Habitat Restoration and Protection Projects in the St. Louis River Area of Concern, Wisconsin

March 2015

Documentation for Remedial Action Plan Management Actions
9.18 - Wisconsin Habitat Protection and Rehabilitation Projects, and
9.20 - Actions Taken to Control Invasive Species in Wisconsin and Minnesota

Compiled by:
Molly Wick, Habitat Project Coordinator, Wisconsin Department of Natural Resources

With input and assistance from:

Jane Anklam	West Wisconsin Land Trust
Jeremy Bates	Wisconsin Department of Natural Resources
Nick Danz	University of Wisconsin Superior
Diane Desotelle	Minnesota Pollution Control Agency
Kristy DeVera	AMI Consulting Engineers, P.A. (formerly City of Superior)
Kris Eilers	St. Louis River Alliance
Amy Eliot	Lake Superior Research Institute, University of Wisconsin, Superior
Miles Falck	Great Lakes Indian Fish and Wildlife Commission
Richard Gitar	Fond du Lac Band of Lake Superior Chippewa
Joe Graham	Wisconsin Department of Natural Resources
Cherie Hagen	Wisconsin Department of Natural Resources
Jon Harris	Douglas County
Paul Hlina	Lake Superior Research Institute, University of Wisconsin, Superior
Joel Hoffman	Environmental Protection Agency Mid-Continent Ecology Division Lab
Doug Jensen	Minnesota Sea Grant
Greg Kessler	Wisconsin Department of Natural Resources
Ted Koehler	US Fish and Wildlife Service
Steve LaValley	Wisconsin Department of Natural Resources
Tracey Ledder	Lake Superior National Estuarine Research Reserve
John Lindgren	Minnesota Department of Natural Resources
Dave Lindsley	Wisconsin Department of Natural Resources
Ryan Magana	Wisconsin Department of Natural Resources
Sumner Matteson	Wisconsin Department of Natural Resources
Darienne McNamara	City of Superior
Martha Minchak	Minnesota Department of Natural Resources
Mary Morgan	City of Superior
Christian Nelson	Fond du Lac Band of Lake Superior Chippewa
Diane Nelson	City of Superior
Sue O'Halloran	Lake Superior Research Institute, University of Wisconsin, Superior
Christine Ostern	Douglas County
Daryl Peterson	Minnesota Land Trust
Steve Rannenberg	Douglas County
Shon Schooler	Lake Superior National Estuarine Research Reserve
Mike Schrage	Fond du Lac Band of Lake Superior Chippewa
Matthew Steiger	Wisconsin Department of Natural Resources
Dara Unglaube	Great Lakes Indian Fish and Wildlife Commission

Executive Summary

The St. Louis River Area of Concern (AOC) was listed in 1987 under the Great Lakes Water Quality Agreement between the United States and Canada due to a history of contamination and habitat degradation caused by poor land use practices. The Wisconsin Department of Natural Resources (WDNR) and the Minnesota Pollution Control Agency (MPCA) are the state agencies responsible for implementing actions necessary to move the AOC towards de-listing. Two of nine Beneficial Use Impairments (BUIs) listed for the St. Louis River AOC relate directly to fish and wildlife; BUI 2, Degraded Fish and Wildlife Populations, and BUI 9, Loss of Fish and Wildlife Habitat. This report contains a summary of work completed in Wisconsin to date (March, 2015) pertaining to these two BUIs, as well as invasive species control work completed to date in the AOC in both Wisconsin and Minnesota.

The WDNR and many partnering agencies and organizations have made significant progress towards improving and restoring habitat opportunities and restoring healthy fish and wildlife populations in the AOC in Wisconsin. The efforts to date have included protection of 17,648 acres of habitat in the Area of Concern including Clough Island, St. Louis River and Red River Streambank Protection Area, Wisconsin Point, and Superior Municipal Forest, among several other properties. Additionally, a major sediment clean-up effort funded by Great Lakes Legacy Act removed over 60,000 tons of contaminated sediment from Newton Creek and Hog Island Inlet, and restored habitat. Additional habitat restoration efforts have included wetland restoration in Allouez Bay; conifer restoration and invasive species control on Clough Island; and invasive species control throughout the estuary. Restoration efforts in the Wisconsin portion of the Area of Concern total over 345 acres, with at least 50 acres of aquatic habitat restoration. The 2013 Remedial Action Plan Update contains the priority projects for Wisconsin to complete in order to remove the Degraded Fish and Wildlife Populations BUI and the Loss of Fish and Wildlife BUI. This list includes seven assessment or planning projects, two documentation projects, and seven habitat restoration projects to be implemented in Wisconsin between now and the AOC delisting goal of 2025.

Table of Contents

List of Figures

List of Tables

List of Acronyms

AIS	Aquatic Invasive Species
EPA	U.S. Environmental Protection Agency
EPA-MED Lab	Environmental Protection Agency Mid-Continent Ecology Division Lab
FDL	Fond du Lac Band of Lake Superior Chippewa
FY	Fiscal Year
GLIFWC	Great Lakes Indian Fish and Wildlife Commission
LID	Low Impact Development
LSRI	Lake Superior Research Institute (part of University of Wisconsin Superior)
MNDNR	Minnesota Department of Natural Resources
MLT	Minnesota Land Trust
MPCA	Minnesota Pollution Control Agency
NERR	Lake Superior National Estuarine Research Reserve
NISC	National Invasive Species Council
NWRPC	Northwest Regional Planning Commission
NWRC	U.S. Geological Survey National Wetlands Research Center
RP	Responsible Party
SLRA	St. Louis River Alliance
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
UWS	University of Wisconsin Superior
WCMP	Wisconsin Coastal Management Program
WDNR	Wisconsin Department of Natural Resources
WWLT	West Wisconsin Land Trust

Introduction

The St. Louis River Area of Concern, located on the western arm of Lake Superior and including the twin port cities of Duluth, Minnesota, and Superior, Wisconsin, was listed as one of 43 Great Lakes AOCs in 1987. The aerial extent of the St. Louis River AOC is shown in Figure 1. Historical actions such as improper municipal and industrial waste disposal and unchecked land use practices, including dredging and filling of aquatic habitat and damaging logging practices, contributed to the complex set of issues facing the AOC at the time it was listed. The St. Louis River AOC is spatially large and geographically complex, spanning the Minnesota and Wisconsin state line and including tribal interests. The AOC boundary includes the lower 39 miles of the St. Louis River; from upstream of Cloquet, Minnesota, to its mouth at the Duluth/Superior Harbor and Lake Superior; and the Nemadji River watershed (Figure 1).

The Stage I Remedial Action Plan (RAP; MPCA and WDNR, 1992) determined that nine of 14 possible Beneficial Use Impairments (BUIs) exist in the AOC including:

- BUI 1: Fish Consumption Advisories
- BUI 2: Degraded Fish and Wildlife Populations
- BUI 3: Fish Tumors and Other Deformities
- BUI 4: Degradation of Benthos
- BUI 5: Restrictions on Dredging
- BUI 6: Excessive Loading of Sediment and Nutrients
- BUI 7: Beach Closings and Body Contact Restrictions
- BUI 8: Degradation of Aesthetics
- BUI 9: Loss of Fish and Wildlife Habitat

This St. Louis River Area of Concern Remedial Action Plan Update (RAP), published in 2013, presents a comprehensive plan for delisting the AOC. The RAP details the management actions necessary to remove each of the beneficial use impairments (BUIs) identified for the St. Louis River AOC. The agencies responsible for implementing the RAP in the St. Louis River Area of Concern are the Wisconsin Department of Natural Resources (WDNR) and the Minnesota Pollution Control Agency (MPCA). Fond du Lac Band of Lake Superior Chippewa (FDL) and Minnesota Department of Natural Resources (MNDNR) are also responsible for coordinating management actions in the RAP.

Two BUIs specifically target habitat issues in the Area of Concern: BUI 2, Degraded Fish and Wildlife Populations, and BUI 9, Loss of Fish and Wildlife Habitat. The Degraded Fish and Wildlife Populations BUI removal target is:

> *"In consultation with their federal, tribal, local, and nonprofit partners, state resource management agencies concur that diverse native fish and wildlife populations are not limited by physical habitat, food sources, water quality, or contaminated sediments."*

Specific removal objectives are defined in the RAP for walleye, muskellunge, sturgeon, piping plover, common tern, great blue heron, bald eagle, wetland bird species, invasive species, and semi-aquatic mammals. The target will be met and removal of this BUI will be justified when it is shown that key native species of fish and wildlife are present and not limited by physical habitat, food sources, water quality, or contaminated sediments. In order to reach this target, five management actions are listed in the RAP including monitoring and assessment for birds, fish, and small aquatic mammals; and a habitat restoration project for piping plover. The four monitoring/assessment actions span both states, and the piping plover habitat restoration action is specific to a site in Wisconsin.

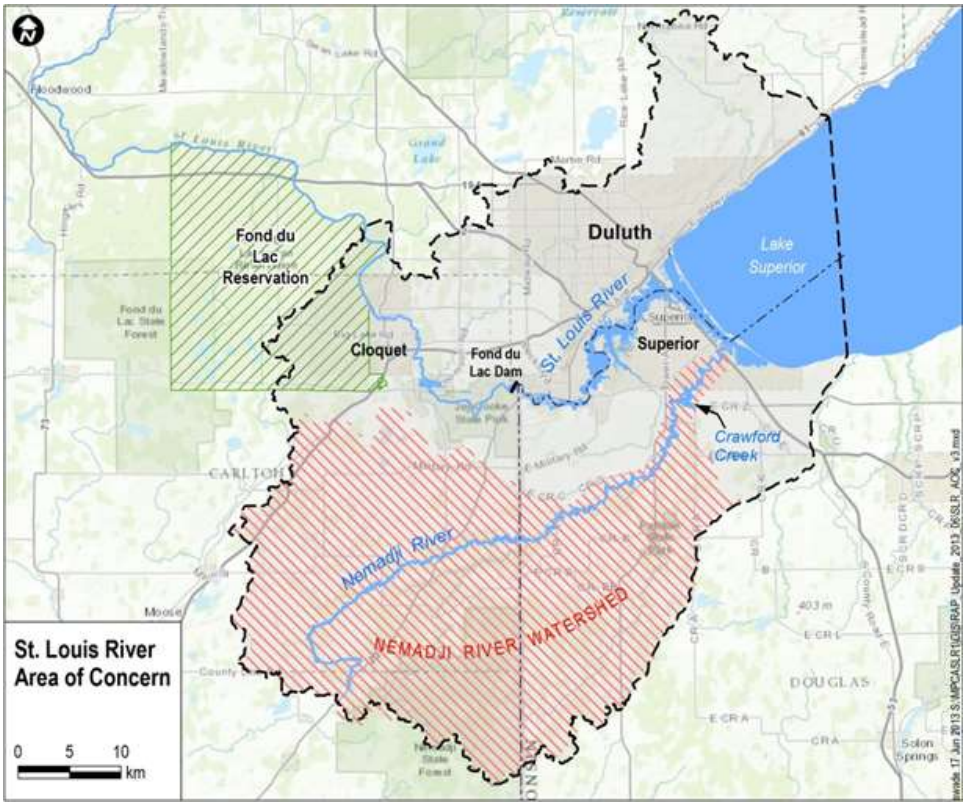


Figure 1. The St. Louis River Area of Concern is located at the southwestern corner of Lake Superior and contains the harbor cities of Duluth, Minnesota and Superior, Wisconsin.

The Loss of Fish and Wildlife Habitat BUI removal target is:

> *"State resource management agencies concur, in consultation with their federal, tribal, local, and nonprofit partners, that a reasonable amount, as quantified in the benchmarks, of fish and wildlife habitat, given the presence of industrial development in the estuary, that is currently degraded is enhanced, rehabilitated, and protected against further loss of habitat.*

Measureable indicators for habitat recovery were defined for the Loss of Fish and Wildlife Habitat BUI in the 2013 RAP: "Removal of the Loss of Fish and Wildlife BUI will be justified when:

1. *Remediation of contaminated sediment at prioritized sites within the AOC is complete.*
2. *Programs are in place to discourage further proliferation and further introduction of non-native invasive species.*
3. *At least 50% of known degraded aquatic habitat acreage (1,700 acres) is rehabilitated through implementation of projects in accordance with a restoration site. The number of acres restored will be equivalent to the area of a restoration site, since the restoration work will be designed and constructed with an overall goal to provide for fish and wildlife habitat for the entire site as a whole.*
4. *Additional aquatic or hydrologically connected habitat throughout the AOC watersheds has been successfully protected and rehabilitated sufficiently to maintain healthy fish and wildlife populations through implementation of projects at prioritized restoration sites."*

The RAP Removal Strategy describes that this target will be met upon completion of the management actions described in Table 11 of the RAP. For Wisconsin, this list includes six habitat restoration projects, one habitat assessment project, one master planning project, and two documentation projects.

Purpose Statement

This document contains a summary of relevant habitat-related work already completed in the Area of Concern in Wisconsin, details the priority management action items listed in the RAP in order to meet BUI targets and remove BUIs, and an assessment of progress towards BUI targets. This project is Project 9.18 and 9.20 in the RAP. This document will help provide justification for BUI removal (especially for BUI 2 and BUI 9) once all removal targets are met. For completed habitat work, this document includes a summary of each project including a project description, partnerships, funding sources, and acres protected or restored. This report also contains a description of each management action listed in the RAP including project description, site location, project partners, timeline, planning-level estimates of funding needed to complete the project, and a status update if available. Generally, this document refers only to actions relevant to actions completed or to be completed in the Wisconsin portion of the AOC, except for past and ongoing invasive species control, which includes actions that occurred or are occurring throughout the AOC in both Minnesota and Wisconsin.

Completed Habitat Restoration and Protection Projects

This section includes a summary of the major actions completed in Wisconsin since the Area of Concern was listed in 1987. While some of these items were not driven specifically by the Area of Concern program, cumulatively they represent significant progress towards improving habitat quantity and quality in the AOC. Past efforts in Wisconsin have been focused on establishing permanent protection for properties that provide valuable fish and wildlife habitat and help protect water quality in the St. Louis River. Restoration efforts in Wisconsin have focused on remediating contaminated sediments and restoring aquatic habitat, as well as restoring hydrologically connected habitat. On several properties that have previously been protected, further habitat restoration is underway or planned in the RAP. These ongoing and future restoration plans are described below under Future Project Needs.

Note that generally, actions completed for mitigation purposes are not included in the following summaries, as they generally do not result in a net increase in ecosystem services, but instead are actions that counter a loss of ecosystem services elsewhere. However, a few select mitigation actions (restoration and invasive species control) are included in the summaries because they improved habitat on previously protected lands important to the AOC.

Habitat Protection

The WDNR and the many local partners listed below have worked hard to protect key properties for several purposes: protection of water quality in the St. Louis River, erosion prevention, and protection of unique and rare habitat such as northern boreal forests and hardwood swamps located on Lake Superior Clay Plains. Land protection efforts are shown in Figure 2 and have been focused in a few areas: Wisconsin Point, Superior Municipal Forest, Nemadji River Watershed, St. Louis River and Red River Streambank Protection Area, and Clough Island. However, several additional small-scale projects also contribute to the wealth of protected public lands in the Wisconsin portion of the AOC.

Table 1 lists past land protection efforts in the AOC, along with their associated acreages. The acreages of protected lands given in Table 1 are based on best available information using the areas shown in the map of habitat protection shown in Figure 2. The total area of lands protected since AOC listing is 17,648 acres.

Wisconsin Point

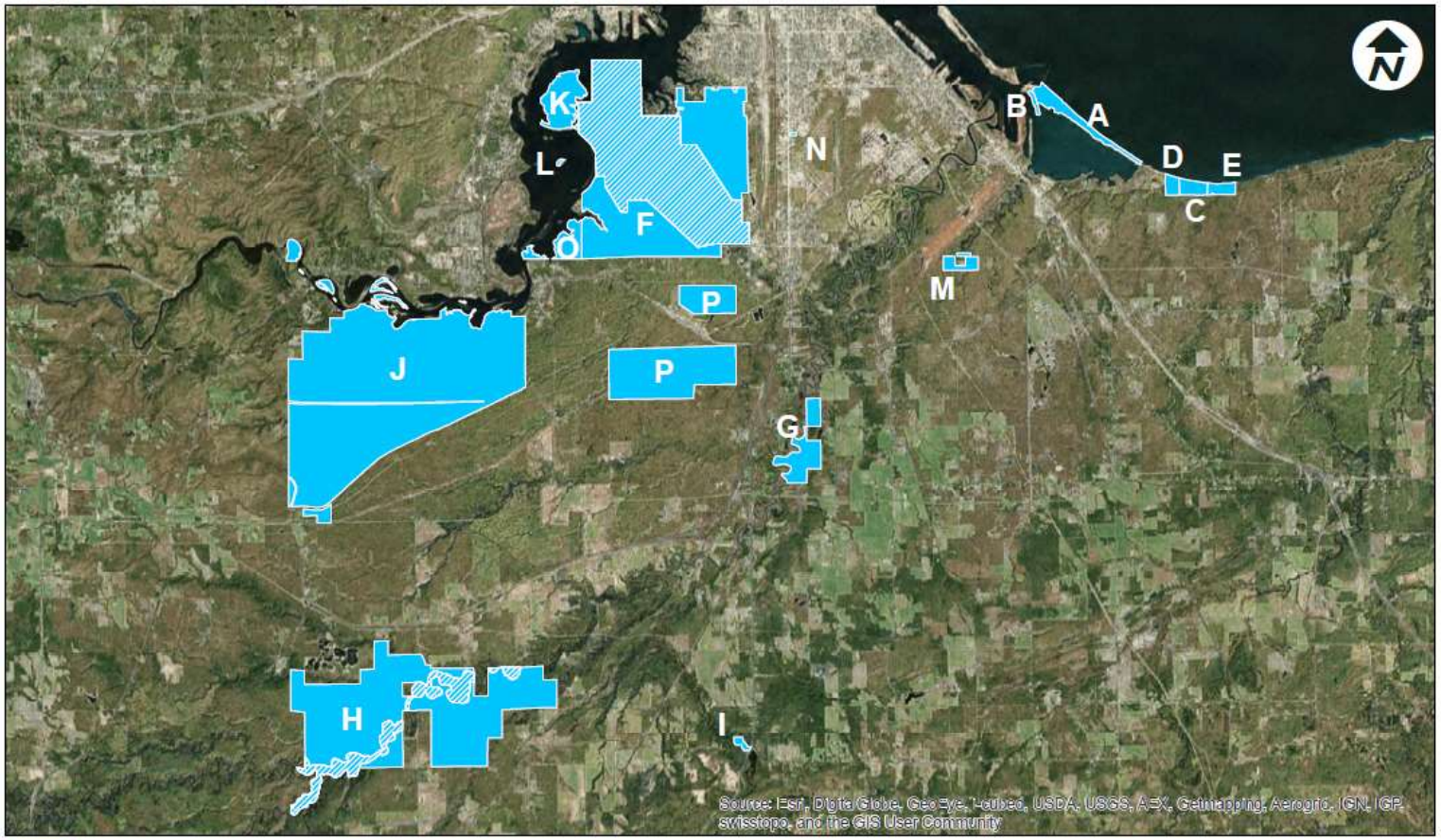
Wisconsin Point is a 3-mile-long bay-mouth bar that forms the eastern edge of Allouez Bay on the eastern end of Superior, Wisconsin (See Figure 2). The point ends at the Superior Entry, with Minnesota Point on the opposite side of the Entry. Sand beach parallels sand dunes with interdunal wetlands along the Lake Superior side of the bar. Xeric forests of white and red pines form the interior of the bar. The point is important stopover habitat for many migratory birds and is a well-known birder destination. The Wisconsin Point Area Management Plan was completed in 2012 by a broad representation of local stakeholders and property owners with public input to direct the management of the area (NWRCP, 2012). The management plan was completed for 2,315 acres of property in the vicinity of Wisconsin Point, and applies to lands owned by several different property owners including City of Superior, Douglas County, WDNR, NERR, and UWS.

The parkland property on Wisconsin Point itself, encompassing 206 acres, is owned by the City of Superior and was formally protected from residential, commercial, and industrial development in December 1996 (Figure 2 parcel A). This property is managed as public open space, designed and intended for the use and enjoyment of residents. In addition to the parkland, the City of Superior also owns a historic landfill which is located just east of Allouez Bay and southeast of Wisconsin Point. This landfill operated from 1950 to 1978 and is now closed. The federal government (USACE) owns 18 acres at the end of the point. Historically, members of the Fond du Lac Band of Lake Superior Chippewa (FDL) lived on

Table 1. Past Habitat Protection Projects. See text for detailed descriptions and partnership involvement.

Figure Letter	Year	Description	Property Owner	Acres
A	1996	Wisconsin Point- Protected parkland	City of Superior	206
B	1989	Wisconsin Point Bird Sanctuary - In an easement for piping plover and common tern habitat	WDNR	10
C	2012	Shafer Beach - County Parcel. In an easement for piping plover habitat.	Douglas County	82
D	2010	Shafer Beach - City Parcel. In an easement for piping plover habitat.	City of Superior	53
E	2007	Nelson Outdoor Laboratory, UW Superior	UWS	64
F	1992	Superior Municipal Forest, including Dwight's Point and Pokegama Wetlands State Natural Area (3135 acres within Municipal Forest)	City of Superior	4427
G	1997	Nemadji River Floodplain Forest State Natural Area	DNR	341
H	2010	Nemadji River Stewardship Grant Area, and the Upper Nemadji Floodplain Forest State Natural Area (est. 2011)	Douglas County	4132
I	2003	Big Manitou Falls and Gorge State Natural Area, located within Pattison State Park	WDNR	23
J	1995	St. Louis River and Red River Streambank Protection Area - WDNR property	WDNR	6336
K	2011	St. Louis River and Red River Streambank Protection Area - Clough Island & two adjacent islands	WDNR	356
L	2011	Spirit Island (Minnesota, not included in Total Acres)	FDL	5
M	2006	Bluff Creek Property	WWLT	87
N	2008	Superior Middle School Wetland	Superior School District	4
O	2003	Oliver Marsh Special Use Area (portion protected after AOC listing)	Douglas County	87
P	2006	Pokegama Carnegie Wetlands State Natural Area	WDNR & Douglas County	1440
		Total Acres of Land Protection in Wisconsin		**17,648**

Figure 2. St. Louis River AOC Wisconsin Past Land Protection



Protection Areas

A Wisconsin Point Protected Parkland
B Wiscons Point Bird Sanctuary
C Shafer Beach - County Parcel
D Shafer Beach - City Parcel
E Nelson Outdoor Laboratory, UW Superior
F Superior Municipal Forest (SMF)
F Dwight's Point and Pokegama Wetlands State Natural Area (Crosshatched Area within SMF)
G Nemadji River Floodplain Forest State Natural Area
H Nemadji River Stewardship Grant Area
H Upper Nemadji Floodplain Forest State Natural Area (Crosshatched area within Stewardship Grant Area)
I Big Manitou Falls and Gorge State Natural Area
J St. Louis River and Red River Streambank Protection Area
K Clough Island
L Spirit Island
M Bluff Creek Property
N Superior Middle School Wetland
O Superior Middle School Wetland
P Pokegama Carnegie Wetlands State Natural Area

10 Miles

Figure 2. Map of past habitat protection in the St. Louis River AOC in Wisconsin. Note that State Natural Areas (SNAs) located within larger protected parcels are denoted with a crosshatch pattern. These SNAs include Dwight's Point and Pokegama Wetlands State Natural Area within the Superior Municipal Forest and the Upper Nemadji Floodplain Forest SNA within the Nemadji River Stewardship Grant Area. Oliver Marsh areas shown include areas protected prior to listing. The total area is 199 acres, 86.9 of which were protected in 2003 after AOC listing. Additional Douglas County lands exist within the AOC but are not shown here because here because they were established prior to AOC listing, or are not managed for conservation.

Wisconsin Point. A 17th century FDL tribal burial ground once existed at the end of Wisconsin Point. Many human remains were disinterred in 1912 and relocated to the St. Francis Cemetery in the City of Superior. The extent of the remains that are still located at Wisconsin Point is currently unknown. An archaeological assessment is planned for 2015 in preparation for the Wisconsin Point Dune Restoration Project (Project 9.15, See under Future Project Needs). The FDL are in discussions with USACE about acquiring a portion of land at the end of the point from the federal government.

WDNR owns one 10-acre parcel near the end of the point on the Allouez-Bay–side (Figure 2 parcel B). The WDNR parcel on Wisconsin Point is known as the Bird Sanctuary. A conservation easement was established for this property in 1989 for common terns (WI Endangered Species) and piping plovers (WI and Federal Endangered Species). In addition to this easement, two parcels along the lakeshore southeast of the Point also have an easement for piping plover habitat, and are listed in the Federal Register as critical habitat for piping plover. These parcels are owned by Douglas County (Figure 2 parcel C, 82 acres) and the City of Superior (Figure 2 parcel D, 53 acres). The easement on the Douglas County property was set up in 2011-12 for future development of the Parkland Industrial Park. The easement on the City of Superior property was established in May 2010 for mitigation of an expansion at the Moccasin Mike Landfill in Superior. These properties are included here even though the easements were established for mitigation purposes because the properties have been the focus of habitat restoration for piping plover. This work is described in more detail below under Habitat Restoration and Future Project Needs.

Inland from the shore southeast of Wisconsin Point, Douglas County and the City of Superior own additional undeveloped parcels which are included in the Wisconsin Point Area Management Plan but not shown in Figure 2 because they are not currently protected. The University of Wisconsin owns a 64-acre property east of the Douglas County parcels, along the shore of Lake Superior near the mouth of Dutchman's Creek (Figure 2 parcel E). This property was designated as the Nelson Outdoor Laboratory in 2007 to be used to enhance the instruction, research, and public service missions of the University.

Several projects listed in the RAP are focused in the Wisconsin Point area and are also mentioned in the Wisconsin Point Area Management Plan. These include Shafer Beach Piping Plover Habitat Restoration/Beach Nourishment (Project 2.05), Allouez Bay Habitat Restoration (RAP project 9.11), Wisconsin Point Dune Restoration (Project 9.15), and Hog Island Nesting Enhancement (Project 9.16). More detail about these projects can be found under Future Project Needs.

Superior Municipal Forest

The City of Superior protected the Superior Municipal Forest from residential, commercial, and industrial development in April, 1992 (Figure 2 parcel F). Although the City of Superior is able to develop trails and access to the forest, the land transfer agreement between the previous landowner and the City of Superior prevents any further development of the property. It is one of the largest municipal forests in the United States at 4427 acres. In 1994, a 3135-acre property located within the Superior Municipal Forest was designated as Dwight's Point and Pokegama Wetlands State Natural Area (SNA). This designation establishes basic goals and a management direction for the property, while allowing the landowner (City of Superior) to maintain management of the property. The property contains one of the best examples of boreal forest in the Lake Superior area, along with perched wetlands on poorly drained clay soils, and marshes along the Pokegama River. Pokegama Bay contains wetlands used extensively by waterfowl and includes the largest remaining stands of wild rice in estuary.

Nemadji River Watershed Properties

Nemadji River Floodplain Forest State Natural Area is a 341-acre property protected in 1997 (Figure 2 parcel G). It is located just south of Superior, Wisconsin and is owned by the WDNR. This property contains floodplain forests along the

steep-sided Nemadji River valley which cuts through lake plain. The floodplain forests contain black ash, green ash, basswood, red maple, silver maple, balsam poplar, American elm, and bur oak. The Nemadji River hosts a healthy population of wood turtles, a rare species that is listed as Threatened in Wisconsin.

Further upstream on the Nemadji is the Nemadji Stewardship Grant Area (Figure 2 parcel H). This is a 3,979-acre riparian parcel purchased and protected from future development in 2010 by Douglas County with assistance from West Wisconsin Land Trust, The Conservation Fund, and support from USFWS Coastal Office. It is located roughly 10 miles southwest of Superior, Wisconsin, and borders the Minnesota-Wisconsin state line. The property includes 6 miles of pristine riverfront and rare mesic floodplain forests with scattered conifers. The area was identified for protection in order to reduce erosion of tall clay streambanks and reduce sediment delivery to the St. Louis River. The floodplain forests provide rich and diverse habitat for fish, reptiles, amphibians, birds, and mammals. The property is currently managed by the Douglas County Forestry Department. The 613-acre Upper Nemadji Floodplain Forest State Natural Area was established in 2011 and is managed by the WDNR. This area includes a portion of the Nemadji Stewardship Grant area along with a portion of the Nemadji corridor that is on Douglas County Forest lands.

Big Manitou Falls and Gorge is a 23-acre State Natural Area located within Pattison State Park and owned by the WDNR (Figure 2 parcel). The entire state park is not included here as the state park was established prior to AOC listing. The 23-acre SNA was designated in 2003. The SNA contains Big Manitou Falls, a 165’ high falls on the Black River, a major tributary of the Nemadji. The falls, the fourth highest waterfall east of the Rocky Mountains, is in a unique river gorge carved out of sandstone and basalt. The name Big Manitou comes from Native Americans who said they heard the voice of the Great Spirit in the roaring of the falls calling it "Gitchee Manitou". Two rare species have been found within the rocky gorge Oregon woodsia (*Woodsia oregana var. cathcartiana*) and the mystery vertigo land snail (*Vertigo paradoxa*).

St. Louis River and Red River Streambank Protection Area, including Clough Island

The St. Louis River and Red River Streambank Protection Area (SLRR SBPA) is a parcel of land primarily owned by the WDNR. The property consists of 6,700 acres managed by the WDNR Bureau of Facilities and Lands, including a small 8-acre Douglas County parcel along the St. Louis River, a 6,336-acre WDNR parcel to the east, 346-acre Clough Island, and two small adjacent islands (10 acres). The SLRR SBPB was created in 1995 with the acquisition of “Red River Breaks”, by WDNR, a large parcel between the village of Oliver, Wisconsin, on the east and the Minnesota state line on the west (Figure 2 parcel J). The property is bisected by the Red River, and approximately 70% of the Red River watershed lies within the protected area. The property consists of a trembling aspen and speckled alder understory with small stands of conifers and hardwood swamps. Emergent marshes line the back bays of the St. Louis River to the north of the property. This area was protected in order to prevent erosion on the steep bluffs of the Red River and St. Louis River, reduce fine sediment inputs into the AOC, and protect water quality in the St. Louis River. The small 8-acre Douglas County property located just to the west along the St. Louis River is managed as a Special Use Area, designated in 1977. Special Use Areas recognize the value of land for conservation rather than timber production.

Clough Island and two smaller adjacent islands were added to SLRR SBPA in 2011, after being purchased from developers by The Nature Conservancy (TNC) in 2010 and subsequently acquired from TNC by the WDNR. Clough Island is the largest island in the St. Louis River, located adjacent to Dwight’s Point and the Superior Municipal Forest (Figure 2 parcel K). Robert B. Whiteside, a timber and mining baron, purchased the island in the late 1890’s, when it was known as Whiteside Island. The forests were harvested at least twice. The island was converted to a small resort and pasture farming operation, and farming continued from the early 1900’s until the early 1950’s. Today the forests are an early successional stage of aspen-birch and the central part of the island is a complex of wet meadows.

Currently there is very limited access to the SLRR SBPA property although unsanctioned ATV and snowmobile trails exist on the Red River Breaks portion of the property. Access to Clough Island is by boat in the warm season and accessible by ice in winter. The SLRR SBPA is largely within the boundary of the Lake Superior National Estuarine Research Reserve (NERR). Clough Island, the only portion not currently within the NERR, was excluded from the NERR boundary in 2010 primarily because it was not publically owned at the time. Clough Island will likely be included in the upcoming NERR Management Plan update.

Natural Heritage Inventory (WDNR) completed a biotic inventory of the property in 2013 through a grant from the Wisconsin Coastal Management Program (WCMP) (Staffen and O'Connor, 2014). The intent was to fill information gaps and set the stage for Master Planning. Master Planning has been identified as a need for the SLRR SBPA property, in order to identify needs for ecosystem protection as well as allow the most effective community use of the property. Master Planning of this property and Clough Island, another DNR property, will be done together. Initiation of the Master Planning process for these properties is listed as a priority action (Project 9.19) in the RAP.

Bluff Creek Property

An 87-acre parcel along Bluff Creek property was purchased in 2006 by West Wisconsin Land Trust (Figure 2 parcel L). The property was purchased for protection and conservation based on its location in the Bluff Creek watershed, situated in Lake Superior clay plain soils. The watershed drains into Allouez Bay, a notoriously sediment-laden portion of the St. Louis River estuary. Identified as a priority in the Lower St. Louis River Habitat Plan (2002), protection of the upstream habitat and riparian condition of the Bluff Creek watershed serves to reduce sedimentation in Allouez Bay.

Superior Middle School Wetland

The Superior Middle School Wetland was protected in 2008 (Figure 2 parcel M). The 4-acre property was purchased by the Superior School District with assistance from West Wisconsin Land Trust. It is located adjacent to the Superior Middle School. Although the property was purchased for conservation education, there is not a long term conservation easement on the property.

Oliver Marsh

The Oliver Marsh is located between the Village of Oliver and the Superior Municipal Forest along the St. Louis River (Figure 2 parcel N). The property consists of 199 acres owned by Douglas County. The majority of the area was designated a Special Use Area in 1971, with the remaining 87 acres along the east edge of the Oliver marsh designated as Special Use Area in 2003. The property is managed by the Douglas County Forestry Department. This shoreline property contains emergent marsh beds with pockets of wild rice, along with stands of floating-leaf and submergent aquatic plants.

Pokegama Carnegie Wetlands State Natural Area

The Pokegama Carnegie Wetlands is a 1,440 acre property designated as a State Natural Area in 2006 (Figure 2 parcel O). The property consists of a north unit owned by WDNR and a south unit owned by Douglas County. The headwaters of the Pokegama and Little Pokegama Rivers are both located in the SNA. Shrub swamps, sedge meadows, emergent marshes, and small ponds are perched on red clay soils. The property contains many rare plants and is home to a wide variety of amphibians and birds.

Habitat Restoration

The WDNR and many local partners have worked to restore several properties in the estuary. Many of the past restoration efforts have focused on the protected lands discussed above. Figure 3 shows the past restoration areas, along with past invasive species control work. A total of at least 345 acres have been restored in the St. Louis River AOC in Wisconsin. Table 2 lists these past habitat restoration and invasive species control efforts, along with associated acreages. Acreages for restored lands are estimated based on best available information from project partners. In some cases, acreages are not available or difficult to estimate (e.g. purple loosestrife biological control). Therefore the total area of 345 acres of restored lands is a conservative estimate.

Hog Island Remediation and Restoration

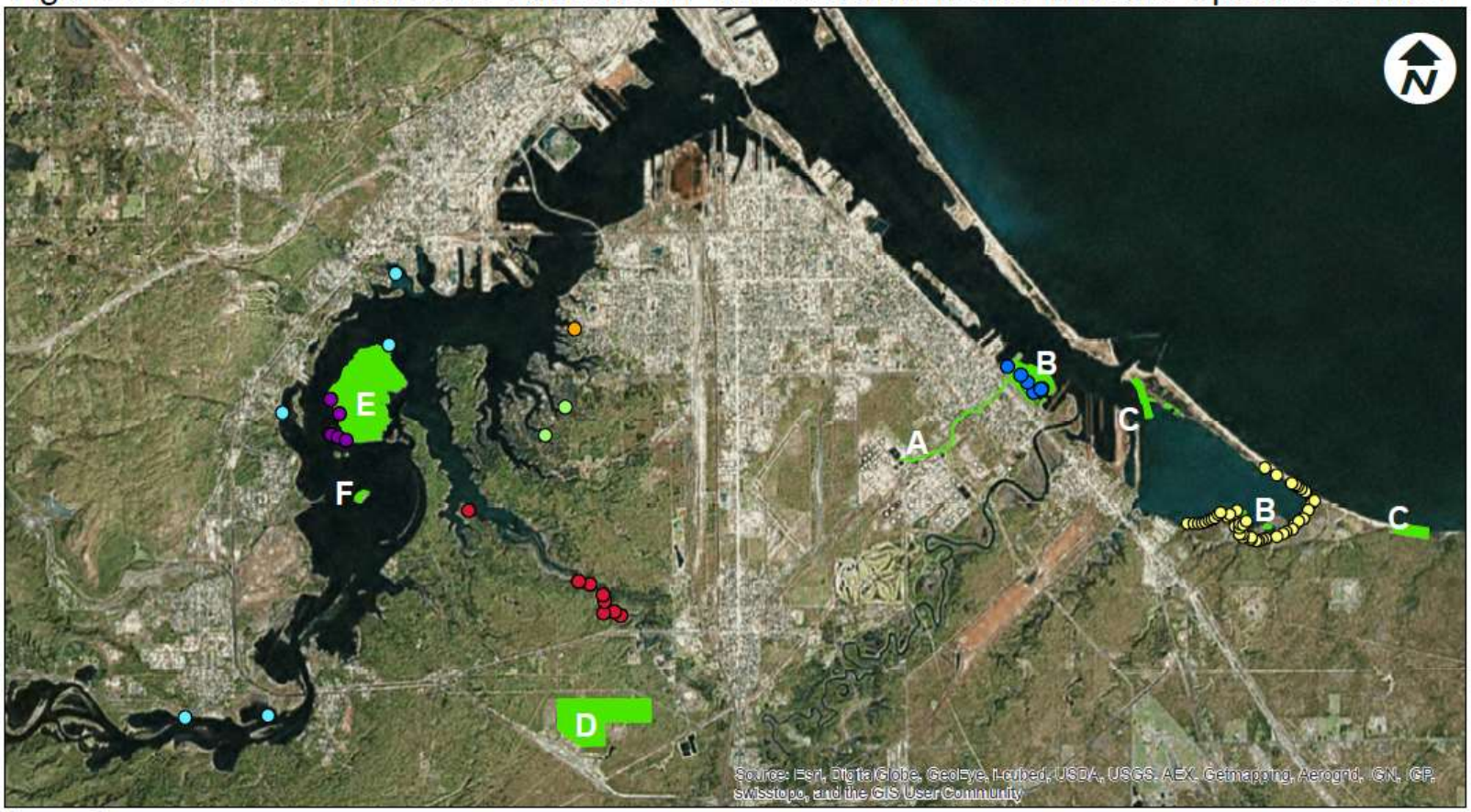
Since the early 1920's, the Newton Creek and Hog Island Inlet area served as a disposal site for dredge spoils, a railway yard, and a repository for industrial petroleum byproducts. The headwaters of Newton Creek are located in an impoundment at what is currently the Calumet Refinery (previously Murphy Oil Company, Figure 4). The stream flows 1.5 miles from there through Superior Wisconsin and drains into Superior Bay at the Hog Island Inlet. The inlet is an 18-acre shallow embayment with emergent vegetation, connected to Superior Bay by a 50-foot wide channel. Soils along the stream were contaminated with petroleum compounds and lead. In 1997, Murphy Oil Company made improvements to their wastewater treatment facility and remediated the contaminated sediments in the upper reaches of Newton Creek including the impoundment area and segment A (Figure 3). In 2003, an estimated 7,400 tons (5,978 cubic yards) of contaminated sediment and floodplain soils were removed from the middle reaches (Figure 4, segments B – K) of Newton Creek by the WDNR (SEH, 2007). An estimated 1.4 acres (roughly 10 feet wide along 6,000 feet of stream) were remediated. Road crossings and culverts were not remediated.

In 2005, 60,520 tons (44,040 cubic yards) of contaminated sediment and soil in Newton Creek and the Hog Island Inlet were remediated under the Great Lakes Legacy Act, which provided $4.1M towards a total project cost of $ 6.3M (SEH, 2008.) This was one of the first projects in the Great Lakes funded through the Great Lakes Legacy Act and the project completed the remediation of Newton Creek and Hog Island Inlet. The remediation removed sediments over a total of 6.22 acres. Douglas County and the Lake Superior Research Institute (LSRI) at UW Superior (UWS) partnered to implement the restoration plan following sediment remediation. The project included invasive species control, aquatic habitat structures, riparian restoration, vegetation buffers, wetland restoration, and wild rice restoration. More information about this project can be found on LSRI's website at http://www.uwsuper.edu/lsri/hogisland/index.cfm.

As part of the restoration, invasive species control for phragmites (*Phragmites australis var. australis*), purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinaceae*) and cattails (*Typha angustifolia* and *Typha x glauca*) was conducted. A total of 6.56 acres of invasive species were controlled. Phragmites was identified in the immediate project area around Hog Island as well as in Pokegama Bay, around Clough Island, and in Allouez Bay. Phragmites was controlled by burning and treating with glyphosate. Purple loosestrife was bio-controlled using two species of beetles in the genus Galerucella. Beetles were raised at UWS. Over 100,000 beetles were released on purple loosestrife at Hog Island and in Allouez Bay in 2010 and 2011. In 2009 and 2010, invasive cattails along the shoreline of Hog Island Inlet, Loon's Foot Landing, and Allouez Bay were mowed beneath the waterline and manually removed. At Loon's Foot Landing, emergent and wet meadow zone wetland plugs were planted along a 6 foot wide planting strip along the shoreline in place of the cattails, for a total restoration area of 1.29 acres. Additional native species filled in between the plugs after the cattails were removed, and after three years, the dominant species is softstem bulrush (*Schoenoplectus tabernaemontani*).

Riparian areas were restored along 5 acres on Newton Creek and 2 acres on the West Wisconsin Land Trust property along Bluff Creek in order to help stabilize banks and shade the stream while enhancing water quality, flood water

Figure 3. St. Louis River AOC Wisconsin Past Restoration and Invasive Species Control



Legend

Invasive Species Control

- Allouez Bay purple loosestrife biocontrol
- City of Superior purple loosestrife biocontrol
- Clough Island Phragmites Control
- Clough Island Phragmites Control
- Hog Island purple loosestrife biocontrol
- Japanese Knotweed Control by Eagle Scout
- MN SeaGrant purple loosestrife biocontrol
- Shoreline Stabilization & Culvert Upgrade

Restoration Areas

- A Hog Island/Newton Creek Remediation
- B Hog Island Habitat Restoration
- C Wisconsin Point & Shafer Beach Piping Plover Habitat Restoration
- D Pokegama Carnegie Wetlands Forest Restoration
- E Clough Island Restoration
- F Spirit Island Invasive Species Control

5 Miles

Figure 3. Restoration efforts in the Wisconsin portion of the St. Louis River Estuary. Habitat restoration efforts are shown in green polygons and purple points and polygons represent general invasive species control areas.

Table 2. Past Habitat Restoration Projects including invasive species control projects. See text, Sections II. b. Habitat Restoration, and II. c. Invasive Species for details. Acreages are based on project estimates. The areas shown in maps represent project areas and may not be the same as acreages given in text for actual restoration.

Figure Letter	Year	Description	Lead	Acres
A	1997-2005	Hog Island/Newton Creek Remediation		24.62
	1997	Impoundment and Segment A	RP	17
	2003	Segments B - K	WDNR	1.4
	2005	Hog Island Inlet	WDNR	6.22
B	2009 - 2011	Hog Island Restoration Project		23.58
	2010-2011	Purple loosestrife biological control, Allouez Bay and Hog Island Inlet	Douglas County	NC
	2009-2011	Control of invasive cattails, phragmites, cattails, yellow iris at Hog Island, Allouez Bay, Clough Island, and Pokegama Bay	Douglas County	6.56
	2010-2011	Wetland Restoration at Loon's Foot Landing	Douglas County	1.29
	2011	Riparian restoration along Bluff and Newton Creeks	Douglas County	7
	2010-2011	Wild Rice restoration pilot project in Allouez Bay	Douglas County	4
		Vegetative Buffer around Hog Island Inlet	Douglas County	4.73
		Installation of fish cribs in Hog Island Inlet	Douglas County	NE
	1980's	Barkers Island Bird Sanctuary	WDNR	NE
		Decoy installation and adult vocalization audio system	WDNR	NE
C	1989-2005	Wisconsin Point Bird Sanctuary		10
	1989	Fence installation and clearing with rotovator.	WDNR	10
	1990's	Tree removal and vegetation reduction using weed fabric.	SLRA	10
	1989-2005	Vegetation control and monitoring	WDNR	10
C	2012-2017	Piping Plover Habitat at Shafer Beach and Wisconsin Point Bird Sanctuary	SLRA	35
		Removal of invasive species, excavation and re-sloping of the beaches, clearing of wood and debris at Bird Sanctuary and Shafer Beaach	SLRA	35
		Cleared shrubs along bluff at Shafer beach to increase the distance to the treeline	SLRA	35
		Use of piping plover decoys and adult vocalization audio playback system for Bird Sanctuary and Shafer Beach sites	SLRA	35
		Development of outreach materials	SLRA	35
		Development of outreach materials and coordination/training of volunteer piping plover monitors for Bird Sanctuary and Shafer Beach sites.	SLRA	35
D	2007 - 2009	Pokegama Carnegie Wetlands Forest Restoration**	WNDR	145.3
		Conifer plantings on existing early successional boreal forest	WDNR	20
		Alder thicket clearing	WDNR	124.8
		Wetland conifer plantings in alder thicket clearing areas	WDNR	115
		Wetland restoration of previously filled railroad grade	WDNR	0.5
E	2012 - 2015	Clough Island FWS Grant	WDNR	106
	2012	Treatment of buckthorn in planting areas	WDNR	26
	2013	Planting of 6000 seedlings in two planting areas	WDNR	26
	2013	Closure of well and clean-up of unauthorized camp site.	WDNR	NA
	2014	Removal of structures, capping of well	WDNR	NA
	2014	Re-planting of failed seedlings and additional white pine seedlings	WDNR	NE
	2014	Re-treatment of buckthorn in planting areas and treatment of 79 additional acres	WDNR	105
	2014	Treatment of phragmites on southwest Clough Island	WDNR	< 1
	2014	Kelly and Kilner Bay Shoreline Stabilization & Culvert Replacement	City of Superior	NE
	1990's-2000's	Purple loosestrife biological control throughout SLRE	MDNR Wildlife	NE
	2002, 2003	Purple loosestrife biological control, Boy Scout Landing - Indian Point bay	MN Sea Grant	NE
	2007, 2008	Purple loosestrife biological control, SLRE	MN Sea Grant & St. Louis County	NE
	2002 - 2005	Purple loosestrife biological control, Pokegama River*	City of Superior	NE
	2013 - 2014	Purple loosestrife manual removal, Spirit Island	FDL	5
	2013-2014	Treatment of Buckthorn on Spirit Island	FDL	5
	2012-2014	Treatment of spotted knapweed, and planting of 1700 seedlings on Wisconsin Point	UWS	4
	2013	Treatment of Japanese knotweed at Billings Park Boat Launch	Superior Boy Scouts, City of Superior	1
		Total Acres of Restoration in Wisconsin		**345**
		Estimated Acres of Aquatic Restoration		**25**
		Estimated Acres of Hydrologically Connected Restoration		**320**

Figure 4. Hog Island and Newton Creek Remediation

Figure 4. Map of Hog Island and Newton Creek. Newton Creek was broken up into segments for remediation in multiple stages.

storage and bird and wildlife habitats. Restoration involved control of reed canary grass through mowing and glyphosate control. Six thousand native trees and shrubs were planted, and native grass and forb species were seeded between tree plantings. A vegetative buffer was established around the perimeter of Hog Island Inlet over 4.73 acres. Portions of this area are along a rail corridor, and therefore contained a high density of invasive species like tansy, wormwood, and spotted knapweed. These were controlled through mowing, treating with glyphosate, and smothering with black plastic for 2.5 months. Ten thousand wildflower plugs were planted in wildflower openings between native shrub, pine, fir, and spruce tree plantings.

Large woody crib structures were installed within Hog Island Inlet for fish and wildlife habitat. Manipulation of the St. Louis River for logging and navigation has reduced the amount of coarse woody debris found in Hog Island Inlet today. Early accounts portray extensive woody debris along the shoreline and in shallows in the St. Louis River and Allouez Bay historically. Three-hundred-plus-year-old log pier pieces from Connors Point were removed and recycled for the construction of 20 fish cribs. The large wooden crib structures can provide habitat for aquatic macroinvertebrates that feed on algae growing on the wood. Fish can use the logs for nursery habitat. Where they breach the water's surface they can be used as a resting spot for waterfowl, turtles, and muskrats. The structures were designed by WDNR and Douglas County scientists and built by inmates from the Gordon Correctional facility and UW-Superior students. They were placed in the inlet and anchored to the bottom in 4 feet of water. Cormorants, otters, and turtles were observed using the structures as little as two days after placement.

Lastly, restoration efforts included a wild rice pilot project in Allouez Bay. Historically wild rice was abundant in Allouez bay and throughout the estuary, providing an important food source and cultural component for Native Americans. Wild rice beds also provide habitat and food for birds and wildlife. Their abundance in the estuary has declined significantly in the past century, and today only a sparse remnant stand exists in Allouez Bay. This project included seeding two areas covering 4 acres at a rate of 75lbs per acre in the fall of 2010 and spring of 2011. Exclosures were installed to evaluate browsing pressure of geese and carp. Outside the exclosures, the tops of the wild rice plants were heavily browsed; however within the exclosures, the plants were successful. This pilot project showed that wild rice restoration can be successful with appropriate use of exclosures and repeated seeding; and founded the basis for Douglas County's Allouez Bay wild rice project which is to start in Fall 2015 (see Future Project Needs, Project 9.11 below for more detail on that project).

Wisconsin Point Bird Sanctuary and Shafer Beach

The Wisconsin Point Bird Sanctuary is in an easement for common tern (endangered in Wisconsin) and piping plover (federally endangered) habitat. In 2014, there were just 70 breeding pairs of piping plover in the Great Lakes, with most pairs nesting in the Lake Michigan basin (43 pairs) and only 12 pairs in the Lake Superior basin. WDNR has actively managed for piping plover in the St. Louis River estuary since 1980. In 1980, the Barker's Island Bird Sanctuary was established cooperatively by the WDNR and City of Superior at the east end of Barker's Island. Piping plover nested there from 1957 through 1971. Beginning in 1982, WDNR installed up to 10 plover decoys and a sound system that used adult vocalizations on a continuous loop at the Barker's Island Bird Sanctuary in an unsuccessful attempt to attract breeding adults. In 1989, the City of Superior designated the Bird Sanctuary on the Allouez Bay-side of Wisconsin Point as mitigation for developing the property on Barker's Island and losing that habitat. The Wisconsin Point property was given to WDNR, cleared with a rotovator, and a chain-link fence was installed around the perimeter to deter traffic. SLRA conducted a habitat restoration project in the 1990's at the Bird Sanctuary with weed fabric and tree removal. The WDNR actively managed this property for common terns and piping plover until 2005, including vegetation control and monitoring. None of these habitat management methods were successful in attracting either terns or plovers to nest on the property. Interstate Island was identified as a preferred alternative tern nesting area. After 2005, WDNR discontinued management at the Bird Sanctuary, and common tern management efforts were re-directed at Interstate Island.

Management was started again in 2011, when SLRA received a grant from USFWS to undertake habitat restoration for piping plover on the Bird Sanctuary property (10 acres) and at Shafer Beach (~25 acres). The 5-year project (2012 – 2017) is currently in its third year to restore piping plover habitat on Wisconsin Point. Through SLRA's partnership with Douglas County, USFWS, WDNR, and City of Superior, restoration at the Bird Sanctuary and Shafer beach has included eradicating invasive species, excavating and sloping the beaches, and clearing wood and debris. At Shafer Beach, the County has cleared shrubs along the bluff adjacent to the beach to increase the distance between the waterline and the treeline. The St. Louis River Alliance has developed curriculum and outreach materials and educated over 200 children and adults about piping plover. SLR trains and coordinates volunteers who monitor the beach for piping plover twice a day during nesting season, and to educate beach-goers in an effort to minimize human and dog disturbances at the beach. Ten plover decoys were made in 2013 and will be used in conjunction with a playback system in an attempt to attract breeding piping plover to the Wisconsin Point and Shafer Beach sites. In recent years, typically 1 – 3 piping plover are observed each year on Wisconsin Point and MN Point, including observation of a fledgling from Long Island near Ashland, Wisconsin in 2014.

Piping plover prefer beaches with a large distance from shoreline to treeline. The WDNR along with many partners including Douglas County, City of Superior, USFWS, and SLRA, are working with the US Army Corps of Engineers (USACE)

to complete a feasibility study to evaluate the use of beach nourishment and submerged breakwaters or groins to widen the beach to create more piping plover habitat at Shafer Beach. This is listed as action 2.05 in the RAP and is described in more detail under Future Project Needs, below.

Pokegama Carnegie Wetlands State Natural Area

As part of mitigation for the impacts of transmission lines erected by the American Transmission Company, a large scale forest restoration project was initiated in 2007 - 2009 on the state-owned portion of the Pokegama Carnegie Wetlands SNA. The total project including planting, invasive plant control and monitoring will extend for a 10-year period. Although this restoration project was part of a mitigation requirement from the USACE, the eventual result will be a net increase in boreal forest habitat on a previously protected parcel of public land, and therefore it is included here. In exchange for loss of approximately 0.5 acres of wetland due to pole placement, this project included restoration of 0.5 acres of wetlands as well as restoration of approximately 144.8 acres of forested wetland and boreal forest. To mitigate the permanent loss of 0.5 acres of wetland, an area of adjacent wetlands was restored. These adjacent wetlands were formerly filled for creation of railroad grades. The rail line was dismantled and the railroad grade fill was removed to the level of the adjacent wetlands to re-establish wetland hydrology.

The objective of the forested wetland restoration component was to reestablish conifer-dominated forested wetlands and boreal forest in sites that were currently alder thicket wetlands and aspen-birch dominated uplands. Clearing activities and tree plantings were focused in areas so as to not disturb threatened and endangered species existing at the site, including arrowhead sweet-colt's-foot (*Petasites sagittatus*, Threatened), diamond-leaf willow (*Salix planifolia*, Threatened), and Vasey's rush (*Juncus vaseyi*, Special Concern). Dominance of quaking aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) were reduced through selective cutting, girdling, and basal bark treatments. Conifer species were planted over 20 acres of existing early successional boreal forest, including balsam fir (*Abies balsamea*), white spruce (*Picea glauca*), white cedar (*Thuja occidentalis*), and white pine (*Pinus strobus*). White cedar were planted along the tributary to the Pokegama River within the project area.

In order to convert existing alder thickets to Black Spruce/Tamarak swamps, Alders (*Alnus*) and willows (*Salix*) were cleared and wetland conifer species were planted over 115 acres. Planted seedlings consisted of tamarack (*Larix laricina*), black spruce (*Picea mariana*), and white cedar; while white pine and white spruce were planted in upland areas. Over 9.8 additional acres of alders and willows were cleared, but no additional conifers were planted in that area.

Ongoing restoration activities within the project area include annual monitoring of plantings, invasive species control and applications of deer repellent to protect the browse-susceptible seedlings.

Clough Island

The WDNR received a Coastal Wetland Protection & Restoration Grant from USFWS in 2012 to complete a Clough Island Restoration Project. The goals of this project were to establish a baseline inventory of the island's terrestrial and aquatic communities, restore the degraded forest community by conducting conifer restoration on ~10% of the island, increase and enhance the shoreline buffer along the top of the bluff to slow runoff and improve bluff stability, and install a sign with allowable uses and educational information at the main access point on the island.

In 2013, WDNR NHI conducted a rapid ecological assessment for the property (Staffen and O'Connor, 2014). Also in 2013, Leaning Pines Natives conducted an extensive invasive plant survey on Clough Island, discussed under Invasive Species Control below. Clay cliffs surround much of the island and rise to a broad, level, red clay plain. Edges of the island to the north, west, and east are fringed by emergent wetlands. Much of the south-central part of the island, which

was cleared for logging and agricultural activities, is a complex of wet grasslands, sedge meadows, and shrublands that has generally recovered well from past farming and grazing. The northern portion of the island is forested. The northern and northwestern portion of the island contains a 15-acre moderate-quality boreal forest. A forested seep originates in the northwest and supports black ash and a diverse ground layer of ferns, sedges and forbs. The remainder of the forest is lower quality and dominated by early successional aspen-birch. The understory is dominated by invasive common buckthorn (*Rhamnus cathartica*); and honeysuckle (*Lonicera tartarica, L. morrowii, and L. x bella*) are common along forest edges. These non-native species are most dense in the southeast, the southwest, and the northwest portions of the island. Invasion is limited in the west and south portions of the island, and the north and northeast portion of the island have the lowest level of buckthorn and honeysuckle invasion (Hlina, 2013; Staffen and O'Connor, 2014).

In fall of 2012, the planting areas were controlled for common buckthorn and honeysuckle using Garlon 4 foliar and basal bark methods. In 2013, approximately 6000 3-year-old seedlings were planted in two planting areas totaling 26 acres on Clough Island. One planting area was located in the south side of the island, and one area was located on the west side of the island. Species planted included white spruce, balsam fir, white pine, and white cedar. Trees were scatter planted by hand in both wooded and open areas and caged for protection against deer browsing. A well on the island was closed, and an unauthorized campsite on the island was removed.

In 2014, the remaining structure, a barn, was removed from the south-central part of the island. An informational sign was designed and installed in 2014 by St. Louis River Alliance at the main beach access point on the south side of the island. The planting areas were evaluated for success and cages that had mortality were replanted. Additional white pine seedlings were planted outside of the original planting area. Common buckthorn and honeysuckle were treated again in 2014. The areas treated in 2014 included the two planting areas (27 acres), the well-preserved northeastern quarter of the island (80 acres), the two small islands just to the southeast of Clough Island (10 acres), and the highly infested peninsula on the southwest corner of the island (8 acres). A total of 125 acres was treated in 2014 using basal bark, cut stump, and foliar treatment. In addition, phragmites along the southwest portion of the island (two locations, one on the south side of the peninsula and one on the west side of the island opposite the peninsula) was treated using two glyphosate treatments in summer 2014. More detail on the invasive species treatments can be found under Invasive Species Control below.

Invasive Species Control

The presence and spread of invasive species were part of the rationale for listing both the Degraded Fish and Wildlife Populations BUI, and the Loss of Fish and Wildlife Habitat BUI. Invasive species can change water quality, reduce the availability of resources, alter the structure of food webs and fundamentally change habitats, which can lead to a decrease in biodiversity. Aquatic and terrestrial invasive species are a consideration throughout the estuary for every land protection, sediment remediation, or habitat restoration project. Any form of disturbance on the landscape (or waterscape) has a potential to facilitate the introduction and/or spread of invasive species.

Making sure that efforts are in place to limit the further spread and impacts of invasive species is listed as part of the target for the Loss of Fish and Wildlife Habitat BUI. In an effort to distribute information and facilitate efficient and expedient efforts to control invasive species in the Area of Concern, this report includes information about local invasive species plans, and previous and ongoing actions to control or limit the spread of invasive species throughout the Area of Concern. The invasive species section here contains information relating to Minnesota as well as Wisconsin. These materials are not all-inclusive, as it is often difficult to find details of activities conducted more than a decade ago, especially those done by local groups or clubs like school groups, Boy Scouts/Girl Scouts, etc.

State Invasive Species Laws

Both Wisconsin and Minnesota have laws that address invasive species concern. Wisconsin's invasive species Rule (Wis. Adm. Code ch. NR 40) makes it illegal to possess, transport, transfer, or introduce certain invasive species in Wisconsin without a permit. Regulated invasive species include over 128 species which are listed as prohibited and restricted species. Prohibited species are not yet in the state or only limited to a few locations, and are highly likely to cause economic and environmental harm. Eradication and/or prevention of these species is feasible. Restricted Invasive Species are already widely established, and have already had environmental and economic impacts. Complete eradication of these species is unlikely. For more information on Wisconsin's invasive species rule, visit http://dnr.wi.gov/topic/invasives/classification.html.

Additionally, Wisconsin has implemented several additional state statutes regarding transport and movement of aquatic invasive species, including the requirement that all plants and animals be removed and all water drained from boating equipment prior to leaving a boat landing. The following webpage contains a Guide to Aquatic Invasive Species Statutes in Wisconsin: http://dnr.wi.gov/topic/Invasives/documents/AISBondSchedule6.2013.pdf.

Minnesota has several state laws that address invasive species. The MNDNR regulates invasive animals and aquatic invasive plants and animals. For more information about Minnesota's animal and aquatic invasive species laws, visit http://www.dnr.state.mn.us/invasives/laws.html. Minnesota's classification system establishes the level of regulation and allowable uses for each species. Invasive species can fall into one of four classifications: prohibited, regulated, unregulated nonnative species, and unlisted nonnative species. Forty-seven state-listed species, plus all federally listed species, are classified as prohibited. This means that it is illegal to possess, import, purchase, transport, or introduce these species except under a permit for disposal, control, research, or education. Nineteen species are classified as regulated, which means the species may not be introduced into a free-living state, such as being released or planted in public waters possess, although it is legal to possess, sell, buy, and transport these species. Fifteen species plus subtropical, tropical, and saltwater invertebrates and fish, except anadromous species are classified as unregulated nonnative species. These species are not subject to regulation under Minnesota Statutes. Lastly, unlisted species must first be classified and evaluated by the MNDNR in order to be released into a free-living state.

The Minnesota Department of Agriculture has regulatory authority over terrestrial plants (noxious weeds) and plant pests. Twenty-seven plant species are regulated as noxious weeds. Nineteen are listed as prohibited noxious weeds (either on a prohibited eradicate list or on a prohibited control list). Five species are listed as restricted noxious weeds, which means they are prohibited from importation, sale, and unlawful transport. Three species are listed as specially regulated plants. For more information about Minnesota's terrestrial invasive species laws, visit http://www.dnr.state.mn.us/invasives/terrestrial/laws.html.

Invasive Species Plans

Appendix A includes a bulleted list of completed invasive species plans relevant to the Area of Concern. It also includes a list of associated plans that, while not specific to invasive species management, control and eradication, contain guidance on invasive species within the context of their respective goals. As a group, these two lists can help guide invasive species management efforts in the AOC, and can help provide justification when seeking funding for invasive species management.

Invasive Species Programs

The Wisconsin DNR is committed to working with partners and citizens to slow the spread of invasive species. Both state and local partners are committed to continuing the existing programming described below to address invasive species issues in the St. Louis River AOC. As with many natural resource programs, continued efforts dependent on sustained funding availability for these programs.

Outreach efforts are incredibly important to protect Wisconsin's public water resources from aquatic invasive species (AIS). The state AIS office develops messaging and enacts it through television and radio advertising, online and social media, and print and multimedia news coverage. The department also supports research on how to most effectively communicate messaging to successfully prevent new introductions of invasive species. The Clean Boats Clean Waters program is a major partnership-based outreach effort in which teams of volunteers along with DNR staff are stationed at popular boat landings to inspect watercraft and help disseminate information about how boaters can prevent the spread of aquatic invasive species. More information on this program can be found at http://dnr.wi.gov/lakes/invasives/Project.aspx?project=10046338.

In 2011, the Great Lakes Restoration Initiative provided funding to WDNR to increase AIS monitoring and response efforts across the Great Lakes basin. These funds were used to hire several Aquatic Invasive Species County Coordinators along the Great Lakes, conduct social marketing research to ensure effective messaging and fund an effective media campaign, and to increase AIS monitoring and watercraft inspection efforts within the basin. As a result of this funding, DNR has built strong partnerships with many local communities and partners, and established a successful AIS program. For more information on the AIS program, see http://dnr.wi.gov/lakes/invasives/.

One goal of this program is to conduct Early Detection Monitoring to establish baseline AIS distribution information on lakes with boat landings. For five years starting in 2011, DNR staff and local partners are surveying approximately 200 lakes each year to understand the status and extent of invasive species in the state. Wisconsin also has established a Rapid Response Framework for Aquatic Invasive Species. in order to serve as an aid to resource managers who are responsible for responding to newly discovered AIS. This framework outlines communication plans, verification and assessment methods, and resources available to stakeholders to help them effectively get ahead of AIS before they become unsurmountable.

Other monitoring efforts conducted by the WI DNR have included aquatic plant inventories via point intercept methods in the AOC. These inventories, conducted from 2008-2010, provide a means of describing the plant community and can determine the extent of AIS invasion in the AOC during that time frame.

The Wisconsin DNR has an extensive AIS grant program to help fund organizations conducting invasive species control work. Grants are available (http://dnr.wi.gov/lakes/grants/) for conducting Education, Planning, Prevention, and Control for invasive species. These grants share the costs of aquatic invasive species education programs that teach about the threats posed by invasive species and how to prevent and control them. The grants also help with projects that prevent new introductions, control existing populations, and restore habitat. Education programs funded include Clean Boats Clean Waters projects, aquatic plant management planning, and citizen science programs such as Citizen Lakes Monitoring Network. Applicants for these grants can include local governments, tribal governments, town sanitary districts, lake and river organizations, school districts, colleges, universities, technical schools, nonprofit organizations, and state and federal natural resource agencies. For more information about the Aquatic Invasive Species Grants, see http://dnr.wi.gov/Aid/documents/SurfaceWater/AISGrantOverview.pdf.

In addition to aquatic invasive species, Wisconsin also is committed to preventing the spread of wetland and terrestrial invasive species and forest insects and diseases. Information about state programing concerning invasive species can be found at http://dnr.wi.gov/topic/Invasives/. State programming includes extensive education and outreach efforts, control of invasive species on DNR lands, and a permit program for transport of invasive species for educational and research purposes. Through statutory authority described above, Wisconsin prohibits the transport of aquatic invasive species. The statutes related to invasive species have allowed Wisconsin to implement efforts to control phragmites, purple loosestrife, Yellow Iris. These efforts include an ongoing effort to control wetland species like purple loosestrife through bio-control programs involving both professional organizations and volunteers.

At a local level, Douglas County is also committed to preventing the spread of aquatic invasive species. The Douglas County Aquatic Invasive Species Strategic Plan outlines the county's goals for addressing AIS in the county. The Douglas County AIS Coordinator position was funded through the WDNR grant program described above, but is dependent on available grant funding. Douglas County is a participant in the Clean Boats, Clean Water Program and the Citizen Lake Monitoring Network (which includes observing for the first appearance of invasive species near boat landings, shorelines, and recreation areas), and provides annual training workshops for each of these programs. The county also provides free Purple Loosestrife biocontrol training. The county has partnered with DNR and other stakeholders, such as GLIFWC and the Northwoods Cooperative Weed Management Area, to inventory and plan for management of nonnative Phragmites in the AOC.

The State of Minnesota and the Minnesota DNR is committed to working with partners and citizens to slow the spread of invasive species. Both state and local partners are committed to continuing the existing programming described below to address invasive species issues in the St. Louis River AOC. As with many natural resource programs, continued efforts dependent on sustained funding availability for these programs.

More information on Minnesota's programs and efforts may be found in *A Minnesota Management Plan for Invasive Species* at http://anstaskforce.gov/State%20Plans/MN/state_invasive_species_plan.pdf or at the MNDNR's website at http://www.dnr.state.mn.us/invasives/index.html. The state has a variety of public outreach efforts including television, radio and print media public service announcements. This includes the *Protect Your Waters* educational campaign referenced at http://www.dnr.state.mn.us/invasives/aquatic_programs.html. The MNDNR also has an extensive *Watercraft Inspection Program* at public water access points around the state to inspect watercraft and help disseminate information about how boaters can prevent the spread of aquatic invasive species. More information on this program can be found at http://www.dnr.mn.us/invasives/watercraft_inspect.html.

The Minnesota DNR has an extensive AIS grant program to help fund organizations conducting invasive species education and control work. Grants are available for conducting education, prevention and control for invasive species (http://dnr.state.mn.us/grants/aquatic_invasiv/index.html). These grants share the costs of aquatic invasive species education programs that teach about the threats posed by invasive species and how to prevent and control them. The grants also help with projects that prevent new introductions, control existing populations, and restore habitat. Grants are also available for informational signage and Watercraft Access Inspections by local government units. Applicants for these grants can include local governments, tribal governments, town sanitary districts, lake and river organizations, school districts, colleges, universities, technical schools, nonprofit organizations, and state and federal natural resource agencies.

In addition to aquatic invasive species, Minnesota is also committed to preventing the spread of terrestrial invasive species and forest insects and diseases. State programming includes extensive education and outreach efforts, control of invasive species on DNR lands through a departmental Operational Order, and a permit program for transport of

invasive species. Through statutory authority Minnesota prohibits the transport of invasive species (aquatic plants as well as timber, firewood and fuelwood).

At a local level, St Louis County and the City of Duluth are also committed to preventing the spread of and controlling invasive species. The City of Duluth – Parks Department conducts frequent volunteer days for removing invasives within the city park system. St Louis County has a 'weed inspector' on staff that is authorized to issue citations and assess fines to individuals or commercial enterprises for noncompliance with state invasives laws and ordinances. Both are often involved in local and regional educational programming and outreach efforts.

Table 3. Past Invasive Species Surveys. For more detail on these efforts, see the Invasive Species section in the text.		
Year	Description	Lead/Partners
2011-2014	Surveys of purple loosestrife biological control in SLRE	NERR
2011	Phragmites in SLRE below Oliver Bridge mapped	Douglas County
2014	Estuary-wide survey of phragmites	GLIFWC
2013	Survey of invasive species on Clough Island (part of Hog Island Restoration project)	Douglas County
2010	Invasive Plant Surveys on Wisconsin Point	UWS
2005 - 2006	Early Detection Surveys for non-native benthic invertebrates in SLRE below Fond du Lac Dam	EPA-MED Lab
2012	Early Detection Surveys for non-native benthic invertebrates in SLRE below Bong Bridge	EPA-MED Lab
2006 - present	Early Detection Surveys for non-native fish in SLRE below Fond du Lac Dam	EPA-MED Lab
Ongoing and Future Invasive Species Work. For more information, see Section II. c. Invasive Species.		
Ongoing	Early Detection Surveys for non-native fish in SLRE below Fond du Lac Dam	EPA-MED Lab
Ongoing	Ongoing research into proper early detection monitoring methods, non-native zooplankton early detection methods, and non-native fish early detection methods based on fish larvae.	EPA-MED Lab
1999	Rusty crayfish surveys, SLRE	MN Sea Grant
2013-2014	Rusty crayfish surveys, SLRE	NERR
Ongoing and Future Monitoring and Assessment Work. This table includes RAP actions under BUI 2 and BUI 9. For more information on RAP projects, see Section III. Future Project Needs.		
2012 - 2016	2.01 Bird Inventory and Assessment (AOC-wide)	MPCA
Annual	2.02 Fish Population Monitoring (AOC-wide)	WDNR, MDNR
Complete 2015	2.03 Ruffe Assessment (AOC-wide)	WDNR, MDNR
Complete 2016	2.04 Semi-Aquatic Mammal Survey (AOC-wide)	WDNR
Complete in 2016	9.13 Nemadji River Watershed Habitat Assessment using Lidar Data	WNDR

Table 4. Ongoing and Future Habitat Restoration Projects including invasive species control projects. This table includes RAP actions under BUI 2 and BUI 9, and any other additional ongoing habitat work lead by partners in Wiscosnin. For more information on non-RAP projects, see Sections II. b. Habitat Restoration, and II. c. Invasive Species. For more information on RAP projects, see Section III. Future Project Needs. Acreages listed here are best estimates of actual restoration, and not based on the project areas shown in maps.

Year	Description	Lead/Partners	Estimated Acres
Start 2015	Estuary-wide treatment of phragmites, ongoing land surveys of phragmites targeting rail corridors, bridges, etc.	GLIFWC, WDNR, St. Louis County	NE
2016	Follow-up phragmites treatments following estuary-wide treatment	GLIFWC	NE
2015	Treat 81 acres of honeysuckle & buckthorn on Clough Island	WDNR	81
2015	Treat approximately 2.5 acres of phragmites around Clough Island	WDNR	2.5
2015 and ongoing	Follow-up treatment of purple loosestrife on Spirit Island	FDL	5.7
2015 and ongoing	Follow-up treatment of buckthorn on Spirit Island, with native seedings and potentially tree plantings	FDL	5.7
2015	St. Louis River Estuary Wild Rice Restoration	MDNR & MLT	NE
2015	River2Lakes Wild Rice Restoration	NERR	4-6
2015	Kelly Bay and Kilner Bay Shoreline Stabilization & Culvert Replacement	City of Superior	NE
2016	City of Superior Shoreline Cities Green Infastructure Project	City of Superior	NE
Complete in 2017	2.05 Piping Plover Habitat/Beach Nourishment	WDNR, Douglas County	200
Complete in 2017	9.11 Allouez Bay Wild Rice Restoration	Douglas County	25
Complete by 2025	9.12 Crawford Creek Remediation2Restoration project	WDNR & RP	NE
Complete in 2018	9.14 Pickle Pond Remediation2Restoration project	FWS, WDNR	12
Complete in 2017	9.15 Wisconsin Point Dune Restoration	City of Superior	206
Start Design 2016	9.16 Hog Island Habitat Restoration	TBD	NE
Complete 2017	9.17 Fish Passage Culverts	WDNR	NE
	Total Acres of Future Restoration in Wisconsin		538
	Estimated Acres of Future Aquatic Restoration		50
	Estimated Acres of Future Hydrologically Connected Restoration		488

NA indicates information not applicable.

NE indicates that acreage was not estimated.

* Denotes action was completed for mitigation purposes. While generally mitigation activities were not included, restoration actions that occurred on protected lands important to the AOC were included.

Previous and Ongoing Invasive Species Survey and Control Work

This summary of past invasive species control work includes work in Wisconsin and Minnesota, however, it may not be all-inclusive. Records of work done over 10-15 years ago are often difficult to find. The summary does include all past efforts known at this time. Invasive species survey and control work in the St. Louis River Area of Concern has focused on the following harmful exotic species: purple loosestrife (*Lythrum salicaria*), non-native phragmites (*Phragmites australis var. australis*), cattails (*Typha angustifolia, T. x glauca*), common buckthorn (*Rhamnus cathartica*), honeysuckle (*Lonicera tartarica, L. morrowii, L. x bella*), reed canary grass (*Phalaris arundinaceae*), spotted knapweed (*Centaurea maculosa*), Japanese knotweed (*Fallopia japonica*), Eurasian ruffe (*Gymnocephalus cernua*), round goby (*Neogobius melanostomus*), and rusty crayfish (*Orconectes rusticus*). Lake Superior and the St. Louis River also contain Eurasian water milfoil (*Myriophyllum spicatum*) and curly leaf pondweed (*Potamogeton crispus*).

Table 2 includes a list of the invasive species control efforts and their main sponsor, and Figure 3 shows a map of invasive species efforts in the AOC. Table 3 is a list of past and ongoing/future survey efforts for invasive species in the AOC. Table 4 includes planned future invasive species control efforts.

Purple Loosestrife

Purple loosestrife is found sporadically throughout the entire estuary. It has been treated in many areas using biological control with *Galerucella* beetles, which feed on purple loosestrife and reduce their abundance, although complete eradication is unlikely. Dr. Shon Schooler at the Lake Superior NERR has been conducting surveys to evaluate the effectiveness of purple loosestrife biological control in the SLRE from 2011 – 2014. From this work he hopes to better understand the level of control needed to manage the populations and evaluate if additional biological control agents should be utilized in the AOC.

From 1995 through 2005, MNDNR Wildlife in Cloquet, MN ran a program for biocontrol of purple loosestrife. They raised and released beetles in many areas in the estuary with much success. Additionally, at that time many youth and volunteer groups were involved in beetle release as well, including Boys Scouts, Girl Scouts, 4-H groups, and the St. Louis River Alliance. One example is in 2002 and 2003, Minnesota Sea Grant (Doug Jensen) worked with 4-H groups to release beetles at purple loosestrife occurrences on the St. Louis River. The release sites included locations near Boy Scout Landing, Radio Tower Bay, Mud Lake, Munger Landing, Clough Island, Indian Point Bay, as well as a site on Tischer Creek near University of Minnesota Duluth. The 4-H program included "starter kits" to rear beetles. Beetles were released in 2002 and in 2003. In 2002, 25 youth and 67 volunteers participated in the program. Approximately 309,000 beetles were released in 2003. Doug Jensen, in cooperation with St. Louis County Agriculture Weed Inspector, also conducted additional small scale releases in 2007-2008 at some of the above sites and along the inside of Minnesota Point.

From 2002 - 2005, the City of Superior hired Fortin Consulting to release a total of 12,000 - 58,000 beetles in the Pokegama River between U.S. Highway 105 and the St. Louis River, to be used as mitigation credits in their wetland mitigation program. Beetles were released at six sites in 2002, 2003, and 2004, and vegetation surveys were completed each year and in 2005 to track success. The program was very successful with the abundance of purple loosestrife reduced at all release sites. At some sites, loosestrife was reduced to 0% abundance. Observations were made at additional sites where beetles were not released, and monitoring indicated that beetles moved into these areas and were also reducing abundance there. A Final Report for the project (Fortin Consulting, 2005) contains more information including detailed methods.

In 2011, as part of the Hog Island restoration project lead by Douglas County and Lake Superior Research Institute, beetles were raised at UWS and released on purple loosestrife at over 50 locations around Allouez Bay and at 6 locations around the Hog Island Inlet. Additionally, invasive cattails were controlled in two areas totaling 3 acres in Allouez Bay. As part of the wild rice restoration project in Allouez Bay, Douglas County is planning to re-treat the invasive cattails and purple loosestrife as needed through 2017. For more information about this project (9.11), see its summary below under Future Project Needs.

Currently, Fond du Lac Band of Lake Superior Chippewa is working on removing purple loosestrife on Spirit Island. Spirit Island is located in Spirit Lake, located adjacent to the Morgan Park community and part of Minnesota. According to Ojibwe oral history, Spirit Island was the "Sixth Stopping Place" in the Ojibwe Migration Story. The island was purchased in 2011 by FDL with the intent to use the island for conservation and cultural preservation. The purple loosestrife control program started in 2013 and FDL plans to continue it into the future. Purple loosestrife is removed manually by digging up all roots, bagging, and removing them from the island. Approximately 100 stems are removed each year. Other herbaceous invasives are removed as observed when possible; for example one spotted knapweed stem was removed in 2014.

Phragmites

Both native and non-native phragmites are found in the St. Louis River estuary. The invasive is often difficult to distinguish from the native variety. The species is found in localized areas throughout the estuary but is not yet widespread as observed in other areas in Wisconsin (e.g. Lower Green Bay and Fox River AOC). The most significant infestations are located near Clyde Avenue Landing and the St. Louis River Interlake/Duluth Tar Site, with smaller low-density beds dispersed throughout the estuary (See Figure 5, GLIFWC 2014). Local resource managers agree that phragmites poses a significant threat to the region and is at a level where control is still feasible, although the time window to act is limited.

Phragmites, along with cattails and yellow iris, were controlled over a total of 1.79 acres at Hog Island in 2011 as part of Douglas County's Hog Island Restoration project. At that time, native and non-native phragmites stands in the estuary below the Oliver Bridge were mapped, and non-native phragmites was controlled over 0.82 acres around Clough Island, Pokegama Bay, and Dwight's Point. The phragmites treated on the southwest edges of Clough Island (on the peninsula and along Clough Island inside of the peninsula) was re-treated in 2014 through the WDNR's Clough Island restoration project (described in more detail above under Habitat Restoration – Clough Island).

In 2014, GLIFWC completed an estuary-wide phragmites survey. GLIFWC produced a map of all current known locations of native and non-native phragmites from the Fond du Lac dam downstream to the Superior entry including Duluth & Superior Harbors, Allouez Bay and the estuary-sides of Minnesota and Wisconsin Points. As a response to this effort, GLIFWC convened a meeting in October, 2014 for resource managers and stakeholders involved in invasive species control in the estuary to develop a plan for addressing the threat that phragmites poses. This group agreed to collaborate to complete the remaining survey needs outside of the estuary proper (primarily within the Duluth and Superior municipalities and along local railway corridors), and to pursue existing Wisconsin state funds and Minnesota state funds accepted by St. Louis County in order to control phragmites in Wisconsin and Minnesota. An initial round of control is planned for 2015, and GLIFWC plans to do follow-up treatments on phragmites stands in subsequent years.

Terrestrial Invasive Species

Terrestrial and wetland invasive species were surveyed in 2013 on Clough Island by Leaning Pines Natives as part of the Hog Island restoration project (described above under Habitat Restoration). The target species were:

- Common buckthorn (Rhamnus cathartica)
- Glossy buckthorn (R. frangula)
- Honeysuckle (Lonicera tartarica, L. morrowii, L. x bella)
- Reed canary grass (Phalaris arundinaceae)
- Phragmites (Phragmites australis var. australis)
- Cattails (Typha angustifolia, T. x glauca)
- Purple loosestrife (Lythrum salicaria)

Meander surveys were conducted in each of seven zones based on habitat type. For each population, population intensity was estimated as one of five categories, from 1-50 stems to greater than 1,000 stems. Buckthorn and honeysuckle were identified as serious invasive species throughout the island. Reed canary grass was found at the southwestern part of the island in a small pocket in the middle field, located at the center of previous farm activities. Additional terrestrial invasive species identified included 1 amur maple tree (*Acer ginnala*), yellow rocket (*Barbarea vulgaris*), tansy (*Tanacetum vulgare*), quack grass (*Elymus repens*) and smooth broom (*Bromus inermis*). None of these

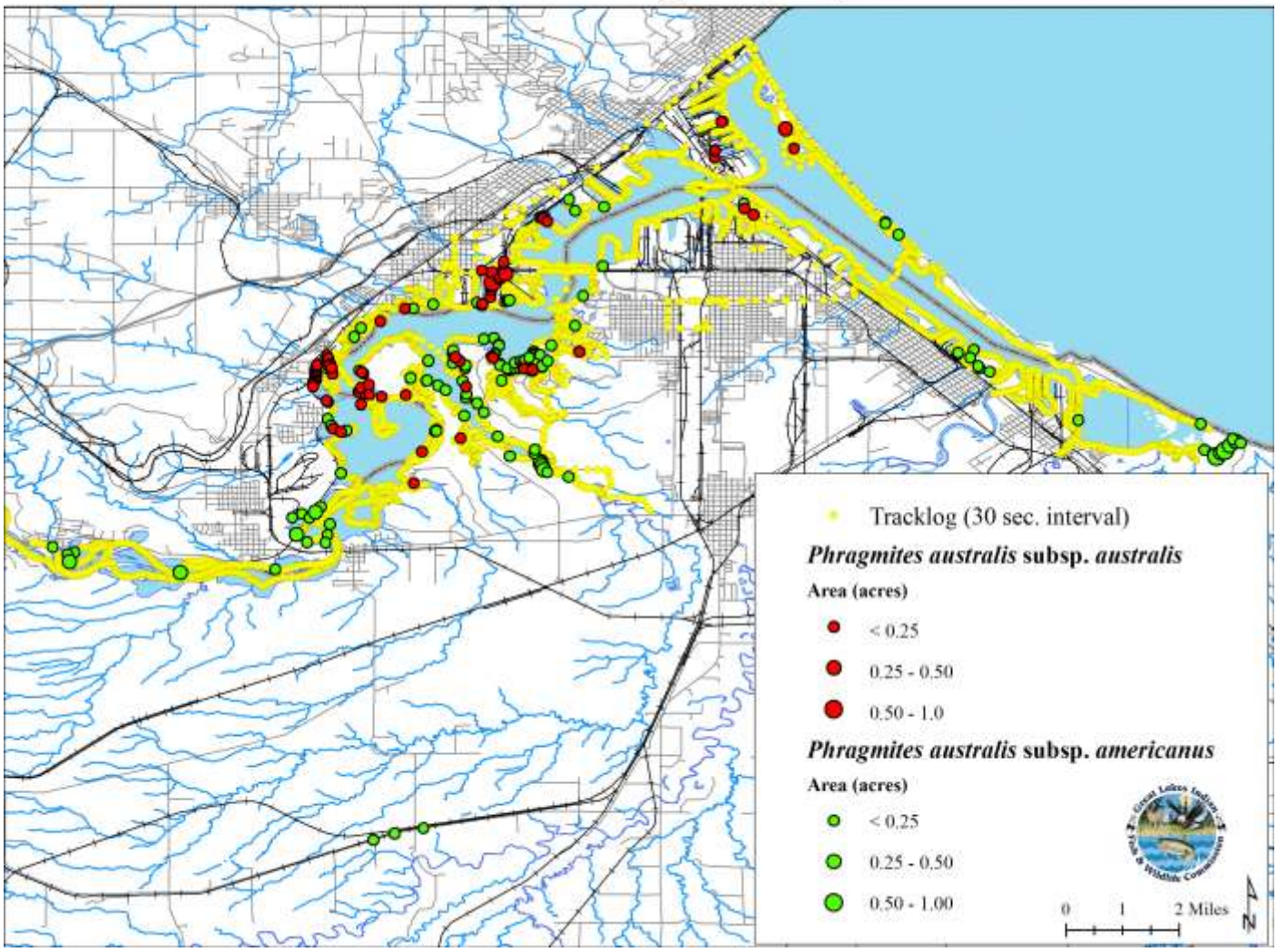


Figure 5. Results of GLIFWC's phragmites survey of the St. Louis River estuary. Map courtesy of GLIFWC.

species were dominant except quack grass in one small valley leading into the forest to the east. Cattails are dominant in the coastal wetlands around the island, with the exotic cattail a minor component of the community. Purple loosestrife was found only in small populations on all sides of the island. In the 2013 survey, phragmites was found on the southwest edge of the island as well as several small populations in other areas surrounding the island (Note that this was after having been treated in 2010 and re-treated in 2012 as part of Douglas County's Hog Island restoration project).The details of this survey can be found in the report titled Clough Island Invasive Plant Final Report (Hlina, 2013).

Common Buckthorn (*Rhamnus cathartica*) was brought to the region in the mid-1800s as a hedge species, but is very invasive and is now commonly found throughout the estuary. Exotic honeysuckle (*Lonicera tartarica, L. morrowii, L. x bella*) is another common invasive species. Both of these were treated on Clough Island in 2012 and in 2014. In 2012, two planting areas totaling 26 acres were controlled for buckthorn and honeysuckle using Garlon 4 foliar and basal bark methods. In 2014, 105 acres of the island and the two small adjacent islands were controlled using foliar, basal bark, and cut stump treatments. The southern planting area was treated again, along with the southwestern peninsula, which was highly infested. The northeastern third of the island and the two small islands to the southeast of Clough had low level infestations and were also treated. At that time, one glossy buckthorn (*Rhamnus frangula*) was found on a small island

to the southeast of Clough Island. Glossy buckthorn had not previously been identified on Clough Island. An invasive species management plan for the island will be necessary to plan activities for at least an estimated 10 - 15 years in order to successfully control and eradicate buckthorn and honeysuckle on the island. This work will likely come out of future master planning for the property. In the meantime, additional follow-up buckthorn, honeysuckle, and phragmites treatment are recommended to prevent further spread of these species where previously treated. Remaining funds from the DNR's Clough Island restoration grant from USFWS will be used in 2015 to treat remaining untreated areas for buckthorn, honeysuckle, and phragmites.

Fond du Lac Band has led buckthorn control on Spirit Island. A site visit to the island in 2012 revealed that at least a quarter of the upland area was infested with thousands of buckthorn seedlings and about 6 sapling-sized buckthorn. FDL's Resource Management Division led an effort in 2013 to treat the buckthorn using a foliar application with 4% glyphosate solution. Saplings were cut and their stumps were treated with an 18% glyphosate solution. All the buckthorn identified were treated. Based on a subsequent site visit in 2014, the treatment was very successful with no stump sprouting. Some seedlings were missed, survived treatment, or have germinated from seeds still present in the soil. FDL plans to re-treat buckthorn seedlings in fall 2015 using a foliar glyphosate spray, and possibly re-seed bare areas with a native plant mix, depending on an assessment of success. Re-treatment, evaluation, and potential re-seeding will continue every two years to try to eradicate buckthorn from the island. Planting of tree seedlings such as white cedar, white pine, red oak, and white spruce will also being considered to supplement diversity.

Professor Nick Danz with UWS has lead several projects on Wisconsin Point to try to understand the past, present, and future of vegetative communities on the point. In 2010, students Matthew Jahnke and Donald Lisdahl completed a survey of beachgrass and dune health plant communities, and compared results to a 1956 survey. Students Glenn Belde and Daniel Fraser surveyed 255 spatially-distributed locations across the entire point and recorded the presence of invasive plant species. Based on that work, Dr. Danz has found that invasive species have increased substantially on Wisconsin Point in recent decades. Belde and Fraser identified 27 species of invasive plants listed on the Working List of Invasive Plants in Wisconsin, although Spotted Knapweed and a few invasive grasses were the most problematic. In some areas, more than 400 invasive plants occurred in a 1 m^2 survey plot. Spotted knapweed has a particularly wide distribution as it was found colonizing the parking lots along the point and in a large area near the tip of the point. From 2012 - 2014, over 250 students in the non-majors botany class Plants and People at UWS have monitored Spotted Knapweed abundance in a 4-acre parcel that occupies the former borrow pit site on the Allouez Bay shoreline near the tip of the point. Students have hand-pulled knapweed plants at the site, resulting in the removal of about 1000 garbage bags full of plants and millions of seeds. In an effort to shade out spotted knapweed at the site, in 2012 and 2013, students planted 1,700 tree seedlings of Paper Birch, White Pine, Red Pine, Jack Pine, White Pine, Pin Cherry, and White Spruce at the site. Future goals include continued removal of spotted knapweed, more plantings, and continued monitoring at the site.

A troop of Boy Scouts worked with the City of Superior to treat Japanese knotweed at the Billings Park Boat Launch in 2013. The boat launch, located at the end of N 21st St in Superior, had a large bed of Japanese knotweed approximately 4000 square feet in area. The Boy scouts manually cut the plants with hand tools, then covered them with black plastic to shade them out. The cover was compromised over the winter, so the City of Superior hired Superior Vocations Center to make repairs.

Invasive Animal Species

Several surveys for invasive animals have been conducted in the St. Louis River estuary. In 2005 and 2006 scientists at the EPA-MED Lab conducted early detection surveys for non-native benthic invertebrates in the St. Louis River below the

Fond du Lac Dam (Grigorovich et al. 2008; Trebitz et al . 2009; Trebitz et al. 2010). In 2012 a similar survey was conducted below the Bong Bridge. Table 5 contains the 19 known non-native benthic species. The quagga mussel was previously known to occur in the lower Great Lakes but was first identified in Lake Superior (in the St. Louis River estuary) in 2005. Based on the oldest collected snail, the introduction was estimated to be no later than 2003, but it is very difficult to differentiate from the zebra mussel, so it may have been present prior to that (Grigorovich et al., 2008). The New Zealand mud snail had previously been identified in the Thunder Bay region but was first identified in the St. Louis Harbor in 2005. The operculae of one faucet snail was found in one of the 2006 samples from Superior Bay, but no live specimens were found at that time. Later, in 2012, live faucet snails were collected from the St. Louis River with the densest colonies near Grassy Point and Barker's Island.

EPA-MED Lab in partnership with the USFWS Fish and Wildlife Conservation Office (Ashland, WI) and 1854 Treaty Authority have has also conducted annual early detection surveys for non-native fish in the St. Louis River below the Fond du Lac Dam since 2006. The 10 known non-native fish species in the St. Louis River are listed in Table 5. Of these, the Eurasian ruffe and round goby are considered the most widespread and abundant, while the others are more localized and rare (Peterson et al. 2011). Other invasive species of interest are the sea lamprey (*Petromyzon marinus*), a jawless parasitic fish, introduced to the Great Lakes in the 1830's and appearing in Lake Superior in 1938; and the spiny water flea (*Bythotrephes longimanus*), a small predacious crustacean that appeared in Lake Superior in 1987. EPA-MED Lab scientists have worked to identify proper methods and procedures for early detection of invasive species in the estuary (Trebitz et al. 2009; Hoffman et al. 2011; Peterson et al. 2011; Trebitz et al. 2010; Hoffman et al. in prep). They have also developed protocols and conducted a trial for non-native zooplankton early detection surveys (Hoffman et al. 2011), and are currently working to develop a DNA-based method for non-native early detection surveys targeting fish larvae.

Rusty crayfish (*Orconectes rusticus*) are another invasive species of concern in the St. Louis River. They were discovered in the Thunder Bay area in the early 1990s, and were first observed in the Duluth-Superior Harbor in 1999, when two crayfish were captured during surveys at 84 locations in Superior Bay (MN Sea Grant). Re-sampling efforts in 2013 at 148 locations including the locations sampled in 1999, yielded not a single rusty crayfish and just three native crayfish (LS NERR, Tudor et al. in prep). Surveys in 2014 captured six crayfish which were confirmed by DNA analysis as being invasive rusty crayfish. Scientists at the NERR and UWS will continue surveys to characterize the population of rusty crayfish in the estuary and better understand the population changes since 1999.

Table 5. Non-native benthic invertebrate species detected in the St. Louis River in 2005 and 2006. (modified from Trebitz et al. 2009 and Trebitz et al., 2010)

Benthic taxa			
Non Native Species	Latin Name	Origin	Year First Detected (St. Louis River)
Zebra mussel	Dreissena polymorpha	Eurasia	1989
Henslow peaclam	Pisidium henslowanum	Eurasia	2005
Amphipod	Gammarus fasciatus	North America	1982
Oligochaete	Potamothrix vejdovskyi	Eurasia	2003
Oligochaete	Potamothrix moldaviensis	Eurasia	2001
Moitessier peaclam	Pisidium moitessierianum	Eurasia	1985
European valve snail	Valvata piscinalis	Eurasia	1995
Amphipod	Echinogammarus ischnus	Eurasia	2005
Quagga mussel	Dreissena bugensis	Eurasia	2005
Amphipod	Gammarus tigrinus	North America	1985
New Zealand mudsnail	Potamopyrgus antipodarum	New Zealand	2005
Oligochaete	Paranais frici	Eurasia	2005
Oligochaete	Pristina acuminata	Eurasia	2005
Oligochaete	Ripistes parasita	Eurasia	2001
Asian clam	Corbicula fluminea	Asia, Africa	1999
Greater European peaclam	Pisidium amnicum	Eurasia, Africa	1985
Lumholtz waterflea	Daphnia lumholtzi	Africa, Asia	2005
Hump-backed peaclam	Pisidium supinum	Eurasia	2005
Hydroza	Cordylophora caspia	Eurasia	2001
Faucet Snail	Bithynia tentaculata	Eurasia	2012
Fish taxa			
Non Native Species	Latin Name	Origin	Year First Detected (Great Lakes)
Eurasian ruffe	Gymnocephalus cernuus	Eurasia	1986
Round goby	Neogobius melanostomus	Eurasia	1995
White perch	Morone americana	North America	1990
Tubenose goby	Proterorhinus marmoratus	Eurasia	2002
Common carp	Cyprinus carpio	Eurasia	Late 1800's
Rainbow smelt	Osmerus mordax	North America	Mid 1900's
Alewife	Alosa pseudoharengus	North America	1950's
Brook silverside	Labidesthes sicculus	North America	2002
Threespine stickleback	Gasterosteus aculeatus	North America	1990's
Freshwater drum	Aplodinotus grunniens	North America	1970's *
Sea Lamprey	Petromyzon marinus	North America	1970's

* Freshwater Drum is native to other Great Lakes but not Lake Superior. First detected in Lake Superior in 1970's.

Future Project Needs

The RAP included a list of priority management actions needed for BUI removal and ultimate delisting of the AOC. Many of the actions are underway. The implementing agencies are committed to reaching the goal of de-listing the AOC by 2025. The summaries below include all priority management actions listed in the RAP, along with a project description, partnerships involved, the expected timeframe for completion, funding needs, and project status. Some of these projects involve assessment of the impairment and "if-then" scenarios, and as such require adaptive management and may change with time, more data, and a better understanding of the AOC.

Figure 6 shows a map of all on-the-ground Wisconsin projects to be completed before AOC delisting. Table 4 shows a list of all planned habitat restoration projects, and Table 3 shows ongoing and future monitoring and assessment work planned for the AOC.

Degraded Fish and Wildlife Populations (BUI 2) Priority Projects

Project: 2.01 Bird Inventory and Assessment
Project Type: Monitoring/Assessment
Site Location: AOC-wide
Project Partners: MPCA, WDNR, MNDNR
Description: Conduct an estuary-wide bird inventory for target species to be combined with existing inventory data available for Minnesota. Complete an AOC-wide assessment using the combined dataset.
Status & Timeframe: Bird population data for this project will be collected at estuary-wide restoration sites by NRRI through an existing contract MPCA has with NRRI. The existing contract does not contain work to synthesize and summarize existing historic data in order to come to a consensus among resource managers that wildlife species are no longer limited by physical habitat, food sources, water quality, or contaminated sediments. This additional component will be completed in-house by staff at MPCA, MNDNR, or WDNR; or through an amendment to the existing contract. This action is scheduled for completion in 2016.
Planning-level Cost Estimate: $135,000
Funding Requirements: If historic analysis is completed through an amendment to existing contract, additional funding may be needed.

Project: 2.02 Fish Population Monitoring
Project Type: Monitoring/Assessment
Site Location: AOC-wide
Project Partners: MPCA, WDNR, MNDNR, FDL
Description: Continue regular MNDNR and WDNR fish population monitoring and evaluate to track current status of target fish species against the BUI removal objectives.
Status & Timeframe: Annual monitoring for Lake Sturgeon as well as walleye and muskellunge is led by MNDNR. The removal targets for walleye and muskellunge are currently being met, with good progress towards the target for lake sturgeon. See Assessment of Progress below for more detail. Monitoring will continue annually. A documentation of population status relative to the targets will be needed for BUI removal.
Cost Estimate: Operational Support
Funding Requirements: No additional funding requirements anticipated.

Figure 6. St. Louis River AOC Wisconsin Planned Restoration

Figure 6. Map of Future on-the-ground Restoration Projects in the St. Louis River Area of Concern. Projects are generally focused in the Wisconsin Point/Allouez Bay area. Note that the Hog Island Project is currently shown located on Hog Island, although the siting for this project may change. The Fish Passage Culvert project (9.17) is not shown because locations have not yet been determined. Other planned projects do not include on-the-ground work.

Project: 2.03 Ruffe Assessment
Project Type: Monitoring/Assessment
Site Location: AOC-wide
Project Partners: MPCA, WDNR, MNDNR
Description: Document ruffe populations in relation to native fish populations within the estuary.
Status & Timeframe: Joel Hoffman with EPA-MED Lab and USFWS Fish and Wildlife Conservation Office (Ashland, WI) have collected and are in the process of synthesizing data on Eurasian ruffe in the St. Louis River estuary. The preliminary results indicate that the population has decreased significantly since the mid 1990's. This project is scheduled for completion in 2015.
Cost Estimate: Operational Support
Funding Requirements: No additional funding requirements anticipated.

Project: 2.04 Semi-Aquatic Mammal Survey
Project Type: Monitoring/Assessment
Site Location: AOC-wide
Project Partners: WDNR, MNDNR, MPCA, University of Wisconsin-Madison, FDL
Description: Conduct an estuary-wide semi-aquatic mammal survey.
Status & Timeframe: A Project Agreement was established in August 2014 with University of Wisconsin-Madison to complete these semi-aquatic mammal surveys. Surveys include aerial flights in winter using fixed wing aircraft and trail camera surveys throughout the year. Surveys were conducted in fall/winter 2015 and are planned for summer and fall/winter 2015 as well. Preliminary results will be presented to AOC coordinators in May 2015. A final report and presentation of results is due June 30, 2016.
Cost Estimate: $311,645
Funding Requirements: No additional funding requirements anticipated.

Project: 2.05 Piping Plover Habitat/Beach Nourishment
Project Type: Habitat Restoration
Site Location: Shafer Beach, near Wisconsin Point, Superior, Wisconsin
Project Partners: WDNR, USACE, Douglas County, City of Superior, USFWS, SLRA
Description: Increase available nesting habitat within area designated critical habitat through beneficial reuse of clean dredge material.
Status and Timeframe: A feasibility study is currently being funded under USACE Section 204 program, Beneficial Use of Dredge Material. The feasibility study is estimated to be complete in early 2016. Design and Engineering is estimated to start in early 2016 with completion in summer 2016. Implementation is planned for 2016 or 2017.
Planning-level Cost Estimate: The preliminary cost estimate of the Feasibility Study, calculated in the Determination of Federal Interest, is $300,000 but may be significantly lower. Design and Engineering is estimated at $50,000. The Determination of Federal Interest estimated implementation costs to be $542,000 - $3,200,000, depending on preferred design and size of project implemented.
Funding Requirements:
Under the Section 204 program, the USACE funds up to $100,000 of the feasibility phase, after which a 65/35 match is required. A sponsor with available match dollars has not been identified. WDNR, Douglas County, and USACE will work with EPA to identify a funding mechanism for feasibility and subsequent phases of the project.

Loss of Fish and Wildlife Habitat (BUI 9) Priority Projects

Project: 9.11 Allouez Bay
Project Type: Habitat Restoration
Site Location: Allouez Bay, St. Louis River Estuary, Superior, Wisconsin
Project Partners: Douglas County, LSRI, UWS, City of Superior, SLRA, NERR, Ducks Unlimited, USFWS, MNDNR, GLIFWC, FDL.
Description: Vegetation restoration including removal of AIS and re-establishment of wild rice. Upstream sediment control outreach.
Status & Timeframe: This project was funded in Federal FY 2014 through Sustain Our Great Lakes ($121,954) and USFWS Great Lakes Coastal Program Partnership ($35,000) funding. Implementation will begin in 2015, and project will be completed in 2017. Originally implementation was planned for fall 2014, but due to late notice of award and poor wild rice harvest in fall 2014, implementation will start in 2015. The 3-year project includes 25 acres of wild rice seeding, 10 acres of exclosures, and AIS control. Note that the current project does not contain upstream sediment control outreach. Water clarity factors have not been shown to limit wild rice in the estuary, so this was not included as a component of the wild rice restoration project. Fundamental questions still stand about the relative importance of the sources of sediment (e.g. Bluff Creek, Bear Creek, Nemadji River) to Allouez Bay, and the role re-suspension plays in water clarity in the Bay. Further efforts for upstream sediment control outreach may be warranted upon further assessment.
Cost Estimate: $156,954
Funding Requirements: No additional funding is anticipated.

Project: 9.12 Crawford Creek Remediation and Habitat Restoration
Project Type: Contaminated media remediation with potential habitat restoration
Site Location: Crawford Creek, tributary to Nemadji River, Superior, Wisconsin
Project Partners: WDNR, Responsible Party (RP - Beazer Corporation)
Description: Remediate contaminated sediments and restore habitat within stream, wetland, and floodplain.
Status and Timeframe: WDNR is in discussions with RP. EPA contracted site characterization during summer of 2014. Timeframe for completion is unknown at this time and is dependent on RP cooperation and regulatory procedures.
Planning-level Cost Estimate: To Be Determined, WDNR is in discussions with RP.
Funding Requirements: RP, Potential Great Lakes Legacy Act (GLLA) request.

Project: 9.13 Nemadji River Watershed
Project Type: Assessment/Monitoring
Site Location: Nemadji River Watershed
Project Partners: WDNR, Douglas County, City of Superior, University of St. Mary's, LSRI, SLRA, NERR, WWLT, USACE, UWS, EPA-MED Lab, MNDNR, Carleton County, MPCA.
Description: Conduct habitat assessment and evaluation to determine priority locations for conifer restoration, land protection, and AIS control.
Status & Timeframe: Grant proposal complete, including collection of lidar data on the Wisconsin portion of the AOC to complete coverage for the AOC, and a GIS-based habitat assessment for the entire Nemadji River watershed to prioritize habitat restoration areas. If FY2015 funding is received, completion is expected in 2016.
Cost Estimate: $195,000
Funding Requirements: Wisconsin Noncompetitive AOC GLRI request anticipated for Federal FY 2015.

Project: 9.14 Pickle Pond
Project Type: Sediment remediation and habitat restoration/enhancement
Site Location: Pickle Pond, located across from Barkers Island in Central Superior.
Project Partners: USFWS, City of Superior, WDNR, BNSF Railway.
Description: Habitat enhancement as warranted by R2R evaluation
Status & Timeframe: A preferred preliminary concept design was chosen during Pickle Pond Phase I, led by USFWS. USFWS is now leading Phase II, a feasibility study which started in September 2014. The preliminary concept design includes removal of contaminated sediment, deepening portions of the pond, and establishment of wetland vegetation in the south end of the pond. Buffers will be established around the pond to improve runoff. The hydrologic connection between the pond and Superior Harbor will be improved. Upstream storm water controls (bioretention) will address continuing inputs to the pond. Design and Engineering will follow the feasibility study, with implementation planned for 2016 and completion in 2018.
Planning-level Cost Estimate: Feasibility cost is $236,000 (secured through USFWS). Design cost is estimated to be $145,000. The initial cost estimate was determined in the *Pickle Pond Restoration – Phase I: Baseline Characterization and Restoration Alternatives*. The implementation cost is estimated to be $2,950,000 for remediation and restoration plus $150,000 - $200,000 per acre of bioretention for watershed controls. This estimate is preliminary and an accurate cost estimate will be determined during the feasibility study.
Funding Requirements: Additional funding for Design and Implementation will be required. Design funding will be needed in Fall 2015. Implementation funding will be needed in early 2016.

Project: 9.15 Wisconsin Point Dune Restoration
Project Type: Habitat Restoration
Site Location: Wisconsin Point, Superior, Wisconsin
Project Partners: NOAA, City of Superior, FDL, WDNR
Description: Development of appropriate public access infrastructure to protect dunes and conduct dune restoration and invasive species control.
Status & Timeframe: Project includes protecting dunes by focusing traffic in 4 access points and removing 16 small parking lots and ~30 trails over the dunes. Previous access points will be restored/revegetated, invasive species will be treated, elevated boardwalks will be installed for access at access points, shoreline along road and Allouez Bay will be stabilized and the roadway will be re-constructed using low impact development techniques. NOAA requested FY2015 Funding from EPA for project. If Fed FY 2015 funding is secured, project will start upon completion of NEPA requirements by NOAA in summer 2015 (Q4 of Fed FY 2015), and would be scheduled for completion by 2017.
Cost Estimate: $1,600,000
Funding Requirements: If NOAA request is funded, no additional funding request is anticipated for this project.

Project: 9.16 Hog Island
Project Type: Habitat Restoration
Site Location: Hog Island, located in the East End neighborhood of Superior.
Project Partners: City of Superior, Douglas County, NRRI, LSRI, WDNR, NERR, UWS.
Description: Nesting area enhancement, habitat restoration
Status & Timeline: The intended design for this project has changed over time. Originally it was to be a shorebird project on Hog Island, which was then modified to a Great Blue Heron nesting project based on a perceived need. However the site is not well-suited for a heron rookery due to high traffic and a bald eagle's nest on the island. Additionally, preliminary results of bird surveys do not indicate a need for a heron rookery restoration project. Instead, there may be

a potential need for secretive marsh bird habitat enhancement. This project needs further development/study to determine if it is appropriate. The project will be re-evaluated after data from project 2.01 Bird Inventory and Assessment is available. The results of the bird assessment will inform if further nesting enhancement is needed for any species in the estuary. Based on those results a project will be developed, which may be located at a different site in the estuary.
Planning-level Cost Estimate: TBD
Funding Requirements: Project implementation funding may be needed for this project in 2017.

Project: 9.17 Fish Passage Culverts
Project Type: Habitat Restoration
Site Location: To be determined, St. Louis Estuary in Superior, Wisconsin
Project Partners: DOT, City of Superior, Douglas County, Townships, WDNR, USFWS
Description: Replace or retrofit a minimum of two perched culverts to allow for fish passage and other aquatic organism passage.
Status & Timeline: WDNR fisheries will collect culvert data in summer of 2015. Data will be analyzed thereafter and priority culvert projects will be developed internally in Fall 2015. Implementation is planned for 2016-2017, with completion in 2017.
Planning-level Cost Estimate: $960,000
Funding Requirements: Anticipated funding request through competitive or noncompetitive GLRI funding for implementation in 2016.

Project: 9.18 Wisconsin Habitat Protection & Rehabilitation
Project Type: Assessment/Monitoring and Documentation
Site Location: Wisconsin portion of AOC
Project Partners: WDNR, WI Partners
Description: Document existing WI habitat protection and rehabilitation projects since 1989 AOC designation and prepare a map(s) showing locations of these projects.
Status & Timeline: Draft map of previous habitat restoration and protection projects completed and presented to Wisconsin Partners in summer 2014. This report contains a final map and summaries of past restoration and protection efforts. This project will be complete in early 2015 upon finalization of this report.
Planning-level Cost Estimate: Operational Support, Habitat Coordinator Position
Funding Requirements: No additional funding is anticipated for this project.

Project: 9.19 St. Louis River Stream Bank Protection Area
Project Type: Planning
Site Location: St. Louis River and Red River Stream Bank Protection Area, located near Oliver, Wisconsin.
Project Partners: WDNR, NERR
Description: Initiate WDNR master planning including natural and undisturbed ecosystem management plan for islands and bays.
Status & Timeframe: NHI completed a Biotic Inventory in 2013 using a Coastal Management Grant to prepare for master planning. Master Planning maybe delayed based on statewide priority. WDNR (NHI) is working with NERR to use remaining funds in the Coastal Management Grant to have NERR conduct a Regional Property Analysis for master planning. Future funding may be needed to support master planning, specifically mapping needs. To move master

planning forward, WDNR may seek alternate funding to support mapping needs for master planning, which would be complete in 2017 if 2016 funding is requested.
Planning-level Cost Estimate: $345,000
Funding Requirements: Funding request is anticipated in 2015 for FY2016 funding. No additional funding is anticipated after that request.

Project: 9.20 Document actions taken to control invasive species
Project Type: Assessment/Monitoring and Documentation
Site Location: AOC-wide
Project Partners: WDNR, MNDNR, NERR, SLRA, GLIFWC, FDL, City of Superior, Douglas County, City of Duluth, Carleton County, St. Louis County, MLT, WWLT, LSRI, NRRI, UWS
Description: Document the appropriate area-specific plans relative to invasive species control in the AOC and incorporate it into an information tool to provide a joint MN/WI view of the ongoing invasive species control efforts. Distribute the information to help provide for efficient and expedited efforts in the AOC.
Status: This report includes documentation of existing area-specific invasive species control plans, and will be distributed to partners in order to help align and increase efficiency of invasive species control efforts. This project will be complete upon finalization of this report in early 2015.
Planning-level Cost Estimate: Operational Support
Funding Requirements: No anticipated funding is anticipated for this project.

Project: 9.21 Wild Rice Plan and Associated Restoration Sites
Project Type: Planning and Habitat Restoration
Site Location: AOC-wide
Project Partners: MLT, MNDNR, MPCA, GLIFWC, FDL, 1854 Treaty Authority, NERR
Description: Develop a plan that identifies the high priority restoration sites and provides a process for restoring those sites.
Status: Plan was completed in December 2014.
Planning-level Cost Estimate: $510,000
Funding Requirements: No additional funding request is anticipated for this project.

Non-RAP Projects

In addition to the projects in the RAP described above, several other projects are planned that may also contribute to BUI removal targets. One of these efforts is further restoration efforts by the WDNR on Clough Island. Using funds remaining in the USFWS grant, the WDNR plans to hire a contractor in 2015 to control 81 additional acres of buckthorn and honeysuckle on the island and an estimated 2.5 acres of phragmites around the island, around Dwight's Point, and in Pokegama Bay. Additionally, WDNR staff plan to work with NERR staff and Rivers2Lake schools to evaluate the areas treated in 2014. Rivers2Lake is a year-long educational program in local schools that uses inquiry-based learning in the Lake Superior watershed as a foundation for increased Great Lakes literacy and engagement. Teachers in the Rivers2Lake program receive extensive training and support. WDNR staff, NERR staff, and Rivers2Lake teachers and students will evaluate the 2014 treatments and pull or cut remaining understory buckthorn, and potentially plant conifer seedlings.

A large group of partners including MNDNR, MPCA, MLT, GLIFWC, FDL, 1854 Treaty Authority, and WDNR worked together to complete a Wild Rice Restoration Implementation Plan for the St. Louis River Estuary in 2014. MNDNR and

MLT have secured funding and are committed to restoring at least 250 acres of wild rice in the St. Louis River estuary. This restoration project will include activities such as cutting existing vegetation (site pre-conditioning), seeding, and installing exclosures to prevent wild rice herbivory by geese and uprooting by carp. A portion of this work will be completed in Wisconsin waters, and will be guided by the recommendations described in the Wild Rice Restoration Implementation Plan. Current funding goes through 2015, but restoration activities are scheduled for 2015 through at least 2020, and partners are committed to seeking future funding to continue implementation of the plan after that time. Additionally, NERR staff along with partners at WDNR, GLIFWC, and FDL, are seeking funding to work with Rivers2Lake school students to assist with wild rice restoration efforts in Pokegama and other back bays in Wisconsin in 2015 based on the Implementation Plan.

The City of Superior received grant funding from the Great Lakes Commission-Great Lakes Basin Program for Soil Erosion and Sediment Control to perform shoreline restoration along Billings Drive near Kelly and Kilner Bays on the St. Louis River. As part of the project, the City has also redesigned the culverts at Kelly and Kilner Bays to make them more fish-friendly. Both culverts will be realigned with the stream and expanded to reflect the natural channel conditions upstream. This project will be completed in the spring of 2015 with assistance from Douglas County.

In 2014, the City of Superior requested funding under the EPA's 2014 Great Lakes Shoreline Cities Green Infrastructure Grants. This proposal is to construct a wetland stormwater basin near Poplar Avenue and 12th Street in order to treat runoff and improve water quality. Because the City of Superior is situated on the Lake Superior Clay Plain, management of runoff is a continual concern. The City's proposal is for a naturalized detention system which incorporates biological components including native vegetation into the traditional water quality basin in order to improve function and aesthetics. Because of this approach, the basin will provide habitat for wildlife and aquatic organisms. Maintenance will include treatment of invasive species. If funded, this project would be completed in 2015.

Assessment of Progress

Degraded Fish and Wildlife Populations (BUI 2)

The removal target for the Degraded Fish and Wildlife Populations BUI is:

> *"In consultation with their federal, tribal, local, and nonprofit partners, state resource management agencies concur that diverse native fish and wildlife populations are not limited by physical habitat, food sources, water quality, or contaminated sediments."*

This target will be met and removal of this BUI will be justified when it is shown that key native species of fish (walleye, muskellunge, sturgeon) and wildlife (piping plover, common tern, great blue heron, and bald eagle) are present and not limited by physical habitat, food sources, water quality, or contaminated sediments. An assessment of progress with respect to the specific targets for each of these species is provided in Table 6.

Loss of Fish and Wildlife Habitat (BUI 9)

The Loss of Fish and Wildlife Habitat BUI removal target is:

> *"State resource management agencies concur, in consultation with their federal, tribal, local, and nonprofit partners, that a reasonable amount, as quantified in the benchmarks, of fish and wildlife habitat, given the presence of industrial development in the estuary, that is currently degraded is enhanced, rehabilitated, and protected against further loss of habitat.*

Measureable indicators for habitat recovery were defined for the Loss of Fish and Wildlife Habitat BUI in the 2013 RAP and are included in Table 7. An assessment of progress with respect to each of those measurable indicators is also shown in Table 7.

Table 6. Assessment of Progress: BUI 2

Removal Target	Assessment of Progress
Walleye Gillnet catch per unit effort (CPUE) is maintained at or above 5.0 per lift with a proportional stock density (PSD) greater than 50 in at least 50% of years surveyed since 2000.	Annual monitoring for walleye is led by MNDNR and indicates that the St. Louis River estuary is currently meeting the BUI target for Walleye. Formal documentation is needed to verify this.
Muskellunge Trapnet CPUE is maintained at or above 1.0 per lift in at least 50% of years surveyed since 1997.	Annual monitoring for muskellunge is led by MNDNR and indicates that the St. Louis River estuary is currently meeting the BUI target for muskellunge. Formal documentation is needed to verify this.
Lake Sturgeon Document an increasing trend of 2 to 5 year old fish captured in summer index nets, with at least 2 index values greater than 2.0 per gillnet lift.	Annual monitoring for lake sturgeon is led by MNDNR. Currently this target is not being met. However one juvenile sturgeon was captured in 2014, indicating that the stocked fish are reproducing in the estuary and surviving. This indicates that lake sturgeon populations are rebounding since stocking efforts ceased in 2000.
Piping Plover Piping plover populations may be restricted by factors operating outside of the estuary; however, to support the USFWS recovery goal of 150 breeding pairs for the Great Lakes Piping Plover population, efforts are being made to create suitable nesting habitat within the St. Louis River AOC. In order to remove this BUI, implementation of the Piping Plover habitat project (action item 2.05) in this Roadmap is necessary.	The piping plover habitat restoration project (2.05) is currently in the feasibility phase and is planned for implementation in 2016/2017 pending the feasibility study and funding.
Common Tern Maintenance of a viable common tern colony of 100 nesting pairs in the estuary in at least 50% of years surveyed since 1997 is necessary for BUI removal.	The St. Louis River AOC is currently meeting the target for common tern. Formal documentation is needed to verify this. The Bird Inventory and Assessment (project 2.01) should provide this and will be complete in 2016.
Great Blue Heron Removal of this BUI is not dependent on the establishment of a Great Blue Heron rookery, but the recorded presence of the species in the estuary during nesting season since 1997 will provide additional evidence for BUI removal.	The St. Louis River AOC is currently meeting the target for Great Blue Heron. Formal documentation is needed to verify this. The Bird Inventory and Assessment (project 2.01) should provide this and will be complete in 2016.
Bald Eagle Recovery of the Bald Eagle and the recorded presence of the species in the estuary during nesting season since 1997 is an indicator for BUI removal.	The St. Louis River AOC is currently meeting the target for Bald Eagle. Formal documentation is needed to verify this. The Bird Inventory and Assessment (project 2.01) should provide this and will be complete in 2016.
Wetland Bird Species Removal of this BUI is not dependent on populations of wetland-associated wildlife species. An AOC-wide bird follow-up survey to compare to work done in 1979 is necessary evidence for BUI removal.	It is unknown if this target is being met. The Bird Inventory and Assessment (project 2.01) should determine if the St. Louis River Estuary is meeting this target or identify any needed follow-up actions, and will be complete in 2016.
Invasives An analysis of historical data that shows the ruffe is not inhibiting the native fish population is required to remove this BUI.	Preliminary results indicate that the ruffe population has decreased significantly since the mid 1990's, and that the St. Louis River AOC is meeting this target. Formal documentation is needed to verify this.
Semi-Aquatic Mammals Removal of this BUI is not dependent on specific small aquatic mammal population numbers. However, to support development of concurrence among state resource management agencies, a small mammal survey will be conducted in the estuary to verify that populations are not limited by physical habitat, food sources, water quality, or contaminated sediments.	No data is currently available to assess semi-aquatic mammals in the St. Louis River estuary. A survey of semi-aquatic mammals in the St. Louis River estuary is in progress and scheduled for completion in 2016.

Table 7. Assessment of Progress: BUI 9

Removal Target	Assessment of Progress
Remediation of contaminated sediment at prioritized sites within the AOC is complete.	Newton Creek/Hog Island Inlet has been remediated. WDNR is in discussions with the RP about the Crawford Creek site. A feasibility study for remediation of Howard's Bay started in 2014. WDNR staff are evaluating data and need for additional characterization at the Superior Water Light and Power site. Additional sediment characterization is needed for several additional areas in Wisconsin and funding for that work will be requested under GLLA in 2015, and later as needed.
Programs are in place to discourage further proliferation and further introduction of non-native invasive species.	Appendix A includes a list of invasive species management plans relevant to the Area of Concern. Wisconsin and Minnesota both have laws in place to prevent the spread of invasive species. WDNR and local partners are currently leading efforts to treat and control phragmites, purple loosestrife, spotted knapweed, buckthorn, and honeysuckle in the AOC.
At least 50% of known degraded aquatic habitat acreage (1,700 acres) is rehabilitated through implementation of projects in accordance with a restoration site. The number of acres restored will be equivalent to the area of a restoration site, since the restoration work will be designed and constructed with an overall goal to provide for fish and wildlife habitat for the entire site as a whole.	The Newton Creek/Hog Island Inlet remediation and restoration contributed over 24 acres aquatic habitat restoration to this goal. The completion of the planned projects discussed above will contribute at least an additional 50 acres to this goal. Much of this acreage will be gained through implementation of Minnesota's habitat restoration projects.
Additional aquatic or hydrologically connected habitat throughout the AOC watersheds has been successfully protected and rehabilitated sufficiently to maintain healthy fish and wildlife populations through implementation of projects at prioritized restoration sites.	Wisconsin has successfully protected 17,648 acres and restored over 345 acres of hydrologically connected habitat. The completion of the planned projects described above will result in the restoration of an additional approximately 488 acres of hydrologically connected habitat.

Conclusions

Much work has been completed or is in progress to restore fish and wildlife habitat and populations in the St. Louis River AOC since it was listed in 1987. Wisconsin actions include protection of 17,648 acres of habitat in the Area of Concern including Clough Island, St. Louis River and Red River Streambank Protection Area, Wisconsin Point, and Superior Municipal Forest; and restoration of over 385 acres of aquatic and hydrologically-connected habitat. A major sediment clean-up of Newton Creek and the Hog Island Inlet funded by Great Lakes Legacy Act removed 60,000 tons of contaminated sediment, and subsequent habitat restoration efforts have improved aquatic habitat, emergent wetlands, vegetative buffers, and upland habitats around Newton Creek and Hog Island. Additional habitat restoration efforts have included wetland restoration in Allouez Bay; conifer restoration and invasive species control on Clough Island; and invasive species control for phragmites, purple loosestrife, invasive cattails, and common buckthorn throughout the estuary.

The RAP contains the priority management actions for Wisconsin to complete in order to remove the Degraded Fish and Wildlife Populations BUI and the Loss of Fish and Wildlife BUI. This list includes seven assessment or planning projects, two documentation projects, and seven habitat restoration projects to be implemented in Wisconsin between now and the AOC delisting goal of 2025. Of these 16 projects, 15 are in progress, and just one has yet to be started. One assessment project (2.04 Semi-Aquatic Mammal Surveys) was funded in 2014 and is in progress, three assessment projects are in progress with existing funding or operational support (2.01 Bird inventory and Assessment, 2.02 Fish Population Monitoring, and 2.03 Ruffe Assessment), and a proposal for one assessment project (9.13 Nemadji River Watershed Habitat Assessment) was submitted to EPA for funding in 2015. One habitat restoration project was funded in 2014 and will be implemented in 2015 (9.11 Allouez Bay Wild Rice Restoration), and two projects are in a feasibility assessment (2.05 Piping Plover Habitat/Beach Nourishment and 9.14 Pickle Pond). Initial planning has been initiated for three other remediation or restoration projects (9.12 Crawford Creek Habitat Restoration, 9.15 Wisconsin Point Dune Restoration, and 9.17 Fish Passage Culverts). Evaluation and planning for project 9.16 Hog Island will commence after review of results of project 2.01, the Bird Inventory and Assessment. Two documentation projects will be complete in 2015 (9.18 Wisconsin Habitat Protection & Rehabilitation, and 9.20 Document actions taken to control invasive species). One planning project will be completed in 2014 (project 9.21 Wild Rice Implementation Plan), and one planning project has been initiated (9.19 St. Louis River Streambank Protection Area).

Significant progress has been made towards meeting removal targets for the Degraded Fish and Wildlife Habitat BUI. Although formal documentation is still needed, targets are currently being met for walleye, muskellunge, common tern, great blue heron, bald eagle, and invasives. Lake sturgeon populations are rebounding since stocking efforts ceased in 2000. Assessments are currently in progress to determine if targets are being met for wetland bird species, and semi-aquatic mammals.

Significant progress has also been made towards removal targets for the Loss of Fish and Wildlife BUI. One contaminated sediment site has been remediated in Wisconsin, with three additional sites in planning stages and additional sediment characterization needed. Programs and plans are in place to control and discourage the spread of invasive species. Wisconsin has focused on land protection and restoration of hydrologically connected habitat, with 17,648 acres protected and over 345 acres restored since AOC listing, including at least 25 acres of aquatic habitat restored. Planned future restoration efforts will result in at least 50 additional acres of aquatic habitat restoration and 488 additional acres of hydrologically connected habitat restoration.

References

Dindorf C. and Fortin, C. (2005) Purple Loosestrife Biological Control on the Pokegama River. Final Report Prepared for City of Superior, Wisconsin. Prepared by Carolyn Dindorf, Connie Fortin, Fortin Consulting, Inc. October 2005.

Grigorovich, I. A., Kelly, J. R., Darling, J. A., & West, C. W. (2008). The quagga mussel invades the Lake Superior basin. *Journal of Great Lakes Research*, *34*(2), 342-350.

Hlina P., Anderson D., and Beaster K. (2013) Clough Island Invasive Plant Final Report. Prepared for Douglas County by Leaning Pine Natives, Paul Hlina, Derek Anderson, Kelly Beaster.

Hoffman J. C., Kelly J. R., Trebitz A. S., Peterson G. S., West C. W. (2011). Effort and potential efficiencies for aquatic non-native species early detection. *Canadian Journal of Fisheries and Aquatic Sciences* 68, 2064-2079.

LimnoTech (2014). Pickle Pond Restoration – Phase I: Baseline Characterization and Restoration Alternatives

Minnesota Pollution Control Agency and Wisconsin Department of Natural Resources (2008). Final Delisting Targets.

Minnesota Pollution Control Agency (2013). St. Louis River Area of Concern: Implementation Framework: Roadmap to Delisting (Remedial Action Plan Update). July 15, 2013. http://www.pca.state.mn.us/index.php/view-document.html?gid=19677

Northwest Regional Planning Commission (2013). Wisconsin Point Area Management Plan. August 2012. http://www.nwrpc.com/DocumentCenter/View/142

Peterson, G. S., Hoffman, J. C., Trebitz, A. S., West, C. W., & Kelly, J. R. (2011). Establishment patterns of non-native fishes: Lessons from the Duluth–Superior harbor and lower St. Louis River, an invasion-prone Great Lakes coastal ecosystem. *Journal of Great Lakes Research*, *37*(2), 349-358.

SEH, 2007. Construction Documentation and Post-Remediation Monitoring Report, Construction Oversight Services, Newton Creek Interim Remedial Action. WDNR No. 03RRSU. SEH No. A-WIDNR9905.03. Short Elliot Hendrickson, Inc. October, 2007.

SEH, 2008. Final Construction Documentation and Post-Remediation Monitoring Report, Hog Island Inlet Remedial Action. BRRTS# 02-16-000603. SEH No. A-WIDNR9905.06. Short Elliot Hendrickson, Inc. July, 2008.

St. Louis River Citizens Action Committee (SLRCAC). (2002). Lower St. Louis River Habitat Plan. http://www.stlouisriver.org/IAhabitatplan/table%20of%20contents.htm

Staffen R. and O'Connor R. (2014) Rapid Ecological Assessment for the St. Louis River Planning Group. A Rapid Ecological Assessment Focusing on Rare Plants, Selected Rare Animals, and High-quality Natural Communities. June 2014.

Trebitz, A. S., Kelly, J. R., Hoffman, J. C., Peterson, G. S., & West, C. W. (2009). Exploiting habitat and gear patterns for efficient detection of rare and non-native benthos and fish in Great Lakes coastal ecosystems. *Aquat. Invas*, *4*(4), 651-667.

Trebitz, A. S., West, C. W., Hoffman, J. C., Kelly, J. R., Peterson, G. S., & Grigorovich, I. A. (2010). Status of non-indigenous benthic invertebrates in the Duluth–Superior Harbor and the role of sampling methods in their detection. *Journal of Great Lakes Research*, *36*(4), 747-756.

Tudor K. D., Gunderson J. L., Jensen D. A., Schooler S. S. In Prep. Where Have All the Crayfish Gone? Change in Occurrence of Invasive and Native Crayfish in the St. Louis River Estuary Over 14 Years.

Appendix A: Invasive Species Plans

Area-Specific Invasive Species Plans

The following plans are local, state, and federal invasive species plans that were completed to guide management, control, and eradication of invasive species within the St. Louis River estuary region. These references may help provide justification when seeking funding for invasive species control activities.

- *Douglas County Aquatic Invasive Species Strategic Plan*
  This plan was completed in December 2009 and contains Douglas County, Wisconsin's AIS strategy to control/eradicate existing AIS, prevent existing AIS from spreading, effectively communicate with users, protect water resources, and establish sustainable funding for AIS work in the County.
  - http://www.douglascountywi.org/DocumentCenter/Home/View/1175
- *Lake Superior Aquatic Invasive Species Complete Prevention Plan*
  This plan, completed in September 2010, identifies recommended actions that need to be newly implemented, in addition to existing efforts, to prevent new aquatic invasive species from entering and becoming established in the Lake Superior ecosystem, based on sound science and extensive technical, agency, and stakeholder review. The plan is relevant to all states and nations bordering Lake Superior.
  - http://epa.gov/greatlakes/lakesuperior/LakeSuperior_AIS_Sept2010DRAFT.pdf
- *GLIFWC Invasive Species Program 2013*
  This report summarizes the activities undertaken by GLIFWC staff during 2013 to address the spread of invasive species in the ceded territories. GLIFWC's invasive species program consists of education/outreach, inventory and monitoring, control, and evaluation. Each of these components is coordinated with local cooperators to maximize the efficient use of limited resources. GLIFWC has a draft Invasive Species Plan which should be approved in winter, 2014-2015.
  - http://data.glifwc.org/Reports/Administrative%20Report%2014-04.pdf
- *A Statewide Strategic Plan for Invasive Species* (Wisconsin)
  This plan was developed by the Wisconsin Invasive Species Council to bring together state, federal, and local partners to share the task of preventing and managing invasive species in Wisconsin. In order to minimize the environmental and financial harm of invasive species, protect human health, and protect natural resources, this plan presents cost-effective, balanced approaches to minimize the introduction of invasive species into Wisconsin and to carefully manage the species already established in the state. The plan was approved in February 2013.
  - http://invasivespecies.wi.gov/docview.asp?docid=24479
- *Wisconsin's Comprehensive Management Plan to Prevent Further Introductions and Control Existing Populations of Aquatic Invasive Species*
  This plan was completed in 2003 by WDNR in cooperation with University of Wisconsin-Sea Grant and GLIFWC with stakeholder review. This plan describes the approaches that must be followed to protect indigenous species and the socio-economic benefits that are threatened by aquatic invasive species. The document serves as a guide in developing coordinated responses to AIS problems. The plan focuses on prevention but also suggests control, mitigation, and elimination strategies, and will provide the framework for a comprehensive state program to combat problems caused by AIS.
  - http://dnr.wi.gov/topic/Invasives/documents/compstateansplanfinal0903.pdf

  Wisconsin Invasive Species Report – Fiscal Year 2012 - 2013.
  This interim report details the state's progress in controlling invasive species, current expenditures, and future needs of the program.
  - http://dnr.wi.gov/topic/Invasives/documents/WI-AISReport2012.pdf
- Wisconsin's Rapid Response Framework for Aquatic Invasive Species
  This document was created in December 2012 and is intended to serve as an aid to resource managers who are responsible for responding to newly discovered aquatic invasive species (AIS). It has been prepared not just for

government agency staff but also for anyone who has responsibility for managing the waters of the State of Wisconsin.
    - http://dnr.wi.gov/lakes/invasives/WIAISRapidResponseFramework2012.pdf
- *A Minnesota State Management Plan For Invasive Species*
  This plan, completed in October 2009, was developed by a workgroup of the Minnesota Invasive Species Advisory Council with public review and extensive stakeholder review. The plan contains the elements, desired outcomes, strategies, and actions that, if supported and advanced through individual or cooperative actions, will further the effective management of invasive species across all lands, waters, and jurisdictions in the State of Minnesota.
    - http://anstaskforce.gov/State%20Plans/MN/state_invasive_species_plan.pdf
- *National Invasive Species Management Plan*
  Executive Order 13112 required the National Invasive Species Council (NISC) to prepare and issue the first national plan to deal with invasive species. Completed in 2001, the National Invasive Species Management Plan, Meeting the Invasive Species Challenge, served as a comprehensive "blueprint" for federal action on invasive species, and NISC's primary coordination tool. This was the first comprehensive national plan for invasive species action.
    - http://www.invasivespecies.gov/home_documents/2001%20Invasive%20Species%20National%20Management%20Plan.pdf

  The 2008–2012 National Invasive Species Management Plan is the first revision of the 2001 Plan, as mandated by EO 13112. This document directed Federal efforts (including overall strategy and objectives) to prevent, control and minimize invasive species and their impacts from 2008 – 2012.
    - http://www.invasivespecies.gov/home_documents/2008-2012%20National%20Invasive%20Species%20Management%20Plan.pdf
- *Aquatic Nuisance Species Task Force Strategic Plan (2013 – 2017)*
  This plan, approved in May 2012 by the Aquatic Nuisance Species Task Force, outlines goals and objectives focused on prevention, monitoring, and control of AIS as well as increasing public understanding of the problems and impacts associated with invasive species. The Strategic Plan also calls attention to other areas of management including habitat restoration and research. The Strategic Plan establishes eight goals, each with objectives and action items to be completed in the next 5 years.
    - http://www.anstaskforce.gov/Documents/ANSTF%20Strategic%20Plan%202013-2017.pdf
- *U.S. Geological Survey Invasive Species Program Five Year Program Plan 2005 – 2009*
  This plan outlines goals, strategies, and requirements for significantly increasing U.S. Geological Survey (USGS) efforts during the fiscal years 2005 - 2009 to help Department of the Interior (DOI) managers and the nation respond more rapidly and effectively to the growing threats from invasive species in U.S. ecosystems. The plan identifies opportunities to enlist, increase, and redirect the capabilities of USGS biological research centers to integrate with other agencies and organizations to help provide resources to address complex invasive species problems.
    - http://www.usgs.gov/ecosystems/invasive_species/USGSInvasiveSpeciesProgramFiveYearProgramPlanFiscalYears2005-2009.pdf
- *Forest Service National Strategic Framework for Invasive Species Management*
  Although the Area of Concern does not contain Forest Service lands, the Superior National Forest covers a large portion of the Upper St. Louis River Watershed outside of the Area of Concern. Completed in August 2013, the Forest Service National Strategic Framework for Invasive Species Management replaced the National Strategy and Implementation Plan for Invasive Species Management (USDA/Forest Service 2004 – second link below). The new plan prioritizes and guides the prevention, detection, and control of invasive insects, pathogens, plants, wildlife, and fish that threaten our terrestrial and aquatic ecosystems.
    - http://www.fs.fed.us/foresthealth/publications/Framework_for_Invasive_Species_FS-1017.pdf
- *Road Map to 2015: A Strategic Plan for Plant Protection & Quarantine*
  This plan was completed in 2010 by USDA Animal and Plant Health Inspection Service - Plant Protection and Quarantine (PPQ). The plan identifies patterns and trends that impact PPQ's ability to achieve its mission over

the next 5 years, and assesses PPQ's internal capacity to meet these challenges was assessed. The plan sets goals, objectives, and a set of strategies to support the achievement of the Strategic Goals.
    - http://www.aphis.usda.gov/plant_health/downloads/PPQStrategicPlan2015.pdf
- *National Road Map for Integrated Pest Management*
  The National Roadmap for Integrated Pest Management (IPM Roadmap) was completed in October 2013 and identifies strategic directions for IPM research, implementation, and measurement for all pests, in all settings, throughout the nation. This includes pest management for all areas including agricultural, structural, ornamental, turf, museums, public and wildlife health pests, and encompasses terrestrial and aquatic invasive species.
    - http://www.csrees.usda.gov/nea/pest/in_focus/ipm_if_roadmap.html

Associated Plans

The following plans, while not specific to invasive species management, control and eradication, contain guidance on invasive species within the context of their respective goals. These references may help provide justification when seeking funding for invasive species control activities.

- *St. Louis River AOC Implementation Framework: Roadmap to Delisting*, July 2013
  This plan provides the actions necessary for de-listing the St. Louis River Area of Concern. Invasive species concerns were part of the rationale for listing the Degraded Fish and Wildlife Populations BUI and the Loss of Fish and Wildlife Habitat BUI.
    - http://www.pca.state.mn.us/index.php/view-document.html?gid=19677
- *Lower St. Louis River Habitat Plan*, May 2002
  This plan was prepared to facilitate protection of the ecological diversity of the Lower St. Louis River and presents conservation goals for the area. The plan contains recommendations for management of invasive species.
    - http://www.stlouisriver.org/habitatplan/habitatplan.pdf
- *Wisconsin Point Area Management Plan*
  This plan, which covers roughly 2,300 acres along Wisconsin Point and Allouez Bay, was completed in 2012. The purpose of the Plan is to: 1) catalog existing cultural and natural resources; 2) develop a long-range vision for the Wisconsin Point Management Area; 3) propose a range of alternatives that will address management opportunities among the various stakeholders and the public; and 4) identify a preferred management approach and implementation framework. The plan identifies invasive plants and noxious weeds as posing a serious ecological threat to the area, and recommends actions to address the issue.
    - http://www.nwrpc.com/DocumentCenter/View/142
- *St. Louis County, Minnesota Comprehensive Water Management Plan Update, 2010 - 2020*, September, 2010
  This plan presents strategies to address water-related issues in St. Louis County. Invasive species are listed as a special concern, and the plan provides management recommendations. Note that St. Louis County commissioners approved development of a St. Louis County aquatic species management plan in October, 2014.
    - http://www.stlouiscountymn.gov/Portals/0/Library/government/County-Plans-Ordinances/2010-2020-Comprehensive-Water-Management-Plan.pdf
- *Carlton County, Minnesota Comprehensive Local Water Management Plan, 2010 - 2020*, Amended 2014.
  This plan presents strategies to address water-related issues in Carlton County. Under Goal 3, maintain and improve water quality in County lakes, rivers and streams, implementation of measures for controlling the spread of aquatic and terrestrial invasive species, such as monitoring, education and enforcement, is listed as a priority. Note that Carlton County Board of Commissioners approved and adopted Carlton County 2014 Aquatic Invasive Species Program in June, 2014.
    - http://www.co.carlton.mn.us/vertical/Sites/%7B315ADE76-21A3-4241-B977-F94AEE8A7F04%7D/uploads/Carlton_County_Comprehensive_Local_Water_Management_Plan_2010-2020.pdf

- *Pine County, Minnesota Local Water Management Plan, 2010 - 2020*
  This Local Water Management Plan shows the direction in natural resource management the county will proceed in for the next ten years. Exotic species are listed under Priority Concern #2. Natural Resources Conservation, Utilization, and Education.
    - http://www.co.carlton.mn.us/vertical/Sites/%7B315ADE76-21A3-4241-B977-F94AEE8A7F04%7D/uploads/Carlton_County_Comprehensive_Local_Water_Management_Plan_2010-2020.pdf
- *Fond du Lac Resource Management 2008 Integrated Resource Management Plan*, 2008
  This plan contains information about the Band's past and current management activities across all types of natural resources and identifies needs for additional management. The plan identified invasive species as a major concern and cites "Develop and implement an invasive plant monitoring and management plan" as a goal/objective.
    - http://www.stlouiscountymn.gov/Portals/0/Library/government/County-Plans-Ordinances/2010-2020-Comprehensive-Water-Management-Plan.pdf
- *Great Lakes Indian Fish & Wildlife Commission 2010 Strategic Plan*
  This Strategic Plan identifies assessment and management of invasive species as a strategy for natural resource management.
    - http://www.glifwc.org/Reports/GLIFWC%202010%20Strategic%20Plan.pdf
- *Lake Superior Binational Program Lakewide Management Plan (LaMP)*
  The Lakewide Management Plan identifies aquatic nuisance species as currently the greatest threat to the integrity of the Lake Superior ecosystem. The plan includes an assessment of the current conditions, an overview of existing efforts in the basin, and recommendations and needed actions efforts to address the problem. The website below contains the original full LaMP, the executive summary, and biennial updates from 2002 through 2008.
    - http://epa.gov/greatlakes/lakesuperior/index.html
- *Great Lakes Water Quality Agreement between Canada and the United States of America*
  The purpose of this agreement, signed in 1987 and amended in 2012, is to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes. The agreement defines invasive species prevention and control programs as a priority program for implementation. The Area of Concern program was created under this Agreement, listing St. Louis River Area of Concern as one of 43 Areas of Concern.
    - http://www.ec.gc.ca/grandslacs-greatlakes/A1C62826-72BE-40DB-A545-65AD6FCEAE92/1094_Canada-USA%20GLWQA%20_e.pdf
- *Strategic Plan for the Great Lakes Commission*
  This plan is a statement of vision, mission, goals, objectives and strategic actions to guide the work of the Great Lakes Commission. The strategic plan was approved by the Commission in May, 2007. The plan identifies "Healthy and diverse populations of native flora and fauna … protected by preventing the introduction and spread of invasive species" as part of the vision for the region.
    - http://glc.org/files/main/glc-strategicplan-2007.pdf
- *The Great Lakes Commission Work Plan 2012 – 2014*
  This is the follow-up document to the Commission's strategic plan (above). The work plan identifies invasive species as one of six broad program areas.
    - http://glc.org/files/main/2012-2014-GLC-Workplan-FINAL-May2012.pdf
- *Great Lakes Restoration Initiative Action Plan*
  This plan describes how the Great Lakes Restoration Initiative, a $475 million federal funding initiative, will be executed from 2010 to 2014. This plan, completed in February 2010, lists invasive species as one of five major focus areas.
    - http://www.glri.us/pdfs/glri_actionplan.pdf
- *Great Lake Regional Collaboration Strategy*
  This strategy intends to build upon the extensive regional efforts to date to work together toward a common goal of restoring and protecting the Great Lakes ecosystem for this and future generations. It includes the

highest priority recommendations for action focused on the steps that should be taken immediately to proceed with restoration to achieve the greatest results. Immediate action to stop the introduction of aquatic invasive species is listed as a high priority.
    - http://glrc.us/strategy.html
- *NOAA National Sea Grant College Program Strategic Plan 2014 - 2017*
  This four-year strategic plan establishes a prioritized national direction to guide the Sea Grant network in addressing critical national needs at local, state and regional scales in ocean, coastal and Great Lakes environments. One of Sea Grant's focus areas is Healthy Coastal Ecosystems, including those threatened by invasive species.
    - http://seagrant.noaa.gov/Portals/0/Documents/global_docs/strategic_plan/Strategic_Plan_withphotos_12_2013.pdf
- *U.S. Geological Survey National Wetlands Research Center Strategic Plan: 2010 – 2015*
  The mission of the National Wetlands Research Center (NWRC) is to develop and disseminate scientific information needed for understanding the ecology and values of wetlands and for managing and restoring wetlands, coastal habitats, and associated plant and animal communities throughout our world. This plan outlines the NWRC's goals, thematic areas, geographic areas, guiding principles, capabilities, vision, and scientific agenda. One of the components of the NWRC's scientific agenda is to address invasive species problems.
    - http://www.nwrc.usgs.gov/about/5-year-plan.htm

Additional Resources

- *Hazard Analysis-Critical Control Point*
  HACCP Planning is an international standard (ASTM E2590 - 09) for reducing or eliminating the spread of unwanted species during specific processes or practices or in materials or products.
    - http://www.habitat.noaa.gov/pdf/HACCP%20Training%20Manual.pdf
- *Overview of EPA Authorities for Natural Resource Managers Developing Aquatic Invasive Species Rapid Response and Management Plans*
  The U.S. Environmental Protection Agency (EPA) has developed this document as a tool for state, tribal, regional, and local natural resource managers who are preparing or considering the preparation of rapid response action and/or management plans for aquatic invasive species (AIS). The document provides an overview of EPA authorities that might apply to state or local AIS rapid response and control actions.
    - http://water.epa.gov/type/oceb/habitat/upload/2007_6_26_invasive_species_invasives_management_AquaticInvasiveSpecies-final.pdf