Environmental Assessment
For Wisconsin DNR project:

Removal of populations of invasive,
non-native *Glyceria maxima* from Wisconsin.

Prepared by:
Wisconsin Department of Natural Resources
June 2016

Prepared for:

U.S. Fish and Wildlife Service (USFWS)

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ENVIRONMENTAL ANALYSIS AND DECISION ON THE NEED FOR AN ENVIRONMENTAL IMPACT STATEMENT (EIS)
Form 1600-1 Rev. 6-2010

Department of Natural Resources (DNR)

Region or Bureau
Type List Designation

NOTE TO REVIEWERS: This document is a DNR environmental analysis that evaluates probable environmental effects and decides on the need for an EIS. The attached analysis includes a description of the proposal and the affected environment. The DNR has reviewed the attachments and, upon certification, accepts responsibility for their scope and content to fulfill requirements in s. NR 150.22, Wis. Adm. Code. Your comments should address completeness, accuracy or the EIS decision. For your comments to be considered, they must be received by the contact person before **4:30 p.m., July 15, 2016**.

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Title of Proposal: USFWS/DNR/GLRI Removal of populations of invasive *Glyceria maxima* from Wisconsin.

Location: County: Counties throughout Wisconsin, see project location statement for more information.

City/Town/Village: Various

Township Range Section(s): Various, see maps 1 & 3 and project location statement for more information

1. INTRODUCTION

1.1 Project Summary - Brief overview of the proposal including the DNR action (include cost and funding source if public funds involved)

1.1.1 Project Funding

- $50,000 for two field seasons; August 2016 – August 2017
- United States Fish and Wildlife Service (USFWS)
- Great Lakes Restoration Initiative (GLRI)

1.1.2 Project Location

This project is in the process of gathering data regarding the locations of the invasive grass, *Glyceria maxima*, throughout Wisconsin. Most project sites will be located near the Milwaukee metropolitan area and along the transportation corridors heading westward towards Dane County, and south towards Chicago paralleling the Lake Michigan shoreline. Most populations have been discovered in Milwaukee, Waukesha, Racine, and Kenosha counties; fewer populations have been discovered in Jefferson, Dane and Dodge counties. Additional populations are found in Calumet, Wood, Oneida, and Door counties. Currently, we are forming a list of proposed treatment sites for preliminary treatment in 2016 with focus on peripheral populations.

1.1.3 Project Description

- Mapping of *G.maxima* throughout Wisconsin.
- Development and implementation of a control strategy for *G.maxima*.
- Implementation of an educational campaign to inform property owners, regional Cooperative Invasive Species Management Areas (CISMAs), conservation groups, and local units of government about *G.maxima*.
- Control program targeting pioneering infestations according to a site selection protocol. Control 150 acres of wetland invasive plants is the goal of the GLRI grant. Conduct evaluation of treatment sites.

This project meets the USFWS' goals for the Great Lakes Restoration Initiative (GLRI) Action Plan to prevent the spread of 'new invasions' of species into an area. *G.maxima* is listed with in the Great Lakes & Mississippi River Interbasin Study (GLMRIS) as being an aquatic nuisance species of concern for the Mississippi River Basin. This species has moderate environmental impact to the Great Lakes.

G.maxima occurs very infrequently in the Midwest, most of the known current records are found within Wisconsin, with additional verified reports found in northern Illinois and eastern Minnesota. Implementing reconnaissance and control efforts now will help to reduce the potential spread of this species into other areas, and help prevent it from entering the Mississippi River Basin.

1.2 Purpose and Need (include history and background as appropriate)

Department Land Managers spend significant amounts of time and money controlling invasive species. Invasives are one of the most serious and persistent threats to native species and ecosystems. Given the right conditions, non-native invasive species can rapidly spread into natural areas and out-compete, damage and often eliminate native plant and animal communities. Once established, invasive species disrupt ecosystem patterns and processes, such as hydrology, nutrient cycling, erosion, habitat succession, and the frequency and intensity of wildfires. By reducing biological diversity, diminishing ecosystem resources, posing public health risks and impacting agriculture, tourism, fisheries, and outdoor recreation industries, invasive species are inflicting economic damage.

Glyceria maxima has several specific impacts to the environment and to Wisconsin economy. This species can be especially problematic for emergent wetlands, riparia, and water courses. It can form dense impenetrable stands, which can lead to slowed waters, shallower channels and flooding, and accelerate sediment deposition. As the plant decays, it reduces the availability of dissolved oxygen, which negatively impacts aquatic fauna. In Australia and New Zealand, *G.maxima* has been implicated in the deaths of livestock, both by cyanide poisoning and by drowning animals as they attempt to cross densely infested waters.

This project will map infestations, develop a priority control plan, enlist cooperators to assist with the control, evaluate effectiveness, and restore natives where needed. Counties throughout the state (See map 1.) will be targeted for this control effort. Local partners needed to establish a sustainable effort would be asked to implement the control strategy and track the success over time.

1.3 Authorities and Approvals (list local, state and federal permits or approvals required)

FIFRA (Federal Insecticide, Fungicide and Rodenticide Act)
ESA (Endangered Species Act) Section 7
National Historic Preservation Action, Section 106
ATCP (Agriculture, Trade and Consumer Protection)
Wis. Statute ATCP 29 Pesticide Use and Control
NR (Natural Resources)
Wis. Statute Ch. 30 Navigable Waters, Harbors and Navigation
Wis. Admin. Code NR 40
Invasive Species Identification, Classification and Control
Wis. Admin. Code NR 103 Water Quality Standards for Wetlands
Wis. Admin. Code NR 107 Aquatic Plant Management

Private Land Treatments

Herbicide treatment on private land will only occur after written permission is obtained from the landowner. Permission forms will be coordinated and held by the Project Coordinator. These forms will be retained by the project coordinator for at least 3 years or the end of the project, whichever comes first.

2. PROPOSED PHYSICAL CHANGES OF PROPOSED ACTION (more fully describe the proposal)

2.1 Manipulation of Terrestrial Resources (include relevant quantities - sq. ft., cu. yard, etc.)

None

2.2 Manipulation of Aquatic Resources (include relevant quantities - cfs, acre feet, MGD, etc.)

Reduce or eliminate invasive *Glyceria maxima* populations, focusing on remote populations in the landscape followed by sites along the advancing edge of invasion fronts. Priority will be given to those that are new, controllable, pioneering populations threatening high value or sensitive wetland or lotic ecological communities. Control work will be done throughout the state, with primary focus on isolated, peripheral populations. Private contractors, partner organizations and DNR personnel will treat *G.maxima* with herbicide, with up to 150 acres treated.

A site selection protocol will guide the treatment process by identifying pioneering *Glyceria maxima* populations and populations which exhibit the greatest risk of spreading, threatening to create new infestations in wetlands, lakeshores, waterways. Treatments are not restricted to only wetland and riparian areas, and may include right of ways, public lands adjoining private lands, and artificial drainages where written permission for treatment is given by the landowner or other authority. The sites of highest priority will be those found to be within or proximal to the Mississippi River Basin. Sites that are found along watercourses have the greatest likelihood of spreading further. With the remaining sites not found within these two categories, a site selection process will include the use of the Priority Areas for Invasive Species Management (PAISM) model by Jason Granberg, Ph.D. of the Wisconsin Department of Natural Resource. The PAISM geospatial model considers sensitive habitats, occurrence of rare, threatened, or endangered species Conservation Opportunity Areas (COAs), State Natural Areas, State Wildlife Areas, State Parks/Forests and wetlands included on the Natural Heritage Inventory (NHI). This model, combined with an understanding of site characteristics, hydrological connectivity, and regional *G. maxima* distribution, will help inform treatment decisions allowing for the best use of management resources.

Comparing herbicide treatment methods for *Glyceria maxima* control.
Glyceria maxima has a limited distribution within the United States, with most known reports occurring within Wisconsin. Control efforts for this invasive species have occurred elsewhere in the world, including Massachusetts and Washington states; the United Kingdom, Tasmania, and New Zealand. However, efforts to control *G. maxima* in the Midwest, have not been attempted on a broader landscape scale and the methods used elsewhere may not be entirely applicable to Wisconsin due to variations in climate. This project will test the efficacy of different herbicide treatment methods, comparing imazapyr to glyphosate, under a variety of ecological and population size and hydrological contexts during the first year of treatment. Herbicide treatments will only use one chemical and will not examine interaction effects (i.e. both chemicals used concurrently at the same site). After monitoring the preliminary treatment results, we will then apply the most effective treatment method to other sites with the remaining funding.

First treatment method: Imazapyr
The first herbicide to be tested is imazapyr, which has been used successfully to control *Glyceria maxima* in Washington state and Tasmania. Imazapyr is a non-selective herbicide used for the control of a broad range of weeds including terrestrial annual and perennial grasses and broadleaved herbs, woody species, and riparian and emergent aquatic species. It controls plant growth by preventing the synthesis of branched-chain amino acids. Imazapyr is a non-selective broad-spectrum systemic herbicide, absorbed by the foliage and roots of a plant, with rapid transfer to the xylem and phloem to the meristematic regions, where it accumulates and causes disruption of protein synthesis. This leads to interference in DNA synthesis and cell growth of the plants.

For specific rate information, refer to herbicide labels. The following are a list of aquatic-use approved herbicides that have imazapyr as the active ingredient.

EPA Aquatic-Use Approved Herbicides

- **Arsenal®**
- **Habitat®**
- **Polaris®**

One of the herbicides will be paired with a MSO surfactant approved for aquatic use.

Label Recommendations
28.7% Imazapyr a.i.
4 to 6 pints per acre applied to actively growing, green foliage after full leaf elongation.

Second treatment method: Glyphosate
The second herbicide to be tested is glyphosate, which has been used by The Nature Conservancy and by private restoration firms in Wisconsin to control *Glyceria maxima*. Glyphosate is a non-selective, broad spectrum, systemic herbicide that is used to control many grasses, forbs, vines, shrubs, and trees. It is one of the most commonly used herbicides in natural areas because it provides effective control of many species. Glyphosate works by preventing the plant from producing amino acids that are the building blocks of plant proteins. Formulations of glyphosate such as Rodeo© have been approved for use in aquatic systems, and have successfully controlled invasive aquatic grasses such as common reed (*Phragmites australis)*, giant reed (*Arundo donax*), and Japanese stiltgrass (*Microstegium vimineum*). Because glyphosate is non-selective, appropriate application methods (spot treatment) and seasonal timing similar to use of imazapyr will be used to prevent impacts on non-target species. A perceived benefit to using glyphosate in areas of high plant sensitivity is less persistence in the soil than imazapyr. In a former project to treat non-native *Phragmites australis,* some land managers recommended that glyphosate be used for wetland areas that are of very high rare plant diversity.

For specific rate information, refer to herbicide labels. The following are a list of aquatic-use approved herbicides that have glyphosate as the active ingredient.

EPA Aquatic-Use Approved Herbicides
- **Aquamaster®**
- **Accord®**
- **Rodeo®**
- **AquaNeat®**

One of the herbicides will be paired with a MSO surfactant approved for aquatic use.

Label Recommendations
50.2% to 53.8% Glyphosate a.i., based on herbicide brand name.
3 to 7.5 pints per acre applied for perennial weeds to actively growing, green foliage. Application may occur throughout the target species' growing period.

Methylated seed oil (MSO)
Post-emergence applications require the addition of a spray adjuvant. Only spray adjuvants that are approved or appropriate for aquatic use will be utilized. A methylated seed oil or vegetable-based seed oil concentrate may be used at the rate of 1.5 to 2 pints per acre. When using spray volumes greater than 30 gallons per acre, concentrates should be mixed at a rate of 1% of the total spray volume.

Application will be done after assessing the site needs, size and distribution of *Glyceria maxima* populations and existence/proximity of any important native species. Ground application techniques may include treatments done with a backpack sprayer, hand-sprayer, boom-mounted sprayer with low pressure nozzles, wick, bundle-cut and treat stem surface, and/or machinery with low impact tread.

2.3 Buildings, Treatment Units, Roads and Other Structures (size of facilities, road miles, etc.)

None

2.4 Emissions and Discharges (include relevant characteristics and quantities)

Chemical Names - % by weight.

Typical concentrations of 28.7% active ingredient of isopropylamine salt of imazapyr is in aquatic approved herbicides such as Habitat® or Arsenal®. While 50.2% to 53.8% active ingredient, N-(phosphonomethyl)glycine isopropylamine is in aquatic approved herbicides such as Aquamaster®, Accord®, Rodeo®, and AquaNeat®.

Herbicides will be applied by certified applicators. Contractors must fully comply with all safety requirements as set forth by the Wisconsin Administrative Code, the Rules of the Industrial Commission on Safety, and all applicable OSHA standards.

Applications will be made by ground staff, contractors, or partners; will be site specific, and will include a variety of methods including: spraying with backpack, from ATV, or machines mounted with boom sprayers. The bundle-cut-treatment of stems or hand wicking of herbicide may also be used, particularly in areas with sensitive native vegetation.

All herbicide label formulations are listed as percent active ingredient (a.i.); also referred to as the chemical name, this is the chemical that kills the plant. When an herbicide is purchased it will contain a certain amount of active ingredient.

Herbicide rates by % a.i.:	**Ground Application rate:**		
Imazapyr 28.7%	Initial broadcast spray:	1.5 oz per gallon water	4 to 6 pints per acre
	Follow up spray:	1.5 oz per gallon water	4 to 6 pints per acre
Glyphosate 50.2% - 53.8%	Initial broadcast spray:	2 oz per gallon water	5 pints per acre
	Follow up spray:	2 oz per gallon water	5 pints per acre
MSO (surfactant)	Initial broadcast spray:	1.5 oz per gallon water	1 to 2 pints per acre
	Follow up spray:	1.5 oz per gallon water	1 to 2 pints per acre

Imazapyr (the active ingredient in Habitat and Arsenal) is an anionic, organic acid that is non-volatile, and is both persistent and mobile in soil. It may be applied by broadcast application to aquatic freshwater sites to control floating or emergent aquatic vegetation. Application may be made to control undesirable wetland, riparian and terrestrial vegetation growing in or around surface water when applications may result in inadvertent applications to surface water.

Glyphosate (the active ingredient in Aquamaster and Rodeo) is an organic acid and is expected to be immobile in soil, and is mobile in water. This herbicide can be used for broadcast application, and may be used on aquatic freshwater sites only with aquatic compatible formulations. Aquatic compatible formulations have been used to control plant species in wetlands, riparia, and upland ecosystems.

MSO (methylated seed oil) is a vegetable oil that is mixed with imazapyr or glyphosate to aid in breaking the waxy surface tension of the leaves, which results in better contact of the herbicide to the plant material. MSO is the surfactant required to mix with imazapyr due to its drift reduction capabilities. The MSO surfactant will make the smaller driftable droplets of the straight herbicide larger, which results in the droplets being heavier and less likely to move around in the air before making contact with the target species. MSO, like other herbicide adjuvants, also serves as an anti-foaming agent, which reduces air entrapment, which leads to better surface contact of herbicides against vegetation. MSO is designed for use with post-emergent herbicides. MSO is not a pesticide.

Colorants are added to the herbicide/surfactant solutions to enable spray crews to see where they have treated areas and are visible after the initial evaporation of the solution. The applicator usually determines the compatibility of a colorant with an herbicide and particular application. The use of colorants can assist in the prevention of overspraying as treated areas are clearly observed by the applicator, preventing re-spraying of an area. Colorants are non-toxic and will disappear in a short time with rainfall.

Environmental Hazards of Imazapyr
Imazapyr has low acute toxicity via the oral (mouth) and dermal (skin) routes of exposure. It is not irritating to the skin, and is negative for dermal sensitization; however, imazapyr may cause eye damage. The available data suggest that a single exposure to imazapyr does not result in an effect of concern for risk assessment purposes. Imazapyr does not bioconcentrate in fish.

The U.S. Environmental Protection Agency (EPA) classifies Imazapyr as category III (Low Toxicity).

Imazapyr Toxicity Category and Signal Word

	High Toxicity (*Danger*)	**Moderate Toxicity (*Warning*)**	**Low Toxicity (*Caution*)**	**Very Low Toxicity (*Caution*)**
Oral LD50	Less than 50 mg/kg	50-500 mg/kg	500-5000 mg/kg	Greater than 5000 mg/kg
Dermal LD50	Less than 200 mg/kg	200-2000 mg/kg	2000-5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC50	Less than 0.05 mg/l	0.05-0.5 mg/l	0.5-2.0 mg/l	Greater than 2.0 mg/l
Eye Effects	Corrosive	Irritation persisting for 7 days	Irritation reversible in 7 days	Minimal effects, gone in 24 hrs
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation

Highlighted categories specify the range for imazapyr.

There are no restrictions on recreational use of treated water, including swimming and eating fish from treated water bodies. If application occurs within a ½ mile of a drinking water intake, then the intake must be shut off for 48 hours following treatment. There is a 120-day irrigation restriction for treated water, but irrigation can begin sooner if the concentration falls below one part per billion (ppb).

Imazapyr Wildlife Toxicity Category

Risk Category	Mammals	Birds	Fish or Aquatic Insects
	Acute Oral or Dermal LD_{50} (mg/kg)	Acute Oral LD_{50} (mg/kg)	Acute LC_{50} (mg/L)
Practically nontoxic	>2,000	>2,000	>100
Slightly toxic	501-2,000	501-2,000	>10-100
Moderately toxic	51-500	51-500	>1-10
Highly toxic	10-50	10-50	0.1-1
Very highly toxic	<10	<10	<0.1

Highlighted categories specify the range for imazapyr cited in this fact sheet. The toxicity of imazapyr to wildlife receptors varies by species.

Environmental Hazards of Glyphosate

Glyphosate has a relatively low oral and dermal acute toxicity. The EPA has classified it as a Toxicity Category III for human health effects. For perspective, a Toxicity Category I has the highest degree of acute toxicity, while a Category IV has the lowest. Animal testing indicates that glyphosate has moderate toxicity warning as an eye irritant, with effects persisting for seven days. Glyphosate ranks highly among pesticides that cause illness and injury to workers.

The U.S. Environmental Protection Agency (EPA) classifies Glyphosate as category III (Low Toxicity).

Glyphosate Toxicity Category and Signal Word

	High Toxicity (*Danger*)	**Moderate Toxicity (*Warning*)**	**Low Toxicity (*Caution*)**	**Very Low Toxicity (*Caution*)**
Oral LD50	Less than 50 mg/kg	50-500 mg/kg	500-5000 mg/kg	Greater than 5000 mg/kg
Dermal LD50	Less than 200 mg/kg	200-2000 mg/kg	2000-5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC50	Less than 0.05 mg/l	0.05-0.5 mg/l	0.5-2.0 mg/l	Greater than 2.0 mg/l
Eye Effects	Corrosive	Irritation persisting for 7 days	Irritation reversible in 7 days	Minimal effects, gone in 24 hrs
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation

Highlighted categories specify the range for glyphosate.

Glyphosate has different formulations based upon the presence of water at the intended treatment site. Glyphosate is formulated for either aquatic or terrestrial application. The application of glyphosate-based herbicides that are not approved for aquatic use is unsafe, and violates federal and state pesticide laws. Most formulations of glyphosate for aquatic applications have no restrictions on swimming or the consumption of fish from treated waterbodies. If application is to occur within a ½ mile of a drinking water intake, it must be shut off 48 hours after treatment.

Glyphosate Wildlife Toxicity Category

Risk Category	Mammals	Birds	Fish or Aquatic Insects
	Acute Oral or Dermal LD_{50} (mg/kg)	Acute Oral LD_{50} (mg/kg)	Acute LC_{50} (mg/L)
Practically nontoxic	>2,000	>2,000	>100
Slightly toxic	501-2,000	501-2,000	>10-100
Moderately toxic	51-500	51-500	>1-10
Highly toxic	10-50	10-50	0.1-1
Very highly toxic	<10	<10	<0.1

Highlighted categories specify the range for glyphosate cited in this fact sheet. The toxicity of glyphosate to wildlife receptors varies by species.

2.5 Other Changes

There may be areas where cutting, mowing, or scything of dead *Glyceria maxima* plants may be necessary or beneficial to treatment with herbicides. This will be assessed on an individual site by site basis depending on ground conditions, accessibility, and existing ground vegetation.

2.6 Maps, Plans and other Descriptive Material Attached

A) Map of Wisconsin with project counties

B) Map of identified Conservation Opportunity Areas within Ecological Landscapes

C) Existing distribution map of *Glyceria maxima* in Wisconsin (currently known reports as of date of EA submission)

D) Section 7 form (ESA)

3.0 AFFECTED ENVIRONMENT (describe existing features that may be affected by proposal)

3.1 Information Sources (check all that apply):

☒ Literature/correspondence (specify major sources)

1) DNR – GLRI grant: Aquatic Nuisance Species Management Plan Implementation
2) US EPA – Reregistration Eligibility Decision for Imazapyr, 2006
3) US EPA – Reregistration Eligibility Decision for Glyphosate, 1993
4) US EPA – Web pages on Pesticides, Ecological Risk Assessments, Risk Reduction
5) Wisconsin Department of Natural Resources web pages:
    a) Wetlands & Wetland Invasive Species Strategy
    b) Invasive Species
    c) Natural Heritage Inventory
    d) Conservation Opportunities
    e) Ecological Landscapes
6) Department of Primary Industries, Water, and Environment. 2002. Service Sheet: Glyceria/Reed sweetgrass. Department of Primary Industries, Water, and Environment. Hobart, Australia.
7) Hudson, H. R. 2005. *Glyceria maxima* (reed sweet grass) fact sheet *in* Sustainable drain management: Best management practices. New Zealand Water Environment Research Foundation (NZWERF). Wellington, New Zealand.
8) Loo, S. 2016. Invasive Species Compendium: Datasheet report for *Glyceria maxima* (reed sweet-grass). Center for Agriculture and Bioscience International.
9) Melbourne Water. 2003. Weed Fact Sheet: Reed Sweet Grass (*Glyceria maxima*). Melbourne Water. Melbourne, Australia.
10) Patti, H. and A. Thompson. 2013. Aquatic Invasive Species (AIS) Control Grant Application, *Glyceria maxima* control study. Final Report to the Village of Mount Pleasant, Racine Co. WI.
11) Trayes M. and T Belton. 2011. Reed Sweet Grass: *Glyceria maxima*, Surveillance Plant under the West Coast Regional Pest Plant Management Strategy. The West Coast Regional Council, New Zealand.
12) Washington State Noxious Weed Control Board. 2005. Written Findings of the Washington State Noxious Weed Control Board for *Glyceria maxima*. Washington, USA.
13) Herbicide Labels and MSDS
    a) Habitat (Imazapyr)
    b) Arsenal (Imazapyr)
    c) Polaris (Imazapyr)
    d) Aquamaster (Glyphosate)
    e) Accord (Glyphosate)
    f) Rodeo (Glyphosate)
    g) AquaNeat (Glyphosate)
14) MSO – surfactant label and MSDS

☒ Personal Contacts (list in item 26)

Field Analysis By: ☐ Author ☐ Other (list in item 26)

Past Experience With Site By: ☒ Other (list in item 26)

3.2 Physical Environment (topography, soils, water, air)

Due to the scope of the project boundaries covering a wide area, the physical environment, topography and soils will change depending on the county and ecological landscape or wetland habitat. Generally this project will be targeting *Glyceria maxima* populations in or near wetlands and waterways that fall into a range of community types. Information on different ecological landscapes can be found on the DNR's website at http://dnr.wi.gov Keywords: Ecological Landscapes. For this project, the primary ecological landscapes and their characteristics are as follow.

Northern Highland

Primarily Vilas and Oneida counties, this landscape consists of 2,081 square miles or 3.7% of the total land area of

WI. Only one population has been detected along the northern border of Oneida County. Most of this Ecological Landscape is an undulating, gently rolling glacial outwash plain with many kettle lakes, wetlands, and bogs. Remnant moraines and drumlins occur often, with their lower slopes covered with outwash sands. Most soils are sands and gravels, some with a loamy mantle. Soil productivity is low compared to glacial till but relatively high for outwash sands. Wetlands are numerous; most have organic soils of peat or muck. There is a globally significant concentration of glacial lakes in the Northern Highland: 4,291 lakes; 1,543 miles of streams, including the headwaters of the Wisconsin and Manitowish-Flambeau-Chippewa river systems. Many lakes are connected by small streams. Rare aquatic species and extensive wetlands (see below) occur here.

The mean annual temperature is 39.5 deg. F, the lowest of any Ecological Landscape in the state and almost 2 degrees lower than other northern ecological landscapes. The mean annual precipitation is 31.6 inches, similar to other northern ecological landscapes. The mean annual snowfall is 68.1 inches, the second largest amount of snowfall in the state. Only about one percent of the Northern Highland is used for agricultural purposes. The climate is favorable for forests, which cover more than 76% of the Ecological Landscape.

Forest Transition

A large east-west orientated landscape, this project has only has the Wood County which falls into the Forest Transition ecological landscape. The entire landscape consists of 7,279 square miles or 12.9% of the land area of the state. The Forest Transition landscape was entirely glaciated. The central portion was formed by older glaciations, both Illinoian and pre-Illinoian, while the eastern and western portions are covered by deposits of the Wisconsin glaciation. Glacial till is the major type of material deposited throughout, and the prevalent landforms are till plains or moraines. Throughout the area, post-glacial erosion, stream cutting, and deposition formed floodplains, terraces, and swamps along major rivers. Wind-deposited silt material (loess) formed a layer 6 to 24 inches thick. Density of the glacial till is generally high enough to impede internal drainage, so there are many lakes and wetlands in most parts of the Forest Transition landscape.

Because this Ecological Landscape extends east-west across much of Wisconsin, the climate is variable. In addition, it straddles a major eco-climatic zone (the “Tension Zone”) that runs southeast-northwest across the state. Mean annual temperature is 41.9 deg. F, mean annual precipitation is 32.6, and mean annual snowfall is 50.2 inches. The Wisconsin and Wolf rivers drain areas of this ecological landscape, and land cover varies greatly depending on the region, with eastern areas more forested.

Southeast Glacial Plains

Dane, Jefferson, Waukesha, and parts of Calumet, Racine, and Kenosha counties are the project counties in this ecological landscape. Overall this ecological landscape stretches from Southern Waupaca County south to the counties that border Illinois and covers almost 5 million acres. Its dominant landforms are glacial till plains and moraines, with numerous other glacial landscape features such as eskers, drumlins, kames and kettles.

This ecological landscape contains some of the most productive aquatic environments for plants, invertebrates and fish in the state. There are several important chains or clusters of lakes, as well as important river systems that move through this landscape, including the Wolf, Bark, Rock, Fox, Milwaukee, Sugar, Mukwonago, and Sheboygan. However, many of the riparian zones around these rivers have been degraded.

The climate is typical of southern Wisconsin with a mean annual temperature of 45.9 deg. F, mean annual precipitation of 33.6 inches and mean annual snowfall of 39.4 inches. This climate is suitable for agricultural row crops, small grains and pastures.

Southern Lake Michigan Coastal

This ecological landscape is one of the smaller landscapes in Wisconsin and only covers 1.5% of the state and is the most urbanized within the state. The general topography is relatively low, with level to gently rolling ground moraine. In areas closest to Lake Michigan, the topography changes to ridges and swales, beaches, dunes, and bluffs. The upland soils within this landscape are moderately well drained brown calcareous silty clay loam till. Within the lowlands, soils are primarily very poorly drained mucks, or silty and clayey lacustrine soils. Lake Michigan itself is the primary hydrological feature in this landscape, although there are 26 smaller named lakes and 1,500 unnamed lakes within this landscape. The important river systems here include the Milwaukee, Menomonee, Kinnickinnic, Root, Des Plaines, Southeast Fox, and Pike rivers. The current understanding of *G. maxima*’s distribution indicates that most reports are found along the riparian areas. Thus, controlling along these and other smaller tributaries will be important to stop the spread of this species.

The climate of this landscape is highly moderated by lake effects from Lake Michigan. The mean annual temperature is 47.2 deg F. with a mean annual precipitation of 34 inches. The climate is suitable for agricultural row crops, small grains, and pastures, which are prevalent in the non-urbanized parts of this landscape.

3.3 Biological Environment (dominant aquatic and terrestrial plant and animal species and habitats including threatened/endangered resources; wetland amounts, types and hydraulic value)

Due to the scope of the project boundaries covering a wide area, the biological environment (including species composition and habitat) will change depending on the county and ecological landscape or wetland habitat. This project will be targeting *Glyceria maxima* populations in or near wetlands and waterways that fall into a range of community types.

Information on different ecological landscapes can be found on the DNR's website at http://dnr.wi.gov Keywords: Ecological Landscapes. For this project, the primary ecological landscapes and their biological characteristics are as follow.

Northern Highland

The Northern Highland ecological landscape is especially rich in rare species associated with waters and wetlands, including some of the north's most iconic animals, such as the Bald Eagle, Osprey and Common Loon. Lakes connected by perennial streams are common here and support a diverse aquatic fauna which includes rare and uncommon species such as longear sunfish (*Lepomis megalotis*), Pugnose Shiner (*Notropis anogenus*), and Mink Frog (*Lithobates septentrionalis*). The landscape's rivers and streams include the headwaters region and upper stretches of the Wisconsin River, as well as the Manitowish, Tomahawk and Squirrel rivers.

The Northern Highland landscape historically consisted of a diverse mosaic of habitats, patch sizes, stand ages, ecotones and aquatic features. The extensive forests here present major opportunities and include the state's greatest acreage of dry-mesic white pine-red pine forests. Other less abundant forest types providing good management opportunities include mesic hemlock-hardwood and northern hardwood forests; swamp conifers of black spruce, tamarack, or white cedar; dry jack pine forests; and hardwood swamps. Abundant wetlands include several of the state's largest and least disturbed acid peatland ecosystems, as well as hardwood swamp, white cedar swamp, shrub communities, emergent marsh and wild rice marsh. These wetlands provide important habitats and are critical for maintaining water quality in the landscape's high-quality lakes and streams. Species of special concern found in these forests and wetlands include northern flying squirrel (*Glaucomys sabrinus*), water shrew (*Sorex palustris*), and black-throated blue warblers (*Dendroica caerulescens*).

Forest Transition

Once almost completely forested, the Forest Transition's largest blocks of forests are now limited to certain areas. Portions of two large forested areas, the Lakewood-Laona District of the Chequamegon-Nicolet National Forest (CNNF) and the Menominee Indian Reservation, comprise the easternmost and most densely forested end of the landscape. These are largely mesic forests, and the forests of the Menominee Reservation have retained some old forest attributes, including large trees, coarse woody debris and multi-layered canopies. Unlike many other parts of Wisconsin, eastern hemlock remains abundant in some areas, and both it and northern white cedar can be found reproducing here. These forests provide important habitats that are rare or absent elsewhere and offer excellent opportunities for monitoring and research.

Much of this ecological landscape is now quite open and dominated by intensive agricultural use. A few open areas of surrogate grassland (non-native grasses) and adjacent wetlands embedded within agricultural lands are large enough to support declining grassland birds, including the WI threatened greater prairie-chicken (*Tympanuchus cupido*). Bedrock exposures, though localized and uncommon, can provide specialized habitats. Significant outcroppings of Precambrian rock in the Forest Transition include exposures of granites, quartzite and basalt as cliffs, glades and talus slopes in certain areas. Cambrian sandstone exposures occur at a few locations such as the south central part of the landscape.

A number of rivers cross the landscape from north to south, which support high aquatic biodiversity and many rare species. Wetlands and forests forming the corridors of these rivers are used heavily by migratory birds and may be important for other species traveling between northern and southern Wisconsin. Habitats such as floodplain forest and marsh are better represented along the large rivers than elsewhere in the landscape. The wetlands of this landscape support such threatened or special concern species as American bitterns (*Botaurus lentiginosus*), black terns (*Chlidonias niger*), and marsh valerian (*Valeriana sitchensis ssp. uliginosa*).

Southeast Glacial Plains

Although much of this ecological landscape is heavily developed or in agricultural use, there exist important areas of undeveloped lands to provide habitat for native species. The landscape contains the Kettle Moraine region, with large amounts of undeveloped uplands within the Kettle Moraine State Forest. The northern unit of the state forest has extensive upland forests, important wetlands and rivers, and many ephemeral ponds. The southern unit of the KMSF holds many areas of oak savannas and open wetlands such as bogs and fens. The large complex of sedge meadow, marsh and wet prairie associated with the White and Puchyan rivers is outstanding in terms of size and quality and supports an extremely large range of wildlife including many birds and reptiles. The landscape also contains Horicon Marsh, the Upper Midwest's largest cat-tail marsh, and the Mukwonago River watershed, the most intact watershed in the landscape, with a high diversity of fishes and aquatic invertebrates inhabiting the spring-fed river system. Many private and public partners are working to protect, manage and restore areas of these important watersheds.

Southern Lake Michigan Coastal

This is the most highly populated and heavily developed Ecological Landscape in the state. It has long been a hub of transportation, heavy industry, and commerce, as well as a productive agricultural area, resulting in large and long-term impacts to the land and water. Natural systems are severely fragmented and disturbed by widespread and intensive agricultural, industrial, and residential development. Ongoing development may increase land values, taxes, and costs of public services. All of the formerly extensive plant community groups - forests, savannas, prairies, and wetlands - have been greatly reduced from their historical abundance. Most natural community remnants are small and isolated, occurring within a context of lands and waters that are now dedicated to supporting residential, industrial, and agricultural uses. Invasive species are a major problem here, more so than in other Ecological Landscapes. Wetland and aquatic systems have been significantly diminished or degraded, often leading to serious water management issues that are difficult and expensive to fix. Despite all of the development that has occurred, this Ecological Landscape still supports rare and declining species and communities that occur at few other locations. A 1990s critical features inventory planned and conducted by SEWRPC (1997) and Wisconsin DNR identified more than 18,000 acres of high quality remnant natural communities and critical species habitats throughout a seven county area, including the entire Southern Lake Michigan Coastal Ecological Landscape. Several counties have extensive systems of parklands and green spaces, and conservation-oriented groups dedicated to a wide array of interests, including land stewardship, are well-established and active. Stream restoration has attracted great local support. There may be significant opportunities to re-vegetate areas, especially brownfields, not as natural communities, but to serve as surrogate habitats for wildlife. Urban forestry is important here and could represent ecological as well as socio-economic opportunities.

3.4 Cultural Environment

Due to the scope of the project boundaries covering a wide area, the cultural environment (including land-use and social/economic features) will change depending on the county and location. The DNR's breakdown of areas based on Ecological Landscapes does contain information on land-use and social features. Generally this project will be targeting *Glyceria maxima* populations in or near wetlands and riparia that fall into a range of community types. Information on different ecological landscapes can be found on the DNR's website at http://dnr.wi.gov Keywords: Ecological Landscapes. For this project, the primary ecological landscapes and their primary land-uses and social features are as follow:

3.4.1 Land use (dominant features and uses including zoning if applicable)

Northern Highland

Current land-use in this region is 48% upland forest, 34% wetlands (both forested and non-forested), 13% open water, 5% grassland and open land, and 1% urban. The cool temperatures, short growing season, and sandy soils are not adequate to support agricultural row crops, such as corn. Only about one percent of the Northern Highland is used for agricultural purposes, as opposed to forests, which cover 76% of the ecological landscape.

Forest Transition

Landcover is highly variable by subsection, dominant landform, and major land use. The eastern part of the ecological landscape remains heavily forested; the central portion is dominated by agricultural uses (with most of the historically abundant mesic forest cleared). The growing season is long enough that agriculture is viable, although climatic conditions are not as favorable for many crops as they are in southern Wisconsin. A large part of the Menominee Indian Reservation is in the Forest Transition and these tribal lands (along with some

the adjoining publicly-owned forests) constitute the largest block of contiguous forest in this ecological landscape.

Southeast Glacial Plains

Agricultural cropland is the most abundant land-cover in this landscape (58%), while forests only cover 11% of the land area. The only areas of large upland forest are found in the Kettle Interlobate Moraine, where topography limits intensive agriculture and soils are not as productive. Wetlands are extensive (12% of the landscape) and include marshes as well as floodplain wetlands. Only 4% of the landscape is within public ownership, of which 58% is wetland and 42% is upland.

Southern Lake Michigan Coastal

This ecological landscape is the highest degree of urbanization. Remote sensing from the WISCLAND data indicates that it is primarily agriculture (39%), followed by urban (24%), grassland (16%), then upland and lowland forest (12%). Agriculture within this landscape has the highest market value as compared to other regions, and conversion from agriculture to urban development continues as the Milwaukee metropolitan area expands. Most of the aquatic ecosystems within this landscape have been highly altered due to urbanization and industry. Most rivers and streams have altered channel morphology through channelization, dam constructions and anthropogenic disturbances.

3.4.2 Social/Economic (including ethnic and cultural groups)

Northern Highland

Retail trade (16%); accommodation and food services (11%), construction (10%) and real estate, rental, and leasing (5%) sectors led in 2002, reflecting high recreation and rural development. Forestry, residential development, and recreation have the largest impacts on the Ecological Landscape's natural resources. Tribal ownership is significant, as the large reservation of the Lac du Flambeau band of the Ojibwa Nation is here. The population of Iron, Vilas and Oneida counties is 65,660, or 1.2% of the state total, with a per capita income of $26,853.

Forest Transition

Government, manufacturing (non-wood), health care & social services, and retail trade sectors provided the highest number of jobs in 2007. Agriculture (including commercial ginseng farms) is now the dominant land use in many areas that historically supported mesic forest. Timber and paper production, and recreational uses are highly significant in some parts of the Forest Transition landscape. The entirety of this landscape has a population of 639,625 or 11.4% of the state total with a per capita income of $29,814. A large part of the Menominee Indian Reservation is in the Forest Transition ecological landscape.

Southeast Glacial Plains

Manufacturing (13.9%) and government (12.6%) make up the largest areas of employment in this region, with less tourism-related employment than the average in the state (10.6% vs. 11.2% statewide). Overall there are just over 1.5 million people in this ecological landscape, 28.5% of the state total, although the counties in the project area may have less population density than other counties. The per capita income for the landscape is $38,934.

Southern Lake Michigan Coastal

The Southern Lake Michigan Coastal counties have the highest population densities within the state, having a population of 1,278,000, and accounts for almost 20% of statewide employment. Provisional ecosystem services contribute to some economic activities such as agriculture and forestry, but are less important drivers within the larger service based economy. The per capita income for the landscape is $27,837.

3.4.3 Archaeological/Historical

This project will comply with Section 106 of the National Historic Preservation Act. In Wisconsin, there are a range of archaeological and historic sites including prehistoric villages and burial areas, fur trade era sites, sunken vessels, farmsteads, mining camps and quarries, WPA-era structures, rock art sites, ferries and lighthouses. These cultural resources are a valuable part of Wisconsin’s landscape and history, even if some sites may not be immediately visible or apparent. Across the large area that is part of this project, there may be areas of burial sites or mounds, old Civilian Conservation Corps (CCC) camps, or historic buildings.

The project is limited to chemical control of *Glyceria maxima* which should not result in any soil disturbance or excavation that would have adverse effects on archaeological or historic sites/artifacts. Some follow up activities such as cutting or burning will also take place above ground and should result in little to no ground disturbance.

At the moment, specific parcels of land to be treated have not been identified. When specific parcels are delineated for spraying, Mark J Dudzik – Department Archaeologist, will be consulted to determine any potential conflicts with reported sites.

3.4.4 Other Special Resources (e.g., State Natural Areas, prime agricultural lands)

There are many areas of the project counties that have State Wildlife Areas, State Natural Areas, State or County parks, or other places that may be considered special resources. The project will be seeking to work in close partnership with land managers of these areas to ensure work is done in a way suitable to the needs of the resources, whether due to ecological, social, or cultural aspects. These partnerships will be key in promoting long-term control of *Glyceria maxima* in these landscapes and will be especially valuable in maintaining quality natural resource areas near the densely populated Milwaukee metropolis.

4. ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION (probable adverse and beneficial impacts including indirect and secondary impacts)

4.1 Physical (include visual if applicable)

Imazapyr is an anionic, organic acid that is non-volatile, and is both persistent and mobile in soil. This herbicide will attack certain enzymes found only in plants and does not bind to water. It takes about 4-6 weeks for the herbicide to work its way down through the stem and move into (translocate) the roots. Proper timing of application will allow for better control of the plants. Depending on weather conditions (average year temperatures), treatments will begin in mid to late August, and plants can be treated until mid-October, or before the ground freezes. Treating at this time of year will be when the plant is reversing its energy reserves, and when applied during this transition, the plant will move the herbicide into its roots and rhizomes as it goes into dormancy for the winter. This results in most visual impacts of dead plants being noticeable the following year.

After Imazapyr is applied, it is broken down by microbes in the soil and sunlight in water; the half-life of imazapyr is approximately 3 to 5 days in surface water. Field study observations are consistent with imazapyr's intrinsic ability to persist in soils and move via runoff to surface water and leach to groundwater.

Glyphosate functions by interfering with the synthesis of amino acids. When the glyphosate chemical is catalyzed within the cell, it bonds to specific plant enzymes, thus inhibiting the formation of new aromatic amino acids. The target of the glyphosate catalysis is only produced plants and microbes, and is absent within mammal genomes. Glyphosate is a faster acting herbicide than imazapyr, and can begin suppressing plant function immediately, with chlorosis beginning within hours after treatment. Glyphosate has a high adsorption to soils with low mobility, and is degraded by microbes. Past studies of *Glyceria maxima* control have listed various dates for herbicide application. Some reports have mentioned a spring application, while others a late summer/early fall application. For this project, to reduce confounding factors, we will begin application among the various sites at the same time of year for both glyphosate and imazapyr. Application is planned to occur at early August.

After Glyphosate is applied, it has an average half-life of 47 days in soil and a half-live range of 7 to 63 days in natural aquatic ecosystems. Chemical half-life is variable and can be lengthened by colder climates. Glyphosate has moderate persistence within soils, resistant to chemical degradation, low soil leaching, and low runoff tendency.

Early in the following growing season of 2017, sites that were treated will be evaluated to assess what effect the treatment had, compare the effectiveness of imazapyr versus glyphosate treatments, and determine what follow-up treatment will be necessary, and monitor the impacts of treatment on other species. In most cases it is assumed that the site will be left for the existing seed-bank to regenerate. If partner organizations have the capacity to assist with vegetation regeneration by clearing the site of dead vegetation then introducing appropriate native plants or seeds, this may improve site appearance faster and assist in preventing any new invasive infestations.

Degradation and Metabolism of Imazapyr (from EPA Environmental Fate of Imazapyr & Imazapyr Transformation Products)

Study MRID	Study Type	System	Imazapyr half-life
00132359	Hydrolysis (161-1)	pH 5, 7 and 9 at 25°	Stable
00131617	Photolysis in water (161-2)	pH 5 and 9 at 25° (12 hour exposure cycle)	2.5-5.3 days
41023201	Aerobic Soil Metabolism (162-1)	Loamy sand soil	Stable
45119701	Aerobic Soil Metabolism (162-1) (supplemental)	Loamy sand soil	(~5.9 years) >296 days
00131619	Anaerobic Soil Metabolism (162-2)	Loamy sand soil	Stable (>60 day)
40003712	Anaerobic Aquatic Metabolism (162-3)	Total system	>120 days
41002301	Aerobic Aquatic Metabolism (162-4)	Total system	>120 days
45119702	Aerobic Aquatic Metabolism (162-4) – Degradate metabolism	Total system (CL 119060 metabolism) (CL 9140 metabolism)	4.9 days 3.6 days
42192101	Terrestrial field dissipation (164-1)	Bare ground / Silt loam soil Hillsboro, Oregon	143 days
42192102	Terrestrial field dissipation (164-1)	Bare ground / sandy loam soil Janesville, North Carolina	64 days
40003714	Forestry Dissipation (164-3)	Aerial application, residues measured	12-40 days (vegetation) 37-44 days (litter)

Degradation and Metabolism of Glyphosate (From multiple EPA Reregistration Eligibility Documents)

Study MRID	Study Type	System	Glyphosate half-life
00108192	Hydrolysis (161-1)	pH 3, 6 and 9 at (5 & 25 C)	Stable
44125716	Photolysis in water (161-2)	Wavelengths of 290 to 750 nm	Stable
44125717	Aerobic Soil Metabolism (162-1)	Sandy loam soil	7.5 days
44320645	Aerobic Soil Metabolism (162-1)	Sandy loam soil	5.4 days
44125718	Anaerobic Aquatic Metabolism (162-3)	Total system	203 days
44125719	Terrestrial field dissipation (164-1)	Upper 6” of Bare ground / sandy loam soil	48 days
44422201	Terrestrial field dissipation (164-1)	Upper 6” of Bare ground / sandy loam soil North Carolina	31 days
41723601	Aerobic Aquatic Metabolism (162-4)	Silty clay loam	7 days
41552801	Forestry Dissipation (164-3)	Aerial application,	<1 day to <14 days
40881601	Aquatic Field Dissipation	Irrigated water	7.5 to 120 days

4.2 Biological (including impacts to threatened/endangered resources)

Because imazapyr and glyphosate are a non-selective herbicide and may therefore harm non-target plants exposed via drift, all applicators will be required to follow use restrictions to help minimize spray drift. Where established *Glyceria* maxima populations are growing, few other native plants are able to coexist with it. *G. maxima* is also noted to have the ability to displace other invasive species including non-native cattail (*T. angustifolia & T. Glauca*), non-native Phragmites (*Phragmites australis* var. *australis*), and reed canary grass (*Phalaris arundinacea*). Application will be localized by using ground based applications. Spot treatments will occur within areas where the adjacent native vegetation is still well represented. By controlling smaller pioneer populations along the edge of the invasion front, the impact on native plants will be considerably less as they will not be impacted by *G. maxima* expanding into their habitats. Additionally, there will be collectively less herbicide applied to the landscape when invasive species are controlled while they remain localized to smaller populations.

For imazapyr, there are few negative impacts anticipated for invertebrates, fish, herptiles, birds, and mammals. The EPA's RED paper for Imazapyr lists that "The [EPA] has determined that there are no risks of concern to terrestrial birds, mammals and bees, or to aquatic invertebrates and fish. For terrestrial organisms, available acute and chronic toxicity data indicate that imazapyr acid and salt are practically non-toxic to birds, mammals and honeybees." The EPA does not anticipate negative impacts to rare, threatened, or endangered plant species when utilizing imazapyr.

For glyphosate, this chemical is described by the EPA's RED Facts paper as "no more than slightly toxic to birds and is practically non-toxic to fish, aquatic invertebrates and honeybees". However, glyphosate formulations are also mixed with an inert ingredient; though not used in the catalysis reactions of glyphosate, this inert ingredient is toxic to fish. To avoid potential fish mortality, the formulation of glyphosate to be used must be compatible with aquatic applications. The EPA does not anticipate negative impacts to rare, threatened, or endangered plant species when utilizing glyphosate.

Controlling *Glyceria maxima* will also have the additional benefit of removing competition for native species by opening niche space. *Glyceria maxima* forms thick interlaced grass mats that are not used by native vertebrates for nesting or food.

A range of endangered or threatened species inhabit the counties covered by this project. These counties include Milwaukee, Waukesha, Racine, Kenosha, Jefferson, Dane, Dodge, Calumet, Wood, Oneida, and Door. An ESA Section 7 form has been completed with guidance from DNR staff for submission. It finds that there will be "*no effect*" to critical habitats identified by the FWS in the project area and that the proposed project "*May Affect, but is Not Likely to Adversely Affect*" Canada lynx, Gray wolf, Whooping crane, Karner blue butterfly, Poweshiek skipperling, Eastern prairie fringed orchid, Higgins eye pearly mussel, Sheepnose, Mead's milkweed, Prairie bush-clover, Northern long-eared bat, Hine's emerald dragonfly, Pitcher's thistle, Dwarf lake iris, Rufa red knot, Eastern massasauga.

4.3 Cultural

4.3.1 Land Use (including indirect and secondary impacts)

There will be a return of native plant and animal wetland communities along with associated species after *Glyceria maxima* populations are reduced. Preventing expansion of this plant into sensitive wetlands and waterways will safeguard access for users engaged in a range of activities including boating and fishing.

Indirect effects are more difficult to assess because of the many complex effects (positive and negative) that may occur due to pesticide application. For example, herbicide applications that result in substantial decreases in aquatic primary production or plant cover could have indirect effects on listed species habitat or food availability. Conversely, if mostly exotic invasive species are eliminated by the herbicide application, native plants may be able to colonize the area and thrive, improving or extending habitat and food for non-target species including certain listed species of concern.

Several factors will determine the extent to which harmful indirect effects might be an issue for aquatic and aquatic-dependent listed species for each of the various pesticide use patterns. These factors include:

- Properties of the active ingredient (AI) of the herbicide that are non-persistent, have non-toxic degradation products, and are hydrophilic (mix easy with water) are less likely to cause indirect effects on non-target species.

- Species habitat and life history characteristics: those species that are less mobile, spend most or all of their time in a small area or single habitat type, or have longer generation times could be relatively more at risk due to indirect effects. In addition, those listed species that have a very limited population size and/or very limited spatial distribution, could be potentially at greater risk due to herbicide application in, on or near the water because the population is likely to have less resilience to disturbances caused by indirect effects of herbicides (e.g. loss of habitat, cover or prey).
- Ecosystem characteristics: listed species inhabiting aquatic ecosystems that are more spatially isolated (e.g. springs), structurally simpler (e.g. fewer species or functional redundancies naturally), or otherwise less resilient to disturbances in general, might be more susceptible to indirect effects if they are exposed to herbicides used in, on or near the water.

Certain types of listed species may be more or less susceptible to the above factors depending on the pesticide use pattern and the active ingredient in the herbicide. No one pesticide use pattern appears to have less potential effects overall on non-target species. Rather, the type of active ingredient in the herbicide used (i.e. its mode of action), or the combination of active ingredient in the herbicide, additional compounds within the herbicide formulation which are not part of the active ingredient, and use pattern, may be more important in determining the degree of potential direct and indirect effects on aquatic and aquatic-dependent listed species.

4.3.2 Social/Economic (including ethnic and cultural groups, and zoning if applicable)

Glyceria maxima is a relatively new invasive species within the Wisconsin landscape, and has not yet reached populations large enough to cause widespread social or economic impacts. However, in other areas where this species has been found it has been known to impact recreational fishing, swimming, and boating along watercourses. For the regional economy, *G. maxima* pose the greatest threat to the State's dairy industry. As seen in southern Queensland Australia, Tazmania, and New Zealand, G. maxima can poison cattle when grazed under certain conditions, and may lead to cattle drowning as they attempt to ford densely infested streams. In the Melbourne metropolitan area, G. maxima has been known to lower water quality, and render it putrid and unusable, as cattle refuse to drink from infested waters. Heavily infested streams have greatly reduced water flows, which can lead to flooding and property damage.

4.3.2.1 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, requires that the effects on minority and low-income populations within a project area be given special consideration to determine if the proposed action would result in disproportionate adverse effects to their communities. Minority populations include all persons identified by the U.S. Census of Population and Housing to be of Hispanic origin, regardless of race, and all persons not of Hispanic origin other than White (i.e., Black, American Indian, Eskimo or Aleut, Asian or Pacific Islander, or other race).

Using the EPA's Environmental Justice screening and mapping tool, EJSCREEN, and comparing the various demographic indicators and census reports, it appears there is a trend in demographic indicators throughout the proposed treatment area. Starting within the Milwaukee metropolitan area, there is a higher percentage of minority populations, low income, linguistically isolated, and undereducated citizens. Moving westward towards Madison, these demographic indicators change in the opposite direction. When examining the distribution of known *G. maxima* sites, the largest stands of this invasive species are found in the more affluent areas with fewer minority populations. Proposed treatment will be distributed among these two demographic areas. The proposed herbicides and their application methods are not likely to pose an adverse environmental impact to these communities.

As described in the Proposed Physical Changes section of this document under "Emissions and Discharges", health risks and long-term effects on visitors or users of the treatment areas would not be significant. Both imazapyr and glyphosate do not bio-accumulate, there would be no significant impacts to low-income or minority fishermen in places where treatment areas were adjacent to waters. Therefore, no disproportionate impacts to minority or low-income populations would result from implementing the control actions as planned by this project.

4.3.2.2 Economics

In the United States, expenses associated with ecological damage and control of invasive species is estimated at $137 billion per year and increasing. In Wisconsin, some industries affected negatively by invasive species include sport and commercial fishing, forestry, hunting, and raw water users (power companies and utilities).

These expenses are passed on to Wisconsin's consumers (for example, in the form of higher water and electric bills).

Well established populations of Glyceria maxima are known to displace numerous wetland species and can outcompete both invasive cattails (*Typha angustifolia* and *T. x glauca*) and reed canary grass (*Phalaris arundinacea*). Its growth pattern is to develop as tall stems, then to collapse horizontally which then smothers any adjacent vegetation. This adaptation removes any remaining cover for wildlife, especially for any nesting waterfowl. Such impacts would be detrimental for both birdwatching and waterfowl hunters.

G. maxima also poses a threat to Wisconsin's dairy industry, which sis the largest segment of the State's agricultural economy valued at $43.4 billion. This invasive species can impact cattle by 1) fouling waters, making drinking water unpalatable for cattle, 2) directly toxic to cattle which consume and then poisoned by cyanide, and 3) potentially drowned as they are entangled by dense stands which grow in deeper waters.

4.3.2.3 Ecology

Humans have created conditions where plants and animals can aggressively invade and dominate natural areas and waterways in three ways:

1. Introducing exotic species (from other regions or countries) who lack natural competitors and predators to keep them in check.
2. Disrupting the delicate balance of native ecosystems by changing environmental conditions (e.g. stream sedimentation, ditching, building roads) or by restricting or eliminating natural processes (e.g. fire). In such instances, even some native plants and animals can become invasive.
3. Spreading invasive species through various methods (e.g. moving watercraft from waterbody to waterbody without removing invasive plants and animals, roadside mowing, and moving firewood).

The net result is a loss of diversity of our native plants and animals; as invasive species rapidly multiply and take over. About 42% of the species on the Federal Threatened or Endangered species lists are at risk primarily because of invasive species.

Glyceria maxima is known to be an obligate wetland invasive species, and is found in very wet habitats. The majority of populations are found within counties between Dane and Milwaukee. This area is predominantly agricultural and urban, and has few natural resources areas. However, it does have important aquatic Conservation Opportunities Areas (Map 2). When compared to other areas of Wisconsin, the southeast has fewer COAs, leading to a greater need to preserve these areas for the more populous counties of the state, who's citizens do not have regular access to these amenities.

4.3.2.4 Recreation

Currently, there have been no reports within Wisconsin which indicate the *Glyceria maxima* is causing a negative impact to recreational activities. However, there are instances of this species covering over 15 acres as a single monoculture. In Australia, streams and rivers infested with this species can become impassible by small watercraft. If such densities were to occur in Wisconsin, it would be detrimental to boating and fishing enthusiasts. Additionally, after discussions with a landowner who has large *G. maxima* property on his property for several years, he has noted an absence of native birds and other wildlife. If this species were to colonize large areas of state natural areas or similar lands, it would likely result in negative impacts to eco-tourism, which is an important source of revenue for Wisconsin.

4.3.3 Archaeological/Historical

There is limited potential for project-associated activities which might cause adverse effects to recorded archaeological or historic sites which might be co-incident with the invasive plant treatment areas. Little to no disturbance to the soil is expected, however the use of motorized vehicles in some areas may lead to very minor soil or vegetation disturbance. It is likely the majority of sites will be treated by hand spraying – either using a backpack sprayer or attachment to vehicle on the roadside, therefore, it seems prudent to limit the cultural resource review to those limited areas which require vehicle access for spray application when they are identified (should there be any).

At the time such specific parcels are delineated, a USGS map of same along with T/R/S info will be provided to Mark J Dudzik, Department Archaeologist, to be able to quickly determine if there are potential conflicts with reported sites.

4.4 Other Special Resources (e.g., State Natural Areas, prime agricultural lands)

Due to the scope of this project, there is the potential for treatment of *Glyceria maxima* in State Natural Areas or

other important habitats. However, the habitat quality of the State Natural Areas, Wildlife Areas, Parks and important wetland communities should benefit by removal of *Glyceria maxima* since it will benefit wetland associated species that would otherwise be crowded out and eliminated by *Glyceria maxima.*

Private Lands, below OHWM (Ordinary High Water Mark)
Under Wisconsin's Constitution, lakes and rivers belong to everybody and the DNR manages them for the benefit of all citizens. The state Supreme Court has rules that the state owns title to lakebeds (not streambeds or flowed lands), and that the ordinary high water mark, (OHWM) establishes the boundary between public lakebed and private land.

Local Access: Regardless of the location of invasive species populations with respect to parcel boundaries, the general public must follow the law to legally gain access to public waters. Adjacent property owners have exclusive use of dry or exposed lakebed below the OHWM. Such areas may be posted, but not fenced. If private land surrounds a land-locked lake, the general public must obtain the landowner's permission to enter. The general public must gain access to a public stream or river or connected lake via a public access such as a public boat landing or a public highway that crosses the river or stream. Someone hunting or fishing on a lake or stream must keep their feet wet unless portaging a physical obstruction by the shortest possible route.

4.5 Summary of Adverse Impacts That Cannot Be Avoided

Adverse impacts that cannot be avoided are the killing of associated non-target wetland plants. The herbicide being used is non-selective and will impact all vegetation it comes in contact with. Personnel using a backpack sprayer can be very selective when spraying targeted invasive species, which can mitigate some of these adverse impacts. Trained applicators paying careful attention to weather conditions and ensuring equipment is functioning correctly will limit chemical drift and impacts to non-target vegetation.

Potential effects of the AI (active ingredient) on biota are evident, not all AI's in a given pesticide will have equivalent potential effects on a particular class of species or on one of the listed species of concern. In general, herbicides are much more toxic to aquatic plants and algae than aquatic or aquatic-dependent animals, while insecticides, molluscicides, and piscicides are more toxic to aquatic animals than plants as expected. Biological pesticides such as *Bacillus spp.* or the gypsy moth pheromone, disparlure, appear to have no effect on biota and aquatic or aquatic-dependent listed species in particular. For most of the AIs examined, direct effects on aquatic and aquatic-dependent birds and mammals are not expected.

Certain types of listed species may be more or less susceptible to the above factors depending on the pesticide use pattern and the active ingredient in the herbicide used. The type of AI (i.e. its mode of action) and the combination of AI and use pattern are more important in determining the degree of potential direct and indirect effects on aquatic and aquatic-dependent listed species.

5. DNR EVALUATION OF PROJECT SIGNIFICANCE

5.1 Environmental Effects and Their Significance

Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are long-term or short-term.

The physical effects of the proposed herbicide treatments include dead patches of *Glyceria maxima* stands. In areas where *G.maxima* has co-mingled with other wetland vegetation, we expect there to be collateral damage and death to non-target vegetation. Following successful control, adjacent native vegetation will be able to fill the open niche space and recolonize the controlled areas.

The effects of treatment on habitat quality, species diversity and recreational access should be long term as we will be working with local partners wherever possible to develop capacity for follow up treatment. The scope of this project being to target pioneer populations will have long term effects on the wider landscape by removing those small populations that if ignored, over time, would spread and dominate far more acres.

Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are effects on geographically scarce resources (e.g. historic or cultural resources, scenic and recreational resources, prime agricultural lands, threatened or endangered resources or ecologically sensitive areas).

The treatment of *Glyceria maxima* populations within or near areas which have been evaluated as high quality wetlands will maintain their species diversity of these ecologically sensitive and in some cases, ecologically rare, habitats.

Some *G. maxima* populations have been found within or proximal to recreational greenspaces near the Milwaukee metropolitan area. Due to the degree of urbanization within the Milwaukee area, preservation of greenspaces, will be important for maintaining refugia for urban wildlife and providing a diverse and aesthetically pleasing experience for visitors.

Discuss the extent to which the primary and secondary environmental effects listed in the environmental consequences section are reversible.

If no future work is done to identify and control infestations, *Glyceria maxima* could re-establish in the long-term and eliminate associated plants and animals, including rare species. Prevention, early detection and rapid removal of new invasive plants or new infestations are the most cost effective ways to control invasives such as *Glyceria maxima*. This project should provide scope to educate local partners, especially Wisconsin's Cooperative Invasive Species Management Areas, about how to monitor and report populations of invasive species, and promote local involvement in control to avoid re-infestation.

Secondary effects of this project that include negative effects on non-target vegetation are expected to be reversible. The best management practices to be followed during treatment will mitigate negative effects to a point where existing vegetation should be able to recover and fill in gaps left in the vegetation layer. There may be areas where it is decided the best option is to assist this re-vegetation by seeding, plantings, etc. which will aid in reversing any negative effects and contribute to the long term goal of maintaining diverse wetland communities.

5.2 Significance of Cumulative Effects

Discuss the significance of reasonably anticipated cumulative effects on the environment (and energy usage, if applicable). Consider cumulative effects from repeated projects of the same type. Would the cumulative effects be more severe or substantially change the quality of the environment? Include other activities planned or proposed in the area that would compound effects on the environment.

For this project, we anticipate repeated herbicide applications between 2 to 3 growing seasons. After the herbicide applications, we will need to apply continued stress to the target species to facilitate control. Imazapyr has a longer half-life in the soil than other herbicides such as glyphosate, which is what makes it more effective in the long-term control of invasive grasses such as *Arundo donax, Panicum repens,*

Phragmites australis, and *Spartina alterniflora*. Repeated application and translocation of imazapyr will help to control regrowth of *Glyceria maxima.* Glyphosate produces more immediate control, with chlorosis appearing within a few days and has relatively rapid dissipation in soils. Repeated applications of imazapyr or glyphosate should not pose a threat to soils, as both are relatively immobile in most soils and have strong adsorption to soil particles.

The areas to be treated will be site specific and mapped. Sites will be treated by certified applicators using backpack or vehicle mounted sprayers with hand attachments. The usage of these spraying tools provides a high level of accuracy in treatment and lowers the likelihood of non-target vegetation being sprayed.

The effects of repeated projects in the same area of the same type would be to increase the chance of non-target vegetation being adversely affected. Efforts to monitor each area treated and adjust follow up treatments as necessary for the scale of remaining plants will be done to prevent excess herbicides being used. For example, after the initial treatment with a backpack sprayer, a second year of treatment may only have a few standing plants, which would be better treated by hand wicking – a more accurate method of treatment that causes less non-target vegetation to be exposed to herbicide.

Wetland and riparian habitats have been and will continue to be affected by numerous activities such as urban development, agriculture, and right of way management. These activities can have impacts with regards to removal of native vegetation, draining of wetlands or alterations to hydrology, sediment and nutrient contribution, and new vectors for invasions of invasive species. New invasive plants might be brought into these wetland areas as a result of these land-use activities, which might require follow up herbicide treatments. The DNR has developed a list of Best Management Practices (BMPS) to prevent the spread of invasive species in wetlands, to accompany those already developed for right of way managers, forestry operations, and recreation. Promoting these BMPS to wetland users and other associated groups may reduce the chance of new infestations.

5.3 Significance of Risk

Explain the significance of any unknowns that create substantial uncertainty in predicting effects on the quality of the environment. What additional studies or analysis would eliminate or reduce these unknowns?

The DNR and other partner organizations have used chemical spraying as a method for controlling invasive plants for several years and have participated in research that studied the impacts of spraying. The DNR is also in regular communication with Alice Thompson of Thompson & Associates Wetland Services, who has conducted control activities of *Glyceria maxima* along the Pike River. After suppressing G. maxima populations, recolonization from the local species pool is expected, either by emergence from the seed bank or colonization by adjacent species. Treatment monitoring and additional adaptive management is needed to suppress any remaining G. maxima and prevent infestations by other invasive species.

Following initial treatment, if there are other wetland invasive plants such as non-native cattails, purple loosestrife, or reed canary grass present nearby, the open space created by the G. maxima treatment may allow for immediate colonization by these species. Prior to herbicide application, sites should be evaluated for potential secondary invasions. If treatment sites may be subject to high infestation rates by other species, additional restoration activities may be needed, including the introduction of native seeds or plants.

Long-term management of private lands beyond the timeline of this project is unknown. Long-term, pro-active management will be needed from land managers and property owners to maintain treated areas and prevent further re-infestation. Attempts to build capacity for upkeep within the initial stages of this project may make this follow up management more achievable.

Explain the environmental significance of reasonably anticipated operating problems such as malfunctions, spills, fires or other hazards (particularly those relating to health or safety). Consider reasonable detection and emergency response, and discuss the potential for these hazards.

Within the scope of this project, reasonably anticipated operating problems include those associated with the transport, mixing and use of chemicals, in this case, herbicides. Spray drift has been identified as an anticipated operating problem. Efforts to reduce spray drift include: ensuring the correct size of droplets, working only under ideal weather conditions, having accurate GPS locations of infestations and ensuring equipment is in good repair.

The proposed action does not create a new threat to listed species nor does it change, in any way, other

existing threats to these species. Rather, the proposed action is intended to reduce impacts on listed species through a variety of mechanisms. Current requirements that are required regarding application of pesticides (which include herbicides such as imazapyr and glyphosate) include:

- The FIFRA label is followed in its entirety for the pesticide in terms of application rates, methods, frequency of application, and by any other requirements noted in the label (e.g. required offsets, allowable habitats).
- Pesticide is applied by trained, certified applicators familiar with the equipment and pesticide properties (e.g. drift potential).
- Use of only the lowest effective amount of pesticide product per application at the optimum frequency of application necessary to control the target pest.
- Performance of regular maintenance activities to minimize the potential for leaks, spills, and unintended/accidental release of pesticides from pesticide containers into waters of the U.S.
- Maintenance of application equipment including regular calibration, cleaning, and repair to ensure correct application as required in the pesticides label.
- Integrated Pest Management (IPM) practices, which include assessment of alternatives to pesticide use; identification of action thresholds; development of species-specific control strategies; source reduction; pre-application surveillance to determine whether pesticide use is necessary; post-application surveillance; and the minimization of environmental impacts.

5.4 Significance of Precedent

Would a decision on this proposal influence future decisions or foreclose options that may additionally affect the quality of the environment? Describe any conflicts the proposal has with plans or policy of local, state or federal agencies. Explain the significance of each.

The project should not influence future decisions or foreclose options on habitat management of wetlands.

5.5 Significance of Controversy over Environmental Effects

Discuss the effects on the quality of the environment, including socio-economic effects, that are (or are likely to be) highly controversial, and summarize the controversy.

Herbicide use can be controversial. Imazapyr is registered for this use and will be applied by certified applicators observing all safety measures required. Imazapyr is also registered for use on a variety of commercial and residential use sites, including forestry sites, rights-of-ways, fencerows, hedgerows, drainage systems, outdoor industrial areas, outdoor buildings and structures, domestic dwellings, paved areas, driveways, patios, parking areas, walkways, various water bodies (including ponds, lakes, streams, swamps, wetlands, stagnant water) and urban areas. Similar statements can be made for the use of glyphosate, depending on formulation. However, there are specific limitations on the formulation of glyphosate that may be used in and near aquatic ecosystems.

The EPA's Registration Eligibility Decision for Imazapyr contains an ecological risk assessment for imazapyr. The Agency has determined there are no risks of concern to terrestrial birds, mammals and bees, or to aquatic invertebrates and fish. For terrestrial organisms, available acute and chronic toxicity data indicate that imazapyr acid and salt are practically non-toxic to birds, mammals and honeybees. Acute risks to both mammals and birds were not calculated because LC50/LD50 (Median Lethal Concentration/Median Lethal Dose) values were greater than highest concentration tested. For glyphosate, this chemical is described by the EPA's RED Facts paper as "no more than slightly toxic to birds and is practically non-toxic to fish, aquatic invertebrates and honeybees". However, glyphosate formulations are also mixed with an inert ingredient; though not used in the catalysis reactions of glyphosate, this inert ingredient is toxic to fish. To avoid potential fish mortality, the formulation of glyphosate to be used must be compatible with aquatic applications.

6. ALTERNATIVES

Briefly describe the impacts of no action and of alternatives that would decrease or eliminate adverse environmental effects. (Refer to any appropriate alternatives from the applicant or anyone else.)

6.1 No Action

Taking no action would result in the continued expansion of *Glyceria maxima* into new wetland habitats and riparian areas. The presence of this species along waterways lends itself to increased likelihood of expansion. This would, in turn, result in further decreases or elimination of native wetland plants, a decrease in wildlife usage, impair fish communities, promote flooding, and less biological diversity in Wisconsin's State Natural Areas and wetland communities.

6.2 Other Control Options

a) Manual Removal

Mechanical removal can be used to control *G. maxima*, however it may be ineffective if there are any remaining rhizomes. Manual removal should be limited to the removal of small plants and populations. When populations are found within waterways, manual removal via excavation equipment, becomes more challenging as this may damage the structure of the waterway.

b) Biological Control

Biological control refers to the use of animals, fungi or diseases to control invasive populations. Control organisms usually come from the native range of the target species. They require a period of study to ensure that they will remain specific to the target population and will not harm native species, crops or other ornamental species. They require both federal and state permits for their use. Biological control typically does not eradicate the invasive species, and usually takes several years to show results.

There is no known biological control for *G. maxima* at this time.

c) Grazing

Animals can also be used as biological control agents. For effective control, grazing may need to be used multiple consecutive years, generally during the early growth to early flowering stages of the plant, and sometimes with multiple treatments per year. This practice is best used as part of an integrated pest management plan including manual, mechanical or chemical controls. Care needs to be taken when using grazers since they can eat desirable plants as well as invasive plants. Livestock welfare considerations also need to be taken into consideration when using grazers.

With regards to *G. maxima*, the use of grazing may dangerous for the health of the animals. Although *G. maxima* is used by cattle as fodder within its native ranges, it has known to become toxic. In southern Australia and New Zealand, *G. maxima* can develop toxic levels of hydrocyanic acid. When consumed at certain times during its life cycle, during spring and autumn, livestock can be poisoned by cyanide. *G. maxima* also poses a threat to grazers moving through densely infested waters, as they may be rendered immobile by the grass and drown.

d) Water Depth Manipulation

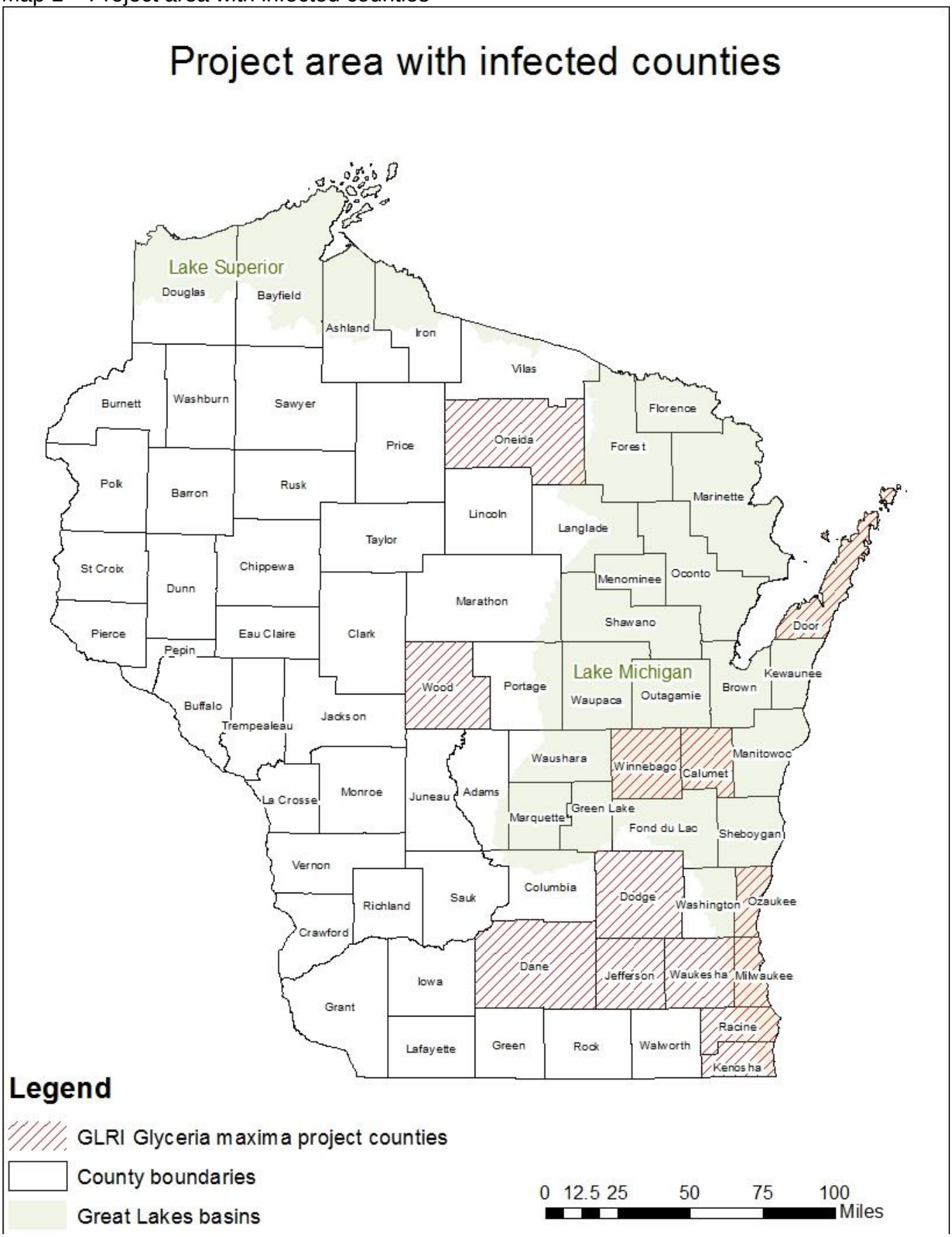
Water depth manipulation may not be an effective form of control for this species. Recent surveys indicate that *G. maxima* can grow in several feet of flowing water. From the available literature from Queensland, Australia, pictures show *G. maxima* completely filling a stream and across riparia. Additionally, if *G. maxima* populations are to be controlled using some combination of herbicides, then water depth manipulation is discouraged as it will reduce herbicide efficacy.

7. Consultation and Coordination

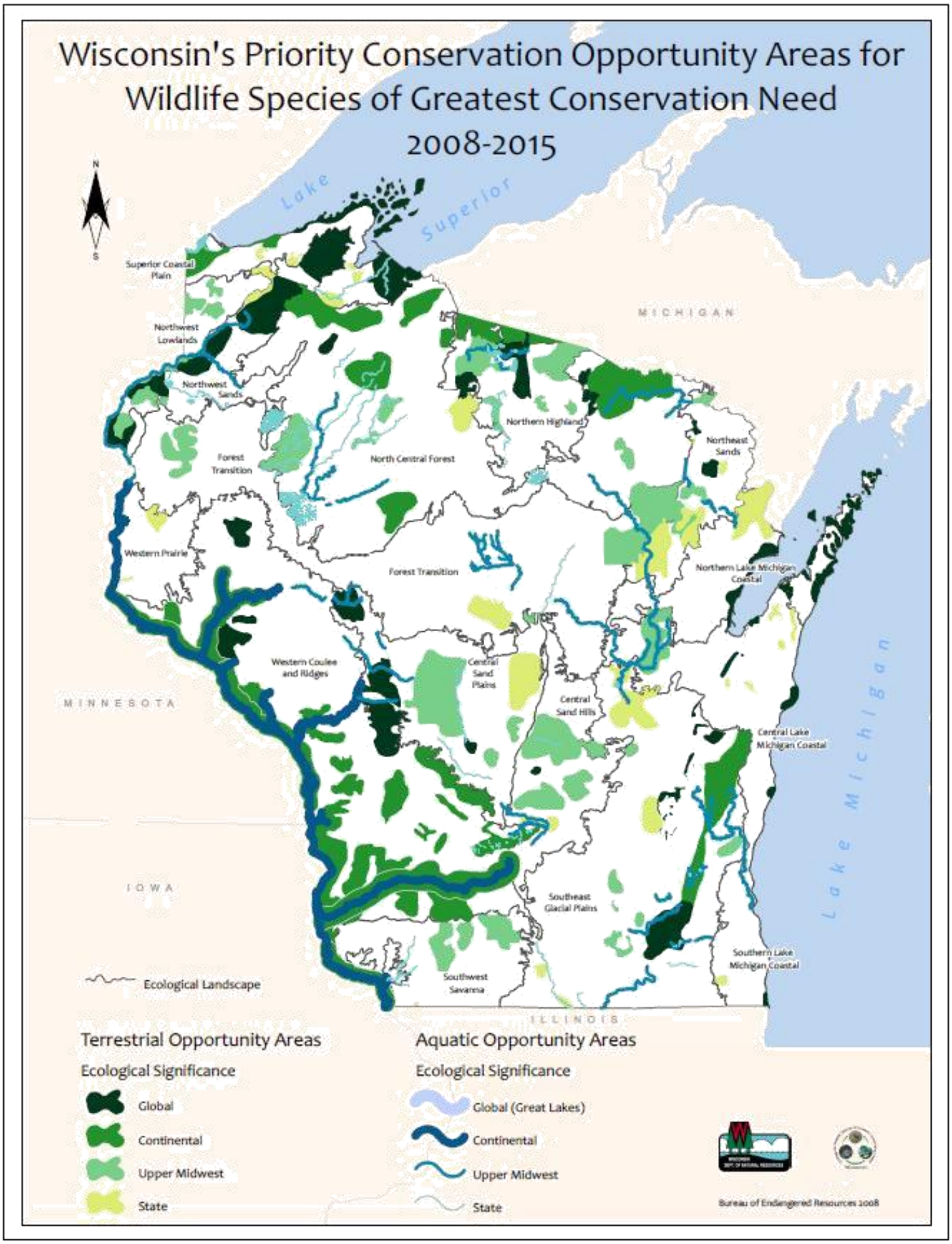
List agencies, citizen groups and individuals contacted regarding the project (include DNR personnel and title) and summarize public contacts, completed or proposed).

Date	Contact	Comment Summary
ongoing	Brock Woods, WI purple loosestrife biocontrol program manager	Has provided information on habitat assessments, distribution of *Glyceria maxima* and experience working with multiple partner organizations on Invasive control projects.
ongoing	Mary Gansberg, Water Resources Management Specialist	Providing information and insight regarding water quality and NR 107 permits.
ongoing	Patricia Trochlell, Water Resources Management Specialist	Providing ongoing information on wetland habitats, rare species, and ecological effects of wetland invasive species. Provided early reconnaissance of *Glyceria maxima*.
ongoing	Tom Bernthal, Water Resources Management Specialist	Providing ongoing information on wetland habitats, monitoring programs, and evaluation of data on populations.
ongoing	Bob Wakeman, Water Resources Management Specialist	Statewide Aquatic Invasive Species Coordinator, wrote the accepted grant DNR received from USFWS; ongoing lead on project coordination.
ongoing	Jason Granberg Water Resources Management Specialist	Providing data support for project through GIS mapping of *Glyceria* reports, assisting in project coordination, communication, and field reconnaissance. Author of Wetland Invasive Species Monitoring Protocol.

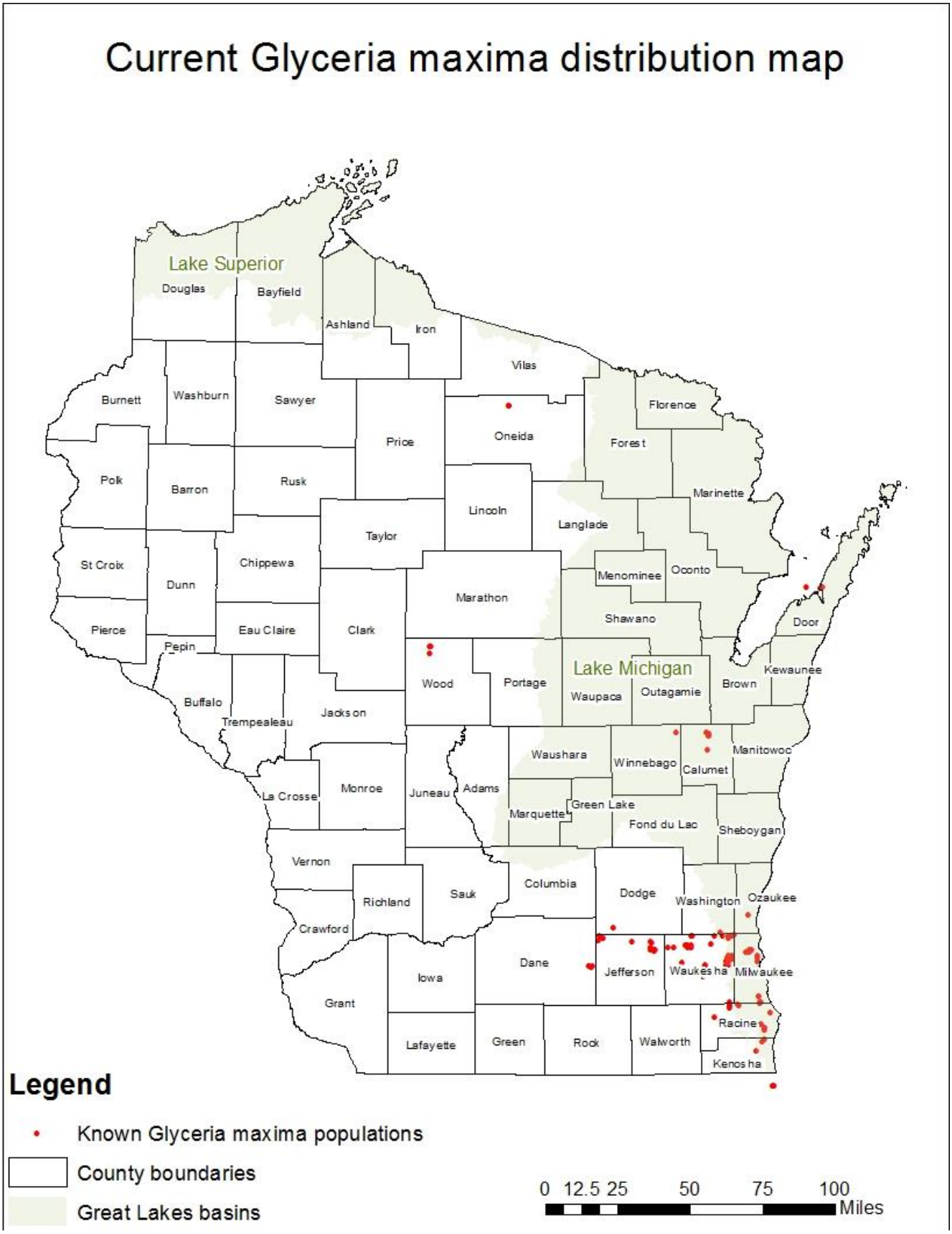
Map 1 – Project area with infected counties



Map 2 – Wisconsin Conservation Opportunity Areas and Ecological Landscapes



Map 3 – Current *Glyceria maxima* Distribution Map (July 1, 2016)



REGION 3 WSFR SECTION 7 EVALUATION DOCUMENTATION
PHASE 1: COMPLETED BY GRANTEE
(See Phase 1 Instructions for Completion)

State: Wisconsin **Grantee:** Wisconsin Department of Natural Resources
Grant Program(s): Great Lakes Restoration Initiative

Grant Title and Number (add amendment no**):** GLRI – ANS Management Plan Implementation F16AP00045

I. Location:
A. List counties where grant activities will occur; listed in decreasing frequency

- Milwaukee, Waukesha, Racine, Kenosha, Jefferson, Dane, Dodge, Calumet, Wood, Oneida, and Door counties

B. Describe the action area (see instructions).

This project plans to treat the invasive grass *Glyceria maxima* throughout Wisconsin. Most populations have been found within the Lake Michigan basin, though additional populations can be found within the Mississippi River basin. Most populations detected to date are small, typically less than 1 acre in size, and confined to the Milwaukee to Madison corridor. Reconnaissance is ongoing, and a complete list of sites is still in development. Prior to control activities, this list will be finalized and permits will be secured. Identified populations are found mostly within palustrine emergent wetlands, along the shores of small ponds, lakes, and riparia, or within roadside ditches with sufficient hydrology to allow for standing water. Herbicide application will only be conducted by trained contractors, who must take efforts to prevent off-target chemical drift.

II. Species/Critical Habitat:
A. Species information
1. Using the FWS web site (http://www.fws.gov/midwest/Endangered/), list species that are/or may be present in the county(ies):

Calumet: Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*)

Dane: Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*), Higgins eye pearly mussel (*Lampsilis higginsii*), Sheepnose (*Plethobasus cyphyus*), Eastern prairie fringed orchid (*Platanthera leucophaea*), Mead's milkweed (*Asclepias meadii*), Prairie bush-clover (*Lespedeza leptostachya*)

Dodge: Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*)

Door: Northern long-eared bat (*Myotis septentrionalis*), Hine's emerald dragonfly (*Somatochlora hineana*), Pitcher's thistle (*Cirsium pitcher*), Dwarf lake iris (*Iris lacustris*)
Jefferson: Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*), Eastern prairie fringed orchid (*Platanthera leucophaea*)

Kenosha: Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*), Eastern prairie fringed orchid (*Platanthera leucophaea*)

Milwaukee: Northern long-eared bat (*Myotis septentrionalis*), Rufa red knot (*Calidris canutus rufa*)

Oneida: Canada lynx (*Lynx canadensis*), Gray wolf (*Canis lupus*), Northern long-eared bat (*Myotis septentrionalis*)

Racine: Northern long-eared bat (*Myotis septentrionalis*), Rufa red knot (*Calidris canutus rufa*)

Waukesha: Northern long-eared bat (*Myotis septentrionalis*), Poweshiek skipperling (*Oarisma poweshiek*), Eastern prairie fringed orchid (*Platanthera leucophaea*)

Wood: Gray wolf (*Canis lupus*), Northern long-eared bat (*Myotis septentrionalis*), Whooping crane (*Grus americanus*), Eastern massasauga (*Sistrurus catenatus*), Karner blue butterfly (*Lycaeides melissa samuelis*)

2. List species, from "1." above, that are not in the action area, and explain why:

B. Using the FWS web site, identify whether federally designated or proposed critical habitat is present within the action area:

*Note: If II.A and II.B above have no species or critical habitat, skip sections III and IV and go to V.

III. Description of Proposed Action: In the space provided or on an attached sheet, describe the action(s) in sufficient detail so that the potential effects of the action can be identified and fully evaluated.

Areas of non-native *Glyceria maxima* which have been identified and verified will be treated with herbicide in the late summer or early autumn of 2016. Since management of this species within the Midwest has not been attempted before, we will use to different herbicide approaches using the available control literature gathered from private restoration firms, and from control literature developed by other state and federal agencies including the Washington State Noxious Weed Control Board and US Forest Service; and from international government agencies such as the West Coast Regional Council of New Zealand, Melbourne Water Agency, and the Department of Primary Industries, Water, and Environment of Tasmania.

We will use two different herbicide approaches during the first year of treatment. First treatment method will be to use 28.7% Isopropylamine salt of imazapyr is standard for aquatic approved herbicides such as Habitat® or Arsenal®. The second treatment method will be to use 50.2% to 53.8% , N-(phosphonomethyl)glycine isopropylamine, which is commonly known as glyphosate. This chemical is found within aquatic approved herbicides such as Aquamaster®, Accord®, Rodeo®, or AquaNeat®.

Herbicides will be applied by certified applicators. Applications will be made by contractors after DNR staff has evaluated each site and assessed the site needs, size, and distribution of *Glyceria maxima*, and the existence or proximity of any important native species. Methods used will include spraying with backpack-sprayers, from ATVs, or machines mounted with boom sprayers. Hand-wicking, swiping, or mopping of herbicide may also be used, particularly in areas with sensitive native vegetation.

After the first year of treatment, monitoring will evaluate the effectiveness of the type of herbicide used and if the hydrology of the site has any impact of control success. Follow up treatment for the remaining sites are planned for late summer of 2017.

Treatments are anticipated to occur within palustrine emergent wetlands, the shorelines of small inland lakes and ponds, along riparia, and within roadside ditches where there is sufficient hydrology. *Glyceria maxima* is considered to have an obligate wetland life history, and should have a limited distribution in the landscape. However, it is possible, but unlikely that it would be found within drier terrestrial environments.

IV. Description of Effects: In the space provided or on an attached sheet, describe the effects, including beneficial, of the project actions on the identified species, species habitats and federal critical habitat (see II above).

Because imazapyr and glyphosate are non-selective herbicides and both may therefore harm non-target plants exposed via drift, all applicators will be required to follow use restrictions to help minimize spray drift. When well established *Glyceria maxima* populations have been discovered, they are able to displace other native and invasive plant species, including common reed (*Phragmites australis* subsp. *australis*) and reed canary grass (*Phalaris arundinacea*). Negative impacts to rare plants such as the eastern prairie fringed orchid, Mead's milkweed, and prairie bush clover should be minimal for two reasons; first, *Glyceria maxima*'s hydrology will limit it to very wet areas which are outside the hydrology tolerance for these species and second, targeted spot treatment methods will be used where any native vegetation is still well represented in the immediate landscape.

Conducting control efforts on *Glyceria maxima* populations while they are still small and localized to a few areas will generate a net positive impact on other native species, including benefits for rare, threatened, and endangered species. Controlling populations with limited distributions will be far less disruptive, and require less total herbicide application, rather than acting later to treat larger and more established infestations in future years.

For mobile species, there should be limited adverse effects as a result of treatment. *Glyceria maxima* populations are found within low lying areas and tend to be hydrologically connected to other natural corridors. If disturbed, species should be able to find cover nearby to evade human activity. The current literature suggests that *Glyceria maxima* stands are not used as cover, nesting, or forage material for native species.

Regarding the possible impacts due to chemical herbicide usage, The EPA's RED paper for imazapyr lists that "The Agency has determined that there are no risks of concern to terrestrial birds, mammals and bees, or to aquatic invertebrates and fish. For terrestrial organisms, available acute and chronic toxicity data indicate that imazapyr acid and salt are practically non-toxic to birds, mammals and honeybees." Assessing the impacts to butterflies by using bees as a surrogate for all terrestrial insects suggests that imazapyr is 'practically non-toxic'. The treatment actions will take place outside the flying season for the Poweshiek skipperling, and *Glyceria maxima* is not a host plant for this species. The Karner blue butterfly is very unlikely to overlap with action areas as its habitat requirements tend to fall into drier upland sites where *Glyceria maxima* is highly unlikely to be found.

For the use of glyphosate, the EPA's RED paper this chemical lists that it is no more than slightly toxic to birds and is practically non-toxic to fish, aquatic invertebrates and honeybees. It also states that due to the presence of a toxic inert ingredient, some glyphosate end-use products must be labeled, "toxic to fish" if they may be applied directly to aquatic environments. Additionally, the EPA does not expect that most endangered terrestrial or aquatic organisms will

be affected by the registered use of glyphosate. However, plants may be at risk for potential off-target application or drift. We expect the same level of impact for the species listed above due to the aforementioned habitat reasons.

V. Recommended Determination(s) of Effect(s): For all species and critical habitat identified in the action area, mark (X) the appropriate determinations.

A. Listed, Proposed and Candidate Species

___ *a) "No Effect"*
List species for which this recommendation is applicable (or attach list): _____
_____

_**X**_ b) "*May Affect, but is Not Likely to Adversely Affect*"
List species for which this recommendation is applicable (or attach list):
Canada lynx, Gray wolf, Whooping crane, Karner blue butterfly, Poweshiek skipperling, Eastern prairie fringed orchid, Higgins eye pearly mussel, Sheepnose, Mead's milkweed, Prairie bush-clover, Northern long-eared bat, Hine's emerald dragonfly, Pitcher's thistle, Dwarf lake iris, Rufa red knot, Eastern massasauga.

___c) *"May Affect, and is Likely to Adversely Affect"*
List species for which this recommendation is applicable (or attach list):
_____

B. Federal Designated and Proposed Critical Habitat

_**X**_ *a) "No Effect*" to Critical Habitat
List critical habitat(s) for which the recommendation is applicable. _____
_____

___ b) "*May Affect, but is not likely to Adversely Affect*"
List critical habitat(s) for which the recommendation is applied. _____
_____

___c) "*May Affect, and is Likely to Adversely Affect*"
List critical habitat(s) for which the recommendation is applied. _____
_____

Grantee Signatures:

Prepared by:
Name/Title: Jason E. Granberg, Water Resources Management Specialist

Signature: *Jason E. Granberg* _____ Date: 6/14/2016
Telephone No. (608) 267 – 9868 email: Jason.Granberg@Wisconsin.Gov

Reviewed by:

Name/Title: __Rori Paloski/Conservation Biologist_____

Signature: Rori A. Paloski _____ Date: __6/17/2016___
Telephone No. _608-264-6040____ email: __rori.paloski@wi.gov_____