

National Park Service
U.S. Department of the Interior

GREAT LAKES INVASIVE PLANT MANAGEMENT PLAN ENVIRONMENTAL ASSESSMENT

Prepared by:

National Park Service
Great Lakes Parks

TABLE OF CONTENTS

1.0	PURPOSE AND NEED	1
1.1	INTRODUCTION	1
1.2	PURPOSE AND NEED FOR TAKING ACTION	1
1.2.1	Purpose for Taking Action	1
1.2.2	Need for Taking Action	1
1.3	SCOPE OF THE GREAT LAKES IPMP/EA.....	2
1.3.1	Objectives.....	2
1.3.2	Jurisdiction of the IPMP	3
1.3.3	Life of the IPMP	4
1.3.4	Definitions	4
1.3.5	NPS Criteria for Invasive Plant Management.....	4
1.3.6	Management Partnerships / Stakeholder Coordination.....	5
1.3.7	NEPA Compliance	5
1.4	HISTORY, PURPOSE AND SUMMARY OF EACH PARK	6
1.4.1	Background and History of Each Park	6
1.5	IMPACT TOPICS and CUMULATIVE IMPACTS	12
1.5.1	Impact Topics and General Impact Thresholds.....	12
1.5.2	Impact Topics Dismissed from Analysis	14
1.5.3	Cumulative Impacts	19
1.6	RELATIONSHIP OF THE GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS	19
2.0	DESCRIPTION OF ALTERNATIVES.....	20
2.1	ALTERNATIVES.....	20
2.2	REGULATORY MEASURES COMMON TO ALL ALTERNATIVES	20
2.2.1	Federal Regulatory Measures	21
2.2.2	State Regulatory Measures	23
2.2.3	Local Regulatory Measures	23
2.2.4	National Park Service Policies and Guidelines	23
2.3	ACTIONS/TREATMENT OPTIONS COMMON TO ALL ALTERNATIVES	27
2.3.1	Education Programs	27
2.3.2	Collaboration Measures	29

2.3.3	Cultural Treatments	30
2.3.4	Manual/Mechanical Treatments	32
2.3.5	Biological Treatments	33
2.3.6	Chemical Treatments	35
2.3.7	Mitigation Measures and BMPs	41
2.4	ALTERNATIVE 1 – NO ACTION / CONTINUE WITH CURRENT MANAGEMENT PLANS	47
2.5	ALTERNATIVE 2 – FUNDAMENTAL AND SIGNIFICANT RESOURCES AND VALUES-BASED INVASIVE PLANT MANAGEMENT (PREFERRED ALTERNATIVE)	49
2.6	ALTERNATIVE 3 – SPECIES-BASED INVASIVE PLANT MANAGEMENT	53
2.7	ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS	57
2.7.1	Seasonal Invasive Plant Management	57
2.7.2	Stop Treatment	57
2.7.3	No Biocontrol or Chemical Treatment	58
2.8	ENVIRONMENTALLY PREFERABLE ALTERNATIVE	58
2.9	IMPACT SUMMARY BY ALTERNATIVE	60
2.10	PROJECT OBJECTIVES BY ALTERNATIVE	65
3.0	AFFECTED ENVIRONMENT	67
3.1	GENERAL VEGETATION	68
3.1.1	IATR	68
3.1.2	MISS	69
3.1.3	SACN	69
3.2	RARE OR UNUSUAL VEGETATION	70
3.2.1	INDU	70
3.2.2	PIRO	72
3.2.3	SLBE	73
3.2.4	VOYA	74
3.3	SPECIES OF SPECIAL CONCERN, INCLUDING POTENTIAL/CRITICAL HABITAT	75
3.3.1	APIS	75
3.3.2	INDU	76
3.3.3	ISRO	78
3.3.4	PIRO	80
3.3.5	Sleeping Bear Dunes National Lakeshore (SLBE)	80

3.4	UNIQUE ECOSYSTEMS (E.G., NNLS, MARITIME CLIFFS, BIOSPHERE RESERVES, WORLD HERITAGE SITES)	81
3.4.1	INDU	81
3.5	RECREATION RESOURCES, VISITOR EXPERIENCE, ESTHETIC RESOURCES	82
3.5.1	MISS	82
3.5.2	SACN.....	83
3.6	PARK OPERATIONS.....	83
3.6.1	IATR	83
4.0	ENVIRONMENTAL IMPACTS	84
4.1	METHODOLOGY	84
4.2	DIRECT AND INDIRECT IMPACTs	85
4.2.1	Direct and Indirect Impacts from Alternative 1 - No Action, Continue with Current Management Plans	85
4.2.2	Direct and Indirect Impacts from Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	98
4.2.3	Direct and Indirect Impacts from Alternative 3 - Species-Based Invasive Plant Management.....	110
5.0	CUMULATIVE IMPACTS	123
5.1	INTRODUCTION	123
5.1.1	General Cumulative Impacts of Invasive Species Treatment.....	123
5.1.2	General Vegetation	125
5.1.3	Rare or Unusual Vegetation (e.g., old growth timber, riparian, alpine, dunes, wetlands)	125
5.1.4	Species of Special Concern and their Potential/Critical Habitat	126
5.1.5	Unique Ecosystems	128
5.1.6	Recreation Resources, Visitor Experience, Esthetic Resources	128
5.1.7	Park Operations	128
6.0	CONSULTATION AND COORDINATION	129
6.1	SUMMARY OF PUBLIC INVOLVEMENT	129
6.1.1	Public Scoping	129
6.1.2	Public Comment Period	130
6.2	CONSULTATION AND COORDINATION WITH OTHER AGENCIES	130
6.3	LIST OF PREPARERS	130
7.0	REFERENCES AND ACRONYMS	132

7.1 REFERENCES 132

7.2 ACRONYMS..... 135

LIST OF APPENDICES

Appendix A – Memo to File Form – NEPA Compliance Confirmation

Appendix B – Environmental Screening Form

Appendix C – Relationship of Great Lakes IPMP/EA to Other Park Plans and Documents

Appendix D – Figures

Appendix E – Special Status Species in Great Lakes Region

Appendix F – Public Scoping Report

1.0 PURPOSE AND NEED

1.1 INTRODUCTION

The National Park Service (NPS) proposes to implement an Invasive Plant Management Plan (IPMP) to control invasive plant species in the following ten parks located in the Great Lakes region: Apostle Islands National Lakeshore (APIS), Grand Portage National Monument (GRPO), Ice Age National Scenic Trail (IATR), Indiana Dunes National Lakeshore (INDU), Isle Royale National Park (ISRO), Mississippi National River and Recreation Area (MISS), Pictured Rocks National Lakeshore (PIRO), Sleeping Bear Dunes National Lakeshore (SLBE), St. Croix National Scenic River (SACN), and Voyageurs National Park (VOYA) (see **Figure 1**). This IPMP evaluates three alternatives for invasive plant management; No Action/Continue with Current Management, Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative), and Species-Based Invasive Plant Management.

As defined in National Park Service Director's Order (DO)-12, the National Environmental Policy Act (NEPA) was enacted *"...to make sure that agencies fully consider the environmental costs and benefits of proposed federal actions before they make any decision to undertake those actions."* Based on this stated intent, NEPA and the Council on Environmental Quality (CEQ) regulations require all federal agencies to make a careful, complete, and analytic study of the impacts of any proposal, and alternatives to that proposal, that has the potential to affect the human environment well before any decisions are made. Implementation of the Great Lakes IPMP constitutes a federal planning and resource management action that has the potential to affect the human environment, and therefore, is subject to analysis under NEPA. The purpose of this Environmental Assessment (EA) is to determine whether implementation of the alternatives identified in this IPMP would have significant effects on the human environment, and to satisfy compliance under NEPA for the IPMP.

1.2 PURPOSE AND NEED FOR TAKING ACTION

1.2.1 Purpose for Taking Action

Under DO-12, "purpose" is defined as *"...a statement of goals and objectives that the NPS intends to fulfill by taking action."* Based on this definition, the purpose of the Great Lakes Invasive Plant Management Plan /Environmental Assessment (IPMP/EA) is to:

- Decrease the impacts of invasive plants to promote the restoration of natural and cultural resources;
- Identify and implement environmentally sound, cost-effective invasive plant management strategies that pose the least possible risk to people and park resources; and
- Provide defensible rationale for invasive plant management strategies.

1.2.2 Need for Taking Action

Under DO-12, "need" is described as *"...an existing condition that should be changed, problems that should be remedied, decisions that should be made, and policies or mandates that should be*

implemented. Based on this definition, the following needs have been identified for the Great Lakes IPMP/EA:

- Natural and cultural resources are being adversely impacted by invasive species.
- Many invasive plant vectors are unmitigated by current park practices.
- There is a lack of public awareness about invasive plant issues.
- A programmatic invasive plant management plan and compliance document does not exist.
- A comprehensive evaluation of potential impacts associated with invasive plant management is needed to educate park staff on the potential effects of various treatment methods.
- Park staff need standardized best management practices (BMPs) to mitigate potential impacts associated with park and visitor activities.
- Standardized guidance tools are needed to help prioritize invasive species management and compliance.

1.3 SCOPE OF THE GREAT LAKES IPMP/EA

Based on the purpose and need for the project, the scope of the Great Lakes IPMP/EA is to develop a plan that identifies long-term invasive plant management strategies that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources, and provide opportunities for restoring native plant communities and cultural landscapes.

As this project involves multiple parks, a primary goal of the IPMP/EA is to provide park staff with broad, adaptive strategies of invasive plant management treatment options; a plan that would guide park staff to select the most appropriate treatment option(s), or combination of treatment options. This strategy would allow parks to minimize invasive plant impacts and maximize park-specific integrated pest management success.

Proposed treatment measures identified in this IPMP/EA are based on sound integrated pest management. Integrated pest management is defined as a decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible risk to people and park resources. Integrated pest management can also include reducing the risk of new introductions, determining acceptable levels of infestation, use of multiple techniques for control, and continued monitoring and management.

When completed, this IPMP/EA would provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on both NPS and NPS managed lands within the designated boundaries of the ten Great Lakes parks. Another primary goal of the IPMP/EA is to serve as a programmatic NEPA document for invasive plant management within each of the ten parks. That is, future invasive plant activities addressed by this EA would not require additional analysis under NEPA for park-specific actions, so long as the impacts of these specific actions have been adequately addressed in the IPMP/EA.

1.3.1 Objectives

Based on the purpose, need, and scope of the project, and as defined by the ten parks during internal scoping meetings conducted in January 2011, the objectives of the IPMP/EA are to:

- Differentiate invasive plant management strategies based on park-specific resources (e.g., Wilderness, natural areas, cultural sites, management zones); and land use history.
- Include common treatment methods in the IPMP currently used at each park, as well as any methods that could be used in the foreseeable future;
- Include BMPs that would mitigate/reduce impacts from invasive plant management on non-target resources;
- Create an adaptive plan that provides park staff with broad strategies for invasive plant management including prevention, assessment, control, and monitoring;
- Provide the flexibility to allow for the implementation of emerging/developing technologies and treatments for invasive plant management;
- Provide the flexibility to allow for treatment of any plants based on current or potential impacts to park resources;
- Provide allowances for and opportunities to respond to park-specific invasive species and integrated pest management needs;
- Identify relevant policy documents and compliance requirements related to integrated pest management, pesticide¹ use, human health and safety;
- Identify other potential/future/cumulative effects of invasive plant management; and
- Create standardized guidance to help parks prioritize selection of treatment areas, selection of invasive species management strategies, and to determine compliance under NEPA for each selection.

1.3.2 Jurisdiction of the IPMP

This IPMP/EA is intended to provide strategies to manage invasive plants within the designated boundaries of the ten Great Lakes parks on both NPS owned and NPS managed lands. Park unit boundaries are boundaries that have been legislated by Congress.

Invasive plant management activities that occur within park unit boundaries on NPS managed (i.e., federal or non-federal lands) lands, and that involve NPS resources (funding or staff) would be conducted in full cooperation and agreement with landowners. Invasive plant management activities under this IPMP/EA may also involve pooling of resources and/or the development of Memorandums of Understanding (MOUs) between landowners/stakeholders. Measures for collaboration with tribal governments, other federal offices, and state, county, private entities, and other stakeholders are discussed in **Section 2.3.2** of this IPMP.

Invasive plant management activities located outside of the park unit boundaries would not fall within the jurisdiction of this IPMP/EA. Similarly, invasive plant management activities on non-NPS managed lands, that do not use NPS resources, and/or are conducted by other entities (such as counties, State agencies, or non-governmental organizations) also would not fall within the jurisdiction of this IPMP/EA.

In summary, invasive plant management within the jurisdiction of this IPMP/EA would be limited to activities that occur within park unit boundaries and involve NPS resources.

¹ As the Great Lakes IPMP/EA is specific to treating invasive plant species, the only types of pesticides that would be used under this plan are herbicides. However, to be consistent with NPS policy definitions and other pesticide reference materials the term pesticide is used consistently throughout the Great Lakes IPMP/EA to describe chemical treatments.

1.3.3 Life of the IPMP

The Great Lakes IPMP is intended to provide NPS with long-term invasive plant management strategies. However, after ten years from signature date on the Finding of No Significant Impact (FONSI), this IPMP/EA may be reevaluated by NPS staff to determine whether updates and/or additional/new analysis under NEPA are needed.

1.3.4 Definitions

This IPMP/EA defines management strategies for terrestrial and emergent invasive plant species only. For this plan, “invasive” plants are plants whose presence or introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order (EO)-13112). Invasive species are also commonly referred to as non-native, alien, or exotic. However, origin and impact should be separated with the recognition that not all non-native plants are invasive and that native plants have the ability to exhibit invasive or weed-like tendencies.

Based on the definition of “invasive”, many non-native species would not be managed under the IPMP. Many of these species have little negative impact on natural ecosystems, cultural landscapes or short-term restoration activities. Also based on this definition, the majority of native plants would not be managed under this IPMP. Native plants are defined as those species that have co-evolved in the local ecological communities as a result of natural processes on lands designated as units of the national park system. However, in some instances native plants can and do become invasive (e.g., sumac, prickly ash, and box elder) and are therefore, managed in similar ways as, and in conjunction with, non-native invasive plants, particularly during restoration activities.

1.3.5 NPS Criteria for Invasive Plant Management

Under NPS Management Policies 2006, an invasive plant must meet several criteria to be managed:

“All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or

- Interferes with natural processes and the perpetuation of natural features, native species, or natural habitats;
- Disrupts the genetic integrity of native species;
- Disrupts the accurate presentation of a cultural landscape;
- Damages cultural resources;
- Significantly hampers the management of park or adjacent lands;
- Poses a public health hazard as advised by the U.S. Public Health Service (which includes the Centers for Disease Control and the NPS Public Health Program); or
- Creates a hazard to public safety.”

For species that meet these criteria, management priorities would be assigned to each invasive plant. Invasive plants would then be managed according to relative management priority. In accordance with Management Policies 2006; Section 4.4.4.2, relative management priorities would be determined as follows:

“Higher priority will be given to managing invasive species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled. Lower priority will be given to invasive species that have almost no impact on park resources or that probably cannot be successfully controlled.”

It is important to note that not all plants defined as invasive would necessarily be managed under this plan, as several of the parks maintain invasive species that have historic or cultural significance. Management Policies 2006; Section 4.4.4.1 provides for the maintenance of invasive species, which includes criteria such as when the species is:

“...needed to meet the desired condition of a historic resource, but only where it is noninvasive and is prevented from being invasive by such means as cultivating (for plants), or tethering, herding, or pasturing (for animals). In such cases, the exotic species used must be known to be historically significant, to have existed in the park during the park’s period of historical significance, to be a contributing element to a cultural landscape, or to have been commonly used in the local area at that time; or an agricultural crop used to maintain the character of a cultural landscape, with rigorous review given to any proposal to introduce a genetically modified organism...”

Similarly, as defined in Management Policies 2006; Section 4.4.2.5, the use of [invasive] species may be permitted:

“...Where necessary to preserve and protect the desired condition of specific cultural resources and landscapes, plants and plant communities generally will be managed to reflect the character of the landscape that prevailed during the historic period.”

In addition to species-specific priorities, priority for management would be determined based on the alternative that is eventually selected in the FONSI for this EA.

1.3.6 Management Partnerships / Stakeholder Coordination

Under this IPMP/EA, individual parks would cooperate with state, county, tribal, and federal officials, private landowners, and applicable management partnerships/stakeholders to implement approved invasive plant management strategies.

1.3.7 NEPA Compliance

As discussed in **Section 1.3**, one of the primary goals of the IPMP/EA is to serve as a programmatic NEPA document for invasive plant management within each of the ten parks. That is, future invasive plant management activities addressed by this EA would not require additional analysis under NEPA for park-specific actions. Each park would also have the option to develop a more detailed and park-specific invasive plant management or implementation plan for treatments considered in this IPMP/EA. Park-specific plans that include treatments and associated potential impacts considered in this IPMP/EA would not require additional compliance with NEPA. In this case, parks could then complete the Memo to File provided in Appendix A (or one similar to the Memo to File in Appendix A) to document compliance with NEPA through this IPMP/EA. Park-specific plans that identify invasive plant management treatments or potential impacts that have not been considered in this IPMP/EA would require additional compliance with NEPA.

1.3.7.1 Using the Great Lakes IPMP/EA to Comply with Other Relevant Laws

Invasive plant treatment activities on NPS owned and NPS administered lands are required to demonstrate compliance with several other federal laws prior to implementation. Two of the most salient federal laws include Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA). As described in Section 6.2, the NPS intends to consult with the U.S. Fish and Wildlife Service, the applicable State Historic Preservation Offices, Native American Tribes, and Tribal Historic Preservation Officers under this IPMP/EA. The decision as to whether this programmatic Great Lakes IPMP/EA provides sufficient information to fulfill consultation needs under the ESA and NHPA for site-specific invasive plant treatment actions will be determined by the respective agencies and Tribes. Additional, project or site-specific consultation may be required under Section 7 of the ESA if project or site-specific invasive plant treatment actions have the potential to affect a listed or candidate species. Additional, project or site-specific consultation may also be required under Section 106 of the NHPA if project or site-specific invasive plant treatment actions have the potential to adversely affect historic properties, cultural landscapes, or cultural resources eligible to the National Register of Historic Places (NRHP).

1.4 HISTORY, PURPOSE AND SUMMARY OF EACH PARK

The following sections provide a brief history of each park addressed in this IPMP/EA.

1.4.1 Background and History of Each Park

1.4.1.1 Apostle Islands National Lakeshore (APIS)

APIS was established in 1970 and is composed of 21 islands and 12 miles of mainland that hosts a unique blend of cultural and natural resources. APIS contains scientifically important geologic features, including a highly diverse array of coastal landforms that retain a high degree of ecological integrity. Shaped and isolated by Lake Superior and located where northern hardwoods and boreal forests meet, the islands of the park sustain rare communities, habitats, and species of plants and animals. Some of these communities are remnants of ancient forests, providing a rare glimpse into the past. In 2006, approximately 80 percent of APIS was designated as Wilderness land, which is managed to preserve and, where possible, to restore the Wilderness character.

The Apostle Islands are the traditional home of the Ojibwe people and integral to their culture. They have used the natural resources of the Apostle Islands area for centuries to sustain their way of life, and continue to do so today. Lighthouses are present on six of the twenty-one islands, which contribute to the cultural landscapes. Invasive plant management within cultural landscapes needs to balance historical representation with the ability to contain certain species.

The isolation and remoteness of the archipelago has preserved a variety of historic and archeological resources reflecting human response to the Great Lakes maritime environment. The park offers a combination of remote but accessible scenery and geography, which allow for freshwater sailing, boating, sea kayaking, and fishing opportunities. Invasive species are present at mainland boat launch ramps and kayak put-in points, where there is concern that boats and kayaks may be transporting invasive species to islands and sandscapes. The environmentally sensitive nature of the sandscapes results in heightened concern for invasive plant management. Furthermore, in recent years, there have

been several large-scale construction projects that have resulted in ground disturbance and unintentional introductions of invasive species.

The enabling legislation provides the primary guidance for resource management at APIS by directing the NPS to conserve the islands and shorelines and their related geographic, scenic, and scientific values; permit hunting, fishing and trapping according to federal and state laws; preserve the unique flora and fauna of the lakeshore; and provide for the public enjoyment and understanding of the unique natural, historical, scientific, and archeological features of the lakeshore.

1.4.1.2 Grand Portage National Monument (GRPO)

GRPO consists of 710 acres stretching from the north shore of Lake Superior to the Pigeon River border of Ontario, Canada. GRPO was established in 1958 to commemorate and preserve a premier site and route of the 18th century fur trade that led to pioneering international commerce and exploration in North America as well as cultural contact between Ojibwe and other native societies and the North West Company partners, clerks and canoe-men. The monument was also established to work with the Grand Portage Band of Lake Superior Chippewa (Ojibwe) in preserving and interpreting the heritage and lifeways of the Ojibwe people. To facilitate this interpretation, the park manages a nexus of landscapes based on their natural and cultural resource values.

Enabling legislation directs the NPS to provide visitor services and facilities that do not impact natural, cultural, or ethnographic resources (including contemporary Ojibwe resources); accommodate administrative and support services and facilities without impacting resources; and restore the natural and cultural resources to the late 18th century to enhance the visitor experience. GRPO contains reconstructed buildings and well preserved archeological remains of several fur trading posts instrumental in the exploration of the West and in the economic history of the United States and Canada. Enabling legislation also directs the park to partner with other entities to meet common needs while continuing to fulfill the NPS mission. Due to close association with neighbors and partners in the management of the park, certain plant species such as sweetgrass, that are culturally important to the Grand Portage Band of Lake Superior Chippewa, are managed with high priority.

1.4.1.3 Ice Age National Scenic Trail (IATR)

During the Ice Age, much of North America lay under glacial ice. Some of the best examples of this last glacial advance were left in Wisconsin some 10,000 years ago. Authorized in 1980, the idea for the Ice Age Trail was to create a footpath that would wind through and interpret some of the world's finest examples of continental glaciation.

The nine units of the Ice Age National Scientific Reserve were established in 1971 as prime examples of glacial landscapes, to be administered by the State of Wisconsin in cooperation with NPS. The Reserve also promoted the idea of a trail connecting these areas. Following volunteers' successful establishment of segments of this trail, the Ice Age National Scenic Trail was authorized in 1980, to establish a continuous statewide footpath that would wind through and interpret the established Reserve areas and other world-renowned examples of continental glaciation.

Enabling legislation directs IATR to establish a superlative segment of the Ice Age National Scenic Trail and provide outdoor recreational and educational opportunities in support of and compatible with the conservation and enjoyment of the nationally significant scenic, historic, natural, and cultural resources within IATR. Today, approximately 650 miles of trail has been constructed, providing outstanding opportunities for recreation, education, inspiration, solitude, and enjoyment. When complete, the IATR

will be 1,200 miles in length. The National Park Service is working with the Wisconsin Department of Natural Resources (WDNR), Ice Age Trail Alliance, and other state and local units of government to complete the trail.

Enabling legislation also directs the park to provide information and interpretation about the trail to the public at a significant site along its route. The IATR has one primary site for interpreting the IATR called the Ice Age Complex at Cross Plains, one of the units of the Scientific Reserve. The park currently owns 156 acres within this complex. Opportunities for the public to experience and understand the marks of the glacier's farthest advance are highlighted in the areas where the IATR crosses the reserve units, as it does in Cross Plains. The Ice Age Complex also includes adjacent natural areas: the Cross Plains State Park site, managed by the WDNR, and the Shoveler Sink waterfowl production area, managed by the US Fish and Wildlife Service (USFWS). The post-glacial terrain at the complex supported wetland systems, native forest, savanna, and prairie communities, which have since been altered by various land uses such as farming, tree cutting, and the exclusion of fire. The complex nonetheless currently supports state listed and sensitive species and represents an opportunity to restore rare floral communities such as prairie, grassland, and oak savanna.

Furthermore, enabling legislation directs the NPS to ensure protection, preservation, and interpretation of the nationally significant values of continental glaciation in Wisconsin, including moraines, eskers, kames, kettleholes, drumlins, swamps, lakes, and other reminders of the Wisconsin Ice Age. IATR has been practicing invasive species preventative strategies, such as purchasing mowing equipment, boot brushes, power washing vehicles, and other equipment. The NPS Great Lakes Exotic Plant Management Team (EPMT) has performed treatment activities at the Ice Age Complex. Volunteers are heavily utilized throughout IATR, specifically the Ice Age Complex, for trail construction and maintenance and other resource-related activities.

1.4.1.4 Indiana Dunes National Lakeshore (INDU)

INDU was established in 1966, and is composed of several noncontiguous units. Most of the national lakeshore's land area is along the south shore of Lake Michigan between the urban centers of Gary and Michigan City, Indiana. Cultural resources within INDU represent the cultural evolution of northern Indiana from prehistoric times to the present day. The 15,177 acre park is surrounded by industrial areas, urban areas, and is highly fragmented by roads, railroads, and other infrastructure.

Congress designated Indiana Dunes National Lakeshore as a unit of the national park system to preserve for the educational, inspirational, and recreational use of the public certain portions of the Indiana Dunes and other areas of scenic, scientific, and historic interest and recreational value in the state of Indiana. INDU contains biological diversity and floral richness, resulting from the combination of complex geological processes and the convergence of several major North American life zones. INDU has over 130 rare plants, one federally threatened plant, and a federally endangered butterfly. In addition, there are several National Natural Landmarks (NNLs), nearly 1,200 native plant species, and over 300 non-native species many of which are invasive, that occur within INDU. Approximately 35 invasive plant species are actively being managed. The plant management focus is on higher quality vegetation communities and communities with rare species and relatively low invasive plant impacts. Currently, control efforts, such as early detection and rapid response, are concentrated on highly invasive species and new invaders.

1.4.1.5 Mississippi National River and Recreation Area (MISS)

MISS was established 1988, and is comprised of a 72 linear mile corridor along the Mississippi River and 4 miles along the Minnesota River, which encompasses about 54,000 acres of public and private land and water in 5 Minnesota counties, stretching from the cities of Dayton and Ramsey to just south of Hastings. Enabling legislation directs the park to protect, preserve, and enhance the significant values of the Mississippi River corridor through the Twin Cities metropolitan area, including recreational opportunities for birding, canoeing, fishing, kayaking, biking, skiing and snowshoeing.

The MISS is also a natural riverine ecosystem. As such, it is a major migratory flyway for over 40 percent of the nation's shorebirds and waterfowl, and is a critical migration corridor for numerous neotropical migrants. This river corridor has been designated an Important Bird Area (IBA).

Cultural resources within MISS represent the cultural history of the Minneapolis/St. Paul area from prehistoric tribes to European explorers, fur traders, farmers, loggers, steamboaters, and the birth of flour milling. The Mississippi River continues to play an important role in transportation, power, and industry, where the park is involved with the transportation use of the river, including barge management.

Enabling legislation also encourages coordination of federal, state, and local programs; and directs the park to provide a management framework to assist the state of Minnesota and units of local government in the development and implementation of integrated resource management programs, and to ensure orderly public and private development in the area. MISS was established as one of the first partnership parks, but only owns 35 acres of the 54,000 acre corridor, which creates park management challenges. The land managed and owned by the park includes abandoned and previously unmanaged areas, which contain many invasive plants and undesirable plant communities. Due to staff shortages, volunteers are heavily utilized for invasive plant management. Because of population size in the MISS, there are many sources of invasive plant infestations, chief of which is landscaping plants. During flood stages, the river also imports invasive species from areas to the north.

1.4.1.6 St. Croix National Scenic Riverway (SACN)

The St Croix River was one of the original eight Wild and Scenic Rivers which presents a combination of high-quality natural and cultural resources, and scenic, aesthetic, and recreational values. The St. Croix River is one of the last undisturbed, large floodplain rivers in the upper Mississippi River system. SACN is a 252-mile corridor partnership park that was established in 1968 to preserve and protect, restore, and enhance, where appropriate, the riverway's ecological integrity, unimpounded condition, natural and scenic resources, and significant historic resources. SACN provides an environment that allows the opportunity for peace and solitude, and provides an opportunity for the education and study of the geologic, historic, ecologic, and aesthetic values to further enhance stewardship of the river.

The park's relatively intact native plant communities are recognized regionally as significant, as evidenced by the 14 state natural areas on the Wisconsin side of the St Croix River, 2 scientific and natural areas on the Minnesota side of the river as well as 3 state parks and 3 state forests. These areas represent barrens, northern hardwood forests, old growth big-tooth aspen, seeps and their related plant communities, black ash swamps, wetlands, floodplain forests and bedrock glades.

Approximately 227 miles of the 252-mile corridor are managed by the park, where the NPS owns approximately 60 percent of the land along the river. The remaining 25 miles are managed by the states of Wisconsin and Minnesota. There are approximately 100 public access points and many campsites, all

of which are possible entry points for invasive species. The existing invasive species management program began in 1983 and relies in part on partnerships with other land managers and owners. The park concentrates on invasive species that have the most impact, are the most treatable, and in areas where there are management partnerships.

1.4.1.7 Isle Royale National Park (ISRO)

In the northwestern portion of Lake Superior is a unique and remote island archipelago. ISRO is one of the largest parks in the Great Lakes Network comprised of 571,000 acres. The park consists of one large island surrounded by over 450 smaller islands; encompassing a total area of 850 square miles including submerged land, which extends 4.5 miles out into the largest fresh water lake in the world. ISRO's unique ecosystem led to it being designated an International Biosphere Reserve in 1980.

In addition, the park has been designated as a World Heritage Site, and preserves 132,018 acres of land that was federally designated as Wilderness land in 1976.

Enabling legislation directs ISRO to provide opportunities for recreational uses and experiences that are compatible with the preservation of the park's Wilderness character and park resources. The park's remote location is only accessible by seaplane or a two to six hour boat ride. The park hosts a relatively low volume of visitors including boaters that utilize the park for fishing and Wilderness experience. Due to its remote nature, few invasive weed species occur within the park. Currently, invasive plant management focuses on the high traffic visitor areas, vector control, and prevention activities such as the utilization of boot brushes.

1.4.1.8 Pictured Rocks National Lakeshore (PIRO)

PIRO is 71,397 acres of lakeshore located in the north-central section of the Upper Peninsula of Michigan along the south shore of Lake Superior. Pictured Rocks National Lakeshore was established in 1966 as America's first national lakeshore to preserve for the benefit, inspiration, education, recreational use, and enjoyment of the public, a significant portion of the diminishing shoreline of the United States and its related geographic and scientific features. PIRO is divided approximately equally into two distinct ownership and management zones. Specifically, the federally-owned shoreline zone was established for traditional NPS reasons of preserving natural and cultural resources and providing for recreation; and the non-federal inland buffer zone (IBZ) was created to stabilize and protect the existing character and uses of the land, waters, and other properties within the zone.

The shoreline offers scenic vistas of Lake Superior. The 200-foot high Pictured Rocks cliffs rise perpendicularly from Lake Superior, creating a rock mosaic of form, color, and texture, which is enhanced by cascading waterfalls. Grand Sable Dunes, perched atop 300-foot high sand banks above Lake Superior, are one of two perched dune systems on the Great Lakes. Within these dunes are unique plant communities resulting from geomorphic processes. Twelve miles of unspoiled and undeveloped Lake Superior beach contrast the Pictured Rocks cliffs and Grand Sable Dunes.

Enabling legislation directs the park to preserve a portion of the Great Lakes shoreline for its geographic, scientific, scenic, and historic features, and its associated ecological processes. PIRO preserves 11,740 acres of land that was federally designated as Wilderness land in 2009. The Beaver Basin Wilderness includes 13 miles of Lake Superior shoreline, which is about 3.5 miles wide.

PIRO is marked by streams, inland lakes, and a diversity of associated vegetation. Lying in a transition zone between boreal and eastern hardwood forest, the lakeshore's scientifically recognized assemblage of flora and fauna is representative of associations unique to the Lake Superior Basin. PIRO also

contains habitat for a federally threatened and endangered plant species and a number of state listed species.

Enabling legislation also directs the park to protect the character and use of the shoreline zone while allowing economic utilization of the IBZ's renewable resources. The lakeshore contains a spectrum of cultural resources focused on the human use of Lake Superior and its shoreline. Approximately 400,000 visitors utilize the park annually in various year-round outdoor opportunities.

Currently, invasive species management in the park focuses on the fragile dunal ecosystems, but also includes preventative efforts. Invasive species vectors within the park include construction activities related to a number of major road projects. Some of the invasive species that occur within the park include spotted knapweed, garlic mustard, and a localized area of *Phragmites*.

1.4.1.9 Sleeping Bear Dunes National Lakeshore (SLBE)

Named after a complex of coastal sand dunes, SLBE features white sand beaches, steep bluffs reaching as high as 450 feet, thick maple and beech forest, and clear inland lakes. Established in 1970, SLBE includes approximately 65 miles of Lake Michigan coastline, half of which is on the mainland and half is on North and South Manitou Islands. SLBE has two main districts, the Platte District and Leelanau District, which includes the Manitou Islands.

The national lakeshore preserves scenic and publicly accessible resources. Its glacial headlands, Lake Michigan beaches, diverse habitats, water resources, and human history offer a range of recreational, educational, and inspirational opportunities. The national lakeshore contains compactly grouped features of continental glaciation, including post-glacial shoreline adjustment, ridge/swale complex, wind-formed dunes, perched dunes, and examples of associated plant succession. These features are of global importance due to their relatively unimpacted condition, the variety of features present, and their proximity to one another. The national lakeshore's native plant and animal communities, especially the northern hardwoods, coastal forests, dune communities, and interdunal wetlands, are of a scale and quality that is rare on the Great Lakes shoreline. These relatively intact communities afford an opportunity for continuation of the ecological processes that have shaped them.

Many conifer plantations and windrows exist within the lakeshore. These plantations were primarily planted to stabilize the sandy soils that had begun eroding after the native hardwoods had been removed. The plantations typically consist of species that lack local genotypes or are invasive conifers such as Scotch (Scots) and Austrian (black) pines, Norway spruce, and Douglas fir. Regular thinning of the conifer plantations along with the establishment of native hardwood species will replace the monocultures created by these plantations with the unique species rich northern hardwoods historically present.

The collection of historic landscapes, maritime, agricultural, and recreational, is of a size and quality unsurpassed on the Great Lakes and rare elsewhere on the United States' coastline. Invasive plant management within cultural landscapes poses challenges in managing cultural species that are or may become invasive.

There are historic districts (e.g., Glen Haven Village and Port Oneida) and other park areas where some invasive species, such as black locust, have been treated. However, there are a number of other park areas that need to be addressed. Accessibility to remote areas, especially the islands, is a challenge for the park.

1.4.1.10 Voyageurs National Park (VOYA)

VOYA is a 218,000-acre water-based park located on the Canadian border. Forty percent of the park consists of water, and 60 percent consists of land. VOYA was established in 1975, but the first people to travel to this region came thousands of years ago, after the last of the glaciers had melted away and left this low landscape of expansive lakes and wetlands. Many people called this place home before the European demand for beaver pelts brought fur traders into the region. This landscape was also home to people that sought to make their living off the land through logging, mining, commercial fishing, and recreation. The waterways of VOYA include one of the most important segments of the fur trade route used in the opening of northwestern North America. Enabling legislation directs the park to preserve, for the inspiration and enjoyment of present and future generations, the outstanding scenery, geological conditions and waterway system which constituted a part of the historic route of the Voyageurs who contributed significantly to the opening of the Northwestern United States.

VOYA is a scenic land and water environment of natural and cultural resources, character, beauty, and recreational potential. The diverse resources provide opportunities for outdoor recreation, scientific study, sportfishing, education, and appreciation of the Northwood's lake country setting. Located in northern Minnesota, the park protects 218,054 acres that includes roughly 134,000 acres of forested woodlands, 84,000 acres of water, 655 miles of undeveloped shoreline, and over 1,000 islands. The park's 55-mile northern boundary runs along the international border with Canada.

Purpose and significance statements within VOYA's GMP direct the park to preserve the scenery, geologic conditions, and interconnected waterways within the park for the inspiration and enjoyment of people now and in the future; preserve, in an unimpaired condition, the ecological processes, biological and cultural diversity, and history of the Northwood's lake country border shared with Canada; and provide opportunities for people to experience, understand, and treasure the lake country landscape — its clean air and water, forests, islands, wetlands, and wildlife — in a manner that is compatible with the preservation of park values and resources.

NPS has sole jurisdiction over terrestrial areas of the park. However, for the public waters within the park boundary, the park has joint jurisdiction with the Department of Natural Resources (DNR) and works cooperatively with them. The park also collaborates on projects with the Minnesota DNR and the Ontario Ministry of Natural Resources (OMNR), as the northern boundary runs through shared waters.

The bulk of the park's area is islands, which makes logistical access challenging. There are also mainland areas with two park entrances and six miles of road. Most of the land area was managed for timber. Wilderness areas, cultural landscapes, archeological sites, and historic Ojibwe Indian sites present challenges for invasive species management in the park. The islands were historically cabin recreation sites where invasive garden species, such as lilac, and rhubarb, surround hundreds of the cabin sites. Invasive plant management focus has been on controlling garden and invasive species, and prevention.

1.5 IMPACT TOPICS AND CUMULATIVE IMPACTS

1.5.1 Impact Topics and General Impact Thresholds

During an internal scoping meeting in January 2011 and an alternative development meeting in July 2011, and based upon input received during the public scoping period, the parks completed and refined an Environmental Screening Form (ESF) that was used to determine the impact topics carried forward

for analysis in this IPMP/EA. The ESF outlined numerous potential impact topics (see **Appendix B**). Each park representative carefully evaluated and provided input on the anticipated type(s), context, duration, and intensity of potential impacts for each of the impact topics identified in the ESF by park. Based on careful and methodic evaluation, each impact topic for each park was then ranked and assigned one of five, general “impact threshold” categories. Definitions of the general impact thresholds for potential impact topics included the following:

General Impact Thresholds

- **0 – No Effect:** Implementation of the alternatives and invasive plant treatment options would have no effect on the impact topic or the impact topic is not present in the park.
- **1 – Negligible:** Implementation of the alternatives and invasive plant treatment options would have a highly localized, short-term, and/or non-measurable effect on the impact topic.
- **2 – Minor:** Implementation of the alternatives and invasive plant treatment options would have a localized, short-term, and/or measurable but not readily noticeable effect on the impact topic.
- **3 – Moderate:** Implementation of the alternatives and invasive plant treatment options would have a regional, long-term, measurable, noticeable, and/or large-scale effect on the impact topic.
- **4- Major:** Implementation of the alternatives and invasive plant treatment options would have a substantial, regional, long-term, highly noticeable, and/or permanent effect on the impact topic.

Only those potential impact topics where the effect of the IPMP was expected to be moderate or major (i.e., those topics assigned an effects category of “3” or higher) were carried forward for full analysis on a per park basis. These include:

- General Vegetation
- Rare or Unusual Vegetation
- Species of Special Concern Including Potential/Critical Habitat
- Unique Ecosystems
- Recreation Resources, Visitor Experience, Esthetic Resources
- Park Operations

In most cases, moderate effects for a specific impact topic were only anticipated for one to a few individual parks as shown in **Table 1.5-1**. Resource-specific impact thresholds for these impact topics were developed for each of the impact topics carried forward for analysis. Resource-specific impact thresholds are provided in Chapter 4.0.

Table 1.5-1. Impact Topics and Parks Carried Forward for Analysis in Great Lakes IPMP/EA

Park	General Vegetation	Rare or Unusual Vegetation	Species of Special Concern, including Potential/Critical Habitat	Unique Ecosystems	Recreation Resources /Visitor Experience /Esthetic Resources	Park Operations
APIS			Yes			
GRPO						
IATR	Yes					Yes
INDU		Yes	Yes	Yes		
ISRO			Yes			
MISS	Yes				Yes	
PIRO		Yes	Yes			
SACN	Yes				Yes	
SLBE		Yes	Yes			
VOYA		Yes				

1.5.2 Impact Topics Dismissed from Analysis

Impact topics assigned an effect category of “0” were dismissed from analysis in their entirety because they either are not present in the parks or no effects are anticipated. Impact topics that would be affected in a negligible or minor way (i.e., those topics assigned an effects category of “1” or “2”) were also dismissed from detailed analysis in this IPMP/EA. **Table 1.5-2** provides a brief rationale for impact topics dismissed from detailed analysis in the Great Lakes IPMP/EA. The decision to dismiss an impact topic from analysis was based on the professional judgment of park staff and management.

Table 1.5-2. Impact Topics Dismissed from Analysis

Impact Topic Dismissed From Analysis	Rationale for Dismissal
Geologic Resources (bedrock, streambeds, etc.)	Geologic Resources were dismissed from analysis because the potential effects of invasive plant treatment options evaluated in this plan would have negligible or no effects on bedrock, streambeds, paleontological resources, or other park geologic resources.
Geohazards (sink holes, carsts, rock slides, mud slides)	Geohazards were dismissed from analysis because geohazards are either not present in the parks (e.g., sink holes, carsts) or invasive plant treatment options identified in this plan would not lead to or contribute to geohazard events such as rock slides or mud slides.
Air Quality	Air Quality was dismissed from analysis because invasive plant treatment options identified in this plan would likely have negligible effects on ambient air quality (i.e., less than 50 tons per year of pollutant emissions) and would not lead to any exceedances of the National Ambient Air Quality Standards (NAAQS). Invasive plant treatments that have the potential to yield pollutant emissions (e.g., from the use of ATVs, back hoes, gas-powered chain saws) within Class I areas in ISRO and VOYA would be evaluated on a site-specific basis and subject to additional NEPA compliance prior to treatment.

Impact Topic Dismissed From Analysis	Rationale for Dismissal
Soundscapes	Soundscapes were dismissed from analysis because potential noise-related impacts are evaluated under visitor experience and wildlife sections of this IPMP/EA.
Surface and Ground Water (quality or quantity)	Surface and Ground Water Resources were dismissed from analysis because invasive plant treatment options identified in this plan would be subject to numerous BMPs identified in Section 2.3.7 designed to prevent or reduce potential impacts to surface or groundwater quality, and thus effects on these resources would be local, short-term, and/or minor. Treatment options identified in this plan would have no effect on surface or groundwater quantity.
Streamflow Characteristics	Streamflow Characteristics were dismissed from analysis because invasive plant treatment options identified in this plan would not impede streamflow. Beneficial effects on streamflow (e.g., improvement of natural streamflow through the removal of reed canary grass, purple loosestrife, etc.) would be localized and/or minor.
Marine or Estuarine Resources	Marine and Estuarine Resources were dismissed from analysis because they do not occur within the Great Lakes National Parks.
Floodplains	Floodplains were dismissed from analysis because invasive plant treatment options identified in this plan would have no effects on floodplain function.
Wetlands	Wetlands were dismissed from analysis for all parks with the exception of VOYA. Wetlands are dismissed from analysis because treatment options identified in this IPMP/EA would not result in the disturbance or loss of wetland resources, and would not result in adverse modifications to the characteristic or function of wetlands. For all parks with the exception of VOYA, beneficial effects of treatment options would be localized, short-term, and/or minor.
Land Use	Land use, including occupancy, income, value, ownership, and types of use, was dismissed from analysis because it would not be affected by treatment options identified in this IPMP/EA.
Rare or Unusual Vegetation	Rare or Unusual Vegetation were dismissed from analysis for APIS, GRPO, IATR, ISRO, MISS, SACN, and VOYA because any potential adverse (e.g., potential for overspray) or beneficial (e.g., improvement of rare and unusual plant habitat) effects of treatment options on rare or unusual plants/habitats would be localized, short-term, and/or minor.
Species of Special Concern	Species of Special Concern were dismissed from analysis for GRPO, IATR, MISS, SACN, and VOYA because non-target impacts from invasive plant treatment options (e.g., overspray in species of special concern habitat) are expected to be localized, short-term and/or negligible based on the resource-specific BMPs defined in Section 2.3.7. Similarly, beneficial effects of invasive plant treatment on habitats and populations of species of special concern are

Impact Topic Dismissed From Analysis	Rationale for Dismissal
	expected to be localized and minor.
Unique Ecosystems, Biosphere Reserves, and World Heritage Sites	Unique Ecosystems were dismissed from analysis for APIS, GRPO, IATR, MISS, PIRO, SLBE, SACN, and VOYA because these resources/special designations within the parks. While ISRO is designated as a Global Biosphere Reserve, this impact topic is dismissed from analysis because treatment options would not have a negative impact on ISRO's biosphere status. Beneficial impacts of invasive plant treatments that may indirectly contribute to the park's maintenance of its biosphere designation would be localized and minor.
Unique, Essential, or Important Wildlife or Wildlife Habitat	Unique, Essential, or Important Wildlife or Wildlife Habitat were dismissed from analysis because potential, non-target effects of invasive plant treatment on wildlife populations (e.g., non-target effects of chemical treatments on invertebrates) and habitats would be localized, short-term, negligible, and substantially reduced or avoided based on BMPs identified in Section 2.3.7.
Unique, Essential, or Important Fish or Fish Habitat	Unique, Essential, or Important Fish or Fish Habitat were dismissed from analysis because this IPMP/EA defines management strategies for terrestrial and emergent invasive plant species only. In addition, non-target effects of invasive plant treatment on fish habitats would be localized, short-term, negligible, and substantially reduced or avoided based on BMPs identified in Section 2.3.7.
Recreation Resources	Recreation Resources were dismissed from analysis for APIS, GRPO, IATR, INDU, ISRO, PIRO, SLBE, and VOYA because invasive plant treatment options identified in this IPMP/EA would have a negligible or no effect on visitor supply and demand for recreational resources, visitation rates, or recreational activities/opportunities. Many of the BMPs identified in Section 2.3.7 would further reduce potential effects on recreational resources to levels that would be localized, short-term, and/or minor.
Visitor Experience	Visitor Experience was dismissed from analysis for APIS, GRPO, IATR, INDU, ISRO, MISS, PIRO, SLBE, and VOYA because invasive plant treatment options identified in this IPMP/EA would have a negligible or no effect on visitor experience. Many of the BMPs identified in Section 2.3.7 would further reduce potential effects on visitor experience by providing timing or locational limitations on treatment activities that could potentially affect visitor experience.
Cultural (Archaeological Resources, Prehistoric/Historic Structures, Cultural Landscapes), Ethnographic Resources, and Museum Collections	Section 2.3.7 includes several BMPs that are intended to reduce or mitigate potential negative effects of invasive plant treatments to cultural and ethnographic resources. In addition, the parks are required to comply with Section 106 of the NHPA (Section 1.3.7.1), which would ensure that invasive plant treatment options identified in this plan would have no adverse effects on historic properties, cultural landscapes, or cultural resources eligible to the NRHP. As a result of these BMPs, compliance with the NHPA, and because this IPMP/EA is intended to provide invasive plant treatment options (not cultural or ethnographic resource management tools), impacts to Cultural and Ethnographic Resources would be localized, short-term, and/or negligible, and

Impact Topic Dismissed From Analysis	Rationale for Dismissal
	therefore were dismissed from analysis. Museum Collections were dismissed from analysis because treatment options identified in this IPMP/EA would have no effect on museum objects, specimens, archival or manuscript collections and/or these resources do not occur within the parks.
Socioeconomics	Socioeconomics were dismissed from analysis because treatment options identified in the Great Lakes IPMP/EA would have negligible or no effects on the socioeconomic environment of the Great Lakes National Parks or surrounding regions/populations.
Minority and Low Income Populations, Ethnography	Invasive plant treatment options would have negligible or no effects on Minority or Low Income Populations or Ethnography. Therefore, these impact topics were dismissed from analysis.
Energy Resources	Invasive plant treatment options would have negligible or no effect Energy Resources such as oil and natural gas reserves, other mineral deposits, hydroelectric power, wind power, or solar power. Therefore, these impact topics were dismissed from analysis.
Other Agency or Tribal Use Plans	<p>Compliance with other Agency or Tribal Use Plans was dismissed from analysis for several reasons:</p> <p>NPS is engaged in several consultation efforts with relevant agencies and affected Tribes regarding this IPMP/EA;</p> <p>The goals of invasive plant treatment are presumed to be compatible with most agencies and Tribal use plans and objectives; and</p> <p>If site-specific treatment options identified in this plan are determined to conflict with another agency and/or Tribe's plans, NPS would likely engage in additional consultation with that agency/Tribe and/or complete additional compliance prior to implementing the treatment.</p>
Resource Use (including Energy Conservation Potential and Sustainability)	Implementation of invasive plant treatment options would have no effect on parks' abilities to manage for energy conservation and sustainability. Therefore, Resource Use was dismissed from analysis.
Urban Quality and Gateway Communities	Urban quality and gateway communities are dismissed from analysis as treatment options would not have a noticeable or measureable effect on these resources.
Long-term Management of Resources or Land Resource Productivity	Long-term Management of Resources and Land Resource Productivity were dismissed from analysis because treatment options would not have a measureable impact on the parks' ability to manage timber harvest resources, fisheries, pine plantations, agricultural leasing, or wildlife habitat management.

Impact Topic Dismissed From Analysis	Rationale for Dismissal
Fire Management	<p>Fire Management was dismissed for IATR because the park does not have a fire management plan that would allow them to use prescribed fire as a treatment tool under this plan.</p> <p>Fire Management was dismissed from analysis for the remainder of the parks as each of them have existing Fire Management, and they already use prescribed fire as a treatment option. However, site-specific uses of prescribed fire may require additional, site-specific evaluation and compliance under NEPA.</p>
Sandsclapes / Coastal Processes	<p>Sandsclapes were dismissed from analysis for GRPO and IATR because these resources do not occur within these parks. Sandsclapes are dismissed from analysis for APIS, INDU, ISRO, MISS, SACN, and VOYA because treatment options would only have a localized, short-term, and/or minor effect on beach erosion, changes in dunal formation, and/or sediment movement along coastal environments.</p>
Agriculture	<p>Agriculture was dismissed from analysis in this IPMP/EA for one or more of the following reasons:</p> <p>Prime and unique farmlands do not occur within the parks;</p> <p>Treatment options would not result in the permanent conversion of agricultural lands.</p>
Wilderness	<p>Wilderness was dismissed from analysis for GRPO, IATR, INDU, and MISS because designated Wilderness does not occur in these parks. Wilderness is dismissed from analysis for APIS, ISRO, PIRO, SLBE, SACN, and VOYA because any potential impacts to Wilderness and parks' ability to manage Wilderness due to treatment options would be localized, short-term, and/or negligible. In addition, Section 2.3.7 includes several BMPs that are intended to reduce the potential effects of invasive plant treatment in Wilderness.</p>
General Wildlife	<p>General Wildlife was dismissed from analysis because potential, non-target effects of invasive plant treatment on wildlife populations (e.g., non-target effects of chemical treatments on invertebrates) and habitats would be localized, short-term, negligible, and substantially reduced or avoided based on BMPs identified in Section 2.3.7.</p>
General Vegetation	<p>General Vegetation was dismissed from analysis for APIS, GRPO, INDU, ISRO, PIRO, SLBE, and VOYA because potential, non-target effects of invasive plant treatment on vegetation resources (e.g., overspray) would be localized, short-term, negligible, and substantially reduced or avoided based on BMPs identified in Section 2.3.7.</p>
Human Health and Safety	<p>Implementation of the Great Lakes IPMP/EA has the potential to increase park staff exposure to and/or increase health and safety risks from pesticides, toxic plants, mosquitos, heat exhaustion, and use of dangerous equipment such as chain saws. However, based on standardized safety requirements and</p>

Impact Topic Dismissed From Analysis	Rationale for Dismissal
	procedures, potential increases in human health and safety risks would be localized, short-term, and minor. Therefore, Human Health and Safety was dismissed from analysis.
Park Operations	Park Operations were dismissed from analysis for all parks with the exception of IATR. Park operations are dismissed from analysis for the remaining parks because implementation of treatment options are expected to have a minor impact on parks costs and staffing needs.
Migratory Birds	Migratory Birds were dismissed from analysis because the parks would comply with the BMPs provided in Section 2.3.7. As a result of these BMPs, implementation of invasive plant treatment options would have a negligible or no adverse effect on migratory bird populations, habitats, or activities.

1.5.3 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires assessment of cumulative effects in the decision-making process for federal actions. Brief, summary statements of cumulative impacts are included in the Chapter 4 conclusion statements. However, detailed evaluations of the cumulative impacts of the alternatives and treatment options, plus past, present and reasonably foreseeable actions are included in **Section 5.1**.

1.6 RELATIONSHIP OF THE GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS

Appendix C summarizes the relationship of the Great Lakes IPMP/EA to other park documents and plans.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 ALTERNATIVES

This chapter describes the alternatives analyzed and alternatives considered but eliminated from further analysis for the Great Lakes IPMP/EA. Issues to be analyzed in detail in Chapter 4 and issues considered but dismissed from further analysis are also described in this section. This chapter is organized into the following sections.

- Regulatory Measures Common to All Alternatives
- Actions/Treatment Options Common to Alternatives 2 and 3
- Alternative 1 – No Action Alternative, Continue with Current Management Plans
- Alternative 2 – Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)
- Alternative 3 – Species-Based Invasive Plant Management
- Alternatives Considered but Eliminated from Further Analysis

2.2 REGULATORY MEASURES COMMON TO ALL ALTERNATIVES

A number of federal, state, and local regulatory measures either directly or indirectly speak to management of invasive species, and therefore, are applicable to all alternatives considered for this project. Regulatory measures include laws, executive orders, and regulations and policies defined as:

- Federal Laws – acts passed by the U.S. Congress and approved by the President. All laws must be consistent with the U.S. Constitution. Federal laws have supremacy over state and local laws. Legislative history (i.e., committee reports, transcripts of congressional debates) clarifies the congressional intent in enacting a law.
- Executive Orders (EO) – directives from the President to departments and agencies of the executive branch.
- Regulations – rules for complying with a federal law developed by the authorized department or agency that also include codification of agency policy. For example, Title 36 Code of Federal Regulation (CFR) Section 1-199 contains general and specific regulations for the management and use of the National Park System (these regulations are augmented by the superintendent's compendium for each unit).
- Policies - guiding principles or procedures that set the framework and provide direction for management decisions. They may prescribe the process by which decisions are made, how an action is to be accomplished, or the results to be achieved.

The regulations described in the following sections are not an exhaustive list of applicable laws and statutes, but rather, focus on those regulatory measures that directly or indirectly apply to invasive plant treatment actions. The following sections describe the applicable federal, National Park Service (NPS), state, and local regulatory measures that apply to this project.

2.2.1 Federal Regulatory Measures

The following federal regulatory measures are applicable to all alternatives:

- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA);
- Federal Plant Pest Act of 1957;
- Federal Noxious Weed Act of 1974;
- Occupational Health and Safety Administration (OSHA) Hazard Communication Standard;
- EO 13112 on Invasive Species; and
- Plant Protection Act of 2000.

2.2.1.1 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA and the regulations established by the U.S. Environmental Protection Agency (EPA) (FIFRA, Sections 116-117, 165, 170-172) serve as the primary legislation for federal control of pesticide distribution, sale, and use. FIFRA defines the term pesticide as: (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pests; (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant; and (3) any nitrogen stabilizer, except that term “pesticide” shall not include any article that is a “new animal drug” within the definition of the Federal Food, Drug, and Cosmetic Act. As the Great Lakes IPMP/EA is specific to treating invasive plant species, the only types of pesticides that would be used under this plan are herbicides. However, to be consistent with NPS policy definitions and other pesticide reference materials the term pesticide is used consistently throughout the Great Lakes IPMP/EA to describe chemical treatments. Selective pesticides control certain target plants while limiting non target effects to desired plants.

Except for a small number of low-toxicity active ingredients that have been exempted, a pesticide cannot be legally used if it has not been registered with the EPA’s Office of Pesticide Programs. Pesticide registration is the process through which the EPA examines the pesticide’s active ingredient and formulation in addition to; the site or crop on which it is to be used; the amount, frequency and timing of its use; and storage and disposal practices. The EPA evaluates the pesticide to ensure that it will not have unreasonable adverse effects on humans, the environment, and non-target species. Once registered, a label is developed for each pesticide. Pesticide labels include directions for the protection of workers who apply the pesticide, directions for reducing exposure to non-applicators, and reducing potential impacts to the environment. Violations of pesticide label directions constitute a violation of the FIFRA. The storage and disposal of most pesticides is also regulated under FIFRA, with specific direction provided on pesticide labels. Under FIFRA, enforcement of the act is delegated to individual states. Because labels contain important application, safety, and storage and disposal information, labels must be kept with the product.

2.2.1.2 Occupational Health and Safety (OSHA) Hazard Communication Standard

Under the OSHA Hazard Communication Standard (Section 1910.1200), employers must provide workers with training, protective equipment, and information about hazardous substances. The employer is also required to maintain Material Safety Data Sheets (MSDSs) about these substances and to provide the employee with a copy of the sheets if they are requested. MSDSs for most pesticide chemicals can be obtained at the respective manufacturer’s website(s) and at the following websites:

- Greenbook – <http://www.greenbook.net/>; and
- Crop Data Management Systems – <http://www.cdms.net/manuf/acProducts.asp>.

Park resource managers must maintain a current set of MSDSs for any pesticides identified for use in their management programs.

2.2.1.3 Executive Order 13112

Section 2 of EO 13112 on Invasive Species, signed February 1999, directs federal agencies to identify actions that may affect the status of invasive species and to take action to:

- Prevent the introduction of invasive species;
- Detect, respond rapidly to, and control populations of such species in a cost-effective and environmentally sound manner;
- Monitor invasive species populations accurately and reliably;
- Provide for restoration of native species and habitat conditions in ecosystems that have been invaded;
- Conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and
- Promote public education on invasive species and the means to address them.

EO 13112 also established the Invasive Species Council and authorized the Council to develop and implement a National Management Plan (NMP) for invasive species. This first edition of this plan was finalized on January 18, 2001. The plan is updated every two years and serves as a blueprint for all federal action on invasive species. The current version is dated August 2008 and is available at the following website: <http://www.invasivespeciesinfo.gov/council/mp2008.pdf>.

2.2.1.4 Plant Protection Act of 2000

The Plant Protection Act of 2000 provides the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) with the authority to regulate biological control agents, or “any enemy, antagonist or competitor used to control a plant pest or noxious weed.” Plant Protection and Quarantine (PPQ) is a program within APHIS to safeguard agriculture and natural resources from the risks associated with the entry, establishment, or spread of animal and plant pests and noxious weeds to ensure an abundant, high-quality, and varied food supply. The PPQ is responsible for granting permission for the use of biological control agents within the U.S. Once a target invasive plant and biological control agent is identified, the PPQ goes through extensive host-specificity testing. This testing is designed to ensure that introduced biological weed control agents are limited in host range and do not threaten endangered, native, or crop plants. The plant species tested are chosen from three groups of plants. The first group identified includes those native North America plants in the same family, genus, species, or type as the target weed. The next group is threatened and endangered species in the same family, genus, or species as the target weed. Finally, species in other orders or families that are similar in form or shape or that have historical or chemical similarities to the target weed are tested. This last group of plants could include any economically or environmentally important plants. Precautions are also taken to ensure that the introduced agents are neither parasitized nor diseased so that when an introduction is made, only one organism is introduced. This requires that several generations of the proposed agent be reared in a laboratory environment.

The development of a list of host plants for host-specificity testing is aided by the involvement of an interagency committee. The Technical Advisory Group for Biological Control Agents of Weeds (TAG) is a voluntary interagency committee first formed in 1957 to provide advice to researchers. TAG members review petitions for biological control of invasive plants and provide an exchange of views, information and advice to researchers and those in APHIS responsible for issuing permits for importation, testing,

and field release of biological control agents of invasive plants. Members in TAG include weed managers from the Bureau of Land Management (BLM), NPS, Bureau of Reclamation, National Plant Board, Agricultural Research Service, U.S. Army Corps of Engineers (USACE), National Biological Control Institute, U.S. Geological Survey (USGS), U.S. Forest Service (USFS), EPA, APHIS, USFWS, Citrus Research and Education Center, Bureau of Indian Affairs (BIA), and the Weed Science Society. Once the USDA has approved an invasive biological control agent, a permit must also be obtained if this agent will be transported across state lines. In some instances, biological control agents may not be available from within the state, but can be obtained from sources located in other states. An application to transport a biological control agent must be prepared to obtain a permit from the USDA. The PPQ will review the request, assess the risks, and assign mitigating safeguards. Next, the request is faxed to the appropriate State Plant Regulatory Official for review and comment. After the State Official responds, the PPQ considers the comments and either issues or denies the permit.

2.2.2 State Regulatory Measures

Implementation of the IPMP/EA will conform to all applicable state laws. The states of Indiana, Michigan, Minnesota, and Wisconsin have established legislation and regulations that further define pesticide registration, pesticide usage, training and certification of pesticide applicators, and the criminal enforcement and civil penalties associated with the misuse of pesticides. All pesticide application will be conducted by or under the supervision of a certified pesticide applicator or in accordance with state laws. All NPS employees that apply for or have pesticide application as a significant element of their job description are encouraged to obtain state certification for pesticide application. Some states have passed legislation that requires applicators to post information to identify treated areas. Some legislation also specifies that areas proposed for treatment must be posted for a minimum period before the area is treated. The ten parks included in this project are located in four states. Each of these states has legislation that identifies noxious weeds. A noxious weed is specified by law as being especially undesirable, troublesome, and difficult to control. Definitions vary from state to state and according to legal interpretations.

2.2.3 Local Regulatory Measures

Implementation of the IPMP/EA will conform to applicable local laws. Under the IPMP/EA, parks will comply with more stringent local requirements, where applicable. For example, Cities and Counties may have established local ordinances and regulations that further define pesticide use. Some parks are located in more than one county. In cases where a Park falls within multiple County boundaries, the County-specific guidelines for invasive plant management may not be consistent. Under this scenario, park staff would comply with guidelines of the County within which they are implementing treatment actions. Under all alternatives, parks will abide by applicable local regulations.

2.2.4 National Park Service Policies and Guidelines

The NPS has a strong and clear policy on managing invasive plants in the parks. Parks are guided by three primary internal documents to manage invasive plants:

- NPS Management Policies 2006;
- Natural Resources Management Guidelines (NPS-77); and
- Park-specific Natural Resource Management Plans, General Management Plans, and Invasive Plant Management Plans.

2.2.4.1 NPS Management Policies 2006

General policies for management of invasive plants are provided in the Management Policies 2006, Section 4.4.4 – Management of Exotic Species and Section 4.4.5 – Pest Management. The most relevant sections are summarized below.

Management of Invasive Species

Section 4.4.4 of the NPS Management Policies requires parks to manage invasive species to prevent the displacement of native species. This section states, “Exotic species will not be allowed to displace native species if displacement can be prevented.”

Removal of Invasive Species Already Present

Section 4.4.4 of the Management Policies 2006 allows parks to remove invasive species that are already present within parks. Management Policies 2006 also lists specific criteria that must be met before an invasive species may be managed.

For a species determined to be invasive and where management appears to be needed, feasible, and effective, park staff should: (1) evaluate the species’ current or potential effect on park resources; (2) develop and implement invasive species management plans according to established planning procedures; (3) consult, as appropriate, with federal and state agencies; and (4) invite public review and comment, where appropriate. Programs to manage invasive species will be designed to avoid causing significant damage to native species, natural ecological communities, natural ecological processes, cultural resources, and human health and safety.

Section 4.4.4 of the NPS Management Policies also provides guidance to the parks on how to determine invasive plant management priorities. As such, “High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled. Lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successfully controlled.”

Pest Management

Section 4.4.5 provides guidance on general pest management as well as the definition and guidelines for invasive plant management adopted for this project. Pests are living organisms that interfere with the purposes or management objectives of a specific site within a park, or that jeopardize human health or safety. Invasive pests will be managed according to the invasive species policies provided in Section 4.4.4. All park employees, concessioners, contractors, permittees, licensees, and visitors on all lands managed or regulated by the NPS will comply with NPS pest management policies.

Pesticide Use

Section 4.4.5 of the Management Policies 2006 addresses the use of chemicals and biological control agents. A park resource management specialist must first determine that the use of pesticides or biological control agents is necessary, and that all other available options are either not acceptable or not feasible.

Once a resource management specialist determines that use of a chemical or biological control agent is necessary, its use must then be approved. Apart from few exceptions (see discussion of NPS 77 below),

all prospective users of pesticides in parks must submit a pesticide use proposal, which is reviewed on a case-by-case basis by the Regional and possibly the National Integrated Pest Management (IPM) Coordinator, as required. These proposals take into account environmental effects, costs, staffing, and other relevant considerations. The application or release of any biological control agent must also be approved by a National IPM Coordinator in accordance with DO 77-7, and must conform to the invasive species policies in Section 4.4.4.

Pesticide Purchase and Storage

Section 4.4.5 of the Management Policies 2006 provides guidance on the storage of pesticides:

“No pesticides may be purchased unless they are authorized and are expected to be used within one year from the date of purchase. Pesticide storage, transport, and disposal will comply with procedures established by the EPA, the individual states in which parks are located, and Director’s Order #30A: Hazardous and Solid Waste Management, Director’s Order 77-1: Wetland Protection, and Director’s Order 77-7: Integrated Pest Management (in preparation).”

2.2.4.2 Natural Resources Management Guideline – NPS-77

NPS-77: Natural Resource Management Guideline (NPS-77) (NPS 1991) provides resource managers with an overview of the integrated pest management concept, summarizes NPS policies regarding pesticide use, and provides directions for applying for approval to use pesticides. NPS-77 also provides general guidelines and recommendations for invasive plant management.

The transition of NPS-77 into Reference Manual (RM) 77 is in progress. The purpose of the RM will be to supplement and clarify existing NPS policies on invasive plant management. RM 77 will provide parks with additional information and procedures for carrying out NPS responsibilities included in NPS-77, DO 77-7, and Management Policies 2006. Once formalized, policy and guidance included in DO 77-7 and RM 77 would apply to any actions taken under the IPMP/EA. Since DO 77-7 has not been approved, the IPMP/EA was developed based on existing policy included in NPS-77 and Management Policies 2006. However, some concepts that are included in draft versions of DO 77-7 have been incorporated into the IPMP/EA to provide additional guidance, where appropriate.

Review and Approval to Use Pesticides

NPS-77 provides guidance on the review and approval process for pesticides, biological control, and other treatments. The natural resource manager at the park can approve treatments that do not involve the use of pesticides or biological control. However, if pesticides or biological control treatments will be used, a use proposal must be sent to the Regional IPM Coordinator. The Regional IPM Coordinator may then forward requests to the National IPM Coordinator in Washington D.C., as necessary. Parks that propose the use of pesticides or biological control agents must also follow established state and federal regulations. Pesticides must be reviewed and approved prior to use if they:

- Are applied to any lands, waters, or structures that are owned, managed, or regulated by the NPS;
- Are purchased by NPS or cooperating association funds;

- Are used on privately owned lands or lands managed by another government agency and are located within a park boundary, and NPS approval is required under the terms of a legally binding agreement between the park and the landowner; or
- Are purchased by the park for employees (e.g., insect repellants and bear deterrents).

The following pesticides do not require approval (unless approval is required by a regional director or superintendent):

- Personal insect repellants and bear deterrents that are purchased by park employees or visitors from their own funds and applied to their own persons, pets, and privately owned livestock;
- Personal insect repellants and bear deterrents sold by concessioners; and
- Disinfectants and cleaning solutions used in restrooms and restaurants, even though these products have EPA pesticide registration numbers.

To obtain approval for pesticide use, each park is required to prepare a pesticide use proposal. An intranet-based system has been developed whereby resource managers can submit these requests electronically. The Regional and, as necessary, the National IPM Coordinator then reviews these requests. Except as noted below, Regional IPM coordinators review pesticide use proposals and either approve them, approve them with conditions, or deny them (and provide alternative methods). Currently, the following pesticide use proposals also require a second level of review by the National IPM Coordinator:

- Pesticide uses that involve aquatic applications or situations in which the applied pesticide could reasonably be expected to get into waters or wetlands;
- Pesticide uses that may affect rare, threatened, or endangered species or associated critical habitat;
- Pesticide use involving aerial application; and
- Restricted-use pesticides as defined by the EPA.

Broadcast applications over a specified acreage may also require approval from the National IPM Coordinator under DO 77-7. While not yet formally approved, approval should be obtained from the National IPM Coordinator for any chemical treatment of 400 or more contiguous acres. The decision by either the Regional IPM Coordinator or National IPM Coordinator to approve a pesticide use proposal is based on its conformance with NPS policies and guidelines, a determination of whether other alternatives are available or feasible, and whether the pesticide is registered for the proposed use. If proposals are denied, the Regional or National IPM Coordinator will provide a written explanation of the denial and suggestions for suitable alternatives.

Pesticide use proposals are approved on an annual basis, with each approval expiring on December 31 of the year of approval. However, approval can also be obtained for situations where the pesticide need was not anticipated at the beginning of the year, including emergency situations. These emergency pesticide use proposals may be submitted via telephone, fax, or email to the Regional IPM Coordinator, or in their absence, the National IPM Coordinator.

Reporting Pesticide Use

Under NPS-77, parks are required to maintain records of pesticide use, including pesticide use reports, during the year. Pesticide use reports are submitted electronically using the intranet-based IPM System. Pesticide use reports must be entered into this system by March 15 of each year.

Review and Approval to Use Biological Control Agents

Any park proposing to release a biological control agent must receive approval from the Regional and National IPM Coordinator. Biological control use requests are first submitted to the Regional IPM Coordinator. The Regional IPM Coordinator may deny the proposal, modify the proposal in cooperation with the park and forward the modified request, or forward the request (without modification) to the National IPM Coordinator for review and approval. State permitting may also be required prior to the release of a biological control agent.

Other Pesticide Related Guidelines

NPS-77 also provides guidelines for the following activities: pesticide purchase, pesticide storage, disposal of pesticides, pesticide safety, and contracted pest management services.

Invasive Species Management

NPS-77 also provides guidance on a number of invasive species management topics. These topics include prevention of invasive species invasions, management of established invasive species, biological control, invasive plant management and pesticide use, and environmental compliance and planning documents. This guidance has been used to develop this IPMP/EA. NPS-77 also includes guidance for NPS concessioners that manage pests on NPS property or in NPS buildings. Based on NPS-77, the NPS has developed guidance to help educate parks on their responsibilities for implementing IPM. The guidance document is titled 2010 Guidance on Integrated Pest Management Procedures: Park, Superintendent, Region, and WASO IPM Responsibilities (NPS 2010), and at the time of this IPMP/EA can be accessed at: www.nps.gov/training/tel/Guides/ipm_responsibilities_08102010.doc.

2.3 ACTIONS/TREATMENT OPTIONS COMMON TO ALL ALTERNATIVES

The following sections describe the cultural, mechanical, chemical, and biological treatment options that parks could implement under all alternatives. However, the parks' ability to use, and the decision making tools used to prioritize and select if, how, when, and where treatment options are implemented, could differ substantially under each alternative. Under Alternative 1 (No Action/Current Management Action), individual parks' ability to implement the treatment options in this section would be substantially reduced when compared to Alternatives 2 or 3.

2.3.1 Education Programs

Under the Great Lakes IPMP/EA, visitor awareness or public education activities could be an integral component of invasive plant management at each of the ten parks. These programs would provide general information on specific invasive plant management issues and strategies for controlling individual invasive plants, and would also provide guidance on why the public should be concerned

about invasive plant impacts. Parks could offer training to the public, seasonal park staff, and park volunteers on prevention or early detection and eradication of invasive plant species.

Under the Great Lakes IPMP/EA, internal training and awareness programs could be developed at each park. These programs would be used to educate park employees and volunteers on invasive plant identification and invasive plant management programs. Through an effective education program, park staff would come to recognize potential invasive plant problems, allowing resource managers to take action before problems develop. Informed park staff members understand invasive plant management objectives and are more likely to support an invasive plant management program. These programs may include training on how to identify invasive plants that are known to occur within the park and invasive plants of concern that have not yet been located within the park, but that could occur within the park in the future. During this training, employees and volunteers would be provided with a NPS point of contact for reporting the locations of new invasive plants or new infestations that are observed within the park. Training could also include an overview of the Great Lakes IPMP/EA to help staff and volunteers understand the decision-making process, what treatments are being used at that park and the justification for their use, and sensitive resource considerations. Other internal education programs include:

- Incorporating invasive plant management information at all levels of NPS training, including planning/design, management, construction, interpretation, maintenance, law enforcement, and resource management;
- Using established and upcoming media (electronic media, publications, permits, and contracts) to educate NPS staff and commercial users about invasive plant management issues; and
- Interpreting and communicating the results of the latest research on invasive plants to resource managers, interpreters, maintenance personnel, and others.
- Educating contractors about invasive species control and prevention with respect to cleaning and moving equipment.

Park visitors and others concerned with management activities at any of the ten parks could be advised of invasive plant management practices included in the IPMP/EA and the benefits of implementing these approaches to address specific invasive plant management issues. Parks may develop a variety of avenues to educate the public, including education programs, exhibits, and public outreach programs. These programs could be used to educate the public on:

- The potential threats of unwanted invasive plants to park resources;
- Methods for preventing the introduction of invasive plants into the park;
- Invasive plant management planning;
- Invasive plant management priorities within the park;
- Treatment methods used within the park to control invasive plants, and why these treatments were selected; and/or
- Maintenance of certain invasive species for the preservation of historic and cultural landscapes and/or ethnographic uses.

These programs could also include publication of press releases using local media and articles in park newsletters, bulletins, and on park websites. In the case of large-scale treatments, parks could provide information to park staff, residents of surrounding areas, and park visitors. In the case of highly visible projects, formal interpretive programs or materials could be developed and press releases or briefings prepared. Some parks may also organize volunteer efforts to provide the public with “hands-on”

opportunities to become involved in invasive plant management. Programs may also be developed for local schools to educate students on the threat and management of invasive plants. Under the Great Lakes IPMP/EA, specific public awareness activities may also include:

- Creating and disseminating, through all available local outlets, educational materials that increase awareness of, understanding of, and support for the full range of invasive plant management activities;
- Participating in or creating local area field days and other types of meetings to highlight the invasive plant management plan or current invasive plant management projects; and/or
- Encouraging public support through volunteer invasive plant management projects and activities.

2.3.2 Collaboration Measures

Under the Great Lakes IPMP/EA, the ten parks should collaborate with one another on a limited basis as part of invasive plant management planning. However, care should be taken not to pattern programs too closely after one another and to fully appreciate all of the differences between parks. Complementing park staff efforts, the NPS created the Exotic Plant Management Program (EPMP) in 2000 that now supports 16 teams working in over 225 park units. Exotic Plant Management Teams are led by individuals with specialized knowledge and experience in invasive plant management. Each field-based team operates over a wide geographic area and serves multiple parks to increase operational efficiency. In addition to NPS staff, the EPMTs work with volunteers, contractors, and service organizations to meet the Agency's mission which is to preserve... "unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world."

The Great Lakes Exotic Plant Management Team (GL-EPMT) provides support to the ten parks evaluated in this IPMP/EA. At the time of this EA, information on the NPS' EPMT program was found at the following website: http://www.nature.nps.gov/biology/invasivespecies/EPMT_teams.cfm.

The parks also collaborate with tribal governments, other federal officials, and state, county, and private entities. The type and extent of collaboration varies greatly among park units. In some cases, extensive collaboration is necessary in parks with management partnerships such as those parks that have Memorandums of Understanding (MOUs) with Cooperative Weed Management Areas (CWMAs). For parks supporting habitats of and populations for federally listed species under the Endangered Species Act (ESA), consultation with the USFWS is required prior to implementing treatment options in habitats for listed species. Invasive plant management requires extensive coordination among the NPS, and private landowners.

Under the Great Lakes IPMP/EA, other collaboration activities may include:

- Working with universities, state and federal agencies, and organizations such as the Midwest Invasive Plant Network to develop education programs and courses for resource managers and others responsible for managing potential and emerging invasive plants;
- Working with responsible agencies and the concerned public to incorporate invasive plant management techniques into pesticide applicator training courses;
- Participating in and conducting seminars or workshops on invasive plant management;

- Cooperating with other agencies to develop and disseminate educational materials (publications, posters, videos, and internet) to the public, interested organizations, and agency employees;
- Working with the horticultural industry to increase awareness of the invasive plant problem and encourage them to discontinue growing problem species;
- Working with non-profit organizations, such as local conservation districts and youth conservation corps, on costly larger scaled projects such as removal of invasive trees and conifer plantations through clear cutting and selective thinning to restore upland hardwood forests; and
- Developing collaborative groups that include multiple agencies and the public to assist with invasive plant management and to ensure that planning incorporates the concerns and issues of land managers and landowners with similar invasive plant management issues.

2.3.3 Cultural Treatments

Cultural treatments are practices that promote the growth of desirable plants and reduce the opportunities for invasive plants to grow. Examples include irrigation and seeding of native plant species. Cultural treatment methods involve manipulating treatment areas to present invasive plants with effective native competitors. Examples of cultural treatments that could be implemented by parks include:

- Prevention
- Reseeding/Planting and Restoration
- Flooding/Irrigation
- Cover Crops and Nurse Crops
- Smothering
- Prescribed Fire

2.3.3.1 Prevention

Preventing establishment is an economical way to manage invasive plants. Under any of the alternatives, parks could employ some programs to limit the potential for introduction and expansion of invasive plants as a result of human activities. Examples of preventative measures include boot brush stations, interpretive education, using clean fill (certified weed free soil), proper grading and road maintenance, cleaning lawn mowers and other equipment, timing of mowing (i.e., mowing before species go to seed), and contractor and cooperator guidelines and communication. Under all alternatives, educating park contractors about the threats of invasive species, and how infestations can be prevented (e.g., cleaning vehicles, equipment, boots, etc.) should be a high priority.

2.3.3.2 Reseeding/Planting and Restoration

Reseeding could be used to encourage the re-establishment of native plants and to prevent the establishment of invasive plants. As part of restoring native plant communities, parks could reseed areas that do not have adequate seed banks to recover naturally, or in areas where native species can be used to out-compete invasive species. For this treatment option, parks would require that materials used for reseeded, planting and restoration be non-invasive, preferably native species, of the same genetic provenance (genotype) of the plants from a similar habitat in adjacent or local areas to maintain the integrity of park flora (Management Policies 2006). Overseeding (i.e., seeding on top of established vegetation) could be used in areas where park staff anticipates planted species to outcompete existing invasive species.

2.3.3.3 Flooding/Irrigation

Under the Great Lakes IPMP/EA, irrigation could be implemented on a limited basis during the first year or two of plan implementation. However, no surface water depletions or accretions related to irrigation would occur under either alternative. If drought conditions are forecasted, resource managers should delay the purchase, seeding, or planting to avoid the need for irrigation. Resource managers should also confirm that there is water available for irrigation should the need arise. Seasonally timed plantings and seedings can increase successful establishment and minimize the need for irrigation.

In areas where control of the hydroperiod/manipulation of the water table is feasible, flooding and dewatering may also be available as a treatment option under the Great Lakes IPMP/EA. Artificial water table manipulation would require separate, site-specific analysis under NEPA. However, natural water table manipulation would be covered under this EA. Flooding may be a viable treatment option in areas where dense infestations of invasive species (such as reed canary grass) occur. Flooding works best when combined with tilling (i.e., plowing or harrowing). For maximum efficacy when treating invasive species with flooding, infestations should first be tilled through the sod layer (i.e., the top layer/several inches of the ground surface including soil and roots). Tilling may be required several times before the stems and rhizomes are exposed and allowed to desiccate. When winter flooding begins, flood gates should be closed and the area inundated with water at least 18 inches deep for an extended period of time (typically until the spring season). Dewatering areas prior to pesticide application can sometimes minimize collateral effects. Dewatering coupled with mechanical techniques can also be an effective treatment tool. For example, dewatering *Typha* spp. infestations first, followed by cutting, and completed with flooding, has been shown to be a successful treatment.

2.3.3.4 Cover Crops and Nurse Crops

Under the Great Lakes IPMP/EA, parks would have the ability to use cover crops or nurse crops to aid in the prevention of invasive species and encourage the growth of native species. Nurse crops typically consist of an annual species used to assist in establishment of perennial vegetation. Cover crops are typically considered place holders or space holders when reseeding with desired species is delayed for various reasons. For this treatment option, parks would require that cover or nurse crop seeds used in seeding, planting, and restoration be non-invasive, preferably native species, of the same genetic provenance (genotype) of the plants from a similar habitat in adjacent or local areas and free of weed seed to maintain the integrity of park flora (Management Policies 2006). The downside of using some nurse or cover crops is that there is limited availability of native annuals on the market and costs are prohibitive.

2.3.3.5 Smothering/Solar Sterilization

Smothering of invasive infestations can be accomplished in smaller areas with the use of thick woven geotextile shade cloth such as Mirafi® or Amoco®. The cloths would typically be held in place by gutter spikes and washers and duck-bill tree anchors. Shading will generally kill all vegetation under the cloth if left for an extended period of time. Solar soil sterilization (sometimes called soil solarization) is a technique most typically used on small areas for vegetation and soil borne pathogen control. Plastic is spread over the soil surface and secured tightly around the edges. The plastic is left on site during the growing season for extended periods of time (weeks if not months). Heat builds up between the soil and plastic on sunny days. Solar sterilization, as the term implies, is non-selective. It is a rather aggressive technique and should only be used where the intent is to kill everything. One of the benefits of this technique is the seed bank is largely destroyed within the top couple of inches of the soil surface. One of the down sides to this technique is that it kills almost all of the soil microbiota too within the top couple of inches of the soil.

2.3.3.6 Prescribed Fire

Using prescribed fire treatments consists of applying fire to a predetermined area to reduce the growth of invasive plants and to increase the growth of desirable plants. Prescribed fire success differs substantially among species, but is typically most effective when the invasive plant is more susceptible to the effects of fire when compared with intermingled native plants. Prescribed fire may also be used to control invasive cool-season plants or for fuel reduction following large scale mechanical treatment (e.g., removal of burn piles).

It should be noted that prescribed fire can exacerbate some invasive species problems and a single prescribed fire generally has minimal effect. Single prescribed fires typically have limited success in treating invasive species, and therefore, repeated use of prescribed fire in infested areas has a higher rate of success.

The use of prescribed fire is also limited by fire ecology of the infested area and current fuel loads. Prescribed fire is best used in situations where fire was part of the pre-European ecology and where native fire-adapted species still exist. Sufficient fuel loads must be present for prescribed fires to be successful. Once certain invasive species dominate there is often not enough fuel to successfully carry a prescribed fire.

Parks, following their fire management plans that include the use of prescribed fire, would be able to use prescribed fire treatments to manage invasive plants. Invasive plant management objectives for each prescribed fire treatment are defined in a project-specific prescribed fire plan. These plans may also include follow-up treatments for post-fire invasive plant discoveries.

APIS, INDU, ISRO, GRPO, MISS, PIRO, SACN, SLBE, and VOYA have fire management plans that include the use of prescribed fire as an invasive plant management tool. These parks could continue to use prescribed fire in accordance with these existing plans. Prescribed fire could also be used at these parks as part of vegetation management programs to restore native plant communities and the processes, such as fire, that maintain them. Prescribed fires may require additional, site-specific analysis under NEPA.

IATR does not have a fire management plans and therefore does not currently use prescribed fire as a vegetation management tool. Under this IPMP/EA, IATR could be required to undergo additional, site-specific NEPA analysis or complete a fire management plan before employing fire management as a tool to control invasive species.

2.3.4 Manual/Mechanical Treatments

Under the Great Lakes IPMP/EA, parks could use manual or mechanical treatments to control invasive plants.

Manual treatment can be used in any area. Manual treatment is most effective for pulling shallow-rooted species. Manual pulling of deep-rooted species may require repeated treatment to effectively deplete the root system. Portions of roots can break off, remain in the soil, and regenerate. Hand pulling is conducted by removing as much of the root as possible while minimizing soil disturbance. However, it should be noted that disturbance of the soil can stimulate the seed germination of both native and non-native species.

Mechanical treatments involve physical damage to or removal of part or all of the plant. Types of mechanical treatment include using hand cutting tools, pulling tools, power tools, or heavy equipment. Hand cutting tools are a treatment option for removing the aboveground portions of annual or biennial plants. Use of hand tools, such as trowels, shovels, and pulaskis are simple forms of mechanical treatments. These tools can be used to remove a larger portion of the root system or to sever the plant's taproot below the point where nutrients are stored. Efforts would be made to collect and dispose of viable seeds from plants that are cut, or to cut plants when seeds are not viable. Pulling tools are a treatment option for removing individual plants that are deep-rooted. Pulling tools (e.g., weed wrenches™) could be used to control small infestations, such as when an invasive plant is first identified in an area. These tools grip the weed stem and remove the root by providing leverage. Pulling tools are most effective on firm ground rather than soft, sandy, or muddy substrates.

Power tools, such as mowers, are used to treat small to large infestations. Mowers work best in large, relatively flat treatment areas that do not include sensitive environmental resources. Weed whips and brush blades can be used at small sites, selectively around sensitive vegetation or sites that are inaccessible or are too rocky to be mowed. Power tools (such as weed whips, brush blades, chainsaws, tractors, or utility terrain vehicle (UTV)-pulled mowers) remove aboveground biomass, reduce seed production, and reduce plant growth. Power tools do not remove biomass, which is sometime desired. Power tools are useful for controlling annual plants before they set seed. Power tools can also be used along with other treatments, such as chemicals or prescribed fire, to treat perennial invasive plants.

Heavy equipment (such as bulldozers, tilling equipment, hydro-axe or heavy loaders, etc.) can be used to treat dense invasive plant infestations with greater control and efficiency. Heavy equipment would only be used in areas of dense invasive plant infestations, such as invasive tree infestations and conifer plantations, and where there are no natural or cultural resources that could be impacted by this equipment. The use of heavy equipment could trigger the need for additional, site-specific analysis under NEPA. Depending on the outcome of site-specific NEPA analyses, parks could decide to implement the use of heavy tools or determine that such activities would result in substantial impacts and therefore, preclude their use.

Mechanical methods are highly selective for individual plants and would generally be employed in concert with other treatments, such as the use of pesticides. For example, manual or mechanical treatments may be followed by application of pesticides or prescribed fire to treat re-sprouts and new seedlings. Hand weeding by itself is typically ineffective in controlling large infestations of invasive species.

Both manual and mechanical treatments could be used to treat individual plants or specific treatment areas.

2.3.5 Biological Treatments

Biological treatments, commonly referred to as biological control, or biocontrol, involve the use of "natural enemies" (including insects and microorganisms) to reduce the abundance of an invasive plant. Natural enemies are imported from areas where the target invasive plant occurs as a native plant. They are deliberately released into areas where the plant is invasive. These natural enemies limit the growth or reproduction of invasive plants. Examples include plant-feeding insects such as leaf beetles (*Galerucella* spp.) for purple loosestrife. Leaf beetle larvae feed on bud, leaf, and stem tissue of purple loosestrife.

Biological control may be a long-term solution for controlling some invasive species that are too widespread for control by other means or for invasive plants that are readily invading a park. Biological control is best suited for infestations of a single, dominant invasive plant species that is not closely related to other native plant species. All biological control agents that are currently used by parks for management of invasive plants have been approved by APHIS. APHIS-approved biological control agents have undergone extensive testing to confirm that the agents are known to be host-specific and have a negligible risk for becoming a pest. Under the Great Lakes IPMP/EA parks would use APHIS-approved biological control agents.

Release of biological control agents adhere to the following Best Management Practices (BMPs):

- Biological control agents should be released in each climatic zone that is occupied by the host so that the natural enemy has a chance to develop in all areas where the host occurs.
- The number of biological control agents released should account for the size and density of the treatment area and the number of agents required to maintain a viable biological control agent population.
- The reproductive capacity of the biological control agent, and its ability to overwinter and naturalize should be evaluated prior to its use as a treatment option.
- More than one release in an area may be necessary for successful establishment.
- Releases should be synchronized with the time period when the host is present.
- Biological control agents should be released at times of the day when they will not disperse from the treatment area.
- Surveys for biological control agents should be completed several times during the season to monitor biological control agents.

Under the Great Lakes IPMP/EA, insects would be the primary biological control agent used.

A summary of biological control agents available for use under the Great Lakes IPMP/EA is provided in **Table 2.3-1**. However, should additional biocontrols be approved by APHIS within the lifespan of this IPMP/EA, those biocontrols could also be available for use by the parks.

Table 2.3-1 Summary of Biological Control Agents Available for use by the Great Lakes National Parks to Control Invasive Species

Target Species	Biological Control Agent
Canada Thistle	Stem mining weevil, seed head weevil, stem and shoot gallfly, flowerhead weevil, defoliating weevil, painted lady butterfly caterpillars
Leafy Spurge	Flea beetles, leafy spurge gall midge, stem boring beetle, root-boring moth
Purple Loosestrife	Leaf beetle
Garlic Mustard	Research pending approval
Spotted Knapweed	Root weevils, flower weevils, seedhead feeders

2.3.6 Chemical Treatments

Under the Great Lakes IPMP/EA, parks could use a variety of pesticides to control invasive species.

Non-selective pesticides can be effective for treating pure stands of a single invasive plant species in areas where desirable plants are scarce or absent. Pesticides can also be used to treat small patches of invasive plants where hand pulling or cutting is not feasible.

Using chemical treatments consists of applying pesticides as prescribed by their labels, using a variety of application methods. Examples of application methods include portable sprayers, utility terrain vehicles (UTVs) equipped with sprayers, aerial application (helicopter and fixed-wing), and hand-wicking.

Recent technology has produced several specialty pesticides that are very selective in control of certain weed species at low application rates. These low application rates greatly reduce non-target plant effects and have resulted in successful control efforts in mixed plant communities.

Parks must obtain approval from either the Regional or National IPM Coordinator before using a pesticide. The unique combination of active ingredient and formulation of the inert ingredients makes each pesticide unique. The combination of an active ingredient with compatible inert ingredients is referred to as a formulation. Pesticides are formulated for a number of different reasons. A pesticide active ingredient in a relatively pure form is rarely suitable for field application. An active ingredient usually must be formulated in a manner that:

- Increases pesticide effectiveness in the field;
- Improves safety features; and
- Enhances handling qualities.

A pesticide's formulation gives the product its unique physical form and specific characteristics. The unique formulation enables a pesticide to treat specific species or to treat species in specific ecosystems. Many of the pesticides contemplated in this IPMP/EA, for example, are formulated specifically for wetland use.

Pesticides have three names: trade name, common name, and chemical name (formula). For example:

- Roundup® (trade name);
- Glyphosate (common name, also the active ingredient); and
- N-(phosphonomethyl) glycine (chemical name)

A summary of pesticides available for parks to use under the Great Lakes IPMP/EA is provided in **Table 2.3-2**. However, should additional pesticides appropriate for the Great Lakes region be approved by the EPA within the lifespan of this IPMP/EA, those treatments would also be available for use by the parks.

Table 2.3-2 Sample List of Chemical Treatments (Pesticides) Available for use by the Great Lakes National Parks to Control Invasive Species

Active Ingredient	Trade Names	Target Species
Aminopyralid	Milestone®	Canada thistle, spotted knapweed, common tansy, musk thistle, amur maple, bull thistle, orange hawkweed, black locust, scotch thistle, Oriental bittersweet, Japanese knotweed
Glyphosate	Roundup®, Rodeo®, Aquamaster®, Glypro®	Periwinkle, purple loosestrife, Japanese knotweed, garlic mustard, dame's rocket, musk thistle, Grecian foxglove, reed canary grass, bull thistle, yellow iris, Japanese barberry, white poplar, baby's breath, Phragmites/common reed grass, goutweed, blue lyme grass, common mullein, Japanese hedge parsley
2,4-D	2,4-D, Aqua-Kleen®, Barrage®, Esteron® brand 99, and Weedone®	general broad leaf weeds
Clopyralid	Transline®, Curtail®, Reclaim®, and Lontrel®	White & yellow sweet clover, orange hawkweed, spotted knapweed, common tansy, musk thistle, bird's foot trefoil, black locust, crown vetch
Picloram	Tordon®, Grazon® PC, Tordon® K, and Tordon® 22K	Spotted knapweed, periwinkle
Metsulfuron Methyl	Escort®	Common tansy, common mullein, wild parsnip
Imazapic	Plateau®	Leafy spurge, cypress spurge
Triclopyr	Garlon 4®, Garlon 3A®, Ultra®	Common buckthorn, amur maple, Japanese barberry, euonymus/burning bush, Siberian pea shrub, white poplar, periwinkle, prickly ash, autumn olive, black locust, common mullein, dame's rocket, invasive bush honeysuckle, Lombardy poplar, multiflora rose, Oriental bittersweet, tree of heaven, Japanese hedge parsley, garlic mustard, forget-me-nots
Sethoxydim	Vantage®	Reed canary grass in dry/upland areas
Imazapyr	Habitat®, Arsenal®	Reed canary grass, Phragmites/common reed, hybrid cattail

Under the Great Lakes IPMP/EA pesticides could be applied a number of different ways:

Foliar spray applications involve spraying green foliage with pesticide. Pesticides used for foliar application are mixed at low concentrations (typically 0.25 – 5 percent by volume) and are typically mixed with water, though a surfactant / adjuvant may be added to increase absorption on species with waxy leaves. An adjuvant is a substance added to a pesticide to aid its action, but has no pesticide action by itself. Some pesticides require the addition of an adjuvant to work effectively. Surfactants are adjuvants that are used in conjunction with pesticides to increase absorption. A surfactant is a surface-active ingredient that lowers surface tension of the solvent in which it is dissolved or the tension between two immiscible liquids. Safety procedures and MSDSs must be kept on site for all surfactants or adjuvants used under the IPMP/EA.

Foliar applications are made with a low pressure (20-50 psi) backpack sprayer at rates of one gallon or less per minute. Foliar treatments are applied after full leaf expansion in the spring and before leaves senesce in the fall. Pesticide treatments are dried, for example, for at least one hour at an air

temperature above 60°F to ensure adequate absorption and translocation. However, the drying time and temperature varies with the chemical and formulation. In areas that receive significant public use, and depending on what pesticide is used, it is often necessary to close off the treatment area until the pesticide has completely dried. Pesticides are typically applied with a backpack, motorized spray tank, or similar hand-operated pump sprayer equipped with a flat spray tip or adjustable cone nozzle. Spray is applied to the leaves and stems of target plants using a consistent back and forth motion to promote complete and consistent coverage. Pesticides would be applied so that they thoroughly cover foliage, but not to the point of run-off.

Aerial spray application of pesticides would only be conducted for sites that meet one of the following criteria:

- The infestation covers a large area and would be most effectively treated from the air;
- There is no acre limit for using aerial application, however, aerial application sites are typically over 20 acres and have fairly dense invasive plant coverage;
- The infestation covers a small area but can be successfully treated using a microfoil boom or similar apparatus that allows for a limited band of spray. A microfoil boom can be used to spray widths as small as 12 feet, effectively treating small infestations. Microfoil booms are designed specifically to minimize pesticide drift;
- The infestation is very remote and treatment using other application methods would require an inordinate amount of time for crews to arrive and apply ground treatment; and/or
- The infestation is located on rough, steep terrain that prevents ground application and is too dangerous for employees on foot.

Cut Surface Applications include cut stump methods, hack and squirt, and frill (girdle). Higher concentrations of pesticide (10-50 percent by volume - mixed with either water or penetrating oil) are usually used in cut stump applications. The main advantages to these methods are: (1) they are very economical, (2) there is minimal probability of non-target damage through drift or overspray, (3) minimal application time, and (4) they can be used in the winter with appropriate pesticide as long as snow depth does not impede proper application to root collar. Backpack sprayers or spray bottles are also effective for all of these methods. There are four types of cut stump methods that could be implemented under the Great Lakes IPMP/EA:

- Cut Stump Method: Horizontally cut stems at or near ground level; all cuts should be level, smooth, and free of debris. Pesticide is applied immediately to the cambial area (i.e., the lateral meristem, including the vascular cambium and cork cambium) of the stump and root collar.
- Girdling Method: Bark is removed from the entire circumference of the trunk of a woody plant with pesticide applied to the exposed area, resulting in the death of wood tissues beyond the damage. This method allows for the removal of an individual tree within an ecologically protected community.
- Hack and Squirt Method: Using an axe or similar cutting tool, uniformly spaced cuts are made around the base of the stem. The cuts should angle downward, be less than 2.5 cm (1 inch) apart, and extend into the sapwood. Apply pesticide to each cut to the point of overflow.
- Frill Method/Drill and Frill: Using an axe or similar cutting tool, continuous cuts are made around the base of the stem. The cuts should angle downward, be less than 2.5 cm (1 inch) apart, and extend into the sapwood. Apply the recommended pesticide to the entire cut area to the point of overflow.

Basal bark applications involve applying pesticide to the bark of uncut stems near ground level. Ground level is usually avoided to avoid collateral problems with roots of other plants growing in and around the target species. Basal bark applications are usually mixed at higher concentrations (10-50 percent by volume) and mixed with vegetable or petroleum based oil. This method is used on species that sprout prolifically if the stem is cut (such as Tree of Heaven or black locust). A variant of this method is injecting stems/trunks with a small dose of pesticide. Devices such as the EZ-Ject® Lance as well as other products are used to implement this method. Basal bark treatments are effective for controlling woody vines, shrubs, and trees. Treatments can be made any time of year, including the winter months, except when snow or water prevents spraying the basal parts of the stem. Proper plant identification is crucial during the dormant season due to the absence of foliage. Pesticide is applied with a backpack sprayer using low pressure (e.g., 20-40 psi) with a straight stream or flat fan tip. To control vegetation with a basal stem diameter of less than 7.6 cm (3.0 in) parks would typically apply specified pesticide-oil mixture on one side of the basal stem to a height of approximately 15.25 cm (6 in) from the base. Pesticide is applied to the point of run-off; within an hour mixture should almost encircle the stem. For stems greater than 7.6 cm (3.0 in) basal diameter or with thick bark, treat both sides of the stem to a basal height of 30.5 cm (12 in) to 61 cm (24 in).

Individual plant treatments can also be applied with the use of glove applications, hand wicking, and swiping. Glove applications involve the selective application of pesticides to targeted plants. This is achieved by first applying pesticide to an absorbent glove covering an impermeable glove that protects the applicator's hand from contact with the pesticide. The pesticide is then transferred to the targeted plant by contacting it with the saturated glove. Hand wicking is well suited for applications on spot patches of invasive species. Swiping is typically done with an apparatus consisting of a fabric wrapped bar that has been treated with pesticide. The bar is held between two individuals or mounted on equipment and passed over the target species. The bar can be raised to selectively treat different species to minimize contact with shorter stature non-target species.

A non-toxic marking dye, which aids in detecting areas already treated, is typically mixed with the chemical in all application methods described above.

Under the Great Lakes IPMP/EA the use of pesticides would be considered only after manual/mechanical or cultural treatment methods have been ruled out. Under some circumstances, pesticides may be the only feasible option for managing an invasive plant. Pesticides and formulation selected for treatment would be known to be effective on the target invasive plant and known to have a minimal effect on the environment. To minimize potential environmental effects, pesticides and their respective formulations would be selected based on the presence of non-target plants (including sensitive, threatened and endangered, and traditional use plants), soil texture, depth and distance to water, and environmental conditions.

As previously discussed, only those pesticides that have been registered by the EPA, and permitted for use by the respective state would be used under the Great Lakes IPMP/EA. When considering the use of a chemical treatment, the resource manager would confirm that its use is necessary and that all other treatment options are either not acceptable or not feasible. The resource manager should also confirm that use of the selected pesticide is appropriate for the site and that it has the potential to be effective on the target species. Similarly, to determine the potential for surface water contamination, the resource manager would consider the potential effects of any selected pesticide based on its distance to streams, rivers, or other water bodies; soil types where application is proposed; and the leaching

potential of the selected pesticide. Taking these extra steps would help to ensure that the most appropriate and cost-effective pesticide is selected.

Pesticides are classified according to their mode of action, which is determined by the active ingredients. For example, 2,4-D, Aqua-Kleen®, Barrage®, Esteron® brand 99, and Weedone®, whose active ingredient is 2,4-D, are plant growth regulators that stimulate nucleic acid and protein synthesis and affects enzyme activity, respiration, and cell division. The pesticide 2,4-D is absorbed by plant leaves, stems, and roots and moves throughout the plant, and is accumulated in growing tips. In another example, Tordon, Grazon PC, Tordon K, and Tordon 22K, whose active ingredient is picloram, is absorbed through plant roots, leaves and bark. Picloram moves both up and down within the plant, and accumulates in new growth. It acts by interfering with the plant's ability to make proteins and nucleic acids.

Pesticides containing active ingredients that are not listed on **Table 2.3-2** may also be used under the IPMP/EA depending on the Alternative. However, the use of any pesticide must meet all conditions outlined in this document and must also be approved by the Regional or National IPM Coordinator.

Each pesticide varies in terms of its chemical and biological behavior in the environment, and those behaviors are typically disclosed on the product's label and/or manufacturer's website. However, for informational purposes in this IPMP/EA, factors that affect pesticide behavior in the environment include pesticide properties, soil characteristics, and climatic conditions. Factors that influence the behavior of pesticides in the environment are summarized below. This summary is based on information provided by Miller and Westra (1998) in Colorado State University Fact Sheet Pesticide Behavior in Soils:

- Acid or base strength – refers to whether a pesticide has basic, acidic, or non-ionizable properties. This factor determines the ability of a pesticide to exist in soil water or be retained onto soil solids. In general, pesticides whose pH is close to the pH of soil are strongly retained and are not subject to runoff, erosion, and/or leaching. In contrast, pesticides whose pH is not close to that of the soil are less strongly retained and are subject to runoff, erosion, and/or leaching. These pesticides are also more available for plant uptake than those pesticides that are strongly retained onto soil solids.
- Water solubility – refers to how readily a pesticide dissolves in water and determines the extent to which a pesticide is in the solution (water) phase or the solid phase. A pesticide that is water soluble generally does not have long-term residual effects.
- Volatility – refers to the tendency of a pesticide molecule to become a vapor. Pesticides with high vapor pressures are likely to escape from the soil or foliage and volatilize in the atmosphere.
- Soil retention – is an index of the binding capacity of the pesticide molecule to soil organic matter and clay. In general, pesticides with high soil retention are strongly bound to soil and are not subject to leaching. Those not exhibiting high soil retention are not strongly bound and are subject to leaching.
- Soil persistence – refers the longevity of a pesticide molecule, typically expressed in terms of a half-life, as determined under normal conditions in the region where the pesticide would be used.

These factors influence the environmental fate and effects of a pesticide, including its residual soil activity, persistence, volatilization, water solubility, and potential for leaching into ground water.

Once a pesticide has been selected, the resource manager would submit a pesticide use request using the internet-based Pesticide Use Proposal system. In general, the Regional IPM Coordinator would be responsible for reviewing and approving proposed pesticide uses. However, review and approval from a National IPM Coordinator would be required for pesticide uses that involve: aquatic applications or situations in which the applied pesticide could reasonably be expected to enter waters or wetlands; pesticide uses that may affect rare, threatened, or endangered species or associated critical habitat; pesticide use involving aerial application; pesticide use on 400 or more contiguous acres; and/or use of a restricted-use pesticide as defined by the EPA. The only restricted use pesticides currently being considered by parks are Tordon®, Grazon® PC, Tordon® K, and Tordon® 22K, all of which share Picloram as their active ingredient. All formulations that contain picloram and that may be broadcast on soil or foliage are classified as “Restricted Use” pesticides. Sale and use of these pesticides are limited to licensed pesticide applicators or their employees, and only for uses covered by the applicator's certification. A National IPM Coordinator must approve the use of picloram prior to its purchase and use.

BMPs would be followed to ensure that the overall effectiveness of pesticides is maximized and the potential for impacts is minimized. All contractors would comply with this IPMP/EA and NPS policy when applying pesticides. These general BMPs include the following:

- Pesticides would be applied at the appropriate time based on the pesticide's mode of action. Poor timing of application can reduce the effectiveness of pesticides and can increase the impact on non-target plants.
- Pesticides would be applied according to application rates specified on the product label.
- Reduced application rates of pesticides would be used wherever possible. Reduced application rates are often more effective than higher application rates because translocation is not curtailed prematurely prior to loss of physiologic function. Higher rates may burn off leaves and reduce translocation.
- Pesticides would be applied as near to the target plant as possible.
- Pesticide application would account for meteorological factors such as wind speed, wind direction, inversions, humidity, and precipitation in relation to the presence of sensitive resources near the treatment area and direction provided on labels. Pesticides would only be applied when meteorological conditions at the treatment site allow for complete and even coverage, which would prevent drifting of spray and allow sufficient drying time before precipitation events.
- Pesticide application would be timed and applied to minimize impact onto non-target sensitive resources and reduce the risk of human exposure including to applicator and the general public.
- Pesticides would be applied using coarse sprays to minimize the potential for drift. Combinations of pressure and nozzle type that would result in fine particles (mist) would be avoided. Thickeners, if the product label permits, may be added.
- In areas where there is the potential to affect surface water or ground water resources, pesticide pH and soil pH would be considered to select the pesticide with the lowest leaching potential.
- Highly water-soluble, terrestrial pesticides would not be used in areas where there is potential to affect surface water or ground water resources.
- Pesticides with high volatility would not be used to treat areas located adjacent to sensitive areas because of the potential for unwanted movement of pesticides to these areas, or the use of volatile pesticides would be timed during seasons of cool weather to minimize volatilization.

- Pesticides with high soil retention would be used in areas where there is potential to affect surface water or ground water resources.
- Pesticides with longer persistence would be applied at lower concentrations and with less frequency to limit the potential for accumulation of pesticides in soils.
- Safety protocols for storing, mixing, transporting, handling spills, and disposing of unused pesticides and containers would be followed at all times.
- Equipment would be maintained and calibrated prior to each application of pesticides. During all applications, droplet size would be controlled to decrease the risk of pesticide drift to non-target species outside the immediate treatment area. Droplet size is controlled by the nozzle, psi, and adjuvants.

2.3.6.1 Monitoring and Record Keeping

Under the Great Lakes IPMP/EA, monitoring of areas impacted by invasive species, vector locations, and treatment areas could be employed at each park. Record keeping and reporting the use of pesticides would be completed in compliance with NPS guidelines. Monitoring and record keeping efforts could include documentation of known populations using global positioning system (GPS) units, monitoring to determine the efficacy studies of control methods, monitoring to determine the effects of invasive plant management treatment options on non-target impacts, monitoring to determine the efficacy of recovery efforts for native species (i.e., restoration), and inventories and monitoring for new infestations.

2.3.7 Mitigation Measures and BMPs

In addition to the BMPs described in **Section 2.3.6**, under the Great Lakes IPMP/EA parks would employ a suite of mitigation measures and BMPs designed to reduce non-target impacts of plant management on other resources. The specific mitigation measures or BMPs to be employed would depend upon the treatment option selected and/or the potential, non-target impact of the selected treatment option(s). The mitigation measures and BMPs that where appropriate, would be employed under the Great Lakes IPMP/EA include but are not limited to the following:

General BMPs and Mitigation Measures

To minimize the potential impacts from personnel and equipment, the following general BMPs would be implemented where appropriate:

- Equipment used for invasive plant management would be power washed and/or vacuumed prior to entering a park to reduce the potential for accidentally introducing invasive plants from another area.
- To limit the potential for treatment equipment and vehicles to spread invasive plant seeds, treatments would be completed before seed becomes viable, as feasible and to the maximum extent possible.
- Vehicles and UTVs would use existing roads and trails to the maximum extent practical.
- UTVs would be transported by trailer from one general area of the park to another. Trailers would be used to avoid unnecessary cross-country travel, tracks, and to promote safe operation.
- Contractors would be educated on the importance of invasive species prevention including the power washing of vehicles and equipment prior to entering parks, cleaning clothes and footwear, chainsaws, and other hand tools.

Wilderness BMPs and Mitigation Measures

Under the Great Lakes IPMP/EA a strong emphasis would be placed on preventing invasive plant infestation in designated Wilderness areas through educational activities such as brochures and displays, Wilderness permit requirements, and signs where appropriate. To minimize the potential impacts from personnel and invasive plant management equipment to Wilderness experience, the following BMPs would be implemented where appropriate:

- Efforts would be made to minimize the number of trips and to reduce the visibility, duration, and sounds of invasive plant management activities in Wilderness areas.
- Any visitor complaints regarding invasive plant management activities in Wilderness would be handled as follows:
 - The complaint would be communicated to the park staff responsible for managing Wilderness and/or the Regional Wilderness Coordinator as appropriate.
 - If the visitor were still available, the Wilderness Coordinator would discuss the complaint with the visitor, explaining the Minimum Requirement Analysis that was performed. The Wilderness Coordinator would work with the Resource Manager to re-examine alternatives, if appropriate, and adjust mitigation measures for continuing invasive plant management activities in Wilderness.
 - The Wilderness Coordinator would report any findings to the respective park Superintendent and would seek concurrence for continuing action as originally planned or for adjusting the action to better mitigate impacts to specific Wilderness values of concern to the visitor.

Cultural and Ethnographic Resource BMPs and Mitigation Measures

To ensure that invasive plant management activities do not adversely affect cultural or ethnographic resources, parks would employ the following BMPs and mitigation measures where appropriate:

- NPS cultural resource specialists would be consulted to determine if cultural resources are present in areas proposed for invasive species treatment, or if the area needs to be surveyed for cultural resources prior to work being done.
 - Parks would determine the necessity of project or site-specific consultation with the applicable State Historic Preservation Office (SHPO) and/or tribes associated with the park regarding the potential impact to cultural resources. Decisions surrounding the need for project or site-specific consultation would be based on input from NPS cultural resource specialists, and review of relevant cultural resource survey reports, CLIs, and CLRs.
- Individual parks may consider developing a Programmatic Agreement in consultation with their respective SHPO(s)/THPO(s) to define the invasive plant management activities that would be appropriate under a streamlined review process.
- Pesticides would not be directly applied to historic structures with limestone grout, hearth features, or cultural resources comprised of organic material, such as bone, pollen, seeds, and materials made from plant fiber. However, pesticides may be used in lands surrounding cultural or historic sites in accordance with BMPs.
- If cultural resources are inadvertently discovered during sub-surface ground disturbing activities, NPS would suspend operations at the site and immediately contact the appropriate cultural

resource specialist, who would arrange for a determination of eligibility in consultation with the SHPO and if necessary, would recommend a recovery plan.

- Traditional use plants are plants used or held sacred by Native American Tribes for medicinal, ceremonial, religious, or other cultural purposes. To minimize the impacts of invasive plant management on traditional use plants, parks would identify traditional use plants based on consultation with tribes and avoid impact to those plants as is practicable.

Visual Resource and Noise BMPs and Mitigation Measures

To minimize the impacts of invasive plant management on visual resources and landscapes, parks would employ the following BMPs and mitigation measures where appropriate:

- UTVs and other equipment would be routed along breaks in topography or behind existing tree groupings where possible.
- Use of equipment in high visibility areas would be avoided to the extent feasible.
- As feasible, UTVs used in high visibility areas would follow slope contours to minimize the potential for visual disturbance.
- To reduce the potential for large brush piles and/or standing dead and dying trees that impact the visual landscape, parks would limit the size of brush piles and strategically place brush piles such that there is minimal visual impact.
- Use of UTVs and other noise producing equipment for treatment (e.g., chainsaws) would be limited in soundscapes and/or timed to reduce activities that impact ambient noise levels in soundscapes outside peak use.

Erosion and Sedimentation BMPs and Mitigation Measures

To minimize the impacts of invasive plant management on soil resources, surface water, and wetlands, parks would employ the following BMPs and mitigation measures where appropriate:

- UTVs will be operated to minimize disturbance to vegetation and soils. UTVs will not be operated under conditions where soil is susceptible to compaction, erosion, or creation of wheel ruts.
- The number of vehicle and UTV passes off-road would be minimized to the extent possible.
- Personnel and equipment would avoid areas having sensitive soils or areas that are prone to erosion, and consider applying wood chips on soil during active use of heavy equipment.
- Any stream crossings to access treatment areas would be traversed at a right angle to the crossing.
- UTVs would be routed to avoid palustrine (wet or marshy) wetlands. UTVs will avoid wetland areas with standing water or saturated soils, to the extent practical.
- Reseeding could be used as needed in areas prone to erosion and/or unlikely to reseed naturally, and seeds would need to come from local genotypes.

General Wildlife BMPs and Mitigation Measures

To minimize the impacts of invasive plant management on general wildlife species (i.e., species that are not federally or state listed), parks would employ the following BMPs and mitigation measures where appropriate:

- Physical disturbance to ground nesting birds and burrowing animals would be avoided, to the extent possible. Treatments (chemical or otherwise) would not be applied in the immediate vicinity of any nests or burrows.
- Prior to invasive plant treatments that have the potential to result in nest displacement or disturbance (i.e., treatments where tilling or use of heavy equipment are needed, boom-spraying) during the nesting/breeding/brooding season, parks would survey areas surrounding treatment locations for the active presence of raptor nests, burrows, or other evidence of habitation by a sensitive species. The survey buffer radii (e.g., 0.1-mile, 0.25 mile) around proposed treatment areas would be determined by park biologists. If active raptor nests or other evidence are found, treatment activities would not occur during the nesting season for that species within a species-specific spatial buffer that would be determined by NPS biologists based on the presence of vegetative or topographic screening and/or the stage of the nesting activity.
- Prior to the use of any pesticides, the resource manager would consider the potential effects of any selected pesticide based on its distance to streams, rivers, or other water bodies; soil types where application is proposed; and the leaching potential of the selected pesticide.
- **Migratory Birds**
 - The NPS has a Memorandum of Understanding (MOU) with the USFWS that defines the roles and responsibilities of each agency in protecting neotropical migratory birds from federal actions on NPS lands. In accordance with this MOU, the NPS would consult with the USFWS on a project-specific basis prior to implementation of any treatment option that has the potential to adversely affect neotropical migratory birds.
 - Prior to invasive species treatments in neotropical migratory bird habitats during the spring breeding and nesting season, NPS biologists would determine whether or not proposed treatment areas require surveys for the presence of active bird nests. If required, nesting surveys would typically include an audial survey for diagnostic vocalizations in conjunction with a visual survey for adults and nests. Surveys would be conducted by a qualified biologist, typically between sunrise and 10:00 AM under favorable weather conditions. If determined necessary, nest surveys would be completed to ensure that active nests would not be affected by treatment activities. If active nests are located, NPS biologists could require that treatment be postponed within a defined spatial buffer around the nest during the species-specific nesting period and/or until young have successfully fledged the nest.
 - If active nests are documented during treatment activities, treatment personnel would cease activities and contact the park resource manager for further direction. Park staff could require that the treatment be postponed during the species-specific nesting period and/or until young have successfully fledged the nest.

Threatened, Endangered, and Sensitive Species BMPs and Mitigation Measures

The USFWS Great Lakes Basin Ecosystem Team has identified 130 federally listed or other, otherwise special status species that occur within the Great Lakes regions. The USFWS Great Lakes Basin Ecosystem Team species list can be found at the following:

Section 7(a) of the ESA requires federal agencies to evaluate their actions with respect to any species that are proposed or listed as endangered or threatened, and their critical habitat, if any has been formally designated. Regulations implementing this interagency cooperation provision of the ESA are codified at 50 Federal Register (FR) 402. Section 7(a)(2) requires NPS to ensure that activities that they authorize, fund, or carry out are not likely to “adversely affect” or “jeopardize the continued existence” of a federally-listed species or result in the adverse modification or destruction of its critical habitat. If a federal action “is likely to adversely affect” a federally-listed species or its critical habitat, the NPS must enter into formal consultation with the USFWS. Candidate species for listing under the ESA are also managed to prevent future listing as threatened or endangered. Each state maintains its own list of state sensitive species.

Under the Great Lakes IPMP/EA, parks would employ the following BMPs to reduce or eliminate potential impacts to federally listed, candidate, and or otherwise special status species:

- Field personnel would be trained to recognize and avoid threatened, endangered, and candidate species in their work sites and travel routes, and would be provided information on locations of known habitats for listed or candidate species.
- If any proposed treatment has the potential to adversely affect listed or candidate species, NPS would formally consult with the USFWS prior to any action. Under the Great Lakes IPMP/EA, parks would also implement several species-specific BMPs designed to prevent non-target impacts of invasive species treatments on wildlife or fish species listed as threatened, endangered, or candidates for listing under the ESA. Some of these measures are described below. However, as new protective measures for federally listed or candidate species are developed by the USFWS, those measures would also be implemented as appropriate. Similarly, as new species are listed under the ESA, parks would be responsible for implementing protective measures for those newly listed species prior to invasive species treatment actions as appropriate.
- **Whooping Crane (*Grus americana*)**
 - If whooping cranes are present, a 0.5 mile buffer area would be established around any feeding or roosting areas. No invasive plant management activities would occur within this area while whooping cranes are present.
 - A no-flight buffer area of 0.5 mile would be established around any nesting or foraging areas when whooping cranes are present.
- **Interior Least Tern and Piping Plover (*Sterna antillarum athallasos* and *Charadrius melodus*)**
 - Treatment areas would be evaluated for potential piping plover and interior least tern habitat before invasive plant treatment. Potential habitat for interior least tern includes dry, flat, sparsely vegetated sand and gravel bars within a wide, unobstructed, water-filled river channel. Potential habitat for piping plovers includes sparsely vegetated areas that are slightly raised in elevation, beaches that are 10 to 40 yards wide, and barren river sandbars.
 - A no-flight buffer zone of 0.5 mile would be established around any active colonies.
 - If interior least terns or piping plovers are found, a buffer zone of 0.25 mile would be established around any active nesting colonies. No invasive plant management

activities would occur within this buffer zone during the active breeding period (from approximately April 15 to August 15, or as identified by park staff).

- **Gray Wolf (*Canis lupus*) and Eastern Wolf (*C. lyacon*)**

- Gray wolves and Eastern wolves occur within several of the Great Lakes parks. If wolves are present in the area, no invasive plant management activities would be conducted within the area of any dens, foraging areas, or rendezvous sites.

- **Pallid Sturgeon (*Scaphirhynchus albus*)**

- Channel island tips would not be altered in any manner.
- Channel alternations that limit or eliminate shallow, sloping bank habitat would be avoided.
- No treatments that might alter flows in pallid sturgeon habitat (such as the diversion of water for irrigation) would be allowed.

- **Bald Eagle (*Haliaeetus leucocephalus*)**

- While delisted by the ESA, bald eagles are still protected under the Bald and Golden Eagle Protection Act (BGPA), and protection is encouraged by the USFWS to prevent the need for relisting. The USFWS provides guidance for protecting bald eagles from land use activities in the Great Lakes Region at the following website:

<http://www.fws.gov/midwest/eagle/guidelines/disturbnestingbaea1.html>.

- The BMPs listed below have been adopted from these USFWS guidelines, and would be considered and implemented when feasible prior to invasive plant treatment in bald or golden eagle habitat:
 - Treatment areas would be evaluated for suitable bald eagle nesting and roosting habitat prior to conducting invasive plant management activities. Suitable nesting habitat consists of any mature stand of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes, or any significant body of water. Suitable roosting habitat is defined as any mature stand of conifer or cottonwood trees.
 - As feasible, invasive plant treatment activities that involve tree removal or mechanized activity (e.g., chainsaws and UTVs) would not be completed within 660 feet (200 meter) of bald eagle nest sites during the nest-building, egg laying, and early brooding period (typically March to May).
 - As feasible, invasive plant treatment activities that involve tree removal or mechanized activity (e.g., chainsaws and UTVs) would not be completed within 660 feet (200 meter) of known winter roost sites during the winter roosting season (typically November through mid-April).
 - Clearing of live or dead trees greater than 12 inches in diameter at breast height (DBH) along streams, rivers, and wetlands would be avoided to the extent possible to help preserve potential bald eagle roosting or nesting habitat.
 - Parks would avoid clear-cutting or removal of overstory trees within 330 feet (100 meters) of both active and alternate nests at any time.
 - Parks would avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the nesting season within 660 feet (200 meters) of the nest. The distance may be decreased to 330 feet around

alternate nests within a particular territory, including nests that were attended during the current nesting season but not used to raise young, after eggs laid in another nest within the territory have hatched.

- Parks would employ selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the nesting season.
- If burning during the nesting season is necessary, parks would implement the following BMPs in known bald eagle habitats:
 - Parks would conduct burns only when adult eagles and young are absent from the nest tree (i.e., at the beginning of, or end of, the nesting season, either before the particular nest is active or after the young have fledged from that nest).
 - Parks would take precautions such as raking leaves and woody debris from around the nest tree to prevent crown fire or fire climbing the nest tree.
 - Parks would avoid construction of log transfer facilities and in-water log storage areas within 330 feet (100 meters) of active and alternate nests.
- **Threatened and Endangered Plants**
 - Pesticide applicators would receive training on identification of threatened and endangered plants. If these plants were identified in the field, treatments would be halted until buffer areas are established.
 - Where chemical treatment is needed near threatened or endangered plants, hand spraying or hand wicking would be prioritized.
 - If boom treatments are used (UTVs or aircraft) to apply pesticides, a 50-foot no-spray zone would be established around threatened and endangered plants.
 - Plowing, harrowing or other forms of tilling would not be used in areas where such activity would have an adverse impact on known populations of threatened or endangered plants.
 - UTVs and off-road vehicle traffic would be used on a limited basis in areas where threatened or endangered plants are known to occur or have the potential to occur.

2.4 ALTERNATIVE 1 – NO ACTION / CONTINUE WITH CURRENT MANAGEMENT PLANS

Under Alternative 1, parks could continue to manage invasive plants according to existing regulations and policies addressed in **Section 2.2** and using many of the treatments defined in **Section 2.3**. However, under Alternative 1, the parks ability to implement treatment options would be substantially reduced when compared to Alternatives 2 or 3.

Specifically, at many parks, this would mean that invasive plant management activities would only continue on a limited basis. Park resource managers would be limited to those treatment options that either qualifies as being categorically excluded (CE) from analysis under NEPA, or those treatments whose impacts have been previously addressed in other NEPA documents. Under DO-12, the only invasive plant management activities that are covered under a CE involve “Removal of individual

members of a non-threatened/endangered species or populations of pests and invasive plants that pose an imminent danger to park visitors or an immediate threat to park resources.”

In addition to meeting this criterion, the proposed treatment must also have no measurable impacts to qualify as a CE. Measurable impacts are those that the interdisciplinary team determines to be greater than minor by the analysis process described in DO-12. For effects to be minor, a relatively small number of individuals/resources would be affected. Minor impacts typically require considerable scientific effort to measure, are limited to relatively few individuals of the populations, are localized in areas, and have barely perceptible consequences.

Any proposed treatments that were not covered under a CE or under another existing NEPA document would require preparation of additional NEPA documents, such as an EA or EIS.

Existing guidance for current management of invasive plants at each park is also provided under existing Resource Management Plans (RMPs) and General Management Plans (GMPs), which identify the management objectives for various environmental resources within the park (see **Section 1.6**). APIS, INDU, PIRO, SACN, SLBE, and VOYA have also developed invasive plant management guidance documents for their parks. In many cases, these plans have been developed to provide technical guidance in documenting treatment as part of a CE memo to file. A summary of existing invasive species management plans for the Great Lakes parks is provided in **Table 2.4-1**.

Table 2.4-1 Existing Invasive Plant Management Strategies/Plans for the Great Lakes National Parks

Park	Invasive Plant Management Plan
APIS	Exotic Plant Management Plan, Apostle Islands National Lakeshore. March 24, 2009. 34 pp.
INDU	Indiana Dunes National Lakeshore Invasive Plant Management Strategy.
PIRO	Draft Invasive Plant Management Plan Pictured Rocks National Lakeshore, National Park Service, March 2011. 45 pp.
SACN	Exotic Plant Management Plan, St. Croix National Scenic Riverway. March 23, 2009. 57 pp.
	St. Croix National Scenic Riverway Aquatic Invasive Species Interagency Task Force 2009 Action Plan For The Lower ST. Croix River. March 2009. 7 pp.
	Purple Loosestrife Integrated Pest Management Plan, Saint Croix National Scenic Riverway, Wisconsin. 1994. 25 pp.
SLBE	Invasive Plant Management Plan, Sleeping Bear Dunes National Lakeshore. February 25, 2011. 67 pp.
VOYA	Exotic Plant Management Plan Voyageurs National Park Final. April 2009. 29 pp.

2.5 ALTERNATIVE 2 – FUNDAMENTAL AND SIGNIFICANT RESOURCES AND VALUES-BASED INVASIVE PLANT MANAGEMENT (PREFERRED ALTERNATIVE)

Under Alternative 2 (Preferred Alternative), parks would have the option to use any of the treatment options defined in **Section 2.3**. Plants to be managed under this alternative include invasive, non-native, non-invasive, or native species. However, the priority for invasive plant management would be given to the stewardship of fundamental and/or significant resources and values through management of plant species that alter the desired resource condition.

For the purposes of this IPMP/EA, fundamental resources and values are broadly defined as systems, processes, features, visitor experiences, stories and scenes that deserve primary consideration and management because they are critical to maintaining the park's purpose and significance. Fundamental resources and values are subject to periodic review and updates based on new information and changing conditions. Significant resources that are not necessarily fundamental resources could also be given management priority under this IPMP/EA.

Park-specific fundamental and/or significant resources and values are defined within their enabling legislation, GMPs, and other park-specific documents such as CLRs, etc. Some of the fundamental and/or significant resources currently defined for the Great Lakes parks, and to which priority is given under Alternative 2, are listed below. It is important to note that the list simply provides an example of some of the fundamental and significant resources and values of the ten Great Lakes parks. Fundamental resources and values are subject to periodic review and updates based on new information and changing conditions, and therefore, any new or modified fundamental or significant resources or values defined during the life of this IPMP/EA would also be given priority for invasive plant management under this alternative.

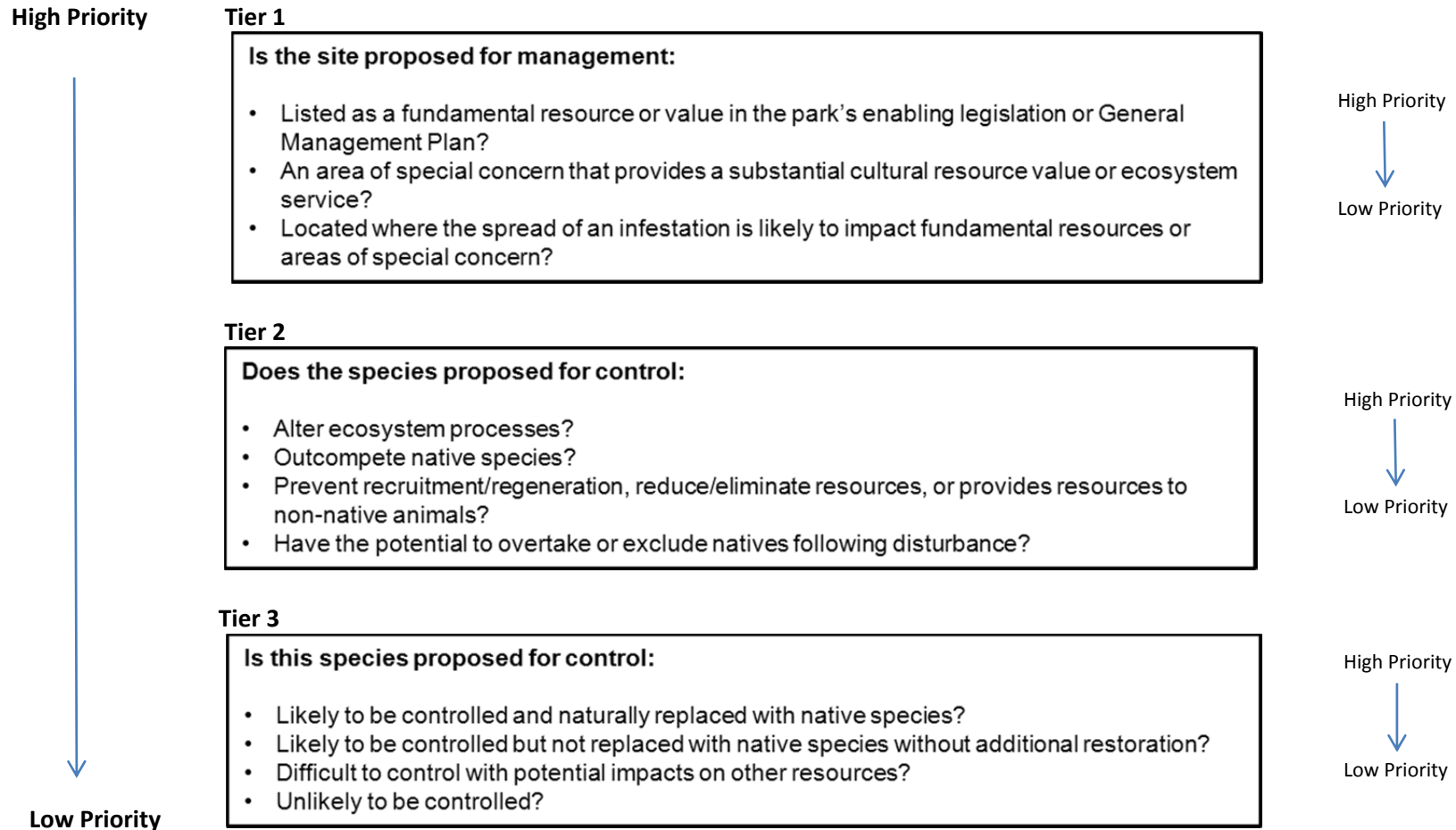
Examples of some of the fundamental and significant resources and values considered under Alternative 2 include:

- Areas of Special Designation (cultural or natural) such as Wilderness, designated critical habitat for species listed under the ESA, National Historic Landmarks (NHLs), National Natural Landmark (NNLs), Research Natural Areas (RNAs), and historic districts;
- Geologic Processes such as ridge and swale topography resulting from old shorelines, perched dunes, and bow or kettle lakes;
- Areas/Resources at Risk such as sensitive ecological communities and habitats (e.g., potential habitats for species listed under the ESA, habitats for state sensitive species, migratory bird habitats, rare plant communities, wetlands, riparian corridors, dunal ecosystems, sandscapes, old growth timber);
- Visitor opportunities and scenery, such as opportunities for quiet, solitude, and naturalness;
- Areas that provide high quality recreational opportunities that do not detract from the exceptional, natural, scenic cultural and aesthetic resources, such as viewsheds, soundscapes, and interpretive areas;
- Natural and cultural landscapes; and
- Places of important tribal history and heritage.

Under Alternative 2, resource managers would use the questions identified in **Figure 2** as guidance for helping determine invasive plant management priorities. The guidance for setting management

priorities under Alternative 2 is unique in that it focuses largely on preventing or reducing impacts to fundamental or significant resources and values. Once management priorities have been established, park staff would then use standardized Integrated Pest Management principles to evaluate specific treatment actions; evaluate the efficacy and environmental effects of proposed treatment actions, consider alternative treatments having fewer impacts, justify why a treatment was selected, and confirm compliance with applicable policies and regulations. Park staff would then use a memo to file such as the example provided in **Appendix A** to confirm compliance of proposed treatment methods with NEPA.

Figure 2 Relative Priorities for Management of Invasive Species under Alternative 2 (Preferred Alternative)



This page intentionally left blank.

2.6 ALTERNATIVE 3 – SPECIES-BASED INVASIVE PLANT MANAGEMENT

Under Alternative 3, parks would have the option to use any of the treatment options defined in **Section 2.3**. However, under Alternative 3, priority would be given to the management and control of species that are legally mandated for control such as federally, state or local listed “noxious species”. Many states have different terminology for their listed species such as noxious, prohibited, restricted, invasive, quarantined, category 1 noxious, regulated, etc. We use the term noxious in this document to encompass all federal and state invasive species legal designations. In addition to noxious weeds, other species may be managed under this IPMP such as:

- Non-native invasive species that negatively impact or have the potential to negatively impact biodiversity and ecosystem function (e.g., those species that negatively impact fire regime, nutrient cycling, hydrology, soil processes/erosion);
- Non-native invasive species that negatively impact or have the potential to negatively impact cultural landscapes (could encompass culturally significant species); and
- Non-native invasive species that negatively impact or have the potential to negatively impact the visitor experience (e.g., spotted knapweed).

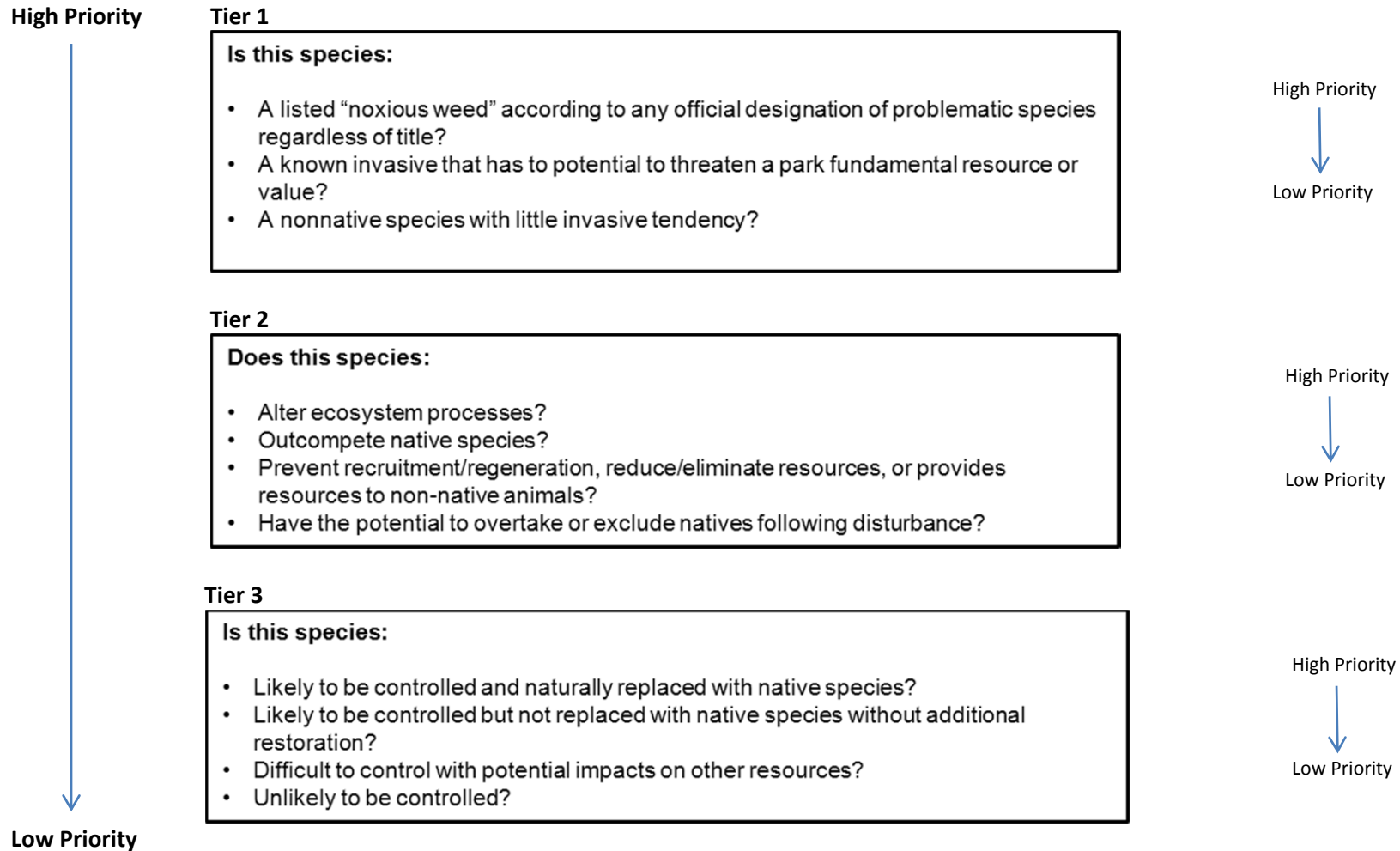
It is important to note that treatment would not be limited to the species defined above. Rather, treatment efforts would be prioritized such that these species are treated first.

Under Alternative 3, resource managers would use the questions identified in **Figure 3** as a tool for helping to determine invasive plant management priorities. The guidance for setting management priorities under Alternative 3 is unique in that it employs a species-based approach to determine the highest priorities for treatment.

Once treatment priorities have been established, park staff would then use standardized Integrated Pest Management principles to evaluate selected treatment actions; evaluate the efficacy and environmental effects of the proposed treatment actions, consider alternative treatments having fewer impacts, justify why a treatment was selected, and confirm compliance with applicable policies and regulations. Resource managers would also be able to use the results of the decision making process to explain to the public how each of these factors was accounted for in selecting treatment methods. Park staff would then use a memo to file such the example provided in **Appendix A** to confirm compliance of proposed treatment methods with NEPA.

This page intentionally left blank.

Figure 3 **Relative Priorities for Invasive Plant Management under Alternative 3**



This page intentionally left blank.

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

A number of alternatives were considered and discussed based on the results of internal and external scoping.

Alternatives are different ways to meet the purpose and objectives, while resolving needs or issues. The following section discusses those alternatives considered, but eliminated from further study. This discussion also includes an explanation of why these alternatives did not warrant additional analysis. These alternatives and issues were eliminated from detailed study because they did not meet one or more of the criteria below:

- The alternative must be consistent with NPS management policies and guidelines;
- The alternative must respond to the purpose of and need for action;
- The alternative must be feasible from a technical and economic standpoint, while remaining environmentally responsible;
- The alternative must be compatible with the policies and regulations of other agencies and jurisdictions; and
- The alternative must meet the purpose of and need for action.

Sections 2.7.1 – 2.7.3 provide a brief description of three alternatives that were considered but dismissed from analysis for the Great Lakes IPMP/EA.

2.7.1 Seasonal Invasive Plant Management

This alternative would require parks to prioritize treatment activities during seasons or times of year that have the least impact on or conflict with other resource uses of the parks. For example, under this alternative, invasive species treatments would be precluded during peak recreational season to reduce impacts to visitor experience. Similarly, treatment would be precluded during breeding or nesting seasons to prevent potential non-target effects on breeding birds. However, an alternative that severely limits the parks' ability to treat invasive species during the growing season would undermine the efficacy of treatment options, and therefore, would not be feasible. For this reason the seasonal invasive plant management alternative was dismissed from analysis.

2.7.2 Stop Treatment

This alternative would require parks to cease all treatment of invasive species. This alternative was eliminated from detailed study because stopping all invasive plant management and control activities within parks is inconsistent with federal noxious weed management policies, NPS resource management guidelines, and state noxious weed laws. Specifically, this alternative is inconsistent with EO 13112 on Invasive Species, the National Historic Preservation Act, the Federal Noxious Weed Control Act, NPS management policies, and Indiana, Michigan, Minnesota, and Wisconsin noxious weed laws. This alternative would not meet the purpose of and need for the project and was dismissed from further analysis.

2.7.3 No Biocontrol or Chemical Treatment

Developing an IPMP that considers all treatments except chemical and biocontrol treatments was briefly considered, but eliminated from further analysis because of the efficiency of chemicals and biocontrols for treating some invasive plants. Eliminating the use of pesticides or biocontrols would undermine the parks' ability to successfully and efficiently control invasive species and would not meet the purpose of or need for the project. For these reasons, this alternative was dismissed from further analysis.

2.8 Environmentally Preferable Alternative

As stated in Section 2.7D of Director's Order #12 and Handbook (NPS 2001), the environmentally preferable alternative is the alternative that would promote the national environmental policy expressed in the National Environmental Policy Act.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferable alternative. The act directs that federal plans should:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and,
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Generally this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources (Council on Environmental Quality 1981).

Continuing the current conditions under Alternative 1, No Action, would not allow the parks to meet the purpose and need for the Great Lakes IPMP/EA by restricting their abilities to implement invasive plant management and/or by requiring parks to complete additional site-specific analysis under NEPA before implementing current invasive plant management tools.

Alternatives 2 or 3 would provide the parks with a programmatic invasive plant management plan that identifies long-term invasive plant management strategies that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources, and provide opportunities for restoring native plant communities and cultural landscapes.

The NPS, in accordance with 516 DM 4.10 and the CEQ's NEPA's Forty Most Asked Questions, defines the environmentally preferable alternative that best promotes the national environmental policy expressed in NEPA (Section 101(b)) and 516 DM 4.10. In their Forty Most Asked Questions, CEQ further

clarifies the identification of the environmentally preferable alternative, stating “Ordinarily, this means the alternative that ... best protects, preserves, and enhances historic, cultural, and natural resources” (Q6a). However, by focusing on the significant park resources, Alternative 2 may have a have a slightly better environmental outcome under the NPS’ “best protects, preserves and enhances...” criterion. Therefore, Alternative 2 is the NPS’ Preferred Alternative.

2.9 IMPACT SUMMARY BY ALTERNATIVE

Table 2.9-1 illustrates the impacts under each alternative.

Table 2.9-1. Summary of Impacts by Alternative.

Impact Topic	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
General Vegetation	Implementation of Alternative 1 would have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that IATR, MISS, and SACN have to remove existing invasive plants and help prevent future infestations. As there would be no change in management, invasive plant treatments under Alternative 1 would have minimal cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.	Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on native vegetation by providing IATR, MISS, and SACN the ability to use a suite of treatment options to remove existing invasive plants, and help prevent future infestations. Potential adverse impacts on native vegetation under Alternative 2 include the minor potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 2 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how IATR, MISS, and SACN prioritize invasive plant treatment options, native vegetation would be beneficially affected by reducing invasive species. Therefore, the beneficial effects of Alternative 2 on native vegetation	Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing IATR, MISS, and SACN with a suite of treatment options to help achieve these restoration objectives. Potential adverse impacts on native vegetation under Alternative 3 include the minor potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 3 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how IATR, MISS, and SACN prioritize invasive plant treatment options, native vegetation would be beneficially affected by reducing invasive species and allowing for the restoration and conservation of native plants. Therefore, the beneficial effects of

Impact Topic	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
		would be similar to those under Alternative 3, but would be far greater than under Alternative 1.	Alternative 3 would be similar to those under Alternative 2, but would be far greater than under Alternative 1.
Rare or Unusual Vegetation	Implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on rare and unusual vegetation at INDU, PIRO, SLBE, and VOYA by limiting the parks' treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions, Alternative 1 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.	Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing INDU, PIRO, SLBE, and VOYA with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions, Alternative 2 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes and wetlands of INDU, PIRO, SLBE, and VOYA are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would have a greater beneficial impact on INDU, PIRO, SLBE, and VOYA than Alternatives 1 or 3.	Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation at INDU, PIRO, SLBE, and VOYA by providing the park with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions, Alternative 3 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. However, Alternative 2, which prioritizes treatment for fundamental resources, would have a greater beneficial impact on INDU, PIRO, SLBE, and VOYA than Alternatives 3, or 1.
Species of Special Concern, including Potential/Critical Habitat	Based on a continuation of currently employed invasive species treatment options, Alternative 1 would have no direct, indirect, or cumulative effects on species of special concern in APIS, INDU,	Implementation of Alternative 2 would have moderate, long-term, localized, beneficial, indirect and cumulative effects on special status species in APIS, INDU, ISRO, PIRO, and SLBE. Therefore,	Implementation of Alternative 3 would have moderate, long-term, localized, beneficial, indirect and cumulative, effects on special status species in APIS, INDU, ISRO, PIRO, and SLBE. Therefore,

Impact Topic	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
	PIRO, and SLBE. As ISRO does not have an existing invasive plant management plan, implementation of the No Action alternative would result in slightly adverse direct and cumulative effects.	implementation may affect but is not likely to adversely affect the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management in APIS, INDU, ISRO, PIRO, SLBE under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.	implementation may affect but is not likely to adversely affect the species. The effects of invasive species management on piping plover under Alternative 3 would be similar to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.
Unique Ecosystems	Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on dunal and wetland habitats by limiting INDU's treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial cumulative impact on unique	Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial	Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial

Impact Topic	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
	ecosystems. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.	cumulative impact on unique ecosystems. As the dunes, wetlands, and NNLs of INDU are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would conceivably have a greater beneficial impact on INDU than Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.	cumulative impact on unique ecosystems. As the dunes, wetlands, and NNLs of INDU are considered a fundamental resource, Alternative 3 would have less beneficial impact than would Alternative 2, which prioritizes treatment for fundamental resources. However, the beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.
Recreation Resources /Visitor Experience /Esthetic Resources	Under Alternative 1 there would be no change in management actions in MISS or SACN. Therefore, Alternative 1 would have negligible, direct, indirect, or cumulative effects on recreation resources. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.	Alternative 2 would have a moderate, direct, beneficial, long-term, and localized effects on recreation resource and visitor experience in MISS. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. MISS is known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value, would conceivably have a greater beneficial impact on the recreational	Implementation of Alternative 3 would have moderate, direct, beneficial, long-term, and localized effects on recreation resource and visitor experience in MISS and SACN. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. SACN is known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 3 would have less beneficial impact than Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value.

Impact Topic	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
		resources of MISS than would Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.	The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.
Park Operations	Implementation of Alternative 1 would have negligible direct, indirect, and cumulative impacts on park operations at IATR. Implementation of Alternative 1 would result in less of a negative impact on park operations as species as compared to Alternatives 2 or 3.	Alternative 2 has the potential to result in moderate, indirect and slightly negative impacts on park operations by adding to the existing workload of already limited park operation resources. Combined with existing demands on staff and budget, Alternative 2 would have an additive, adverse, cumulative impact on IATR park operations. Impacts to park operations under Alternative 2 would be similar to those under Alternatives 1 or 3.	Implementation of invasive species treatments under Alternative 3 has the potential to result in moderate, indirect and slightly negative impacts on park operations by adding to the existing workload of already limited park operation resources. Combined with existing demands on staff and budget, Alternative 3 would have an additive, adverse, cumulative impact on IATR park operations. Impacts to park operations under Alternative 3 would be identical to those under Alternatives 1 or 2.

2.10 PROJECT OBJECTIVES BY ALTERNATIVE

Table 2.10-1 illustrates how well each alternative addresses the objectives defined in Section 1.3.1.

Table 2.10-1. Project Objectives by Alternative.

Project Objective	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
Differentiate invasive plant management strategies based on park-specific resources (e.g., Wilderness, natural areas, cultural sites, management zones) and land use history.	Does not address this objective.	Fully addresses this objective.	Partially addresses this objective.
Include common treatment methods in the IPMP currently used at each park, as well as any methods that could be used in the foreseeable future.	Does not address this objective; no action alternative does not provide for the methods that could be used in the foreseeable future without additional analysis under NEPA.	Fully addresses this objective.	Fully addresses this objective.
Include BMPs that would mitigate/reduce impacts from invasive plant management on non-target resources.	Fully addresses this objective.	Fully addresses this objective.	Fully addresses this objective.
Create an adaptive plan that provides park staff with broad strategies for invasive plant management including prevention, assessment, control, and monitoring.	Does not address this objective.	Fully addresses this objective.	Fully addresses this objective.
Provide the flexibility to allow for the implementation of emerging/developing technologies and treatments for invasive plant management.	Does not fully address this objective.	Fully addresses this objective.	Fully addresses this objective.
Provide the flexibility to allow for treatment of plant species based on current or potential impacts to park resources.	Does not fully address this objective.	Fully addresses this objective.	Fully addresses this objective.
Provide allowances for and opportunities to respond to park-specific invasive species and integrated pest management needs.	Does not fully address this objective.	Fully addresses this objective.	Fully addresses this objective.
Identify relevant policy documents and compliance requirements related to integrated pest management, pesticide use, and human health and safety.	Fully addresses this objective.	Fully addresses this objective.	Fully addresses this objective.

Project Objective	Alternative 1 – No Action / Continue with Current Management Plans	Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)	Alternative 3 - Species-based Invasive Plant Management
Identify other potential/future/cumulative effects on invasive plant management.	Fully addresses this objective.	Fully addresses this objective.	Fully addresses this objective.
Create standardized guidance tools to prioritize selection of treatment areas, selection of invasive species management strategies, and to determine compliance under NEPA for each selection.	Does not address this objective; no standardized guidance tools exist under the no action alternative.	Fully addresses this objective.	Fully addresses this objective.

3.0 AFFECTED ENVIRONMENT

This chapter provides an overview of the current conditions of the impact topics carried forward for analysis in the Great Lakes IPMP/EA, and provides the baseline for evaluation of potential impacts/environmental consequences described in **Chapter 4**. In most cases, a more detailed description of the current condition for these impact topics can be found in park-specific General Management Plans (GMPs) and Resource Management Plans (RMPs). As discussed in **Section 1.5**, the impact topics carried forward for full analysis in this IPMP/EA include:

- General Vegetation
- Rare or Unusual Vegetation
- Species of Special Concern, Including Potential/Critical Habitat
- Unique Ecosystems
- Recreation Resources, Visitor Experience, Esthetic Resources
- Park Operations

The following sections provide park-specific descriptions of impact topics for only those parks where the impact topic has been carried forward for analysis. Specifically, as discussed in **Section 1.5**, only those impact topics where effect of the IPMP is expected to be moderate (i.e., those assigned an effects category of “3”) are carried forward for full analysis (see **Appendix B**). Figures illustrating the locations of the Great Lakes National Parks are included in **Appendix D**.

Table 3.1-1 summarizes the impact topics and associated parks carried forward for analysis.

Table 3.1-1 Impact Topics and Associated Parks Carried Forward for Analysis in Great Lakes IPMP/EA

Park	General Vegetation	Rare or Unusual Vegetation	Species of Special Concern, Including Potential/Critical Habitat	Unique Ecosystems	Recreation Resources, Visitor Experience, Esthetic Resources	Park Operations
APIS			Yes			
GRPO						
IATR	Yes					Yes
INDU		Yes	Yes	Yes		
ISRO			Yes			
MISS	Yes				Yes	
PIRO		Yes	Yes			
SACN	Yes				Yes	
SLBE		Yes	Yes			
VOYA		Yes				

3.1 GENERAL VEGETATION

Vegetation within and between the parks is variable and is influenced by landscape, elevation, and proximity to lacustrine, riverine, and palustrine environments. The following sections describe the general vegetation communities occurring in IATR, MISS, and SACN, where this impact topic has been carried forward for analysis.

3.1.1 IATR

The IATR stretches nearly 1,200 miles across Wisconsin (NPS 2011a). As such the trail crosses various ecological landscapes and vegetation communities including; the north central forest, the forest transition, the central sand hills, the southeast glacial plains, and the central Lake Michigan coastal ecological landscapes (WDNR 2006). Each of these ecological landscapes has unique combinations of physical and biological characteristics that make up the ecosystem, including vegetation.

The Cross Plains Unit of the Ice Age National Scientific Reserve falls within three of these ecological landscapes; Western Coulee and Ridges, Central Sand Hills, and Southeast Glacial Plains (NPS 2011a). The Ice Age Complex Cross Plains Unit includes scattered closed-canopy red and white oak and sugar maple groves, and bur oak groves on south- and west-facing ridges. Remnant floral communities at the complex include southern mesic forest in ravines and drainages, overgrown oak savannas, and dry mesic prairie on ridges and hillsides (NPS 2011a).

The following summary of vegetation resources at IATR is taken directly from the *Ice Age National Scenic Trail General Management Plan* (NPS 2011a).

“Although this combination of landscapes in the complex indicates a variety of native vegetation, southern dry-mesic forest dominated the site before European settlement. The southern dry-mesic forest is prominently red and white oak, with shagbark hickory, black cherry, white oak, and basswood as canopy associates. Disturbance history and landscape position have allowed variability within the areas of southern dry-mesic forest. This variability includes areas dominated by large white oak, some greater than 24 inches in diameter, and open grown; areas dominated by red oak with white birch and big-tooth aspen as canopy associates; and other areas with a very widely spaced canopy and a dense tall shrub layer composed mostly of buckthorn species (*Rhamnus frangula* and *R. cathartica*) and prickly ash.

The southern mesic forest can be found in the narrow bottoms of steep ravines. This forest is characterized by a canopy of sugar maple with basswood and ironwood as associates. The shrub layer has a moderate cover, with eastern prickly gooseberry as a common species. The forest ground layer has many species that bloom in the spring and include wild ginger, sharp-lobed hepatica, jack in-the-pulpit, mayapple, and bloodroot. Spring ephemerals are also present, although not abundant. Shoveler Sink is currently fringed by reed canary grass with some sedges and smartweeds. Many of the uplands have been planted into prairie with big bluestem and switch grass, as well as smooth brome grass for hay and pasturing. Many of the open fields in the Ice Age Complex are cropped for corn and soybeans, or remain as old fields.

Some invasive plants are well-established within the Ice Age Complex, including common buckthorn, Tatarian honeysuckle, prickly ash, and reed canary grass. Other invasive plants that occur and present possible future threats to diversity include garlic mustard, winged burning-

bush, star-of-Bethlehem, multiflora rose, Oriental bittersweet, Japanese barberry, and common burdock. Numerous other invasive species are present in the old field and planted prairie areas.”

Furthermore, the Ice Age Complex also contains lands under active farming and old agricultural fields as well as wetlands at the USFWS Shoveler Sink freshwater emergent wetland site, Coyle Pond freshwater emergent wetland and freshwater pond site, and other small freshwater emergent wetland areas on the north and west edges of the Complex (Pers. Comm. with Mark Holden (NPS 2011b)).

3.1.2 MISS

Vegetation resources are documented in the *Mississippi National River and Recreation Area Comprehensive Management Plan* (NPS 1988) and quoted in this section. The MISS includes 72 miles of the Mississippi River stretching from the cities of Dayton and Ramsey to south of Hastings, passing through the deciduous forest – hardwood and prairie vegetation zone (MDNR 1993).

The hardwood forests in MISS are dominated by hardwood trees such as ash, bur oak, and sugar and silver maples. There is also the potential for evergreens to occur in locations having poorer soils, such as rock outcroppings and wetlands. Wildflower species include spring ephemerals that typically bloom before the trees begin leafing out each spring. Later blooming wildflowers are generally found at the forest edge and in openings where sunlight reaches the forest floor (NPS 2011).

Historically, MISS was dominated by open prairie and savanna ecosystems covered mainly by oak, woodlands, and various species of woody shrubs. Other vegetation types in MISS included floodplain forest, upland prairie, and maple basswood forest (NPS 1988). Urbanization and use of the area have altered the vegetation composition of the river corridor and surrounding landscape. Land cover data derived from 1988 satellite imagery identified 28 percent of the corridor as developed (NPS 1988).

Invasive species such as buckthorn, Tatarian honeysuckle, and garlic mustard have become established along the river corridor, and have contributed to the closed canopy forests that now dominate the area. The various park units within MISS vary with regard to invasive species abundance; for example, Crosby Farm Nature Area and Gores Pool Wilderness Management Area (WMA) have few invasive species and low cover, relative to other park units within MISS (NPS 2009).

3.1.3 SACN

The St. Croix National Scenic Riverway Fire Management Plan (NPS 2005a) summarizes information on plant communities at SACN and reads as follows:

“Terrestrial vegetation communities along the St. Croix and Namekagon transitions from northern mixed hardwood forests in the northern reaches, through red, white, and jack pine forests in the north-central regions, and emerge as a northern mixed hardwood and river floodplain forest complex in the middle and southern reaches of the river. The south and southwest facing slopes in the lower reaches also contain grasslands which have been described as sand prairie, basalt bald prairie, and hill prairie. Mesic-wet prairie vegetation is common on islands and adjacent uplands subjected to periodic flooding. These intergrade with the wetlands that include peatland, bog, wet meadow, and fen habitats. These habitats support a thriving community of aquatic and wetland vegetation throughout the Riverway.

Vegetation communities tend to run in varying width bands parallel to the river. Immediately adjacent to the riverbanks along the entire river there is usually a band of sedge meadow, marsh, or lowland hardwoods. This riparian zone may extend up to a mile from the river but it is typically much less. The width of this band is determined by topography and is subject to flooding in its entirety, sometimes annually. The second band along the river is usually the oak forest type. Jack pines and scrub (Hill's, black, bur and/or northern red) oak dominate in the northwest sands of Wisconsin between Nevers Dam (north of St. Croix Falls, Wisconsin) and Hayward, Wisconsin. In pre-settlement times, much of this would have been oak or jack pine barrens or savanna. Beyond this second tier, there exist second growth stands of jack pine, hardwood and mixed hardwood forests and pine plantations.

From Nevers Dam southward to Stillwater, Minnesota, oak and hardwood (maple-basswood-elm) are the dominant forest types. Hill prairies are found on the west and southwest facing bluffs of the Wisconsin side of the river below Osceola, Wisconsin. These prairies often extend well back from the bluff line and were more common in pre-settlement days. There are also cultivated fields and pastures. Agriculture and residential homes are the dominant land use here, with occasional subdivisions interspersed along the bluff line. The most intensive development along this stretch of the river occurs on the Minnesota side.”

3.2 Rare or Unusual Vegetation

Rare and unusual vegetation includes old growth forest, riparian, alpine, and wetlands. The following sections describe the rare and unusual vegetation occurring in INDU, PIRO, SLBE, and VOYA, where this impact topic has been carried forward for analysis.

3.2.1 INDU

The *Indiana Dunes National Lakeshore Land Protection Plan* (NPS 1998) describes INDU as having high biological diversity due, in part, to the variability of its habitats and the intersection of three biomes; the temperate deciduous forest, tall grass prairie, and boreal forest (NPCS 2007). The national lakeshore is approximately 25 miles long situated at the extreme southern end of Lake Michigan, 35 miles east of Chicago. The park contains 15 miles of the Lake Michigan shoreline and approximately 15,000 acres of land. Immediately inland from the beaches, sand dunes rise to almost 200 feet in a series of ridges, blowouts, and valleys. Extensive wetlands fill the depressions between the dunes (NPS 1998).

The varied topographical features provide areas for rare or unique vegetation communities that contain habitat for sensitive plant and wildlife species. Three such unique communities found in INDU include peat based wetland, free moving dunal systems, and black oak savanna (NPS 1998). Each of these unique ecosystems provides habitat for numerous sensitive species: the peat wetlands provide habitat for the pitcher plant species; the dunal system provides habitat for the Pitcher’s thistle, and oak savanna provides habitat for the Karner blue butterfly. These species are discussed in detail in the sensitive species section of this EA (see **Section 3.4**). The habitats that support these species are discussed below.

Peat-Based Wetland

This description of the peat-based wetlands is taken directly from the *Indiana Dunes National Lakeshore, Fire Monitoring Plan* (NPS 29 2011a).

“Graminoid peat-based wetland is a generic term that identifies the various wetland types contained within the Great Marsh. The Great Marsh, now about 10 miles long by 0.5 miles wide, was once a floristically rich wetland, dominated by graminoid species. Wetland community types once abundant in the Great Marsh include bog, vegetated floating mat, graminoid fen, calcareous seeps, shallow-marsh, sedge meadow, wet-prairie and hydromesophytic swamp forest. These communities are increasingly rare due to anthropogenic disturbance including changes in the hydrology of these systems. A century of anthropogenic stressors including ditching, peat fires, fire suppression, landscape alterations, biological pollutants, lumbering, hydrological alterations and haying of the graminoid resource, have left these communities highly degraded or entirely eliminated them. These stressors produced a species poor upland/wetland complex dominated by wind dispersed tree species such as green ash, eastern cottonwood and silver maple, exotic shrubs such as honeysuckle and multiflora rose, and invasive herbaceous species such as reed canary grass, *Phragmites*, hybrid cattail or white cattail and garlic mustard.” (NPS 29 2011a)

Surveys for invasive plants within INDU have documented invasive species in bogs, oak savannas, prairies, and wetlands; habitats that are known to contain rare plant and/or federally endangered Karner blue butterfly populations. These survey data along with INDU's mapped coverage of non-native plants known to exist elsewhere in the park, is being used to prioritize treatment areas to prevent the loss of unique resources such as rare plant communities and individual rare plant populations. However, with its current resources, the national lakeshore is unable to treat all the identified priority areas.

Dune Ecosystem

Indiana Dunes National Lakeshore is comprised of over 15,000 acres of dunes and 15 miles of Lake Michigan shoreline spanning the distance from Gary to Michigan City. The NPS INDU website (<http://www.nps.gov/indu/index.htm>) provides the following description related to the dune ecosystem:

“Immediately inland from the beaches, sand dunes rise to almost 200 feet in a series of ridges, blowouts, and valleys. Extensive wetlands fill many depressions between the dune ridges.

Today, four major dune complexes can be easily seen. Beginning with the present shoreline and moving inland into progressively older dunes, they include the present dune formation, the Tolleston dunes, the Calumet dunes and the Glenwood dunes. A stable oak forest characterizes the two older dune complexes. The younger dune/shoreline area is still active and all stages of plant succession can be observed there. Open beaches, grass covered dune ridges, blowouts, dunes with woody shrub vegetation, pine-forested dunes, oak-forested dunes, oak savannas, and prairies all come together to form the tapestry that is Indiana Dunes National Lakeshore.

A natural pattern of erosion and deposition moves sand in a westward direction along INDU's area beaches. In several cases breakwaters and other structures have been constructed along the Lake Michigan shoreline. These structures have interrupted the natural movement of sand,

allowing erosion to continue while simultaneously impeding deposition. The net result has been increased erosion of the National Lakeshore's beaches and dunes. To protect its shoreline, the National Lakeshore responded with a beach nourishment project to replenish the sand that was no longer being deposited naturally."

Oak Savanna

Information describing oak savanna resources for INDU is taken directly from the *Indiana Dunes National Lakeshore, Fire Monitoring Plan* (NPS 29 2011a).

"The once widespread oak savannas of the Midwest are now considered imperiled ecosystems. The variation in light found in savannas supports a highly diverse understory community of shade tolerant and intolerant grasses and forbs. Though specifics on canopy cover vary, savanna is generally defined as having a single discontinuous and patchy tree or shrub canopy layer of between 15 and 50 percent closure and a continuous herbaceous layer dominated by grasses. The precise amount of woody vegetation is not as important an indicator of savannas as is the existence of the two distinct vegetation layers. Treed communities with an understory dominated by low growing shrubs are not considered savannas. Savannas can, however, include patches of oak scrub instead of the herbaceous layer.

Currently, degraded black oak savannas at the Lakeshore have an overstory of black oak with white oak, sassafras and cottonwood also present. The understory is dominated by several common species, Pennsylvania sedge, bracken fern, woodland sunflower, blueberry and blackberry. Over 100 fire dependent and fire sensitive species are present. Grass cover is not dominant, averaging less than 10 percent cover, but includes important species such as little bluestem, bluejoint, Indian grass and June grass." (NPS 29 2011a)

Increased numbers of exotic plants negatively impact growing conditions for rare plants and the Karner blue butterfly's sole larval food source, wild lupine. A survey for non-native plant populations revealed that areas supporting Karner blue butterfly populations are impacted by buckthorn black locust, tree of heaven, non-native honeysuckle, bristly locust, multiflora rose, garlic mustard, Oriental bittersweet, cattail, Phragmites, reed canary grass, purple loosestrife, and autumn olive. Many of these non-native plant species impact the Karner blue butterfly by reducing the abundance of wild lupine and nectaries of adults. Furthermore, one of the trees targeted for treatment, black locust, is allelopathic and suppresses the growth of native vegetation (NPS – INDU Invasive Species Plant Management Strategy).

3.2.2 PIRO

The NPS's State of Our Parks Report describes PIRO as being located within the transition zone between the boreal and eastern deciduous forest, supporting diverse habitats including:

- Mesic deciduous forests,
- Hydric forests and swamps,
- Wetlands,
- Lakes and ponds,
- Xeric coniferous forests,
- Sand dunes and beaches, and
- Sandstone cliffs.

One of the more unique ecosystems at PIRO is its sand dunes and sandscapes, which include the Grand Sable Dune. Many of the species of concern identified at PIRO, including Pitcher's thistle (see **Section 3.4**), are found in the Grand Sable Dunes Research Natural Area (RNA); others are found in various habitats throughout the National Lakeshore (NPS 2005b). Grand Sable Dunes is a designated RNA under NPS policies because the area contains many rare plants. Few such undeveloped dunes remain in the Great Lakes area. RNAs are established for areas that are prime examples of natural ecosystems and areas with significant genetic resources with value for long-term baseline observational studies or as control areas for comparative studies in other areas. The Grand Sable Dunes are also designated as a Critical Dune Area by the Michigan Department of Environmental Quality. This designation identifies the dunes as an environmental area warranting protection under the Michigan Coastal Management Program (NPS 2005b).

Sensitive dune habitats are threatened by heavy visitor use. Aerial photos taken during the past 50 years show an increase in unvegetated sand, which has been attributed, in part, to foot traffic and snowmobiles (NPCS 2007). Although sand dunes stabilize naturally as a result of native plant succession, rapid stabilization as a consequence of invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes (Rebertus and Hardenbrook 2009).

Non-native plants that are of the most concern at PIRO include spotted knapweed, white sweet clover, red clover, burdock, periwinkle, and several hawkweed species. The shifting sands of the park's dunes are attractive habitat for spotted knapweed, a superior competitor that invades highly disturbed areas. Park staff treats for spotted knapweed by containing the larger populations through chemical treatment and physically removing smaller infestations without the use of chemicals. This strategy helps protect native species such as Pitcher's thistle and Lake Huron tansy, both species listed as threatened in the state of Michigan. PIRO has a program in place to contain invasive plants and a system for monitoring the success of this program. By periodically mapping invasive plant coverage within the 1,976-acre dune ecosystem, park staff has the ability to monitor changes (NPCS 2007).

Of the invasive plant species at PIRO, spotted knapweed, white sweet-clover, red clover, and several species of hawkweed pose serious threat to the native plant community of the Grand Sable Dunes. Baby's breath, currently found on the border of the national lakeshore, is a potential threat to the native dune plant community, should it become established (NPS 2005b).

3.2.3 SLBE

SLBE manages for multiple, biologically diverse native communities to protect and restore, when possible. Particularly sensitive communities are closely monitored and protected. Endemic species and habitats are fully protected, non-native species are controlled, and native species are reintroduced when conditions allow. To further meet SLBE goals and objectives to protect and restore biologically diverse native communities, the genetic integrity of native species is protected, threatened and endangered species are protected to the greatest extent possible, and natural fire regimes are investigated and supported where possible.

SLBE's Final General Management Plan, Wilderness Study, Environmental Impact Statement (NPS 2008) describes the rare and unusual vegetation as primarily occurring on the sand dunes. While SLBE supports other rare and unusual vegetation types, the sand dunes and sandscapes of SLBE are its most well-known and widely visited feature and the most likely to be affected by implementation of invasive plant management. Approximately 4,800 acres of beaches and sand dunes occur in SLBE. The Sleeping

Bear Plateau, a 15-square mile dune field, contains some of the most prominent dunes, including the park's namesake. Dunes are also found at Empire Bluffs, Platte Bay, Good Harbor, and both North and South Manitou Islands. However, the dunes are not just composed of sand; they also support a variety of unique vegetation species, such as Marram grass, bearberry, sand cherry, beach pea, and Pitcher's thistle, a federally listed threatened species. Furthermore, a new species of dunewort was first identified on dunes within the park.

While the dunes may be the most well-known natural environment of Sleeping Bear, the lakeshore also supports several different habitat types including forests, wetlands, riverine systems, lacustrine systems, open fields, and lakes. Many of these habitats support species of concern. Beach ridge and swale formations provide an intricate transition between upland and wetland habitats, with excellent examples at Platte Bay, Good Harbor Bay, and the crescent-shaped bay of South Manitou Island. White pine, red pine, and jack pine along with northern pin oak dominate the beach ridges, while wetland vegetation, including herbaceous, shrub, and tree species, dominate the beech swales. Further inland, hardwood forests span the landscape, which are dominated by sugar maple and American beech, along with white ash, American basswood, and yellow birch. Remnant farms and old-field meadows from past agricultural practices break up the forested landscape.

At least 150 exotic or invasive plants or noxious weeds have been identified at SLBE. Spotted knapweed, baby's breath, bull thistle, blue lyme grass, bladder campion, hoary alyssum, and Lombardy poplar have extensive, established populations in the open dune habitat that supports a number of sensitive species including the endangered piping plover (see Section 3.4) and the threatened Pitcher's thistle among others (NPS 2008).

3.2.4 VOYA

The *Voyageurs National Park General Management Plan, Environmental Impact Statement and Visitor Use and Facilities Plan* (NPS 2001) describes VOYA as being composed of a mosaic of land and water, a place of interconnected waterways that flow west into the Rainy River, and eventually north as part of the arctic watershed of Hudson's Bay. The park is a place of transition, between upland and aquatic ecosystems, southern boreal and northern hardwoods forest types, and both wild and developed areas (NPS 2011b). Lake levels in the VOYA's large lakes have been regulated by a hydroelectric dam on Rainy Lake and regulatory dams on Namakan Lake since the early 1900s (NPS 2005c).

Information on the rare and unusual vegetation resources presented here is taken directly from the *Voyageurs National Park General Management Plan, Environmental Impact Statement and Visitor Use and Facilities Plan* (NPS 2001). VOYA includes natural features such as bogs, marshes, swamp forests, and wetlands that support rare and unusual vegetation. These features are abundant in the Border Lakes area; however, they are not as common as upland forests. In the park about 20,000 to 27,000 acres are considered wetlands. The park's wetlands are important communities for several reasons. They have the greatest diversity of plant and animal species of any vegetative assemblage; most of the park's unusual or unique vegetative communities are wetland communities; and with few exceptions all rare or protected plant species in the park occur in wet or low lying areas. Minnesota's peatlands (swamp forests, bogs, and fens) are also significant simply for their extent — over 6 million acres and more than any other state except Alaska. Examples of unique wetland communities in the park include leatherleaf/sweet gale shore fens, northern bur oak mesic forests, white cedar/mixed conifer or tamarack swamps, and wild rice marshes (NPS 2001).

Interfaces between land and lakes are some of the most diverse, dynamic, and complex habitats in the park. Marsh vegetation in the park is most abundant at the edge of lakes. Marsh and shoreline (or littoral) vegetation, which occurs from the shore to depths where light still penetrates to the bottom, are used by many species of fish, birds, and other wildlife to live and rear young (NPS 2001).

Moreover, VOYA has at least 71 exotic plant species that have invaded and likely displaced some of the park's native vegetation. Most appear to have been introduced through vehicles, boats, pets, or other visitor-related means. Invasive species of concern in the park include purple loosestrife and several species of invasive Eurasian watermilfoil. Watermilfoil has not been observed in the park, but is a regional concern (NPS 2001).

An invasive plant survey was conducted in Voyageur's National Park, Minnesota. Exotic plants were ranked based on field evidence and a literature review. Reed canary grass and Phragmites are found in shoreline wetlands but may consist of at least partly native populations. Narrow-leaved cattail appears to have invaded the park since the 1980s and now dominates several wetland communities on Kabetogama Lake. Purple loosestrife, which prefers sites that are seasonally flooded (meadow marshes and cattail marshes), is present in at least 12 locations in the park.

Narrow-leaved cattail is widely distributed in eastern and central North America in wetlands, shorelines and ditches and other disturbed wet areas. Where it has invaded, it often out-competes native vegetation to form dense, pure stands. Narrow-leaved cattail hybridizes with common cattail (*T. latifolia*) to form *T. glauca*, an even more competitive form. In VOYA, narrow-leaved cattail forms extensive monocultures on Kabetogama Lake shorelines. Scattered other occurrences, consisting of smaller stands, are found on Namakan and Rainy Lake. Cattails produce enormous quantities of fruit in a single inflorescence (up to 700,000) that is easily transported long distance by wind. Proliferation of dense cattail colonies can reduce species diversity by closing open water and eliminating habitat for wildlife and native plant species.

3.3 SPECIES OF SPECIAL CONCERN, INCLUDING POTENTIAL/CRITICAL HABITAT

Federally threatened, endangered, and candidate species, as well as state species of concern in Indiana, Michigan, Minnesota, and Wisconsin are summarized in **Appendix E**. **Appendix E** also provides a determination as to whether a species has the potential to be affected by treatment actions within the IPMP/EA. The rationale for determining whether or not a species of special concern has the potential to be impacted by treatment options in the IPMP/EA was consistent with that used to identify impact topics in the ESF (**Appendix B**) only those species where the effect of the IPMP is expected to be moderate, regional, long-term, or large-scale are carried forward for full analysis.

3.3.1 APIS

Piping Plover (Charadrius melodus)

The piping plover in the Great Lakes area is an endangered species. The USFWS Recovery Plan for the piping plover identifies a goal of establishing for 150 breeding pairs in Michigan for a period of 5 consecutive years, and 50 pairs in the other Great Lakes states.

In the Great Lakes region, piping plovers breed and raise young mainly on sparsely vegetated beaches, cobble pans, and sand spits of glacially formed sand dune ecosystems along the Great Lakes shoreline. Wintering grounds range from North Carolina to Florida and along the Florida Gulf Coast to Texas, Mexico, and the Caribbean Islands. Habitat destruction and degradation are pervasive and have reduced physically suitable habitat. Human disturbance and predators further reduce breeding and wintering habitat quality and affect survival. Contaminants, as well as genetic and geographic consequences of small population size, pose additional threats to piping plover survival and reproduction (USFWS 2003).

Surveys have indicated that 230 breeding pairs of piping plover move through the archipelago during the fall migration (NPS 2005). Apostle Islands National Lakeshore provides important habitat for the federally endangered piping plover. Piping plovers are frequently present on Long Island during late spring and early summer and nesting is possible. Nests are on built on the beach and are difficult to find. Nesting behavior is closely monitored by Planning and Resource Management staff and any nests are protected with exclosures and buffer zones in cooperation with the USFWS, the Wisconsin Department of Natural Resources, and the Bad River Indian Tribe (NPS 2005).

APIS park staff are actively involved in piping plover recovery activities, and have documented success in increasing the numbers of breeding pairs on Long Island. Long Island is the only location in Wisconsin where piping plovers have recently nested successfully. From 1998 to 2005, nesting was sporadic, but in 2006, the park had four nests; three on Long Island and, for the first time, one on Outer island. All three nests on Long Island successfully produced young, but the nest on Outer Island was unsuccessful as of 2001. Long Island and the Michigan Island sandscapes are designated critical habitats for piping plover (NPS 2007).

3.3.2 INDU

Indiana Dunes National Lakeshore provides important habitat for federally and state listed species and is specifically directed through federal law and NPS policy to protect these species and their habitats. There are four federally and/or state listed animal species found in and around INDU, including:

- Eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*),
- Pitcher's thistle (*Cirsium pitcheri*),
- Pitcher-plant (*Sarracenia purpurea*), and
- Karner blue butterfly (*Lycaeides melissa samuelis*).

Eastern Massasauga Rattlesnake (Sistrurus catenatus)

The eastern massasauga rattlesnake is a candidate for federal listing under the ESA as a threatened or endangered Distinct Population Segment (DPS). Although the massasauga rattlesnake is thought to be in decline throughout much of its range, only the eastern subspecies is currently under consideration for listing. The eastern subspecies has been described as historically ranging from central New York and southern Ontario, southwest to Iowa and Missouri. This eastern subspecies encompasses all *S. catenatus* residing north and east of the Missouri River (USGS 2005).

Since the establishment of INDU in 1966, there have been only 15 reported sightings of the massasauga within or near the park boundary. Of these, only three are considered confirmed, none of which were

within the official park boundary. In 2005, one eastern massasauga rattlesnake was captured in a drift fence as part of a study of the rattlesnake (USGS 2005).

A variety of vegetation communities have been identified as possible massasauga habitat. However, throughout its range, the massasauga exhibits an affinity for wetland habitats. Massasaugas have been documented in wet areas including bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows (USGS 2005).

Pitcher's Thistle (Cirsium pitcheri)

Pitcher's thistle is listed as threatened by state and federal governments. There are 173 known occurrences found in Michigan (90 percent), Indiana (5 percent) and Wisconsin (5 percent).

A description of Pitcher's thistle is taken directly from the *USFWS Recovery Plan for the Pitcher's Thistle* (USFWS 2002). According to this plan, "Pitcher's thistle is endemic to the beaches and grassland dunes of Lakes Michigan, Superior, and Huron. Pitcher's thistle requires active sand dune processes to maintain its early successional habitat. The highest ranked occurrences are on large, intact, active dunes. The species' survival is threatened by shoreline development, dune stabilization, recreation, erosion when lake levels are high, and impacts from invasive non-native plants and insects.

The majority of known sites of Pitcher's thistle occur along the shores of Lake Michigan. The species ranges from the north shore of Lake Superior south to Indiana, and formerly occurred in northern Illinois, where it has been experimentally reintroduced. Distribution of the species extends along the Lake Michigan shoreline in Wisconsin. In the east it ranges through northern Lake Huron to the Manitoulin Island archipelago and southern Georgian Bay in Ontario. Pitcher's thistle extends as far south as Lambton County, Ontario, Canada on Lake Huron, as indicated by pre-1964 collections for two localities."

Pitcher-plant (Sarracenia purpurea)

The pitcher-plant is a native, perennial, carnivorous forb. Although the plant is state listed in Michigan, it has not been listed in Indiana or under the ESA (IDNR 2011). The species characteristically occurs in bogs, savannas, and flatwoods. The most saturated areas of the bogs are favored, often restricting the species to the edges of bogs. The plant forms dense, floating mats on the water at the edges of bog ponds and lakes and across acid streams. The species is adapted to poor soils that are deficient in trace elements such as molybdenum. The environment of the pitcher-plant ranges from alkaline to highly acidic soils. This plant colonizes sites where competition by other vegetation is restricted by the extreme growing conditions (<http://herbarium.lsa.umich.edu/>).

Plant succession for pitcher-plant bogs is towards sedges and bog adapted woody species. Fire, however, retards this succession and pitcher-plant bogs are thought to be fire disclimaxes. Fire is beneficial to the pitcher-plant in many ways. Periodic, moderate fires are necessary to reduce the encroachment of competing plants and stimulate growth by releasing nutrients bound up in organic matter. The plant survives fire by resprouting from underground rhizomes.

Karner Blue Butterfly (Lycaeides melissa samuelis)

A description of the Karner blue butterfly is taken directly from INDU's *Fire Monitoring Plan* (NPS 2011a), and is quoted as follows:

“Oak savanna is regionally rare and declining and is habitat for the federally endangered Karner blue butterfly. The species prefers sandy barrens and oak savannas as these areas contain its larval host plant, wild lupine. Wild lupine historically occurred in savanna and barrens habitats typified by dry sandy soils, and presently occurs in remnants of these habitats, as well as other locations such as roadsides, military bases, and some forest lands. The primary limiting factors are loss of habitat through development, and canopy closure (succession) without a concomitant restoration of habitat. A shifting geographic mosaic that provides a balance between closed and open-canopy habitats is essential for the maintenance of large viable populations of Karner blue butterflies.

In addition to wild lupine, adults are known to feed on at least 70 different nectar producing species across its range. This list includes plants that flower in the shade and those that flower in the sun, hence its preference toward habitats that contain a mixture of sun and shade. Frequent and patchy fires seem to be most effective in providing habitat for the species.”

The *USFWS Karner Blue Butterfly Recovery Plan* (USFWS 2003) provides information about the locations in which the Karner Blue Butterfly occurs and reads as follows:

“The species formerly occurred in a band extending across 12 states from Minnesota to Maine and in the province of Ontario, Canada, and now only occurs in the 7 states of Minnesota, Wisconsin, Indiana, Michigan, New York, New Hampshire, and Ohio. Wisconsin and Michigan support the greatest number of Karner blue butterflies and butterfly sites. The majority of the populations in the remaining states are small and several are at risk of extinction from habitat degradation or loss. Based on the decline of the Karner blue across its historic range, it was listed as endangered in 1992. Since listing, two populations have been extirpated and are being reintroduced to Concord, New Hampshire, and West Gary, Indiana. A third population is being reintroduced to Ohio.”

3.3.3 ISRO

The isolated nature of ISRO and the unique ecosystems present at the island have contributed to the high number of sensitive plant species that occur there. There are no federally listed threatened or endangered plant species within ISRO; although, over 100 species of protected plants occur at ISRO. Of those 100 species, 89 are legally protected, and 45 are listed as threatened or endangered by the state of Michigan. ISRO also supports numerous arctic and western disjunct plant species. Many of these species are found in the narrow, specialized rock shoreline habitat along Lake Superior (NPS 1998).

The National Parks Conservation Association *National Parks of the Great Lakes* (NPCA 2007) describes Lake Superior as having the greatest surface area of any freshwater lake in the world and includes 10 percent of the world's fresh surface water. ISRO encompasses over 400,000 acres of Great Lakes waters. With its many inlets and islands, ISRO includes 337 miles of Lake Superior shoreline. Rock pools on the Lake Superior shoreline provide a unique habitat for frogs and other amphibians as well as arctic and alpine plant and insect species (NPS 2010).

Lake Superior plays a major role in governing forest vegetation patterns at ISRO. The lake creates cool, moist conditions near shorelines, which favor boreal forests of balsam fir, white spruce, paper birch, aspen, and mountain ash with understories of large-leaved aster, thimbleberry, and Canada dogwood or bunchberry. Moving inland, this lake effect dissipates, and warmer, drier conditions favor northern hardwood forests of sugar maple and yellow birch. These forests are more widespread on the west end

of the island where soils are deeper and the island is about eight miles wide. Perhaps the largest tract of undisturbed and unaltered forest on ISRO is the sugar maple forest centered on the west end of Greenstone Ridge (NPCA 2007).

Locations of 102 rare plant species have been documented on ISRO, all of which are on the state list, and/or are new rare plant findings in the state. Selected rare plant species occur more commonly in the region, but are known to be very rare on ISRO. Several plant species found on ISRO are far removed from their present range; they are believed to have arrived in ISRO during post-glacial times and have survived along the cool, moist rock shorelines (NPS 1998). This environment harbors many plant species not found elsewhere in the park, and it contains many arctic tundra species found far south of their normal distribution range (NPS 1985).

The sensitive plant species that occur on ISRO fall within a variety of plant families, with the most highly represented family being the orchid family. Some of the special status plant species on the island include:

- Isle Royale ragwort (*Packera insulae-regalis*),
- Devil's club (*Oplopanax horridus*), and
- Mountain cranberry (*Vaccinium vitis-idaea*).

Isle Royale Ragwort

The Isle Royale ragwort, a plant species endemic only to ISRO, was recently discovered on the island (NPCA 2007). The plant grows in rocky openings and is probably derived from hybridization between tetraploid *P. paupercula* and octoploid *P. indecora* (Michigan Flora Online 2011). The ragwort has only been found in one population on ISRO (University of Wisconsin 2011).

Devil's Club

Devil's Club is a large shrub primarily native to the cool, dense, moist, old growth conifer forests of the Pacific Northwest. This member of the *Araliaceae* family is disjunct on Isle Royale. Its only occurrences east of the Rocky Mountains are a few discreet locations on the ISRO archipelago and Porphyry Island near Thunder Bay, Ontario. This species is most abundant on Passage Island (NPS 1985).

Mountain Cranberry

Mountain cranberry is a short evergreen shrub in the heath family, native to boreal forest and Arctic tundra throughout the Northern Hemisphere from Eurasia to North America. The plant is known in Michigan only from the ISRO archipelago.

Compared to many mainland locations, invasive species on ISRO are relatively sparse; only 15 percent of the plants are non-native. Therefore, the plant and animal communities on ISRO may be less susceptible to the processes of biotic homogenization that plague many other areas of the region (NPS 2009).

3.3.4 PIRO

PIRO supports habitat for and populations of Pitcher's thistle.

Pitcher's Thistle

Grand Sable Dunes of PIRO is one of only two U.S. populations of the federally threatened Pitcher's thistle on Lake Superior. The recovery plan for the species ranks the Pitcher's thistle population occurring in the area of the Grand Sable Dunes an "A" under Nature Serve Elemental Global Ranking Criteria. An "A" rank suggests a dune size over 250 acres and a population of at least 5,000 individuals (NPS 2003).

As previously discussed, Pitcher's thistle is endemic to the beaches and grassland dunes of Lakes Michigan, Superior, and Huron. Pitcher's thistle requires active sand dune processes to maintain its early successional habitat. The highest ranked occurrences are on large, intact, active dunes. Its survival is threatened by shoreline development, dune stabilization, recreation, erosion when lake levels are high and invasive non-native plants and insects (USFWS 2002).

The national lakeshore staff manages for Pitcher's thistle consistent with the U.S. Fish and Wildlife Service's Pitcher's thistle recovery plan (USFWS 2002). Lakeshore staff cooperates in ongoing efforts to control invasive plant species to protect and recover this species and monitor populations (NPS 2003).

3.3.5 Sleeping Bear Dunes National Lakeshore (SLBE)

SLBE supports habitat for and populations of Pitcher's thistle, piping plover, and Michigan monkey-flower. While SLBE provides suitable habitat for numerous unique (non-listed) plant and animal species (Appendix E – Special Status Species in the Great Lakes Region), moderate to severe impacts are not anticipated from the implementation of the IPMP/EA to most, and only the Pitcher's thistle, piping plover, and Michigan monkey-flower have been carried forward for analysis in this IPMP/EA.

Pitcher's Thistle

Similar to INDU and PIRO, SLBE provides habitat for the federally threatened Pitcher's thistle, and is endemic to the beach and dune habitats that occur with SLBE. As previously discussed, the species' survival is threatened by shoreline development, dune stabilization, recreation, erosion when lake levels are high and invasive non-native plants and insects are present.

Piping Plover

Similar to APIS and PIRO, SLBE provides habitat for the federally endangered piping plover in the Great Lakes area. During recent years SLBE has hosted highest concentration of the breeding pairs of within Great Lakes population and successful chick rearing has typically been demonstrated with an average of two chicks per pair surviving to fledging.

Piping plovers traditionally have nested in the park in two primary locations: Platte Point, where the Platte River empties into Lake Michigan, and Dimmick's Point on NMI. These two sites tend to support larger colony groups (seven or more nests). Additionally, smaller dispersed nesting sites have been located along Platte Bay and near Sleeping Bear Point. Historical nesting locations include Donner's

Point on NMI, and on the mainland at Glen Haven Beach and the shoreline near the southern boundary of SLBE.

There are approximately 31 miles of shoreline within the lakeshore listed as designated critical piping plover habitat. Each of these critical habitat units extends inland 500 meters designating approximately 6,239 acres as critical piping plover habitat within the lakeshore.

Michigan Monkey-flower (Mimulus michiganensis)

Michigan monkey-flower is an aquatic to semi-aquatic Michigan endemic perennial characterized by its mat-forming, clonal growth habitat. It is restricted to cold, alkaline spring seepages and streams, usually in association with northern white cedar swamps formed in drainages found at the base of relatively steep, morainic slopes and bluff. Within its habitat, it generally flourishes best in tree canopy openings, along forest edges, or along streams adjacent to open, meadow-like areas and flowers abundantly when growing in full sunlight. However, it mostly persists as sterile colonies when growing under heavy tree canopy cover.

Occurrences of Michigan monkey-flower are often much localized, sometimes consisting of small but dense patches restricted to small seeps, springs, and depressions, whereas others are comprised of numerous patches of plants widely dispersed along small streams and spring-fed seeps within northern white cedar swamps (Penskar and Higman 2001). Large to moderately-sized populations include occurrences on Glen Lake, Burt Lake, and portions of the Mackinac County shoreline within the Manitou Payment Highbanks formation in the Brevort to Epoufette region (Penskar and Higman 2001). Although new occurrences are documented, the distribution of Michigan monkey-flower has not changed.

3.4 UNIQUE ECOSYSTEMS (E.G., NNLS, MARITIME CLIFFS, BIOSPHERE RESERVES, WORLD HERITAGE SITES)

In the context of this IPMP/EA, unique ecosystems are defined as areas of unique ecological importance at global scale. While there are many unique ecosystems within the Great Lakes national parks, only one (i.e., the NNLS within INDU) was determined to be affected to a regional and/or long-term effect from the Great Lakes IPMP.

3.4.1 INDU

The NNL Program recognizes and encourages the conservation of sites that contain outstanding biological and geological resources, regardless of landownership type. It is the only natural areas program of national scope that recognizes the best examples of biological and geological features in both public and private ownership. NNLS are owned by a variety of land stewards, and participation in the program is voluntary.

There are 30 NNL sites located within the state of Indiana. Natural features represented include bogs, fens, marshes, and dune systems along Lake Michigan, fossil reefs in large river ecosystems, canyons, springs, and caves in an area of karst topography, and diverse and rare forest ecosystems. The sites in Indiana received NNL designation between 1965 and 1986. Sites range in size from 28 acres to over 1,500 acres, and are owned by a variety of landowners including U.S. Forest Service, NPS, Indiana

Department of Natural Resources (INDR), Purdue University, non-profit land trusts, Evansville City Parks, The Nature Conservancy, and private individuals (NPS 2011b).

The Indiana Dunes Lakeshore, including the Indiana Dunes State Park, contains the following four Registered NNLs (NPS 1998):

- Dunes Nature Preserve NNL,
- Pinhook Bog NNL,
- Cowles Bog NNL, and
- Hoosier Prairie State Nature Preserve NNL

The Dunes Nature Preserve is the best remaining example of undeveloped and relatively unspoiled dune landscape along the southern shore of Lake Michigan, a portion of which is known as the "Birthplace of American Ecology." The site also contains the Ancient Pines Nature Area, a prehistoric forest now exposed by dune blowouts. Pinhook Bog is a living demonstration of the textbook description of ecological succession from pond to woodland. The site lies within a bowl-shaped depression likely to be a glacial kettle, and is surrounded by wooded hills. Cowles Bog illustrates marsh and bog habitat, as well as transition to swamp. The site includes flora that are locally rare. Hoosier Prairie is the last large tract of prairie near the eastern margin of the "Prairie Peninsula." The site contains a great diversity of community types, with nearly 300 vascular plant species identified here (NPS 2011b). All four NNLs are affected by invasive species.

3.5 RECREATION RESOURCES, VISITOR EXPERIENCE, ESTHETIC RESOURCES

National parks provide opportunities for public visitation, recreation, and enjoyment of natural communities. The following sections describe the recreation resources, visitor experience, and esthetic resources occurring in MISS and SACN, where this impact topic has been carried forward for analysis.

3.5.1 MISS

This description of recreation resources, visitor experience, and esthetic resources is taken directly from the Mississippi National River and Recreation Area Comprehensive Management Plan. A variety of passive and active resource related recreational activities are encouraged in the MISS river corridor. These include: fishing, hunting, boating, canoeing, cross country skiing, snowshoeing, hiking, bicycling, jogging, picnicking, taking photographs, birding, and participating in a variety of interpretive and educational programs. People now enjoy a wealth of recreational, educational, and contemplative activities in the corridor. The Coon Rapids dam attracts anglers and other river users from spring through fall. The river above the dam offers good boating and fishing. Above the Rum River confluence canoeists paddle the segment of the Mississippi River designated by the state as wild and scenic. Recreational and residential users share the river corridor with commercial river traffic and industry below the Camden Bridge in Minneapolis. Commercially operated excursion boats show residents and tourists the river from St. Anthony Falls to Hastings. Pleasure boats power past Pigs Eye and climb the locks as far as Minneapolis. Industrial sites are found along several stretches of the river, most commonly in north Minneapolis and from St. Paul downstream to Cottage Grove.

Much of the river corridor has been developed; land cover data derived from 1988 satellite imagery for the corridor identified 28 percent as developed (NPS 1988). As such, restoration of some of the areas is

planned, including at the Bureau of Mines Coldwater Unit. According to the Bureau of Mines (Coldwater) Project website (NPS 2011b), “The project will result in restoring Coldwater Unit to an open space, oak savanna/tall grass prairie. The historic Coldwater spring and reservoir will be restored, and public access and enjoyment will be enhanced through trail connections and the elimination of the abandoned buildings. Interpretive waysides and programming will be developed to interpret the natural landscape of the area, Native American presence in the area, outline early settlement patterns, and explore the history of Fort Snelling.”

3.5.2 SACN

St. Croix National Scenic Riverway was established to protect and preserve the outstanding scenic landscape of the St. Croix and Namekagon rivers. To provide for the public enjoyment of the riverway, designated primitive campsites and a camping zone have been established. Most are accessible only by boat or canoe. The St. Croix and Namekagon Rivers are known for their quiet water canoeing. The river corridor provides a wealth of scenic views and a haven for wildlife near a major metropolitan area.

People participate in a variety of motorized and non-motorized recreational uses in the SACN, including: camping, picnicking, canoeing, hunting, horseback riding, mountain biking, hiking, snowmobiling, cross-country skiing, and snowshoeing (NPS 1998). Visitor information provided in the *SACN Draft Water Resources Management Plan* (NPS 1997), documents recreational use of the Riverway as having doubled in the last 23 years to nearly one million visitors yearly. Most visitors are boaters and canoeists, with the majority being repeat visitors from the region. With more than 10 million people living within a day's drive of the Riverway, one of the major concerns of the future will be recreational.

3.6 Park Operations

While each of the ten parks conducts park operations, in the context of this IPMP/EA only IATR was determined to be affected to a regional and/or long-term effect from the Great Lakes IPMP.

3.6.1 IATR

The description of park operations is taken directly from the *Ice Age Complex at Cross Plains Draft General Management Plan Environmental Impact Statement*, (NPS 2011a). “The Ice Age Complex is undeveloped for visitor use and minimally maintained. The IATR site is relatively newly-acquired by the NPS, and still in the preliminary phases of management planning. Currently, the IATR employs only a few full time staff, which severely limits the park's ability to control and prevent invasive species.

4.0 ENVIRONMENTAL IMPACTS

NEPA requires that environmental documents disclose the environmental impacts of a proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided. This chapter describes the effects of implementing the alternatives on the affected environment (i.e., the impact topics described in Chapter 3). Within this chapter, the terms “impact” and “effect” are used synonymously and interchangeably.

This chapter is organized into the following sections:

- Methodology - describes the methodology used to predict impacts.
- Direct and Indirect Impacts - describes the potential direct and indirect impacts to each impact topic carried forward for analysis under each alternative.
 - Conclusion – summary statement of the direct and indirect impacts of treatment options under the alternative, summary statement of cumulative impacts of invasive plant treatment options when combined with other past, present, and reasonably foreseeable activities², and a brief comparison of the beneficial or adverse impacts amongst the three alternatives.

4.1 METHODOLOGY

This section describes the methodology used to predict potential impacts of the alternatives.

The definition of an environmental impact or effect is the change in condition of the resource or environment under examination due to the alternatives. The magnitude or type and degree of impact on each topic/resource were analyzed by considering the following factors:

- Type (beneficial or adverse, direct or indirect);
- Context (site-specific, local, regional); and
- Duration and timing (short or long-term).

Determining impact thresholds is a key component of the Management Policies 2006 and the DO- 12 Handbook. These thresholds provide the reader with an idea of the intensity of a given impact on a specific topic. The impact threshold is determined primarily by comparing the impact to a relevant standard from state or federal regulations or scientific research. Because definitions of intensity vary by impact topic, intensity definitions (i.e., negligible, minor, moderate, major) are provided separately for each impact topic analyzed in this document (see **Section 4.2**). However, the following general definitions are used throughout this analysis:

- Direct impact - an effect that is caused by an action and occurs in the same time and place.
- Indirect impact - an effect that is caused by an action but occurs later in time or is farther removed in distance, but is still reasonably foreseeable.

² Detailed evaluations of cumulative impacts are provided in Chapter 5.0.

- Beneficial impact - a positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- Adverse impact - in the context of most resources, an adverse impact refers to a change that moves the resource away from a desired condition or detracts from its appearance or condition.
- Short-term impact - an effect that within a short period would no longer be detectable as the resource is returned to its pre-disturbance condition or appearance, generally less than 5 years.
- Long-term impact - a change in a resource or its condition that does not return the resource to pre-disturbance condition or appearance and for all practical purposes is considered permanent.
- Site-specific impact - the action would affect areas within a park unit boundary.
- Local impact - the action would affect areas within a park unit boundary and land adjacent (sharing a boundary) to a park unit.
- Regional impact - the action would affect the park, land adjacent to the park, and surrounding communities.

4.2 DIRECT AND INDIRECT IMPACTS

Section 4.2.1 describes the potential direct and indirect impacts resulting from Alternative 1 - No Action, Continue with Current Management Plans. **Section 4.2.2** describes potential direct and indirect impacts resulting from Alternative 2 - Fundamental and Significant Resources. **Section 4.2.3** describes the potential direct and indirect impacts resulting from Alternative 3 - Species-Based Invasive Plant Management. Conclusion statements are included within each subsection for each impact topic. The conclusion statements include a summary of the direct and indirect impacts of treatment options under the alternative, a summary of cumulative impacts, and a brief comparison of the beneficial or adverse impacts amongst the three alternatives.

4.2.1 Direct and Indirect Impacts from Alternative 1 - No Action, Continue with Current Management Plans

This section describes the potential effects of implementing Alternative 1 - No Action, Continue with Current Management Plans.

Several of the Great Lakes parks including APIS, INDU, PIRO, SACN, SLBE, and VOYA have developed park-specific invasive plant management plans. In many cases, these plans have been developed to provide technical guidance when documenting treatment as part of a CE memo to file (see **Table 2.4-1**). For treatments identified in these plans, the parks have determined that these activities would have no significant impacts on park resources.

Currently the parks often rely on Categorical Exclusions (CEs) to obtain compliance for invasive plant management treatments. However, this somewhat restricts parks to the types of treatment that can be implemented. Under DO-12, the only invasive plant management activities that are covered under a CE involve removal of individual members of a non-threatened/endangered species or populations of pests and exotic plants that pose an imminent danger to park visitors or an immediate threat to park resources. In addition to meeting these criteria, these treatments must also have no measurable impacts to park resources to qualify as a CE. Measurable impacts are those that the interdisciplinary team determines to be greater than minor by the analysis process described in DO-12. Parks have also recently received guidance that any effects that are minor can also be covered using a CE. For effects to

be minor, a relatively small number of individuals/resources would be affected. Minor impacts typically require considerable scientific effort to measure, are limited to relatively few individuals of the populations, are localized in area, and have barely perceptible consequences. Therefore, the potential impacts for any activities covered under a CE would be negligible to minor.

Potential impacts of Alternative 1 on each impact topic carried forward for analysis are discussed in detail in the following sections.

4.2.1.1 General Vegetation

IMPACT THRESHOLDS

Vegetation impact thresholds were determined by examining the potential effects of invasive plant treatment on general vegetation, according to type, context, and duration. The following impact thresholds were established to describe the relative changes in vegetation anticipated from treatment options identified in each alternative evaluated for the Great Lakes IPMP/EA:

- **Negligible:** Impacts would have no measurable or perceptible changes in plant community size, integrity, or continuity.
- **Minor:** Impacts would be measurable or perceptible but would be localized within a small area within the park. The overall viability of the plant community would not be affected.
- **Moderate:** Impacts would cause a measureable and/or noticeable change in a plant community within the park (e.g. measureable and noticeable change in abundance, distribution, quantity, or quality of general vegetation communities).
- **Major:** Impacts to the plant community would be substantial, regional or park-wide, highly noticeable, and permanent.

IATR

As described in Chapter 3, native vegetation within IATR is heavily impacted by infestations of common buckthorn, Tatarian honeysuckle, prickly ash, and reed canary grass. Other invasive plants that occur within IATR at lower levels, but present growing threats to native vegetation include garlic mustard, winged burning-bush, star-of-Bethlehem, multiflora rose, Oriental bittersweet, Japanese barberry, and common burdock. As IATR does not have an existing invasive plant management plan, existing options for treating invasive species are limited, and are subject to analysis under NEPA prior to implementation. Therefore, implementation of Alternative 1 would have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that IATR has to remove existing invasive plants and help prevent future infestations.

Conclusion: Implementation of Alternative 1 would have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that IATR has to remove existing invasive plants and help prevent future infestations. As there would be no change in management, invasive plant treatments under Alternative 1 would have minimal cumulative effect on

maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

MISS

As described in Chapter 3, native vegetation along the river corridor at MISS is heavily impacted by infestations of invasive species such as buckthorn, Tatarian honeysuckle, and garlic mustard. These species have contributed to the closed canopy forests that now dominate the area, and contribute to the loss of native vegetation in the understory through shading and competition for other resources. As MISS does not have an existing invasive plant management plan, existing options for treating invasive species are limited, and are subject to analysis under NEPA prior to implementation. Therefore, implementation of Alternative 1 would have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that MISS has to remove existing invasive plants and help prevent future infestations.

Conclusion: Implementation of Alternative 1 would have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that MISS has to remove existing invasive plants and help prevent future infestations. As there would be no change in management, invasive plant treatments under Alternative 1 would have minimal cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

SACN

Native vegetation in SACN is heavily impacted by invasive species such as buckthorn, which is extensive in the southern half of the park, and honeysuckle, which is extensive in the northern half of the park. SACN is in the process of a major native vegetation restoration project to convert old agricultural fields back to native prairie, and areas infested with buckthorn back to native oak savanna. As SACN has two existing, invasive species management plans, treatment activities would continue under the nexus of these plans. However, as compared to Alternatives 2 or 3, SACN would have limited ability to implement new or future invasive species management tools without having to go through additional analysis under NEPA. Therefore, implementation of Alternative 1 would primarily have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that SACN has to remove existing invasive plants and help prevent future infestations.

Conclusion: Implementation of Alternative 1 would primarily have a moderate, direct, adverse, long-term, localized effect on native vegetation by limiting the treatment tools that SACN has to remove existing invasive plants and help prevent future infestations. As there would be no change in management, invasive plant treatments under Alternative 1 would have minimal cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

4.2.1.2 Rare or Unusual Vegetation

IMPACT THRESHOLDS

Impacts to rare and unusual plant communities (e.g., wetlands, peat bogs, dunal systems, oak-savanna woodlands) were determined by examining the potential effects of invasive plant treatment on the community, according to type, context, and duration. The following impact thresholds were established to describe the relative changes in rare and unusual plant communities anticipated from treatment options identified in each alternative evaluated for the Great Lakes IPMP/EA:

- **Negligible:** Impacts would have no measurable or perceptible changes in rare or unusual plant community viability, size, integrity, or continuity.
- **Minor:** Impacts would be measurable or perceptible but would be localized within a relatively small area in the park. The overall viability of the plant community would not be affected.
- **Moderate:** Impacts would cause a measureable and/or noticeable change in the plant community (e.g. measureable or noticeable change in abundance, distribution, quantity, or quality of wetlands, dunal ecosystems, etc.).
- **Major:** Impacts to the plant community would be substantial, regional, highly noticeable, and permanent.

INDU

As described in Chapter 3, INDU supports several rare and unusual vegetation communities including peat based wetlands (aka peatlands), free moving dunal systems, and black oak savanna. INDU has an existing invasive plant management strategy, and therefore, the ability to implement treatment options on a limited basis. Under Alternative 1, INDU would continue to manage invasive species using the strategies identified in its Indiana Dunes National Lakeshore Invasive Plant Management Strategy; there would be no change in management actions. Therefore, implementation of Alternative 1 would have a moderate, indirect, slightly adverse, long-term, and localized effect on rare and unusual vegetation by limiting the tools that INDU has for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 1 would have a moderate, indirect, slightly adverse, long-term, and localized effect on rare and unusual vegetation by limiting the tools that INDU has for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 1 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

PIRO

The dunes at PIRO have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization. While dune stabilization occurs naturally as a

result of native plant succession, rapid stabilization as a consequence of highly competitive and fast-growing invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes. The invasive species of most concern at PIRO include spotted knapweed, white sweet clover, red clover, burdock, periwinkle, and several hawkweed species. In particular, the shifting sands of PIRO's dunes are attractive habitat for spotted knapweed, which is a superior competitor that invades highly disturbed areas. In the Grand Sable Dunes, spotted knapweed infestations are exacerbated by infestations of white sweet-clover, red clover, and several species of hawkweed. Baby's breath, which is currently found on the border of the PIRO lakeshore, is a potential threat to the native dune plants community should it become established. Implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, localized effect on dunes and unique dune vegetation by limiting the treatment tools that PIRO has to remove existing invasive plants and help prevent future infestations.

Conclusion: Implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, localized effect on dunes and unique dune vegetation by limiting the treatment tools that PIRO has to remove existing invasive plants and help prevent future infestations. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 1 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

SLBE

Like INDU and PIRO, the dunes at SLBE have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization from invasive species. Spotted knapweed, baby's breath, bull thistle, blue lyme grass, bladder campion, hoary alyssum, and Lombardy poplar have extensive, established populations in the open dune habitat. These invasive species not only adversely affect the natural dunal movement, but also impact other unique and rare vegetation species that occur in SLBE including a species of dunewort that was first discovered in SLBE and Pitcher's thistle. Other vegetation such as Marram grass, bearberry, sand cherry, beach pea would also be impacted. Deterioration of forest, wetlands, riverine systems, lacustrine systems, open fields, and riparian habitats by invasive species such as those mentioned above. Additional invasive species that impact these other habitats include garlic mustard, black locust, Phragmites, conifer plantations, and narrow-leaved cattails (and hybrids) is also occurring. These invasive species adversely affect the natural function and ecological services provided by these systems along with impacting spring ephemerals, mushrooms, forest regeneration, and rare vegetation Michigan monkey-flower, American ginseng, and various orchids.

Under Alternative 1, SLBE would have limited ability to implement new or future invasive species management tools. Therefore, implementation of Alternative 1 would have a moderate, indirect, slightly adverse, long-term, localized effect on dunes, forest, wetlands, riverine systems, lacustrine systems, open fields, and riparian habitats and their respective associated vegetation by limiting the treatment tools that SLBE has to remove existing invasive plants and help prevent future infestations.

Conclusion: Implementation of Alternative 1 would have a moderate, indirect, slightly adverse, long-term, localized effect on dunes, forest, wetlands, riverine systems, lacustrine systems, open fields, and riparian habitats and their respective associated vegetation by limiting the treatment tools that SLBE has to remove existing invasive plants and help prevent future infestations. Combined with existing and

future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 1 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

VOYA

As described in Chapter 3, VOYA supports approximately 20,000 to 27,000 acres of wetlands, which include peat wetlands, leatherleaf/sweet gale shore fens, northern bur oak mesic forests, white cedar/mixed conifer or tamarack swamps, and wild rice marshes. VOYA's wetlands provide habitat for the majority of the park's rare and unique plant species. The primary invasive species of concern that affect VOYA's wetlands include purple loosestrife, reed canary grass, Phragmites, and narrow-leaved cattail. While Eurasian watermilfoil has not been observed in VOYA, the species is a regional concern and prevention is an imperative control tool. Removal and control of both native and non-native invasive species would help VOYA in their efforts to conserve healthy wetlands, and to restore impacted wetlands to proper functioning condition. Therefore, implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on rare and unusual vegetation at VOYA by limiting the park's treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on rare and unusual vegetation at VOYA by limiting the park's treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 1 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

4.2.1.3 Species of Special Concern and their Potential/Critical Habitat

The following sections describe the potential effects of Alternative 1 on special status plant and wildlife species and/or their habitat.

IMPACT THRESHOLDS

Impact thresholds for federally listed species are based on impact determination terminology defined by the Endangered Species Act. Impact thresholds for non-listed special status species (i.e., pitcher-plant and species of special concern in ISRO) are similar to those provided for general vegetation.

- **No effect:** Treatment options identified in the alternative would not affect a listed species or designated critical habitat.
- **May affect / not likely to adversely affect:** Effects from invasive plant treatment options on special status species would be discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or effects would be beneficial.

- **May affect / likely to adversely affect:** Implementation of invasive plant treatment options would have an adverse effect to the species or its critical habitat may occur as a direct or indirect result of an action, and the effect is not discountable, insignificant, or beneficial.
- **Is likely to jeopardize proposed species / adversely modify proposed critical habitat:** Implementation of invasive plant treatment options could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a species within or outside park boundaries.

APIS

Piping Plover: In APIS, Long Island is known to support breeding pairs of piping plover. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. As APIS has an existing invasive plant management plan, the park has the ability to implement invasive species control. Under Alternative 1, APIS would continue to use existing treatment options identified in their invasive plant management plan to control invasive species in piping plover habitats. Treatment options not currently considered within the strategy, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change) Alternative 1 would have **no effect** on the piping plover.

Conclusion: Alternative 1 would have no direct, indirect or cumulative impacts on the piping plover, and therefore, **no effect**, on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

INDU

Eastern Massasauga Rattlesnake: As described in Chapter 3, the massasauga exhibits an affinity for wetland habitats. Massasaugas have been documented in wet areas including bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the massasauga. As removal and control of invasive species would help INDU in their efforts to restore wetlands to proper functioning condition, habitat for the massasauga would also be restored and protected. Under Alternative 1, INDU would continue to use existing treatment options identified in their invasive plant management strategy. Treatment options not currently considered within the strategy, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change) Alternative 1 would have **no effect** on the eastern massasauga rattlesnake.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on the eastern massasauga rattlesnake, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

Pitcher's Thistle: As described in Chapter 3, Pitcher's thistle is endemic to beaches and grassland dunes. The species requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for

the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve INDU's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Under Alternative 1, INDU would continue to use existing treatment options identified in their invasive plant management strategy. Treatment options not currently considered within the strategy, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options, Alternative 1 would have **no effect** on Pitcher's thistle.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on Pitcher's thistle, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

Pitcher-plant: The pitcher-plant characteristically occurs in bogs, savannas, and flatwoods. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the pitcher-plant. As removal and control of invasive species would help INDU in their efforts to restore the wetlands to proper functioning condition, habitat for the pitcher-plant would also be restored and protected. Under Alternative 1, INDU would continue to use existing treatment options identified in their invasive plant management strategy. Treatment options not currently considered within the strategy and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change), Alternative 1 would have **no effect** on the pitcher-plant.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on the pitcher-plant, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

Karner Blue Butterfly: As described in Chapter 3, the Karner blue butterfly is dependent upon its larval host plant, wild lupine, for survival. Habitat for wild lupine is found in the oak savanna community of INDU, which has been substantially impacted by invasive species. Invasive plants have created closed canopy areas that result in diminished habitat for wild lupine, and therefore the Karner blue butterfly. Under Alternative 1, INDU would continue to use existing treatment options identified in their invasive plant management strategy. Treatment options not currently considered within the strategy and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change) Alternative 1 would have **no effect** on the Karner blue butterfly.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on the Karner blue butterfly, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

ISRO

As described in Chapter 3, ISRO supports a rich diversity of species of special concern. Invasive plant species on are currently limited on ISRO. However, as ISRO does not have an existing invasive plant

management plan, existing options for treating invasive species are limited, and are subject to analysis under NEPA prior to implementation. Implementation of Alternative 1 would have a direct, slightly adverse, long-term, localized effect on native vegetation by limiting the treatment tools that ISRO has to remove existing invasive plants and help prevent future infestations.

Conclusion: Alternative 1 would have slightly adverse direct and cumulative, long-term, localized effect on species of special concern by limiting the treatment tools that ISRO has to remove existing invasive plants and help prevent future infestations. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

PIRO

Pitcher's Thistle: As described in Chapter 3, Pitcher's thistle occurs in the Grand Sable Dunes of PIRO. The species requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve PIRO's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Under Alternative 1, PIRO would continue to use existing treatment options identified in their existing invasive plant management plan. Treatment options not currently considered within the strategy, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change), Alternative 1 would have **no effect** on Pitcher's thistle.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on Pitcher's thistle, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

SLBE

Pitcher's Thistle: Similar to INDU and PIRO, Pitcher's thistle occurs in the dunes for which SLBE is named. The species requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve SLBE's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Under Alternative 1, SLBE would continue to use existing treatment options identified in their existing invasive plant management plan. Treatment options not currently considered within the strategy and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change), Alternative 1 would have **no effect** on Pitcher's thistle.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on Pitcher's thistle, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

Piping Plover

There are several established nesting areas in SLBE which have for many years supported a significant proportion of the breeding pairs of piping plover in the Great Lakes population. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. SLBE has invested substantial park staff labor and resources into controlling species within designated critical piping plover habitat. SLBE has an existing invasive plant management plan and Biological Opinion issued by the USFWS to treat these invasive species in the vicinity of listed species providing SLBE with the ability to implement invasive species control. Under Alternative 1, SLBE would continue to use existing treatment options identified in their invasive plant management plan and Biological Opinion to control invasive species in piping plover habitats. Treatment options not currently considered within the strategy, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change) Alternative 1 would have **no effect** on the piping plover.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on the piping plover, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

Michigan Monkey-flower

SLBE has restored and continues to monitor three colonies of Michigan monkey-flower that were removed from an artificial drainage system and transplanted to a location adjacent to a nearby existing patch of Michigan monkey-flower. Relocating the plants was part of restoring the hydrological functions on this newly acquired NPS property that had previously been altered by human development. According to the NPS's annual monitoring reports, the transplanting has been successful and the plants continue to thrive, however, coltsfoot and reed canary grass pose immediate threats. As discussed in the recovery plan, Michigan monkey-flower is threatened by direct destruction and modification of its habitat. Its habitat has been developed for recreational and residential purposes, which has led to extirpation and severe impacts to some historical populations. Hydrological disruptions constitute the next most serious threat as water diversion, warming of water sources, and other groundwater alterations lead to less than optimal habitat conditions. Consequently, this species may be inadvertently impacted by offsite activities. The lakeshore has in place a Biological Opinion issued by the USFWS to control invasive weeds within the vicinity of Michigan monkey-flower, however, treatment options not currently considered within the Biological Opinion, and new treatment options would require additional analysis under NEPA. Based on a continuation of currently employed invasive species treatment options (i.e., no change) Alternative 1 would have **no effect** on the Michigan monkey-flower.

Conclusion: Alternative 1 would have no direct, indirect, or cumulative impacts on the Michigan monkey-flower, and therefore, **no effect** on the species. Implementation of Alternative 1 would have far less efficacy in treating invasive species for the preservation and/or restoration of special status species habitat as compared to Alternatives 2 or 3.

4.2.1.4 Unique Ecosystems

IMPACT THRESHOLDS

Unique ecosystem impact thresholds were determined by examining the potential effects of invasive plant treatment on the ecosystem type, according to type, context, and duration. As INDU's NNLs are the only unique ecosystems analyzed in this IPMP/EA, the following impact threshold definitions are limited to defining the intensity of impact anticipated on INDU's NNLs:

- **Negligible:** Impacts would have no measurable or perceptible changes in the condition or function of INDU's NNLs.
- **Minor:** Impacts would be measurable or perceptible but would be localized within a relatively small area of the NNL(s). The overall condition or viability of the NNL would not be affected.
- **Moderate:** Impacts would cause a noticeable or measureable change in NNL's outstanding condition, illustrative value, rarity, diversity, and/or value to science and education; however, the impact would remain localized.
- **Major:** Impacts to the NNL's outstanding condition, illustrative value, rarity, diversity, and/or value to science and education would be substantial, highly noticeable, and permanent.

INDU

As discussed in Chapter 3, INDU contains four registered NNLs; the Dunes Nature Preserve NNL, the Pinhook Bog NNL, Cowles Bog NNL, and the Hoosier Prairie State Nature Preserve NNL. As potential impacts of Alternative 1 on the NNLs are identical to those described for dunes and wetlands, the reader is referred to **Section 4.2.1.2** of this IPMP/EA.

Based on the analyses provided in **Section 4.2.1.2**, implementation of Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on dunal and wetland habitats by limiting INDU's treatment options for the control and prevention of invasive plant species.

Conclusion: Alternative 1 would have a moderate, indirect, adverse, long-term, and localized effect on dunal and wetland habitats by limiting INDU's treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial cumulative impact on unique ecosystems. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

4.2.1.5 Recreation Resources, Visitor Experience, Esthetic Resources

IMPACT THRESHOLDS

Impact thresholds for recreational resources, visitor experience, and esthetic resources were determined by examining the potential effects of invasive plant treatment on recreation and visitor experience according to type, context, and duration. The following impact thresholds were established to describe the relative changes in recreational opportunities and experience anticipated from treatment options identified in each alternative evaluated for the Great Lakes IPMP/EA:

Negligible: There would be little or no change in recreational opportunities. Visitors would not be aware of the invasive plant treatment activities or the effects of invasive plant treatment.

Minor: Invasive plant treatment activities could result in a small and/or temporary change in recreational opportunities or visitor safety, however it would affect relatively few visitors, or would not affect any wilderness-dependent recreational activities. Visitors would likely be aware of invasive plant treatment activities; however the changes in visitor use, experience, and aesthetics would be localized and short-term.

Moderate: There would be substantial and lasting changes in recreational opportunities, however these changes would not affect the majority of visitors in a wilderness-dependent user group and/or would be beneficial. Visitors would be aware of the effects of invasive plant treatment activities. Other areas in the park would remain available for similar visitor experience and use without derogation of park resources and values, but visitor satisfaction might be measurably affected (visitors could be either satisfied or dissatisfied with invasive plant treatment activities and/or results).

Major: There would be substantial changes in recreational opportunities as a result of invasive plant treatment activities. Visitors would be highly aware of the effects. Changes in visitor use and experience would be readily apparent and long term.

MISS

The primary invasive species of concern for recreational resources and visitor experience in MISS is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of MISS' most popular parks and destinations. MISS is currently engaged in an effort to remove buckthorn using existing invasive species treatment options. Under Alternative 1 there would be no change in management actions in MISS. Therefore, Alternative 1 would have negligible, direct and indirect effects on recreation resources.

Conclusion: Alternative 1 would have negligible, direct, indirect, and cumulative effects on recreation resources. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

SACN

Similar to MISS, the primary invasive species of concern for recreational resources and visitor experience is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of SACN's most popular parks and destinations. SACN is currently engaged in an effort to remove

buckthorn using existing invasive species treatment options. Under Alternative 1 there would be no change in management actions in SACN. Therefore, Alternative 1 would have negligible, direct and indirect effects on recreation resources.

Conclusion: Alternative 1 would have negligible direct, indirect, and cumulative effects on recreation resources. Implementation of Alternative 1 would have far less efficacy in treating invasive species as compared to Alternatives 2 or 3.

4.2.1.7 Park Operations

Impact thresholds for park operations were determined by qualitatively evaluating the potential effects of the alternatives and treatment options on parks' staff and budget resources.

Negligible: Implementation of the alternative and invasive plant treatment activities would have an immeasurable/imperceptible impact on park staffing and/or budget resources.

Minor: Implementation of the alternative and invasive plant treatment activities would have a noticeable and slightly measurable impact on park staffing and/or budget resources.

Moderate: Implementation of the alternative and invasive plant treatment activities would have a noticeable and measureable effect on park staffing and budget resources. Park staff may be constrained in their abilities to implement invasive plant strategies based on limited resources. Treatment options will be limited by budgetary constraints.

Major: Implementation of the alternative and invasive plant treatment activities would have a substantial impact on park staffing and budget resources, and could conflict with or impact the park's abilities to carry out other park management responsibilities.

IATR

The IATR site is relatively newly-acquired by the NPS, and still in the preliminary phases of management planning. Current trail planning staff and park management maintain IATR as collateral duty, therefore, existing opportunities to implement invasive species control are limited. Implementation of invasive species treatments under Alternative 1 would not require additional staffing and/or funding as treatment would continue as currently being employed. Therefore, implementation of Alternative 1 would have a negligible impact on park operations at IATR.

Conclusion: Implementation of Alternative 1 would have negligible direct, indirect, or cumulative impacts on park operations at IATR. Implementation of Alternative 1 would result in less of a negative impact on park operations as species as compared to Alternatives 2 or 3.

4.2.2 Direct and Indirect Impacts from Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management (Preferred Alternative)

This section describes the potential effects of implementing Alternative 2 - Fundamental and Significant Resources and Values-Based Invasive Plant Management.

4.2.2.1 General Vegetation

IMPACT THRESHOLDS

See definitions provided in **Section 4.2.1.1**.

IATR

As described in Chapter 3, native vegetation within IATR is heavily impacted by infestations of common buckthorn, Tatarian honeysuckle, prickly ash, and reed canary grass. Other invasive plants that occur within IATR at lower levels, but present growing threats to native vegetation include garlic mustard, winged burning-bush, star-of-Bethlehem, multiflora rose, Oriental bittersweet, Japanese barberry, and common burdock. Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing IATR the ability to use a suite of treatment options to remove existing invasive plants, and help prevent future infestations.

Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a minor, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on native vegetation by providing IATR the ability to use a suite of treatment options to remove existing invasive plants, and help prevent future infestations. Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 2 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how IATR prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources versus prioritizing treatment for individual or targeted species) native vegetation would be beneficially affected by reducing invasive species. Therefore, the beneficial effects of Alternative 2 on native vegetation would be similar to those under Alternative 3, but would be far greater than under Alternative 1.

MISS

As described in Chapter 3, native vegetation along the river corridor at MISS is heavily impacted by infestations of buckthorn, Tatarian honeysuckle, and garlic mustard. These species have contributed to the closed canopy forests that now dominate the area, and contribute to the loss of native vegetation in the understory through shading and competition for other resources. Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing MISS the ability to use a suite of treatment options to control existing invasive plants, and help prevent future infestations (e.g., regrowth of buckthorn).

Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a minor, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing MISS the ability to use a suite of treatment options to control existing invasive plants, and help prevent future infestations (e.g., regrowth of buckthorn). Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 2 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how MISS prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources versus prioritizing treatment for individual or targeted species) native vegetation would be beneficially affected by reducing invasive species. Therefore, the beneficial effects of Alternative 2 would be similar to those under Alternative 3, but would be far greater than under Alternative 1.

SACN

Native vegetation in SACN is heavily impacted by invasive species such as buckthorn, which is extensive in the southern half of the park, and honeysuckle, which is extensive in the northern half of the park. SACN is in the process of a major native vegetation restoration project to convert old agricultural fields back to native prairie, and areas infested with buckthorn back to native oak savanna. Therefore, implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing SACN with a suite of treatment options to help achieve these restoration objectives.

Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a minor, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Alternative 2 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing SACN with a suite of treatment options to help achieve these restoration objectives. Potential adverse impacts on native vegetation under Alternative 2 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 2 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how SACN prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources such as native oak savanna, versus prioritizing treatment for targeted species such as buckthorn), native vegetation would be beneficially affected by reducing invasive species and allowing for the restoration and conservation of native plants. Therefore, the beneficial effects of Alternative 2 would be similar to those under Alternative 3, but would be far greater than under Alternative 1.

4.2.2.2 Rare or Unusual Vegetation

IMPACT THRESHOLDS

See Impact Threshold definitions provided in **Section 4.2.1.2**.

INDU

As described in Chapter 3, INDU supports several rare and unusual vegetation communities including peatlands, free moving dunal systems, and black oak savanna.

Anthropogenic stressors including ditching, peat fires, fire suppression, landscape alterations, biological pollutants, lumbering, hydrological alterations, and haying of the graminoid resource, have left INDU's peat wetland communities highly degraded or eliminated. These stressors have resulted in a species-poor upland/wetland complex that is easily dominated by wind dispersed native tree species such as green ash, eastern cottonwood, and silver maple; non-native invasive shrubs such as honeysuckle and multiflora rose; and non-native invasive herbaceous species such as reed canary grass, *Phragmites*, hybrid cattail, and garlic mustard. Removal and control of both native and non-native invasive species would help INDU in their efforts to restore the peat wetlands to proper functioning condition.

The dunes at INDU have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events, and dune stabilization. While dune stabilization occurs naturally as a result of native plant succession, rapid stabilization as a consequence of highly competitive and fast-growing invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing invasive species from the dunes would improve INDU's ability to restore a natural pattern of erosion and deposition that moves in a westward direction along INDU's area beaches.

Native oak savanna in INDU is heavily impacted by buckthorn, black locust, tree of heaven, honeysuckle, bristly locust, multiflora rose, garlic mustard, Oriental bittersweet, cattail, *Phragmites*, reed canary grass, purple loosestrife, and autumn olive. Removal and control of invasive tree and shrub species would help open the canopy of the oak savanna communities. Removal of invasive ground cover would help restore the dry, sandy soils that typify native oak savanna.

In summary, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing INDU with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 2 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes and wetlands of INDU are considered a

fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would conceivably have a greater beneficial impact on INDU than Alternatives 1 or 3.

PIRO

The dunes at PIRO have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization. While dune stabilization occurs naturally as a result of native plant succession, rapid stabilization as a consequence of highly competitive and fast-growing invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes. The invasive species of most concern at PIRO include spotted knapweed, white sweet clover, red clover, burdock, periwinkle, and several hawkweed species. In particular, the shifting sands of PIRO's dunes are attractive habitat for spotted knapweed, which is a superior competitor that invades highly disturbed areas. In the Grand Sable Dunes, spotted knapweed infestations are exacerbated by infestations of white sweet-clover, red clover, and several species of hawkweed. Baby's breath, which is currently found on the border of the PIRO lakeshore, is a potential threat to the native dune plants community should it become established.

Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing existing invasive species from the dunes, and preventing infestation by baby's breath and other invasive plants would improve PIRO's ability to restore a natural pattern of erosion and deposition.

Based on the analysis above, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing PIRO with a suite of treatment options for the control and prevention of invasive plant species at the dunes.

Conclusion: Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing PIRO with a suite of treatment options for the control and prevention of invasive plant species at the dunes. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 2 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes of PIRO are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would conceivably have a greater beneficial impact on PIRO than Alternatives 1 or 3.

SLBE

Like INDU and PIRO, the dunes at SLBE have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization from invasive species. Spotted knapweed, baby's breath, bull thistle, blue lyme grass, bladder campion, hoary alyssum, and Lombardy poplar have extensive, established populations in the open dune habitat. These invasive species not only adversely affect the natural dunal movement, but also impact other unique and rare vegetation species that occur in SLBE including a species of dunewort that was first discovered in SLBE and Pitcher's thistle. Other vegetation such as Marram grass, bearberry, sand cherry, beach pea would also be impacted.

Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing invasive species from the dunes would improve SLBEs ability to restore a natural pattern of erosion and deposition.

Also supported by SLBE are variety of rich wetlands ecosystems that consists of bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows. Removal and control of both native and non-native invasive species would help SLBE in their efforts to conserve healthy wetlands, and to restore impacted wetlands to proper functioning condition.

Forest, riverine systems, lacustrine systems, open fields, and riparian habitats are also supported by SLBE. Additional invasive species that impact these other habitats include garlic mustard, black locust, Phragmites, conifer plantations, and narrow leaved cattails (and hybrids). The natural function and ecological services provided by these systems along with spring ephemerals, mushrooms, forest regeneration, and rare vegetation such as Michigan monkey-flower, American ginseng, and various orchids will also benefit by invasive species removal and control.

Based on the analysis above, implementation of Alternative 2 would have a moderate, indirect, beneficial, long term, and localized effect on rare and unusual vegetation by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in all habitat types found within the lakeshore.

Conclusion: Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in all habitat types found within the lakeshore. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 2 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes and wetlands of SLBE are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would have a greater beneficial impact on SLBE than Alternatives 1 or 3.

VOYA

As described in Chapter 3, VOYA supports approximately 20,000 to 27,000 acres of wetlands, which include peat wetlands, leatherleaf/sweet gale shore fens, northern bur oak mesic forests, white cedar/mixed conifer or tamarack swamps, and wild rice marshes. VOYA's wetlands provide habitat for the majority of the park's rare and unique plant species. The primary invasive species of concern that affect VOYA's wetlands include purple loosestrife, reed canary grass, Phragmites, and narrow-leaved cattail. While Eurasian watermilfoil has not been observed in VOYA, the species is a regional concern and prevention is an imperative control tool. Removal and control of both native and non-native invasive species would help VOYA in their efforts to conserve healthy wetlands, and to restore impacted wetlands to proper functioning condition. Therefore, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation at VOYA by providing the park with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation at VOYA by providing the park with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 2 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the wetlands of VOYA are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would conceivably have a greater beneficial impact on VOYA than Alternatives 1 or 3.

4.2.2.3 Species of Special Concern and their Potential/Critical Habitat

IMPACT THRESHOLDS

Impact Threshold definitions for species listed under the ESA are provided in **Section 4.2.1.3**. Impact thresholds for non-listed species of special concern (i.e., pitcher-plant and species of special concern in ISRO) are similar to those provided for general vegetation.

APIS

Piping Plover: In the Great Lakes region, piping plovers breed and raise young mainly on sparsely vegetated beaches, cobble pans, and sand spits of glacially formed sand dune ecosystems along the Great Lakes shoreline. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement, limitations on public access to breeding and nesting areas), removing invasive species from the shoreline, dunes, and cobble pans would improve APIS' ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on piping plover by providing APIS with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn, improving habitat for the piping plover. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on the piping plover; and therefore, ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

INDU

Eastern Massasauga Rattlesnake: As described in Chapter 3, the massasauga exhibits an affinity for wetland habitats. Massasaugas have been documented in wet areas including bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the massasauga. As removal and control of invasive species would help INDU in their efforts to restore wetlands to proper

functioning condition, habitat for the massasauga would also be restored and protected. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on the massasauga by providing INDU with a suite of treatment options for the control and prevention of invasive plant species in wetlands, and in turn improving habitat for the massasauga. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on the massasauga; *and* therefore, ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Pitcher's Thistle: As described in Chapter 3, Pitcher's thistle is endemic to beaches and grassland dunes. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve INDU's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 2 would have moderate indirect, beneficial, long-term, and localized effects on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on the Pitcher's thistle; *and* therefore, ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Pitcher-plant: The pitcher-plant characteristically occurs in bogs, savannas, and flatwoods. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the pitcher-plant. As removal and control of both invasive species would help INDU in their efforts to restore the wetlands to proper functioning condition, habitat for the pitcher-plant would also be restored and protected. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on the pitcher-plant by providing the park with a suite of treatment options for the control and prevention of invasive plant species thereby improving wetland habitats, and in turn improving habitat for the pitcher-plant.

In addition, as described in Chapter 3, periodic, moderate fires are necessary to reduce the encroachment of competing plants and stimulate growth of the pitcher-plant by releasing nutrients bound in organic matter. The species survives fire by resprouting from underground rhizomes. Therefore, prescribed fires used to treat invasive species under Alternative 2, could also have a moderate, indirect, beneficial, long-term, and localized effect on the pitcher-plant.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on the pitcher-plant by providing the park with a suite of treatment options for the control and prevention of invasive plant species thereby improving wetland habitats, and in turn improving habitat for the pitcher-plant. Prescribed fires used to treat invasive species under Alternative 2, could also have a moderate, indirect, beneficial, long-term, and localized effect on the pitcher-plant. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Karner Blue Butterfly: As described in Chapter 3, the Karner blue butterfly is dependent upon its larval host plant, wild lupine, for survival. Habitat for wild lupine is found in the oak savanna community of INDU, which has been substantially impacted by invasive species. Invasive plants have created closed canopy areas that result in diminished habitat for wild lupine, and therefore, the Karner blue butterfly. Therefore, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on the Karner blue butterfly by providing the park with a suite of treatment options for the control and prevention of invasive plant species in oak savanna habitat, thereby improving habitat for wild lupine, and in turn improving habitat for the Karner blue butterfly.

In addition, adult butterflies are known to feed on at least 70 different nectar producing species for whom frequent and patchy fires seem to be most effective in providing habitat for the species. Therefore, prescribed fires used to treat invasive species under Alternative 2, could also have a moderate, indirect but beneficial effect on the Karner blue butterfly.

Based on this analysis, implementation of Alternative 2 *may affect but is not likely to adversely affect* the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on the Karner blue butterfly; and therefore, *may affect but is not likely to adversely affect* the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

ISRO

As described in Chapter 3, ISRO supports a rich diversity of rare species or species of special concern. While invasive plant species on ISRO are currently limited, implementation of Alternative 2 would provide the park with a suite of treatment options that could be used to help prevent future infestations and help eradicate existing infestations. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on special status species and habitats on ISRO.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on special status species and habitats on ISRO. As special status species could be construed as a

fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

PIRO

Pitcher's Thistle: As described in Chapter 3, Pitcher's thistle occurs in the Grand Sable Dunes of PIRO. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve PIRO's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative impacts on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Therefore, implementation ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

SLBE

Pitcher's Thistle: Similar to INDU and PIRO, Pitcher's thistle occurs in the dunes for which SLBE is named. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve SLBE's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, indirect and cumulative, beneficial effects on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the

effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Piping Plover: There are several established nesting areas in SLBE which have for many years supported a significant proportion of the breeding pairs of piping plover in the Great Lakes population. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. SLBE has invested substantial park staff labor and resources into controlling species within designated critical piping plover habitat. SLBE has an existing invasive plant management plan and Biological Opinion issued by the U.S. Fish and Wildlife Service to treat these invasive species in the vicinity of listed species providing SLBE with the ability to implement invasive species control. Therefore, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on piping plover by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn, improving habitat for the piping plover. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have a moderate, beneficial, indirect and cumulative effect on piping plover by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn, improving habitat for the piping plover. Based on this analysis, implementation of Alternative 2 ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Michigan Monkey-flower: SLBE has restored and continues to monitor three colonies of Michigan monkey-flower that were removed from an artificial drainage system and transplanted to a location adjacent to a nearby existing patch of Michigan monkey-flower. Relocating the plants was part of restoring the hydrological functions on this newly acquired NPS property that had previously been altered by human development. According to the NPS's annual monitoring reports, the transplanting has been successful and the plants continue to thrive, however, coltsfoot and reed canary grass pose immediate threats. Therefore, implementation of Alternative 2 would have moderate, indirect, beneficial, long-term, and localized effects on Michigan monkey-flower by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in wetland and forest habitats. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 2 would have moderate, beneficial, indirect and cumulative effects on Michigan monkey-flower by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in wetland and forest habitats. Based on this analysis, implementation ***may affect but is not likely to adversely affect*** the species. As special status species could be construed as a fundamental and/or significant resource of the park, the effects of invasive species management under Alternative 2 would likely be identical to the effects of invasive species management under Alternative 3. The beneficial effects of invasive plant management under Alternative

2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.2.4 Unique Ecosystems

IMPACT THRESHOLDS

See Impact Threshold definitions provided in Section 4.2.1.4.

INDU

As discussed in Chapter 3, INDU contains four registered NNLs; the Dunes Nature Preserve NNL, the Pinhook Bog NNL, Cowles Bog NNL, and the Hoosier Prairie State Nature Preserve NNL. As the potential impacts of Alternative 2 on the NNLs are identical to those described for dunes and wetlands, the reader is referred to **Section 4.2.2.2** of this IPMP/EA.

Based on the analyses provided in **Section 4.2.2.2**, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial cumulative impact on unique ecosystems. As the dunes, wetlands, and NNLs of INDU are considered a fundamental resource, Alternative 2, which prioritizes treatment for fundamental resources, would conceivably have a greater beneficial impact on INDU than Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.2.5 Recreation Resources, Visitor Experience, Esthetic Resources

IMPACT THRESHOLDS

See Impact Threshold definitions provided in Section 4.2.1.5.

MISS

The primary invasive species of concern for recreational resources and visitor experience in MISS is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of MISS' most popular parks and destinations. Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation and visitor experience by opening currently unavailable areas to visitors and campers. Conversely, physical opening of these areas to the public could have an indirect but minor, adverse impact on vegetation and other park resources by potentially increasing the spread of other invasive species carried on boots/shoes, bikes, and camping

gear. Increased access into formerly unavailable areas has also led to increases in unapproved uses of NPS lands (e.g., unauthorized fire rings, rope swings, firewood cutting, and off-leash dog use), all of which have the potential to result in site-specific degradation of the visual landscape of the park.

Conclusion: Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation resource and visitor experience in MISS. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. MISS is known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value, would conceivably have a greater beneficial impact on the recreational resources of MISS than would Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

SACN

Similar to MISS, the primary invasive species of concern for recreational resources and visitor experience in SACN is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of SACN's most popular parks and destinations. Implementation of Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation and visitor experience by opening currently unavailable areas of the park to visitors, campers, and hunters. Conversely, physical opening of these areas to the public could have a minor, indirect but adverse impact on vegetation and other park resources by potentially increasing the spread of other invasive species carried on boots/shoes and camping gear.

Conclusion: Alternative 2 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation resource and visitor experience in SACN. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. SACN is also known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value, would conceivably have a greater beneficial impact on the recreational resources of SACN than would Alternative 3. The beneficial effects of invasive plant management under Alternative 2 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.2.6 Park Operations

IMPACT THRESHOLDS

See Impact Threshold definitions provided in Section 4.2.1.6.

IATR

As discussed in previous sections of this EA, implementation of Alternative 2 would result in beneficial effects on park resources. However, given the limited staffing and budget of IATR, the opportunities to implement invasive species control on a large scale would be limited. Therefore, implementation of invasive species treatments under Alternative 2 has the potential to result in a moderate, indirect and slightly negative impact on park operations by adding to the existing workload of already limited park operation resources.

Conclusion: Alternative 2 has the potential to result in a moderate, indirect and slightly negative impact on park operations by adding to the existing workload of already limited park operation resources. Combined with existing demands on staff and budget, Alternative 2 would have an additive, cumulative impact on IATR park operations. Impacts to park operations under Alternative 2 would be similar to those under Alternatives 1 or 3.

4.2.3 Direct and Indirect Impacts from Alternative 3 - Species-Based Invasive Plant Management

This section describes the potential effects of implementing Alternative 3 - Species-Based Invasive Plant Management.

4.2.3.1 General Vegetation

IMPACT THRESHOLDS

See definitions provided in **Section 4.2.1.1**.

IATR

As described in Chapter 3, native vegetation within IATR is heavily impacted by infestations of common buckthorn, Tatarian honeysuckle, prickly ash, and reed canary grass. Other invasive plants that occur within IATR at lower levels, but present growing threats to native vegetation include garlic mustard, winged burning-bush, star-of-Bethlehem, multiflora rose, Oriental bittersweet, Japanese barberry, and common burdock. Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing IATR the ability to use a suite of treatment options to remove existing invasive plants, and help prevent future infestations.

Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a negligible, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing IATR the ability to use a suite of treatment options to remove existing invasive plants, and help prevent future infestations. Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 3 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how IATR prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources versus prioritizing treatment for individual or targeted species) native vegetation would be beneficially affected by reducing native invasive species and non-native invasive species. Therefore the beneficial effects of Alternative 3 on native vegetation would be similar to those under Alternative 2, but would be far greater than under Alternative 1.

MISS

As described in Chapter 3, native vegetation along the river corridor at MISS is heavily impacted by infestations of invasive species such as buckthorn, Tatarian honeysuckle, and garlic mustard. These species have contributed to the closed canopy forests that now dominate the area, and contribute to the loss of native vegetation in the understory through shading and competition for other resources. Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing MISS the ability to use a suite of treatment options to control existing invasive plants, and help prevent future infestations (e.g., regrowth of buckthorn).

Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a negligible, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing MISS the ability to use a suite of treatment options to control existing invasive plants, and help prevent future infestations (e.g., regrowth of buckthorn). Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 3 would have a beneficial cumulative effect on maintaining/restoring native vegetation when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how MISS prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources versus prioritizing treatment for individual or targeted species); native vegetation would be beneficially affected by reducing native invasive species and non-native invasive species. Therefore, the beneficial effects of Alternative 3 would be similar to those under Alternative 2, but would be far greater than under Alternative 1.

SACN

Native vegetation in SACN is heavily impacted by invasive species such as buckthorn, which is extensive in the southern half of the park, and honeysuckle, which is extensive in the northern half of the park. SACN is in the process of a major native vegetation restoration project to convert old agricultural fields back to native prairie, and areas infested with buckthorn back to native oak savanna. Therefore, implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing SACN with a suite of treatment options to help achieve these restoration objectives.

Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. However, based on the BMPs described in **Section 2.2.6**, the potential for overspray would result in a negligible, direct and adverse, but short-term and site-specific impact on individual native plants.

Conclusion: Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, localized effect on native vegetation by providing SACN with a suite of treatment options to help achieve these restoration objectives. Potential adverse impacts on native vegetation under Alternative 3 include the potential for over-spray of pesticides onto native plants. Invasive plant treatments under Alternative 3 would have a beneficial cumulative effect on maintaining/restoring native vegetation

when combined with other past, present, and reasonably foreseeable restoration activities. Regardless of how SACN prioritizes invasive plant treatment options (i.e., prioritizing treatment for stewardship of fundamental resources such as native oak savanna, versus prioritizing treatment for targeted species such as buckthorn), native vegetation would be beneficially affected by reducing invasive species and allowing for the restoration and conservation of native plants. Therefore, the beneficial effects of Alternative 3 would be similar to those under Alternative 2, but would be far greater than under Alternative 1.

4.2.3.2 Rare or Unusual Vegetation

IMPACT THRESHOLDS

See definitions provided in **Section 4.2.1.2**.

INDU

As described in Chapter 3, INDU supports several rare and unusual vegetation communities including peatlands, free moving dunal systems, and black oak savanna.

Anthropogenic stressors including ditching, peat fires, fire suppression, landscape alterations, biological pollutants, lumbering, hydrological alterations, and haying of the graminoid resource, have left INDU's peatland communities highly degraded or eliminated. These stressors have resulted in a species-poor upland/wetland complex that is easily dominated by wind dispersed native tree species such as green ash, eastern cottonwood, and silver maple; non-native invasive shrubs such as honeysuckle and multiflora rose; and non-native invasive herbaceous species such as reed canary grass, *Phragmites*, hybrid cattail, and garlic mustard. Removal and control of both native and non-native invasive species would help INDU in their efforts to restore the peat wetlands to proper functioning condition.

The dunes at INDU have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events, and dune stabilization. While dune stabilization occurs naturally as a result of native plant succession, rapid stabilization as a consequence of highly competitive and fast-growing invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing invasive species from the dunes would improve INDU's ability to restore a natural pattern of erosion and deposition that moves in a westward direction along INDU's area beaches.

Native oak savanna in INDU is heavily impacted by buckthorn, black locust, tree of heaven, honeysuckle, bristly locust, multiflora rose, garlic mustard, Oriental bittersweet, cattail, *Phragmites*, reed canary grass, purple loosestrife, and autumn olive. Removal and control of invasive tree and shrub species would help open the canopy of the oak savanna communities. Removal of invasive ground cover would help restore the dry, sandy soils that typify native oak savanna.

In summary, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing INDU with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 3 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes and wetlands of INDU are considered a fundamental resource, Alternative 3, would have less beneficial impact on dunes and wetlands compared to Alternative 2, which prioritizes treatment for fundamental resources.

PIRO

The dunes at PIRO have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization. While dune stabilization occurs naturally as a result of native plant succession, rapid stabilization as a consequence of highly competitive and fast-growing invasive species can exclude organisms adapted to the movement of sand in highly dynamic portions of dunes. The invasive species of most concern at PIRO include spotted knapweed, white sweet clover, red clover, burdock, periwinkle, and several hawkweed species. In particular, the shifting sands of PIRO's dunes are attractive habitat for spotted knapweed, which is a superior competitor that invades highly disturbed areas. In the Grand Sable Dunes, spotted knapweed infestations are exacerbated by infestations of white sweet-clover, red clover, and several species of hawkweed. Baby's breath, which is currently found on the border of the PIRO lakeshore, is a potential threat to the native dune plants community should it become established.

Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing invasive species from the dunes would improve PIRO's ability to restore a natural pattern of erosion and deposition.

Based on the analysis above, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing PIRO with a suite of treatment options for the control and prevention of invasive plant species at the dunes.

Conclusion: Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation by providing PIRO with a suite of treatment options for the control and prevention of invasive plant species at the dunes. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 3 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes of PIRO are considered a fundamental resource, Alternative 3, would have less beneficial impact on dunes and wetlands compared to Alternative 2, which prioritizes treatment for fundamental resources.

SLBE

Like INDU and PIRO, the dunes at SLBE have been and continue to be degraded by shoreline development, recreation, erosion caused by storm events and dune stabilization from invasive species. Spotted knapweed, baby's breath, bull thistle, blue lyme grass, bladder campion, hoary alyssum, and Lombardy poplar have extensive, established populations in the open dune habitat. These invasive

species not only adversely affect the natural dunal movement, but also impact other unique and rare vegetation species that occur in SLBE including a species of dunewort that was first discovered in SLBE and Pitcher's thistle. Other vegetation such as Marram grass, bearberry, sand cherry, beach pea would also be impacted.

Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to dunal movement), removing invasive species from the dunes would improve SLBEs ability to restore a natural pattern of erosion and deposition.

Also supported by SLBE are variety of rich wetlands ecosystems that consists of bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows. Removal and control of both native and non-native invasive species would help SLBE in their efforts to conserve healthy wetlands, and to restore impacted wetlands to proper functioning condition.

Forest, riverine systems, lacustrine systems, open fields, and riparian habitats are also supported by SLBE. Additional invasive species that impact these other habitats include garlic mustard, black locust, Phragmites, conifer plantations, and narrow leaved cattails (and hybrids). The natural function and ecological services provided by these systems along with spring ephemerals, mushrooms, forest regeneration, and rare vegetation such as Michigan monkey-flower, American ginseng, and various orchids will also benefit by invasive species removal and control.

Based on the analysis above, implementation of Alternative 3 would have a moderate, indirect, beneficial, long term, and localized effect on rare and unusual vegetation by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in all environments at the lakeshore.

Conclusion: Implementation of Alternative 3 would have a moderate, indirect, beneficial, long term, and localized effect on rare and unusual vegetation by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in all environments at the lakeshore. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 3 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. As the dunes are considered a fundamental resource, Alternative 3, would have less beneficial impact on dunes and wetlands compared to Alternative 2, which prioritizes treatment for fundamental resources. However, beneficial impacts to wetlands would be similar under Alternatives 2 and 3. Specifically, under Alternative 2, SLBE could prioritize treatment of invasive species in wetlands based on their significant value. Under Alternative 3, SLBE could prioritize treatment of invasive species in wetlands based on their potential to affect wetland ecosystem function.

VOYA

As described in Chapter 3, VOYA supports approximately 20,000 to 27,000 acres of wetlands, which include peat wetlands, leatherleaf/sweet gale shore fens, northern bur oak mesic forests, white cedar/mixed conifer or tamarack swamps, and wild rice marshes. VOYA's wetlands provide habitat for the majority of the park's rare and unique plant species. The primary invasive species of concern that affect VOYA's wetlands include purple loosestrife, reed canary grass, Phragmites, and narrow-leaved cattail. While Eurasian watermilfoil has not been observed in VOYA, the species is a regional concern

and prevention is an imperative control tool. Removal and control of both native and non-native invasive species would help VOYA in their efforts to conserve healthy wetlands, and to restore impacted wetlands to proper functioning condition. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation at VOYA by providing the park with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on rare and unusual vegetation at VOYA by providing the park with a suite of treatment options for the control and prevention of invasive plant species. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternative 3 would have a beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region. Beneficial impacts to wetlands would be similar under Alternatives 3 and 2. Specifically, under Alternative 3, VOYA could prioritize treatment of invasive species in wetlands based on their potential to affect wetland ecosystem function. Under Alternative 2, VOYA could prioritize treatment of invasive species in wetlands based on their significant value. However, the beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.3.3 Species of Special Concern and their Potential/Critical Habitat

IMPACT THRESHOLDS

Impact Threshold definitions for species listed under the ESA are provided in **Section 4.2.1.3**. Impact thresholds for non-listed species of special concern (i.e., pitcher-plant and species of special concern in ISRO) are similar to those provided for general vegetation.

APIS

Piping Plover: In the Great Lakes region, piping plovers breed and raise young mainly on sparsely vegetated beaches, cobble pans, and sand spits of glacially formed sand dune ecosystems along the Great Lakes shoreline. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. Therefore, implementation of Alternative 3 would have moderate, indirect, beneficial, long-term, and localized effects on piping plover by providing APIS with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn, improving habitat for the piping plover. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the piping plover; and therefore, ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on piping plover under Alternative 3 would be similar to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

INDU

Eastern Massasauga Rattlesnake: As described in Chapter 3, the massasauga exhibits an affinity for wetland habitats. Massasaugas have been documented in wet areas including bogs, marshes, wet prairies, fens, peatlands, swamp forests, and sedge meadows. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the massasauga. As removal and control of invasive species would help INDU in their efforts to restore wetlands to proper functioning condition, habitat for the massasauga would also be restored and protected. Therefore, implementation of Alternative 3 would have moderate, indirect, beneficial, long-term, and localized effects on the massasauga by providing INDU with a suite of treatment options for the control and prevention of invasive plant species in wetlands, and in turn improving habitat for the massasauga. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the massasauga; and therefore, ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on eastern massasauga rattlesnake under Alternative 3 would be similar to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Pitcher's Thistle: As described in Chapter 3, Pitcher's thistle is endemic to beaches and grassland dunes. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve INDU's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 3 would have moderate, indirect, beneficial, long-term, and localized effects on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have a moderate, beneficial, indirect and cumulative effect on the Pitcher's thistle; and therefore, may affect but is not likely to adversely affect the species. The effects of invasive species management on Pitcher's thistle under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Pitcher-plant: The pitcher-plant characteristically occurs in bogs, savannas, and flatwoods. Therefore, there is a direct tie between the impact of invasive plant species on wetland habitats and habitat loss for the pitcher-plant. As removal and control of both invasive species would help INDU in their efforts to restore the wetlands to proper functioning condition, habitat for the pitcher-plant would also be restored and protected. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on the pitcher-plant by providing the park with a suite of treatment options for the control and prevention of invasive plant species thereby improving wetland habitats, and in turn improving habitat for the pitcher-plant.

In addition, as described in Chapter 3, periodic, moderate fires are necessary to reduce the encroachment of competing plants and stimulate growth of the pitcher-plant by releasing nutrients bound in organic matter. The species survives fire by resprouting from underground rhizomes. Therefore, prescribed fires used to treat invasive species under Alternative 3, could also have a moderate, indirect, beneficial, long-term, and localized effect on the pitcher-plant.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the pitcher-plant by providing the park with a suite of treatment options for the control and prevention of invasive plant species thereby improving wetland habitats, and in turn improving habitat for the pitcher-plant. Prescribed fires used to treat invasive species under Alternative 3, could also have a moderate, indirect, beneficial, long-term, and localized effect on the pitcher-plant. The effects of invasive species management on the pitcher-plant under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Karner Blue Butterfly: As described in Chapter 3, the Karner blue butterfly is dependent upon its larval host plant, wild lupine, for survival. Habitat for wild lupine is found in the oak savanna community of INDU, which has been substantially impacted by invasive species. Invasive plants have created closed canopy areas that result in diminished habitat for wild lupine, and the Karner blue butterfly. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on the Karner blue butterfly by providing the park with a suite of treatment options for the control and prevention of invasive plant species in oak savanna habitat, thereby improving habitat for wild lupine, and in turn improving habitat for the Karner blue butterfly.

In addition, adult butterflies are known to feed on at least 70 different nectar producing species for whom frequent and patchy fires seem to be most effective in providing habitat for the species. Thus, prescribed fires used to treat invasive species under Alternative 3, could also have an indirect but beneficial effect on the Karner blue butterfly.

Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the Karner blue butterfly by providing the park with a suite of treatment options for the control and prevention of invasive plant species in oak savanna habitat, thereby improving habitat for wild lupine, and in turn improving habitat for the Karner blue butterfly. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on the Karner blue butterfly under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

ISRO

As described in Chapter 3, ISRO supports a rich diversity of species of special concern. While invasive plant species on ISRO are currently limited, implementation of Alternative 3 would provide the park with

a suite of treatment options that could be used to help prevent future infestations and help eradicate existing infestations. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on special status species and habitats on ISRO.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on special status species and habitats on ISRO. The effects of invasive species management on special status species at ISRO under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

PIRO

Pitcher's Thistle As described in Chapter 3, Pitcher's thistle occurs in the Grand Sable Dunes of PIRO. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve PIRO's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the Pitcher's thistle; and therefore, ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on Pitcher's thistle under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

SLBE

Pitcher's Thistle: Similar to INDU and PIRO, Pitcher's thistle occurs in the dunes for which SLBE is named. The species' requires active sand dune processes to maintain its early successional habitat. Therefore, there is a direct tie between the negative impacts of invasive species on sand dunes and habitat loss for the Pitcher's thistle. Coupled with other restoration activities (e.g., beach nourishment efforts, removing man-made physical impediments to sand movement), removing invasive species from the dunes would improve SLBE's ability to restore a natural pattern of erosion and deposition along beaches and dunal habitats. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on Pitcher's thistle by providing the park with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn improving habitat for the Pitcher's thistle. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have indirect and cumulative, beneficial effects on the Pitcher's thistle; and therefore, ***may affect but is not likely to adversely affect*** the species. The

effects of invasive species management on Pitcher's thistle under Alternative 3 would likely be identical to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Piping Plover: In the Great Lakes region, piping plovers breed and raise young mainly on sparsely vegetated beaches, cobble pans, and sand spits of glacially formed sand dune ecosystems along the Great Lakes shoreline. Therefore, there is a direct tie between the negative impacts of invasive species on shorelines, sand dunes, and cobble pans and habitat loss for the piping plover. Therefore, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on piping plover by providing APIS with a suite of treatment options for the control and prevention of invasive plant species in the dunes, and in turn, improving habitat for the piping plover. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the piping plover; therefore, implementation ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on piping plover under Alternative 3 would be similar to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

Michigan Monkey-flower: SLBE has restored and continues to monitor three colonies of Michigan monkey-flower that were removed from an artificial drainage system and transplanted to a location adjacent to a nearby existing patch of Michigan monkey-flower. Relocating the plants was part of restoring the hydrological functions on this newly acquired NPS property that had previously been altered by human development. According to the NPS's annual monitoring reports, the transplanting has been successful and the plants continue to thrive, however, coltsfoot and reed canary grass pose immediate threats. Therefore, implementation of Alternative 2 would have a moderate, indirect, beneficial, long-term, and localized effect on Michigan monkey-flower by providing SLBE with a suite of treatment options for the control and prevention of invasive plant species in wetland and forest habitats. Based on this analysis, implementation of Alternative 3 ***may affect but is not likely to adversely affect*** the species.

Conclusion: Implementation of Alternative 3 would have moderate, beneficial, indirect and cumulative effects on the Michigan monkey-flower; and therefore, ***may affect but is not likely to adversely affect*** the species. The effects of invasive species management on Michigan monkey-flower under Alternative 3 would be similar to the effects of invasive species management under Alternative 2. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.3.4 Unique Ecosystems

IMPACT THRESHOLDS

See definitions provided in Section 4.2.1.4.

INDU

As discussed in Chapter 3, INDU contains four registered NNLs; the Dunes Nature Preserve NNL, the Pinhook Bog NNL, Cowles Bog NNL, and the Hoosier Prairie State Nature Preserve NNL. As potential impacts of Alternative 3 on the NNLs are identical to those described for dunes and wetlands, the reader is referred to **Section 4.2.3.2** of this IPMP/EA.

Based on the analyses provided in **Section 4.2.3.2**, implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species.

Conclusion: Implementation of Alternative 3 would have a moderate, indirect, beneficial, long-term, and localized effect on dunal and wetland habitats by providing INDU with a suite of treatment options for the control and prevention of invasive plant species. When combined with other past, present and reasonably foreseeable restoration activities, by helping restore the natural function of dunal and wetland systems within INDU's NNLs, invasive plant treatment would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial cumulative impact on unique ecosystems. As the dunes, wetlands, and NNLs of INDU are considered a fundamental resource, Alternative 3 would have less beneficial impact than would Alternative 2, which prioritizes treatment for fundamental resources. However, the beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.3.5 Recreation Resources, Visitor Experience, Esthetic Resources

IMPACT THRESHOLDS

See definitions provided in Section 4.2.1.5.

MISS

The primary invasive species of concern for recreational resources and visitor experience in MISS is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of MISS' most popular parks and destinations. Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation and visitor experience by opening currently unavailable areas to visitors and campers. Conversely, physical opening of these areas to the public would have minor, indirect but adverse impact on vegetation and other park resources by potentially increasing the spread of other invasive species carried on boots/shoes, bikes, and camping gear. Increased access into formerly unavailable areas has also led to increases in unapproved uses of NPS lands (e.g., unauthorized fire rings, rope swings, firewood cutting, and off-leash dog use), all of which have the potential to degrade the visual landscape of the park.

Conclusion: Implementation of Alternative 3 would have a moderate, direct, beneficial, long-term, and localized effect on recreation resource and visitor experience in MISS. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. MISS is known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 3 would have less beneficial impact than Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value. However, the beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

SACN

Similar to MISS, the primary invasive species of concern for recreational resources and visitor experience in SACN is buckthorn. Infestations of buckthorn have resulted in dense, nearly impassable vegetation in many of SACN's most popular parks and destinations. Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation and visitor experience by opening currently unavailable areas of the park to visitors, campers, and hunters. Conversely, physical opening of these areas to the public would have a minor, indirect but adverse impact on vegetation and other park resources by potentially increasing the spread of other invasive species carried on boots/shoes and camping gear.

Conclusion: Implementation of Alternative 3 would primarily have a moderate, direct, beneficial, long-term, and localized effect on recreation resource and visitor experience in SACN. Combined with other past, present, and reasonably foreseeable park restoration and recreation improvement actions, invasive plant treatment would have a beneficial cumulative impact on recreational resources and visitor experience. SACN is known for and values its superior recreational opportunities; a significant value of the park. Therefore, Alternative 3 would have less beneficial impact than Alternative 2, which prioritizes treatment of invasive species in resources/areas of significant value. The beneficial effects of invasive plant management under Alternative 3 would be far greater than that under Alternative 1, which only allows for limited use of treatment options/actions.

4.2.3.6 Park Operations

IMPACT THRESHOLDS

See definitions provided in Section 4.2.1.6.

IATR

As discussed in previous sections of this EA, implementation of Alternative 3 would result in beneficial effects on park resources. However, given the limited staffing and budget of IATR, the opportunities to implement invasive species control on a large scale would be limited. Therefore, implementation of invasive species treatments under Alternative 3 has the potential to result in a moderate, indirect and slightly negative impact on park operations by adding to the existing workload of already limited park operation resources.

Conclusion: Implementation of invasive species treatments under Alternative 3 has the potential to result in a moderate, indirect and slightly negative impact on park operations by adding to the existing workload of already limited park operation resources. Combined with existing demands on staff and budget, Alternatives 3 would have an additive, cumulative impact on IATR park operations. Impacts to park operations under Alternative 3 would be identical to those under Alternatives 1 or 2.

5.0 CUMULATIVE IMPACTS

5.1 INTRODUCTION

The CEQ regulations for implementing NEPA require assessment of cumulative effects in the decision-making process for federal actions. Cumulative impacts result from the incremental impacts of a proposed federal action when added to past, present, and reasonably foreseeable future actions, regardless of who takes the action (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions.

The geographic area of influence for cumulative impacts varies according to resource. The cumulative impact analysis areas (CIAA) are defined as follows:

- The CIAA for general vegetation and rare and unusual vegetation includes the Great Lakes region. As such, the cumulative impact analyses for biological resources were combined for the respective parks and biological impact topics carried forward for analysis.
- The CIAA for special status species and their potential/critical habitat includes their species-specific habitat range and/or State within which the species was carried forward as an impact topic.
- The CIAA for recreation resources, visitor experience, and aesthetic resources, as well as for fire management and park operations were defined as respective park units analyzed.
- The CIAA for unique ecosystems (i.e., NNLs) was defined as the State of Indiana (the NNLs within INDU were the only unique ecosystems carried forward for analysis in this plan).

The temporal scope is the same for all resources and was defined as impacts that have taken or would take place within the next 10 years. A period of 10 years was selected because that is also the proposed duration of this plan. In the context of this cumulative impact analysis, long-term is considered to be 10 – 15 years, which consists of the potential life of the IPMP plus the additional timeframe during which treatment options completed during the plan's life would continue to have efficacy or contribute to any negative cumulative impacts.

5.1.1 General Cumulative Impacts of Invasive Species Treatment

In addition to cumulative effects on the impact topics carried forward for analysis, it is important to note certain types of treatments proposed in this IPMP can have long-term, cumulative impacts. Cumulative effects of invasive plant treatments can be exacerbated by interactions: e.g., interactions between pesticides and other pesticides; pesticides and diseases, biocontrols and microbial populations, prescribed fire and mycorrhizal fungi.

Brief discussions of potential cumulative effects from the use of prescribed fire, biocontrol, and pesticide use are provided below. Resource and park-specific discussions of cumulative effects are provided in **Sections 5.1.2** through **5.1.8**.

Prescribed Fire: Many factors, including fire intensity, ambient temperature, vegetation type, and soil moisture influence the effects of long-term prescribed burns on soil (Wells et. al. 1979 as cited in Wear and Greis 2009), and could contribute to cumulative degradation of soils when added to other land use activities. Low-intensity prescribed fires have few, if any, cumulative adverse effects on soil properties; in some cases such fires may improve soil properties (McKee 1982 as cited in Wear and Greis 2009). Repeated burning for invasive plant management over a long period may affect levels of available phosphorus, exchangeable calcium, and organic matter content of mineral soil. Fire volatilizes nitrogen from the forest floor, but the losses could be offset by increased activity of nitrogen-fixing soil microorganisms after the fire. Calcium and phosphorus could also be lost through erosion from the soil surface due to repeated burns but would be partially retained in lower mineral soil horizons.

Biological: As previously discussed in Chapter 2, biological control is the purposeful introduction of natural enemies by scientists and environment managers as a means to weaken and suppress invasive plants. Biological control agents are used to decrease the invasive plants' competitive advantages over native species, and to weaken the invading population by increasing leaf mortality, decreasing plant size, reducing flower and seed production, and/or limiting population expansion. However, the release of biological control agents for invasive plant management has the potential for adverse cumulative effects on biodiversity through unintended impacts on non-target plants. For example, the flowerhead weevil (*Rhinocyllus conicus* Froeh), was the first of four insects reported as released in North America for the biological control of Eurasian thistles of the genus *Carduus* L., including musk thistle. Louda et. al. (1997) documented the continuing expansion of host range by this weevil including three new host associations with native, non-invasive species (*Cirsium canescens* Nutt., *C. centaureae* (Rydb.) K. Schum., and *C. pulchellum* (Greene Woot. & Standl). While stringent requirements reduce the potential for these types of unintended consequences, the use of biological controls under this IPMP has the potential to lead to cumulative effects of biological controls on non-target species. However, recent studies indicate host-specific biocontrol agents can also exhibit substantial non-target effects through indirect interactions and food-web subsidies (Pearson and Callaway 2003). One of the best example of non-target effects is one which the impact was avoided; proposed biocontrol of saltcedars (*Tamarix* spp.) in the southwest was rejected because of risks to the endangered subspecies of the Southwestern willow flycatcher (*Empidonax traillii extimus*), which currently relies on saltcedars for nesting sites in areas where these invasive species have replaced its native nesting habitat. The concern was that biocontrol of saltcedars would remove nesting habitat before the native vegetation could be restored. Combined with past and present impacts on southwestern willow flycatchers from habitat loss and degradation, eradication of salt cedar would have contributed to adverse, cumulative impacts on a non-target species.

Chemical: The capacity of the soil to filter, buffer, degrade, immobilize, and detoxify pesticides identified in this IPMP would be a function of proper application and the quality of the soil. Pesticides typically have soil half-lives of between one and 170 days depending on the pesticide. Other processes that influence the fate of the chemical include plant uptake, soil sorption (i.e., the physical and chemical process by which one substance becomes attached to another), leaching, and volatilization. Chemicals used for invasive plant control under this IPMP/EA have the potential to result in cumulative effects on soils, surface and ground water, and other biotic resources in areas where applied. When combined with effects on soils from other past, present and future impacts such as vegetation trampling, soil erosion in disturbed areas, presence of other chemicals in soils from non-related actions (e.g.,

petroleum products from OHVs), the use of pesticides has the potential to result in onsite cumulative effects.

If pesticides implemented under this IPMP move off-site (e.g., through wind drift, runoff, leaching), they would be considered to be pollutants as they have the potential to adversely affect terrestrial and aquatic ecosystems. When combined with effects on resources from other past, present and future impacts such as concentrations of metals in industrial areas, water pollution due to industrial and recreational activities, the use of pesticides has the potential to result in offsite cumulative effects. The potential for pesticides identified in this IPMP to move off-site depends on the chemical properties and formulation of the pesticide, soil properties, rate and method of application, pesticide persistence, frequency and timing of rainfall or irrigation, depth to ground water, and compliance with the BMPs identified in **Section 2.3.6** (NRCS 1998).

Therefore, long-term, repeated use of pesticides under this IPMP could result in cumulative, adverse impacts on soils, vegetation, water, and human and animal health, both onsite and offsite.

5.1.2 General Vegetation

Invasive plant species are regularly introduced to IATR, MISS, and SACN via wind, water, human activities, and wildlife, all of which contribute to the degradation of native vegetation communities. Beach development activities, conversion of woodlands/wetland to commercial/residential areas, and other adjacent land use activity creates disturbed areas, which also contribute to the introduction, spread, and reestablishment of invasive plants.

Under all alternatives, IATR, MISS, and SACN would continue to treat existing and new invasive plant infestations. None of the alternatives would result in a cumulative increase in the amount of invasive plant seeds introduced into the Great Lakes region. In fact, each of the alternatives would have a localized beneficial effect of reducing existing and potential infestations of invasive plants, and combined would have a cumulative beneficial effect on maintaining/restoring native vegetation. However, given the more expansive suite of tools available under Alternatives 2 and 3, and the fact that NEPA compliance would be satisfied for almost all tools available, Alternatives 2 and 3 would allow the parks to be more responsive in their invasive species management. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve vegetative communities (e.g., wildlife habitat restoration projects by state agencies), Alternatives 2 and 3 may have a greater beneficial cumulative effect on general vegetation in the Great Lakes region than Alternative 1.

5.1.3 Rare or Unusual Vegetation (e.g., old growth timber, riparian, alpine, dunes, wetlands)

The dunes and wetlands of the Great Lakes region are resources of regional and perhaps national significance. As demonstrated in Chapters 3 and 4, invasive plant species have had severe adverse impacts on natural dune and wetland functions.

Under all alternatives, INDU, PIRO, SLBE, and VOYA would continue to treat existing and new invasive plant infestations in an effort to restore and maintain healthy wetland and dunal ecosystems. None of the alternatives would result in a cumulative increase in the amount of invasive plant seeds introduced into the Great Lakes region. In fact, each of the alternatives would have a localized beneficial effect of reducing existing and potential infestations of invasive plants, and combined would have a cumulative

beneficial effect on maintaining/restoring dunes, forest, riverine systems, lacustrine systems, open fields, riparian habitats, and wetland ecosystems. However, given the more expansive suite of treatment tools available under Alternatives 2 and 3, and the fact that NEPA compliance would be satisfied for almost all tools available, Alternatives 2 and 3 would allow the parks to be more responsive in their invasive species management. Combined with existing and future invasive plant management actions by cooperative partners and adjacent landowners, and/or other activities that improve wetland and/or dunal function (e.g., State initiatives to remove man-made impediments to dunal function and movement), Alternatives 2 and 3 may have a greater beneficial cumulative effect on rare or unusual vegetation in the Great Lakes region than would Alternative 1.

5.1.4 Species of Special Concern and their Potential/Critical Habitat

APIS

The piping plover's breeding range (i.e., the CIAA) includes beaches or sand flats in the Great Plains states, on the shores of Lakes Michigan and Superior, and on the Atlantic coast. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving breeding and nesting habitats through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

INDU

Pitcher's Thistle: The CIAA for the Pitcher's thistle is defined as the beaches and grassland dunes along the shorelines of Lakes Michigan, Superior, and Huron, which comprise the range for the species. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving habitat for Pitcher's thistle through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

Pitcher-plant: The pitcher-plant has a very broad range, and thus for this plan, the CIAA for the species is defined as the State of Indiana. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving wetland habitats through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for sensitive or rare species assists in preventing the species from being listed on the ESA.

Massasauga Rattlesnake: The CIAA for the eastern massasauga includes its historic range, which extends from western New York and southern Ontario to southern Iowa and a narrow band in northeastern Missouri. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving wetland habitats through invasive plant management. Albeit a localized effect (limited to habitats occurring within INDU), in the context of cumulative impacts any improvement in habitat for candidate species assists in preventing the species from being listed on the ESA.

Karner Blue Butterfly: The CIAA for the Karner blue butterfly includes the oak savannas and pine barren ecosystems from eastern Minnesota and eastward to the Atlantic seaboard, which comprise the species' range. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving habitat for wild lupine, and thus habitat for the Karner blue butterfly

through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

ISRO

As ISRO identified multiple endemic special status species occurring on the island, the CIAA for those species is defined as the Great Lakes region. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on ISRO's special status species by improving and protecting native plant habitats through invasive plant management. Albeit a localized effect (i.e., limited to the island), in the context of cumulative impacts any improvement in habitat (i.e., no matter how small or localized) for sensitive or rare species contributes to conservation and/or recovery of the species.

PIRO

Pitcher's Thistle: The CIAA for the Pitcher's thistle is defined as the beaches and grassland dunes along the shorelines of Lakes Michigan, Superior, and Huron, which comprise the range for the species. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving habitat for Pitcher's thistle through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

SLBE

Pitcher's Thistle: The CIAA for the Pitcher's thistle is defined as the beaches and grassland dunes along the shorelines of Lakes Michigan, Superior, and Huron, which comprise the range for the species. Implementation of any of the alternatives in this plan would have a beneficial cumulative effect on the species by improving habitat for Pitcher's thistle through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

Piping Plover: The piping plover's breeding range (i.e., the CIAA) includes beaches or sand flats in the Great Plains states, on the shores of Lakes Michigan and Superior, and on the Atlantic coast. Implementation of the alternatives in this plan would have a beneficial cumulative effect on the species by improving breeding and nesting habitats through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

Michigan Monkey-flower: Michigan monkey-flower is an aquatic to semi-aquatic Michigan endemic perennial characterized by its mat-forming, clonal growth habitat. It is restricted to cold, alkaline spring seepages and streams, usually in association with northern white cedar swamps formed in drainages found at the base of relatively steep, morainic slopes and bluff. Implementation of the alternatives in this plan would have a beneficial cumulative effect on the species by improving suitable habitat for Michigan monkey-flower through invasive plant management. Albeit a localized effect, in the context of cumulative impacts any improvement in habitat for listed species contributes to the recovery of the species.

5.1.5 Unique Ecosystems

The unique ecosystems carried forward for analysis in this plan were the NNLs that occur within INDU. The CIAA for these NNLs is defined as the state of Indiana, within which there are 30 NNLs including the 4 that occur within INDU. The NNL Program recognizes and encourages the conservation of sites that contain outstanding biological and geological resources, regardless of landownership type. It is the only natural areas program of national scope that recognizes the best examples of biological and geological features in both public and private ownership. NNLs are owned by a variety of land stewards, and participation in the program is voluntary. Given the multi-land owner nature of NNLs, there are a wide variety of past, present, and reasonably foreseeable actions that could contribute to the spread of invasive species on biological resources. Implementation of any of the alternatives analyzed in this plan would have a beneficial cumulative impact on the NNLs by reducing existing and potential infestations of invasive plants within the NNLs in INDU. However, under Alternatives 2 or 3, INDU would have a wider variety of treatment options available to them and would not have to go through additional analysis under NEPA prior to implementing any of the treatment options. By helping restore the natural function of dunal and wetland systems within INDU's NNLs, this plan would contribute towards achieving the goals of the NNL Program and would therefore, result in a beneficial cumulative impact on unique ecosystems.

5.1.6 Recreation Resources, Visitor Experience, Esthetic Resources

Visitors in both MISS and SACN are faced with similar impacts from invasive species such as buckthorn. Some treatment methods, such as equipment operation during buckthorn removal, may be noticeable to visitors and could result in short-term, adverse cumulative impacts on visitor experience. However, under all three alternatives, invasive plant management would have a long-term, beneficial cumulative impact by removing invasive species that currently preclude recreational activity in certain areas of the parks.

Given the more expansive suite of treatment tools available under Alternatives 2 and 3, and the fact that NEPA compliance would be satisfied for almost all tools available, Alternatives 2 and 3 would allow the parks to be more responsive in their invasive species management than Alternative 1. Under Alternatives 2 and 3, additional efforts would be made to educate the public about invasive species management programs. These education efforts, coupled with the likely increased success of treatment compared with current invasive plant management plans, would likely help to further improve the quality of the recreational experience. Therefore, Alternatives 2 and 3 would likely have a greater, beneficial cumulative effect on recreation resources, visitor experience and esthetic resources in MISS and SACN.

5.1.7 Park Operations

Under Alternative 1 there would be no cumulative impact on park operations as there would be no change in management action. However, under Alternatives 2 or 3, IATR would be expected to implement invasive plant management in accordance with the selected alternative. Combined with existing demands on staff and budget, Alternatives 2 or 3 would have an additive, cumulative impact on IATR park operations.

6.1 SUMMARY OF PUBLIC INVOLVEMENT

6.1.1 Public Scoping

The official public scoping report for this IPMP/EA is included in Appendix F. However, this section provides a brief description of public scoping completed to date. In March 2011, a pre-scoping courtesy letter was provided to the ten Great Lakes parks on March 3, 2011. The pre-scoping courtesy letter was intended for dissemination amongst working partners and interested parties of each park, and announced NPS' intent to prepare the Great Lakes IPMP/EA. The recipients of the pre-scoping courtesy letter were at the discretion of each park. The template pre-scoping courtesy letter is included in **Appendix F**.

On March 10, 2011, a template press release was provided to the ten Great Lakes parks for release to the public March 21, 2011 through March 28, 2011. The recipients of the press release were also at the discretion of each park. The template press release is included in **Appendix F**.

On March 17, 2011, a scoping brochure was provided to the ten Great Lakes parks for distribution by each park to Federal, State, and local agencies, elected officials, groups, and interested individuals. The scoping brochure provided information on the NPS purpose and need for the IPMP and asked for comments on the scope of issues to be addressed in the IPMP/EA (see **Appendix F**). The distribution of the scoping brochure was also at the discretion of each park, which could have included park websites, email distribution lists, and mailing lists. The scoping brochure was also posted on NPS' Planning, Environment and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/ipmpea> on March 28, 2011. Members of the public were afforded two different methods for providing comments: electronically through the PEPC website or by mail at Great Lakes IPMP, c/o Kleinfelder, 300 E. Mineral Ave., Suite 7, Littleton, CO 80122-2655.

Project information was also provided to the public through other media outlets such as news articles, radio interviews, and websites prior to and during the public scoping period.

The official public scoping period was held from March 28, 2011 through May 2, 2011. Four comments were received through the PEPC website, and one typed letter was received through the contractor's mailing address, for a total of five scoping comments (See **Appendix F**, Attachments D – H). The topics addressed by the public in these comments have been organized into four major subject areas that broadly describe the nature of the contents:

- Need - landscape scale conservation efforts
- Potential Impacts - concern for treatment types
- Existing conditions
- Other

These scoping comments were valuable in defining the alternatives and impact topics evaluated in this EA.

6.1.2 Public Comment Period

The Great Lakes IPMP/EA is now available for public review and is posted on the project's web page, <http://parkplanning.nps.gov/ipmpea>. The document will undergo a 30-day public review period and all substantive comments will be addressed prior to the NPS' decision on the project.

6.2 CONSULTATION AND COORDINATION WITH OTHER AGENCIES

During the public comment period, the NPS intends to complete relevant consultation and coordination efforts with Tribal governments; relevant federal agencies such as the USFWS, USFS, USACE, USEPA; SHPOs; affected State parks and agencies, and county governments. A FONSI decision will not be rendered until required agency consultations are completed.

6.3 LIST OF PREPARERS

Table 6.3-1 identifies the NPS park staff and contractors who prepared this EA.

Table 6.3-1. List of Preparers.

Park / Organization	Contact name	Role
Federal Agency Contributors		
Great Lakes Exotic Plant Management Team, Great Lakes Network Office	Carmen Chapin	Liaison, QA/QC
SLBE	Michael Duwe	Project NEPA Coordinator
MWR	Nick Chevance	Regional Environmental Coordinator
SLBE	Amanda Brushaber	Contributor, Peer Review
IATR	Pam J. Schuler	Contributor, Peer Review
GRPO	Brandon Seitz	Contributor, Peer Review
ISRO	Paul Brown	Contributor, Peer Review
APIS	Peggy Burkman	Contributor, Peer Review
INDU	John Kwilosz	Contributor, Peer Review
MISS	Nancy Duncan	Contributor, Peer Review
SACN	Robin Maercklein	Contributor, Peer Review

Park / Organization	Contact name	Role
VOYA	John S. Snyder	Contributor, Peer Review
PIRO	Bruce Leutscher	Contributor, Peer Review
Contractor		
Kleinfelder	Dawn Martin	Project Manager, Senior Author
Kleinfelder	Karin McShea	Botanist, Senior Author
Kleinfelder	Chrissy Lawson	Senior Author, Peer Review, Administrative Record
WILDTYPE Design, Native Plants & Seed LTD.	William Schneider	Contributing Author, Peer Review
Independent Consultant	Janet Marr	Contributing Author, Peer Review
Kleinfelder	Nicole Peace	GIS
Kleinfelder	Lindsey Hockert	GIS
Kleinfelder	Ashley Hawes	Peer Review, QA/QC
Buys & Associates, Inc.	Martin Buys	Principal

7.0 References and Acronyms

7.1 References

- Foster, D.F. and Harris, A.G. 2001. Invasive Plants Survey, Voyageurs National Park. Northern Bioscience. Thunder Bay, ON. Submitted to: Voyageurs National Park, Minnesota. - February 2001. 67 pages.
- Indiana Department of Natural Resources (IDNR). 2011. List of Endangered, Threatened, & Rare Species by County. Accessed; <http://www.in.gov/dnr/naturepreserve/4666.htm>
- Louda, S. M., D. Kendally, J. Connorz, and D. Simberlo. Ecological Effects of an Insect Introduced for the Biological Control of Weeds. Science, Vol. 277, August 1997. www.sciencemag.org. 4 pp.
- McGee, C.E. 1979. Fire and other factors related to oak regeneration. In: Holt, H.A.; Fischer, B.C., Eds. Proceedings: regenerating oaks in upland hardwood forests: the 1979 John S. Wright forestry conference; 1979 February 22-23; West Lafayette, IN. West Lafayette, IN: Purdue University, Department of Forest & Natural Resources, and Indiana Cooperative Extension Service: 75-81.
- Michigan Flora Online. A. A. Reznicek, E. G. Voss, & B. S. Walters. 2011. University of Michigan. Web. October 14, 2011. Accessed: <http://michiganflora.net/species.aspx?id=2862>
- Minnesota Department of Natural Resources (MDNR). 1993. Minnesota's Native Vegetation, A Key to Natural Communities, Version 1.5. Natural Heritage Program. St. Paul, Minnesota. Accessed: <http://files.dnr.state.mn.us/eco/nhnrp/nckey.pdf>
- National Parks Conservation Association (NPCA). 2007. State of the Parks. National Parks of the Great Lakes. Resource assessments of: Pictured Rocks National Lakeshore , Apostle Island National Lakeshore, Isle Royale National Park, Keweenaw National Historic Park, Sleeping Bear Dunes National Lakeshore , and Indiana Dunes National Lakeshore. July 2007. Accessed: http://www.npca.org/stateoftheparks/great_lakes/
- Pearson, D.E. and R.M. Callaway. Indirect Effects of Host-Specific Biological Control Agents. TRENDS in Ecology and Evolution, Vol.18 No.9, September 2003.
- Penskar, M.R. and P.J. Higman. 2001. Special plant abstract for *Botrychium acuminatum* (acute-leaved moonwort). Michigan Natural Features Inventory. Lansing, MI. 2 pages.
- Rebertus, Alan, and Hardenbrook , Kim. 2009. The Status and Ecology of Pitcher's Thistle (*Cirsium pitcheri*) in the Grand Sable Dunes at Pictured Rocks National Lakeshore, Michigan. Final Report Submitted January 31, 2009 to Dr. Bruce Leutscher, National Park Service, Pictured Rocks National Lakeshore, Munising, MI. Northern Michigan University, Marquette, MI. 112 pages.

- U.S. Department of Interior, National Park Service (USDOI-NPS). 1985. Isle Royal Biosphere Reserve: Volume 1. A history of scientific studies. U.S. Man and the Biosphere Program. U.S. MAB Report No.11. Prepared by: Michigan Technological University, Department of Biological Sciences. Houghton, Michigan 49931. March 1985. 120 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 1988. Comprehensive Management Plan, Mississippi National River and Recreation Area (NPS - MISS CMP). 287 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 1997. Water Resources Management Plan . St. Croix National Scenic Riverway - Minnesota and Wisconsin. February 1997. 216 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 1998. Draft General Management Plan/EIS. Isle Royal National Park, Michigan.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 1998. Indiana Dunes National Lakeshore, Land Protection Plan - August 1998, 69 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 1998. General Management Plan, Upper St. Croix and Namekagon Rivers. Saint Croix National Scenic Riverway. Wisconsin, Minnesota. July 1998. 75 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2001. Final General Management Plan/Environmental Impact Statement and Visitor Use and Facilities Plan - Voyageurs National Park. August 2001.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2005. Apostle Islands National Lakeshore, Final Fire Management Plan Environmental Assessment - February 2005. 167 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2005a. St. Croix National Scenic Riverway Fire Management Plan - March 2005. 63 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2005b. Final General Management, Plan Wilderness Study, Environmental Impact Statement, Pictured Rocks National Lakeshore National Lakeshore. 409 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2005c. Aquatic studies in National Parks of the upper Great Lakes States: past efforts and future directions. Lafrancois, B. Moraska and J. Glase, Water Resources Division Technical Report, NPS/NRWRD/NRTR-2005/334. National Park Service, Denver, Colorado. 332 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2006. Management Policies 2006. 180 pages. <http://www.nps.gov/policy/MP2006.pdf>.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2007. Indiana Dunes National Lakeshore, Fire Management Plan. Appendix O – Fire Monitoring Plan (NPS - INDU Fire Monitoring Plan). Porter, Indiana. 67 pages.

- U.S. Department of Interior, National Park Service (USDOI-NPS). 2008. Sleeping Bear Dunes National Lakeshore, Final General Management Plan, Wilderness Study, Environmental Impact Statement, Sleeping Bear Dunes National Lakeshore, Michigan - October 2008, 405 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2009. Strategic Plan for Scientific Research in Isle Royale National Park. Submitted January 2009. 37 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2009. Distribution and abundance of invasive non-indigenous plants and rare plants at two riverine national parks in the Great Lakes Network. Larson, J., and D. Larson. Natural Resource Technical Report NPS/GLKN/NRTR—2008/161. National Park Service, Fort Collins, Colorado. 82 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2010. Assessment of Natural Resource Conditions, Isle Royal National Park, Natural Resource Report NPSINRPC/WRDINRR-20 101237 Sept 2010. 246 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2011a. Draft General Management Plan/EIS, Ice Age Complex at Cross Plains, Wisconsin. Review only - Not for Public Distribution - January 2011. 162 pages.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2011b. Personal Communication with Mark Holden, Ice Age National Scenic Trail. Email dated June 30, 2011.
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2011b. National Park service home webpage. Accessed numerous park webpages from this main home page. Accessed: <http://www.nps.gov/index.htm>
- U.S. Department of Interior, National Park Service (USDOI-NPS). 2011. Personal Communication with Paul Boren, Ice Age National Scenic Trail.
- U.S. Department of Interior, National Park Service (USDOI-NPS). No Date. Indiana Dunes National Lakeshore Invasive Plant Management Strategy (NPS – INDU Invasive Species Plant Management). 6 pages.
- U.S. Fish and Wildlife Service (USFWS). 2002. Pitcher's Thistle (*Cirsium pitcheri*) Recovery Plan. Fort Snelling, Minnesota. September 2002. 92 Pages. Accessed: http://ecos.fws.gov/docs/recovery_plan/020920b.pdf
- U.S. Fish and Wildlife Service (USFWS). 2003. Karner Blue Butterfly Recovery Plan (*Lycaeides melissa samuelis*). Fort Snelling, Minnesota. September 2003. 293 Pages. Accessed: http://ecos.fws.gov/docs/recovery_plan/030919.pdf
- U.S. Fish and Wildlife Service (USFWS). 2003. Recovery Plan for the Great Lakes Piping Plover (*Charadrius melodus*). Great Lakes-Big Rivers Region. September 2003. 151 Pages. Accessed: http://ecos.fws.gov/docs/recovery_plans/2003/030916a.pdf

- U.S. Forest Service (USFS). 2011. Index of Species Information, Species: *Sarracenia purpurea*. Accessed: <http://www.fs.fed.us/database/feis/plants/forb/sarpur/all.html>
- U.S. Geological Survey (USGS). 2005. Status of the Eastern Massasauga Rattlesnake at Indiana Dunes National Lakeshore. Gary Glowacki and Ralph Grundel. Great Lakes Science Center. January 10, 2005. 41 pages. Accessed: <http://science.nature.nps.gov/im/units/glkn/Eastern%20Massasauga%20Rattlesnake.pdf>
- University of Wisconsin. 2011. University Relations and Communications. UWSP professor collaborates in discovery of new sunflower species . Accessed: <http://www3.uwsp.edu/urc/Lists/NewsArchive/DispForm.aspx?ID=596>.
- Wear, D.N. and J. G. Greis. 2009. The Southern Forest Resource Assessment Summary Report. S
- Wells, Carol G., Campbell, R. E., DeBano, L. F. [and others]. 1979. Effects of fire on soil: a state-of-knowledge review. Gen. Tech. Rep. WO-7. Washington, DC: U.S. Department of Agriculture, Forest Service. 34p.outhern Research Station, USDA Forest Service, and Southern Region, USDA Forest Service.
- Wisconsin Department of Natural Resources (WDNR). 2006. Ecological Landscapes of Wisconsin. Last Revised: Thursday February 08 2006. Madison, Wisconsin. Accessed: <http://dnr.wi.gov/landscapes/>

7.2 ACRONYMS

aka – also known as

AMR – appropriate management response

APHIS – Animal and Plant Health Inspection Service

APIS – Apostle Islands National Lakeshore

BGPA – Bald and Golden Eagle Protection Act

BIA – Bureau of Indian Affairs

BLM – Bureau of Land Management

BMP – best management practices

CE – categorically excluded

CEQ – Council on Environmental Quality

CFR – Code of Federal Regulation

cm – centimeters

CWMA – Cooperative Weed Management Area

DBH – diameter at breast height

DNR – Department of Natural Resources

DO – Director’s Order

DPS – Distinct Population Segment

EA – Environmental Assessment

e.g. – for example

EIS – Environmental Impact Statement

EO – Executive Order

EPA – United States Environmental Protection Agency

EPMT – Exotic Plant Management Team

ESA – Endangered Species Act

ESF – Environmental Screening Form

FIFRA – Federal Insecticide, Fungicide, and Rodenticide Act

FONSI – Finding of No Significant Impact

FR – Federal Register

GIS – Geographic Information System

GL-EPMT – Great Lakes Exotic Plant Management Team

GMP – General Management Plan

GPS – global positioning system

GRPO – Grand Portage National Monument

IATR – Ice Age National Scenic Trail

IBA – Important Bird Area

IBZ – inland buffer zone

i.e. – that is, or as in

in – inches

INDR – Indiana Department of Natural Resources

INDU – Indiana Dunes National Lakeshore

IPM – Integrated Pest Management

IPMP – Invasive Plant Management Plan

ISRO – Isle Royale National Park

MISS – Mississippi National River and Recreation Area

MOU – Memorandums of Understanding

MSDS - Material Safety Data Sheet

NEPA – National Environmental Policy Act

NHL – National Historic Landmark

NHPA – National Historic Preservation Act

NRHP - National Register of Historic Places

NMP – National Management Plan

NNL – National Natural Landmark

NPS – National Park Service

Ojibwe – Grand Portage Band of Lake Superior Chippewa

OMNR – Ontario Ministry of Natural Resources

OSHA – Occupational Health and Safety Administration

pH - measure of the acidity or basicity

PIRO – Pictured Rocks National Lakeshore

PPQ – Plant Protection and Quarantine

RM – Reference Manual

RMP – Resource Management Plan

RNA – Research Natural Area

SACN – St. Croix National Scenic River

SHPO – State Historic Preservation Office

SLBE – Sleeping Bear Dunes National Lakeshore

TAG – Technical Advisory Group for Biological Control Agents of Weeds

U.S. – United States

USACE – United States Army Corps of Engineers

USDA – United States Department of Agriculture

USFWS – United States Fish and Wildlife Service

USFS – United States Forest Service

USGS – United States Geological Survey

UTV – utility terrain vehicle

VOYA – Voyageurs National Park

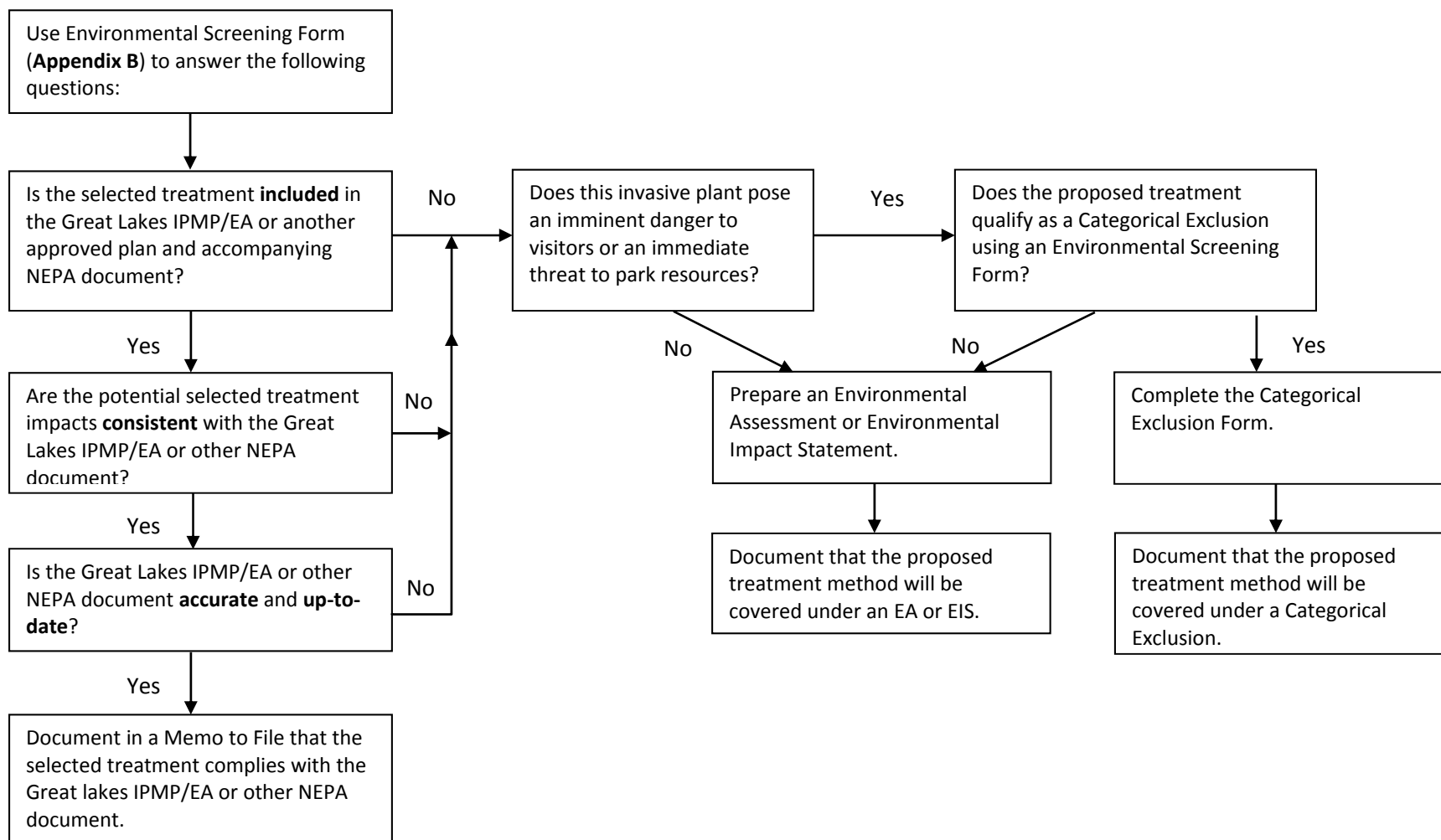
WDNR – Wisconsin Department of Natural Resources

WMA – Wilderness Management Area

Appendix A

Great Lakes IPMP/EA Confirm Compliance with NEPA Guidance Tool and Memo to File

Confirm Compliance of Treatment Method with an Existing NEPA Document and Other Requirements



Great Lakes National Parks Memo to File: Confirm Compliance of Invasive Plant Treatment Method(s) with an Existing NEPA Document and Other Requirements

Site Location (legal location, UTM Coordinates, or Lat/Long): _____

Species Treated(s):

Treatment Action(s):

Treatment Rationale:

Proposed Treatment Date:

Is the selected treatment included in the Great Lakes IPMP/EA or another approved plan and accompanying NEPA document? List document(s):

Are the potential selected treatment impacts consistent with the Great Lakes IPMP/EA or other NEPA document? Identify where discussed in the NEPA document:

Is the Great Lakes IPMP/EA or other NEPA document accurate and current?

Has a Pesticide Use Proposal been requested and approved? If yes, please attach approved PUP to memo. _____

Have necessary permits (aquatic, NPDES, vegetation removal, burning) and certifications (herbicide applicator) been approved? List:

Treatment Personnel:

Signature:

Date:_____

Appendix B

Great Lakes IPMP/EA Environmental Screening Form

ENVIRONMENTAL SCREENING FORM (ESF) FOR THE GREAT LAKES IPMP/EA

Appendix B Key:

General Impact Threshold Definitions¹:

0 – No Effect: Implementation of the alternatives and invasive plant treatment options would have no effect on the impact topic or the impact topic is not present in the park.

1 – Negligible: Implementation of the alternatives and invasive plant treatment options would have a highly localized, short-term, and/or non-measurable effect on the impact topic.

2 – Minor: Implementation of the alternatives and invasive plant treatment options would have a local, short-term, and/or measurable but not readily noticeable effect on the impact topic.

3 – Moderate: Implementation of the alternatives and invasive plant treatment options would have a regional, long-term, measurable, noticeable, and/or large-scale effect on the impact topic.

4- Major: Implementation of the alternatives and invasive plant treatment options would have a substantial, regional, long-term, highly noticeable, and/or permanent effect on the impact topic.

Impact Topics to be dismissed: Impact topics assigned either a 0, 1, or 2 are dismissed from analysis in the IPMP/EA.

Impact Topics to be analyzed: Impact topics highlighted assigned a 3 are carried forward for analysis in the IPMP/EA.

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
Geological resources – bedrock, streambeds, etc.	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or	1 Dismissed from analysis because any potential effects of the alternatives or

¹ Impact topic-specific impact threshold definitions are provided for the resources/values carried forward for analysis in the IPMP/EA.

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA

[illegible]

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA

[illegible]

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
Rare or unusual vegetation – old growth timber, riparian, alpine, (such as wild rice)	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.
Species of special concern (plant or animal; state or federal listed or proposed for listing) or their potential/critical habitat	3	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.
Unique ecosystems (e.g., maritime cliffs,>NNLs), biosphere reserves, World Heritage Sites	0	0	0	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	0	0	0	0	0

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
					be local, short-term, and measurable but minor.					
Unique, essential or important wildlife or wildlife habitat	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.
Unique, essential or important fish or fish habitat	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
Introduce or promote non-native species (plant or animal) as an IPM tool (e.g., the use of non-native cover crops or nurse crops., certified weed free seeds could still have weed seeds)	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.
Recreation resources, including supply, demand, visitation, activities, etc.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	3	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	3	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.
Visitor experience, aesthetic resources	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	3	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA

[illegible]

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
	alternatives or treatment options would be local, short-term, and measurable but minor.	alternatives or treatment options would be local, short-term, and measurable but minor.		alternatives or treatment options would be local, short-term, and/or negligible.	alternatives or treatment options would be local, short-term, and/or negligible.	alternatives or treatment options would be local, short-term, and measurable but minor.	alternatives or treatment options would be local, short-term, and measurable but minor.	alternatives or treatment options would be local, short-term, and measurable but minor.	alternatives or treatment options would be local, short-term, and measurable but minor.	alternatives or treatment options would be local, short-term, and measurable but minor.
Ethnographic resources	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.
Museum collections (objects, specimens, and archival and manuscript collections)	0	0	0	0	0	0	0	0	0	0
Socioeconomics, including employment, occupation, income changes, tax base, infrastructure	0	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment	1 Dismissed from analysis because any potential effects of the alternatives or treatment	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment	1 Dismissed from analysis because any potential effects of the alternatives or treatment	0

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
			options would be local, short-term, and/or negligible.	options would be local, short-term, and/or negligible.		options would be local, short-term, and/or negligible.		options would be local, short-term, and/or negligible.	options would be local, short-term, and/or negligible.	
Minority and low income populations, ethnography, size, migration patterns, etc.	0	0	0	0	0	0	0	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	0
Energy resources (oil, natural gas, other mineral deposits, hydroelectric power, wind power)	0	0	0	0	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	0	0	0	0
Other agency or tribal use plans or policies (e.g., MOUs with other agencies/Tribes, CWMAs)	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
	be local, short-term, and/or negligible.	be local, short-term, and/or negligible.	be local, short-term, and measurable but minor.	be local, short-term, and/or negligible.		be local, short-term, and/or negligible.	be local, short-term, and/or negligible.	be local, short-term, and/or negligible.	be local, short-term, and/or negligible.	be local, short-term, and/or negligible.
Resource use, including energy, conservation potential, sustainability	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.
Urban quality, gateway communities, etc. (will the treatment options noticeably enhance the urban quality or gateway community?)	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	0	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	0
Long-term management of resources or land/resource productivity	2 Dismissed from analysis because any potential	1 Dismissed from analysis because any potential	2 Dismissed from analysis because any potential	0	1 Dismissed from analysis because any potential	1 Dismissed from analysis because any potential	2 Dismissed from analysis because any potential	1 Dismissed from analysis because any potential	2 Dismissed from analysis because any potential	2 Dismissed from analysis because any potential

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
(e.g., timber harvest, fisheries, pine plantations, agricultural leasing, managing wildlife habitats for huntable or trapable populations)	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and/or negligible.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.		effects of the alternatives or treatment options would be local, short-term, and/or negligible.	effects of the alternatives or treatment options would be local, short-term, and/or negligible.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and/or negligible.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.
Fire management (e.g., would IPM treatment would affect fire management? Would use of another treatment reduce the use of prescribed burns?)	0 Dismissed from analysis because APIS has an existing fire management plan.	2 Dismissed from analysis because GRPO has an existing fire management plan.	2 Dismissed from analysis because IATR has an existing fire management plan.	2 Dismissed from analysis because INDU has an existing fire management plan.	0 Dismissed from analysis because ISRO has an existing fire management plan.	1 Dismissed from analysis because MISS has an existing fire management plan.	0 Dismissed from analysis because PIRO has an existing fire management plan.	1 Dismissed from analysis because SLBE has an existing fire management plan.	2 Dismissed from analysis because SACN has an existing fire management plan.	2 Dismissed from analysis because VOYA has an existing fire management plan.
Sandscapes (will IPM have an impact on beach erosion, changes in dunal formation) / Coastal Processes (sediment movement along the coast)	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	0	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	3	3	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
Agriculture (prime and unique farmlands, grazing areas, permanent conversions of agricultural land)	0	0	0	0	0	0	0	0	0	0
Wilderness (will treatment options affect Wilderness character?)	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor and because BMPs would reduce or eliminate impacts to Wilderness.	0	0	0	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible and because BMPs would reduce or eliminate impacts to Wilderness.	0	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor and because BMPs would reduce or eliminate impacts to Wilderness.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor and because BMPs would reduce or eliminate impacts to Wilderness.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but minor and because BMPs would reduce or eliminate impacts to Wilderness.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible and because BMPs would reduce or eliminate impacts to Wilderness.
General Wildlife and Fisheries (potential non-target effects on wildlife and fisheries [e.g., chemical effects on invertebrates, improvement of big game habitat])	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and measurable but	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or negligible.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and/or	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be local, short-term, and

ENVIRONMENTAL SCREENING FORM FOR GREAT LAKES IPMP/EA										
Resources:	APIS	GRPO	IATR	INDU	ISRO	MISS	PIRO	SLBE	SACN	VOYA
etc.)	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.		effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.	effects of the alternatives or treatment options would be local, short-term, and measurable but minor.
Migratory Birds	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	2 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.	1 Dismissed from analysis because any potential effects of the alternatives or treatment options would be reduced by BMPs designed to protect migratory birds.

Appendix C

Relationship of the Great Lakes IPMP/EA to Other Park Plans and Documents

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
APIS	Survey of Exotic Vascular Plants (2010)	NPS	Identifies 70 exotic species and includes occurrence and abundance in the park.	The Survey of Exotic Vascular Plants is accounted for when establishing invasive plant management priorities within APIS.
	Exotic Plant Survey Report (2000)	NPS	Summarizes weed threats to various plant communities.	The Exotic Plant Survey Report is accounted for when establishing invasive plant management priorities within APIS.
	Exotic Plant Survey Table (2000)	NPS	Survey results of non-native (exotic) vascular plant species of campgrounds and developed areas.	The Exotic Plant Survey Table is accounted for when establishing invasive plant management priorities within APIS.
	Exotic Plant Management Plan (2009)	NPS	Defines goals and objectives for exotic plant management and species-specific management prescriptions.	The IPMP/EA is consistent with the goals and objectives of the Exotic Plant Management Plan.
	Fire Management Plan (2005)	NPS	Provides guidance for using prescribed fire to restore ecosystems with natural fire regimes.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	Final Fire Management Plan Environmental Assessment (2005)	NPS	Provides guidance for using prescribed fire to restore ecosystems with natural fire regimes. The Environmental Assessment element assesses the impacts to implementing the Fire Management Plan and alternatives of the plan.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	Resources Management Plan	NPS	Establishes specific goals for management of invasive plants.	The IPMP/EA is consistent with the Resource Management Plan and will help APIS to meet invasive plant management goals.
	Apostle Islands Maritime Cliffs No. 267, State Natural Area Management Plan	NPS	Addresses the partnership between the NPS and the Department of Natural Resources' Endangered Resources Program for addressing actions on State Natural Areas. The plan states the natural values of concern, the required management actions, guidelines for developing management strategies, and adaptive options for implementing the management strategies.	The IPMP/EA is consistent with the goals, objectives, and strategies identified to work cooperatively with the Department of Natural Resources on issues of mutual concern.
	Apostle Islands Maritime Forest No. 266, State Natural Area Management Plan	NPS	Addresses the partnership between the NPS and the Department of Natural Resources' Endangered Resources Program for addressing actions on State Natural Areas. The plan states the natural values of concern, the required management actions, guidelines for developing management strategies, and adaptive options for implementing the management strategies.	The IPMP/EA is consistent with the goals, objectives, and strategies identified to work cooperatively with the Department of Natural Resources on issues of mutual concern.
	Apostle Islands Sandscapes No. 268, State Natural Area Management Plan	NPS	Addresses the partnership between the NPS and the Department of Natural Resources' Endangered Resources Program for addressing actions on State Natural Areas. The plan states the natural values of concern, the required management actions, guidelines for developing management strategies, and adaptive options for implementing the management strategies.	The IPMP/EA is consistent with the goals, objectives, and strategies identified to work cooperatively with the Department of Natural Resources on issues of mutual concern.
	Apostle Islands Yew Forest No. 640, State Natural Area Management Plan	NPS	Addresses the partnership between the NPS and the Department of Natural Resources' Endangered Resources Program for addressing actions on State Natural Areas. The plan states the natural values of concern, the required management actions, guidelines for developing management strategies, and adaptive options for implementing the management strategies.	The IPMP/EA is consistent with the goals, objectives, and strategies identified to work cooperatively with the Department of Natural Resources on issues of mutual concern.

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	Superintendent's Order #31, APIS Numbered Memorandum 99-05 (2011)	NPS	Describes the guiding principles for safety management, environmental management, and sustainable practices at APIS and sets forth the top level commitments we make to uphold excellence in these areas. By providing environmental policy direction in support of the park's Integrated Environmental Plan the Superintendent's Order also functions as the park's Environmental Commitment Statement.	Superintendent's Order #31 is accounted for when establishing invasive plant management priorities within APIS.
GRPO	Exotic Plant Management Team Trip Report (2010)	NPS	Reported findings related to invasive species. Includes target species, site descriptions, a treatment record, targeted plant phenology during inventory, and potential threats to the park. Identifies monitoring, and prevention strategies.	The trip report is accounted for when establishing invasive plant management priorities within GRPO.
	Final Wildland Fire Management Plan and Environmental Assessment (2004)	NPS	Provides guidance for using prescribed fire to restore ecosystems with natural fire regimes. The Environmental Assessment element assesses the impacts to implementing the Wildland Fire Management Plan and alternatives to the plan.	The IPMP/EA will not conflict with the overall management directions and specific management requirements of the Wildland Fire Management Plan.
	Wildland Fire Management Plan (2004)	NPS	Provides guidance for using prescribed fire to restore ecosystems with natural fire regimes.	The IPMP/EA will not conflict with the overall management directions and specific management requirements of the Wildland Fire Management Plan.
	Vegetation analysis of the Grand Portage National Monument (1986-2004)	NPS	Presents the results of an analysis of vegetation data collected from 1986 to 2004 at 4 permanent plots at GRPO.	The vegetation analysis is accounted for when establishing invasive plant management priorities within GRPO.
	Implementation of Long-term Vegetation Monitoring Program at Grand Portage National Monument (2008)	NPS	Defines the general goals of this program to monitor forest vegetation to gain a better understanding of its dynamics, and to compare vegetation indices to baseline conditions.	The IPMP/EA will not conflict with the overall goals of implementation of long-term vegetation monitoring program. The IPMP/EA will help GRPO to meet invasive plant management goals.
	Final General Management Plan / Environmental Impact Statement	NPS	Provides guidance for long-range operation of the park.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the General Management Plan.
	Evaluation of Grand Portage Creek Channel Morphology and Instability (2008)	NPS	Assesses the general stability of several eroding reaches of Grand Portage Creek and provides recommendations for treating these reaches.	The Evaluation of Grand Portage Creek Channel Morphology and Instability is accounted for when establishing invasive plant management priorities within GRPO.
	Streambank Stabilization on Grand Portage Creek (2009)	NPS	Describes conditions, limiting factors, and possible treatments for a short reach of eroding streambank in GRPO.	The Streambank Stabilization on Grand Portage Creek is accounted for when establishing invasive plant management priorities within GRPO.
	A Survey of Beaver Ecology in GRPO	NPS	Identify the results of biological surveys of Beavers in GRPO.	The survey of beaver ecology is accounted for when establishing invasive plant management priorities within GRPO.
	Beaver in the Grand Portage National Monument (2011)	NPS	Determines how many beaver were present in the Boardwalk beaver pond in 2010, evaluates the food supply available to beavers, provides information of the biology of beavers in Grand Portage, and evaluates the Boardwalk beaver pond in the context of existing beaver literature. Discusses results of an aerial census for beaver food caches completed in Fall 2008. Determines the	The information provided in the beaver report is accounted for when establishing invasive plant management priorities within GRPO.

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
			historical occupancy of the Boardwalk pond and other ponds identified by Smith and Peterson. Provides recommendations on what could be done to provide foraging habitat for beaver within the GRPO.	
	Aquatic Studies in National Parks of the Upper Great Lakes States: past efforts and future directions. Water Resources Division Technical Report (2005)	NPS	Summarizes water-related studies and investigations and their recommendations on a park by park basis. Provides a brief synthesis of water-related issues common to multiple parks across the GRPO. Provides an annotated summary of the over 600 existing studies and investigations identified, including information on individual study approaches, sampling designs, and findings. Includes recommendations taken directly from the reviewed literature as well as considerations for future monitoring and research.	The IPMP/EA is consistent with the aquatic studies. The data included in this report is accounted for when establishing invasive plant management priorities within GRPO, and will help GRPO to meet invasive plant management goals.
IATR	Exotic Plant Management Team Trip Report (2010)	NPS	Reported findings related to treating thistles and leafy spurge (<i>Euphorbia esula</i>) in the open fields, and status removing shrubs from the open areas. Includes site descriptions, a treatment record, and targeted plant phenology. Identifies monitoring and recommended follow up.	The trip report is accounted for when establishing invasive plant management priorities within IATR.
	Draft General Management Plan and Environmental Impact Statement (2011)	NPS	Provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, providing opportunities for quality visitor experiences, and for management direction of a park unit at IATR. The Environmental Impact Statement element presents and analyzes alternatives, including the preferred alternative, for the general management plan.	The IPMP/EA is consistent with the Draft General Management Plan and Environmental Impact Statement and will help IATR to meet any invasive plant management goals that may be identified.
	Exotic Plant Management Team Trip Report (2008-2010)	NPS	Reported findings related to invasive species. Includes target species, site descriptions, treatment efficacy, treatment record, recommended follow up, and long-term management.	The trip report is accounted for when establishing invasive plant management priorities within IATR.
	Cross Plains Unit Ice Age National Scientific Reserve Feasibility Study and Environmental Analysis (1998)	Wisconsin Department of Natural Resources	Study of the geological, natural, cultural, and scenic resources of the Cross Plains Reserve to determine if the existing reserve adequately protects these resources.	While the state study is not binding to federal agencies, the IPMP/EA does not conflict with the management objectives identified by the state of Wisconsin. The study is accounted for when establishing invasive plant management priorities within the IATR.
	Exotic Plant Management Team Trip Report (2011)	NPS	Reported findings related to invasive species. Includes target species, site descriptions, a treatment record, targeted plant phenology, and recommended follow-up.	The trip report is accounted for when establishing invasive plant management priorities within IATR.
	Draft Rapid Ecological Assessment for the Ice Age National Scientific Reserve at Cross Plains (2008)	NPS	A summary of biodiversity values focusing on rare plants, selected rare animals, and high quality natural communities in preparation for the development of a new property master planning.	The IPMP/EA is consistent with the Draft Rapid Ecological Assessment and will help IATR to meet any invasive plant management goals that may be identified.
	Shoveler Sink prescribed burn information	USFWS	Provides prescribed burn information	The Shoveler Sink prescribed burn information is accounted for when establishing invasive plant management priorities within IATR.
	USFWS National Wetlands	USFWS	Identifies wetlands within IATR.	The wetlands are accounted for when establishing invasive

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	Inventory			plant management priorities within IATR.
	Black Earth Creek map (2010)	Wisconsin Department of Natural Resources	Identifies Black Earth Creek and easement uses within IATR.	The data provided by the Black Earth Creek map is accounted for when establishing invasive plant management priorities within IATR.
	Cross Plains site prescribed burn information	Wisconsin Department of Natural Resources	Provides prescribed burn information	The Cross Plains site prescribed burn information is accounted for when establishing invasive plant management priorities within IATR.
	Vegetation Patterns and Land Cover Change for the Cross Plains Ice Age National Scientific Reserve (1937-2007)	NPS	Conducts a land cover to supplement the 2004/2005 surveys within the Cross Plains Ice Age National Scientific Reserve; notes significant features to supplement the previous survey; develops a GIS of the land cover and significant features for all units; and provide an interpretation of the future vegetation cover with and without management.	The IPMP/EA is consistent with the Vegetation Patterns and Land Cover Change. The data included in this report is accounted for when establishing invasive plant management priorities within IATR, and will help IATR to meet invasive plant management goals.
INDU	Land Protection Plan (1998)	NPS	Addresses concerns and proposes protection strategies for lands and mineral interests within the park boundary.	The IPMP/EA is consistent with strategies identified to work cooperatively with landowners on issues of mutual concern.
	Fire Monitoring Plan	NPS	Describes the extent of the fire monitoring program, the type of plots and protocols being used, and schedules for monitoring.	The IPMP/EA is consistent with the Fire Monitoring Plan and will help INDU to meet identified invasive plant management goals.
	Fire Management Plan (2007)	NPS	Provides guidance for using prescribed fire to restore natural fire regimes and for invasive plant management.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	Map of Fragmentation and Corridors	NPS	Identifies corridor types resulting in fragmentation of INDU.	The assessment of corridors and fragmentation is accounted for when establishing invasive plant management priorities within INDU.
	General Management Plan (1997)	NPS	Defines strategies to provide management, use, and development of the park for 20 years.	The IPMP/EA is consistent with the General Management Plan and will help INDU to meet identified invasive plant management goals.
	Invasive Plant Management Strategy	NPS	Prioritizes invasive plant control projects and Identifies priority of invasive species.	The IPMP/EA is consistent with the Invasive Plant Management Strategy and will help INDU to meet invasive plant management goals.
ISRO	Draft General Management Plan and Environmental Impact Statement	NPS	Provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, providing opportunities for quality visitor experiences, and for management direction of a park unit at ISRO for the next 20 years. The Environmental Impact Statement element presents and analyzes alternatives, including the preferred alternative, for the general management plan.	The IPMP/EA is consistent with the Draft General Management Plan and Environmental Impact Statement and will help ISRO to meet any invasive plant management goals that may be identified.
	Assessment of Natural Resource Conditions	NPS	Identifies and describes various natural resources present in ISRO. This report provides an assessment of the conditions of the various resources identified, and identifies stressors to specific resources.	The Assessment of Natural Resource Conditions report is accounted for when establishing invasive plant management priorities within ISRO.
	Isle Royal Biosphere Reserve: Volume 1, a history of	NPS	Accumulated information concerning the physical and biotic components of the Isle Royale ecosystem dated from as early as	The history of scientific studies report is accounted for when establishing invasive plant management priorities within ISRO.

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	scientific studies (1985)		1669.	
MISS	Comprehensive Management Plan	NPS	Provides broad guidance for managing the corridor for the next 10 to 15 years	The IPMP/EA is consistent with the Comprehensive Management Plan and will help MISS to meet any invasive plant management goals that are identified.
	A Historic Resources Study of the Mississippi National River and Recreation Area	NPS, USACE	Provides a historical overview of a park or region and identifies and evaluates the park's cultural resources within historic contexts.	The Historic Resources Study is accounted for when establishing invasive plant management priorities within MISS.
	Mississippi National River and Recreation Area Property Information (2011)	NPS	Provides property and cultural information.	The information is accounted for when establishing invasive plant management priorities within MISS.
	Distribution and abundance of invasive non-indigenous plants and rare plants at two riverine national parks in the Great Lakes Network (2008)	NPS	Explores existing reports on rare plant locations in MISS and SACN. Provides results from invasive plant surveys on several species considered "target" species of concern at each park. Serves as a template for future surveys and to emphasize the importance of the continuation to allow compilation and comparison of data across parks.	The report is accounted for when establishing invasive plant management priorities within MISS and SACN.
	An Archeological Overview and Assessment of the Mississippi National River and Recreation Area (2000)	NPS	Provides an assessment of archeological resources within MISS.	The archeological assessment is accounted for when establishing invasive plant management priorities within MISS.
PIRO	Draft Environmental Assessment for Pictured Rocks National Lakeshore Exotic Plant Management Plan (2007)	NPS	Analyzes the environmental impacts that would result from the alternatives considered, including the No Action alternative. The preferred alternative is to implement the park's exotic vegetation management plan using invasive plant management techniques of mechanical, cultural, and herbicidal control.	The IPMP/EA is consistent with the Draft Environmental Assessment for Pictured Rocks National Lakeshore Exotic Plant Management Plan and will help PIRO to meet any invasive plant management goals that may be identified.
	Draft Exotic Plant Management Plan (2006)	NPS	Defines goals and objectives for invasive plant management. Identifies priority invasive plants.	The IPMP/EA is consistent with the goals and objectives of the Draft Exotic Plant Management Plan and will help PIRO to meet invasive plant management goals that may be identified.
	General Management Plan, Wilderness Study, and Environmental Impact Statement (2003)	NPS	Provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, providing opportunities for quality visitor experiences, and for management direction of a park unit at PIRO for the next 20 years. The Wilderness Study element evaluates lands for possible recommendation to Congress for inclusion in the national Wilderness preservation system. The Environmental Impact Statement element presents and analyzes five alternatives, including the preferred alternative, for a general management plan.	The IPMP/EA is consistent with the General Management Plan, Wilderness Study, and Environmental Impact Statement and will help PIRO to meet invasive plant management goals.
	Decreasing Effectiveness of Protected Areas Due to Increasing Development in the Surroundings of U.S. National Park Service Holdings After Park	NPS	Compared observed rates and magnitudes of change with those in a broader landscape, based on U.S. census data. This approach enabled the assessment of park effectiveness both in time (pre- and post-establishment period) and space (park area vs. buffer zones vs. broader landscape), and estimated potential leakage and amenity effects due to park establishment.	The technical report is accounted for when establishing invasive plant management priorities within PIRO.

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	Establishment, Natural Resource Technical Report (2009)			
	Pictured Rocks National Lakeshore Wildland Fire Management Plan Environmental Assessment (2004)	NPS	Identified and addressed the potential to use prescribed fire for restoration of natural ecosystem processes and vegetation conditions, especially the fire-dependent jack and red pine forests; the potential threat of fire escaping to surrounding state, corporate and private lands; the effects of fire and fire suppression activities on rare plant communities and wildlife; fire and suppression impacts on cultural, ethnographic, archeological, and historic resources; potentially increased fuel loads resulting from logging in the inland buffer zone; potential impacts to air quality from prescribed fire.	The Environmental Assessment of Wildland Fire Management is accounted for when establishing invasive plant management priorities within PIRO.
	Wildland Fire Management Plan (2005)	NPS	Provides guidance for using prescribed fire to restore natural fire regimes and for invasive plant management.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	PIRO Vascular Certified Plant Species List	NPS	Identifies 980 species and includes occurrence and abundance in the park.	The Vascular Certified Plant Species List is accounted for when establishing invasive plant management priorities within PIRO.
	Pictured Rocks National Lakeshore Resource Management Plan (2003)	NPS	Directs the protection of the natural resources and actions to restore impacted sites to predevelopment conditions where feasible.	The IPMP/EA will help PIRO to meet any invasive plant management goals identified in the Resource Management Plan.
SACN	Fire Management Plan (2005)	NPS	Provides guidance for using prescribed fire to restore natural fire regimes and for invasive plant management.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	Aquatic Invasive Species Inter-agency Task Force Action Plan For The Lower ST. Croix River (2009)	NPS	Outlines strategies and actions proposed by the participating agencies for the 2009 season to help accomplish the Task Force purpose and implement actions from the St. Croix Scenic Riverway Comprehensive Interstate Management Plan.	The IPMP/EA is consistent with the Action Plan, and will help to meet the objectives of the Task Force and the comprehensive interstate management plan.
	Exotic Plant Management Plan (2009)	NPS	Defines goals and objectives for exotic plant management. Identifies priority exotic plants.	The IPMP/EA is consistent with the goals and objectives of the Exotic Plant Management Plan and will help to meet the objectives of facilitating management of invasive plants.
	Lower St. Croix National Scenic Riverway Cooperative Management Plan Final Environmental Impact Statement (2000)	NPS	Presents and analyzes six alternatives, including the preferred alternative, for a cooperative management plan for the Lower St. Croix National Scenic Riverway.	The IPMP/EA will help SACN to meet invasive plant management goals.
	Lower St. Croix National Scenic Riverway Cooperative Management Plan (2002)	NPS	Describes the direction the managing agencies intend to follow in managing the lower riverway for the next 15 to 20 years. The plan provides a framework for proactive decision making, including decisions on recreational use, land use, natural and cultural resource management and general development in the lower riverway.	The IPMP/EA will help SACN to meet any invasive plant management goals that may be identified.
	Progress Report For Control	NPS	Provides information on the Grecian foxglove, <i>Digitalis lanata</i> , a	The Grecian foxglove 2001 Progress Report is accounted for

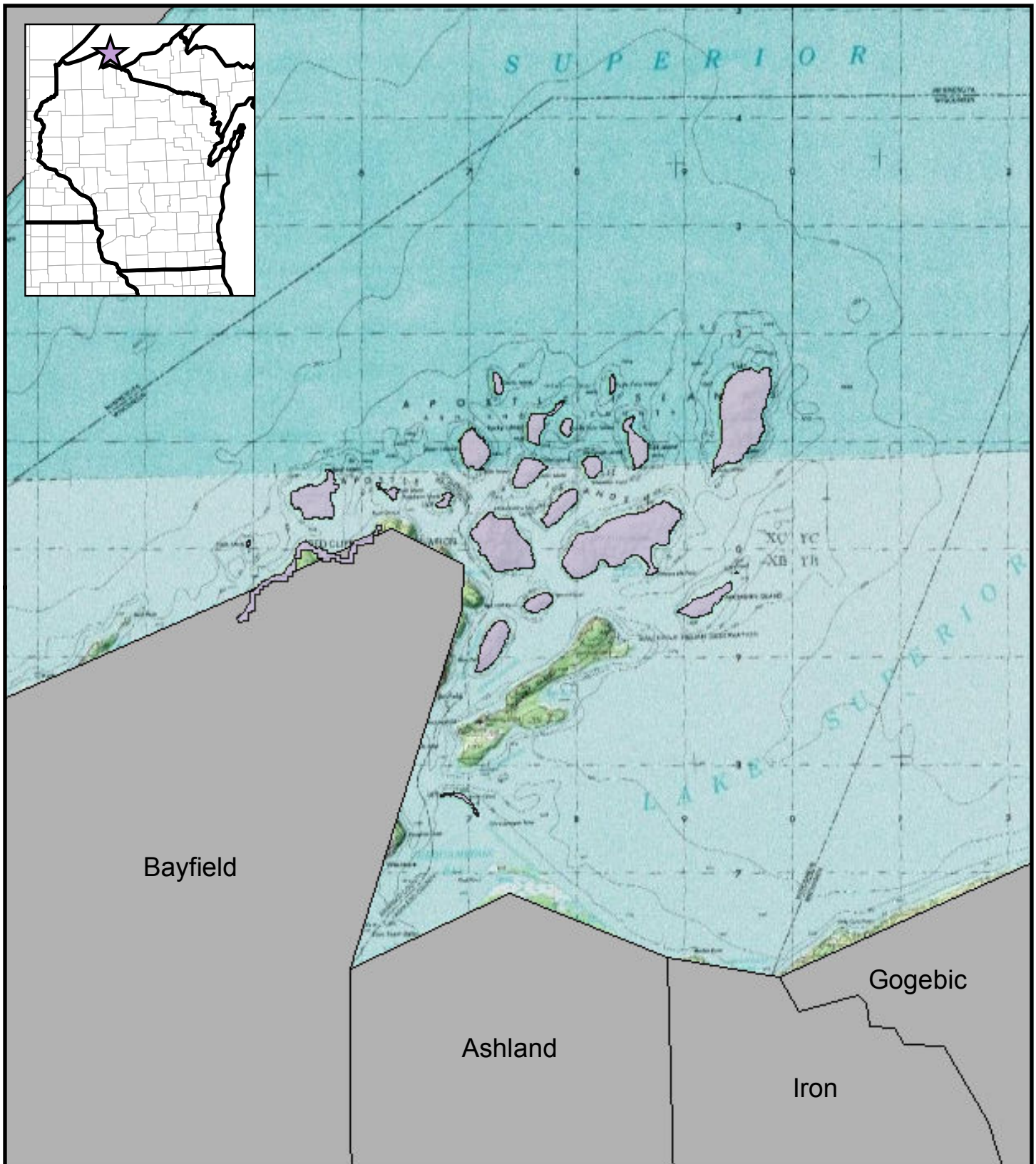
RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	of Grecian Foxglove (<i>Digitalis lanata</i>) at St. Croix National Scenic Riverway (2001)		biennial exotic plant species that is a very toxic plant, containing digitoxin and digitalis, a cardiovascular drug extracted from the leaves. The report identifies locations of species and control methods used in SACN for the 2000/2001 season.	when establishing invasive plant management priorities within SACN.
	Exotic Plant Control Summary (2008)	NPS	Provides details for the exotic plants that regularly receive some control activities in an effort to formally rank exotic plant species in SACN.	The Exotic Plant Control Summary is accounted for when establishing invasive plant management priorities within SACN.
	Purple Loosestrife Integrated Pest Management Plan (1994)	NPS	Provides management guidelines for controlling purple loosestrife in order to restore and maintain the integrity of the SACN's natural ecological communities and processes.	The IPMP/EA is consistent with the goals and objectives of the Purple Loosestrife Integrated Pest Management Plan and will help to meet the objectives of facilitating management of purple loosestrife.
	Purple Loosestrife Control Efforts of St. Croix National Scenic Riverway (2006)	NPS	Provides a progress report and efforts used for controlling purple loosestrife in SACN.	The Purple Loosestrife Control Efforts report is accounted for when establishing invasive plant management priorities within SACN.
	Resources Management Plan (2000, updated 2001)	NPS	Provides documentation of resources, planning, and other guidance for resource management planning for SACN.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Resource Management Plan.
	St. Croix National Scenic Riverway, Minnesota/Wisconsin, Superintendent's Compendium (2009)	NPS	Provides a summary of park specific rules implemented under the discretionary authority of the park Superintendent.	The Superintendent's Compendium is accounted for when establishing invasive plant management priorities within SACN.
	Upper St. Croix and Namekagon Rivers General Management Plan (1998)	NPS	Describes the general direction that the NPS intends to follow in managing the upper riverway for the next 15 to 20 years while meeting the stated purposes of the upper riverway as set forth in the Wild and Scenic Rivers Act. This plan provides a framework for proactive decision making, including decisions on visitor use, natural and cultural resource management, and general development.	The IPMP/EA does not conflict with the overall management directions and specific management requirements of the General Management Plan.
SLBE	Assessment of Natural Resource Conditions (2009)	NPS	Identifies and describes various natural resources present in SLBE. This report provides an assessment of the conditions of the various resources identified, and identifies stressors to specific resources.	The Assessment of Natural Resource Conditions report is accounted for when establishing invasive plant management priorities within SLBE.
	Sleeping Bear Dunes National Lakeshore Final General Management Plan, Wilderness Study, and Environmental Impact Statement (2008)	NPS	Provides comprehensive guidance for perpetuating natural systems, preserving cultural resources, providing opportunities for quality visitor experiences, and for management direction of a park unit at SLBE for the next 20 years. The Wilderness Study element evaluates lands for possible recommendation to Congress for inclusion in the national Wilderness preservation system. The Environmental Impact Statement element presents and analyzes five alternatives, including the preferred alternative, for a general management plan.	The IPMP/EA is consistent with the General Management Plan, Wilderness Study, and Environmental Impact Statement and will help SLBE to meet invasive plant management goals.
	Invasive Plant Management	NPS	Defines goals and objectives for invasive plant management.	The IPMP/EA is consistent with the goals and objectives of the

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	Plan (2011)		Identifies priority invasive plants.	SLBE Invasive Plant Management Plan of 2011 and will help SLBE to meet invasive plant management goals.
	State of Michigan Natural Resources and Environmental Protection Act	State of Michigan	To provide guidance to protect the environment and natural resources of the state of Michigan; to codify, revise, consolidate, and classify laws relating to the environment and natural resources of the state; to regulate the discharge of certain substances into the environment; to regulate the use of certain lands, waters, and other natural resources of the state; to prescribe the powers and duties of certain state and local agencies and officials; to provide for certain charges, fees, assessments, and donations; to provide certain appropriations; to prescribe penalties and provide remedies; and to repeal acts and parts of acts.	The IPMP/EA is consistent with the State of Michigan Natural Resources and Environmental Protection Act.
	Michigan Monkey-flower (<i>Mimulus glabratus</i> var. <i>michiganensis</i>) Recovery Plan (1997)	USFWS	Describes the current status (as of 1997) of the Michigan Monkey-flower, a federally and State of Michigan listed endangered species. The Recovery plan defines the habitat requirements and limiting factors, and identifies the recovery goals and objectives.	The IPMP/EA is consistent with the goals and objectives of the Michigan Monkey-flower Recovery Plan and will help to meet the goals and objectives of facilitating recovery efforts.
	Recovery Plan for the Pitcher's Thistle (<i>Cirsium pitcheri</i>) (2002)	USFWS	Describes the current status (as of 2002) of the pitcher's thistle, a federally and State of Michigan listed endangered species. The Recovery plan defines the habitat requirements and limiting factors, and identifies the recovery goals and objectives.	The IPMP/EA is consistent with the goals and objectives of the Pitcher's Thistle Recovery Plan and will help to meet the goals and objectives of facilitating recovery efforts.
	Fire Management Plan (2005)	NPS	Provides guidance for using prescribed fire to restore natural fire regimes and for invasive plant management.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.
	Resource Management Plan (2000)	NPS	Directs the protection of the natural resources and actions to restore impacted sites to predevelopment conditions where feasible.	The IPMP/EA will help SLBE to meet any invasive plant management goals identified.
	Recovery Plan for the Great Lakes Piping Plover (<i>Charadrius melodus</i>) (2003)	USFWS	Describes the current status (as of 2003) of the Great Lakes Piping Plover, a federally listed endangered species. The Recovery plan defines the habitat requirements and limiting factors, and identifies the recovery goals and objectives.	The IPMP/EA is consistent with the goals and objectives of the Piping Plover Recovery Plan and will help to meet the goals and objectives of facilitating recovery efforts.
VOYA	Voyageurs National Park Exotic Plant Management Plan (2009)	NPS	Defines goals and objectives for exotic plant management and species-specific management prescriptions.	The IPMP/EA is consistent with the goals and objectives of the Exotic Plant Management Plan.
	Invasive Plants Survey (2001)	NPS	Provides results of an invasive species survey, and recommendations for treatment. Identifies priority of invasive species.	The IPMP/EA is consistent with the recommendations, and will help to meet the objectives of invasive plant management at VOYA.
	Voyageurs National Park General Management Plan / Environmental Impact Statement and Visitor Use and Facilities Plan (2001)	NPS	Defines basic management philosophy for Voyageurs National Park and to provide a framework for future decision making for the next 15 to 20 years. The Visitor Use and Facilities Plan takes a more comprehensive look at the VOYA region related to tourism, surrounding visitor use and facilities, and opportunities for working with others outside the park.	The IPMP/EA does not conflict with the overall management directions and specific management requirements of the General Management Plan and Visitor Use and Facilities Plan.
	USGS-NPS Vegetation	USGS, NPS	Provides VOYA vegetation mapping and classifications.	The vegetation is accounted for when establishing invasive

RELATIONSHIP OF GREAT LAKES IPMP/EA TO OTHER PARK PLANS AND DOCUMENTS				
Park Unit	Policy/Plan	Responsible Agency	Requirements / Goals / Objectives	Relationship
	Mapping Program for Voyageurs National Park			plant management priorities within VOYA.
	Voyageurs National Park Fire Management Plan	NPS	Provide guidance for using prescribed fire to restore ecosystems with natural fire regimes.	The IPMP/EA is consistent with the overall management directions and specific management requirements of the Fire Management Plan.

Appendix D

Great Lakes IPMP/EA Figures




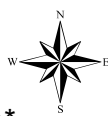
The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfield makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

Legend

 Apostle Islands National Lakeshore*



*Land ownership: National Park Service

0 1.5 3 6 9 12 15 Miles

PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

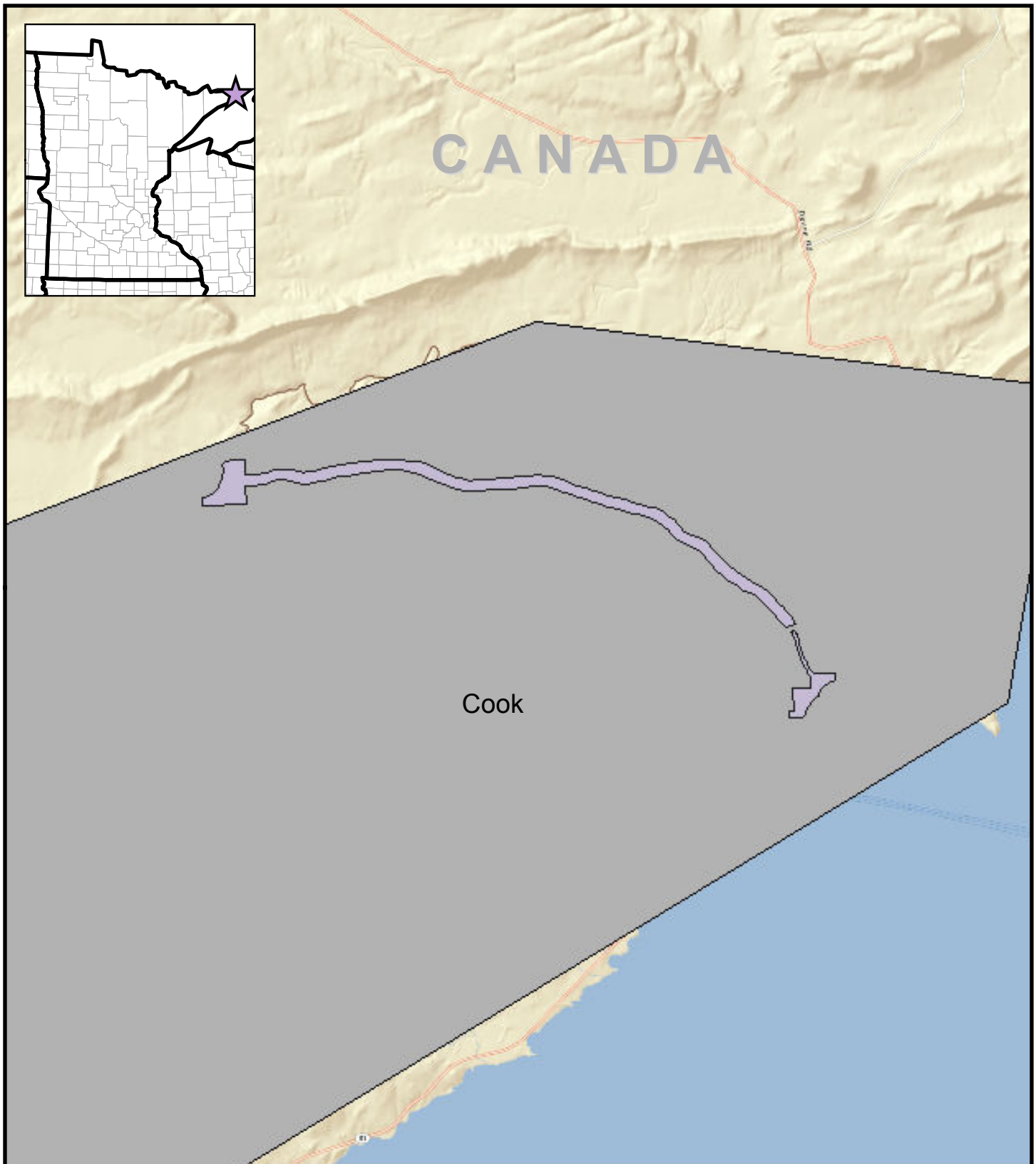
FILE NAME: APIS.mxd

**Apostle Islands
National Lakeshore
(APIS)**

Bayfield & Ashland
Counties Wisconsin

FIGURE

D1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

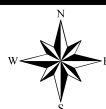
Legend



Grand Portage National Monument*

*Land ownership: Bureau of Indian Affairs

0 0.3750.75 1.5 2.25 3 Miles



PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

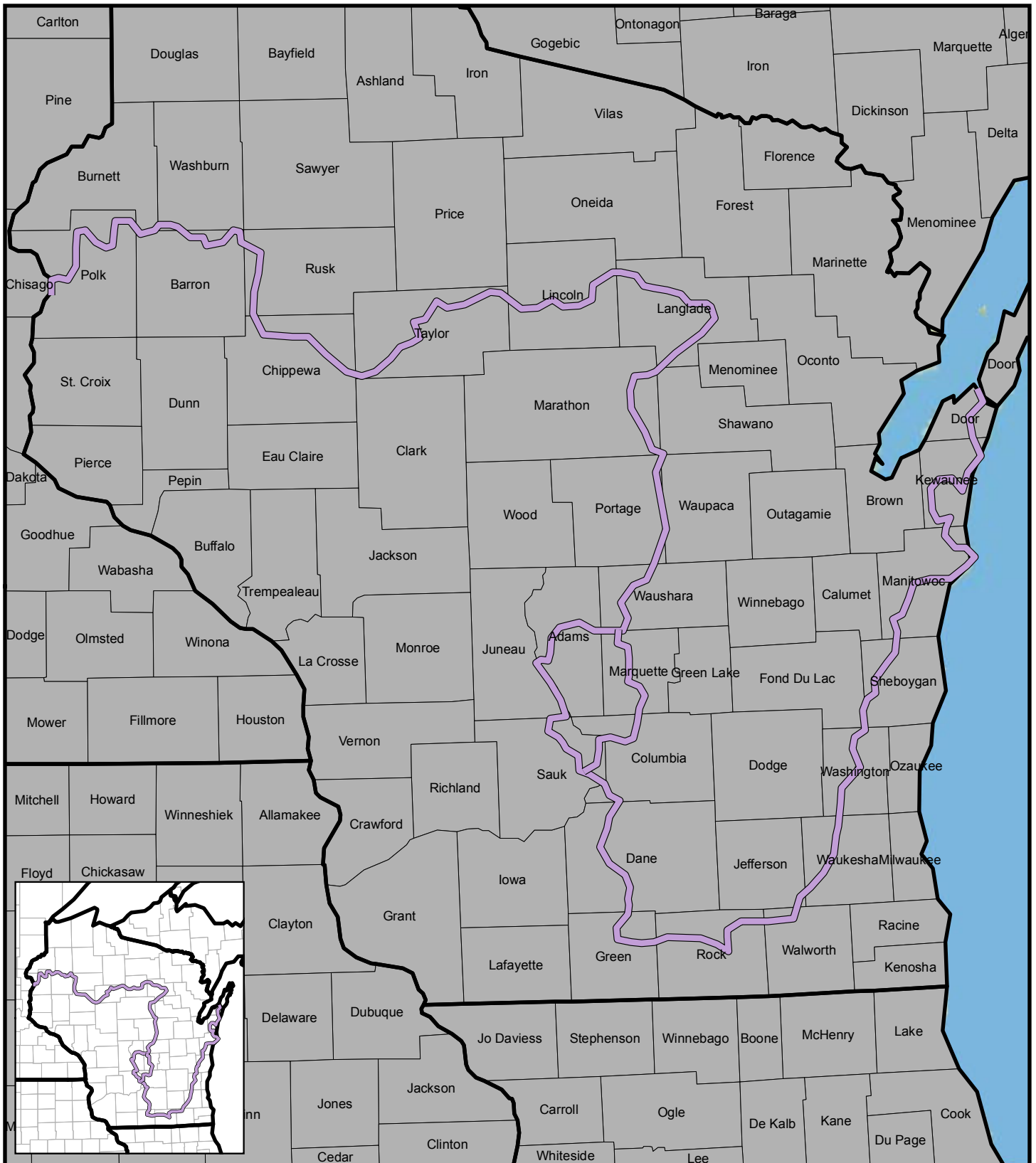
FILE NAME: GRPO.mxd

Grand Portage National Monument (GRPO)

Cook County, Minnesota

FIGURE

D2



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfield makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

Legend

Ice Age National Scenic Trail*

**Trail crosses various land ownerships including: Forest Service,*



0 12.5 25 50 75 Miles

PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

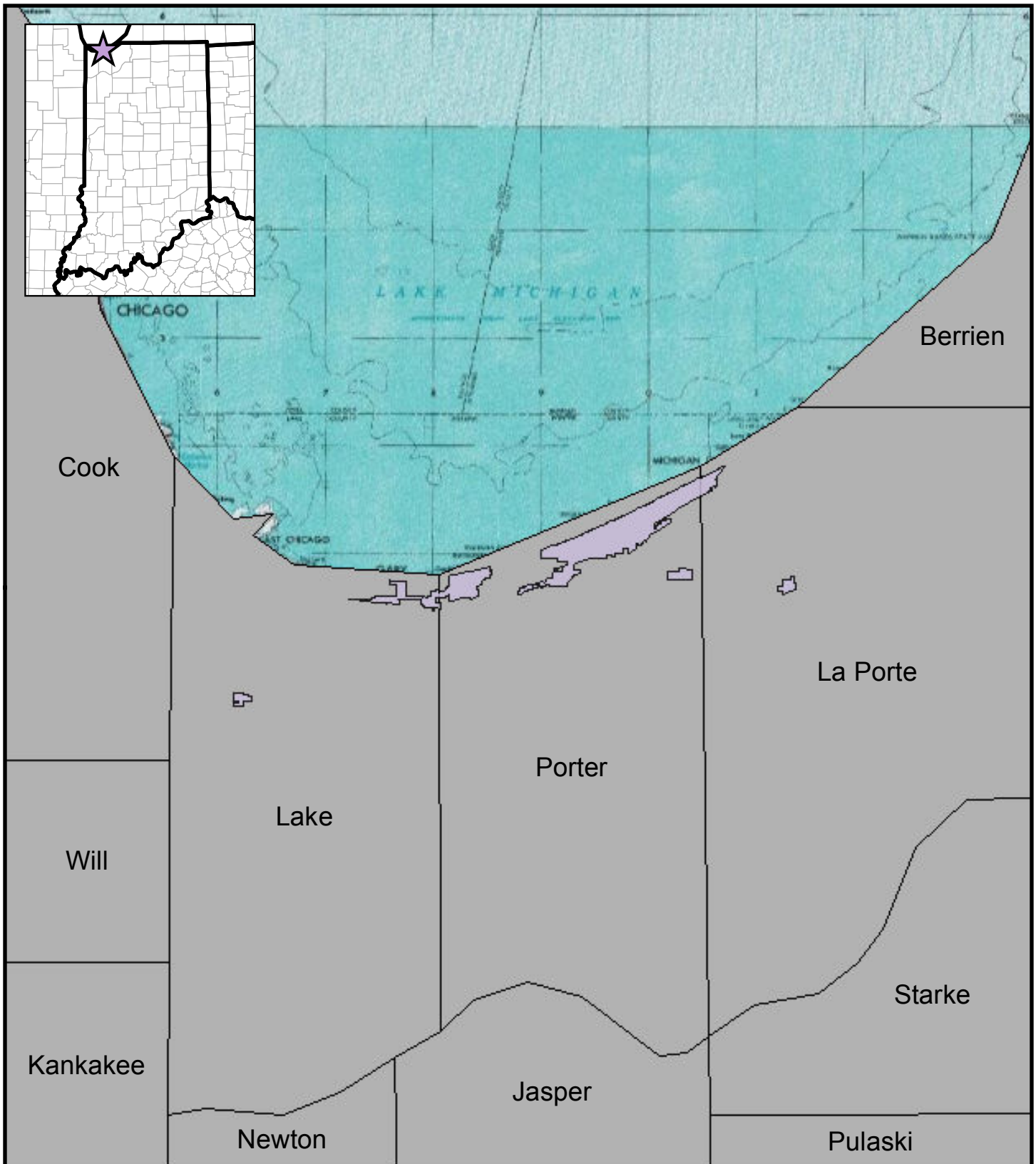
FILE NAME: IATR.mxd

**Ice Age
National Scenic Trail
(IATR)**

State of
Wisconsin

FIGURE

D3



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

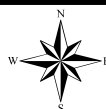
Legend



Indiana Dunes National Lakeshore*

*Majority of land ownership: National Park Service

0 1.5 3 6 9 12 15 Miles



PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

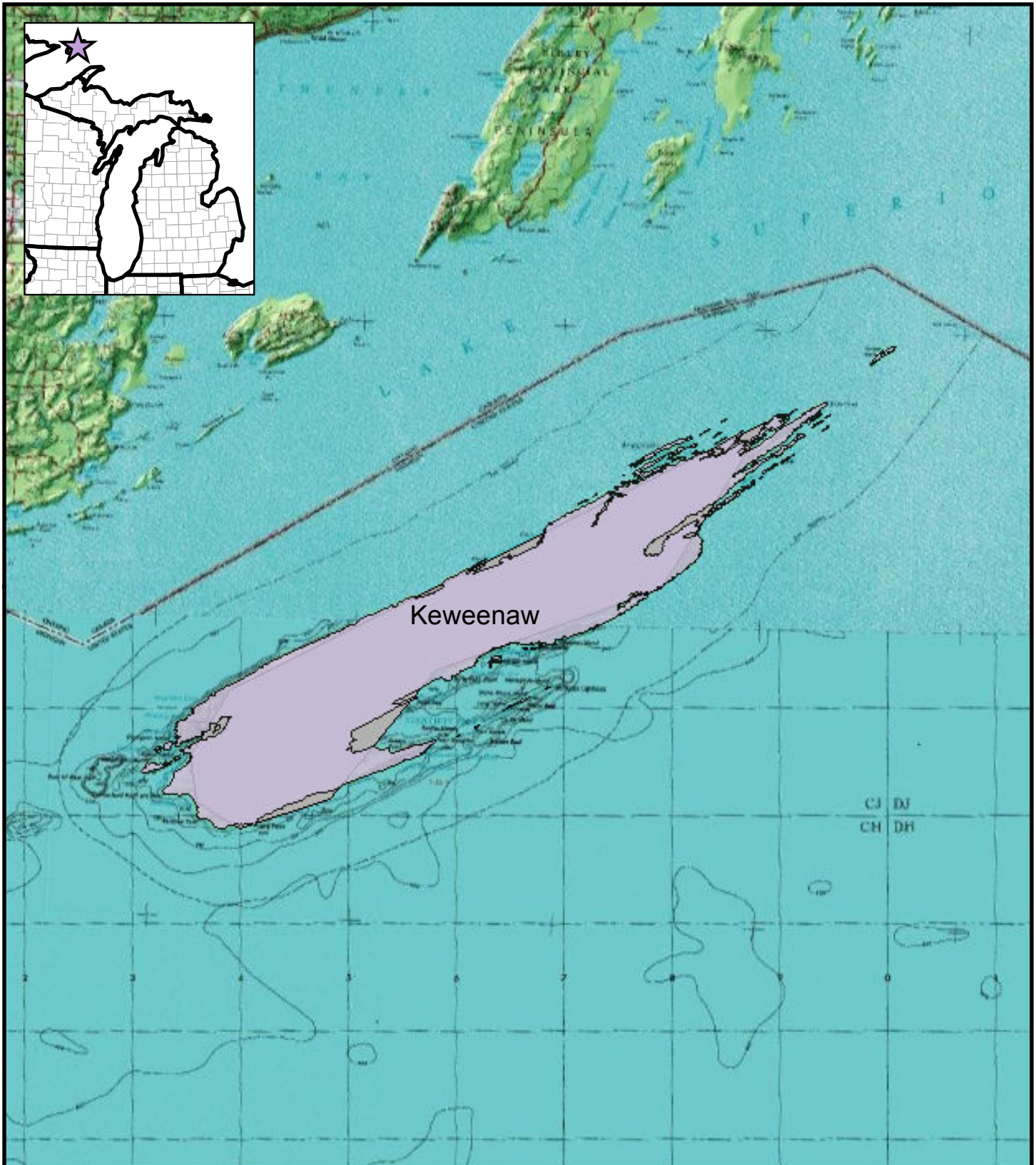
FILE NAME: INDU.mxd

Indiana Dunes National Lakeshore (INDU)

Lake, Porter & La Porte Counties, Indiana

FIGURE

D4



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfield makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

Legend



Isle Royale National Park*

*Land ownership: Forest Service



0 1.5 3 6 9 12 15 Miles

PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

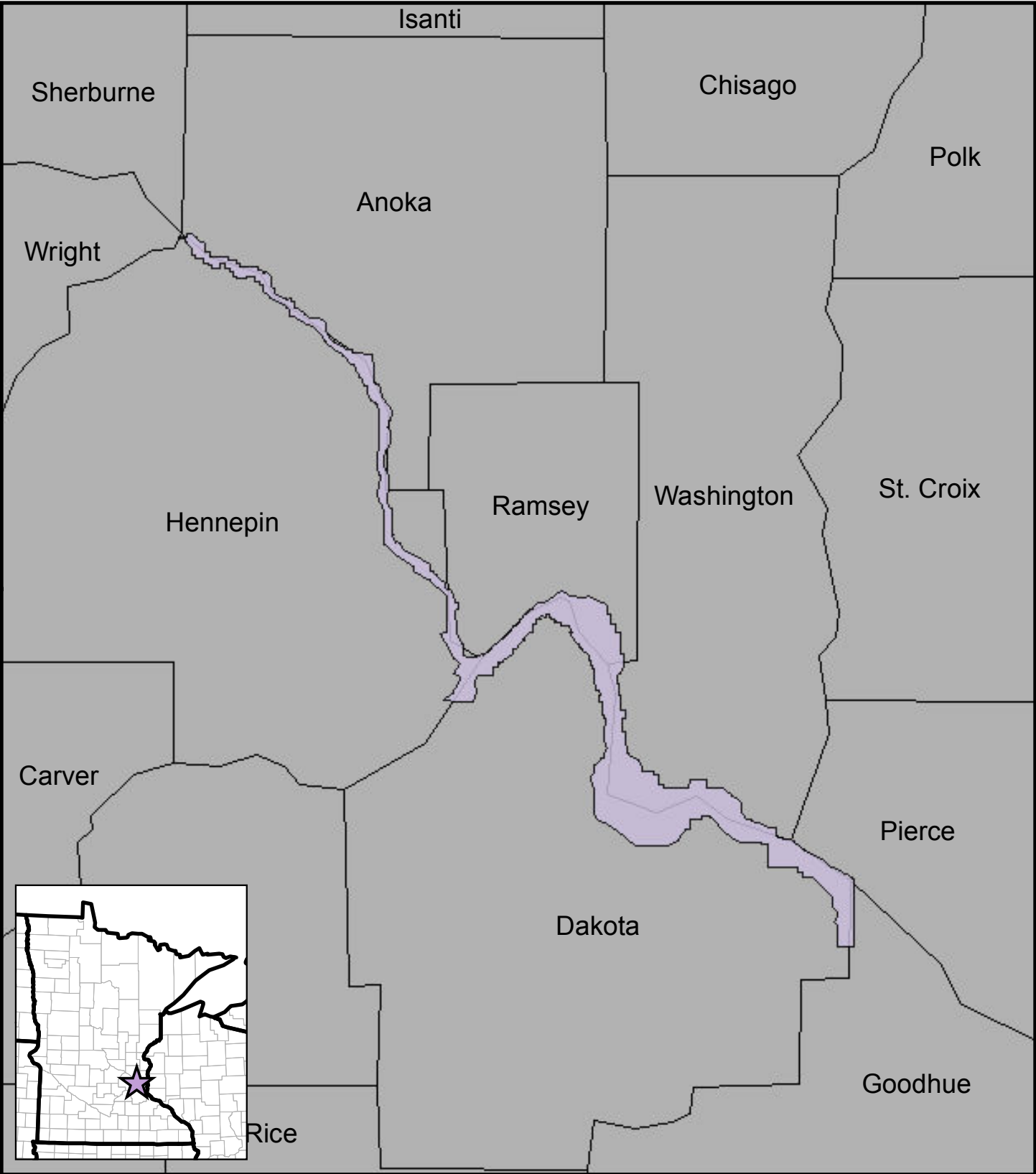
FILE NAME: ISRO.mxd

Isle Royale National Park (ISRO)

Keweenaw County, Michigan

FIGURE

D5



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps



Legend



Mississippi National River & Recreation Area*

*Land ownership: National Park Service

0

1.5

3

6

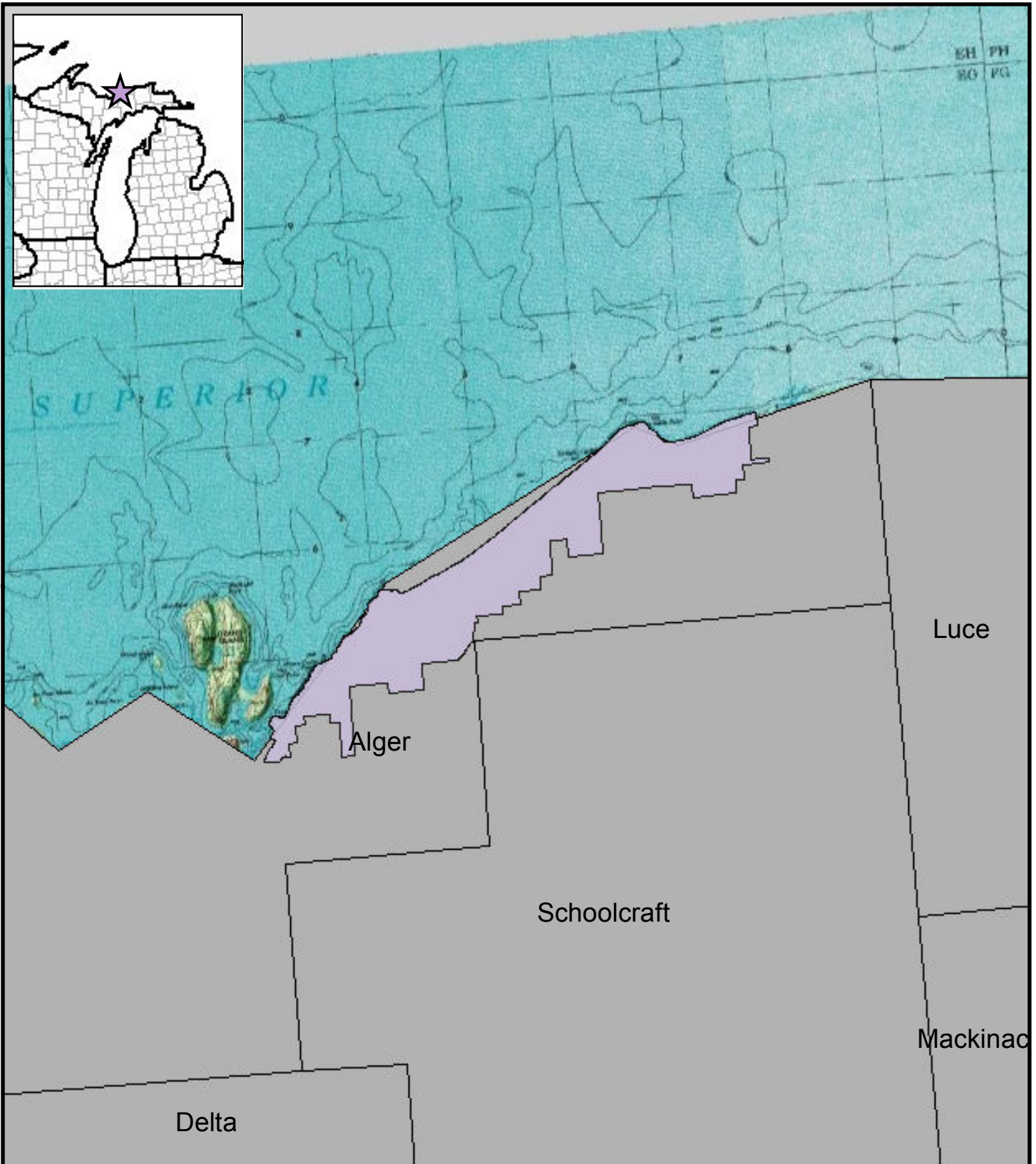
9

12

15

Miles

PROJECT NO.	116258	Mississippi National River & Recreation Area (MISS)	FIGURE D6
DRAWN:	12/12/11		
DRAWN BY:	L.Hockert		
CHECKED BY:	D.Martin	State of Minnesota	
FILE NAME:	MISS.mxd		



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

Legend



Pictured Rocks
National Lakeshore*

*Land ownership: National Park Service

0 1.5 3 6 9 12 15 Miles



PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

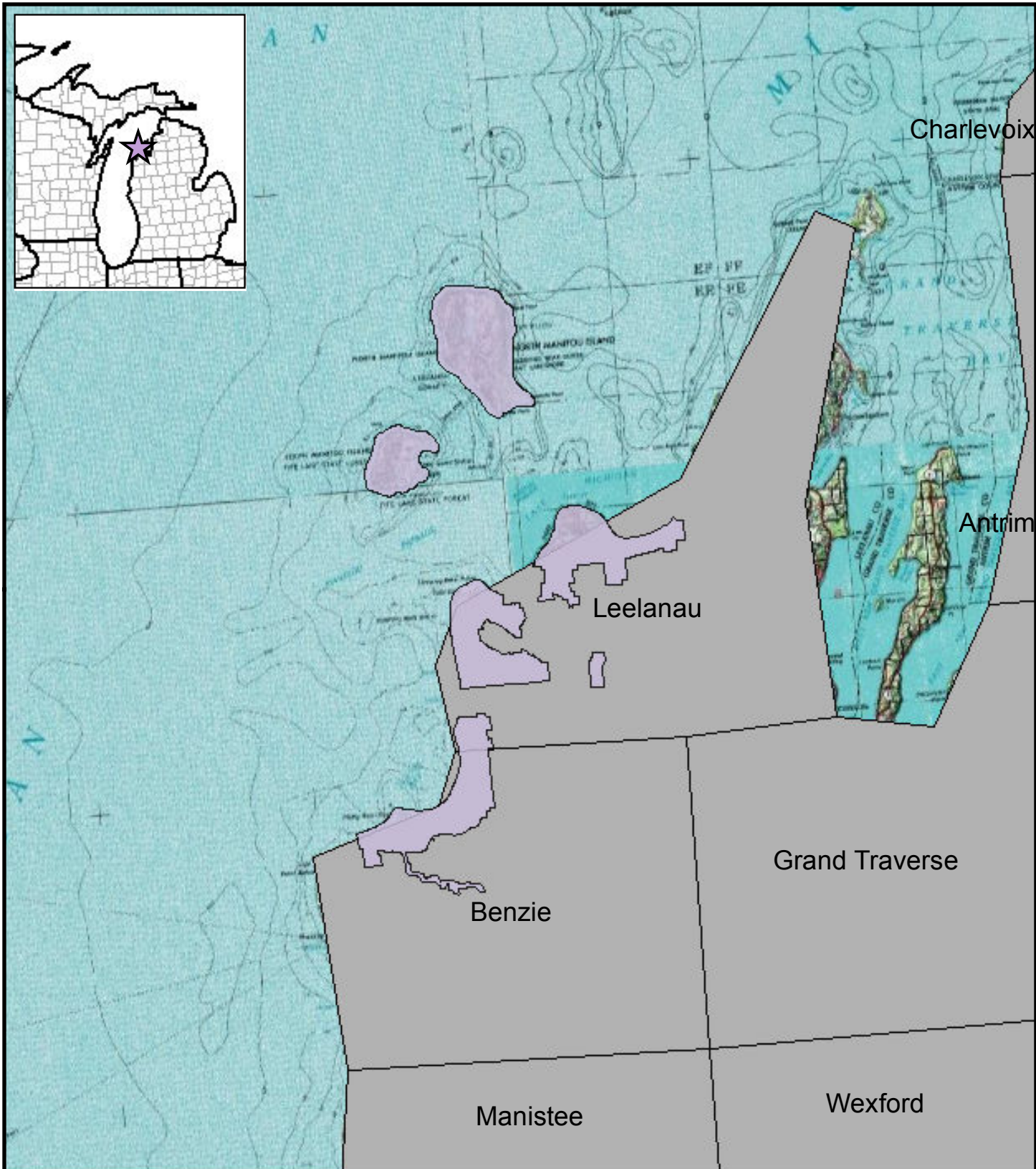
FILE NAME: PIRO.mxd

**Pictured Rocks
National Lakeshore
(PIRO)**

Alger County,
Michigan

FIGURE

D7



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

Base map and park boundaries from ESRI online maps

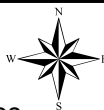
Legend



Sleeping Bear Dunes National Lakeshore*

*Land ownership: National Park Service

0 1.5 3 6 9 12 15 Miles



PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

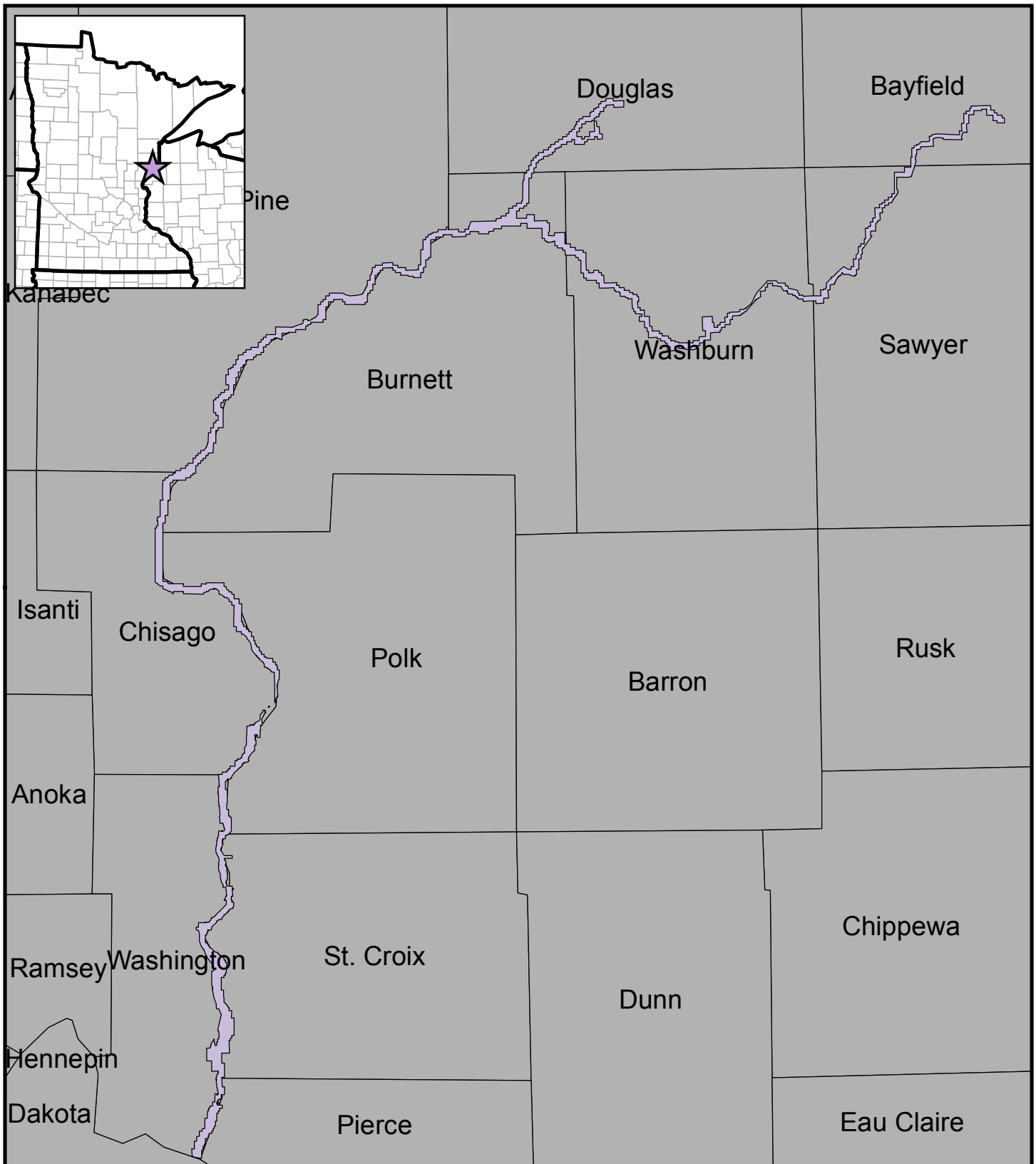
FILE NAME: SLBE.mxd

Sleeping Bear Dunes National Lakeshore (SLBE)

Leelanau & Benzie Counties, Michigan

FIGURE

D8




The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfield makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

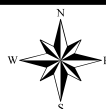
Sources:

Base map and park boundaries from ESRI online maps

Legend

 **St. Croix National Scenic River***

**Land ownership: National Park Service (partial)*



PROJECT NO.	116258
DRAWN:	01/10/12
DRAWN BY:	L.Hockert
CHECKED BY:	D.Martin

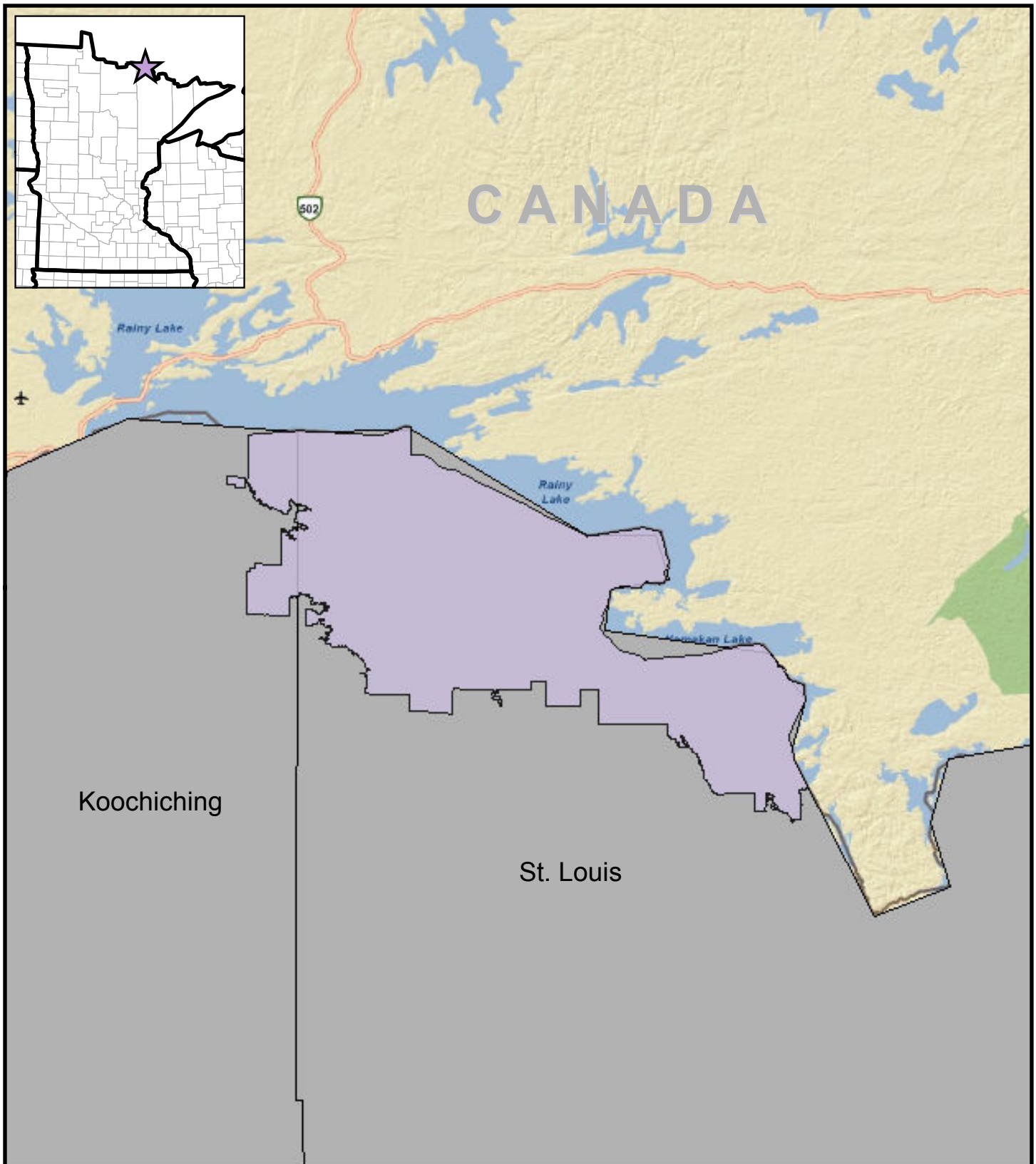
FILE NAME:	SACN.mxd
------------	----------

St. Croix National Scenic River (SACN)

Multiple Counties, Minnesota

FIGURE

D9



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

Sources:

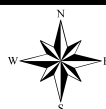
Base map and park boundaries from ESRI online maps

Legend



Voyageurs National Park*

*Land ownership: National Park Service



0 2.5 5 10 15 Miles

PROJECT NO. 116258

DRAWN: 12/12/11

DRAWN BY: L.Hockert

CHECKED BY: D.Martin

FILE NAME: VOYA.mxd

Voyageurs National Park (VOYA)

St. Louis & Koochiching Counties, Minnesota

FIGURE

D

10

Appendix E

Special Status Species in Great Lakes Region (Determination as to Whether Has Potential to Affect Special Status Species)

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

Status	Common Name	Scientific Name	Habitat	USFWS Region 3 Species Range	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in GRPO?	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in INDU?	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in SLBE?	Potential to be Affected by Treatment Options in VOYA?
Mammals														
Threatened	Canada lynx	Lynx canadensis	Mix of evergreens and hardwoods, such as maple and birch; interspersions of mature and young forest	Northern Minnesota , northern Wisconsin, and the upper peninsula of Michigan	No	No	No	No	No	No	No	No	No	No
Endangered	Gray bat	Myotis grisescens	Caves	Indiana	No	No	No	No	No	No	No	No	No	No
Threatened / Endangered	Gray wolf	Canis lupus	*not provided*	Threatened in Minnesota, Endangered in all other states in Region 3	No	No	No	No	No	No	No	No	No	No
Endangered	Indiana bat	Myotis sodalis	County list	Indiana, Michigan	No	No	No	No	No	No	No	No	No	No
Birds														
Endangered	Least tern	Sterna antillarum	Bare alluvial islands and dredged spoil islands	Indiana	No	No	No	No	No	No	No	No	No	No
Endangered	Kirtland's warbler	Dendroica kirtlandii	Breeding in jack pine	Michigan and Wisconsin	No	No	No	No	No	No	No	No	No	No
Endangered	Piping Plover	Charadrius melodus	County list	Michigan and Wisconsin	Yes, Addressed in Section 3.3.1	No	No	No	No	No	No	No	Yes, addressed in Section 3.3.5	No
Candidate	Sprague's Pipit	Anthus spragueii	For breeding large (>350 acre) patches of grassland - prefer native grassland, but also use non-native planted grassland	Minnesota	No	No	No	No	No	No	No	No	No	No
Nonessential, experimental population	Whooping Crane	Grus americana	Open wetlands and lakeshores	Indiana, Michigan, Minnesota, and Wisconsin	No	No	No	No	No	No	No	No	No	No
Reptiles														

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

[illegible]

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

[illegible]

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

[illegible]

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

[illegible]

Federally Listed Species in the States of Indiana, Michigan, Minnesota, and Wisconsin - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA

[illegible]

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Mammals					
Endangered	American marten	<i>Martes americana</i>	No	No	No
Threatened	Big brown bat	<i>Eptesicus fuscus</i>	No	No	No
Threatened	Little brown bat	<i>Myotis lucifugus</i>	No	No	No
Threatened	Northern long-eared bat	<i>Myotis septentrionalis</i>	No	No	No
Threatened	Eastern pipistrelle	<i>Perimyotis subflavus</i>	No	No	No
Birds					
Endangered	Piping plover	<i>Charadrius melodus</i>	No	Yes, Addressed in Section 3.3.1	No
Endangered	Yellow-throated warbler	<i>Dendroica dominica</i>	No	No	No
Endangered	Snowy egret	<i>Egretta thula</i>	No	No	No
Endangered	Peregrine falcon	<i>Falco peregrinus</i>	No	No	No
Endangered	Worm-eating warbler	<i>Helmitheros vermivorus</i>	No	No	No
Endangered	Loggerhead shrike	<i>Lanius ludovicianus</i>	No	No	No
Endangered	Red-necked grebe	<i>Podiceps grisegena</i>	No	No	No
Endangered	Caspian tern	<i>Sterna caspia</i>	No	No	No
Endangered	Forster's tern	<i>Sterna forsteri</i>	No	No	No
Endangered	Common tern	<i>Sterna hirundo</i>	No	No	No
Endangered	Bewick's wren	<i>Thryomanes bewickii</i>	No	No	No
Endangered	Barn owl	<i>Tyto alba</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Henslow's sparrow	<i>Ammodramus henslowii</i>	No	No	No
Threatened	Red-shouldered hawk	<i>Buteo lineatus</i>	No	No	No
Threatened	Great Egret	<i>Casmerodius albus</i>	No	No	No
Threatened	Yellow rail	<i>Coturnicops noveboracensis</i>	No	No	No
Threatened	Spruce grouse	<i>Dendragapus canadensis</i>	No	No	No
Threatened	Cerulean warbler	<i>Dendroica cerulea</i>	No	No	No
Threatened	Acadian flycatcher	<i>Empidonax virescens</i>	No	No	No
Threatened	Yellow-crowned night-heron	<i>Nyctanassa violaceus</i>	No	No	No
Threatened	Kentucky Warbler	<i>Oporornis formosus</i>	No	No	No
Threatened	Greater prairie-chicken	<i>Tympanuchus cupido pinnatus</i>	No	No	No
Threatened	Bell's vireo	<i>Vireo bellii</i>	No	No	No
Threatened	Hooded warbler	<i>Wilsonia citrina</i>	No	No	No
Recommended	Upland sandpiper	<i>Bartramia longicauda</i>	No	No	No
Recommended	Black tern	<i>Chlidonias niger</i>	No	No	No
Recommended	Kirtland's warbler	<i>Dendroica kirtlandii</i>	No	No	No
Reptiles and Amphibians					
Endangered	Blanchard's cricket frog	<i>Acris crepitans</i>	No	No	No
Endangered	Slender glass lizard	<i>Ophisaurus attenuatus</i>	No	No	No
Endangered	Queen snake	<i>Regina septemvittata</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Endangered	Massasauga rattlesnake	<i>Sistrurus catenatus</i>	No	No	No
Endangered	Ornate box turtle	<i>Terrapene ornata</i>	No	No	No
Endangered	Western ribbon snake	<i>Thamnophis proximus</i>	No	No	No
Endangered	Northern ribbon snake	<i>Thamnophis sauritus</i>	No	No	No
Threatened	Wood turtle	<i>Clemmys insculpta</i>	No	No	No
Threatened	Blanding's turtle	<i>Emydoidea blandingii</i>	No	No	No
Threatened	Butler's garter snake	<i>Thamnophis butleri</i>	No	No	No
Fishes					
Endangered	Skipjack herring	<i>Alosa chrysochloris</i>	No	No	No
Endangered	Crystal darter	<i>Crystallaria asprella</i>	No	No	No
Endangered	Gravel chub	<i>Erimystax x-punctata</i>	No	No	No
Endangered	Bluntnose darter	<i>Etheostoma chlorosomum</i>	No	No	No
Endangered	Starhead topminnow	<i>Fundulus dispar</i>	No	No	No
Endangered	Goldeye	<i>Hiodon alosoides</i>	No	No	No
Endangered	Striped shiner	<i>Luxilus chrysocephalus</i>	No	No	No
Endangered	Black redhorse	<i>Moxostoma duquensnei</i>	No	No	No
Endangered	Pallid shiner	<i>Notropis amnis</i>	No	No	No
Endangered	Slender madtom	<i>Noturus exilis</i>	No	No	No
Threatened	Blue sucker	<i>Cycleptus elongatus</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Black buffalo	<i>Ictiobus niger</i>	No	No	No
Threatened	Longear sunfish	<i>Lepomis megalotis</i>	No	No	No
Threatened	Redfin shiner	<i>Lythrurus umbratilis</i>	No	No	No
Threatened	Speckled chub	<i>Macrhybopsis aestivalis</i>	No	No	No
Threatened	River redhorse	<i>Moxostoma carinatum</i>	No	No	No
Threatened	Greater readhorse	<i>Moxostoma valenciennesi</i>	No	No	No
Threatened	Pugnose shiner	<i>Notropis anogenus</i>	No	No	No
Threatened	Ozark minnow	<i>Notropis nubilus</i>	No	No	No
Threatened	Gilt darter	<i>Percina evides</i>	No	No	No
Threatened	Paddlefish	<i>Polydon spathula</i>	No	No	No
Insects					
Endangered	Pecatonica river mayfly	<i>Acanthametropus pecatonica</i>	No	No	No
Endangered	Red-tailed prairie leafhopper	<i>Aflexia rubranura</i>	No	No	No
Endangered	Flat-headed mayfly	<i>Anepeorus simplex</i>	No	No	No
Endangered	Swamp metalmark	<i>Calephelis mutica</i>	No	No	No
Endangered	Northern blue butterfly	<i>Lycaeides idas</i>	No	No	No
Endangered	Giant carrion beetle	<i>Nicrophorus americanus</i>	No	No	No
Endangered	Powesheik skipperling	<i>Oarisma powesheik</i>	No	No	No
Endangered	Extra-striped snaketail dragonfly	<i>Ophiogomphus anomalus</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Endangered	Saint croix snaketail dragonfly	<i>Ophiogomphus susbehcha</i>	No	No	No
Endangered	Silphium borer moth	<i>Papaipema silphii</i>	No	No	No
Endangered	Phlox moth	<i>Schinia indiana</i>	No	No	No
Endangered	Warpaint emerald dragonfly	<i>Somatochlora incurvata</i>	No	No	No
Endangered	Hine's emerald dragonfly	<i>Somatochlora hineana</i>	No	No	No
Endangered	Regal fritillary	<i>Speyeria idalia</i>	No	No	No
Endangered	Knobels riffle beetle	<i>Stenelmis knobeli</i>	No	No	No
Endangered	Lake Huron locust	<i>Trimerotropis huroniana</i>	No	No	No
Threatened	Spatterdock darner dragonfly	<i>Aeshna mutata</i>	No	No	No
Threatened	Frosted elfin	<i>Incisalia irus</i>	No	No	No
Threatened	Prairie leafhopper	<i>Polyamia dilata</i>	No	No	No
Threatened	Pygmy snaketail dragonfly	<i>Ophiogomphus howei</i>	No	No	No
Recommended	Leafhopper	<i>Attenuipyga vanduzeei</i>	No	No	No
Recommended	Beach-dune tiger beetle	<i>Cicindela hirticollis rhodensis</i>	No	No	No
Recommended	Ottoe skipper	<i>Hesperia ottoe</i>	No	No	No
Recommended	Issid planthopper	<i>Fitchiella robertsoni</i>	No	No	No
Snails					
Endangered	Midwest Pleistocene vertigo	<i>Vertigo hubrichti</i>	No	No	No
Endangered	Occult vertigo	<i>Vertigo occulta</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Wing snaggleteeth	<i>Gastrocopta procera</i>	No	No	No
Threatened	Cherrystone drop	<i>Hendersonia occulta</i>	No	No	No
Mussels					
Endangered	Spectaclecase	<i>Cumberlandia monodonta</i>	No	No	No
Endangered	Purple wartyback	<i>Cyclonaias tuberculata</i>	No	No	No
Endangered	Butterfly	<i>Ellipsaria lineolata</i>	No	No	No
Endangered	Elephant-ear	<i>Elliptio crassidens</i>	No	No	No
Endangered	Snuffbox	<i>Epioblasma triquetra</i>	No	No	No
Endangered	Ebonyshell	<i>Fusconaia ebena</i>	No	No	No
Endangered	Higgins eye	<i>Lampsilis higginsii</i>	No	No	No
Endangered	Yellow/slough sandshell	<i>Lampsilis teres</i>	No	No	No
Endangered	Bullhead	<i>Plethobasus cyphus</i>	No	No	No
Endangered	Rainbow	<i>Villosa iris</i>	No	No	No
Endangered	Winged Mapleleaf	<i>Quadrula fragosa</i>	No	No	No
Threatened	Slippershell mussel	<i>Alasmidonta viridis</i>	No	No	No
Threatened	Rock-pocketbook	<i>Arcidens confragosus</i>	No	No	No
Threatened	Monkeyface	<i>Quadrula metanevra</i>	No	No	No
Threatened	Wartyback	<i>Quadrula nodulata</i>	No	No	No
Threatened	Salamander mussel	<i>Simpsonaias ambigua</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Buckhorn	<i>Tritogia verrucosa</i>	No	No	No
Threatened	Ellipse	<i>Venustaconcha ellipsiformis</i>	No	No	No
Recommended	Fawnsfoot	<i>Truncilla donaciformis</i>	No	No	No
Plants					
Endangered	Carolina anemone	<i>Anemone caroliniana</i>	No	No	No
Endangered	Hudson bay anemone	<i>Anemone multifida</i>	No	No	No
Endangered	Lake cress	<i>Armoracia lacustris</i>	No	No	No
Endangered	Purple milkweed	<i>Asclepias purpurascens</i>	No	No	No
Endangered	Green spleenwort	<i>Asplenium trichomanesramosum</i>	No	No	No
Endangered	Alpine milk vetch	<i>Astragalus alpinus</i>	No	No	No
Endangered	Prairie plum	<i>Astragalus crassicarpus</i>	No	No	No
Endangered	Coopers milk vetch	<i>Astragalus neglectus</i>	No	No	No
Endangered	Prairie moonwort	<i>Botrychium campestre</i>	No	No	No
Endangered	Moonwort	<i>Botrychium lunaria</i>	No	No	No
Endangered	Goblin fern	<i>Botrychium mormo</i>	No	No	No
Endangered	Floating marsh marigold	<i>Caltha natans</i>	No	No	No
Endangered	Wild hyacinth	<i>Camassia scilloides</i>	No	No	No
Endangered	Crow-spur sedge	<i>Carex crus-corvi</i>	No	No	No
Endangered	Smooth-sheathed sedge	<i>Carex laevivaginata</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Endangered	Hop-like sedge	<i>Carex lupuliformis</i>	No	No	No
Endangered	Intermediate sedge	<i>Carex media</i>	No	No	No
Endangered	Schweinitz's sedge	<i>Carex schweinitzii</i>	No	No	No
Endangered	Brook grass	<i>Catabrosa aquatica</i>	No	No	No
Endangered	Stoneroot	<i>Collinsonia canadensis</i>	No	No	No
Endangered	Hemlock-parsley	<i>Conioselinum chinense</i>	No	No	No
Endangered	Beak Grass	<i>Diarrhena americana</i>	No	No	No
Endangered	Lanceolate whitlow-cress	<i>Draba cana</i>	No	No	No
Endangered	Neat spike-rush	<i>Eleocharis nitida</i>	No	No	No
Endangered	Wolf spike-rush	<i>Eleocharis wolfii</i>	No	No	No
Endangered	Angle-stemmed spikerush	<i>Eleocharis quadrangulata</i>	No	No	No
Endangered	Harbinger-of-spring	<i>Erigenia bulbosa</i>	No	No	No
Endangered	Chestnut sedge	<i>Fimbristylis puberula</i>	No	No	No
Endangered	Umbrella sedge	<i>Fuirena pumila</i>	No	No	No
Endangered	Northern commandra	<i>Geocaulon lividum</i>	No	No	No
Endangered	Pale false foxglove	<i>Agalinus skinneriana</i>	No	No	No
Endangered	Bog rush	<i>Juncus stygius</i>	No	No	No
Endangered	Prairie bush clover	<i>Lespedeza leptostachya</i>	No	No	No
Endangered	Dotted blazing star	<i>Lisatris punctata</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Endangered	Auricled twayblade	<i>Listera auriculata</i>	No	No	No
Endangered	Fly honeysuckle	<i>Lonicera involucrata</i>	No	No	No
Endangered	Smith melic grass	<i>Melica smithii</i>	No	No	No
Endangered	Large-leaved sandwort	<i>Moehringia macrophylla</i>	No	No	No
Endangered	Mat muhly	<i>Muhlenbergia richardsonis</i>	No	No	No
Endangered	Louisiana broomrape	<i>Orobanche ludoviciana</i>	No	No	No
Endangered	Fassett's locoweed	<i>Oxytropis campestris</i>	No	No	No
Endangered	Small-flowered grass-of-Parnassus	<i>Parnassia parviflora</i>	No	No	No
Endangered	Smooth phlox	<i>Phlox glaberrima</i>	No	No	No
Endangered	Butterwort	<i>Pinguicula vulgaris</i>	No	No	No
Endangered	Heart-leaved plantain	<i>Plantago cordata</i>	No	No	No
Endangered	Eastern prairie white-fringed orchid	<i>Platanthera leucophaea</i>	No	No	No
Endangered	Western Jacob's ladder	<i>Polemonium occidentale lacustre</i>	No	No	No
Endangered	Pink milkwort	<i>Polygala incarnata</i>	No	No	No
Endangered	Spotted pondweed	<i>Potamogeton pulcher</i>	No	No	No
Endangered	Rough white lettuce	<i>Prenanthes aspera</i>	No	No	No
Endangered	Great white lettuce	<i>Prenanthes crepidinea</i>	No	No	No
Endangered	Pine-drops	<i>Pterospora andromedea</i>	No	No	No
Endangered	Small shinleaf	<i>Pyrola minor</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Endangered	Small yellow water crowfoot	<i>Ranunculus gmelinii</i>	No	No	No
Endangered	Lapland buttercup	<i>Ranunculus lapponicus</i>	No	No	No
Endangered	Lapland rosebay	<i>Rhododendron lapponicum</i>	No	No	No
Endangered	Wild petunia	<i>Ruellia humilis</i>	No	No	No
Endangered	Sand dune willow	<i>Salix cordata</i>	No	No	No
Endangered	Satiny willow	<i>Salix pellita</i>	No	No	No
Endangered	Hall's bulrush	<i>Scirpus hallii</i>	No	No	No
Endangered	Netted nut-rush	<i>Scleria reticularis</i>	No	No	No
Endangered	Small skullcap	<i>Scutellaria parvula</i>	No	No	No
Endangered	Selego-like spikemoss	<i>Selaginella selaginoides</i>	No	No	No
Endangered	Fire pink	<i>Silene virginica</i>	No	No	No
Endangered	Blue-stemmed goldenrod	<i>Solidago caesia</i>	No	No	No
Threatened	Northern monkshood	<i>Aconitum noveboracense</i>	No	No	No
Threatened	Muskroot	<i>Adoxa moschatellina</i>	No	No	No
Threatened	Round stemmed false foxglove	<i>Agalinus gattingeri</i>	No	No	No
Threatened	Yellow giant hyssop	<i>Agastache nepetoides</i>	No	No	No
Threatened	Small round-leaved orchis	<i>Amerorchis rotundifolia</i>	No	No	No
Threatened	Prairie indian plaintain	<i>Arnoglossum plantagineum</i>	No	No	No
Threatened	Dwarf milkweed	<i>Asclepias ovalifolia</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Wooly milkweed	<i>Asclepias lanuginosa</i>	No	No	No
Threatened	Prairie milkweed	<i>Asclepias sullivantii</i>	No	No	No
Threatened	Pinnatifid spleenwort	<i>Asplenium pinnatifidum</i>	No	No	No
Threatened	Forked aster	<i>Aster furcatus</i>	No	No	No
Threatened	Kitten tails	<i>Besseyia bullii</i>	No	No	No
Threatened	Sand reed	<i>Calamovilfa longifolia</i>	No	No	No
Threatened	Large water starwort	<i>Callitriche heterophylla</i>	No	No	No
Threatened	Calypso orchid	<i>Calypso bulbosa</i>	No	No	No
Threatened	Carey's sedge	<i>Carex careyana</i>	No	No	No
Threatened	Beautiful sedge	<i>Carex concinna</i>	No	No	No
Threatened	Coast sedge	<i>Carex exilis</i>	No	No	No
Threatened	Handsome sedge	<i>Carex formosa</i>	No	No	No
Threatened	Garbers sedge	<i>Carex garberi</i>	No	No	No
Threatened	Lenticular sedge	<i>Carex lenticularis</i>	No	No	No
Threatened	Michaux's sedge	<i>Carex michauxiana</i>	No	No	No
Threatened	Drooping sedge	<i>Carex prasina</i>	No	No	No
Threatened	Prairie thistle	<i>Cirsium hillii</i>	No	No	No
Threatened	Dune thistle	<i>Cirsium pitcheri</i>	No	No	No
Threatened	Rams-head ladys slipper	<i>Cypripedium arietinum</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	White ladys slipper	<i>Cypripedium candidum</i>	No	No	No
Threatened	English sundew	<i>Drosera anglica</i>	No	No	No
Threatened	Linear-leaved sundew	<i>Drosera linearis</i>	No	No	No
Threatened	Pale purple coneflower	<i>Echinacea pallida</i>	No	No	No
Threatened	Beaked spike rush	<i>Eleocharis rostellata</i>	No	No	No
Threatened	Thickspike wheatgrass	<i>Elymus lanceolatus ssp. Psammophilus</i>	No	No	No
Threatened	Western fescue	<i>Festuca occidentalis</i>	No	No	No
Threatened	Blue ash	<i>Fraxinus quadrangulata</i>	No	No	No
Threatened	Yellowish gentian	<i>Gentiana alba</i>	No	No	No
Threatened	Cliff cudweed	<i>Gnaphalium saxicola</i>	No	No	No
Threatened	Round fruited St. John's wort	<i>Hypericum sphaerocarpum</i>	No	No	No
Threatened	Dwarf lake iris	<i>Iris lacustris</i>	No	No	No
Threatened	Slender bush clover	<i>Lespedeza virginica</i>	No	No	No
Threatened	Bladderpod	<i>Lesquerella ludoviciana</i>	No	No	No
Threatened	Broad-leaved twayblade	<i>Listera convallarioides</i>	No	No	No
Threatened	Brittle prickly pear	<i>Opuntia fragilis</i>	No	No	No
Threatened	Clustered broomrape	<i>Orobanche fasciculata</i>	No	No	No
Threatened	Marsh grass-of-Parnassus	<i>Parnassia palustris</i>	No	No	No
Threatened	Wild quinine	<i>Parthenium integrifolium</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Sweet coltsfoot	<i>Petasites sagittatus</i>	No	No	No
Threatened	Tuberclcd orchid	<i>Platanthera flava</i>	No	No	No
Threatened	Bog bluegrass	<i>Poa paludigena</i>	No	No	No
Threatened	Braun's holly fern	<i>Polystichum braunii</i>	No	No	No
Threatened	Prairie-parsley	<i>Polytaenia nuttallii</i>	No	No	No
Threatened	Algal-leaved pondweed	<i>Potamogeton confervoides</i>	No	No	No
Threatened	Sheathed pondweed	<i>Potamogeton vaginatus</i>	No	No	No
Threatened	Seaside crowfoot	<i>Ranunculus cymbalaria</i>	No	No	No
Threatened	Bald rush	<i>Rhynchospora scirpoides</i>	No	No	No
Threatened	Hawthorn-leaved gooseberry	<i>Ribes oxycanthoides</i>	No	No	No
Threatened	Flat-leaved willow	<i>Salix planifolia</i>	No	No	No
Threatened	Tussock bulrush	<i>Scirpus cespitosus</i>	No	No	No
Threatened	Plains ragwort	<i>Senecio indecorus</i>	No	No	No
Threatened	Snowy campion	<i>Silene nivea</i>	No	No	No
Threatened	Dune goldenrod	<i>Solidago simplex</i> var. <i>gilmanii</i>	No	No	No
Threatened	Clustered bur reed	<i>Sparganium glomeratum</i>	No	No	No
Threatened	False asphodel	<i>Tofieldia glutinosa</i>	No	No	No
Threatened	Snow trillium	<i>Trillium nivale</i>	No	No	No
Threatened	Spike trisetum	<i>Trisetum spicatum</i>	No	No	No

Wisconsin Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in IATR?	Potential to be Affected by Treatment Options in APIS?	Potential to be Affected by Treatment Options in SACN?
Threatened	Marsh valerian	<i>Valeriana sitchensis</i>	No	No	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Mammals				
Endangered	Indiana Bat	<i>Myotis sodalis</i>	La Porte, Porter	No
Endangered	Franlin's ground squirrel	<i>Spermophilus franklinii</i>	Lake, La Porte, Porter	No
Special Concern	Star-nosed mole	<i>Condylura cristata</i>	La Porte	No
Special Concern	Eastern red bat	<i>Lasiurus borealis</i>	Lake, La Porte, Porter	No
Special Concern	Hoary bat	<i>Lasiurus cinereus</i>	Lake, Porter	No
Special Concern	Northern river otter	<i>Lutra canadensis</i>	Lake	No
Special Concern	Bobcat	<i>Lynx rufus</i>	La Porte	No
Special Concern	Least weasel	<i>Mustela nivalis</i>	La Porte	No
Special Concern	Little brown bat	<i>Myotis lucifugus</i>	La Porte, Porter	No
Special Concern	Northern myotis	<i>Myotis septentrionalis</i>	La Porte, Porter	No
Special Concern	Eastern pipistrelle	<i>Pipistrellus subflavus</i>	Porter	No
Special Concern	American badger	<i>Taxidea taxus</i>	Lake, La Porte, Porter	No
Birds				
Endangered	Henslow's sparrow	<i>Ammodramus henslowii</i>	Lake, La Porte, Porter	No
Endangered	Upland sandpiper	<i>Bartramia longicauda</i>	Lake, La Porte, Porter	No
Endangered	American bittern	<i>Botaurus lentiginosus</i>	Lake, La Porte, Porter	No
Endangered	Piping plover	<i>Charadrius melodus</i>	Lake	No
Endangered	Black tern	<i>Chlidonias niger</i>	Lake, La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	Northern harrier	<i>Circus cyaneus</i>	La Porte, Porter	No
Endangered	Marsh wren	<i>Cistothorus palustris</i>	Lake, La Porte, Porter	No
Endangered	Sedge wren	<i>Cistothorus platensis</i>	Lake, La Porte, Porter	No
Endangered	Cerulean warbler	<i>Dendroica cerulea</i>	La Porte, Porter	No
Endangered	Peregrine falcon	<i>Falco peregrinus</i>	Lake, La Porte, Porter	No
Endangered	Common moorhen	<i>Gallinula chloropus</i>	Lake, La Porte	No
Endangered	Bald eagle	<i>Haliaeetus leucocephalus</i>	La Porte	No
Endangered	Least bittern	<i>Ixobrychus exilis</i>	Lake, La Porte, Porter	No
Endangered	Loggerhead shrike	<i>Lanius ludovicianus</i>	Lake, La Porte, Porter	No
Endangered	Black rail	<i>Laterallus jamaicensis</i>	Lake	No
Endangered	Yellow-crowned night-heron	<i>Nyctanassa violacea</i>	Lake	No
Endangered	Black-crowned night-heron	<i>Nycticorax nycticorax</i>	Lake, La Porte, Porter	No
Endangered	Osprey	<i>Pandion haliaetus</i>	La Porte	No
Endangered	Kings rail	<i>Rallus elegans</i>	Lake, Porter	No
Endangered	Virginia rail	<i>Rallus limicola</i>	Lake, La Porte, Porter	No
Endangered	Barn owl	<i>Tyto alba</i>	Lake	No
Endangered	Golden-winged warbler	<i>Vermivora chrysoptera</i>	Porter	No
Endangered	Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	Lake, La Porte	No
Special Concern	Great egret	<i>Ardea alba</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Special Concern	Red-shouldered hawk	<i>Buteo lineatus</i>	Lake, La Porte, Porter	No
Special Concern	Broad-winged hawk	<i>Buteo platypterus</i>	La Porte, Porter	No
Special Concern	Sandhill crane	<i>Grus canadensis</i>	La Porte	No
Special Concern	Black-and-white warbler	<i>Mniotilta varia</i>	La Porte, Porter	No
Special Concern	Wilson's Phalarope	<i>Phalaropus tricolor</i>	Lake	No
Special Concern	Western meadowlark	<i>Sturnella neglecta</i>	La Porte, Porter	No
Special Concern	Hooded warbler	<i>Wilsonia citrina</i>	La Porte, Porter	No
Reptiles and Amphibians				
Endangered	Spotted turtle	<i>Clemmys guttata</i>	Lake, La Porte, Porter	No
Endangered	Kirtland's snake	<i>Clonophis kirtlandii</i>	Lake, La Porte, Porter	No
Endangered	Blanding's turtle	<i>Emydoidea blandingii</i>	Lake, La Porte, Porter	No
Endangered	Four-toed salamander	<i>Hemidactylium scutatum</i>	La Porte, Porter	No
Endangered	Smooth green snake	<i>Liochlorophis vernalis</i>	Lake, La Porte, Porter	No
Endangered	Eastern massasauga	<i>Sistrurus catenatus catenatus</i>	Lake, La Porte, Porter	Yes, addressed in Section 3.3.2
Endangered	Ornate box turtle	<i>Terrapene ornata ornata</i>	Lake, La Porte	No
Endangered	Bulter's garter snake	<i>Thamnophis butleri</i>	Porter	No
Special Concern	Northern cricket frog	<i>Acris crepitans blanchardi</i>	Lake, La Porte	No
Special Concern	Blue-spotted salamander	<i>Ambystoma laterale</i>	Lake, Porter	No
Special Concern	Common mudpuppy	<i>Necturus maculosus</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Special Concern	Northern leopard frog	<i>Rana pipiens</i>	Lake, La Porte, Porter	No
Special Concern	Western ribbon snake	<i>Thamnophis proximus proximus</i>	Lake, La Porte, Porter	No
Fishes				
Endangered	Lake sturgeon	<i>Acipenser fulvescens</i>	Lake, La Porte, Porter	No
Insects				
Endangered	*none*	<i>Aethes patricia</i>	Lake, La Porte, Porter	No
Endangered	Opalescent apamea	<i>Apamea lutosa</i>	La Porte, Porter	No
Endangered	Nebraska silver bordered fritillary	<i>Boloria selene nebraskensis</i>	La Porte, Porter	No
Endangered	Frosted elfin	<i>Callophrys irus</i>	Porter	No
Endangered	Hoary elfin	<i>Callophrys polios</i>	Porter	No
Endangered	Abbreviated leadplant underwing moth	<i>Catocala abbreviatella</i>	La Porte	No
Endangered	Leadplant underwing moth	<i>Catocala amestris</i>	La Porte	No
Endangered	Sweet fern underwing	<i>Catocala antinympha</i>	Lake	No
Endangered	Persius dusky wing	<i>Erynnis persius persius</i>	Lake, Porter	No
Endangered	Silvery blue	<i>Glaucopsyche lygdamus couperi</i>	Lake	No
Endangered	Ottoe skipper	<i>Hesperia ottoe</i>	Lake	No
Endangered	Karner blue	<i>Lycaeides melissa samuelis</i>	Lake, Porter	Yes, addressed in Section 3.3.2
Endangered	Great copper	<i>Lycaena xanthoides</i>	Lake	No
Endangered	Helianthus leafhopper	<i>Mesamia stramineus</i>	La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	Four-lined cordgrass borer	<i>Mesapamea stipata</i>	La Porte, Porter	No
Endangered	Barrens metarranthis moth	<i>Metarranthis apiciaria</i>	Lake	No
Endangered	Mitchell's satyr	<i>Neonympha mitchellii mitchellii</i>	La Porte	No
Endangered	Leadplant leafwebber moth	<i>Nephoterix dammersi</i>	La Porte, Porter	No
Endangered	Noctuid moth	<i>Oligia obtusa</i>	Lake, La Porte, Porter	No
Endangered	Ernestine's moth	<i>Phytometra ernestinana</i>	Lake	No
Endangered	Kansas prairie leafhopper	<i>Prairiana kansana</i>	Lake, La Porte, Porter	No
Endangered	Phlox moth	<i>Schinia indiana</i>	Lake, Porter	No
Endangered	Regal fritillary	<i>Speyeria idalia</i>	Lake	No
Endangered	Spatterdock darner	<i>Aeshna mutata</i>	La Porte	No
Threatened	*none*	<i>Agrotis stigmosa</i>	Lake, La Porte, Porter	No
Threatened	Noctuid moth	<i>Apamea burgessi</i>	Lake, La Porte, Porter	No
Threatened	Wood-colored apamea	<i>Apamea lignicolora</i>	La Porte	No
Threatened	Noctuid moth	<i>Apamea relicina</i>	Porter	No
Threatened	*none*	<i>Archanara laeta</i>	Lake	No
Threatened	Dusted skipper	<i>Atrytonopsis hianna</i>	Lake, La Porte, Porter	No
Threatened	Silver-bordered fritillary	<i>Boloria selene myrina</i>	Lake, La Porte, Porter	No
Threatened	Noctuid moth	<i>Capis curvata</i>	Lake, La Porte, Porter	No
Threatened	Many-lined cordgrass moth	<i>Chortodes enervata</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Tufted sedge moth	<i>Chortodes inquinata</i>	Lake	No
Threatened	*none*	<i>Cicadula straminea</i>	Lake, La Porte	No
Threatened	Two-lined cosmotettix	<i>Cosmotettix bilineatus</i>	Lake, La Porte, Porter	No
Threatened	Prairie sedge moth	<i>Crambus murellus</i>	Lake	No
Threatened	*none*	<i>Dorydiella kansana</i>	Lake	No
Threatened	Mottled duskywing	<i>Erynnis martialis</i>	Lake, La Porte, Porter	No
Threatened	Olympia marble	<i>Euchloe olympia</i>	Lake, Porter	No
Threatened	Noctuid moth	<i>Eucoptocnemis fimbriaris</i>	Lake, Porter	No
Threatened	Two-spotted skipper	<i>Euphyes bimacula</i>	Lake, Porter	No
Threatened	Dune cutworm	<i>Euxoa aurlenta</i>	Porter	No
Threatened	Marsh fern moth	<i>Fagitana littera</i>	Lake, La Porte, Porter	No
Threatened	Pine streak	<i>Faronta rubripennis</i>	Lake, La Porte, Porter	No
Threatened	Indiangrass flexamia	<i>Flexamia reflexus</i>	Lake, La Porte, Porter	No
Threatened	Starry campion moth	<i>Hadena ectypa</i>	Lake, Porter	No
Threatened	*none*	<i>Limotettix divaricatus</i>	Lake	No
Threatened	Noctuid moth	<i>Loxagrotis acclivis</i>	Lake, Porter	No
Threatened	Grote's black-tipped Quaker	<i>Loxagrotis grotei</i>	Lake	No
Threatened	*none*	<i>Macrochilo louisiana</i>	Lake, La Porte	No
Threatened	Newman's brocade	<i>Meropleon ambifuscum</i>	Lake, La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Golden legged mydas fly	<i>Mydas tibialis</i>	La Porte, Porter	No
Threatened	Dune oncocnemis moth	<i>Oncocnemis riparia</i>	Lake	No
Threatened	Multicolored huckleberry moth	<i>Pangrapta decoralis</i>	Lake	No
Threatened	Beer's blazing star borer moth	<i>Papaipema beeriana</i>	Lake, La Porte	No
Threatened	Golden borer moth	<i>Papaipema cerina</i>	Lake, La Porte, Porter	No
Threatened	Columbine borer	<i>Papaipema leucostigma</i>	Lake, Porter	No
Threatened	Giant sunflower borer moth	<i>Papaipema maritima</i>	Lake, La Porte, Porter	No
Threatened	Culver's root borer	<i>Papaipema sciata</i>	Lake, La Porte	No
Threatened	Silphium borer moth	<i>Papaipema silphii</i>	Lake, La Porte, Porter	No
Threatened	Royal fern borer moth	<i>Papaipema speciosissima</i>	Lake, La Porte, Porter	No
Threatened	Spittle bug	<i>Paraphilaenus parallelus</i>	Lake	No
Threatened	*none*	<i>Paraphlepsius lobatus</i>	Lake	No
Threatened	Peppered paraphlepsius leafhopper	<i>Paraphlepsius maculosus</i>	Lake, La Porte	No
Threatened	Grasshopper	<i>Paroxya atlantica</i>	Lake	No
Threatened	Large-headed grasshopper	<i>Phoetaliotes nebrascensis</i>	Lake	No
Threatened	Rare sand quaker	<i>Platyperigea meralis</i>	Lake, Porter	No
Threatened	Big broad-winged skipper	<i>Poanes viator viator</i>	Lake, La Porte, Porter	No
Threatened	Prarie panic grass leafhopper	<i>Polyamia herbida</i>	Lake, La Porte, Porter	No
Threatened	Bunchgrass skipper	<i>Problema byssus</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Bunch grass locust	<i>Pseudopomala brachyptera</i>	Porter	No
Threatened	Aureolaria seed borer	<i>Rhodoecia aurantiago</i>	Lake	No
Threatened	Smoky-eyed brown	<i>Satyrodes eurydice fumosa</i>	La Porte, Porter	No
Threatened	Pearly indigo borer	<i>Sitochroa dasconalis</i>	Lake, La Porte, Porter	No
Threatened	Included cordgrass borer	<i>Spartiniphaga includens</i>	Lake, La Porte	No
Threatened	Red-striped panic grass moth	<i>Tampa dimediatella</i>	Porter	No
Threatened	Marked noctuid	<i>Tricholita notata</i>	Lake, La Porte, Porter	No
Threatened	Dune locust	<i>Trimerotropis maritima</i>	Lake, Porter	No
Rare	Hoary edge skipper	<i>Achalarus lyciades</i>	Porter	No
Rare	*none*	<i>Acronicta dactylina</i>	Lake, La Porte	No
Rare	Funerary dagger moth	<i>Acronicta funeralis</i>	Lake, La Porte	No
Rare	Moth	<i>Agrotis vetusta</i>	Lake, Porter	No
Rare	Common roadside-skipper	<i>Amblyscirtes vialis</i>	La Porte, Porter	No
Rare	Green arches	<i>Anaplectoides prasina</i>	La Porte	No
Rare	*none*	<i>Ancylis semiovana</i>	Lake, Porter	No
Rare	Starry campion capsule moth	<i>Anepia capsularis</i>	Lake, Porter	No
Rare	Black-dashed apamea	<i>Apamea nigrior</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Bruchomorpha dorsata</i>	Lake, Porter	No
Rare	Long-nosed elephant hopper	<i>Bruchomorpha extensa</i>	Lake, La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	*none*	<i>Bruchomorpha oculata</i>	Lake, Porter	No
Rare	Graceful underwing	<i>Catocala gracilis</i>	Lake, La Porte, Porter	No
Rare	Praeclara underwing	<i>Catocala praeclara</i>	Lake, La Porte, Porter	No
Rare	White underwing	<i>Catocala relict</i>	La Porte	No
Rare	Sprinkled locust	<i>Chloealtis conspersa</i>	Lake, La Porte, Porter	No
Rare	Leafhopper	<i>Chlorotettix fallax</i>	Lake, La Porte, Porter	No
Rare	Huckleberry looper moth	<i>Chrysanympa formosa</i>	Porter	No
Rare	Sand dune panic grass moth	<i>Coenochroa bipunctella</i>	Porter	No
Rare	Dune panic grass moth	<i>Coenochroa illibella</i>	Lake, Porter	No
Rare	Prairie meadow katydid	<i>Conocephalus saltans</i>	Lake, Porter	No
Rare	*none*	<i>Crambus bidens</i>	Lake, La Porte, Porter	No
Rare	Orange-striped sedge moth	<i>Crambus girardellus</i>	La Porte, Porter	No
Rare	*none*	<i>Croesia curvalana</i>	Porter	No
Rare	*none*	<i>Croesia semipurpurana</i>	Lake, Porter	No
Rare	Sweetfern geometer	<i>Cyclophora penduliniaria</i>	Lake, Porter	No
Rare	Unexpected milkweed moth	<i>Cynia inopinatus</i>	Lake, Porter	No
Rare	*none*	<i>Epipaschia zelleri</i>	Porter	No
Rare	Moth	<i>Eubaphe meridian</i>	La Porte, Porter	No
Rare	*none*	<i>Eucosma bilineana</i>	Lake, La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Moth	<i>Eucosma bipunctella</i>	Lake, La Porte	No
Rare	*none*	<i>Eucosma fulminana</i>	Lake	No
Rare	*none*	<i>Eucosma giganteana</i>	Lake, La Porte	No
Rare	Baltimore	<i>Euphydryas phaeton</i>	Lake, La Porte, Porter	No
Rare	Sedge skipper	<i>Euphyes dion</i>	Lake, La Porte, Porter	No
Rare	White-striped dart	<i>Euxoa albipennis</i>	Porter	No
Rare	Long-nose three-awn leafhopper	<i>Flexamia pyrops</i>	Lake, Porter	No
Rare	Noctuid moth	<i>Gabara subnivosella</i>	Lake, La Porte	No
Rare	Anna's tiger moth	<i>Grammia anna</i>	Porter	No
Rare	Figured grammia	<i>Grammia figurata</i>	Lake, Porter	No
Rare	Sand barrens grammia	<i>Grammia phyllira</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Grammia virguncula</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Graminella mohri</i>	Lake, Porter	No
Rare	Blueberry clearwing sphinx	<i>Hemaris gracilis</i>	Lake, Porter	No
Rare	Leonard's skipper	<i>Hesperia leonardus</i>	Lake, La Porte, Porter	No
Rare	Grasshopper	<i>Hesperotettix viridis pratensis</i>	Lake, Porter	No
Rare	Smokey holomelina	<i>Holomelina opella</i>	La Porte, Porter	No
Rare	Noctuid moth	<i>Homophoberia cristata</i>	La Porte	No
Rare	Large Hypenodes	<i>Hypenodes caducus</i>	Lake, La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Noctuid moth	<i>Iodopepla u-album</i>	Lake	No
Rare	*none*	<i>Laevicephalus acus</i>	Lake, La Porte	No
Rare	Noctuid moth	<i>Lemmeria digitalis</i>	Lake	No
Rare	Moth	<i>Lesmone detrahens</i>	Lake, Porter	No
Rare	Moth	<i>Leucania inermis</i>	Lake, La Porte, Porter	No
Rare	Salt marsh wainscot	<i>Leucania linita</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Leucania multilinea</i>	Lake, La Porte	No
Rare	Purplish copper	<i>Lycaena helloides</i>	Lake, La Porte, Porter	No
Rare	Moth	<i>Macrochilo absorptalis</i>	Lake, La Porte, Porter	No
Rare	Noctuid moth	<i>Macrochilo hypocriticalis</i>	Lake, La Porte, Porter	No
Rare	Huckleberry eye-spot moth	<i>Melanomma auricinctaria</i>	Lake, La Porte, Porter	No
Rare	Huckleberry spur-throat grasshopper	<i>Melanoplus fasciatus</i>	Lake	No
Rare	Graceful spur-throated grasshopper	<i>Melanoplus gracilis</i>	La Porte	No
Rare	Keeler's spur-throated grasshopper	<i>Melanoplus keeleri luridus</i>	Lake	No
Rare	Green-legged spur-throated grasshopper	<i>Melanoplus viridipes viridipes</i>	Porter	No
Rare	Noctuid moth	<i>Melipotis jucunda</i>	Lake	No
Rare	Noctuid moth	<i>Meropleon diversicolor</i>	Lake, La Porte, Porter	No
Rare	Leafhopper	<i>Mesamia nigradorsum</i>	Lake, La Porte, Porter	No
Rare	Dark metanema	<i>Metanema determinata</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Pale metanema	<i>Metanema inatomaria</i>	Lake, Porter	No
Rare	Katydid	<i>Neoconocephalus exiliscanorus</i>	La Porte, Porter	No
Rare	Katydid	<i>Neoconocephalus nebrascensis</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Nola cilicoides</i>	Lake, La Porte, Porter	No
Rare	Sharp-blotched nola	<i>Nola pustulata</i>	Porter	No
Rare	Notodontid moth	<i>Notodonta scitipennis</i>	Lake	No
Rare	Elegant prominent	<i>Odentosia elegans</i>	Lake, La Porte, Porter	No
Rare	Green desert grasshopper	<i>Orphulella pelidna</i>	Lake, Porter	No
Rare	Barrens paectes moth	<i>Paectes abrostolella</i>	Porter	No
Rare	Heracleum stem borer moth	<i>Papaipema harrisii</i>	La Porte	No
Rare	Ironweed borer moth	<i>Papaipema limpida</i>	La Porte	No
Rare	St. John's wort borer moth	<i>Papaipema lysimachiae</i>	Lake, La Porte, Porter	No
Rare	Borer moth	<i>Papaipema rigida</i>	Lake, La Porte	No
Rare	Mayapple borer moth	<i>Papaipema rutila</i>	La Porte	No
Rare	Moth	<i>Parasa indetermina</i>	Lake, La Porte, Porter	No
Rare	Orange-winged grasshopper	<i>Pardalophora phoenicoptera</i>	Lake	No
Rare	Gemmed cordgrass borer	<i>Peoria gemmatella</i>	Lake, La Porte, Porter	No
Rare	*none*	<i>Plagodis kuetzingi</i>	La Porte	No
Rare	*none*	<i>Peoria tetradella</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	*none*	<i>Phaneta ochroterminana</i>	Lake, Porter	No
Rare	*none*	<i>Phaneta olivacea</i>	Lake	No
Rare	*none*	<i>Phaneta ornatula</i>	Porter	No
Rare	*none*	<i>Phaneta raracana</i>	Lake	No
Rare	*none*	<i>Phaneta striatana</i>	Lake, Porter	No
Rare	*none*	<i>Phaneta umbrastriana</i>	Lake	No
Rare	Great Lakes dune spittlebug	<i>Philaenarcys killa</i>	Lake, Porter	No
Rare	Mulberry wing skipper	<i>Poanes massaoit</i>	Lake, La Porte	No
Rare	Long dash skipper	<i>Polites mystic</i>	Lake, La Porte	No
Rare	Little Bluestem Polyamia	<i>Polyamia caperata</i>	Lake, La Porte, Porter	No
Rare	Sand Panic Grass Leafhopper	<i>Polyamia obtectus</i>	La Porte, Porter	No
Rare	Gray comma	<i>Polygonia progne</i>	Lake, La Porte, Porter	No
Rare	Saturn quaker	<i>Protorthodes incincta</i>	Lake, Porter	No
Rare	Red-legged spittle bug	<i>Prosapia ignipectus</i>	Lake, Porter	No
Rare	Sand locust	<i>Psinidia fenestralis</i>	Lake, Porter	No
Rare	Sprauge's pygartic	<i>Pygarctia spraguei</i>	Lake, Porter	No
Rare	Southern purple mint moth	<i>Pyrausta laticlavia</i>	Lake, Porter	No
Rare	*none*	<i>Pyreferra citromba</i>	La Porte	No
Rare	Mustard swallow	<i>Pyreferra hesperidago</i>	La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Noctuid moth	<i>Pyreferra pettiti</i>	La Porte	No
Rare	Eyed brown	<i>Satyrodes eurydice</i>	Lake	No
Rare	*none*	<i>Scaphoideus ochraceus</i>	La Porte	No
Rare	Noctuid moth	<i>Schinia septentrionalis</i>	Lake, Porter	No
Rare	*none*	<i>Scirpophaga perstrialis</i>	Lake, Porter	No
Rare	Goat's rue looper	<i>Semiothisa eremiata</i>	Lake, Porter	No
Rare	Geometrid moth	<i>Semiothisa mellistrigata</i>	Lake	No
Rare	*none*	<i>Semiothisa multilineata</i>	Lake	No
Rare	Spartina borer moth	<i>Spartiniphaga inops</i>	Lake, La Porte, Porter	No
Rare	Luscious willow sphinx	<i>Sphinx luscitiosa</i>	Lake, Porter	No
Rare	Red-legged tussock moth	<i>Spilosoma latipennis</i>	Lake, La Porte	No
Rare	Band-winged meadowhawk	<i>Sympetrum semicinctum</i>	Lake, La Porte, Porter	No
Rare	Northern cloudywig	<i>Thorybes pylades</i>	Lake, La Porte, Porter	No
Rare	Record keeper moth	<i>Trichosilia manifesta</i>	Lake, Porter	No
Rare	*none*	<i>Zomaria interruptolinea</i>	Lake, Porter	No
Extirpated	American burying beetle	<i>Nicrophorus americanus</i>	Lake, Porter	No
Extirpated	Hine's emerald	<i>Somatochlora hineana</i>	Lake	No
Watch list	Bracken borer moth	<i>Papaipema pterisii</i>	Lake	No
Watch list	Aphrodite fritillary	<i>Speyeria aphrodite</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Mollusk/Crustacean				
Endangered	Sheepnose	<i>Plethobasus cyphus</i>	Lake, Porter	No
Threatened	Prairie Crayfish	<i>Procambarus gracilis</i>	Lake, Porter	No
Special Concern	Swamp Lymnaea	<i>Lymnaea stagnalis</i>	La Porte	No
Special Concern	Ellipse	<i>Venustaconcha ellipsiformis</i>	Lake, Porter	No
Plants				
Endangered	Running serviceberry	<i>Amelanchier humilis</i>	Lake, Porter	No
Endangered	Bristly sarsaparilla	<i>Aralia hispida</i>	Lake, La Porte, Porter	No
Endangered	Lake cress	<i>Armoracia aquatica</i>	Lake	No
Endangered	Mead's milkweed	<i>Asclepias meadii</i>	Lake	No
Endangered	Gray birch	<i>Betula populifolia</i>	Lake, La Porte, Porter	No
Endangered	Least grape-fern	<i>Botrychium simplex</i>	Lake	No
Endangered	Northern shorthusk	<i>Brachyelytrum aristosum</i>	Porter	No
Endangered	Bluehearts	<i>Buchnera americana</i>	Lake, Porter	No
Endangered	Wild calla	<i>Calla palustris</i>	La Porte	No
Endangered	Black sedge	<i>Carex arctata</i>	La Porte	No
Endangered	Awned sedge	<i>Carex atherodes</i>	La Porte, Porter	No
Endangered	Howe sedge	<i>Carex atlantica ssp. capillacea</i>	La Porte, Porter	No
Endangered	Brownish sedge	<i>Carex brunnescens</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	Creeping sedge	<i>Carex chordorrhiza</i>	La Porte	No
Endangered	Little prickly sedge	<i>Carex echinata</i>	Lake, La Porte	No
Endangered	Finely-nerved sedge	<i>Carex leptonervia</i>	La Porte, Porter	No
Endangered	Mud sedge	<i>Carex limosa</i>	Lake, La Porte, Porter	No
Endangered	Rough sedge	<i>Carex scabrata</i>	La Porte	No
Endangered	Thinleaf sedge	<i>Carex sparganioides</i> var. <i>cephaloidea</i>	La Porte	No
Endangered	Prairie redroot	<i>Caenothus herbaceus</i>	Lake	No
Endangered	Hill's thistle	<i>Cirsium hillii</i>	Lake, Porter	No
Endangered	Clinton Lily	<i>Clintonia borealis</i>	Lake, Porter	No
Endangered	Hemlock parsely	<i>Conioselinum chinense</i>	La Porte	No
Endangered	Silky dogwood	<i>Cornus amomum</i> ssp. <i>Amomum</i>	Lake, Porter	No
Endangered	Bunchberry	<i>Cornus canadensis</i>	Lake, Porter	No
Endangered	Toothed sedge	<i>Cyperus dentatus</i>	Lake, La Porte	No
Endangered	Houghton's nutsedge	<i>Cyperus houghtonii</i>	Porter	No
Endangered	Small-fruited spike-rush	<i>Eleocharis microcarpa</i>	Porter	No
Endangered	Variegated horsetail	<i>Equisetum variegatum</i>	Lake, La Porte	No
Endangered	Pipewort	<i>Eriocaulon aquaticum</i>	La Porte, Porter	No
Endangered	Woodland strawberry	<i>Fragaria vesca</i> var. <i>americana</i>	La Porte	No
Endangered	Carolina fimbry	<i>Frimbristylis puberula</i>	Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	Bicknell northern crane's bill	<i>Geranium bicknellii</i>	Lake, Porter	No
Endangered	Small floating manna-grass	<i>Glyceria borealis</i>	Lake	No
Endangered	Drummond hemicarpha	<i>Hemicarpha drummondii</i>	Lake, Porter	No
Endangered	Creeping St. John's-wort	<i>Hypericum adpressum</i>	Porter	No
Endangered	Jointed rush	<i>Juncus articulatus</i>	Lake, La Porte, Porter	No
Endangered	Bayonet rush	<i>Juncus militaris</i>	Porter	No
Endangered	Brown-fruited rush	<i>Juncus pelocarpus</i>	Lake, La Porte, Porter	No
Endangered	Beach peavine	<i>Lathyrus maritimus</i> var. <i>glaber</i>	Lake, La Porte, Porter	No
Endangered	Pale vetchling peavine	<i>Lathyrus ochroleucus</i>	Porter	No
Endangered	Least duckweed	<i>Lemna minima</i>	Porter	No
Endangered	Pale duckweed	<i>Lemna valdiviana</i>	Porter	No
Endangered	Globe-fruited false-loosestrife	<i>Ludwigia sphaerocarpa</i>	Lake, Porter	No
Endangered	Hairy woodrush	<i>Luzula acuminata</i>	La Porte	No
Endangered	Northern bog clubmoss	<i>Lycopodiella inundata</i>	Lake, La Porte, Porter	No
Endangered	Northern appressed bog clubmoss	<i>Lycopodiella subappressa</i>	Porter	No
Endangered	Green adder's-mouth	<i>Malaxis unifolia</i>	Lake, La Porte	No
Endangered	Climbing hempweed	<i>Mikania scandens</i>	Lake, Porter	No
Endangered	Cutleaf water-milfoil	<i>Myriophyllum pinnatum</i>	La Porte, Porter	No
Endangered	Clustered broomrape	<i>Orobanche fasciculata</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	White-grained mountain-ricegrass	<i>Oryzopsis asperifolia</i>	La Porte, Porter	No
Endangered	Eastern eulophus	<i>Perideridia americana</i>	Lake	No
Endangered	Heart-leaved plantain	<i>Plantago cordata</i>	Lake, Porter	No
Endangered	Yellow-fringe orchis	<i>Platanthera ciliaris</i>	Lake, La Porte, Porter	No
Endangered	Prairie white-fringed orchid	<i>Platanthera leucophaea</i>	Lake, La Porte	No
Endangered	Gay-wing milkwort	<i>Polygala paucifolia</i>	Porter	No
Endangered	Fringed black bindweed	<i>Polygonum cilinode</i>	La Porte	No
Endangered	Prairie parsley	<i>Polytaenia nuttalii</i>	Lake, La Porte	No
Endangered	Nuttall pondweed	<i>Potamogeton epihydrus</i>	La Porte, Porter	No
Endangered	Spotted pondweed	<i>Potamogeton pulcher</i>	Lake, La Porte, Porter	No
Endangered	Vasey's pondweed	<i>Potamogeton vaseyi</i>	La Porte, Porter	No
Endangered	Globe beaked-rush	<i>Rhynchospora recognita</i>	Lake, La Porte, Porter	No
Endangered	Southern dewberry	<i>Rubus enslenii</i>	Lake	No
Endangered	Small bristleberry	<i>Rubus setosus</i>	Lake	No
Endangered	Calamint	<i>Satureja glabella</i> var. <i>angustifolia</i>	Lake, La Porte	No
Endangered	American scheuchzeria	<i>Scheuchzeria palustris</i> ssp. <i>americana</i>	La Porte	No
Endangered	Hall's bulrush	<i>Schoenoplectus hallii</i>	Lake, Porter	No
Endangered	Bulrush	<i>Scirpus expansus</i>	Porter	No
Endangered	Smith's bulrush	<i>Scirpus smithii</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Endangered	Torrey's bulrush	<i>Scirpus torreyi</i>	Porter	No
Endangered	Strict blue-eyed-grass	<i>Sisyrinchium montanum</i>	Lake, La Porte, Porter	No
Endangered	Great Plains ladies-tresses	<i>Spiranthes magnicamporum</i>	Lake, Porter	No
Endangered	Northern white cedar	<i>Thuja occidentalis</i>	Lake, Porter	No
Endangered	Nodding trillium	<i>Trillium cernuum</i> var. <i>macranthum</i>	Porter	No
Endangered	Hidden-fruited bladderwort	<i>Utricularia geminiscapa</i>	La Porte	No
Endangered	Northeastern bladderwort	<i>Utricularia resupinata</i>	Lake	No
Endangered	Velvetleaf blueberry	<i>Vaccinium myrtilloides</i>	Lake	No
Endangered	Hairy valerian	<i>Valeriana edulis</i>	La Porte	No
Endangered	Marsh valerian	<i>Valeriana uliginosa</i>	La Porte	No
Endangered	Goose-foot corn-salad	<i>Valerianella chenopodiifolia</i>	La Porte, Porter	No
Endangered	High-bush cranberry	<i>Viburnum opulus</i> var. <i>americanum</i>	Lake, La Porte, Porter	No
Endangered	Sword bogmat	<i>Wolffiella gladiata</i>	La Porte	No
Threatened	False foxglove	<i>Agalinis auriculata</i>	Lake	No
Threatened	Pale false foxglove	<i>Agalinis skinneriana</i>	Lake	No
Threatened	Western rockjasmine	<i>Androsace occidentalis</i>	Lake	No
Threatened	Beck water-marigold	<i>Bidens beckii</i>	Lake, La Porte, Porter	No
Threatened	Bebb's sedge	<i>Carex bebbii</i>	Lake	No
Threatened	Prairie gray sedge	<i>Carex conoidea</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Crawe sedge	<i>Carex crawei</i>	Lake	No
Threatened	Yellow sedge	<i>Carex flava</i>	La Porte, Porter	No
Threatened	Elk sedge	<i>Carex garberi</i>	Lake, Porter	No
Threatened	Richardson Sedge	<i>Carex richardsonii</i>	Lake	No
Threatened	Straw sedge	<i>Carex straminea</i>	Lake	No
Threatened	Pipsissewa	<i>Chimaphila umbellata</i> ssp. <i>Cisatlantica</i>	Porter	No
Threatened	American golden-saxifrage	<i>Chrysosplenium americanum</i>	La Porte, Porter	No
Threatened	Dune thistle	<i>Cirsium pitcheri</i>	Lake, Porter	Yes, addressed in Section 3.3.2
Threatened	Long-bract green orchis	<i>Coeloglossum viride</i> var. <i>virescens</i>	Lake, Porter	No
Threatened	Pale corydalis	<i>Corydalis sempervirens</i>	Lake, La Porte	No
Threatened	Capitate spike-rush	<i>Eleocharis geniculata</i>	Lake, Porter	No
Threatened	Black-fruited spike-rush	<i>Eleocharis melanocarpa</i>	Lake, La Porte, Porter	No
Threatened	Slender cotton-grass	<i>Eriophorum gracile</i>	Lake, La Porte	No
Threatened	Dwarf umbrella-sedge	<i>Fuirena pumila</i>	Porter	No
Threatened	Downy gentian	<i>Gentiana puberulenta</i>	Lake, La Porte, Porter	No
Threatened	Sand-heather	<i>Hudsonia tomentosa</i>	Lake, Porter	No
Threatened	Great St. John's-wort	<i>Hypericum pyramidatum</i>	Porter	No
Threatened	Scirpus-like rush	<i>Juncus scirpoides</i>	Lake, La Porte, Porter	No
Threatened	Smooth veiny pea	<i>Lathyrus venosus</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Cattail gray-feather	<i>Liatris pycnostachya</i>	Lake	No
Threatened	Smaller forget-me-not	<i>Myosotis laxa</i>	Lake, La Porte, Porter	No
Threatened	Thread-like naiad	<i>Najas gracillima</i>	La Porte, Porter	No
Threatened	Leiberg's witchgrass	<i>Panicum leibergii</i>	La Porte, Porter	No
Threatened	Warty panic-grass	<i>Panicum verrucosum</i>	La Porte, Porter	No
Threatened	Leafy northern green orchis	<i>Platanthera hyperborea</i>	Lake, La Porte, Porter	No
Threatened	Carey's smartweed	<i>Polygonum careyi</i>	Lake, La Porte, Porter	No
Threatened	Northeastern smartweed	<i>Polygonum hydropiperoides</i> var. <i>opelousanum</i>	Porter	No
Threatened	Frie's pondweed	<i>Potamogeton friesii</i>	La Porte	No
Threatened	White-stem pondweed	<i>Potamogeton praelongus</i>	La Porte	No
Threatened	Straight-leaf pondweed	<i>Potamogeton strictifolius</i>	Lake, La Porte, Porter	No
Threatened	Silverweed	<i>Potentilla anserina</i>	Lake, La Porte, Porter	No
Threatened	Long-beaked baldrush	<i>Psilocarya scirpoides</i>	La Porte, Porter	No
Threatened	Heartleaf willow	<i>Salix cordata</i>	Lake, Porter	No
Threatened	Reticulated nutrush	<i>Scleria reticularis</i>	Lake, Porter	No
Threatened	Ledge spike-moss	<i>Selaginella rupestris</i>	Lake, Porter	No
Threatened	Royal catchfly	<i>Silene regia</i>	La Porte	No
Threatened	Sticky goldenrod	<i>Solidago simplex</i> var. <i>gillmanii</i>	Lake, La Porte, Porter	No
Threatened	Branching burr-reed	<i>Sparganium androcladum</i>	La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Threatened	Slick-seed wild-bean	<i>Strophostyles leiosperma</i>	Lake	No
Threatened	Prairie fame-flower	<i>Talinum rugospermum</i>	Lake, Porter	No
Threatened	Tall meadowrue	<i>Thalictrum pubescens</i>	Porter	No
Threatened	Horned bladderwort	<i>Utricularia cornuta</i>	Lake, Porter	No
Threatened	Lesser bladderwort	<i>Utricularia minor</i>	Lake, La Porte, Porter	No
Threatened	Zigzag bladderwort	<i>Utricularia subulata</i>	Lake, La Porte, Porter	No
Threatened	Small cranberry	<i>Vaccinium oxycoccos</i>	La Porte, Porter	No
Threatened	Prairie violet	<i>Viola pedatifida</i>	Lake	No
Threatened	Primrose-leaf violet	<i>Viola primulifolia</i>	Porter	No
Threatened	Carolina yellow-eyed grass	<i>Xyris difformis</i>	La Porte, Porter	No
Rare	Red baneberry	<i>Actaea rubra</i>	Porter	No
Rare	Bog rosemary	<i>Andromeda glaucophylla</i>	La Porte	No
Rare	Bearberry	<i>Arctostaphylos uva-ursi</i>	Lake, La Porte, Porter	No
Rare	Michaux's stitchwort	<i>Arenaria stricta</i>	Lake, La Porte, Porter	No
Rare	Slim-spike three-awn grass	<i>Aristida intermedia</i>	Lake, La Porte, Porter	No
Rare	Seabeach needlegrass	<i>Aristida tuberculosa</i>	Lake, La Porte, Porter	No
Rare	Rushlike aster	<i>Aster borealis</i>	Lake, La Porte, Porter	No
Rare	Forked aster	<i>Aster furcatus</i>	Lake, Porter	No
Rare	Western silvery aster	<i>Aster sericeus</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Chamomile grape-fern	<i>Botrychium matricariifolium</i>	Lake, La Porte, Porter	No
Rare	Golden-fruited sedge	<i>Carex aurea</i>	Lake, Porter	No
Rare	White-edge sedge	<i>Carex debilis</i> var. <i>rudgei</i>	La Porte, Porter	No
Rare	Ebony sedge	<i>Carex eburnea</i>	Lake, Porter	No
Rare	Long sedge	<i>Carex folliculata</i>	La Porte, Porter	No
Rare	Longstalk sedge	<i>Carex pedunculata</i>	La Porte, Porter	No
Rare	Weak stellate sedge	<i>Carex seorsa</i>	La Porte, Porter	No
Rare	Roundleaf dogwood	<i>Cornus rugosa</i>	Lake, La Porte, Porter	No
Rare	Small yellow lady's-slipper	<i>Cypripedium calceolus</i> var. <i>parviflorum</i>	Lake, La Porte, Porter	No
Rare	Tufted hairgrass	<i>Deschampsia cespitosa</i>	La Porte	No
Rare	Hemlock panic-grass	<i>Dichanthelium sabulorum</i> var. <i>thinium</i>	Lake, Porter	No
Rare	Northern bush-honeysuckle	<i>Diervilla lonicera</i>	Lake, La Porte, Porter	No
Rare	Spoon-leaved sundew	<i>Drosera intermedia</i>	Lake, La Porte, Porter	No
Rare	Wolf spikerush	<i>Eleocharis wolfii</i>	Lake	No
Rare	Robbins spikerush	<i>Eleocharis robbinsii</i>	Porter	No
Rare	Narrow-leaved cotton-grass	<i>Eriophorum angustifolium</i>	Lake, La Porte, Porter	No
Rare	Green-keeled cotton-grass	<i>Eriophorum viridicarinatum</i>	La Porte	No
Rare	Seaside surge	<i>Euphorbia polygonifolia</i>	Porter	No
Rare	Yellow gentian	<i>Gentiana alba</i>	Lake, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Herb-robert	<i>Geranium robertianum</i>	La Porte	No
Rare	Baltic rush	<i>Juncus balticus</i> var. <i>littoralis</i>	Lake, La Porte, Porter	No
Rare	Ground juniper	<i>Juniperus communis</i>	Lake, La Porte, Porter	No
Rare	Grooved yellow flax	<i>Linum sulcatum</i>	Lake	No
Rare	Hickey's clubmoss	<i>Lycopodium hickeyi</i>	La Porte, Porter	No
Rare	Tree clubmoss	<i>Lycopodium obscurum</i>	La Porte, Porter	No
Rare	Deep-root clubmoss	<i>Lycopodium tristachyum</i>	La Porte, Porter	No
Rare	Ostrich fern	<i>Matteuccia struthiopteris</i>	Lake, La Porte	No
Rare	American cow-wheat	<i>Melampyrum lineare</i>	Lake, La Porte, Porter	No
Rare	Tall millet-grass	<i>Milium effusum</i>	Porter	No
Rare	Whorled water-milfoil	<i>Myriophyllum verticillatum</i>	Lake, Porter	No
Rare	Small sundrops	<i>Oenothera perennis</i>	Lake, La Porte	No
Rare	Black-fruit mountain-ricegrass	<i>Oryzopsis racemosa</i>	Porter	No
Rare	Northern witchgrass	<i>Panicum boreale</i>	Lake, La Porte, Porter	No
Rare	Jack pine	<i>Pinus banksiana</i>	Lake, La Porte, Porter	No
Rare	Eastern white pine	<i>Pinus strobus</i>	Lake, La Porte, Porter	No
Rare	Small purple-fringe orchis	<i>Platanthera psycodes</i>	Lake, La Porte, Porter	No
Rare	Grove meadow grass	<i>Poa alsodes</i>	La Porte, Porter	No
Rare	Eastern jointweed	<i>Polygonella articulata</i>	Lake, La Porte, Porter	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Rare	Redheadgrass	<i>Potamogeton richardsonii</i>	Lake, Porter	No
Rare	Flatleaf pondweed	<i>Potamogeton robbinsii</i>	Lake, La Porte	No
Rare	Rough rattlesnake-root	<i>Prenanthes aspera</i>	Lake, La Porte	No
Rare	Fire cherry	<i>Prunus pensylvanica</i>	Lake, La Porte, Porter	No
Rare	American wintergreen	<i>Pyrola rotundifolia</i> var. <i>americana</i>	La Porte, Porter	No
Rare	Beach sumac	<i>Rhus aromatica</i> var. <i>arenaria</i>	Lake, Porter	No
Rare	Tall beaked-rush	<i>Rhynchospora macrostachya</i>	Lake, Porter	No
Rare	Weakstalk bulrush	<i>Scirpus purshianus</i>	Porter	No
Rare	Water bulrush	<i>Scirpus subterminalis</i>	Lake, Porter	No
Rare	Prairie goldenrod	<i>Solidago ptarmicoides</i>	Lake, Porter	No
Rare	Shining ladies-tresses	<i>Spiranthes lucida</i>	Lake, La Porte, Porter	No
Rare	Blackseed needlegrass	<i>Stipa avenacea</i>	La Porte, Porter	No
Rare	False asphodel	<i>Tofieldia glutinosa</i>	Lake, La Porte	No
Rare	Forked bluecurl	<i>Trichostema dichotomum</i>	Lake, Porter	No
Rare	Marsh arrow-grass	<i>Triglochin palustris</i>	Lake, La Porte	No
Rare	Purple bladderwort	<i>Utricularia purpurea</i>	Lake, Porter	No
Rare	Netted chainfern	<i>Woodwardia areolata</i>	Porter	No
Rare	Horned pondweed	<i>Zannichellia palustris</i>	Lake, Porter	No
Rare	White camas	<i>Zigadenus elegans</i> var. <i>glaucus</i>	La Porte	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Extirpated	Swamp-pink	<i>Arethusa bulbosa</i>	Lake	No
Extirpated	Large-flower false-foxglove	<i>Aureolaria grandiflora</i> var. <i>pulchra</i>	Lake	No
Extirpated	Leathery grape-fern	<i>Botrychium multifidum</i> var. <i>intermedium</i>	Porter	No
Extirpated	Small enchanter's nightshade	<i>Carcaea alpina</i>	La Porte, Porter	No
Extirpated	Clinton woodfern	<i>Dryopteris clintoniana</i>	La Porte, Porter	No
Extirpated	Dense cotton-grass	<i>Eriophorum spissum</i>	La Porte	No
Extirpated	Upright pinweed	<i>Lechea stricta</i>	Lake, Porter	No
Extirpated	Twinflower	<i>Linnaea borealis</i>	Lake, Porter	No
Extirpated	American fly-honeysuckle	<i>Lonicera canadensis</i>	La Porte	No
Extirpated	Slender mountain-ricegrass	<i>Oryzopsis pungens</i>	La Porte, Porter	No
Extirpated	Panic-grass	<i>Panicum mattamuskeetense</i>	Porter	No
Extirpated	Hooker orchis	<i>Platanthera hookeri</i>	Lake, Porter	No
Extirpated	Balsam poplar	<i>Populus balsamifera</i>	Lake, Porter	No
Extirpated	Short-beaked bald-rush	<i>Psilocarya nitens</i>	Porter	No
Extirpated	One-sided wintergreen	<i>Pyrola secunda</i>	Lake, La Porte, Porter	No
Extirpated	Bramble	<i>Rubus alumnus</i>	La Porte	No
Extirpated	Canada buffalo-berry	<i>Shepherdia canadensis</i>	Lake	No
Extirpated	Northern mountain-ash	<i>Sorbus decora</i>	La Porte, Porter	No
Watch list	Speckled alder	<i>Alnus rugosa</i>	Lake	No

Indiana Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA				
Status	Common Name	Scientific Name	County List	Potential to be Affected by Treatment Options in INDU?
Watch list	Tower-mustard	<i>Arabis glabra</i>	Lake, Porter	No
Watch list	Small white lady's slipper	<i>Cypripedium candidum</i>	Lake, La Porte, Porter	No
Watch list	Trailing arbutus	<i>Epigaea repens</i>	Lake, La Porte, Porter	No
Watch list	Golden seal	<i>Hydrastis canadensis</i>	Lake, La Porte	No
Watch list	Butternut	<i>Juglans cinerea</i>	Lake, La Porte, Porter	No
Watch list	Ridged yellow flax	<i>Linum striatum</i>	La Porte, Porter	No
Watch list	American ginseng	<i>Panax quinquefolius</i>	Lake, Porter	No
Watch list	Dwarf ginseng	<i>Panax trifolius</i>	La Porte, Porter	No
Watch list	Pale green orchis	<i>Platanthera flava</i> var. <i>herbiola</i>	Lake	No
Watch list	Green-frindge orchis	<i>Platanthera leucophaea</i>	Lake	No
Watch list	Bog bluegrass	<i>Poa paludigena</i>	La Porte, Porter	No
Watch list	Slender pondweed	<i>Potamogeton pusillus</i>	Lake, La Porte, Porter	No
Watch list	American wild basil	<i>Satureja vulgaris</i> var. <i>neogaea</i>	La Porte	No
Watch list	Meadow spike-moss	<i>Selaginella apoda</i>	Lake	No
Watch list	American snowbell	<i>Styrax americanus</i>	La Porte, Porter	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Mammals						
Threatened	Eastern spotted skunk	<i>Spilogale putorius</i>	No	No	No	No
Special Concern	Gray wolf	<i>Canis lupus</i>	No	No	No	No
Special Concern	Elk	<i>Cervus elaphus</i>	No	No	No	No
Special Concern	Least shrew	<i>Cryptotis parva</i>	No	No	No	No
Special Concern	Mountain lion	<i>Felis concolor</i>	No	No	No	No
Special Concern	Prairie vole	<i>Microtus ochrogaster</i>	No	No	No	No
Special Concern	Woodland vole	<i>Microtus pinetorum</i>	No	No	No	No
Special Concern	Least weasel	<i>Mustela nivalis</i>	No	No	No	No
Special Concern	Northern myotis	<i>Myotis septentrionalis</i>	No	No	No	No
Special Concern	Plains pocket mouse	<i>Perognathus flavescens</i>	No	No	No	No
Special Concern	Heather vole	<i>Phenacomys intermedius</i>	No	No	No	No
Special Concern	Eastern pipistrelle	<i>Pipistrellus subflavus</i>	No	No	No	No
Special Concern	Smokey shrew	<i>Sorex fumeus</i>	No	No	No	No
Special Concern	Northern bog lemming	<i>Synaptomys borealis</i>	No	No	No	No
Special Concern	Northern pocket gopher	<i>Thomomys talpoides</i>	No	No	No	No
Birds						
Endangered	Baird's sparrow	<i>Ammodramus bairdii</i>	No	No	No	No
Endangered	Henslow's sparrow	<i>Ammodramus henslowii</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Sprague's pipit	<i>Anthus spragueii</i>	No	No	No	No
Endangered	Chestnut-collared longspur	<i>Calcarius ornatus</i>	No	No	No	No
Endangered	Piping plover	<i>Charadrius melodus</i>	No	No	No	No
Endangered	King rail	<i>Rallus elegans</i>	No	No	No	No
Endangered	Burrowing owl	<i>Speotyto cunicularia</i>	No	No	No	No
Threatened	Trumpeter swan	<i>Cygnus buccinator</i>	No	No	No	No
Threatened	Peregrine falcon	<i>Falco peregrinus</i>	No	No	No	No
Threatened	Loggerhead shrike	<i>Lanius ludovicianus</i>	No	No	No	No
Threatened	Wilson's phalarope	<i>Phalaropus tricolor</i>	No	No	No	No
Threatened	Horned grebe	<i>Podiceps auritus</i>	No	No	No	No
Threatened	Common tern	<i>Sterna hirundo</i>	No	No	No	No
Special Concern	Nelson's sharp-tailed sparrow	<i>Ammodramus nelsoni</i>	No	No	No	No
Special Concern	Short-eared owl	<i>Asio flammeus</i>	No	No	No	No
Special Concern	Red-shouldered hawk	<i>Buteo lineatus</i>	No	No	No	No
Special Concern	Yellow rail	<i>Coturnicops noveboracensis</i>	No	No	No	No
Special Concern	Cerulean warbler	<i>Dendroica cerulea</i>	No	No	No	No
Special Concern	Acadian flycatcher	<i>Empidonax virescens</i>	No	No	No	No
Special Concern	Common moorhen	<i>Gallinula chloropus</i>	No	No	No	No
Special Concern	Bald eagle	<i>Haliaeetus leucocephalus</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Franklin's gull	<i>Larus pipixcan</i>	No	No	No	No
Special Concern	Marbled godwit	<i>Limosa fedoa</i>	No	No	No	No
Special Concern	American white pelican	<i>Pelecanus erythrorhynchos</i>	No	No	No	No
Special Concern	Louisiana waterthrush	<i>Seiurus motacilla</i>	No	No	No	No
Special Concern	Forster's tern	<i>Sterna forsteri</i>	No	No	No	No
Special Concern	Greater prairie-chicken	<i>Tympanuchus cupido</i>	No	No	No	No
Special Concern	Hooded warbler	<i>Wilsonia citrina</i>	No	No	No	No
Reptiles and Amphibians						
Endangered	Northern cricket frog	<i>Acris crepitans</i>	No	No	No	No
Endangered	Massasauga	<i>Sistrurus catenatus</i>	No	No	No	No
Threatened	Wood turtle	<i>Clemmys insculpta</i>	No	No	No	No
Threatened	Timber rattlesnake	<i>Crotalus horridus</i>	No	No	No	No
Threatened	Blanding's turtle	<i>Emydoidea blandingii</i>	No	No	No	No
Special Concern	Smooth softshell	<i>Apalone mutica</i>	No	No	No	No
Special Concern	Snapping turtle	<i>Chelydra serpentina</i>	No	No	No	No
Special Concern	Racer	<i>Coluber constrictor</i>	No	No	No	No
Special Concern	Rat snake	<i>Elaphe obsoleta</i>	No	No	No	No
Special Concern	Five-lined skink	<i>Eumeces fasciatus</i>	No	No	No	No
Special Concern	Four-toed salamander	<i>Hemidactylum scutatum</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Western hognose snake	<i>Heterodon nasicus</i>	No	No	No	No
Special Concern	Gopher snake	<i>Pituophis catenifer</i>	No	No	No	No
Special Concern	Lined snake	<i>Tropidoclonion lineatum</i>	No	No	No	No
Fishes						
Threatened	Paddlefish	<i>Polyodon spathula</i>	No	No	No	No
Special Concern	Lake sturgeon	<i>Acipenser fulvescens</i>	No	No	No	No
Special Concern	Skipjack herring	<i>Alosa chrysochloris</i>	No	No	No	No
Special Concern	Crystal darter	<i>Ammocrypta asprella</i>	No	No	No	No
Special Concern	Pirate perch	<i>Aphredoderus sayanus</i>	No	No	No	No
Special Concern	Kiyi	<i>Coregonus kiyi</i>	No	No	No	No
Special Concern	Shortjaw cisco	<i>Coregonus zenithicus</i>	No	No	No	No
Special Concern	Blue sucker	<i>Cycleptus elongatus</i>	No	No	No	No
Special Concern	Gravel chub	<i>Erimystax x-punctata</i>	No	No	No	No
Special Concern	Least darter	<i>Etheostoma microperca</i>	No	No	No	No
Special Concern	Plains topminnow	<i>Fundulus sciadicus</i>	No	No	No	No
Special Concern	Northern brook lamprey	<i>Ichthyomyzon fossor</i>	No	No	No	No
Special Concern	Southern brook lamprey	<i>Ichthyomyzon gagei</i>	No	No	No	No
Special Concern	Black buffalo	<i>Ictiobus niger</i>	No	No	No	No
Special Concern	Yellow bass	<i>Morone mississippiensis</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Pallid shiner	<i>Notropis amnis</i>	No	No	No	No
Special Concern	Pugnose shiner	<i>Notropis anogenus</i>	No	No	No	No
Special Concern	Ozark minnow	<i>Notropis nubilus</i>	No	No	No	No
Special Concern	Topeka shiner	<i>Notropis topeka</i>	No	No	No	No
Special Concern	Slender madtom	<i>Noturus exilis</i>	No	No	No	No
Special Concern	Gilt darter	<i>Percina evides</i>	No	No	No	No
Insects						
Endangered	Headwaters chilostigman	<i>Chilostigma itascae</i>	No	No	No	No
Endangered	Tiger beetle	<i>Cicindela fulgida fulgida</i>	No	No	No	No
Endangered	Tiger beetle	<i>Cicindela limbata nympha</i>	No	No	No	No
Endangered	Persius dusky wing	<i>Erynnis persius</i>	No	No	No	No
Endangered	Assiniboia skipper	<i>Hesperia comma assiniboia</i>	No	No	No	No
Endangered	Uncas skipper	<i>Hesperia uncas</i>	No	No	No	No
Endangered	Karner blue	<i>Lycaeides melissa samuelis</i>	No	No	No	No
Endangered	Uhler's arctic	<i>Oeneis uhleri varuna</i>	No	No	No	No
Threatened	Tiger beetle	<i>Cicindela denikei</i>	No	No	No	No
Threatened	Tiger beetle	<i>Cicindela fulgida westbournei</i>	No	No	No	No
Threatened	Tiger beetle	<i>Cicindela lepida</i>	No	No	No	No
Threatened	Dakota skipper	<i>Hesperia dacotae</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Threatened	Ottoa skipper	<i>Hesperia ottoe</i>	No	No	No	No
Threatened	Garita skipper	<i>Oarisma garita</i>	No	No	No	No
Special Concern	Red-tailed prairie leafhopper	<i>Aflexia rubranura</i>	No	No	No	No
Special Concern	Caddisfly	<i>Agapetus tomus</i>	No	No	No	No
Special Concern	Caddisfly	<i>Asynarchus rossi</i>	No	No	No	No
Special Concern	Arogos skipper	<i>Atrytone arogos</i>	No	No	No	No
Special Concern	Caddisfly	<i>Ceraclea brevis</i>	No	No	No	No
Special Concern	Caddisfly	<i>Ceraclea vertreesi</i>	No	No	No	No
Special Concern	Tiger beetle	<i>Cicindela hirticollis rhodensis</i>	No	No	No	No
Special Concern	Tiger beetle	<i>Cicindela macra macra</i>	No	No	No	No
Special Concern	Tiger beetle	<i>Cicindela patruela patruela</i>	No	No	No	No
Special Concern	Tiger beetle	<i>Cicindela splendida cyanocephalata</i>	No	No	No	No
Special Concern	Disa alpine	<i>Erebia disa mancinus</i>	No	No	No	No
Special Concern	Jumping spider	<i>Habronattus texanus</i>	No	No	No	No
Special Concern	Leonardus skipper	<i>Hesperia leonardus</i>	No	No	No	No
Special Concern	Caddisfly	<i>Hydroptila metoeca</i>	No	No	No	No
Special Concern	Caddisfly	<i>Hydroptila novicola</i>	No	No	No	No
Special Concern	Caddisfly	<i>Hydroptila tortosa</i>	No	No	No	No
Special Concern	Nabokov's blue	<i>Lycaeides idas nabokovi</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Jumping spider	<i>Marpissa grata</i>	No	No	No	No
Special Concern	Jumping spider	<i>Metaphidippus arizonensis</i>	No	No	No	No
Special Concern	Powesheik skipper	<i>Oarisma powesheik</i>	No	No	No	No
Special Concern	Extra-striped snaketail	<i>Ophiogomphus anomalis</i>	No	No	No	No
Special Concern	St. Croix snaketail	<i>Ophiogomphus susbehcha</i>	No	No	No	No
Special Concern	Caddisfly	<i>Oxyethira ecornuta</i>	No	No	No	No
Special Concern	Caddisfly	<i>Oxyethira itascaae</i>	No	No	No	No
Special Concern	Jumping spider	<i>Paradamoetas fontana</i>	No	No	No	No
Special Concern	Jumping spider	<i>Phidippus apacheanus</i>	No	No	No	No
Special Concern	Jumping spider	<i>Phidippus pius</i>	No	No	No	No
Special Concern	Caddisfly	<i>Polycentropus milaca</i>	No	No	No	No
Special Concern	Caddisfly	<i>Protoptila talola</i>	No	No	No	No
Special Concern	Grizzled skipper	<i>Pyrgus centaureae</i>	No	No	No	No
Special Concern	Jumping spider	<i>Sassacus papenhoei</i>	No	No	No	No
Special Concern	Phlox moth	<i>Schinia indiana</i>	No	No	No	No
Special Concern	Caddisfly	<i>Setodes guttatus</i>	No	No	No	No
Special Concern	Regal fritillary	<i>Speyeria idalia</i>	No	No	No	No
Special Concern	Jumping spider	<i>Tutelina formicaria</i>	No	No	No	No
Mollusk/Crustacean						

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Rock pocketbook	<i>Arcidens confragosus</i>	No	No	No	No
Endangered	Elephant-ear	<i>Elliptio crassidens</i>	No	No	No	No
Endangered	Ebonyshell	<i>Fusconaia ebena</i>	No	No	No	No
Endangered	Higgins eye	<i>Lampsilis higginsi</i>	No	No	No	No
Endangered	Yellow sandshell	<i>Lampsilis teres</i>	No	No	No	No
Endangered	Iowa Pleistocene ambersnail	<i>Novasuccinea n. sp. Minnesota B</i>	No	No	No	No
Endangered	Sheepnose	<i>Plethobasus cyphus</i>	No	No	No	No
Endangered	Winged mapleleaf	<i>Quadrula fragosa</i>	No	No	No	No
Endangered	Wartyback	<i>Quadrula nodulata</i>	No	No	No	No
Endangered	Midwest Pleistocene vertigo	<i>Vertigo hubrichti hubrichti</i>	No	No	No	No
Threatened	Mucket	<i>Actinonaias ligamentina</i>	No	No	No	No
Threatened	Elktoe	<i>Alasmidonta marginata</i>	No	No	No	No
Threatened	Spectaclecase	<i>Cumberlandia monodonta</i>	No	No	No	No
Threatened	Purple wartyback	<i>Cyclonaias tuberculata</i>	No	No	No	No
Threatened	Butterfly	<i>Ellipsaria lineolata</i>	No	No	No	No
Threatened	Snuffbox	<i>Epioblasma triquetra</i>	No	No	No	No
Threatened	Washboard	<i>Megalonaias nervosa</i>	No	No	No	No
Threatened	Minnesota Pleistocene ambersnail	<i>Novasuccinea n. sp. Minnesota A</i>	No	No	No	No
Threatened	Round pigtoe	<i>Pleurobema coccineum</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Threatened	Monkeyface	<i>Quadrula metanevra</i>	No	No	No	No
Threatened	Salamander mussel	<i>Simpsonaias ambigua</i>	No	No	No	No
Threatened	Pistolgrip	<i>Tritogonia verrucosa</i>	No	No	No	No
Threatened	Ellipse	<i>Venustaconcha ellipsiformis</i>	No	No	No	No
Threatened	Variable Pleistocene vertigo	<i>Vertigo hubrichti variabilis</i>	No	No	No	No
Threatened	Bluff vertigo	<i>Vertigo meramecensis</i>	No	No	No	No
Special Concern	Spike	<i>Elliptio dilatata</i>	No	No	No	No
Special Concern	Creek heelsplitter	<i>Lasmigona compressa</i>	No	No	No	No
Special Concern	Fluted-shell	<i>Lasmigona costata</i>	No	No	No	No
Special Concern	Black sandshell	<i>Ligumia recta</i>	No	No	No	No
Special Concern	Hickorynut	<i>Obovaria olivaria</i>	No	No	No	No
Plants						
Endangered	Eared false foxglove	<i>Agalinis auriculata</i>	No	No	No	No
Endangered	Round-stemmed false foxglove	<i>Agalinis gattingeri</i>	No	No	No	No
Endangered	Narrow-leaved milkweed	<i>Asclepias stenophylla</i>	No	No	No	No
Endangered	Alpine milk-vetch	<i>Astragalus alpinus</i>	No	No	No	No
Endangered	Virginia bartonia	<i>Bartonia virginica</i>	No	No	No	No
Endangered	Frenchman's bluff moonwort	<i>Botrychium gallicomontanum</i>	No	No	No	No
Endangered	Blunt-lobed grapefern	<i>Botrychium oneidense</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Pale moonwort	<i>Botrychium pallidum</i>	No	No	No	No
Endangered	Lichen	<i>Buellia nigra</i>	No	No	No	No
Endangered	Sweet-smelling Indian-plantain	<i>Cacalia suaveolens</i>	No	No	No	No
Endangered	Lichen	<i>Caloplaca parvula</i>	No	No	No	No
Endangered	Floating marsh-marigold	<i>Caltha natans</i>	No	No	No	No
Endangered	Handsome sedge	<i>Carex formosa</i>	No	No	No	No
Endangered	Pale sedge	<i>Carex pallescens</i>	No	No	No	No
Endangered	Plantain-leaved sedge	<i>Carex plantaginea</i>	No	No	No	No
Endangered	Northern paintbrush	<i>Castilleja septentrionalis</i>	No	No	No	No
Endangered	Hairy lip-fern	<i>Cheilanthes lanosa</i>	No	No	No	No
Endangered	Iowa golden saxifrage	<i>Chrysosplenium iowense</i>	No	No	No	No
Endangered	James' polanisia	<i>Cristatella jamesii</i>	No	No	No	No
Endangered	Lichen	<i>Dermatocarpon moulinsii</i>	No	No	No	No
Endangered	Prarie shooting star	<i>Dodecatheon meadia</i>	No	No	No	No
Endangered	Norwegian whitlow-grass	<i>Draba norvegica</i>	No	No	No	No
Endangered	Wolf's spike-rush	<i>Eleocharis wolfii</i>	No	No	No	No
Endangered	Purple crowberry	<i>Empetrum eamesii</i>	No	No	No	No
Endangered	Black crowberry	<i>Empetrum nigrum</i>	No	No	No	No
Endangered	Dwarf trout lily	<i>Erythronium propullans</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Ball cactus	<i>Escobaria vivipara</i>	No	No	No	No
Endangered	Hairy fimbristylis	<i>Fimbristylis puberula</i> var. <i>interior</i>	No	No	No	No
Endangered	Fungus	<i>Fuscoboletinus weaverae</i>	No	No	No	No
Endangered	Sea milkwort	<i>Glaux maritima</i>	No	No	No	No
Endangered	Golden-seal	<i>Hydrastis canadensis</i>	No	No	No	No
Endangered	Purple rocket	<i>Iodanthus pinnatifidus</i>	No	No	No	No
Endangered	Blackfoot quillwort	<i>Isoetes melanopoda</i>	No	No	No	No
Endangered	Narrow-leaved pinweed	<i>Lechea tenuifolia</i>	No	No	No	No
Endangered	Lichen	<i>Leptogium apalachense</i>	No	No	No	No
Endangered	Bladder pod	<i>Lesquerella ludoviciana</i>	No	No	No	No
Endangered	Auricled twayblade	<i>Listera auriculata</i>	No	No	No	No
Endangered	Lichen	<i>Lobaria scrobiculata</i>	No	No	No	No
Endangered	Bog adder's mouth	<i>Malaxis paludosa</i>	No	No	No	No
Endangered	Hairy water clover	<i>Marsilea vestita</i>	No	No	No	No
Endangered	Montia	<i>Montia chamissoi</i>	No	No	No	No
Endangered	Indian ricegrass	<i>Oryzopsis hymenoides</i>	No	No	No	No
Endangered	Chilean sweet cicely	<i>Osmorhiza berteroi</i>	No	No	No	No
Endangered	Sticky locoweed	<i>Oxytropis viscida</i>	No	No	No	No
Endangered	Lichen	<i>Parmelia stictica</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Forked chickweed	<i>Paronychia fastigiata</i>	No	No	No	No
Endangered	Wild quinine	<i>Parthenium integrifolium</i>	No	No	No	No
Endangered	Tubercled rein-orchid	<i>Platanthera flava</i> var. <i>herbiola</i>	No	No	No	No
Endangered	Western prairie fringed orchid	<i>Platanthera praeclara</i>	No	No	No	No
Endangered	Western Jacob's ladder	<i>Polemonium occidentale</i> ssp. <i>lacustre</i>	No	No	No	No
Endangered	Cross-leaved milkwort	<i>Polygala cruciata</i>	No	No	No	No
Endangered	Braun's holly fern	<i>Polystichum braunii</i>	No	No	No	No
Endangered	Snailseed pondweed	<i>Potamogeton bicupulatus</i>	No	No	No	No
Endangered	Diverse-leaved pondweed	<i>Potamogeton diversifolius</i>	No	No	No	No
Endangered	Slender-leaved scurf pea	<i>Psoralidium tenuiflora</i>	No	No	No	No
Endangered	Fungus	<i>Psathyrella cystidiosa</i>	No	No	No	No
Endangered	Fungus	<i>Psathyrella rhodospora</i>	No	No	No	No
Endangered	Lichen	<i>Pseudocyphellaria crocata</i>	No	No	No	No
Endangered	Knotty pearlwort	<i>Sagina nodosa</i>	No	No	No	No
Endangered	Nodding saxifrage	<i>Saxifraga cernua</i>	No	No	No	No
Endangered	Luminous moss	<i>Schistostegia pennata</i>	No	No	No	No
Endangered	Tall nut-rush	<i>Scleria triglomerata</i>	No	No	No	No
Endangered	Leedy's roseroot	<i>Sedum integrifolium</i> ssp. <i>leedyi</i>	No	No	No	No
Endangered	Northern spikemoss	<i>Selaginella selaginoides</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Endangered	Gray ragwort	<i>Senecio canus</i>	No	No	No	No
Endangered	Rough-seeded fameflower	<i>Talinum rugospermum</i>	No	No	No	No
Endangered	Small false asphodel	<i>Tofieldia pusilla</i>	No	No	No	No
Endangered	Lichen	<i>Umbilicaria torrefacta</i>	No	No	No	No
Endangered	Twisted yellow-eyed grass	<i>Xyris torta</i>	No	No	No	No
Threatened	Siberian yarrow	<i>Achillea sibirica</i>	No	No	No	No
Threatened	Nodding wild onion	<i>Allium cernuum</i>	No	No	No	No
Threatened	Wild chives	<i>Allium schoenoprasum</i>	No	No	No	No
Threatened	Beachgrass	<i>Ammophila breviligulata</i>	No	No	No	No
Threatened	Holboell's rockcress	<i>Arabis holboellii</i> var. <i>retrofracta</i>	No	No	No	No
Threatened	Long-leaved arnica	<i>Arnica lonchophylla</i>	No	No	No	No
Threatened	Tuberous Indian-plantain	<i>Arnoglossum plantagineum</i>	No	No	No	No
Threatened	Prairie milkweed	<i>Asclepias hirtella</i>	No	No	No	No
Threatened	Sullivant's milkweed	<i>Asclepias sullivantii</i>	No	No	No	No
Threatened	Maidenhair spleenwort	<i>Asplenium trichomanes</i>	No	No	No	No
Threatened	Short's aster	<i>Aster shortii</i>	No	No	No	No
Threatened	Fernleaf false foxglove	<i>Aureolaria pedicularia</i>	No	No	No	No
Threatened	Kitten-tails	<i>Besseyia bullii</i>	No	No	No	No
Threatened	Triangle moonwort	<i>Botrychium lanceolatum</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Threatened	Common moonwort	<i>Botrychium lunaria</i>	No	No	No	No
Threatened	St. Lawrence grapefern	<i>Botrychium rugulosum</i>	No	No	No	No
Threatened	Carey's sedge	<i>Carex careyana</i>	No	No	No	No
Threatened	Jointed sedge	<i>Carex conjuncta</i>	No	No	No	No
Threatened	Davis' sedge	<i>Carex davisii</i>	No	No	No	No
Threatened	Fescue sedge	<i>Carex festucacea</i>	No	No	No	No
Threatened	Garber's sedge	<i>Carex garberi</i>	No	No	No	No
Threatened	James' sedge	<i>Carex jamesii</i>	No	No	No	No
Threatened	Katahdin sedge	<i>Carex katahdinensis</i>	No	No	No	No
Threatened	Smooth-sheathed sedge	<i>Carex laevivaginata</i>	No	No	No	No
Threatened	Spreading sedge	<i>Carex laxiculmis</i>	No	No	No	No
Threatened	Sterile sedge	<i>Carex sterilis</i>	No	No	No	No
Threatened	Lichen	<i>Cetraria oakesiana</i>	No	No	No	No
Threatened	Lichen	<i>Coccocarpia palmicola</i>	No	No	No	No
Threatened	Pigmyweed	<i>Crassula aquatica</i>	No	No	No	No
Threatened	Black hawthorn	<i>Crataegus douglasii</i>	No	No	No	No
Threatened	Short-pointed umbrella-sedge	<i>Cyperus acuminatus</i>	No	No	No	No
Threatened	Ram's-head lady's-slipper	<i>Cypripedium arietinum</i>	No	No	No	No
Threatened	Narrow-leaved spleenwort	<i>Diplazium pycnocarpon</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Threatened	Marginal shield-fern	<i>Dryopteris marginalis</i>	No	No	No	No
Threatened	Neat spike-rush	<i>Eleocharis nitida</i>	No	No	No	No
Threatened	Olivaceous spke-rush	<i>Eleocharis olivacea</i>	No	No	No	No
Threatened	Beaked spike-rush	<i>Eleocharis rostellata</i>	No	No	No	No
Threatened	Upland boneset	<i>Eupatorium sessilifolium</i>	No	No	No	No
Threatened	False mermaid	<i>Floerkea proserpinacoides</i>	No	No	No	No
Threatened	Mud plantain	<i>Heteranthera limosa</i>	No	No	No	No
Threatened	Rock clubmoss	<i>Huperzia porophila</i>	No	No	No	No
Threatened	Prarie bush clover	<i>Lespedeza leptostachya</i>	No	No	No	No
Threatened	Three-flowered melic	<i>Melica nitens</i>	No	No	No	No
Threatened	Large-leaved sandwort	<i>Moehringia macrophylla</i>	No	No	No	No
Threatened	Glade mallow	<i>Napaea dioica</i>	No	No	No	No
Threatened	Small white waterlily	<i>Nymphaea leibergii</i>	No	No	No	No
Threatened	Lichen	<i>Parmelia stuppea</i>	No	No	No	No
Threatened	Canadian forked chickweed	<i>Paronychia canadensis</i>	No	No	No	No
Threatened	Broad beech-fern	<i>Phegopteris hexagonoptera</i>	No	No	No	No
Threatened	Slender plantain	<i>Plantago elongata</i>	No	No	No	No
Threatened	Bog bluegrass	<i>Poa paludigena</i>	No	No	No	No
Threatened	Christmas fern	<i>Polystichum acrostichoides</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Threatened	Hair-like beak-rush	<i>Rhynchospora capillacea</i>	No	No	No	No
Threatened	Tooth-cup	<i>Rotala ramosior</i>	No	No	No	No
Threatened	Cloudberry	<i>Rubus chamaemorus</i>	No	No	No	No
Threatened	Red saltwort	<i>Salicornia rubra</i>	No	No	No	No
Threatened	Encrusted saxifrage	<i>Saxifraga paniculata</i>	No	No	No	No
Threatened	Whorled nut-rush	<i>Scleria verticillata</i>	No	No	No	No
Threatened	Ovate-leaved skullcap	<i>Scutellaria ovata</i>	No	No	No	No
Threatened	Annual skeletonweed	<i>Shinnersoseris rostrata</i>	No	No	No	No
Threatened	Snowy campion	<i>Silene nivea</i>	No	No	No	No
Threatened	Awlwort	<i>Subularia aquatica</i>	No	No	No	No
Threatened	Reniform sullivantia	<i>Sullivantia sullivantii</i>	No	No	No	No
Threatened	Alpine bilberry	<i>Vaccinium uliginosum</i>	No	No	No	No
Threatened	Valerian	<i>Valeriana edulis</i> var. <i>ciliata</i>	No	No	No	No
Threatened	Lance-leaved violet	<i>Viola lanceolata</i>	No	No	No	No
Threatened	Yellow prairie violet	<i>Viola nuttallii</i>	No	No	No	No
Threatened	Smooth woodsia	<i>Woodsia glabella</i>	No	No	No	No
Threatened	Rocky Mountain woodsia	<i>Woodsia scopulina</i>	No	No	No	No
Special Concern	Moschatel	<i>Adoxa moschatellina</i>	No	No	No	No
Special Concern	Twin bentgrass	<i>Agrostis geminata</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Lichen	<i>Anaptychia setifera</i>	No	No	No	No
Special Concern	Northern androsace	<i>Androsace septentrionalis</i> ssp. <i>Puberulenta</i>	No	No	No	No
Special Concern	Small-leaved pussytoes	<i>Antennaria parvifolia</i>	No	No	No	No
Special Concern	Red three-awn	<i>Aristida purpurea</i>	No	No	No	No
Special Concern	Sea-beach needlegrass	<i>Aristida tuberculosa</i>	No	No	No	No
Special Concern	Clasping milkweed	<i>Asclepias amplexicaulis</i>	No	No	No	No
Special Concern	Ebondy spleenwort	<i>Asplenium platyneuron</i>	No	No	No	No
Special Concern	Slender milk-vetch	<i>Astragalus flexuosus</i>	No	No	No	No
Special Concern	Missouri milk-vetch	<i>Astragalus missouriensis</i>	No	No	No	No
Special Concern	Water-hyssop	<i>Bacopa rotundifolia</i>	No	No	No	No
Special Concern	White wild indigo	<i>Baptisia alba</i>	No	No	No	No
Special Concern	Plains wild indigo	<i>Baptisia bracteata</i> var. <i>leucophaea</i>	No	No	No	No
Special Concern	Prairie moonwort	<i>Botrychium campestre</i>	No	No	No	No
Special Concern	Mingan moonwort	<i>Botrychium minganense</i>	No	No	No	No
Special Concern	Goblin fern	<i>Botrychium mormo</i>	No	No	No	No
Special Concern	Least moonwort	<i>Botrychium simplex</i>	No	No	No	No
Special Concern	Sword moss	<i>Bryoxiphium norvegicum</i>	No	No	No	No
Special Concern	Buffalo grass	<i>Buchloe dactyloides</i>	No	No	No	No
Special Concern	Marsh reedgrass	<i>Calamagrostis lacustris</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Plains reedgrass	<i>Calamagrostis montanensis</i>	No	No	No	No
Special Concern	Purple reedgrass	<i>Calamagrostis purpurascens</i>	No	No	No	No
Special Concern	Larger water-starwort	<i>Callitriche heterophylla</i>	No	No	No	No
Special Concern	Yellow-fruited sedge	<i>Carex annectens</i>	No	No	No	No
Special Concern	Raven's foot sedge	<i>Carex crus-corvi</i>	No	No	No	No
Special Concern	Coastal sedge	<i>Carex exilis</i>	No	No	No	No
Special Concern	Yellow sedge	<i>Carex flava</i>	No	No	No	No
Special Concern	Hall's sedge	<i>Carex hallii</i>	No	No	No	No
Special Concern	Michaux's sedge	<i>Carex michauxiana</i>	No	No	No	No
Special Concern	Blunt sedge	<i>Carex obtusata</i>	No	No	No	No
Special Concern	Prairie sedge	<i>Carex praticola</i>	No	No	No	No
Special Concern	Northern singlespike sedge	<i>Carex scirpoidea</i>	No	No	No	No
Special Concern	Weak arctic sedge	<i>Carex supina</i> var. <i>spaniocarpa</i>	No	No	No	No
Special Concern	Cattail sedge	<i>Carex typhina</i>	No	No	No	No
Special Concern	Wood's sedge	<i>Carex woodii</i>	No	No	No	No
Special Concern	Dry sedge	<i>Carex xerantica</i>	No	No	No	No
Special Concern	Lichen	<i>Cetraria aurescens</i>	No	No	No	No
Special Concern	Missouri spurge	<i>Chamaesyce missurica</i>	No	No	No	No
Special Concern	Hill's thistle	<i>Cirsium hillii</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Twig-rush	<i>Cladium mariscoides</i>	No	No	No	No
Special Concern	Lichen	<i>Cladonia pseudorangiformis</i>	No	No	No	No
Special Concern	Carolina spring-beauty	<i>Claytonia caroliniana</i>	No	No	No	No
Special Concern	Wild parsely	<i>Cymopterus acaulis</i>	No	No	No	No
Special Concern	Small white lady's slipper	<i>Cypripedium candidum</i>	No	No	No	No
Special Concern	Western white prairie-clover	<i>Dalea candida</i> var. <i>oligophylla</i>	No	No	No	No
Special Concern	Waterwillow	<i>Decodon verticillatus</i>	No	No	No	No
Special Concern	Slender hairgrass	<i>Deschampsia flexuosa</i>	No	No	No	No
Special Concern	Prairie mimosa	<i>Desmanthus illinoensis</i>	No	No	No	No
Special Concern	Big tick-trefoil	<i>Desmodium cuspidatum</i> var. <i>longifolium</i>	No	No	No	No
Special Concern	Stemless tick-trefoil	<i>Desmodium nudiflorum</i>	No	No	No	No
Special Concern	American beakgrain	<i>Diarrhena obovata</i>	No	No	No	No
Special Concern	Squirrel-corn	<i>Dicentra canadensis</i>	No	No	No	No
Special Concern	Rock whitlow-grass	<i>Draba arabisans</i>	No	No	No	No
Special Concern	English sundew	<i>Drosera anglica</i>	No	No	No	No
Special Concern	Linear-leaved sundew	<i>Drosera linearis</i>	No	No	No	No
Special Concern	Goldie's fern	<i>Dryopteris goldiana</i>	No	No	No	No
Special Concern	Dwarf spike-rush	<i>Eleocharis parvula</i>	No	No	No	No
Special Concern	Few-flowered spike-rush	<i>Eleocharis quinqueflor</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Rattlesnake-master	<i>Eryngium yuccifolium</i>	No	No	No	No
Special Concern	Hudson Bay eyebright	<i>Euphrasia hudsoniana</i>	No	No	No	No
Special Concern	Autumn fimbristylis	<i>Fimbristylis autumnalis</i>	No	No	No	No
Special Concern	Blanket-flower	<i>Gaillardia aristata</i>	No	No	No	No
Special Concern	Northern gentian	<i>Gentiana affinis</i>	No	No	No	No
Special Concern	Felwort	<i>Gentianella amarella ssp. acuta</i>	No	No	No	No
Special Concern	Witch-hazel	<i>Hamamelis virginiana</i>	No	No	No	No
Special Concern	Nuttall's sunflower	<i>Helianthus nuttallii</i>	No	No	No	No
Special Concern	Oat-grass	<i>Helictotrichon hookeri</i>	No	No	No	No
Special Concern	Beach-heather	<i>Hudsonia tomentosa</i>	No	No	No	No
Special Concern	American water-pennywort	<i>Hydrocotyle americana</i>	No	No	No	No
Special Concern	Twinleaf	<i>Jeffersonia diphylla</i>	No	No	No	No
Special Concern	Butternut	<i>Juglans cinerea</i>	No	No	No	No
Special Concern	Marginated rush	<i>Juncus marginatus</i>	No	No	No	No
Special Concern	Bog rush	<i>Juncus stygius</i> var. <i>americanus</i>	No	No	No	No
Special Concern	Creeping juniper	<i>Juniperus horizontalis</i>	No	No	No	No
Special Concern	Fungus	<i>Laccaria trullisata</i>	No	No	No	No
Special Concern	Fungus	<i>Lactarius fuliginellus</i>	No	No	No	No
Special Concern	Catchfly grass	<i>Leersia lenticularis</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Mudwort	<i>Limosella aquatica</i>	No	No	No	No
Special Concern	Broad-lipped twayblade	<i>Listera convallarioides</i>	No	No	No	No
Special Concern	American shore-plantain	<i>Littorella uniflora</i>	No	No	No	No
Special Concern	Lich	<i>Lobaria quercizans</i>	No	No	No	No
Special Concern	Small-flowered woodrush	<i>Luzula parviflora ssp. Melanocarpa</i>	No	No	No	No
Special Concern	Whorled loosestrife	<i>Lysimachia quadrifolia</i>	No	No	No	No
Special Concern	Fungus	<i>Lysurus cruciatus</i>	No	No	No	No
Special Concern	Cutleaf ironplant	<i>Machaeranthera pinnatifida</i>	No	No	No	No
Special Concern	White adder's-mouth	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	No	No	No	No
Special Concern	Rock sandwort	<i>Minuartia dawsonensis</i>	No	No	No	No
Special Concern	One-flowered muhly	<i>Muhlenbergia uniflora</i>	No	No	No	No
Special Concern	Slender naiad	<i>Najas gracillima</i>	No	No	No	No
Special Concern	Sea naiad	<i>Najas marina</i>	No	No	No	No
Special Concern	Rhombic-petaled evening primrose	<i>Oenothera rhombipetala</i>	No	No	No	No
Special Concern	Plains prickly pear	<i>Opuntia macrorhiza</i>	No	No	No	No
Special Concern	Clustered broomrape	<i>Orobanche fasciculata</i>	No	No	No	No
Special Concern	Louisiana broomrape	<i>Orobanche ludoviciana</i>	No	No	No	No
Special Concern	One-flowered broomrape	<i>Orobanche uniflora</i>	No	No	No	No
Special Concern	Blunt-fruited sweet cicely	<i>Osmorhiza depauperata</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	American ginseng	<i>Panax quinquefolius</i>	No	No	No	No
Special Concern	Purple cliff-break	<i>Pallaea atropurpurea</i>	No	No	No	No
Special Concern	Lichen	<i>Peltigera venosa</i>	No	No	No	No
Special Concern	Franklin's phacelia	<i>Phacelia franklinii</i>	No	No	No	No
Special Concern	Butterwort	<i>Pinguicula vulgaris</i>	No	No	No	No
Special Concern	Club-spur orchid	<i>Platanthera clavellata</i>	No	No	No	No
Special Concern	Wolf's bluegrass	<i>Poa wolfii</i>	No	No	No	No
Special Concern	Carey's smartweed	<i>Polygonum careyi</i>	No	No	No	No
Special Concern	Alpine bistort	<i>Polygonum viviparum</i>	No	No	No	No
Special Concern	Prairie-parsley	<i>Polytaenia nuttallii</i>	No	No	No	No
Special Concern	Sheathed pondweed	<i>Potamogeton vaginatus</i>	No	No	No	No
Special Concern	Vasey's pondweed	<i>Potamogeton vaseyi</i>	No	No	No	No
Special Concern	Nodding rattlesnake-root	<i>Prenanthes crepidinea</i>	No	No	No	No
Special Concern	Small shinleaf	<i>Pyrola minor</i>	No	No	No	No
Special Concern	Lapland buttercup	<i>Ranunculus lapponicus</i>	No	No	No	No
Special Concern	Sooty-colored beak-rush	<i>Rhynchospora fusca</i>	No	No	No	No
Special Concern	Sessile-flowered cress	<i>Rorippa sessiliflora</i>	No	No	No	No
Special Concern	Three-leaved coneflower	<i>Rudbeckia triloba</i>	No	No	No	No
Special Concern	Ditch-grass	<i>Ruppia maritima</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Maccall's willow	<i>Salix maccalliana</i>	No	No	No	No
Special Concern	Satiny willow	<i>Salix pellita</i>	No	No	No	No
Special Concern	Beaked snakeroot	<i>Sanicula trifoliata</i>	No	No	No	No
Special Concern	Tumblegrass	<i>Schedonnardus paniculatus</i>	No	No	No	No
Special Concern	Clinton's bulrush	<i>Scirpus clintonii</i>	No	No	No	No
Special Concern	Elegant grounsel	<i>Senecio indecorus</i>	No	No	No	No
Special Concern	Drummond's campion	<i>Silene drummondii</i>	No	No	No	No
Special Concern	Soft goldenrod	<i>Solidago mollis</i>	No	No	No	No
Special Concern	Cliff goldenrod	<i>Solidago sciaphila</i>	No	No	No	No
Special Concern	Clustered bur-reed	<i>Sparganium glomeratum</i>	No	No	No	No
Special Concern	Long-stalked chickweed	<i>Stellaria longipes</i>	No	No	No	No
Special Concern	Lichen	<i>Sticta fuliginosa</i>	No	No	No	No
Special Concern	Coralberry	<i>Symphoricarpos orbiculatus</i>	No	No	No	No
Special Concern	Goat's-rue	<i>Tephrosia virginiana</i>	No	No	No	No
Special Concern	Moss	<i>Tomenthypnum falcifolium</i>	No	No	No	No
Special Concern	Torrey's manna-grass	<i>Torreyochloa pallida</i>	No	No	No	No
Special Concern	Snow trillium	<i>Trillium nivale</i>	No	No	No	No
Special Concern	Bitter fleabane	<i>Trimorpha acris</i> var. <i>asteroides</i>	No	No	No	No
Special Concern	Shortray fleabane	<i>Trimorpha lonchaphylla</i>	No	No	No	No

Minnesota Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA						
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in GPRO?	Potential to be Affected by Treatment Options in MISS?	Potential to be Affected by Treatment Options in SACN?	Potential to be Affected by Treatment Options in VOYA?
Special Concern	Purple sand-grass	<i>Triplasis purpurea</i>	No	No	No	No
Special Concern	Eastern hemlock	<i>Tsuga canadensis</i>	No	No	No	No
Special Concern	Purple-flowered bladderwort	<i>Utricularia purpurea</i>	No	No	No	No
Special Concern	Lavender bladderwort	<i>Utricularia resupinata</i>	No	No	No	No
Special Concern	Narrow-leaved vervain	<i>Verbena simplex</i>	No	No	No	No
Special Concern	Silverleaf grape	<i>Vitis aestivalis</i>	No	No	No	No
Special Concern	Barren strawberry	<i>Waldsteinia fragarioides</i>	No	No	No	No
Special Concern	Alpine woodsia	<i>Woodsia alpina</i>	No	No	No	No
Special Concern	Montane yellow-eyed grass	<i>Xyris montana</i>	No	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Mammals					
Endangered	Cougar	<i>Felis concolor</i>	No	No	No
Endangered	Lynx	<i>Lynx canadensis</i>	No	No	No
Endangered	Prairie vole	<i>Microtus ochrogaster</i>	No	No	No
Endangered	Indiana bat	<i>Myotis sodalis</i>	No	No	No
Threatened	Gray wolf	<i>Canis lupus</i>	No	No	No
Threatened	Least shrew	<i>Cryptotis parva</i>	No	No	No
Threatened	Evening bat	<i>Nycticeius humeralis</i>	No	No	No
Threatened	Smoky shrew	<i>Sorex fumeus</i>	No	No	No
Special Concern	Moose	<i>Alces americanus</i>	No	No	No
Special Concern	Northern flying squirrel	<i>Glaucomys sabrinus</i>	No	No	No
Special Concern	Woodland vole	<i>Microtus pinetorum</i>	No	No	No
Special Concern	Eastern pipistrelle	<i>Pipistrellus subflavus</i>	No	No	No
Birds					
Endangered	Henslow's sparrow	<i>Ammodramus henslowii</i>	No	No	No
Endangered	Short-eared owl	<i>Asio flammeus</i>	No	No	No
Endangered	Piping plover	<i>Charadrius melodus</i>	No	No	Yes, addressed in Section 3.3.5
Endangered	Prairie warbler	<i>Dendroica discolor</i>	No	No	No
Endangered	Kirtland's warbler	<i>Dendroica kirtlandii</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Peregrine falcon	<i>Falco peregrinus</i>	No	No	No
Endangered	Migrant loggerhead shrike	<i>Lanius ludovicianus migrans</i>	No	No	No
Endangered	King rail	<i>Rallus elegans</i>	No	No	No
Endangered	Barn owl	<i>Tyto alba</i>	No	No	No
Threatened	Long-eared owl	<i>Asio otus</i>	No	No	No
Threatened	Red-shouldered hawk	<i>Buteo lineatus</i>	No	No	No
Threatened	Yellow rail	<i>Coturnicops noveboracensis</i>	No	No	No
Threatened	Trumpeter swan	<i>Cygnus buccinator</i>	No	No	No
Threatened	Cerulean warbler	<i>Dendroica cerulea</i>	No	No	No
Threatened	Yellow-throated warbler	<i>Dendroica dominica</i>	No	No	No
Threatened	Merlin	<i>Falco columbarius</i>	No	No	No
Threatened	Common moorhen	<i>Gallinula chloropus</i>	No	No	No
Threatened	Common loon	<i>Gavia immer</i>	No	No	No
Threatened	Least bittern	<i>Ixobrychus exilis</i>	No	No	No
Threatened	Louisiana waterthrush	<i>Seiurus motacilla</i>	No	No	No
Threatened	Caspian tern	<i>Sterna caspia</i>	No	No	No
Threatened	Forster's tern	<i>Sterna forsteri</i>	No	No	No
Threatened	Common tern	<i>Sterna hirundo</i>	No	No	No
Special Concern	Northern goshawk	<i>Accipiter gentilis</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Grasshopper sparrow	<i>Ammodramus savannarum</i>	No	No	No
Special Concern	Ammerican bittern	<i>Botaurus lentiginosus</i>	No	No	No
Special Concern	Black tern	<i>Chlidonias niger</i>	No	No	No
Special Concern	Northern harrier	<i>Circus cyaneus</i>	No	No	No
Special Concern	Marsh wren	<i>Cistothorus palustris</i>	No	No	No
Special Concern	Spruce grouse	<i>Falcipennis canadensis</i>	No	No	No
Special Concern	Bald eagle	<i>Haliaeetus leucocephalus</i>	No	No	No
Special Concern	Black-crowned night-heron	<i>Nycticorax nycticorax</i>	No	No	No
Special Concern	Osprey	<i>Pandion haliaetus</i>	No	No	No
Special Concern	Wilson's phalarope	<i>Phalaropus tricolor</i>	No	No	No
Special Concern	Black-backed woodpecker	<i>Picoides arcticus</i>	No	No	No
Special Concern	Prothonotary warbler	<i>Protonotaria citrea</i>	No	No	No
Special Concern	Dickcissel	<i>Spiza americana</i>	No	No	No
Special Concern	Western meadowlark	<i>Sturnella neglecta</i>	No	No	No
Special Concern	Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	No	No	No
Special Concern	Hooded warbler	<i>Wilsonia citrina</i>	No	No	No
Special Concern	Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	No	No	No
Extirpated	Lark sparrow	<i>Chondestes grammacus</i>	No	No	No
Reptiles and Amphibians					

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Marbled salamander	<i>Ambystoma opacum</i>	No	No	No
Endangered	Smallmouth salamander	<i>Ambystoma texanum</i>	No	No	No
Endangered	Kirtland's snake	<i>Clonophis kirtlandii</i>	No	No	No
Endangered	Copperbelly water snake	<i>Nerodia erythrogaster neglecta</i>	No	No	No
Threatened	Blanchard's cricket frog	<i>Acris crepitans blanchardi</i>	No	No	No
Threatened	Six-lined racerunner	<i>Aspidoscelis sexlineata</i>	No	No	No
Threatened	Spotted turtle	<i>Clemmys guttata</i>	No	No	No
Threatened	Eastern fox snake	<i>Pantherophis gloydi</i>	No	No	No
Special Concern	Blanding's turtle	<i>Emydoidea blandingii</i>	No	No	No
Special Concern	Wood turtle	<i>Glyptemys insculpta</i>	No	No	No
Special Concern	Gray ratsnake	<i>Pantherophis spiloides</i>	No	No	No
Special Concern	Boreal chorus frog	<i>Pseudoacris triseriata maculata</i>	No	No	No
Special Concern	Northern leopard frog	<i>Rana pipiens</i>	No	No	No
Special Concern	Queen snake	<i>Regina septemvittata</i>	No	No	No
Special Concern	Western lesser siren	<i>Siren intermedia nettingi</i>	No	No	No
Special Concern	Eastern massasauga	<i>Sistrurus catenatus catenatus</i>	No	No	No
Special Concern	Eastern box turtle	<i>Terrapene carolina carolina</i>	No	No	No
Fishes					
Endangered	Redside dace	<i>Clinostomus elongatus</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Creek chubsucker	<i>Erimyzon claviformis</i>	No	No	No
Endangered	Pugnose shiner	<i>Notropis anogenus</i>	No	No	No
Endangered	Silver shiner	<i>Notropis photogenis</i>	No	No	No
Endangered	Northern madtom	<i>Noturus stigmosus</i>	No	No	No
Endangered	Pugnose minnow	<i>Opsopoeodus emiliae</i>	No	No	No
Endangered	Channel darter	<i>Percina copelandi</i>	No	No	No
Endangered	River darter	<i>Percina shumardi</i>	No	No	No
Endangered	Southern redbelly dace	<i>Phoxinus erythrogaster</i>	No	No	No
Threatened	Lake sturgeon	<i>Acipenser fulvescens</i>	No	No	No
Threatened	Eastern sand darter	<i>Ammocrypta pellucida</i>	No	No	No
Threatened	Lake herring	<i>Coregonus artedi</i>	No	No	No
Threatened	Siskiwit lake cisco	<i>Coregonus bartlettii</i>	No	No	No
Threatened	Ives lake cisco	<i>Coregonus hubbsi</i>	No	No	No
Threatened	Shortjaw cisco	<i>Coregonus zenithicus</i>	No	No	No
Threatened	Mooneye	<i>Hiodon tergisus</i>	No	No	No
Threatened	River redhorse	<i>Moxostoma carinatum</i>	No	No	No
Threatened	Sauger	<i>Sander canadensis</i>	No	No	No
Special Concern	Kiyi	<i>Coregonus kiyi</i>	No	No	No
Special Concern	Spoonhead sculpin	<i>Cottus ricei</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Orangethroat darter	<i>Etheostoma spectabile</i>	No	No	No
Special Concern	Starhead topminnow	<i>Fundulus dispar</i>	No	No	No
Special Concern	Spotted gar	<i>Lepisosteus oculatus</i>	No	No	No
Special Concern	Silver chub	<i>Macrhybopsis storeriana</i>	No	No	No
Special Concern	Bigmouth shiner	<i>Notropis dorsalis</i>	No	No	No
Special Concern	Brindled madtom	<i>Noturus miurus</i>	No	No	No
Extirpated	Deepwater cisco	<i>Coregonus johannae</i>	No	No	No
Extirpated	Blackfin cisco	<i>Coregonus nigripinnis</i>	No	No	No
Extirpated	Shortnose cisco	<i>Coregonus reighardi</i>	No	No	No
Extirpated	Bigeye chub	<i>Notropis amblops</i>	No	No	No
Extirpated	Ironcolor shiner	<i>Notropis chalybaeus</i>	No	No	No
Extirpated	Weed shiner	<i>Notropis texanus</i>	No	No	No
Extirpated	Paddlefish	<i>Polyodon spathula</i>	No	No	No
Extirpated	Blue Pike	<i>Sander glaucus</i>	No	No	No
Extirpated	Arctic grayling	<i>Thymallus arcticus</i>	No	No	No
Insects					
Endangered	Hungerford's crawling water beetle	<i>Brychius hungerfordii</i>	No	No	No
Endangered	Three-staff underwing	<i>Catocala amestris</i>	No	No	No
Endangered	Mitchell's satyr	<i>Neonympha mitchellii mitchellii</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Phlox moth	<i>Schinia indiana</i>	No	No	No
Endangered	Leadplant moth	<i>Schinia lucens</i>	No	No	No
Endangered	Hine's emerald dragonfly	<i>Somatochlora hineana</i>	No	No	No
Endangered	Regal fritillary	<i>Speyeria idalia</i>	No	No	No
Threatened	Six-banded longhorn beetle	<i>Dryobius sexnotatus</i>	No	No	No
Threatened	Persius dusky wing	<i>Erynnis persius persius</i>	No	No	No
Threatened	Corylus dagger moth	<i>Acronicta falcula</i>	No	No	No
Threatened	Duke's skipper	<i>Euphyes dukesi</i>	No	No	No
Threatened	Huron River leafhopper	<i>Flexamia huroni</i>	No	No	No
Threatened	Ottoe skipper	<i>Hesperia ottoe</i>	No	No	No
Threatened	Henry's elfin	<i>Incisalia henrici</i>	No	No	No
Threatened	Frosted elfin	<i>Incisalia irus</i>	No	No	No
Threatened	Northern blue	<i>Lycaeides idas nabokovi</i>	No	No	No
Threatened	Karner blue	<i>Lycaeides melissa samuelis</i>	No	No	No
Threatened	Poweshiek skipperling	<i>Oarisma poweshiek</i>	No	No	No
Threatened	Pygmy snaketail	<i>Ophiogomphus howei</i>	No	No	No
Threatened	Silphium borer moth	<i>Papaipema silphii</i>	No	No	No
Threatened	Grey petaltail	<i>Tachopteryx thoreyi</i>	No	No	No
Threatened	Lake Huron locust	<i>Trimerotropis huroniana</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Walker's tusked sprawler	<i>Anthopotamus verticis</i>	No	No	No
Special Concern	Secretive locust	<i>Appalachia arcana</i>	No	No	No
Special Concern	Davis's shield-bearer	<i>Atlanticus davisii</i>	No	No	No
Special Concern	Dusted skipper	<i>Atrytonopsis hianna</i>	No	No	No
Special Concern	Gold moth	<i>Basilodes pepita</i>	No	No	No
Special Concern	Pipevine swallowtail	<i>Battus philenor</i>	No	No	No
Special Concern	Freija fritillary	<i>Boloria freija</i>	No	No	No
Special Concern	Frigga fritillary	<i>Boloria frigga</i>	No	No	No
Special Concern	Rusty-patched bumble bee	<i>Bombus affinis</i>	No	No	No
Special Concern	Yellow-banded bumble bee	<i>Bombus terricola</i>	No	No	No
Special Concern	Boreal brachionyncha	<i>Brachionycha borealis</i>	No	No	No
Special Concern	Swamp metalmark	<i>Calephelis mutica</i>	No	No	No
Special Concern	Quiet underwing	<i>Catocala dulciola</i>	No	No	No
Special Concern	Magdalen underwing	<i>Catocala illecta</i>	No	No	No
Special Concern	Robinson's underwing	<i>Catocala robinsoni</i>	No	No	No
Special Concern	Gorgone checkerspot	<i>Chlosyne gorgone carlota</i>	No	No	No
Special Concern	Tiger spiketail	<i>Cordulegaster erronea</i>	No	No	No
Special Concern	Leafhopper	<i>Dorydiella kansana</i>	No	No	No
Special Concern	Pine imperial moth	<i>Eacles imperialis pini</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Mayfly	<i>Epeorus suffusus</i>	No	No	No
Special Concern	Red-disked alpine	<i>Erebia discoidalis</i>	No	No	No
Special Concern	Early hairstreak	<i>Erora laeta</i>	No	No	No
Special Concern	Wild indigo duskywing	<i>Erynnis baptisiae</i>	No	No	No
Special Concern	Large marble	<i>Euchloe ausonides</i>	No	No	No
Special Concern	Dune cutworm	<i>Euxoa aurulenta</i>	No	No	No
Special Concern	Leafhopper	<i>Flexamia delongi</i>	No	No	No
Special Concern	Leafhopper	<i>Flexamia reflexus</i>	No	No	No
Special Concern	Northern hairstreak	<i>Fixsenia favonius ontario</i>	No	No	No
Special Concern	Splendid clubtail	<i>Gomphus lineatifrons</i>	No	No	No
Special Concern	Rapids clubtail	<i>Gomphus quadricolor</i>	No	No	No
Special Concern	Mayfly	<i>Habrophlebiodes americana</i>	No	No	No
Special Concern	Barrens buckmoth	<i>Hemileuca maia</i>	No	No	No
Special Concern	Somkey rubyspot	<i>Hetaerina titia</i>	No	No	No
Special Concern	Small heterocampa	<i>Heterocampa subrotata</i>	No	No	No
Special Concern	Riley's lappet moth	<i>Heteropacha rileyana</i>	No	No	No
Special Concern	Angular spittlebug	<i>Lepyronia angulifera</i>	No	No	No
Special Concern	Great Plains spittlebug	<i>Lepyronia gibbosa</i>	No	No	No
Special Concern	Cantrall's bog beetle	<i>Liodessus cantralli</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Caddisfly	<i>Limnephilus pallens</i>	No	No	No
Special Concern	Black lordithon rove beetle	<i>Lordithon niger</i>	No	No	No
Special Concern	Blue-legged locust	<i>Melanoplus flavidus</i>	No	No	No
Special Concern	Doll's merolonche	<i>Merolonche dolli</i>	No	No	No
Special Concern	Newman's brocade	<i>Meropleon ambifusca</i>	No	No	No
Special Concern	Bog conehead	<i>Neoconocephalus lyristes</i>	No	No	No
Special Concern	Conehead grasshopper	<i>Neoconocephalus retusus</i>	No	No	No
Special Concern	Fishfly	<i>Neohermes concolor</i>	No	No	No
Special Concern	Tamarack tree cricket	<i>Oecanthus laricis</i>	No	No	No
Special Concern	Pinetree cricket	<i>Oecanthus pini</i>	No	No	No
Special Concern	Mancoun's arctic	<i>Oeneis macounii</i>	No	No	No
Special Concern	Three-striped oncocnemis	<i>Oncocnemis piffardi</i>	No	No	No
Special Concern	Extra-striped snaketail	<i>Ophiogomphus anomalus</i>	No	No	No
Special Concern	Red-faced meadow katydid	<i>Orchelimum concinnum</i>	No	No	No
Special Concern	Delicate meadow katydid	<i>Orchelimum delicatum</i>	No	No	No
Special Concern	Green desert grasshopper	<i>Orphulella pelidna</i>	No	No	No
Special Concern	Three-horned moth	<i>Pachypolia atricornis</i>	No	No	No
Special Concern	Aweme borer	<i>Papaipema aweme</i>	No	No	No
Special Concern	Blazing star borer	<i>Papaipema beeriana</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Golden borer	<i>Papaipema cerina</i>	No	No	No
Special Concern	Maritime sunflower borer	<i>Papaipema maritima</i>	No	No	No
Special Concern	Culvers root borer	<i>Papaipema sciata</i>	No	No	No
Special Concern	Regal fern borer	<i>Papaipema speciosissima</i>	No	No	No
Special Concern	Hoosier locust	<i>Paroxya hoosieri</i>	No	No	No
Special Concern	Prairie spittle bug	<i>Philaenarcys bilineata</i>	No	No	No
Special Concern	Tawny crescent	<i>Phyciodes batesii</i>	No	No	No
Special Concern	Hoary comma	<i>Polygonia gracilis</i>	No	No	No
Special Concern	Red-legged spittlebug	<i>Prosapia ignipectus</i>	No	No	No
Special Concern	Yellow-banded day-sphinx	<i>Proserpinus flavofasciata</i>	No	No	No
Special Concern	Atlantic-coast locust	<i>Psinidia fenestralis</i>	No	No	No
Special Concern	Sprague's pygarctia	<i>Pygarctia spraguei</i>	No	No	No
Special Concern	Grizzled skipper	<i>Pyrgus wyandot</i>	No	No	No
Special Concern	Pine katydid	<i>Scudderia fasciata</i>	No	No	No
Special Concern	Incurvate emerald	<i>Somatochlora incurvata</i>	No	No	No
Special Concern	Douglas stenelmis riffle beetle	<i>Stenelmis douglasensis</i>	No	No	No
Special Concern	Riverine snaketail	<i>Stylurus amnicola</i>	No	No	No
Special Concern	Laura's snaketail	<i>Stylurus laurae</i>	No	No	No
Special Concern	Elusive snaketail	<i>Stylurus notatus</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Russet-tipped clubtail	<i>Stylurus plagiatas</i>	No	No	No
Special Concern	Spartina moth	<i>Spartiniphaga inops</i>	No	No	No
Special Concern	Ebony boghaunter	<i>Williamsonia fletcheri</i>	No	No	No
Special Concern	Ringed boghaunter	<i>Williamsonia lintneri</i>	No	No	No
Extirpated	American burying beetle	<i>Nicrophorus americanus</i>	No	No	No
Mollusk/Crustacean					
Endangered	Land snail	<i>Catinella protracta</i>	No	No	No
Endangered	White catspaw	<i>Epioblasma obliquata perobliqua</i>	No	No	No
Endangered	Northern riffleshell	<i>Epioblasma torulosa rangiana</i>	No	No	No
Endangered	Snuffbox	<i>Epioblasma triquetra</i>	No	No	No
Endangered	Lamda snaggletooth	<i>Gastrocopta holzingeri</i>	No	No	No
Endangered	Sterki's granule	<i>Guppya sterkii</i>	No	No	No
Endangered	Eastern pondmussel	<i>Ligumia nasuta</i>	No	No	No
Endangered	Black sandshell	<i>Ligumia recta</i>	No	No	No
Endangered	Threehorn wartyback	<i>Obliquaria reflexa</i>	No	No	No
Endangered	Hickorynut	<i>Obovaria olivaria</i>	No	No	No
Endangered	Round hickorynut	<i>Obovaria subrotunda</i>	No	No	No
Endangered	Acorn ramshorn	<i>Planorbella multivolvis</i>	No	No	No
Endangered	Aquatic snail	<i>Planorbella smithi</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Clubshell	<i>Pleurobema clava</i>	No	No	No
Endangered	Salamander mussel	<i>Simpsonaias ambigua</i>	No	No	No
Endangered	Deepwater pondsnail	<i>Stagnicola contracta</i>	No	No	No
Endangered	Petoskey pondsnail	<i>Stagnicola petoskeyensis</i>	No	No	No
Endangered	Purple lilliput	<i>Toxolasma lividus</i>	No	No	No
Endangered	Lilliput	<i>Toxolasma parvus</i>	No	No	No
Endangered	Land snail	<i>Vallonia gracilicosta albula</i>	No	No	No
Endangered	Hubricht's vertigo	<i>Vertigo hubrichti</i>	No	No	No
Endangered	Land snail	<i>Vertigo modesta modesta</i>	No	No	No
Endangered	Land snail	<i>Vertigo modesta parietalis</i>	No	No	No
Endangered	Land snail	<i>Vertigo morsei</i>	No	No	No
Endangered	Deep-throat vertigo	<i>Vertigo nylanderi</i>	No	No	No
Endangered	Rayed bean	<i>Villosa fabalis</i>	No	No	No
Threatened	Slippershell	<i>Alasmidonta viridis</i>	No	No	No
Threatened	Pleistocene catinella	<i>Catinella exile</i>	No	No	No
Threatened	Land snail	<i>Catinella gelida</i>	No	No	No
Threatened	Purple wartyback	<i>Cyclonaias tuberculata</i>	No	No	No
Threatened	Carinate pillsnail	<i>Euchemotrema hubrichti</i>	No	No	No
Threatened	Land snail	<i>Euconulus alderi</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Bugle fossaria	<i>Fossaria cyclostoma</i>	No	No	No
Threatened	Cherrystone drop	<i>Hendersonia occulta</i>	No	No	No
Threatened	Wavyrayed lampmussel	<i>Lampsilis fasciola</i>	No	No	No
Threatened	Proud globe	<i>Mesodon elevatus</i>	No	No	No
Threatened	Foster mantleslug	<i>Philomycus fosteri</i>	No	No	No
Threatened	Broadshoulder physa	<i>Physella parkeri</i>	No	No	No
Threatened	Pink papershell	<i>Potamilus ohioensis</i>	No	No	No
Threatened	Round lake floater	<i>Pyganodon subgibbosa</i>	No	No	No
Threatened	Fawnsfoot	<i>Truncilla donaciformis</i>	No	No	No
Threatened	Delicate vertigo	<i>Vertigo bollesiana</i>	No	No	No
Special Concern	Spindle lymnaea	<i>Acella haldemani</i>	No	No	No
Special Concern	Elktoe	<i>Alasmidonta marginata</i>	No	No	No
Special Concern	Banded globe	<i>Anguispira kochi</i>	No	No	No
Special Concern	Spike-lip crater	<i>Appalachina sayanus</i>	No	No	No
Special Concern	Globe siltsnail	<i>Birgella subglobosus</i>	No	No	No
Special Concern	File thorn	<i>Carychium nannodes</i>	No	No	No
Special Concern	Campeloma spire snail	<i>Cincinnatia cincinnatiensis</i>	No	No	No
Special Concern	Domed disc	<i>Discus patulus</i>	No	No	No
Special Concern	Watercress snail	<i>Fontigens nickliniana</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Land snail	<i>Glyphyalinia solida</i>	No	No	No
Special Concern	Southeastern gem	<i>Hawaiiia alachuana</i>	No	No	No
Special Concern	Scaleshell	<i>Leptodea leptodon</i>	No	No	No
Special Concern	Greater European pea clam	<i>Pisidium amnicum</i>	No	No	No
Special Concern	Ornamanted peaclam	<i>Pisidium cruciatum</i>	No	No	No
Special Concern	Smooth coil	<i>Helicodiscus singleyanus</i>	No	No	No
Special Concern	Lake Superior ramshorn	<i>Helisoma anceps royallense</i>	No	No	No
Special Concern	Canadian duskysnail	<i>Lyogyrus walkeri</i>	No	No	No
Special Concern	Yellow goblet	<i>Mesodon clausus</i>	No	No	No
Special Concern	Sealed globelet	<i>Mesodon mitchellianus</i>	No	No	No
Special Concern	Proud globelet	<i>Mesodon pennsylvanicus</i>	No	No	No
Special Concern	Copper button	<i>Mesomphix cupreus</i>	No	No	No
Special Concern	Carolina mantleslug	<i>Philomycus carolinianus</i>	No	No	No
Special Concern	Eastern flat-whorl	<i>Planogyra asteriscus</i>	No	No	No
Special Concern	Great Lakes physa	<i>Physella magnalacustris</i>	No	No	No
Special Concern	Round peaclam	<i>Pisidium equilaterale</i>	No	No	No
Special Concern	Giant northern pea clam	<i>Pisidium idahoense</i>	No	No	No
Special Concern	Fingernail clam	<i>Pisidium simplex</i>	No	No	No
Special Concern	Round pigtoe	<i>Pleurobema sintoxia</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Brown walker	<i>Pomatiopsis cincinnatiensis</i>	No	No	No
Special Concern	Kidney shell	<i>Ptychobranchus fasciolaris</i>	No	No	No
Special Concern	Widespread column	<i>Pupilla muscorum</i>	No	No	No
Special Concern	Gravel pyrg	<i>Pyrgulopsis letsoni</i>	No	No	No
Special Concern	European pea clam	<i>Sphaerium corneum</i>	No	No	No
Special Concern	River fingernail clam	<i>Sphaerium fabale</i>	No	No	No
Special Concern	Coldwater pondsnail	<i>Stagnicola woodruffi</i>	No	No	No
Special Concern	Median striate	<i>Striatura meridionalis</i>	No	No	No
Special Concern	Deertoe	<i>Truncilla truncata</i>	No	No	No
Special Concern	Paper pondshell	<i>Utterbackia imbecillis</i>	No	No	No
Special Concern	Trumpet vallonia	<i>Vallonia parvula</i>	No	No	No
Special Concern	Purplecap valvata	<i>Valvata perdepressa</i>	No	No	No
Special Concern	Flanged valvata	<i>Valvata winnebagoensis</i>	No	No	No
Special Concern	Pyramid dome	<i>Ventridens intertextus</i>	No	No	No
Special Concern	Crested vertigo	<i>Vertigo cristata</i>	No	No	No
Special Concern	Flat dome	<i>Ventridens suppressus</i>	No	No	No
Special Concern	Ellipse	<i>Venustaconcha ellipsiformis</i>	No	No	No
Special Concern	Tapered vertigo	<i>Vertigo elatior</i>	No	No	No
Special Concern	Mystery vertigo	<i>Vertigo paradoxa</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Crested vertigo	<i>Vertigo pygmaea</i>	No	No	No
Special Concern	Rainbow	<i>Villosa iris</i>	No	No	No
Special Concern	Velvet wedge	<i>Xolotrema denotata</i>	No	No	No
Plants					
Endangered	Gattinger's gerardia	<i>Agalinis gattingeri</i>	No	No	No
Endangered	Skinner's gerardia	<i>Agalinis skinneriana</i>	No	No	No
Endangered	Small round-leaved orchis	<i>Amerorchis rotundifolia</i>	No	No	No
Endangered	Rock-jasmine	<i>Androsace occidentalis</i>	No	No	No
Endangered	Rosy pussytoes	<i>Antennaria rosea</i>	No	No	No
Endangered	Beach three-awned grass	<i>Aristida tuberculosa</i>	No	No	No
Endangered	Heart-leaved arnica	<i>Arnica cardifolia</i>	No	No	No
Endangered	Longleaf arnica	<i>Arnica lonchophylla</i>	No	No	No
Endangered	Dwarf milkweed	<i>Asclepias ovalifolia</i>	No	No	No
Endangered	Wall-rue	<i>Asplenium ruta-muraria</i>	No	No	No
Endangered	Hart's-tongue fern	<i>Asplenium scolopendrium</i> var. <i>americanum</i>	No	No	No
Endangered	Cream wild indigo	<i>Baptisia leucophaea</i>	No	No	No
Endangered	Kitten-tails	<i>Besseyia bullii</i>	No	No	No
Endangered	Moonwort	<i>Botrychium acuminatum</i>	No	No	No
Endangered	Side-oats grama grass	<i>Bouteloua curtipendula</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Raven's-foot sedge	<i>Carex crus-corvi</i>	No	No	No
Endangered	Hudson Bay sedge	<i>Carex heleonastes</i>	No	No	No
Endangered	Black sedge	<i>Carex nigra</i>	No	No	No
Endangered	Broad-leaved sedge	<i>Carex platyphylla</i>	No	No	No
Endangered	Straw sedge	<i>Carex straminea</i>	No	No	No
Endangered	American chestnut	<i>Castanea dentata</i>	No	No	No
Endangered	Rock-rose	<i>Chamaerhodos nuttallii</i> var. <i>keweenawensis</i>	No	No	No
Endangered	Wild oats	<i>Chasmanthium latifolium</i>	No	No	No
Endangered	Purple turtlehead	<i>Chelone obliqua</i>	No	No	No
Endangered	Mullein-foxtail	<i>Dasistoma macrophylla</i>	No	No	No
Endangered	Round-seed panic-grass	<i>Dichanthelium polyanthes</i>	No	No	No
Endangered	Shooting star	<i>Dodecatheon meadia</i>	No	No	No
Endangered	Smooth whitlow grass	<i>Draba glabella</i>	No	No	No
Endangered	Dwarf burhead	<i>Echinodorus tenellus</i>	No	No	No
Endangered	Purple spike rush	<i>Eleocharis atropurpurea</i>	No	No	No
Endangered	Small-fruited spike-rush	<i>Eleocharis microcarpa</i>	No	No	No
Endangered	Slender spike-rush	<i>Eleocharis nitida</i>	No	No	No
Endangered	Dwarf spike-rush	<i>Eleocharis parvula</i>	No	No	No
Endangered	Bedstraw	<i>Galium kamtschaticum</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	White gentian	<i>Gentiana flavida</i>	No	No	No
Endangered	Downy gentian	<i>Gentiana puberulenta</i>	No	No	No
Endangered	Bowman's root	<i>Gillenia trifoliata</i>	No	No	No
Endangered	Northern oak fern	<i>Gymnocarpium jessoense</i>	No	No	No
Endangered	Alpine sainfoin	<i>Hedysarum alpinum</i>	No	No	No
Endangered	Lakeside daisy	<i>Hymenoxys herbacea</i>	No	No	No
Endangered	Round-fruited St. John's-wort	<i>Hypericum sphaerocarpum</i>	No	No	No
Endangered	Engelmann's quilwort	<i>Isoetes engelmannii</i>	No	No	No
Endangered	Climbing fern	<i>Lygodium palmatum</i>	No	No	No
Endangered	Virginia bluebells	<i>Mertensia virginica</i>	No	No	No
Endangered	Michigan monkey flower	<i>Mimulus michiganensis</i>	No	No	Yes, addressed in Section 3.3.5
Endangered	Small yellow pond lily	<i>Nuphar pumila</i>	No	No	No
Endangered	Pygmy water lily	<i>Nymphaea leibergii</i>	No	No	No
Endangered	Southeastern adder's-tongue	<i>Ophioglossum vulgatum</i>	No	No	No
Endangered	Fragile prickly pear	<i>Opuntia fragilis</i>	No	No	No
Endangered	Slender beard tongue	<i>Penstemon gracilis</i>	No	No	No
Endangered	Wideflower phlox	<i>Phlox ovata</i>	No	No	No
Endangered	Heart-leaved plantain	<i>Plantago cordata</i>	No	No	No
Endangered	Orange- or yellow-fringed orchid	<i>Platanthera ciliaris</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Prairie white-fringed orchid	<i>Platanthera leucophaea</i>	No	No	No
Endangered	Canbyi's bluegrass	<i>Poa canbyi</i>	No	No	No
Endangered	Swamp or Black cottonwood	<i>Populus heterophylla</i>	No	No	No
Endangered	Spotted pondweed	<i>Potamogeton pulcher</i>	No	No	No
Endangered	Fairy bells	<i>Prosartes hookeri</i>	No	No	No
Endangered	Mermaid-weed	<i>Proserpinaca pectinata</i>	No	No	No
Endangered	Short-beak beak-rush	<i>Rhynchospora nitens</i>	No	No	No
Endangered	Globe beak-rush	<i>Rhynchospora recognita</i>	No	No	No
Endangered	Dwarf raspberry	<i>Rubus acaulis</i>	No	No	No
Endangered	Smooth ruellia	<i>Ruellia strepens</i>	No	No	No
Endangered	Western dock	<i>Rumex occidentalis</i>	No	No	No
Endangered	Canadian burnet	<i>Sanguisorba canadensis</i>	No	No	No
Endangered	Three-squared bulrush	<i>Schoenoplectus americanus</i>	No	No	No
Endangered	Few-flowered nut rush	<i>Scleria pauciflora</i>	No	No	No
Endangered	Skullcap	<i>Scutellaria nervosa</i>	No	No	No
Endangered	Fire pink	<i>Silene virginica</i>	No	No	No
Endangered	White goldenrod	<i>Solidago bicolor</i>	No	No	No
Endangered	Dropseed	<i>Sporobolus clandestinus</i>	No	No	No
Endangered	Fleshy stitchwort	<i>Stellaria crassifolia</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Endangered	Awlwort	<i>Subularia aquatica</i>	No	No	No
Endangered	Crane-fly orchid	<i>Tipularia discolor</i>	No	No	No
Endangered	Painted trillium	<i>Trillium undulatum</i>	No	No	No
Endangered	Floating bladderwort	<i>Utricularia inflata</i>	No	No	No
Endangered	Mountain cranberry	<i>Vaccinium vitis-idaea</i>	No	No	No
Endangered	Northern marsh violet	<i>Viola epipsila</i>	No	No	No
Endangered	Northern woodsia	<i>Woodsia alpina</i>	No	No	No
Threatened	Prairie or pale agoseris	<i>Agoseris glauca</i>	No	No	No
Threatened	Beaked agrimony	<i>Agrimonia rostellata</i>	No	No	No
Threatened	Chives	<i>Allium schoenoprasum</i>	No	No	No
Threatened	Rock cress	<i>Arabis perstellata</i>	No	No	No
Threatened	Three-awned grass	<i>Aristida longespica</i>	No	No	No
Threatened	Virginia snakeroot	<i>Aristolochia serpentaria</i>	No	No	No
Threatened	Lake cress	<i>Armoracia lacustris</i>	No	No	No
Threatened	Western mugwort	<i>Artemisia ludoviciana</i>	No	No	No
Threatened	Tall green milkweed	<i>Asclepias hirtella</i>	No	No	No
Threatened	Purple milkweed	<i>Asclepias purpurascens</i>	No	No	No
Threatened	Sullivan's milkweed	<i>Asclepias sullivantii</i>	No	No	No
Threatened	Walking fern	<i>Asplenium rhizophyllum</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Drummond's aster	<i>Aster drummondii</i>	No	No	No
Threatened	Forked aster	<i>Aster furcatus</i>	No	No	No
Threatened	Great northern aster	<i>Aster modestus</i>	No	No	No
Threatened	Western silvery aster	<i>Aster sericeus</i>	No	No	No
Threatened	Canadian milk vetch	<i>Astragalus canadensis</i>	No	No	No
Threatened	Panicled screwstem	<i>Bartonia paniculata</i>	No	No	No
Threatened	Slough grass	<i>Beckmannia syzigachne</i>	No	No	No
Threatened	Cut-leaved water parsnip	<i>Berula erecta</i>	No	No	No
Threatened	Prairie moonwort	<i>Botrychium campestre</i>	No	No	No
Threatened	Western moonwort	<i>Botrychium hesperium</i>	No	No	No
Threatened	Goblin moonwort	<i>Botrychium mormo</i>	No	No	No
Threatened	Spatulate moonwort	<i>Botrychium spathulatum</i>	No	No	No
Threatened	Low northern rock cress	<i>Braya humilis</i>	No	No	No
Threatened	Pumpelly's bromegrass	<i>Bromus pumpellianus</i>	No	No	No
Threatened	Northern reedgrass	<i>Calamagrostis lacustris</i>	No	No	No
Threatened	Narrow-leaved reedgrass	<i>Calamagrostis stricta</i>	No	No	No
Threatened	Large water starwort	<i>Callitriche heterophylla</i>	No	No	No
Threatened	Floating marsh marigold	<i>Caltha natans</i>	No	No	No
Threatened	Calypso	<i>Calypso bulbosa</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Wild hyacinth	<i>Camassia scilloides</i>	No	No	No
Threatened	Sedge	<i>Carex albolutescens</i>	No	No	No
Threatened	Assiniboia	<i>Carex assiniboinensis</i>	No	No	No
Threatened	Sedge	<i>Carex atratiformis</i>	No	No	No
Threatened	Sedge	<i>Carex conjuncta</i>	No	No	No
Threatened	False hop sedge	<i>Carex lupuliformis</i>	No	No	No
Threatened	Sedge	<i>Carex media</i>	No	No	No
Threatened	New England sedge	<i>Carex novae-angliae</i>	No	No	No
Threatened	Eastern few-fruited sedge	<i>Carex oligocarpa</i>	No	No	No
Threatened	Ross's sedge	<i>Carex rossii</i>	No	No	No
Threatened	Bulrush sedge	<i>Carex scirpoidea</i>	No	No	No
Threatened	Sedge	<i>Carex seorsa</i>	No	No	No
Threatened	Sedge	<i>Carex tincta</i>	No	No	No
Threatened	Cattail sedge	<i>Carex typhina</i>	No	No	No
Threatened	Pale Indian paintbrush	<i>Castilleja septentrionalis</i>	No	No	No
Threatened	Wild lilac	<i>Ceanothus sanguineus</i>	No	No	No
Threatened	Shortstalk chickweed	<i>Cerastium brachypodum</i>	No	No	No
Threatened	Pitcher's thistle	<i>Cirsium pitcheri</i>	No	Yes, addressed in Section 3.3.4	Yes, addressed in Section 3.3.5
Threatened	Small blue-eyed Mary	<i>Collinsia parviflora</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Prairie coreopsis	<i>Coreopsis palmata</i>	No	No	No
Threatened	Yellow fumewort	<i>Corydalis flavula</i>	No	No	No
Threatened	American rock-break	<i>Cryptogramma acrostichoides</i>	No	No	No
Threatened	White lady slipper	<i>Cypripedium candidum</i>	No	No	No
Threatened	Tennessee bladder fern	<i>Cystopteris tennesseensis</i>	No	No	No
Threatened	False violet	<i>Dalibarda repens</i>	No	No	No
Threatened	Hay-scented fern	<i>Dennstaedtia punctilobula</i>	No	No	No
Threatened	Large toothwort	<i>Dentaria maxima</i>	No	No	No
Threatened	Beak grass	<i>Diarrhena obovata</i>	No	No	No
Threatened	Leiberg's panic grass	<i>Dichanthelium leibergii</i>	No	No	No
Threatened	Ashy whitlow grass	<i>Draba cana</i>	No	No	No
Threatened	Twisted whitlow grass	<i>Draba incana</i>	No	No	No
Threatened	Creeping whitlow grass	<i>Draba reptans</i>	No	No	No
Threatened	Small log fern	<i>Dryopteris celsa</i>	No	No	No
Threatened	Flattened spike rush	<i>Eleocharis compressa</i>	No	No	No
Threatened	Three-ribbed spike rush	<i>Eleocharis tricostata</i>	No	No	No
Threatened	Black crowberry	<i>Empetrum nigrum</i>	No	No	No
Threatened	Fleabane	<i>Erigeron acris</i>	No	No	No
Threatened	Hyssop-leaved fleabane	<i>Erigeron hyssopifolius</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Rattlesnake-master	<i>Eryngium yuccifolium</i>	No	No	No
Threatened	Hollow-stemmed Joe-pye weed	<i>Eupatorium fistulosum</i>	No	No	No
Threatened	Upland boneset	<i>Eupatorium sessilifolium</i>	No	No	No
Threatened	Tinted spurge	<i>Euphorbia commutata</i>	No	No	No
Threatened	Eyebright	<i>Euphrasia hudsoniana</i>	No	No	No
Threatened	Eyebright	<i>Euphrasia nemorosa</i>	No	No	No
Threatened	Rough fescue	<i>Festuca scabrella</i>	No	No	No
Threatened	Queen-of-the-prairie	<i>Filipendula rubra</i>	No	No	No
Threatened	Pumpkin ash	<i>Fraxinus profunda</i>	No	No	No
Threatened	Umbrella-grass	<i>Fuirena pumila</i>	No	No	No
Threatened	Showy orchis	<i>Galearis spectabilis</i>	No	No	No
Threatened	Narrow-leaved gentian	<i>Gentiana linearis</i>	No	No	No
Threatened	Stiff gentian	<i>Gentianella quinquefolia</i>	No	No	No
Threatened	Prairie smoke	<i>Geum triflorum</i>	No	No	No
Threatened	Slender manna grass	<i>Glyceria melicaria</i>	No	No	No
Threatened	Woodland everlasting	<i>Gnaphalium sylvaticum</i>	No	No	No
Threatened	Hedge-hyssop	<i>Gratiola aurea</i>	No	No	No
Threatened	Annual hedge hyssop	<i>Gratiola virginiana</i>	No	No	No
Threatened	Limestone oak fern	<i>Gymnocarpium robertianum</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Downy sunflower	<i>Helianthus mollis</i>	No	No	No
Threatened	Panicked hawkweed	<i>Hieracium paniculatum</i>	No	No	No
Threatened	Goldenseal	<i>Hydrastis canadensis</i>	No	No	No
Threatened	Creeping St. John's-wort	<i>Hypericum adpressum</i>	No	No	No
Threatened	Wild potato vine	<i>Ipomoea pandurata</i>	No	No	No
Threatened	Dwarf lake iris	<i>Iris lacustris</i>	No	No	No
Threatened	Whorled pogonia	<i>Isotria verticillata</i>	No	No	No
Threatened	Short-fruited rush	<i>Juncus brachycarpus</i>	No	No	No
Threatened	Bayonet rush	<i>Juncus militaris</i>	No	No	No
Threatened	Scirpus-like rush	<i>Juncus scirpoides</i>	No	No	No
Threatened	Moor rush	<i>Juncus stygius</i>	No	No	No
Threatened	Vasey's rush	<i>Juncus vaseyi</i>	No	No	No
Threatened	Water willow	<i>Justicia americana</i>	No	No	No
Threatened	Woodland lettuce	<i>Lactuca floridana</i>	No	No	No
Threatened	Leggett's pinweed	<i>Lechea pulchella</i>	No	No	No
Threatened	Virginia flax	<i>Linum virginianum</i>	No	No	No
Threatened	Black twinberry	<i>Lonicera involucrata</i>	No	No	No
Threatened	Globe-fruited seedbox	<i>Ludwigia sphaerocarpa</i>	No	No	No
Threatened	Small-flowered wood rush	<i>Luzula parviflora</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Northern prostrate clubmoss	<i>Lycopodiella margueritae</i>	No	No	No
Threatened	Virginia water-horehound	<i>Lycopus virginicus</i>	No	No	No
Threatened	Big-leaf sandwort	<i>Moehringia macrophylla</i>	No	No	No
Threatened	Red mulberry	<i>Morus rubra</i>	No	No	No
Threatened	Mat muhly	<i>Muhlenbergia richardsonis</i>	No	No	No
Threatened	Northern bayberry	<i>Myrica pensylvanica</i>	No	No	No
Threatened	Farwell's water milfoil	<i>Myriophyllum farwellii</i>	No	No	No
Threatened	American lotus	<i>Nelumbo lutea</i>	No	No	No
Threatened	Devil's club	<i>Oplopanax horridus</i>	No	No	No
Threatened	Broomrape	<i>Orobanche fasciculata</i>	No	No	No
Threatened	Canada rice grass	<i>Oryzopsis canadensis</i>	No	No	No
Threatened	Sweet Cicely	<i>Osmorhiza depauperata</i>	No	No	No
Threatened	Ginseng	<i>Panax quinquefolius</i>	No	No	No
Threatened	Panic grass	<i>Panicum longifolium</i>	No	No	No
Threatened	Philadelphia panic grass	<i>Panicum philadelphicum</i>	No	No	No
Threatened	Warty panic grass	<i>Panicum verrucosum</i>	No	No	No
Threatened	Marsh grass-of-parnassus	<i>Parnassia palustris</i>	No	No	No
Threatened	Purple cliff brake	<i>Pellaea atropurpurea</i>	No	No	No
Threatened	Beard tongue	<i>Penstemon calycosus</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Sweet coltsfoot	<i>Petasites sagittatus</i>	No	No	No
Threatened	Franklin's phacelia	<i>Phacelia franklinii</i>	No	No	No
Threatened	Wild sweet William	<i>Phlox maculata</i>	No	No	No
Threatened	Alpine bluegrass	<i>Poa alpina</i>	No	No	No
Threatened	Bog bluegrass	<i>Poa paludigena</i>	No	No	No
Threatened	Jacob's ladder	<i>Polemonium reptans</i>	No	No	No
Threatened	Carey's smartweed	<i>Polygonum careyi</i>	No	No	No
Threatened	Alpine bistort	<i>Polygonum viviparum</i>	No	No	No
Threatened	Yellow-flowered leafcup	<i>Polymnia uvedalia</i>	No	No	No
Threatened	Waterthread pondweed	<i>Potamogeton bicupulatus</i>	No	No	No
Threatened	Hill's pondweed	<i>Potamogeton hillii</i>	No	No	No
Threatened	Vasey's pondweed	<i>Potamogeton vaseyi</i>	No	No	No
Threatened	Sand cinquefoil	<i>Potentilla paradoxa</i>	No	No	No
Threatened	Prairie cinquefoil	<i>Potentilla pensylvanica</i>	No	No	No
Threatened	Nodding rattlesnake-root	<i>Prenanthes crepidinea</i>	No	No	No
Threatened	Northern fairy bells	<i>Prosartes trachycarpa</i>	No	No	No
Threatened	Pine-drops	<i>Pterospora andromedea</i>	No	No	No
Threatened	Mountain mint	<i>Pycnanthemum muticum</i>	No	No	No
Threatened	Hairy mountain mint	<i>Pycnanthemum pilosum</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Spearwort	<i>Ranunculus ambigens</i>	No	No	No
Threatened	Seaside crowfoot	<i>Ranunculus cymbalaria</i>	No	No	No
Threatened	Lapland buttercup	<i>Ranunculus lapponicus</i>	No	No	No
Threatened	Macoun's buttercup	<i>Ranunculus macounii</i>	No	No	No
Threatened	Prairie buttercup	<i>Ranunculus rhomboideus</i>	No	No	No
Threatened	Maryland meadow beauty	<i>Rhexia mariana</i>	No	No	No
Threatened	Bald-rush	<i>Rhynchospora scirpoides</i>	No	No	No
Threatened	Hairy wild petunia	<i>Ruellia humilis</i>	No	No	No
Threatened	Widgeon grass	<i>Ruppia maritima</i>	No	No	No
Threatened	Rosepink	<i>Sabatica angularis</i>	No	No	No
Threatened	Pearlwort	<i>Sagina nodosa</i>	No	No	No
Threatened	Arrowhead	<i>Sagittaria montevidensis</i>	No	No	No
Threatened	Tea-leaved willow	<i>Salix planifolia</i>	No	No	No
Threatened	Yellow pitcher plant	<i>Sarracenia purpurea f. heterophylla</i>	No	No	No
Threatened	Encrusted saxifrage	<i>Saxifraga paniculata</i>	No	No	No
Threatened	Prickly saxifrage	<i>Saxifraga tricuspidata</i>	No	No	No
Threatened	Hall's bulrush	<i>Schoenoplectus hallii</i>	No	No	No
Threatened	Netted nut rush	<i>Scleria reticularis</i>	No	No	No
Threatened	Forest skullcap	<i>Scutellaria ovata</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Small skullcap	<i>Scutellaria parvula</i>	No	No	No
Threatened	Northern ragwort	<i>Senecio indecorus</i>	No	No	No
Threatened	Evening campion	<i>Silene nivea</i>	No	No	No
Threatened	Starry campion	<i>Silene stellata</i>	No	No	No
Threatened	Rosinweed	<i>Silphium integrifolium</i>	No	No	No
Threatened	Compass plant	<i>Silphium laciniatum</i>	No	No	No
Threatened	Cup plant	<i>Silphium perfoliatum</i>	No	No	No
Threatened	Atlantic blue-eyed-grass	<i>Sisyrinchium atlanticum</i>	No	No	No
Threatened	Houghton's goldenrod	<i>Solidago houghtonii</i>	No	No	No
Threatened	Missouri goldenrod	<i>Solidago missouriensis</i>	No	No	No
Threatened	Lesser ladies'-tresses	<i>Spiranthes ovalis</i>	No	No	No
Threatened	Lake Huron tansy	<i>Tanacetum huronense</i>	No	No	No
Threatened	False asphodel	<i>Tofieldia pusilla</i>	No	No	No
Threatened	False pennyroyal	<i>Trichostema brachiatum</i>	No	No	No
Threatened	Bastard pennyroyal	<i>Trichostema dichotomum</i>	No	No	No
Threatened	Snow trillium	<i>Trillium nivale</i>	No	No	No
Threatened	Prairie trillium	<i>Trillium recurvatum</i>	No	No	No
Threatened	Toadshade	<i>Trillium sessile</i>	No	No	No
Threatened	Nodding pogonia	<i>Triphora trianthophora</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Threatened	Bladderwort	<i>Utricularia subulata</i>	No	No	No
Threatened	Dwarf bilberry	<i>Vaccinium cespitosum</i>	No	No	No
Threatened	Alpine blueberry	<i>Vaccinium uliginosum</i>	No	No	No
Threatened	Edible valerian	<i>Valeriana edulis</i> var. <i>ciliata</i>	No	No	No
Threatened	Goosefoot corn salad	<i>Valerianella chenopodiifolia</i>	No	No	No
Threatened	Corn salad	<i>Valerianella umbilicata</i>	No	No	No
Threatened	Squashberry	<i>Viburnum edule</i>	No	No	No
Threatened	New England violet	<i>Viola novae-angliae</i>	No	No	No
Threatened	Prairie birdfoot violet	<i>Viola pedatifida</i>	No	No	No
Threatened	Frost grape	<i>Vitis vulpina</i>	No	No	No
Threatened	Wisteria	<i>Wisteria frutescens</i>	No	No	No
Threatened	Watermeal	<i>Wolffia papulifera</i>	No	No	No
Threatened	Blunt-lobed woodsia	<i>Woodsia obtusa</i>	No	No	No
Threatened	Wild rice	<i>Zizania aquatica</i> var. <i>aquatica</i>	No	No	No
Threatened	Prairie golden alexanders	<i>Zizia aptera</i>	No	No	No
Special Concern	Climbing fumitory	<i>Adlumia fungosa</i>	No	No	No
Special Concern	Leadplant	<i>Amorpha canescens</i>	No	No	No
Special Concern	Hairy angelica	<i>Angelica venenosa</i>	No	No	No
Special Concern	Pussy-toes	<i>Antennaria parvifolia</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Missouri rock-cress	<i>Arabis missouriensis</i> var. <i>deamii</i>	No	No	No
Special Concern	Green spleenwort	<i>Asplenium trichomanes-ramosum</i>	No	No	No
Special Concern	Willow aster	<i>Aster praealtum</i>	No	No	No
Special Concern	Cooper's milk vetch	<i>Astragalus neglectus</i>	No	No	No
Special Concern	White false indigo	<i>Baptisia lactea</i>	No	No	No
Special Concern	Murray birch	<i>Betula murrayana</i>	No	No	No
Special Concern	Gray birch	<i>Betula populifolia</i>	No	No	No
Special Concern	Pale moonwort	<i>Botrychium pallidum</i>	No	No	No
Special Concern	Satin brome	<i>Bromus nottowayanus</i>	No	No	No
Special Concern	Prairie indian-plantain	<i>Cacalia plantaginea</i>	No	No	No
Special Concern	Autumnal water-starwort	<i>Callitriche hermaphroditica</i>	No	No	No
Special Concern	Davis's sedge	<i>Carex davisii</i>	No	No	No
Special Concern	Fescue sedge	<i>Carex festucacea</i>	No	No	No
Special Concern	Sun sedge	<i>Carex inops</i> ssp. <i>Heliophila</i>	No	No	No
Special Concern	Richardson's sedge	<i>Carex richardsonii</i>	No	No	No
Special Concern	Sedge	<i>Carex squarrosa</i>	No	No	No
Special Concern	Hairy-fruited sedge	<i>Carex trichocarpa</i>	No	No	No
Special Concern	Wiegand's sedge	<i>Carex wiegandii</i>	No	No	No
Special Concern	Dwarf hackberry	<i>Celtis tenuifolia</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Hill's thistle	<i>Cirsium hillii</i>	No	No	No
Special Concern	Purple clematis	<i>Clematis occidentalis</i>	No	No	No
Special Concern	Douglas's hawthorn	<i>Crataegus douglasii</i>	No	No	No
Special Concern	Field dodder	<i>Cuscuta campestris</i>	No	No	No
Special Concern	Rope dodder	<i>Cuscuta glomerata</i>	No	No	No
Special Concern	Dodder	<i>Cuscuta indecora</i>	No	No	No
Special Concern	Dodder	<i>Cuscuta pentagona</i>	No	No	No
Special Concern	Knotweed dodder	<i>Cuscuta polygonorum</i>	No	No	No
Special Concern	Ram's head lady's slipper	<i>Cypripedium arietinum</i>	No	No	No
Special Concern	Laurentian fragile fern	<i>Cystopteris laurentiana</i>	No	No	No
Special Concern	Wild oat grass	<i>Danthonia intermedia</i>	No	No	No
Special Concern	Small-fruited panic-grass	<i>Dichanthelium microcarpon</i>	No	No	No
Special Concern	Rock whitlow grass	<i>Draba arabisans</i>	No	No	No
Special Concern	English sundew	<i>Drosera anglica</i>	No	No	No
Special Concern	Male fern	<i>Dryopteris filix-mas</i>	No	No	No
Special Concern	Fragrant cliff woodfern	<i>Dryopteris fragrans</i>	No	No	No
Special Concern	Engelmann's spike rush	<i>Eleocharis engelmannii</i>	No	No	No
Special Concern	Horsetail spike rush	<i>Eleocharis equisetoides</i>	No	No	No
Special Concern	Black-fruited spike-rush	<i>Eleocharis melanocarpa</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Blue wild-rye	<i>Elymus glaucus</i>	No	No	No
Special Concern	Love grass	<i>Eragrostis capillaris</i>	No	No	No
Special Concern	Small love grass	<i>Eragrostis pilosa</i>	No	No	No
Special Concern	Wahoo	<i>Euonymus atropurpurea</i>	No	No	No
Special Concern	Pale avens	<i>Geum virginianum</i>	No	No	No
Special Concern	Whiskered sunflower	<i>Helianthus hirsutus</i>	No	No	No
Special Concern	Dwarf-bulrush	<i>Hemicarpha micrantha</i>	No	No	No
Special Concern	Mountain fir-moss	<i>Huperzia appalachiana</i>	No	No	No
Special Concern	Fir clubmoss	<i>Huperzia selago</i>	No	No	No
Special Concern	Green violet	<i>Hybanthus concolor</i>	No	No	No
Special Concern	Gentian-leaved St. John's-wort	<i>Hypericum gentianoides</i>	No	No	No
Special Concern	Twinleaf	<i>Jeffersonia diphylla</i>	No	No	No
Special Concern	False boneset	<i>Kuhnia eupatorioides</i>	No	No	No
Special Concern	Erect pinweed	<i>Lechea stricta</i>	No	No	No
Special Concern	Conobea	<i>Leucospora multifida</i>	No	No	No
Special Concern	American dune wild-rye	<i>Leymus mollis</i>	No	No	No
Special Concern	Furrowed flax	<i>Linum sulcatum</i>	No	No	No
Special Concern	Purple twayblade	<i>Liparis liliifolia</i>	No	No	No
Special Concern	Auricled twayblade	<i>Listera auriculata</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Broad-leaved puccoon	<i>Lithospermum latifolium</i>	No	No	No
Special Concern	American shore-grass	<i>Littorella uniflora</i>	No	No	No
Special Concern	Northern appressed clubmoss	<i>Lycopodiella subappressa</i>	No	No	No
Special Concern	Western monkey flower	<i>Mimulus guttatus</i>	No	No	No
Special Concern	Alternate-leaved water-milfoil	<i>Myriophyllum alterniflorum</i>	No	No	No
Special Concern	Pale beard tongue	<i>Penstemon pallidus</i>	No	No	No
Special Concern	Butterwort	<i>Pinguicula vulgaris</i>	No	No	No
Special Concern	Alaska orchid	<i>Piperia unalascensis</i>	No	No	No
Special Concern	Cross-leaved milkwort	<i>Polygala cruciata</i>	No	No	No
Special Concern	Alga pondweed	<i>Potamogeton confervoides</i>	No	No	No
Special Concern	Alleghany	<i>Prunus alleghaniensis</i> var. <i>davisii</i>	No	No	No
Special Concern	Whorled mountain mint	<i>Pycnanthemum verticillatum</i>	No	No	No
Special Concern	Shumard's oak	<i>Quercus shumardii</i>	No	No	No
Special Concern	Meadow beauty	<i>Rhexia virginica</i>	No	No	No
Special Concern	Tall beakrush	<i>Rhynchospora macrostachya</i>	No	No	No
Special Concern	Northern gooseberry	<i>Ribes oxycanthoides</i>	No	No	No
Special Concern	Satiny willow	<i>Salix pellita</i>	No	No	No
Special Concern	Clinton's bulrush	<i>Scirpus clintonii</i>	No	No	No
Special Concern	Torrey's bulrush	<i>Scirpus torreyi</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Special Concern	Tall nut rush	<i>Scleria triglomerata</i>	No	No	No
Special Concern	Hairy skullcap	<i>Scutellaria elliptica</i>	No	No	No
Special Concern	Blue-eyed-grass	<i>Sisyrinchium strictum</i>	No	No	No
Special Concern	Smooth carrion-flower	<i>Smilax herbacea</i>	No	No	No
Special Concern	Prairie dropseed	<i>Sporobolus heterolepis</i>	No	No	No
Special Concern	Stitchwort	<i>Stellaria longipes</i>	No	No	No
Special Concern	Trailing wild bean	<i>Strophostyles helvula</i>	No	No	No
Special Concern	Virginia spiderwort	<i>Tradescantia virginiana</i>	No	No	No
Special Concern	Sand grass	<i>Triplasis purpurea</i>	No	No	No
Special Concern	Downy oat-grass	<i>Trisetum spicatum</i>	No	No	No
Special Concern	Black haw	<i>Viburnum prunifolium</i>	No	No	No
Extirpated	Bluebunch wheatgrass	<i>Agropyron spicatum</i>	No	No	No
Extirpated	Three-awned grass	<i>Aristida dichotoma</i>	No	No	No
Extirpated	Bluehearts	<i>Buchnera americana</i>	No	No	No
Extirpated	Log sedge	<i>Carex decomposita</i>	No	No	No
Extirpated	Sedge	<i>Carex grvida</i>	No	No	No
Extirpated	Hayden's sedge	<i>Carex haydenii</i>	No	No	No
Extirpated	Field chickweed	<i>Cerastium velutinum</i>	No	No	No
Extirpated	Slender dayflower	<i>Commelina erecta</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Extirpated	Cyperus	<i>Cyperus acuminatus</i>	No	No	No
Extirpated	Purple prairie clover	<i>Dalea purpurea</i>	No	No	No
Extirpated	Slender finger grass	<i>Digitaria filiformis</i>	No	No	No
Extirpated	Alpine clubmoss	<i>Diphasiastrum alpinum</i>	No	No	No
Extirpated	Purple coneflower	<i>Echinacea purpurea</i>	No	No	No
Extirpated	Spike-rush	<i>Eleocharis geniculata</i>	No	No	No
Extirpated	Spike-rush	<i>Eleocharis radicans</i>	No	No	No
Extirpated	Giant horsetail	<i>Equisetum telmateia</i>	No	No	No
Extirpated	Chestnut sedge	<i>Fimbristylis puberula</i>	No	No	No
Extirpated	Soapwort gentian	<i>Gentiana saponaria</i>	No	No	No
Extirpated	Manna grass	<i>Glyceria acutiflora</i>	No	No	No
Extirpated	Hedyotis	<i>Hedyotis nigricans</i>	No	No	No
Extirpated	Small wood sunflower	<i>Helianthus microcephalus</i>	No	No	No
Extirpated	Smooth rose-mallow	<i>Hibiscus laevis</i>	No	No	No
Extirpated	Azure bluet	<i>Houstonia caerulea</i>	No	No	No
Extirpated	Small whorled pogonia	<i>Isotria medeoloides</i>	No	No	No
Extirpated	Blue lettuce	<i>Lactuca pulchella</i>	No	No	No
Extirpated	Least pinweed	<i>Lechea minor</i>	No	No	No
Extirpated	Pale duckweed	<i>Lemna valdiviana</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Extirpated	Trailing bush clover	<i>Lespedeza procumbens</i>	No	No	No
Extirpated	Dotted blazing star	<i>Liatris punctata</i>	No	No	No
Extirpated	Plains blazing star	<i>Liatris squarrosa</i>	No	No	No
Extirpated	Narrow-leaved puccoon	<i>Lithospermum incisum</i>	No	No	No
Extirpated	Swamp candles	<i>Lysimachia hybrida</i>	No	No	No
Extirpated	Mikania	<i>Mikania scandens</i>	No	No	No
Extirpated	Winged monkey flower	<i>Mimulus alatus</i>	No	No	No
Extirpated	Plains muhly	<i>Muhlenbergia cuspidata</i>	No	No	No
Extirpated	Marbleweed	<i>Onosmodium molle</i>	No	No	No
Extirpated	Violet wood sorrel	<i>Oxalis violacea</i>	No	No	No
Extirpated	Low-forked chickweed	<i>Paronychia fastigiata</i>	No	No	No
Extirpated	Wild bean	<i>Phaseolus polystachios</i>	No	No	No
Extirpated	Mountain timothy	<i>Phleum alpinum</i>	No	No	No
Extirpated	Cleft phlox	<i>Phlox bifida</i>	No	No	No
Extirpated	Pink milkwort	<i>Polygala incarnata</i>	No	No	No
Extirpated	Prairie parsley	<i>Polytaenia nuttallii</i>	No	No	No
Extirpated	Nodding mandarin	<i>Prosartes maculata</i>	No	No	No
Extirpated	Sweet coneflower	<i>Rudbeckia subtomentosa</i>	No	No	No
Extirpated	Skullcap	<i>Scutellaria incana</i>	No	No	No

Michigan Division of Natural Resources List Species - Evaluation of Potential to be Affected by Treatment Options within the Great Lakes IPMP/EA					
Status	Common Name	Scientific Name	Potential to be Affected by Treatment Options in ISRO?	Potential to be Affected by Treatment Options in PIRO?	Potential to be Affected by Treatment Options in SLBE?
Extirpated	Marsh fleabane	<i>Senecio congestus</i>	No	No	No
Extirpated	Farwell's blue-eyed-grass	<i>Sisyrinchium fuscatum</i>	No	No	No
Extirpated	Blue-eyed-grass	<i>Sisyrinchium hastile</i>	No	No	No
Extirpated	Eared foxglove	<i>Tomanthera auriculata</i>	No	No	No
Extirpated	Long-bracted spiderwort	<i>Tradescantia bracteata</i>	No	No	No
Extirpated	Netted chain-fern	<i>Woodwardia areolata</i>	No	No	No

Appendix F

Great Lakes IPMP/EA

Public Scoping Report

GREAT LAKES INVASIVE PLANT MANAGEMENT PLAN / ENVIRONMENTAL ASSESSMENT PUBLIC SCOPING COMMENT SUMMARY

1.0 INTRODUCTION

The National Park Service (NPS) has begun the process of developing a plan that identifies long-term invasive plant management tools that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources and provide opportunities for restoring native plant communities and cultural landscapes. To do so, the NPS will prepare a Great Lakes Invasive Plant Management Plan (IPMP) and an associated Environmental Assessment (EA) for the following ten parks located in the Great Lakes region: Apostle Islands National Lakeshore (APIS), Grand Portage National Monument (GRPO), Ice Age National Scenic Trail (IATR), Indiana Dunes National Lakeshore (INDU), Isle Royale National Park (ISRO), Mississippi National River and Recreation Area (MISS), Pictured Rocks National Lakeshore (PIRO), Sleeping Bear Dunes National Lakeshore (SLBE), St. Croix National Scenic Riverway (SACN), and Voyageurs National Park (VOYA). The purpose of the IPMP/EA will be to provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on both NPS and NPS managed lands within the designated boundaries of the ten Great Lakes parks.

2.0 PUBLIC SCOPING OPPORTUNITIES

2.1 Pre-Scoping Courtesy Letter

A pre-scoping courtesy letter was provided to the ten Great Lakes parks on March 3, 2011 to disseminate to working partners and interested parties of each park. The recipients of the pre-scoping courtesy letter were at the discretion of each park. The template pre-scoping courtesy letter is included in **Attachment A**.

2.2 Press Release

On March 10, 2011, a template press release was provided to the ten Great Lakes parks for release to the public March 21, 2011 through March 28, 2011. The recipients of the press release were also at the discretion of each park. The template press release is included in **Attachment B**.

2.3 Scoping Brochure

On March 17, 2011, a scoping brochure was provided to the ten Great Lakes parks for distribution by each park to Federal, State, and local agencies, elected officials, groups, and interested individuals. The scoping brochure provided information on the NPS purpose and need for the IPMP and asked for comments on the scope of issues to be addressed in the IPMP/EA (see **Attachment C**). The distribution of the scoping brochure was also at the discretion of each park, which could have included park websites, email distribution lists, and mailing lists. The scoping brochure was also posted on NPS' Planning, Environment and Public Comment (PEPC) website at: <http://parkplanning.nps.gov/ipmpea> on March 28, 2011. Members of the public were afforded two different methods for providing comments: electronically through the PEPC website or by mail at Great Lakes IPMP, c/o Kleinfelder, 300 E. Mineral Ave., Suite 7, Littleton, CO 80122-2655.

2.4 Supplementary Media Exposure

Project information was also provided to the public through other media outlets such as news articles, radio interviews, and websites prior to and during the public scoping period. **Table 1** identifies the IPMP/EA news articles, radio interviews, and websites that provided project related information to the public.

Table 1. Supplementary Media Exposure Sources and Dates

Media Type	Media Source	Date
Radio Station	FM 91.3 KUWS	April 3, 2011
Website	RV Daily Report	April 4, 2011
Website	Stop Aquatic Hitchhikers: Protect Your Waters	April 5, 2011
Radio Station	WQXO Great Lakes Radio	March 21, 2011
Newsletter	St. Croix River Association	March 21, 2011
Newspaper	Glen Arbor Sun	March 22, 2011
Newspaper	Ashland Current	March 28, 2011
Radio Station	WTIP North Shore Community Radio	March 30, 2011

3.0 COMMENTS

The official public scoping period was from March 28, 2011 until May 2, 2011. Four comments were received through the PEPC website, and one typed letter was received through the contractor's mailing address, for a total of five scoping comments (See **Attachments D – H**). The topics addressed by the public in these comments have been organized into four major subject areas that broadly describe the nature of the contents:

- Need - landscape scale conservation efforts (**Attachment D, F, and G**)
- Potential Impacts - concern for treatment types (**Attachment E**)
- Existing conditions (**Attachment F**)
- Other (**Attachment H**)

These scoping comments will help set the stage for topics that the IPMP/EA will address. Public input will continue to be invaluable in developing a plan that will make a lasting difference in the long-term invasive plant management of the ten Great Lakes parks. The NPS thanks all who commented and looks forward to your comments on the Draft IPMP/EA, which is expected to be available for review in the spring of 2012.

RE: Courtesy Letter Regarding NPS Preparation of the Great Lakes IPMP/EA

Dear Valued Stakeholder:

The National Park Service (NPS) is planning to prepare an Environmental Assessment (EA) for a Great Lakes Invasive Plant Management Plan (IPMP) for the following ten parks located in the Great Lakes region: Apostle Islands National Lakeshore (APIS), Grand Portage National Monument (GRPO), Ice Age National Scenic Trail (IATR), Indiana Dunes National Lakeshore (INDU), Isle Royale National Park (ISRO), Mississippi National River and Recreation Area (MISS), Pictured Rocks National Lakeshore (PIRO), Sleeping Bear Dunes National Lakeshore (SLBE), St. Croix National Scenic River (SACN), and Voyageurs National Park (VOYA).

Based on the purpose and need for the project, the scope of the Great Lakes IPMP EA is to develop a plan that identifies long-term invasive plant management tools that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources and provide opportunities for restoring native plant communities and cultural landscapes.

This IPMP/EA is intended to provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on both NPS and NPS managed lands within the designated boundaries of the 10 Great Lakes parks.

Public Scoping Opportunities

The National Environmental Policy Act (NEPA) regulations at 40 CFR 1501.7 requires an early and open process to determine the scope of issues to be addressed and for identifying the significant issues related to a proposed action in an EIS. This process is termed “scoping.”

The formal public scoping period for the IPMP/EA will be held from approximately March 28, 2011 until May 2, 2011. The public will be encouraged to provide input on the proposed IPMP during this time. However, as a valued stakeholder in our park’s resources, we are providing you advance notice of our intent to prepare the IPMP/EA.

During the formal scoping period we will be inviting you to submit your comments, thoughts and suggestions regarding the project. Information on how to submit these comments will be provided at a later date.

Interested parties should also know that once the Draft EA is completed it will be made available for a 30-day public review and comment period. The NPS anticipates that the Draft IPMP/EA will be published for public review in the spring of 2012.

Sincerely,

Park Superintendent Name

Superintendent

Date



National Park Service
U.S. Department of the Interior

Great Lakes Region

2800 Lakeshore Drive E.,
Suite D
Ashland, WI 54806
715 682-0631 phone
715 682-6190 fax

Great Lakes Region News Release

March X, 2011

For Immediate Release

Contact: Carmen Chapin, 715-682-0631 ext. 30

Great Lakes Invasive Plant Management Plan / Environmental Assessment

The National Park Service (NPS) is planning to prepare an Environmental Assessment (EA) for a Great Lakes Invasive Plant Management Plan (IPMP) for the following ten parks located in the Great Lakes region: Apostle Islands National Lakeshore (APIS), Grand Portage National Monument (GRPO), Ice Age National Scenic Trail (IATR), Indiana Dunes National Lakeshore (INDU), Isle Royale National Park (ISRO), Mississippi National River and Recreation Area (MISS), Pictured Rocks National Lakeshore (PIRO), Sleeping Bear Dunes National Lakeshore (SLBE), St. Croix National Scenic River (SACN), and Voyageurs National Park (VOYA).

The Great Lakes IPMP/EA will be based on sound integrated pest management (IPM). IPM is defined as a decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible risk to people and park resources.

Based on the purpose and need for the project, the scope of the Great Lakes IPMP EA will be to develop a plan that identifies long-term invasive plant management tools that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources and provide opportunities for restoring native plant communities and cultural landscapes.


This IPMP/EA will be intended to provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on both NPS and NPS managed lands within the designated boundaries of the 10 Great Lakes parks.

Public Scoping Opportunities

The National Environmental Policy Act (NEPA) regulations at 40 CFR 1501.7 require an early and open process to determine the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process is termed "scoping."

The public scoping period for the Great Lakes IPMP/EA is from March 28, 2011 until May 2, 2011. The public is encouraged to provide comments electronically through the NPS' Planning, Environment and Public Comment (PEPC) database at: <http://parkplanning.nps.gov/ipmpea>.

Comments may also be mailed to: Great Lakes IPMP, c/o Kleinfelder, 300 E. Mineral Avenue, Suite 7, Littleton, CO 80122-2655.



Comments must be received by, time-stamped, and/or post-marked by May 2, 2011, 5:00pm eastern standard time (EST). Before including your address, phone number, email address, or other personal information in your comments, you should be aware that your entire comment - including your personal identifying information - will be included in the administrative record for the IPMP/EA, and may be made publicly available at any time. While you may ask us in your scoping comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Scoping comments may also be published as part of the IPMP/EA. All submissions from organizations or businesses will be made available for public inspection in their entirety.

During the public scoping period, public meetings may be held at the discretion of the individual parks within the Great Lakes region. Notices of public meetings will be advertised in local newspapers, park administrative offices, and on the PEPC website. For more information, please visit the project website at <http://parkplanning.nps.gov/ipmpea> or contact Carmen Chapin at 715-682-0631 ext. 30.

Interested parties should also know that once the Draft IPMP/EA is completed it will be made available for a 30-day public review and comment period. The NPS anticipates that the Draft IPMP/EA will be published for public review in the spring of 2012.

-NPS-



National Park Service
Great Lakes Network Office
2800 Lakeshore Drive E., Suite D
Ashland, WI 54806

Great Lakes Region
Invasive Plant Management Plan
Environmental Assessment

National Park Service
U.S. Department of
Interior



**PUBLIC SCOPING FOR:
Great Lakes Invasive Plant Management Plan
Environmental Assessment**

The National Park Service (NPS) is planning to prepare an Environmental Assessment (EA) for a Great Lakes Invasive Plant Management Plan (IPMP) for the following ten parks located in the Great Lakes region:

- Apostle Islands National Lakeshore
- Grand Portage National Monument
- Ice Age National Scenic Trail
- Indiana Dunes National Lakeshore
- Isle Royale National Park
- Mississippi National River & Recreation Area
- Pictured Rocks National Lakeshore
- Sleeping Bear Dunes National Lakeshore
- St. Croix National Scenic Riverway
- Voyageurs National Park



Photo courtesy of: Daniel P. Hojnacki

The public scoping period for the Great Lakes IPMP/EA is from **March 28, 2011** until **May 2, 2011**. The public is encouraged to provide comments electronically through the NPS' Planning, Environment and Public Comment (PEPC) database at: <http://parkplanning.nps.gov/ipmpea>

Comments may also be mailed to:

Great Lakes IPMP, c/o Kleinfelder, 300 E. Mineral Avenue, Suite 7, Littleton, CO 80122-2655.

Comments must be received in writing by, time-stamped, and/or post-marked by:

May 2, 2011, 5:00pm eastern standard time (EST).

"....to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations"

National Park Service - The Organic Act of 1916

PROJECT BACKGROUND

The Great Lakes Invasive Plant Management Plan (IPMP) / Environmental Assessment (EA) will be based on sound integrated pest management (IPM). IPM is defined as a decision-making process that coordinates knowledge of pest biology, the environment, and available technology to prevent unacceptable levels of pest damage, by cost-effective means, while posing the least possible risk to people and park resources.

Based on the purpose and need for the project, the scope of the Great Lakes IPMP EA will be to develop a plan that identifies long-term invasive plant management tools that would reduce the impacts of (or threats from) invasive plants to natural and cultural resources and provide opportunities for restoring native plant communities and cultural landscapes.

This IPMP/EA will be intended to provide strategies for park staff to manage terrestrial and emergent wetland invasive plants on both NPS and NPS managed lands within the designated boundaries of the ten Great Lakes parks.

PUBLIC SCOPING OPPORTUNITIES

The National Environmental Policy Act regulations at 40 CFR 1501.7 require an early and open process to determine the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process is termed "scoping."

Comment submittal instructions are included on the other side of this brochure.

Before including your address, phone number, email address, or other personal information in your comments, you should be aware that your entire comment - including your personal identifying information - will be included in the administrative record for the IPMP/EA, and may be made publicly available at any time. While you may ask us in your scoping comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Scoping comments may also be published as part of the IPMP/EA. All submissions from organizations or businesses will be made available for public inspection in their entirety.

During the public scoping period, public meetings may be held at the discretion of the individual parks within the Great Lakes region. Notices of public meetings will be advertised in local newspapers, park administrative offices, and on the PEPC website. For more information, please visit the project website at <http://parkplanning.nps.gov/ipmpea> or contact Carmen Chapin at 715-682-0631 ext. 30.

Interested parties should also know that once the Draft IPMP/EA is completed it will be made available for a 30-day public review and comment period. The NPS anticipates that the Draft IPMP/EA will be published for public review in the spring of 2012.





United States
Department of
Agriculture

Forest
Service

Hiawatha National Forest
Munising District

400 East Munising Avenue
Munising, MI 49862
(906) 387-2512

File Code: 1900 Planning

Date: April 13, 2011

To: Great Lakes IPMP
Attn: Kleinfelder
300 E. Mineral Avenue, Suite 7
Littleton, CO 80122-2655

Subject: Great Lakes Invasive Plant Management Plan/Environmental Assessment

The Hiawatha National Forest has received your letter dated March 14, 2011, and the March 21, 2011, News Release regarding the proposed Invasive Plant Management Plan for the ten parks located in the Great Lakes Region. We were encouraged to see your proposal. The Hiawatha National Forest is also concerned about invasive plants and their potential to disrupt native ecosystems. Coordination with your agency, particularly Pictured Rocks National Lakeshore, allows landscape scale conservation efforts to be implemented and for the potential to protect ecosystems across boundaries.

The Hiawatha currently has several tools available for controlling invasive plants. In 2007, we completed an Environmental Assessment that authorized a variety of tools for invasive species control including manual, mechanical, herbicides, and biological techniques. We have been implementing the decision since 2007. We are currently in the process of preparing a new EA that will use similar treatment techniques on additional locations known to be infested with non-native invasive plants. The focus of the project will be roadsides, gravel pits, recreation portal areas, openings and other disturbed areas. It will also incorporate 200 to 300 acres of non-FS lands within and near the proclamation boundary of the Hiawatha National Forest. Including other ownerships will allow the control of invasive species to occur at a larger scale. Further, the Hiawatha has an active native plant program including a greenhouse that produces over 35,000 native plugs a year which we are using to restore disturbed areas.

The Hiawatha National Forest supports the proposal and looks forward to working with you in the future to control the impact of invasive plants on our natural communities. Please forward a copy of the EA when it is complete.

Sincerely,

/s/ James F. Gries
Acting District Ranger

CC:

Bruce Leutscher – Pictured Rocks National Lakeshore



Caring for the Land and Serving People

Printed on Recycled Paper



PEPC Project ID: 34281, DocumentID: 39820

Correspondence: 1

Author Information

Keep Private: No

Name: [REDACTED]

Organization: [REDACTED]

Organization Type: I - Unaffiliated Individual

Address: [REDACTED]

E-mail:

Correspondence Information

Status: New Park Correspondence Log:

Date Sent: 03/29/2011 Date Received: 03/29/2011

Number of Signatures: 1 Form Letter: No

Contains Request(s): No Type: Web Form

Notes:

Correspondence Text

Topic Question 1:

My main concern is the type of agent that will be used to control the invasive plant species. In the past, we introduce species to counteract other species and then THAT spirals out of control. . . .particularly in our waters. Thank you.

PEPC Project ID: 34281, DocumentID: 39820

Correspondence: 2

Author Information

Keep Private: No

Name: [REDACTED]

Organization: NPS

Organization Type: I - Unaffiliated Individual

Address: [REDACTED]

E-mail: [REDACTED]

Correspondence Information

Status: New Park Correspondence Log:

Date Sent: 03/29/2011 Date Received: 03/29/2011

Number of Signatures: 1 Form Letter: No

Contains Request(s): No Type: Web Form

Notes:

Correspondence Text

Topic Question 1:

First, I want to clarify that my opinions do not represent those of my employer [REDACTED]. I am submitting my comments as part of the public comment.

Second, my concerns:

+ I feel that the plan should emphasize that the need for including the 10 participating NPS units in the same plan is because the spread of invasive plants may very well be one that originates in one park is transferred to another park. In other words, the problem and solution must be viewed from the perspective of invasive species in each individual park unit and then from a regional landscape.

+There should be a level of synthesis of what is already known and then what is needed to understand the spread of invasive species within a park and the risk of those species spreading to designated wilderness, adjacent lands, and in particular, other federally managed lands.

+Determining the origin of invasive species is important including any continuous sources that cannot easily be

controlled such as wind, water, and wildlife.

+A landscape approach should be emphasized that generates an understanding of past, present, and potential future outcomes of invasive plant spread with the alternatives.

+The effect of changing weather patterns, areas with poor water quality, and urban growth should be included in a study of how invasive plants might be managed.

Topic Question 2:

*Why invasive plant management should or shouldn't be implemented in the Great Lakes National Parks?

+ I have already made up my mind that invasive plant management should be implemented. Alternatives that might be evaluated might consider a simple analysis of the number of known invasive plants in the Great Lakes region by park unit, the number of years each park has already had a plan or actions taken to address invasive plants, the money spent, and the success rate. In other words, an alternative to just bring the issue to light is what has been done or is being done now enough to negate the need for more effort or are invasive plants spreading beyond adjacent lands into the parks and vice versa at an uncontrollable rate despite the cost and effort to date being taken?

+The beach and dune areas along the shores of the lakes should be of particular concern and both removal of plants and plantings can potentially impact those ecosystems. Restoring the native vegetation should be a priority and addressed in the context of the role plants have in sand and soil stabilization and food for migrating animals.

+The potential impact invasive plants are having on the initial spring food supplies for hibernating animals should be considered as both a justification for the need for the plan and in the management alternatives for invasive plant control.

*Management tools such as outreach and education, prevention and control that should or shouldn't be implemented in the Great Lakes National Parks?

+Along with the removal invasive plants, at least one alternative might include the restoration planting of the displaced native plants.

+Outreach might include alternatives to a program to organize volunteers and school groups for removal of invasive plants and restoration planting of native plants.

*Species or areas that should or shouldn't be considered in an invasive plant management program for the Great Lakes National Parks?

+The spread of genetic hybrids should be a secondary concern to controlling invasive species that are already hard to distinguish. An example is cattail hybrids. The emphasis should first be on if the plant is an invasive or exotic impacting the area. If there is an impact of the plant as an invasive, but there is a question of whether or not it is a native, then the question of whether or not it is a hybrid can be pursued. Part of this question is how management of the hybrid will improve or impact biodiversity.

I look forward to seeing the progress of the scoping period.

PEPC Project ID: 34281, DocumentID: 39820

Correspondence: 4

Author Information

Keep Private: No

Name: [REDACTED]

Organization: [REDACTED]

Organization Type: I - Unaffiliated Individual

Address: 3728 West River Dr NE
Comstock Park, MI 49321
USA

E-mail: [REDACTED]

Correspondence Information

Status: New Park Correspondence Log:

Date Sent: 05/02/2011 Date Received: 05/02/2011

Number of Signatures: 1 Form Letter: No

Contains Request(s): No Type: Web Form

Notes:

Correspondence Text

The Nature Conservancy fully supports the National Park Service's proposed Environmental Assessment for a Great Lakes Invasive Plant Management Plan (IPMP) in 10 Great Lakes region parks. The proposed IPMP is based on the principles of Integrated Pest Management (IPM), ensuring cost-effective control methods implemented with minimal risk to desirable natural resources. Recognizing the incredible threat posed by invasive species, in 2007 The Nature Conservancy and the National Park Service formed a partnership to implement invasive plant control in the Sleeping Bear Dunes National Lakeshore. These efforts have been highly successful; to date we have removed 47 percent of the baby's-breath infestation that once covered over 1,800 acres of coastal dune ecosystems and are now expanding our focus to a number of other regional invasives. While it's clear that much has been accomplished, future work will greatly benefit from IPM and we believe every effort should be made to compose future management strategies using its framework.

While concerns about the use of herbicides are valid, IPM provides a guide to the safest and most beneficial ways in which to use them and clearly defines when their use is inappropriate. Within the Lakeshore, the herbicides have not only been thoroughly tested for effectiveness, but also for their effect on the sensitive native

communities. By combining highly-specific application methods with herbicides that are reduced to inert organic compounds upon contact with non-target materials, there has been no observed damage to the native species present in the area, including federally-threatened Pitcher's thistle (*Cirsium pitcher*) and federally-endangered piping plover (*Charadrius melodus*). As IPM dictates, the results of our efforts will be carefully reviewed and the methodology of those efforts altered as necessary to provide the greatest possible improvement to both the area's ecology and its benefit to the public.

Without the comprehensive, large-scale vision that the Great Lakes Invasive Plant Management Plan provides, ongoing protection for our National Parks will be less effective and more costly. A plan that encompasses the entire Great Lakes region has the ability to provide information on existing invasive species distribution and spread more readily; essentially an early-warning system to prevent emergent populations from becoming unmanageable infestations. Based on a huge body of collective expertise, the plan also ensures park managers identify and implement the best tools and resources for long-term control and eradication of targeted invasives. Effectively managing and eradicating invasive plants in the treasures we call our Great Lakes National Parks is of the utmost importance, and through an Invasive Plant Management Plan it is a thoroughly attainable goal.

PEPC Project ID: 34281, DocumentID: 39820

Correspondence: 3

Author Information

Keep Private: Yes

Name: C M

Organization:

Organization Type: I - Unaffiliated Individual

Address:



E-mail:

Correspondence Information

Status: New Park Correspondence Log:

Date Sent: 04/06/2011 Date Received: 04/06/2011

Number of Signatures: 1 Form Letter: No

Contains Request(s): No Type: Web Form

Notes:

Correspondence Text

Topic Question 1:

Just looking