

## Environmental Impact Report



### Rapide Croche Boat Transfer and Aquatic Invasive Species Cleansing Station Project

Fox River Navigational System Authority  
Wrightstown, Wisconsin



Project No.: 193702539  
December 16, 2013

## Sign-off Sheet



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Prepared by

A handwritten signature in blue ink, appearing to read "Kathleen Melland", written over a horizontal line.

(signature)

**Kathleen Melland, Environmental Scientist**

Reviewed by

A handwritten signature in black ink, appearing to read "Jon Gumtow", written over a horizontal line.

(signature)

**Jon Gumtow, Project Manager**

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## Introduction

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The Fox River Navigational System Authority (FRNSA) is planning to construct and operate a seasonal Boat Transfer and Aquatic Invasive Species Cleansing Station (the "Project" or "station") at the Rapide Croche Lock Site (Appendix A, Figure 1). The Rapide Croche Lock was sealed in 1988 and will remain sealed to prevent sea lamprey (*Petromyzon marinus*) and other aquatic invasive species (AIS) from migrating upstream from the Great Lakes to the Lake Winnebago system. As currently planned, the Project includes a method for lifting boats over the Rapide Croche barrier and cleansing of AIS before boats are transferred upstream. Once the Project is in place it will allow navigation access for commercial and recreational boats on the lower Fox River between Green Bay and Lake Winnebago. The proposed cost for each boat transfer will be approximately \$25 for boats under 26 feet and \$50 for larger boats.

For the purposes of this report, a boat is defined as a vessel of any size used for navigation on water, including both recreational and commercial uses. The station is planned to accommodate boats up to 53 feet and 25 tons.

The proposed transfer station will fill the current 160 foot-long lock structure with impermeable surface to create an inspection and spray area plus a 55 foot long x 19 foot wide x 6 foot deep hot water basin. As currently proposed, a fork lift truck and marine travel lift will transfer boats. Launch piers will allow passenger ingress and egress as well as temporary boat mooring. Canoe and kayak cleansing will also be included in the design. Future plans include the possible development of a visitor and AIS education center at the site to educate visitors of the history of the Fox River and the importance of preventing the spread of AIS.

The Wisconsin Department of Natural Resources (WDNR) has requested that FRNSA complete an Environmental Impact Report (EIR) documenting potential environmental impacts that could result from the project. The results of the evaluation are contained within this report and have been documented pursuant to the Wisconsin Environmental Policy Act (WEPA) per State Stats. 1.11. The information contained in this report will be used by the WDNR to fulfill requirements under NR 150.

## **1 Project Summary**

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The Fox River Navigational System Authority (FRNSA) has been authorized by the State of Wisconsin to repair, reopen, operate, and maintain 16 of the 17 locks on the Lower Fox River. In accordance with Wisconsin Statute 237, the Rapide Croche Lock must remain closed to prevent aquatic invasive species (AIS) from moving upstream. Because this lock must remain closed, the FRNSA is proposing to construct a Boat Transfer and Aquatic Invasive Species Cleansing Station at this site (Appendix A: Figure 3). The proposed Project will include a method for transferring boats over the Rapide Croche lock site and cleansing them of AIS before they are placed upstream of the existing barrier.

A boat transfer station at the Rapide Croche lock will allow navigational access on the Lower Fox River between Green Bay and the Lake Winnebago system. The Winnebago system consists of lakes Buttes des Morts, Winneconne, Poygan, Winnebago and all their tributaries from their mouths upstream to the first dam on each tributary. This includes the Fox River from Lake Winnebago upstream to the dam above Princeton, and all its tributaries from their mouths upstream to the first dam. It also includes the Wolf River from its mouth upstream to the dam in the city of Shawano and all its tributaries from their mouths upstream to the first dam. Cincoe Lake, Partridge Crop Lake and Partridge Lake are also included. The Winnebago system falls within Calumet, Fond du Lac, Green Lake, Marquette, Outagamie, Shawano, Waupaca, Waushara and Winnebago counties (WDNR Fishing Regulations 2013).

### **1.1 PROPOSED ACTION**

A boat transfer and AIS cleansing station will be constructed at the lock site and utilize a specialized fork-lift and travel lift to pick up boats from the downstream side of the Rapid Croche lock, pressure wash their hulls, then place them in a heated water basin to eliminate AIS prior to launching them on the upstream side of the lock. The Project would operate during the navigation season that runs from the first weekend of May through the first weekend in October. Key components of the proposed action include the following requirements:

- The lift system will separate the boat from the water and allow for inspection and treatment of the hull such that no organisms attached to the hull or lifting equipment will go unnoticed;
- Water draining from the boat while it is being cleansed must return to the downstream side of the transfer station;
- Boat operators utilizing the transfer and cleansing station will have to prepare their boats for transfer prior to arriving at the station. A guide listing required preparation steps for the transfer process will be developed after the final transfer

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process is determined, and will be published online and in hard copy. Depending on the type of boat, this may involve cleansing hulls, bilge and other equipment and emptying live wells. Boats with hulls that are heavily encrusted with algae or organisms will be turned away and warned that they need to be cleansed before returning to the station;

- Once boats are adequately prepared, the boats will be lifted from the water and bilge plugs will be removed;
- Boat hulls will be thoroughly sprayed with high pressure water, (2200 psi) from 12 to 18 inches away, to remove AIS that may be adhering to surfaces of the boat;
- The boats will be placed in a 110°F water bath for at least ten minutes to remove living AIS;
- Internal watercraft systems and equipment stored on board that may harbor AIS must also be inspected and/or cleansed in 110°F water for 10 minutes. Internal systems that may be subject to the hot water bath include propulsion systems, raw water intake, exhaust, engine and air conditioning cooling systems, bilge compartments, and live wells. Portable equipment (e.g., bait containers, anchors, ropes, skis) will be submersed in a hot water bath;
- No live bait or fish will be permitted to move upstream through the station;
- Each boat will be inspected following treatment and bilge plugs replaced before placement upstream of the barrier. Upstream transfer of any boat may be disallowed if it cannot be adequately cleaned (due to design, condition, etc.).

The boat transfer station will be designed to be capable of processing boats with maximum size characteristics including:

- Boat length up to 53 feet;
- Beam up to 17 feet;
- Weight up to 25 tons;
- Boat draft not greater than 4 feet (including propellers);
- Masts and superstructures of vessels no greater than 23 feet in height.

### 1.2 PROJECT LOCATION

The Rapid Croche Lock complex is located on the north bank of the Lower Fox River at river mile 22.8 (Appendix A, Figures 1 and 2). The existing complex consists of a lock, canal, lockkeeper's residence, lock shelter, garage, storage building, and a sanitary building. There is also a federal dam and a Kaukauna Utilities hydropower station

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located at the complex. The facilities present at this complex are located in a rural setting between the city of Kaukauna and the village of Wrightstown.

### 1.3 PURPOSE AND NEED

The purpose of the Project is to allow navigational access on the Lower Fox River between Green Bay and Lake Winnebago. The Project is needed to protect Lakes Buttes des Morts, Winneconne, Poygan, Winnebago and all their tributaries, including the Fox River, the Wolf River, Cincoe Lake, Partridge Crop Lake, and Partridge Lake in Calumet, Fond du Lac, Green Lake, Marquette, Outagamie, Shawano, Waupaca, Waushara and Winnebago counties from the introduction of AIS through the movement of boats using the Project.

There are over 180 non-native species in the Great Lakes, of which many are considered “invasive” (AIS Plan 2008). Invasive species are species that are outside of their natural range (non-native), which often means they lack predators and other biological controls in the new environment. They may be able to outcompete native species, leading to declines in native populations and interfering with commercial, agricultural, or recreational activities.

In 2010, St. Norbert College Survey Center was contracted by the FRNSA to conduct a mail survey of a random sample of 2100 registered boat owners in Brown, Calumet, Fond du Lac, Outagamie, Waupaca and Winnebago counties and owners of boats greater than 26 feet in length registered in Door, Kewaunee, Manitowoc, Marinette, and Sheboygan counties to determine opinions regarding:

- Development of an AIS cleansing and transfer station at the Rapide Croche lock.
- Demand for and usage of the Rapide Croche lock, and the proposed boat cleansing area and lift/transfer station.
- Number and type of boats that would use the facility each year.
- Number and type of visitors that would visit the facility each year.

Over 990 completed questionnaires were returned (a return rate of 48 percent) and analyzed. The margin of error for the survey was +/-3.1 percent at the 95 percent confidence level (St. Norbert College Survey Center 2010). Survey results were used to identify several facility scenarios that would profile the number and type of potential transfer station users based on a specific combination of responses from the survey. Based on the results, “Scenario #4” was adopted which predicts that over 1,300 boaters would use the proposed transfer station annually. The specific attributes of Scenario #4 are:

- “Boaters who use the Fox River between Green Bay and Rapide Croche two or more times per year AND use the Fox River between Lake Winnebago and Rapide Croche two or more times per year AND anticipate using the new



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proposed transfer station two or more times per year.” (St. Norbert College Survey Center 2010)

Protecting the Lake Winnebago lake sturgeon (*Acipenser fulvescens*) population and other native fisheries from potential adverse impacts of AIS has remained one of FRNSA’s top concerns when evaluating plans for a boat transfer station at the Rapide Croche site. The proposed boat cleansing system is an essential component of the design and will provide an engineered system to control the upstream spread of AIS.

### 1.4 AUTHORITIES AND APPROVALS

FRNSA is authorized by the State of Wisconsin Statute 237 to repair, reopen, operate, and maintain 16 of the 17 locks on the Lower Fox River. The Rapide Croche lock must remain closed in accordance with Wisconsin Statute 237 because a sea lamprey barrier is in place there that prevents AIS from moving upstream. Because this lock must remain closed, a boat transfer and AIS cleansing station is being proposed for this site to allow boat access to the Fox River between Green Bay and Lake Winnebago. According to Statute 237.10, FRNSA must submit a plan to the WDNR for approval prior to constructing a means of boat transfer. In addition, U.S. Army Corps of Engineers (USACE) approval is required before altering the locks, and Kaukauna Utilities (the dam and water rights owner) approval is required for flow alteration.

The project will involve the construction of piers with piling, grading, filling, sediment removal, ground disturbance and other work in and near the Fox River; therefore, Chapter 30 (Wis. Stats.) and NR 103 (Wis. Admin. Code) approvals will be necessary from the WDNR. In addition, USACE approval for filling the locks is required under both Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The Project scope will involve a joint WDNR/USACE Individual Permit process. This process typically involves preparation of design plans/drawings, completion of an application package, and collaboration with WDNR personnel. A public comment period and informational hearing will be required prior to final review and issuance of the permit.

A Wisconsin Pollutant Discharge Elimination System (WPDES) permit from the WDNR will be required for the discharge of water used in pressure washing the boat hulls (referred to as “pre-wash” because it will occur before the boat is placed in the heated water bath). The WDNR has already developed a general permit program for wastewater discharge resulting from the outside washing of vehicles, equipment and other objects. This will be applicable to the Project’s boat pre-wash discharge water. The general permit application process involves submission of project-specific information / application to the WDNR prior to gaining permit coverage.

The Project will require soil disturbance, requiring compliance with Chapter 30, NR 151 and NR 216 Storm Water Construction Site Permit.

Because the site and buildings are listed on the National Register of Historic Places, the site plan and mitigation is subject to review and approval by the State Historic

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Preservation Office. A historic preservation study is currently being conducted by Anne Bieble of Cornerstone Preservation.

## 2 Proposed Physical Changes

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### 2.1 MANIPULATION OF TERRESTRIAL RESOURCES

The final design of the facility has not been developed, therefore, soil grading volumes, changes in impervious area, or grade changes cannot be provided at this time. The development of the Project at the Rapide Croche site would include below grade piping, launch piers on either side of the station, a ramp, loading dock, and concrete stairwells for access. A parking lot and pedestrian pathway with picnic areas would also be installed, as well as a future AIS education center. A pre-wash water treatment unit and an underground sludge holding tank would also be installed.

The Project will increase the amount of impervious surfaces at the site with the addition of a pedestrian pathway, parking lot, stairwells, piers, and chelated clay fill inside the current lock area. Parking lot and pathways may be built with pervious materials.

The Project may require some shoreline tree removal for shoreline development and access between the shore facilities and the docking areas. An erosion control and site re-vegetation plan will be completed during final design and will comply with state standards.

### 2.2 MANIPULATION OF AQUATIC RESOURCES

The design requires conversion of the existing lock system to the proposed transfer station. A majority of the construction will occur in the existing lock with the exception of regress / egress piers.

The current lock area would be filled with impervious material in order to create a boat inspection and pre-wash area, the hot water cleansing chamber, and an operations building. This would also involve the removal and storage of the existing lock gates, valves, and machinery which will be restored and placed on display.

#### 2.2.1 Stormwater Treatment and Control

Stormwater may need to be controlled and treated if the future additions of a parking lot and paths are impervious surfaces<sup>1</sup>. Alternatively, these additions could be permeable (i.e. porous pavement). Bio-retention areas, such as rain gardens and bank stabilization methods may also be considered.

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<sup>1</sup> Evaluated in response to item #2, WDNR (2013e).

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### 2.2.2 Water Bypass System

A drop culvert that discharges at least 2 feet above 100 year flood high water will be installed to create a water bypass system<sup>2</sup> to generate a flow in the downstream lock channel to help prevent stagnation of the water. In addition to flow velocity and height above 100-year flood elevation, the bypass will be designed in a manner to ensure that no AIS enter and move upstream. It will also help maintain water quality in the channel to reduce the accumulation of blue green algae, which can produce an unpleasant odor and reduce dissolved oxygen content. The flushing rate and discharge volume are estimated to be approximately 30 cubic feet per second (cfs).

Section 408 of the River and Harbors Act of 1899, as amended in 1985, allows for the Secretary of the Army to grant permission to alter public works if the alteration does not impair the usefulness of the project and is not injurious to the public interest. The water bypass system<sup>3</sup> will comply with this act, and will require approval of the U.S. Army Corps of Engineers (USACE). Kaukauna Utilities currently owns the water rights at the dam; therefore, installing a flow bypass will also require approval. The FRNSA has been coordinating with representatives of USACE and Kaukauna Utilities, and it is expected that approvals can be developed for the Project.

## 2.3 BUILDINGS, TREATMENT UNITS, ROADS AND OTHER STRUCTURES

### 2.3.1 Boat Transfer and Cleansing Station

Small boats (less than 30 feet long) can be lifted and transported efficiently with a fork truck rather than a mobile hoist. Boats greater than 30 feet in length will be lifted and transferred with a mobile boat hoist. Based upon the specification for maximum boat sizes provided in Section 1.3, as an example, a Marine Travelift model 25 BFMIII will be adequate for the needs at the station, which can handle boats up to 55 feet long and up to 55,000 pounds (27.5 tons). If FRNSA prefers to incorporate capacities for larger boats, a Model 35 BFMIII would be able to handle boats up to 77,000 pounds (38.5 tons).

#### *Aquatic Invasive Species Cleansing*

By removing all boats from the water and disposing of any live fish or bait, the Project will ensure that no fish are moved to the upstream side of the lock. To avoid the transfer of other AIS, the boat will be rinsed with high pressure water to dislodge any organisms adhering to the hull. The boat will then be placed in the 110°F water bath for a minimum of 10 minutes to kill any remaining organisms.

Additionally, sodium hypochlorite will be used for control of biological growth in the hot water bath when it is not being held at treatment temperature. The sodium hypochlorite will be introduced by a separate chemical metering pump on a batch basis to maintain

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<sup>2</sup> Evaluated in response to item #8, WDNR (2013e).

<sup>3</sup> Evaluated in response to item #9, WDNR (2013e).

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the recommended concentration in the basin and will also serve to augment the heat-based AIS control.

### *Treatment System Process and Users*

The cleansing operation will consist of a chamber/tank for immersing and cleansing relevant watercraft components. The following is a summary of the steps involved in the proposed cleansing process<sup>4</sup>:

A. Passengers will exit the boat on an access dock. The boat will be lifted from the downstream side of the transfer station and transported to the inspection area with lift/transfer equipment.

1. Inspect boat

The hull will be inspected for excessive fouling from mussels, algae, or other organisms (boat will be rejected if necessary). Until a method can be determined to adequately cleanse them, wakeboard boats with ballast bags will be rejected. The water inside the hull will be drained (from bilges, engine, live wells, bait containers, and ballast water). The slope of the inspection area and the drainage system will ensure that water does not drain to the upstream side of the transfer and cleansing station. Contaminated water will be captured and properly disposed of or treated.

2. Cleanse boat

- a. Hull and exposed components

The hulls will first be sprayed from the gunwales to the keel with high pressure water to remove organisms adhering to the hull. The boat will then be placed in the hot water bath to allow contact of the boat hull and exposed components with 110°F cleansing water for a minimum contact period of 10 minutes. Tension on slings, lift straps, fork truck forks or other lifting device components would be released to ensure that the boat is free floating such that hull contact with lift components does not hinder hot water exposure to the boat and lift straps and forks. Raw water systems will be operated for the 10 minutes soak time. Canoes and/or kayaks, including their sealed fore and aft compartments, would be filled with hot water to achieve the minimum contact criteria above.

Washwater from the hull could potentially be contaminated with paint and other residue from the washing process. This will also be captured and properly disposed of or treated if found to be contaminated.

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<sup>4</sup> Evaluated in response to item #11, WDNR (2013e).

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### b. Other boat components

Depending on the type of boat, other components would then be rinsed, flushed or soaked (including sailboat keel trunk, propulsion systems, intake/exhaust ports and cooling systems, bilge compartments if not dry, live wells, anchors, anchor ropes, anchor chains and lockers, skis and other equipment such as bait containers and fishing equipment would be inspected and cleansed as necessary) for a minimum of 10 minutes contact time in a 110°F water bath. Some of these activities could be completed concurrently with those in 3(a).

### c. Boater's footwear<sup>5</sup>

Due to the tendency for boaters, especially kayak and canoe users, to enter the water with their footwear on, all boaters will be required to walk through a disinfecting solution or across a saturated pad to kill any potential AIS. This process is similar to bio security methods used in fish hatcheries and food preparation industries.

### d. Lifting/transfer equipment components

The boat lifting and transfer equipment that potentially came in contact with downstream water will be rinsed/dipped (i.e. mobile hoist slings, fork truck forks, etc.) in the 110°F cleansing water. Note – activities associated with this step could be accomplished concurrently with those in 3(a).

## 2. Transfer boat from cleansing chamber to upstream side

The boat will be lifted from the cleansing chamber with the lift equipment and transferred to the upstream side. The operators will verify that the components removed from the boat for cleansing are returned, drain plugs are replaced, etc. After the boat is placed in the water, passengers will be allowed to re-enter the boat from the access pier.

Boats traveling downstream through the transfer station will not require cleansing, since all AIS currently in the Lake Winnebago system are also in the Great Lakes<sup>6</sup>. The station will have posted hours and will not operate unless a trained staff member is present. Additionally, the facility will be fenced such that no one may pass through the boat transfer station, including canoes and kayaks, when station staff is not present.

The hot water cleansing chamber will require a water recirculation system to both maintain the minimum desired water temperature in the cleansing chamber (110°F) and to remove sediments and other contaminants generated from the process. To

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<sup>5</sup> Evaluated in response to item #15, WDNR (2013e).

<sup>6</sup> Evaluated in response to item #14, WDNR (2013e).

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accomplish this, preliminary plans include a treatment process consisting of a submersible pump delivering the water to a packaged treatment system followed by an inline electric or natural gas heating system. A recirculation system is required to remove accumulated suspended solids and floating oil that could potentially be discharged into the cleansing chamber from boats during the cleansing operation.

### ***Water Temperature and Contact Time***

Hot water is the preferred option for treating boats to remove AIS in an environmentally sound manner. Hot water use, at a minimum of 110°F, is the treatment recommended by the Aquatic Nuisance Species Task Force in the Recreational Boating Guidelines for AIS removal. The transfer and cleansing station will use a water bath temperature of 110°F in addition to the high pressure water wash. Boats and equipment will be subjected to the 110°F water for a minimum of 10 minutes.

### ***Boat Transfer Cycle Time***

The approximate amount of time to process a boat through the transfer and cleansing station may vary considerably depending upon the ability of the boat driver to efficiently position the boat within the launch pier, passenger and equipment disembark time, size/type of boat (transfer method), weather conditions, cleanliness of boat hull, requirements for flushing of boat ports and drives, cleansing/immersion of auxiliary equipment, and other factors.

Smaller boats that can be transferred via the fork truck may be processed faster than boats requiring the mobile hoist. Small boats are estimated to take 15 to 20 minutes when traveling upstream, with boats traveling downstream requiring less time since they can bypass the cleansing process. Larger boats are estimated to take 30 to 60 minutes when traveling upstream, and again boats traveling downstream would require less time since they can bypass the cleansing process.

### ***Effectiveness of Planned Treatment***

The planned treatment will use a temperature of 110°F, with the addition of high pressure pre-wash to dislodge any organisms on the hull prior to the hot water bath. Research shows that this temperature is adequate to eliminate the AIS of concern. For example, a temperature of 98.6°F will instantaneously kill any juvenile zebra mussels still attached to the hull (McMahon and Ussery 1995, McMahon 1996). The quagga mussel (*Dreissena bugensis*) will be killed at temperatures above 86°F (Mills et al. 1996), while the spiny waterflea (*Bythotrephes longimanus*) has an upper lethal limit of 74°F (Yurista 1999). Recent work by DeStasio (2009) indicated that fishhook waterfleas (*Cercopagis pengoi*) have a higher thermal threshold than spiny waterfleas, requiring 110°F for up to 10 minutes. The water bath will be maintained at a temperature that will ensure delivery of water at 110°F to affected areas, regardless of heat loss from contact with the boat or due to the time it may take heated water to arrive at hard to reach areas<sup>7</sup>. Fishhook waterfleas produce a resting egg during the late fall. Operating the station only during

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<sup>7</sup> Evaluated in response to item #12, WDNR (2013e).

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times of year when this resistant life stage is absent and using cleansing methods effective on target organisms will allow for safe transfer of boats over the AIS barrier.

### ***Energy Use Requirements***

Electricity will be required to operate the facility pumps, treatment system, control systems and facility lighting and perhaps water heating. Natural gas may be used as well. Providing three phase power to the site will allow for procurement and use of standard electric heating and motor equipment.

### **2.3.2 Parking and Access**

Boat passengers will exit their boats onto docks installed at the upstream and downstream launching pier locations. Stairs and walking paths will route passengers around the operational area of the station. Restroom and rest area facilities (i.e. pavilion and picnic tables) for passenger and visitor use will be included, as well as an information kiosk. Site provisions that require compliance with the Americans with Disabilities Act are uncertain at this time, but it is likely that ramps may be necessary at both the upstream and downstream sides of the facility. A wheel chair lift or elevator may be an alternative to ramps.

Future plans include a visitor center and a parking lot to be constructed north of the boat transfer and cleansing station. These will be connected with the pedestrian pathway leading to the picnic area. This will provide future parking for visitors and staff.

### **2.3.3 Utilities**

Power is currently routed to the site from the Kaukauna Utilities Rapide Croche hydroelectric dam site. It will be used to power a pump system to withdraw upstream river water for the pre-wash and hot water bath systems.

Municipal water service is not available near the Rapide Croche lock site. An on-site well with a submersible pump would be necessary for supplying potable water

Municipal sewer service is also not available. Waste holding vaults or a septic system and drain field may be necessary for containment of waste water from restroom facilities. A contracted waste hauler will be necessary to periodically collect sludge material that accumulates from the hot water and pre-wash water treatment systems. Considering the need for waste hauler service, a holding tank configuration for the restroom facilities was assumed. Wastewater holding systems and contracted waste hauling are common practices for many remote boat launch and park sites.

## **2.4 EMISSIONS AND DISCHARGES**

### **2.4.1 Hazardous Materials**

A coagulant and polymer will likely be necessary to enhance the water treatment unit performance. Due to the seasonal operation of the process, chemicals will be provided



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in 55 gallon drums and pumped by small chemical metering pumps directly from the drums.

Both the fork truck and the mobile hoist use diesel fuel. Based upon discussions with the manufacturers and expected volume of traffic through the station, frequent refueling of the hoist is not anticipated (likely to be less than once per week). Considering that the station will likely experience a higher proportion of boat traffic suitable for transfer via the fork truck, more frequent re-fueling of the fork truck is anticipated. Direct re-fueling of the truck, hoist, and portable storage containers could be accomplished with routine or as-needed deliveries from a diesel fuel supplier (i.e. small tanker truck). Alternatively, a small on-site diesel fuel storage tank, in compliance with regulations, could be included in final plans for the site or subsequently installed depending on need.

### ***Polychlorinated biphenyls (PCBs)***

Polychlorinated biphenyls (PCBs) were used widely as dielectric and coolant fluids prior to being banned by the United States Congress in 1979. PCBs are known to be found in sediments throughout the Great Lakes. During 1989, the Corps of Engineers completed analysis of sediment collected from various locations throughout the Fox River Navigation project. The Corps of Engineers' study showed that the lower Fox River contained sediments that were contaminated with heavy metals and other compounds such as PCBs (USACE 1989). To determine if contaminated sediments exist near the Project, sediments will be tested prior to construction. Clean sediment may be land-spread or beneficially reused and any contaminated sediment, if present, will be handled following appropriate regulations.<sup>8</sup>

### ***Sludge***

Sludge removed from the hot water treatment system will accumulate in an underground sludge storage tank<sup>9</sup>. A wastewater/sludge hauler will be periodically contracted (as-needed basis) to vacuum the sludge tank and transport the sludge to a licensed facilitator treatment and disposal. The frequency of contractor sludge collection will depend on usage of the boat transfer facility and cleanliness of boat hulls but it is expected to be infrequent because pre-washing of boats should limit significant impacts to or fouling of the hot water chamber system.

The anticipated pre-wash water treatment system will need to be periodically cleaned of grit, sediment, and any floatable materials removed from discharged pre-wash water. A contracted vacuum truck will be called as necessary based on visual inspections for accumulated material in the treatment system. Collected water and sediment material will be hauled to a licensed facility for treatment and disposal. Petroleum that could potentially accumulate in the floatable section of the treatment system will be collected and managed separately as wastewater.

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<sup>8</sup> Evaluated in response to item #1, WDNR (2013e).

<sup>9</sup> Evaluated in response to item #6, WDNR (2013e).

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### *Human and Animal Waste*

Waste holding vaults or a septic system and drain field may be necessary for containment of waste water from restroom facilities. Wastewater holding systems and contracted waste hauling are common practices for many remote boat launch and park sites. A wastewater/sludge hauler will be contacted to vacuum waste and transport to a licensed facility for treatment and disposal.

A pet waste disposal system<sup>10</sup> will be placed on site for the pick-up and disposal of pet-related waste. This will include posted signage, bags to facilitate clean-up, and garbage cans to dispose of waste. The waste will be disposed as garbage according to the guidelines in *Garbage and Recycling* below.

### *Garbage and Recycling*

General trash from the site will be stored in a dumpster/bin for routine pickup by a contracted waste hauler. Recycling and garbage receptacles will be made available and signs will be posted to encourage appropriate disposal.<sup>11</sup> A solid waste and recycling hauler will be contracted to transport and dispose garbage and recyclable waste from the site.

### *Chemical and Fuel Storage and Spills Response*

Chemicals will be stored in 55 gallon drums. Additionally, diesel fuel will be needed for the lifting equipment. This can be accomplished either without storage of extra fuel through deliveries from a diesel fuel supplier, or in the future by having a small on-site diesel fuel storage tank. FRNSA will follow the WDNR and USCG Marina Standards when responding to any potential chemical or fuel spill.<sup>12</sup>

## 2.5 OTHER CHANGES

### 2.5.1 Current and Future Monitoring for Aquatic Invasive Species

Monitoring has been conducted for AIS since 2006 and its continuation will be integral to the operation of the proposed Rapide Croche Boat Transfer and AIS Cleansing Station<sup>13</sup>. Monitoring for AIS both currently and in the future is and will be conducted by personnel from a local post-secondary academic institution, under the direction of a PhD-level Principal Investigator. Monitoring will occur between March and September.

### *Sampling Equipment*

- Plankton: Wisconsin-type plankton net with retaining collar (mouth diameter=0.13m, mesh size=63um)

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<sup>10</sup> Evaluated in response to item #3, WDNR (2013e).

<sup>11</sup> Evaluated in response to item #4, WDNR (2013e).

<sup>12</sup> Evaluated in response to item #5, WDNR (2013e).

<sup>13</sup> Evaluated in response to item #10, WDNR (2013e).

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- Benthic Invertebrates: standard Ekman grab sampler (0.15m x 0.15 m box size), a wash bucket with mesh bottom (mesh size=500um), dip nets, and seine nets. Additionally, floating periphyton samplers (16 glass slides) will be used to sample invertebrates that attach to solid substrates from a planktonic phase.
- Fish: cod-end type traps, beach seine nets (1/4inch mesh, 20 foot length), and Smith-Root Model LR-20 Backpack Electrofisher.
- Sea Lamprey: a double-funnel system trap will be used to sample for sea lamprey, based upon the design of Morris and Maitland (1987).

### *Sampling Techniques and Methods*

- Plankton: Oblique tows will be performed at the mid-channel location of each site using the Wisconsin-type plankton net. Samples will be preserved in 80% ethyl alcohol and examined in the laboratory using 10X to 400X magnification. All zooplankton in the samples will be identified to the species level when possible.
- Benthic Invertebrates: mid-channel areas will be sampled using the standard Ekman grab sampler. Replicate grab samples will be collected at each site and filtered through the wash bucket. Both shorelines will also be sampled at each site using dip nets and beach seining techniques. Animals captured will be washed into sorting trays and later preserved with 80% ethyl alcohol. Specimens will be identified to the species level in the laboratory when possible. For the floating periphyton samplers, each sampler will be anchored at each site for two-week sampling periods. The glass slides will be removed at the end of the two-week period and preserved in 80% ethyl alcohol, later being identified to the species level when possible.
- Fish: fish will be sampled using a combination of trapping, seining and electrofishing techniques. If possible, specimens from all sampling efforts will be identified to the species in the field and then released. Specimens of new species or specimens difficult to identify in the field will be saved live for later identification in the laboratory. Upon return to the laboratory, specimens will be frozen or transferred to 70% ethyl alcohol for preservation, and identified to the species if possible.
  - Traps: the traps will be deployed during two different periods of the summer at each site for a maximum of 24 hours before being emptied. Traps will be set with and without bait on different dates to optimize catch. Trapping will include mid-channel and shoreline locations at each site.
  - Seine: at least five (5) beach seine hauls will be conducted at each shoreline location on each sampling day.
  - Electrofishing: shoreline habitats will be sampled with electroshocking.

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- Sea Lamprey: traps will be placed at sites using a 4-foot metal stake pounded into the substrate. A rope will then be attached to the back of the trap and secured around the pole. If the substrate does not allow for a metal stake to be secured, ropes can be attached to both ends of the trap and secured to trees along the shoreline. The mouth of the trap will face upstream, and traps will be checked at least once every 24 hours.

### ***Proposed Sampling Locations***

The monitoring program for the Project involves sampling points in the three navigation pools above and the three navigation pools below the Rapide Croche transfer and cleansing station. This monitoring program will help determine whether the source of the new species was indeed the Project or some other vector.

### ***Targeted Species***

The monitoring effort includes sampling for invertebrates and fishes. Species which are currently in the Great Lakes that are targeted from spreading into the Lake Winnebago system include: sea lamprey, round goby (*Neogobius melanostomus*), rainbow smelt (*Osmerus mordax*), ruffe and Great Lakes trout (*Salvelinus namaycush*), salmon (*Salmonidae sp.*), the quagga mussel, non-indigenous waterfleas (fishhook and spiny waterfleas), and the bloody red shrimp (*Hemimysis anomala*). As other non-indigenous species or organisms appear in Green Bay or the Lower Fox River, they will be added to the list.

### ***Contingency Plans***

The WDNR has requested that FRNSA develop a contingency plan to be implemented in the event any AIS are found upstream of the Rapide Croche boat transfer station. There are two significant disadvantages in addressing this request: First, it assumes that any AIS found upstream of the transfer station will have passed through the cleansing station. However, it has been plainly demonstrated that AIS are present in the pools upstream of Rapide Croche Lock despite the presence of the sea lamprey barrier and no boat transfer station. Second, aside from a limited suite of response options for fish, there is almost nothing that can be done to contain or eradicate AIS once present and established in a given locale. For these reasons FRNSA will take a more offensive position in monitoring for and preventing the upstream movement of AIS through the Rapide Croche boat transfer and cleansing station.

The FRNSA proposes to enhance the current AIS monitoring protocol in the navigation pools downstream of Rapide Croche Lock; the objective being to identify any new AIS threats approaching the transfer station from downstream and to modify, as necessary, the cleansing and decontamination protocol to address that threat. This will proactively prevent the upstream movement of non-native species rather than trying to respond to a breach in the system. The FRNSA will also include regional academic experts and local environmental interests as they move forward with development of the enhanced AIS monitoring protocol. As this Project develops the FRNSA will work closely with the WDNR and consider the AIS Rapid Response guidelines (WDNR, 2012b).

## 2.6 MAPS, PLANS AND OTHER DESCRIPTIVE MATERIAL

The following materials are attached to this document in Appendix A:

- Figure 1. Project Location and Topography
- Figure 2. Project Location and Orthophotography
- Figure 3. Site Development Plan
- Figure 4. Plat Map
- Figure 5. WDNR County Wetlands Map
- Figure 6. County Zoning Map

### 3 Affected Environment<sup>14</sup>

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#### 3.1 PHYSICAL ENVIRONMENT

##### 3.1.1 Topography and Soils

The topography of Outagamie and Brown Counties is relatively consistent with an elevation around 700ft. The only noticeable relief is near streams and rivers. The Rapide Croche lock site is located within the steep river valley of the Lower Fox River. The top of the valley is approximately 660ft and slopes down to approximately 600ft at the lock site. Slopes in this area vary from 20-45%.

According to the Natural Resource Conservation Service (NRCS) soil survey (NRCS 2013a) the project site is made up of Kewanee soils. These soils consist of very deep; well drained soils formed in clayey till and are commonly found on ground, end, and recessional moraines.

The majority of sediment annually deposited in the tributaries on the east side of the Lower Fox River (East River and Baird Creek) is from agricultural upland erosion, gully erosion, and stream bank erosion. Soils in this part of the basin are relatively fine in texture with slow permeability. In addition, the landscape consists of moderate to steep slopes and is subject to increased urbanization and significant agricultural land use. All of these conditions play a part in the increased erosion potential and delivery of sediment to the streams, especially for areas in close proximity to the streams (Cadmus 2012). This erosion can occur both from runoff and from boat wake impacts.

On the west side of the Lower Fox River (Apple, Ashwaubenon, and Duck Creek), soils typically consist of clay loam glacial till or sandy soils, which range from poorly-drained to well-drained. Upland erosion in this area of the basin contributes to high sediment loading to the tributary streams. Livestock operations that allow cattle access to streams are a key cause for eroding stream banks, loss of bank cover and vegetation, and degradation to the stream-bed and habitat. Eroding stream banks contribute to flashy stream conditions, which results in smaller tributaries experiencing little to no flow in summers, limiting fish and aquatic life uses. In addition, organic pollutants from livestock waste can cause in-stream temperatures to rise and dissolved oxygen levels to fall (Cadmus 2012).

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<sup>14</sup> The “Affected Environment” includes the immediate project site and surrounding vicinity (i.e. Rapide Croche Lock and immediately adjacent land) as well as portions of the Winnebago system as defined in Section 1.0 that could receive direct, indirect, or cumulative impacts as a result of the Project.

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### 3.1.2 Water Resources

#### *Lakes*

Lake Winnebago is a large (137,708 acre), freshwater lake that has a maximum depth of 21ft and an average depth of 15.5ft (WDNR 2004). This lake is the headwaters of the Lower Fox River and is located at the south end of the river. Lake Winnebago is a heavily used fishery, utilized for recreation year round. The Lake Winnebago system consists of 166,000 surface acres of water (WDNR 2004). Over 2 million people live within 75 miles of the lakes, and the cities of Appleton, Neenah, Menasha, and Oshkosh all obtain drinking water directly from Lake Winnebago (WDNR 2004). Dams built in the 1850's altered the water levels of these lakes by 2.5 feet, creating slightly deeper environments causing a loss of aquatic plant habitat and poor water clarity (WDNR 2004).

Green Bay is located at the mouth of the Lower Fox River, and is one of the largest freshwater estuaries in the world. Green Bay is 1639 square miles (1,049,425 acres) located along the south coast of Michigan's Upper Peninsula and the east coast of Wisconsin (Fox River and Green Bay Statistics 2013). The bay is navigable by large ships, and is also heavily utilized for recreation and sporting activities such as hunting and fishing. It also provides drinking water for the city of Green Bay.

#### *Waterways (streams, creeks, and rivers)*

The main source of water to the watershed at the project site is the Lower Fox River, which flows northeast for 39 miles from Lake Winnebago and its tributaries to Lake Michigan. The main tributaries to the Lower Fox River include Apple Creek, Ashwaubenon Creek, Baird Creek, Duck Creek, and the East River. The Wolf and Upper Fox river basins drain into the Lower Fox basin. The Lower Fox River drains 6,349 square mile area into Lake Michigan (WDNR 2013). Studies have shown the Lower Fox River to have high sediment and phosphorus loads, mostly due to the high amount of land within the watershed which is in active agriculture. Additionally, industrial and residential development and a dominant paper industry in the Neenah, Appleton, and Green Bay areas have also contributed to excessive loadings of bacteria, PCB's, and heavy metals. This has resulted in a degraded aquatic habitat, an unbalanced fish community with low population abundance and limited diversity, an advanced state of eutrophication, and high concentrations of toxic materials in bottom sediments and invertebrate organisms consumed by fish (WDNR 2013a).

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### *Groundwater*

The Lower Fox River valley is underlain mostly by dolomite and limestone which yields water to domestic wells due to its secondary fractures and solution cavities (Kammerer et al. 1998). The fractures in this type of bedrock can contribute to increased groundwater contamination as there is less active filtering in these fractures than if the water were to infiltrate through the rock itself.

Nitrate and herbicides (or herbicide metabolites) have been detected in private wells in both Brown and Outagamie counties. Each county has had private wells test over the federal safe drinking water limit for nitrate of 10mg/L. Potential sources of nitrate contamination include infiltration from nitrate fertilizers, manure application, land application of sewage, and non-sewered residential development (USGS 2013a,b). Groundwater use between 1979 and 2005 has increased in Brown County and decreased in Outagamie County.

### **3.1.3 Air**

According to the WDNR, air quality, as measured by ozone and fine particulates, from 2002 to 2011 for Brown and Outagamie counties has consistently been at or below the federal standards with the only exception being in 2007 (WDNR 2013b). In 2007 the city of Green Bay exceeded the 24h-particulate standard. It should be noted however that this was the same year that the Environmental Protection Agency decreased the standard from 65 $\mu\text{g}/\text{m}^3$  to 35 $\mu\text{g}/\text{m}^3$ . From 2008 through 2011, Green Bay has been at or below the federal standard of 35 $\mu\text{g}/\text{m}^3$ . All samples for Outagamie County were taken in the city of Appleton; one of the largest cities in the county. Samples for ozone in Brown County were taken at the University of Wisconsin Green Bay and particulate samples were taken at Green Bay East High School.

### **3.1.4 Impervious Surface**

The current impervious surfaces at the lock site are structures associated with the lock system. This includes concrete footings and pilings as well as small buildings which comprise approximately 2,500 square feet.

## **3.2 BIOLOGICAL ENVIRONMENT**

The two main terrestrial habitats in the Lower Fox River basin are agriculture and woodland. Aquatic habitats include wetland, riverine and lacustrine. The other dominant landscape is urban environment (WDNR 2001).



### 3.2.1 Dominant Aquatic Plant and Animal Species and Habitat

#### *Plants*

Within the lock itself, there are no known aquatic plants present and very few found within the river. Any aquatic plants found in the river will likely be found around the banks or in back waters and bays. Examples of plants found in the aquatic habitats of the Lower Fox River and surrounding wetland, riverine and lacustrine habitats include the following: water lilies (*Nymphaea odorata*), pond weeds (*Potamogeton spp.*), duck weeds (*Lemna spp.*), cattails (*Typha spp.*), bulrush (*Scirpus spp.*), arrowhead (*Sagittaria spp.*), various rushes, sedges, and reeds, cottonwood (*Populus deltoides*), willow (*Salix spp.*), common elderberry (*Sambucus canadensis*), ash (*Fraxinus spp.*), elm (*Ulmus spp.*), maple (*Acer spp.*), red cedar (*Juniperus virginiana*), box elder (*Acer negundo*), and dog wood (*Cornus spp.*).

Within Lake Winnebago, dominant plants include water milfoil (both native and non-native species), sago pondweed (*Potamogeton pectinatus*), common waterweed (*Elodea elodea*), water celery or eelgrass (*Vallisneria americana*), and the emergent canes or common reed (*Phragmites australis*; WDNR 2004).

#### *Animals*

The wetland, riverine and lacustrine environments in this area provide habitat for various species of fish, birds, mammals, reptiles and amphibians. Examples of common fish species include northern pike (*Esox lucius*), walleye (*Sander vitreus*), bass, sunfish, yellow perch (*Perca flavescens*), rainbow smelt (*Osmerus mordax*) and shiners. Common bird species include mallards (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), wood ducks (*Aix sponsa*), osprey (*Pandion haliaetus*), bald eagles (*Haliaeetus leucocephalus*), red-winged blackbirds (*Agelaius phoeniceus*), sparrows, and other migratory songbirds. Mammals include muskrat (*Ondatra zibethicus*), woodchuck (*Marmota monax*), mink (*Neovison vison*), otter (*Lontra canadensis*), raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), coyotes (*Canis latrans*), fox and squirrels.

Within the river, dominant fish species include various panfish, bass, and catfishes along with northern pike and walleye. A wide variety of clams, mussels, amphibians, and invertebrates are also common in this river.

Most notably from a fisheries standpoint, Lake Winnebago is renowned for supporting the largest self-sustaining lake sturgeon population in the world (40,000 adults; WDNR 2004). Each winter, thousands of anglers participate in the unique annual spearfishing tradition that dates back to the Native Americans of the Fox Valley region. Lake Winnebago is not only famous for its sturgeon, it is also known for supporting one of the best walleye fisheries in the United States (WDNR 2004). Lake Winnebago is home to many other popular sport fish as well, including musky, panfish, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), northern pike, and catfish (WDNR 2013c).

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### *Habitat*

Wetland, riverine and lacustrine habitats are all present within the potentially affected environment. Wetland habitats include submergent marsh, emergent marsh, shoreland wetlands, wet meadow, shrub-carr, forested or floodplain wetland.

The sealed lock area provides limited incidental aquatic habitat. Algae are present in the water and attached to portions of the lock structure itself.

Due to the high sediment loads throughout much of the watershed, the river substrate is likely very silty. And although the river is impounded by 12 dams and 17 locks, it maintains the characteristics of a large flowing stream and not a series of impoundments (WDNR 1988).

### **3.2.2 Dominant Terrestrial Plant and Animal Species and Habitat**

The dominant terrestrial habitats are open land and woodland. Open land includes cropland, orchards, pastures and meadows, and comprises the majority of land within 0.5 miles of the Lower Fox River (WDNR 2001).

#### *Plants*

The area immediately surrounding the lock is mowed and maintained lawn. However, in areas where the river valley is steep it is dominated by mixed deciduous woodland including oaks (*Quercus spp.*), hickory (*Carya spp.*), and maple (*Acer spp.*) as well as various other upland understory shrubs including glossy buckthorn (*Rhamnus frangula*), grasses and forbs. In flatter, floodplain areas cottonwood and box elder trees dominate the tree layer. The understory in these floodplain areas are dominated by various sedges (*Carex spp.*), rushes (*Juncus spp.*), and reed canary grass (*Phalaris arundinacea*).

#### *Animals*

Outside the banks of the river valley, this region is dominated by agriculture; mostly comprised of row crops as well as dairy farms and feed cattle.

Common species in the open land habitat include songbirds, white-tailed deer, rabbits, red fox (*Vulpes vulpes*), coyote, pheasant (*Phasianus colchicus*), Hungarian partridge (*Perdix perdix*), waterfowl and domesticated livestock (WDNR 2001). Additional animals include small mammals, bats, frogs, turtles, snakes and invertebrates. Many of these same species are present in the woodland habitats, and also include skunk, thrushes and woodpeckers.

Because the area around the lock has been mowed and maintained, few animals actually live in the immediate Project area. Animals likely to exist in the lock area include furbearers (raccoon, skunk), small mammals and songbirds.

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### 3.2.3 Threatened, Endangered, and Rare Species and Natural Communities

A Natural Heritage Inventory (NHI) review was conducted for the Project. No threatened, endangered, or rare species or natural communities were identified in proximity to the Project area. The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald and Golden Eagle Protection Act and is described below.

#### *Raptors*

Bald Eagles are known to be present around the Rapide Croche lock during the winter months. They utilize the open water areas around the dam for fishing and the trees along the bank for perching. It is also likely that Osprey can be found fishing in the Lower Fox River during the summer months; however, it would be very unlikely that an Osprey would be found at this latitude during the winter.

State-listed raptors include the Barn Owl (*Tyto alba*; endangered), Peregrine Falcon (*Falco peregrinus*; endangered), and red-shouldered hawk (*Buteo lineatus*; threatened). None of these species were identified in proximity of the project area during the NHI inventory review.

### 3.2.4 Wetlands and Waterways

#### *Wetlands, Shoreland, and Waterways*

There are no wetlands located within the immediate project area. However, there are wetlands along Lake Winnebago, the Lower Fox River and Green Bay that provide critical fish spawning habitat for perch, northern walleye and spotted musky (See Section 3.2.1.3; Cadmus 2011) and help protect shorelines from erosion caused by boat traffic and wind-generated waves. Published information specific to the Lower Fox River regarding the current stability of the shoreline or the current level of bank erosion is not available. Although river bank instability is not cited as a major issue in the Lower Fox River Basin Integrated Management Plan (WDNR 2001), streambank erosion is a widespread problem and can be expected to occur currently along at least some portion of the Lower Fox basin. The fact that one of the goals of that Plan is to “Identify critical habitat sites for shoreline protection, restoration, or in-stream habitat restoration” (WDNR 2001) indicates that some problems with river bank erosion are likely to exist.

In contrast to inland lakes, rivers tend to connect long stretches of habitat, have a dendritic tributary network that can touch large areas of land, collect water from large areas, and can act as corridors for the spread of disease, contaminants, nutrients, plants, and animals. Rivers also act as “conveyor belts” delivering sediment and flotsam from upstream sources. The connectivity that rivers have with the landscape also makes them important transportation corridors.

The Lower Fox River has been and remains an important navigation corridor for boat traffic of all kinds. Beginning with light watercraft used by Indians and early European traders and explorers to heavy transport traffic that continues in the estuary area to this day, the Fox River has been an important feature serving many human needs. The lock

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system installed along the Fox River was conceived as a way to allow uninterrupted inland navigation from the Great Lakes to the Gulf of Mexico. In practice, commercial lock use was limited to the section of the river between Green Bay and Lake Winnebago. This section of the river contains numerous rapids requiring a complicated sequence of locks to allow larger vessels to navigate upstream of De Pere. The lock system was expensive to operate and maintain. Following the establishment of the non-native sea lamprey in Lake Michigan, the Rapide Croche Lock was sealed in 1988 by USACE and WDNR to create a barrier preventing the migration of this destructive species into Lake Winnebago. Sixteen of the 17 locks in the Fox River system are currently undergoing renovation, and the system will reopen for navigation in the next two years. When the system renovation and boat transfer station is completed, boats will be able to navigate the entire stretch of river between Lake Winnebago and Green Bay.

### **Blue-green Algae**

While there are advantages to having blue-green algae in an aquatic system, such as oxygen production and nitrogen fixation, in large amounts these algae can cause a variety of problems for an ecosystem. In high concentrations the algae can become toxic to domestic animals such as dogs. Also, when these large colonies start to decompose, they produce a foul odor and can greatly increase the nutrient load in that area, thus fueling future blooms. In freshwater, blue-green algae blooms commonly occur in shallow, stagnant, nutrient rich waters. Both the Lower Fox River and Lake Winnebago are known to experience blue-green algae blooms.

### **Aquatic Invasive Species**

Currently, according to the Wisconsin Department of Natural Resources (WDNR; WDNR 2013c), there are eight AIS already documented in the Lower Fox River system, including Eurasian Watermilfoil (*Myriophyllum spicatum*), Zebra Mussel (*Dreissena polymorpha*), Chinese Mystery Snail (*Bellamya chinensis*), Curly-leaf Pondweed (*Potamogeton crispus*), Flowering Rush (*Butomus umbellatus*), Viral Hemorrhagic Septicemia (*Novirhabdovirus Viral hemorrhagic septicemia virus*), Faucet Snail (*Bithynia tentaculata*) and Rusty Crayfish (*Orconectes rusticus*). AIS monitoring conducted by DeStasio for FRNSA from 2006 through 2012 also found white perch (*Morone Americana*), common carp (*Cyprinus carpio*), and the amphipod *Echinogammarus ischnus* above the Rapide Croche lock and dam (DeStasio 2013). Other non-native species have been detected above the dam, but are not thought to have established populations yet. These include *Daphnia lumholtzii*, a waterflea, and the amphipod *Gammarus fasciatus*.

Additional AIS of significant concern present in Lake Michigan that have not yet been found in the Winnebago Pool include asiatic clam (*Corbicula fluminea*), fishhook Waterflea (*Cercopagis pengoi*), rainbow smelt (*Osmerus mordax*), round goby (*Neogobius melanostomus*), and spiny waterflea (*Bythotrephes longimanus*) (WDNR 2013c).

### **3.3 CULTURAL ENVIRONMENT**

#### **3.3.1 Land Use**

Land use in the Lower Fox River basin's 403,657 acres, which encompasses the entire Lower Fox River and surrounding area from Lake Winnebago to Green Bay, can be separated into three main categories, agriculture (including barnyards), urban, and natural areas. Agriculture makes up the greatest portion of this area at 50.2% followed by urban and natural areas representing 34.6% and 14.7% respectively (active construction sites made up the remaining 0.6% at the time the study was conducted; Cadmus 2012).

#### **3.3.2 Social**

##### ***Recreational Use***

The Fox River State Recreational Trail runs for 25 miles, starting in the city of Green Bay. Seven miles of paved trail go south along the Fox River to the city of De Pere, and unpaved portions of the trail are open to horseback riding. Fishing, biking, walking, jogging and rollerblading are all popular recreational activities along the trail. Other popular trails along the Fox River include the Little Chute Heritage Trail, and the Menasha Trestle Trail.

The Lake Winnebago system, the Lower Fox River, and Lake Michigan are all utilized recreationally. Lake Winnebago alone features over 30 boat launching sites, 13 public lands/parks, and a beach (Nisbet and Davis-Foust 2013; WDNR 2013c). There are also numerous end-of-road and end-of-lane ramps in addition to recently installed kayak and canoe launches and portages. Additionally, the Winnebago Pool hosts approximately 50 fishing tournaments a year (WDNR 2004). Due to their size and accessibility, lakes Winnebago and Michigan likely see more recreational use than the Lower Fox River.

The 39-mile section of the Lower Fox River from Lake Winnebago to Green Bay has been identified as part of the 280-mile Fox-Wisconsin Water Trail, which was recently designated a National Recreational Trail by the National Park Service.

##### ***Boats***

Boat traffic along the Lower Fox River includes both recreational and commercial use. However, currently the only way to move a boat around the Rapide Croche Lock is to portage over or trailer the boat around it. Thus, traffic on the 39-mile reach of river between Lake Winnebago and Green Bay is largely limited to boats owned by shoreline residents or smaller boats that can easily be launched at a ramp or the shoreline. Aerial photos show at least three private boat launches on this reach.

Since 1988, navigation for power boats on the Lower Fox River has been limited to those that can be trailered. Power boating has generally been limited to the individual pools created by the numerous dams that exist along this reach.

## ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC INVASIVE SPECIES CLEANSING STATION PROJECT

The Lake Winnebago system is one of the most popular recreational boating lakes in Wisconsin. Over 78,000 boats are registered in the six counties bordering the Lake Winnebago system (WDNR 2012). These boats utilize Lakes Winnebago, Butte des Morts, Poygan, and Winneconne during the summer months.

### *Canoes and Kayaks*

With limited boating access to river between Kaukauna and Rapide Croche lock, canoes or kayaks are more likely to be used on this stretch of river than other boats, simply because they are easier to launch. Recent designation of this segment of the Fox River as part of a National Recreational Trail system has increased attention from canoe and kayak users.

### *Sport Fishing*

The Winnebago Pool hosts approximately 50 fishing tournaments a year (WDNR 2004), and in 2013 the WDNR sold 11,601 sturgeon-spearing licenses for Lake Winnebago. Recreational fishing on the Winnebago system may be an important economic driver in terms of area tourism. The Winnebago recreational fishing industry depends on a healthy and sustainable fishery. **Economic**

### *Employment, Labor Force, and Income*

According to three-year estimates from the U.S Census Bureau (2010), the populations of employed civilian citizens age 16 and older in the work force in Brown and Outagamie Counties are 139,310 and 99,049 respectively. Unemployment rates for Brown and Outagamie Counties are 5.4% and 3.5% respectively, both of which are below the unemployment rates of Wisconsin and the U.S. rates of 5.7% and 6.6% respectively (date). Per capita income for Brown and Outagamie Counties are both above that of Wisconsin as a whole and slightly below that of the U.S. (Table 1).

Educational services/health care and social assistance, manufacturing, and retail trade respectively, make up the three largest employment industries in both Brown and Outagamie Counties (Table 2) (U.S. Census 2010). Despite the significant acreage of agricultural land in this area, the agriculture/forestry/fishing and hunting/mining industry is the smallest employment sector in both counties. This is likely due to the large industrial presence in the Appleton (Outagamie County) and Green Bay (Brown County) regions.

**ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC  
INVASIVE SPECIES CLEANSING STATION PROJECT**
**Table 1. Employment and Income Comparison (2010)**

<b>Location</b>	<b>Civilian Labor Force</b>	<b>Number Employed</b>	<b>Number Unemployed</b>	<b>Unemployment Rate</b>	<b>Per Capita Income</b>
Brown County	139,310	128,469	10,688	5.4%	\$27,224
Outagamie County	99,099	94,191	4,862	3.5%	\$26,603
Wisconsin	3,089,541	2,826,631	258,986	5.7%	\$26,562
United States	156,201,959	140,145,661	16,056,298	6.6%	\$27,158

Source: U.S. Census Bureau 2010

**ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC  
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**Table 2. Brown and Outagamie County Employment by Industry (2010).**

Industry	Brown County		Outagamie County	
	Employee Estimate	Percent of Total Employees	Employee Estimate	Percent of Total Employees
Agriculture, forestry, fishing and hunting, and mining	2,440	1.9%	1,551	1.6%
Construction	7,031	5.5%	5,058	5.4%
Manufacturing	21,735	16.9%	21,592	22.9%
Wholesale trade	4,787	3.7%	2,487	2.6%
Retail trade	13,303	10.4%	11,178	11.9%
Transportation and warehousing, and utilities	8,543	6.6%	4,548	4.8%
Information	2,808	2.2%	1,926	2.0%
Finance and insurance, and real estate and rental and leasing	8,101	6.3%	6,551	7.0%
Professional, scientific, and management, and administrative and waste management services	9,134	7.1%	7,653	8.1%
Educational services, and health care and social assistance	29,822	23.2%	17,543	18.6%
Arts, entertainment, and recreation, and accommodation and food services	11,171	8.7%	7,669	8.1%
Other services, except public administration	5,792	4.5%	3,554	3.8%
Public administration	3,802	3.0%	2,881	3.1%

Source: U.S. Census Bureau 2010



## **ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC INVASIVE SPECIES CLEANSING STATION PROJECT**

### **3.3.3 Historical and Archaeological**

The Wisconsin Historical Society (WHS) lists the Rapide Croche Lock (WHS Record #27751) and the Dam (WHS Record #27752) on the State Register of Historic Places. Both are included in the Rapide Croche Lock and Dam Historic District (WHS Record #93001326), which is listed on both the State and National registers. Other facilities, including the Rapide Croche Lockkeepers House (WHS Record #27749), and the Rapide Croche Lock Shack (WHS Record #27750), are also included in the listing. Archaeological sites are not listed on the project site.

### **3.4 OTHER SPECIAL RESOURCES**

The Winnebago system consists of Lakes Buttes des Morts, Winneconne, Poygan, Winnebago and all their tributaries from their mouths upstream to the first dam including the Fox river from Lake Winnebago upstream to the dam above Princeton and all its tributaries from their mouths upstream to the first dam and the Wolf river from its mouth upstream to the dam in the city of Shawano and all its tributaries from their mouths upstream to the first dam including Cincoe lake, Partridge Crop lake and Partridge lake in Calumet, Fond du Lac, Green Lake, Marquette, Outagamie, Shawano, Waupaca, Waushara and Winnebago counties (WDNR Regulations 2013).

As stated above, the Winnebago system supports a valuable angling industry and also supports the largest naturally reproducing Lake Sturgeon population in the world (WDNR 2004).

### **3.5 HAZARDOUS MATERIALS**

#### **3.5.1 Polychlorinated biphenyls (PCBs)**

Until the 1970's PCBs were used in the production of carbonless copy paper. PCB's are very stable compounds that persist in the environment for long periods of time. The PCBs were used in forming an emulsion that was applied as a coating to one side of the paper. Approximately 65% of the emulsion that was used to make carbonless copy paper between 1953 and the early 1970's was sold to Appleton Paper Company located in Appleton Wisconsin (Patterson 1998). PCBs were released into Lower Fox River via wastewater from the recycling of contaminated paper trimmings that were created during production and post-consumer carbonless paper products as well as general production losses while applying the coating to the paper.

The Lower Fox River remains contaminated with PCB's despite fairly extensive and widespread cleanup efforts. Fish and waterfowl consumption advisories have been in place since the 1980's and some modified recommendations continue today. PCB's accumulate in adipose tissue and are not readily removed from the body. They have been shown to have adverse effects on the immune, reproductive, nervous, and endocrine system as well as cause cancer (EPA 2013).

### **3.5.2 Solid Waste**

Currently, there is no solid waste being generated at the project site.

### **3.5.3 Chemicals and Fuels**

There are no chemicals or fuels currently being stored within the project site.

## 4 Environmental Consequences

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### 4.1 PHYSICAL AND VISUAL

Once the Project is operational, 39 miles of the Fox River will be opened for navigation between Lake Winnebago and the bay of Green Bay for all types of watercraft under 55 feet in length. The recent Boater Survey (St. Norbert 2010) indicates that there is a good deal of enthusiasm for the increased access that the Project would enable, and that boating traffic in the Fox River upstream of the Project will likely increase. Increased boat traffic may occur upstream on the Fox and Wolf Rivers resulting in increased sediment and erosion in those waters; however, the physical and visual effects of the predicted 1,300 additional boats (St. Norbert 2010) in comparison to the thousands of boats already using the Lake Winnebago system (based on the number and capacity of existing boat launch sites per Nisbet and Davis-Foust 2013), would be negligible.

More boats and boat traffic<sup>15</sup> will mean additional wake waves, which can lead to river bank erosion problems in susceptible areas. Factors including a boat's speed, size and displacement affect the magnitude of wake waves. According to Asplund (2000), wake waves can have heights of 40-50 cm (15-20 in.), but then dissipate in size and erosive force as the distance from the boat increases. If increased boat activity is combined with sparse bank vegetation and unconsolidated soils, new bank erosion problems may result, especially along narrow reaches or steeply sloping banks. Installation of energy absorbing measures and/or establishment of boat speed rules in river segments susceptible to erosion may be necessary to minimize the effects of waves and wakes on the river's banks.

### 4.2 BIOLOGICAL

#### 4.2.1 Effects of Boat Traffic

Boats may affect the biological community in several ways<sup>16</sup>. Direct contact with boats/propellers can be a source of mortality for fish and wildlife such as shorebirds, waterfowl, herons, loons, turtles and frogs. Pollution from exhaust or spills may be toxic to some species. Boat movements can affect individual fish by disturbing their normal activities, and increased turbidity may affect sight-feeding species. Birds are especially sensitive to human disturbance, which may affect their nesting or feeding habits. Populations may also be affected by habitat alteration caused by waves and/or propeller damage (Asplund 2000). However, these waterways are already heavily trafficked by boats, and many of these impacts are already occurring. The areas near the station itself will see increased boat traffic once that river reach is navigable, and

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<sup>15</sup> Evaluated in response to item #7, WDNR (2013e).

<sup>16</sup> Evaluated in response to item #7, WDNR (2013e).

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certain areas may require mitigation in the form of decreasing the maximum boat speed.

### 4.2.2 Aquatic Invasive Species

Increased boat numbers would normally increase the likelihood of AIS introduction, as recreational boating and fishing is one of the main vectors for transport of. Herein lays the purpose of the Project: providing a means to transfer and cleanse boats to prevent the introduction of AIS.

The transportation of boats and trailers between bodies of water presents the risk of introduction of AIS through hull fouling, entanglement, and water discharge from bilge pumps and bait buckets. The operation of the Project will decrease the likelihood of AIS transfer on boats that are placed upstream through the transfer station by requiring all boats to go through the cleansing process. Currently, boats gaining access to the river upstream of Rapide Croche via boat launches may be inspected and have visible weeds removed, but for the most part are not being washed or otherwise decontaminated and are therefore potential AIS vectors. Additionally, once the Project is operational, associated monitoring activities (see Section 2.5.1) may result in earlier detection of AIS even if they are transferred via other vectors (see Section 4.5).

### 4.2.3 Water Quality

Boat traffic has been shown to affect water clarity<sup>17</sup> and can be a source of nutrients and algal growth in aquatic ecosystems (Asplund 2000). Shallow lakes, shallow parts of lakes and rivers, and channels connecting lakes are the most susceptible to impacts. Depth of impact varies depending upon many factors including boat size, engine size, speed, and substrate type. In silty substrates, the greatest increases in suspended solids have been observed at depths of 3 feet, and to a lesser degree at 6 feet deep. No changes have been observed below 8 feet deep (USACE 1994). Creating no-wake zones in shallow areas can help reduce boat-related increases in turbidity. Lake Winnebago is already in a eutrophic state according to 2013 water quality reports (available at <http://dnr.wi.gov/lakes/waterquality/bycounty.aspx>), which results in high turbidity. Compared to the overall boat usage of the lake, the increased boat traffic due to the Project will likely have a negligible effect on water quality. Near the boat transfer and cleansing station itself, the water bypass system (see Section 3.2.2) will help to reduce algal growth (and thus keep turbidity low).

There have been numerous studies on the effects of outboard motor exhaust and related pollution from fuel leakage. In general, these studies have shown minimal toxic effects on aquatic organisms because: 1) the amount of pollution is small compared to the volume of a lake; and 2) most hydrocarbons are volatile and quickly disperse. However, polyaromatic hydrocarbons and fuel additives have been detected in some cases. Build-up of certain compounds in sediments has been documented, especially

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<sup>17</sup> Evaluated in response to item #7, WDNR (2013e).

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near marinas or other high concentrations of boats, and may be detrimental to bottom dwelling organisms (Asplund 2000). However, the expected increase in boat numbers due to the boat transfer and cleansing station, spread over the boating season, is unlikely to create a situation similar to a marina (due to small numbers of boats, lack of fueling or other attractive services) and should, therefore, have a negligible effect on water quality.

Blue-green algae are commonly found in stagnant water such as backwaters. Increased boat traffic around the Project would increase wave action in otherwise calm areas adjacent to the lock, and discourage the formation of algal mats. Also the water bypass system (see Section 3.2.2) and the discharge of clean wash water will help to discourage blue-green algae mats from forming.

### 4.3 CULTURAL

#### 4.3.1 Land Use

Land use in the Lower Fox River basin is not expected to change due to the Project. The station will not alter any land other than the existing lock and surrounding property.

#### 4.3.2 Social

##### *Recreational Use*

The Project is expected to increase recreational use<sup>18</sup> of the Lower Fox River by increasing the accessibility for boats from downstream and upstream. Additionally, Lake Winnebago and Green Bay may also see additional recreational activity, in the form of boat traffic, due to increasing the ability for boats to move from one side of the lock to the other without having to use a boat landing and trailer. This may be especially important for larger recreational boats and commercial vessels that are too large to trailer on a regular basis. The boat cleansing and transfer station will increase the accessibility of recreation for people living downstream of the Rapide Croche dam, allowing access for recreational boating and fishing, as well as access to all of Lake Winnebago's recreational areas.

Increased boat traffic is expected on the Lower Fox River and potentially on Green Bay and Lake Winnebago as well. The Lower Fox River may see an increase in larger boat traffic, since the Project will allow for large boats (as are often used on Green Bay or Lake Winnebago) to travel between the two bodies of water. According to the St. Norbert Boat Survey (2010), length of boat has a significant positive correlation with support for, and likelihood of using, the proposed Project at Rapide Croche.

Opening the lock system will make it easy to pass through the entire river and will undoubtedly increase the number of boats plying all reaches of the Lower Fox. The St.

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<sup>18</sup> Evaluated in response to item #16, WDNR (2013e).

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Norbert Survey (2010) suggests that over 1300 boats will annually utilize the transfer facility at Rapide Croche. This number can be considered the likely number of additional recreational watercraft to navigate between the Lower Fox River, Lake Winnebago, and Green Bay.

Assuming that all additional boat traffic predicted by the St. Norbert Survey (2010) occurs between Memorial Day weekend and Labor Day, an estimated 13 additional boats can be expected to be contributed to the Lake Winnebago system boat traffic each day, a number that is very small when compared to system-wide boat traffic. When boats exiting the Lake Winnebago system via the Rapide Croche transfer station are considered, the number declines further. In summary, there is very little likelihood that additional boating traffic contributed by the Project will tangibly increase the negative effects of recreational boating on the environment and human welfare.

Since canoes and kayaks are easy to portage, the Project may not significantly alter canoe and kayak travel. However, the river is part of the Fox-Wisconsin Heritage Water Trail, recently designated as part of the National Recreational Trail system, is likely to garner more attention to the waterway. This designation is likely to increase the number of small craft navigators in the river system. The proposed Project will provide a means of cleansing canoes and kayaks to prevent the spread of AIS upstream into the Lake Winnebago system, which will increase in importance as the water trail becomes more popular.

Sport fishing may increase in association with improved access between Lake Winnebago and Lake Michigan (St. Norbert 2010). Because of the lack of public boat ramps on the river between Rapide Croche and the next upstream lock, even sport fishing boats that are easily trailered may use the transfer station to take advantage of the newly available angling territory.

Should AIS be introduced to the Lake Winnebago system, they would have access to roughly 17 percent of Wisconsin's inland water acreage (WDNR 2004). The construction and subsequent operation of the Project and the rigorous boat cleansing process will eliminate the threat of AIS transfer associated with boats traveling through the station.

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### *Educational Use*

The Project will be an educational facility that teaches boaters and anglers about the prevention and consequences of AIS in waterways. Educating boaters who utilize both the Lake Winnebago system and Lake Michigan, may help reduce the potential for AIS spread.

### *Effects of Boat Traffic*

Increased boat traffic can result in the crowding of lakes, decreased safety, decreased air quality, and increased noise. Motor noise can disturb aquatic wildlife as well as upset human inhabitants of lakes and waterways. Increased boat traffic is also likely to result in an increase in motor noise. This could result in decreased enjoyment for homeowners and other visitors. However, the increased boating activity associated with the limited number of boats using the transfer station on a daily basis is not expected to result in nuisance level effects, when compared to current boating use.<sup>19</sup>

### **4.3.3 Economic**

#### *Staffing Levels*

The boat transfer and AIS cleansing station will likely be operational from 10am to 11pm on Mondays through Thursdays, and from 8am until midnight on Fridays, Saturdays, Sundays and holidays. This is the current operation schedule for the interior locks and is subject to change. It is anticipated that two station operators at a time will likely be necessary to facilitate efficient and orderly boat transfers. This represents 100 person-hours of operation each week, or two to three seasonal positions.

According to the 2008 Aquatic Invasive Species Strategic Plan for the Winnebago Pool (Winnebago Lakes Council 2008), angling in the Winnebago system is directly responsible for 3,500 jobs in the area, and indirectly adds an additional 800 jobs. The Project could contribute to additional jobs, both directly as a result of the jobs at the station itself, and indirectly as a result of increased angling and recreation.

#### *Area Economy*

Direct and indirect spending from fishing activities contributes greatly to the local economy. The Project is expected to increase the area economy, due to both direct fees from the boat transfer fee, the activities related with construction of the facilities, and indirectly through increased angling and other recreation activities. The 2011 National Survey of Fishing, Hunting and Wildlife-Related Recreation found that anglers in Wisconsin (both resident and visitors) spend an average of \$29 per day of fishing. This equates to \$1,129 per angler per year. Of this, approximately 21.5% goes towards food and lodging expenses, and 19.8% to travel expenses. The rest goes towards equipment and other miscellaneous expenditures.

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<sup>19</sup> Evaluated in response to item #7, WDNR (2013e).

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### *Cost Effectiveness*

If operation of the Project would have to be terminated at some point in the future if found not to be cost effective<sup>20</sup>, the expected economic benefits will not come to bear. However, the protective AIS barrier will remain in place.

### 4.3.4 Historical and Archaeological

A State Process 44.40 form was sent to the Wisconsin Historical Society (WHS) regarding the Project. In order to construct the project the Rapide Croche Lock (WHS Record #27751) would need to be filled and the lock gates removed. The Rapide Croche Lockkeeper's House (WHS Record #27749) would remain; however, a future parking lot may be constructed in the vicinity of the house. The Rapide Croche Lock Shack (WHS Record #27750) may need to be removed. The WHS responded that the Project will have adverse impacts on historical properties and that further consultation is needed. No archaeological impacts are anticipated.

The FRNSA will continue to work with the WHS as it has on other projects to minimize and mitigate for historical impacts. These include restoration of the Lock Shack and Lock Gates. These and other components of the lock, such as operating machinery, will be used as part of educational displays at and around the Project and will also be supplemented with pictures and other documentation discussing the historic elements of the Lock and Dam, and the District. A Historic Preservation Study is currently being conducted by Anne Biebel of Cornerstone Preservation. A Historian has been contracted to work with WHS during final design.

## 4.4 OTHER SPECIAL RESOURCES

### 4.4.1 Winnebago System and the Lower Fox River

The Winnebago system consists of Lakes Buttes des Morts, Winneconne, Poygan, Winnebago and all their tributaries from Lake Winnebago upstream to the dams at Princeton and Shawano making it the largest lake system in the state of Wisconsin. This lake system is approximately 166,000 acres, comprising 17% of the freshwater in the state. The Lower Fox River includes approximately 39 miles from the Winnebago pool to Lake Michigan in the city of Green Bay.

The Lower Fox River and Winnebago system is an ancestral home to Native Americans and has a strong historical significance to the settlement of Wisconsin. Historically the Winnebago system is described as an area with abundant wild rice fishing, furbearing animals and waterfowl. In the 1850's the system changed dramatically with new settlers and industrial development, including two dams constructed at the Fox River outlets of Lake Winnebago in Menasha and Neenah. Wood product and paper industries continue to be important industries in this region.

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<sup>20</sup> Evaluated in response to item #16, WDNR (2013e).



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The Winnebago system is critical for the surrounding communities, providing drinking water to 250,000 people including the communities of Menasha, Neenah, Appleton, and Oshkosh.

The Winnebago system provides important recreational outlets, making this system the most heavily used by boaters in the state. Over 2 million people reside within 75 miles of the lake, making it an ideal day trip. Additionally, the 39-mile section of the Lower Fox River from Lake Winnebago to Green Bay has been identified as part of the 280-mile Fox-Wisconsin Water Trail, which was recently designated a National Recreational Trail by the National Park Service.

Lake Winnebago contains a sustainably harvested lake sturgeon population that is managed by the WDNR. Thousands of tourists visit popular spawning viewing areas located at the Shawano dam in Shawano, Bamboo Bend in Shiocton, and the Wolf River Sturgeon Trail in New London. Sturgeon spearing and sturgeon spawning periods occur during winter and early spring, respectively, and annually provide an economic benefit to local communities.

High Cliff State Park is a 1,187-acre park operated by the WDNR near Sherwood, Wisconsin on the northeast shore of Lake Winnebago. It is the only state-owned recreation area located on Lake Winnebago. The park includes a marina that has more than 100 slips available for rent and areas for fishing, hiking, and camping. Additional county and municipal marinas and facilities are located at Calumet Park, Stockbridge, Brothertown, Pipe, Fond du Lac, Oshkosh, Neenah, Menasha, Appleton, Kimberly, Little Chute, and Kaukauna.

### 4.5 ADVERSE IMPACTS THAT CANNOT BE AVOIDED

#### 4.5.1 Use of Boat Ramps to Avoid Boat Transfer System

Despite the efforts that will be made at the proposed boat transfer and AIS cleansing station, trailered boat access ramps still represent a significant threat for AIS introductions through other access points<sup>21</sup>. There are a total of over 60 access points for boats on the Lake Winnebago system. Based on the number of available parking spaces in just the primary launch sites within the system (Nisbet and Davis-Foust 2013), and assuming only 30% capacity weekdays and 60% on weekends, more than 23,000 boats may be launched within the Lake Winnebago system in a given season. This number greatly exceeds the 1300 boats expected to pass through the proposed Rapide Croche boat transfer station during its annual period of operation (St. Norbert 2010). Unless all boaters and anglers take precautions to prevent the spread of AIS from lake to lake via trailered boats, this vector will remain a serious threat to the Lake Winnebago system. In summary, introduction of new AIS into the Lake Winnebago system could occur regardless of the proposed Project or its level of use.

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<sup>21</sup> Evaluated in response to item #13, WDNR (2013e).

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### 4.5.2 Other Vectors for AIS Transfer

In addition to the threat of AIS transfer via trailered boats, AIS introductions can also occur through other vectors. According to the Aquatic Invasive Species Plan for the Winnebago Lakes Pool (July 2008 Draft), the following are all recognized potential threats for AIS transport:

- Nursery/Water Gardens/Aquarium Suppliers: plants can either be unintentionally introduced from water gardens, or may be mislabeled or misidentified as native species.
- Construction and Restoration Industry: installation of docks and other marine equipment, as well as the use of machinery in the water for installation of equipment, lake monitoring, habitat restoration, or AIS removal can create a vector of transport if not properly cleansed prior to new projects.
- Sea Planes: the pontoons of float planes may be contaminated with AIS similar to the hull of a boat.

Despite the operation of the Project, AIS may still be introduced to the Winnebago system through these vectors.

## 5 Evaluation of Project Significance

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### 5.1 ENVIRONMENTAL EFFECTS AND THEIR SIGNIFICANCE

#### 5.1.1 Long- and Short-term Primary and Secondary Effects

##### *Long Term Effects*

The worst long term, adverse impact of this project would be the introduction of AIS into the Lake Winnebago system. The most concerning possible, though unlikely, introduction is that of the sea lamprey. With no natural predator in this system, the sea lamprey could decimate the native fish populations including the lake sturgeon. The Project will leave the current sea lamprey barrier in place, and will additionally cleanse each boat of any potential AIS prior to placement upstream. This will greatly reduce the likelihood of introduction of AIS via the transfer station by providing a safe means of transferring boats between the two systems, rather than relying on personal boat trailers and unmanned boat launches where people may not take the necessary precautions.

This Project would also alter the Rapide Croche Lock which is designated as a state and national historical location. Completion of this project may affect this designation. There is currently a Historic Preservation study being conducted to determine which elements at the Rapide Croche Lock would need to be preserved and which would become parts of the educational piece. FRNSA will continue to work with the WHS during this process.

Completion of this project would likely increase boat activity on this section of the river, though the number of boats using the transfer station is unlikely to exceed 25 per day (including up and downstream movements). Increased boat activity could adversely affect boater safety, air quality, water quality, water clarity, shoreline erosion, and communities/populations of aquatic plants, fish, and other wildlife. Conversely, increased boat activity could positively affect the local economy by increasing the number of visitors to the Lake Winnebago system.

##### *Short Term Effects*

Effects from active construction and ground disturbance (i.e. air emissions, dust, noise) would be the only short-term negative effects of construction at this site. These effects would be unavoidable, but temporary. A positive effect of the construction phase would be the injection of financial resources and short-term jobs into the local economy.

#### 5.1.2 Environmental Effects on Geographically Scarce Resources

##### *Naturally Reproducing Lake Sturgeon*

While no lake sturgeon has been observed at the project site itself, the Lake Winnebago system represents a significant stronghold within the largest naturally reproducing lake sturgeon population in the world: the Great Lakes and St. Lawrence basins (IUCN 2013).

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Introduction of the sea lamprey could have severe negative effects on this population. A permanent sea lamprey barrier has been in place since 1988 at the Rapide Croche Lock site. That barrier would remain in place with the proposed project. In conjunction with the Project, increased monitoring for the lamprey and other AIS have also been proposed.

### **5.1.3 Irreversible Impacts**

Removal and destruction of current structures and buildings would essentially be irreversible. Additionally, introduction of additional AIS above Rapide Croche would likely be irreversible. This impact is much less likely to occur due to the Project, however, than it currently is via trailered boats launching upstream at public boat access points without decontamination facilities. Also, it should be noted that monitoring associated with operation of the transfer station Project may increase the likelihood of early detection, which may allow AIS to be stopped prior to entering the Lake Winnebago system.

## **5.2 SIGNIFICANCE OF CUMULATIVE EFFECTS**

The cumulative or additive effects resulting from this project relate primarily to the historical impacts that will result from the project. The FRNSA has been conducting projects on many of the locks and dams it maintains and multiple projects have resulted in alterations to the historical environment. However, FRNSA maintains a relationship with WHS and a historian on the FRNSA board to help oversee the projects. Through this relationship they are able to restore and maintain some of the historical elements of the locks and dams and use them as educational pieces.

## **5.3 SIGNIFICANCE OF RISK**

Introduction of AIS, especially the sea lamprey, into the Lake Winnebago system is a significant concern. Any of the AIS listed above, as well many that are not listed, have the potential to significantly alter this ecosystem. The lamprey could devastate fish populations including many sought after game fish such as walleye, pike, muskellunge, and lake sturgeon. Significant declines in these populations would not only affect the food web but could result in a decrease of sport fishing in this area thus, negatively affect the local economy.

It should be noted that there is currently significant risk of transferring AIS from Lake Michigan to the Lake Winnebago system via trailered boats. Aquatic invasive species can easily be spread by trailering a boat from an infested water to an uninfested water. Plant species can be transferred by not removing plant fragments from boats and trailers and invertebrates can be transferred through bait buckets, bilge water, and live-wells.

With the current access of boats, and thus AIS, to the Lake Winnebago system from the Great Lakes and beyond, it is unlikely that the installation and use of the proposed Project would significantly increase the risk of new AIS becoming introduced and

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established in the Winnebago system. The Project itself would provide greater protection to the Winnebago system than any of the 60+ access points currently provides. Additionally, additional boats expected to use the transfer station will be no larger than boats already on the system. While indirect effects of building this Project pose an unlikely risk to the Lower Fox River and associated Lake Winnebago system for AIS transfer, it is less of a risk in comparison to the unregulated access sites on the Winnebago system.

### **5.4 SIGNIFICANCE OF CONTROVERSY OVER ENVIRONMENTAL EFFECTS**

Based on the results of the St. Norbert Survey (2010), the proposed Project appears to enjoy broad support among the boating public. Among environmental and angler advocacy groups, however, there is concern about the potential for the Project to result in AIS moving upstream and the need to address in the facility's design all identified potential for spreading AIS via the proposed Project. However, since five such species already exist upstream of Rapide Croche despite the existence of a barrier, it follows that trailered boats launching directly into the protected portion of the river are the likely vector; and the purpose of the Project is to reduce or eliminate the potential for AIS to move upstream in association with boat transferred at the station. Additionally, boats expected to use the transfer station will be no larger than boats already on the system.

### **5.5 PUBLIC INVOLVEMENT**

Public involvement included multiple outlets of media, press releases, and public meetings to allow stakeholder interaction during the Rapid Croche Boat Transfer Project planning process. On November 28, 2007 a Press Release was prepared giving back-ground information and locations of public meetings. Organizations were sent mailings about the proposed project. The local newspapers, television stations, radio stations, state legislatures, state assembly members, local municipalities, and people on the FRNSA monthly meeting notification list were also sent a press release via email. State Congressional members were notified via fax. Five public meetings were held in 2007 and 2008 throughout the Lower Fox River basin in the communities of Green Bay, Appleton, Oshkosh, Fond du Lac and Winneconne. Meetings contained information stations, opening remarks and were moderated, a FRNSA mission and activities segment, the primary presentation with the Transfer Station Description, AIS Inspection and Cleansing, and AIS Monitoring Program, a questions and answer period, and listening stations. The meetings gave the public the opportunity to ask questions, state concerns, and give suggestions about the Project.

## 6 Alternatives

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### 6.1 ALTERNATIVE SITE LOCATION

No alternative site location was considered; however, early design alternatives included a plan that would site the project adjacent to the lock rather than on top of it and a plan that would site the project in the canal below the Rapide Croche Lock.

### 6.2 ALTERNATIVE DESIGN

During project planning, ten conceptual boat transfer station alternatives were identified, characterized and evaluated. A conceptual cleansing operation was also developed that would be generally common to the boat transfer alternatives. Based on decision analysis methods and results, several priority/preferred boat transfer alternatives were identified:

- Mobile Boat Hoist and Fork Truck
- Mobile Boat Hoist
- Fork Truck
- Strap-Style Transporter with Launching Ramps
- Bunk-Style Transporter with Launching Ramps

### 6.3 NO-BUILD ALTERNATIVE

The no-build alternative would result in the continued lack of navigational access to the Fox River between Lake Winnebago and Lake Michigan, representing a missed opportunity to increase recreational and commercial including intermodal transportation revenue in this area. Additionally, the no-build alternative would offer no reduction in the current risk levels for the spread of AIS into the Lake Winnebago system via uncontrolled boat access points having no rigorous AIS abatement protocols or inspections. Under the no-build alternative, the current AIS monitoring taking place above and below the Rapide Croche Loch would no longer occur.

The no-build alternative would also preserve the Rapide Croche Lock and associated buildings in place. These structures are currently designated as state and national historical sites.

## 7 References

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Asplund, Timothy R. 2000. The Effects of Motorized Watercraft on Aquatic Ecosystems. Wisconsin Department of Natural Resources.

Cadmus Group, The. 2012. Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay.

De Stasio, B. and J. Beyer. 2009. Tests of Lethal Temperature Limits for Invasive Species in the Lower Fox River. Final Project Report to the Fox River Navigational System Aquatic Invasive Species Committee.

De Stasio, Bart. 2013. Aquatic Invasive Species Monitoring Project Summary Report for 2006-2012. Lawrence University, Appleton, WI.

Environmental Protection Agency (EPA). 2013. Polychlorinated Biphenyls (PCBs). <http://www.epa.gov/epawaste/hazard/tsd/pcbs/about.htm>. Accessed 8/16/2013.

International Union for Conservation of Nature. 2013. The IUCN Red List of Threatened Species, *Acipenser fluvescens* (Lake Sturgeon). <http://www.iucnredlist.org/details/223/0>. Accessed 11/7/2013.

Kammerer, Phil A. Jr., Trotta, Lee C., Krabbenhoft, David P., and Lidwin, R.A. 1998. Geology, Ground-water Flow, and Dissolved-solids Concentrations in Ground Water Along Hydrogeologic Sections Through Wisconsin Aquifers. Hydrogeologic sections, ground-water province II. United States Geological Survey.

McMahon, R.F. 1996. The physiological ecology of the zebra mussel, *Dreissena polymorpha*, in North America and Europe. *American Zoologist* 36:339-363.

McMahon, R.F. and R.A. Ussery. 1995. Thermal tolerance of zebra mussels (*Dreissena polymorpha*) relative to rate of temperature increase and acclimation temperature. Technical Report (US Army Corps of Engineer Waterways Experiment Station): EL-95-10.

Mills, E.L., G. Rosenberg, A.P. Spidle, M. Ludyanskiy, Y. Pligin, and B. May. 1996. A review of the biology and ecology of the quagga mussel (*Dreissena bugensis*), a second species of freshwater dreissenid introduced to North America. *American Zoologist* 36:271-286.

Morris, K.H. and P.S. Maitland. 1987. A trap for catching adult lampreys (*Petromyzonidae*) in running water. *Journal of Fish Biology* 31(4):513-516.

## ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC INVASIVE SPECIES CLEANSING STATION PROJECT

Natural Resource Conservation Service (NRCS). 2013a. Official Soil Series Description. [https://soilseries.sc.egov.usda.gov/OSD\\_Docs/K/KEWAUNEE.html](https://soilseries.sc.egov.usda.gov/OSD_Docs/K/KEWAUNEE.html). Accessed 8/13/2013.

Nisbet, Tammy and Shannon Davis-Foust. 2013. A Guide to Boat Landings of the Winnebago System. University of Wisconsin – Oshkosh.

Patterson, Dale J. 1998, June 3. "Fox River and Green Bay PCB Fate and Transport Model Evaluation, Technical Memorandum 2d, Compilation and Estimation of Historical Discharges of Total Suspended Solids and PCB from Fox River Point Sources, Draft," Wisconsin Dept. of Natural Resources.

St. Norbert College Survey Center. 2010. Fox River Navigational System, 2010 Boater Survey. Final Report. [http://foxriverlocks.org/images/stories/AIS\\_Transfer/2013/USE%20FRNSA%202010%20Final%20Complete%20Report.pdf](http://foxriverlocks.org/images/stories/AIS_Transfer/2013/USE%20FRNSA%202010%20Final%20Complete%20Report.pdf) Accessed 11/7/2013

U. S. Army Corps of Engineers (USACE). 1994. Cumulative impacts of recreational boating on the Fox River - Chain O' Lakes area in Lake and McHenry Counties, Illinois: Final Environmental Impact Statement. Environ. and Social Anal. Branch, U.S. Army Corps of Eng., Chicago, IL.

United States Census Bureau. 2010. [http://factfinder2.census.gov/faces/nav/jsf/pages/guided\\_search.xhtml](http://factfinder2.census.gov/faces/nav/jsf/pages/guided_search.xhtml). Accessed 8/16/2013.

United States Geological Survey. 2007. Protecting Wisconsin's Groundwater Through Comprehensive Planning: Brown County. <http://wi.water.usgs.gov/gwcomp/find/brown/index.html>. Accessed 8/13/2013

United States Geological Survey. 2007. Protecting Wisconsin's Groundwater Through Comprehensive Planning: Outagamie County. <http://wi.water.usgs.gov/gwcomp/find/outagamie/index.html>. Accessed 8/13/2013

Winnebago Lakes Council. 2008. Aquatic Invasive Species Strategic Plan for the Winnebago Pool Lakes. July 2008 Draft. <http://www.winnebagolakes.org/documents/AISPlanJuly2008Draft.pdf>. Accessed 11/7/2013.

Wisconsin Department of Natural Resources (WDNR). 1988. Lower Green Bay Remedial Action Plan.

Wisconsin Department of Natural Resources (WDNR). 2001. Lower Fox River Integrated Management Plan. WDNR Publication WT-666-2001.

Wisconsin Department of Natural Resources (WDNR). 2004. Water Quality in the Lake Winnebago Pool. WDNR Publication FH-229-04.



## ENVIRONMENTAL IMPACT REPORT: RAPIDE CROCHE BOAT TRANSFER AND AQUATIC INVASIVE SPECIES CLEANSING STATION PROJECT

Wisconsin Department of Natural Resources (WDNR). 2012. 2012 Wisconsin Boating Program Report. Bureau of Law Enforcement. Pub-LE-314-2012.

Wisconsin Department of Natural Resources (WDNR). 2012b. WISCONSIN'S RAPID RESPONSE FRAMEWORK FOR AQUATIC INVASIVE SPECIES, A Working Document dated September 30, 2012.

Wisconsin Department of Natural Resources (WDNR). 2013a. Wisconsin Water Basins. <http://dnr.wi.gov/water/basin/Lowerfox>. Accessed 8/13/2013.

Wisconsin Department of Natural Resources (WDNR). 2013b. Wisconsin's Air Quality Trends. <http://dnr.wi.gov/topic/AirQuality/Trends.asp>. Accessed 8/14/2013.

Wisconsin Department of Natural Resources (WDNR). 2013c. Lake Winnebago. <http://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=131100>. Accessed 10/17/2013.

Wisconsin Department of Natural Resources (WDNR). 2013d. Aquatic Invasive Species. <http://dnr.wi.gov/lakes/invasives/AISByWaterbody.aspx>. Accessed 8/14/2013.

Wisconsin Department of Natural Resources (WDNR). 2013e. Letter dated February 4, 2013 to Robert Stark, FRNSA, from James P. Doperalski, Jr., WDNR Environmental Analysis & Review Specialist, Northeast Region, Subject: Environmental Impact Report (EIR) Requested Information for the Rapide Croche Boat Transfer Station Proposal, plus attachments.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

Yurista, P. 1999. A model for temperature correction of size-specific respiration in *Bythotrephes cederstroemi* and *Daphnia middendorffiana*. *Journal of Plankton Research* 21(4):721-734.

## APPENDICES

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