Voyageurs

National Park Service
U.S. Department of the Interior

Voyageurs National Park

Cattail Control Plan and Environmental Assessment

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Cattail Control Plan and Environmental Assessment

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CHAPTER 1: PURPOSE AND NEED

1.1 Introduction

Voyageurs National Park (VOYA) supports approximately 20,000 to 27,000 acres of wetlands, which include peat wetlands, leatherleaf/sweet gale shore fens, black spruce bogs, white cedar/black ash or tamarack swamps, and wild rice marshes. Many wetland areas throughout VOYA have been invaded by non-native plants which invade aquatic environments, displacing native vegetation by forming dense stands or large subsurface mats. These invasions pose a threat to park resources due to a reduction in aquatic and riparian habitat biodiversity, and a reduction in overall diversity within all impacted ecosystems. Invasions alter the dynamics of aquatic ecosystems, reducing native plant and animal diversity, deviating natural flow patterns, increasing flooding, clogging drainageways and limiting use of waterways for recreation and park operations (i.e., fueling areas, marinas).

The most aggressive and invasive non-native plant species that have invaded park wetlands are non-native cattails. The majority of cattails found in VOYA's two main water bodies (Rainy Lake and Namakan Reservoir) are hybrids (*Typha x glauca*) resulting from cross-pollinated non-native narrow-leaved cattail (*Typha angustifolia*) and the native broad-leaved cattail (*Typha latifolia*), or their offspring (Marburger et al 2005, Travis et al. 2010). Wetlands throughout these reservoirs have been inundated by these hybridized cattails. Other invasive species impacting wetland areas in the park include purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*) and common reed (*Phragmites australis*).

Hybrid cattail invasions are having the largest impact on the shoreline ecosystems, creating large dense monocultures. These monocultures disrupt and reduce habitat and species diversity by excluding native plants and altering the biotic and abiotic environment of wetlands (Motivans, et al. 1978, OMNR 2011). Monotypic stands of invasive hybrid cattails are replacing native vegetation such as sedges, rushes, pondweeds and cattails causing an overall decline in species richness and diversity, which in turn disrupts food webs for wetland wildlife (OMNR 2011). In VOYA, hybrid cattail forms extensive monocultures on Kabetogama shorelines with smaller stands on Namakan and Rainy lakes.

Recent research in VOYA has confirmed that hybrid cattail is the dominant species of the plant in many wetlands in the park, with the non-native narrowleaf cattail also present (Travis et al., 2010, Travis et al., 2011). The native broadleaf cattail has effectively been displaced from many wetlands as a result of this invasion. Hybrids have become the dominant cattail because they are more aggressive and can occupy broader ecological niches (e.g., a wider range of water depths) than the pure strains of

either parent species (Kuehn and White 1999). As a result, many VOYA wetlands have shown an encroachment of hybrid cattails over the past 20+ years.

Expansion of hybrid cattail in the park has been exacerbated by artificial water level management in the Rainy and Namakan systems since dams were built in 1911-1914 (Meeker and Harris, 2009). These water level changes have been regulated by the International Joint Commission since 1949, and have created water levels that are quite different from what would occur if the system were natural (IRLBC, 1999). Along with the increased vigor of the hybrids compared to the parent strains, these water level changes are likely an important factor in the establishment of cattail monocultures that have reduced habitat and species diversity.

These monocultures can grow to very large sizes creating mats that cover entire bays (Figure 1 and Figure 2). Areas of Black Bay on Rainy Lake and along the south shore of Kabetogama Lake have large established mats that have been in place for decades. In other parts of the park the cattail mats are not as entrenched and may be just a few meters in size. In all, there are approximately 500 acres of these cattails in the park (Figure 3).

Figure 1. Cove Bay on Kabetogama Lake dominated by hybrid cattails.

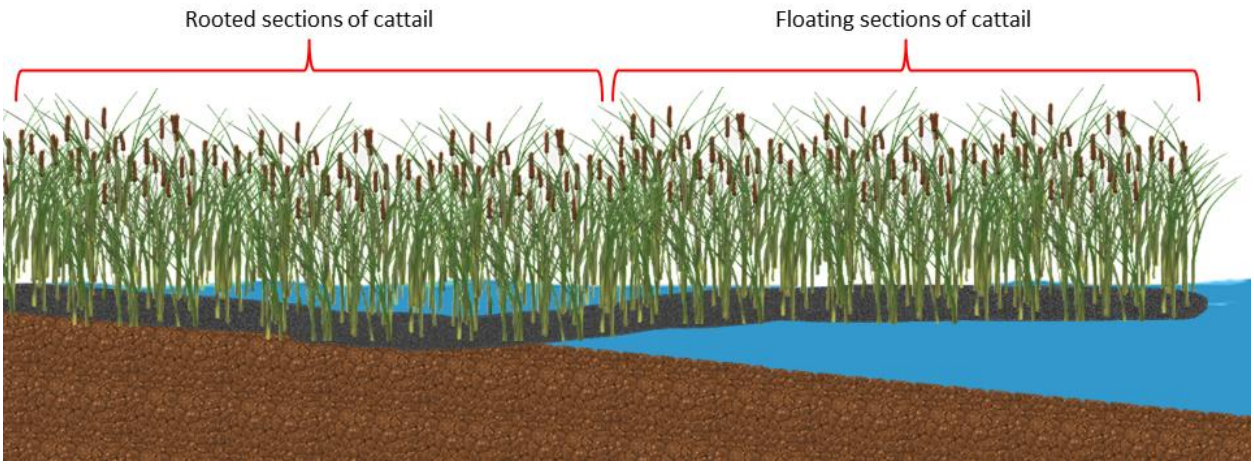

Figure 2. Cross-section of representative cattail dominated wetland in VOYA.

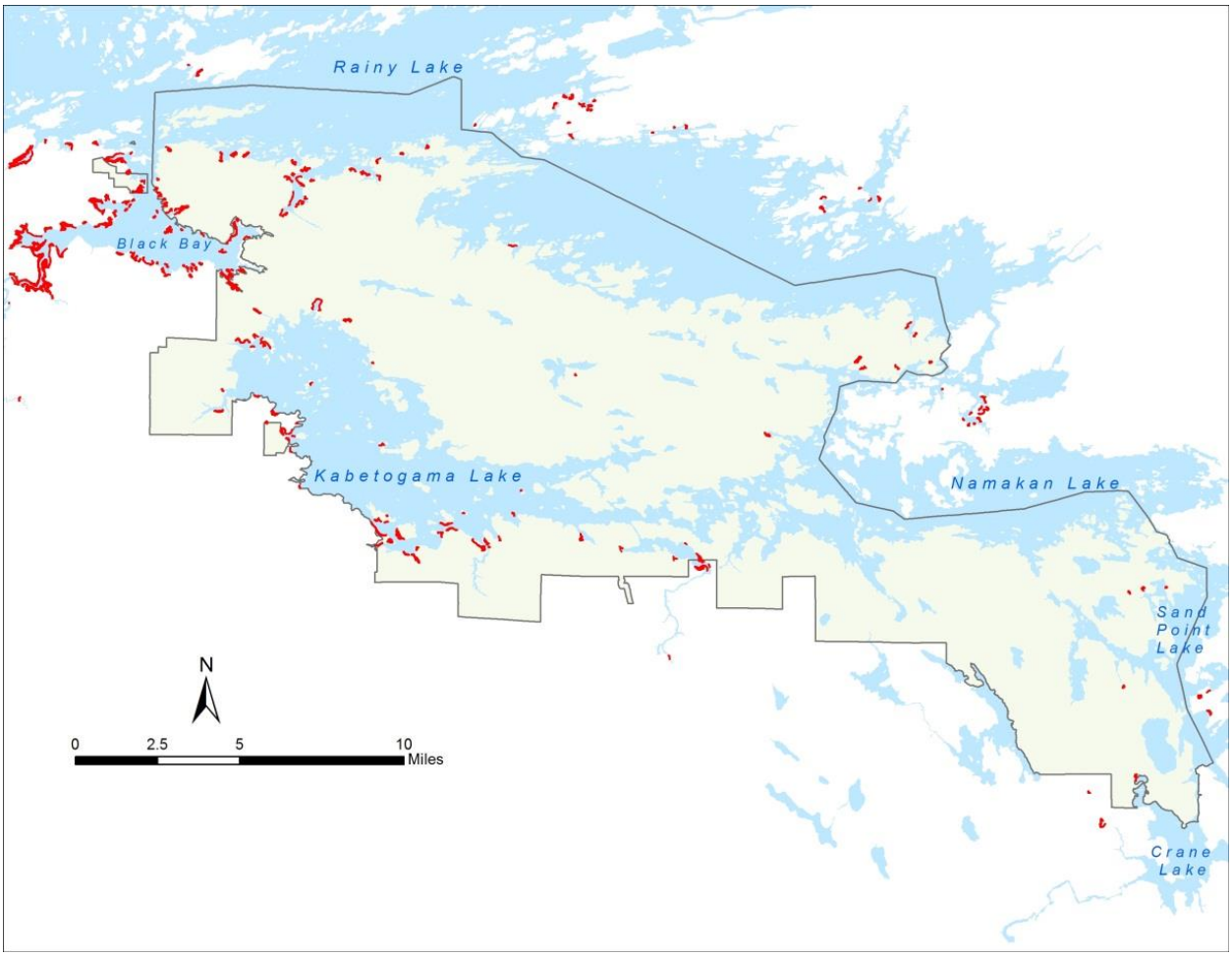

Figure 3. Cattail marshes in and around VOYA. Cattails are shown in red.

Compounding the cattail problem is the issue of floating bogs. Not truly a bog by definition, “floating bog” is a term used to identify pieces of floating cattail mats. In windy conditions, sections of existing cattail mats can break off and float free in the lakes. The floating mats can be quite variable in size and they pose a navigation hazard to boaters.

They may also lodge in inappropriate locations such as nesting or spawning habitat, near docks, or in front of private property. If left, these mats often become entrenched and grow, creating new monocultures.

The current policy in place at VOYA is to push floating bogs to the nearest shore and temporarily secure it by tying off to a tree or staking to remove the immediate hazard. Once a more appropriate location has been determined (ideally back to the original colony to avoid transferring cattails to an uninvaded bay), the mat should be moved to that location and staked until it can be treated or removed (NPS Memo, 2014).

The Minnesota Department of Natural Resources (DNR) Floating Bog Policy states that an Aquatic Plant Management (APM) permit must be obtained to move or remove a floating bog. The bog should be moved back to where it appears to have come from and secured it in place with appropriate anchors such as wooden stakes. If it is unknown from where it came or is impossible to put back in place, the bog may be moved to an adequate drop-off point and staked or anchored. The bog may be completely removed with machinery as well. This method also requires a permit to destroy aquatic vegetation from the DNR (Minnesota Administrative Rules chapter 6280).

As mentioned earlier, hydrologic changes are only one factor leading to the current cattail issues in VOYA. Nutrient loading is most certainly an influence as well. Nutrient loading or eutrophication of wetlands can be attributed to external nutrient inputs and to soil biogeochemical processes (Koerselman et al., 1993). Nitrogen enrichment by atmospheric deposition and other causes has the potential to change the function of wetland ecosystems both directly and indirectly by altering the chemistry and hydrology of the wetlands, altering the competitive balance of plant species, and influencing the direction of wetland succession (Morris, 1991). Eutrophic conditions can promote the growth of algae and aquatic plants and stimulate the development of monotypic stands of aggressive species such as cattails (Maurer and Zedler, 2002, Werner and Zedler, 2002, Woo and Zedler, 2002).

In addition, hybrid cattails appropriate nitrogen at the expense of native marsh species through higher rates of both nitrogen uptake and retention in biomass (living and dead) (Larkin et. al., 2012). This nutrient appropriation advantage alone can shift native wetlands toward hybrid cattail dominance (Woo and Zedler, 2002).

The relationship between cattails and certain aquatic animals can be important as well. Muskrats (*Ondatra zibethicus*), for example, prefer to feed on cattails but muskrat populations in eastern North America have declined dramatically in the past 25-30 years. The cause of these declines is not fully understood but habitat degradation (in part from invasive aquatic plant invasions) is likely partially to blame. Healthy muskrat populations could help keep smaller patches of cattails in check.

“Although the non-native narrow-leaved cattail (*Typha angustifolia*) and the hybrid (*Typha x glauca*) both clearly fall under the federal definition of invasive plants, neither are listed in Minnesota as prohibited or regulated invasive plants” (Minnesota Statutes

chapter 84D.01 and Minnesota Rules chapter 6216) or noxious weeds (Minnesota Statutes chapter 18.77 and other parts). Being left off the regulated noxious weeds lists does not mean these non-native cattails cannot be treated as invasive. To the contrary, VOYA and other NPS staff regularly control non-listed invasive plants in the park by cultural, mechanical, and chemical methods. Nevertheless, being listed could potentially make it easier to get an exception to the Outstanding Resource Value Waters (ORVW) designation. This designation prohibits any new discharge of pollutants (including pesticides) into ORVW designated waters, including VOYA (Minn. R. 7050.0180 subp. 3 through 5 (Nondegradation for ORVWs)).

As shown in Figure 3, cattails are widely distributed in VOYA. As a water-based park, just navigating VOYA can be a challenge at times. The four main lakes are quite large with long fetches and weather conditions can change rapidly. Accessibility of some of the more remote cattail patches with harvesting/removal equipment is likely not feasible. Moreover, shoreline and/or substrate conditions in certain areas may limit the efficacy of treatment methods. For these reasons, accessibility will be a major factor in deciding which cattail colonies may be treated and which control method may be the most effective.

Another factor impacting cattail management in VOYA is water level management. The water levels of the main lakes in the park are artificially managed by dams at International Falls, Kettle Falls, and Squirrel Falls. Natural water level fluctuations (or lack thereof) can be a significant influence in the establishment of species such as cattails. Although the most recent Rule Curve (IJC, 2001) for these lakes attempts to mimic a more natural seasonal water level dynamic and appears to be beneficial for native wetland species, these rule curves do change at times and future changes to these regulations cannot be anticipated.

Lastly, climate change may give invasive cattails an advantage over native marsh plants. Increases in atmospheric CO_2 can stimulate growth in C3 plants (plants such as cattails that convert CO_2 into a 3 carbon compound during photosynthesis) and increase their water-use efficiency at the expense of C4 plants (plants that convert CO_2 into a 4 carbon compound) (United Nations Environment Programme, 1990). In addition, cattail leaf litter will increase, further suppressing native seed germination. This leaf litter being significantly higher in carbon will lead to increased methane production from decomposition, resulting in a positive feedback.

1.2 Purpose and Need for Taking Action

NPS management policies (Management Policies 2006) related to wetlands state that, "when natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human actions, the Service will, to the extent practicable, restore them to pre-disturbance conditions…NPS will not simply protect but will seek to enhance natural wetland value by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions."

The Great Lakes Integrated Pest Management Plan/EA (FONSI signed July, 2012) provides a suite of options for controlling invasive plants including cultural methods and manual/mechanical, biological, and chemical treatment that can be used at Voyageurs without additional NEPA analysis. While heavy equipment is included in that analysis, it does not include the use of aquatic vegetation harvesters for removal of cattails.

The purposes for taking action are to:

- Decrease the impacts on wetlands by invasive plants to promote the restoration of natural and cultural resources, and increase recreational and educational opportunities in the park.

- Develop environmentally sound, cost effective invasive plant management strategies that pose the least possible risk to people and park resources.

- Protect and enhance natural wetland value.

The following needs for taking action have been identified:

- Invasive wetland plants have replaced native vegetation in many areas within Voyageurs, causing an overall decline in species richness and diversity, adversely impacting natural and cultural resources.

- As a result of Minnesota regulations, the park is prohibited from using herbicide in aquatic applications.

- Mechanical treatment options for controlling large dense stands of invasive plants in Voyageurs are not addressed in an existing plan or compliance document.

- 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.

- There is lack of public awareness about invasive wetland plants.

1.3 Relationship to Other Plans and Policies

Several policies and plans give guidance or mandates to control non-native invasive species and restore systems to a natural, biologically-diverse condition.

Executive Order 13112 (1999) directs Federal agencies to:

“(i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide

for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them."

This executive order also defines invasive species.

- "Alien species" means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

- "Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

- "Native species" means, with respect to a particular ecosystem, a species that other than as a result of an introduction historically occurred or currently occurs in that ecosystem.

Management Policies 2006 gives direction to Parks to restore natural systems damaged by human influences. Section 4.1.5 states:

"Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function. Efforts may include, for example

- removal of exotic species

- removal of contaminants and non-historic structures or facilities

- restoration of abandoned mineral lands, abandoned or unauthorized roads, areas overgrazed by domestic animals, or disrupted natural waterways and/or shoreline processes

- restoration of areas disturbed by NPS administrative, management, or development activities (such as hazard tree removal, construction, or sand and gravel extraction) or by public use

- restoration of natural soundscapes

- restoration of native plants and animals

- restoration of natural visibility”

More specifically, section 4.4.4.2 of Management Policies 2006 states:

“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
- disrupts the genetic integrity of native species, or
- disrupts the accurate presentation of a cultural landscape, or
- damages cultural resources, or
- significantly hampers the management of park or adjacent lands, or
- 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”

In addition, Procedural Manual #77-1: Wetland Protection (National Park Service, 2012) states that for aquatic habitats the NPS shall seek to:

"…avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative...."

Procedural Manual 77-1 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.

The **VOYA General Management Plan (2001)** identifies Mission Goals, or desired conditions, for the park. Relevant goals include:

- “Voyageurs is restored and protected in a manner that allows natural processes, functions, cycles, and biota to be maintained in perpetuity. An adaptive ecosystem-based approach to resource preservation has been implemented, with essential data and tools to support a scientifically based management program.
- The natural beauty of the park is unimpaired. The park continues to be a dynamic, biologically diverse environment.

- The park's viewshed is maintained to the extent possible to portray features and landscapes similar to those seen by the voyageurs.

- Park lands that have been significantly altered by land uses in the past are restored to a natural condition.

- Native plant and animal species diversity, abundance, and behavior reflect sustainable and naturally occurring conditions.

- Exotic species have been controlled to the extent that they have a minimal impact on the ecosystem or they have been completely removed.

- Aquatic systems within the park are healthy and biologically functional. Water quality is at least maintained or improved from existing conditions.

- Biotic cultural resources such as wild rice, old-growth trees, and features in cultural landscapes are preserved."

The **Great Lakes Invasive Plant Management Plan/Environmental Assessment (2012).** The National Park Service completed a Great Lakes Invasive Plant Management Plan/Environmental Assessment (FONSI signed July, 2012) for ten parks in the region, including Voyageurs, defining strategies for management of terrestrial and emergent invasive plant species. Park-specific activities that include treatments and associated potential impacts considered in the GLIPMP/EA do not require additional compliance with NEPA. Under the Preferred Alternative of the GLIPMP/EA, parks would have the option to use treatment options including biological and chemical treatment and manual/mechanical methods, with the exception of heavy equipment and prescribed fire, which require additional NEPA compliance.

Cultural methods that can be used at VOYA include reseeding/planting and restoration, smothering and flooding. Manual/mechanical treatments that can be used at VOYA include pulling and use of hand cutting tools or power tools. See discussion of cultural and manual/mechanical treatment in section 2.4.

Chemical treatment options in VOYA, however, are limited to terrestrial applications. Minnesota Administrative Rule 7050.0180 Non-degradation for Outstanding Resource Value Waters states:

"Subp. 3. Prohibited discharges. No person may cause or allow a new or expanded discharge of any sewage, industrial waste, or other waste to waters within the Boundary Waters Canoe Area Wilderness; those portions of Lake Superior north of latitude 47 degrees, 57 minutes, 13 seconds, east of Hat Point, south of the Minnesota-Ontario boundary, and west of the Minnesota-Michigan boundary; Voyageurs National Park; or Department of Natural Resources designated scientific and natural areas; or to federal or state wild river segments."

VOYA waters are listed as prohibited Outstanding Resource Value Waters (ORVW) meaning any new applications of pesticides in the waters of VOYA are prohibited. Effective treatment of invasive cattails in VOYA is, therefore, limited to cultural and mechanical methods.

Section 401 of the Clean Water Act gives authority to the Minnesota Pollution Control Agency (MPCA) to certify that discharges of dredged or fill material authorized by a federal permit or license comply with state water quality standards.

Section 404 of the Clean Water Act (CWA) and **Section 10 of the Rivers and Harbors Act** give federal regulatory authority to the St. Paul District of the U.S. Army Corps of Engineers. These acts cover discharges of dredged or fill material into waters of the United States (wetlands, tributaries, lakes, etc.) (Sec. 404) and work in navigable waters (Sec. 10).

The Minnesota **Wetland Conservation Act (WCA)** regulates most activities affecting wetlands. It is administered by local government units (LGUs) which can be counties, townships, cities, watershed districts, watershed management organizations or state agencies (on state-owned land).

The **Public Waters Work Permit Program (DNR Public Waters Permits)** gives the permitting authority to the Minnesota DNR Division of Ecological and Water Resources for work in specially-designated public waters.

The **Aquatic Plant Management Permit Program (DNR APM Permits)** gives the permitting authority for aquatic plant removal in public waters to the DNR Division of Fisheries. NPS and DNR have joint jurisdiction of waters within the park boundary. Any actions undertaken by VOYA will be in collaboration and/or consultation with the DNR Division of Fisheries.

1.4 Issues and Concerns

The current state of cattail management in the park (i.e., the “no action” alternative for this EA) is causing a variety of problems related to the natural resources and the visitor’s use of the park. These issues are:

- Hybrid cattails are invasive and are spreading to new locations.
- The invasive nature of hybrid cattails leads to habitat degradation and likely reduces biodiversity for most taxa, including plants, vertebrates, and invertebrates.
    - Muskrat and other wildlife habitat are diminished.
    - Fish spawning areas are reduced.

- Vegetation biodiversity is reduced.

- The visitor experience is hampered. Canoeing, fishing, wildlife viewing opportunities are reduced.

- Floating cattail mats break off in windy conditions creating navigation hazards and facilitate the spread of cattails.

- The cattails can choke out shorelines and boat docking areas creating the need for periodic maintenance to remove the vegetation.

1.5 Impact Topics Retained for Further Analysis

A wide range of potential impact topics were initially considered. Based on results from internal scoping meetings, those potential impact topics where the effect of treatments was more than negligible were carried forward for full analysis. These include:

- Water Quality: The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; enhance the quality of water resources; and prevent, control, and abate water pollution. NPS Management Policies (2006) provides direction for the preservation, use, and quality of water originating, flowing through, or adjacent to park boundaries. The NPS seeks to restore, maintain, and enhance the water quality within the parks consistent with the 1972 Federal Water Pollution Control Act, as amended, and other applicable federal, state, and local laws and regulations. The proposed action will include management actions that may adversely impact Rainy Lake and Kabetogama Lake. Adverse impacts may include increased turbidly, nutrient loading, and toxicity, etc. Actions taken under this plan to address threats from hybrid cattails that pose an ongoing threat to water quality throughout VOYA, therefore, this topic was carried forward for analysis.

- Wetland Vegetation: Presidential Executive Order 11990 mandates protection of wetlands. The Midwest Cattail Marsh covers approximately 500 acres in the park, mostly in the four large lakes. These marshes on the large lakes are predominantly comprised of the hybrid *Typha x glauca* and are the focus of this document; therefore this topic was carried forward for analysis.

- Fish and Aquatic Invertebrates: There are 53 species of fish in the park (number on the large lakes ranges from 36 to 40). Bottom-dwelling aquatic insects, such as the larvae of midges, mayflies, and dragonflies, as well as worms, crayfish, snails, sponges, and clams occupy the shallow zones of lakeshores. Alternatives may cause loss of individuals or impact habitat for these species; therefore this topic was carried forward for analysis.

- Wildlife: Red-winged blackbirds, rails, bitterns, and some sparrows use the cattails for nesting and foraging. Muskrats, although not as prevalent as they used to be, use cattail stands as habitat. Reptiles such as painted turtles and snapping turtles may use cattail mats as resting or escape cover. Many species of frogs and toads may use cattail stands for breeding, foraging, or escape cover. Alternatives may displace individuals or impact habitat for these species and translocation of muskrats is being considered; therefore this topic was carried forward for analysis.

- Visitor Experience: The 1916 Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife and natural and historic resources of national parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." VOYA is a water-based park. Sports fishing is a primary recreational attraction, bays on the main lakes offer secluded canoeing/kayaking experiences, and viewing scenery and wildlife are popular activities. Visitor experience may be impacted by the alternatives presented; therefore this topic was carried forward for analysis.

1.6 Impact Topics Dismissed from Further Analysis

Impact topics determined to have no or negligible impacts from treatments were dismissed from further analysis. The decision to dismiss an impact topic from analysis was based on the professional judgment of park staff and management. Impact topics dismissed from analysis are listed below with the justifications for dismissal.

- Geologic Resources: Resource is not present or not affected.

- Air Quality: Mechanical equipment used for treatment would have a negligible impact on air quality.

- Soundscapes: Use of mechanical equipment would be temporary and localized and would have negligible impacts on the soundscape.

- Streamflow Characteristics: Mechanical treatments would occur along shorelines and coves on the large lakes and would not impact streamflow.

- Floodplains: Resource is not present or not affected.

- Land Use: All treatment sites will be within park boundaries and will not affect any existing land uses. The exceptions to this are a few specific sites that may impact visitor center areas, campsites, and day use sites and these will be analyzed under the Visitor Experience impact topic.

- Rare or Unusual Vegetation: Treatment locations will be sites with cattail monocultures and would be unlikely to harbor any rare or unusual vegetation. All treatment sites will be surveyed prior to removal of cattails.

- General Vegetation: The impacts of treatment on wetlands will be analyzed under the Wetland Vegetation impact topic. Any impact to the general vegetation outside of the local wetlands will be negligible.

- Human Health and Safety: Resource is not present or not affected.

- Wilderness: In 1992 the National Park Service recommended a total of 127,436 acres of lands and waters for wilderness designation. Treatment locations are on Rainy, Namakan, and Kabetogama lakes which are not included in the park's recommended wilderness.

- Environmental Justice: The gateway communities and areas surrounding the park do contain relatively small low income and minority populations. None live within park boundaries. Because the proposed project area is within the boundaries of the park and impacts from the proposed actions would be localized to the project area, no impacts to disenfranchised populations are expected from the actions.

- Indian Trust Resources: Land tracts owned by the Minnesota Chippewa Tribe or individual members of the tribe are located within park boundaries. None of these tracts are located near existing cattail mats and would therefore be unaffected by the proposed actions.

- Threatened and Endangered Species: The NPS reached a finding of "No Effect" for Canada lynx, gray wolf, and northern long-eared bat for Section 7 purposes. Treatment locations will be sites with cattail monocultures and would be unlikely to harbor any endangered, threatened, and species of special concern.

- Cultural Resources: The majority of shoreline in VOYA has been surveyed for archeological and historic resources. There are 11 known archeological sites within 50 meters of identified cattail mats. Each area proposed for treatment will be evaluated by the park archeologist and a recommendation made to: 1) monitor during treatment; 2) survey prior to treatment; or 3) avoid treatment area.

    - The NPS consulted with the Minnesota Historic Preservation Office (MHPO) on the Great Lakes Integrated Pest Management Plan and the HPO concurred with the NPS finding of no adverse effect in a letter dated June 25, 2012. The MHPO concurred with the BMPs for protecting cultural resources and asked to be consulted further on implementation plans specific to each park. The NPS consulted with the MHPO on August 22, 2016 on the plans for wetlands restoration/cattail control in Voyageurs. The MHPO concurred with the NPS determination that this project will have no adverse effect on historic properties in a letter dated September 23, 2016. Both letters are in Appendix C.

    - VOYA is consulting with the Bois Forte Band of Ojibwe which maintains traditional ties to lands in the park. Per the Programmatic Agreement with the

SHPO for Section 106, the annual letter sent to affiliated tribes in 2015 included an announcement that the park wanted to start planning for treatment of cattails. The Consultation Agreement with the Bois Forte Band exempts routine control of exotics/invasives along roads and developed areas; it does not exempt control of exotics/invasives in wetlands. Therefore, we will follow the steps outlined in our agreement to consult at stages of the project.

CHAPTER 2: ALTERNATIVES

2.1 Introduction

This chapter describes the alternatives analyzed and alternatives considered but eliminated from further analysis. This chapter is organized into the following sections:

- Proposed Action
- Alternatives Considered and Dismissed
- Options Common To All Action Alternatives
- Alternative A: No Action (Continue with Current Management)
- Alternative B: Manually Treat Small Areas Only
- Alternative C: Mechanically Harvest Large Areas of Cattail
- Alternative D: Use Variety of Cattail Control Methods (Preferred)

2.2 Proposed Action

A proposed action is “the bureau activity under consideration” (46.30). “A proposed action is one option (alternative) for addressing purpose and need” (DO-12, 2015).The Proposed Action is to restore degraded wetlands habitat through a variety of cattail control methods, reestablishing native vegetation, and by increasing plant and animal diversity.

2.3 Alternatives Considered and Dismissed

Several alternatives were considered and discussed based on the results of internal and external scoping. This 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 were eliminated from

detailed study because they were either inconsistent with management policies and guidelines, were not feasible from a technical and/or economic standpoint, or did not meet the purpose or need for action.

2.3.1 Flooding

Water level manipulation has shown to be an effective treatment option for cattails in many areas. This is particularly true when coupled with other treatments such as cutting or burning. Late season cutting followed by submergence of at least 3 inches of water has proven to be very effective, providing up to 100% control (Apfelbaum, 1985, Weller, 1975).

Unfortunately, the invasive/hybrid cattails in VOYA are located exclusively along the shorelines and bays of the large lakes. Because of this, water level manipulation at the spatial and temporal scales needed for proper cattail control is simply not feasible. Fortunately, properly timed cutting of cattails below the water surface can also provide good control (Apfelbaum, 1985) and is a feasible option at VOYA. This technique will be discussed further under Alternatives B and D.

2.3.2 Fire

Fire has generally been found not to be effective at controlling cattails unless the fire is hot enough to burn the underground rhizomes. In order to accomplish this, the cattail mats and the substrate would need to be drained and dried. This is not feasible at VOYA for reasons mentioned above and therefore this alternative was dismissed as it does not meet the need for controlling the invasive cattails.

Although fire as a control method by itself is not effective at VOYA, it may still be used as a cultural treatment in preparation for other treatments. Prescribed fire can be effective at removing/reducing leaf litter accumulation and standing dead stems, making cutting easier and reducing the amount of biomass needed to be removed from the site after treatment.

2.3.3 Herbicides

Chemical control of cattails has proven to be quite effective in a variety of conditions and locations (Apfelbaum, 1985, Sojda et al,. 1993). Modern herbicides such as Rodeo (glyphosate) and Habitat (isopropylamine salt of Imazapyr) are aquatic-safe options that are effective at killing cattails and are frequently used in VOYA to treat other invasive plants such as reed canary grass. However, because of recent changes in NPDES permitting and the State of Minnesota’s designation of the waters of VOYA as Outstanding Resource Value Waters, aquatic applications of herbicide in VOYA are no longer an option. This alternative was dismissed for these reasons.

2.4 Options Common to All Action Alternatives

Several aspects of the project are independent of the selected alternative. These aspects include park programs and treatments commonly used for invasive plant control and restoration projects.

2.4.1 Education Programs

Education and outreach is essential to any successful invasive species management program and is one of the pillars of Integrated Pest Management. It is also a cornerstone of NPS management and activities. Public education activities at VOYA provide information on specific invasive plant management issues, strategies for controlling individual invasive plants, and reasons why the public should be concerned about invasive plant impacts.

These programs are well established at VOYA with terrestrial invasive plants and certain wetland invasives such as purple loosestrife. Educational material can be found on the park website, brochures, waysides, and through Ranger-led programs. With the infrastructure already in place, the focus can (and will) easily be expanded to include non-native cattails.

2.4.2 Cultural Treatments

Cultural treatments promote the growth of desirable plants and reduce the opportunities for invasive plants to grow. They involve manipulating treatment areas to present invasive plants with effective native competitors. Prescribed fire, smothering, and seeding/planting are examples of cultural treatments that may be employed at VOYA.

Prescribed fire can be used to clear off dead stems and reduce leaf litter in preparation for mechanical removal and/or seeding. Late fall or winter burning, the winter before treatment, would give optimal results and have minimal impact on wildlife in the area.

Smothering involves covering the plants with heavy black plastic sheeting or tarps. Unwanted plants are cut short and the black plastic is staked down over the area and left in place for a growing season. The black plastic has two effects: it blocks the sunlight the plants need to grow and it conducts heat, effectively cooking the roots and seeds. Smothering has proven to be effective for controlling reed canary grass at VOYA. It is, however, limited to use in smaller patches.

Reseeding/Replanting can be used in conjunction with other cultural or mechanical treatment methods. Once canopy cover of invasive cattails is reduced or eliminated in an area, seeds or seedlings of appropriate native plants can be sowed or planted in the area providing direct competition for the cattails. VOYA has an active seed collection

and native plant nursery program in place which can be utilized to provide plants for small-scale wetland restoration projects.

2.4.3 Manual/Mechanical Treatments

Manual treatment (hand pulling) can be used anywhere in the park, however it will likely be most effective in removing small floating mats. Hybrid cattails spread through underground rhizomes and will regenerate from fragments broken off in the soil. Hand pulling will therefore require multiple re-treatments to adequately deplete the root system.

Removal can be made somewhat easier with hand tools such as shovels and spades. These tools can allow greater access to the root system with fewer root fragments broken off.

Power mowers or brushcutters can be used to cut the plants in preparation for additional treatments. Multiple cuttings can help to deplete nutrient reserves in the root system and weaken the plants.

2.5 Alternative A: No Action (Continue Current Management)

Under the no-action alternative, the Park would not remove cattail and restore wetlands (Figure 4). The park would also continue the current policy to push floating cattail mats to the nearest shore and temporarily secure it by tying off to a tree or staking to remove the immediate hazard. Once a more appropriate location has been determined (ideally back to the original colony to avoid transferring cattails to an uninvaded bay), the mat would be moved to that location and staked until it can be treated or removed.

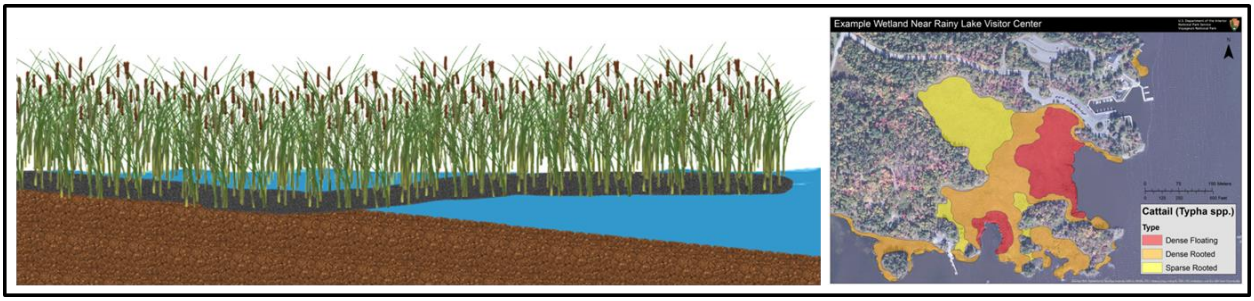

Figure 4. Alternative A projected model of representative wetland. Cattails dominate wetlands.

2.6 Alternative B: Manually Treat Small Areas Only

Cutting or mowing cattails followed by flooding has been proven to be an effective method for control. Along shorelines of large lakes, however, this is not feasible.

Alternatively, cattails can be cut underwater to mimic the cutting/flooding method. This underwater cutting has also proven to be effective against cattails.

Under this Alternative, hand tools (powered and non-powered) would be used to cut cattails underwater (Figure 5). Since hand tools would be used, this Alternative would be limited to treatment of small patches of cattails and non-treatment of large areas invaded by cattails. Silt barriers would be used to prevent silting of nearby habitats from substrate disturbance during treatments and any cut vegetation would be removed from the site to reduce the spread of vegetative propagules from rhizome fragments.

Once canopy cover of invasive cattails is reduced or eliminated in an area, seeds or seedlings of appropriate native plants can be sowed or planted in the area providing direct competition for the cattails (Figure 6). VOYA has an active seed collection and native plant nursery program in place which can be utilized to provide plants for small-scale wetland restoration projects.

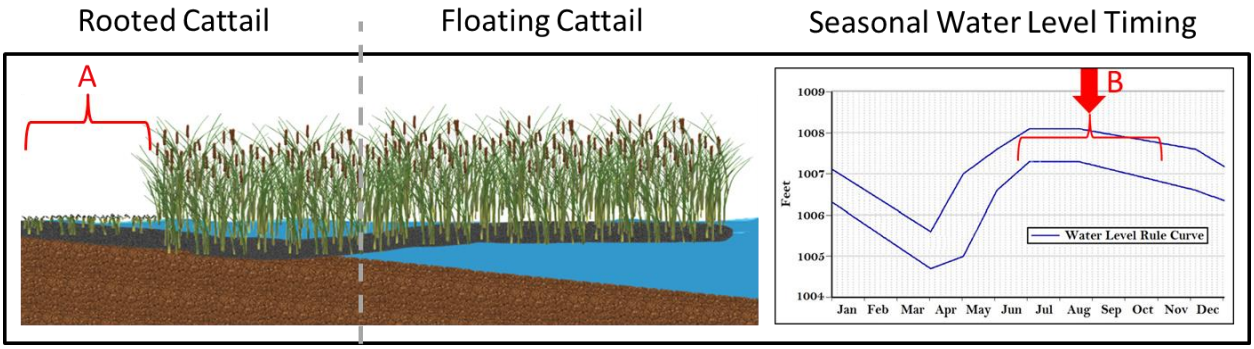

Figure 5. Alternative B treats small areas of cattails (A) with hand tools during summer high water levels (B).

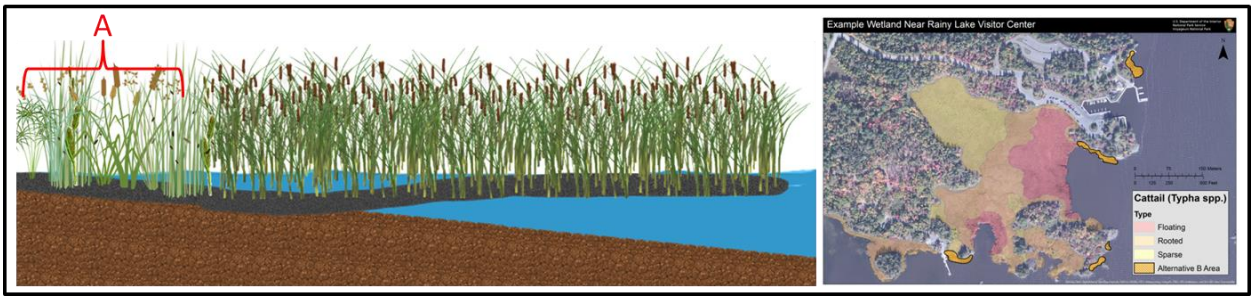

Figure 6. Alternative B projected model of representative wetland. Increased biodiversity in small areas (A). Map shows example wetland near Rainy Lake Visitor Center and areas to be treated (orange cross-hatch).

2.7 Alternative C: Mechanically Harvest Large Areas of Cattail

Physical and mechanical control refers primarily to the use of machinery designed to crush, shred, cut, press, lift, convey, transport and remove cattails and associated organic material from water bodies. Mechanical control on sites that are flooded and

consistently moist is achieved through cutter barges or shredders. Cattails and associated plant material would be cut or shredded and then harvested and transported for disposal. Harvested plant and organic material would be removed to reduce the spread of vegetative propagules from rhizome fragments. Mechanical removal of cattails has been successfully accomplished by American Indian and First Nations communities in the area including by the Bois Forte and Fond du Lac Bands, and the Seine River First Nations (Figure 7).

Figure 7. Fond du Lac harvester on the St. Louis River near Duluth, MN.

The Bois Forte Band has employed this method extensively with great success at Nett Lake. The success rate of cattail removal depends on (1) the ability to “dig” deep enough to get all the rhizome runners - water depth of 2 -3 feet is optimal; and (2) the ability to clean up and remove the rhizomes after cutting. The rhizome pieces float, so they are easily picked up with the harvester barge. The rhizomes are kept from spreading by starting from inside the designated cutting bed area and working toward the outer extent of the cattail mat. The roots remain contained by other standing vegetation until they are picked up by the harvester barge. Under ideal conditions and with appropriate time spent cleaning up, this method has proven to be nearly 100% effective on Nett Lake.

The efficacy on the lakes of VOYA is unknown. Lake size and morphology, substrate, and water level management are all different between Nett Lake and the lakes of VOYA.

Under this alternative, mechanical harvest of non-native cattails in a selected bay or bays would be conducted as an experiment to better understand the effectiveness of

this treatment method as well as potential impacts before using this technique in other areas of the park. This Alternative would employ the use of large mechanical equipment such as mulching and harvesting barges as well as the hand tools described in Alternative B (Figure 8).

If the treatment is determined to be successful, this method *may* be used in other areas of VOYA. The use of mulching and harvesting barges is, however, limited to areas accessible by the harvesters and large enough to justify the extra cost for transportation and operation. Mechanical harvesters would target the large floating cattail mats but shallow waters, rocks, and logs would prevent treatment of rooted cattails.

All biomass that is mechanically cut/chopped would be removed from the water. If an appropriate shoreline location is available, the material will be left on shore to decompose. The piles may be burned after they dry out to expedite the process. Through conversations with Bois Forte Band, the cattail material usually rots away in about one year. If an appropriate location is not available, the material will be loaded into trucks to be hauled off site and dumped at a land fill or similar location.

Restoration efforts would include re-vegetating the area to promote a diverse native marsh habitat. Re-vegetating methods and plant mixes would be site-dependent but would most likely be a combination of re-seeding and planting plugs or “wildings” collected from the area (Figure 9).

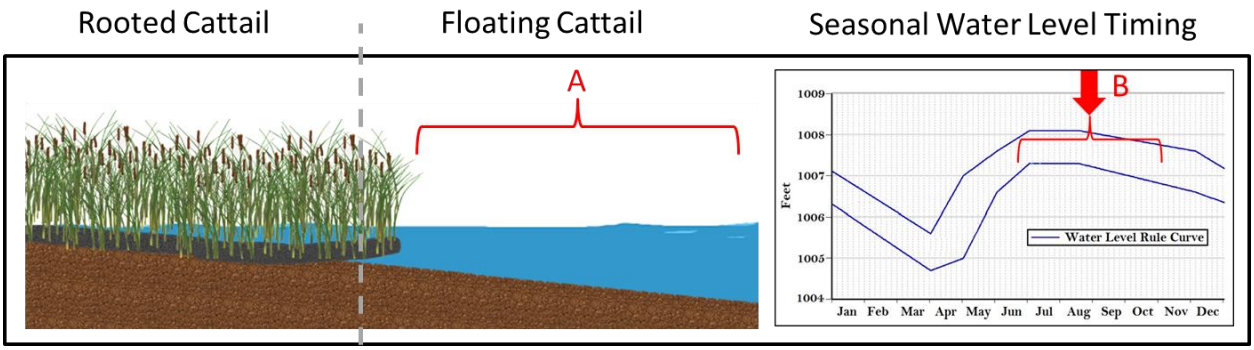

Figure 8. Alternative C treats large areas of floating cattails (A) with mechanical harvesters during summer high water levels (B).

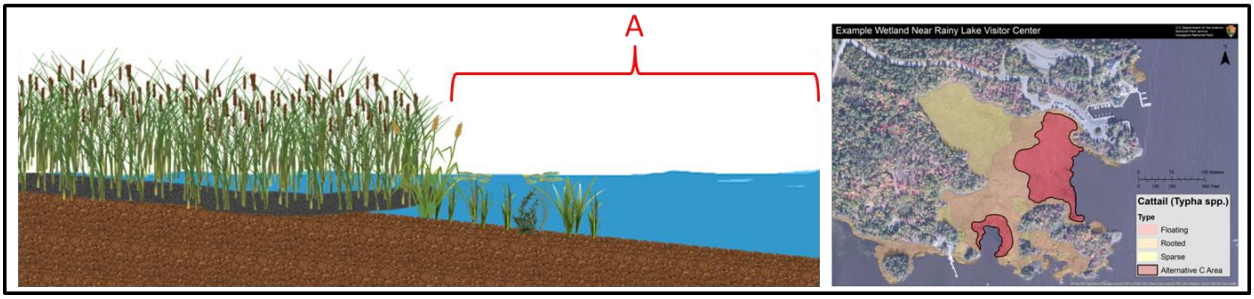

Figure 9. Alternative C projected model of representative wetland. Treatment replaces floating cattails with areas of open water and mixed submergent and emergent native vegetation (A). Map shows example wetland near Rainy Lake Visitor Center and areas to be treated (red).

2.8 Alternative D: Use Variety of Cattail Control Methods (Preferred)

This alternative would use a variety of cattail removal and wetland restoration techniques including reestablishing muskrats as natural biocontrol of cattails (Figure 10). The goal with this Alternative would be to create a diverse system with open water channels and patches of cattails (along with other native marsh species) that would encourage muskrats and other wildlife to re-populate the area (Figure 11). As in Alternative C, the mechanical harvest of non-native cattails in a selected bay or bays would be conducted as an experiment to better understand the effectiveness of this treatment method as well as potential impacts before using this technique in other areas of the park.

Mechanical/Cultural Control

In areas of dense floating invasion, non-native hybrid cattails would be mechanically removed using plant mulching and harvesting barges. Any cattails not accessible by the harvesting equipment would be removed with hand tools designed for aquatic vegetation use. Burning may be used as a tool to reduce cattail biomass prior to harvesting as well as to expedite the composting process. Areas of non-floating cattail would be controlled by clearing of the biomass above the ice level in winter, which would allow increased water levels in spring and summer to drown-out and kill the cattail rhizome mats. Winter clearing methods include scraping the above-ice biomass with mechanical equipment as well as burning. Aquatic vegetation cutters may also be used to cut rooted cattail below the water level during summer. Just like winter clearing, this will drown-out and kill the rhizomes if water levels remain above the cut. The harvested biomass would be composted on-site to reduce the costs of hauling. Cattails may reinvade treated areas, requiring periodic (every 10-20 years) small-scale removal of cattails.

Native Biocontrol

Muskrat populations have the documented ability to reduce and control densities of wetland vegetation, and may be a viable management alternative for expanding cattail

populations. Muskrat populations have dwindled regionally, most likely due to loss of suitable habitat as cattail monocultures have taken over entire bays. We propose to assess the effectiveness of reintroducing and enhancing muskrat populations to serve as a *native biocontrol* for expanding hybrid cattails. A more botanically diverse, structurally patchy wetland with healthy muskrat populations is more likely to withstand invasion by cattails than cattail-dominated wetland with no muskrats.

The park would identify and establish transects at wetland sites with varying levels of *hybrid cattail* abundance. Sampling would be stratified across “restored” and “unrestored” sites. Estimates *of hybrid cattail* density would be measured along each transect and correlated with measurements of native plant, vertebrate, and invertebrate abundance and diversity. This will provide a clear understanding of the benefits of wetland restoration practices by comparing biodiversity measurements from pre- and post-restoration sites. This approach will also provide a mechanistic insight into how wetland ecosystems are impacted by expanding hybrid cattail populations. Because muskrat populations have declined in VOYA over the last 30+ years, we would translocate additional muskrats into these wetlands (at various treatment densities) from nearby areas (<250km away). A subset of muskrats would be fitted with radio transmitters to assess their survival and movements within each treatment wetland. We would also investigate food preferences of native muskrats on invasive hybrid cattail versus other native plant species. The effectiveness of our *native biocontrol* efforts would be evaluated by quantifying the extent of *hybrid cattail* reduction in each wetland relative to control wetlands (no muskrats). Additionally, we would assess the economic and environmental feasibility of this native biocontrol compared to mechanical control techniques.

Reestablish Native Vegetation

Following removal of cattails, we would use a combination of methods to reestablish native vegetation. Removing the cattail mats, even ones in place for many decades, will allow dormant seeds, including wild rice and other native aquatic plants, to germinate without any further effort. Since it is unknown what viable seed bank exists, park staff would use an onsite greenhouse and native plant nursery to propagate plants, transplant plants from nearby sites, and directly-sow seeds to re-establish a diverse community of native species.

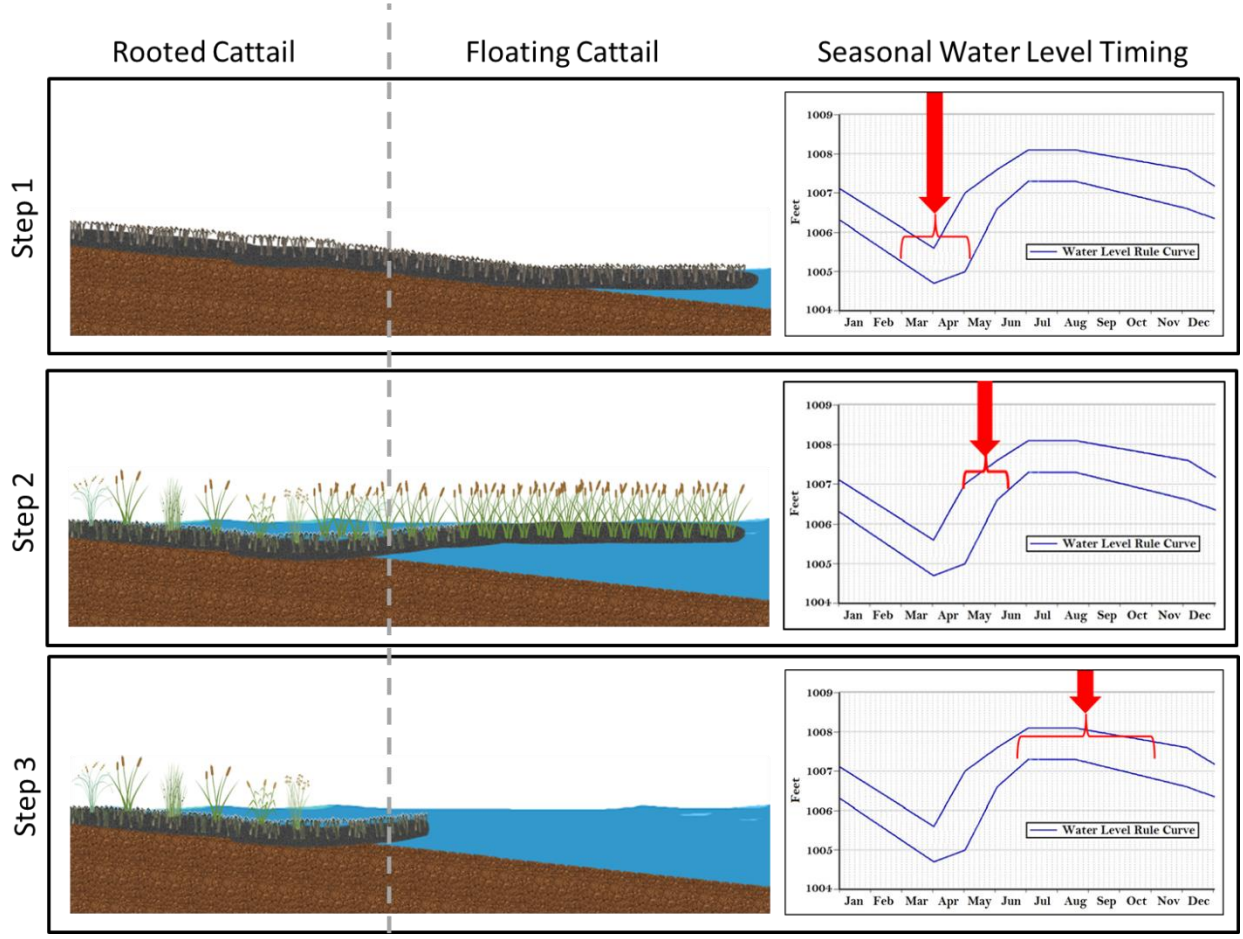

Figure 10. Alternative D treats cattail dominated wetlands in three steps. Step 1: All cattails are cut or burned during winter low water. Step 2: Rooted cattails are flooded and killed by rising water levels in spring/summer. Some rooted cattails regrow from rhizomes and seed. Floating cattails regrow but biomass is reduced. Step 3: Floating cattails are removed with mechanical harvesters. Rooted cattails regrowing from rhizomes and seed are cut under the water level.

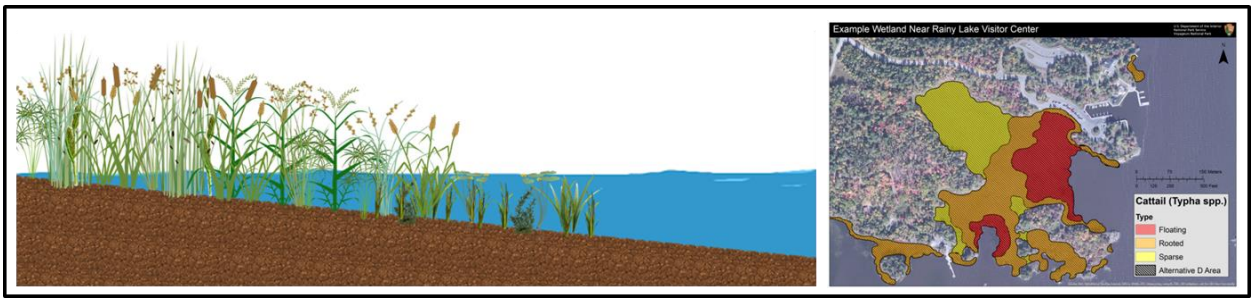

Figure 11. Alternative D projected model of representative wetland. Treatment replaces floating cattails with areas of open water and mixed submergent and emergent native vegetation. Rooted cattails are replaced with increased biodiversity. Map shows example wetland near Rainy Lake Visitor Center and areas to be treated (all colors).

Mitigation Measures

- Wetland biodiversity monitoring: Wildlife and vegetation surveys are being conducted on wetlands in bays of Rainy, Kabetogama, Namakan, Sand Point, and Crane Lakes. Monitoring sites were randomly chosen within accessible bays on the large lakes. Measurements of cattail abundance will be correlated with measurements of native plant and wildlife diversity. This will provide a better understanding how wetland ecosystems are impacted by cattails and the potential benefits of wetland restoration methods.

- Treatment plans: Individual wetland evaluations will be completed by determining the abundance, density, and type (e.g. floating vs rooted) of cattail and other vegetation. This will help determine the appropriate treatment type for cattail removal. For example, a wetland with mostly floating cattail will receive mechanical harvesting barge treatment as this is likely the only viable treatment option. Wetlands with mostly rooted vegetation are not accessible by floating barges and are better candidates for winter scraping or burning. Similarly, the individual wetland evaluations will be used to determine the most appropriate means of revegetation techniques. An example of this would be wetlands with deeper water depths will be revegetated with species likely to grow in these areas such as wild rice or rushes versus shallow areas which are more conducive to sedges or grasses.

- Post-treatment wetland biodiversity monitoring: The wildlife and vegetation surveys completed before treatments will also be carried out following cattail removal and restoration. This will help determine the efficacy of treatment types and the revegetation. This will also help determine any potential impacts of the treatments and revegetation on wetland ecosystems as well as the cost efficiency of various treatment types and restoration processes.

- Muskrat enhancement and reintroduction: Protocols will be developed where appropriate for the capture, handling, transport, fitting of radio transmitters or other tagging or tracking devices, and release of muskrats. All protocols will be developed to meet the guidelines recommended by the American Society of Mammalogists (Sikes et al. 2011) and will be approved by National Park Service and other appropriate Animal Care and Use Committees.

CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

The overall impact of an alternative on the particular affected environment will be determined by the intensity of the impact and the duration of the impact. The impacts

can also be positive or negative so an alternative may have, for example, a moderate short-term negative impact and a positive long-term minor impact.

For this Environmental Assessment we are using the following terms to describe the intensity and duration of the impact:

Intensity:

- Negligible - Impacts would have no measurable or perceptible changes.
- Minor - Impacts would be measurable or perceptible but would be localized within a small area within the park (generally the treatment area).
- Moderate - Impacts would cause a measureable and/or noticeable change in an affected environment outside of the immediate area.
- Major - Impacts to the affected environment would be substantial, regional or park-wide, highly noticeable, and potentially permanent.

Duration:

- Short-term – generally last only during the initiation and implementation of the project, and the resources resume their pre-project conditions following the implementation of the project.
- Long-term – Effects last beyond the initiation and implementation of the project, and the resources may not resume their pre-project conditions for a longer period of time.

3.2 Water Quality

The waters of VOYA are all designated by Minnesota as class A – outstanding resources exhibiting exceptional recreational and/or ecological values. The relatively shallow waters of Kabetogama Lake, Sullivan Bay in Kabetogama Lake, and Black Bay in Rainy Lake have different water chemistry than the other three large lakes (higher nutrients, chlorophyll-*a*, specific conductivity, alkalinity, pH and lower Secchi depth) (Kallemeyn et al., 2003). Kabetogama Lake and Black Bay in particular have higher specific conductance, nutrient, and chlorophyll-*a* concentrations (Kallemeyn et al., 2003) than the other large lakes in the Park. Substantial water-quality differences also occur between the bays, mid-lake, and shoreline areas of Lake Kabetogama (Christensen et al., 2011). One main reason for these differences is the inflow from the Ash River (Kabetogama Lake) and Rat Root River (Black Bay) from an area west and south that is overlain by calcareous drift. Sand Point Lake receives most of its inflow from the southeast via the Vermilion and Loon Rivers that drain a large area of bedrock and thin noncalcareous drift. Namakan and Rainy lakes, which lie near the eastern and northern

boundaries of the Park, also receive water that drains a large area of bedrock and thin noncalcareous drift.

As seen in Figure 3, the majority of cattails mats in and near the park occur along the shorelines of Black Bay and Kabetogama Lake. The cattail dominance in Black Bay is likely related to the eutrophic state of the bay (Kallemeyn et al., 2003).

Although the park's four large lakes are naturally occurring, the lake levels have been artificially controlled for nearly 100 years. The International Joint Commission is responsible for determining the appropriate lake level.

The intensity and duration of the impact will be determined in large part to the potential for mixing of water. Current and wind will therefore play a large role in determining effects.

Turbidity

A technique often employed by aquatic vegetation harvesters consists of starting on the inside of a wetland and working out, leaving a narrow band of cattail on the outside of the wetland as a natural silt barrier. This natural silt barrier acts to reduce the spread and mixing of silt and organic debris from the project site to surrounding areas. Once the organic debris is settled, this narrow band of cattail is removed last. Additional artificial silt barriers can also be installed to contain silt and suspended substrate to the immediate area and removed when the substrate settles back down.

Nutrient Loading and Algal Blooms

Cattails are good at taking up and storing nutrients such as nitrogen and phosphorus. Removal of cattails will result in increased nutrient loading and resultant algal blooms in the immediate area. The impact of these algal blooms will be largely determined by the amount of mixing. Silt barriers can keep the algal blooms localized but will also concentrate the cyanotoxins. Removing the silt barriers as soon as settling occurs will allow mixing/diluting of the algae result in a less intense impact over a larger area.

Dissolved Oxygen

Removal of cattails will likely increase the organic matter load into the area. Loading of organic matter into the substrate and bottom water layers of productive eutrophic lakes (such as Kabetogama Lake and Black Bay on Rainy Lake) increases the consumption of dissolved oxygen (Wetzel, 2001). If the dissolved oxygen concentration becomes low enough, there will be fish and invertebrate mortality within the treatment area. The area impacted by lowered dissolved oxygen should be confined by the use of a silt barrier and be relatively short in duration due to the large volume and high circulation of the large lakes.

3.2.1 Alternative A: No Action (Continue Current Management)

Under the no-action alternative, cattails would not be removed. Cattails are very efficient at removing nutrients from the water column. They help to mitigate the increased nitrogen and phosphorus inputs from both terrestrial runoff and atmospheric deposition. No action would allow cattails to continue to expand in the park and would result in the continuation of this potentially positive impact on water quality for as long as no actions are taken. However, dense non-native cattails also disrupt natural nutrient cycling which would occur in a non-invaded wetland and this may continue to create long term major negative effects on water quality and the natural processes in wetlands.

3.2.2 Alternative B: (Manually Treat Small Areas Only)

Treatment under this alternative would be limited to small patches of cattails, generally less than 1000 square feet, that could feasibly be removed with hand tools. Wading through the site and using power tools to cut cattail stems and roots will disturb the substrate and result in localized, temporary turbidity in some locations. Silt barriers will likely need to be used in some of the treatment sites. Since these will be small, individual patches of cattails being removed, the impact on dissolved oxygen and nutrient loading from removal of these plants will be temporary and negligible.

3.2.3 Alternative C: (Mechanically Harvest Large Areas of Cattail)

Under Alternative C, an aquatic vegetation harvester would be used to remove large stands of cattails in the park.

The immediate impact to the local water quality would be measureable, though temporary. In the short term Alternative C would result in minor negative impacts to the water quality of the area. Disturbance of the substrate will result in temporary high turbidity. There would also be localized increases in biological oxygen demand and nutrients and the increase in nutrients could stimulate algal blooms and resulting toxicity. The use of silt barriers would be beneficial to keep any negative impacts localized to the immediate area. The silt barrier would also concentrate any algal blooms and toxicity, however, so they would need to be removed as soon as the substrate has settled to allow for water mixing and dilution.

Long-term, this alternative would result in a minor increase in nutrients for phytoplankton. The continued inflow of nutrients coupled with the removal of cattails will result in more nutrients and algal blooms for a while. Once the marsh plant community is re-established, this increase should be mitigated.

3.2.4 Alternative D: (Use Variety of Cattail Control Methods)

Since one of the techniques this alternative uses is the same as Alternative C, the impacts will be similar in regards to the large floating cattail mats. The use of fire as a means of biomass reduction prior to treatment would reduce the levels of nutrients entering the system. This should reduce the minor negative impacts described in alternative C of temporary increased turbidity, oxygen demand, and potential algal blooms. The additional cattail control methods used for the rooted cattail areas such as winter cut at ice level and cutting under water during summer do not typically disturb the sediment. Therefore, these techniques should not increase turbidity significantly. The flooding of cut cattail and subsequent mortality of the rhizomes will release nutrients into the system. This will likely have a similar effect of increased oxygen demand and algal blooms but should be temporary and minor. The use of fire as a biomass reduction tool prior to treatment should reduce these temporary negative impacts. Further, once native plant communities are re-established, these systems should return to a natural state.

3.3 Vegetation

VOYA contains significant wetland resources. Because of the well-recognized ecological values of these wetland resources (Wilcox and Meeker, 1992; Mitsch and Gosselink, 1993), they have been included in parkwide as well as site-specific plant community classification and mapping investigations. The three primary park wide investigations were conducted by Kurmis et al. (1986), the U. S. Fish and Wildlife Service (USFWS), and Hop et al. (2001). Kurmis et al.'s (1986) classification of the Park's vegetation includes 12 ecological types identified on the basis of moisture and nutrient gradients. The five of these associated with wet, edaphic conditions were white cedar – Coptis, black spruce – Alnus, black spruce – Kalmia, leatherleaf bog, and marsh. In contrast, the USFWS and the Hop et al. (2001) studies used more detailed classification systems to identify and map the Park's wetlands. The USFWS as part of their National Wetlands Inventory (NWI) identified and mapped wetlands in the Park and adjoining areas. Wetlands were identified on aerial photographs based on vegetation, visible hydrology, and geography in accordance with Cowardin et al.'s (1979) wetland classification guide. Based on an analysis of the digital versions of the NWI maps, 29,646 acres in the Park were classified as palustrine wetlands. These would include the vegetated wetlands traditionally called marsh, swamp, bog, fen, and in some instances small, shallow ponds (Cowardin et al., 1979). Portions of these wetlands lie within the Park's lacustrine system, which encompasses the permanently flooded interior lakes and the four large lakes.

Similar quantities and distributions of wetland communities were identified in the most recent parkwide analysis of the Park's plant communities (Hop et al., 2001). Based on aerial photo interpretation and ground truthing, Hop et al. (2001) identified a total of 50 plant community types using the U. S. National Vegetation Classification system. About 50% of these were identified as bog, swamp, marsh, fens, and ponds. Together, these covered about 32,380 acres with about 10,300 acres located within the 81,609 acres encompassed by the Park's 30 named lakes.

The Midwest Cattail Marsh covers approximately 500 acres in the park, mostly in the four large lakes. These marshes on the large lakes are predominantly comprised of the hybrid *Typha x glauca* and are the focus of this document.

3.3.1 Alternative A: No Action (Continue Current Management)

Continuing current management activities would allow hybrid cattails to expand further in the park resulting in a major long term degradation of native wetland vegetation. Floating cattail mats will continue to break off, cause navigational hazards, and start additional cattail invasions in new locations. This will result in continued loss of native marsh plant communities and overall biodiversity in these wetlands.

3.3.2 Alternative B: (Manually Treat Small Areas Only)

This alternative will have no impact on large cattail populations and the overall impact to these larger marshes in the park will be negligible. This technique may have a minor positive impact, however, by reducing the spread of cattails to new areas. By targeting small patches, and in particular the break-away mats, establishment of cattails in new areas can be reduced. However, this is limited to break-away mats which are small enough for hand operated tools to be useful. This option does nothing for the large break-away mats of cattail. The small areas that are treated can be restored resulting in minor improvement of native vegetation biodiversity.

3.3.3 Alternative C (Mechanically Harvest Large Areas of Cattail)

The temporary removal of cattails and associated disturbance to site would have negligible negative impacts to the plant community in the area as these hybrid cattail mats are a mono-dominant stand and not a “community” to start with. Replacing these stands with a diverse mix of native plants would restore the community and would result in noticeable changes to the site. Establishment of the new plants may take a few years. Once the new plants have been established, the quality, diversity, and functionality of the marsh plant community in these specific areas would all be measurably improved.

However, this alternative only targets the large floating cattail mats which only comprise of a portion, typically less than half, of the total area invaded by cattail in a wetland. This alternative will have little impact on the cattails that are rooted due to the inability of the equipment to access these areas due to lack of water depth.

3.3.4 Alternative D (Use Variety of Cattail Control Methods)

Unlike Alternative C, entire cattail dominated wetland will be targeted with a variety of methods throughout the park. This would result in more botanically diverse, structurally patchy wetlands. Healthy muskrat populations will aid in the maintaining wetland biodiversity as a natural biocontrol of cattails.

There is a risk of regrowth of cattails expanding over time and eventually overtaking marsh areas again. However, the timeframe over which cattails may reinvade treated areas is likely 10-20 years or more. This would be mitigated by periodic small-scale removal efforts and maintenance of healthy muskrat populations. This alternative should have the largest long-term positive impact on wetlands and overall vegetation biodiversity in the park.

3.4 Fish

Fifty-four fish species from 16 families have been identified in Park waters as a result of the various surveys and studies. The best-represented families are Cyprinidae (16 species), Centrarchidae (8 species), and Percidae (7 species).

The number of fish species ranges from 36 to 40 in the large lakes. Species richness is strongly correlated with the lake area. Relations such as these are generally attributed to the increased habitat diversity in larger, deeper lakes with more complex shorelines (Tonn and Magnuson, 1982; Eadie and Keast, 1984; Eadie et al., 1986).

Yellow perch and northern pike are the most ubiquitous species, occurring in 27 and 23 lakes, respectively. Other species that occur in 15 or more lakes include the white sucker, blacknose shiner, golden shiner, and Iowa darter. Walleye, the species most sought by anglers, only occurs in the large lakes and in three interior lakes. Smallmouth bass, largemouth bass, sauger, and black crappie, which are also sought by anglers, occur in 9, 9, 7, and 6 lakes, respectively. Lake trout are present in three interior lakes and are also occasionally reported in Rainy Lake with the most recent report being in 1988. Muskellunge are present in the two Shoepack lakes, Rainy Lake, and based on recent angler reports, Crane Lake.

3.4.1 Alternative A: No Action (Continue Current Management)

Dense cattail stands are impenetrable to spawning fish and are therefore not frequently used. Continuing current management practices would potentially mean a decrease in fish spawning habitat as cattail infestations expand their boundaries and move to new areas. The overall viability of fish populations in the park are not likely to be impacted in the near future but perceptible losses of habitat could happen at the local level. This alternative will likely result in a long-term minor negative impacts to fish populations.

3.4.2 Alternative B: (Manually Treat Small Areas Only)

The overall impact of Alternative B on fish would be negligible. Some foraging or spawning areas may be restored for fish use but these areas would be small and localized and not affect fish viability in a measureable way. Minnow kills during treatment would be very minimal or non-existent as the fish could easily escape. Long

term, this alternative will have similar continued minor negative impacts to fish populations as alternative A.

3.4.3 Alternative C: (Mechanically Harvest Large Areas of Cattail)

There are probably not many fish utilizing the floating cattail mat areas due to the inability of the fish to enter the mats. The most likely negative impacts to the fish populations would be to small fish and minnows that would be killed by mulching barge operations or the changes in turbidity, oxygen levels, and algal blooms. This would be a temporary minor impact as species should recolonize from neighboring areas.

Long-term, restoration of a diverse marsh habitat should increase the feeding and spawning habitat for a wider range of fish species. This will likely result in a long term moderate positive impact for fish.

3.4.4 Alternative D: (Use Variety of Cattail Control Methods)

Although the entire wetland would be targeted for cattail removal and restoration in this alternative, impacts would most likely be similar to Alternative C for fish. This is because the additional treatment types used in this alternative are mostly targeted at the rooted cattail sections with little to no standing water for the majority of the year and not typically used by most fish. The additional use of fire to reduce biomass may reduce the negative impacts of the cattail control methods for fish. Further, it is possible that some shallow areas used by fish will be restored in this alternative. Overall, major long-term positive impacts for fish should be seen with this alternative through increases in feeding and spawning habitat.

3.5 Aquatic Invertebrates

McEwen and Butler (2008) performed a survey of benthic macroinvertebrates (invertebrates that live on the lake bottoms) of VOYA. They found the lakes studied supported average densities of 3,298 invertebrates per square meter based on grab samples. Over 80% of the organisms belonged to one of five taxonomic units: Chironomidae (non-biting midges) - 41%, Amphipoda (crustaceans) - 19%, Oligochaeta (worms) - 11%, Sphaeriidae (molluscs) - 7%, and Gastropoda (snails and slugs) - 4%. Among the most ubiquitous invertebrates (those occurring in more than 50% of the grab samples) were non-biting midges - 100%, molluscs - 79%, Hexagenia (mayflies) - 75%, worms - 70%, Ceratopogonidae (biting gnats) - 69%, Chaoborus (glassworms) - 67%, snails and slugs - 61%, and crustaceans - 57%. On average, the species richness was 10 per meter square, and there were no locations where no organisms were found.

There were 131 different taxa identified: 108 in Rainy Lake with 16 unique taxa found in Rainy Lake but not in Namakan Reservoir, and 113 taxa in Namakan with 21 unique taxa found in Namakan Reservoir but not in Rainy Lake. The majority of organisms

(based on relative densities) were crustaceans - 15%, worms - 15%, and three non-biting midge genera: *Procladius* - 9%, *Chironomus* - 6%, and *Tanytarsus* - 5%.

With proper mitigations such as silt barriers in place, the affected environment for both fish and aquatic invertebrates is not likely to extend beyond the immediate footprint of the treatment area.

3.5.1 Alternative A: No Action (Continue Current Management)

Invertebrate diversity is low in cattail stands, though some species do utilize these locations. This negative long term condition would continue. As with fish habitat, as cattails expand, measureable losses of species diversity would be expected at the local level but overall viability of these species would not likely be impacted in the near future.

3.5.2 Alternative B: (Manually Treat Small Areas Only)

As with fish, the overall impact on invertebrates would be negligible. Any increase in habitat and diversity or killing of invertebrates during treatment would be very localized. These areas would be quickly reestablished by surrounding populations. Areas restored may increase habitat for some species but would likely be small and negligible.

3.5.3 Alternative C: (Mechanically Harvest Large Areas of Cattail)

There is a community of aquatic invertebrates that live in the cattail mats, although the species diversity is low. These invertebrates would be killed by mulching barge operations. They should, however, recolonize the area from neighboring habitats and therefore be a temporary minor negative impact.

Long-term, restoration of a diverse marsh habitat should increase the habitat for a wider range of aquatic invertebrates. The will result in a long term moderate positive impact on invertebrates for this alternative.

3.5.4 Alternative D: (Use Variety of Cattail Control Methods)

The additional cattail control methods used in alternative D may increase the likelihood of the temporary minor negative impacts described in alternative C resulting in mortality of invertebrates in the treatment areas. However, just as in alternative C, these should be highly localized and temporary as the invertebrates should quickly recolonize from surrounding areas.

Overall, this alternative should result in the most diverse and structurally patchy wetlands creating lots of habitat for invertebrates. This should give this alternative a long-term major positive impact on invertebrates.

3.6 Wildlife

Mono-dominant cattail mats are not home to a wide variety of wildlife but some birds, mammals, and herptiles do use the areas. Red-winged blackbirds, rails, bitterns, and some sparrows use the cattails for nesting and foraging. Muskrats, although not as prevalent as they used to be, use cattail stands as habitat. Reptiles such as painted turtles and snapping turtles may use cattail mats as resting or escape cover. Many species of frogs and toads may use cattail stands for breeding, foraging, or escape cover.

The affected environment for these wildlife species is not likely to extend beyond the immediate footprint of the treatment area.

3.6.1 Alternative A: No Action (Continue Current Management)

Cattail stands can be home to a few species of nesting birds such as red-winged blackbirds, bitterns, and rails. Muskrats, painted turtles, snapping turtles, and several species of frogs can also be found in these stands. Overall wildlife diversity is fairly low, though, as its generally considered poor habitat. Continuation of current management practices would provide continued marginal quality habitat for these species of animals. Expansion of cattails, however, would decrease habitat for other species that require more diverse plant communities. Overall, this alternative will continue a long-term moderate negative impact on wildlife.

3.6.2 Alternative B: (Manually Treat Small Areas Only)

Small cattail patches may contain one or two bird nests, a few turtles and some frogs but overall wildlife numbers should be fairly low in these sites. The use of hand tools would limit the number of animal casualties as most would be able to escape. A walk through the site prior to treatment to remove animals will mitigate damage. Loss of wildlife and loss of habitat in this scenario would be quite low and not affect viability of any of the species. Any increase in habitat would likely be negligible due to the small size of restored areas.

3.6.3 Alternative C: (Mechanically Harvest Large Areas of Cattail)

The mulching barge would be destructive to any wildlife in the area that was unable to leave. Red-winged blackbirds, rails, bitterns, and sparrows nesting in these areas and any eggs or nestling birds would potentially be killed. Therefore, it is important to time the removal operations for later in the season to reduce the likelihood of this temporary minor negative impact.

Likewise, any painted turtles, snapping turtles, and frogs would likely be killed by the mulching barge. Any occupied muskrat houses could be destroyed but care could be taken to avoid this by working around them.

Some negative effects on wildlife from the harvest barge can be mitigated by having people walk through the patches to be treated to scare away wildlife, and capturing and moving wildlife to adjacent patches. Relocated wildlife could include nestling birds, turtles, and frogs and toads.

Those would be the immediate impacts to the wildlife. Long-term, restoring a diverse native marsh habitat should increase the wildlife use of these specific areas. A wider range of bird species would use the sites, herptiles would re-colonize the area from neighboring areas, and muskrat habitat would be dramatically improved. This would yield a long term moderate positive impact for wildlife.

3.6.4 Alternative D: (Use Variety of Control Methods)

The temporary minor negative impacts would be similar to alternative C including potential mortality of wildlife unable to vacate the site during treatment. Similar mitigation procedures could be used to reduce this temporary negative impact. Species such as Red-winged blackbirds who use cattail to a great extent will not likely be dramatically impacted as areas of cattail will still exist in a structurally diverse wetland. The capture, handling, tagging, and relocation of muskrats from surrounding areas carry a small risk of injury or loss of animals. These risks are mitigated by following approved protocols for the appropriate care and use of animals.

The additional cattail control methods employed here should create diverse wetlands providing measurably better food and lodging habitat for muskrats and other wildlife. Enhanced and reintroduced muskrat populations should further increase biodiversity of both plants and animals by creating a structurally patchy and diverse wetland habitat. Long-term, restoring diverse native marsh habitat parkwide should increase wildlife use. A wider range of bird species would use restored sites, herptiles would re-colonize areas from neighboring sites, and muskrat habitat would be improved. This alternative should result in the greatest long term positive impact for a diversity of wildlife.

3.7 Visitor Experience

Although some small cattail patches may choke out landing spots and shorelines near Visitor Destination sites, most cattail-infested areas are in locations that do not impact visitor experiences to a large extent. These locations are typically in back bays and shallow, mucky shorelines. The exceptions are the cattails that grow in areas usable for wildlife viewing, areas for fishing, and areas adjacent to campsites or visitor centers, in particular the Rainy Lake Visitor Center. Here, the treatment options have the potential to affect visitor experiences in the short-term during and following treatment.

For these areas, the affected environment will likely extend beyond the immediate footprint of the treatment area to include the adjacent picnic areas, boat launches, parking lots, and visitor centers.

3.7.1 Alternative A: No Action (Continue Current Management)

Cattail stands provide no fishing, boating, or paddling opportunities and very few wildlife viewing opportunities for visitors. The No Action alternative would continue this current long term negative condition and likely exacerbate it in the future.

3.7.2 Alternative B: (Manually Treat Small Areas Only)

Using hand power tools to remove small patches will create temporary noise that may be intrusive to nearby campers or boaters. This noise would be temporary and would not occur during quiet hours. Removal of these small patches may open up canoeing and kayaking opportunities as well as fishing and wildlife viewing in some locations but are likely very small. Overall impact to visitor experiences would be negligible.

3.7.3 Alternative C: (Mechanically Harvest Large Areas of Cattail)

One potential treatment area is located adjacent to the parking lot and picnic area at the Rainy Lake Visitor Center boat launch. The cattail-infested bay provides very little recreational opportunities for visitors. Because of its location to the parking lot and picnic area, however, disturbances to visitor activities in the area can be expected during barge operations. These short-term disturbances include partial closings of the parking lot and picnic area, noise, and mess from spraying water, muck, and plant debris. The barges would operate out of the maintenance fuel dock area south of the public boat launch so interference with boat launching activities is not expected. The disturbed substrate, chopped and composting plant material, and possible dead fish and animals may create a foul smell in the area. These would only be temporary minor negative impacts. There should be negligible impacts to the use of the nearby hiking trails.

Treatment in other locations may temporarily impact fishing and wildlife viewing activities in certain locations or may require short-term closure of campsites or day use sites. Long-term the restored marshes will provide increased recreational opportunities for visitors through safer navigation and increased fishing and wildlife viewing.

Long-term, the restored marsh habitat should provide increased opportunities for recreation and interpretation/education at the Rainy Lake Visitor Center site. The opened bay would provide wildlife viewing, canoeing, and possibly fishing opportunities. The restored habitat would also be interpreted via waysides along the shoreline educating visitors on invasive species, marsh restoration, and would tie in to the nearby Ethnobotanical Garden.

3.7.4 Alternative D: (Use Variety of Cattail Control Methods)

Impacts would be similar to Alternative C for the most part. The additional cattail control methods employed throughout the wetlands would mostly likely not increase the negative impacts as described for alternative C but may actually reduce them. This is because the use of fire to reduce biomass prior to treatments should reduce the mess and smell of the cattail removal methods.

Further, this alternative uses a variety of cattail control methods which targets the entire wetland area invaded by cattails. This will result in more habitat restored as compared to alternative C. The end result is a more structurally diverse wetland community with increase habitat for fish and wildlife available for visitors to experience. Navigation, fishing, and wildlife viewing should all be enhanced.

3.8 Cumulative Impacts

The Council on Environmental Quality's (CEQ) regulations (40 CFR §§ 1500 - 1508) define cumulative effects as:

"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR ~ 1508.7)."

3.8.1 Approach to Analysis

The purpose of this Environmental Assessment is to analyze the impacts of proposed management strategies. These strategies would be implemented in local areas throughout VOYA. Specific locations are not defined here. For this reason the cumulative impact analysis will be looked at on a park-wide scale with the understanding that the main impacts (beneficial or not) of the proposed actions will be localized.

Past, present, and reasonably foreseeable actions that contribute to cumulative impacts on the resources that would be affected by the cattail control plan were identified during internal and external scoping. These include actions taken by others in the surrounding area and/or actions taken at the park that are unrelated to the cattail control plan; but in all cases, these other actions may have impacts on the same resources or values as the alternatives evaluated for cattail management, resulting in an additive (cumulative) effect.

Once these other actions were identified, cumulative impacts were determined by generally assessing the impacts of those other actions then combining those impacts with the impacts of the cattail control alternatives to estimate the overall cumulative impacts.

3.8.2 Impact Analysis

Because VOYA is managed to preserve the natural and cultural resources within the park, there are few current or proposed actions within the park boundaries that will affect these infested areas. Some actions from the past and present in the region or watersheds draining into the park, however, have adversely affected the native marsh communities with VOYA. These actions have helped tip the scale in favor of invasives such as hybrid cattails.

- **Land Use** – Past and present land use activities within the watersheds draining into VOYA waters have impacted and continue to impact the wetland vegetation in the park. These land use activities include logging, agriculture, and residential and commercial development. The main impact is an increase in nutrient loading resulting from runoff associated with clearings, fertilizer use, and leaking septic tanks. This nutrient loading affects water quality, wetland vegetation, fish and aquatic invertebrates, and wildlife in lakeshore marshes. The increased nutrient loading can benefit cattails at the expense of native vegetation. These inputs are expected to continue into the reasonably foreseeable future, though at a somewhat reduced rate due to current logging practices utilizing buffers and sewer projects replacing septic systems in the area.

- **Atmospheric Deposition** – Deposition from regional industrial sources in the past and present has impacted and continues to impact the wetland resources in the park similarly to land use. Atmospheric deposition of nitrogen in particular acts as another source of nutrient loading and can negatively affect water quality, wetland vegetation, fish and aquatic invertebrates, and wildlife in lakeshore marshes. Increased nitrogen deposition can benefit C4 plants (plants that fix carbon into a four carbon sugar during photosynthesis) such as cattails at the expense of other native plants. These atmospheric inputs are expected to continue into the reasonably foreseeable future.

- **Management Activities** - Some past and current management activities within VOYA have contributed to the spread of cattails within the park. Past developments of boat ramps and parking lots altered the local hydrology, reducing natural flow and creating a habitat more favorable to cattails. Current practices of pushing floating bogs (cattail mats that break off in windy conditions) to shore establish these cattails in new areas effectively helping them spread. These activities impact water quality, wetland vegetation, fish and aquatic invertebrates, wildlife, and visitor experience in localized areas throughout the park. No major development is expected in the foreseeable future within the park.

- **Lake Level Management** – The main water bodies within VOYA are controlled by dams. The seasonal increases and drawdowns are governed by rule curves that define the ideal water levels. Past rule curves created unnatural drawdowns resulting in loss of wetland diversity throughout the park and created conditions beneficial to cattails in some areas. The current rule curve tries to mimic a more

natural seasonal fluctuation and should be more beneficial to the shoreline marsh communities. The rule curves are currently under review by the International Joint Commission (IJC) and may be maintained or altered as an outcome of the review. The NPS is a stakeholder and participates in the evaluation.

3.8.3 Scenario Analysis

The proposed actions assessed in this document are intended to offset some of the negative impacts currently affecting VOYA marsh habitats. The Preferred Alternative should have the greatest positive impact long-term while the No Action alternative should have the greatest negative long-term impact. Therefore, these two alternatives are being used as scenarios to analyze the cumulative impacts.

- **No Action Alternative** – Under this alternative, current management practices will continue. No marsh restoration activities will occur. Under this scenario, we can expect continued habitat loss or degradation, continued (and possibly increased) impacts to navigation, and further encroachment on developed areas, docks, and shorelines. Continued neutral impacts on water quality and negative impacts on wetland vegetation, fish and aquatic invertebrates, wildlife, and visitor experience can be expected in the present and foreseeable future.

- **Preferred Alternative** – Although the regional and watershed impacts are not addressed by this alternative, the overall negative impacts to wetland vegetation, fish and aquatic invertebrates, wildlife, and visitor experience should be reduced. This alternative, combined with the current rule curve, will result in short-term degradation of water quality in localized sites but long-term (into the reasonably foreseeable future) should result in an overall decrease in invasive cattails park-wide. This will restore the spatial heterogeneity and diversity of wetland vegetation which in turn will increase fish and wildlife habitat. Improved fish and wildlife diversity will enhance visitor opportunities and experiences.

CHAPTER 4: CONSULTATION AND COORDINATION

4.1 Scoping

A scoping letter and press release were distributed on June 10, 2015 to 78 government, tribal and private recipients. Two written comments were received.

4.2 Consultation

Per the Programmatic Agreement with the SHPO for Section 106, Voyageurs sends annual letters to affiliated tribes informing tribes of upcoming projects and planning efforts. Included the letter of February 27, 2015 was an announcement that the park

wanted to start planning for treatment of cattails. In addition, the scoping letter for this EA was sent to the Bois Forte and Leech Lake Bands of the Minnesota Chippewa Tribe. No comments were received. The Consultation Agreement with the Bois Forte Band exempts routine control of exotics/invasives along roads and developed areas; it does not exempt control of exotics/invasives in wetlands. Therefore, we will follow the steps outlined in our agreement to consult at stages of the project. The most recent letter was sent on August 18, 2016.

The NPS consulted with the Minnesota Historic Preservation Office (MHPO) on the Great Lakes Integrated Pest Management Plan and the HPO concurred with the NPS finding of no adverse effect in a letter dated June 25, 2012. The MHPO concurred with the BMPs for protecting cultural resources and asked to be consulted further on implementation plans specific to each park. The NPS consulted with the MHPO on August 22, 2016 on the plans for wetlands restoration/cattail control in Voyageurs. The MHPO concurred with the NPS determination that this project will have no adverse effect on historic properties in a letter dated September 23, 2016.

4.3 List of Preparers

Author: John Snyder, Biologist/GIS Specialist, Voyageurs National Park, 15 years

- BS in Biology from Stephen F. Austin State University
- MS in Biology (Forest Ecology) from Bemidji State University
- Training in Restoration Ecology
- 20 years of experience in forest ecology
- 15 years of experience in vegetation management including exotic plant management, restoration, and nursery production
- 15 years of experience in GIS

The following individuals assisted in the preparation of this Environmental Assessment:

National Park Service:

Mary Graves	Chief, Division of Resource Management, Voyageurs
Steve Windels	Wildlife Biologist, Voyageurs
Ryan Maki	Aquatic Ecologist, Voyageurs
Drew LaBounty	Archeologist/Integrated Resource Technician, Voyageurs
Nick Chevance	Regional Environmental Coordinator, Omaha

Minnesota Department of Natural Resources:

Kevin Peterson	Area Fisheries Supervisor
Joe Mix	Regional Fisheries Manager
Chip Welling	Aquatic Invasive Species Coordinator
Erika Herr	Area Hydrologist – Itasca & Koochiching Counties
Amy Loiselle	Area Hydrologist – St. Louis County

US Army Corps of Engineers:

Craig Jarnot	Biologist

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Appendix A – Scoping Letter

United States Department of the Interior

NATIONAL PARK SERVICE
Voyageurs National Park
360 Highway 11 East
International Falls, Minnesota 56649-8802

IN REPLY REFER TO:

I.A.2 (permanent)

June 10, 2015

Dear Interested Party:

Voyageurs National Park is preparing an Environmental Assessment (EA) for the removal of invasive hybrid cattail and the subsequent restoration of native marsh plant communities. This EA will explore various methods for treating cattails and will analyze the impacts of those treatments.

The National Park Service mission is to preserve and protect the natural and cultural resources, and the ecological processes that support them, for the enjoyment of this and future generations. Under this guidance, the park focuses on maintaining, and restoring when needed, the natural processes that define the aquatic and terrestrial habitats of Voyageurs. Invasive plants are a threat to natural and cultural resources throughout the National Park Service and throughout Minnesota. They can displace native plants and animals in an area, creating monocultures with very little species diversity, and can disrupt the ecological processes of the area.

Typha x glauca is a hybrid type of cattail that is formed when the native broadleaf cattail naturally crosses with the non-native narrowleaf cattail. The resulting hybrid has traits from both parent genotypes, allowing it to thrive in a wider range of environmental conditions and making it highly invasive. These hybrid cattails have become dominant throughout Voyageurs and have crowded out whole bays, leading to habitat degradation. Muskrat and other wildlife habitat is diminished, fish spawning areas are decreased, vegetation biodiversity is reduced, and the visitor experience is compromised.

The EA will explore alternatives for treatment or removal of cattails and restoration of native plants. Voyageurs is seeking public input on the issues identified above. Once scoping comments are received, alternatives will be developed for a draft EA. Public input will then be sought on the draft EA.

Written comments on the issues identified for invasive cattails should be postmarked no later than July 6, 2015 and should be addressed to: Superintendent, Voyageurs National Park, 360 Highway 11 East, International Falls, MN, 56649. Written comments may also be submitted electronically to http://parkplanning.nps.gov/VOYACattails .

Please indicate if you want to stay on this mailing list and receive a copy of the draft EA. Should you have any questions, contact Biologist John Snyder at 218-283-6690.

Sincerely,

Michael M. Ward
Superintendent

Appendix B – Best Management Practices

Regardless of which alternative is chosen, VOYA would employ a suite of mitigation measures and Best Management Practices (BMPs) designed to reduce non-target impacts on other resources. The specific mitigation measures or BMPs to be employed would depend upon the treatment option selected, the location, and the potential impact of the selected treatment option(s). The mitigation measures and BMPs include but are not limited to the following:

General Invasive Species BMPs: 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.

- Contractors would be educated on the importance of invasive species prevention including the power washing of vehicles and equipment prior to entering parks, and cleaning clothes, footwear and hand tools.

Cultural Resources BMPS: To ensure that management activities do not adversely affect cultural or ethnographic resources, the park would employ the following BMPs and mitigation measures where appropriate:

- Each area proposed for mechanical treatment will be evaluated by the park archeologist and a recommendation made to: 1) monitor during treatment; 2) survey prior to treatment; or 3) avoid treatment area. Recommendations will be based on the presence and intensity of prior archeological survey, as well as the potential for archeological resources based on soils, landform characteristics, elevation, geographical location, and other relevant factors.

- If a survey is required prior to treatment, an evaluation of archeological significance and data potential may lead to additional recommendations, including avoidance. Archeological survey prior to treatment and monitoring during treatment will be carried out by the park archeologist.

- If cultural resources are inadvertently discovered during sub-surface ground disturbing activities, the project manager would suspend operations at the site and immediately contact the park archeologist.

Visual/Noise BMPs: To minimize the impacts of management activities on visual resources and soundscapes, VOYA would employ the following BMPs and mitigation measures where appropriate:

- Use of equipment in high visibility areas would be avoided to the extent feasible. If it cannot be avoided, activities would be timed to have the least impact on visitors.

- Use of noise-producing equipment for treatment would be limited in soundscapes and/or timed to reduce activities that impact ambient noise levels in soundscapes during peak use.

- Removed vegetation would be hauled away to avoid unsightly piles along shorelines. In some circumstances where the amount of dead vegetation is small and the location is remote the vegetation may be place in an inconspicuous location on shore to rot away naturally.

Erosion and Sedimentation BMPs: 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:

- Silt barriers would be used to reduce the silting of nearby fish spawning sites and other habitat. These barriers would stay in place until the disturbed underwater substrate settles back down.

- Cattails do provide erosion control along shorelines. In locations where this is a concern, care would be given to minimize the impact on the shoreline soil resources and those areas would be re-seeded or re-planted with appropriate native species as soon as possible.

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

- Physical disturbance to ground nesting birds and other animals would be avoided, to the extent possible.

- Treatments would be timed to avoid prime bird nesting and fish spawning times. Management activities in spring and summer would be avoided to the extent possible. Small outlying patches of cattails may be treated in summer if it is determined by VOYA wildlife biologists that the activity is not in danger of disturbing wildlife in the area. Larger areas would only be treated in late summer through fall.

Threatened, Endangered, or Sensitive Species BMPs:
VOYA 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.

- Treatment locations will be sites with cattail monocultures and would be unlikely to harbor any species of special concern. All treatment sites will be surveyed prior to removal of cattails.

- 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. VOYA would also implement species-specific BMPs designed to prevent non-target impacts of invasive species treatments on wildlife 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.

    - **Gray Wolf (*Canis lupus*)**
      It is unlikely that cattail management would affect wolves, however, if wolves are present in the area, no management activities would be conducted within the area of any dens, foraging areas, or rendezvous sites.

    - **Canada Lynx (*Lynx canadensis*)**
      It is unlikely that cattail management would affect lynx. If any lynx are known to be in the area, no management activities would be conducted within the area of dens or foraging areas.

    - **Northern Long-eared Bat (*Myotis septentrionalis*)**
      These are cave-roosting bats that may use riparian areas for foraging. Any management activities would be avoided in the area of this population.

    - **Bald Eagle (*Haliaeetus leucocephalus*)**
      VOYA performs annual bald eagle nest surveys and all active nests are recorded. Any cattail treatment activities near these active

nests would be postponed until the young have been fledged or the nest abandoned.

- **Floating Marsh Marigold (*Caltha natans*)**
  Any management activities would be avoided in the area of this population.

Appendix C – Letters from Minnesota Historical Preservation Office

Minnesota Historical Society
STATE HISTORIC PRESERVATION OFFICE

June 25, 2012

Michael Reynolds, Regional Director
National Park Service
601 Riverfront Drive
Omaha, NE 68102-4226

RE: Great Lakes Invasive Management Plan
Multiple Counties
SHPO Number: 2011-1335

Dear Mr. Reynolds

Thank you for contacting us about the above-referenced project. The materials submitted have been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800).

The proposed project will affect several historic properties within the State of Minnesota, including the Grand Portage National Monument, the Mississippi National River and Recreation Area, the St. Croix National Scenic Riverway and Voyageurs National Park.

We have reviewed the proposed Best Management Practices (BMPs) to be used in controlling and eradicating invasive plant species at the subject properties and for encouraging the re-establishment of native vegetation where feasible. We believe the selected BMPs to be appropriate. Therefore, we concur in the National Park Service's finding that the project as proposed will have no adverse effect on the subject historic properties.

As detailed projects covered by this plan are more fully developed, we would be happy to consult with you further on local implementation decisions at any of the subject properties, to make sure the projects as implemented avoid any adverse effect.

You may contact me at (651) 259-3456 with any questions or concerns you may have about our review.

Sincerely,

Mary Ann Heidemann, Manager
Government Programs and Compliance

cc: Carmen Chapin, National Park Service Midwest Office

Minnesota Historical Society, 345 Kellogg Boulevard West, Saint Paul, Minnesota 55102
651-259-3000 • 800-727-3582 • www.mnhs.org

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MINNESOTA HISTORIC PRESERVATION OFFICE

September 23, 2016

Mr. William K. Carlson
Acting Superintendent
National Park Service
Voyageurs National Park
360 Highway 11 East
International Falls, MN 56649-8802

RE: Removal of invasive non-native hybrid cattails in Rainy and Kabetogama Lakes
Voyageurs National Park
Koochiching and Saint Louis Counties
MnHPO Number: 2016-3449

Dear Mr. Carlson:

Thank you for initiating consultation on the above project. Information received in our office on 25 August 2016 has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by Section 106 of the National Historic Preservation Act of 1966 and implementing federal regulations at 36 CFR 800.

We have reviewed the proposed methods for archaeological assessment outlined in your submittal. Each area proposed for mechanical treatment will be evaluated by the park archaeologist and a recommendation made to: 1) monitor during treatment; 2) survey prior to treatment; or 3) avoid the treatment area. We find these methods to be appropriate. We also understand that Voyageurs National Park will be consulting with the Bois Forte Band at several stages throughout the project. Therefore, based on information available to us at this time, we concur with your determination that this project will have no adverse effect on historic properties

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

cc: Mary Graves, Voyageurs National Park

Minnesota Historical Society, 345 Kellogg Boulevard West, Saint Paul, Minnesota 55102
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