

***Wildlife Management Plan
and Environmental Assessment
for
Harvestable Species***

**Apostle Islands National Lakeshore
Bayfield, Wisconsin
June 14, 2007**

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INTRODUCTION

PURPOSE AND NEED

The purpose of this plan is to provide direction for managing huntable and trappable wildlife within Apostle Islands National Lakeshore (NL). Although, with minor exceptions, hunting and trapping has been permitted under State of Wisconsin regulations since the park was established, recent events have increased the need for a harvestable wildlife plan. Most notably, white-tailed deer have become established on islands that historically did not have deer populations, threatening rare vegetation communities. In addition, for species other than deer, the park does not have a timely way to determine the amount of harvest occurring within the park.

National Park Service (NPS) objectives for harvestable wildlife include:

1. Managing processes and preserving ecologically sound native biological communities, while recognizing factors unique to island ecosystems.
2. Providing for state regulated hunting and trapping opportunities.
3. Provide for treaty-related hunting and trapping opportunities.

Species/groups that will be addressed by this plan include: white-tailed deer; black bear; furbearers (otter, mink, fisher, beaver, muskrat, fox, coyote, bobcat); small game (red squirrel, gray squirrel, snowshoe hare, ruffed grouse, woodcock); and waterfowl.

POLICY AND PLANNING BACKGROUND

Like all units of the National Park Service, the park is guided by the National Park Service (NPS) Organic Act and the enabling legislation that created the park. The park was created to “conserve and develop for the benefit, inspiration, education, recreational use, and enjoyment of the public certain significant islands and shoreline of the United States and their related geographic, scenic, and scientific value...”

Unlike most units of the National Park Service, Apostle Islands NL’s enabling legislation directs park management to permit hunting, fishing, and trapping in accordance with the appropriate laws of Wisconsin and the United States. This same legislation also gives the park flexibility to “designate zones where, and establish periods when, no hunting, trapping, or fishing shall be permitted for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment.”

In addition, part of the park’s mainland unit is within the reservation of the Red Cliff Band of Lake Superior Chippewa and the remaining land areas of the park are within territory that was ceded as part of the 1842 Treaty with the Chippewa. Within this ceded territory, the Chippewa reserved their rights to hunt and trap. These rights are recognized and respected by the National Park Service.

Park managers are also guided by Code of Federal Regulations, Federal Court cases (e.g., *NRA v Potter*), National Park Service policies and guidelines and park specific plans. Important

guidance includes: NPS Management Policies 2006; Director's Orders (DO), including DO-77 Natural Resource Protection, DO-2 Park Planning, and DO-12: Conservation Planning, Environmental Impact Analysis, and Decision-making. Relevant park specific plans include: the General Management Plan and the Resources Management Plan.

NPS Management Policies 2006 state that “the ‘fundamental purpose’ of the national park system ... begins with a mandate to conserve park resources and values” and leave them unimpaired. It also directs parks to manage natural resources so that fundamental physical and biological processes are preserved, as well as individual species, features, and plant and animal communities. Biological or physical processes altered in the past by human activities may need to be actively managed to restore them to a natural condition. NPS managers are also directed to preserve and restore the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur. This may include the eradication of non-native species, where appropriate and feasible. (NPS 2006).

NPS internal guidance related to natural resource management advises that hunting and trapping must be consistent with sound resource management practices. Parks are required to obtain the necessary data or initiate studies to determine population trends, habitat conditions, appropriate harvest levels and seasons, participant levels, and harvest success. DO-77 also directs the parks to perpetuate native plant life as part of natural ecosystems.

On a park specific level, Apostle Islands NL's 1989 General Management Plan states that the long-term natural resource objective of the National Park Service is to restore and maintain the biological diversity of the dynamic ecosystem that would exist today had not large-scale disturbances, such as logging, intervened. Restoration would only be done if it was not in conflict with protection of the park's cultural resources. The park's Resources Management Plan provides more specific guidance for individual species or communities.

BACKGROUND

BRIEF DESCRIPTION OF APOSTLE ISLANDS NATIONAL LAKESHORE

Apostle Islands National Lakeshore, on the tip of the Bayfield Peninsula in northwestern Wisconsin, includes 21 islands in Lake Superior and a 12-mile narrow strip of mainland shoreline (see figure 1). The park encompasses 69,372 acres, of which 27,323 acres are submerged lands in Lake Superior; the park boundary extends a quarter mile from the shore of the mainland and from each island. The islands range in size from 3-acre Gull Island to 10,054-acre Stockton Island.

The park is at the continental northwestern limits of the hemlock-white pine-northern hardwood forest and also contains elements of the boreal forest. It is on or near the ecotones of several continental biomes. The park features a diverse collection of high quality coastal features, pristine stretches of sand beaches and coves, spectacular sea caves, remnant old growth forests, a diverse population of birds, mammals, amphibians, and fish, and the largest collection of lighthouses in the national park system. People have used the islands and nearby mainland for thousands of years. This area continues to be the traditional homeland for the Ojibwe or Chippewa people. During the historic period, people constructed residences and started farms, fishing operations, brownstone quarries, and logging camps on the islands. Several of these historic sites are listed on the National Register of Historic Places.

FACTORS INFLUENCING WILDLIFE POPULATIONS WITHIN THE APOSTLE ISLANDS

Island Biogeography

Island biogeography plays a large role in the distribution and abundance of wildlife populations within the park. During the end of the last glacial period (11,500 years before present), the islands were covered by Lake Superior. When the lake level dropped to 450 feet above sea level, around 9,500 years before present, the current archipelago was part of the mainland and the majority of terrestrial vertebrates and plant life became established. Currently, the archipelago includes 22 islands, 21 of which are in the park. The park also includes a 2,592 acre strip on the mainland – in essence, 22 discreet “patches.”

Lake Superior acts as a large barrier, greatly influencing immigration and emigration. Species that are not active during the winter, such as raccoon, chipmunk, and skunk, tend not to occur on the park’s islands. The only winter-inactive species that has colonized the islands is black bear. Distances from the mainland to various islands vary from as close as 1 mile to as far as 18 miles, with up to three mile gaps between islands. In addition to distance, the cold temperatures and strong currents of Lake Superior present challenges to inter-island movements. Most winters, many of the islands are accessible by ice. During exceptionally cold winters, all islands may be locked in by ice and during exceptionally warm winters, very few islands are accessible over ice.

In addition to geographic barriers that influence the demography of wildlife populations, island size can be a limiting factor for many species. Island size ranges from 3 acres to approximately 10,000 acres. Most of the islands fall in size between 100 and 500 acres (6, with 4 approx. 300 acres) and 1,000-2,000 acres (7). Two islands are less than 50 acres and two are between 500 and 1,000 acres. Only 4 are greater than 2,000 acres in size (Sand-2,949; Oak-5,078; Outer-8,000; and Stockton-10,054).

Belant et al. (2001) studied the biogeographic distribution of mammals among 20 islands within Apostle Islands National Lakeshore. He found island area to be strongly associated with the number of species present, but did not find a significant relationship between the number of species and distance to mainland or the number of species and distance to the nearest islands. Belant also found species-area relationships to be significant and larger islands to be colonized by species with greater body mass.

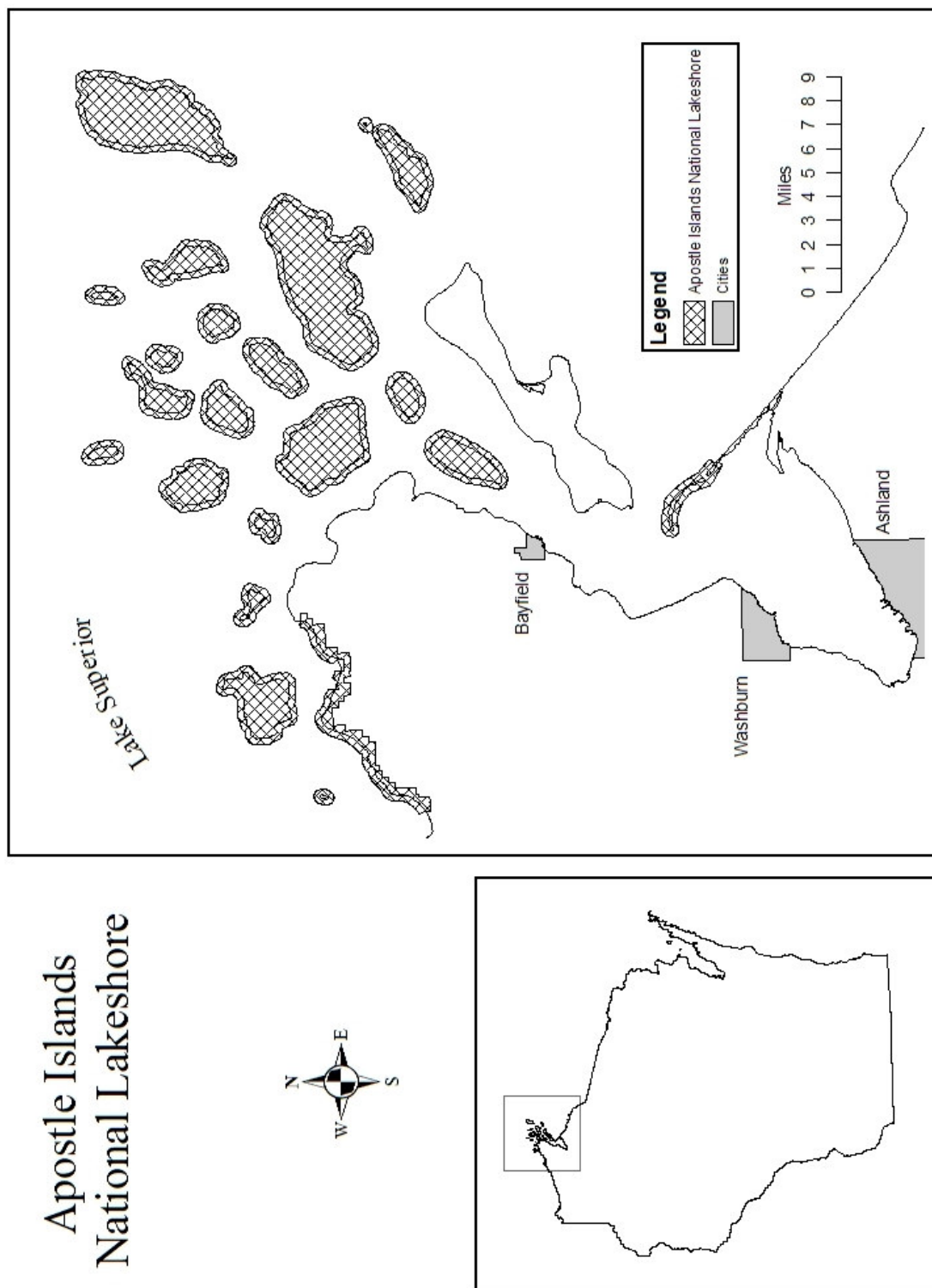
Habitat Changes

The habitats available to wildlife in the park have undergone dramatic changes in the past 150 years. Natural processes such as fire and wind have affected the park's forests over time, as have human activities such as fishing, hunting, trapping, farming, quarrying, and logging. Of these, logging had by far the greatest impact: not only were forests removed, but fires followed harvesting, and intense deer browse began after the forests began to regenerate. In addition to deer, beaver numbers greatly increased, especially on Stockton and Outer Islands where nearly all drainages were dammed. The number of clearings, rare in the pre-logging era, dramatically increased, as did edge habitat. Although some logging continued into the early 1970's, the majority of logging occurred between the 1880's and 1920's. Prior to logging, 90% of the Apostle Islands were covered with northern hemlock hardwood forest, dominated by hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and white birch (*Betula papyrifera*). As a result of logging, the abundance of hemlock and white pine was greatly reduced and forest dominance shifted to white birch, sugar and red maples, balsam fir, and aspen. Aspens are now in decline as are beaver, forest cover has increased, and the forests have matured. Although processes of natural succession are moving many of the forested areas within the park toward their pre-logging composition, some forest communities may take a very long time to recover (hundreds of years). In addition, factors such as deer browse can prevent recovery of certain species (e.g., hemlock, Canada yew) and result in long-term changes to forest composition.

Mainland Populations

In addition to island biogeographic and habitat factors on the islands, the status of wildlife populations and associated habitat changes on the mainland can greatly influence whether or not various wildlife populations immigrate and potentially become established on the islands.

Figure 1. Apostle Islands National Lakeshore



OVERVIEW OF PARK WILDLIFE MANAGEMENT

With the exception of deer, the NPS has allowed hunting and trapping under standard State of Wisconsin regulations since it was established in 1970. Because of the isolation of the islands and lack of sizeable wildlife populations, hunting and trapping pressure has tended to be very low. In addition to general ecological inventories that were done in the 1980's, the park has conducted recent inventories for fisher and otter and has been working with various partners to try to monitor deer populations and browse impacts. Information on population status and trends is needed for fox, coyote, and snowshoe hare. An inventory for beaver was conducted in the late 1980's and periodic monitoring through aerial overflights is done. Waterfowl hunting has also been conducted under standard State of Wisconsin regulations. The amount of hunting is believed to be very low. Migratory bird surveys were conducted on both Long and Outer Islands in 1990 and have been conducted periodically on Outer Island since that time. Although not specifically designed to monitor waterfowl, survey results provide baseline information on waterfowl at these locations.

There has been extensive research on the Stockton Island black bear population and recent research (2002) on the population status of black bears park-wide. From the park's establishment (1970) to 1987, the park was not specifically closed to hunting, however, no bear are known to have been taken. During the time period 1987-1994, a temporary closure as authorized by 36 CFR section 1.5(a)(1) prohibited bear hunting on Stockton Island (in consultation with the Wisconsin DNR) to prevent interference with black bear research. In 1994, Stockton Island was opened to bear hunting, consistent the State of Wisconsin hunting regulations. To date (2005), very little hunting has occurred and only one bear has been taken.

A special muzzleloading season for deer was established in 1985 by the park and Wisconsin Department of Natural Resources (DNR). Previous to this, deer hunting within the park was permitted consistent with current State regulations. State regulations were changed to limit hunting within Deer Management Unit 79 to an October muzzleloader hunt. From 1985 to 2003, the muzzle loading season was limited to Oak and Basswood Islands. Two two-week hunting periods (Oct. 1-15 and Oct. 16-31) were established with up to 25 permits issued for each period. In 2004, Sand Island was also opened to muzzle loading hunting. Up to 25 permits were made available for this hunt. Results of the muzzleloader hunt are shown below in Table 1. A Wisconsin sanctioned nuisance hunt was conducted in 2004 on Sand Island and 2005 on both Sand and York Islands to try to curb rapidly increasing deer populations that threatened a unique vegetation community. Neither of these islands had a historic population of deer. Fifteen deer were taken from Sand Island as a result of the nuisance and muzzle loading hunts in 2004 and six were taken in 2005. Four deer were harvested from York Island as a result of the nuisance hunt in 2005.

Table 1. Muzzleloader Harvest Statistics

Year	Deer Taken Oak Island	Deer Taken Basswood Island	Deer Taken Sand Island	Total
1985	0	0	Not open	0
1986	0	0	Not open	0
1987	0	0	Not open	0
1988	1	0	Not open	1
1989	0	0	Not open	0
1990	2	1	Not open	3
1991	0	0	Not open	0
1992	1	0	Not open	1
1993	2	0	Not open	2
1994	3	2	Not open	5
1995	1	1	Not open	2
1996	1	0	Not open	1
1997	1	0	Not open	1
1998	4	1	Not open	5
1999	2	0	Not open	2
2000	9	1	Not open	10
2001	4	1	Not open	5
2002	2	1	Not open	3
2003	2	0	Not open	2
2004	0	0	3	3
2005	1	2	2	5

IMPACT TOPICS SELECTED FOR ANALYSIS

Vegetation

Apostle Islands NL contains rare examples of both ecological communities and species of vegetation. The structure and composition of the park's forests and other communities determine the types and quality of wildlife habitat present in the park. Certain wildlife species, such as deer, have the potential to have widespread and long-lasting effects on both individual species and entire forest communities. Therefore, potential impacts of various alternatives will be analyzed from both the perspective of changes to wildlife habitat and wildlife impacts to plant species and communities.

Rare, Threatened, and Endangered Species

The Federal Endangered Species Act provides protection and directs recovery of fauna or flora listed by the U. S. Fish and Wildlife Service (USFWS) as being either threatened or endangered. In addition to protection from direct injury or mortality, the habitat on which they depend is also afforded protection. Section 7 of the Act also requires federal agencies to consult with the USFWS when any activity permitted, funded, or conducted by that agency may affect a listed species or designated critical habitat, or is likely to jeopardize proposed species or adversely modify proposed critical habitat. Apostle Islands National Lakeshore offers refuge to several federal and state threatened and endangered species, including the bald eagle, piping plover, and timber wolf, as well as a number of Wisconsin state species of special concern. This EA will consider the potential effect of various wildlife management alternatives on rare, threatened, and endangered species known to occur in the park.

Wildlife

This plan directly addresses management alternatives for harvestable wildlife within the park. Although harvestable wildlife species will be addressed in greater detail, the potential impacts to all wildlife within the park will be evaluated.

Wilderness

The 1964 Wilderness Act states that wilderness, "in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain." This statute established a National Wilderness Preservation System; designated areas in that system are to be left unimpaired for future generations as wilderness. Approximately 80% of the land area of Apostle Islands National Lakeshore has been designated as wilderness and is managed to protect its wilderness values. Both various levels of certain wildlife populations and the implementation of management alternatives have the potential to impact the wilderness character of the islands. Wilderness will therefore be addressed in this EA.

Cultural Resources (ethnographic resources)

Section 106 of the National Historic Preservation Act (NHPA) of 1966 provides the framework for federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. Human occupation and use of the park spans two millennia, and valuable archeological and ethnographic resources, historic structures and cultural landscapes are found within the park. Although none of the alternatives are expected to effect archeological resources, historic structures or cultural landscapes within the park, various alternatives may affect ethnographic resources. Therefore, potential impacts to ethnographic resources will be addressed.

Visitor Use and Experience

The 1916 National Park Service Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife, and natural and historic resources of national parks “in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The enjoyment and education of visitors are emphasized in Apostle Island National Lakeshore’s purpose and mission statements. In addition, the park’s enabling legislation specifically authorizes hunting and trapping, making these activities valid visitor uses within the park. Therefore, the potential impacts of the proposed alternatives on visitor use and experience will be addressed.

Park Operations

This topic concerns NPS staffing levels and workloads, maintenance activities, costs and planning needs. Because workload and staff requirements may vary for different alternatives, this topic will be addressed.

IMPACT TOPICS ELIMINATED FROM FURTHER EVALUATION

Several potential impact topics were dismissed because they would not be affected, or the potential for impacts under all of the alternatives would be negligible. These topics are listed below, with an explanation of why they were not considered in detail.

Prime and Unique Agricultural Lands

There are no prime or unique agricultural soils within the boundaries of Apostle Islands National Lakeshore (NPS 1989).

Air Quality

In all of the alternatives the National Park Service would continue to protect and conserve air quality as required under the NPS Organic Act and *NPS Management Policies 2001*. None of the alternatives being considered would alter the park's air quality.

Water Quality

NPS policies require protection of water resources consistent with the Clean Water Act. Both water quantity and water quality are important issues at Apostle Islands. In all of the alternatives the National Park Service would continue to protect and conserve water quality. None of the alternatives being considered would alter the park's water quality.

Geology and Soils

The park includes significant geologic features, including sandstone cliffs and a highly diverse collection of coastal features. Preserving geologic conditions is one of the purposes listed in the enabling legislation of Apostle Islands. However, none of the alternatives being considered would alter the geologic features or processes within the park. It is therefore eliminated from detailed analysis.

Floodplains and Wetlands

None of the alternatives would alter the park's wetlands and floodplains. Although wildlife utilize wetland and floodplain habitats, impacts to floodplains and wetlands from various wildlife management approaches are not expected. In all of the alternatives the National Park Service would continue to protect and conserve the park's wetlands and floodplains as required under the NPS Organic Act, Executive Order 11988 (Floodplain Management), the NPS "Floodplain Management Guideline," Executive Order 1190 ("Protection of Wetlands"), NPS Director's Order 77-1 ("Wetland Protection"), and NPS Management Policies 2006.

Fish

The Apostle Islands area provides very important fish habitat, including spawning areas, and is important for commercial and recreational fishing. However, this plan is specific to terrestrial wildlife and does not address fishery resources. Recreational and commercial fishermen would continue to be able to harvest fish within the boundaries of the park under all of the alternatives, subject to state and tribal regulations.

Lightscape

Under the NPS Organic Act and *NPS Management Policies 2006*, the National Park Service is required to protect to the greatest extent possible the natural lightscapes (i.e., night sky) of the park. In particular, the policies call for the National Park Service to protect natural darkness. None of the alternatives in this plan would affect the park's lightscape.

Soundscape

Under the NPS Organic Act, Director's Order 47 ("Soundscape Preservation and Noise Management"), and *NPS Management Policies 2006*, the National Park Service is required to protect to the greatest extent possible the natural soundscape. Hunting has the potential to impact the natural soundscape as a result of the sound associated with a gun firing. However, the associated impacts are considered to be negligible because hunting is not permitted during the peak visitor season, and the sound of gunfire, even during the hunting season, is very sporadic.

Cultural Resources (non-ethnographic resources)

Section 106 of the National Historic Preservation Act (NHPA) of 1966 provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. Human occupation and use of the park spans two millennia, and valuable archeological and ethnographic resources, historic structures and cultural landscapes are found within the park. None of the alternatives are expected to effect archeological resources, historic structures or cultural landscapes within the park.

Museum Objects

Museum objects are manifestations and records of behavior and ideas that span the breadth of human experience and depth of natural history. None of the proposed alternatives have potential to affect museum objects.

Public Health and Safety

Hunting and trapping, similar to many other activities, involves some potential safety risks. Since hunting and trapping are not allowed during the peak visitor season, the associated risks are primarily limited to those engaging in the activity. Standard safety clothing and procedures

are required of hunters in the park. Impacts to public health and safety are expected to be negligible to minor for any of the alternatives. The difference in impacts between alternatives is also expected to be negligible.

Socioeconomic Environment

Apostle Islands National Lakeshore affects local businesses and the economy of Bayfield and other communities in the area. Any actions that would alter visitor use levels or visitor use patterns would be of concern to many local businesses, including marinas, lodges, motels and restaurants, supply stores, guides, outfitters, and concessioners. Because of logistical challenges, the amount of hunting or trapping occurring within the park is expected to remain at a very low level. Therefore, any socioeconomic impact associated with hunting or trapping is expected to be negligible.

Land Use

No local land use plans (outside the park boundary) would be affected by actions proposed under the alternatives. In addition, hunting or trapping activity as described under any of the alternatives would not induce any changes in land use, or increase pressure for development on the mainland adjacent to the park.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The lands and waters comprising Apostle Islands National Lakeshore, including the lands on the mainland that are part of the Red Cliff Indian Reservation (and possibly Long Island in relation to the Bad River Indian Reservation), are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Although not trust resources, tribes do have specific off-reservation treaty-related rights. Under the Treaty of 1842, Lake Superior Chippewa reserved off-reservation treaty rights to the lands and waters of Lake Superior that now fall within the park.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. Minority or low income populations would be treated the same way under all of the alternatives considered in this plan. None of the alternatives being considered would have a disproportionately high and adverse effect on any minority or low income population or community.

This conclusion is based on the following information:

- The alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct, indirect, or cumulative adverse effects on any minority or low-income population or community.
- The alternatives would not affect Native American treaty rights – Native Americans with treaty-related rights would continue to be able to hunt and trap within Apostle Islands National Lakeshore, consistent with those rights.
- No adverse impacts were identified that would significantly and adversely affect minority or low-income populations or communities.
- The alternatives would not result in any identified effects that would be specific to any minority or low-income community.
- The study team actively solicited public comments during the development of the harvestable wildlife plan and gave equal consideration to all input from persons, regardless of age, race, sex, income status, or other socioeconomic or demographic factors.
- During the study process NPS staff consulted and worked with the Red Cliff and Bad River Bands of the Lake Superior Chippewa, and the Voigt Intertribal Task Force of the Great Lakes Indian Fish and Wildlife Commission, and will continue to do so in cooperative efforts to improve communications and resolve any problems that occur.
- No impacts were identified to the socioeconomic environment due to the alternatives that would substantially alter the physical and social structure of the nearby communities.

Natural or Depletable Resource Requirements and Conservation Potential

None of the alternatives being considered would result in the extraction of resources from the park. Under all of the alternatives ecological principles would be applied to ensure that the park's natural resources were maintained and not impaired.

Energy Requirements and Conservation Potential

None of the alternatives would result in a measurable change in energy consumption compared to current conditions.

ALTERNATIVES

MANAGEMENT OBJECTIVES COMMON TO ALL ALTERNATIVES

General

- Provide both general public and treaty-related harvest opportunities
- Utilize general public and treaty-related hunting to assist the park in meeting management goals
- Ensure that hunting and trapping do not result in over-harvest of affected species
- Obtain needed research and develop effective monitoring for individual species or groups
- Develop trigger points that indicate a need for management action

White-tailed Deer

- Keep populations at levels low enough to prevent impacts to forest composition, and which protect the exceedingly rare yew stands (and other elements of the understory) on islands that saw little to no browse in the past 100 years
- Prevent or limit the spread of deer to the small number of islands that have rare understory plant communities, not eliminate deer from the islands

Black bear

- Maintain the natural distribution, density, age-class distribution and behavior of the park's bear population.

Furbearers

- Maintain the natural distributions, densities, age-class distributions and behavior of the park's furbearer populations.

Small game

- Maintain the natural distributions, densities, age-class distributions and behavior of the park's furbearer populations.

Historically non-native species

- Historically non-native species are those whose range has been expanded as a result of intentional human introduction.
- Prevent species that are not native to the park from becoming established.
- These species would be managed similar to non-native species and potentially eradicated if appropriate and feasible.

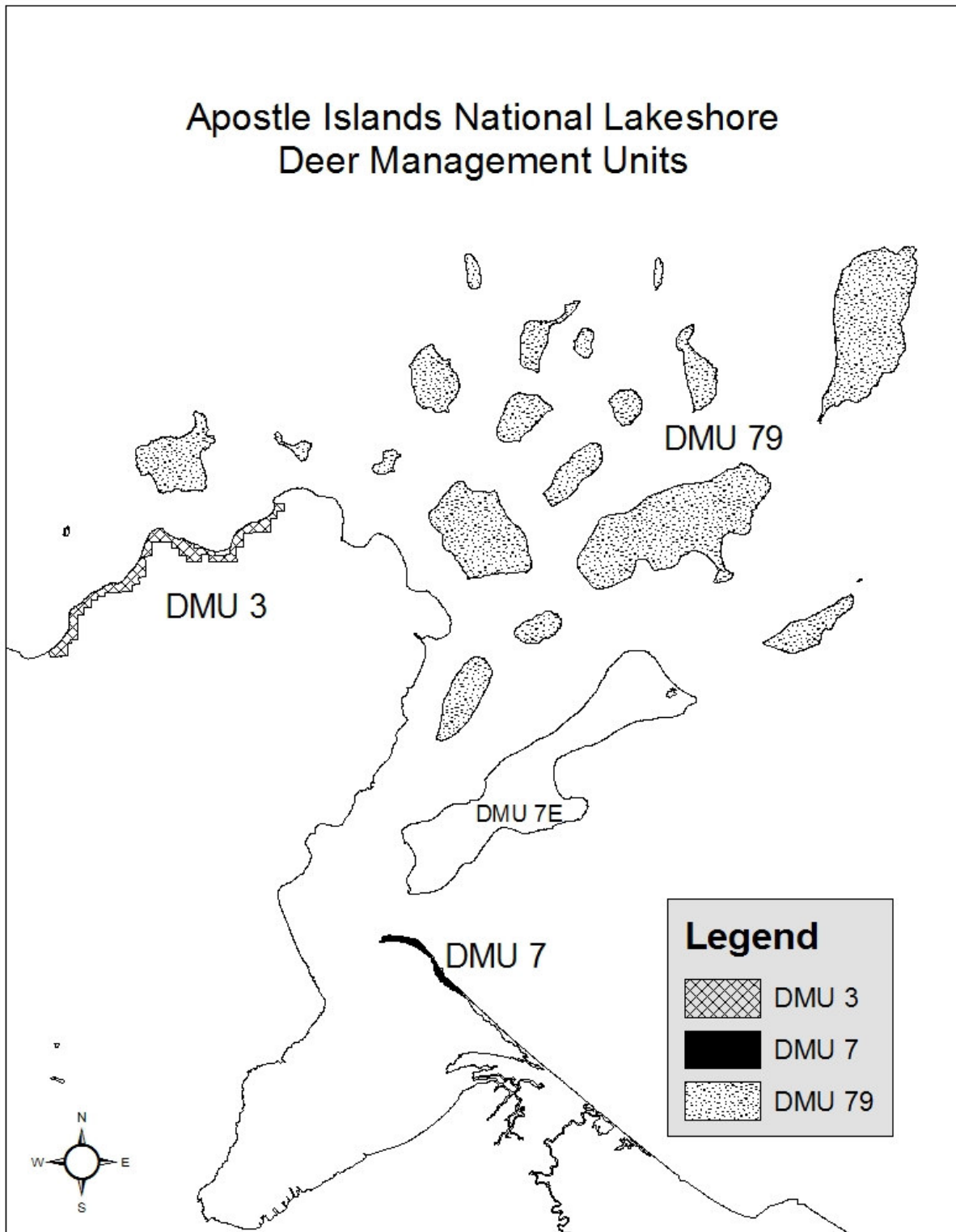
Rare, Threatened, Endangered or Extirpated species

- Protect species and their habitat and work toward their recovery

ACTIONS COMMON TO ALL ALTERNATIVES

- The NPS will meet with the Wisconsin DNR and the Great Lakes Indian Fish and Wildlife Commission and other tribal representatives on an annual and as-needed basis to discuss current research, issues, and upcoming seasons.
- Target harvest levels will be determined considering both general public and treaty-related harvests. Allocation of harvest will be made in consultation with the DNR and GLIFWC and other tribal representatives consistent with federal court decisions, other legal authorities and NPS stewardship goals.
- To fully implement any of the action alternatives, the NPS would work with the State of Wisconsin, utilizing the state's regulatory process, to modify current state regulations for Deer Management Unit 79.
- Where appropriate, current state hunting and trapping regulations would be adopted by the NPS, in accordance with existing regulations.
- Small game and waterfowl populations within the park would be managed as part of the larger state management unit and applicable state regulations that are not in conflict with federal regulations would be adopted by the NPS.
- Restrictions to protect resources and visitors are consistent for all alternatives and include:
 - No hunting during peak visitor season (Memorial Day through Labor Day)
 - No hunting or trapping on Gull or Eagle Islands (colonial birds)
 - Restrictions outlined in the Superintendent's Compendium and formal agreements between the NPS and Tribes.
- Should control of any wildlife populations be needed beyond that which can be accomplished with general public or treaty-related harvests, the NPS may employ more aggressive management actions such as direct reduction (by NPS or under contract).
- If a specific management control effort were conducted in the winter or spring, rather than the fall, it would not be done within a 1/2 mile radius of historically active (in the past 5 years) eagle nests as long as eagles remain on the list of federally threatened and endangered species or within a 1 mile radius of historic nesting locations for piping plover.

Figure 2. Deer Management Units



DESCRIPTION OF ALTERNATIVES

Alternative A- No Action (continuation of current management)

Deer

- October muzzleloader hunt on Basswood, Oak, Sand and York Islands; park-specific permit required; use of standard hunting tag(s) for harvested deer
- Under current WI regulations, October muzzleloader hunt could be expanded to all islands within DMU 79
- Mainland unit is included within DMU 3
- Long Island is included within DMU 7
- If hunting is not adequate to meet management goals, options to increase harvest are limited to the use of DNR issued nuisance permits. Current regulations do not allow the park to expand hunting opportunities beyond the muzzleloader hunt.

Bear

- State regulations not in conflict with federal regulations have been adopted by the park
- Park is included within management zone A1

Furbearers

- State regulations not in conflict with federal regulations have been adopted by the park
- Park is included within a larger management unit

Small Game

- State regulations not in conflict with federal regulations have been adopted by the park
- Park is included within a larger management unit

Waterfowl

- State regulations not in conflict with federal regulations have been adopted by the park
- Park is included within a larger management unit

Alternative B – No Special Seasons or Park-specific Regulations

General

- To implement this alternative, the NPS would work with the state, utilizing the state's regulatory process, to modify current regulations specific to DMU 79. The State of Wisconsin's special regulation authorizing the muzzleloader hunt would be eliminated and hunting that is consistent with current statewide regulations for deer reinstated.
- The NPS would also work with the tribes through on-going agreements and Memoranda of Understanding to achieve goals outlined in this alternative.

Deer

- On an annual basis, the Wisconsin DNR would develop specific goals and quotas for state-regulated hunters in DMU 79 (not done now), and establish hunting seasons, weapon types, etc. Similar to how the mainland unit is managed as part of DMU 3, the state would manage DMU 79. The NPS would adopt state regulations that are not in conflict with federal regulations.
- The mainland unit would continue to be managed as part of DMU 3.
- Long Island would continue to be managed as part of DMU 7.
- If hunting is not adequate to meet management goals, options to increase harvest would be limited to the use of DNR issued nuisance permits. However, under this regulatory framework, nuisance permits would be much more difficult to obtain than under Alternative A.

Bear

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be included within a larger management unit (Zone A1).

Furbearers

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be included within a larger management unit.

Small Game and Waterfowl

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be included within a larger management unit.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

General

- To implement this alternative, the NPS would work with the state, utilizing the state's regulatory process, to modify current regulations specific to DMU 79. Special regulations would be needed to expand the deer hunting season, allow a wider range of weapon types, and develop DMU 79-specific tags and permits.

- The NPS would also work with the tribes through on-going agreements and Memoranda of Understanding to achieve goals outlined in this alternative.

Deer

- DMU 79 would be divided into two zones with different management goals:
 - Zone 1 (8 islands (29% of park's land acreage); islands that historically had few to no deer – Devils, Eagle, Gull, North Twin, Outer, Raspberry, Sand, York) Overall goal is to protect rare vegetation and native biological communities. Because the vegetation on these islands is exceptionally sensitive to deer browse, very few deer could cause long-term impacts. Therefore, the goal on these islands is to keep deer numbers as low as possible (e.g., few to no deer). NOTE: Currently (2006), the only islands where this goal is not being achieved are Sand and York (8% of park's land acreage). Gull and Eagle Islands are closed to hunting to protect colonial birds; Gull is three acres in size and does not provide good deer habitat.
 - Zone 2 (12 islands; historically had low to high deer populations – Basswood, Bear, Cat, Hermit, Ironwood, Manitou, Michigan, Oak, Otter, Rocky, South Twin, Stockton). Overall goal is to protect native biological communities; keep deer populations at or below estimated historic levels (approx. 10/mi²) (Dahlberg and Guettinger 1956).
- All of DMU 79 (all islands, except Long) would be open to hunting and there would be an increase in hunting opportunities (e.g., extended seasons, weapon types, etc.)
- Working with the state DNR, DMU 79-specific tags and permits would be developed to provide greater incentives for increased harvest and enable wildlife managers to obtain harvest data in a timely manner. These tags would not count against a hunter's standard deer hunting tag.
- Long Island would continue to be managed as part of DMU 7.
- The mainland unit would continue to be managed as part of DMU 3.
- A special muzzleloader hunt during October on Basswood and Oak Islands would continue
- Hunting is the preferred option to managing deer numbers within the park. However, if hunting is not adequate to meet management goals, management control (e.g., liberal seasons, nuisance permits, agency or contracted herd reduction, etc.) would be used to prevent long-term impacts to other important natural resources. Although management control may be needed within Zone 1, the likelihood of needing management control on islands within Zone 2 is very low.

Bear

- State regulations not in conflict with federal regulations would be adopted by the NPS.
- Park would continue to be part of a larger management unit (A1).
- Park-specific permit would be developed for DMU 79 - to enable wildlife managers to obtain harvest data in a timely manner.

Furbearers

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be part of a larger management unit.

- Park-specific permit would be developed for DMU 79 - to enable wildlife managers to obtain harvest data in a timely manner.

Small Game and Waterfowl

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be included within a larger management unit.

Alternative D – Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences (Preferred Alternative)

General

- To implement this alternative, the NPS would work with the state, utilizing the state's regulatory process, to modify current regulations specific to DMU 79. Special regulations would be needed to expand the deer hunting season, specify primitive weapons for deer, bear and hunted furbearers, and develop DMU 79-specific tags and permits.
- The NPS would also work with the tribes through on-going agreements and Memoranda of Understanding to achieve goals outlined in this alternative.

Deer

- Only primitive weapons (e.g., muzzleloader, bow, etc.) would be used for hunting
- As in Alternative C, DMU 79 would be divided into two zones with different management goals:
 - Zone 1 (8 islands (29% of park's land acreage); islands that historically had few to no deer – Devils, Eagle, Gull, North Twin, Outer, Raspberry, Sand, York) Overall goal is to protect rare vegetation and native biological communities. Because the vegetation on these islands is exceptionally sensitive to deer browse, very few deer could cause long-term impacts. Therefore, the goal on these islands is to keep deer numbers as low as possible (e.g., few to no deer).
 - Zone 2 (12 islands; historically had low to high deer populations – Basswood, Bear, Cat, Hermit, Ironwood, Manitou, Michigan, Oak, Otter, Rocky, South Twin, Stockton). Overall goal is to protect native biological communities; keep deer populations at or below estimated historic levels (approx. 10/mi²)(Dahlberg and Guettinger 1956).
- All of DMU 79 would be open to hunting and there would be increased hunting opportunities (e.g., extended seasons, etc.).
- Working with the state DNR, DMU 79-specific tags and permits would be developed to provide greater incentives for increased harvest and enable wildlife managers to obtain harvest data in a timely manner.
- Zone 2 would have a special muzzleloader hunt during October.
- Long Island would continue to be managed as part of DMU 7.
- The mainland unit would continue to be managed as part of DMU 3.
- The use of hunting is the preferred option to managing deer numbers within the park. However, if hunting is not adequate to meet management goals, management control (e.g., liberal seasons, nuisance permits, agency or contracted herd reduction, etc.) would be used to

prevent long-term impacts to other important natural resources. Although management control may be needed in within Zone 1, the likelihood of needing management control on islands within Zone 2 is very low.

Bear

- Only primitive weapons (e.g., muzzleloader, bow, etc.) would be used for hunting.
- State regulations not in conflict with federal regulations would be adopted by the NPS.
- Park would continue to be part of a larger management unit (A1).
- Park-specific permit would be developed for DMU 79 - to enable wildlife managers to obtain harvest data in a timely manner.

Furbearers

- State regulations (hunting and trapping) that are not in conflict with federal regulations would be adopted by the NPS.
- Park would continue to be part of a larger management unit.
- NPS permit would be developed for DMU 79 - to enable wildlife managers to obtain harvest data in a timely manner.

Small Game and Waterfowl

- State regulations not in conflict with federal regulations would be adopted by the park.
- Park would continue to be included within a larger management unit.

Table 2. Alternative Comparison Matrix

	ALT. A <i>No Action – Continuation of Current Management</i>	ALT. B <i>No Special Seasons or Park-specific Regulations</i>	ALT. C <i>Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences</i>	ALT. D <i>Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences</i>
Deer	<p>Special muzzleloader hunt on Oak, Basswood, Sand and York Islands – park-specific permit required.</p> <p>Muzzleloader hunt could be expanded to include all islands within DMU 79.</p> <p>Islands (except Long) are a separate DMU (79).</p> <p>No change to mainland unit (DMU 3 and Long Island DMU 7).</p> <p>If hunting is not adequate to meet management goals, options to increase harvest are limited to the use of DNR issued nuisance permits. Current regulations do not allow the park to expand hunting opportunities beyond the muzzleloader hunt.</p>	<p>Eliminate special muzzleloader hunt (muzzleloader hunting may be an option under current state regulations).</p> <p>Manage DMU 79 consistent with other DMU's – goals, quotas and seasons established within a statewide framework.</p> <p>No change to mainland unit (DMU 3) and Long Island (DMU 7)</p> <p>If hunting is not adequate to meet management goals, options to increase harvest would be limited to the use of DNR issued nuisance permits. However, under this regulatory framework, nuisance permits would be much more difficult to obtain than under Alternative A.</p>	<p>Expand hunting opportunities, including type of weapons used, seasons, etc. Special muzzleloader hunt on Oak and Basswood Islands.</p> <p>DMU 79-specific tags and permits; tags would not count against a hunter's standard deer hunting tag</p> <p>Divide DMU 79 into two zones:</p> <ul style="list-style-type: none"> • Zone 1 (8 islands; historically few to no deer – Devils, Eagle*, Gull*, North Twin, Outer, Raspberry, Sand, York). Goal is to keep numbers as low as possible. • Zone 2 (12 islands – Basswood, Bear, Cat, Hermit, Ironwood, Manitou Michigan, Oak, Otter, Rocky, South Twin, Stockton). Goal is to keep deer populations at or below historic levels (10 m²). <p>No change to mainland unit (DMU 3) and Long Island (DMU 7).</p> <p>If hunting is not adequate to meet management goals, management control would be used to prevent long-term impacts to other important natural resources.</p> <p>*Colonial bird islands-closed to hunting</p>	<p>Expand hunting opportunities - use of primitive weapons (e.g., muzzleloader, bow, etc.) only. Special muzzleloader hunt in Zone 2.</p> <p>DMU 79 specific tags and permits; tags would not count against a hunter's standard deer hunting tag.</p> <p>Divide DMU 79 into two zones:</p> <ul style="list-style-type: none"> • Zone 1 (8 islands; historically few to no deer – Devils, Eagle*, Gull*, North Twin, Outer, Raspberry, Sand, York). Goal is to keep numbers as low as possible. • Zone 2 (12 islands – Basswood, Bear, Cat, Hermit, Ironwood, Manitou Michigan, Oak, Otter, Rocky, South Twin, Stockton). Goal is to keep deer populations at or below historic levels (10 m²). <p>No change to mainland unit (DMU 3) and Long Island (DMU 7).</p> <p>If hunting is not adequate to meet management goals, management control would be used to prevent long-term impacts to other important natural resources.</p> <p>*Colonial bird islands-closed to hunting</p>

	ALT. A <i>No Action - Continuation of Current Management</i>	ALT. B <i>No Special Seasons or Park-specific Regulations</i>	ALT. C <i>Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences</i>	ALT. D <i>Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences</i>
Bear	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit (A1).	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit (A1).	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit (A1). Park-specific permit for DMU 79.	Seasons consistent with current state regulations; use of primitive weapons only. Park is part of a larger management unit (A1). Park-specific permit for DMU 79.
Furbearers	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current state regulations adopted by NPS, where appropriate. Park is part of a larger management unit. Park-specific permit for DMU 79.	Consistent with current state regulations Park is part of a larger management unit. Park-specific permit for DMU 79.
Small game	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit. Park-specific permit for DMU 79.	Current State regulations adopted by NPS, where appropriate Park is part of a larger management unit. Park-specific permit for DMU 79.
Waterfowl	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit.	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit. Park-specific permit for DMU 79.	Current State regulations adopted by NPS, where appropriate. Park is part of a larger management unit. Park-specific permit for DMU 79.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

Alternative D is the environmentally preferred alternative because it best promotes the national environmental policy expressed in NEPA (Sec. 101(b)). This alternative enhances the ability of the NPS to protect rare vegetation and preserve ecologically sound native biological communities. In so doing, the NPS will be fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations. This alternative attains a wide range of beneficial uses by balancing different visitor uses, including both hunting and non-hunting based recreation. Alternatives D and C best preserve important natural aspects of our national heritage by protecting a remnant of northern Wisconsin's original forest, something that has become extremely rare. Alternative D also provides for important historic and cultural aspects of our national heritage by focusing on primitive hunting experiences. Therefore, Alternative D would best protect, preserve, and enhance environmental resources.

ALTERNATIVES CONSIDERED BUT DISMISSED

Island-by-island management for all species or species group was considered. However, management in this manner is not considered feasible. Most species move readily between the islands and some populations tend to be transient. A great deal of time, effort and funding would be needed to adequately determine population status on an island-by-island basis and, with the possible exception of deer, this intensive of management is not needed to adequately protect park resources. This alternative was therefore dismissed.

Expanding DMU 79 to include the entire park was also considered, but dismissed. The mainland unit of the park, though fairly long (12 miles) is very narrow (1/4-1/2 mile). Wildlife populations utilize habitat available on the mainland unit, but it is usually only a portion of their habitat. In addition, approximately 2/3 of the mainland unit is within the Red Cliff Indian Reservation. For these reasons, managing the mainland unit separate from the rest of the mainland is not considered to be feasible or warranted. Long Island is also outside of DMU 79 and is currently managed as part of DMU 7, which includes the Bad River Reservation. Since Long Island is ecologically connected to the Kakagon Sloughs, continuing to manage it as part of DMU 7 is the most feasible alternative from both an ecological and administrative perspective.

AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the existing environment of Apostle Islands National Lakeshore and the surrounding region. The focus of this chapter is on key natural and cultural resources, wilderness resources, visitor uses and experiences, and park operations that have the potential to be affected by various harvestable wildlife management alternatives. There are other park resources that are also important elements of Apostle Islands National Lakeshore, but because they would not be affected under the proposed alternatives, they are not included in the descriptions that follow.

GENERAL

Apostle Islands National Lakeshore (NL) is located along Northern Wisconsin's Lake Superior coast on and adjacent to the Bayfield Peninsula. It is within Bayfield and Ashland Counties. The park includes 69,372 acres (28,074 hectares), of which 27,232 acres (11,020 hectares) are submerged (park boundaries extend 0.25 miles from the shore of the mainland and from each island). There are 42,160 acres (17,061 hectares) of land area. The park includes 21 islands, ranging in size from 3 to 10,000 acres (1.2 to 4070 hectares) and a 12 mile (22.2 kilometer) segment along the mainland shore consisting of 2,565 acres (1043 hectares).

The local climate is moderated by the "maritime" situation of the islands; compared with the adjacent Bayfield Peninsula, winters are warmer, spring arrives later, summers are cooler, and fall lasts longer. The far northern islands, Devils, and Outer, have noticeably cooler climates than ones that are closer to the mainland. Prevailing storm winds blow from the northwest, north, and northeast, and winter storms from these quadrants are significant factors in determining island vegetation, especially in the northwestern and northern parts of the archipelago.

VEGETATION

Located in far northwestern Wisconsin, Apostle Islands National Lakeshore is at the continental northwestern limits of the hemlock-white pine-northern hardwood forest and also contains elements of the boreal forest. In pre-settlement times about 90% of the islands were covered by an upland mixed coniferous/hardwood forest dominated by hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and white birch (*Betula papyrifera*). The park's current forests reflect complex disturbance histories. Forests within the park range from pristine old-growth forest without a history of deer browsing, to forests that have been subjected to logging, fires, and extensive deer browsing. Areas that escaped commercial logging include North Twin, Eagle, and Gull Islands and the lighthouse reservations on Outer, Sand, Devils and Raspberry Islands. In the case of Devils and Raspberry Islands, the reservations included the entire islands. The old-growth forest on Outer Island is one of the best examples of northern hardwood hemlock forest remaining in the upper Great Lakes (Judziewicz and Koch 1993). This stand is especially unique because it has not been affected by deer browsing. Most of the park's forests were logged, first for white and red pines

(*Pinus resinosa*), white cedar (*Thuja occidentalis*) and hemlock (ca. 1870), and later for hardwoods, particularly sugar maple and yellow birch. Today, a maturing second growth northern hardwood forest exists throughout the islands. However, the effects of logging remain. Hemlock and white pine are no longer dominant; the most important tree species in the archipelago are white birch, sugar and red maples, balsam fir (*Abies balsamea*), and white cedar (Judziewicz and Koch 1993). The species composition of the boreal forest community was not changed due to logging. Today this community is dominated by white spruce, balsam fir, tamarack (*Larix laricina*), white cedar, birch, and aspen, as it was during pre-settlement times.

Following logging, deer populations irrupted on many of the islands, severely impacting species favored by deer, especially Canada yew (*Taxus canadensis*). Several of the islands, however, that did not have a history of deer populations and others that had moderate deer populations have lush stands of Canada yew – a species that has become nearly extirpated on the mainland due to deer browsing. The islands that historically have not had reproducing deer populations include Devils, Eagle, Gull, North Twin, Outer, Raspberry, Sand and York Islands (Wisconsin Conservation Department 1946-1956). Deer have recently become established and are rapidly increasing on Sand and York Islands.

The importance of the unbrowsed vegetative communities on the Apostle Islands cannot be overestimated. Conservation Biologist Dr. Don Waller (2005) states that “Unbrowsed vegetative communities in the Apostle Islands represent a unique resource with national and international significance. They provide a living baseline record for understanding the pervasive impacts deer are having elsewhere and an ongoing laboratory for comparative research. Deer populations have been chronically overabundant in the region for >20 years, as documented by the Wisconsin DNR. Islands without deer, and those that have variable histories of deer occupation and use, provide a priceless 'living laboratory' for us to understand deer impacts. The Apostle Islands provide, in particular, a 'natural experiment' into the short- medium- and long-term impacts of deer browsing and thus a setting for evaluating the cascading effects of this 'keystone' herbivore. Landscapes like those in the Apostle Islands without deer have become vanishingly scarce elsewhere in the upper Midwest and, indeed, throughout North America. The only deer-free habitats we have in the region apart from the Apostle Islands are scattered fenced exclosures and perhaps the Indian reservations. This is robbing us not only of our ability to understand how deer affect plant communities, but also how deer have cascading impacts over time on animal communities and whole ecosystems. Impacts on birds and mammal populations, for example, are now well-documented, but we have only started to assess the full range and magnitude of deer impacts on other biotic components and ecosystem processes. In addition, the historical baseline of data from studies by Beals and Cottam in the Apostle Islands in the 1950's and 60's, and Allison's long-term (1982-2000) research on Canada yew, provide an unparalleled opportunity to track long-term vegetation changes on landscapes with and without deer.”

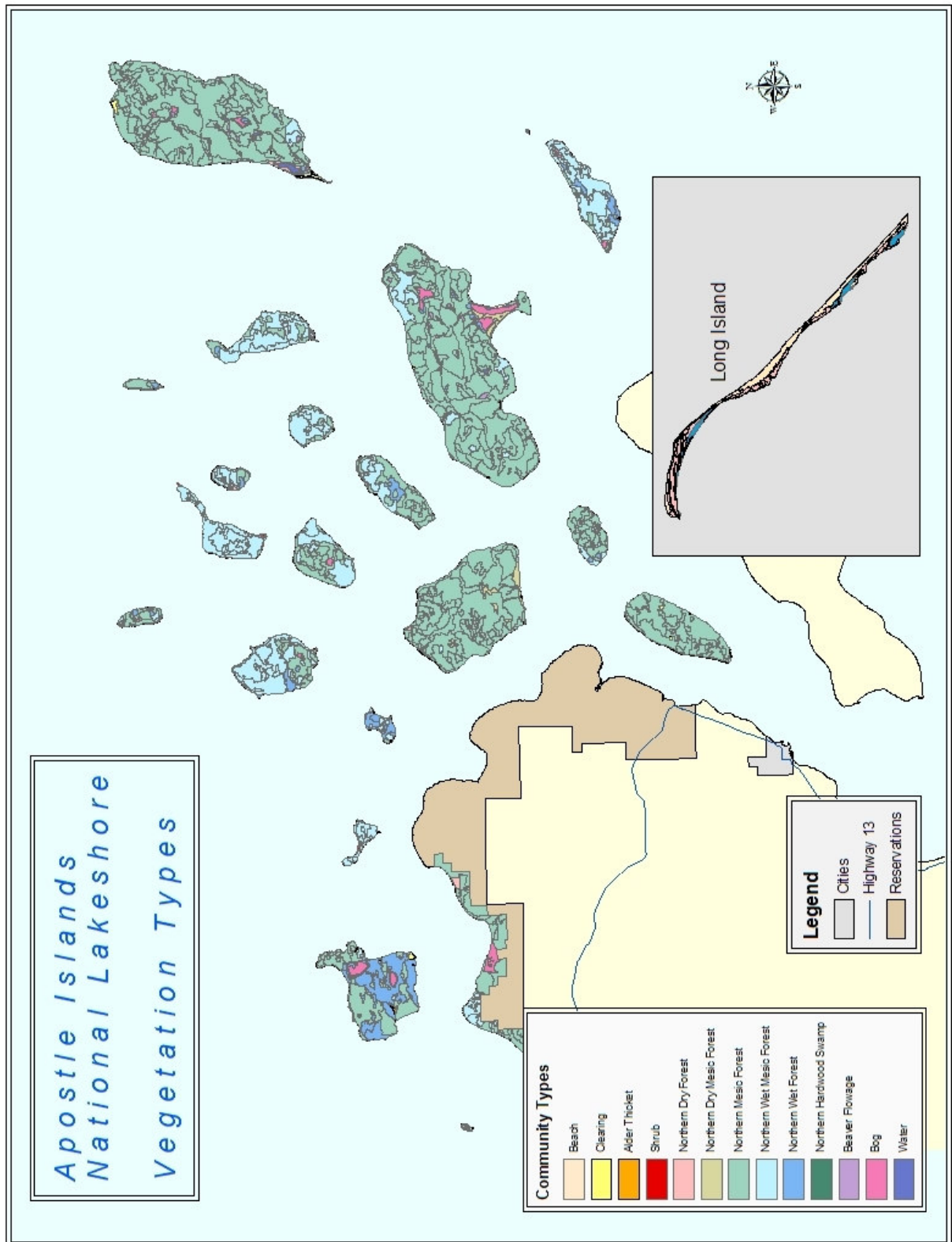
About one-third of the islands' coasts consist of Precambrian sandstone ledges and bluffs. Local vegetation on these rock faces depends on the microhabitat and can vary from common willows (*Salix* spp.) and weed species, to sub-arctic rarities and species with calcareous tendencies. Steep reddish clay bluffs are vegetated with small trees of balsam poplar, white birch, red maple and showy mountain ash (*Sorbus decora*) (Judziewicz and Koch 1993). The park has a rich assemblage of sandscapes, including sand spits, cusped forelands, tombolos, a barrier spit (Long

Island), and beaches. These are some of the most biologically diverse areas in the park. They are dominated by dune vegetation, beach grass (*Ammophila breviligulata*), and beach pea (*Lathyrus japonicus*), as well as a shrub and forest component of speckled alder (*Alnus rugosa*), quaking aspen (*Populus tremuloides*), and white birch.

Over 800 plant species occur within the park, including 26 species of concern. Because the Apostle Islands are at the extreme northern frontier of Wisconsin, they tend to provide plant habitats not found elsewhere in the state. Regionally rare habitats in the park include old-growth forest, boreal forest, northern forests (five types), forest seep, clay bluff communities, sandstone cliff communities, lagoon and bog communities, forested ridge and swale, coastal fen, Great Lakes barrens (only example in the state), and dune communities. The Wisconsin DNR's Natural Heritage Inventory Program has designated four state natural areas within the park, including maritime forest, sandscape (includes beaches, sandspits, cusped forelands, and tombolos), maritime cliff, and critical species areas.

Non-native vegetation in the park is primarily confined to disturbed landscapes, including old logging camps, farmsteads, fishing camps, light station grounds, and quarries. NPS developed areas, such as Presque Isle on Stockton Island, and developments on the mainland unit also contain non-native species. Sandscapes are vulnerable to invasion by non-native species, especially where native vegetation has been affected by human disturbance (NPS 1999).

Figure 3. Vegetation Types.



RARE, THREATENED, ENDANGERED OR EXTIRPATED SPECIES

General

Apostle Islands National Lakeshore provides important habitat for federally and state listed species and is specifically directed through the Endangered Species Act (ESA) and National Park Service policy to protect these species and their habitats.

There are four federally and/or state-listed species found in and around the park. They include piping plover (*Charadrius melodus*)(federally and state endangered), peregrine falcon (*Falco peregrinus*)(state endangered), gray wolf (*Canis lupus*)(Federally endangered and state threatened) and the bald eagle (*Haliaeetus leucocephalus*) (federally threatened). The bald eagle is in the process of being delisted, but still remains a state species of concern and is protected under the Bald Eagle Protection Act. The federal government has begun the process to de-list wolves and it is anticipated that the State of Wisconsin will de-list the gray wolf as populations increase. In 2000, Canada lynx was listed as a threatened species in the contiguous 48 United States. The park falls within the potential southern range limit of the lynx (*Lynx canadensis*), however, no verified sightings have ever been recorded in the park. Lynx is a species of the boreal forest of which there is only a limited amount in the park. Additional information for wolves and lynx is provided below.

Eagles began recolonizing the Apostle Islands in the early 1980s and young have been produced annually since 1983. However, nest productivity still remains below levels found on the mainland. Research indicates that lowered productivity is primarily due to a low food base and the continuing presence of anthropogenic toxic chemicals in Lake Superior (Meyer et al. 1994). Reproducing bald eagle populations occur in the park and are annually monitored in cooperation with the Wisconsin DNR.

In 1998, a pair of piping plovers nested and successfully reared three chicks on Long Island, the first nesting activity in the park since 1983. Nesting success has been sporadic since then, with the most recent successful nesting occurring in 2006. For the first time, there were four active piping plover nests in the park – three on Long Island and one on Outer Island. All three Long Island nests were successful. This has been the only successful nesting location in Wisconsin. Long Island and the Michigan Island sandspit were designated as critical habitat by the U.S. Fish & Wildlife Service in 2001. The Apostle Islands provide important habitat for spring and fall migratory peregrine falcons.

Apostle Islands National Lakeshore provides important habitat for five state endangered plants, 13 state threatened plants, and 26 state species of concern (see Table 7).

Wolf (Canis lupus)

Wolves occurred throughout Wisconsin prior to European settlement. Although estimates vary, the statewide estimate is believed to have been between 3,000-5,000 (Wydevan 1993; Jackson 1961). It is not known whether or not wolf packs were ever established or the extent to which they utilized the park. A state bounty program that lasted from 1865 to 1957 (Thiel 1993),

resulted in the extirpation of gray wolves in Wisconsin by the late 1950's. A combination of factors, including the elimination of the bounty program in Wisconsin, Michigan, and Minnesota, as well as protection under the Endangered Species Act, allowed wolves to recolonize Wisconsin in the mid 1970's (Wydeven et al. 1995). In 1975, the gray wolf was listed as a state endangered species and formal population monitoring began in 1979. In 1999, wolves were reclassified as a state threatened species and in 2004, the gray wolf was removed from the state list of threatened and endangered species, and was listed as a protected wild animal.

The U.S. Fish and Wildlife Service (FWS) listed the eastern gray wolf as an endangered species in 1974 under the 1973 Endangered Species Act (FWS 2006). In 1978, wolves were reclassified as threatened in Minnesota, but remained as an endangered species in Wisconsin and Michigan until they were downlisted to threatened in 2003. Because population goals for Wisconsin and Michigan have been exceeded, the U.S. Fish and Wildlife Service began the delisting process during the summer of 2004. However, a federal judge ruling from Oregon in January of 2005, reversed the process and the downlisting that occurred in 2003. Wolves are currently listed as federally endangered.

There have been increasing wolf sightings and sign in the mainland unit of the park, especially from Sand Point to Meyers Road. Wolf tracks were also seen during a track survey on Sand Island in March of 2004. However, because most of the islands are too small to support a wolf population and the largest islands lack deer, an important prey species, wolves will probably remain a transient visitor to the islands.

Caribou (Rangifer tarandus)

The historic range of caribou included Wisconsin (International Mountain Caribou Committee 2006), however, their historic status in the park or the Bayfield Peninsula is unknown. The closest population of caribou is in the Slate Islands of Ontario. In 1990, the Wisconsin DNR conducted a study to determine the feasibility of reintroducing caribou, moose and elk to the State. Elk were the only species found to be feasible for a reintroduction effort (WI DNR 2006).

Moose (Alces alces)

Historically, moose were widely distributed in Wisconsin, but were never very abundant. There are specific historic records of moose in Chequamegon Bay and the Bayfield Peninsula dating back to the 1600's. By 1900, moose were virtually gone and were officially declared eradicated in 1921. In the 1960's, moose began to enter the State from Minnesota (Brander and Bailey 1983). Although uncommon, moose are occasionally seen in Bayfield County. Remains of a moose were found on the Stockton Island tombolo in 1995. The location was far enough inland to preclude the possibility of a carcass being washed ashore from another location (NPS 2005a). In 2002, Bad River Wildlife Biologist Tom Doolittle observed a moose on Long Island. Reports of moose in 2004 were limited to the far northern counties of the state (Wiedenhoeft and Wydeven 2004).

Bobcat (Lynx rufus)

Both the bobcat and lynx were in the presettlement fauna of northern Wisconsin. It is not known if either cat was common on the Apostle Islands, if there was sufficient food to support a population, or if Lake Superior was a barrier preventing their movement to the islands (Jackson 1961). An observation of a bobcat was made on Sand Island in 1980 (Anderson et al. 1982) and by park volunteers in 1997. On Bear Island, the seasonal residents of a leased cabin report historic sightings of bobcat.

Lynx (Lynx canadensis)

Although Canada lynx were part of the presettlement fauna of northern Wisconsin, they have never been common. At one time, a breeding population may have existed, but declined as trappers caught lynx for the fur trade and its northern forest habitat was destroyed through logging and settlement. Lynx were also subjected to bounty hunting. Beginning in 1865 and continuing until 1957, the state-financed bounty encouraged the killing of lynx, even though it is thought that lynx no longer bred in the state by the early 1900s.

Lynx were listed as a federally threatened species in Wisconsin in 2000. The park does not have any current or historic observations. However, sightings have been recorded in both Ashland and Bayfield Counties (WI DNR 2005). Douglas County, adjacent to Bayfield County, had the highest number of observations of any county in the state (20) during this time period.

WILDLIFE

General

Thirty-seven species of mammals are known to occur in the park. Large mammals are not common on most of the islands and tend to be transient. Mammals that are common to most islands include red squirrel, snowshoe hare, deer mouse, and redback vole. Other species, such as black bear and white-tailed deer, are locally common on certain islands. Mammal species found on the islands less frequently include fox, coyote, otter, and fisher. Some common mainland species that are less mobile or dormant in the winter (e.g., gray squirrel, least chipmunk, porcupine, skunk, raccoon, and possibly some species of amphibians and reptiles) are not present on the islands. However, Long Island, currently a barrier spit rather than an island, contains most species that occur on the mainland.

Due to its strategic geographic location and wide diversity of habitats, Apostle Islands National Lakeshore provides a refuge for birds. Through the park's long-term monitoring program for forest breeding birds, 150 species of birds have been recorded (NPS 2005d). The islands provide important habitats for resident breeding birds as well as neotropical migrant land birds (birds that migrate to Central and South America in winter). Over 89% of the breeding birds in the park are migrants, 59% of which are neotropical migrants. The Apostle Islands are an important

migratory flyway stopover in the Great Lakes region. Nearly all of the islands provide habitat for migrating birds. In particular, Outer and Long Islands provide key habitats for migratory birds: Outer Island is important for passerines, hawks and falcons, while Long Island is important for waterfowl, passerines and shorebirds. Migratory bird surveys conducted on Outer and Long Islands have recorded over 200 species (NPS 2005c). The park provides important nesting habitat for the following colonial nesting birds: herring gulls, double-crested cormorants, great blue herons, and cliff swallows. Gull and Eagle Islands combined have 88% of the park's breeding herring gull populations and 80% of the herring gull breeding population on the entire Wisconsin shore of Lake Superior. Eagle Island has the only great blue heron rookery in the park. The park also provides nesting habitat for bald eagles (federally threatened) and piping plover (federally and state endangered)(see Rare, Threatened, Endangered or Extirpated Species).

Six species of salamanders, ten species of frogs and toads, and six species of reptiles are known to occur within the park, including the islands. The most common species of salamander are blue-spotted, spotted, and eastern red-backed. Four-toed salamander and Central newt are regionally uncommon, and mudpuppies are regionally local. Frogs and toads that occur in the park and are regionally common include: eastern American toad, northern spring peeper, eastern gray tree frog, green frog, northern leopard frog, mink frog, and wood frog. Chorus frogs are regionally local, Cope's gray treefrogs are regionally rare, and American bullfrogs are regionally uncommon. The park has a rather depauperate turtle fauna, with only two species, painted and snapping turtles. The most abundant snakes in the park are eastern garter snakes. Other snake species that are present include northern red-bellied snake, northern ring-necked snake, and smooth green snake (Casper 2001a and 2001b).

White-tailed Deer (Odocoileus virginianus)

White-tailed deer are native to the Lake Superior region, but their abundance has increased considerably over time. Prior to 1800, deer populations in northwestern Wisconsin were the lowest in the State ($<3.9/\text{km}^2$ or $10/\text{mi}^2$; Dahlberg and Guettinger 1956) and the northern Great Lakes region was covered in climax coniferous forest with occasional openings or early-successional habitats as a result of fire (Christensen 1959). This habitat type was ideal for caribou, and to a lesser extent, moose, but is considered very poor habitat for white-tailed deer. Historic accounts indicate that deer were scarce in northwestern Wisconsin prior to European settlement (Lapham 1846). In Lapham's 1859 account of the Penoque Iron Range, he speaks of the ground surface north of the Merangowin branch becoming covered with ground hemlock (Canada yew), whose low, entangled branches will be very apt to bring you prostrate to the ground (Shorger 1970). Canada yew is near extirpation on the mainland due to deer browsing (yew is highly preferred browse). On the archipelago, it remains abundant and widespread (Stowell 1984), especially on those islands that have not had historic deer populations. According to Beals (1960), "The data indicate that the lightest deer pressure on these islands will result in some vegetational change...This combination of high palatability and low resistance to browsing makes it [yew] an inefficient deer food, and it is probable that under the vegetational conditions existing on the Apostle Islands (and very likely throughout most of the northern lake

states) deer and yew are incompatible.” Prior to European settlement, deer were probably very rare and quite possibly absent from most of the Apostle Islands.

Extensive logging in the late nineteenth century dramatically altered the northern Wisconsin ecosystem. The opened and regenerating forests were ideal for deer and their populations exploded throughout the Lake Superior region. The expanding deer populations on the mainland quickly colonized some of the islands nearest to shore (deer are very capable swimmers). A biologist visited 7 of the islands in 1919 and did not see any sign of deer (although local residents did report deer presence on some of the islands). A State of Wisconsin deer biologist visited Stockton island in 1937-38 and found very light populations of deer. The biologist noted that young white cedar, mountain ash, and eastern hemlock were found in abundance on the island, along with some extremely dense stands of yew. By 1946, a survey of Stockton Island found deer to be "abundant." He also noted that deer had first colonized Rocky Island in that same year and that the island had a dense cover of yew. By 1954, a State of Wisconsin biologist reported that Rocky Island had "the fastest buildup of a deer population and the fastest degeneration of a habitat I've seen." Deer browsing caused considerable damage to native vegetation in the 1950's, particularly to stands of Canada yew that had hitherto experienced little or no deer browsing. At about the same time the State of Wisconsin established liberal either-sex hunting quotas especially for the islands. The hunting, along with overbrowsed and deteriorating habitat, severe winters, and starvation, resulted in the overall reduction of deer populations on the islands. In spite of these efforts, significant damage had occurred to the vegetation of some islands (Beals et al. 1960, Beals and Cottam 1967). Over 50 years later, Canada yew has only minimally recovered on islands impacted by deer browse. Full recovery may take hundreds of years. (Unless otherwise noted, the preceding information comes from Brander and Bailey 1983).

An overflight that was conducted during late winter in 1954, when harvest levels were at their peak, did not find deer on Devils, Eagle, Gull, North Twin, Outer, Raspberry, Sand, and York Islands (Wisconsin Conservation Department 1955). Deer were found at various concentrations on the other islands. Table 2 includes harvest records from 1953 to 1964. Harvest records weren't kept prior to 1953, only total harvest for the islands was recorded from 1964-1971, and records stopped being kept after 1972, until a muzzleloader season began in 1985.

Currently, island deer populations are limited to Sand, Oak, Basswood, and most recently, Sand and York Islands (Doolittle 2005). Islands that did not have a historic population and currently (2005) do not have populations of deer include: Devils, Eagle, Gull, North Twin, Outer, and Raspberry Islands. Even in 1954, when harvest levels were at their peak, Sand and York Islands did not have deer (WI DNR 1946-1956). The absence of deer allowed Canada yew, a very rare plant on the mainland, to thrive in these locations. Deer were seen occasionally on Sand Island by summer residents; however, it is only within the past few years that deer have become established as an overwintering population, causing great concern for protection of this rare vegetation community. An aerial overflight conducted in February of 2001 (Doolittle 2001) revealed overwintering deer. By February of 2003, another overflight (Doolittle 2003) found increased deer sign on Sand Island with tracks being more abundant on Sand than Oak Island. Overflights conducted in March of 2004 and 2005 continued to find abundant deer sign on Sand

Island. On York Island, sign of overwintering deer was observed for the first time in 2005 (Doolittle 2005).

Browse surveys and pellet counts were conducted on Sand Island in 2003-2005. Two types of plots were surveyed – the first were random plots located throughout the island; the second set of plots were randomly located along clearing edges. In 2003, throughout the island, Canada yew was most heavily browsed (33%), followed by sugar maple (23%) and eastern hemlock (17%). Browsing was even heavier near clearing edges; 70% of Canada yew was browsed and 71% of red osier dogwood. Results from 2005 indicate that deer have become more widely distributed on Sand Island. All of the plots sampled that had Canada yew showed evidence of browse. The level of browse averaged 33% on the west side of the island and 39% on the east side (Smith 2006).

Oak and Basswood Islands have had a population of deer since at least the late 1950's (Stowell 1984). In February 2001, an aerial survey conducted by the Bad River Wildlife Biologist (Doolittle 2001) found extensive trail sign on Oak Island. No deer and little trail sign were seen on Basswood Island. During an overflight conducted in February of 2003 (Doolittle 2003), trail sign was much more extensive on Oak than Basswood Island. During the first 2003 survey, all islands were surveyed; no sign was found on any island other than Sand, Basswood and Oak. In March of 2004 and 2005 aerial surveys continued to find a moderate amount of deer sign on Oak and very minimal sign on Basswood (Doolittle 2004 and 2005).

A browse survey was conducted on Oak Island in 2001 by a Northland College class (Meeker 2001). The survey focused on browse impacts to eastern hemlock (*Tsuga Canadensis*) and sugar maple (*Acer saccharum*). Of the hemlocks sampled, 60% had been browsed; 24% had moderate to high levels of browse. Sugar maple browse was 20%.

The mainland unit of the park contains a small portion of the Sand River deer-yard, one of several along the Lake Superior coast of Wisconsin. This area has large white cedars with an understory of heavily browsed beaked hazelnut and mountain maple; Canada yew is rare. An early 1980 estimate of deer density in the Sand River deer-yard ranged from 147/km² in white cedar to 0/km² in balsam fir cover-types. Yarding deer have greatly suppressed white cedar regeneration.

Table 3. Harvest of White-tailed Deer on the Apostle Islands (1954-1971) (Brander and Bailey 1983)

Year	Rocky	Manitou	Hermit	Bear	Basswood	Stockton	Ironwood	Otter	Michigan	Cat	Oak	Totals
1953	5	0	2	7	4	42	0	1	3	0	6	70
1954	124	43	22	40	28	131	5	7	1	0	9	411
1955	58	38	13	39	13	74	1	7	0	0	10	254
1956	45	8	10	28	26	50	8	8	5	0	11	209
1957	6	12	11	31	16	12	6	8	0	0	6	121
1958	22	13	2	26	10	2	4	6	1	2	5	95
1959	8	18	5	8	8	2	1	0	1	1	1	54
1960	5	37	15	20	12	24	4	6	6	3	6	138
1961	7	13	0	9	13	10	7	14	0	0	17	90
1962	11	2	3	12	17	11	3	10	4	5	15	93
1963	15	0	3	6	11	4	5	12	8	9	7	80
1964	9	0	7	9	16	10	0	6	13	10	1	81
1965	Records Not Kept for Individual Islands											144
1966												45
1967												32
1968												55
1969												18
1970												10
1971												9
TOTALS	315	184	93	235	174	372	44	85	42	30	94	2009
Density of harvested animals/mi ² at Peak Population Level	72.09	20.19	19.30	14.04	9.0	8.34	6.80	6.73	5.26	4.76	2.14	6.22

Black Bear (Ursus americanus)

Black bear were part of the pre-settlement fauna. However, habitat changes resulting from logging have undoubtedly affected their populations. Martin Kane, a resident of Oak Island during the 1920s to 1940s, is reported to have hunted black bears on Oak Island (Ashland Daily Press 1946).

Black bears, including cubs, have been seen on Stockton Island since 1980. Monitoring of the black bear population on Stockton Island began in 1984, when a 7-year-old sow and 6-year-old boar on the island were radio-tagged by Anderson and his students (Trauba 1996). Overwintering and on-island reproduction were probably occurring by 1980. Research on the Stockton Island bear population was conducted from 1984-1994. Two master's theses projects were completed. Trauba (1996) studied black bear population dynamics, home range, and habitat use on Stockton Island and Fleming (1997) conducted a demographic comparison of a hunted and an unhunted population of black bears in northern Wisconsin (including Stockton Island). Trauba's fieldwork was conducted from 1987-1990 and Fleming's from 1992-1994. The bear population on Stockton Island grew from a population of 3 animals in 1984 to a peak of 31 in 1994 and then declined to approximately 25 in 1996 (Fleming 1997). Bears from the Stockton Island population was found to regularly den on nearby islands, such as Oak, Hermit, and Basswood. However, it appeared that they rarely stay past the denning season, returning to Stockton Island.

Results of Fleming's (1997) research indicate that bears on Stockton Island in comparison with a mainland population had significantly smaller home ranges, older age of first breeding, and were lighter in weight than those in the mainland population. Four instances of skipped breeding cycles were documented in the Stockton Island population after 1992; no females missed a breeding cycle in the mainland population. Both study areas had similar mortality rates for yearling and sub-adult bears, but the causes differed. All mortality in the Stockton Island population was due to cannibalism (n=10), whereas mortality in the mainland population was primarily due to hunting (hunting n=10; cannibalism n=1). Both Fleming (1997) and Trauba (1996) conclude that social interactions and intra-specific killings may be regulating the black bear population in a density-dependent fashion.

The black bear population in the park is currently concentrated on Stockton, Sand, and Oak Islands, and the mainland unit. Transient bears can occur on nearly any island and have been observed on 14 of the 21 islands.

In 2002-04, a study was conducted to determine the population status of black bears within the park and to determine whether or not the use of DNA analysis of bear hair is a feasible method for monitoring the park's bear population. In 2002, hair snares were used on Stockton and Sand Islands. Hair from problem bears that were removed from Oak Island was also tested. Results of analysis found that there were 26 (1.7/mi²) bears on Stockton, nearly the same as Fleming's 1996 estimate of 25 bears (1997). Six bears were identified on Sand Island (1.3/mi²) during the recent study. Analysis also found that there is a high degree of genetic variability, with the genetic variability being highest at Sand, intermediate at Oak, and lowest on Stockton. Additional hair samples were collected in 2003 on Oak Island and the mainland. This additional information revealed distinct populations on

Stockton, Oak, and Sand/mainland. In 2004, hair snares were sampled from islands that are known to only have transient bears. Results from this additional data are not yet available. This study has shown DNA analysis of bear hair to be a very useful and feasible tool for obtaining population data on bears.

Furbearers

The enabling legislation of Apostle Islands National Lakeshore allows for trapping and hunting of furbearers. Currently, trapping is allowed under State of Wisconsin regulations that have been adopted by the NPS. Inventories have been conducted for fisher, otter and beaver and monitoring using aerial surveys is conducted for beaver on a periodic basis. Furbearer populations within the park tend to be small and somewhat transient. Most of the islands are too small to accommodate typical home ranges and tend to have low prey bases. Island biogeography also plays a role, creating impediments to colonization and movement. Because of these unique factors, techniques used by the state to monitor furbearer populations are not applicable to the park's furbearer population. This, in combination with logistical challenges, makes monitoring these populations extremely challenging. Furbearers in need of baseline inventory data include: mink, muskrat, red fox, and coyote. Additional inventory data for fisher is also needed, especially related to dispersion.

Beaver (*Castor canadensis*)

Beaver were, most likely, not very abundant on the Apostle Islands prior to 1850, since the islands were dominated by old-growth forests of white pine, hemlock and hardwoods. Surveyors conducting the original land survey on the islands from 1852-1957 made no mention of beaver ponds (Brander and Bailey 1983). In addition, archeological investigations did not indicate historic occurrences of beaver within the park (Richner 1980). It was not until the intensive logging subsided after 1930's when appropriate beaver habitat became available on the islands. However, it was not until the late 1940's and 1950's when abundant forage became available, that beaver intensively colonized the Apostle Islands (Smith 1994). Overall beaver numbers in the park peaked in the late 1970's and then began to decline (Anderson et al., 1979; Anderson et al., 1980; Smith and Peterson, 1991).

From 1987-1989, an intensive study of beavers was conducted (Smith and Peterson 1991). In 1987, there were 38 active beaver colonies in the park, 23 on Outer, 13 on Stockton, and one each on Cat and Sand Islands. Smith and Peterson found the ecology of the beaver population in the park to be characterized by: low fecundity; poor food resources; seasonally variable water levels; lodge site instability; and probable bear predation on Stockton Island. In addition to Outer and Stockton, beaver periodically colonize other islands, but their population tends to be transitory and limited to one colony. Other islands where beaver have occurred include: Basswood, Cat, Devils, Long, Michigan, Oak, and Sand.

On Outer Island, beaver population levels were stable during the study (23 in 1987; 24 in 1989). Beaver were foraging long distances, which was possible due to a lack of predators. In 1992, the number of colonies increased to 30, a five year high. Since 1992, however, beaver colonies have sharply declined to only 4 in 1999 and 3 in 2003 (Doolittle 2003).

No active colonies have been observed during aerial overflights on Stockton Island since 1994. However, there is an occasional sighting of beaver on the island. The extirpation of beaver on Stockton Island has been attributed to black bear (*Ursus americanus*) predation and habitat loss. The probable predation of beaver by bear was noted again on Outer Island in 2000, when bear scat (comprised dominantly of beaver hair) was collected by Doolittle (2003) at interior beaver ponds. On both islands, there appears to be a direct correlation between bear predation and a dramatic decline in beaver colonies. In addition, since Stockton Island has not been re-colonized with beaver since 1994, bear may be deterring re-colonization.

Otter (*Lutra canadensis*)

Prior to 1850, otter were common in the region and were exploited for their fur prior to the exploitation of beaver (Schorger 1970). Otter were first recorded on Oak, Stockton, and Outer Islands as early as 1919 (Jackson 1961). Recent unconfirmed records occur from 13 of the 22 Apostle Islands (NPS 2005a). A study to determine the status and distribution of otter was conducted from 2000-2003 (Doolittle 2003). In the winters of 2000 through 2003, aerial slide and track surveys were done throughout the Apostle Islands National Lakeshore to detect the presence of otter. In 2000-2003, otter sign was observed on Outer, Stockton, and Sand Islands. Otter sign was also observed on Michigan Island at a new beaver colony in 2002 and 2003. Aerial surveys were also helpful in showing the relative distribution of otter from its potential mainland source. During the December 25, 2003 aerial survey, otter slide sign was observed throughout the entire Bad River Reservation open water habitats, through the tip of Long Island, to Madeline Island's most northern extent, and into every other Apostle Island that had large lagoons and interior open water bodies (Sand, Outer, Stockton, Michigan).

The occurrence of otter sign and abundance was related to beaver ponds on Sand, Outer, and Michigan Islands. In all years, islands without interior open water bodies did not have any observed otter slide sign from the air. On Stockton Island, otter sign was observed on old beaver flowages and the tombolo lagoon. Similarly, the Outer and Michigan Island lagoons had otter sign. On Outer Island, open water has declined 39% since 1992. In 1992 and 2003, there were 209 (114.9 acres) and 139 (69.8 acres) open water bodies, respectively, on Outer Island. The decline of open water was determined from delineations made from 1992 digital ortho-photographs, compared to a set of aerial photographs flown on April 4, 2003. The noted decrease in open water through the 2003 aerial photographs parallels the decrease in active beaver colonies on Outer Island (see above). Aerial surveys conducted in 2005 found very little sign of beaver on Outer Island and no sign on Stockton or Michigan Islands. Sand Island continued to have one active beaver flowage (Doolittle 2005).

Based on mean otter home ranges in the Bad River Reservation (6 km²), Outer Island (8,000 acres, 32.4 km²) may only have enough space for two adult females and young and one male. The estimated spatial carrying capacity on Outer Island is 6-8 animals (adults and young). A factor that may increase carrying capacity is that island situations may create tighter home ranges than mainland populations. However, a factor that may decrease carrying capacity is habitat availability. Aerial surveys found consistent otter sign near the lagoon, in the island's center, and southwest of the lighthouse. The walking transect found sign of one adult with two juveniles and a single adult animal. (Doolittle 2003).

Stockton Island (10,000 acres), though larger than Outer, may be more habitat-limited due to the scarcity of interior beaver ponds and other open water habitats. Similar to Outer Island, Stockton Island's surface area may support 7-10 ten otter in the winter. In 2001, one family group of three otter was seen near Quarry Bay and slide sign was found in the tombolo lagoon drainage. In all years during winter, otter were located in the few available interior open water habitats.

Sand Island (2,949 acres) and Michigan Island (1,578 acres) had sign of one otter in 2001, related to new active beaver colonies. Doolittle (2003) estimates that Sand and Michigan Islands could likely support 4-6 otter. During an aerial overflight conducted in 2005, otter sign was not found on Sand or Michigan Islands (Doolittle 2005).

Mink (*Mustela vison*)

The status of mink (*Mustela vison*) is unknown. The earliest records of mink were reported in 1919 (Jackson 1961) for Outer and Stockton Islands. More recently there have been unconfirmed observations on Basswood, Oak, and Rocky Islands. Areas within the park that appear to have suitable mink habitat include: Oak, Rocky, Outer, Stockton, and Michigan Islands and the mainland unit (Brander and Bailey 1983).

Fisher (*Martes pennanti*)

Fisher (*Martes pennanti*) were eradicated in the State of Wisconsin by the 1930's. Reintroduction efforts in the State took place between 1956-1967 and have been very successful. Observations (mostly unconfirmed) of fisher have been made sporadically in the park since 1979 on the following islands: Basswood (1991); North Twin (2004); Oak (1993, 1997); Rocky (1987); Sand (1991, 1993); and Stockton (1980, 1988, 1994)(NPS 2005a).

A study to determine the status and distribution of fisher was conducted in 2000 and 2001 (White Water Associates 2001). In 2000, Sand, Oak, and Stockton Islands were surveyed using sooted track boxes; fisher were only found on Sand Island (female with young). Sand, Stockton, and Basswood Islands and the mainland unit were sampled in 2001. Fisher were detected in all locations. Results of the track data indicated that Basswood and Stockton Islands had at least one male and one female; Sand had at least one male. Both male and female tracks also were found on the mainland unit. In addition, a male track was recovered from a box set in 2000 on Stockton and not recovered in that year. The shift in genders on Sand suggests dispersal of fishers among the islands or between the islands and the mainland.

It seems likely that fisher are moving to and from (and perhaps between) the islands far more readily than previously expected (White Water Associates 2001). Perhaps fishers on the mainland, needing to expand to new territories or find mates during the February-March breeding season, strike off across the ice at near points (Sand Point, Roys Point) to an island. Fisher may also respond to population booms of prey species on a particular island. It is possible that they leave the island again, perhaps the following winter, if there is insufficient food. If young are born on an island, there is almost certain to be dispersal or attempted dispersal. Although not generally thought of, fishers may be swimming between islands as well, as was

reported once from islands in Georgian Bay, Ontario (Douglas and Strickland 1987). Whereas the Apostle Islands National Lakeshore appears consistently to have a small number of resident fisher (that is part of the Bayfield Peninsula population) any one island may have resident fishers only periodically through the years and seasons, exploiting booms in prey populations or responding to pressures for dispersal (White Water Associates 2001).

White Water Associates (2001) concluded that the islands surveyed in 2001 might only support, at the most, 10 fishers. Actual estimated numbers from track box records indicated a more likely abundance of 5-6 fishers on these three islands in 2001. The mainland unit may only harbor 2-6 individuals with the most liberal estimate being 4-12. Even extrapolating sub-population estimates to other islands (farther from the mainland and thus less likely to have fishers on a regular basis), the total sub-population of the islands would still be a very small number.

Muskrat (*Ondatra zibethicus*)

Historically, muskrat occurred throughout Wisconsin, as it does today (Brander and Bailey 1983). Tracks of muskrat were observed on Outer and Stockton Islands as early as 1919 (Jackson 1961). Little is known about the current muskrat population in the park. Likely muskrat habitat occurs on the mainland at Sand River and the lagoons of Michigan, Outer, and Stockton Islands (Brander and Bailey 1983).

Red Fox (*Vulpes vulpes*)

While there is little quantitative data, field observations indicate that red fox are fairly widespread in the park. Fox travel freely over the ice in the winter to the islands. During track surveys on Stockton Island from 1954-1960, an average of 0.3 fox tracks per mile were observed (Brander and Bailey 1983). There are field observations (mostly unconfirmed) from Basswood, Bear, Devils, Ironwood, Long, Manitou, Michigan, North Twin, Otter, Ironwood, Raspberry, Rocky, Sand, South Twin, and Stockton Islands (Anderson 1980), and the mainland unit.

Coyote (*Canis latrans*)

Similar to fox, the abundance and distribution of coyote (*Canis latrans*) in the park is relatively unknown. Early observations date back to 1919 (Jackson 1961) when a coyote was collected on Basswood Island. During the fall of 1950, there were at least three, and probably seven, coyote on Outer (Keener 1951). Three of these were shot as part of a predator control program. During track surveys on Stockton Island from 1954-1960, an average of 1.4 coyote tracks per mile were observed (Brander and Bailey 1983). Field observations (1975-2004) of coyote have been made from Basswood, Long, Manitou, Michigan, Oak, Outer, Raspberry, Rocky, Sand and Stockton Islands, and the mainland unit. Coyote sign is abundant on the mainland unit year-round (Brander and Bailey 1983) and coyote are frequently seen on the ice in the winter.

Small Game

Small game that occur within the park include: red and gray squirrel, snowshoe hare, cottontail rabbit, ruffed grouse and woodcock. Wild turkey have recently been introduced into Bayfield County and a few birds appear to have been illegally introduced into the park on Oak and Stockton Islands, most likely during the spring of 2003. None are believed to have survived.

Squirrels

Red squirrels (*Tamiasciurus vulgaris*) were part of the park's fauna historically and remain widespread in the park, occurring on most, if not nearly all of the islands. Early observations (Shorger 1970) take note of their excellent swimming abilities.

Gray squirrel (*Sciurus carolinensis*) have only been observed on the mainland and Long Island (Brander 1978-1979).

Snowshoe Hare (*Lepus americanus*)

Past studies and observations indicate that snowshoe hare occur on every island except Eagle and Gull (Anderson 1983 and 1978; NPS 2005a; Brander 1978-1979; Brander et al. 1978; Jackson 1961; Patzoldt 1978; Schulz 1976; Stadnyk et al. 1974; Wisconsin Conservation Department 1946-1956). On islands without deer, snowshoe hare are, most likely, the most important herbivore. Baseline inventory data is needed to determine the status and distribution of snowshoe hare within the park.

Ruffed Grouse (*Bonasa umbellus*)

Ruffed grouse have been observed on Basswood, Long, Manitou, North Twin, Rocky, Sand, and Stockton Islands and the mainland unit (NPS 2005a). The park has participated in the Wisconsin statewide ruffed grouse survey (4-1, Ashland County) on an annual basis since 1989. This route is outside, but close to the mainland unit of the park. Numbers of grouse heard during this spring survey have varied from 21 in 1989 to 5 in 2002 and 2003, with an average of 11 birds per year.

Walking routes have been established on the mainland unit. Four routes were surveyed in 1989, 1991, 1993 and 1996. Route 1 (near Sand River) had the highest numbers of birds during all four surveys. The total number of birds heard on all four routes was highest in 1991 (26) and lowest in 1993 (9), averaging 18.

Woodcock (*Scolopax minor*)

Woodcock have been observed on the mainland unit, Basswood, Outer, and Stockton Islands.

The NPS has participated in a U.S. Fish and Wildlife Service annual woodcock singing-ground survey since 1989. Route 1, Bayfield County, follows nearly the same route as the Wisconsin ruffed grouse survey and is close to, but outside the boundary of the mainland unit. The range of birds recorded during these surveys has ranged from 0 to 16. Between 1989 and 1994, the range

was 7-16 (avg. 10.5), while in recent years (1995-2004), the range has been 0 to 6 (avg. 4.1). The average number of singing males heard on routes in the central region of the country from 1968-2002 was 2.16. The apparent decline in woodcock abundance on route 1 in Bayfield County is consistent with a steadily declining trend in woodcock abundance in both the central and eastern regions of the country.

Waterfowl

The park provides important habitat for waterfowl, especially during migration. Nineteen species of waterfowl have been recorded during migratory bird surveys (Table 6). These surveys were designed to monitor all migratory birds, not specifically waterfowl. Surveys have been conducted on both Outer and Long Islands, however, the only year that both islands were surveyed was 1991 (Van Stappen and Doolittle 1992). Results of the 1991 survey indicate that although the number of waterfowl species recorded was similar for each island (14 on Outer; 15 on Long), the total number of waterfowl and their relative abundance compared to other birds groups was markedly different. On Long Island, waterfowl made up the highest percentage of any bird group (66%). However, on Outer Island, waterfowl consisted of only 1% of the total number of birds recorded. Since 1990, the amount of standing water on Long Island has decreased. It is not known whether or not this has affected the numbers of waterfowl that currently utilize this location.

Historically Non-native Wildlife

Wild Turkey (*Meleagris gallopavo*)

Historically, wild turkeys occurred south of a line between Green Bay and Prairie du Chien, far south of the park. Wild turkeys were extirpated in Wisconsin during the late 1800's. However, recent reintroduction efforts have been very successful. As a result of reintroductions or introductions, the current distribution of wild turkeys is nearly statewide. In May of 2003, there was an apparent illegal introduction of turkeys within the park on both Oak and Stockton Islands. Turkeys have not been recently reported from Oak Island and there have been only very sporadic reports on Stockton Island. During the winter of 2003/2004, the DNR introduced wild turkeys into Bayfield and Douglas Counties. Although the ability of turkeys to fly long-distances is very limited, if populations are successfully established on the Bayfield peninsula, there is potential for them to migrate to the islands. Since turkeys are not native to the park, effort would be made to prevent their establishment.

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WILDERNESS

In 2004, 80% of the land area of the park was designated as the Gaylord Nelson Wilderness Area. Areas not designated as wilderness include: Sand, Basswood, and Long Islands and the mainland unit; exclusions near docks; and exclusions related to cultural resources.

NPS Management Policies (2006) directs the park to preserve wilderness characteristics. These characteristics include that:

- The earth and its community of life are untrammelled by humans, where humans are visitors and do not remain;
- The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation;
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable;
- The area is protected and managed so as to preserve its natural conditions; and
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Motor vehicles, motorized equipment, and mechanical transport, as well as permanent structures are not allowed within wilderness areas. Exceptions can only be made for administration of the wilderness area. Wilderness designation does not directly affect hunting or trapping; they are allowable activities within wilderness.

CULTURAL RESOURCES (*Ethnographic Resources*)

Ethnographic resources are the cultural and natural features of a park that are of traditional significance to traditionally associated peoples (NPS 2006). Park neighbors include both the Red Cliff and Bad River Bands of Lake Superior Chippewa. Part of the park's mainland unit is within the Red Cliff Reservation and the remainder of the park is included within lands ceded to the United States government in the Treaty of 1842 with the Chippewa. In these ceded lands, Chippewa tribes kept their off-reservation rights to hunt and trap.

Only limited research has been completed for the ethnographic significance of the Apostle Islands to associated Native American groups. In 1999, a team from the University of Arizona conducted field interviews with Ojibwe elders to begin the process (Stoffle 2000). This study provided some valuable preliminary information; however, given the archipelago's central role to the Ojibwe, it is likely that there is much yet to be learned. In the course of the University of Arizona study, Native consultants reported that all the islands were used by their people, primarily on a seasonal basis. Responses evidenced a pattern according to which the islands closer to the mainland were generally inhabited for longer periods of time than those further from the shore. Consultants also stressed that environmental constraints and uneven resource distribution both spatially and temporally, forced Ojibwe people to constantly move from island to island, to the mainland, and to places in the interior. In addition, Ojibwe people utilized the park for hunting. Use of the park resources extended to Ojibwe bands from the entire Lake Superior region.

Canada yew (ne'bagandag) is a native species to the region and has been utilized by the Great Lakes Ojibwe since time immemorial. In his book *Plants Used by the Great Lakes Ojibwe*, Jim Meeker states that "While Canada yew is a favorite browse of deer, the needles and seeds contain poisonous alkaloids to humans...A compound decoction of twigs was traditionally used as an herbal steam for rheumatism. It is also one ingredient used in thirty-two medicine." In a paper titled *Medicinal Use of Forest Trees and Shrubs by Indigenous People of Northeastern North America*, author Glen Blouin states that "...by far yew's most common use was to treat rheumatism: Abenaki in Maine, Algonquin in Quebec, Ojibway in Minnesota and Ontario, and Menominee in Wisconsin all used it for this purpose, the needles steeped into a tea for internal consumption, or steamed in their sweat baths (Smith 1923, Gilmore 1933, Rousseau 1947, Black 1980)."

VISITOR USE AND EXPERIENCE

Enjoying the park and its resources is a fundamental part of the visitor experience. Natural and cultural resources and park facilities provide opportunities for a variety of visitor experiences at Apostle Islands National Lakeshore. Visitors to the park have an opportunity for both wilderness and non-wilderness related experiences. Recreational users of the park include sailors, kayakers, motorboaters, hikers, sightseers, picnickers, swimmers, campers, fishers, hunters, photographers, birdwatchers, divers, skiers, snowshoers, berry pickers, nature students, and lighthouse buffs. The most popular activities on the islands tend to be sightseeing, lighthouse tours, day hikes, and camping, although many visitors who come to the park participate in more than one activity.

The average number of annual recreational visitors to Apostle Islands National Lakeshore in the period from 1996-2005 was 187,510. In 2005 there were a little more than 170,000 recreational visitors in the park. Approximately 39,000 of these were island visitors. An additional 28,000 visitors toured the Apostle Islands by the concessioner's cruise boat. The seasonal visitation patterns for this period show that the vast majority of visitation occurs in the summer months, from June-August. Peak use is during July and August, on weekends. Visitation rapidly drops off in September and October. September visitation in 2005 was approximately 17% of visitation in July and October visitation was only 2%. Most motorboaters and sailboaters congregate at relatively secure anchorages or docks at Stockton, Rocky/South Twin, Raspberry, Oak and Sand Islands. These islands also receive the highest use levels. Also, islands that are closer to the mainland tend to receive higher use levels, while the more remote islands receive lower use levels. Eagle and Gull Islands, and the northwest corner of Otter Island are closed to visitors in the summer (May 15 to September 15) due to the presence of nesting colonial birds.

There are over 60 developed campsites on 14 islands; eight of these campsites are group campsites on four islands. All park visitors that camp on the islands are required to obtain a permit. The number of camping permits issued annually has increased from 1,330 in 1997 to 1,516 in 2005. A total of about 55 miles of trails are actively maintained on 12 islands. These trails provide hiking opportunities for visitors, as well as opportunities to experience and enjoy a variety of natural and historic features. There are also interpretive facilities and programs available for visitors.

A muzzleloader hunt for deer was established in 1987 and provides for a primitive deer hunting experience on the islands. Other harvest related opportunities are permitted on the islands. However, the difficulties associated with accessing the islands has kept use low.

PARK OPERATIONS

Park divisions within the park include: planning and resource management; protection, interpretation and education; business services; and facility management. The planning and resource management division has the lead responsibility for wildlife management, including planning, research, monitoring, and compliance. The natural resource staff work with state and tribal biologists, researchers, and other experts to develop strategies, scientifically based recommendations, and plans for managing harvestable wildlife within the park. The protection division has a key role to play in harvest related activities. In addition to administering the muzzleloader permit system, resource protection rangers are the primary park staff that interacts with hunters. Rangers monitor public use activities, provide visitor information and assistance, ensure compliance with federal and state laws and regulations, track hunting permits, and register deer. The interpretation and education division plays an important role through the education of park visitors and the general public on a variety of wildlife management related issues, including harvest activities. Although not directly involved in wildlife management, the business services and facility management divisions indirectly support wildlife management within the park by providing a wide variety of administrative and maintenance related services.

ENVIRONMENTAL CONSEQUENCES

METHODOLOGIES FOR ANALYZING IMPACTS

This chapter analyzes the impacts of various wildlife management alternatives. The planning team based the impact analysis and the conclusions in this chapter on information provided by experts both within and outside the National Park Service, current and historic data, and on the review of existing literature and studies. The team's method of analyzing impacts is further explained below. The environmental consequences for each impact topic were defined based on impact type, context, duration, and intensity. Effects can be either adverse or beneficial for the topic being analyzed. The effects also can be direct or indirect. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later or farther away, but are still reasonably foreseeable. Context refers to the setting within which an impact is analyzed, such as the affected region or locality. In this document most impacts are either localized (site-specific) or parkwide.

Impact duration refers to how long an impact would last. Unless otherwise specified, in this document the following terms are used to describe the duration of the impacts:

Short term: The impact would be temporary in nature, lasting a year or less.

Long term: The impact would last more than one year and could be permanent in nature, such as long-term changes in forest composition due to overbrowsing or the elimination of a native species population from the park due to overharvest. Levels of intensity for each impact topic were determined using the definitions presented below. All of the following intensities were expressed qualitatively.

MITIGATION MEASURES

No impacts were identified that would require mitigation measures.

CUMULATIVE IMPACTS

Cumulative actions are those that have additive impacts on a particular environmental resource. It is irrelevant who takes these actions (i.e., they are not confined to NPS or even federal activities), or whether they took place in the past, are taking place in the present, or will take place in the reasonably foreseeable future. Each cumulative impact analysis is additive, considering the overall impact of the alternative when combined with effects of other actions (inside and outside the park) that have occurred or that would occur in the foreseeable future.

The planning team considered the potential of actions occurring within and outside the park, which when added to various wildlife management alternatives, could result in a cumulative impact.

Among the various actions considered in evaluating cumulative impacts were

- Native American treaty-related rights
- Wildlife management by the State of Wisconsin, as well as other factors affecting local and regional population levels of wildlife

Native American treaty-related rights existed prior to the establishment of the park and will continue to be respected by the National Park Service. Wildlife management by the State of Wisconsin that results in changes to wildlife population levels on a local, regional or state level can impact immigration to the islands and associated population levels. However, acceptable harvest levels on NPS lands are not calculated separately for state or treaty-related hunters. To insure that cumulative impacts do not occur, the NPS will work closely with both the DNR and tribal governments to determine acceptable harvest levels for all hunters and ensure that park resources are adequately protected.

In conclusion, it is expected that cumulative impacts would not occur as a result of implementation of proposed actions related to wildlife management of harvestable species. No further evaluation of cumulative impacts is included in this chapter.

IMPACT ANALYSIS

IMPACTS ON VEGETATION

Impact Thresholds for Vegetation

The intensity of impacts on vegetation resources was determined using the following definitions:

- *Negligible* – The impact would be either barely detectable or extremely localized and would have no discernible effect on vegetation, including species of management concern.
- *Minor* – The impact would be slight but detectable and would affect only a small number of plant species that are not of special management concern in a small number of park locations or have a slight but detectable impact on species of management concern in one or two locations.
- *Moderate* – The impact would be detectable and spread over a number of park locations and would have an appreciable effect on vegetation or be clearly noticeable on one or more species of special management concern and at more than one location.
- *Major* – The impact would be easily detectable and widespread and could result in a substantial change in the park's vegetation or a substantial change in one or more species of special management concern in more than one location.

Alternative A – No Action (Continuation of Current Management)

Under this alternative, the impact to vegetation from harvestable wildlife species other than deer is expected to be negligible. Vegetation provides important food and habitat for all wildlife species. However, only deer have the potential to substantially impact plant communities and species over the long-term. The species of greatest concern is Canada yew. However, species such as eastern hemlock and white cedar have been dramatically reduced on the mainland due to deer overbrowsing. Canada yew is a highly preferred browse species and has been nearly eliminated from the mainland because of its high sensitivity to deer browse. According to Beals (1960):

“... the lightest deer pressure on Canada yew understory would result in some vegetational changes. The combination of high palatability and low resistance to browsing makes yew an inefficient deer food, and it is probable that under the vegetational conditions existing on the Apostle Islands (and very likely throughout most of the northern lake states) deer and yew are incompatible.”

Under current management, the ability of the National Park Service to control burgeoning deer populations is very limited. There is only an October muzzleloader hunt in which hunters are limited to the use of their state harvest tags. Under the current hunt, bucks are almost exclusively harvested. Wildlife populations can only be adequately reduced by reducing the number of females in the population. Additional harvest through the use of a nuisance permit is currently the only management control option available and can only be used on a limited basis.

Under this alternative, negative impacts are expected to be minor to moderate and long-term. Species of special management concern include Canada yew and other browse sensitive species (e.g., white cedar, eastern hemlock, orchids).

Alternative B – No Special Seasons or Park-specific Regulations

Under this alternative, management of species other than deer remains the same as in Alternative A. Therefore, impacts to vegetation from those species (black bear, furbearers, small game, waterfowl) are expected to be negligible.

However, deer management under this alternative differs. The Wisconsin DNR would develop specific goals and quotas for state-regulated hunters in DMU 79 (not done now), and establish hunting seasons, weapon types, etc. These goals would be consistent with other State DMU's and would therefore not take into consideration specific management goals and mandates of the National Park Service, including protection of unique plant communities and species. Management of deer outside of DMU 79 (Long Island and the mainland) and management of other harvestable species would be the same as under Alternative A.

Under Alternative B, the NPS's ability to manage wildlife populations and achieve NPS's goals is more limited than under Alternative A. Therefore, the likelihood of long-term negative impacts to rare vegetation communities is higher (see Alternative A). There would be no special incentives to hunt deer within the islands and the hunting season would, most likely, be limited to the standard gun season in November. At this time of year, access to the islands tends to be very difficult and frequently hazardous due to rough and quickly changing sea conditions. Prior to establishment of a muzzleloader season in October, very little hunting occurred on the islands. Nuisance permits would be more difficult to obtain because standard state methods for determining population levels rely heavily on numbers of harvested deer. Use of this method has a high potential to severely underestimate deer numbers on the islands due to low hunting activity. Overall state harvest goals may also be much higher than what is needed to protect sensitive species.

Under this alternative, negative impacts are expected to be moderate and long-term. Species of special management concern include Canada yew and other browse sensitive species (e.g., white cedar, eastern hemlock, orchids).

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

Under this alternative, management of species other than deer is similar to Alternative A. Therefore, negative impacts to vegetation from those species (black bear, furbearers, small game, waterfowl) are expected to be negligible.

Alternative C provides the NPS with a much broader array of options for controlling deer populations than under Alternatives A or B. Therefore, the park has a higher likelihood of being able to meet goals related to the protection of rare plant communities and species through both hunting and management control. Although meeting park goals will be challenging because of access and the difficulty of hunting on the islands, reduction in deer numbers will beneficially impact vegetation.

Impacts under this alternative as compared with Alternative A are expected to be beneficial, minor to moderate, and long-term. Species of special management concern include Canada yew and other browse sensitive species (e.g., white cedar, eastern hemlock, orchids).

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under this alternative, management of most furbearers, small game, and waterfowl is similar to Alternative A. A difference is that the weapon type available for use in hunting black bear and some furbearers differs. However, this difference is not expected to have more than a negligible change on population levels of these species. Therefore, negative impacts to vegetation from species other than deer are expected to be negligible.

Alternative D provides the NPS with a broader array of options for controlling deer populations than under Alternative A or B. However, options are less than what would be available under Alternative C, because weapon type would be limited to primitive weapons. Because a primitive weapon only hunt would provide a unique hunting experience, however, there may be increased interest in this type of hunt. Management control is equally available under Alternatives B and C, therefore, the difference in the NPS's ability to control deer under these two alternatives is expected to be negligible. As under Alternative C, meeting NPS's goals will be challenging because of access and the difficulty of hunting on the islands. However, reduction in deer numbers will beneficially impact vegetation, especially Canada yew.

Impacts under this alternative as compared with Alternative A are expected to be beneficial, minor to moderate, and long-term. Species of special management concern include Canada yew and other browse sensitive species (e.g., white cedar, eastern hemlock, orchids).

IMPACTS ON THREATENED AND ENDANGERED SPECIES

Impact Thresholds for Threatened and Endangered Species

The intensity of impacts on threatened and endangered species was determined using the following definitions:

- *Negligible* – The impact would be either barely detectable or extremely localized and would have no discernible effect on a threatened or endangered species.
- *Minor* – The impact would be slight but detectable in a small number of park locations on a threatened or endangered species.
- *Moderate* – The impact would be detectable and spread over a number of park locations and would have an appreciable effect on a threatened or endangered species.
- *Major* – The impact would be easily detectable and widespread and could result in a substantial change in the population level of threatened or endangered species parkwide.

ALTERNATIVES A, B, C and D

Hunting is not permitted during the peak visitor season, which coincides with nesting activity for both bald eagles (federally threatened) and piping plover (federally endangered). Piping plover habitat in the park is limited to Long Island and the Michigan Island sandspit. Peregrine falcons (state endangered) are migratory within the Apostle Islands, utilizing important habitat primarily during the fall migration. Changes in the abundance of wildlife populations covered by this plan or their associated impacts to vegetation are not expected to impact the bald eagle or piping plover populations of the park. They are also not expected to impact migrating peregrine falcons. Therefore, the alternatives are expected to have no impact these species.

Timber wolves (federally endangered) are very transient within the park. No known packs occur exclusively within the park and the islands are not considered large enough to provide adequate habitat for a wolf pack. The average territory for an adult wolf in Wisconsin is 37 square miles (Wydevan and 2005). The largest of the islands within the park, Stockton Island, is 15.6 square miles in size. Although deer are an important food item and various alternatives would impact the numbers of deer on a few of the islands, the value of the islands as wolf habitat is, at best, transient and partial. Therefore, impacts of implementing any of the alternatives are expected to be, at most, negligible.

Of the species that are listed as endangered or threatened by the State of Wisconsin (Table 7), most are not located in areas where they are vulnerable to deer browse or they are not generally considered preferred species. The only exception is broad-leaved twayblade (*Listera convallariodes*) that occurs within steep ravines. These areas tend not to be heavily frequented by deer, but a negligible to minor negative impact to this species is possible under Alternatives A and B. Under Alternatives C and D, lower deer numbers would be anticipated, greatly decreasing potential impact to this species.

Overall, negative impacts to federally threatened or endangered species are not expected from implementation of Alternatives A-D. Potential negative impacts to state threatened plant species from Alternatives A and B are expected to be negligible to minor and long-term. Negative impacts to state threatened plant species are not expected to occur from Alternatives C or D.

IMPACTS ON WILDLIFE

Impact Thresholds for Wildlife

The intensity of impacts on wildlife resources was determined using the following definitions:

- *Negligible* – The impact would be either barely detectable or extremely localized and would have no discernible effect on wildlife on a park-wide scale.
- *Minor* – The impact would be slight but detectable and would affect only a small number of wildlife species in a small number of park locations.
- *Moderate* – The impact would be detectable and spread over a number of park locations and would have an appreciable effect on the population level of one or more wildlife species.
- *Major* – The impact would be easily detectable and widespread and could result in a substantial change in the park-wide population level of one or more wildlife species.

Alternative A – No Action (Continuation of Current Management)

Under the no action alternative, future changes to wildlife populations as a result of hunting or trapping are expected to be minimal. However, the NPS does not currently have the ability to obtain information on hunting activity or harvest in an accurate or timely manner. As a result, overharvesting of certain species could occur before the NPS is aware of the problem and can take appropriate action to protect the species. If that did occur, minor to moderate negative impacts could occur for an individual species.

Negative changes to habitat, especially for non-game species, are likely under this alternative as a result of overbrowsing by deer. Deer overbrowsing can significantly alter forest composition and structure, especially understory species, negatively impacting forest birds and small mammals that rely on this habitat (Waller and Alverson 1997). Recent work on islands by Allombert et al. (2005) found bird abundance to be 55-70% lower on islands that have had a long history of deer browse as compared to islands that have been deer free. Negative impacts to nongame species could vary greatly depending on deer population levels. On islands with high deer densities, negative impacts would be expected to be minor to moderate and long-term. If deer densities exceed management goals and management control (e.g., nuisance permits, etc.) is successful in reducing the deer herd, impacts to non-game species would be reduced. Negative impacts to the park's deer population are expected to be negligible to minor and long-term.

Overall, negative impacts to wildlife, both game and non-game under this alternative are expected to be minor to moderate and long-term.

Alternative B - No Special Seasons or Park-specific Regulations

Under Alternative B, hunting and trapping seasons in DMU 79 would be determined in the same manner as other DMU's in the state. Many of the impacts associated with this alternative would be similar to Alternative A. Future changes to wildlife populations as a result of hunting or trapping are expected to be minimal. Under this alternative, the deer hunting season would likely be shortened and consistent with the statewide deer season, resulting in little if any activity within DMU 79. Similar to Alternative A, the NPS would continue to lack the ability to obtain

information on hunting activity or harvest in an accurate or timely manner. As a result, overharvesting of certain species could occur before the NPS is aware of the problem and can take appropriate action to protect the species. If that did occur, minor to moderate negative impacts could occur for an individual species.

Negative changes to habitat, especially for non-game species, are more likely under this alternative as a result of overbrowsing by deer than under any of the alternatives. Because the special muzzleloader hunt in October would be eliminated and hunting would, most likely, be limited to the traditional gun season in November, when safe access to the islands is very difficult, the number of deer harvested by the general public is expected to be near zero. In addition, quotas and goals would be set in a statewide framework, making the ability of the NPS to obtain nuisance permits less likely. As mentioned under Alternative A, deer overbrowsing can significantly alter forest composition and structure, especially understory species, negatively impacting forest birds and small mammals that rely on this habitat (Waller and Alverson 1997). Recent work on islands by Allombert et al. (2005) found bird abundance to be 55-70% lower on islands that have had a long history of deer browse as compared to islands that have been deer free. Negative impacts to nongame species could vary greatly depending on deer population levels. On islands with high deer densities, negative impacts would be expected to be moderate and long-term.

Impacts to the deer population are expected to be beneficial, negligible and long-term as a result of less hunting pressure as compared with Alternative A.

Overall, negative impacts to wildlife, both game and non-game, under this alternative are expected to be moderate and long-term.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

With the exception of deer, future changes to harvestable wildlife populations as a result of hunting or trapping are expected to be minimal. Unlike Alternatives A and B, a park-specific permit would provide timely information on harvest activity occurring within the park, as well as numbers of animals taken. This would greatly assist the park in preventing potential over-harvest of certain species, resulting in a beneficial minor to moderate impact.

Under this alternative, the NPS would have the greatest potential for meeting deer management goals. Therefore, negative changes to habitat as a result of deer over-browsing, especially for non-game species, are least likely under this alternative, resulting in minor to moderate beneficial impacts.

Increased harvest of deer within DMU 79 is anticipated under this alternative. However, deer management on the mainland unit and Long Island would be the same as Alternative A. Therefore, negative impacts to the park's deer population on the mainland and Long Island are expected to be neutral and minor to moderate in DMU 79.

Overall, the impacts to wildlife under this alternative as compared with Alternative A are expected to be beneficial, minor and long-term.

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under Alternative D, impacts to wildlife would be very similar as those described under Alternative C. Future changes to harvestable wildlife populations as a result of hunting or trapping are expected to be minimal, except for deer which would be actively managed. Unlike Alternatives A and B, a park-specific permit would provide timely information on hunting activity and harvest of other species, greatly assisting the NPS in preventing potential over-harvest of certain species. Under this alternative, the NPS would have a variety of options for meeting deer management goals. The ability for the NPS to meet deer management goals is similar between Alternatives C and D. Since fewer weapon types are available under Alternative D, fewer deer may be harvested. However, the difference is expected to be negligible. Similar to Alternative C, negative changes to habitat as a result of deer overbrowsing, especially for non-game species, are much less likely under this alternative than under Alternatives A or B. This is expected to result in minor to moderate beneficial impacts.

Similar to Alternative C, increased harvest of deer within DMU 79 is anticipated under this alternative. However, deer management on the mainland unit and Long Island would be the same as Alternative A. Therefore, negative impacts to the park's deer population are expected to be negligible on the mainland and Long Island and minor to moderate in DMU 79.

Overall, the impacts to wildlife under this alternative as compared with Alternative A are expected to be beneficial, minor and long-term.

IMPACTS ON CULTURAL RESOURCES (ethnographic resources)

Impact Thresholds for Cultural Resources (ethnographic resources)

The intensity of impacts on cultural resources was determined using the following definitions:

- *Negligible* – The impact would be either barely noticeable or extremely localized and would have no discernible effect on ethnographic resources on a parkwide scale.
- *Minor* – The impact would be slight but noticeable, with only a small number of ethnographic resources in a small number of park locations being affected.
- *Moderate* – The impact would be clearly noticeable and spread over a number of park locations and would have an appreciable parkwide effect on ethnographic resources.
- *Major* – The impact would be highly noticeable and widespread and could result in the irretrievable loss of ethnographic resources within the park.

Common to all alternatives

Under all alternatives, the exercise of treaty-related rights, including hunting and trapping would be respected.

Alternative A – No Action (Continuation of Current Management)

and

Alternative B – No Special Seasons or Park-specific Regulations

Under Alternatives A and B, the impacts to harvestable wildlife, including deer are expected to be negligible. Harvest of deer by hunters is expected to be low under Alternative A and very low under Alternatives B. Management control options would be limited under both of these alternatives, but most restricted under Alternative B. Negative, minor, long-term impacts to non-wildlife ethnographic resources, such as medicinal plants, may occur as a result of deer over-browsing.

Overall, negative impacts to ethnographic resources under Alternatives A or B are expected to be minor and long-term.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

and

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under Alternatives C and D, the beneficial impacts to harvestable wildlife, other than deer, are expected to be negligible. Harvest of deer by state licensed hunters is expected to be higher under these alternatives than under Alternatives A or B and management control may be needed to reach management goals in a few locations. However, this is not expected to have more than a negligible negative impact on treaty-related hunting, since there would be no change from current management for deer on the mainland unit, which overlaps with the Red Cliff reservation, or on Long Island. Both of these areas are much more accessible and, hence, are more utilized.

Since management options are greater under Alternatives C and D, the ability for the park to protect non-wildlife ethnographic resources (e.g., plants and habitat) from over-browsing is higher. This is expected to result in a minor beneficial long-term impact.

Overall, beneficial impacts to ethnographic resources under Alternatives C or D are expected to be minor.

IMPACTS ON WILDERNESS

Impact Thresholds for Wilderness Resources

The intensity of impacts on wilderness resources was determined using the following definitions:

- *Negligible* – The impact would be either barely noticeable or extremely localized and would have no discernible effect on wilderness resources on a parkwide scale.
- *Minor* – The impact would be slight but noticeable and would affect only a small number of visitors in a small number of park locations.
- *Moderate* – The impact would be clearly noticeable and spread over a number of park locations and would have an appreciable effect on wilderness resources.
- *Major* – The impact would be highly noticeable and widespread and could result in a substantial change in the quantity and quality of lands within the park possessing wilderness resources.

Alternative A – No Action (Continuation of Current Management)

Under Alternative A, deer hunting would remain limited to an October muzzle loader hunt. For non-hunting visitors, the current limited hunting season may provide a short-term beneficial negligible impact to their wilderness experience. In addition, an island muzzle loader hunt can provide a beneficial, negligible, short-term wilderness experience to those who participate. If deer numbers are not adequately controlled, however, the ability for visitors to experience a forest similar to what the early explorers saw may be reduced, if not eliminated, causing a negligible to minor negative long-term impact.

Overall, however, negative wilderness related impacts are expected to be negligible and long-term.

Alternative B – No Special Seasons or Park-specific Regulations

Under Alternative B, public hunting seasons would be determined under the state hunting framework. This is expected to greatly reduce deer hunting activity within the park. As a result, the opportunity for deer hunters to have a wilderness experience within the islands would be reduced, causing minor negative impacts. For non-hunting visitors, the reduced likelihood of encountering hunters may enhance their wilderness experience. However, this would be negligible since the vast majority of visitation occurs at a time when the park is closed to hunting. In addition, the NPS's ability to control deer populations under Alternative B is more limited than under any other alternative. Therefore, the likelihood of not being able to adequately control deer populations is highest and the potential, over the long-term, for visitors to experience northern Wisconsin's original forest is the least, causing potential minor negative impacts.

Overall, the negative wilderness related impacts associated with this alternative on visitor use and experience is expected to be minor and long-term.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

Under Alternative C, public deer hunting opportunities would be greatly increased as compared with Alternative A. As long as hunting is dispersed, the opportunity for a hunting-related wilderness experience would be increased. Impacts to hunters are expected to be beneficial and minor. On the other hand, the potential for hunters to negatively impact the wilderness experience of non-hunters is also increased. This is expected to be negligible to minor and short-term, however, because the park is closed to hunters when the vast majority of people (93%) visit the park. Under this alternative, the NPS has the greatest flexibility in controlling deer populations and, therefore, the highest likelihood of preserving the ability for visitors to experience a rare historic Wisconsin forest, enhancing their wilderness experience.

Overall, the beneficial wilderness-related impacts associated with this alternative are expected to be minor and long-term.

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under Alternative D, wilderness-related experiences would be enhanced for hunters that prefer the use of primitive weapons. This alternative would provide a unique primitive hunting experience. For this hunting public, Alternative D is expected to have minor to moderate beneficial short-term impacts. Similar to under Alternative C, the potential for hunters to negatively impact the wilderness experience of non-hunters is increased. This is expected to be negligible to minor and short-term, however, because the park is closed to hunters when the vast majority of people (93%) visit the park. Under this alternative, the NPS has a high amount of flexibility in controlling deer populations and, therefore, a high likelihood of preserving the ability for visitors to experience a rare historic Wisconsin forest, enhancing their wilderness experience. This would create a beneficial, minor, long-term impact.

Overall, the beneficial impacts associated with this alternative on visitor use and experience is expected to be minor to moderate and long-term.

IMPACT ON VISITOR USE AND EXPERIENCE

Impact Thresholds for Visitor Experiences

The intensity of impacts on visitor experiences not related to wilderness was determined using the following definitions:

- *Negligible* – The impact would be barely detectable by few visitors and would have no discernible effect on their experience.
- *Minor* – The impact would be slightly detectable by few visitors and would have little effect on visitor experiences.
- *Moderate* – The impact would be clearly detectable by many visitors and would have an appreciable effect on visitor experiences.
- *Major* – The impact would be severely adverse or exceptionally beneficial for the majority of visitors, and would have a substantial, highly noticeable influence on various aspects of visitor experiences.

Alternative A – No Action (Continuation of Current Management)

Under Alternative A, the opportunity for the public to hunt deer within the islands would remain limited to an October muzzle loader hunt. This hunt is currently limited to Oak, Basswood, Sand and York, but could be expanded to other islands. For non-hunting visitors, the limited hunting season may provide a short-term beneficial impact. However, this is expected to be negligible and short-term, however, because the park is closed to hunters when the vast majority of people (93%) visit the park. Under this alternative, the park's ability to control deer populations is limited. If deer numbers are not adequately controlled, the ability for visitors to experience a forest similar to what the original land surveyors saw may be reduced, if not eliminated. This would result in a negative, negligible to minor impact.

Overall, negative visitor use impacts are expected to be negligible and long-term.

Alternative B – No Special Seasons or Park-specific Regulations

Under Alternative B, public hunting seasons would be determined under the state hunting framework. Deer hunting would, most likely, be limited to the standard November season. During this time of year, access is very difficult due to frequently rough and unpredictable sea conditions. The October muzzleloader season that is currently available would be eliminated, resulting in a negative moderate impact to those hunters that have enjoyed participating in this special hunt. Hunting opportunities for species other than deer would remain the same as under Alternative A. For non-hunting visitors, the overall amount of hunting by the general public in the islands would be reduced. This may result in a negligible beneficial short-term impact. However, the amount of visitation occurring on the islands during this time is very small. From 1996-2005, the amount of visitation that occurred was only 6% in September and 0.7% in October. Under Alternative B, the NPS's ability to control deer populations is more limited than under any other alternative. Therefore, the likelihood of not being able to adequately control deer populations is highest and the potential, over the long-term, for visitors to experience northern Wisconsin's original forest is the least.

Overall, the negative impacts associated with this alternative are expected to be minor to moderate and long-term on visitor use and experience.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences

Under Alternative C, public deer hunting opportunities would be greatly increased as compared with Alternative A. A variety of hunting opportunities and longer seasons would be available. Hunting incentives would be available, including DMU 79-specific tags that would be in addition to other State issued tags. In addition, the October muzzleloader only season on Oak and Basswood Islands would continue. Hunting opportunities for species other than deer would remain the same as under Alternative A. For the hunting public, this alternative is expected to have moderate beneficial impacts.

Conversely, this alternative has the highest potential for non-hunting visitors to encounter hunters. Hunting activity would, most likely, be concentrated on a few islands and be primarily limited to the months of September and October, when island visitation tends to be very low (6% in September; 0.7% in October). However, under this alternative, the park has the greatest flexibility in controlling deer populations and, therefore, the highest likelihood of preserving the ability for visitors to experience a rare historic Wisconsin forest.

Overall, the beneficial impacts associated with this alternative as compared with Alternative A are expected to be minor to moderate and long-term on visitor use and experience.

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under Alternative D, public deer hunting opportunities using primitive weapons (e.g., muzzleloaders, bows, etc.) would be greatly increased as compared with Alternative A. A variety of primitive hunting opportunities and longer seasons would be available. Similar to Alternative C, hunting incentives would be available, including DMU 79 specific tags that would be in addition to other state issued tags. In addition, the muzzleloader only season in October would be expanded to include all 12 of the islands in zone 2. This alternative would provide a unique primitive hunting experience.

Hunting opportunities for species other than deer would remain the same as under Alternative A. For the hunting public that prefers primitive weapons, this alternative is expected to have moderate to moderate beneficial impacts.

Less than under Alternative C, but more than under Alternatives A and B this alternative has a fairly high potential for non-hunting visitors to encounter hunters. Hunting activity would, most likely, be concentrated on a few islands and be primarily limited to the months of September and October, when visitation to the islands tends to be very low (6% in September; 0.7% in October). However, under this alternative, the NPS has the greatest amount of flexibility in controlling deer

populations and, therefore, the likelihood of preserving the ability for visitors to experience a rare historic Wisconsin forest is high.

Overall, the beneficial impacts associated with this alternative as compared with Alternative A are expected to be minor to moderate and long-term on visitor use and experience.

IMPACTS ON PARK OPERATIONS

Impact Thresholds for Park Operations

The intensity of impacts on park operations was determined using the following definitions:

- *Negligible* – The impact would be barely noticeable on day-to-day operations of a limited aspect of park operations.
- *Minor* – The impact would be slight, but noticeable on day-to-day operations of more than one aspect of park operations. However it would not affect the park's overall ability to provide services and maintain facilities.
- *Moderate* – The impact would be noticeable on day-to-day operations of more than one aspect of park operations and could have an appreciable effect on park operations and facilities.
- *Major* – The impact would have a substantial, highly noticeable influence on park operations and facilities, and could change the park's services and/or facilities.

Alternative A – No Action (Continuation of Current Management)

Under Alternative A, hunting and trapping of wildlife, with the exception of deer, are managed consistent with State of Wisconsin regulations and federal law. Under this circumstance, the NPS has adopted state regulations that are not in conflict with federal regulations. As a result, administration of hunting or trapping of wildlife (other than deer) is done by the Wisconsin DNR. From an administrative workload perspective, this is a negligible to minor beneficial impact. However, under this alternative, the NPS does not have the ability to obtain harvest information in a timely fashion, making protection and management of these species more difficult. This can result in a negative negligible to minor impact.

For deer, there is a special muzzleloader hunt in October. A special permit, administered by the NPS, is required for this hunt. Administration includes: sending letters and permit applications to interested parties, collecting fees, responding to inquiries, etc. The negative impacts of administering this hunt are cancelled out by the beneficial impacts of having timely and accurate information related to deer harvest activities.

For all harvest activities, NPS protection rangers enforce applicable federal and state regulations and help keep all visitors safe.

Overall, the negative impacts on park operations as a result of Alternative A are negligible and long-term.

Alternative B – No Special Seasons or Park-specific Regulations

Under Alternative B, hunting and trapping of all wildlife would be managed consistent with state of Wisconsin regulations. Under this circumstance, the NPS would adopt state regulations that are not in conflict with federal regulations. As a result, administration of hunting or trapping of wildlife would be done by the Wisconsin DNR. With the exception of deer, this alternative would be the same as Alternative A. From an administrative workload perspective, this would have a negligible to minor beneficial impact. However, under this alternative, the NPS would not have the ability to obtain harvest information in a timely fashion, making protection and management of these species more difficult. In the case of deer, the NPS would lack the ability to have island-specific data. Because deer populations within the park vary greatly by island, this information is critical to proper management. As a result, minor negative impacts would be expected.

Similar to Alternative A, NPS protection rangers would enforce applicable federal and state regulations and help keep visitors safe. However, a lack of information on harvest activities would make these duties more difficult.

Overall, negative impacts associated with Alternative B are expected to be negligible to minor and long-term.

Alternative C – Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences ***and***

Alternative D - Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences

Under Alternatives C and D, the NPS would take a more active role in harvestable wildlife management. Similar to Alternative A, harvestable wildlife, other than deer, would continue to be managed consistent with appropriate state regulations. State regulations that are not in conflict with federal regulations would be adopted by the NPS. However, a park-specific permit would be developed that would enable wildlife managers to obtain harvest data in a timely manner. This would create an additional administrative workload for the NPS. If current levels of hunting and trapping on the islands continue, however, this administrative workload is expected to be very low. As a result, the benefits of having this data available for management are expected to easily outweigh the associated administrative workload resulting in a negligible beneficial long-term impact.

For deer, as compared with Alternative A, there would be extended seasons and an expansion of weapon types. Under Alternative D, the expansion of weapon types would be limited to primitive weapons. There would also be special permits developed for DMU 79 that would not count against a hunter's standard state permit. As with all alternatives, it is possible that management control may be needed to reach management goals. Under Alternatives C and D, it is anticipated that hunting will be more effective at keeping deer numbers near management

goals than under Alternatives A or B. Under any of the alternative management control may be needed and would result in an increase in NPS staff time.

The amount of increased workload as a result of more actively managing harvestable wildlife under this alternative is expected to be higher than under Alternative A. However, the NPS's ability to protect park resources would also be higher. The overall negative impacts of these alternatives are expected to be negligible to minor and long-term.

Table 4. Impact Analysis Matrix Summary

	ALT. A <i>No Action – Continuation of Current Management</i>	ALT. B <i>No Special Seasons or Park-specific Regulations</i>	ALT. C <i>Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences</i>	ALT. D <i>Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences</i>
Vegetation	Negative Minor to Moderate Long-term	Negative Moderate Long-term	Beneficial Minor to Moderate Long-term	Beneficial Minor to Moderate Long-term
Threatened and Endangered Species	Negative No impact to negligible Long-term	Negative No impact to negligible Long-term	No impact	No impact
Wildlife (game and non-game)	Negative Minor to moderate Long-term	Negative Moderate Long-term	Beneficial Minor Long-term	Beneficial Minor Long-term
Cultural Resources (ethnographic)	Negative Minor Long-term	Negative Minor Long-term	Beneficial Minor Long-term	Beneficial Minor Long-term
Wilderness	Negative Negligible Long-term	Negative Minor Long-term	Beneficial Minor Long-term	Beneficial Minor to moderate Long-term
Visitor Use and Experience	Negative Negligible Long-term	Negative Minor to moderate Long-term	Beneficial Minor to moderate Long-term	Beneficial Minor to moderate Long-term
Park Operations	Negative Negligible Long-term	Negative Negligible to minor Long-term	Negative Negligible to minor Long-term	Negative Negligible to minor Long-term

Table 5. Detailed Impact Analysis Matrix

	ALT. A <i>No Action – Continuation of Current Management</i>	ALT. B <i>No Special Seasons or Park-specific Regulations</i>	ALT. C <i>Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences</i>	ALT. D <i>Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences</i>
Vegetation	Negative Minor to Moderate Long-term	Negative Moderate Long-term	Beneficial Minor to Moderate Long-term	Beneficial Minor to Moderate Long-term
Threatened and Endangered Species	Federally listed species – No Impact State listed species – Negative Negligible to minor Long-term	Federally listed species – No Impact State listed species – Negative Negligible to minor Long-term	Federally and State listed species – No Impact	Federally and State listed species – No Impact
Wildlife (game and non-game)	Most species other than deer and associated wildlife habitat – negative, minor to moderate, long-term Deer – no impact Overall – negative, minor to moderate, long-term	Most species other than deer and associated wildlife habitat – negative, minor to moderate, long-term Deer – beneficial, negligible, long-term Overall – negative, moderate, long-term	Most species other than deer and associated wildlife habitat – beneficial, minor to moderate, long- term Deer – negative, minor to moderate, long-term Overall – beneficial, minor, long-term	Most species other than deer and associated wildlife habitat – beneficial, minor to moderate, long-term Deer – negative, minor to moderate, long-term Overall – beneficial, minor, long-term
Cultural Resources (ethnographic)	Harvestable wildlife including deer – negative, negligible Non-wildlife ethnographic resources, including medicinal plants – negative, minor, long-term Overall – negative, minor, long-term	Harvestable wildlife including deer – negative, negligible Non-wildlife ethnographic resources, including medicinal plants – negative, minor, long-term Overall – negative, minor, long-term	Harvestable wildlife other than deer – beneficial, negligible Deer – negative, negligible Non-wildlife ethnographic resources, including medicinal plants – beneficial, minor, long-term Overall – beneficial, minor, long-term	Harvestable wildlife other than deer – beneficial negligible Deer – negative, negligible Non-wildlife ethnographic resources, including medicinal plants – beneficial, minor, long-term Overall – beneficial, minor, long-term

	ALT. A <i>No Action – Continuation of Current Management</i>	ALT. B <i>No Special Seasons or Park-specific Regulations</i>	ALT. C <i>Manage for Historic Ecological Habitat Conditions and Diverse Hunting Experiences</i>	ALT. D <i>Manage for Historic Ecological Habitat Conditions and Primitive Hunting Experiences</i>
Wilderness	Wilderness experience associated with hunting - beneficial, negligible, short-term Wilderness experience not associated with hunting – negative, negligible, long-term Overall – negative, negligible, long-term	Wilderness experience associated with hunting - negative, minor, short-term Wilderness experience not associated with hunting – beneficial, negligible to negative minor Overall – negative, minor, long-term	Wilderness experience associated with hunting - beneficial, minor, short-term Wilderness experience not associated with hunting – negative, negligible and short-term to beneficial, minor, and long-term Overall – beneficial, minor, long-term	Wilderness experience associated with hunting - beneficial, minor to moderate, short-term Wilderness experience not associated with hunting – negative, negligible and short-term to beneficial, minor, and long-term Overall – beneficial, minor to moderate, long-term
Visitor Use and Experience	Visitor use associated with hunting - beneficial, negligible, short-term Visitor use not associated with hunting – negative, negligible, long-term Overall – negative, negligible, long-term	Visitor use associated with hunting – negative, minor, short-term Visitor use not associated with hunting – negative, minor to moderate, long-term Overall – negative, minor to moderate, long-term	Visitor use associated with hunting - beneficial, moderate, short-term Visitor use not associated with hunting – beneficial, minor, long-term Overall – beneficial, minor to moderate, long-term	Visitor use associated with hunting - beneficial, moderate, short-term Visitor use not associated with hunting – beneficial, minor, long-term Overall – beneficial, minor to moderate, long-term
Park Operations	Negative Negligible Long-term	Negative Negligible to minor Long-term	Negative Negligible to minor Long-term	Negative Negligible to minor Long-term

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are defined as impacts that cannot be fully mitigated or avoided. High numbers of deer, especially if they are sustained over a period of time, would result in impacts that cannot be fully mitigated. These impacts would most directly impact favored browse species, such as Canada yew, but also indirectly impact wildlife through alterations to habitat. These impacts would be the most severe under Alternative B and slightly less under Alternative A. These habitat alterations and potential long-term changes to forest composition could also negatively impact wilderness and visitor use experience. Under Alternatives C and D, long-term changes to forest composition would be mitigated. None of the action alternatives are expected to have unavoidable adverse impacts on threatened and endangered species, cultural resources or park operations.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No actions would be taken as a result of any of the alternatives that would result in the consumption of nonrenewable natural resources or in the use of renewable resources that would preclude other uses for a period of time. Thus, there would be no irreversible or irretrievable commitments of resources in the park by the National Park Service.

IMPAIRMENT OF PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of the preferred alternative, *NPS Management Policies 2006* require that potential effects be analyzed to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within the park, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute an impairment if it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or

- identified in the park's general management plan or other relevant NPS planning documents as being of significance. Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Impairment Determination

After evaluating the natural and cultural resource impacts for the four alternatives considered in this document, none of the impacts were found to be of sufficient intensity to constitute an impairment of park resources and values. Under alternatives C and D, some of the resource impacts were beneficial. With the exception of vegetation under Alternative B, all adverse impacts were found to be moderate or lower in intensity and are not anticipated to be of sufficient magnitude to warrant a finding of impairment of park resources and values.

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PUBLIC INVOLVEMENT

A scoping meeting was held on December 6, 2005 at the Northern Great Lakes Visitor Center. A press release was published to inform the public of the meeting. Press following the meeting included a newspaper article and local television coverage. Following the meeting, there was a 30 day public review period. Information was available both on the park's website and the public PEPC website. Only one public comment letter was received. The draft plan/EA will be made available for public review for 30 days following internal review. During this time, a public meeting will be held to provide additional opportunities for input.

Table 6. List of waterfowl recorded during migratory bird surveys on Long and Outer Islands (1990-2004)

Common Name	Scientific Name
American Black Duck	<i>Anas rubripes</i>
American Coot	<i>Fulica americana</i>
American Wigeon	<i>Anas americana</i>
Blue-winged Teal	<i>Anas discors</i>
Bufflehead	<i>Bucephala albeola</i>
Canvasback	<i>Aythya valisineria</i>
Common Goldeneye	<i>Bucephala clangula</i>
Common Merganser	<i>Mergus merganser</i>
Greater Scaup	<i>Aythya marila</i>
Green-winged Teal	<i>Anas crecca</i>
Hooded Merganser	<i>Lophodytes cucullatus</i>
Lesser Scaup	<i>Aythya affinis</i>
Mallard	<i>Anas platyrhynchos</i>
Northern Pintail	<i>Anas acuta</i>
Northern Shoveler	<i>Anas clypeata</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Redhead	<i>Aythya americana</i>
Ring-necked Duck	<i>Aythya collaris</i>
Wood Duck	<i>Aix sponsa</i>

Table 7. Wisconsin State Endangered and Threatened Plant Species

Species	State Status
Butterwort (<i>Pinguicula vulgaris</i>)	Endangered
Calypso orchid (<i>Calypso bulbosa</i>)	Endangered (probably extirpated)
Lake cress (<i>Armoracia lacustris</i>)	Endangered (probably extirpated)
Moonwort (<i>Botrychium lunaria</i>)	Endangered
Mountain cranberry (<i>Vaccinium vitis-idaea</i>)	Endangered
Satiny willow (<i>Salix pellita</i>)	Endangered
Beautiful sedge (<i>Carex concinna</i>)	Threatened
Broad-lipped twayblade (<i>Listera convallarioides</i>)	Threatened
Coast sedge (<i>Carex exilis</i>)	Threatened
Drooping sedge (<i>Carex prasina</i>)	Threatened
Flat-leaved willow (<i>Salix planifolia</i>)	Threatened
Marsh grass-of-parnassus (<i>Parnassia palustris</i>)	Threatened
Michaux's sedge (<i>Carex michauxiana</i>)	Threatened
Northern Gooseberry (<i>Ribes oxycanthoides</i>)	Threatened
Plains ragwort (<i>Senecio indecorus</i>)	Threatened
Shore sedge (<i>Carex lenticularis</i>)	Threatened
Spike trisetum (<i>Trisetum spicatum</i>)	Threatened