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*Customer Driven, Community Minded, Environmentally Responsible*

September 30, 2019

FERC Project No. 1510

Ms. Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street NE  
Washington, DC 20425

Re: Kaukauna City Plant Hydroelectric Project  
Article 405 Invasive Species Control Plan

Dear Secretary Bose:

Per Article 405 of the Order Issuing New License for the Kaukauna City Plant Hydroelectric Project (FERC Project No. 1510) dated March 29, 2019, Kaukauna Utilities (KU) is providing this proposed Invasive Species Control Plan for Commission approval.

KU consulted with the Wisconsin Department of Natural Resources (WDNR) during the development of the plan. The WDNR responded on August 18, 2019 with comments. Their comments have either been incorporated or addressed in the proposed plan. Documentation of Consultation is explained in Section 11 of the proposed plan.

Thank you for your time and consideration in this matter. Should you have any questions relative to this information, please do not hesitate to contact me at (920) 766-5721 or Shawn Puzen at (920) 593-6865.

Sincerely,

A handwritten signature in blue ink, appearing to read "Mike Pedersen".

Mike Pedersen  
Director of Operations  
Kaukauna Utilities

Enclosure: Proposed Invasive Species Control Plan

cc: Ms. Cheryl Laatsch - WDNR

# **Invasive Species Control Plan**

## **Kaukauna (City Plant) Hydroelectric Project**

**FERC Project No. 1510**

**Lower Fox River  
Outagamie County, Wisconsin**



**Kaukauna, Wisconsin**



September 2019

## Table of Contents

	<b>Page</b>
<b>1. Introduction .....</b>	<b>1</b>
<b>2. Kaukauna City Plant Hydroelectric Project Boundary .....</b>	<b>2</b>
<b>3. General Project Area Description.....</b>	<b>3</b>
<b>4. Invasive Species Listed in Article 405 .....</b>	<b>4</b>
4.1 Japanese knotweed.....	4
4.2 Garlic mustard .....	4
4.3 Buckthorn.....	4
4.4 Eurasian watermilfoil .....	4
4.5 Purple loosestrife .....	4
4.6 Common reed .....	4
4.7 Japanese honeysuckle .....	4
4.8 Narrow-leaf cattail.....	4
<b>5. Monitoring.....</b>	<b>5</b>
5.1 Project areas subject to monitoring .....	5
5.2 Monitoring schedule and methods.....	5
5.3 Species to be monitored.....	6
5.3.1 Japanese knotweed .....	6
5.3.2 Common reed.....	6
5.3.3 Dreissenid mussels .....	6
5.3.4 Additional invasive species .....	6
5.3.5 Future invasive species.....	7
<b>6. Measures to Increase Public Awareness .....</b>	<b>8</b>
<b>7. Best Management Practices .....</b>	<b>9</b>
<b>8. Reporting .....</b>	<b>10</b>
<b>9. Control Measures.....</b>	<b>11</b>
<b>10. Technical Assistance .....</b>	<b>12</b>
<b>11. Documentation of Consultation .....</b>	<b>13</b>

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Table of Contents**

---

**Appendices**

- A 2016 Monitoring Report
- B WDNR Rapid Response Species Identification Sheet
- C Project Boundary
- D WDNR Reporting Forms
- E Documentation of Consultation

**Tables**

- 5-1 Additional Invasive Species.....Page 7

## 1. Introduction

In 2014 and 2015, Kaukauna Utilities (KU) completed a Terrestrial and Aquatic Investigation of the Vicinity of the Kaukauna City Plant Hydroelectric Project (KCP) for non-native species during the Federal Energy Regulatory Commission (FERC or Commission) licensing process (FERC Project No. 1510). The Monitoring Report, dated February 2016 is included in Appendix A.

On March 29, 2019, the FERC issued the KCP license, which included requirements for developing an Invasive Species Control Plan part of Article 405. KU is required to file plans for FERC approval in consultation with the Wisconsin Department of Natural Resources (WDNR). This plan covers Section 401 Water Quality Certification condition 6 imposed by the WDNR, which requires KU to consult on the development of an “invasive species monitoring plan.”

The specific language of Article 405 is as follows:

*Article 405. Invasive Species Control Plan.* Within six months of the effective date of the license, the licensee must file with the Commission, for approval, an invasive species control plan. Invasive species of interest include but are not necessarily limited to: glossy and common buckthorn, garlic mustard, Japanese honeysuckle, narrow leaf cattail, purple loosestrife, Eurasian milfoil, phragmites, and Japanese knotweed. The plan must include, but not necessarily be limited to, the following:

- (1) identifying target species;
- (2) defining the treatment area(s) in the vicinity of the project;
- (3) describing the techniques to be used to control invasive species, including the frequency of treatments;
- (4) monitoring treatment areas for invasive species on an annual basis for three consecutive years following invasive species control treatment, to evaluate the success of invasive species control efforts; and
- (5) filing a report with the Commission following the monitoring period, including an analysis of whether additional invasive species control is necessary.

The licensee must prepare the plan in consultation with Wisconsin Department of Natural Resources (Wisconsin DNR). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to Wisconsin DNR, and specific descriptions of how Wisconsin DNR is accommodated by the plan. The licensee must allow a minimum of 30 days for Wisconsin DNR to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee’s reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

## **2. Kaukauna City Plant Hydroelectric Project Boundary**

The KCP is positioned on the Lower Fox River in Outagamie County, Wisconsin at river mile 23 between the upstream Badger Plant and the downstream Rapide Croche Plant that are part of the Badger-Rapide Croche Hydroelectric Project (FERC Project no. 2677). The Badger Plant is located at river mile 24 and the Rapide Croche Plant is located at river mile 19.

The areas contained within the KCP Hydroelectric Project boundary are depicted in Appendix C.

### **3. General Project Area Description**

The KCP area has a humid, continental-type climate characterized by cold, snowy winters and relatively short, warm summers. The area lies within the glaciated Eastern Lakes section of the Central Lowlands physiographic province, which is typically blanketed with glacial topography consisting of lakes or swamps within closed basins and eskers, drumlins and gently rolling ground moraine within watersheds.

The Fox River flows in a moderately deep valley of limited floodplain area. Normal flows have low to moderate velocity over bedrock, cobble and silt substrate. Instream cover consists of varying amounts of root wads, boulders, logs and woody debris, the depth of which is influenced by predominant velocities, positioned within the river and riffle-pool sequence.

The floodplain near KCP is highly developed with industrial and commercial development and vegetation is generally limited to mown areas of turf grasses. The conservancy zone located immediately downstream of the KCP is dominated by tree species such as elm, cottonwood, ash and silver maple.

## 4. Invasive Species Listed in Article 405

Species listed in Article 405 of the KCP license are Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*), buckthorn (*Rhamnus cathartica* and *Rhamnus frangula*), Eurasian water milfoil (*Myriophyllum spicatum*), purple loosestrife (*Lythrum salicaria*), phragmites (*Phragmites australis* or common reed), Japanese honeysuckle (*Lonicera japonica*) and narrow-leaf cattail (*Typha angustifolia*). The species listed in Article 405 are included below for reference purposes.

### 4.1 Japanese knotweed

Japanese knotweed will be monitored as further explained in Section 5.

### 4.2 Garlic mustard

Since garlic mustard is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.3 Buckthorn

Since buckthorn is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.4 Eurasian watermilfoil

Since Eurasian watermilfoil is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.5 Purple loosestrife

Since purple loosestrife is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.6 Common reed

Since common reed is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.7 Japanese honeysuckle

Since Japanese honeysuckle is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

### 4.8 Narrow-leaf cattail

Since narrow-leaf cattail is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.



## **5. Monitoring**

Although the requirements for Article 403 emphasize control of existing prevalent invasive species, the WDNR implements an aquatic invasive species state management plan. The WDNR plan goal is to prevent introduction of new invasive species into the state, develop and implement an early detection and rapid response program to address new invasive species, limit dispersal of established invasive species populations through the state, and manage and control invasive species. Following this format, KU proposes rapid response monitoring prior to rapid response control in the manner described in the following subsections.

### **5.1 Project areas subject to monitoring**

Due to the small size of the reservoir and the presence of the long spillway, survey by boat on the reservoir is not believed to be feasible or safe. As a result, KU has agreed to conduct monitoring immediately downstream of the reservoir in the Thousand Island of the areas shown in red on the FERC-approved Exhibit G included in Appendix C. The area will be subject to monitoring for the species described in Section 5.3.

### **5.2 Monitoring schedule and methods**

Monitoring for invasive species within the Hydroelectric Project boundary will be completed every even year beginning in 2020 to correspond with the monitoring schedule for the Badger-Rapide Croche Hydroelectric Project because of its location within the area of the Fox River encompassing the KCP. It will be completed according to the following conditions:

- All monitoring will occur during the late summer months (late July through early August)
- All monitoring will be conducted by personnel familiar with the visual characteristics of the invasive species identified in Section 5.3 below
- All monitoring will be conducted through a combination of on-foot or via carry-in boat.
- Monitoring will occur on the aquatic/ terrestrial interface of the shoreline to the extent it encompasses the entirety of any contiguous invasive plant communities.
- WDNR data sheets will be populated with information for each new occurrence of an invasive species identified in Section 5.3 below
- Data concerning the locations of new occurrences of invasive species identified in Section 5.3 below will be collected using a handheld GPS
- Monitoring will not be limited to three consecutive years following control treatment to evaluate the success beyond the requirement outlined in Article 403 and will continue for the term of the license.

Monitoring of all current and future invasive species identified in Section 5.3 below shall only occur until a point at which the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary will no longer be instrumental to stop the spread of the invasive species identified in Section 5.3 below.

The WDNR currently has a form available to report the occurrence of newly discovered invasive species. These forms are included in Appendix D. If the WDNR modifies the reporting forms at any time in the future, they shall note where or how KU can obtain the updated forms in the comments section of the monitoring report. KU will utilize the revised forms for future monitoring activities. In the event a new occurrence has been observed, the WDNR will be notified as soon as possible by no later than within 5 days of its discovery.

### **5.3 Species to be monitored**

Monitoring of all current and future invasive species shall only occur until a point at which the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary can no longer be instrumental to stop the spread of the invasive species.

#### **5.3.1 Japanese knotweed**

Japanese knotweed has the potential to grow in wet to mesic, open habitats. It can also grow in exposed joints or cracks in masonry, pavement or concrete and potentially cause structural damage if not controlled promptly. Consequently, exposed masonry elements of the Hydroelectric Project, such as power canal walls and powerhouse foundations, and other areas described in Section 5.1 will be visually inspected during each monitoring period.

#### **5.3.2 Common reed**

At this time, Common reed will not be monitored. In the event KU is notified by the WDNR it can demonstrate limited local control of areas contained within the Hydroelectric Project boundary and limited control can be instrumental to stop the spread of the invasive species, KU will cooperate with the WDNR on such measures.

#### **5.3.3 Dreissenid mussels**

Dreissenid mussels are fully aquatic animals that can grow and disperse continuously during favorable water temperature regimes throughout the area. These mussels grow on hard objects or surfaces, which allows for numerous monitoring locations, including trash racks that screen the intakes for the Badger Plant and Rapide Croche Plant powerhouses. According to the WDNR, zebra mussels are already present in the area and as described in Section 11, KU does not propose to monitor for quagga mussels.

#### **5.3.4 Additional invasive species**

Although not listed above, the presence of the additional species listed below in Table 5-1 will be monitored as part of this plan in the areas described in Section 5.1. Since the plan focuses on rapid response monitoring, monitoring will occur until the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary can no longer be instrumental in stopping the spread of the invasive species. Due to the small size of the reservoir, the significant amount of recreation upstream of the project, the water connectivity provided by the Fox River Lock system, and no formal recreation sites on KCP, rapid response monitoring shall be limited to aquatic and terrestrial plants. Any monitoring of aquatic environments adjacent to the upland areas will be conducted from the shoreline. The WDNR provides an identification sheet that will be helpful to KU in identifying rapid response species (See Appendix B)

**Table 5-1. Additional Invasive Species**

<b>Common Name</b>	<b>Scientific Name (<i>Genus species</i>)</b>
Aquatic forget-me-not	<i>Myosotis scorpioides</i>
Asian marshweed	<i>Limnophila sessiliflora</i>
Brazilian waterweed	<i>Egeria densa</i>
Brittle naiad	<i>Najas minor</i>
Didymo	<i>Didymoshenia geminata</i>
Duck lettuce	<i>Ottelia alismoides</i>
European frog-bit	<i>Hydrocharis morsus-ranae</i>
Fanwort	<i>Cabomba caroliniana</i>
Floating marsh pennywort	<i>Hydrocotyle ranunculoides</i>
Flowering rush	<i>Butomus umbellatus</i>
Giant Salvinia	<i>Salvinia molesta</i>
Hydrilla	<i>Hydrilla verticillata</i>
Indian swampweed	<i>Hygrophila polysperma</i>
Japanese hop	<i>Humulus japonicus</i>
Java water dropwort	<i>Oenanthe javanica</i>
Killer algae	<i>Caulerpa taxifolia</i>
Parrot feather	<i>Myriophyllum aquaticum</i>
Spiny naiad	<i>Najas marina</i>
Starry stonewort	<i>Nitellopsis obtusa</i>
Water chestnut	<i>Trapa natans</i>
Water hyacinth	<i>Eichhornia crassipes and Eichhornia azurea</i>
Water lettuce	<i>Pistia stratiotes</i>
Water spinach	<i>Ipomoea aquatica</i>
Yellow floating heart	<i>Nymphoides peltata</i>
Yellow iris	<i>Iris pseudacorus</i>

### 5.3.5 Future invasive species

Invasive species can be introduced to an area or region at any time; therefore, the list of monitored invasive species within the Hydroelectric Project boundary should be continually adjusted and updated accordingly. Invasive species will be added for monitoring only if it is currently not common to the area or region and early, limited control and detection will stop the species from spreading.

The WDNR can also add invasive species that fit the rapid response criteria for future monitoring at any time outside the above-mentioned schedule by notifying KU and the Commission.

## **6. Measures to Increase Public Awareness**

KU will undertake the following measures to increase public awareness of invasive species within the Hydroelectric Project boundary:

- Post WDNR-provided invasive species signs on KU property as requested by the WDNR.
- Assess the condition of existing WDNR-provided invasive species signs during scheduled monitoring activity. A new sign will be installed if replacement is warranted and the WDNR agrees to provide a replacement sign.
- Make WDNR-provided invasive species information available to the public at the KU customer service office.

## **7. Best Management Practices**

KU will take precautions and implement best management practices to prevent the spread of invasive species during transportation of equipment used for the operation and maintenance of its hydroelectric projects. Equipment used for project purposes that contacts water on a regular basis will be inspected, disinfected, rinsed, or otherwise cleaned as necessary following the current best management practices before use in another area outside of the reservoir.

## 8. Reporting

### Quick response notification

In the event a new occurrence of a species is identified during monitoring, the WDNR will be notified at [invasive.species@wisconsin.gov](mailto:invasive.species@wisconsin.gov) as soon as possible, but no later than within 5 days of its discovery. The notification will also include pictures and submittal of the online WDNR invasive species form.

### End of year monitoring notification

A notification with the date(s) of the monitoring will be filed with the Commission by December 31<sup>st</sup> of each monitoring year. A copy of the notification will also be provided to the WDNR. The notification will also include any completed WDNR Detection Forms<sup>1</sup> provided earlier in the year (if any) and a summary any control that was implemented as a result of the monitoring.

As part of the notification, KU may also recommend rapid response species to be eliminated from future rapid response monitoring if a species becomes prevalent in the reservoir and limited local control measures will no longer be instrumental to stop the spread of that invasive species. In its request, KU will provide information to support its position. If within 60 days of the notification, the WDNR does not provide information to KU and the Commission refuting the KU position, the species will be eliminated from future rapid response monitoring through formal amendment of the plan<sup>2</sup>.

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<sup>1</sup> If WDNR modifies the Detection Forms at any time in the future, the agency shall notify where or how KU can obtain the updated forms. KU will utilize the revised forms for future monitoring activities.

<sup>2</sup> The statement “through formal amendment of the plan.” was added after consultation with the WDNR was complete based upon the Commission’s August 14, 2019 Order Approving and Modifying Invasive Species Management Plan for P-2744.

## **9. Control Measures**

Control measures under this plan are based upon the WDNR rapid response approach. As such, rapid response assistance from KU shall only continue if limited local control of areas contained within the Hydroelectric Project boundary can be instrumental to stop the spread of the invasive species throughout the area.

The WDNR, with assistance from KU,<sup>3</sup> shall be responsible for initiating control for rapid response invasive species identified during the rapid response surveys.

Controls using established methods for terrestrial species that do not require permits may be initiated by KU independently. The need for any control measures will further be evaluated based on the availability, practicality and cost versus benefits of the suitable control measures. In instances where established control measures will yield immediate benefits, KU may initiate controls at their discretion. KU will utilize suitable methods for all control activities. All suitable control measures implemented by KU shall be in accordance with technical assistance obtained through the procedure outlined in Section 10.

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<sup>3</sup> KU monetary assistance shall not exceed \$2,000 for each monitoring event in 2018 dollars to match the level of effort analyzed in the Commission's Comparison of Alternatives included as Section 4.3 in the Kaukauna Hydro Project Environmental Assessment dated August 2018.

## **10. Technical Assistance**

This plan focuses only on the control of species that are not already prevalent in the area and where early detection and control will have an impact on the prevalence of the invasive species in the area. Some control measures have the potential for negative impacts on aquatic communities and non-invasive species; therefore, KU will seek technical assistance and consultation from control experts from the University of Wisconsin – Extension, WDNR or other agencies, as appropriate, prior to implementing any invasive species control measures.



## **11. Documentation of Consultation**

Appendix E presents a summary of consultation between KU, WDNR and additional agencies during the development of this revised plan.

The WDNR provided comments on September 18, 2019. With the exception of the request to monitor for quagga mussels as an early response species, the WDNR comments have been addressed in the plan.

Regarding quagga mussel monitoring, the WDNR provided a monitoring protocol in its response. The monitoring protocol (Page 129) indicates quagga mussels “prefer silt-and sand-bottomed lakes,” “...quagga mussels tend to do best in cooler waters,” “Quagga mussels prefer water that is deeper where there is less turbulence, but they can survive in near-shore shallow water areas,” and “Quaggas have been found in waters as deep as 130 meters (426 feet) in the Great Lakes, but do best in water depths of 10-30 meters (32-98 feet).” It does not appear quagga species are a rapid response-type species because they do not appear to thrive in the shallow, warm, fast moving, bedrock bottomed, stretch of the Fox River occupied by the Project. Therefore, KU does not propose to complete quagga mussel-specific monitoring by the placement of substrate samplers. However, they will continue to be noted if observed during the routine monitoring protocol outlined in Section 5.

**Appendix A. 2016 Monitoring Report**

*EA Project No. 15139.01*

**FINAL REPORT**

**NON-NATIVE INVASIVE SPECIES SURVEY  
KAUKAUNA CITY PLANT  
HYDROELECTRIC RELICENSING**

**FERC Project No. P-1510**

***Prepared for:***

Kaukauna Utilities  
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***Prepared by:***

EA Engineering, Science, and Technology, Inc., PBC  
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February 2016

**TABLE OF CONTENTS**

**1.0 INTRODUCTION ..... 1**

    1.1 Site Background ..... 1

    1.2 Past Invasive Species Investigations ..... 1

        1.2.1 Rapide Croche – Lawrence University ..... 1

        1.2.2 1000 Islands Conservancy Zone ..... 2

        1.2.3 Badger-Rapide Croche Hydroelectric (2013)..... 2

        1.2.4 Badger-Rapide Croche Hydroelectric (2015)..... 3

        1.2.5 WDNR Round Goby Press Release..... 3

**2.0 KAUKAUNA CITY PLANT INVASIVE SPECIES INVESTIGATION..... 4**

    2.1 Terrestrial Investigation..... 4

    2.2 Aquatic Investigation..... 6

**FIGURE**

**TABLES**

**LIST OF FIGURES**

Figure 1. Habitat Types in the KCP Study Area

**LIST OF TABLES**

Table 1. Wisconsin DNR NR 40 Invasive Plant Species List

Table 2. Wisconsin DNR NR 40 Invasive Fish and Crayfish Species List

## 1.0 INTRODUCTION

Invasive species are generally defined as non-native plants which quickly invade, out-compete, and replace native species that are indigenous, occur naturally within an ecosystem, and which existed prior to significant human impacts and alterations to the landscape of a region or particular habitat. The spread of invasive species disrupts newly reforested areas in addition to established forest ecosystems or other habitat types, and often results in negative impacts on the overall biodiversity of an ecosystem, especially if the invasive species becomes a monoculture or significantly dominates the vegetation within a plant community. In 2009, the Wisconsin Department of Natural Resources (WDNR) created Chapter NR 40 Wisconsin Amendment Code which identifies and classifies invasive species known to occur in Wisconsin (Tables 1 and 2). Invasive species are classified as either “prohibited” or “restricted” and are subject to restrictions on possession, transport, transfer, and introduction based on classification. The rule also details preventative measures for reducing the introduction and spread of invasive species.

EA Engineering, Science, and Technology, Inc., PBC (EA) has been contracted by Kaukauna Utilities (KU) to develop and implement a Natural Resource Study Plan to support the Kaukauna City Plant (KCP) Federal Energy Regulatory Commission (FERC) license application. As part of the Natural Resources Study Plan, a reconnaissance-level survey was conducted to document observed invasive species and evaluate the potential for invasive species reported for nearby locations outside the KCP project boundary.

### 1.1 SITE BACKGROUND

The KCP is located along the Fox River in the City of Kaukauna, Outagamie County, Wisconsin. KCP is located between KU’s Badger-Rapide Croche Project (P-2677); immediately downstream of the Badger facility and approximately four miles upstream of the Rapid Croche facility. The field study area included the Project boundary as well as adjacent areas to the Project (Figure 1). Given that invasive species may readily spread along aquatic and terrestrial corridors, data from outside the specific study area were included as part of the invasive species literature review.

### 1.2 PAST INVASIVE SPECIES INVESTIGATIONS

Invasive species in the vicinity of KCP are generally understood and a fair amount of supporting documentation is available. However, in order to gain a more complete understanding, based upon the Wisconsin Department of Natural Resources (WDNR) NR 40 invasive species list, EA reviewed existing literature and data sources as well as performed field observations to characterize invasive species threats within the KCP Project boundary. The literature review included existing information from surveys on the Fox River near KCP, data and observations from 1000 Islands Environmental Center, and information gathered as part of the Badger-Rapide Croche Project invasive species surveys. These data as well as field observations made in the KCP project boundary are summarized in the following sections.

#### 1.2.1 Rapide Croche – Lawrence University

From 2006 through 2012, Lawrence University conducted invasive species monitoring at six locations in the vicinity of the Rapide Croche Dam. Each summer, students from Lawrence University sampled plankton, benthic invertebrates, and fish at three locations upstream and

three locations downstream of the Rapide Croche Dam. The upstream area included a location near the Kaukauna locks, in the vicinity of the KCP project. During the seven year study, students identified 49 zooplankton taxa, 103 groups of benthic macroinvertebrates, and 47 species of fish including several invasive species. The invasive species identified included zebra mussels, rusty crayfish, *Echinogammarus ischnus*, *Daphnia lumholtzi*, and common carp. While *E. ischnus* is considered an invasive species throughout the Great Lakes but is not presently regulated by WDNR. Invasive species identified at the Kaukauna locks sample location include zebra mussels (2009, 2010, 2011, and 2012), *E. ischnus* (2010, 2011, and 2012), and *D. lumholtzi* (2010 only).

### 1.2.2 1000 Islands Conservancy Zone

Established in 1969, the 1000 Islands Conservancy Zone (the Conservancy) is a 350 acre nature preserve encompassing a group of islands located in Fox River and undeveloped upland areas south of the river. With the exception of one island, the Conservancy is located downstream of KCP. In 2009, the Conservancy created an invasive species management plan in order to address the issue of invasive plant species displacing native species within the Conservancy. The invasive species management plan sets long-term and short-term goals for identifying invasive plants species and where they occur within the Conservancy, removing invasive plants, preventing new infestations from occurring, and restoring native vegetation. Invasive species identified at the Conservancy include common and glossy buckthorn (*Rhamnus cathartica*, *R. frangula*); dames rocket (*Hesperis matronalis*); garlic mustard (*Alliaria petiolata*); bells, amur, morrow's and tartarian honeysuckle (*Lonicera bella*, *L. maackii*, *L. morrowii*, *L. tatarica*); and moneywort (*Lysimachia nummularia*). Known locations of each species are provided as well as recommended mechanical and chemical control methods and native plant species to be used for revegetation. The invasive species management plan also identifies invasive species that are not established within the Conservancy yet but pose a threat. Future invasive species of major concern include bird's foot trefoil (*Lotus corniculatus*); cut leaf and common teasel (*Dispacus sylvestris*, *D. laciniatus*); leafy spruce (*Euphorbia esula*); oriental, Asian, or round-leaved bittersweet (*Celastrus orbiculatus*); perennial pepperweed (*Lepidium latifolium*); and spotted knapweed (*Centaurea maculosa*, *C. biebersteinii*).

### 1.2.3 Badger-Rapide Croche Hydroelectric (2013)

In 2011, FERC issued a new license to KU for the Badger-Rapide Croche Hydroelectric project located immediately upstream (Badger) and approximately four miles downstream of the KCP site. As part of the licensing requirements, KU was required to submit an Invasive Species Monitoring and Control Report for the project area. Mead & Hunt began performing field monitoring of terrestrial and aquatic plants and benthic invertebrates in 2013. Areas monitored include portions of the Fox River, the shoreline of the Fox River, and terrestrial property within the project area. During the 2013 monitoring event, garlic mustard, buckthorn, reed canary grass and purple loosestrife were observed within the project area. No Japanese knotweed or common reed was found. Monitoring for Dreissenid mussels was performed only at the Rapide Croche plant via trash rack cleaning. While zebra mussels have been noted at the project before and are common in the river, none were observed during the 2013 monitoring. However, according to KU personnel, mussels usually pass through the hydroelectric units and do not accumulate on the trash racks.

#### **1.2.4 Badger-Rapide Croche Hydroelectric (2015)**

In accordance with the FERC "Order Modifying and Approving Invasive Species Monitoring and Control Plan" dated 30 March 2012, annual monitoring of invasive species must be performed at the Badger-Rapide Croche in 2014, 2015 and every other following year. The October 2015 "*Invasive Species Monitoring and Control Report*" documents the results of the 2015 monitoring year including updates to monitoring protocol based on the results of 2013 and 2014. During consultation with WDNR in early 2015, it was determined that invasive species monitoring at the Badger-Rapide Croche site should focus on locations where influent drainage occurs as these may present opportunities for invasive species to enter the system. In addition, it was determined that no further mapping of garlic mustard, buckthorn, purple loosestrife and reed canary grass is necessary. Results of the 2015 monitoring found no invasive plants around the influent streams or drainages along the project. Several purple loosestrife plants were observed outside the influent areas that were dead or showed signs of stress resulting from the black-margined loosestrife beetle (*Galerucella californiensis*). Monitoring for Dreissenid mussels was performed only at the Rapide Croche plant via trash rack cleaning. Similar to the 2013 monitoring, no invasive mussels were observed during the 2015 monitoring.

#### **1.2.5 WDNR Round Goby Press Release**

In September 2015, WDNR published a press release announcing the confirmed presence of round goby in Lower Fox River. The species was found below the Neenah dam which is approximately 15 miles upstream from KCP near the confluence of the Lower Fox River and Lake Winnebago. This is the first documented occurrence of the species above the series of locks and dams located downstream of the Neenah Dam. Since KCP is located downstream of the Neenah Dam the future presence of round goby within the project boundary is possible.

Round goby was first discovered in the St. Clair River in 1990 and have rapidly spread throughout the Great Lakes. Round goby impacts native fish populations by feeding on the eggs and early life stages of native fishes. Their ability to survive in poor quality water and spawn multiple times per season allows them to quickly displace native species. WDNR is working to determine the range and extent of the population and have requested that anglers kill all round gobies that are found/caught and report the precise location of its occurrence.

## 2.0 KAUKAUNA CITY PLANT INVASIVE SPECIES INVESTIGATION

The 2014 study area included approximately 84 acres in the vicinity of the Project, including approximately 3,000 linear feet of the Fox River between the right descending bank and the KCP tailwater, approximately 2,000 feet wide (Figure 1). Within the study area, the Fox River consists of a complex network of braided channels with numerous low-lying vegetated and unvegetated islands that are part of the 1000 Islands Conservancy.

### 2.1 Terrestrial Investigation

The area of review investigated as part of this habitat evaluation included Fox River east of Elm Street and the islands east of the Kaukauna City Plant Dam (Figure 1). The area of review was delineated into four distinct habitat areas based on elevation and plant composition: upland islands, low elevation islands, emergent islands, and riparian. The four habitat zones delineated within the area of review are described in the table below and are depicted on Figure 1.

**KCP Terrestrial Habitat Areas**

Habitat Area	Habitat Type	Total Acreage
Upland Islands	Intermittently flooded islands with a diversity of trees and shrubs. Likely only flooded during very high flows.	19.43
Lower Elevation Islands	Lower elevation rocky islands dominated by hydrophytic tree species and a large diversity of emergent wetland plants. Likely seasonally flooded.	8.63
Emergent Islands	Depositional islands dominated by emergent wetland vegetation. Likely regularly flooded	3.62
Riparian	Deciduous riparian buffer with mature trees. Connected to contiguous upland area.	9.32

Once the Habitat areas were delineated, EA performed a terrestrial plant survey and documented the dominant species in each strata (canopy, understory, and herbaceous). Prior to conducting the plant surveys in the field, EA personnel reviewed a list from WDNR of rare, threatened, and endangered species that are known to potentially occur within Outagamie County as well as the WDNR NR 40 invasive species list. The table below presents dominant species within each habitat area. Dominant species within the upland islands consist of common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), box elder (*Acer negundo*), and red maple (*A. rubrum*). Dominant species within the lower elevation islands consist of silver maple (*A. saccharinum*), sandbar willow (*Salix interior*), black willow (*Salix nigra*), narrow leaf cattail (*Typha angustifolia*), broadleaf cattail (*T. latifolia*), and marsh seedbox (*Ludwigia palustris*). The emergent island emergent islands were dominated by narrow leaf and broadleaf cattail. Dominant species within the riparian areas consist of silver maple, common buckthorn, blackberry (*Rhus sp.*), box elder, Japanese honey suckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*) red maple, wood nettle (*Laportea canadensis*), and stinging nettle (*Urtica dioica*).



**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

Invasive species observed within the terrestrial areas included Japanese honeysuckle, garlic mustard, narrow leaf cattail, common buckthorn and glossy buckthorn.

**Dominant Terrestrial Species**

Common Name	Scientific Name	Upland Islands	Lower Elevation Islands	Emergent Islands	Riparian Area
<b>Canopy</b>					
Box Elder	<i>Acer negundo</i>				X
Red Maple	<i>Acer rubrum</i>	X			X
Silver Maple	<i>Acer saccharinum</i>		X		
Bitternut Hickory	<i>Carya cordiformis</i>	X			X
Cottonwood	<i>Populus deltoides</i>		X		X
White Oak	<i>Quercus alba</i>	X			
Swamp White Oak	<i>Quercus bicolor</i>	X			X
Bur Oak	<i>Quercus macrocarpa</i>				X
Northern Red Oak	<i>Quercus rubra</i>	X			
<b>Understory</b>					
Box Elder	<i>Acer negundo</i>	X			
Musclewood	<i>Carpinus caroliniana</i>				X
Flowering Dogwood	<i>Cornus florida</i>		X		
Glossy Buckthorn*	<i>Frangula alnus</i>	X			X
Japanese Honeysuckle*	<i>Lonicera japonica</i>				X
Common Buckthorn*	<i>Rhamnus cathartica</i>	X			X
Blackberry	<i>Rubus sp.</i>				X
Sand Bar Willow	<i>Salix interior</i>		X	X	
Black Willow	<i>Salix nigra</i>		X		
<b>Herbaceous</b>					
Garlic Mustard*	<i>Alliaria petiolata</i>				X
False Nettle	<i>Boehmeria cylindrica</i>		X	X	
Bullrush	<i>Cyperaceae sp.</i>		X		
Autumn Sneezeweed	<i>Helenium autumnale</i>		X		
American Water Willow	<i>Justicia americana</i>		X		
Wood Nettle	<i>Laportea canadensis</i>	X			X

**Dominant Terrestrial Species (Continued)**

Common Name	Scientific Name	Upland Islands	Lower Elevation Islands	Emergent Islands	Riparian Area
<b>Herbaceous Continued</b>					
Marsh Seedbox	<i>Ludwigia palustris</i>		X	X	
Purple Loosestrife*	<i>Lythrum salicaria</i>		X	X	
Clear Weed	<i>Pilea</i> Lindl		X		
May Apple	<i>Podophyllum peltatum</i>				X
Lady's Thumb	<i>Polygonum persicaria</i>			X	
Dandelion	<i>Taraxacum officinale</i>				X
Narrow Leaf Cattail*	<i>Typha angustifolia</i>		X	X	
Broad Leaf Cattail	<i>Typha latifolia</i>		X	X	
Stinging Nettle	<i>Urtica dioica</i>		X	X	X
Common Mullein	<i>Verbascum thapsus</i>				X
Blue Violet	<i>Viola sororia</i>				X
*Wisconsin DNR NR 40 Invasive Species					

**2.2 Aquatic Investigation**

During the spring and summer of 2015, EA conducted fish and benthic sampling in the vicinity of KCP. Complete fish and benthos results will be presented in a separate report. Fish collections were made in three primary areas: upstream in the KCP impoundment, immediately downstream in the wadeable portions of the 1000 Islands Conservancy Area, and downstream non-wadeable Fox River locations. Benthic macroinvertebrate sampling was only conducted in the 1000 Islands Conservancy Area. No invasive aquatic plant species were documented during the surveys.

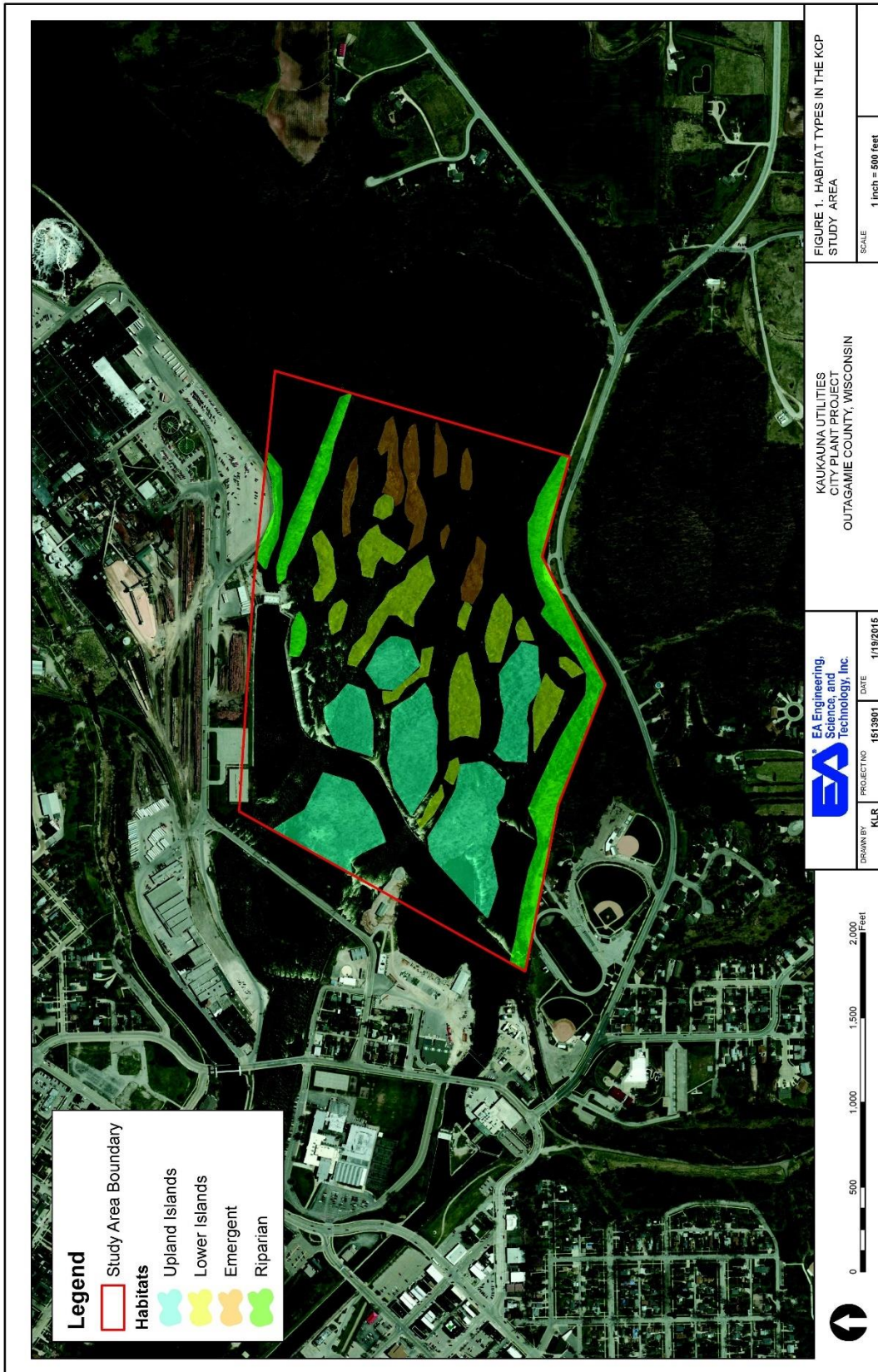
The fish collections yielded 37 species for the entire study area. Of these species, common carp was the only non-native species reported in the study area. Common carp were reported from both upstream in the KCP impoundment as well as at downstream river locations but were not observed in the wadeable portions of the 1000 Islands Conservancy Area. Overall, common carp was a relatively minor component of the fishery, representing just over five percent of the total catch by number.

Qualitative benthic macroinvertebrate samples yielded 20 total taxa. Zebra mussel was the only non-native benthic taxa observed. Zebra mussel was collected during both seasons and from three of the five sampling locations in the 1000 Islands Conservancy Area. However, like common carp, zebra mussel was a minor component of the aquatic community in the areas sampled, accounting for less than two percent of the total density at each of the three locations.

**FIGURE**

# Invasive Species Control Plan Kaukauna City Plant Hydroelectric Project

# Appendix A 2016 Monitoring Report



**TABLES**

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Amur Cork Tree	<i>Phellodendron amurense</i>	Prohibited
Amur honeysuckle	<i>Lonicera maackii</i>	Prohibited/Restricted
Amur maple	<i>Acer tataricum</i> subsp. <i>ginnala</i>	Restricted
Anchored water hyacinth	<i>Eichhornia azurea</i>	Prohibited
Aquatic forget-me-not	<i>Myosotis scorpioides</i>	Restricted
Asian loeseneri bittersweet	<i>Celastrus loeseneri</i>	Prohibited
Asian marshweed	<i>Limnophila sessiliflora</i>	Prohibited
Australian swamp crop or New Zealand pygmyweed	<i>Crassula helmsii</i>	Prohibited
Autumn olive	<i>Elaeagnus umbellata</i>	Restricted
Balfour's touch-me-not	<i>Impatiens balfourii</i>	Restricted
Bell's or showy bush honeysuckle	<i>Lonicera x bella</i>	Restricted
Bishop's goutweed	<i>Aegopodium podagraria</i>	Restricted
Black (European) alder	<i>Alnus glutinosa</i>	Restricted
Black knapweed	<i>Centaurea nigra</i>	Restricted
Black locust	<i>Robinia pseudoacacia</i>	Restricted
Black or Louise's swallow-wort	<i>Vincetoxicum nigrum</i> or <i>Cynanchum louiseae</i>	Prohibited/Restricted
Bohemian knotweed	<i>Fallopia x bohemicum</i> or <i>F. x bohémica</i> or <i>Polygonum bohemicum</i>	Prohibited
Brazilian waterweed or wide-leaf anacharis	<i>Egeria densa</i>	Prohibited
Brittle naiad, or lesser, bushy, slender, spiny or minor naiad or waterynymph	<i>Najas minor</i>	Prohibited
Brown knapweed	<i>Centaurea jacea</i>	Restricted
Burning bush	<i>Euonymus alatus</i>	Restricted
Butterfly dock	<i>Petasites hybridus</i>	Prohibited

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Canada thistle	<i>Cirsium arvense</i>	Restricted
Celandine	<i>Chelidonium majus</i>	Restricted
Chinese wisteria	<i>Wisteria sinensis</i>	Prohibited
Chinese yam	<i>Dioscorea batatas</i> or <i>Dioscorea polystacha</i>	Prohibited
Colt's foot	<i>Tussilago farfara</i>	Prohibited
Common barberry	<i>Berberis vulgaris</i>	Prohibited
Common buckthorn	<i>Rhamnus cathartica</i>	Restricted
Common teasel	<i>Dipsacus sylvestris</i> or <i>Dipsacus fullonum</i>	Restricted
Creeping bellflower	<i>Campanula rapunculoides</i>	Restricted
Crown vetch	<i>Coronilla varia</i>	Restricted
Curly-leaf pondweed	<i>Potamogeton crispus</i>	Restricted
Cut-leaved teasel	<i>Dipsacus laciniatus</i>	Restricted
Cypress spurge	<i>Euphorbia cyparissias</i>	Restricted
Dalmatian toadflax	<i>Linaria dalmatica</i>	Prohibited/Restricted
Dame's rocket	<i>Hesperis matronalis</i>	Restricted
Diffuse knapweed	<i>Centaurea diffusa</i>	Prohibited
Ducklettuce	<i>Ottelia alismoides</i>	Prohibited
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	Restricted
European frogbit	<i>Hydrocharis morsus-ranae</i>	Prohibited
European marsh thistle	<i>Cirsium palustre</i>	Prohibited/Restricted
Fanwort, Carolina Fanwort	<i>Cabomba caroliniana</i>	Prohibited
Field scabiosa	<i>Knautia arvensis</i>	Restricted
Fiveleaf akebia or Chocolate vine	<i>Akebia quinata</i>	Prohibited
Floating marsh pennywort	<i>Hydrocotyle ranunculoides</i>	Prohibited
Flowering rush	<i>Butomus umbellatus</i>	Restricted

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Garden heliotrope or Valerian	<i>Valeriana officinalis</i>	Restricted
Garden yellow loosestrife	<i>Lysimachia vulgaris</i>	Restricted
Garlic mustard	<i>Alliaria petiolata</i>	Restricted
Giant hogweed	<i>Heracleum mantegazzianum</i>	Prohibited
Giant knotweed	<i>Fallopia sachalinensis</i> or <i>Polygonum sachalinense</i>	Prohibited
Giant reed	<i>Arundo donax</i>	Prohibited
Giant Salvinia	<i>Salvinia herzogii</i>	Prohibited
Giant salvinia	<i>Salvinia molesta</i>	Prohibited
Glossy buckthorn	<i>Rhamnus frangula</i> or <i>Frangula alnus</i>	Restricted
Graceful cattail	<i>Typha laxmannii</i>	Prohibited
Grecian foxglove	<i>Digitalis lanata</i>	Prohibited
Hairy willow herb	<i>Epilobium hirsutum</i>	Prohibited/Restricted
Hawaii arrowhead	<i>Sagittaria sagittifolia</i>	Prohibited
Helleborine orchid	<i>Epipactis helleborine</i>	Restricted
Hemp nettle, brittlestem hemp nettle	<i>Galeopsis tetrahit</i>	Restricted
Hill mustard	<i>Bunias orientalis</i>	Prohibited/Restricted
Himalayan blackberry	<i>Rubus armeniacus</i>	Prohibited
Hound's tongue	<i>Cynoglossum officinale</i>	Restricted
Hybrid cattail	<i>Typha x glauca</i>	Restricted
Hydrilla	<i>Hydrilla verticillata</i>	Prohibited
Indian Swampweed	<i>Hygrophila polysperma</i>	Prohibited
Indian yam	<i>Dioscorea oppositifolia</i>	Prohibited
Japanese barberry	<i>Berberis thunbergii</i>	Restricted
Japanese chaff flower	<i>Achyranthes japonica</i>	Prohibited
Japanese hedgeparsley or erect hedgeparsley	<i>Torilis japonica</i>	Prohibited/Restricted
Japanese honeysuckle	<i>Lonicera japonica</i>	Prohibited



**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Japanese hops	<i>Humulus japonicus</i>	Prohibited/Restricted
Japanese knotweed	<i>Fallopia japonica</i> or <i>Polygonum cuspidatum</i>	Restricted
Japanese stilt grass	<i>Microstegium vimineum</i>	Prohibited
Japanese wisteria	<i>Wisteria floribunda</i>	Prohibited
Java waterdropwort or Vietnamese parsley	<i>Oenanthe javanica</i>	Prohibited
Johnsongrass	<i>Sorghum halepense</i>	Prohibited
Kudzu	<i>Pueraria montana</i> or <i>P. lobata</i>	Prohibited
Leafy spurge	<i>Euphorbia esula</i>	Restricted
Lesser celandine	<i>Ranunculus ficaria</i>	Prohibited
Lyme grass or sand ryegrass	<i>Leymus arenarius</i> or <i>Elymus arenarius</i>	Prohibited/Restricted
Medusahead	<i>Taeniatherum caput-medusae</i>	Prohibited
Mile-a-minute vine	<i>Polygonum perfoliatum</i> or <i>Persicaria perfoliata</i>	Prohibited
Moneywort	<i>Lysimachia nummularia</i> (or <i>L. nummelaria</i> )	Restricted
Morrow's honeysuckle	<i>Lonicera morrowii</i>	Restricted
Mosquito fern	<i>Azolla pinnata</i>	Prohibited
Mudmat	<i>Glossostigma cleistanthum</i>	Prohibited
Multiflora rose	<i>Rosa multiflora</i>	Restricted
Musk thistle or Nodding thistle	<i>Carduus nutans</i>	Restricted
Narrow leaf bittercress	<i>Cardamine impatiens</i>	Prohibited
Narrow-leaf cattail	<i>Typha angustifolia</i>	Restricted
Oriental bittersweet	<i>Celastrus orbiculatus</i>	Restricted
Oxygen-weed, African elodea or African waterweed	<i>Lagarosiphon major</i>	Prohibited

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Pale or European swallow-wort	<i>Vincetoxicum rossicum</i> or <i>Cynanchum rossicum</i>	Prohibited
Parrot feather	<i>Myriophyllum aquaticum</i>	Prohibited
Perennial or broadleaved pepperweed	<i>Lepidium latifolium</i>	Prohibited
Phragmites or Common reed non-native ecotype	<i>Phragmites australis non-native ecotype</i>	Prohibited/Restricted
Plumeless thistle	<i>Carduus acanthoides</i>	Restricted
Poison hemlock	<i>Conium maculatum</i>	Prohibited/Restricted
Policeman's helmet	<i>Impatiens glandulifera</i>	Prohibited
Porcelain berry	<i>Ampelopsis brevipedunculata</i>	Prohibited
Princess tree	<i>Paulownia tomentosa</i>	Prohibited
Purple loosestrife	<i>Lythrum salicaria</i>	Restricted
Queen of the meadow	<i>Filipendula ulmaria</i>	Restricted
Ribbon grass or Gardener's garters and other ornamental variegated varieties and cultivars.	<i>Phalaris arundinacea var. picta</i>	Restricted
Rose acacia or Bristly locust	<i>Robinia hispida</i>	Restricted
Russian knapweed	<i>Centaurea repens</i>	Prohibited
Russian olive	<i>Elaeagnus angustifolia</i>	Restricted
Sacred Lotus	<i>Nelumbo nucifera</i>	Prohibited
Sawtooth oak	<i>Quercus acutissima</i>	Prohibited
Scarlet pimpernel or Burnet saxifrage	<i>Pimpinella saxifraga</i>	Restricted
Scotch broom	<i>Cytisus scoparius</i>	Prohibited
Seaside goldenrod	<i>Solidago sempervirens</i>	Prohibited/Restricted
Sericea or Chinese lespedeza	<i>Lespedeza cuneata</i> or <i>Lespedeza sericea</i>	Prohibited
Siberian elm	<i>Ulmus pumila</i>	Restricted
Siberian peashrub	<i>Caragana arborescens</i>	Restricted
Southern cattail	<i>Typha domingensis</i>	Prohibited
Spiny naiad	<i>Najas marina</i>	Restricted
Spotted knapweed	<i>Centaurea biebersteinii</i> , <i>Centaurea maculosa</i> or <i>Centaurea stoebe</i>	Restricted

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 1. Wisconsin DNR NR 40 Invasive Plant Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Spreading hedgeparsley	<i>Torilis arvensis</i>	Prohibited
Tall or reed mannagrass	<i>Glyceria maxima</i>	Prohibited/Restricted
Tansy	<i>Tanacetum vulgare</i>	Restricted
Tartarian honeysuckle	<i>Lonicera tatarica</i>	Restricted
Tree of heaven	<i>Ailanthus altissima</i>	Restricted
Tyrol knapweed	<i>Centaurea nigrescens</i>	Restricted
Wanded loosestrife	<i>Lythrum virgatum</i>	Prohibited
Water chestnut	<i>Trapa natans</i>	Prohibited
Water hyacinth, floating	<i>Eichhornia crassipes</i>	Prohibited
Water lettuce	<i>Pistia stratiotes</i>	Prohibited
Water Soldiers	<i>Stratiotes aloides</i>	Prohibited
Water spinach, swamp morning-glory	<i>Ipomoea aquatica</i>	Prohibited
Wavy leaf basket grass	<i>Oplismenus hirtellus ssp. undulatifolius</i>	Prohibited
White bedstraw	<i>Galium mollugo</i>	Restricted
White mulberry	<i>Morus alba</i>	Restricted
White poplar	<i>Populus alba</i>	Restricted
Wild chervil	<i>Anthriscus sylvestris</i>	Prohibited/Restricted
Wild parsnip	<i>Pastinaca sativa</i>	Restricted
Wineberry or wine raspberry	<i>Rubus phoenicolasius</i>	Prohibited
Woodland forget-me-not	<i>Myosotis sylvatica (or M. sylvaticum)</i>	Restricted
Wormwood	<i>Artemisia absinthium</i>	Restricted
Yellow floating heart	<i>Nymphoides peltata</i>	Prohibited
Yellow iris	<i>Iris pseudacorus</i>	Restricted
Yellow star thistle	<i>Centaurea solstitialis</i>	Prohibited

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 2. Wisconsin DNR NR 40 Invasive Fish and Crayfish Species List**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Alewife (2)	<i>Alosa pseudoharengus</i>	Restricted
Arctic char (2)	<i>Salvelinus alpinus</i>	Restricted
Atlantic salmon (2)	<i>Salmo salar</i>	Restricted
Bighead carp	<i>Hypophthalmichthys nobilis</i>	Prohibited
Bitterling (3)	<i>Rhodeus spp.</i>	Restricted
Black carp	<i>Mylopharyngodon piceus</i>	Prohibited
Brown trout (2)	<i>Salmo trutta</i>	Restricted
Chinese hi-fin banded shark (3)	<i>Myxocyprinus asiaticus</i>	Restricted
Chinook salmon (2)	<i>Oncorhynchus tshawytscha</i>	Restricted
Coho salmon (2)	<i>Oncorhynchus kisutch</i>	Restricted
Common carp	<i>Cyprinus carpio</i>	Restricted
Eastern mosquitofish	<i>Gambusia holbrooki</i>	Restricted
Goldfish *(3)	<i>Carassius auratus</i>	Restricted
Grass carp	<i>Ctenopharyngodon idella</i>	Prohibited
Ide (3)	<i>Leuciscus idus</i>	Restricted
Koi carp *(3)	<i>Cyprinus carpio</i>	Restricted
Pink salmon (2)	<i>Oncorhynchus gorbuscha</i>	Restricted
Rainbow smelt	<i>Osmerus mordax</i>	Restricted
Rainbow trout (2)	<i>Oncorhynchus mykiss</i>	Restricted
Red shiner	<i>Cyprinella lutrensis</i>	Prohibited
Red swamp crayfish	<i>Procambarus clarkii</i>	Prohibited
Redear sunfish (2)	<i>Lepomis microlophus</i>	Restricted
Round goby	<i>Neogobius melanostomus</i>	Restricted
Rudd	<i>Scardinius erythrophthalmus</i>	Prohibited
Ruffe	<i>Gymnocephalus cernuus</i>	Restricted
Rusty crayfish	<i>Orconectes rusticus</i>	Restricted

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix A**  
**2016 Monitoring Report**

**Table 2. Wisconsin DNR NR 40 Invasive Fish and Crayfish Species List (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Classification</b>
Sea lamprey	<i>Petromyzon marinus</i>	Restricted
Silver carp	<i>Hypophthalmichthys molitrix</i>	Prohibited
Snakehead family	<i>Channidae</i>	Prohibited
Sterlet (3)	<i>Acipenser ruthenus</i>	Restricted
Tench	<i>Tinca tinca</i>	Prohibited
Three-spine stickleback	<i>Gasterosteus aculeatus</i>	Restricted
Tiger trout (2)	<i>Salvelinus fontinalis x Salmo trutta</i>	Restricted
Tilapia	<i>Tilapia spp.</i>	Restricted
Tube-nose Goby	<i>Proterorhinus marmoratus</i>	Restricted
Weather loach (3)	<i>Misgurnus anguillicaudatus</i>	Restricted
Western mosquitofish	<i>Gambusia affinis</i>	Restricted
White perch	<i>Morone americana</i>	Restricted
Zander	<i>Sander lucioperca</i>	Prohibited

**Appendix B. WDNR Rapid Response Species Sheet**

## Selected Regulated Aquatic Invasive Species in WI



Floating water hyacinth  
*(Eichhornia crassipes)*



Starry stonewort  
*(Nitellopsis obtusa)*



Hydrilla  
*(Hydrilla verticillata)*



Anchored water hyacinth  
*(Eichhornia azurea)*



Water lettuce  
*(Pistia stratiotes)*



Faucet snail  
*(Bithynia tentaculata)*



European frog-bit  
*(Hydrocharis morsus-ranae)*



Brittle naiad  
*(Najas minor)*



New Zealand mud snail  
*(Potamopyrgus antipodarum)*



Spiny water flea  
*(Bythotrephes cederstroemi)*



Malaysian trumpet snail  
*(Melanoides tuberculata)*



Duck lettuce  
*(Ottelia alismoides)*



Java waterdropwort  
*(Oenanthe javanica)*



Quagga mussel  
*(Dreissena rostriformis)*



Yellow floating heart  
*(Nymphoides peltata)*



Brazilian waterweed  
*(Egeria densa)*

Report any prohibited species as soon as possible by emailing: [Invasive.Species@wi.gov](mailto:Invasive.Species@wi.gov).  
 This publication does not list all the regulated species. For the full list of Prohibited or Restricted species please visit:  
[www.dnr.wi.gov](http://www.dnr.wi.gov) keyword: invasives

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix B**  
**WDNR Rapid Response Species Identification Sheet**



Asian clam  
*(Corbicula fluminea)*



Floating marsh pennywort  
*(Hydrocotyle ranunculoides)*



Didymo  
*(Didymosphenia geminata)*



Giant salvinia  
*(Salvinia molesta)*



Red swamp crayfish  
*(Procambarus clarkii)*



Water spinach  
*(Ipomoea aquatica)*



Killer algae  
*(Caulerpa taxifolia)*



Asian marshweed  
*(Limnophila sessiliflora)*



Indian swampweed  
*(Hygrophila polysperma)*



Aquatic forget-me-not  
*(Myosotis scorpiodes)*



Spiny naiad  
*(Najas marina)*



Curly-leaf pondweed  
*(Potamogeton crispus)*



Zebra mussel  
*(Dreissena polymorpha)*



Rusty crayfish  
*(Orconectes rusticus)*



Chinese mystery snail  
*(Cipangopaludina chinensis)*



Yellow Iris  
*(Iris pseudacorus)*

**Prohibited Species**

**Restricted Species**

[www.dnr.wi.gov](http://www.dnr.wi.gov) keyword: **invasives**



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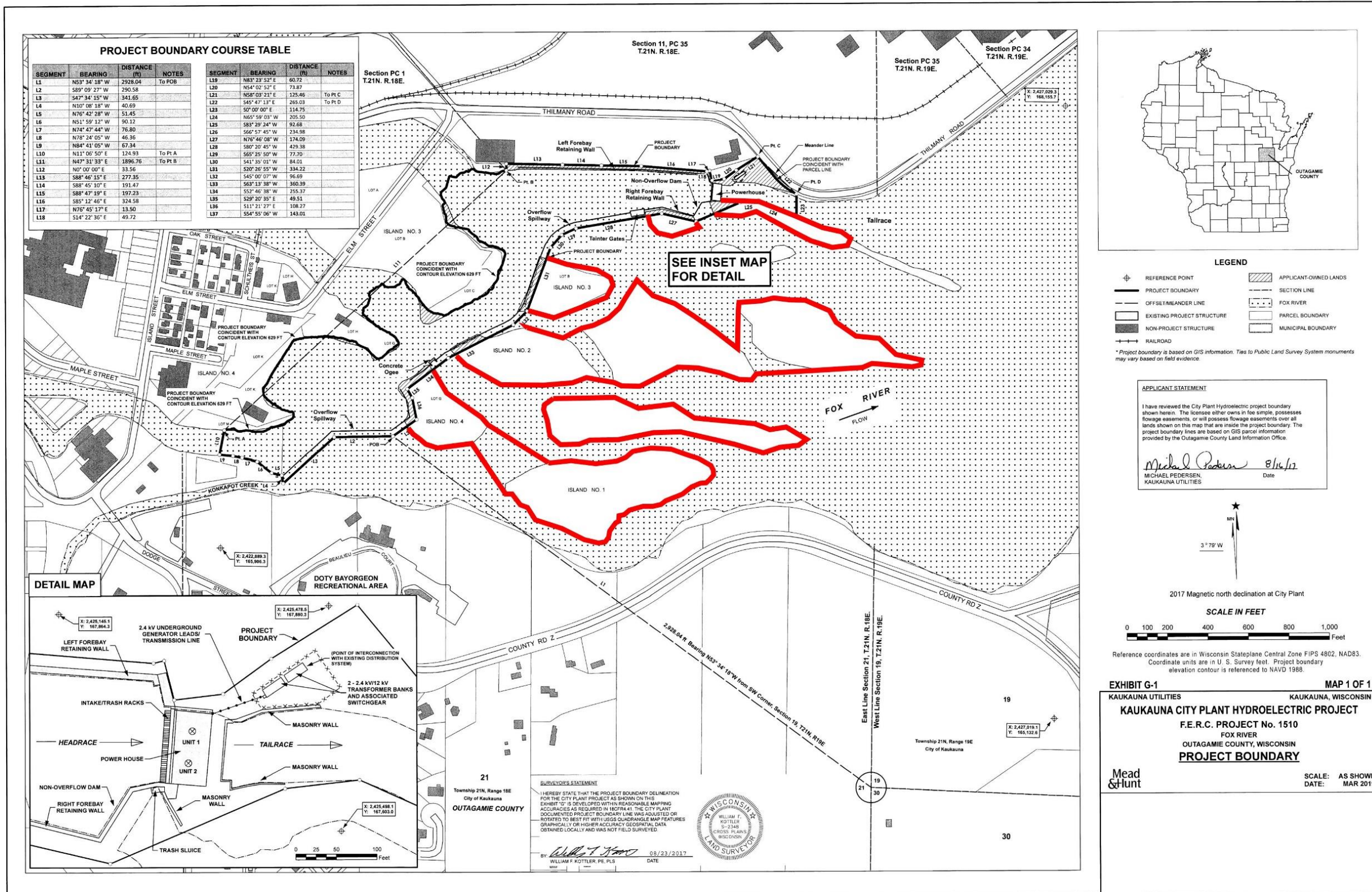
PUB-SS-1162 2016



**Appendix C. Project Boundary**

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix C**  
**Project Boundary**



**Appendix D. WDNR Reporting Forms**



**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix D  
WDNR Reporting Forms**

Form 3200.1-xxx (R 4/2019)

Aquatic Invasive Species (AIS) Early Detection Monitoring Data

Site <sup>1</sup>	Latitude XX.XXXXX	Longitude -XX.XXXXX	Species, gross a. <sup>2</sup> , cover (1-6) <sup>3</sup> , infested a. (sq m) <sup>4</sup> , and L:D (1-7) <sup>5</sup>			Specimen (Y/N)	Photo (Y/N)	No AIS (Y/N)	Comments (Include habitat description or protocol changes)
			Species	Gross Area	Cover				

- 1 Boat landing (BL), access (A), targeted search site (TS), meander/incidental site (MS)
- 2 Gross Area: estimate square meter area of survey site. We generally survey 15m x 15m or 225m<sup>2</sup> (~50ft x 50ft or 2,500ft<sup>2</sup>) at each site.
- 3 Cover (Daubenmire): 1: 0 - 5% (2.5%), 2: 5 - 25% (15%), 3: 25 - 50% (37.5%), 4: 50-75% (62.5%), 5: 75-95% (85.0%), 6: 95-100% (97.5%). Median % cover is the value in parentheses.
- 4 Infested area: gross area x median % cover. For median % cover see value in parenthesis in cover above. This will be calculated on iPads, but manually calculated in SWIMS.
- 5 L:D Classes - 1: 100:0; 2: 95:5; 3:75-25; 4: 50:50; 5: 25:75; 6: 5:95; 7: 0:100. Live (L) animals will contain flesh and respond; live plants will be green or with live tissue when scratched and have reproductive fragments (seeds, flowers, apical meristem, etc.). Dead (D) animals will not contain flesh or respond and dead plants sterile fragments that won't root.

**Comments:**

**STEP 3:** Submit specimens/photographs and a map to Regional DNR AIS coordinator for verifier examination (required for all new records). Name photos with the SPCODE\_COUNTY\_YYYYMMDD\_WATERBODY\_NAME\_(WBIC or STATIONID or LAT-LONG)\_COLLECTOR-NAME as detailed in the Photo Guidance. Regional DNR AIS coordinator will ensure ROI creation/editing.

Species	Specimen (Y/N)	Photo Name	Date sent	Comments	This section is completed by the verifier(s)			
					Verifier #1	Date	Verifier #2	Date

**STEP 4:** Data was entered into SWIMS on \_\_\_\_\_ by \_\_\_\_\_

Once data is entered, send scans of data sheets to Regional DNR AIS Coordinator or attach them to the SWIMS project.

**STEP 5:** Data was proofed on \_\_\_\_\_ by \_\_\_\_\_



**Appendix E. Documentation of Consultation**

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

---

**Shawn Puzen**

---

**From:** Shawn Puzen  
**Sent:** Friday, August 16, 2019 12:47 PM  
**To:** cheryl.laatsch@wisconsin.gov  
**Cc:** Hudak, Andrew J - DNR  
**Subject:** Request for Comments on Kaukauna City Plant Invasive Species Control Plan-Due EOB September 16, 2019  
**Attachments:** 20190816 Invasive Species Plan sent to WDNR.pdf  
**Categories:** Filed by Newforma

Good Afternoon Cheryl,

Enclosed is an agency draft copy of the Invasive Species Control Plan for the Kaukauna City Hydroelectric Project.

Please provide your comments no later than EOB on September 16, 2019.

If a response is not received by September 16, 2019, it will be assumed you do not have any comments.

Please feel free to contact me with any questions.

Thanks,

**Shawn Puzen | FERC Licensing & Compliance**  
Mead & Hunt | 1702 Lawrence Drive | De Pere, WI 54115  
Direct: 920-593-6865 | Mobile: 920-639-2480  
[shawn.puzen@meadhunt.com](mailto:shawn.puzen@meadhunt.com) | [meadhunt.com](http://meadhunt.com)  
<https://www.linkedin.com/in/shawnpuzen>



# **Invasive Species Control Plan**

**Kaukauna (City Plant)  
Hydroelectric Project**

**FERC Project No. 1510**

**Lower Fox River  
Outagamie County, Wisconsin**

Prepared for



**Kaukauna, Wisconsin**

Prepared by



September 2019

**Table of Contents**

	<b>Page</b>
<b>1. Introduction .....</b>	<b>3</b>
<b>2. Kaukauna City Plant Hydroelectric Project Boundary .....</b>	<b>4</b>
<b>3. General Project Area Description.....</b>	<b>5</b>
<b>4. Invasive Species Listed in Article 405 .....</b>	<b>6</b>
4.1 Japanese knotweed.....	6
4.2 Garlic mustard .....	6
4.3 Buckthorn.....	6
4.4 Eurasian watermilfoil .....	6
4.5 Purple loosestrife.....	6
4.6 Common reed .....	6
4.7 Japanese honeysuckle .....	6
4.8 Narrow-leaf cattail.....	6
<b>5. Monitoring.....</b>	<b>7</b>
5.1 Project areas subject to monitoring .....	7
5.2 Monitoring schedule and methods.....	7
5.3 Species to be monitored .....	9
5.3.1 Japanese knotweed .....	9
5.3.2 Common reed.....	9
5.3.3 Dreissenid mussels .....	9
5.3.4 Additional invasive species .....	9
5.3.5 Future invasive species.....	10
<b>6. Measures to Increase Public Awareness .....</b>	<b>11</b>
<b>7. Best Management Practices .....</b>	<b>12</b>
<b>8. Reporting .....</b>	<b>13</b>
<b>9. Control Measures.....</b>	<b>14</b>
<b>10. Technical Assistance .....</b>	<b>15</b>
<b>11. Documentation of Consultation .....</b>	<b>16</b>

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Table of Contents**

---

**Appendices**

- A 2016 Monitoring Report
- B WDNR Rapid Response Species Identification Sheet
- C Project Boundary
- D WDNR Reporting Forms
- E Documentation of Consultation

**Tables**

- 5-1 Additional Invasive Species.....Page 17

Agency Draft

## **1. Introduction**

In 2014 and 2015, Kaukauna Utilities (KU) completed a Terrestrial and Aquatic Investigation of the Vicinity of the Kaukauna City Plant Hydroelectric Project (KCP) for non-native species during the Federal Energy Regulatory Commission (FERC or Commission) licensing process (FERC Project No. 1510). The Monitoring Report, dated February 2016 is included in Appendix A.

On March 29, 2019, the FERC issued the KCP license, which included requirements for developing an Invasive Species Control Plan part of Article 405. KU is required to file plans for FERC approval in consultation with the Wisconsin Department of Natural Resources (WDNR). This plan covers Section 401 Water Quality Certification condition 6 imposed by the WDNR, which requires KU to consult on the development of an "invasive species monitoring plan."

The specific language of Article 405 is as follows:

Article 405. Invasive Species Control Plan. Within six months of the effective date the license, the licensee must file with the Commission, for approval, an invasive species control plan. Invasive species of interest include but are not necessarily limited to: glossy and common buckthorn, garlic mustard, Japanese honeysuckle, narrow leaf cattail, purple loosestrife, Eurasian milfoil, phragmites, and Japanese knotweed. The plan must include, but not necessarily be limited to, the following:

- (1) identifying target species;
- (2) defining the treatment area(s) in the vicinity of the project;
- (3) describing the techniques to be used to control invasive species, including the frequency of treatments;
- (4) monitoring treatment areas for invasive species on an annual basis for three consecutive years following invasive species control treatment, to evaluate the success of invasive species control efforts; and
- (5) filing a report with the Commission following the monitoring period, including an analysis of whether additional invasive species control is necessary.

The licensee must prepare the plan in consultation with Wisconsin Department of Natural Resources (Wisconsin DNR). The licensee must include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to Wisconsin DNR, and specific descriptions of how Wisconsin DNR is accommodated by the plan. The licensee must allow a minimum of 30 days for Wisconsin DNR to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Implementation of the plan must not begin until the licensee is notified by the Commission that the plan is approved. Upon Commission approval, the licensee must implement the plan, including any changes required by the Commission.

## **2.    Kaukauna City Plant Hydroelectric Project Boundary**

The KCP is positioned on the Lower Fox River in Outagamie County, Wisconsin at river mile 23 between the upstream Badger Plant and the downstream Rapide Croche Plant that are part of the Badger-Rapide Croche Hydroelectric Project (FERC Project no. 2677). The Badger Plant is located at river mile 24 and the Rapide Croche Plant is located at river mile 19.

The areas contained within the KCP Hydroelectric Project boundary are depicted in Appendix C.

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### **3. General Project Area Description**

The KCP area has a humid, continental-type climate characterized by cold, snowy winters and relatively short, warm summers. The area lies within the glaciated Eastern Lakes section of the Central Lowlands physiographic province, which is typically blanketed with glacial topography consisting of lakes or swamps within closed basins and eskers, drumlins and gently rolling ground moraine within watersheds.

The Fox River flows in a moderately deep valley of limited floodplain area. Normal flows have low to moderate velocity over bedrock, cobble and silt substrate. Instream cover consists of varying amounts of root wads, boulders, logs and woody debris, the depth of which is influenced by predominant velocities, positioned within the river and riffle-pool sequence.

The floodplain near KCP is highly developed with industrial and commercial development and vegetation is generally limited to mown areas of turf grasses. The conservancy zone located immediately downstream of the KCP is dominated by tree species such as elm, cottonwood, ash and silver maple.

#### **4. Invasive Species Listed in Article 405**

Species listed in Article 405 of the KCP license are Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*), buckthorn (*Rhamnus cathartica* and *Rhamnus frangula*), Eurasian water milfoil (*Myriophyllum spicatum*), purple loosestrife (*Lythrum salicaria*), phragmites (*Phragmites australis* or common reed), Japanese honeysuckle (*Lonicera japonica*) and narrow-leaf cattail (*Typha angustifolia*). The species listed in Article 405 are included below for reference purposes.

##### **4.1 Japanese knotweed**

Japanese knotweed will be monitored as further explained in Section 5.

##### **4.2 Garlic mustard**

Since garlic mustard is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.3 Buckthorn**

Since buckthorn is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.4 Eurasian watermilfoil**

Since Eurasian watermilfoil is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.5 Purple loosestrife**

Since purple loosestrife is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.6 Common reed**

Since common reed is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.7 Japanese honeysuckle**

Since Japanese honeysuckle is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

##### **4.8 Narrow-leaf cattail**

Since narrow-leaf cattail is not listed as a rapid response species in WI, it will not be monitored as further explained in Section 5.

## **5. Monitoring**

Although the requirements for Article 403 emphasize control of existing prevalent invasive species, the WDNR implements an aquatic invasive species state management plan. The WDNR plan goal is to prevent introduction of new invasive species into the state, develop and implement an early detection and rapid response program to address new invasive species, limit dispersal of established invasive species populations through the state, and manage and control invasive species. Following this format, KU proposes rapid response monitoring prior to rapid response control in the manner described in the following subsections.

### **5.1 Project areas subject to monitoring**

There are no formal recreation areas within the Project. However, there are three areas where members of the public can easily access the project waters on foot. As a result, the following easily accessible Hydroelectric Project areas, shown in red on the FERC-approved Exhibit G included in Appendix C, will be subject to monitoring for the species described in Section 5.3.

- Shoreline of Island No. 3
- Shoreline of Thousand Island Nature Center
- North Shoreline of Tailrace.

### **5.2 Monitoring schedule and methods**

Monitoring for invasive species within the Hydroelectric Project boundary will be completed every even year beginning in 2020 to correspond with the monitoring schedule for the Badger-Rapide Croche Hydroelectric Project because of its location within the area of the Fox River encompassing the KCP. It will be completed according to the following conditions:

- All monitoring will occur during the late summer months (late July through early August)
- All monitoring will be conducted by personnel familiar with the visual characteristics of the invasive species identified in Section 5.3 below
- All monitoring will be conducted from a terrestrial standpoint
- Aquatic monitoring will be conducted from the shoreline and shoreline monitoring will be completed at the monitoring location to the extent it encompasses the entirety of any contiguous aquatic plant communities.
- A meander survey will be utilized for upland areas and aquatic environments will be observed from the shoreline
- WDNR data sheets will be populated with information for each new occurrence of an invasive species identified in Section 5.3 below
- Data concerning the locations of new occurrences of invasive species identified in Section 5.3 below will be collected using a handheld GPS



**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Section 6  
Measures to Increase Public Awareness**

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- Monitoring will not be limited to three consecutive years following control treatment to evaluate the success beyond the requirement outlined in Article 403 and will continue for the term of the license.
- Monitoring of all current and future invasive species identified in Section 5.3 below shall only occur until a point at which the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary will no longer be instrumental to stop the spread of the invasive species identified in Section 5.3 below

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**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Section 6**  
**Measures to Increase Public Awareness**

The WDNR currently has a form available to report the occurrence of newly discovered invasive species. These forms are included in Appendix D. If the WDNR modifies the reporting forms at any time in the future, they shall note where or how KU can obtain the updated forms in the comments section of the monitoring report. KU will utilize the revised forms for future monitoring activities. In the event a new occurrence has been observed, the WDNR will be notified as soon as possible by no later than within 5 days of its discovery.

### **5.3 Species to be monitored**

Monitoring of all current and future invasive species shall only occur until a point at which the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary can no longer be instrumental to stop the spread of the invasive species.

#### **5.3.1 Japanese knotweed**

Japanese knotweed has the potential to grow in wet to mesic, open habitats. It can also grow in exposed joints or cracks in masonry, pavement or concrete and potentially cause structural damage if not controlled promptly. Consequently, exposed masonry elements of the Hydroelectric Project, such as power canal walls and powerhouse foundations, and other areas described in Section 5.1 will be visually inspected during each monitoring period.

#### **5.3.2 Common reed**

At this time, Common reed will not be monitored. In the event KU is notified by the WDNR it can demonstrate limited local control of areas contained within the Hydroelectric Project boundary and limited control can be instrumental to stop the spread of the invasive species, KU will cooperate with the WDNR on such measures.

#### **5.3.3 Dreissenid mussels**

Dreissenid mussels are fully aquatic animals that can grow and disperse continuously during favorable water temperature regimes throughout the area. These mussels grow on hard objects or surfaces, which allows for numerous monitoring locations, including trash racks that screen the intakes for the Badger Plant and Rapide Croche Plant powerhouses. Throughout the year, powerhouse operations at both Plants require frequent cleaning of the trash racks using a special-purpose rake. Each cleaning event offers an opportunity to monitor for mussels either on entrained debris or the racks themselves. Any stockpiled debris will be reviewed for the presence of dreissenid mussels monthly (only during the growing season).

#### **5.3.4 Additional invasive species**

Although not listed above, the presence of the additional species listed below in Table 5-1 will be monitored as part of this plan in the areas described in Section 5.1. Since the plan focuses on rapid response monitoring, monitoring will occur until the species becomes prevalent in the area or limited local control measures of areas contained within the Hydroelectric Project boundary can no longer be instrumental in stopping the spread of the invasive species. Due to the small size of the reservoir, the significant amount of recreation upstream of the project, the water connectivity provided by the Fox River Lock system, and no formal recreation sites on KCP, rapid response monitoring shall be limited to aquatic and terrestrial plants. Any monitoring of aquatic environments adjacent to the upland areas will be

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Section 6**  
**Measures to Increase Public Awareness**

conducted from the shoreline. The WDNR provides an identification sheet that will be helpful to KU in identifying rapid response species (See Appendix B)

**Table 5-1. Additional Invasive Species**

<b>Common Name</b>	<b>Scientific Name (<i>Genus species</i>)</b>
Aquatic forget-me-not	<i>Myosotis scorpioides</i>
Asian marshweed	<i>Limnophila sessiliflora</i>
Brazilian waterweed	<i>Egeria densa</i>
Brittle naiad	<i>Najas minor</i>
Didymo	<i>Didymoshenia geminata</i>
Duck lettuce	<i>Ottelia alismoides</i>
European frog-bit	<i>Hydrocharis morsus-ranae</i>
Fanwort	<i>Cabomba caroliniana</i>
Floating marsh pennywort	<i>Hydrocotyle ranunculoides</i>
Flowering rush	<i>Butomus umbellatus</i>
Giant Salvinia	<i>Salvinia molesta</i>
Hydrilla	<i>Hydrilla verticillata</i>
Indian swampweed	<i>Hygrophila polysperma</i>
Japanese hop	<i>Humulus japonicus</i>
Java water dropwort	<i>Oenanthe javanica</i>
Killer algae	<i>Caulerpa taxifolia</i>
Parrot feather	<i>Myriophyllum aquaticum</i>
Spiny naiad	<i>Najas marina</i>
Starry stonewort	<i>Nitellopsis obtusa</i>
Water chestnut	<i>Trapa natans</i>
Water hyacinth	<i>Eichhornia crassipes and Eichhornia azurea</i>
Water lettuce	<i>Pistia stratiotes</i>
Water spinach	<i>Ipomoea aquatica</i>
Yellow floating heart	<i>Nymphoides peltata</i>
Yellow iris	<i>Iris pseudacorus</i>

**5.3.5 Future invasive species**

Invasive species can be introduced to an area or region at any time; therefore, the list of monitored invasive species within the Hydroelectric Project boundary should be continually adjusted and updated accordingly. Invasive species will be added for monitoring only if it is currently not common to the area or region and early, limited control and detection will stop the species from spreading.

The WDNR can also add invasive species that fit the rapid response criteria for future monitoring at any time outside the above-mentioned schedule by notifying KU and the Commission.

## **6. Measures to Increase Public Awareness**

KU will undertake the following measures to increase public awareness of invasive species within the Hydroelectric Project boundary:

- Post WDNR-provided invasive species signs on KU property as requested by the WDNR.
- Assess the condition of existing WDNR-provided invasive species signs during scheduled monitoring activity. A new sign will be installed if replacement is warranted and the WDNR agrees to provide a replacement sign.
- Make WDNR-provided invasive species information available to the public at the KU customer service office.

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## **7. Best Management Practices**

KU will take precautions and implement best management practices to prevent the spread of invasive species during transportation of equipment used for the operation and maintenance of its hydroelectric projects. Equipment used for project purposes that contacts water on a regular basis will be inspected and rinsed or otherwise cleaned as necessary to remove fragments of invasive plants before use in another area outside of the reservoir.

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## **8. Reporting**

### Quick response notification

In the event a new occurrence of a species is identified during monitoring, the WDNR will be notified at [invasive.species@wisconsin.gov](mailto:invasive.species@wisconsin.gov) as soon as possible, but no later than within 5 days of its discovery. The notification will also include pictures and submittal of the online WDNR invasive species form.

### End of year monitoring notification

A notification with the date(s) of the monitoring will be filed with the Commission by December 31<sup>st</sup> of each monitoring year. A copy of the notification will also be provided to the WDNR. The notification will also include any completed WDNR Detection Forms<sup>1</sup> provided earlier in the year (if any) and a summary any control that was implemented as a result of the monitoring.

As part of the notification, KU may also recommend rapid response species to be eliminated from future rapid response monitoring if a species becomes prevalent in the reservoir and limited local control measures will no longer be instrumental to stop the spread of that invasive species. In its request, KU will provide information to support its position. If within 60 days of the notification, the WDNR does not provide information to KU and the Commission refuting the KU position, the species will be eliminated from future rapid response monitoring.

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<sup>1</sup> If WDNR modifies the Detection Forms at any time in the future, the agency shall notify where or how KU can obtain the updated forms. KU will utilize the revised forms for future monitoring activities.

## **9. Control Measures**

Control measures under this plan are based upon the WDNR rapid response approach. As such, rapid response assistance from KU shall only continue if limited local control of areas contained within the Hydroelectric Project boundary can be instrumental to stop the spread of the invasive species throughout the area.

The WDNR, with assistance from KU,<sup>2</sup> shall be responsible for initiating control for rapid response invasive species identified during the rapid response surveys.

Controls using established methods for terrestrial species that do not require permits may be initiated by KU independently. The need for any control measures will further be evaluated based on the availability, practicality and cost versus benefits of the suitable control measures. In instances where established control measures will yield immediate benefits, KU may initiate controls at their discretion. KU will utilize suitable methods for all control activities. All suitable control measures implemented by KU shall be in accordance with technical assistance obtained through the procedure outlined in Section 10.

---

<sup>2</sup> KU monetary assistance shall not exceed \$2,000 for each monitoring event in 2018 dollars to match the level of effort analyzed in the Commission's Comparison of Alternatives included as Section 4.3 in the Kaukauna Hydro Project Environmental Assessment dated August 2018.

## **10. Technical Assistance**

This plan focuses only on the control of species that are not already prevalent in the area and where early detection and control will have an impact on the prevalence of the invasive species in the area. Some control measures have the potential for negative impacts on aquatic communities and non-invasive species; therefore, KU will seek technical assistance and consultation from control experts from the University of Wisconsin – Extension, WDNR or other agencies, as appropriate, prior to implementing any invasive species control measures.

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## **11. Documentation of Consultation**

Appendix E presents a summary of consultation between KU, WDNR and additional agencies during the development of this revised plan. The WDNR provided comments on xxxxx. The WDNR comments have been addressed in the plan and responded to in Exhibit E.

Agency Draft

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

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**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix A  
2016 Monitoring Report**

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**Appendix A. 2016 Monitoring Report**

Agency Draft

**To reduce the document size, the 2016 Monitoring Report has not been reproduced in this copy of the Agency draft.**

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

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**Invasive Species Control Plan** **Appendix B**  
**Kaukauna City Plant Hydroelectric Project** **WDNR Rapid Response Species Identification Sheet**

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**Appendix B. WDNR Rapid Response Species Identification Sheet**

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**Selected Regulated Aquatic Invasive Species in WI**



**Floating water hyacinth**  
*(Eichhornia crassipes)*



**Starry stonewort**  
*(Nitellopsis obtusa)*



**Hydrilla**  
*(Hydrilla verticillata)*



**Anchored water hyacinth**  
*(Eichhornia azurea)*



**Water lettuce**  
*(Pistia stratiotes)*



**Faucet snail**  
*(Bithynia tentaculata)*



**European frog-bit**  
*(Hydrocharis morsus-ranae)*



**Brittle naiad**  
*(Najas minor)*



**New Zealand mud snail**  
*(Potamopyrgus antipodarum)*



**Spiny water flea**  
*(Bythotrephes cederstroemi)*



**Malaysian trumpet snail**  
*(Melanoides tuberculata)*



**Duck lettuce**  
*(Ottelia alismoides)*



**Java waterdropwort**  
*(Oenanthe javanica)*



**Quagga mussel**  
*(Dreissena rostriformis)*



**Yellow floating heart**  
*(Nymphoides peltata)*



**Brazilian waterweed**  
*(Egeria densa)*

Report any **prohibited** species as soon as possible by emailing: **Invasive.Species@wi.gov**.  
This publication does not list all the regulated species. For the full list of Prohibited or Restricted species please visit:  
**www.dnr.wi.gov** keyword: **invasives**

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**      **Appendix B  
WDNR Rapid Response Species Identification Sheet**



Asian clam  
*(Corbicula fluminea)*



Floating marsh pennywort  
*(Hydrocotyle ranunculoides)*



Didymo  
*(Didymosphenia geminata)*



Giant salvinia  
*(Salvinia molesta)*



Red swamp crayfish  
*(Procambarus clarkii)*



Water spinach  
*(Ipomoea aquatica)*



Killer algae  
*(Caulerpa taxifolia)*



Asian marshweed  
*(Limnophila sessiliflora)*



Indian swampweed  
*(Hydrophila polysperma)*



Aquatic forget-me-not  
*(Myosotis scorpiodes)*



Spiny naiad  
*(Najas marina)*



Curly-leaf pondweed  
*(Potamogeton crispus)*



Zebra mussel  
*(Dreissena polymorpha)*



Rusty crayfish  
*(Orconectes rusticus)*



Chinese mystery snail  
*(Cipangopaludina chinensis)*



Yellow Iris  
*(Iris pseudacorus)*

**Prohibited Species**

**Restricted Species**

[www.dnr.wi.gov](http://www.dnr.wi.gov) keyword: **invasives**



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**Appendix C. Project Boundary**

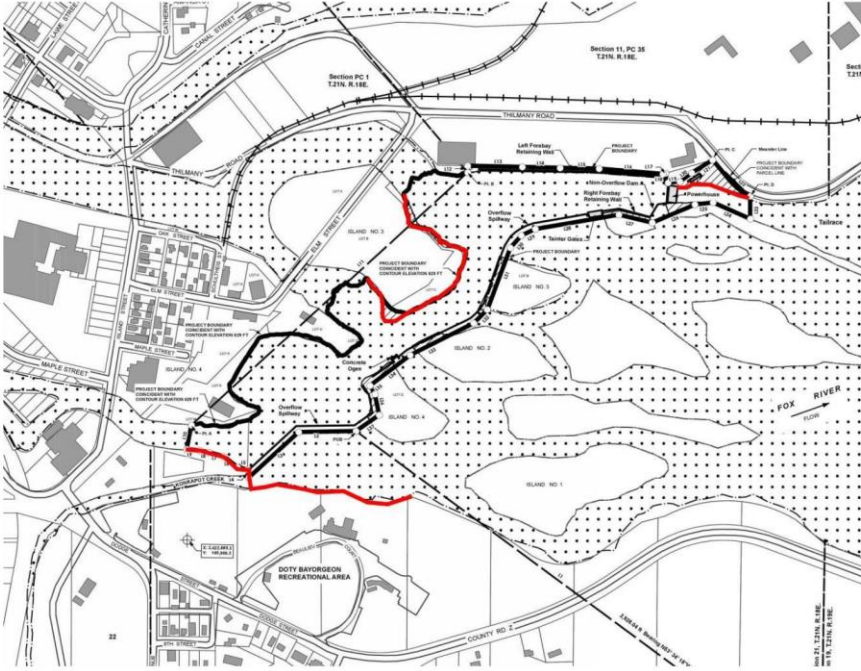
Agency Draft

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project

Appendix C  
Project Boundary





**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

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**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix D  
WDNR Reporting Forms**

---

**Appendix D. WDNR Reporting Forms**

Agency Draft

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**Appendix D  
WDNR Reporting Forms**

Form 32/00.1-xxx (R. 4/2019)

**Aquatic Invasive Species (AIS) Early Detection Monitoring Data**

The purpose of this form is to notify DNR of a new population of AIS. Only use if you found an aquatic invasive species where it hasn't been found previously. To find where aquatic invasives have already been found, visit <http://dnr.wisconsin.gov/topic/invasives/report.html>.  
 Notice: Information on this voluntary form is collected under s. 33.02 and 28.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes but may be made available to requestors under Wisconsin's Open Records laws, s. 19.32 - 19.39, Wis. Stats.  
 If the plant or animal cannot be collected due to safety concerns or it is located on private property, please take a photo (see Sample section below). DNR staff will then follow-up if further monitoring is needed for identification. Instructions: Bold fields must be completed.

**Instructions: Bold fields must be completed.**

Location Name	SWIMS Station ID	County	Collector(s)	Date	Start Time	End Time
Protocol <input type="checkbox"/> Wetland <input type="checkbox"/> Lake <input type="checkbox"/> Stream <input type="checkbox"/> Roadside <input type="checkbox"/> OIT <input type="checkbox"/> Pathway <input type="checkbox"/> Maritime <input type="checkbox"/> State & Fed <input type="checkbox"/> Road & Trans <input type="checkbox"/> Canal, Dam, Div <input type="checkbox"/> Rec <input type="checkbox"/> OIT <input type="checkbox"/> Natural <input type="checkbox"/>						
<b>STEP 1: Become familiar with the ID handout before monitoring. Circle species looked for. These species will appear in SWIMS dropdown when entering fieldwork event.</b> <b>AQUATIC PLANTS/ALGAE</b> Brazilian waterweed* Curly leaf pondweed Didymo* Eurasian water milfoil European frogbit* Fairy stonewort* Fanwort* Hydrilla* Java water dropwort* Parrot feather* Yellow floating heart* <b>RIPARIAN PLANTS</b> Cattail - hb/narrow Cattail-graceful*/south* Flowering rush Giant hogweed* Hairy willow herb* Japanese hops* Knotweed-Bob*/giant* Knotweed-Japanese Lesser celandine* <b>INVERTEBRATES</b> Manchu tubert Phragmites* Purple loosestrife Red manna grass* Faucet snail* New Zealand mudsnail* Other:						
<b>STEP 2: Record locations of sites in decimal degrees. If diverting from the protocol (i.e. not snorkeling), indicate how and why in comments. List AIS found, gross area, cover, infested area and whether specimens were live/dead. Indicate whether specimens/photos were collected. Include internal and external labels with species name, SWIMS Station ID, Station name, county, sample date, and collector(s). Legibility is important. If needed, preserve with alcohol (4:1). If possible, submit maps.</b>						
Site <sup>1</sup>	Latitude	Longitude	Species, gross a. <sup>2</sup> , cover (1-6) <sup>3</sup> , infested a. (sq. m.) <sup>4</sup> , and L:D (1-7) <sup>5</sup>	Specimen (Y/N)	Photo (Y/N)	Comments (include habitat, description or protocol changes)
	XX.XXXXX	-XX.XXXXX	Species Gross Area Cover Infested Area	Live/Dead		

**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
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**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix D  
WDNR Reporting Forms**

Form 3200.1-xxx (R. 4/2019)

Aquatic Invasive Species (AIS) Early Detection Monitoring Data

Site <sup>1</sup>	Latitude -XX.XXXXX	Longitude -XX.XXXXX	Species	Species, gross area <sup>2</sup> , cover (1-6) <sup>3</sup> , infested area (sq m) <sup>4</sup> , and LD (1-7) <sup>5</sup>		Specimen (Y/N)	Photo (Y/N)	No AIS (Y/N)	Comments (include habitat description or protocol changes)
				Gross Area	Cover				

1 Boat landing (BL), access (A), targeted search site (TS), meander/incidental site (MS)  
 2 Gross Area: estimate square meter area of survey site. We generally survey 15m x 15m or 225m<sup>2</sup> (~50ft x 50ft or 2,500ft<sup>2</sup>) at each site.  
 3 Cover (Daubemire): 1: 0 - 5% (2.5%), 2: 5 - 25% (15%), 3: 25 - 50% (37.5%), 4: 50-75% (62.5%), 5: 75-95% (85.0%), 6: 95-100% (97.5%). Median % cover is the value in parentheses.  
 4 Infested area: gross area x median % cover. For median % cover see value in parenthesis in cover above. This will be calculated on Pads, but manually calculated in SWIMS.  
 5 LD Classes - 1: 1000; 2: 95; 3: 75-25; 4: 50-50; 5: 25; 75; 6: 5; 95; 7: 0; 100. Live (L) animals will contain flesh and respond; live plants will be green or with live tissue when scratched and have reproductive fragments (seeds, flowers, apical meristem, etc.). Dead (D) animals will not contain flesh or respond and dead plants sterile fragments that won't root.  
**Comments:**

**STEP 3:** Submit specimens/photographs and a map to Regional DNR AIS coordinator for verifier examination (required for all new records). Name photos with the SPSCODE\_COUNTY\_YYYYMMDD\_WATERBODY\_NAME\_(WBIC or STATIONID or LAT-LONG)\_COLLECTOR-NAME as detailed in the Photo Guidance. Regional DNR AIS coordinator will ensure ROI creation/editing.

Species	Specimen (Y/N)	Photo Name	Date sent	Comments	This section is completed by the verifier(s)				
					Verifier #1	Date	Verifier #2	Date	

**STEP 4:** Data was entered into SWIMS on \_\_\_\_\_ by \_\_\_\_\_  
 Once data is entered, send scans of data sheets to Regional DNR AIS Coordinator or attach them to the SWIMS project.  
**STEP 5:** Data was proofed on \_\_\_\_\_ by \_\_\_\_\_



**Appendix E. Documentation of Consultation**

Agency Draft

## Wisconsin Department of Natural Resources Comments

### Shawn Puzen

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**From:** Smith, Amanda S - DNR <Amanda.Smith@wisconsin.gov>  
**Sent:** Wednesday, September 18, 2019 12:04 PM  
**To:** Shawn Puzen; Laatsch, Cheryl - DNR; Hudak, Andrew J - DNR  
**Subject:** Summary of WDNR comments on KU City Plant Invasive Species Plan  
**Attachments:** Ch6-Mussels.pdf

Hi Shawn, Cheryl, and Andy,

As promised, I took a stab at summarizing our discussion –

In order to adequately monitor the project boundary for early detection species, both terrestrial and aquatic, the downstream islands (i.e. Island 1, 2, 3, 4) and the surrounding waterway will be included in the monitoring scope. The spillway itself is not necessarily a habitat where invasive species could establish, but rather could serve as a corridor for species flowing downstream. Therefore, the adjacent islands and surrounding waterways immediately downstream of the project boundary should be monitored.

Because safety is a pressing concern to this project area and the islands, multiple meander track options should be drafted in order to accommodate for water levels and water flow. The monitor should use discretion when selecting which meander track to follow on the scheduled monitoring date.

In regards to Quagga Mussel monitoring, the bottom of page 135 of the Citizen Lake Monitoring Network protocol “Prevention Monitoring” describes a quick and easy method.

As discussed, here is the Disinfection Best Management Practice webpage:  
<https://dnr.wi.gov/topic/Invasives/disinfection.html>

**We are committed to service excellence.**

Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

Amanda Smith

Aquatic Invasive Species Specialist – Office of Great Waters  
Wisconsin Department of Natural Resources  
2984 Shawano Ave. Green Bay, WI 54313  
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# ZEBRA & QUAGGA MUSSELS

# 6

## MONITORING PROTOCOL



- Background/Overview.....129
- Life Cycle.....130
- Identification.....131
- Monitoring.....133
  - Types of Monitoring.....133
  - When to Monitor.....135
  - Where do I Look for Zebra or Quagga Mussels?.....135
  - How to Monitor.....135
  - Equipment Needed.....138
  - Setting Up a Monitoring Team.....139
  - Mapping.....139
  - Reporting.....140
  - What to do with Suspect Specimens.....141
- Additional Materials and Supporting Documentation.....143
  - References.....144
  - Data Reporting Forms.....145
  - Substrate Sampler Construction Diagram.....153





## BACKGROUND/OVERVIEW

Zebra and quagga (Dreissenid) mussels are non-native mussels that can have large impacts on lake ecosystems. They are filter feeders, which mean they feed by drawing water into their bodies and filtering out most of the suspended microscopic plants, animals, and debris in the lake water for food. A single mussel can filter about one quart of water each day. Zebra and quagga mussels primarily feed on phytoplankton (algae in the water column), which may result in increased water clarity, but will result in a depleted food supply for other aquatic organisms. When zebra and quagga mussels become established in a lake they filter plankton from the water column, thus zooplankton and the small fish which feed on plankton have less to eat, and tend to decrease in number. Larger fish which feed on the small fish also decrease in number. Light sensitive fish such as walleye may move to deeper waters.

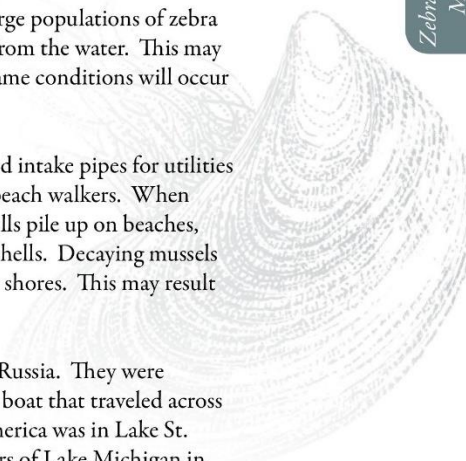
With increased water clarity, aquatic plant beds may become denser and plants are able to grow at deeper locations. Although denser plant beds may create more habitat for small fish, they can inhibit larger, predatory fish from finding their food. This thicker plant growth can also interfere with boaters, anglers and swimmers. Because quaggas and zebra mussels are prolific water/food filters, they eat up the food source of fish and can change the food web in a lake. They also take in pollutants. Their bodies accumulate these pollutants so the pollutant levels in their bodies are higher than the surrounding area. This can harm wildlife that feed on these mussels.

Zebra and quagga mussels displace native mussels. They can promote the growth of blue-green algae because they avoid consuming this type of algae. Some of the blue-green algae release toxins when they decompose. Zebra and quagga mussels seldom eat filamentous algae, the slimy algae that cause unsightly algal blooms. When large populations of zebra mussels die off, their decomposition consumes dissolved oxygen from the water. This may result in lower dissolved oxygen levels. It is anticipated that the same conditions will occur when quagga mussels die off in large numbers.

Zebra and quagga mussels can clog the intakes on boat engines and intake pipes for utilities and industrial facilities; and their sharp shells can cut the feet of beach walkers. When they die, they wash up on the shore and begin to decay. These shells pile up on beaches, in some cases there will be “windrows” several feet thick of these shells. Decaying mussels often attract birds that feed on the mussels and defecate along the shores. This may result in elevated bacteria levels.

Zebra mussels are native to the Ponto-Caspian region of western Russia. They were accidentally introduced to North America in ballast water from a boat that traveled across the ocean. The first known location of zebra mussels in North America was in Lake St. Claire in 1988. Zebra mussels first arrived in the Wisconsin waters of Lake Michigan in the Racine harbor in 1990. It is believed that zebra mussels are frequently transported from an infested lake to other lakes as mature mussels attached to aquatic plants, which are “hitching rides” on boats and boat trailers. The list of waterbodies in Wisconsin where zebra mussels have been verified can be found at <http://dnr.wi.gov/lakes/invasives/>.

Zebra/Quagga  
Mussels







Zebra/Quagga  
Mussels

Quagga mussels are from the Caspian Sea drainage area in Eurasia, in particular the Dneiper River drainage of the Ukraine (Eastern Europe). Quagga mussels were found in Lake Erie in 1989. So far, in Wisconsin, the quagga has been found only in Lake Michigan waters - not in any inland lakes. But because they prefer silt- and sand-bottomed lakes, quagga mussels may be able to successfully invade inland lakes including some lakes that do not have good habitat for zebra mussels. The Dreissenid population in Lake Michigan has largely shifted from zebra mussel dominance to quagga mussel dominance from 1989 to 2008. There is concern that quagga mussels will infest lakes already infested with zebra mussels as Lake Michigan has become a "source" lake. If this happens, the inland zebra mussel lakes may be impacted even more. Quagga mussels have also found their way out west. They were discovered in Arizona in 2007.

Zebra mussels tend to do best in warmer waters and quagga mussels tend to do best in cooler waters. Zebra mussels can live in the near shore area out to a depth of 110 meters (260 feet), but do best in water depths of 2-12 meters (6-40 feet). Quagga mussels prefer water that is deeper where there is less turbulence, but they can survive in near-shore shallow water areas. Quaggas have been found in waters as deep as 130 meters (426 feet) in the Great Lakes, but do best in water depths of 10-30 meters (32-98 feet). Quagga mussels can inhabit the same rock habitat as zebra mussels, plus they can thrive on silty or sandy areas. Quagga mussel byssal threads tend to be weaker than zebra mussel byssal threads. This may be a reason they prefer the deeper less turbulent areas in lakes. Quaggas are able to tolerate somewhat salty water. Quaggas can out-compete zebra mussels in areas that favor quagga reproductive conditions (deeper water depths and lower temperatures). A quagga mussel feeds all year, even in winter when its cousin the zebra mussel is dormant. Some researchers believe that Lake Erie's dead zone may be that way because of quaggas' non-stop feeding, their ability to live in deep water and the excretion of phosphorus with their waste. (Carrick 2002) <http://agsci.psu.edu/international/programs/americas>.



## LIFE CYCLE

Zebra mussels reproduce when the water temperature gets above 54 degrees Fahrenheit. Male zebra mussels release a cloud of sperm into the water. Female zebra mussels release a cloud of eggs. A female zebra mussel can produce 30,000 - 1,000,000 eggs in one year. The fertilized eggs quickly develop into microscopic free-swimming larvae called veligers (pronounced VEL-i-jers). Veligers feed on tiny phytoplankton and begin to grow shells. Water currents can cause veligers to travel great distances. At 3-5 weeks, the veligers' shells weigh enough to cause them to sink. They must find something to attach to or they will die. Some of the veligers attach to hard surfaces with their sticky byssal threads. Hard surfaces include rocks, wood, glass, metal, native mussels, aquatic plants, and each other. This is when they change from free-swimming larvae to anchored zebra mussels. Luckily, only 2-3% of the veligers survive to this stage (but that is still 6,000 - 30,000 per female mussel). The young zebra mussels reach sexual maturity during their first year and are ready to continue the cycle. Adult zebra mussels are normally small, about ¾ to 1½ inch in length, but sometimes grow larger.

Quagga mussels have thinner shells than the zebra mussels. Quagga mussels reproduce when the water temperature gets above 46 degrees Fahrenheit. Like zebra mussels, male

quagga mussels release a cloud of sperm and female zebra mussels release a cloud of eggs into the water. A female quagga mussel can produce 1,000,000 eggs in one year. The fertilized eggs quickly develop into microscopic free-swimming larvae called veligers. Veligers feed on tiny phytoplankton and begin to grow shells. At 3-4 weeks, the veligers' shells weigh enough to cause them to sink. Luckily in this transitional stage, mortality is high and may exceed 99%.

The veligers from zebra mussels or quagga mussels cannot be discerned with microscopic evaluation. When a veliger is observed, we know that we have a Dreissenid species, but adult mussels need to be found to confirm whether it is a zebra mussel or quagga mussel. Quagga mussels can survive on silt, sand or hard substrate. The shells of the quagga mussels are thinner and lighter for those mussels that live on soft substrate and thicker and heavier for those mussels that live on hard inshore substrates. Quagga mussels tend to grow in single layers and produce more patchy distributions than zebra mussels. Zebra mussels attach to each other and forms clumps of mussels.



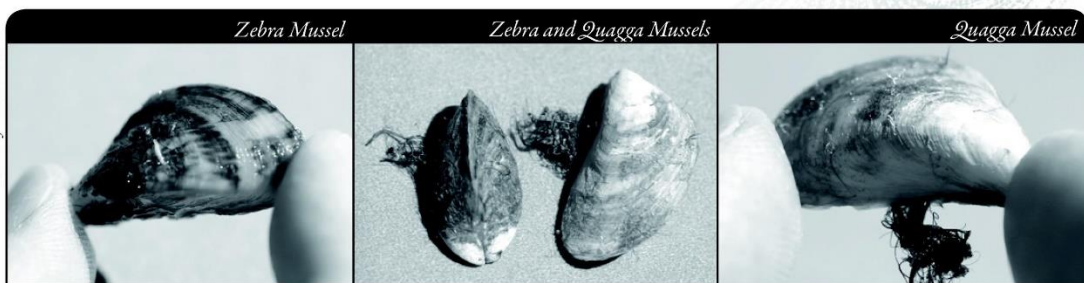
## IDENTIFICATION

In your packet is a Zebra Mussel Watch Card. This card, along with the descriptions below, will help you in the identification of zebra and quagga mussels.

Zebra and quagga mussels have two shells held together by a strong ligament, which make them 'bivalves'. All mussels and clams are bivalve mollusks. In fact, many of the mollusks people call clams are actually mussels.

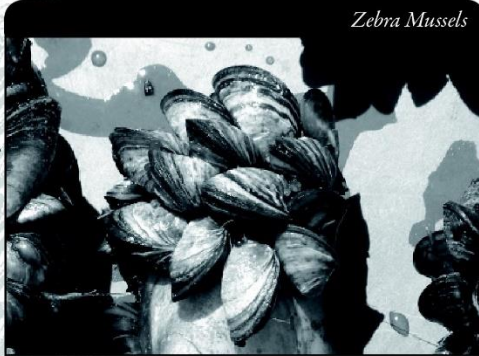
Zebra mussels, *Dreissena polymorpha* (pronounced dry-SIN-nee-a poly-MOR-fa), and quagga mussels, *Dreissena rostriformis bugensis* (pronounced dry-SIN-nee-a rost-ree-FORM-ez bug-EN-sis), are different from native mussels and clams in that they tend to attach to hard surfaces, such as rocks or man-made structures. They are also unique with their free-swimming larval stage – veligers. If you find a “clam” that is attached to a hard object (including plants), please take it to your local CLMN contact.

Refer to pictures below as well as reference materials in your packet, and characteristics listed on the following page.



Zebra mussels will balance on the hinge when placed on a table; quagga mussels will “roll,” as the hinge area is more rounded. Note the byssal threads at the hinge edge of the shells.

Photo by Darren Emerson



*These zebra mussels are attached to a larger, native mollusk.*

#### ZEBRA MUSSEL CHARACTERISTICS:

- Mostly white or cream-colored with jagged brown or black stripes across the shell (which is what gives them their 'zebra' name). However, zebra mussels can come in many colors. Some zebra mussels are all-white, all-black, or have stripes going in the other direction.

- Byssal threads are located on the hinge edge of their shell. These byssal threads are what the zebra mussel uses to attach itself to hard surfaces. Byssal threads are unique to zebra and quagga mussels and are not found on native mussels. The strength of the byssal threads depends upon the substrate to which it is attached.

- Adults range from 1/8 - 2 inches in length.
- Shell is D-shaped. If you place a shell with its hinge edge on a table, the shell will balance on the hinge. The quagga mussel (another non-native you may encounter) will fall over when placed on its hinge. For monitoring purposes, we don't distinguish between these two non-native mussels. They so closely resemble each other that we leave the identification up to the experts.

#### QUAGGA MUSSEL CHARACTERISTICS:

- Shell is normally striped, as is that of the zebra mussel, but the quagga shell is paler toward the hinge. There is a wide range in coloration with some shells being pale or even completely white.
- Byssal threads located on the hinge edge of their shell. These byssal threads are what the quagga mussel uses to attach itself to hard surfaces. Byssal threads are unique to quagga and zebra mussels and are not found on native mussels.
- The adult quagga mussels are slightly larger than the zebra mussels. They can be up to 0.8 inches wide and over 2 inches in length.
- Shell is more rounded (fan shaped with pointed edges at either side) on the hinge edge than the zebra mussel shells. If you place a shell with its hinge edge on a table, the shell will "roll" off of the hinge. The zebra mussel (another non-native you may encounter) will balance on the hinge. For monitoring purposes, we don't distinguish between these two non-native mussels. They so closely resemble each other that we leave the identification up to the experts.
- The shells of the quagga mussels are thinner and lighter for those mussels that live on soft substrate and thicker and heavier for those mussels that live on hard inshore substrates.

Zebra/Quagga  
Mussels



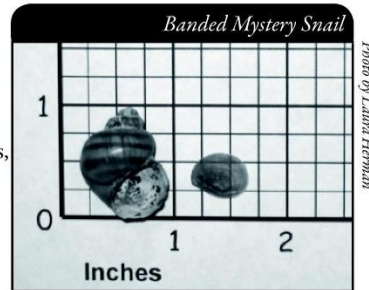
Photo by Robert Korth



Zebra and quagga mussels are sometimes confused with another non-native species, the banded mystery snail. The banded mystery snail has a single spiraled shell. The quagga and zebra mussels have two separate shells attached with a hinge.

**BANDED MYSTERY SNAIL CHARACTERISTICS:**

- Shell is a single shell (zebra and quagga mussels have two shells attached with a hinge).
- Shell has a rounded spiral shape
- Shell has distinct reddish-brown bands. This feature is VERY obvious if you have empty shells, but a little more subtle among living snails.
- No byssal threads
- Can get up to 1.5 inches in length



*Banded mystery snail. Note the rounded shape and lack of byssal threads.*



## ZEBRA AND QUAGGA MUSSEL MONITORING

### TYPES OF MONITORING

The CLMN focuses on the monitoring of adult zebra and quagga mussels. Adult mussel monitoring serves several purposes: (1) to track the spread by collecting data on lakes where zebra mussels have not been reported – as of 2008, quagga mussels have not been found on any Wisconsin inland lakes so quagga monitoring is necessary to verify if quaggas become established in Wisconsin inland lakes; (2) to verify a reproducing population if veligers have been identified as being present in a water sample; and (3) to determine the population densities of mussels after an infestation has occurred. The monitoring for both mussels species is the same.

There are two types of adult zebra and quagga mussel monitoring: prevention monitoring and established population monitoring.

#### **PREVENTION MONITORING**

If a lake is not known to have zebra or quagga mussels, citizen lake monitors can play a very important role by regularly monitoring the lake and reporting that nothing has been found or, if these mussels are found, letting DNR staff know so that the lake's landings can be posted to warn lake users about not spreading zebra or quagga mussels to other lakes. Shoreline surveys and regular inspections of structures in the water is the method used

Zebra/Quagga  
Mussels



Zebra & Quagga  
Mussels

to determine the presence/absence of zebra and quagga mussels. This method is more productive than using a substrate sampler as it covers a larger area on the lake. A single observer can observe many square meters of substrate in a short period of time just by strolling the lake's shorelines and observing the shallow water areas.

#### **ESTABLISHED POPULATION MONITORING**

If zebra or quagga mussels have already been found (or are newly found) and population density estimates are wanted, substrate sampler monitoring should be used. (Substrate refers to any substance in the water that these mussels may attach to.) Sometimes this method is used on lakes not known to have zebra or quagga mussels, or when zebra mussels have been found in an upstream waterbody (as of December 2009, quagga mussels have not been found on any Wisconsin inland lake). Contact your local DNR staff (page viii) to see if substrate sampling is an appropriate monitoring technique for your lake. You should contact Jennifer Filbert, [Jennifer.Filbert@wisconsin.gov](mailto:Jennifer.Filbert@wisconsin.gov), with the locations where you placed your samplers. Jennifer can map these specific points and link the maps to your SWIMS data.



### *ADDITIONAL MONITORING OPPORTUNITIES*

#### **VELIGER (LARVAE) MONITORING**

The CLMN is unable to provide veliger monitoring equipment to individual lake volunteers because the equipment is very expensive. However, DNR staff annually selects water bodies to sample for zebra and quagga mussel veligers, and a CLMN volunteer can often help by providing a boat and assistance to DNR staff. Having a volunteer provide a boat that is already on the lake can eliminate the need for DNR staff to trailer a boat to the lake and disinfect the boat before and after collection. Since the volunteer would be assisting in the monitoring, only one DNR staff person would be needed to do the sampling safely and efficiently. **If you have an interest in learning about the veliger monitoring procedures, contact [laura.herman@uwsp.edu](mailto:laura.herman@uwsp.edu) for a copy of the protocols. If you are interested in assisting with veliger monitoring, contact your local DNR staff (page ix).**

### WHEN TO MONITOR

#### **PREVENTION MONITORING**

- Conduct shoreline surveys about once every two weeks from ice out to ice on. More or less frequent observations may be conducted if desired.
- A survey can be conducted while swimming, taking a casual stroll along the shoreline, or fishing.
- In the fall, check your dock, piers, buoys and boats when you are removing them from the lake. Some residents prefer to do this monitoring in the spring prior to placing their equipment back in the water. In spring, the algae will have dried, leaving just the zebra or quagga mussels behind. Also, residents are often rushed when the equipment is pulled out in the fall. There may be more time to check in the spring.

#### **ESTABLISHED POPULATION MONITORING**

Substrate samplers should be placed into the lake in May. One of the two substrate samplers should be removed and checked once each month from May through September. The other substrate sampler should be left in the entire monitoring season and then checked at the end of the monitoring season (September).

### WHERE DO I LOOK FOR ZEBRA AND QUAGGA MUSSELS?

#### **PREVENTION MONITORING**

- Target areas around public boat ramps or areas that are likely to have a lot of boating traffic in the vicinity (for example, fishing hot spots, resorts, campgrounds, etc.).
- Any solid surface is a suitable substrate to observe zebra or quagga mussels. Divers can monitor in deeper water, or small rocks can be lifted through use of a net. Zebra mussels tend to prefer to attach to hard substrate (rock, wood, and shells). Quagga mussels can live in sand and muck areas as well as areas inhabited by zebra mussels.
- Zebra and quagga mussels do not like direct sunlight and are more often found on the underside of rocks and in cracks and crevices of rocks and structures. Small zebra and quagga mussels can be attached to plants.

#### **ESTABLISHED SPECIES MONITORING**

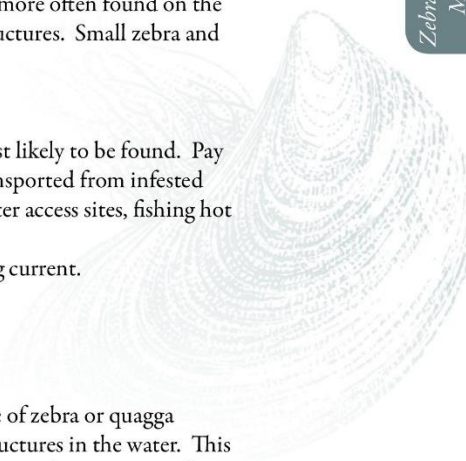
- Place samplers in areas where zebra or quagga mussels are most likely to be found. Pay special attention to areas in which mussels may have been transported from infested waterways (for example, public and private boat landings, water access sites, fishing hot spots, resorts, campgrounds, etc.).
- Avoid placing substrate samplers in areas where there is strong current.

### HOW TO MONITOR

#### **PREVENTION MONITORING**

Prevention monitoring is used to determine the presence/absence of zebra or quagga mussels. It entails shoreline surveys and regular inspections of structures in the water. This method is more productive than using a substrate sampler as it covers a larger area on the lake. A single observer can observe many square meters of substrate in a short period of time just by strolling the lake's shoreline and observing the shallow water areas.

Zebra/Quagga  
Mussels



The easiest way to search for zebra or quagga mussels is to walk the shoreline looking for “clams” that are attached to rocks, docks, piers and plants. If you find a “clam” that is attached to a hard object, collect it and take it to your local DNR CLMN contact.



*Zebra mussels often attach to plants. These zebra mussels are attached to native water-milfoil.*

*Zebra mussels attached to roots of a plant. This plant was found attached to a boat trailer.*

Rub your hands on hard surfaces. Small zebra and quagga mussels will feel like sandpaper. If you think you have found zebra or quagga mussels, gently scrape the surface to collect the mussels. Place the scrapings in a jar of water or rubbing alcohol and take the sample to your local DNR CLMN contact. Your contact will send in the sample to be analyzed.

**NOTE**

A plastic paint can mixer (flat plastic rectangular piece) works great to scrape small zebra or quagga mussels from hard objects. You still have to be gentle, but it is easier than trying to pick the mussels off with your hands. If the mussels are found on a small item (for example a small rock) just bring the object with the mussels attached right to your DNR CLMN contact.

*Zebra/Quagga  
Mussels*

**ESTABLISHED POPULATION MONITORING**

Established population monitoring is used to estimate densities of zebra or quagga mussels.

**Placing the Substrate Samplers**

- Place samplers in areas where zebra or quagga mussels have been found. Pay special attention to areas in which these mussels may have been transported from infested waterways (for example, public and private boat landings, water access sites, fishing hot spots, resorts, campgrounds, etc.).
- Avoid placing substrate samplers in areas where there is strong current.
- Place the substrate samplers in an area where there will be little chance of vandalism.
- Hang the substrate sampler from a dock, pier or other structure found in the water. An existing float or buoy may be used to suspend the sampler in the water column. If you plan to use a new float or buoy, you will need a waterway marker application and permit from the DNR.

- Put two samplers at each location chosen for monitoring. Suspend substrate samplers mid-depth in water. Place the samplers one above the other (one higher in the water column than the other).
  - The top sampler should be removed and analyzed once every four weeks, then placed back into the lake for another four weeks.
  - The second (bottom) sampler should remain in the water for the entire monitoring season (May-September).

Securing the two samplers on the same line with clips makes it easy to remove and replace the top one every four weeks. A small concrete block anchor works to hold the samplers in place (and provides an additional substrate sampler to examine). Rope can be used to suspend the sampler, but sometimes wildlife will sever the rope. Chains work better in order to secure the samplers.

#### Analyzing the Substrate Samplers

The top substrate sampler should be analyzed once a month to determine if zebra or quagga mussels are present. The bottom substrate sampler should be analyzed at the end of the monitoring season, in September. Substrate sampler monitoring documents the arrival of zebra or quagga mussels, tracks the spread of these mussels, and determines mussel population growth and seasonal abundance. This level of monitoring will provide estimates of population density and help determine when zebra or quagga mussels are settling in an area.

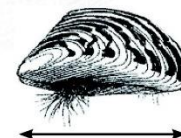
1. Place sampler in a small, white or clear garbage bag as you remove it from the water. This will prevent the mussels from falling off into your boat.
2. At home, disassemble the sampler and examine each plate with a 30x-hand lens. Scan all four plates, top and bottom, looking for zebra or quagga mussels.
3. Recently settled veligers can be very small. If you were to rub your hands along the plate, the surface will feel like sandpaper. If your lake is not known to have zebra or quagga mussels and you believe that you have detected veligers, please hand deliver these to your local DNR CLMN contact (page viii).



**NOTE** A plastic paint can mixer (flat plastic rectangular piece) works great to scrape small zebra or quagga mussels from the plate sampler. You still have to be gentle, but it is easier than trying to pick the mussels off with your hands.

Count the number of mussels found on the top and bottom of each plate and record these numbers separately (use the Zebra and Quagga Mussel Quantitative Report, Form 3200-127. Reporting forms can be found at the end of this section and at <http://dnr.wi.gov/lakes/monitoring/forms.aspx>.

4. If you have a sampler with 1-inch grids, feel free to count the zebra or quagga mussels in several of the 1-inch squares and then estimate the number of mussels per plate instead of counting the mussels on the entire sampler.
5. Report the lengths of the smallest and largest mussels on the plate to the nearest millimeter (1/16-inch). Measure the longest axis of the shell. See diagram at right.



Zebra/Quagga  
Mussels





For an initial discovery, all zebra or quagga mussels collected should be placed in rubbing alcohol for expert verification. Complete the zebra and quagga mussel reporting form and **hand deliver** the form and the specimens to your DNR CLMN contact. **It is illegal to ship or mail alcohol.**



**NOTE** Sampler plates should be thoroughly scrubbed (using a brush and water), dried, and reassembled. If needed, replace the sampler back into the lake for another four weeks. If it is the end of the sampling season, store the sampler(s) for reuse next year.

### EQUIPMENT NEEDED

#### PREVENTION MONITORING

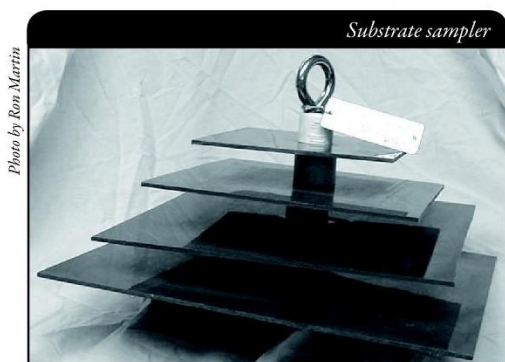
- Hand lens - 30 magnification (30X)
- Rubbing alcohol
- Aquatic Invasives Surveillance Monitoring Report, Form 3200-133 (found at the end of this section and at <http://dnr.wi.gov/lakes/monitoring/forms.aspx>)
- Aquatic Invasive Animal Incident Report Form 3200-126 (found at the end of this section and at <http://dnr.wi.gov/lakes/monitoring/forms.aspx>)

#### ESTABLISHED SPECIES MONITORING

- Substrate samplers (see description and photo below)
- Rope or chain (rope may get chewed on by muskrats or other animals)
- Anchor (e.g. concrete block)
- Hand lens - 30 magnification (30X)
- Rubbing alcohol
- Zebra and Quagga Mussel Quantitative Report, Form 3200-127 (found at the end of this section and at <http://dnr.wi.gov/lakes/monitoring/forms.aspx>)

A substrate sampler is a series of four square plates that are 6, 8, 10 and 12 inches in size, pyramiding from smaller plates at the top, down to larger plates at the bottom. The plates are made of 1/8 inch grey plastic PVC stock with 3/4-inch PVC pipe for spacers (1-inch

sections) between the plates. The sampler is held together with an 8 inch long, 3/8 inch diameter stainless steel eyebolt, plus washers and a wing nut. The substrate samplers are easily disassembled to allow for cleaning between sampling seasons. Some plates have 1-inch grids marked on them. These grids are used to facilitate counting of the mussels on the plate samplers. This is very helpful if a lake has a lot of zebra or quagga mussels and it would be impossible to count the entire plate. If your plate does not have these markings, feel free to mark them with a sharpie or etch the squares onto your plate sampler.



*Substrate sampler for zebra and quagga mussel monitoring.*

Each sampler has a DNR tag attached that provides a phone number for further information. Samplers will be provided by your local DNR CLMN contact.

If you are interested in building additional samplers, a detailed construction diagram can be found at the end of this section.

### SETTING UP A MONITORING TEAM

Often it is easier to “divide” up the work than to rely on one volunteer to monitor an entire lake for invasives. Designate a team leader (and maybe an assistant) who is willing to keep track of what areas are being monitored and who is doing monitoring. The team leader can also be the person who enters the monitoring results on the CLMN website, <http://dnr.wi.gov/lakes/CLMN> and the person to whom other volunteers can bring suspect species. If assistance in identification is needed, the team leader can take the species to DNR, UW-Extension, or the County Land and Water Conservation staff. Remember; do not burn out your team leader!

Consider having a mini-training session for your team. Contact your local CLMN contact to see if an Aquatic Invasive Species training session will be scheduled for your area. These sessions are often set up in conjunction with local lake fairs and conventions. AIS workshops/training sessions are also listed at <http://www.uwsp.edu/cnr/uwexlakes/CLMN/training.asp>.

### MAPPING

A map is a very quick and reliable way to assure that everyone knows the place you are talking about when you describe a certain point on your lake. A map will assist you in locating sampling sites, recreational and habitat use areas, and more. At the end of the season, you can map all of the sites visited.

If you have a team of monitors, a map will also assist your team in deciding who will monitor where. Once you have your “team” together, print out a map so that you can mark which areas each volunteer is monitoring. Your team leader should keep the master copy of the map. It may be easiest to have volunteers monitor the areas by their homes or where they spend time on the lake. Assigning smaller (1/2 or 1-mile) stretches of shoreline per volunteer will be less overwhelming than monitoring larger areas of the lake.

You can get maps from your local DNR office, Fishing Hot Spots, fishing map books, etc. Basic lake maps can also be generated through the DNR web site: <http://dnr.wi.gov/lakes/lakepages/search.aspx>. Type in the name of the lake and choose the county, then click “search.” Click on the lake name (if there are two or more lakes with the same name in the same county, select the lake you are after). This site will give you a plethora of information about your lake, but to find a map, scroll down to the map section

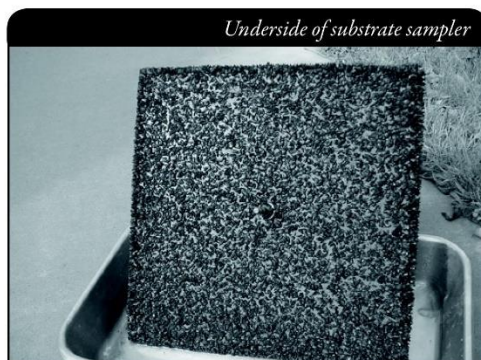


Photo by Mike Paud

*Small zebra mussels attached to the bottom of a plate sampler.*

Zebra/Quagga  
Mussels



Zebra/Quagga  
Mussels

and either click on “Contour (Bathymetric) Map” for a printable version, or click on “Interactive Map.” The interactive map (in the Surface Water Viewer) allows you to add in “layers” such as invasive species or monitoring sites.

Use a map source that is most convenient for you. Make sure the following information is on your lake map: lake name, county, sites monitored, date(s), volunteer(s), and any additional observations.

If you have a GPS unit, you may want to mark locations monitored and then load this data into a mapping program and print out locations of areas monitored.

### REPORTING

What would all the work that goes into gathering accurate information be worth if others could not read, review and act on it? Reporting is one of the most important parts of monitoring for invasive species. Knowing where species are not, as well as where they are, is extremely important in being able to track and understand their spread. Knowing how often monitors are looking for species and what they are finding is very important information.

The DNR, lake managers, researchers, and others use the data that is reported through the CLMN to study lakes and better understand aquatic invasive species. The information reported by volunteers is also provided to the state legislature, federal, tribal and local agencies/organizations that in turn may use this data to help determine funding for invasive species grants and programs.

You can enter your monitoring results on the CLMN website:

<http://dnr.wi.gov/lakes/CLMN> (click “Enter Data” on the left side bar). If you don’t yet have a user id & password, click ‘Request a Wisconsin User ID and Password’. Then, email Jennifer at [jennifer.filbert@wisconsin.gov](mailto:jennifer.filbert@wisconsin.gov) with your User ID and what monitoring you are involved in. Jennifer will set up your accounts and email you back. Once you receive an email back, you can log in. Once you’re logged in, go to the Submit Data tab and click “Add New” to start entering data. Choose the AIS Monitoring project for your lake in the Project dropdown box.

- For prevention monitoring, report your results using the: Aquatic Invasives Surveillance Monitoring Report, Form 3200-133
- For established population monitoring, report your results using the: Zebra and Quagga Mussel (Quantitative) Report, Form 3200-127
- If you believe you found zebra or quagga mussels and your lake has not been previously known to have zebra or quagga mussels, report the information using the: Aquatic Invasive Animal Incident Report, Form 3200-126.

You can report your results as often as you wish, but be sure to at least report results once a year, at the end of the monitoring season. If you are doing Established Population Monitoring, you will probably want to report your results once a month. Before you analyze the top substrate sampler, print out a paper copy of the reporting form off the website so you can write down the number of mussels you find on each plate, as well as the lengths of the smallest and largest mussels. Then enter these numbers on the CLMN website.



Remember, for tracking the movement of zebra mussel infestations, a report of 'no zebra or quagga mussels' at a location is just as important as finding zebra or quagga mussels. One cannot confidently state that zebra or quagga mussels are not present in an area if no one has looked.

### *WHAT TO DO WITH SUSPECT SPECIMENS*

Collect any mussels that you believe are zebra or quagga mussels. Place them in a jar of water or rubbing alcohol. Note the "suspect" mussel location on your map, making sure you can find the spot(s) again. Fill out the Aquatic Invasive Animal Incident Report (Form 3200-126) at <http://dnr.wi.gov/lakes/monitoring/forms.aspx> or fill out the hard copy of the form found at the end of this section and hand deliver it with the suspect zebra or quagga mussel to your team leader or local CLMN contact (page viii). Suspect zebra and quagga mussels need to go to the DNR for vouchering. Do not mail them. It is illegal to ship or mail alcohol.



### *PREVENTION STARTS WITH US*

Whether you are out monitoring, or just boating for fun, be sure to remove all aquatic plants and animals from boating equipment, including your trailer, boat, motor/propeller and anchor before launching and after leaving the water. Small zebra and quagga mussels will attach to plants. By removing aquatic plants and animals from boating equipment and encouraging others to do the same, you can help protect Wisconsin lakes from zebra and quagga mussels.

Photo by Robert Korth



*Windrows of zebra mussels wash up on shores of the Great Lakes.*

Zebra/Quagga  
Mussels





## *ADDITIONAL MATERIALS AND SUPPORTING DOCUMENTATION*

### ZEBRA AND QUAGGA MUSSEL INFORMATION SOURCES

#### REPORTING FORMS

- AQUATIC INVASIVES SURVEILLANCE MONITORING REPORT
  - SINGLE LOCATION, MULTIPLE DATES
  - MULTIPLE LOCATIONS, ONE DATE
- AQUATIC INVASIVE ANIMAL INCIDENT REPORT
- ZEBRA MUSSEL (QUANTITATIVE) REPORT
- MUSSEL VELIGER TOW MONITORING REPORT

### ZEBRA AND QUAGGA MUSSEL SUBSTRATE SAMPLER

#### CONSTRUCTION DIAGRAM





*ZEBRA AND QUAGGA MUSSEL INFORMATION SOURCES*

<http://dnr.wi.gov/invasives>

Under "Species Information" click "Aquatic Invasives" then click "Animals" or go directly to:  
<http://dnr.wi.gov/topic/invasives/species.asp?filterBy=Aquatic&filterVal=Y&catVal=Animals>

<http://dnr.wi.gov/org/caer/ce/eek/critter/invert/zebramussel.htm>

<http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=95>

<http://www.seagrant.psu.edu/publications/fs/zebraquagga2007.pdf>



**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

State of Wisconsin Department of Natural Resources Wisconsin Lakes Partnership		<b>Aquatic Invasives Surveillance Monitoring End of Season Report</b>	
		Form 3200-133 (02/10) Previously Form 3200-124	
<p>This monitoring is designed to help detect new invasive species on your lake, so DNR can be alerted and lake residents and/or professionals can respond appropriately. The purpose of the DNR collecting this data is to let us know what methods trained citizens and professionals use when actively looking for aquatic invasive species. You are often the ones to alert us of new invasives in our waters. Remember for surveillance monitoring, a report of "no invasive" at a location is just as important as finding an invasive. One cannot confidently state that the invasive is not present in an area if no one has looked and reported their findings. Knowing where invasives are not, as well as where they are, is extremely important in being able to track and understand their spread. Knowing how often monitors are looking for species and what they are finding is very important information.</p> <p><b>Notice:</b> Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.</p>			
Data Collectors			
Primary Data Collector Name		Phone Number	Email
Additional Data Collector Names			
Total Paid Hours Spent (# people x # hours each)		Total Volunteer Hours Spent (# people x # hours each)	
Monitoring Location			
Waterbody Name	Township Name	County	Boat Landing (if you only monitor at a boat landing)
Dates Monitored			
Start Date (when you first monitored this season)		End Date (when you last monitored this season)	
Did at least some data collectors monitor in... May? June? July? August? (circle all that apply)			
Did you monitor...		Did you...	
All Beaches and Boat Landings? Frequently    Some of the Time    Not Often/Never		Walk along the shoreline? Frequently    Some of the Time    Not Often/Never	
Perimeter of whole lake? Frequently    Some of the Time    Not Often/Never		Observe entire shallow water area (up to 3 feet deep)? Frequently    Some of the Time    Not Often/Never	
Docks or piers? Frequently    Some of the Time    Not Often/Never		Use rake to extract plant samples? Frequently    Some of the Time    Not Often/Never	
Other: _____		Check underwater solid surfaces (boat hulls, dock legs, rocks)? Frequently    Some of the Time    Not Often/Never	
Other: _____		Other: _____	
Did you find...(even if not a new finding for the lake or stream)			
Banded Mystery Snail?	Yes    No    Did not look for	Hydrilla?	Yes    No    Did not look for
Chinese Mystery Snail?	Yes    No    Did not look for	Purple Loosestrife?	Yes    No    Did not look for
Curly-Leaf Pondweed?	Yes    No    Did not look for	Rusty Crayfish?	Yes    No    Did not look for
Eurasian Water Milfoil?	Yes    No    Did not look for	Spiny Waterfleas?	Yes    No    Did not look for
Fishhook Waterfleas?	Yes    No    Did not look for	Zebra Mussels?	Yes    No    Did not look for
Freshwater Jellyfish?	Yes    No    Did not look for	Other?: _____	
<b>If you find an aquatic invasive</b>		<b>If you don't find an aquatic invasive</b>	
<p>If you find an aquatic invasive and it is not listed at <a href="http://dnr.wi.gov/lakes/AIS">http://dnr.wi.gov/lakes/AIS</a> fill out an incident report for the species. Then bring the form, a voucher specimen if possible, and a map showing where you found it to your regional DNR Citizen Lake Monitoring Coordinator as soon as possible (to facilitate control if control is an option).</p>		<p>If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring Coordinator. <a href="http://dnr.wi.gov/lakes/contacts">http://dnr.wi.gov/lakes/contacts</a></p>	



**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

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**Invasive Species Control Plan  
Kaukauna City Plant Hydroelectric Project**

**Appendix E  
Documentation of Consultation**

**Aquatic Invasives Surveillance Monitoring  
Multiple Locations, One Date**  
Form 3200-130 (R 2/10)

State of Wisconsin  
Department of Natural Resources  
Wisconsin Lakes Partnership

This monitoring is designed to help you detect new invasive species on your lake, so you can then alert the DNR and so lake residents and/or professionals can respond appropriately. The purpose of the DNR collecting this data is to let us know what methods trained citizens and professionals use when actively looking for aquatic invasive species. You are often the ones to alert us of new invasives in our waters. Remember for prevention monitoring, a report of "no invasive" at a location is just as important as finding an invasive. One cannot confidently state that the invasive is not present in an area if no one has looked and reported their findings. Knowing where invasives are not, as well as where they are, is extremely important in being able to track and understand their spread. Knowing how often monitors are looking for species and what they are finding is very important information.

**Notice:** Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. Personally identifiable information collected on this form will be incorporated into the DNR aquatic invasive species database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

**Data Collectors**  
Primary Data Collector Name \_\_\_\_\_  
Phone Number \_\_\_\_\_  
Email \_\_\_\_\_

Additional Data Collectors \_\_\_\_\_

**Date and Time**  
Date \_\_\_\_\_ Start Time \_\_\_\_\_ End Time \_\_\_\_\_

**Record one of the following: Y=Yes N=No N/A = Didn't Look For**

	Did you monitor?	Y=Yes	N=No	N/A = Didn't Look For	Did you find?
Boat Landing (if you only monitor at boat landings)?					
All Beaches and Boat Landings?					
Perimeter of Whole lake?					
Docks or piers?					
Walk along the shoreline?					
Observe entire shallow water area (up to 3 feet deep)?					
Use rake to extract plant samples?					
Check underwater solid surfaces (boat hulls, dock legs, rocks)?					
Banded Mystery Snail?					
Chinese Mystery Snail?					
Curly-Leaf Pondweed?					
Eurasian Water Milfoil?					
Fishhook Waterfleas?					
Freshwater Jellyfish?					
Hydrilla?					
Purple Loosestrife?					
Rusty Crayfish?					
Spiny Waterfleas?					
Zebra Mussels?					
Other? _____					

**Waterbody** \_\_\_\_\_ **County** \_\_\_\_\_ **Township** \_\_\_\_\_

**If you find an aquatic invasive**

If you find an aquatic invasive and it is not listed at <http://dnr.wi.gov/lakes/AIS> fill out an incident report for the species. Then bring the form, a voucher specimen if possible, and a map showing where you found it to your regional DNR Citizen Lake Monitoring Coordinator as soon as possible (to facilitate control if control is an option).

**If you don't find an aquatic invasive**

If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring Coordinator.  
<http://dnr.wi.gov/lakes/contacts>

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

---

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

State of Wisconsin Department of Natural Resources Wisconsin Lakes Partnership		<b>Aquatic Invasive Animal Incident Report</b> Form 3200-126 (R 02/10)	
<p><b>The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive species on a lake where it hasn't been found previously.</b></p> <p>To find where aquatic invasives have already been found, visit: <a href="http://dnr.wi.gov/lakes/ais">http://dnr.wi.gov/lakes/ais</a>.</p> <p><b>Notice:</b> Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.</p>			
<b>Primary Data Collector</b>			
Name		Phone Number	Email
<b>Monitoring Location</b>			
Waterbody Name	Township Name	County	Boat Landing (if you only monitor at a boat landing)
<b>Date and Time of Monitoring or Discovery</b>			
Monitoring Date	Start Time	End Time	
<b>Information on the Aquatic Invasive Animal Found (Fill out one form for each species found.)</b>			
Which aquatic invasive did you find? <input type="checkbox"/> Zebra Mussel <input type="checkbox"/> Quagga Mussel <input type="checkbox"/> Spiny Waterflea <input type="checkbox"/> Freshwater Jellyfish			
<input type="checkbox"/> New Zealand Mud Snail <input type="checkbox"/> Banded Mystery Snail <input type="checkbox"/> Chinese Mystery Snail <input type="checkbox"/> Rusty Crayfish <input type="checkbox"/> Red Swamp Crayfish			
Where did you find the invasive animal?			
Latitude:		Longitude:	
<b>Measurements from where the invasive was found (optional)</b>			
Water Temperature	Degrees F / Degrees C (circle one)		Dissolved Oxygen (mg/l)
<b>Estimated percent cover in the area where the invasive was found (optional)</b>			
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %
Bottom covered with plants, %			
<b>If you found Zebra Mussel(s)</b>			
Water depth where Zebra Mussels were found _____		Feet / Meters (circle one)	Total Number of Zebra Mussels Found _____
What were the Zebra Mussels attached to?			
<input type="checkbox"/> Dock/pier <input type="checkbox"/> Dam <input type="checkbox"/> Rocks <input type="checkbox"/> Plants <input type="checkbox"/> Boats or Gear <input type="checkbox"/> Plate Sampler(s) <input type="checkbox"/> Logs, acorns, pine cones or other woody structure			
<input type="checkbox"/> Other: _____			
Size of Largest Zebra Mussel Found		Size of Smallest Zebra Mussel Found (individual measurements on back of page)	
<b>Voucher Sample</b>			
Did you collect a sample (voucher specimen) and bring it to your local DNR office? If so, which office?			
<input type="checkbox"/> Rhinelander <input type="checkbox"/> Spooner <input type="checkbox"/> Green Bay <input type="checkbox"/> Oshkosh <input type="checkbox"/> Did not take sample to a DNR office			
<input type="checkbox"/> Fitchburg <input type="checkbox"/> Waukesha <input type="checkbox"/> Eau Claire <input type="checkbox"/> Superior <input type="checkbox"/> Other Office: _____			
Please collect up to five specimens and bring a copy of this form, along with the sample and a map showing where you found the suspect invasive species to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.			
While field collecting, specimens can easily be kept alive in a bucket or other container with just about 1/2 inch of water in the bottom. Freeze specimens at the end of the day in a ziploc bag without water. If freezing is not possible for a long period of time preservation in rubbing alcohol (except for Jellyfish - leave fully in water) is sufficient.			
<b>For DNR AIS Coordinator to fill out</b>			
AIS Coordinator or qualified field staff who verified the occurrence: _____			
Statewide taxonomic expert who verified the occurrence: _____ (for list see <a href="http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf">http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf</a> )			
Was the specimen confirmed as the species indicated above?		<input type="checkbox"/> Yes <input type="checkbox"/> No	If no, what was it?
Museum where specimen is housed: _____		Museum Specimen ID: _____	
Have you entered the results of the voucher in SWIMS?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.			

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

State of Wisconsin Department of Natural Resources Wisconsin Lakes Partnership		<b>Aquatic Invasive Animal Incident Report</b> Form 3200-126 (R 02/10)	
<p><b>The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive species on a lake where it hasn't been found previously.</b></p> <p>To find where aquatic invasives have already been found, visit: <a href="http://dnr.wi.gov/lakes/ais">http://dnr.wi.gov/lakes/ais</a>.</p> <p><b>Notice:</b> Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.</p>			
<b>Primary Data Collector</b>			
Name		Phone Number	Email
<b>Monitoring Location</b>			
Waterbody Name		Township Name	County
		Boat Landing (if you only monitor at a boat landing)	
<b>Date and Time of Monitoring or Discovery</b>			
Monitoring Date	Start Time	End Time	
<b>Information on the Aquatic Invasive Animal Found (Fill out one form for each species found.)</b>			
Which aquatic invasive did you find? <input type="checkbox"/> Zebra Mussel <input type="checkbox"/> Quagga Mussel <input type="checkbox"/> Spiny Waterflea <input type="checkbox"/> Freshwater Jellyfish			
<input type="checkbox"/> New Zealand Mud Snail <input type="checkbox"/> Banded Mystery Snail <input type="checkbox"/> Chinese Mystery Snail <input type="checkbox"/> Rusty Crayfish <input type="checkbox"/> Red Swamp Crayfish			
Where did you find the invasive animal?			
Latitude:		Longitude:	
<b>Measurements from where the invasive was found (optional)</b>			
Water Temperature		Dissolved Oxygen (mg/l)	
Degrees F / Degrees C (circle one)			
<b>Estimated percent cover in the area where the invasive was found (optional)</b>			
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %
		Bottom covered with plants, %	
<b>If you found Zebra Mussel(s)</b>			
Water depth where Zebra Mussels were found		Feet / Meters (circle one)	Total Number of Zebra Mussels Found
What were the Zebra Mussels attached to?			

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

State of Wisconsin  
 Department of Natural Resources  
 Wisconsin Lakes Partnership

**Zebra/Quagga Mussel (Quantitative) Report**  
**Requires use of sampler plates**

Form 3200-127 (R 02/10)

**The purpose of this form is to track the abundance of adult zebra or quagga mussels in lakes where larvae or adults have previously been detected during AIS surveillance monitoring.**

**A report should be completed for each sampler deployed.**

**Notice:** Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector				
Name		Phone Number		Email
Monitoring Location				
Waterbody Name		Township Name	County	Station Name
Latitude (If not at an existing SWIMS monitoring station)			Longitude (If not at an existing SWIMS monitoring station)	
Date and Time of Monitoring				
Start Date	Start Time	End Date	End Time	
<i>Start Date = Date sampler deployed or since you last removed mussels from the plate. End Date = Date you pulled up the sampler.</i>				
Vertical Measurements				
Water Depth at Monitoring Location		Feet/ Meters (circle one)	Depth to Top of Zebra Mussel Sampler	
			Feet/ Meters (circle one)	
Measurements from where the invasive was found				
Water Temperature		Degrees F / Degrees C (circle one)		Dissolved Oxygen (mg/l)
Estimated percent cover where sampler plates were located				
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %
Information about Mussels Found				
Number of Zebra Mussels on Top Side of Plates			Number of Zebra Mussels on Bottom Side of Plates	
Total Number of Zebra Mussels on Sampler			Size of Largest Zebra Mussel (mm)	Size of Smallest Zebra Mussel (mm)
<b>Note: if more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels are found, measure all mussels. Report results in the table on page 2 of this form.</b>				
Additional Comments				

*If you find Zebra Mussels*

All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained. Please collect a sample and bring a copy

**Zebra Mussel (Quantitative) Report  
Requires use of sampler plates**

Form 3200-127 (R 02/08)  
Page 2 of 2

**Length of Zebra Mussels from Sample**

*If more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels are*

Number	Length (mm)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Note: All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained.

**Invasive Species Control Plan**  
**Kaukauna City Plant Hydroelectric Project**

**Appendix E**  
**Documentation of Consultation**

State of Wisconsin  
 Department of Natural Resources  
 Wisconsin Lakes Partnership

**Mussel Veliger Tow Monitoring Report**

Form 3200-135 (R 02/10)

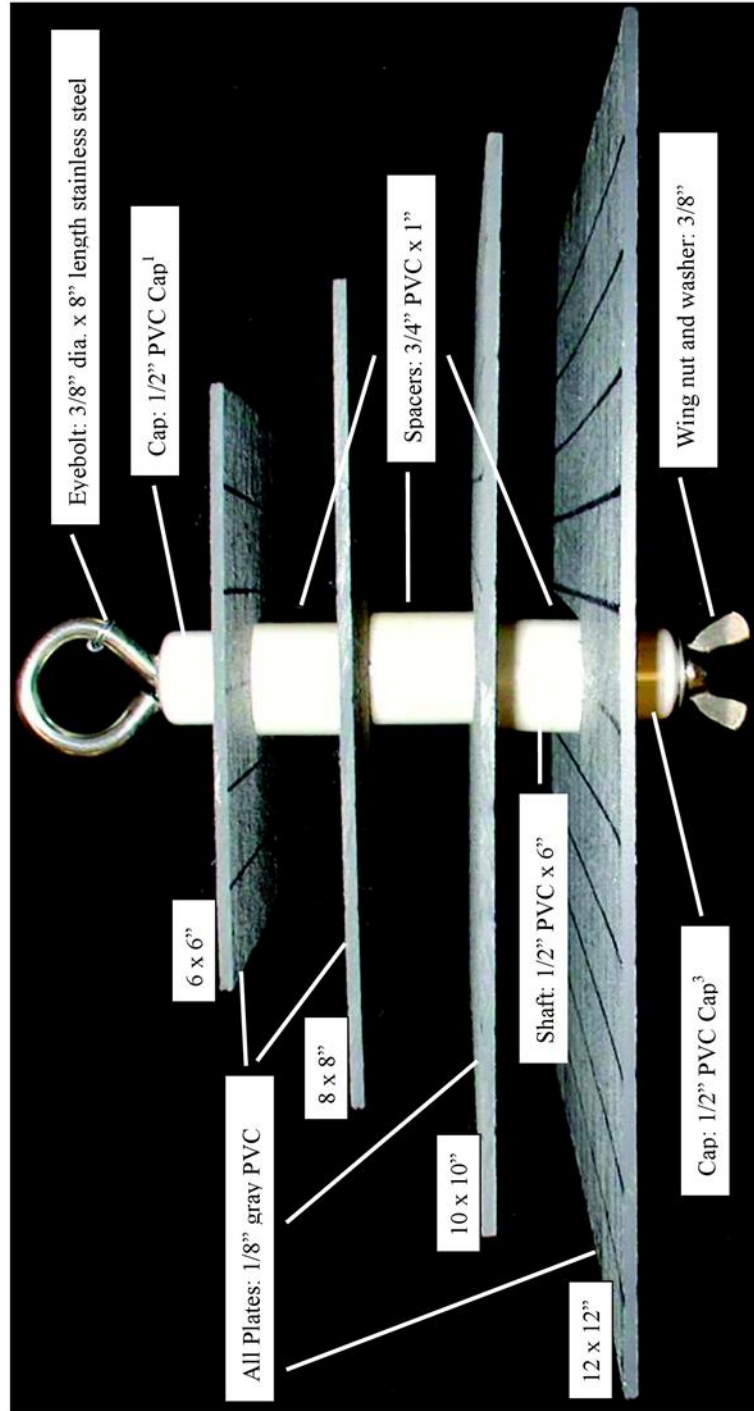
The purpose of this form is to track the presence/absence of zebra or quagga mussel larvae (veligers) collected using a plankton net during AIS surveillance monitoring.

**Notice:** Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. Personally identifiable information collected on this form will be incorporated into the DNR aquatic invasive species database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name	Phone Number	Email	
Monitoring Location			
Waterbody Name	WBIC	County	Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
<b>Guidelines for how many tows to collect:</b> If Secchi depth is >4 m (13 feet) take two 2m deep tows; if Secchi depth is between 2-4 m (6.5-13 feet) take one 2m deep tow; if Secchi depth is <2 m (<6.5 feet) take one 1m tow.			
Diameter of zooplankton net opening 30cm 50cm other _____ (circle one)			
Site 1: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
Site 2: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
Site 3: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
COMMENTS/OBSERVATIONS:			



ZEBRA AND QUAGGA MUSSEL SUBSTRATE SAMPLER INSTRUCTIONS



<sup>1</sup>Solvent weld top cap to shaft and drill a 13/32\" hole in cap

<sup>2</sup>Drill 5/8\" hole in plates to accept shaft

<sup>3</sup>Drill a 13/32\" hole in bottom cap

Document Content(s)

20190930 FERC Invasive Species Plan Cover Letter.PDF.....1-1

20190923 Invasive Species Plan sent to FERC.PDF.....2-105