Fond du Lac Band of Lake Superior Chippewa

MANAGEMENT PLAN FOR AQUATIC AND TERRESTRIAL INVASIVE SPECIES

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APPROVAL OF THE FOND DU LAC INVASIVE SPECIES MANAGEMENT PLAN FOR AQUATIC AND TERRESTRIAL INVASIVE SPECIES

The Fond du Lac Reservation Business Committee, on behalf of the Fond du Lac Band of Lake Superior Chippewa, hereby enact the following Resolution:

WHEREAS, the Fond du Lac Band of Lake Superior Chippewa are a sovereign people, who occupy the Fond du Lac Reservation and retain their aboriginal rights of self-government and self-determination pursuant to the Treaty of LaPointe of September 30, 1854, 10 Stat. 1109; the Indian Reorganization Act of 1934, 25 U.S.C. § 461 et seq.; the common law of the United States; and as recognized by the United Nations Declaration on the Rights of Indigenous Peoples of September 13, 2007; and

WHEREAS, it is the sovereign obligation of the Fond du Lac Reservation Business Committee, as the duly-constituted governing body of the Fond du Lac Band, to exercise the responsibilities of self-government and management over the Band's affairs; and

WHEREAS, the Bureau of Indian Affairs (BIA) provides funding for tribes to support tribal invasive species program for tribes that exist within the Great Lakes watershed; and

WHEREAS, the Fond du Lac Band is concerned about the threat posed by invasive species on Reservation lands and is engaged in work to assess and control invasive species, especially where they may endanger important natural resources such as wild rice;

NOW, THEREFORE LET IT BE RESOLVED, that the Fond du Lac Reservation Business Committee does hereby express its intent to approve the Fond du Lac Invasive Species Management Plan for the overall management including, but not limited to, prevention, surveillance, control, monitoring, and education as it pertains to all terrestrial and aquatic invasive species on the Fond du Lac Reservation, on FDL-owned lands, and/or in the surrounding area and the 1854, 1842, and 1837 ceded territories.

RESOLUTION #_____

CERTIFICATION

We do hereby certify that the foregoing Resolution was duly presented and acted upon by vote of ___ for, ___ against, ___ silent, with a quorum of ___ being present at a _____ Meeting of the Fond du Lac Reservation Business Committee held on _____, 2019 on the Fond du Lac Reservation.

_____	_____
Kevin Dupuis, Sr.	**Ferdinand Martineau, Jr.**
Chairman	**Secretary-Treasurer**

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EXECUTIVE SUMMARY

PROGRAM GOALS:

Control/eradicate existing terrestrial and aquatic invasive species infestations, prevent future introductions and establishment of new invasive species and/or infested areas by especially focusing on restoration, foster partnerships, and build outreach programs to encourage communities to proactively engage in a sustainable invasive species program.

Implement a multi-faceted invasive species management plan within the Fond du Lac (FDL) Reservation boundaries as well as Spirit Island, Anderson Island and Wisconsin Point, and work with partnering organizations to manage a defined buffer area bordering the FDL Reservation, and the 1854, 1842 and 1837 Ceded Territories.

OBJECTIVES AND METHODOLOGY

PREVENTION

Reduce or eliminate pathways for the introduction or spread of terrestrial and aquatic IS, primarily through decontamination and monitoring of equipment, and through implemented and enforced Best Management Practices (BMPs) and decontamination protocols for transported equipment and materials.

> **Enforcement:** Work directly with FDL conservation officers to encourage the public to follow regulations and BMPs put in place to prevent the spread of IS within the areas of concern (areas of concern identified in invasive species management plan).

EARLY DETECTION AND SURVEILLANCE

Identify current and new invasions of terrestrial and aquatic invasive species (IS) prioritizing high risk, high use, and culturally significant areas. Species prioritized for management will be those currently posing a threat on- Reservation and those listed under the Minnesota Department of Agriculture (MDA) "Noxious Weed List" for terrestrial invasive species (TIS) and those listed under the Minnesota Invasive Species Advisory Council (MISAC) rankings for aquatic invasive species (AIS).

> **Species of Concern (including, but not limited to):** Aquatic: purple loosestrife, non-native Phragmites, zebra mussel, rusty crayfish, spiny water flea, pickerelweed*, mystery snail, curly leaf pondweed, yellow iris, Eurasian water milfoil, reed canary grass, starry stonewort, and sea lamprey. Terrestrial: wild parsnip, common tansy, common buckthorn, invasive honeysuckle, spotted knapweed, Canada thistle, bull thistle, leafy spurge, birdsfoot trefoil, garden valerian, garlic mustard, Siberian pea shrub, poison hemlock, water hemlock, St. John's wort, Japanese knotweed, crownvetch, emerald ash borer, gypsy moth, and exotic earthworms.
>
> *Pickerelweed is a native species that sometimes acts invasively if the habitat conditions are right. This can be a concern especially in places that could otherwise produce wild rice.

CONTROL

Manage/ eradicate new and current IS infestations using a variety of treatment methods including biological control, manual control, mechanical control, and chemical control.

> **Restoration:** Restore controlled areas to culturally beneficial native landscapes, including, but not limited to pollinator, fisheries, forestry, wildlife, wetland, wild rice, and harvestable wild foods habitat. Restoration will also aid in recreational, harvestable, and potentially economic use. Restoration efforts will occur in conjunction with input from other resource management and FDL divisions and departments to ensure the efforts are of the highest benefit to the Band and support other FDL programs.

MONITORING

Monitor existing IS infestations to determine rate of spread and protect non-infested areas, prioritizing infested areas that are close to non-infested high-risk, high priority, and culturally significant areas and monitor areas that have undergone control/ treatment efforts to measure success, new species (native and invasive), and control regeneration.

EDUCATION AND OUTREACH

Educate FDL staff, FDL community members, the general public, and outside contractors on how to identify, report, manage, and prevent the spread of IS, focusing especially on engaging Band member youth and working with elders to identify locations of significance. Raise awareness about IS and FDL's contribution by participating in outreach events in the FDL community and around Minnesota. Education is a key component in preventing the spread of IS around the Reservation and the ceded territory areas.

TRAININGS AND PROFESSIONAL DEVELOPMENT

Attend relevant trainings, conferences, workshops, meetings, and webinars to safely implement IS control and to stay current and informed on IS management and emerging threats in the Midwest region.

PARTNERSHIPS AND COLLABORATION

Collaborate with entities that affect Reservation properties directly and those at a state, regional, and federal level to ensure FDL interests and priorities are being pursued and the most effective program is being applied, keeping a duplication of efforts to a minimum.

MEASURING SUCCESS

Success will be measured through physical means including, but not limited to number of acres surveyed and controlled, hours spent on activities, number of people reached, and number of events [including trainings, meetings, workshops] attended. Success will also be measured in accomplishments such as projects and/ or site plans completed, collaborative efforts [partially] completed, and reduction in amount of IS recorded on Reservation.

INTRODUCTION

Invasive species (IS) are defined as species that cause or may cause economic or environmental harm or impact to human health. Native species that act invasively and are currently interfering or threatening to interfere with resources or areas that hold cultural significance are also a concern. With only partial formal surveillance completed before October, 2018 there have been over 1,620 documented locations of approximately 25 different terrestrial invasive species within the Fond du Lac Reservation boundaries, not including surveys performed by the Minnesota Department of Natural Resources (MN DNR). There have also been approximately four different confirmed aquatic invasive species within the Fond du Lac Reservation Boundaries on at least three different waterbodies, with minimal surveillance occurring. The DNR and FDL employees have also noted at least eight other invasive species not included in the previous surveys on Reservation, with many more in the nearby surrounding area and in the ceded territories. There are also several more recorded areas and species of IS on Reservation that are not individually listed above due to their vast numbers and volume around the Reservation, specifically along the pipeline right-of-way corridor.

To address IS issues affecting Fond du Lac (FDL) community members, FDL Resource Management Division aims to implement an Invasive Species Management Plan (ISMP) (outlined briefly in the sections below) that will prevent the spread of IS and control/eradicate current infestations. The implementation of the plan will minimize negative impacts of IS on natural resources within the FDL Reservation and FDL owned lands in the St. Louis River estuary, bordering area, and the 1837, 1842 and 1854 Ceded territories to the benefit of Band and community members, currently jeopardized ecological habitats, high quality ecological habitats, and areas that are culturally significant. An invasive species program will 1) address and manage conservation efforts pertaining to invasive species on Reservation and in surrounding areas and ceded territories in aquatic and terrestrial habitats, focusing specifically on those of cultural significance and 2) allow for continual control, restoration, monitoring, early detection, surveillance, education, and prevention of IS.

INVASIVE SPECIES MANAGEMENT GOALS

Program Goal: *Implement a multi-faceted plan within the Fond du Lac (FDL) Reservation boundaries and on FDL owned land in the St. Louis River estuary including Spirit Island, Anderson Island and Wisconsin Point, the area bordering the FDL Reservation, and the 1854, 1842 and 1837 Ceded Territories to control/eradicate existing terrestrial and aquatic invasive species infestations, prevent future introductions and establishment of new invasive species and/or infested areas, restore previously infested areas to culturally beneficial native landscapes, and expand partnerships and education through outreach programs to encourage communities to proactively engage in a sustainable invasive species program.*

INVASIVE SPECIES MANAGEMENT OBJECTIVES

I. Prevention

a. Reduce or eliminate pathways for the introduction or spread of terrestrial and aquatic IS, primarily through decontamination and monitoring of equipment, and through implemented Best Management Practices (BMPs) for transported equipment and materials.
b. Educate staff, public, outside contractors, and others about BMPs to reduce potential of spread through human introduction pathways. In the case of outside contractors a FDL staff member with knowledge of the BMPs will make an effort to be on site for any management occurring. If staff can't be on site, contractors will be expected to follow FDL IS management BMPs.
c. All outside contractors will also be expected to follow IS permit regulations as defined by permit application and issuance, which will be a collaboration between FDL departments.

II. Early Detection and Surveillance
a. Identify current and new invasions of terrestrial and aquatic IS prioritizing high risk, high- use, and culturally significant areas first within Reservation properties including Spirit Island, Anderson Island and Wisconsin Point, then in the area surrounding the Reservation and in the 1837, 1842 and 1854 ceded territories.
b. Create/add to geographic information system (GIS) mapping project(s) to document current and new IS invasions, intensity of infestation, and areas surveyed to enable better prioritization of control/treatment areas.
c. Enable individuals from FDL staff and members of the community to have access to the maps that show locations of current IS infestations and enable them to report new IS infestations (i.e. using EDD maps software).
d. Implement emerging monitoring techniques (i.e. satellite imagery, drones, eDNA) and pursue grant funding for innovative techniques.

III. Control
a. Manage/eradicate new and current IS infestations using a variety of treatment methods including prescribed burning, mechanical control, manual control, biological control, and chemical control, using a priority matrix to target specific species and/or locations.
    i. Seek input from various Reservation entities including, but not limited to, Resource Management staff and the Conservation Committee to ensure control methods are implemented in a culturally respectful and environmentally safe way. Large scaled management or treatment projects will be internally reviewed by RMD staff in accordance with the Integrated Resource Management Plan (IRMP)
b. Monitor success of control methods, continue to document and implement successful control/eradication techniques in infested areas.
c. Restore controlled areas to culturally significant and beneficial native landscapes including restoring habitat to support culturally significant and beneficial native species.
    i. Restoration will be a collaborative effort with other FDL programs including, but not limited to, fisheries, wildlife, wetlands, food sovereignty, forestry, water quality and others to the benefit of culturally significant species and the FDL Reservation.

IV. Monitoring
a. Monitor existing IS infestations to determine rate of spread and protect non-infested areas, prioritizing infested areas that are close to non-infested high-risk, high priority, and culturally significant areas, or that have high priority IS.

b. Monitor areas that have undergone control/treatment efforts to measure success, new species (native and invasive), and control regeneration.

V. Education
   a. Educate FDL staff, the FDL community, public, and outside contractors to identify, report, manage, and prevent the spread of IS.
   b. Focusing especially on [tribal] youth, emphasize the detrimental impacts that IS can have on ecological communities and the economy, especially those communities which are highly utilized and/or hold cultural significance.
   c. Focus on elder input and include as partners in IS projects to identify locations of significance and/or sensitive areas.
   d. Participate in outreach events around the FDL community and in the surrounding greater MN area to raise awareness about IS, what individuals can do to help, and FDL's contributions with IS management.
   e. Create and implement citizen science monitoring and control programs based around management of high priority areas.

GEOGRAPHICAL AREAS OF FOCUS

The main objective of the IS program is to control existing and prevent new infestations of IS within the FDL Reservation boundaries, on FDL owned lands in the St. Louis River estuary, and other areas deemed important by the Reservation Business Committee (RBC). This will be accomplished by management efforts being directly applied to FDL Reservation owned lands, and by coordinating management efforts with state, county, and private land owners within the Reservation boundaries. Preventing new IS infestations from entering the Reservation will also include creating a buffer zone of managed area around the Reservation ranging between a minimum of 1,000 feet up to 50 miles, unless special circumstances arise along the border in which case this buffer area may be altered to address those needs (Figure 1). IS management efforts will also focus on Mille Lacs Lake, especially during peak times of usage such as spearing and netting seasons.

A second priority for the FDL Band will also be to control existing and prevent new infestations of IS within the 1837, 1842 and the 1854 ceded territories (Figure 2). Management of IS on ceded territory lands will be a cooperative effort with several organizations currently participating in IS control and management. IS management in these areas will preserve the quality of the areas in which Band members have retained the right to hunt, fish, and gather.

SPECIES OF CONCERN (AIS AND TIS)

The Fond du Lac Band of Lake Superior Chippewa is concerned with several aquatic and terrestrial IS that are either currently within the Reservation boundary and/or the ceded territory boundaries, or pose a threat of invasion. For terrestrial invasive species the primary focus of concern will be for those species which are currently listed on the Minnesota Department of Agriculture's (MDA) "Noxious Weed List" (Appendix A). Prioritized species for AIS surveillance will follow the Minnesota Invasive Species

Advisory Council (MISAC) rankings (Appendix B). Species that are currently posing a threat to FDL-owned lands will be ranked as a priority for control efforts, including, but are not limited to:

TERRESTRIAL INVASIVE SPECIES

Wild parsnip (*Pastinaca sativa*) is a monocarpic perennial herbaceous plant that appears as a rosette form in its first year of growth and then changes into a large flowering plant in its second to seventh year. The seeds are dispersed through wind, and can stay viable for up to four years. The sap of wild parsnip is phototoxic and can cause blistering when exposed to skin and to the sun. Parsnip will readily move into disturbed areas, and once a population has established it will rapidly spread into several different types of habitats, changing the overall ecological composition.

Common tansy (*Tanacetum vulgare*) is a perennial plant that is wide spread across most of the northern United States and Canada provinces. It can spread vegetatively or by seed, small root fragments can produce new plants, and seeds are often easily dispersed by wind and water. It can take over habitat areas, producing thick mats of vegetation, making a habitat unusable to many native plant and animal species. In some areas tansy is still cultivated in gardens. Once introduced it is very difficult to eradicate.

Common buckthorn (*Rhamnus cathartica*) is a shrub or small tree that has been noted to spread rapidly and out-compete native plants for nutrients, light, and moisture. It has the ability to completely take over an understory of forested areas, preventing any native forest regeneration. The habitat buckthorn occupies typically degrades, in many instances to the point where it becomes unusable for plants, animals, and human use because it forms an impenetrable layer of vegetation. Common buckthorn can also serve as an over-wintering host to other pests, such as crown rust fungus which affects wheat, oat and barley, and a soybean aphid.

Invasive honeysuckle spp. (*Lonicera tatarica, L. morrowii, L. x bella, L. maackii*) are a shrub species that replace native forest shrubs and herbaceous plants due to an early leaf-out, and late leaf-off. They produce extra shade, which eliminates shade-intolerant species from the ground cover and also depletes soil moisture due to an expansive root system. Honeysuckle can spread vegetatively or by seed, and often has several stems, which make treatment of large infestations and/or plants difficult.

Spotted knapweed (*Centaurea stoebe* spp. *micranthos)* is a biennal or short-lived perennial herbaceous plant. It begins as a rosette the first year, and changes to flower form in its second year. The taproot can sprout lateral shoots, which lead to new rosettes nearby the parent plant. Knapweed can also reproduce via seed and the seeds can stay viable for up to seven years. Knapweed easily occupies dry prairie, oak and pine stands in sandy soils, and sandy ridges. It is also phytotoxic (poisonous to other plants) and can be a skin irritant for humans. It is of special concern in artificial corridors (e.g. pipeline right of way), gravel pits, and overgrazed pastures, where it can easily establish and spread.

Canada thistle (*Cirsium arvense*) is a perennial herbaceous plant that can spread vegetatively or by seed. It is readily able to invade disturbed sites such as gravel pits, open fields, and wet meadows. It can also invade wet areas that are subject to fluctuating water levels such as streambanks, sedge meadows, and

wet prairies. Once it is established in an area it can deplete native diversity and out-compete native plants.

Bull thistle (*Cirsium vulgare*) is a biennial herbaceous plant that grows as a rosette in its first year and blooms into a tall flowering plant in its second year. Similar to Canada thistle, it can easily spread into disturbed areas such as gravel pits, open fields, roadsides, and ditch banks and is left largely untouched by grazing animals, which may give it a competitive advantage.

Leafy spurge (*Euphorbia esula*) is a perennial herbaceous plant that can reproduce vegetatively or by seed. Leafy spurge will rapidly occupy disturbed areas such as roadsides and prairies and savannas, quickly displacing native plants. It can tolerate several different ecological conditions such as dry, moist, sunny, and some shade. Once in an area it has the ability to quickly displace native plants.

Birdsfoot trefoil *(Lotus corniculatus)* is a perennial herbaceous plant that can grow up to two feet tall. It has three clover-like leaflets on a short stem with additional leaflets at the base of the stem with yellow flowers clustered at the top of the plant. It will form a dense mat that will overtake areas, choking and shading out most of the other vegetation that has a chance to grow. It is especially problematic in prairies and disturbed open areas such as roadsides and ditches. Prescribed burns will increase the germination, which can be problematic for control and regeneration efforts.

Garden valerian (*Valeriana officinalis*) is an herbaceous perennial plant that was first introduced for medicinal purposes. However, it has an early spring emergence, tolerant of both wet and dry conditions, and has an ability to self-seed allowing it to readily spread into upland forests, wetlands, marshes, forests, swamps, grasslands, and stream edges, displacing native species.

Garlic Mustard (*Alliaria petiolate*) is a biennial herb that was most likely introduced for food or medicinal purposes. It forms a rosette in the first year, and in its second year will bolt to a flowering stem. After it is mature in its second year it will release its seed and die, similar to wild parsnip. It will emit a strong garlic odor when it is crushed. It grows up to four feet tall and will have small, white, four-petaled flowers clustered at the top of the plant from May through June. Invasive occurrences have been reported in upland woodlands and floodplain forests and will often be found along roadsides, trails, forested openings, and waterways. However, it does not tolerate high acidity. This plant will spread into high quality woodland habitats, not just disturbed areas.

Siberian pea shrub (*Caragana arborescens*) can appear as a tall upright shrub or small tree that has fruit resembling pea pods that are edible. However, its adaptability to a variety of soil conditions, salt, and cold temperatures, allows it to spread quickly and outcompete native vegetation. It will invade coniferous and hardwood forests, plantations, savannas, trails, right-of-ways, and is often time still used as an ornamental shrub on private properties. It also has the ability to alter the natural soil chemistry of plant communities due to nitrogen-fixing microbial symbionts. It also produces a chemical which makes it less susceptible to herbivory and pathogens.

Poison Hemlock (*Conium maculatum*) is a member of the carrot family and a biennial herbaceous plant. It is a low-growing rosette in its first year and develops a flower stalk its second year which can grow up

to eight feet. It is highly poisonous to humans and livestock if digested or inhaled. It is commonly found along roadsides, in pastures, along streambanks, and in ditches. It has abundant seeds that can be easily spread through mowing and other equipment, and it is integral that treatment of this plant is timed appropriately.

Water Hemlock *(Cicuta douglasii)* is a native plant that is being tracked by the IS program due to the high toxicity this plant carries. Although it is native, it is important to understand where it is located and how it is moving to make human/ plant interaction as minimal as possible. The plants have compound, fern-like leaves with white-flower clusters and will grow up to six feet tall. It is commonly found in ditches, along roadsides, and in wetland areas.

St. John's wort *(Hypericum perforatum)* is a perennial herbaceous plant which reproduces via rihizomes which can reach up to four feet tall. Leaves are opposite with bright five-petaled yellow flowers appearing at the end of stems. This plant has been used to treat mild depression, but has also been shown to cause hyper photosensitivity. This plant crowds out native species, especially in pasture-lands and disturbed open areas such as roadsides. Although it is safe for people to use and was originally introduced as a medicinal herb, it is toxic to livestock that ingest it while grazing.

Japanese knotweed (*Polygonum cuspidatum*) is a perennial herbaceous shrub-like plant that reproduces via rhizomes and spreads vegetatively. Once established in an area it can form a very dense patch that suppresses native vegetation, degrades habitat for fish and wildlife, alters waterways, and facilitates erosion and flooding. It poses a significant threat to riparian areas, where it rapidly colonizes due to its ability to tolerate full shade, high temperatures, high salinity, and drought. These plants are not allowed to be planted within 100 feet of a waterbody or floodplain.

Crown vetch (*Coronilla varia*) is a perennial herbaceous plant that invades prairies and dunes. It has extensive vegetative spread due to rhizomes that can grow up to 10 feet long beneath the soil surface, which can produce new roots and plants. Crown vetch prefers open, sunny areas and quickly moves into disturbed remnant prairies and woodland edges, gravel bars, agricultural land, and roadsides.

Emerald ash borer (EAB) (*Agrilus planipennis*) is an invasive insect from Asia that is responsible for the deaths of millions of ash trees, and has continued to spread and kill many more throughout the United States and Canada. Any species of healthy or weak ash tree (*Fraxinus* spp.) in North America is vulnerable to an EAB attack. EAB kills an ash tree by hatching thousands of larvae in a tree, which feed on parts of the tree below the bark, disrupting the flow of nutrients.

Gypsy moth (*Lymantria dispar dispar*) is an invasive insect from Europe that is responsible for the defoliation of over 500 host species, including aspen and oak species. They can completely defoliate a tree, causing fatalities which can impact forest health and can have major ecological implications.

Earthworms *(Lumbricina spp.)* are an invasive invertebrate annelid from Europe. There are currently no native earthworms in areas of North America glaciated during the last ice age. Earthworms disrupt nutrient cycling in a forest ecosystem by digesting material such as leaf litter at a faster rate than its natural decomposition. This causes nutrients to be released into the soil at a faster rate than can be

utilized, resulting in nutrient run-off or "leeching". This can lead to decreased plant diversity, a reduction in forest productivity, soil erosion and a degradation of ground nesting bird and fish habitat.

AQUATIC INVASIVE SPECIES

Purple loosestrife (*Lythrum salicaria*) is a wetland plant that invades marshes and lakeshores and has the potential to replace wild rice and other native wetland plants. It can form dense, impenetrable stands which are unsuitable as cover, food, or nesting sites for a wide range of native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads, and turtles. Many rare and endangered species survive only in wetland habitat, and therefore are at a high risk. Once in aquatic systems, seeds are easily spread by moving water and animals.

Pickerelweed (*Pontederia cordata*) is a perennial *native* emergent plant that can tolerate fluctuating water levels and is found in freshwater along shorelines of lakes and streams, and in wetlands. It can grow in a variety of sediments and will form spreading colonies in protected bays. Due to pickerelweeds' adaptability and competitive advantage as a perennial species, it can negatively impact native wild rice (*Zizania palustris*) through competition when it occupies similar habitats. Pickerelweed can choke out inlets/outlets causing fluctuations in water levels, which may damage wild rice populations which are sensitive to these types of changes.

Non-native Phragmites (*Phragmites australis subsp. australis*) is a non-native subspecies of common reed. Non-native Phragmites is known to invade lake shores, wetlands, rivers, and roadsides. Ecological communities can be replaced by non-native Phragmites monocultures causing changes in hydrology and nutrient cycling along with negatively impacting native plants and wildlife, including wild rice. Once established it spreads easily, and while control of small populations is possible, control of large populations can be extremely difficult.

Zebra mussels (*Dreissena polymorpha*) and **quagga mussels** (*Dreissena rostriformis*) are invasive invertebrates that can clog water intakes and damage equipment by attaching to boat motors and hard surfaces and cost millions of dollars to control each year. They can damage ecosystems by harming fisheries, smothering native mussels and crayfish, and littering beaches with their sharp shells. Zebra and quagga mussels spread primarily by attaching to boat hulls, aquatic plants, nets, fishing equipment, or drifting in water.

Spiny water flea (*Bythotrephes longimanus*) and **fishhook water flea**(*Cercopagis pengoi*) are small predacious crustaceans that threaten aquatic ecosystems by competing with native fish (including fingerlings) for food and can interfere with recreational boaters by accumulating on equipment such as fishing line. Currently, spiny water flea has been found in Lake Superior and some inland lakes in northeastern MN, while only a single specimen of fishhook water flea was found in Lake Superior and is not believed to be established there. Currently, there is no method of controlling water fleas. Surveying for new infestations and preventing new introductions is critical in reducing the spread.

Chinese mystery snail (*Cipangopaludina chinensis)* is an invertebrate that can reproduce and take over areas very quickly. They can survive up to 12 weeks out of water, and once in a new waterbody can

quickly displace native snails, out-competing them for resources such as food and habitat. They also are intermediate hosts for many parasites and trematodes that can kill or cause harm to waterfowl and smallmouth bass. They have also been found to be a potential pathway for human flukes. Chinese mystery snails often have large die offs in mid-summer and their shells can litter beaches, becoming a nuisance to recreational users. Once established, they are very difficult to eradicate from any area.

Curly leaf pondweed (*Potamogeton crispus)* is a submerged aquatic plant that grows quickly in early spring and late fall, which allows it to displace native plants and reduce habitat for native fish populations and cause issues for recreational lake users. Large die offs occurring in the mid- summer can potentially cause oxygen depletion leading to large fish kills, algal blooms, and other harmful impacts to aquatic life. Curly leaf pondweed can reproduce by seed, rhizomes, turions (overwintering bud), and by plant fragmentation. Once present it is extremely difficult to eradicate, however, populations can be controlled mechanically if given continual treatment.

Eurasian watermilfoil and hybrid watermilfoil (*Myriophyllum spicatum*) is a feathery submerged aquatic plant that can quickly form thick mats in shallow areas of lakes and rivers in North America diminishing property value and causing issues for recreational activities such as boating, fishing, and waterfowl hunting. Matted milfoil can displace native aquatic plants, impacting fish and wildlife. It can easily spread through fragmentation. Eradicating established infestations is nearly impossible. However, infestations can be controlled with mechanical cutting and/ or chemical treatments.

Starry stonewort (*Nitellopsis obtusa*) is a new species of algae discovered in MN in 2015, with new infestations found in Beltrami, Cass, and Itasca counties in 2016. This alga can quickly produce extremely thick mats of vegetation that are nearly impenetrable causing issues to recreational users and disrupting fish spawning habitat. Starry Stonewort reproduces by fragmentation, making it very easy to transport by boats and equipment and very difficult to control once it is in an area. Controlling infested areas by removing individual plants by hand is possible, but needs to be consistently monitored and maintained.

Rusty crayfish (*Orconectes rusticus*) are invasive crustaceans spreading to lakes, rivers, and streams in several areas of North America. They are more aggressive than native crayfish, better able to avoid fish predation, graze on aquatic vegetation, and can harm native fish populations by eating their eggs and young. They can displace native crayfish by outcompeting them for resources. Reduction and control of rusty crayfish populations is currently being tested using continual trapping and restoration of large predatory fish species.

Sea lamprey (*Petromyzon marinus*) is a parasitic eel-like fish that feeds on the blood of larger fishes which can kill large predatory fish such as lake trout. There are current successful control efforts being conducted in spawning streams using a lampricide, which is a type of chemical specifically targeting young sea lampreys while they are still in a shallow stream. This control program has successfully reduced sea lamprey populations throughout the great lakes region by 90%. However, it has been recently documented that sea lamprey populations are moving into the St. Louis River, where current control techniques may not be effective.

Yellow Iris (*Iris pseudocorus*) is a perennial aquatic herbaceous plant that competes with native shoreline vegetation. It reproduces both vegetatively via rhizomes and by seed. It can grow 2-3 feet tall

and will have and will have 2-3 deep yellow flowers on one stalk. Control of this plant can be very difficult due to its expansive root system and underground growth. Thus far, only one documented occurrence has been found on the FDL Reservation and it was controlled manually

Reed canary grass *(Phalaris arundinacea)* is a perennial season grass that grows up to six feet high. It is a major threat to natural wetlands as it outcompetes most native species. Currently, reed canary grass is largely naturalized on Reservation, making control efforts extremely difficult. However, there are still several wetlands dominated by Canada bluejoint grass, in which preventing further spread of reed canary grass is vital to the continued protection of these wetland areas. Some control efforts such as burning, mowing, or chemical application may occur in areas next to wetlands that are in need of prevention and protection efforts.

***This list above encompasses current known aquatic and terrestrial IS within the Reservation boundaries or species that may be a threat to the Reservation. However, as surveillance continues, more IS are expected to be discovered and prioritized for treatment on and off the Reservation. Eventually surveillance, species of concern and treatment will change to reflect the area surrounding the Reservation borders and the 1837, 1842 and 1854 ceded territories.*

METHODOLOGY

General approaches to address invasive species problems are often similar across the range of species and pathways of introduction and spread. There are currently many federal, state, local, tribal, and private entities involved in addressing IS, and using a framework established by the FDL ISMP for all types of IS can aid in addressing IS management issues cooperatively, and using approaches consistent with other agencies. FDL will also utilize new management techniques and technologies and aid in advancing the knowledge front of new IS management, focusing especially on those that do not rely on the use of herbicides for control. FDL will share any gained IS management knowledge with partnering agencies to continue a cooperative IS management approach in the Midwest region. FDL will pursue grant funding to implement case studies to test new and innovative control and management techniques.

Prioritization of species will be dependent on the availability of resources and knowledge of the species of concern, and will also be dependent on the direct threat they pose to cultural, historical, and natural resources within the area(s) of concern. General species rankings will follow the MDA's and MISAC's "noxious weed list" and "rankings of threats to MN" respectively (Appendices A and B), but will vary depending on at risk resources and areas of importance to the FDL Band.

PREVENTION

Preventing the spread of invasive species has been shown to be more economically effective than controlling an already established IS infestation for both AIS and TIS (Leung et. al.). Preventing IS can also add to preserving intrinsic value to historically, culturally, and natural significant resources within Fond du Lac owned lands that may otherwise be jeopardized due to ecological impacts from IS.

Prevention will be a primary focus of the IS species program to minimize any damages to significant areas for land and FDL community members.

PRIORITIES AND DISRUPTION OF PATHWAYS OF INTRODUCTION AND SPREAD

Preventing new IS invasions by controlling the pathways of introduction or spread is one of the most critical components in managing IS within the FDL Reservation and FDL-owned properties, its bordering area, and in the 1854, 1842 and 1837 ceded territories. Pathways of introduction or spread can be through recreational human activity (boating, fishing, hiking, skiing, camping, swimming, aquaculture, horticulture, tourism, etc.), constructive and destructive human activity (e.g. pipeline construction/ maintenance, transport of gravel, construction/demolition of buildings, road development/ maintenance, agricultural development, firefighting activities etc.), wildlife activity (e.g. seed transport via ingestion and excrement, beaver activity), natural phenomena (e.g. flooding, wind dispersal, fire disturbance, etc.), shipping and trade (e.g. ballast water, by-product plants, animals, and pathogens, trade in wood products, etc.), through food trade (e.g. live seafood, poultry, livestock, fruit and vegetable importation, etc.), and many others (Hulme et al. and Buhle et al.).

Priority pathways for introduction or spread will be primarily pathways reliant on human transport. These areas are where there is room for direct disruption to prevent any new infestation of IS. These pathways include, but are not limited to, recreational human activity pathways, constructive and destructive pathways, shipping and trade, and food distribution. To disrupt these pathways, prevention will focus and begin with education of best management practices (BMPs, outlined below) to empower individuals to follow practices that will greatly reduce the risk of spreading TIS and AIS. Education to prevent pathways of spread will also occur in placing IS trained staff and decontamination materials (outlined below) in direct areas of high- risk including placing watercraft inspectors and AIS first detector volunteers at public launches and/ or in high-risk TIS transport areas such as hiking, hunting, and harvesting areas. Preventing new IS from entering the Reservation will also occur through implementing an IS tracking and permitting system in which outside contractors will be required to provide information of where there equipment was previously located and what known IS are in that area. They will also be required to clean their equipment after leaving a known infested area AND before entering the Reservation, to ensure as little material as possible is being transported. An AIS tracking system for staff equipment will also be implemented so individuals can watch where equipment is coming from, who it was last used by, and if it has been decontaminated since leaving an infested area. Prevention will also occur by tracking movements of equipment during busy seasons such as spearing and netting, and manoomin harvesting, when equipment frequently moves from infested to non-infested areas. Decontamination protocols will be put in place so Band members can still fully participate in all harvesting, fishing, spearing, and other cultural events with a lowered risk of spreading IS. As an IS tracking system is implemented, feedback will be asked for from Band and community members, and adjustments to procedures will be made accordingly. Prevention will also occur through posting informational signage at high risk transportation sites such as hiking trails, commercial use woodlots, boat landings, and others.

Fond du Lac currently has several partnerships contributing to the prevention of the spread of invasive species. This includes collaboration with the MN DNR and others to specify waters that are non-infested where planes may and may not take water from during fire-fighting activities. The IS program hopes to continue this and other similar partnerships aiding in preventative efforts, as well as look for opportunities for new partnerships to prevent the spread of IS both on Reservation and in the 1837,1842, and 1854 ceded territories.

BEST MANAGEMENT PRACTICES (BMPS)

To control these pathways of introduction and spread best management practices (BMPs) will be written by the Invasive Species Coordinator (ISC) and enforced* through FDL staff and community members. The BMPs will address the most likely human pathways of introduction or spread, along with areas of concern on the Reservation including, but not limited to, gravel transportation, pipeline construction/maintenance, road construction/maintenance, aquaculture, horticulture, agriculture, fire disturbance, and the trade, transport, and/or selling of wood products. As other activities or areas of concern are discovered within the Reservation and St. Louis River estuary lands, in the surrounding areas, and in the 1837, 1842 and 1854 ceded territories, the BMPs will be updated and enforced to reflect the needs of the FDL community. BMPs once created will be available to FDL community members, and other parties recreating or working on FDL owned areas through the FDL website. Examples of BMPs may include, but are not limited to cleaning, draining, and drying any watercraft and/or equipment after being in any water body before moving to another, cleaning shoes and clothing after hiking, hunting, harvesting, etc., reporting suspicious IS vegetation to FDL authorities, cleaning 4-wheelers, ATVs, and trucks before moving locations, and cleaning all netting and spearing equipment before moving lake locations. BMPs will be labeled by activity (fishing, spearing, hiking, etc.), and detailed actions to avoid the spread of IS for each activity will be described in the available document. Notifications will be sent when the BMP documents become available for public use.

**ENFORCEMENT*

The ISC will work with FDL conservation officers to enforce the invasive species ordinance (Appendix C) that has been put in place to prevent the transport and introductions of aquatic invasive species. The ISC will also work with enforcement to encourage BMPs be followed for TIS and AIS for FDL staff, community members, and the general public. IS program employees will also aid in the monitoring of outside contractors to ensure they are abiding by program regulations and following permitting requirement in regards to decontaminations and the transport of IS. Permitting regulations will be determined through a collaborative effort with the IS program and other resource management departments. IS program employees will encourage FDL staff, community members, and the public to follow BMPs, but *will not* engage in any type of enforcement activity beyond contacting a conservation officer if a violation of an ordinance or law has occurred.

DECONTAMINATION

Hiring seasonal watercraft inspection and decontamination staff to protect resources such as priority fisheries lakes and wild rice lakes, as well as the St. Louis River is an integral action in controlling the

pathways of introduction of spread for AIS on FDL Reservation. The ISC will coordinate with other partners such as the MNDNR and others to ensure peak user times and locations on and around the Reservation are staffed with inspectors to prevent the spread of AIS. Enforcing BMPs for boaters and recreational water users for clean equipment, bait disposal, bait usage, etc. is also critical in controlling the pathways of introduction of spread for AIS.

Field decontamination BMPs and field cleaning kits will be made available from the ISC to staff working in high risk [of transport] areas, allowing staff to follow BMPs and protocols put in place to prevent the transport and spread of IS. The ISC will also create an internal FDL staff program where reasonable IS protocols to reduce the risk of transport will be promoted, such as creating "check-in" lists for equipment so anyone using a piece of equipment can track where it has been and if it requires decontamination before moving to a new location. The ISC will also create BMPs for FDL staff to reduce the risk of spread during efforts such as firefighting and/or wild rice restoration.

Decontamination will also occur through hiring seasonal staff to act as naturalists along highly utilized terrestrial areas such as pipeline corridors. These naturalists will aid individuals in identifying different IS and providing decontamination equipment and trainings such as boot and truck brushes and a field decontamination station. Informational signage, and permanent cleaning brushes, and potentially a cleaning station, will also be placed in busy locations around Reservation recreational entrances and exits where the risk of transporting species is significant.

All staff and items associated with decontamination will also have educational materials so community members can recognize IS, such as wild parsnip, that may be harmful to human health, and so there is an easier ability to identify, report, and learn to manage IS infestations on their personal or recreational FDL-owned property. Areas known to be highly infested or busy access sites will be prioritized for implementing prevention protocols to have the highest impact to prevent the pathways of spread for IS.

EARLY DETECTION AND SURVEILLANCE

A major component of a successful management plan will be detailed surveillance and early detection of IS within the areas of concern outlined earlier in this plan. Surveys will reveal if there are protected or important native species in the surveillance area, enabling better prioritization of areas to be treated. It has been documented that early detection leading to a rapid response in a newly infested area is more effective at managing an IS and more cost effective (Zanden et al.). Finding IS early will be the key to keeping new IS infestations and population under control in a timely and effective manner. Populations that are able to reproduce unchecked for several years can become nearly impossible to eradicate. However, populations detected and treated early have been shown to have minimal regeneration and are much easier to manage. Therefore, early detection and surveillance will allow the Reservation to have minimal damage from IS and management of IS to its culturally and naturally significant resources.

SURVEILLANCE AREAS AND MAPPING

Surveillance areas will include FDL-owned lands within the Reservation Boundaries and in the St. Louis River Estuary. Surveillance will include capturing locations of IS, relative abundance of IS, and if the IS

are present in or threatening to invade a high priority area. As the area within the Reservation and the FDL-owned lands in the St. Louis River estuary continues to be successfully surveyed, the area surrounding the Reservation will be surveyed for early detection of new invasions and IS to create a "buffer zone" around the Reservation to better prevent new IS infestations from occurring. As the buffer zone continues to be successfully created, surveillance and early detection of IS will move to culturally significant and highly utilized areas of the 1837, 1842 and 1854 ceded territories, in collaboration with other entities currently managing IS in those areas.

The ISC will continue early detection and surveillance mapping efforts within the boundaries of the Reservation in high priority areas for terrestrial IS, and members of an AIS field crew will target surveillance on high priority lakes and streams within the FDL Reservation boundaries. Contractors must also be responsible for surveys and mapping IS if their work has the potential to introduce or spread IS. High priority areas will be defined as areas that are highly utilized, have cultural significance, are at high risk for invasive species, are associated with other FDL Resource Management division projects, or are in close proximity and therefore pose a threat of invasion to any of the areas mentioned above. Currently, there are 1,620 new locations of TIS recorded within the Reservation boundaries and one confirmed new infested water (West Twin Lake with Chinese mystery snail) with another suspected infested water body (Chinese mystery snail in Big Lake, yet to be confirmed). Once the map of these locations is completed appropriate information will be available for the public on the FDL website and updated annually. Internally, FDL will also maintain a geodatabase of information that may be more sensitive and not publicly available. The internal geodatabase will also be constantly updating information from new IS surveys and early detection, as well as be connected to other information from FDL RM divisions, such as culturally sensitive locations or endangered species locations, to ensure that the IS program is up-to-date as much as possible with other GIS information available.

SITE PLANS

After surveillance efforts have been documented, site plans will be made by the ISC for each location based on the IS present, relative abundance, and extent of coverage. Site plans may include, but are not limited to, assessing the feasibility of control or eradication, what type of treatment(s) will be utilized, what stakeholders need to be contacted and informed, what collaboration is necessary, timeline of management events including initial and follow-up treatments, and end goals for the infested site. Site plan implementation procedures, including how to identify those that may require special approval, can be found under the "Control Method Implementation Procedures" section of the ISMP (Page 15). The ISMP will also adhere to FDL's wetland ordinances and water quality standards when considering control methods. An example of a site plan is demonstrated in Figure 3.

PRIORITIZATION MATRIX

Early detection and surveillance data in conjunction with "site plans" will allow the ISC to develop a "priority matrix" for determining which sites will be prioritized for treatment and maintenance. In general, priority treatment sites will be those deemed a priority from FDL resource management staff and/or the RBC and applicable committees after being advised by resource management staff, or low to

moderately infested sites in high priority areas. However, external factors and unique circumstances within the Reservation such as community priorities, or high priority area importance rankings, may cause IS site control to differ from this general formula. A priority matrix is currently being developed and will be available to FDL community members and the public upon its completion. The priority matrix will continually be updated as new infested sites are found, and/or as priority areas for FDL change. The priority matrix will use a combination of factors including rank of the species as a threat, rank of cultural importance of an infested area, potential for rate of spread, the density of an infestation, and the feasibility of control and treatment. Once the priority matrix has been completed, it will be put on the FDL website with a goal of being updated annually to reflect new species and sites that have become a priority for control.

SURVEILLANCE TECHNIQUES

Surveys for TIS will include a variation of vegetation surveys utilized by the DNR, USGS, and other state, federal, and tribal organizations (Roberts-Pichette et al.). In general, our vegetation surveys will include optimizing plots and plot locations to gain a representative survey of the surveillance area. Data will include species richness and relative abundance, which can be used to calculate diversity within and among plots. It also may include (if resources and time allows) documentation of how much shade cover is present, the soil composition, simple soil nutrients and properties also serving as IS limiting factors for growth (i.e. pH, Nitrogen, Phosphorous, and Potash), if earthworms are present, soil saturation, compaction, disturbance, and understory cover. These factors will enable a better understanding of whether IS have a high or low chance of establishing in these areas and additional funding will be pursued to gather these data as part of case studies. The ISC will also coordinate with FDL wetland and water quality staff to share data from their monitoring programs, including from the extra surveillance the water quality program is already doing on wild rice lakes. If an infestation is found, these vegetation surveys will also enable us to see the extent of the infestation. The in-depth vegetation surveys should also serve as a key early detection mechanism, in which small infestations will have a better chance of being found at an early stage. Visual surveys through hiking, walking, driving will also be utilized. Transect surveys of visually observing vegetation along a specified pathway will also be implemented. Volunteer citizen science monitoring and surveillance and staff observations utilizing applications such as GLEDN or EDDMaps or I-Naturalist will also be used to aid in early detection. The ISC and possibly IS staff will work to provide corroboration for any species posted by volunteers.

Surveillance techniques for AIS will include utilizing plankton tow nets for invasive zooplankton species such as spiny water flea, bloody red shrimp, and zebra mussel veligers. Plankton nets may be used in a vertical drop technique or with a horizontal tow to get a snapshot of the plankton community to find high risk areas for IS infiltration. The IS program will also collaborate with the water and wetland programs in sharing plankton and BMI data to coordinate the conduction of additional surveys in areas where there may be a concern. The IS program will also utilize water quality data from the FDL Office of Water Protection to assess IS limiting factors such as calcium, pH, dissolved oxygen, salinity and others to determine which lakes are at a high risk of infestation from certain AIS. Minnow traps will be modified and utilized to trap potential invasive invertebrates such as Chinese mystery snail, rusty crayfish, and the red swamp crayfish. The IS program may also aid in setting traps for sea lamprey, which has recently

begun to increase in population size in the St. Louis River estuary. The IS program will also survey for invasive aquatic vegetation utilizing modified techniques created by the MNDNR (Perleberg et al.). Surveillance for invasive fishes will also occur through partnering with agencies such as the 1854 Treaty Authority in their bottom trawl surveys in the St. Louis River Estuary, and through utilizing the FDL fisheries resource management department to sample for and keep invasive species samples whenever discovered. Dock and lift inspections, the use of concrete blocks, snorkeling, and potentially scuba diving will be used to survey for zebra mussels and invasive vegetation in high risk and/or high priority lakes and river systems.

The implementation of new surveillance/monitoring techniques will be applied to the IS program as they emerge. This may include using techniques such as eDNA sampling, where water samples are collected and tested for DNA of specified species such as Eurasian watermilfoil and invasive carp which would tell the user if that species exists in the area. Remote imagery such as LIDAR, aerial photos, or the use of drones may also be utilized in the future to find species such as invasive Phragmites; ash stands to be surveyed for EAB, and others. The ISC will pursue grant funding to implement case studies for innovative surveillance and monitoring techniques.

CONTROL

Control and eradication of terrestrial and aquatic IS will require the use of a multi-faceted treatment approach which implements and utilizes varying types of control methods. It is highly unlikely one type of control method will be able to adequately control/eradicate IS from a site. Sites prioritized for control will be based on data collected from surveillance efforts, or those deemed of critical importance by the FDL Resource Management Division or FDL community. Control methods best utilized to control specific species/sites will be outlined in the “site plan”, which is based off of the early detection and surveillance efforts.

CONTROL TECHNIQUES

Under the guidelines laid out in the ISMP, and under the direction of the ISC, aquatic and terrestrial field crews will perform treatments and control on designated sites using a multifaceted treatment approach. Types of control to be utilized on the Reservation include, but are not limited to:

I. BIOLOGICAL CONTROL: The control of a pest by the introduction of a natural enemy or predator.

a. Weevils can prey upon different parts of a plant such as the stems, leaves, or flowers dependent on the type of weevil and the type of plant. This has been shown to be an effective means of control for plants such as spotted knapweed, purple loosestrife or Canadian thistle, with few or no side effects to native species.
b. Grazing by sheep or goats can be an effective way to control large monocultures of plants such as buckthorn or tansy. However, grazing is non-specific and can be problematic if protected or culturally significant native plants are in the area, or if the invasive species is toxic, such as wild parsnip is to sheep and goats.

c. Pheromones added to streams can disrupt mating behavior of sea lampreys that swim upstream to spawn, and pheromone flakes sprayed aerially can disrupt the mating success of gypsy moths.

II. MANUAL CONTROL: Control of IS by physical human labor without the aid of heavy machinery or fire.

a. Hand pulling/digging can be effective if the entire root of the plant can be pulled from the soil. For this reason, hand pulling is most effective on small seedlings, in loose or sandy soils, or when soils are damp. However, this is not recommended for large populations of IS or species that reproduce via fragmentation or rhizomes such as Japanese Knotweed.

b. A weed wrench is a tool that can aid in hand-pulling/digging with slightly larger plants to have a better chance at obtaining the entire root system to avoid re-sprouting. However, this method can cause soil disturbance and erosion leading to problems with re-colonization of the same or new IS and changing hydrology.

c. Smothering is a method that can take the form of mulching, black plastic covering or any other impenetrable barrier for at least one growing season. Often times the IS are able to break through the barrier put in place, and require a secondary treatment method, such as chemical control. There is also the issue of having plastic or other material put into the environment with the possibility of not being able to relocate the treatment site. However, methods such as “buckthorn baggies” in which a buckthorn stem is completely covered by a heavy black plastic for at least two seasons, has been shown as an effective way to control single stem buckthorn plants.

III. MECHANICAL CONTROL: Removal or extermination of IS with the aid of heavy machinery or fire.

a. Spot treatment with fire is a method in which a propane torch is used to boil the water inside of the plant, killing it within a couple of hours. This method is most effective on seedlings and saplings, and can be more effective than hand pulling and less cost than herbicide treatment. However, it is not effective on large plants, and poses a risk of starting wildfires, which is not advisable in times of elevated fire danger.

b. Prescribed burning can be an effective way to control seedlings and saplings of some invasive plants. Usually burns will have to continue for several consecutive years until the seedbank is depleted. Some issues can arise if annual burning does not continue on sites. Many invasive species respond well to disturbance from fire and will mobilize and establish in an area if fire treatment is not maintained. Logistically, prescribed burning can be very hard to implement, and is also expensive.

c. Mechanical mulching (aka forestry mowing) is an effective way to reduce biomass of highly infested areas. This method involves using machinery, such as a tracked skid steer, and a rotating mulching head to grind down what is growing on the surface and usually an inch or two of top soil. Mechanical mulching alone will not stop an infestation. However, it is highly effective when paired with prescribed burning or chemical treatments to control IS seedling regeneration.

d. Mowing can be effective for plant control if it is continuously done before plants are allowed to seed. This can be effective for herbaceous plants in rights-of-way, and is extremely

effective when paired with an herbicide application. Mowing, however, can also cause unwanted transportation of invasive species if it is done at the wrong time (while plants are seeding) or if it is used on plants that reproduce via fragmentation.

e. Girdling is an act of stopping the ability of a shrub or tree to transport nutrients, water, and sap by removing the bark and cambium ring in a circle around the entire trunk or stem of a plant. Herbicide should be applied to larger plants to avoid only a "top kill". If no herbicide is being applied, girdling should be done in early spring to prevent new top growth.
f. Hack and fray (aka "hack and squirt") is a method in which bark is cut to the cambium layer. Herbicide is then applied to the cut area. The tree will continue to transport nutrients, and the herbicide will be slowly transported throughout the entire plant. This can be effective for large trees such as black locust, which have defense mechanisms against other methods of herbicide application.

IV. CHEMICAL CONTROL: The use of herbicides to control and/ or exterminate IS.

a. Basal barking is an herbicide method of girdling a plant in which herbicide is applied to the outer bark in a complete ring at least 6" wide around the stem of a woody plant around 12-24 inches above the base. This treatment is best used in dry conditions in the fall and winter. Typically an herbicide with triclopyr as an active ingredient, plus a surfactant such as bark oil that allows the herbicide to penetrate the outer bark, is used.
b. Foliar spraying involves applying herbicide directly to the leaf surfaces, and care needs to be taken to avoid spraying non-target plants. Foliar spraying can be done on an individual level, with a hand sprayer or back-pack sprayer, or on a large scale with a boom sprayer. It can also be referred to as "spot spraying" in areas with less dense invasive species. Typically, the active ingredient is paired with a surfactant to ensure the herbicide treatment stays on the leaves of the plant it is targeting. Active ingredients used in foliar spraying can include, but are not limited to: glyphosate, triclopyr, clopyralid, metsulfuron, and 2, 4, D depending on what is being treated.
c. Cut-stump treatment involves cutting the adult plant near its base and then applying herbicide to the exposed cambium and along the sides of the stumps to ensure herbicide reaches the root system. Cut-stump treatment involves water based herbicides such as glyphosate being applied immediately after the stem is cut. If a long amount of time lapses between the cut and herbicide application then oil based chemical such as triclopyr with bark oil should be applied.

V. EMERGING CONTROL METHODS

a. The ISC will explore new control methods cited in relevant literature or at professional IS conferences. These methods could include, but are not limited to, experimental methods such as use of electrical fields for zebra mussel control or carbon dioxide as an under-the-ice lethal control for invasive fishes.

A majority of the time using just one of the above treatments will not be sufficient in controlling and/or eradicating IS that are a concern within the Reservation boundaries, but instead control will require the use of several of the techniques mentioned above.

CONTROL METHOD IMPLEMENTATION PROCEDURES

Control that is implemented will be based on the information provided from the initial survey in the site plan. The first step of implementation will involve identifying how large the area of treatment is, who owns the area of the infestation, and is the site on top of or nearby any ecologically, historically and/or culturally significant areas. Areas will be identified using FDL land use plan/zoning map which identifies important cultural and conservation areas, and will also take into consideration other agency classifications such as, but not limited to, the MN DNR aquatic management areas and the FDL's outstanding Reservation resource waters. Areas and site plans will be circulated through the FDL Resource Management Division for feedback to minimize the impact to native natural resources and to ensure invasive species management is a collaborative effort with other departments. If there is a discrepancy in management techniques or concern about the implementation of a site plan, dispute resolution as detailed in the integrated resource management plan (IRMP) will be followed. If infested areas are on land not owned by the Fond du Lac Band, those property owners will be identified and asked for permission to implement treatment on their property. They will also be asked if they wish to participate in control and maintenance for both educational and management purposes and as a way to engage community members in investing in their resources through IS management.

Specific control methods that will be implemented will be based on information from the site plan and will follow methodology outlined through the IRMP which states, "consultation with resource management staff will occur if the area of impact is great than 1 acre". Herbicide usage will follow Minnesota State Statues (*Minnesota Statutes*) in regards to legal pesticide use, application, and equipment cleaning, and will comply with FDL's water quality standards and wetland ordinance. The ISC will be certified for herbicide usage in forestry, rights-of-way, and aquatic environments and will be in charge of training other IS program employees on herbicide proper use and safety. Methods targeting specific individual plants and species will be most utilized including application methods such as basal barking, spot spraying, and cut/stump treatments. Applications such as foliar spraying large areas, which would include spraying non-target species, will be the least utilized on Reservation and FDL-owned lands. Mechanical control such as spot-fire treatments, mowing, mechanical mulching, girdling, or hack and fray which do not pose a significant risk to FDL staff or property, will be explored and utilized as a favored non-herbicide method for IS management. Mechanical control in the form of prescribed burning, or other potentially high-risk mechanical control methods will follow methodology found in the IRMP, and will utilize the knowledge and skill sets of other resource management staff. Any biological control release will also follow the methods and regulations set forth through the IRMP.

SITE CONTROL EXAMPLE FOR THE MANAGEMENT OF WILD PARSNIP (PASTINACA SATIVA)

An example of a control effort that could take place on Reservation includes the management of wild parsnip. Since wild parsnip has become widespread on certain parts of the Reservation, a multifaceted approach potentially utilizing prescribed burning, mowing, foliar spraying, hand pulling/digging and monitoring would be projected to be the most effective management and/or eradication strategy. The first step in this process would be prescribed burning in April to June and/or mowing in late May to early July. Burning and mowing will help reduce biomass, and more importantly reduce the amount of seed

heads present, which are the largest contributor to a growing population. Mowing must occur between late June and early July, before the plant is ready to release its seed but not so early it is able to re-grow a seed head. Mowing should not occur after late July because this will spread the plant by dispersing seed caught in the mower. A follow-up foliar spraying chemical treatment using 2,4,D (a selective herbicide killing broad leaf weeds, but not affecting grasses) occurring in May to June and again in September to October will be the most effective for killing the plant. In small, outlying populations manual control may be used solo or in conjunction with chemical control. For very small populations or populations in sensitive or highly used areas cutting off the seed heads and properly disposing of the material, then digging up the root system may be enough to control the population. In slightly larger areas, cutting off the seed heads and properly disposing of the material and using a spot-spraying foliar chemical treatment on the rosettes may be most effective. After the population is controlled, monitoring will need to continue to address regeneration and new outlying populations, and/or the introduction of new IS into the area. After a site has been successfully controlled, implementation of the end goal for a site (such as introducing native species, maintaining grassy areas, etc.) can begin.

Currently there is no exact guide for control for how to safely manage IS found on FDL Reservation and control that is implemented will be based on previously recorded successful efforts from other organizations. However, the ISC is simultaneously working on creating a guide as surveillance and control efforts are implemented.

RESTORATION

To ensure areas that have undergone control management efforts do not become subject to re-infestation by IS, restoration will occur as the final action in the control process. Restoration efforts will occur to the benefit of and in conjunction with other FDL resource management departments. This will include restoring areas to be suitable for wildlife, pollinators, wild rice, fisheries, forest management, wetland management, and others. Restored areas will also serve to benefit air, land, and water quality as well as support programs such as the brownfields and alternative energy. The IS program will conduct collaborative restoration efforts and follow existing restoration BMPs.

Restoration efforts will begin as soon as possible after a site has undergone management efforts to minimize the impacts of control efforts being applied, which can add additional stress to an already impaired environment. The type of restoration and control effort taking place will determine the timeline for any restoration project, which will follow existing restoration BMPs outlined by the Board of Water and Soil Resources and other agencies, and restoration plans will be posted for internal comment.

MONITORING

Monitoring invasive species populations will occur on both treated and non-treated sites. For previously treated sites, monitoring will serve the purpose of measuring the success of the treatment in terms of IS regeneration and colonization and changes in relative abundance of native and invasive species. Monitoring of treated sites will allow for better determination of what control methods are successful for certain IS, allowing for more effective control and/or treatments to be applied. Ultimately,

monitoring that demonstrates the regeneration of native communities in previously infested areas would indicate a successful management site.

Monitoring at non-treated sites, will determine IS rate of spread and work will be prioritized at sites that are in close proximity to high priority, non-infested areas. This will aid in prioritizing areas to be treated as the program is started by determining if an IS population is moving into other, important, areas at a fast rate, which would pose a threat to significant cultural resources on the FDL Reservation and surrounding areas.

MONITORING TECHNIQUES

For both AIS and TIS and previously treated sites and non-treated sites the main methodology to implement monitoring will be visual surveys, focusing on known and high-risk IS in the area, to look for any individual plants that are growing in the site of interest. Monitoring for TIS in previously treated sites will involve first taking GPS points and mapping polygons and/or points on Arc GIS to establish the initial area of infestation before treatment. After treatment has been applied, new GPS points will be collected and mapped to show how the species responded to the treatment. A successful treatment will be indicated by IS population decline and minimal regeneration and new IS identified. Vegetation surveys may also occur to monitor previously treated sites to gain "snapshots" of regenerating vegetation and what density of the IS being monitored is still present and if new IS have moved into the area.

Monitoring for TIS in non-treatment areas will follow the same mapping protocols as those in the treatment areas in identifying where IS are currently located and then returning to the site to determine the rate of spread, if new IS are entering the infested area, and if the density of individuals is increasing. Determining these factors will help identify priority areas for control.

Monitoring for AIS will occur in conjunction with early detection and surveillance sampling. Since most AIS cannot easily be seen, the same surveys used for early detection will also aid in monitoring conditions for AIS. If new AIS are found and treatment can be/ is performed, then monitoring techniques similar to TIS will be collected by performing surveys to identify how much of the treated species is left, if new individuals of the same species are growing, if native vegetation is regenerating, and if new AIS have inhabited the area. AIS monitoring will include techniques such as snorkeling, scuba diving, trapping, or using a rake toss, to minimize the impacts to the ecosystem.

TIMELINE FOR INVASIVE SPECIES MANAGEMENT

Monitoring for TIS and AIS will be an ongoing process for several years based on the seedbank viability of the IS being monitored/controlled. The seeds of many IS can stay viable for up to seven or more years. Monitoring will need to occur until the initial seedbank is depleted (7-10 years) and then every two to five years, or as needed depending on the location, to ensure no new infestations have moved into the area. Monitoring currently infested sites and controlled sites is an integral part of the ISMP so new or recurring IS can be detected early and eradicated before sites are allowed to get out of control and managing the IS becomes costly and/or extremely difficult to control due to volume.

MONITORING PRIORITIZATION

Priority sites include previously treated sites and non-treated sites that are in close proximity to culturally significant resources. The next level will include those IS that are easier to manage that are in close proximity to culturally significant resources such as wild rice, sugar maple stands, birch stands, berry and timber harvesting locations, and [walleye] fishing lake accesses. Previous treatment/control sites will also be prioritized for monitoring. This will serve two purposes; the first is to gauge the effectiveness of the treatment so control techniques may be adjusted to maximize the impact on IS with minimal impact to native species. The second purpose will be to ensure previous effort, including time and money on management, does not go to waste. By monitoring for returning IS populations we can ensure early detection and a rapid response treatment in which previous efforts would not be overturned by recurring or new IS infestations infiltrating the area. Further priority areas for monitoring will include high-risk IS infestation areas such as those connected or adjacent to already infested aquatic or terrestrial areas or those that are highly utilized by community members and/ or the public in this area. This can include, but is not limited to, pipeline corridors, rivers, creeks and lakes connected to the St. Louis River, hiking, skiing, ATV, snowmobile, and biking trails on FDL-owned lands, public and resort boat accesses, and lakes highly utilized in the spearing and netting seasons.

EDUCATION AND OUTREACH

Educating FDL staff, FDL community members, and the general public about the issues of IS and basic preventative measures to stop/slow the spread is critical in managing IS, including on and off-Reservation and in the ceded territories. It has also been shown that engaging [tribal] youth and young adults in IS management will lead to a sustainable future by teaching preventative BMPs to be a part of everyday life (Roberts et al.). Education is the best line of defense against IS infestations and in implementing all facets of the ISMP. By engaging the community in IS management there is a better chance for early detection, preventing the spread of IS, and controlling IS. If the community is not engaged with the management of IS, managing IS will be an impossible endeavor due to the continued spread through human vectors. However, if we can get the community engaged and disrupt the human vectors of transport (or pathways of spread), IS will be contained to their current locations and control can be implemented, leading to successful IS management.

Other aspects of education and outreach will also include writing and enforcing best management practices (BMPs) and standard operating procedures (SOP's) for topics including, but not limited to, how to safely use and transport equipment to minimize the risk of transport of invasive species while in the field, safe management and removal of invasive species, and others. These will be written for professional and recreational use so they can be applied to FDL staff, FDL community members, and the public. Educational trainings and materials will also be specifically geared towards minimizing IS impacts during important cultural activities such as spearing and netting and wild rice harvesting. The IS program will strive towards using future funding opportunities to set up a library of nets that may only be sued in infested waters, and to have permanent decontamination stations for nets and spearing equipment whenever needed. We will also pursue grant funding to put up culturally- relevant signs at wild rice landings.

SCHOOL EDUCATION PROGRAMS AND EVENTS

Invasive species education will begin with the development of a wide array of programs to offer to schools, FDL community members, and the general public, drawing on existing educational resources where possible. These classes will include themes of TIS and/or AIS, and issue(s) they can cause for the environment, human health, or the economy. The IS program will continue to expand its education initiatives to include a wide variety of classroom presentations to [tribal] youth about how IS disrupt ecosystems, what can be done to prevent their spread, careers in natural resources with IS, and how to aid in IS management. It will also add a hands-on approach through programs such as IS identification hikes where students will learn what IS are in their own spaces. This IS education program will also expand to include a classroom portion in the winter, paired with an in-field management activity in the spring, so students can get a first-hand experience in being an IS manager. Currently, the IS program aims to implement a minimum of five programs per year with FDL community schools and after-school programs. The programs currently available can be modified to fit any teacher requests, or new presentations pertaining to IS can be made upon request. All IS classes are available to any FDL staff or teachers if any one wishes to implement a program without any IS program staff being present. The IS program also aims to teach students in the Ceded Territory areas to bring recognition to the FDL Reservation and their Ceded Territory rights, along with current IS management, in the hopes that it will raise both IS and cultural awareness.

OUTREACH EVENTS

In addition to teaching classroom sessions, large scale outreach event participation has also been shown to be an effective way to target large scale audiences quickly. Participation in outreach events may happen on or off Reservation, depending on the target audience and materials hoping to be conveyed. Education in the form of outreach events can include topics such as IS identification, BMPs, management efforts, FDL's engagement in IS management, detrimental effects of IS, potentially useful aspects of some IS, and many others. Participation in large scale outreach events will mainly occur in the form of having informational booths and materials present at highly attended events such as powwows, festivals, and fairs.

Partnerships Involving Public Outreach

Some outreach events that occur on a large scale will be implemented with partnering organizations who are equipped with large scale materials such as MN Sea Grant and the MN DNR and others. These organizations have more access to equipment and materials that can be utilized for large scale public events. FDL will also have its own materials to hand-out at these events to engage the public in FDL's mission and also to be an IS and cultural resource. FDL will also utilize campaigns created by partnering organizations both at large and small scale events including campaigns such as "Stop aquatic hitchhikers", "Habitattitude", "PlayCleanGo", and "WorkCleanGo". These campaigns are already established and have some publicity, and FDL will partner with these organizations to also promote these ideals and practices.

INTERNSHIPS AND STAFFING OPPORTUNITIES

A large part of a successful IS program will rely on introducing tribal youth to careers in the natural resources and to gain experience in a field that may interest them for a future career. This is a way to engage the FDL community in IS management, as well as start building a sustainable IS management program. Having as many opportunities as possible for the community to engage in resource management as possible will be the best chance at keeping FDL cultural and natural resources preserved for the future. Gaining experience early with resource management career opportunities will also give FDL youth a competitive edge when continuing a career in any field by gaining knowledge and professional experience. The IS program aims to provide youth and young adults full-time, seasonal, and internship employment opportunities for both AIS and TIS positions so any applicant may gain a wide array of experiences. For an IS program to be sustainable and successful it is reliant on participation from the community, and employment and internships opportunities will aid in community involvement.

TRAININGS AND CERTIFICATIONS THROUGH THE SCHOOLS

In conjunction with offering internships, trainings and certifications through schools, such as FDL Community College, will also be made available. Trainings such as equipment safety knowledge and usage, herbicide application, IS identification, IS BMPs, watercraft and vehicle inspection and decontamination, and others will be made available. The processes for implementation of college credit and certifications through FDL Community College are not yet in place, but may be implemented by spring of 2021. Internship opportunities have already established criteria for gaining college credit and will be implemented as soon as the IS program has sufficient resources to hire interns.

VOLUNTEER AND CITIZEN SCIENCE OPPORTUNITIES

To further engage the FDL community citizen science opportunities will be made available to any interested parties potentially including, but not limited to, “buckthorn bonfires”, adopt-a-woodlot programs where adoptees will be responsible for the maintenance of a woodlot and implementing different forms of IS control including hand pulling, hand sawing, and smothering, adopt-a-lake or landing program where adoptees would be responsible for monitoring and maintenance of a boat landing or specific part of a lake, river monitoring, IS boot brush gardens where FDL staff and community members could clean the dirt off of their equipment including their boots to see what grows and what they are transporting on a daily basis, IS identification hikes, and many others. The IS program also aims to utilize Band member and community knowledge and incorporate traditional ecological knowledge throughout the entirety of the IS management program.

Any member of an IS team would be trained to participate in and/ or lead any of the aforementioned programs and/ or opportunities. The IS program also aims to offer opportunities for participation in large community events including, but not limited to, the “City Nature Challenge” and the “We are Water MN” exhibits and events.

TRAININGS AND PROFESSIONAL DEVELOPMENT

To keep informed and up-to-date with ever changing management practices, attendance of relevant trainings, conferences, workshops, meetings, and webinars is necessary. These events are often where new collaborations, professional development, and ideas of how to implement new strategies for multiple facets of IS are founded and thus are critical in maintaining a successful IS program. All members of the IS program will be expected to attend relevant conferences, trainings, workshops, and meetings. The ISC will also be responsible for communicating new technologies, and relevant information from meetings and trainings to other members of the IS program, FDL staff, and interested community members and other tribal and state agencies. Part of the goal of the IS program is also to educate and prepare [tribal] youth for careers [potentially in resource management] through gaining skills, knowledge, and aiding in professional development. Professional development skills will be gained in performing daily tasks, and also through attending professional work events. The IS program will also focus on training other FDL staff on how to use EDDMaps in the field to mark IS as they are working.

PARTNERSHIPS AND COLLABORATION

Currently on-Reservation there are several entities that are currently playing or will play a role in IS management including, but not limited to, private property owners, MN Department of Natural Resources (MN DNR), Carlton County Soil and Water Conservation District (SWCD), South St. Louis SWCD, Carlton County, St. Louis County, Minnesota Department of Transportation (MN Dot), MDA, Big Lake Improvement Association, FDL Elders Concerns Groups, FDL Tribal Community College and extension, and the University of MN Cloquet Forestry Center. Partnerships specific to IS control on FDL-owned lands in the St. Louis River estuary would include the Lake Superior National Estuarine Research Reserve, Natural Resources Research Institute (NRRI), the Environmental Protection Agency (EPA) Mid-Continent Ecology Division, and the St. Louis River Alliance-Invasive Phragmites Work Group.

There are also several partners in the nearby surrounding area that the FDL IS program is currently or will be coordinating with including, but not limited to the 1854 Treaty Authority, Duluth Cooperative Invasive Species Management Area (CISMA), Duluth area Cooperative Weed Management Area (CWMA), MN Sea Grant, Lake County SWCD, US Forest Service (USFS), US Fish and Wildlife Service (USFWS), Minnesota Invasive Terrestrial Plant and Pests Center (MITPPC), Minnesota Invasive Species Advisory Council (MISAC), Ely Area Invasives Team (EAIT), Minnesota Aquatic Invasive Species Research Center (MAISRC), the Nature Conservancy, Large Lakes Observatory (LLO), Lake Superior Research Institute (LSRI), and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC).

Collaboration with a majority of these partners has already started through work groups, meetings, conferences, outreach and education events, and collaborative management and control. The ISC is currently focusing on outreach and collaboration with entities on-Reservation to enlist the help community members in proactive IS management. Large stake-holder prioritization for IS management

on Reservation will include collaboration and involvement from private property and/ or lease owners and the Big Lake Improvement Association. These collaborations will hopefully engage community members to assist in IS control, monitoring, and early detection and lead to a sustainable IS management future.

REPORTING AND MEASURING SUCCESS

Measuring the success of efforts such as early detection and surveillance, education and outreach programs, trainings and professional development, and collaboration with partnering organizations will also allow for adjustments of the program's reach and impact to as many individuals as possible and ensure our efforts are not only fitting the needs of FDL community members, but also working in conjunction with other entities around the state and Midwest region. The IS program will create an annual report that encompasses the work done in the previous year that will be available online so any interested party can identify the work that has been completed. Some measures of success are outlined below, but are expected to change and adapt as the IS program continues to grow.

PREVENTION

Measures of success for IS prevention will include recording the number of boat inspections and equipment decontaminations performed throughout the summer season. In these inspections, we will also record if any visible AIS were seen and prevented from entering and/or leaving a waterbody. Measures of success for prevention will also include tracking how many wetland/ contracting permits were given out to contractors on Reservation and where they were coming from, and if they were clean upon inspection entering the FDL Reservation, this will be kept track of by other departments in FDL resource management who are already procuring this information and doing this work. Measures of success will also include collecting the tracking logs utilized by contractors and FDL staff to see where people were traveling to and from and when equipment was decontaminated between uses. The IS program will also collect tracking logs used during the spearing and netting season to see how many people were moving to different lakes and how many decontaminations were performed or if new equipment was used when moving waterbodies. Measures of success will also include how many in-the-field decontaminations occurred from staff by collecting decontamination tracking logs. Also the number of preventative educational events and how many staff attended will be counted and used as a measure of success. Prevention measures of success will also include how much time and how many people the IS staff spent informing members of the community and the general public about IS issues and if any significant findings, changes, or changes in perception came from these interactions.

EARLY DETECTION AND SURVEILLANCE

Measures of success for early detection and surveillance will include recording the number of IS monitoring activities conducted; to aim to match or exceed 15 lakes and/ or 15 river monitoring and surveying activities being conducted each year; how many acres have been surveyed each year; how

many acres have been surveyed in culturally significant areas; the number and abundance of IS found on Reservation, buffer area, and on the FDL- owned lands in the St. Louis River estuary.

Measures of success will also be identified through the creation of GIS maps indicating what areas have been surveyed, what IS have been found, and where specific IS are found. These maps will be made available to FDL staff and other community members so preventative measures can be taken to avoid spreading IS from these areas. It will also enable the IS program and other staff and community members to see the scope of the problem on Reservation and on FDL-owned lands. These maps will also aid in planning for control methods to be implemented and also aid in creating the priority matrix.

A measure of success will also be the creation of the priority matrix. This will be available to FDL staff and community members to show what areas are deemed a priority for control areas and can be adjusted based on feedback from tribal elders, community members, the RBC, and FDL staff.

Measures of success will also be shown by the number of site plans created and implemented. Site plans will be made based on geographic areas and/or by individual IS. Site plans that are made will be available upon request, and will be implemented through using the priority matrix and following the previously explained model of approval from FDL staff and the community.

Lastly the FDL IS program will be involved with creating and/ or implementing innovative survey techniques including utilizing eDNA and LIDAR, and creating survey techniques for AIS in river systems. The IS program will also work on creating survey techniques that are more suited to the needs of FDL including modifying survey techniques such as vegetation surveys for both AIS and TIS, and modifying trapping and netting techniques for AIS.

CONTROL

Measures of success for control methods will include recording the number of acres that are treated and tracking the location. Control will also be counted in the number of acres treated near culturally significant resources such as wild rice lakes, fishing lakes, berry harvesting areas, and river bank areas.

Control measures of success will also be measure in new control techniques that are utilized. New control methods that potentially could be utilized can include use of goats or sheep for grazing, hand pulling and smothering, new biological controls, carbon dioxide poisoning, forestry mulching, and spot fire treatment. Success of the treatments will be measured and then can be adjusted based on the effectiveness of the treatment.

MONITORING

Measures of success for monitoring will include measuring the number of acres and waterbodies that are monitored for different types of IS. This will include the number of acres monitored in culturally significant areas, lakes monitored with culturally significant resources such as wild rice and/or walleye, acres monitored nearby culturally significant resources such as maple stands or harvesting areas. Success will also be measured by the number of monitoring methods used, and the documentation of the monitoring. Success of monitoring will be recorded in data sheets and in GIS to show if infestations

are expanding, staying the same, or reducing. Recording monitoring will enable the IS program to predict a rate of spread and allow for better prioritization of sites for treatment/control. Monitoring measures of success will also be measured by the number of sites monitored including the number of previously treated sites monitored and the number of non-treated sites and for how many consecutive years the sites had been monitored and what were the monitoring techniques used and were the techniques consistent throughout the monitoring years. These measures of success will aid in prioritizing treatments/control, monitoring the success of treatment areas, and protecting non-infested sites.

EDUCATION AND OUTREACH

Measures of success for education and outreach activities include measuring the number of individuals reached (including FDL community members, and the general public), the number of classroom sessions presented/ attended, the number of public outreach events attended, the number of conference presentations given, the number of FDL internal staff trainings performed, and the number of partnership events the FDL IS program has participated in.

Measures of success will also be measured in the number of volunteers and volunteer hours performed by FDL staff and other community members who are performing IS management in one of the focus areas. The IS program will also measure how many community events are put on and the number of participants, if the participants are recurring or new at each events, how much material has been handed out at each event, and what materials were utilized at events.

Measureable benefits will also include how many tribal youth and young adults are hired as seasonal or full time staff or are performing internships. A successful program will hire a majority of FDL Band members to fulfill the roles needed in the IS program.

The amount of signage posted and available decontamination equipment (such as boot brushes) available will also be a measurable outcome for the education and outreach portion of the ISMP. Equipment purchased to aid the IS program will also be a measure of success including documenting what has been used for citizen science initiatives, school programs, or direct IS program work.

TRAININGS AND PROFESSIONAL DEVELOPMENT

Measures of success the include measuring the number of collaborations developed and enhanced during our IS control work; the amount of funds conserved through cost-sharing; and the number of times we meet with partners to communicate the latest control and management techniques and to support efforts to control established IS and enact effective rapid response. Additional Measures of success will include the number of internal staff trainings conducted to educate Resource Management staff on how to prevent IS spread in their daily work; the number of times we communicate with the FDL Reservation Business Committee; and the number of times the ISC attends IS-related conferences or other trainings.

Additional measures of success will include the number of times that FDL IS program staff attends trainings, conferences, and meetings, and the hours spent at these activities. These activities aid both in

training to do IS management related activities and aid in professional development as attending meetings and performing daily tasks requires professional skills and will build professional development.

PARTNERSHIPS AND COLLABORATION

Measures of success will include how many partnerships have been established including partnerships just involving knowledge sharing, and partnerships that involve large scale collaboration efforts. Collaboration can be measured by how many groups the IS program is involved in more depth collaboration including, but not limited to, advisory councils, work groups, the city nature challenge, powwows, and language and cultural skills workshops. Measures of success will also be measured in hours spent utilizing partnerships and collaborations, and tasks accomplished via partnerships and collaborations. FDL aims to establish and maintain several partnerships and collaborative efforts throughout the Minnesota and the Midwest to ensure our IS program goals and accomplishments are in line with other organizations to ensure the best possible effort is being put forward to manage IS.

FUNDING

The IS program will also track measures of success based on how many grant dollars were focused on different invasive species efforts. This will include funding for base operations, as well as tracking increases of funding for focusing on case studies, innovative surveillance and control methods, new preventative equipment and efforts, and new education and outreach efforts. Reporting how grant dollars and our budget is currently used as well as future plans for usage of monies will aid in measuring the IS programs current monetary success as well as aid in justification of monetary needs for future funding opportunities.

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FIGURES

FIGURE 1. Fond du Lac Reservation located in Northeast MN. Priorities for invasive species management are within the Reservation boundaries and in the "buffer zone" occurring 500 feet to one mile around the Reservation border.

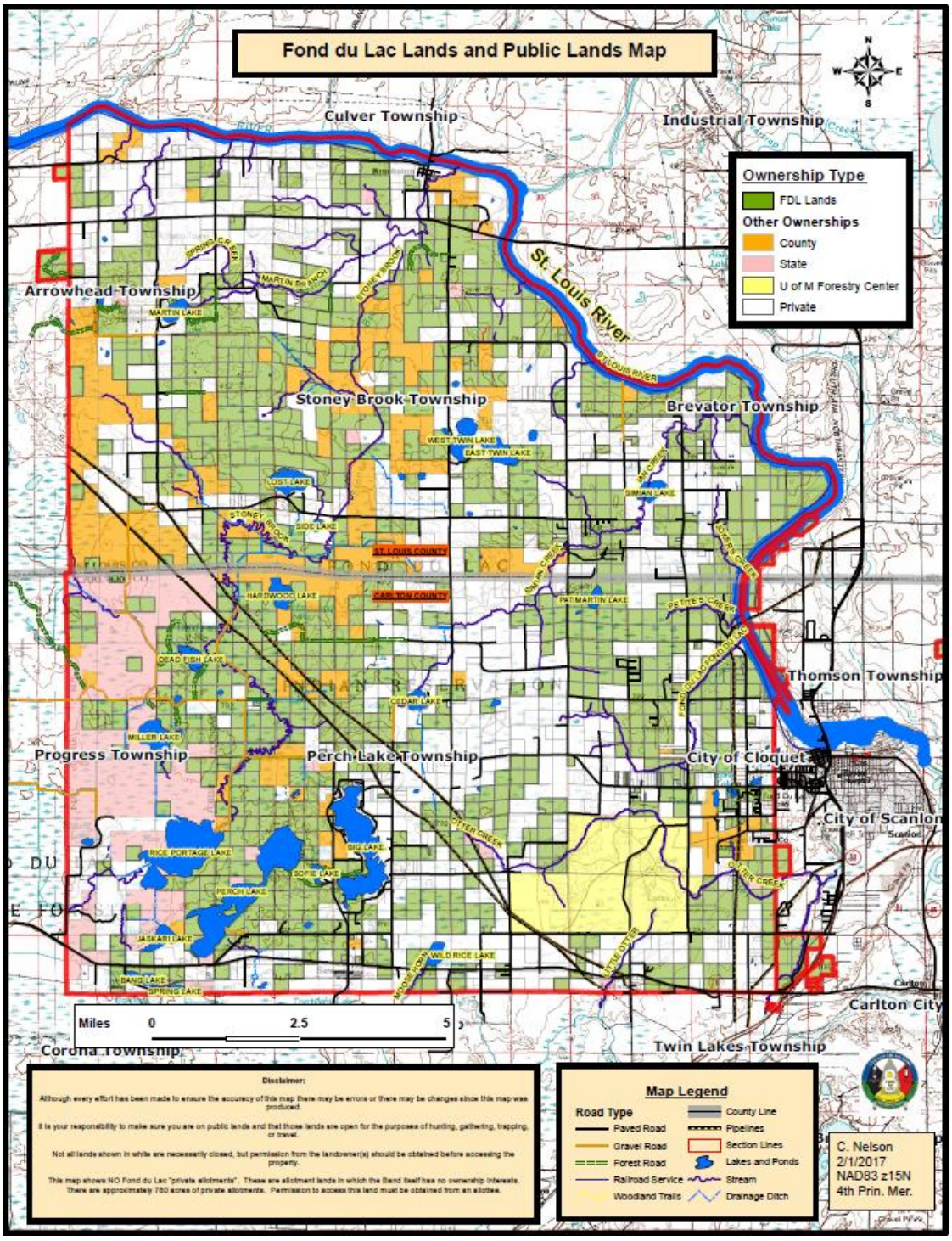
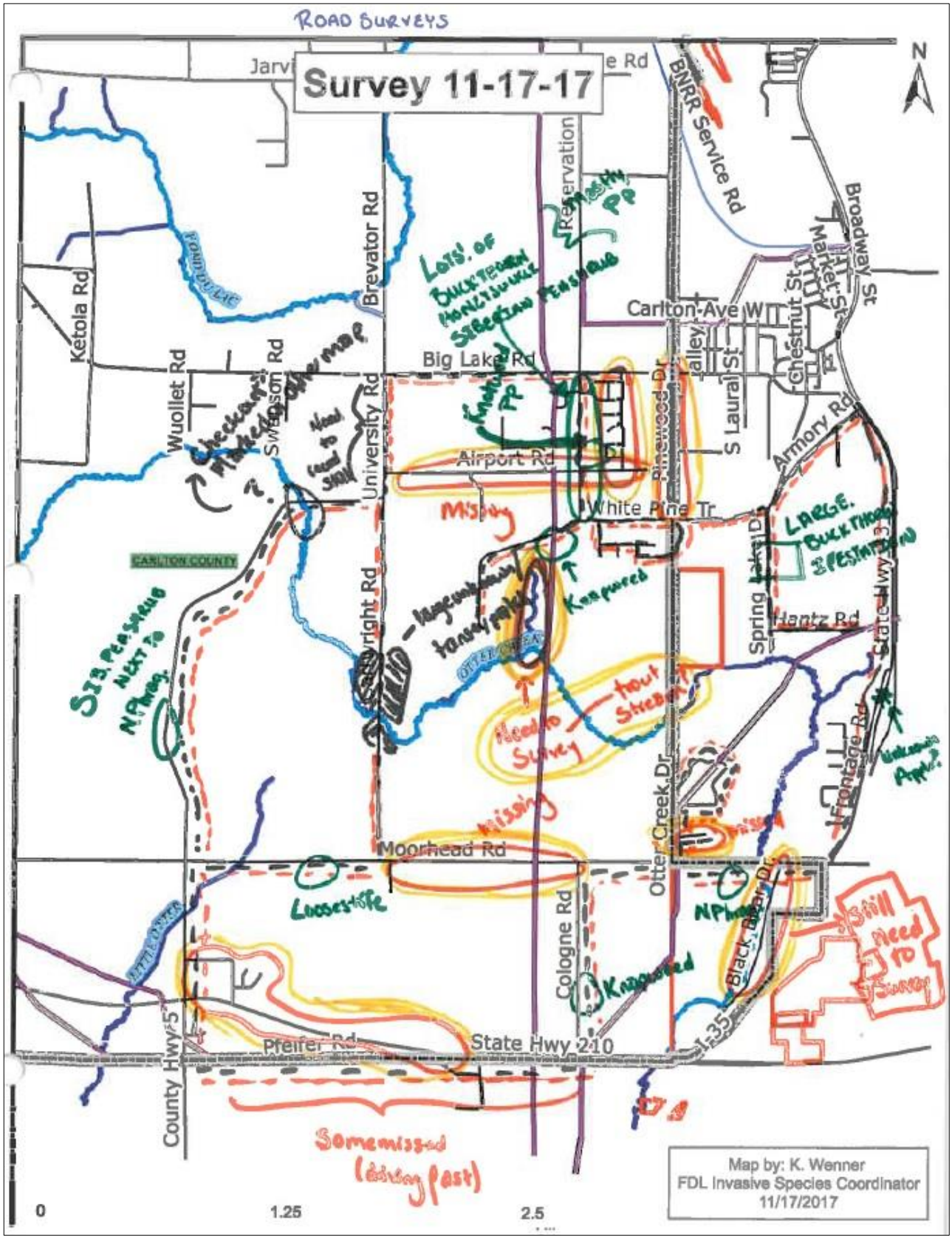


FIGURE 2. A map outlining ceded territories in the Midwest region. Fond du Lac Band of Lake Superior Chippewa has ceded territory rights for hunting, fishing, and gathering in the 1854, 1842 and 1837 region.

The map above is courtesy of the Great Lakes Indian Fish and Wildlife Commission (GLIFWC)

SITE PLAN FOR ROAD SURVEYS CONDUCTED ON 11/17/17
SE CORNER OF FDL RESERVATION

FIGURE 3: **Field Survey map depicting areas covered and invasive species infestations documented. Refer to this map or GIS maps on FDL database for locations and invasive species information.**



NEW INFESTATIONS FOUND:

- Japanese Knotweed- 1 location
- Native Phragmites- 4 locations
- Spotted Knapweed- 3 locations
- Common Buckthorn- 14 locations
- Purple Loosestrife- 2 locations

"General Invasive Species"

- Amur Maple- 2 locations
- Siberian Pea Shrub- 2 locations
- Honeysuckle- 2 locations

ACTION PLAN ITEMS:

I. SURVEILLANCE:

a. In depth/ on-the-ground surveillance around the culturally significant areas **OTTER CREEK** and **the attached northern creek**. These are known trout streams and are a priority for IS management.
   i. Some mapping of these areas has already begun, look at current maps for continuity of surveillance and possible control in these areas.

b. Complete surveillance of roadways and trails from the surveillance map that have not yet undergone any surveillance measures.

II. COMMUNICATION WITH HOMEOWNERS

a. Reservation Road, on the south side of Big Lake Road, has almost every home infested with one or more of the following; common buckthorn, honeysuckle, and/ or Siberian pea shrub. One home also had a large infestation of Japanese knotweed.
   i. Homeowners will first need to be informed of what is on their property and what harm it can cause if left untreated.
   ii. Homeowners, if willing, will be given several invasive species management options.
   iii. Homeowners, if willing, will give permission to FDL staff to perform agreed upon treatment of invasive species on their property.
   iv. Homeowners, if willing, will aid FDL staff in invasive species treatment on their property.
   v. Homeowners, if willing, will upkeep and maintain invasive species on their property after FDL staff has done initial removal
   vi. FDL staff will monitor and re-visit initially treated private property sites to upkeep invasive species treatment if the homeowners are willing.
   vii. Large infestations that are still a manageable size

III. SPOTTED KNAPWEED:

a. Knapweed by airport: technically not on FDL property-coordinate with state/county for treatment options. Relatively low abundance, but nearby **the attached northern creek to OTTER CREEK**, which serves as an important trout stream.
   i. Hand pulling should be sufficient for treatment of an area this size. Hand pull on a slightly rainy/ wet day so the soil is moist and more chance for full root removal is possible.

b. Knapweed on Cologne Road; in the right-of-way outside of a fenced [farm] area.
   i. Talk with land owner about treatment options and potentially hand pulling (following previously formatted "communication with homeowners" steps).
   ii. Large, moderately dense, area of knapweed that in field across the street. Ask homeowner permission to possibly treat with herbicide or other treatment options.

IV. BUCKTHORN

a. Prioritize “Right-of-Way” areas wetland and “Right-of-Way” forest areas.
    i. Further prioritize via areas that will be easily treatable i.e. areas that have a small density infestation, areas that are only infested on FDL land or right-of-way property, areas that have only a few berry producing trees, and areas that are still in the early stages of an infestation containing mainly seedlings and saplings rather than adults.
b. Connect with property owner on Spring Lake Drive
    i. Extremely large buckthorn infestation at this private property location. Talk to homeowners about doing some control, try to include homeowners in removal of adults (especially those that are seed bearing), and removal of seedlings and saplings on their and surrounding property.

V. PURPLE LOOSESTRIFE

a. Two small patches can be hand-pulled next season; can use herbicide treatment if necessary, but try hand pulling treatment first.

VI. AMUR MAPLE

a. Currently this is not listed on the prioritized plants list, so for now just record and in the future if there is time and resources this can be physically removed and treated with herbicide after receiving permissions from homeowners or proper entities

VII. SIBERIAN PEA SHRUB

a. Small seedling/ sapling size patch on University Road by a native patch of Phragmites. Hand pull or treat with fire. Priority area due to location nearby a wetland, and nearby other native plants. On university of MN property, so coordinate property management.
b. Several patches are on Reservation Road south of Big Lake Road. Most sites are landscaped on private property. Reach out to homeowners about possible removal and native replacement of Siberian pea shrub.
c. Also emphasize uses of Siberian pea shrub if removal is not an option, or if they want to utilize before removal. Seeds are edible and seed collection can help in preventing the spread of Siberian Pea shrub. Bark can be utilized for rope. Siberian pea shrub can traditionally be used for medicinal purposes.

VIII. INVASIVE HONEYSUCKLE(S)

a. Several infestations were landscaped patches on Reservation Road south of Big Lake road. Similar to Siberian pea shrub, reach out to homeowners to see if removal is possible with a native replacement. Ask owners if they will be involved in vegetation management and removal in future years.
b. Before and during removal, emphasize uses of honeysuckle so can be utilized rather than just thrown into a landfill area. Uses can include woodworking, paper making, essential oil infusions, and sometimes can be used as an antiviral medicine by being used in tinctures or teas. It may also be helpful in lowering cholesterol.

IX. UNKNOWN PLANTS

a. Identify unknowns: take pictures and collect samples for plant press if possible.
    i. If an invasive species decide on removal plan and strategies based on currently available information.
    ii. If native, document so it can be identified in the future, add to current plant database available on FDL Reservation.

APPENDICES

APPENDIX A

Priority species for early detection and surveillance of terrestrial invasive species will be based on, but is not limited to, the MDA's noxious weed list.

DEPARTMENT OF AGRICULTURE

2019 Noxious Weed List

www.mda.state.mn.us/plants-insects/noxious-and-invasive-weed-program

The Minnesota Noxious Weed Law (Minnesota Statutes 18.75-18.91) defines a noxious weed as an annual, biennial, or perennial plant that the Commissioner of Agriculture designates to be injurious to public health, the environment, public roads, crops, livestock, or other property. The purpose of the law is to protect residents of the state from the injurious effects of noxious weeds.

There are currently forty-two plant species regulated as noxious weeds in Minnesota. Twenty-three plants are listed as Prohibited Noxious Weeds which consist of two regulatory lists – 14 plants listed on the Prohibited Eradicate List and 9 plants listed on the Prohibited Control List. Fifteen species are listed as Restricted Noxious Weeds and four species are listed as a Specially Regulated Plants that can be enforced under specific conditions. ***Years following a species name designate when it was listed.***

A. Prohibited Noxious Weeds – Attempts must be made by all landowners to control or eradicate species on these lists. These species cannot be transported illegally or sold in Minnesota.

Eradicate List –must be eradicated by killing the above and belowground parts of the plant.

1.	Palmer Amaranth - 2014	*Amaranthus palmeri* S.Watson
2.	Oriental Bittersweet - 2010	*Celastrus orbiculatus* Thunb.
3.	Diffuse Knapweed - 2014	*Centaurea diffusa* Lam.
4.	Brown Knapweed - 2012	*Centaurea jacea* L.
5.	Yellow Starthistle* - 2010	*Centaurea solstitialis* L.
6.	Meadow Knapweed - 2012	*Centaurea x moncktonii* C.E. Britton
7.	Poison Hemlock - 2017	*Conium maculatum* L.
8.	Black Swallow-wort - 2012	*Cynanchum louiseae* Kartesz & Gandhi
9.	Grecian Foxglove - 2010	*Digitalis lanata* Ehrh.
10.	Common Teasel - 2011	*Dipsacus fullonum* L.
11.	Cutleaf Teasel - 2011	*Dipsacus laciniatus* L.
12.	Giant Hogweed* - 2011	*Heracleum mantegazzianum* Sommier & Levier
13.	Japanese Hops - 2011	*Humulus japonicus* Siebold & Zucc.
14.	Dalmatian Toadflax - 2011	*Linaria dalmatica* (L.) Mill.

***Species not known to be in Minnesota, but have been determined to be a threat to invade the state.**

Control List –must be controlled preventing the maturation and spread of propagating parts.

1.	Common Barberry - 2016	*Berberis vulgaris* L.
2.	Narrowleaf Bittercress - 2011	*Cardamine impatiens* L.
3.	Plumeless Thistle - 1975	Carduus acanthoides L
4.	Spotted Knapweed - 2001	*Centaurea stoebe* L. ssp. *micranthos* (Gugler) Hayek
5.	Canada Thistle - 1872	*Cirsium arvense* (L.) Scop.
6.	Leafy Spurge - 1992	*Euphorbia esula* L.
7.	Purple Loosestrife - 1992	*Lythrum salicaria* L., *L. virgatum* L.
8.	Wild Parsnip - 2010	*Pastinaca sativa* L. (Except for non-wild cultivated varieties)
9.	Common Tansy - 2010	*Tanacetum vulgare* L

B. Restricted Noxious Weeds - may not be sold, transported illegally, or intentionally planted in Minnesota.

1.	Tree of Heaven - 2016	*Ailanthus altissima* (Mill.) Swingle
2.	Garlic Mustard - 2013	*Alliaria petiolata* (M. Bieb) Cavara & Grande
3.	Porcelain Berry - 2016	*Ampelopsis brevipedunculata* (Maxim.) Trautv.
4.	Crown Vetch - 2016	*Securigera varia* (L.) – Formerly known as *Coronilla varia* L.
5.	Wild Carrot/Queen Anne's Lace - 2016	*Daucus carota* L.
6.	Glossy Buckthorn (and all cultivars) - 1999	*Frangula alnus* Mill.
7.	Amur Honeysuckle – 2016	*Lonicera maackii* (Rupr.) Herder
8.	Morrow's Honeysuckle - 2016	*Lonicera morrowii* A. Gray
9.	Bell's Honeysuckle - 2016	*Lonicera x bella* Zabel
10.	Common Reed (non-native) - 2013	*Phragmites australis* (Cav.) Trin. ex Steud. ssp. *australis*
11.	Common or European Buckthorn - 1999	*Rhamnus cathartica* L
12.	Black Locust - 2016	*Robinia pseudacacia* L.
13.	Multiflora Rose - 2011	*Rosa multiflora* Thunb.
14.	Tatarian Honeysuckle - 2016	*Lonicera tatarica* L.
15.	Japanese Barberry Cultivars** - 2017	*Berberis thunbergii* DC.

****Japanese Barberry Cultivars Regulated as Restricted Noxious Weeds in Minnesota**

• 'Angel Wings' • 'Antares' • var. atropurpurea • 'Bailtwo' (Burgundy Carousel®) • 'Monomb' (Cherry Bomb™) • 'Crimson Velvet' • 'Erecta' • 'Gold Ring' • 'Bailsel' (Golden Carousel®; B. koreana × B. thunbergii hybrid) • 'Inermis' • 'Bailgreen' (Jade Carousel®) • 'JN Redleaf' (Ruby Jewel™) • 'JN Variegated' (Stardust™) • 'Kelleris' • 'Kobold' • 'Anderson' (Lustre Green™) • 'Marshall Upright' • 'Painter's Palette' • 'Pow Wow' • 'Red Rocket' • 'Rose Glow' • 'Bailone' (Ruby Carousel®) • 'Silver Mile' • 'Sparkle' • 'Tara' (Emerald Carousel®; B. koreana × B. thunbergii hybrid) • Wild Type (parent species – green barberry)

C. Specially Regulated Plants –shall be handled, controlled or eradicated according to specified regulations.

1. **Poison Ivy** (*Toxicodendron radicans* L. Kuntze and *T. rydbergii* (Small ex Rhdb.) Greene) - 2010
   Must be eradicated or controlled for public safety along rights-of-ways, trails, public accesses, business properties open to the public or on parts of lands where public access for business or commerce is granted. Must also be eradicated or controlled along property borders when requested by adjoining landowners.
2. **Japanese Knotweed** (*Polygonum cuspidatum* Seib. & Zucc.) - 2013
3. **Giant Knotweed** (*Polygonum sachalinense* F. Schmidt *ex* Maxim.) - 2013
   Any person, corporation, business or other retail entity distributing Japanese and/or giant knotweeds for sale within the state, must have information directly affixed to the plant or container packaging that it is being sold with, indicating that it is unadvisable to plant this species within 100 feet of a water body or its designated flood plain as defined by Minnesota Statute 103F.111, Subdivision 4.
4. **Amur Maple (***Acer ginnala* Maxim.) - 2016
   Sellers shall affix a label that advises buyers to only plant Amur maple and its cultivars in landscapes where the seedlings will be controlled by mowing or other means. Amur maple should be planted at least 100 yards from natural areas.

D. County Noxious Weeds

County Noxious Weeds are plants that are designated by individual county boards to be enforced as prohibited noxious weeds within the county's jurisdiction and must be approved by the Commissioner of Agriculture, in consultation with the Noxious Weed Advisory Committee. Each county board must submit newly proposed County Noxious Weeds to the Minnesota Department of Agriculture for review. Approved County Noxious Weeds shall also be posted with the county's general weed notice prior to May 15th each year. Counties are solely responsible for developing County Noxious Weed lists and their enforcement. ***Contact your local County Agricultural Inspector or Designated Employee for more information on County Noxious Weeds***
www.mda.state.mn.us/plants/pestmanagement/weedcontrol/cailist

Adding species to County Noxious Weed Lists

It is up to an individual county to determine if they will have a designated county noxious weed list and the process for selection of species to be added to the list. If the county board of commissioners establishes a county noxious weed list, townships wanting to add species should pass a resolution with the county's Township Association showing that the representative of townships for that county are in favor of adding a particular species and enforcing it. This resolution can then be submitted to the County Agricultural Inspector or Designated Employee for that jurisdiction. It is still up to the county board of commissioners to decide if they want to list and enforce any species submitted to them via the township association or other entities. Minnesota Department of Agriculture approved County Noxious Weed Lists can be enforced by authorized agents of the commissioner under the Minnesota Noxious Weed Law as outlined in *Minnesota Statutes 18.80 – 18.81*.

Townships can also use their local ordinance process to regulate plant species that are not listed by the county or state. Enforcement of species listed via a municipal ordinance is the responsibility of municipal authorities and cannot be regulated under or associated with the Minnesota Noxious Weed Law - *MS 18.75 – 18.91*.

Additional resources for regulated noxious weeds and non-regulated invasive plants in Minnesota

MDA Website - www.mda.state.mn.us/plants-insects/noxious-and-invasive-weed-program
MN DOT Website - www.dot.state.mn.us/roadsides/vegetation/pdf/noxiousweeds.pdf
MN DNR Website - www.dnr.state.mn.us/invasives/terrestrialplants/index.html
MN BWSR Cooperative Weed Management Areas - http://www.bwsr.state.mn.us/grants/cwma/CWMA.html

APPENDIX B

Priority species for early detection and surveillance of aquatic invasive species will be based on, but is not limited to, Minnesota's State Management Plan for Invasive Species as outlined by the Minnesota Invasive Species Advisory Councils "Rankings of Species Threats to MN".

Ranking*	Common Name	Genus	Species
Aquatic Animals			
Watch	Chinese mystery snail, Japanese trap door snail	*Cipangopaludina*	*spp.*
Severe/Invading	Bighead carp	*Hypophthalmichthy*	*nobilis*
Severe/Invading	Grass carp	*Ctenopharyngodon*	*Idella*
Severe/Invading	Silver carp	*Hypophthalmichthys*	*molitrix*
Severe/Not in state	Black carp	*Mylopharyngodon*	*piceu*
Severe/Not in state	Fishhook waterflea	*Ceropagis*	*Pengoi*
Severe/Not in state	New Zealand mudsnail	*Potamopyrgus*	*antipodarum*
Severe/Not in state	Rudd	*Scardinius*	*erythrophthalmus*
Severe/Not in state	Zander	*Stizostedion*	*lucioperca*
Severe/Established	Common carp, Koi	*Cyprinus*	*Carpio*
Severe/Established	Rainbow smelt	*Osmerus*	*mordax*
Severe/Established	Round goby	*Neogobius*	*melanostomus*
Severe/Established	Ruffe	*Gymnocephalus*	*cernuus*
Severe/Established	Rusty crayfish	*Orconectes*	*rusticus*
Severe/Established	Sea lamprey	*Petromyzon*	*marinus*
Severe/Established	Spiny water flea	*Bythotrephes*	*longimanus*
Severe/Established	Zebra / Quagga mussels	*Dreissena*	*spp.*
Moderate/Not in state	Fourspine stickleback	*Apeltes*	*quadracus*
Moderate/Established	Alewife	*Alosa*	*pseudoharengus*
Moderate/Established	Corbicula	*Corbicula*	*fluminea*
Moderate/Established	Goldfish	*Carassius*	*auratus*
Moderate/Established	Lumholtzi waterflea	*Daphnia*	*lumholtzi*
Moderate/Established	Threespine stickleback	*Gasterosteus*	*aculeatus*
Moderate/Established	Tubenose goby	*Proterorhinus*	*marmoratus*
Moderate/Established	White perch	*Morone*	*Americana*
Severe pest, not expected to survive in MN	Chinese / Japanese Mitten Crabs	*Eriocheir*	*sinensis and japonica*
Aquatic Plants			
Watch/Unknown	Brazilian elodea	*Egeria*	*densa*
Watch	Waterlililes, nonnative or exotic	*Nymphaea*	nonnative spp.
Severe/Not in state	European frog-bit	*Hydrocharis*	*morsus-ranae*
Severe/Not in state	Hydrilla	*Hydrilla*	*verticillata*
Severe/Not in state	Indian swampweed	*Hygrophila*	*polysperma*
Severe/Not in state	Water chestnut	*Trapa*	*natans*
Severe/Established	Curly-leaf pondweed	*Potamogeton*	*crispus*
Severe/Established	Eurasian watermilfoil	*Myriophyllum*	*spicatum*
Severe/Established	Purple loosestrife	*Lythrum*	*salicaria, virgatum, and any hybrids*
Moderate/Not in state	Yellow floating heart	*Nymphoides*	*peltata*
Moderate/Established	Eurasian flowering rush	*Butomus*	*umbellatus*
Moderate/Established	Water cress	*Nasturtium*	*officinale*
Moderate/Established	Yellow iris	*Iris*	*pseudacoris*

APPENDIX C

Ordinances passed by the Fond du Lac Band of Lake Superior Chippewa outlining illegal activities in regards to the transport, possession, importation, purchasing, selling, propagating, or introduction of invasive species.

FOND DU LAC RESERVATION CONSERVATION CODE

GENERAL: SECTION 103, SUBDIVISION 10(G)(1)

No Band member shall possess, import, purchase,sell, propagate,transport, or introduce an invasive species as defined in section (X)(2),except:(a) under a permit issued by the Resource Management Division for the purposes of disposal, control, research, or education;(b) when being transported to the Resource Management Division's offices or another destination as the Resource Management Division may direct, in a sealed container for the purposes of identifying the species or reporting the presence of the species;(c) when a specimen has been lawfully acquired andis dead, or in the case of a plant, is secured in a sealed container;(d) when being removed from watercraft and equipment, or caught while fishing and immediately destroyed or returned to the water from which they came; or(e) when the invasive species has been designated by the Band as "regulated" but not "prohibited,"provided, however that no species designated as a "regulated invasive species" may be introduced into any natural setting such as public waters.(2) Invasive species includes the following species:(a) Aquatic plants: Eurasian milfoil, purple loosestrife.(b) Fish: Grass carp, rudd, round goby, ruffe , sea lamprey, white perch, common carp, Asian carps (bighead, black, grass and silver carps) and goldfish.(c) Invertebrates: rusty crayfish, zebra mussel,Quagga mussel, New Zealand mudsnail, Chinese mystry snail, and spiny water flea. (VHS).(e) Any other species that is designated as an invasive species by the Resource Management Division.

DEFINITIONS: SECTION 102,SUBDIVISION 27a.

Infested waters shall mean lakes, streams, or rivers identified by the Resource Management Division as either (1)containing a population of an aquatic invasive species that could spread to other waters if use of the water and related activities are not regulated to prevent this; or (2) is highly likely to be infested by an aquatic invasive species because it is connected to a water that contains a population of an aquatic invasive species.having populations of harmful exotic species, including, but not limited to, zebra mussels, Eurasian milfoil, purple loosestrife,ruffe, spiny water flea, round goby, white perch, or rusty crayfish.

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Fond du Lac Conservation Committee

Fond du Lac Reservation Business Committee circa 2019

Fond du Lac Conservation Enforcement Division

Fond du Lac Ceded Territory Committee

Fond du Lac Land Use Committee

Fond du Lac Cultural Committee