in the park are obvious cultural landscapes with delineated flower and vegetable gardens and cabins, decaying fishing boats, net reels, outhouses, etc. Other sites are more subtle; these areas at first appear as clearings or breaks in the heavy forest cover which surround them. Upon closer examination one can see abandoned machinery or exotic vegetation. These sites are vulnerable to fire-related impacts.

4. Ethnographic Resources

   Ethnographic resources include plants and animals traditionally used by native peoples as well as sites and landscapes of ceremonial, medicinal, or other cultural significance to native peoples. Known examples include sugar maple, used for sugar production, and pearly everlasting, used for medicinal purposes. It is likely that additional ethnographic resources exist in the park, but have not been made known to NPS staff. Few ethnographic sites have been identified and only the culture of Scandinavian commercial fishermen has been studied and documented. Fishing sites exist with remains of cabins and boats.

5. Museum Collections

   Isle Royale's museum collection contains a general representation of the island's cultural and natural resources. The majority of the collection is housed in a storage facility in Houghton and is not vulnerable to fire impacts on the island. A small number of museum items are housed at the Edisen Fishery, Rock Harbor lighthouse, Windigo Visitor Center and Rock Harbor Visitor Center. Any artifacts discovered during a fire would become part of the museum collection.

6. Mitigation

   Isle Royale's archeological and historical resources are a limited, fragile, and nonrenewable part of the environment that must be protected; when disturbed, the scientific information they provide is often lost forever.

   It is likely that fires of some sort have burned over many of the prehistoric sites multiple times; because of shallow soils on the island, the potential exists that some damage has occurred to some archeological sites from previous fires. Suppression actions are much more likely to cause damage than fire itself.

   Wildland fires and the activities associated with managing them have the potential to adversely affect archeological, cultural, and historic resources. Clearly a distinction can be made between planned and unplanned ignitions; adverse effects on cultural properties should be completely avoided with proper pre-burn surveys and planning prior to planned prescribed fire ignitions. In the case of wildland fires,

public safety will have the highest priority but all reasonable efforts will be made to minimize or avoid adverse impacts to cultural resources. Site-specific holding actions will be taken as appropriate on WFU fires when cultural resources are vulnerable.

Current and accurate databases and digital or paper maps are critical to prevent impacts to cultural resources. These site specific location maps do not presently exist for Isle Royale. When these maps are developed they will be included in Appendix G. In the interim, park or regional cultural resource management staff will be consulted for WFU, unwanted wildland fires, or prescribed fires to ensure all fire management actions consider cultural resource protection needs. Cultural Resource contact names and phone numbers are found in Appendix E, NPS/Interagency/Cultural Resource Contacts.

Fire management activities that disturb the ground will use professional and paraprofessional archaeologists working with firefighters and prescribed fire crews to prevent cultural resource destruction. The park's Branch Chief, Cultural Resources is expected to be a member of the park's wildland fire team so that s/he may be out on the line to advise on placement of fire lines and protection of specific sites. Fires can provide an opportunity for identification and evaluation of previously unknown archeological sites. Archeological information will be collected and data derived from this identification will assist park management in planning future prescribed fires.

B. NATURAL RESOURCES

1. Vegetation

While there is a possibility of a large wildland fire affecting thousands of acres on the island most fires for which there is information are relatively small. The effect of moose browsing may actually reduce the potential for large fires unless extremely dry conditions are present. Large fires would be more apt to occur under dry conditions. Based on the conclusions drawn by Cole, et al, (1995) the northeast portion of the island is most likely to be affected. Species found in this part of the island tend to be fire adapted so that effects would probably be short-lived.

Both digital and hard copy maps of known rare plant locations exist in the park, and they will be consulted on every fire to ensure adequate protection measures are taken, if required.

2. Wildlife

Most large mammals would have little trouble avoiding a fire of any size. Small mammals such as field mice, etc. could suffer some mortality in an intense fast moving fire. Breeding instinct and rejuvenated vegetation would return populations to pre-fire levels quickly. Depending on the season, some effect on nesting birds is likely although the history of small fires indicates that disturbance is more likely

than mortality. The Eastern Timber Wolf and bald eagle are the only federally listed wildlife species in the park and neither is likely to be affected by fire.

During the period in the spring when wolves are denning, wolf pups are not very mobile and thus could suffer adverse affects from a fire. Generally wolf pups will be mobile enough by the end of June to move away from the denning site and avoid a fire (pers. com. R.O. Peterson, December 2002). A review of Isle Royale fire reports from 1937 to 2002 indicates that there have only been 10 fires prior to June 29 in that 65 year period. This works out to an average of 0.15 fires per year and an average of 0.25 acres per year prior to June 29. Fire occurrence and size of fires during the denning period is generally low because of cooler wet spring weather and lower park visitation. It is not likely that fires during the denning period will have a detrimental affect on wolf pups. Although the probability of a fire affecting denning wolves is low, there is still a possibility that it could occur. Mitigation measures will be taken to reduce the impacts on any known wolf den sites with the understanding that suppression actions and disturbance near a den site may be more detrimental than the fire.

In 1994 a lightning fire began within 20 yards of an active bald eagle nest. Park staff consulted with the US Fish and Wildlife Service on how to mitigate impacts to the nest from both the fire itself and fire monitoring personnel having to be onsite. This consultation process will continue as a part of this plan.

Additionally, all active bald eagle nests are mapped and monitored each year. All fire management activities will avoid active bald eagle nests to the greatest extent possible to avoid disturbance to the nest, and the USFWS will be consulted if any fire activity occurs or approaches to within 1/4 mile of an active nest, per existing park regulations.

3. Air Quality

   Based on the historic record, fire effects on air quality are not likely to be long lasting and are not likely to adversely affect smoke sensitive targets for extended periods of time.

4. Mitigation

   Using an appropriate management strategy on wildland fires can reduce the period of active burning and reduce the effects of residual smoke from large fuels or heavy fuel accumulations. Prescribed fire and WFU fires will have fuel moisture parameters established along with other prescriptive standards that should reduce smoke production and subsequent effects on wildlife populations.

C. INFRASTRUCTURE/INHOLDINGS

1. Developed Areas

Most of the buildings within the developed areas are NPS owned. The 2002 FIREPRO run indicated a total of 486 facilities, 49 of which are dispersed life leases. Many of the NPS facilities are backcountry shelters, privies fire rings, bridging, docks and other items that are not at significant risk.

2. Mitigation

   Most buildings that are at risk are located in developed areas where the policy is full and immediate fire suppression. In addition, hazard fuel reduction activities are applied to reduce the threat of damage from wildland fire.

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

A. INTRODUCTION

1. Scope

   All wildland fires and fire-related incidents will be reviewed. All prescribed fires will be reviewed.

2. Reviews

   Reviews are conducted for one or more of the following purposes:

   a. To examine the progress of an on-going fire incident and to confirm effective decisions or correct deficiencies.

   b. To identify new or improved procedures, techniques or tactics.

   c. To compile consistent and complete information to improve or refine park, regional or national fire management programs.

   d. To examine anomalous fire-related incidents in order to determine cause(s), contributing factors, and where applicable, recommends corrective actions. If negligence is indicated, the circumstances will be reported and investigated in accordance with applicable regulations, policies or guidelines.

   e. To determine the cost effectiveness of a fire operation.

   f. The review will document information collected on how the fire impacted cultural resources, if applicable.

3. Authority

   The authority to convene a fire review rests with the park Superintendent, Regional Director, or the Associate Director, Park Operations and Education. It is the clear responsibility of the Superintendent to call for a review, to insure timely completion, and to implement recommended actions. The Regional Director has responsibility to follow-up with the Superintendent: that reviews are established and completed in a timely manner, and that recommended actions are completed. The Superintendent may request technical support from Fire Management Program Center, regional, park or interagency personnel with the appropriate expertise.

4. Incident Types

All wildland fire incidents which result in human entrapment, fatalities, or serious injuries, or result in incidents with potential, will be investigated and reviewed.

5. Associate Director

   The Associate Director, Park Operations and Education, will convene an ad-hoc team to review Service-wide fire management programs subsequent to the occurrence of any significant, controversial or unusual wildland fire management activities.

6. Purpose

   All reviews will be conducted as constructive critiques aimed at determining the facts related to the specific fire or fire management program. They will identify commendable actions, techniques and decisions as well as areas that need improvement. Reviews are intended to resolve operational issues, not impose punitive actions.

B. FIRE REVIEWS

1. "Hotline" Review

   The purpose of the hotline review is to examine the progress of an on-going fire incident, regardless of size. The review will provide a confirmation of the decisions being made daily in the Wildland Fire Situation Analysis or determine where the decision process has been faulty and corrective actions are needed.

   The "hotline" review is normally conducted by the park's Fire Management Officer (or an official who has designated fire program management responsibilities) in conjunction with the incident commander on the fire.

   These reviews require no special reporting. Documentation of "hotline" reviews should be included in the normal fire report narrative.

2. Incident Management Team (IMT) Closeout and Review

   The park Superintendent will conduct a closeout review with the IMT prior to their release from the fire incident. The purpose of this review is to ensure complete transition of the incident management back to the park and to evaluate the status of any incomplete fire business. RM 18, Chapter 13, Exhibit 1 contains a sample Close-Out Review with Incident Management Team.

3. Unit Level Review

   The Superintendent or his/her designated representative should conduct the unit level review. The Superintendent will appoint other qualified persons, including the unit fire management officer (or an official who has designated fire program management responsibilities) to be a part of the review. The purpose of this review is to provide the Superintendent with information to recognize commendable actions and to take needed corrective action(s). Costs associated

with the review will be charged to the account assigned to the fire with the approval of the Regional Fire Management Officer. A copy of the complete report will be sent to the Regional Fire Management Officer, who will review it and, if appropriate, forward a copy to the Fire Management Program Center.

4. Regional Level Review

   A regional level review may be conducted for any fire that:

   a. Crosses a park's boundary into another jurisdiction without the approval of an interagency agreement.

   b. Results in adverse media attention.

   c. Involves serious injury to less than 3 personnel, significant property damage, or an incident with potential.

   d. Results in controversy involving another agency.

   The regional level review normally will be conducted at the unit where the fire occurred. The Regional Fire Management Officer or his/her designated representative will convene the review. Attendees will include the Superintendent of the unit, unit fire management officer (or the official who has designated fire program management responsibilities), the Incident Commander(s) for the fire, and other individuals agreed upon by the Regional Director and Superintendent. If possible, the review team should visit the actual fire site as part of the review. A copy of the review report will be sent to the Fire Management Program Center. Costs associated with the review will be charged to the account assigned to the fire.

5. National Level Review

   A national level review may be conducted for any fire that involves Servicewide or national issues, including:

   a. Significant adverse media or political interest.

   b. Multi-regional resource response.

   c. A substantial loss of equipment or property.

   d. A fatality, or multiple, serious fire-related injuries (three or more personnel).

   e. Any other fires that the Associate Director, Park Operations and Education, wants reviewed.

A national level review normally will be conducted at the unit where the fire occurred. The National Fire Management Officer or his/her designated representative will convene it. It will be attended by the Superintendent of the unit, the Fire Management Officer (or an official who has designated fire program management responsibilities), the Regional Fire Management Officer, the Incident Commander(s) for the fire, and other individuals agreed upon by the National Fire Management Officer, the Regional Director and the Superintendent. If possible, the review team should visit the actual site of the fire as part of the review. All costs associated with the review will be charged to the account assigned to the fire.

RM 18, Chapter 13, Exhibit 2 provides an outline for final reports of fire reviews. RM 18, Chapter 13, Exhibit 3 provides a checklist of sample questions, which might be asked during a fire review. These two documents should be used for unit, regional and national level reviews.

6. Entrapment and Fire Shelter Deployment Review

Fire shelter deployment is defined as the use of a fire shelter for its intended purpose in any situation other than training. Use of the terms "precautionary deployment", "practice deployment" and "entrapment deployment" are not acceptable or recognized. Entrapments and fire shelter deployments will be reviewed in order to gather complete and accurate information to determine the reasons for the deployment. Corrective recommendations will be developed to minimize future situations that might lead to other shelter deployments. All entrapments and fire shelter deployments will be reported to the regional fire management officer, who will be responsible for developing the review team in cooperation with the Fire Management Program Center. The team leader will contact the Superintendent for reporting information. See RM 18, Chapter 3 for investigation and reporting requirements.

All entrapments and fire shelter deployments will be investigated as soon as possible after the deployment incident. RM 18, Chapter 13, Exhibit 4 provides specific directions for conducting an entrapment or shelter deployment review. RM 18, Chapter 13, Exhibit 5 provides an outline format for final reports on entrapment and fire shelter deployment reviews.

C. PROGRAM REVIEWS

1. Operations Evaluations

Operations evaluations of NPS units and regions may include review of fire management programs to assure compliance with established Service standards.

2. Annual Fire Program Review

The Superintendent will convene an ad-hoc team to review park fire activity during any year in which significant, unusual or controversial fire activity occurs.

This review team should analyze the reports from any reviews to determine what, if any, operational changes should be initiated. The review team will develop findings and recommendations and establish priorities for action.

3. FIREPRO Review

   Annually, the FMO will conduct a FIREPRO audit and review of the park values at risk, research, equipment and project needs. This review will be completed on the schedule set by the Fire Management Program Center.

4. Fire Readiness Review

   Fire readiness or preparedness reviews, utilizing the Interagency Fire Readiness Review Guide as adapted for park-specific needs, should be conducted annually prior to the established fire season by park fire management staff.

XIII. CONSULTATION AND COORDINATION

Fitzner, Craig	Supervisor, Modeling and Meteorology, Michigan Department of Environmental Quality, Lansing, MI
Gale, Cal,	Natural Resource Consultant
Gorman, KellyAnn	Ecoregional Fire Ecologist, Voyageurs National Park
Kolankiewicz, Leon	Mangi Environmental Group
Oelfke, Jack	Former Branch Chief, Natural Resources, Isle Royale National Park
Soleim, Dave	Area Fire Management Officer, Voyageurs National Park
Valencia, Liz	Branch Chief, Cultural Resources, Isle Royale National Park
Valencia, Pat	Forestry Technician/Fire Monitor, Isle Royale National Park

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The following list of contributors is from the Environmental Assessment for the 1992 Fire Management Plan for Isle Royale National Park.

Isle Royale National Park Personnel

Boose, D.R.	Trails and Campgrounds Foreman
Case, J.	(former) East District Ranger
Cochrane, J.F.	(former) Wildlife Biologist
Cochrane, T.	(former) Cultural Resource Management Specialist
Croll, S.L.	Chief, Visitor Services and Resource Protection
Fettig, S.M.	(former) Biological Technician
Fink, W.O.	Superintendent
Kangas, L.	West District Ranger
Martin, C.J.	(former) Park Technician, Resource Management
Maurer, E.H.	North Shore Subdistrict Ranger
Soleim, D.	Forestry Technician

Other National Park Service Personnel

Bennett, J.	Air Quality Coordinator, Midwest Regional Office, Madison, WI.
Benedict, J.	(former) Resource Management Specialist, Voyageurs National Park, MN.
Broyles, P.	Fire Management Specialist, (national) Branch of Fire Management, Boise, ID.
Clark, C.	Archaeologist, Midwest Archaeological Center, Omaha, NE.
Douhan, C.	(former) Resource Management Specialist, Indiana Dunes National Lakeshore, IN.
Gale, R.	Fire Management Specialist, (national) Branch of Fire Management, Boise, ID.
Heavner, R.L.	Monitoring Specialist, (national) Air Quality Division, Denver, CO.

Holmes, B.	Fire Management Specialist, Midwest Regional Office, Omaha, NE.
Jakala, S.	Fire Management Officer, Voyageurs National Park, MN.
Mitchell, B.	Environmental Specialist, (national) Air Quality Division, Denver, CO.
Norum, R.	Fire Management Specialist, (national) Branch of Fire Management, Boise, ID.
Petersburg, S.J.	Resource Management Specialist, Dinosaur National Monument, CO.

Other Agency Personnel

Dellies, W.	Environmental Analyst (air), Michigan Department of Natural Resources, Marquette Regional Office.
Fagre, T.	Fire Dispatcher, Superior National Forest, MN.
Joens, R.	(former) Fire and Aviation Staff Officer, Superior National Forest, MN.
Ziel, R.	Fire Management Officer, Michigan Department of Natural Resources, Marquette Regional Office.

Academia

Janke, R.A.	Botanist, Michigan Technological University, Houghton, MI.
Jordan, P.A.	Ecologist, University of Minnesota, St. Paul, MN.
Miller, R.K.	Forester (fire), Michigan Technological University, Houghton, MI
Peterson, R.O.	Wildlife Ecologist, Michigan Technological University, Houghton, MI

Document Preparer

Krumenaker, R.J.	Natural Resource Management Specialist / Fire Management Officer, Isle Royale National Park.

XIV. APPENDICES

APPENDIX A

A. REFERENCES CITED

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APPENDIX B

B. DEFINITIONS

Appropriate Management Response – the response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to the protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation.

Daily revalidation – A process named the periodic fire assessment, which evaluates the continued capability of the local unit to manage the fire for resource benefits, and to determine if the fire is escalating in complexity and operational needs. This process is completed as frequently as specified by the local unit.

Decision criteria checklist (Initial Go/No-Go Decision) – A set of standard evaluation criteria to determine if the current wildland fire meets criteria to be managed for resource benefits. The completion of these criteria will lead to a decision to "Go/No-Go" with management of the fire for resource benefits.

Expected weather conditions - those weather conditions indicated as common, likely, or highly probable based on current and expected trends and their comparison to historical weather records. These are the most probable weather conditions for this location and time. These conditions are used in making fire behavior forecasts for different scenarios (one necessary scenario involves fire behavior prediction under "expected weather conditions").

Disturbance – any relatively discrete event, either natural or human induced, that causes a change in the existing condition of an ecological system.

Confine - the strategy employed in appropriate management responses where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.

Ecological process – the actions or events that link organisms and their environment, such as predation, mutualism, successional development, nutrient cycling, carbon sequestration, primary productivity, and decay.

Ecosystem management – the careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired condition over the long term.

Ecosystem sustainability – the ability to sustain diversity, productivity, resilience to stress, health, renewability, and/or yields of desired values, and resource uses from an ecosystem while maintaining the integrity of the ecosystem over time.

Escaped fire – a fire which has exceeded or is expected to exceed initial attack capabilities or prescription.

Fire complexity analysis – A process for assessing wildland fire organizational needs and relative complexity in terms of ICS types (I, II, III etc.).

Fire Management Unit - any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that sets it apart from management characteristics of an adjacent unit. FMUs are delineated in Fire Management Plans (FMP). These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire dependent or fire maintained ecosystems - an ecosystem can be called fire dependent or fire maintained if periodic perturbations by fire are essential to the functioning of the system.

Fire exclusion – the disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

Fire evaluation - the process of examining and appraising fire monitoring information.

Fire monitoring - the act of observing a fire to obtain information about its environment, behavior, and effects for the purpose of evaluating the fire and its prescription.

Fire prescription - a written statement defining the objectives to be attained, and the conditions of temperature, humidity, wind direction and speed, and fuel moisture, under which a fire will be allowed to burn. Generally expressed as an acceptable range of the various indices, and the limit of the geographic area to be covered.

Fire regime – the fire pattern across the landscape, characterized by occurrence interval and relative intensity. Fire regimes result from a unique combination of climate and vegetation. Fire regimes exist on a continuum from short-interval, low-intensity (stand maintenance) fires to long interval, high-intensity (stand replacement) fires.

Fire return interval – the number of years between two successive fires occurring in a designated area.

Fire use – the combination of wildland fire use and prescribed fire application to meet resource objectives.

Hazard fuels – excessive live and/or dead wildland fuel accumulations (either natural or created) having the potential for the occurrence of uncharacteristically intense wildland fires.

Holding actions - planned actions required to achieve wildland and prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions. For wildland fires managed for resource benefits, an MMA may not be totally naturally defensible. Specific holding actions are developed to preclude fire from exceeding the MMA. For prescribed fires, these actions are developed to restrict the fire inside the planned burn unit. For suppression actions, holding actions may be implemented to prohibit the fire from crossing containment boundaries. These actions may be implemented as firelines are established to limit the spread of fire.

Initial attack – an aggressive suppression action consistent with fire fighter and public safety, and with values to be protected.

Management action points - also called "trigger points." Either geographic points on the ground or specific points in time where an escalation or alteration of management actions is warranted. These points are defined and the management actions to be taken are clearly described in an approved Wildland Fire Implementation Plan (WFIP) or Prescribed Fire Plan. Timely implementation of the actions when the fire reaches the action point is generally critical to successful accomplishment of the objectives.

Maximum Manageable Area (MMA) - MMA defines the firm limits of management capability to accommodate the social, political, and resource impacts of a wildland fire. Once established as part of an approved plan, the general impact area is fixed and not subject to change. MMAs can be developed as part of the FMP and described as a Fire management area or FMA. They can also be developed as part of the planning and implementation of management actions after a fire has ignited. If they are developed after the ignition, their definition will occur during the Wildland Fire Implementation Plan Stage III process. In the event a fire occurs in a pre-planned MMA or FMA and the local unit determines that this MMA is not the best-suited alternative for the present conditions, a new MMA can be developed as part of the Stage III process. Once this occurs, the Stage III MMA becomes the firm limits of the fire and is fixed.

Mitigation actions - Mitigation actions are considered to be those on-the-ground activities that will serve to increase the defensibility of the MMA; check, direct, or delay the spread of fire; and minimize threats to life, property, and resources. Mitigation actions may include mechanical and physical non-fire tasks, specific fire applications, and limited suppression actions. These actions will be used to construct firelines, reduce excessive fuel concentrations, reduce vertical fuel continuity, create fuel breaks or barriers around critical or sensitive sites or resources, create "blacklines" through controlled burnouts, and to limit fire spread and behavior.

Normal fire year – The normal fire year for suppressed wildland fires is the year with the third highest number of wildland fires in the past ten years of record. The normal wildland fire managed for resource benefits year is the year with the third highest number of acres burned by wildland fire managed for resource benefits in the past ten years of record.

Preparedness - Activities that lead to a safe, efficient and cost effective fire management program in support of land and resource management objectives through appropriate planning and coordination. This term replaces presuppression.

Natural ignition – a wildland fire ignited by a natural event such as lighting or volcanoes.

Prescription – a set of measurable criteria that guides the selection of appropriate management strategies and actions. Prescriptions criteria may include safety, economic, public health, environmental, geographic , administrative, social, or legal considerations.

Prescribed fire – any fire ignited by management actions to meet specific objectives. Prescribed fires are conducted in accordance with prescribed fire plans.

Prescribed fire plan – a plan required for each prescribed fire. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription).

Wildland fire – any non structure fire that occurs on wildland.

Wildland Fire Implementation Plan (WFIP) – a progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits.

Wildland Fire Transition Plan – Part of the prescribed fire plan identifying actions and notifications needed when a prescribed fire exceeds project boundaries and cannot be controlled within one burning period using on-site holding resources.

Wildland Fire Use – the management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas outlined in fire management plans.

Wildland fire management - all activities related to the prevention, control or use of fire burning through vegetation under specific prescriptions for the purpose of achieving fire management objectives.

Wildland fire situation analysis (WFSA) – a decision making process that evaluates alternative management strategies against selected safety, environmental, social, political, and economic criteria.

APPENDIX C

C. SPECIES LISTS

This appendix contains a list of species (plants, mammals and birds) identified by the state of Michigan (MIDNR, 1999) as threatened or endangered under state guidelines. Other species information is available based on the NPS Monitoring Program. This program lists plants, mammals and birds that reside on, or visit, the island.

Table 8 – State Listed Plants of Isle Royale

MICHIGAN LISTED PLANT SPECIES OF ISLE ROYALE NATIONAL PARK			
COMMON NAME	**SCIENTIFIC NAME**	**STATUS MI**	**ABUNDANCE**
Wild Chives	*Allium schoenoprasum*	E	uncommon
Round-Leaved Orchid*	*Amerorchis rotundifolia*	E	rare
Rosy Pussytoes*	*Antennaria rosea*	T	rare
Big Leaf Sandwort	*Arenaria macrophylla*	T	rare
Great Northern Aster	*Aster modestus*	T	rare
Slough Grass	*Beckmannia syzigachne*	T	Rare
Low Northern Rock-Cress	*Braya humilis*	T	
Reedgrass	*Calamagrostis lacustris*	T	Rare
Slim-Stem Small Reedgrass	*Calamagrostis stricta*	T	
Autumnal Water Starwart	*Callitriche hermaphroditica*	SC	Rare
Calypso Orchid	*Calypso bulbosa*	T	uncommon
Sedge	*Carex atratiformis*	T	uncommon
Sedge	*Carex media*	T	Frequent
Eastern Paintbrush	*Castilleja septentrionalis*	T	Common
Purple Clematis	*Clematis occidentalis*	SC	uncommon
Small Blue-Eyed Mary	*Collinsia parviflora*	T	Rare
Douglas's Hawthorn	*Crataegus douglasii*	SC	Rare
Ram's Head Lady-Slipper	*Cypripedium arietinum*	SC	Rare
American Rock Brake*	*Cryptogramma acrostichoides*	T	uncommon
American Rock Brake***	*Cryptogramma crispa*	T	
Slender Rock Brake	*Cryptogramma stelleri*	SC	Rare
Rock Whitlow-Grass	*Draba arabisans*	T	uncommon
Smooth Whitlow-Grass	*Draba glabella*	T	Rare
Twisted Whitlow-Grass	*Draba incana*	T	Rare
English Sundew	*Drosera anglica*	SC	Rare
Spreading Wood Fern	*Dryopteris expansa*	SC	uncommon
Fragrant Cliff Woodfern	*Dryopteris fragrans*	SC	
Black Crowberry	*Empetrum nigrum*	SC	Rare
Willow Herb	*Epilobium palustre*	SC	Uncommon
American Eyebright	*Euphrasia artica*	T	Frequent

MICHIGAN LISTED PLANT SPECIES OF ISLE ROYALE NATIONAL PARK			
COMMON NAME	**SCIENTIFIC NAME**	**STATUS MI**	**ABUNDANCE**
Moor Rush	*Juncus stygius*	T	
Blue Lettuce	*Lactuca pulchella*	T	rare
Auricled Twayblade	*Listera auriculata*	SC	Rare
Involucred Honeysuckle	*Lonicera involucrate*	T	Rare
Small-Flowered Wood-Rush	*Luzula parviflora*	T	Uncommon
Fir Clubmoss	*Lycopodium selago*	SC	Rare
Water-Milfoil	*Myriophyllum alterniflorum*	SC	Uncommon
Pygmy Water-Lily	*Nymphaea tertagona*	T	Rare
Devil's Club	*Oplopanax horridus*	T	Uncommon
Sweet Cicely	*Osmorhiza depauperata*	SC	Frequent
Marsh Grass-Of-Parnassus	*Parnassia palustris*	Rare	
Franklin's Phacelia	*Phacelia franklinii*	T	Uncommon
Butterwort	*Pinguicula vulgaris*	SC	Uncommon
Alpine Bluegrass	*Poa alpine*	T	Rare
Canby's Bluegrass	*Poa canbyi*	T	Rare
Alpine Buckwheat	*Polygonum viviparum*	T	Uncommon
Prairie Cinquefoil	*Potentilla pensylvanica*	T	Uncommon
Macoun's Buttercup	*Ranunculus macounii*	T	Rare
Prairie Buttercup	*Ranunculus rhomboideus*	T	Uncommon
Gooseberry	*Ribes oxyacanthoides*	SC	Frequent
Pearlwort	*Sagina nodosa*	T	Uncommon
Satiny Willow	*Salix pellita*	SC	Rare
Tea-Leaved Willow	*Salix planifolia*	T	Uncommon
Encrusted Saxifrage	*Saxifraga paniculata*	T	Rare
	(S. aizoon)		
Prickly Saxifrage	*Saxifraga tricuspidata*	T	Uncommon
Rayless Mountain Ragwort	*Senecio indecorus*	T	Uncommon
Awlwort	*Sublaria aquatica*	T	Rare
False Asphodel	*Tofieldia pusilla*	T	Uncommon
Downy Oatgrass	*Trisetum spicatum*	SC	Frequent
Drawf Bilberry*	*Vaccinium cespitosum*	T	absent?
Alpine Blueberry	*Vaccinium uliginosum*	T	Rare
Mountain-Cranberry	*Vaccinium vitis-idaea*	X	Extirpated
Squashberry	*Viburnum edule*	T	Common

Table 9 – State Listed Mammals of Isle Royale

MICHIGAN LISTED MAMMAL SPECIES OF ISLE ROYALE NATIONAL PARK		
COMMON NAME	**SCIENTIFIC NAME**	**STATUS MI**
Moose	*Alces alces*	T
Gray Wolf	*Canis lupus*	E

Mammal list taken from "Wildlife of Isle Royale" revised by Dr. Peter Jordan 1981.

Table 10 – State Listed Birds of Isle Royale

MICHIGAN LISTED BIRD SPECIES OF ISLE ROYALE NATIONAL PARK			
COMMON NAME	**SCIENTIFIC NAME**	**STATUS MI**	**ABUNDANCE**
Cooper's Hawk	*Accipiter cooperi*	SC	O,T
Northern Goshawk	*Accipiter gentiles*	SC	R
Short-Eared Owl	*Asio flammeus*	E	A,T
Long-Eared Owl	*Asio otus*	T	A,T
American Bittern	*Botaurus lentiginosus*	SC	R
Red-Shouldered Hawk	*Buteo lineatus*	T	A
Piping Plover	*Charadrius melodus*	E	H
Black Tern	*Chlidonias niger*	SC	A
Lark Sparrow	*Chondestes grammacus*	X	A
Northern Harrier	*Circus cyaneus*	SC	O,T
Yellow Rail	*Coturnicops noveboracensis*	T	H
Merlin	*Falco columbarius*	T	R
Peregrine Falcon	*Falco peregrinus*	E	A,T
Common Loon	*Gavia immer*	T	R
Bald Eagle	*Haliaeetus leucocephalus*	T	O
Black-Crowned Night-Heron	*Nycticorax nyticorax*	SC	A
Osprey	*Pandion haliaetus*	T	O
Double-Crested Cormorant	*Phalacrocorax auritus*	SC	O,T
Black-Backed Woodpecker	*Picoides arcticus*	SC	R
Dickcissel	*Spiza americana*	SC	A
Caspian Tern	*Sterna caspia*	T	A
Common Tern	*Sterna hirundo*	T	O
Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*	SC	A

R = regular occurrence
A = accidental occurrence
T = breeds on adjacent mainland
O = occasional occurrence
H = hypothetical occurrence

Species list and abundance based on "Wildlife of Isle Royale," revised 1981 by Dr. Peter Jordon.

Listing status with the Michigan Department of Natural Resources

E = endangered
T = threatened
SC = special concern
PT = extirpated

APPENDIX D

D. NEPA AND NHPA COMPLIANCE

An environmental assessment has been completed for this Fire Management Plan and is considered an unattached appendix. See Isle Royale National Park Fire Management Plan Environmental Assessment. When a decision is reached by the Decision Maker, the Finding of No Significant Impact (FONSI) will be attached here

APPENDIX E

E. ANNUAL REVISION DOCUMENTS

1. Fire Call-up List

The Isle Royale National Park callout list is updated annually and inserted into the working copies of this plan, which is found in the Chief, Natural Resources Management office. Due to the listing of home phone numbers, it will not be included in the published copies of this plan.

2. Preparedness Inventory

Isle Royale National Park Fire Caches and Associated Equipment at Each					
	Fire Cache Location				
Item	**Mott Island**	**Rock Harbor**	**Windigo**	**Malone Bay**	**Amygdaloid**
Hand Tools	✔	♦	♦	♦	♦
Portable Pumps, Hose, & Accessories	✔	♦	♦	♦	♦
Chain Saw w/ Kit	✔				
Firing Devices	✔		♦		
Technical Fire and Weather Monitoring Equipment - **Includes**: Laptop computer w/ fire weather, fire behavior, and GIS software; Computrac fuel moisture oven, belt weather kit, digital camera, and GPS.	✔				
Personal Protective Equipment for 20 Emergency Fire Fighters - **Includes:** Initial Attack Gear Bag, Fire Shelter w/case, Hard Hat, Nomex Shirt, Nomex Pants, Pair Gloves, Goggles, Brush Coat w/ Liner, Head lamp, Nomex Helmet Shroud, First Aid Kit, Ear Plugs, MRE, 4 Canteen (l QT.), Head Lamp w/ AA Batteries, Rain Poncho.	✔				
Personal Camping Gear for 20 Emergency Fire Fighters - **Includes:** Red Pack (personal gear bag), Sleeping Bag, Tent.	✔				
	✔ -Extended attack capable				
	♦- Limited initial attack capable				

3. Cooperative Agreements

Copies of these agreements in the following table are found in the working copy of the Fire Management Plan in the Natural Resource Management office.

Table 11 – Cooperative Agreements

With Whom	Title of Agreement	Purpose	Expires
MNICS Partners	MNICS Charter	Member Organization to operate under NIIMS (ICS)- Parent agreement for MNICS	N/A
MNICS Partners	Implementation Plan	Implementation plan for the Interagency Coordination Center	N/A
MNICS Partners	Interagency agreement for MIFC	Authorizes MIFC Operations	2001
MNICS Partners	MIFC Operating Plan	Operating plan for MIFC Dispatch & financial plan	Annual
MNICS Partners	MOU for RX Fire	Authorizes cooperation on RX fire	2006
OMNR, USFS, NPS, DNR	Border Waters Agreement	Sharing fire fighting resources between US and Ontario	

4. Interagency Contacts

Table 12 – NPS, Interagency, and Cultural Resource Contacts

	Seasonal Numbers	
Isle Royale National Park	Summer	Winter
	(Isle Royale)	(Houghton)
Park Headquarters (Houghton MI)	(906) 482-0984 + "0"	Same
Administrative Office	(906) 487-7142	Same
Chief Ranger	(906) 483-3150	(906) 487-7148
West District Ranger	(906) 337-4994	(906) 487-9080 Ext. 31
East District Ranger	(906) 483-3170	(906) 487-9080 Ext. 30
Branch Chief of Natural Resources	(906) 483-3145	(906) 487-9080 Ext. 34
Fire Effects Monitor	(906) 483-3151	(906) 487-9080 Ext. 26
Voyageurs National Park		
Park Headquarters (International Falls)	(218) 283-9821	
Fire Management Officer	(218) 283-9107 Ext. 6155	
Fire Program Assistant	(218) 283-9107 Ext. 6125	
Ecoregional Fire Ecologist	(218) 283-9107 Ext. 6160	
Grand Portage National Monument		
Superintendents Office	218-387-2788	
MNICS Partners		
Superior National Forest Dispatch (MIFC)	(218) 327-4176	
Superior National Forest (Seaplane Hangar)	(218) 365-7565	
Superior National Forest (Air Tanker Base)	(218) 365-4831	
Minnesota Interagency Fire Center (MIFC Dispatch)	(218) 327-4558	
Minnesota Interagency Fire Center (Aircraft Dispatch)	(218) 327-4582	
Ontario Ministry of Natural Resources		
Atikokan Fire Headquarters	(807) 937-7210	
Thunder Bay Fire Headquarters	(807) 476-2200	
Dryden Fire Headquarters	(807) 937-4402	
Dryden (Hangar)	(807) 937-7255	
Other Cooperating Associations		
US Coast Guard – Portage	(906) 482-1520	
US Coast Guard-Duluth	(218) 720-5412	
US Coast Guard-Duluth	(218) 720-5413	
	(218) 720-5414	
Canadian Coast Guard-Thunder Bay	(807)-345-5190	
Michigan Department of Nat. Res. – Baraga Office	(906)-353-6651	
Regional/Eastern Area		
Midwest Region Fire Mgt Officer Fred Bird (Omaha)	(402) 221-3475	
	Cell (402) 630-0685	
Eastern Interagency Fire Coordination Center, USFS Zone 9 (St. Paul)	(612) 713-7300	
NOAA National Weather Service Offices		
Marquette, MI	906-475-5781	

906-475-5782

Cultural Resource Contacts

Professionals to call for assistance if Branch Chief, Cultural Resources, is not available:

Archeology -	
Mark Lynott, MWAC	402/437-5392, ext. 107
Bill Hunt, MWAC	402/437-5392, ext. 111
Jeff Richner, MWAC	402/437-5392, ext. 112
Pat Martin, MTU	906/487-2070
Susan Martin, MTU	906-487-2366
Cultural Landscapes -	
Roberta Young, MWRO	402/514-9348
Marla McEnaneny, MWRO	402/514-9349
Historic Structures –	
Roberta Young, MWRO	402/514-9348
John Rosemurgy, KEWE	402/337-3168
Ethnography –	
Mike Evans, MWRO	651/290-4165
Michelle Watson, MWRO	402/514-9352
Museum Collections	
Abby Sue Fisher, KEWE	906/337-1104
Brian Hoduski, KEWE	906/337-1104

APPENDIX F

F. WILDLAND AND PRESCRIBED FIRE MONITORING PLAN

The Monitoring Plan is under development by the Great Lakes Eco-Region fire ecologist. It will be attached here when approved.

APPENDIX G

G. PRE-ATTACK PLAN

The Pre-Attack Plan was developed using the Pre-Attack Checklist found in Chapter Seven: Exhibit 3 of RM 18. This Plan consists of a brief summary of those items found in the checklist. In many cases, needed maps and information documents have not yet been developed. Those items are noted in the plan as to be developed as the information becomes available. Included are maps or locations of maps that are large or that contain "sensitive" information. This information will be provided to incoming teams or single resources not familiar with Isle Royale.

PRE-ATTACK PLANNING CHECKLIST

COMMAND

Pre-attack WFSA (if appropriate)
Pre-positioning needs
Draft delegation of authority
Management constraints
Interagency agreements
Evacuation procedures
Structural protection needs
Closure procedures

OPERATIONS

Helispot, helibase locations
Flight routes, restrictions
Water sources
Control line locations
Natural barriers
Safety Zones
Staging area locations

LOGISTICS

ICP, base, camp locations
Road, trails (including limitations)
Utilities
Medical facilities
Stores, restaurants, service stations
Transportation resources location
Rental equipment sources (by type)
Construction contractors
Sanitary facilities
Police, fire departments
Communications (radio, telephone)
Sanitary landfills
Portable water sources
Maintenance facilities

PLANNING

Park base map
Topographic maps
Infrared imagery
Vegetation/fuel maps
Hazard locations (ground and aerial)
Archeological/cultural base map
Endangered species critical habitats
Sensitive plant populations
Special visitor use area
Land status

COMMAND

Pre-attack WFSA.
A Pre-attack WFSA has not yet been developed. Once developed, the electronic version will be maintained on the Fire Effects Monitor's computer.

An electronic version of the Wildland Fire Implementation Plan (WFIP) is found on the Fire Effects Monitor's computer. The WFIP will be the guiding document for the decision-making process for the Appropriate Management Response.

Draft delegation of authority
Draft/example delegations of authority have been developed for both a Wildland Fire Use (WFU) fire and an Unwanted Wildland fire (suppression action) and are attached to this appendix.

Pre-positioning needs
The Preparedness Inventory found in Appendix E shows what and where equipment is pre-positioned for fire response. Collateral duty firefighters are also stationed at each of these locations. Pre-positioning of staff beyond their normal duty locations is not necessary or feasible given the logistics of the island.

The Isle Royale Step-up Plan is located in Appendix H of the FMP.

Management constraints
Isle Royale NP is 99% designated Wilderness. Due to the island nature of the park and the wilderness constraints, the following restrictions will apply to all fire management operations in the park:

- Use water instead of fire retardant chemicals in bombers.
- Cold trail the fire-edge when practical.
- Wetlines, or environmental lines, will be used wherever possible in lieu of handline construction if water and pumps are available.
- Waterbars will be constructed on handlines on steep slopes.
- Utilize soaker hose or foggers in mop-up. Avoid "boring" and hydraulic action on shallow soils.
- Firelines will be kept to the minimum width necessary to allow backfiring or safe blackline to be created. Utilize natural barriers wherever possible.
- If a mineral soil line is needed, utilize fireline explosives whenever possible.
- Decisions on suppression practices will be made by the Incident Commander. Utilize his/her creativity.
- Minimize tree falling. If necessary to fall trees in visually sensitive areas (i.e., trails, lakeshores), utilize "slant cut" technique to face cut away from view, or re-cut later during rehabilitation activities.

- Known archeological and ethnographic sites will be identified prior to a fire and protected wherever possible. Minimize ground disturbance to protect cultural resources.
- Scatter or remove debris as prescribed by the Incident Commander.
- All firelines, spike camps, or other disturbance in visually sensitive areas will be rehabilitated to maintain a natural appearance.
- After the fire emergency is over, transport of personnel, equipment, and trash out of the park will be consistent with national park resource management objectives.
- Maintain Class I air quality.
- Provide information to backcountry users when wildland fires are burning or prescribed fires are planned.

In addition, the following constraints apply to the use of retardent and foam use:

Retardant – No retardant drops within 400 feet of open water.

Foam (aerial delivery) – Aerial delivery of foam requires park Superintendent approval on a case-by-case basis. When approved, the following guidelines apply:
- Foam concentrate will only be injected into the holding tank after the water pick-up operation has been completed.
- Drops from Beaver, T2 & T3 helicopters – no drops within 200 feet of open water.
- Drops from Scoopers, heavy air tanker or heavy helicopter – no drops within 400 feet of open water.

Foam (ground delivery with motorized pumps):
- No application within 25 feet of open water when using small pumps (waterbug, Mk 26, Shindawa, etc.)
- No application within 50 feet of open water when using Mk III or equivalent pumps.
- All foam concentrate used for injection will be located in impermeable containment basins, i.e. visqueen (plastic sheet) spread over rocks or logs to form a catch basin.

Foam (ground delivery with backpack pumps):
- No application within 10 feet of open water.
- All backpack pumps will be filled a minimum of 10 feet from open water. A separate, uncontaminated container must be used to transport water from source to backpack pump. This container must be kept uncontaminated by concentrate.

All of the above restrictions are based on resource protection and values at risk, and can be modified in life-threatening situations, or with the express approval of the Superintendent.

Further explanations and references are found in the Management Constraints section of the Fire Management Plan.

Interagency agreements
As ISRO is a member of the Minnesota Incident Command System (MNICS), several interagency agreements exist. Appendix E.3 is a list of the agreements with each function. These agreements are on different renewing cycles. Copies of agreements are found in the Fire Management Coordinator's working copy of the FMP.

Evacuation procedures/ Closure procedures
No evacuation plans have been prepared for the island. Should areas of the park need to be closed and evacuated, the park trail system would be used to move hikers to safe areas. All closures would be done by Superintendent Order, and implemented by Ranger Staff.

Tag board signs have been printed and will be posted on trails in the event of a Wildland Fire Use fire near a trail. Supplies of these signs are found at the Mott Island Fire Cache. Should a Wildland Fire Use fire or Unwanted Wildland fire occur near a trail, the trail may be closed or visitors re-routed if the safety of the hikers is in jeopardy.

Structural protection needs
All of the buildings within the developed areas are NPS-owned. The 2002 FIREPRO analysis indicated a total of 486 facilities, 49 of which are dispersed life leases. Many of the NPS facilities are backcountry shelters, privies, bridging, docks and other items that are not at significant risk. With the acceptation of a privy at the Island Mine Campsite and the 3 park fire towers, all park-owned structures, including visitor centers, housing, maintenance facilities, concessions operations buildings, life leases, and campground facilities, are located on or in close proximity to either Lake Superior or inland lakes. Potentially threatened structures with boat access from Lake Superior could quickly have sprinkler systems deployed to protect the structure.

Most buildings that are at risk are located in developed areas where the policy is full and immediate fire suppression. In addition, hazard fuel reduction activities have been conducted where threats to frontcountry structures exist.

The developed areas of Mott Island and Rock Harbor have hydrant systems. These systems are supplied by a separate water system pumped from Lake Superior with unlimited capacity. The Windigo standpipe system uses potable water from the water tank and has a limited capacity depending on water tank levels.

Refer to the attached Structure location map for structure dispersal through the park.

LOGISTICS

ICP, base, camp locations

As indicated in the following sections, infrastructure requirements for an Incident Command Post (ICP) or base camp are very limited. Locations for ICP or base camp are limited to Rock Harbor, Mott Island, or Windigo. Mott Island Headquarters, with its multiple phone lines and computer access, would be the most practical location. Remote camps could be located at any of the park campgrounds.

Roads, trails (including limitations)

No roads exist on Isle Royale so all transportation around the island is by boat, canoe, foot, or in extremely limited circumstances float-equipped aircraft. Approved floatplane landing areas are in Washington Harbor (Windigo), Tobin Harbor (Rock Harbor) and Mott Island. Landing areas for helicopters are the docks at Windigo and Mott Island, and the Coast Guard helipad at Passage Island. Refer to the Aviation Landing Area map attached. Landing in any area other than those specified is prohibited without the approval of the Park Superintendent.

Ferry service to the island is operated bi-weekly by the NPS-owned Ranger III and there is daily service provided to the island from Copper Harbor, MI, on the Isle Royale Queen, or from Grand Portage, MN, on the Voyageur II or the Wenonah.

Utilities/Sanitary facilities/ Potable water sources

Utility services are very limited on the island. Phone, electrical, water, and sewage systems are all operated by the NPS and are only available at Windigo, Mott Island, and Rock Harbor. Electricity is generated 24 hours per day at these locations. Overhead power lines are also limited to these areas.

Phone systems at these locations are either a satellite phone system or a radio link to the mainland phone system. Currently there are only one phone line to Windigo, two lines to Rock Harbor, and multiple satellite lines at Mott Island.

Potable water systems are found at Rock Harbor, Windigo, and Mott Island. Much smaller and limited systems are found at the Malone Bay and Amygdaloid Ranger stations. All water drawn from interior lakes or Lake Superior should be considered contaminated and therefore filtered using hand filtration systems.

Medical facilities

The nearest hospital is located in Thunder Bay, Ontario. Depending on the nature of the medical conditions and location of the patient, there are also hospitals in Grand Marais, MN, Duluth, MN, or Houghton, MI. Transport of injuries is based on the urgency of the incident as determined by the responding Emergency Medical Technician (NPS Ranger). In non-emergency cases, transport is generally done by NPS patrol boat or ferry service to either Grand Marais, MN, or Houghton, MI. Advanced care air ambulance services are available through Bandage III

in Thunder Bay, Ontario, or St. Mary's Lifeflight in Duluth, MN; in some cases US Coast Guard helicopters in Traverse City, MI, have been utilized. Helicopter landing locations are the docks at Mott Island Headquarters, Windigo Ranger Station, and the helipad at the Passage Island lighthouse. Refer to the Aircraft Landing Zone map attached.

Details of medical response are located in the Isle Royale Emergency Medical Service (EMS) Response Plan located in all Ranger Stations and the Headquarters Dispatch Office.

Air Evacuation Resources:

Service	Response Time to Windigo	Response Time to Mott Isl.	Night Flight?	ALS?	Hoist?	Landing Area Size	Water Float Equip?
Bandage III	15 min	15-20 min		no	no	125'	no
Lifeflight	70 min	90 min	yes	yes	no	day-60' night-100'	no
USCG	3 hr	3 hr	yes	no	yes	180'	Emergency only
USFS Beaver	50-60 min	1-1.5 hr	no	no	no		yes

Bandage III (5/1/02)
Thunderbay, Ontario (will take to Marquette for decompression)
1. Dial 1800-888-8000
2. Enter Credit Card # 337-359-8729-1291, dial star 0
3. Give number to operator: **416-326-6282** (request air ambulance out of Thunder Bay)

807-577-9378 - administration number for air ambulance operations
416-327-7823 - Jim Vanpelp, for patient information - non emergency

St. Mary's Lifeflight
Duluth, MN
1800-447-5540

U.S. Coast Guard
Traverse City, MI
231-922-8300 - General
231-922-8210 - SAR line

U.S. Forest Service
Ely, MN
218-365-7600 - General
218-327-4176 - Beaver II dispatch
218-365-7576 - Sea hangers
Grand Rapids, MN
218-327-4175 - 24hr dispatch

Hospitals

Portage Health System
906-483-1555 - General
906-483-1111 - Emergency Room

St. Mary's Hospital
Duluth, MN
218-786-4000 - General
218-786-4357 - Trauma

Thunder Bay McKellar Hospital
807-343-7123 - General
(Must use calling card)

St. Joseph's General Hospital
Thunderbay, Ontario
(Must use calling card)

Marquette General Hospital
906-225-3560 - Emergency Room

Cook County Northshore Hospital
Grand Marais, MN
218-387-3040 - General

St. Luke's Hospital
Duluth, MN
218-726-5555 - General
218-726-5466 - Poison Control
800-232-1345 - Trauma Center

Port Arthur General Hospital
807-343-6653 - Emergency
(Must use calling card)

Mercy Ambulance Service
Hancock, Houghton (if transportation to hospital is needed)
906-482-0911

Advising Physician
Dr. Gilbert : **please try all numbers for Dr. Gilbert before notifying another physician.
906-289-4517 Camp/home (not long distance)
906-250-5210 Cell #1
906-250-4366 Cell 32
"Cambria" = Dr. Gilbert's boat
906-289-1040 - Fax home

Dr. Tom McConnon, Dr. Jerry Luoma
906-337-6580 - Keweenaw Medical Center Clinic
906-337-6500 - Hospital, will page

Keweenaw County SO: 906-337-0528

Coast Guard Numbers

U.S. Coast Guard
Cleveland, Ohio
1800-321-4400

Canadian Coast Guard
807-345-5190
(must use calling card)

U.S. Coast Guard Group Office
(Sault Ste. Marie)
906-635-3233 (24-hr.)

U.S. Coast Guard Portage Station
906-482-1520

U.S. Coast Guard Duluth
218-720-5412 or 5413 or 5414

Stores, restaurants, service stations

Stores

Very limited services exist on Isle Royale. Concession-operated "Camp Stores" are located at Windigo and Rock Harbor and have a limited supply of groceries. Park employees submit grocery orders once per week through grocery stores in Houghton, MI. Each Friday, the groceries are hauled to the island aboard the NPS-owned and -operated Ranger III ferry. Incidents on the island would be re-supplied in the same manner.

Restaurants

The Rock Harbor Lodge concessionaire operates a restaurant located on the northeast end of the island. No formal agreements are in place, but the lodge does have the capacity to feed a limited number of firefighters in the dinning room and will prepare bagged lunches if needed.

Service Stations

The NPS maintains boat fueling stations at Mott Island and Windigo, and limited fuel availability at the Malone Bay and Amygdaloid Ranger Stations. All fire-related boat use would be fueled at these locations. National Park Concessions Inc. fuels private boats at Windigo and Rock Harbor.

Aviation fuel (100LL AvGas) is available for government-owned or -contracted float planes at the Windigo Ranger Station. No Jet-A fuel is available on the island. In cases when pre-planned helicopter operations are conducted on the island, Jet-A has been hauled to the island in barrels and dispensed with hand pumps.

Transportation resources location

NPS-owned boats are available at Mott Island, Windigo, Rock Harbor, Malone Bay, and Amygdaloid Island**.**

Rental equipment sources (by type)
No rental equipment agreements are currently in place. As stated in the FMP, no heavy equipment will be used on the Island due to the wilderness designation. All equipment, crews, overhead, or aviation resources will be Resource Ordered through the Minnesota Interagency Fire Center and Coordination Center in Grand Rapid, MN. If weather conditions permit, needed equipment or personnel can be brought to the island via park-owned boats from Grand Portage, MN, or flown directly to the Island using the USFS-owned Beavers.

Construction contractors
No construction contractors are available to work on the island. NPS maintenance staff would fill any construction needs.

Police and fire departments
The National Park Service has exclusive jurisdiction for the land area of Isle Royale. Visitor and Resource protection on the islands is handled exclusively by the NPS. Lake Superior waters are patrolled jointly with NPS, Michigan DNR, and US Coast Guard.

Communications (radio, telephone)
Telephone service is limited to three locations on the island. These locations are the Mott Island Headquarters, Rock Harbor Ranger Station, and Windigo Ranger Station. Mott Island is the only location with multiple satellite phone lines. Rock Harbor has one radio line and two satellite lines and Windigo is limited to one radio line.

Cell phone service is very spotty on the island. The nearest cell phone towers are located on the mainland shores of Minnesota and Ontario, and the Keewenaw Peninsula of Michigan.

Isle Royale is service by two radio repeaters found near Windigo and the Ojibway Fire Tower. The Windigo Repeater services primarily the Windigo area, but transmissions are received on a base radio at Mott Island Park Headquarters. The Ojibway Repeater services most of the park but can not be reached on a portable radio from the Windigo area. Radio frequencies are found in the table on the next page.

Channel #	TX	RX	Usage As
1	169.675	169.675	F1 Isle Royale Park Direct
2	170.350	169.675	F2 Ojibway Tower Repeater
3	170.400	169.675	F3 Windigo Repeater
4	168.350	168.350	F4 Off Park Net
5	N/A	161.650	Canadian Marine Forecast
6	N/A	162.400	NOAA Wx Houghton, Michigan
7	N/A	162.475	Environment Canada
8	166.325	166.325	Direct, Grand Portage NM, Grand Portage, MN
9	166.925	166.325	Repeater, Grand Portage NM, Grand Portage, MN
10	156.800	156.800	Hailing, Marine Channel 16
11	156.450	156.450	Marine Channel 9
12	156.425	156.425	Marine Channel 68
13	156.625	156.625	Marine Channel 72
14	166.900	166.900	Voyageurs NP, Simplex

Sanitary landfills
All garbage generated on the island is collected at Mott Island and hauled in dumpsters to the Michigan mainland.

Maintenance facilities
Mott Island headquarters has a boat repair shop, carpenter's shop, and other maintenance facilities. Windigo and Rock Harbor have limited maintenance facilities.

OPERATIONS

Helispot, Float plane landing zones

Coordinates for Fixed wing landing areas are**:**

Tobin Harbor

The portion of Tobin Harbor located in the NE 1/4 of sec. 4, T. 66 N., R. 33 W; the SE 1/4 of sec. 33, T. 67 N., R. 33 W., and then the SW 1/4 of sec. 34, T. 67 N., R 33 W

Tobin Harbor Landing Zone Coordinates

East End of Landing Zone
Lat/Long: 48 09 24.21 N, 88 28 19.77 W
UTM: 0390504 E, 5334539 N
West End of Landing Zone
Lat/Long: 48 08 49.10 N, 88 29 41.06 W
UTM: 0388834 E, 5333516 N

Mott Island

The portion of Rock Harbor located in the SE 1/4 of sec. 13, the N 1/2 of sec. 24, T. 66 N., R. 33 W., and the W 1/2 of sec. 18, T. 66 N., R. 33 W.

Rock Harbor Landing Zone Coordinates
East End of Landing Zone
Lat/Long: 48 06 55.14 N, 88 32 12.45 W
UTM: 0385585 E, 5330118 N
West End of Landing Zone
Lat/Long: 48 05 56.17 N, 88 34 11.21 W
UTM: 0383080 E, 5328350 N

Windigo

The portion of Washington Harbor located in the N 1/2 of sec. 32, all of sec. 29, SE 1/4 of sec. 30, and the E 1/2 of sec. 31, T. 64 N., R 38 W.
Washington Harbor Landing Zone Coordinates
East End of Landing Zone
Lat/Long: 47 54 13.18 N, 89 10 53.43 W
UTM: 0339308 E, 5309219 N
West End of Landing Zone
Lat/Long: 47 55 05.20 N, 89 09 02.73 W
UTM: 0336965 E, 5307677 N

Helicopter Landing Site Coordinates

Landing areas for helicopters are the docks at Windigo and Mott Island, and the Coast Guard helipad at Passage Island. Refer to the Aviation Landing Area map attached.

Mott Island

	Latitude	**Longitude**
DMS	48°6'26.3" N	88°32'49.7" W
MinDec	48°6.438333	-88°32.828333
DegDec	48.107305	-88.547138
Universal Transverse Mercator (UTM)		
Zone	**Easting** (meters)	**Northing** (meters)
16	384830	5329384

Windigo

	Latitude	**Longitude**
DMS	47°54'43.4" N	89°9'30.3" W
MinDec	47°54.723333	-89°9.505
DegDec	47.912055	-89.158416
Universal Transverse Mercator (UTM)		
Zone	**Easting** (meters)	**Northing** (meters)
16	338721	5308779

Passage Island

	Latitude	Longitude
DMS	48°13'21.9" N	88°22'1.7" W
MinDec	48°13.365	-88°22.028333
DegDec	48.22275	-88.367138
Universal Transverse Mercator (UTM)		
Zone	**Easting** (meters)	**Northing** (meters)
16	398457	5341961

Regulations Regarding Flights Over Isle Royale National Park
The landing of aircraft is prohibited on lands or waters administered by the National Park Service without authorization. Exceptions include: 1) when forced to land due to an emergency beyond the control of the operator, 2) at officially designated landing sites or 3) on approved official business of the Federal Government. The boundary of the park extends 4 1/2 miles out into Lake Superior from the shoreline of Isle Royale.

Ninety-nine (99) percent of the land portion of the park is federally designated wilderness. The park requests that pilots attempt to conduct their flight operations over the open waters of Lake Superior rather than over land, in order to minimize noise disruptions to wildlife and wilderness users.

All aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface. FAA Advisory Circular (AC) 91-36C, "Visual Flight Rules Near Noise-Sensitive Areas," defines the surface as: the highest terrain within 2,000 feet laterally of the flight route, or the upper-most rim of a canyon or valley.

Federal regulations also prohibit air drops by parachute or other means of persons, cargo, or objects from aircraft within park boundaries. Exceptions include: 1) emergencies involving the safety of human life, or 2) threat of serious property loss.

Water sources
Isle Royale National Park is a water-based park. Multiple beaver ponds, creeks, interior lakes, and Lake Superior result in few locations farther than ¼ mile from water. Water locations can be found on topographic maps or on the hydrology theme found in the park's ArcView database.

Control line locations /Natural barriers
The geography of Isle Royale is parallel ridges and valleys running southwest to northwest. Typically these ridges are drier and fuels on the ridges are more susceptible to higher intensity fires than lowland areas. As fires move off the ridges they burn into more deciduous and wetter environments. Often, fires will not carry through deciduous aspen and maple forests and these forest types can be used as natural barriers. As stated previously, the island is also dotted with multiple lakes, beaver ponds and wetlands that can be used as fire breaks.

Safety Zones
No pre-established safety zones other than lakes and beaver ponds have been identified for the island.

Staging area locations
Given the complex logistics of Isle Royale and the limited aircraft landing areas and ferry services, staging of incoming resources will be limited to Mott Island or Windigo.

PLANNING

Topographic maps
Fourteen 7.5 minute quadrangles cover Isle Royale National Park. They are:

- *Belle Harbor*
- *Feldtmann Lake*
- *Feldtmann Ridge*
- *Lake Richie*
- *Little Todd Harbor*
- *Malone Bay*
- *McCargoe Bay*
- *Mott Island*
- *Passage Island*
- *Point Houghton*
- *Rock Harbor Lodge*
- *Sugar Mountain*
- *Todd Harbor*
- *Windigo*

Rolled copies of these maps can be found in the Division Chief, Natural Resources Office. In addition, 1:62,500 scale maps are available in the Division Chief, Natural Resources Office.

Infrared imagery
1996 Color infrared color air photos exist for the park and field copies are found in the Natural Resources Office.

Vegetation/fuel maps
A vegetation survey and map for Isle Royale was completed in 2000. Vegetation maps for the island are found in the Natural Resources Office as well as in the park's GIS database. A Canadian Fuel Type map was created using the vegetation layer and is found in the main body of the Fire Management Plan.

Hazard locations (ground and aerial)
Only one hazard to aviation resources exists on Isle Royale, a 199 foot tower . This unlit radio

tower is found approximately 100 yards southwest of the Mott Island Landing Zone.

Archeological/cultural base map
No archeological, ethnographic, historic structure, or historical landscape maps currently exist. This map is a high priority to be developed as sites are identified. When developed, that map will be attached to this plan.

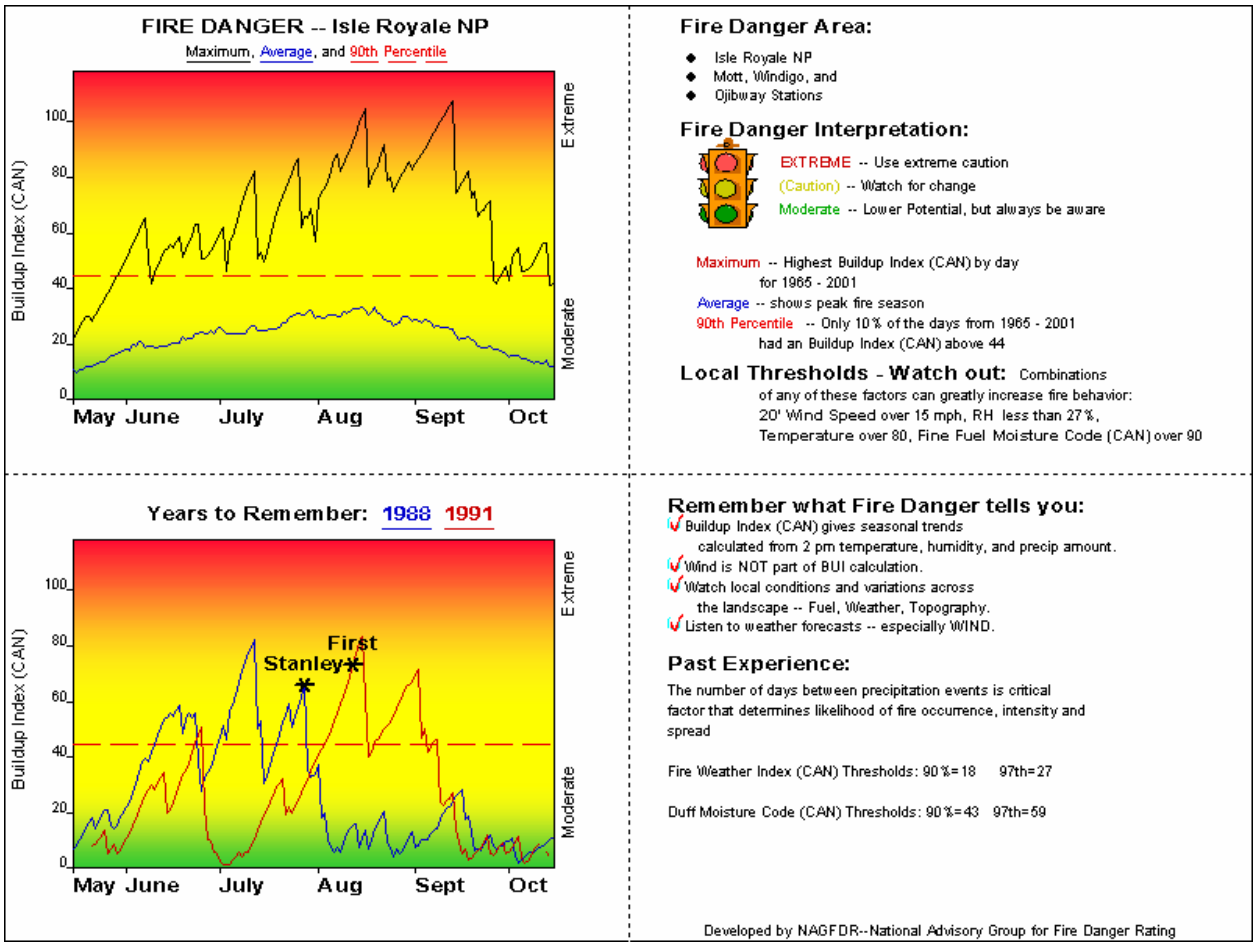
Endangered species critical habitats/ Sensitive plant populations
A database and ArcView GIS layer are maintained for bald eagle and osprey nest locations. This information changes from year to year and is found on the Natural Resources Management Biological Technician computer. Due to the changing nature and sensitivity of this information, the map is not printed with this document. No other maps with T&E species locations have been created. Michigan Technological University researchers maintain data regarding wolf den locations.

Special visitor use area
No special visitor use areas exist on the island. Trails, campgrounds and developed areas are denoted on the Transportation Map.

Land status
The landmass of Isle Royale National Park is 100% owned by the federal government.

SAFETY

Attached is a Pocket Card describing critical fire danger indices and conditions present during past large fire events at Isle Royale National Park. It is intended for use by firefighters from outside the Park who might be ordered to Isle Royale to assist in wildland fire use or suppression actions:


FIRE DANGER -- Isle Royale NP
Maximum, Average, and 90th Percentile
Buildup Index (CAN)
100
80
60
40
20
0
Extreme
Moderate
May June July Aug Sept Oct
Fire Danger Area:
Isle Royale NP
Mott, Windigo, and
Ojibway Stations
Fire Danger Interpretation:
EXTREME -- Use extreme caution
(Caution) -- Watch for change
Moderate -- Lower Potential, but always be aware
Maximum -- Highest Buildup Index (CAN) by day for 1965 - 2001
Average -- shows peak fire season
90th Percentile -- Only 10% of the days from 1965 - 2001 had an Buildup Index (CAN) above 44
Local Thresholds - Watch out: Combinations of any of these factors can greatly increase fire behavior:
20' Wind Speed over 15 mph, RH less than 27%,
Temperature over 80, Fine Fuel Moisture Code (CAN) over 90
Years to Remember: 1988 1991
Buildup Index (CAN)
First
Stanley
Extreme
Moderate
May June July Aug Sept Oct
Remember what Fire Danger tells you:
Buildup Index (CAN) gives seasonal trends calculated from 2 pm temperature, humidity, and precip amount.
Wind is NOT part of BUI calculation.
Watch local conditions and variations across the landscape -- Fuel, Weather, Topography.
Listen to weather forecasts -- especially WIND.
Past Experience:
The number of days between precipitation events is critical factor that determines likelihood of fire occurrence, intensity and spread
Fire Weather Index (CAN) Thresholds: 90%=18 97th=27
Duff Moisture Code (CAN) Thresholds: 90%=43 97th=59
Developed by NAGFDR--National Advisory Group for Fire Danger Rating

1. Sample Delegation of Authority

Isle Royale National Park

Houghton, MI

Limited Delegation of Authority

As of 1800, September 2, 2001, I have delegated authority to manage the Daisy Farms fire, number 0102, Isle Royale National Park, to Incident Commander John Doe and his Incident Management Team.

The fire, which originated as an escaped campfire fire on August 31, 2001, is burning in habitat near the Daisy Farm Campground. My considerations for management of this fire are:

1. Provide for firefighter and public safety.

2. I would like the fire managed in such a manner that suppression actions will cause little environmental damage as possible.

3. Key features requiring priority protection are: NPS facilities, cultural resources, and streams in the area.

4. Restrictions for suppression actions are no tracked vehicles will be utilized.

5. Minimum tools for use are Type II/III helicopters, and chainsaws.

6. My agency advisor will be the park Fire Management Coordinator.

7. Managing the fire cost-effectively for the values at risk is a significant concern.

8. Provide training opportunities for park personnel is requested to strengthen our organizational capabilities.

Superintendent, Isle Royale National Park
September 2, 2001

2. Sample Delegation of Authority for Wildland Fire Use Management Team

Isle Royale National Park
DELEGATION OF AUTHORITY
Sample Fire
September 30, 2001

_____ is assigned as the Team Leader for the Long Term Assessment of the _____ Fire (MN-IRP-???). You have full authority and responsibility for completing the planning efforts within the framework of law, National Park Service policy and direction provided in the Wildland Fire Implementation Plan Stage III, and this Delegation.

Specific direction includes:

- _____, Area Fire Management Officer, will be assigned as the Agency Representative.
- _____, Chief, Natural Resource Management , will be assigned as the Resource Advisor.
- The Park will retain initial attack and suppression responsibilities.
- Firefighter and public safety is the primary objective and should be included in all planning actions.
- Facility and development protection areas are:
  - Cultural sites as identified by the park Cultural Resource Specialist
  - Park developed areas
  -
  -
- The Team will complete a Long Term Assessment Plan for the _____ Fire. At the request of the MWR Fire Management Office, the Plans shall also include a Community Protection Assessment, an evaluation of the full range of adverse effects of the fires, on safety, cultural, social, economic, environmental, and social elements.
- MIST tactics and minimal tool requirements will be a consideration.
- All requests for supplies or resources should be placed through the Isle Royale Resources Management Office.
- The Team is responsible for understanding local aviation protocols and coordinating aviation activities with the Agency Representative. One aviation resource has been assigned and one Park resource can be scheduled for use.
- Release of the Team will occur when agreed to by the Agency Representative and Assessment Team Leader. Completed Long Term Assessment Plans and any related documentation will be provided to Voyageurs National Park upon release.

_____
Superintendent, Isle Royale National Park Date

_____
Assessment Team Leader Date

Figure 6 - Aircraft Landing Zones

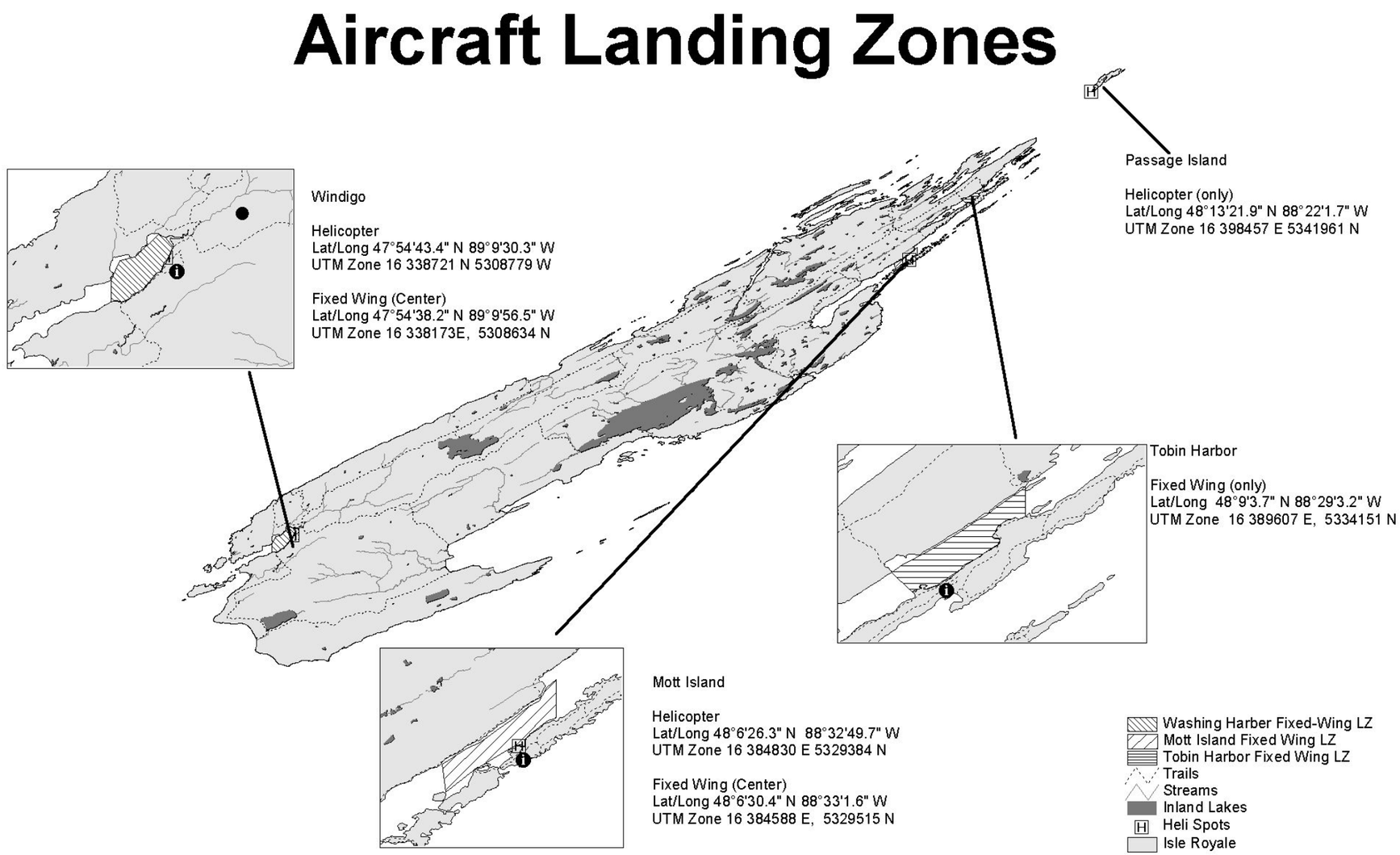


Figure 7 – Transportation Map

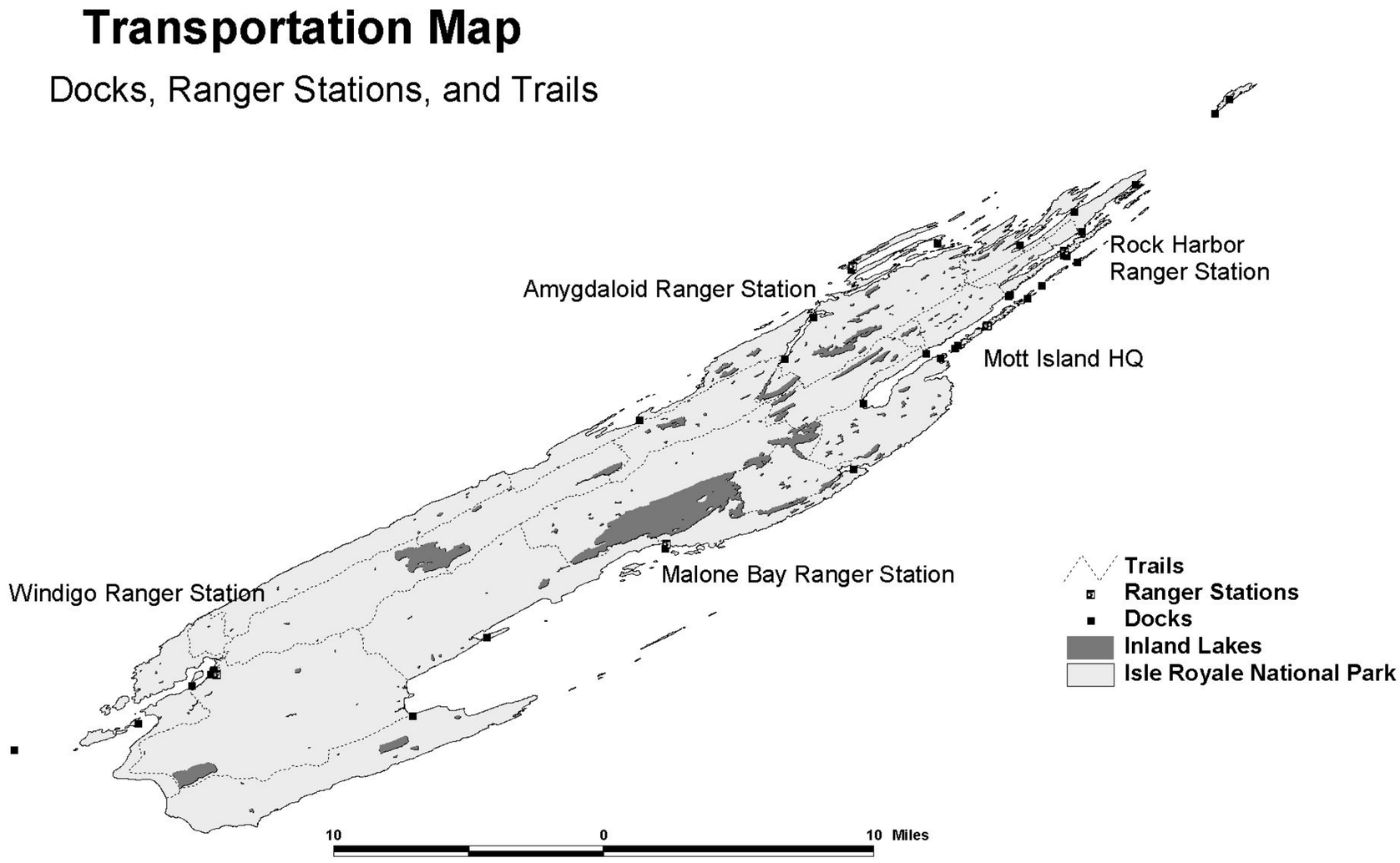
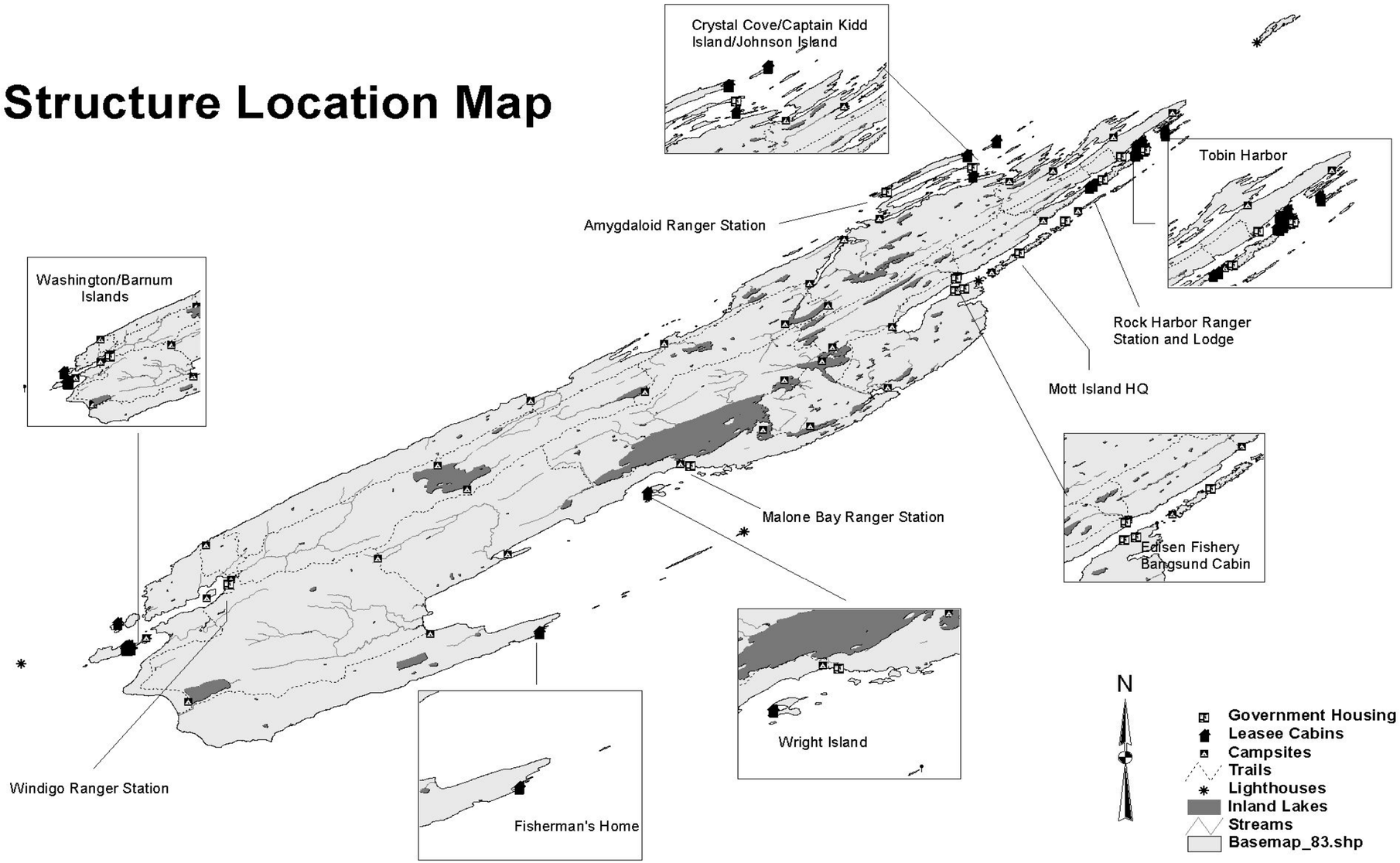


Figure 8 - Structure Location Map



APPENDIX H

H. STEP-UP PLAN

1. Step-Up Plan

   Preparedness actions need to increase incrementally as fire danger increases. Those actions are delineated by "staffing classes," which are approved, pre-determined responses that describe escalations in activity. They are tied to the Canadian Forest Fire Behavior Prediction System (CFFFBP) Fire Weather Index (FWI), which is based on environmental data collected daily in the park. The staffing classes are not a measure of the probability of fire, but relate to the difficulty of control (Hirsch, 1996).

   As experience with the Canadian system increases, the calculated thresholds for the step-up plan will be adjusted to meet park conditions.

2. Funding

   DO-18 and FIREPRO permit the use of emergency funds to accomplish approved step-up activities when the park is in staffing class 4 or 5. Park Service fiscal procedures may vary each year, so procedures for opening emergency accounts and account numbers will not be incorporated into the body of this plan but will be appended to the plan. Emergency preparedness activities normally funded by these accounts include:

   - Overtime and premium pay for increased fire prevention, detection, or readiness by fire-qualified personnel
   - Backfilling of positions used for the above
   - Aircraft reconnaissance
   - Hire of emergency firefighters
   - Extending the employment period for seasonal firefighters beyond their normal termination dates
   - Travel or transportation necessary to pre-position resources

3. Public Notices

   Sample messages to be announced by the Dispatcher on the park radio system during SC 4 and 5 are shown below.

   STAFFING CLASS 4 – HOT, DRY CONDITIONS HAVE CREATED VERY HIGH FIRE DANGER, PARTICULARLY ON EXPOSED RIDGES AND SOUTH-FACING SLOPES. EMPLOYEES AND VISITORS SHOULD BE EXTREMELY CAREFUL WITH ALL FIRES.

STAFFING CLASS 5 – HOT, DRY CONDITIONS HAVE ONCE AGAIN CREATED EXTREME FIRE DANGER AT ISLE ROYALE. UNTIL FURTHER NOTICE, ALL OPEN FIRES SHALL BE PROHIBITED IN THE PARK. CHARCOAL FIRES ARE RESTRICTED TO EMPLOYEE RESIDENCE AREAS, ROCK HARBOR AND WINDIGO DEVELOPED AREAS, CONCRETE DOCKS, AND ON PRIVATE BOATS. PLEASE BE EXTREMELY CAREFUL WITH ALL POTENTIAL SOURCES OF FIRE.

STEP-UP PLAN FOR ISLE ROYALE

STAFFING CLASS	CFFBPS FIRE WEATHER INDEX	ACTIONS
Staffing Class 1	0-7	All work and visitor activities proceed as normal unless some unusual situation such as an ongoing fire preclude them.
Staffing Class 2	8-14	Actions under SC 1
Staffing Class 3	15-21	Actions under SC 2 plus At least one qualified firefighter should be available during duty hours near the main district fire caches (Rock Harbor and Windigo) for fire preparedness and suppression activities.
Staffing Class 4	22-27	All actions under SC 3 plus Fire prevention messages should be made a prominent part of all visitor contacts. At the FMO's discretion, at least two qualified firefighters should be available from 11 am to 5 pm near the main district fire caches for fire preparedness and suppression activities. At the FMO's discretion, the Mott fire cache will be staffed from 11 am to 5 pm. An emergency fire account will be opened if necessary to facilitate these actions.

STAFFING CLASS	CFFBPS FIRE WEATHER INDEX	ACTIONS
Staffing Class 5	28+	All actions under SC 4 plus At the FMO's discretion, at least three qualified firefighters should be available from 8 am to 7 pm near the main district fire caches for fire preparedness and suppression activities. At least two will be available from 7 pm to one half hour after sunset. All members of the wildland fire crew should have their personal protective equipment ready to respond to any fire. At the FMO's discretion, the Mott fire cache will be staffed from 11 am to one half hour after sunset. All open fires may be prohibited in the park, and charcoal fires will be restricted to Rock Harbor, Windigo, Mott Island, Davidson, Amygdaloid, and Malone Bay developed areas, concrete docks, and on private boats. Use of gasoline power tools may be limited to developed areas, early morning hours, or prohibited entirely. All or portions of the backcountry may be closed to visitor use. Aircraft may be secured and placed on standby duty in the park.

APPENDIX I

I. LONG-TERM PRESCRIBED FIRE AND HAZARD REDUCTION PLAN

1. Multi-year prescribed fire schedule

   To be developed in 5-7 years.

2. Hazard fuel reduction areas and schedule

   Including proposed treatment techniques, to be developed in 5-7 years.

APPENDIX J

J. FIRE PREVENTION PLAN

Fire prevention emphasis for Isle Royale National Park is based on an analysis of fire risk, fire hazard and values at risk in the Park. Fire risk is based on occurrence of 149 wildland fires from 1937 to 2001 (Table 13).

Table 13 – Fire History

ISLE ROYALE NATIONAL PARK WILDLAND FIRES
1937-2001
Numbers / Causes / Area Burned

NUMBER OF FIRES				AREA BURNED, acres/*hectares*							
YEAR	HUMAN	LIGHTNING	TOTAL	HUMAN		LIGHTNING		PNF/WFU		TOTAL	
1937	0	2	2	0.0	*0.0*	32.1	*13.0*	0.0	*0.0*	32.1	*13.0*
1938	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1939	1	1	2	0.1	*0.0*	0.1	*0.0*	0.0	*0.0*	0.2	*0.1*
1940	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1941	2	1	3	0.2	*0.1*	0.1	*0.0*	0.0	*0.0*	0.3	*0.1*
1942	0	1	1	0.0	*0.0*	7.0	*2.8*	0.0	*0.0*	7.0	*2.8*
1943	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1944	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1945	0	1	1	0.0	*0.0*	8.0	*3.2*	0.0	*0.0*	8.0	*3.2*
1946	0	1	1	0.0	*0.0*	1.0	*0.4*	0.0	*0.0*	1.0	*0.4*
1947	0	2	2	0.0	*0.0*	2.1	*0.8*	0.0	*0.0*	2.1	*0.8*
1948	0	2	2	0.0	*0.0*	1441.0	*583.2*	0.0	*0.0*	1441.0	*583.2*
1949	0	3	3	0.0	*0.0*	0.3	*0.1*	0.0	*0.0*	0.3	*0.1*
1950	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1951	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1952	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1953	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1954	6	2	8	1.5	*0.6*	6.1	*2.5*	0.0	*0.0*	7.6	*3.1*
1955	1	2	3	0.1	*0.0*	1.1	*0.4*	0.0	*0.0*	1.2	*0.5*
1956	1	0	1	0.1	*0.0*	0.0	*0.0*	0.0	*0.0*	0.1	*0.0*
1957	2	0	2	0.2	*0.1*	0.0	*0.0*	0.0	*0.0*	0.2	*0.1*
1958	2	5	7	0.2	*0.1*	1.4	*0.6*	0.0	*0.0*	1.6	*0.6*
1959	0	2	2	0.0	*0.0*	0.2	*0.1*	0.0	*0.0*	0.2	*0.1*
1960	3	0	3	0.3	*0.1*	0.0	*0.0*	0.0	*0.0*	0.3	*0.1*
1961	1	1	2	0.1	*0.0*	0.1	*0.0*	0.0	*0.0*	0.2	*0.1*
1962	4	1	5	0.4	*0.2*	0.1	*0.0*	0.0	*0.0*	0.5	*0.2*
1963	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1964	1	2	3	0.1	*0.0*	0.2	*0.1*	0.0	*0.0*	0.3	*0.1*
1965	2	0	2	0.2	*0.1*	0.0	*0.0*	0.0	*0.0*	0.2	*0.1*
1966	4	1	5	0.4	*0.2*	0.1	*0.0*	0.0	*0.0*	0.5	*0.2*
1967	1	0	1	0.1	*0.0*	0.0	*0.0*	0.0	*0.0*	0.1	*0.0*
1968	0	1	1	0.0	*0.0*	0.1	*0.0*	0.0	*0.0*	0.1	*0.0*
1969	0	3	3	0.0	*0.0*	0.3	*0.1*	0.0	*0.0*	0.3	*0.1*
1970	4	2	6	1.3	*0.5*	0.2	*0.1*	0.0	*0.0*	1.5	*0.6*
1971	0	0	0	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*	0.0	*0.0*
1972	5	0	5	0.5	*0.2*	0.0	*0.0*	0.0	*0.0*	0.5	*0.2*
1973	0	1	1	0.0	*0.0*	0.1	*0.0*	0.0	*0.0*	0.1	*0.0*
1974	0	1	1	0.0	*0.0*	2.0	*0.8*	0.0	*0.0*	2.0	*0.8*
1975	5	0	5	3.3	*1.3*	0.0	*0.0*	0.0	*0.0*	3.3	*1.3*

ISLE ROYALE NATIONAL PARK WILDLAND FIRES
1937-2001
Numbers / Causes / Area Burned

	NUMBER OF FIRES			AREA BURNED, acres/*hectares*							
1976	**2**	**3**	**5**	**2.1**	*0.8*	**104.1**	*42.1*	**0.0**	*0.0*	**106.2**	*43.0*
1977	**0**	**0**	**0**	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
1978	**0**	**3**	**3**	**0.0**	*0.0*	**0.3**	*0.1*	**0.0**	*0.0*	**0.3**	*0.1*
1979	**0**	**1**	**1**	**0.0**	*0.0*	**0.1**	*0.0*	**0.0**	*0.0*	**0.1**	*0.0*
1980	**0**	**0**	**0**	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
1981	**0**	**0**	**0**	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
1982	**3**	**0**	**3**	**1.2**	*0.5*	**0.0**	*0.0*	**0.0**	*0.0*	**1.2**	*0.5*
1983	**0**	**0**	**0**	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*
1984	**0**	**1**	**1**	**0.0**	*0.0*	**0.1**	*0.0*	**0.0**	*0.0*	**0.1**	*0.0*
1985	**1**	**0**	**1**	**0.3**	*0.1*	**0.0**	*0.0*	**0.0**	*0.0*	**0.3**	*0.1*
1986	**2**	**0**	**2**	**0.2**	*0.1*	**0.0**	*0.0*	**0.0**	*0.0*	**0.2**	*0.1*
1987	**3**	**2**	**5**	**3.2**	*1.3*	**0.2**	*0.1*	**0.2**	*0.1*	**3.4**	*1.4*
1988	**0**	**1**	**1**	**0.0**	*0.0*	**80.0**	*32.4*	**80.0**	*32.4*	**80.0**	*32.4*
1989	**8**	**1**	**9**	**0.8**	*0.3*	**0.3**	*0.1*	**0.0**	*0.0*	**1.1**	*0.4*
1990	**5**	**0**	**5**	**0.5**	*0.2*	**0.0**	*0.0*	**0.0**	*0.0*	**0.5**	*0.2*
1991	**2**	**5**	**7**	**7.1**	*2.9*	**3.1**	*1.3*	**0.0**	*0.0*	**10.2**	*4.1*
1992	**0**	**1**	**1**	**0.0**	*0.0*	**0.1**	*0.0*	**0.0**	*0.0*	**0.1**	*0.0*
1993	**0**	**1**	**1**	**0.0**	*0.0*	**0.1**	*0.0*	**0.0**	*0.0*	**0.1**	*0.0*
1994	**0**	**3**	**3**	**0.0**	*0.0*	**0.3**	*0.1*	**0.3**	*0.1*	**0.3**	*0.1*
1995	**0**	**3**	**3**	**0.0**	*0.0*	**0.3**	*0.1*	**0.3**	*0.1*	**0.3**	*0.1*
1996	**0**	**2**	**2**	**0.0**	*0.0*	**0.2**	*0.1*	**0.2**	*0.1*	**0.2**	*0.1*
1997	**1**	**1**	**2**	**0.1**	*0.0*	**1.4**	*0.6*	**1.4**	*0.6*	**1.5**	*0.6*
1998	**3**	**1**	**4**	**2.2**	*0.9*	**0.2**	*0.1*	**0.2**	*0.1*	**2.4**	*1.0*
1999	**3**	**2**	**5**	**3.6**	*1.5*	**0.2**	*0.1*	**0.2**	*0.1*	**3.8**	*1.5*
2000	**1**	**0**	**1**	**0.1**	*0.0*	**0.0**	*0.0*	**0.0**	*0.0*	**0.1**	*0.0*
2001	**0**	**1**	**1**	**0.0**	*0.0*	**7.6**	*3.1*	**7.6**	*3.1*	**7.6**	*3.1*
TOTALS	**79**	**70**	**149**	**30.5**	*12.3*	**1702.3**	*688.9*	**90.4**	*36.6*	**1732.8**	*701.3*
Percent	**53%**	**47%**	**100%**	**2%**	**2%**	**98%**	**98%**				

*PNF/WFU column represents the totals of lightning-caused fires managed as PNF/WFU

1. Fire Risk Analysis

Risk is defined as any heat source or human ignition which can start a wildland fire.

An analysis of the fire occurrence history in Isle Royale National Park from 1937 – 2001 reveals that human caused fires made up 53% of the wildland fires and lightning-caused fires made up 47%. Fire occurrence maps (Figure 3) for Isle Royale National Park indicate that human caused fires are primarily limited to trails and lakeshore campsites while lightning fires occur more scattered in the interior of the island and less accessible to firefighting resources.

2. Fire Hazard Analysis

Hazard is defined as the fuels and topography on which a fire will spread.

While the human caused ignitions make up the slight majority of fire starts in the Park, the lightning-caused fires (including WFU fires) have burned 98% of the total acreage burned by wildland fires. This is due to several factors, primarily quick access by suppression forces. Fires starting in the interior on the other hand, are more difficult to attack and fuel availability is normally greater.

Problem fuel areas are those with advanced balsam fir in the understory of mature red, white and jack pine stands, areas of bug killed balsam fir and spruce, pockets of blowdown, and limited areas of continuous jack pine. Fuel type maps for the park are found in Figure 4.

3. Values Analysis

Values are defined as areas where the losses from wildland fire would be unacceptable.

As stated in Section XI, primary values areas of concern are the developments, infrastructure, life lessees, and archeological, cultural and historic resources in the Park. Concentrations of values exist in the Windigo, Rock Harbor, and Mott Island areas of the park and are primarily easily accessible by boat.

4. Planned Fire Prevention Activities:

Strategies for fire prevention at Isle Royale National Park will be a mix of engineering, education, and enforcement.

a. Engineering is the process of reducing risks and hazards by shielding or removing heat sources or by removing fuels.

Hazard fuel reduction through primarily mechanical treatments in the developed areas of the park and possibly in the future prescribed fire are the means of using engineering in fire prevention at Isle Royale National Park. In 1998 and 1999, mechanical fuels treatment projects were completed in the Rock Harbor and Mott Island areas of the park. As stated in Section V, in the future prescribed fire may be used in treating moderate to high hazard fuels in low to moderate value areas; while mechanical treatments are the primary means to treat moderate to high hazard fuels in moderate to high value areas.

b. Education emphasizes the need to inform the public of the importance of wildland fire prevention. Activities will include:

- Pertinent signs, posters, and notices will be posted on park bulletin boards, and at visitor centers, developed campsites and day use sites, and neighboring resorts.
- Pertinent messages will be included in park publications, such as the park folder and newspaper, camping and hiking brochures, on the park website, and a site bulletin describing Isle Royale's wildland fire management program, and included in backcountry user briefings.

- Pertinent messages will be included in visitor center exhibits, interpretative talks, and NPS and concession orientations for new and returning employees.
- A slide/tape or video tape program may be developed that describes Isle Royale's wildland fire management program for use in visitor centers or for loan to educational or nonprofit groups.
- Pertinent messages will be included in informal contacts between uniformed NPS employees and park visitors and neighbors.
- Pertinent messages will be included in informal contacts between concession/commercial use license employees and park visitors and neighbors.

c. Enforcement of rules and regulations pertaining to fire will be aggressive as fire danger increases. Burning restrictions are placed in accordance with the park's Step Up Plan, Appendix H. Other enforcement activities include:

- During park trail opening each spring, Maintenance personnel will clear the area around each fire grill of encroaching vegetation, and branches overhanging fire grills will be limbed.
- Patrols by park rangers, particularly during the evening, will enforce compliance with the policy of restricting wood fires to developed sites with fire rings and with any open burning restrictions that may be in effect due to high fire danger.
- Open burning at life lease cabin sites, will require the permission of the appropriate District Ranger or the Chief Park Ranger.
- Park Maintenance staff will check power lines for tree clearance and will correct deficiencies.
- Any restrictions deemed necessary during periods of extreme fire danger will be publicized during backcountry briefings and visitor contacts.