St. Louis River Area of Concern

2014 Remedial Action Plan Update

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Remedial Action Plan Update
for the
St. Louis River Area of Concern

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Disclaimer

The Great Lakes Water Quality Agreement is a non-regulatory agreement between the U.S. and Canada, and criteria developed under its auspices are non-regulatory. The actions identified in this document are designed to meet beneficial use impairment (BUI) delisting targets and are not subject to enforcement or regulatory actions.

The management actions identified in Remedial Action Plans (RAPs) are a prioritized list of projects that are directly related to BUI removal as outlined by the removal strategies; however the list of management actions is adaptive and changes are outlined in the RAP update. Cost estimates provided in the management action tables were generated by different parties, with varying levels of detail and available information, using different assumptions. Therefore the costs must be taken as having an inherent level of uncertainty and are for planning purposes only.

Executive Summary

The St. Louis River Area of Concern (AOC) made substantial progress toward delisting with the development of the 2013 Remedial Action Plan (RAP; MPCA and WDNR, 2013a). The 2013 RAP outlined a removal strategy and priority management actions for each of the nine beneficial use impairments (BUIs) and the goal of delisting the AOC by 2025. This 2014 RAP update is a bi-state effort to show the progress made since the 2013 RAP. This document describes the status and changes made to the priority management actions and updated timelines for project completion and BUI removal.

Since the 2013 RAP, the RAP implementing agencies (Minnesota Pollution Control Agency (MPCA) and Wisconsin Department of Natural Resources (WDNR)) have set a goal of completing major remediation and restoration management actions by the year 2020. This timeline has been accelerated to take advantage of resources available and momentum at the national level to delist AOCs. Monitoring and assessment of projects and removal targets may take place after 2020. The goal of delisting the AOC will remain at 2025.

The St. Louis River AOC, 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. 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 Stage I Remedial Action Plan (MPCA and WDNR, 1992) determined that nine BUIs existed 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

The BUI removal targets were established by stakeholders in 2008 and accepted by the RAP implementing agencies. In 2011, the BUI blueprint teams and Scientific Advisory Group began to develop the BUI blueprints (a comprehensive overview and history of each BUI). The 2008 targets were assessed during the development of the BUI blueprints and 2013 RAP. During this process, BUI removal targets were clarified where needed and measurable indicators for BUI removal have been defined or added to better interpret the targets. These target clarifications are summarized in this 2014 RAP update, but not all information has been repeated from previous documents. A comprehensive version of the BUI removal strategies and maps of projects is included in the 2013 RAP (MPCA and WDNR, 2013a). The BUI blueprints are attached as an appendix to the 2013 RAP.

The 2014 RAP update includes the following information for each BUI:

- BUI Removal Target and Status
- Rationale for Listing
- Summary of key remedial actions since the 2013 RAP, current status and next steps
- Issues affecting progress of the BUI
- Stakeholder Engagement

Stakeholder engagement has been and will continue to be a priority in the St. Louis River AOC. It is not described for each BUI unless a specific action or need has been identified. An extensive stakeholder process was undertaken during the BUI Blueprint and 2013 RAP development and is detailed in the 2013 RAP. Stakeholder outreach for the rollout of the 2013 RAP was coordinated with the assistance of the St. Louis River Alliance (SLRA). Over the past year, the 2013 RAP has been presented to city and county governments, the tribe, and the business community by AOC coordinators and SLRA staff. It is the intention of the AOC staff to continue to reach out to these organizations on a yearly basis. A yearly AOC update is also part of the St. Louis River Estuary Summit where AOC staff have the opportunity to reach citizens, resource managers, and university and research staff.

A stakeholder input opportunity is now a part of the annual RAP update. The list of stakeholders compiled during development of the 2013 RAP will be kept up to date by AOC staff as the primary list of partners, agencies, and citizens. Stakeholders will be notified of the yearly RAP update and given a chance to review the draft and provide input.

Anticipated BUI removal dates are listed in the table below. The Degradation of Aesthetics BUI was removed in 2014, and two other dates have been changed since the 2013 RAP to accommodate management action timelines. Excessive Loading of Sediment and Nutrients BUI has been moved from 2016 to 2017 and Degraded Fish and Wildlife Populations BUI has been moved from 2016 to 2018.

Table 1: Timeline of Anticipated Removal of Beneficial Use Impairments in the St Louis River AOC.

BUI Removal Timeline	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Degradation of Aesthetics	●											
Fish Tumors and Deformities			●									
Excessive Loading of Sediment & Nutrients				●								
Degraded Fish and Wildlife Populations					●							
Beach Closings and Body Contact Restrictions					●							
Degradation of Benthos									●			
Restrictions on Dredging										●		
Fish Consumption Advisories												●
Loss of Fish and Wildlife Habitat												●

Table of Contents

Executive Summary ii
Table of Contents iv
Definitions vi
Purpose Statement 1
Introduction 2
Beneficial Use Impairments Updates 5
Fish Consumption Advisories 5
Degraded Fish and Wildlife Populations 8
Fish Tumors and Deformities 11
Degradation of Benthos 13
Restrictions on Dredging 15
Excessive Loading of Sediment and Nutrients 21
Beach Closings and Body Contact Restrictions 26
Degradation of Aesthetics 29
Loss of Fish and Wildlife Habitat 31
References 38
Appendices 40

List of Figures

Figure 1 The boundaries of the St. Louis River Area of Concern 2
Figure 2 Remediation and characterization sites in the St. Louis River Area of Concern..... 15
Figure 3 Aquatic habitat restoration sites in the St. Louis River Area of Concern..... 32
Figure 4 Hydrologically connected restoration sites in the St. Louis River Area of Concern 33

List of Tables

Table 1 Timeline of Anticipated Removal of BUIs in the St. Louis River AOC..... iii
Table 2 St. Louis River Area of Concern Beneficial Use Impairments Status Summary 4
Table 3 Sediment Assessment Area Color Designations 16

List of Appendices

Appendix A Focus areas for WI St. Louis River AOC Staff in 2015 40

List of Acronyms

AIS	Aquatic invasive species
AOC	Area of Concern
BUI	Beneficial use impairment
CPUE	Catch per unit effort
FDL	Fond du Lac Band of Lake Superior Chippewa
GLRI	Great Lakes Restoration Initiative
HUC	Hydrologic Unit Code
IJC	International Joint Commission
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MS4	Municipal separate storm sewer system
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated biphenyl
RAP	Remedial Action Plan
R2R	Remediation to restoration
SAA	Sediment Assessment Areas
SLRA	St. Louis River Alliance
SOGL	Sustain Our Great Lakes (grant funding from the National Fish and Wildlife Foundation)
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WDNR	Wisconsin Department of Natural Resources
WLSSD	Western Lake Superior Sanitary District
WWTP	Wastewater treatment plant

Definitions

Area of Concern (AOC)

Defined by Annex 1 of the 2012 U.S.-Canada Great Lakes Water Quality Agreement as amended:

> Geographic area where significant impairment of beneficial uses has occurred as a result of human activities at the local level.

These areas are the "most contaminated" areas of the Great Lakes, and the goal of the AOC program is to bring these areas to a point at which they are not environmentally degraded more than other comparable areas of the Great Lakes. When that point has been reached, the AOC can be removed from the list of AOCs in the Annex, or "delisted."

Beneficial Use Impairment (BUI)

A "beneficial use" is any way that a water body can improve the quality of life for humans or for fish and wildlife (for example, providing fish that are safe to eat). If the beneficial use is unavailable due to environmental problems (for example if it is unsafe to eat the fish because of contamination) then that use is impaired. The International Joint Commission provided a list of 14 possible beneficial use impairments in the 1987 Great Lakes Water Quality Agreement amendment.

Delisting Target

Specific goals and objectives established for beneficial use impairments, with measurable indicators to track progress and determine when delisting can occur. Targets should be locally derived.

Remedial Action Plan (RAP)

According to the 2012 U.S.-Canada Great Lakes Water Quality Agreement as amended, a RAP is a document that provides "a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in Areas of Concern…" RAPs are required to be submitted to the International Joint Commission and periodically updated and implemented for each AOC. Stages in RAP development (i.e., Stages I, II, and III) have been consolidated into one inclusive RAP process.

Updating the Remedial Action Plan- for the St. Louis River AOC, an update to the RAP will be led by MPCA and WDNR yearly. The 2013 RAP will be amended to incorporate BUI progress and changes that may occur. The RAP will be labeled with the year it has been updated and will be posted online.

St. Louis River Alliance (SLRA)

St. Louis River Alliance, originating as the St. Louis River Citizen Advisory Committee, incorporating as a 501(c)3 in 1996, and finally becoming the Alliance in 2009.

Purpose Statement

The purpose of this document is to serve as a Remedial Action Plan update. Remedial Action Plans (RAPs) are required by Annex 1 of the Great Lakes Water Quality Protocol of 2012. The 2012 Protocol indicates that RAPs must include the following elements:

1. Identification of beneficial use impairments and causes;

2. Criteria for the restoration of beneficial uses that take into account local conditions and established in consultation with the local community;

3. Remedial measures to be taken, including identification of entities responsible for implementing these measures;

4. A summary of the implementation of remedial measures taken and the status of the beneficial use; and

5. A description of surveillance and monitoring processes to track the effectiveness of remedial measures and confirm restoration of beneficial uses.

This RAP update is a bi-state document that has been produced by the RAP implementing agencies (Wisconsin Department of Natural Resources and Minnesota Pollution Control Agency) with input from Area of Concern stakeholders to document status and progress of BUI removal. It is also intended to assist in providing direction in the short-term for overall statewide Area of Concern coordination in Wisconsin. It builds on the 2013 RAP and is intended to be a concise summary of beneficial use impairment status and specific actions that will be important for reaching the delisting targets. Not all information contained in previous RAPs has been repeated in this document. “Actions or Management Actions” may include on-the-ground restoration projects, monitoring and assessment projects, and stakeholder engagement processes.

Introduction

The St. Louis River Area of Concern (AOC) is the only AOC in Minnesota and one of five AOCs in Wisconsin. The geographic, geological, hydrologic, and industrial historical contexts of the St. Louis River AOC are described in detail in the Stage I RAP (MPCA and WDNR, 1992), Stage II RAP (MPCA and WDNR, 1995) and the Lower St. Louis River Habitat Plan (SLRCAC, 2002).

Most of the actions included in this RAP update focus on the St. Louis River below Fond du Lac Dam, Crawford Creek, and the Nemadji River watershed (Figure 1), as they represent those portions of the AOC most impacted by historical actions. The AOC boundary is described as:

> 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 that portion of the watershed; the Nemadji River watershed; and the western portion of Lake Superior defined on its eastern edge by a line drawn from the eastern HUC 12 Dutchman Creek watershed boundary in Wisconsin where it intersects the Lake Superior shoreline north to where the eastern HUC 12 Talmadge Creek watershed boundary in Minnesota intersects with the Lake Superior shoreline north to the intersection of the Cloquet River HUC 8 (Figure 1).

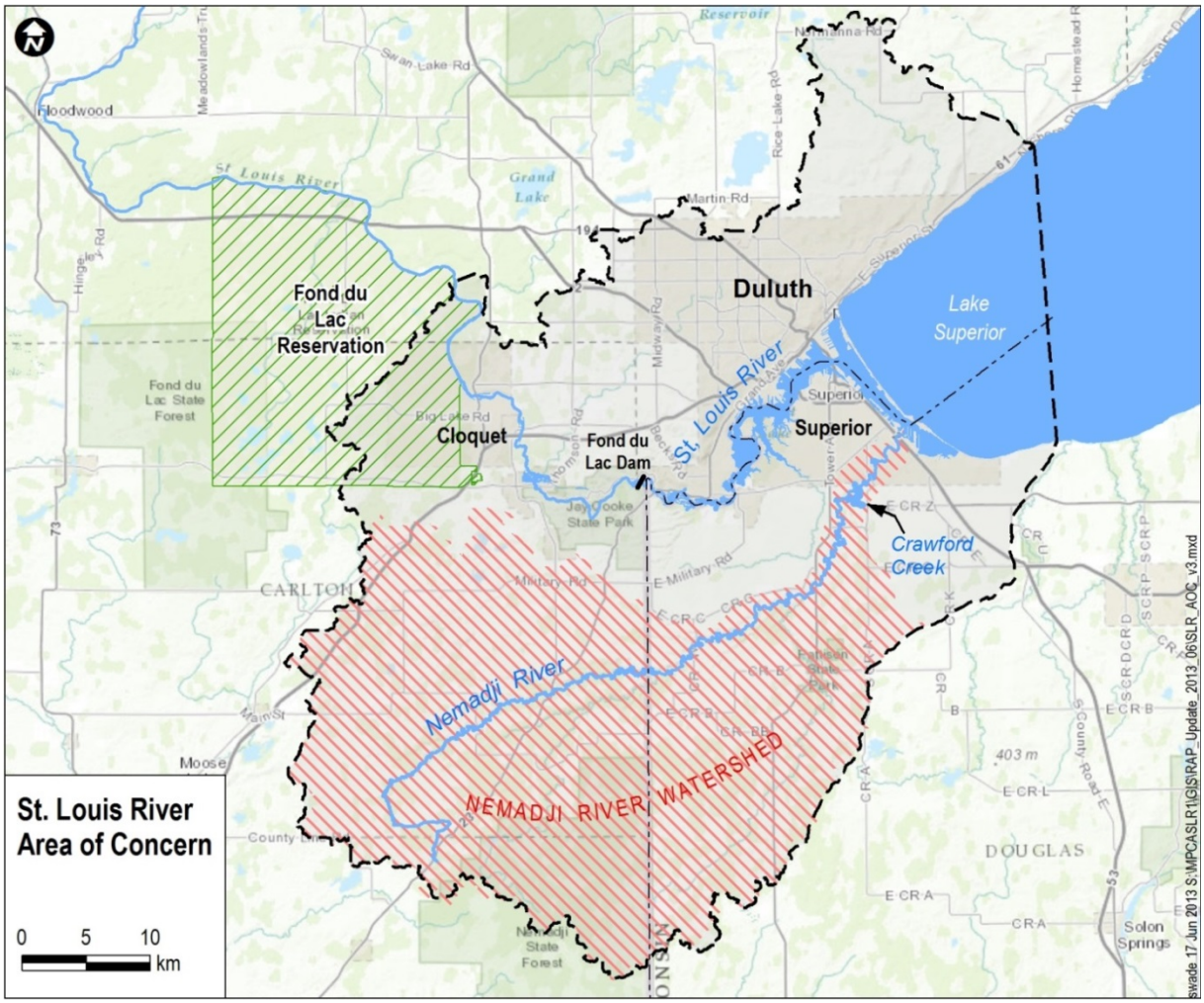

Figure 1: The boundaries of the St. Louis River Area of Concern.

The majority of the beneficial use impairments (BUIs) for the St. Louis River AOC are related to habitat loss from extensive filling of wetlands, dredging of shallow aquatic habitat, and inputs of harmful chemicals that contaminated the sediments and water in the estuary. Since 1861, approximately 3,400 acres of wetlands have been lost in the estuary through a combination of dredging and filling. This includes 1,700 acres of shallow, open-water aquatic habitat in St. Louis Bay and Superior Bay that was converted to deep shipping channels (Hollenhorst et al., 2013).

There is no clear documentation on how the various constituent units of the Duluth-Superior area handled their solid and liquid wastes prior to the 1970s and it has been established that a number of industries discharged directly and indirectly into the river or bay. Consequently, a number of sites within the AOC contain legacy pollutants from historical contamination with chemicals or toxic waste products. Several of these contaminated sites have been or are currently being addressed by state or federal regulatory and resource management programs. Priorities for delisting the AOC are continued remediation of contaminated sediments and restoration of aquatic and hydrologically connected habitat.

Table 2: St. Louis River Area of Concern Beneficial Use Impairments Status Summary

Beneficial Use Impairment	**Beneficial Use Impairment Status**	**Summary of Status and Next Steps**
Fish Consumption Advisories	Impaired	WI and MN regularly sample fish tissue and issue advisories. Compile current and historic fish tissue data and compare to surrounding areas. Preliminary comparison of data from northeast MN to the St. Louis River was completed; next step is to utilize data from WI as well.
Degraded Fish and Wildlife Populations	Impaired	Fish populations have seen improvements including the sturgeon. The first 7-year-old sturgeon was seen in the 2014 summer index survey. Projects are underway assessing semi-aquatic mammal and avian populations. Feasibility and design of the piping plover habitat beach nourishment project are underway.
Fish Tumors and Deformities	Impaired	200 white suckers were sampled in both 2011 and 2013. A third round of sampling will occur in the spring of 2015; anticipating 250 white suckers collected and analyzed. The applicability of Mountain Bay, Ontario, as a reference site has been assessed against the establishment of a more local reference site. It was concluded that white sucker migrating from Lake Superior would be assessed as the reference population (November 2014 AOC staff and partner meeting). Fish from the western end of Lake Superior would represent a reference site that is regional and local, has acceptable sediment quality, and has a fish tumor incidence rate that resembles a least impacted site. The method of determining the reference population from the datasets will use a logistic regression model factoring habitat usage, sex and age.
Degradation of Benthos	Impaired	Several contaminated sites have been remediated, additional remediation and habitat restoration is on-going. Large scale sediment assessment has been completed on the MN side of the river, with some additional characterization needed in WI. Reference locations were sampled for benthic community in the St. Louis River in 2012. Remaining contaminated sediments and habitat restoration must be addressed prior to removing this BUI.
Restrictions on Dredging	Impaired	Several contaminated sites have been remediated and restored, and several are underway. Much of the estuary has been sampled for contaminants, but data gaps still exist on the WI side. The next steps are to sufficiently characterize the red-gray and data gap portions of WI, update the sediment database with recent sediment data, and develop automated tools for data inclusion.
Excessive Loading of Nutrients and Sediments	Impaired	Major wastewater and stormwater improvements have been the result of upgrades to the Western Lake Superior Sanitary District and the Cities of Superior and Duluth. The next action needed is to review results from water quality data and develop water quality targets.
Beach Closings and Body Contact	Impaired	Several contaminated sites have been remediated and now allow recreation. High *E. coli* exceedance rates are causing beach advisories. No swimming sign is still present at US Steel site. Bacterial source tracking project is underway.
Degradation of Aesthetics	Removed	BUI was removed in August of 2014.
Loss of Fish and Wildlife Habitat	Impaired	A target of 1,700 acres of aquatic habitat restored has been defined for this BUI. Several projects have been completed and many are in progress. AOC Staff are developing funding proposals for the RAP actions and managing projects in the AOC. Under a Partnership Agreement with the MPCA, the USACE is providing aquatic habitat consulting services (both in-house and contractually) in accordance with the interests of the stakeholders and partners to develop restoration designs at several AOC restoration sites.

FISH CONSUMPTION ADVISORIES

BUI Removal Target and Status

Fish Consumption Advisories (BUI #1)	Status
There are no Area of Concern-specific fish consumption advisories issued for the St. Louis River by the State of Minnesota or the State of Wisconsin. Tissue concentrations of contaminants of concern in representative samples of resident fish are not significantly elevated from regional background samples.	In progress

Additional Target Clarification from the 2013 RAP:

There are no fish consumption advisories (PCBs and Mercury) issued for the St. Louis River AOC concern by the State of Minnesota or the State of Wisconsin that are more stringent than advice given for other waterbodies in the region; **OR** Tissue concentrations of contaminants of concern in representative samples of resident fish are not elevated from regional background samples by a statistically significant amount.

Note: The BUI may be removed on either basis, and a different basis may apply for each contaminant of concern. The current definition of "regional background" (which may be revised based on forthcoming review and analysis of available fish tissue data) is as follows:

- Mercury – lakes and rivers in NW Wisconsin and NE Minnesota
- PCBs - St. Louis River upstream of Cloquet and/or Lake Superior

The target established for removal of this BUI is not intended to include consumption advice that may be established for sustenance fishing by the Fond du Lac Band of Lake Superior Chippewa (FDL) within the St. Louis River.

Rational for Listing

Historically, fish samples taken from the St. Louis River and Lake Superior exceeded standards established by Minnesota and Wisconsin for the unrestricted consumption of sport fish. The two states issue consumption advisories for various population groups based on fish species and size classes. Advisories are collectively issued for the presence of mercury and polychlorinated biphenyls (PCBs). At the time of AOC listing, fish tissue residues of mercury and PCBs exceeded the 0.5 mg/Kg and 0.1 mg/Kg standards established in the 1978 Great Lakes Water Quality Agreement for the protection of aquatic life and fish-consuming birds.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes four management actions needed for BUI removal (see table below). Management actions are underway; however no actions have been completed since the 2013 RAP. A meeting of managers and scientists is anticipated in early 2015 to share data and assign tasks for completion of actions 1.01-1.03. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed.

Projects 1.01 and 1.02 are underway and the next step is to follow-up on project status and come to a consensus with resource managers and scientists on background waterbodies and indicator fish species for comparison to the AOC. The completion date has been moved to 2015.

Project 1.03 is awaiting the determination of candidate waterbodies and indicator fish species. A determination of whether this project can be done through existing agency staff capacity or need to be contracted will be in early 2015. The completion date has been moved to 2016. If this project must be contracted the cost is estimated at $50,000.

A mercury bioavailability study is currently being conducted in the estuary by Nate Johnson, PhD, University of Minnesota-Duluth. The goal of the study, which is funded by the U.S. Army Corps of Engineers (USACE), is to develop a protocol for prioritizing restoration sites in the AOC based on site-specific bioavailability considerations.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
1.01	Evaluate Consumption Advice for Hg and PCBs	Identify candidate waterbodies and indicator fish species for comparison of Hg and PCB consumption advice.	~~2013~~ 2015	Operational Support
1.02	Study of AOC Fish Tissue vs Regional Background	Compare Hg and PCB fish tissue concentrations in the estuary to fish in regional background areas.	~~2013~~ 2015	Operational Support
1.03	Study of AOC Consumption Advice vs. Regional Background	Using information from Project 1.01, compare Hg and PCB consumption advice for the AOC to that of identified candidate waterbodies.	~~2014~~ 2016	$50,000
1.04	Recovery Monitoring of Consumption Advice	Monitor fish consumption advice over time after remediation in AOC.	Ongoing until BUI removal	Operational Support

Issues affecting progress on this BUI

Fish consumption advisories fall within other agency programs and projects as well as the AOC program. The AOC will continue to work with these programs, researchers, and state and tribal health departments to implement the removal strategy and stakeholder outreach and education. The implementing agencies are also pursuing actions through other BUIs that will contribute to the remediation of mercury and PCBs in the AOC.

Actions are underway to determine if consumption advice and fish tissue concentrations in the AOC are comparable to regional background. If consumption advice or fish tissue concentration comparisons indicate that mercury and/or PCB concentrations are elevated in AOC fish, additional actions may be necessary:

- Identify and remediate sites in the AOC with mercury- and PCB-contaminated sediments, incorporating available bioaccumulation research into site selection.
- Determine whether routine fish tissue contaminant monitoring programs are sufficient to evaluate recovery. Consider the necessity of more intensive post-remediation contaminant monitoring to evaluate contaminant trends. Develop a long-term monitoring program as appropriate.

Monitoring fish tissue for project 1.04 is currently happening through routine state and tribal monitoring. This action may require additional monitoring (intervals, species, and sample sizes) as determined through actions 1.01-1.03. A lack of PCB fish tissue data in the AOC and possible background locations has been identified as a gap. This may lead to a funding need in the future.

Stakeholder Engagement

Stakeholder engagement and education will be critical for removal of this BUI. Clearly explaining how the AOC fits into fish consumption advisories and the scientific basis for BUI removal will be important. Coordinating BUI removal with federal, tribal and state entities is a priority.

DEGRADED FISH AND WILDLIFE POPULATIONS

BUI Removal Target and Status

Degraded Fish and Wildlife Populations (BUI #2)	Status
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.	In progress

Additional Target Clarification from the 2013 RAP:

Removal of the Degraded Fish and Wildlife Populations BUI will be justified when it is shown that key native species populations 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 as evidenced by the removal objectives listed below.

Fish: The BUI removal objectives and methods for surveying fish are established in the Minnesota Department of Natural Resources (MDNR) St. Louis River Estuary Fisheries Management Plan (MDNR, 2012) for three indicator fish species (walleye, muskellunge, and sturgeon). The objectives, which must be demonstrated with fish survey data, are as follows:

> **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.
>
> **Muskellunge:** Trap net CPUE is maintained at or above 1.0 per lift in at least 50% of years surveyed since 1997.
>
> **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.

Wildlife: The wildlife species represented in the BUI removal objectives below were selected by AOC resource managers based on their importance for developing consensus among resource managers that wildlife species are no longer limited by physical habitat, food sources, water quality, or contaminated sediments. The removal objectives for target wildlife species (Piping Plover, Common Tern, Great Blue Heron, Bald Eagle, wetland bird species, and semi-aquatic mammals) and invasive species are as follow:

> **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 (management action 2.05) is necessary.
>
> **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.
>
> **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.
>
> **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.

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.

Invasive Species: An analysis of historical data that shows the ruffe is not inhibiting the native fish population is required to remove this BUI.

Semi-Aquatic Mammals: Removal of this BUI is not dependent on specific semi -aquatic mammal population numbers. However, to support development of concurrence among state resource management agencies, a semi-aquatic 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

Rationale for Listing

During the period of severe organic pollution before 1979, fish populations were degraded and fish kills were common. Fish populations have been recovering from that era because of improvements in wastewater treatment. Fish populations were also adversely affected by the proliferation of the ruffe in the early 1990s. The potential impacts on fish population health from toxic substances in the AOC are largely unknown. At the time of AOC listing, loss of physical habitat threatened populations; the loss of wetland habitat and the infestation of the invasive plant purple loosestrife were also believed to contribute to declining fish and wildlife populations. Little population data were available for wildlife, with the exception of colonial nesting birds in the AOC. Populations of the Common Tern and the Piping Plover (threatened and endangered species, respectively) had declined, likely caused by a combination of local and regional factors.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes five management actions needed for BUI removal (see table below). No actions have been completed since the 2013 RAP, but four are underway. Anticipated BUI removal has been moved to 2018 to allow for completion of piping plover habitat project 2.05. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed.

Bird inventory and assessment project 2.01 is contracted and underway and the avian monitoring has been funded through an ecological monitoring project at restoration sites. The project completion date has been moved to 2016 to allow for completion of avian monitoring and a comparison with historical data. Additional funding may be needed to contract analysis of historical bird data in the estuary.

Data collected from the nesting colony of common tern on Interstate Island indicates that the population target established for BUI removal is being met. Formal documentation of this data is needed.

Routine fish population monitoring and reporting will continue through the capacity of MDNR and Wisconsin Department of Natural Resources (WDNR) fisheries programs. These monitoring data show that walleye and muskellunge population targets have been met. Formal documentation is needed to show that AOC population targets have been met for walleye and muskellunge. Routine monitoring of fish populations will continue to assess lake sturgeon as part of project 2.02. Completion of this management action will depend on recovery of the lake sturgeon population. Enhancement of lake sturgeon and walleye spawning habitat is part of management action 9.10, Chambers Grove Park restoration.

Ruffe population data in the St. Louis River estuary have been collected for many years. Long term data from annual USFWS surveys indicate ruffe populations have declined and are of little impact to native fish populations. Project 2.03 is

underway and USEPA and USFWS personnel are in the process of formally interpreting these data and documenting the status of the ruffe in relation to native fish populations in the estuary. The completion date has been moved to 2015.

An estuary-wide semi-aquatic mammal survey has been funded and is underway as management action 2.04. The project is being contracted by WDNR with University of Wisconsin. Completion date has been moved to 2016 to complete the project. Field observations will be collected through early 2016 with data interpretation and reporting completed by June, 2016.

Beach nourishment project 2.05 is underway and a feasibility study will be conducted under the Section 204 program with the USACE. A determination of federal interest (DFI) is underway and the feasibility study is anticipated to begin in early 2015. The DFI is considering five design alternatives that range from $600,000 to $3.3 million to implement. WDNR is the project sponsor for the feasibility study portion of the project, and the project will be implemented on Douglas County land. The project completion date has been moved to 2018 to allow for implementation. Funding for implementation will be needed in 2016.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
2.01	Bird Inventory and Assessment	Conduct an estuary-wide bird inventory for target species to be combined with existing inventory data available. Complete an AOC-wide assessment of bird population status using the combined dataset.	~~2014~~ 2016	~~$135,000~~ ($39,000 Funded)
2.02	Fish Population Monitoring	Continue regular MDNR and WDNR fish population monitoring and evaluate to track current status of target fish species against the BUI removal objectives.	Yearly	Operational support
2.03	Ruffe Assessment	Document ruffe populations in relation to native fish populations within the estuary.	~~2014~~ 2015	Operational support
2.04	Semi-Aquatic Mammal Survey	Conduct an estuary-wide semi-aquatic mammal survey.	~~2014~~ 2016	$311,200 (Funded)
2.05	Piping Plover Habitat / Beach Nourishment	Increase available nesting habitat within area designated critical habitat through beneficial use of clean dredge material.	~~2016~~ 2018	$600,000-$3,300,000

Issues affecting progress on this BUI

The anticipated BUI removal has been moved to 2018 to allow for implementation of project 2.05. Funding for implementation of the beach nourishment project will need to be secured by 2016 for this timeline.

This BUI relies on recovery of fish and wildlife populations to meet the established population targets. Lake sturgeon populations that meet the objectives above must be documented for two index periods. If the population targets are not being met, BUI removal may be delayed.

FISH TUMORS AND OTHER DEFORMITIES

BUI Removal Target and Status

Fish Tumors and Other Deformities (BUI #3)	Status
Incidence rates of contaminant-related internal and external tumors and deformities in resident benthic fish species, including neoplastic or pre-neoplastic liver tumors, do not exceed incidence rates from unimpaired areas elsewhere in the Great Lakes Basin.	In progress

Additional Target Clarification from the 2013 RAP:

Removal of the Fish Tumors and Other Deformities BUI will be justified when the liver tumor incidence rates in the AOC, as seen in three consecutive samplings of at least 200 white suckers, are statistically similar to, less than, or trending towards the reference site(s) in a six-year period. Comparisons will be made using the variation of tumor incidence rates observed in the reference site(s).

Rational for Listing

Observations at the time of AOC listing suggested that fish tumors and deformities represented an impaired use in the St. Louis River estuary. However, no studies documenting the incidence rates of tumors in fish were available at the time.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes three actions needed for BUI removal (see table below). No actions have been completed since the 2013 RAP, but all of the actions are progressing. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed.

Management action 3.01 is underway and funded. The last of three rounds of sampling white suckers for external and liver tumors and deformities will be conducted in the spring of 2015. It is anticipated that the tumor data will be combined from all three rounds and an incidence rate for the AOC and reference can be determined by 2016.

Management actions 3.02 and 3.03 are underway using data from the 2011 and 2013 white sucker collection. AOC staff and resource managers met with researchers and contractors in November 2014 to look at initial data from 2011 and 2013 and discuss logistics for sampling in 2015. It has been determined that Mountain Bay, Ontario is not an acceptable reference site for the St. Louis River AOC due to landscape differences, smaller sample size, lack of migration information and no tumors found in white sucker during collection in 2006.

An alternative method for determining a reference population has been developed by researchers using white sucker migrating into the estuary from Lake Superior as the reference population. The Lake Superior fish are from a nearby, unimpaired location and are subject to the same regional environmental quality. Lake Superior itself can serve as a reference site because Lake Superior sediments exhibit relatively low levels of contamination (Marvin et al. 2004). The stable isotope method described by Blazer et al. (2014) will be used to determine the Lake Superior reference population as a medium-term (approximately 2 year), diet-based indicator for movement. The stable isotope analysis will be able to provide some insight into where fish have spent their recent life history by indicating the percentage of

diet from the St. Louis River estuary and percentage from Lake Superior. This is necessary because there is no relationship between recent habitat use and where white sucker are captured during the spawning run (Blazer et al. 2014). A logistic regression model factoring habitat usage, sex and age will be used to determine the Lake Superior reference population after the final round of data is collected in 2015. The goal is to be as conservative as possible when comparing river fish to reference fish from the lake and yet be statistically significant for comparison. As a result, an additional 50 white suckers (sample size totaling 250) will be collected in 2015. The 2015 fish will also be analyzed for specific tissue contaminants to confirm contamination exposure risk and gene expression data to look for viral sequences. This will help assess the cause of the low level tumors found thus far. The completion date for projects 3.02 and 3.03 has been moved to 2015 to allow for the third round of sampling and a review of the methods for determining the reference population.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
3.01	Fish Sampling	Conduct representative sampling from the entire AOC.	2015 (3rd round)	$77,000 (funded)
3.02	Reference Site Determination	Evaluate if Mountain Bay is an acceptable reference site for the St. Louis River AOC. If not, establish a more appropriate reference site.	~~2014~~ 2015	Operational Support
3.03	Residency Determination	Determine appropriate methods for fish residency determination (i.e., fish tagging or stable isotopes).	~~2014~~ 2015	Operational Support

Issues affecting progress on this BUI

It is anticipated that the tumor data will be compiled from all three rounds and an incidence rate for the estuary population and Lake Superior reference population can be determined by 2016. If these data indicate that the AOC is not meeting the incidence rate target for BUI removal, the anticipated BUI removal date may be extended until certain contaminated sediment sites have been remediated.

- If AOC tumor incidence rate is within the range of tumor incidence rates of the reference site(s), then sample two more times within six years, with the intent to remove this BUI if acceptable tumor incidence results continue.
- If AOC tumor incidence rate exceeds the range of tumor incidence rates found at the reference site(s), conduct another round of representative sampling in two years. If two rounds of representative sampling fail to meet the reference range, discontinue sampling until at least two remediation projects are conducted at sites contaminated with polycyclic aromatic hydrocarbons (PAHs). Following significant remediation progress, resume fish sampling in two- to three-year intervals. Fish tumor incidence rates similar to the reference site, as evidenced by data from three sampling rounds, will be assessed for justification of BUI removal.

DEGRADATION OF BENTHOS

BUI Removal Target and Status

Degradation of Benthos (BUI #4)	Status
The benthic community in historically degraded areas (e.g., chemically, biologically, or physically degraded areas) of the AOC does not significantly differ from unimpacted sites of comparable characteristics within the AOC. Benthic communities' characteristics including native species richness, diversity, abundance, and functional groups will be considered when comparing sites.	In progress

Additional Target Clarification from the 2013 RAP:

Removal of the Degradation of Benthos BUI will be justified when benthic community survey results associated with the prioritized remediation to restoration (R2R) project sites (approximately 1,700 acres of aquatic habitat restored to meet the Loss of Fish and Wildlife Habitat BUI target) are not significantly different from a St. Louis River AOC reference condition. Appropriate reference conditions will be selected using habitats comparable to each project site. For contaminated sites undergoing remediation, the benthic community will be in recovery once remedial actions are implemented and ecological enhancements complete, if applicable.

Rational for Listing

At the time of AOC listing, reduced benthic macroinvertebrate density and species richness were reported in areas subjected to habitat alteration, physical disturbance, or in close proximity to known contamination. Benthic communities in disturbed areas were dominated by organic tolerant taxa (Oligochaeta, Chironomidae, Diptera) and exhibited an overall lack of species diversity.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes one management action needed for BUI removal (see table below). This management action has not been started, but biological data has been collected at remedial and restoration sites for post-project comparison. A funding need is anticipated for fiscal year 2019 to begin management action 4.01.

The St. Louis River Estuary is fortunate to have an extensive benthic data set collected from 1993 to 2014. Researchers at the EPA Mid-Continent Ecology Division are analyzing a portion of these data (577 ponar samples from 1993-2013) and a draft report – *A Benthos-based Multimetric Index for Use in the St. Louis River Area of Concern*, Draft -August, 2014 (Angradi & Bolgrien, 2014) contains the progress made to develop indicators that can be used to support the development of reference benthos assemblages in the AOC. This data set includes data collected for the *St. Louis River AOC Benthic Community Reference Sites 2012 (*MPCA and WDNR, 2013b).

Removal of this BUI relies on benthic recovery of 1,700 acres from aquatic habitat sites listed under BUI 9: Loss of Fish and Wildlife Habitat. Many of the management actions in BUI 9 are underway.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
4.01	Post-Construction Biological Monitoring	Establish post-construction biological community characteristics evaluation SLR estuary-wide	2022	$600,000
Removal of this BUI relies on benthic recovery of 1,700 acres from aquatic habitat sites listed under BUI 9: Loss of Fish and Wildlife Habitat.				

Issues affecting progress on this BUI

There are no issues affecting this BUI at this time, but if restoration projects contributing to the 1,700 acre goal are delayed it may be necessary to also delay monitoring the recovery of benthic organisms.

RESTRICTIONS ON DREDGING

BUI Removal Target and Status

Restrictions on Dredging (BUI #5)	Status
All contaminated sediment hotspots within the AOC have been identified and implementation actions to remediate contaminated sites have been completed. There are no special handling requirements of material from routine navigational dredging due to contamination originating from controllable sources within the AOC.	Action Needed

Additional Target Clarification from the 2013 RAP:

Removal of the Restrictions on Dredging BUI will be justified when Sediment Assessment Areas (SAAs) designated as "red" are remediated to their respective state's cleanup criteria (Figure 2). Normal navigational dredge material testing, permitting, and certification processes are not considered restrictions. Note: Any dredging activity, whether proposed within or outside these routine navigational corridors, requires state regulatory permits as regulated by each state resource agency.

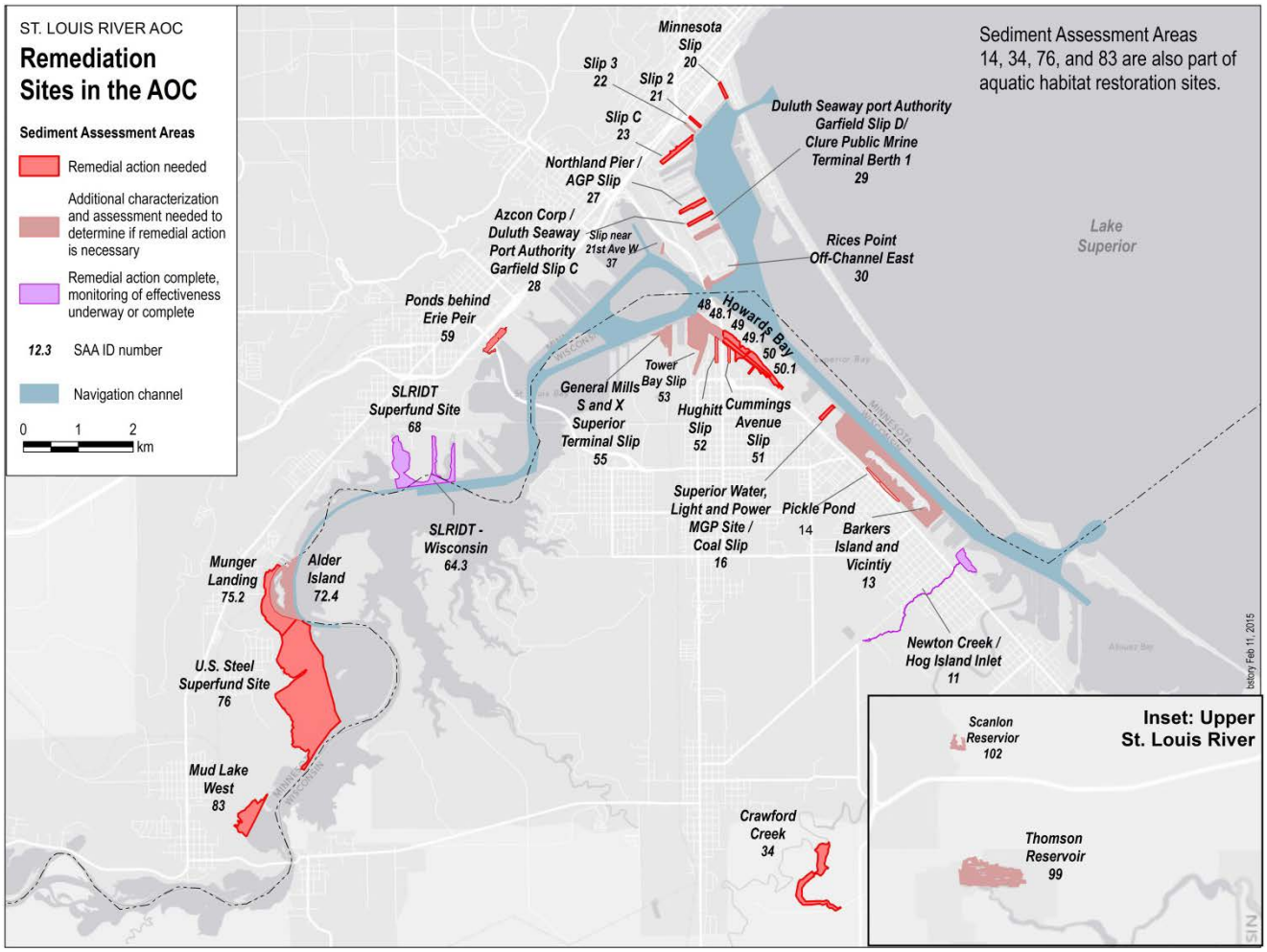

Figure 2: Remediation and characterization sites in the St. Louis River AOC.

The following terms have been defined for the purposes of interpreting the 2008 target:

Restriction on Dredging – additional costs on a dredging project due to the levels of contaminants in the sediment. Contaminant levels could impact the method of dredging (e.g. hydraulic or environmental bucket vs. clam shell), depth of dredging, best management practices, or disposal options (e.g. landfill vs. beneficial use). Note: Restrictions on in-water placement of dredge material based on contaminant levels should not be considered a restriction under this BUI; only land based disposal/reuse options may contribute to restrictions.

Sediment Assessment Areas (SAAs) - The AOC was divided into SAAs to establish a common framework for assessing and displaying sediment contaminant data. Each SAA was given an individual number and unique name. SAAs are categorized by color (Table 3). AOC remediation and restoration sites that are depicted on maps are color coded based on the remedial designation of SAAs.

Table 3: Sediment Assessment Area Color Designations

SAA Remedial Designation	Definition
Purple	Remedial action complete, monitoring of effectiveness underway or complete.
Red	Remedial action needed.
Red-gray	Additional characterization and assessment needed to determine if remedial action is necessary.
Yellow	Remediation generally not warranted, but management actions must consider the presence of contaminants, especially bioaccumulative contaminants.
Green	No known contamination. No remedial actions planned.

Hotspots - sediment assessment areas where sediment data have shown that contamination poses a human health or ecological risk at a level that requires management action as determined through review by Minnesota Pollution Control Agency (MPCA) or WDNR. SAAs designated “red” are considered hotspots.

Navigation - refers to all movements of boats (recreation and commercial) and is not restricted to the federal navigation channel.

Dredge Alternatives Plan for remediated sites includes:

- Restrictions that must remain in place to protect human health and the environment
- Restrictions that must remain in place due to Superfund or Resource Conservation and Recovery Act (RCRA) requirements that are based upon state and federal law
- Priority areas for navigational use
- Priority areas where dredging is needed for other purposes (i.e. utilities)
- Costs associated with removing dredging restrictions in priority areas

Special handling requirements - any requirements that are above and beyond the normal procedures for handling sediments in a working river or harbor where contaminated sediments do not exist. In some cases, agencies may determine it is acceptable to leave contaminants in place if it has been determined that they do not pose a human health or ecological risk.

Rational for Listing

At the time of AOC listing, restrictions on dredging was a use that was clearly identified as impaired in the St. Louis River AOC. Sediments in many parts of the AOC exceeded guidelines developed by regulatory agencies to characterize in-place sediments and contained a variety of toxic, bioaccumulative contaminants, which have been shown to cause adverse effects to aquatic and terrestrial organisms. In addition, serious economic and social consequences were thought to be imposed upon some resource users through special dredging requirements and obligations for long-term sediment containment.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes twelve management actions needed for BUI removal (see table below). No management actions have been completed since the 2013 RAP. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed.

Management action 5.01 is operation of the St. Louis River AOC Database. Inclusion of backlog datasets for MN has been funded and is underway in 2014. A WDNR proposal will be submitted to USEPA for consideration of GLRI AOC funds. The 2015 request will address a backlog of WI datasets and develop automated tools to build agency capacity to prepare data for inclusion; reducing the need to hire contractors to perform the work. Long term housing and operation of the database has not been established although recent discussions between the state agencies and the National Oceanic and Atmospheric Administration (NOAA) may address this need. It will be essential to house and operate the database to ensure access to data from all studies. These datasets are used to develop cleanup objectives, remedial designs and for development of dredge alternatives plans for BUI removal. The expected completion date has been extended to 2025 to allow for development of these plans after remediation of contaminated sites.

Projects 5.02-5.09 are contaminated sediment remedial sites. All of these management actions are underway in different stages of remedial action. Site costs are estimated in the table below, and funding needs will vary based on each site.

The BUI removal strategy includes the following items that are part of management actions 5.10 and 5.11:

- Develop a communication strategy/dredging alternatives plan to inform AOC partners and the public about the actions needed to address this BUI and how they relate to beneficial reuse of dredge material in the AOC.
- Identify and document a bi-state strategic approach to contaminated sediment disposal from remediation sites in Minnesota and Wisconsin.
- Work within the state agencies, the port authorities, and local communities to site a dredge disposal facility for contaminated sediments if possible.
- Assist with the identification/siting of on-land disposal and reuse options for material dredged from hotspots.
- Determine and map the dredging history of the area subject to this BUI.

Management actions 5.10 and 5.11 have not been started, and an assessment of these items is needed in 2015 to determine the need and approach for completing these on an AOC scale. Additional funding or resources may be required to do this. The anticipated completion date for these management actions has been moved to 2016.

An additional sediment characterization management action 5.12 has been added to the Restrictions on Dredging BUI. This management action has now been clearly associated with BUI removal. Sediment characterization for sites in MN has been funded and was completed in 2014. Funding is needed for WI sites that are labeled “red-grey” and also in areas that have little or no sediment chemistry data. Estimated cost of the additional sediment characterization is $830,000. It is estimated the characterization work will take two field seasons. The completion date is 2016, but may be changed if funding or sampling schedule are delayed.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
5.01	Update Sediment Database	Include current and future partner and USACE data sets into St. Louis River database; provide web interface to access, query, and download data	~~2015~~ 2025	$300,000 (estimated operation cost)
5.02	Howard's Bay (including Hughitt and Cummings Slips)	Remediate contaminated sediments	2018	To be determined; In discussions with RP
5.03	Superior Light & Power MGP Site/ Coal Slip	Remediate contaminated sediments	2020	$4,000,000
5.04	Minnesota Slip	Remediate contaminated sediments	~~2015/16~~ 2017	$7,000,000
5.05	Slip 2	Remediate contaminated sediments	2016	$4,000,000
5.06	Slip C	Remediate contaminated sediments	2020	$18,000,000
5.07	Northland Pier/ AGP Slip	Remediate contaminated sediments	2020	$11,000,000
5.08	Azcon Corp/ Duluth Seaway Port Authority Garfield Slip C	Remediate contaminated sediments	2020	$9,000,000
5.09	Munger Landing	Remediate contaminated sediments; restoration	2020	$32,000,000
5.10	Communication Strategy	Develop a communication strategy to inform partners and public about the Restrictions on Dredging BUI	~~2014~~ 2016	Operational support
5.11	Bi-state Contaminated Sediment Disposal Approach	Identify and document a bi-state strategic approach for disposal of contaminated sediment from remediation sites.	~~2014~~ 2016	Operational support
5.12	Additional Sediment Characterization	Characterize estuary sediments that have been identified as red-gray or with limited or no data.	2016	$830,000 WI $350,000 MN(funded)

Issues affecting progress on this BUI

The most significant need in the St. Louis River AOC is additional sediment characterization. This information is needed to identify any unknown contaminated sediment sites and allow any additional sites to be added to the RAP.

This BUI relies on remediation of contaminated sediment sites and the development of dredge alternatives plan(s) in the AOC. If remedial projects are delayed or if remediation of additional sites is needed, the BUI removal timeline may need to be adjusted. The timeline for BUI removal has allowed for recovery and monitoring the success of remedial action. At this time the management actions are on track for BUI removal in 2023.

EXCESSIVE LOADING OF SEDIMENT AND NUTRIENTS

BUI Removal Target and Status

The 2008 delisting target was based on total phosphorus data in available reports from Minnesota, Wisconsin, and the International Joint Commission (IJC). At that time, several studies were in progress via a variety of local agency and university researchers involving the estuary and the western arm of Lake Superior, and portions of the St. Louis River and Nemadji River watersheds. Consequently, more information is currently available to better assess the delisting target and its application to the removal of this BUI. During the development of the BUI Blueprint and 2013 RAP, stakeholders from the Scientific Advisory Group were involved in developing the targets and status indicators included in the BUI removal strategy below.

Excessive Loading of Sediment and Nutrients (BUI #6)	Status
1. All federal, state, and local point source and nonpoint source discharge permits in the AOC are in compliance with regard to controlling sources of nutrients (particularly nitrogen and phosphorus), organic matter, and sediment.	In Progress
2. Assessment of current water quality data for the Lake Superior and the St. Louis River estuary portions of the AOC indicate that water quality meets the water quality targets stablished by the BUI removal strategy in the 2013 RAP.	In Progress
3. Watershed management objectives for the Nemadji River watershed, as established by the Nemadji Basin Plan (NRCS, 1998), have been adopted and progress towards implementing the objectives is being made.	Assessment in Progress (2015-2017)

Rational for Listing

Prior to the improvements in wastewater treatment in the late 1970s, water quality and biological investigations characterized the St. Louis River estuary as eutrophic. At that time, the Western Lake Superior Sanitary District (WLSSD) treatment plant was built and the Superior wastewater treatment plant was upgraded. Since then, many indicators of trophic status have shown improvements. For instance, concentrations of total phosphorus, ammonia, and organic nitrogen have decreased in St. Louis Bay. The loading of phosphorus to the estuary from point sources has been reduced substantially. At the time of AOC listing, further work was needed to ascertain the effects of nonpoint source loadings to the system and to Lake Superior. Despite the reductions in point source loadings, phosphorus concentrations in the estuary remained at levels where eutrophic conditions might be expected. Algal biomass was lower than would be expected, however, given these high phosphorus concentrations. Chlorophyll a concentrations measured in the estuary were similar to levels found in mesotrophic or oligotrophic waters. Several investigators proposed that reduced light penetration caused by turbidity and color may be a limiting factor for algal growth in the estuary. Although persistent water quality problems associated with eutrophication were not observed in the estuary, the high levels of nutrients and sediments being delivered to Lake Superior were determined to be an important concern. Therefore, the RAP used a modification of the IJC eutrophication criterion to reflect local conditions.

Strategy for Removal:

Total phosphorus alone will not provide the level of confidence needed to show that nutrient and sediment levels do not impair water quality and habitat, and do not restrict recreation, including fishing, boating, or body contact in the estuary. Therefore, to protect and restore the condition of the AOC related to the listing of this BUI, a thorough review of historical data and a statistical analysis of the current water quality condition based on the recommended seven status indicators listed below are necessary. These analyses will provide the basis to develop water quality targets and assess the trends and current condition of the St. Louis River estuary in relation to BUI removal. The seven status indicators include:

1. Chemical - total phosphorus, un-ionized ammonia, dissolved oxygen
2. Biological – chlorophyll a
3. Physical - total suspended solids (TSS) and turbidity or other loading metric based on tons of sediment
4. Watershed –progress toward management objectives to reduce runoff rates and sediment delivery in the Nemadji River watershed

This work is not intended to set or replace state water quality standards, but to develop BUI removal objectives agreeable to both states and FDL that are consistent with intent of the BUI removal target. The BUI removal objective water quality target goals are to protect the riverine and estuarine portions of the AOC from a eutrophic classification and to protect the Lake Superior portion of the AOC from a mesotrophic classification as well as achieve desired levels of sediment and nutrient loading to Lake Superior.

The strategy for removal of the Excessive Loading of Sediment and Nutrients BUI is as follows:

1. Perform area-wide water quality analyses in the St. Louis River estuary based on the monitoring protocols in Bellinger et al. (2012). Analysis of the water quality indicators will be used to estimate conditions within zones and/or estuary-wide. Results will be used to report whether the St. Louis River estuary is trending toward or has reached the reference condition or range of conditions considered reasonable for the estuary.
2. Perform an expanded historical data set analysis based on methodologies used in Hoffman (2011) to evaluate long-term trends in water quality as it relates to the six status indicators. Determine the appropriate water quality goals for the reference condition of any or all of the status indicators appropriate for the St. Louis River estuary and western portion of Lake Superior that will meet approval by Minnesota and Wisconsin as appropriate for the AOC.
3. Perform a paleolimnological investigation of the St. Louis River estuary to reconstruct the algal and geochemical history for approximately the last 300 years. Diatom-based (microfossil algae) models will be applied to identify historical temporal and spatial variations in biological (chlorophyll, algal load), chemical (phosphorus, ammonia) and physical (TSS, turbidity) water quality indicators. Combined with the results of the monitoring data and trend analyses in 1 and 2 above, the paleolimnological data will provide quantitative and qualitative reconstructions of the important physical, chemical and biological trends that have resulted from natural and anthropogenic drivers. This information will then be used to make recommendations to AOC managers regarding past remedial success and future expectations.
4. Document progress toward watershed management objectives from the Nemadji Basin Plan (NRCS, 1998) as an indicator of sediment loading to the AOC. The Nemadji plan established watershed objectives to reduce runoff rates and sediment delivery from the Nemadji River watershed into the AOC.

For the water quality indicators:

> If the assessments show the current conditions have been sustained and the water quality has improved to where it meets the water quality goals, then removal targets have been met.
>
> If the assessments show the current conditions have not been sustained and water quality is not meeting the water quality goals, then removal targets have not been met. Determine possible sources and develop an action plan to address the source(s). Then, re-evaluate annually until it can be shown that water quality meets applicable goals for two consecutive years.

For the watershed indicator, if watershed management objectives for the Nemadji watershed are met or progress over time to meeting the objectives can be demonstrated, this information will help support removal of the sediment loading aspect of this BUI.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes five actions needed for BUI removal (see table below). All management actions are underway and data collection for projects 6.01 and 6.02 is complete. Anticipated BUI removal date has been changed to calendar year 2017 to allow for completion of project 6.05 and data interpretation. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed.

Water quality sampling for projects 6.01 and 6.02 was performed in 2012 and 2013 by the U.S. Environmental Protection Agency (USEPA). Final reports are being developed. The next step is to use this information to complete project 6.04.

Project 6.03 is fully funded and underway. Sediment cores were collected at eight sites in 2014, and are being analyzed with results made available starting in 2015. The project will be completed in 2016.

Project 6.04 this project is underway using available water quality data and results from projects 6.01 and 6.02. Completion of project 6.03 will be necessary to complete this action.

As part of project 6.05, WDNR (through the Great Lakes Protection Fund) and Carlton County, MN funded a GIS based open lands assessment in the Nemadji River Watershed. A comparison of previous years to the 2014 analysis showed that open land objectives in the Nemadji River Basin Plan have not been met. Based on the results of the open lands assessment project 6.05 has been modified to assess the impairment in the Nemadji River using biological, water quality, and sediment monitoring. The project will also model changes in sediment loading in the Nemadji River and compare to a non-AOC site with available data. This project is designed to evaluate results of the work that has been implemented since the Nemadji River Basin Plan has been completed. The completion date has been moved to 2017. Wisconsin developed a project proposal for $132,715 that will be submitted to USEPA in 2015 for consideration of GLRI AOC funds.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
6.01	Perform Area-wide Water Quality Sampling and Analyses	Identify data needs, develop sampling design based on Bellinger et al. (2012) and evaluate results.	2015	Operational Support
6.02	Perform Expanded Historical Data Analysis	Conduct a thorough review of current and historical data, and a statistical analysis of the six water quality indicators (TP, NH_3, DO, chlorophyll *a*, TSS and turbidity) and evaluate long-term trends in water quality.	2015	Operational Support
6.03	Paleolimnological Investigation	Perform a paleolimnological investigation of the St. Louis River Estuary to reconstruct the algal and geochemical history and develop models to characterize trends in natural and anthropogenic drivers in water quality.	2016	$404,983 (Funded)
6.04	Develop water quality goals (Compilation of 6.01, 6.02, and 6.03)	Determine appropriate water quality goals for the reference condition of biological, chemical and physical indicators of water quality.	2016	Operational Support
6.05	Assessment and Implementation Planning in the Nemadji River Basin	Assess sediment impairments through biological, water quality, and sediment monitoring, and HSPF modelling of historic sediment loads. Support implementation of the Nemadji Basin project recommendations to reduce sedimentation through stakeholder and landowner planning efforts.	~~2014~~ 2017	$132,715

Issues affecting progress on this BUI

The <40% open lands objective in the Nemadji Basin, included in part four of the removal strategy, was assessed in 2014 and this objective is not being met. While land use trends have an impact on peak flows and erosion in the basin, there are several caveats to using this objective in the RAP. The "open land" classification includes urban, agriculture, grasslands, hay fields, shrublands, and young forest; but each of these land cover types influences peak flows differently (Verry 1976, Verry et al. 1983, Verry 1986). Verry's work found that at moderate percentages (40 -60%) open lands, snowmelt peak flows were desynchronized and thus reduced. Because of this desynchronization and the differences in water uptake among different types of open lands, there is a lack of consensus among resource managers about what the appropriate percent open lands target should be. Also, because "slow the flow" efforts are not limited to reforestation (but also include wetland restoration, ditch plugging, elimination of unused roads, field borders, filter strips, etc.), using the percent of open lands in the basin as the target metric does not accurately assess physical results of efforts that have been implemented to reduce sediment in the Nemadji River. In fact, initial assessments of fish and

macorinvertebrates at several sites on the Nemadji in Wisconsin do not indicate that there is an impairment due to sediment (Roesler, 2014).

Therefore, the <40% open lands objective has been removed from the BUI removal strategy. Management action 6.05 has been adapted to assess the biological condition of the Nemadji River and to determine if excessive sediment is an impairment. The project is intended to justify BUI removal based on historical sediment load modeling and biological condition, and implementation of the Nemadji Basin Plan through stakeholder and landowner planning workshops in the Nemadji River Basin. The planning component will include communication of the results of the open lands assessment to stakeholders and landowners in the Nemadji Basin.

BEACH CLOSINGS AND BODY CONTACT RESTRICTIONS

BUI Removal Target and Status

Beach Closings and Body Contact Restrictions (BUI #7)	Status
Sources of stormwater and wastewater discharge to the St. Louis River Area of Concern have been identified and measures to reduce the risk of human exposures to disease causing microorganisms have been implemented.	In Progress
There are no body contact advisories due to the presence of harmful chemicals at contaminated sites.	In Progress
No water bodies within the AOC are included on the list of non-attaining waters due to controllable sources of disease causing microorganisms or chemicals in the most recent State of Wisconsin and State of Minnesota Section 303(d) programs.	Assessment in Progress (2015-2016)

Additional Target Clarification from the 2013 RAP:

For the purposes of interpreting the 2008 target, "controllable sources" is defined as sources of pathogens of human origin.

Removal of the Beach Closings and Body Contact Restrictions BUI will be justified when the following objectives are met:

Beach Closings

No water bodies within the AOC are included on the list of non-attaining waters due to contamination with pathogens from sewer overflows (defined as sanitary sewer overflows or combined sewer overflows) in either state's most recent Clean Water Act Water Quality and Pollution Control Section 303(d) and 305(b) Integrated Report, or

In cases where the water bodies within the AOC are on the list of non-attaining waters due to the presence of sewer overflows originating within the AOC, this BUI will be considered restored when sewer overflows have been eliminated, are being treated, or are otherwise being managed as follows:

a) Municipalities and municipal wastewater treatment plants within the AOC are in compliance with National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit conditions or are otherwise entered into an agreement or order addressing sewer overflows, and
b) Municipalities within the AOC are in compliance with their municipal separate storm sewer (MS4) NPDES permit conditions.

Body Contact Restrictions

No water bodies within the AOC have posted "No Swimming" signs due to chemical contamination that poses a health risk due to body contact, as determined by Public Participation Rules (NR 717.07) in Wisconsin and by the Department of Health in Minnesota, or

In cases where the water bodies within the AOC are on the list of non-attaining waters due to the presence of chemical contamination (such as at the US Steel site), this BUI will be considered restored when significant progress has been made to reduce chemical contamination to allow for the removal of the "No Swimming" signs.

Rationale for Listing

Water quality data available at the time of AOC listing indicated that improvements had been made in the St. Louis River and bay since the late 1970s. However, sources of potential microbial contamination still existed, namely sewage bypasses into the AOC in both Minnesota and Wisconsin during storm events. Discharge of inadequately treated wastewater by marine traffic was also a concern. Because of the sewage bypasses in both Minnesota and Wisconsin, body contact recreation was deemed a beneficial use impairment. In addition to bacterial contamination, high chemical contaminant levels in the St. Louis River AOC sediments were believed to present a health risk for recreational uses. Cleanup and sediment remediation at Hog Island Inlet in Wisconsin and Stryker Bay in Minnesota have led to the removal of "No Swimming" signs at these locations, although a "No Swimming" sign remains at the US Steel site in Minnesota.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes four actions needed for BUI removal (see table below). No actions have been completed since the 2013 RAP, but one action, the bacterial source tracking project has been funded and is underway.

AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed. Staff are working to compile historic improvements in wastewater and stormwater infrastructure in the AOC. This information, along with permit compliance, will be used to complete project 7.01.

Project 7.01 completion date has been amended to 2018. This was necessary to capture permit compliance until this BUI can be removed (anticipated in 2018).

Project 7.02 completion date has been moved to 2018. Design and implementation of this beach restoration project is awaiting results from the bacterial source tracking project 7.03. Project design and implementation funding will need to be requested in calendar year 2016 for fiscal year 2017 funding in order to complete the restoration project by 2018 and stay on track for BUI removal in 2018.

Project 7.03 completion date has been moved to 2016. This project was amended to include two seasons of data (2015, 2016) and the project cost is $125,200 and has been funded through a USEPAGLRI AOC grant to WDNR. This project will adapt to include beaches within the AOC that have been added to WI and MN 303(d) lists in 2014. WDNR is contracting the bacterial source tracking project.

Project 7.04 has no changes. Stakeholder and community engagement for this project will be coordinated for the "No Swimming" sign removal.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
7.01	Document Permit Compliance Status	Document compliance status of municipal WWTP and MS4 discharge permits in the AOC.	~~2013~~ 2018	Operational support
7.02	Barkers Island Beach Restoration	Design a beach restoration that addresses the stormwater, trash, debris and sources identified in the sanitary survey.	~~2015~~ 2018	$400,000
7.03	Conduct Microbial Source Tracking at Impaired Beaches	Conduct microbial source tracking at the four impaired AOC beaches to determine if pathogens are of human origin (i.e. controllable).	~~2014~~ 2016	~~$60,000~~ 125,200 (funded)
7.04	Track US Steel Superfund Cleanup Process	Track the cleanup process at the US Steel site to determine when the "No Swimming" sign can be removed. Coordinate sign removal.	2018	Operational support

Issues (challenges, risks) affecting progress on this BUI

One potential issue with this BUI is the addition and removal of beaches within the AOC from the 303(d) lists in MN and WI. Bacterial source tracking project 7.02 was designed for the 2012 303(d) lists and was adapted for the 2014 303(d) lists. Additional target clarification or change may need to be considered in the future to address the BUI removal target being linked to the 303(d) list.

Results from the first year of bacterial source tracking project 7.03 will be used to help evaluate the need and design of beach restoration project 7.02. At this time, it is anticipated that the beach restoration project can be implemented and BUI removal (2018) can still occur within this timeline.

Also, if bacterial source tracking project 7.02 shows that pathogens of human origin are impairing beaches within the AOC, additional management actions may be needed to control the sources of human pathogens before BUI removal. This would most likely delay BUI removal.

At this time it is anticipated that cleanup of the US Steel Superfund Site will have progressed to justify removal of the "No Swimming" restriction by 2018. If the cleanup is delayed or progress has not been made to justify removal of the "No Swimming" restriction, BUI removal could be delayed.

Stakeholder Engagement

Stakeholder engagement will be important when results of the source tracking project are known. The City of Superior will be a critical stakeholder for this BUI relating to the Barkers Island beach restoration project and wastewater and storm sewer permit compliance documentation. Engaging staff from WLSSD will also be important to capture the historic improvements to infrastructure and document compliance.

DEGRADATION OF AESTHETICS

BUI Removal Target and Status

Degradation of Aesthetics (BUI #8)	Status
There are no verified persistent occurrences of objectionable properties in the surface waters of the St. Louis River Estuary during the previous five year period. "Persistent occurrences" are defined as objectionable properties that occur more than two times per year and are greater than ten days in duration.	Complete

Additional Target Clarification from the 2013 RAP:

For the purpose of interpreting the 2008 target, objectionable properties mean a nuisance condition. A nuisance condition is defined as the presence of significant amounts of floating solids, scum, visible oil film, material discoloration, obnoxious odors, deleterious sludge deposits, oil slicks, chemical and tar residues, taconite pellets on shorelines, decomposing grain scum on the water surface, or other offensive or harmful effects.

Removal of the Degradation of Aesthetics BUI will be justified when complaint logs and files for the AOC have been reviewed and compiled, regulations pertaining to aesthetics are documented, and actions to address the oil sheens at the US Steel site are complete.

Rationale for Listing

The rationale for listing the Degradation of Aesthetics BUI included in the Stage I RAP described the aesthetic values of the St. Louis River AOC as impaired at some locations. A systematic collection of qualitative and quantitative data was recommended at that time to determine visual or odiferous locations that are degraded and the sources and types of those degradations (e.g., oil slicks, chemical and tar residues, taconite pellets on shorelines, rotting grain scum on water surface, etc.). Hog Island Inlet and Stryker Bay are two areas that historically had repeated reports of oil, chemical, and tar residues on the water's surface. Complaints were also registered about smells emanating from the sediments and water of Newton Creek and Hog Island Inlet. Shoreline aesthetics were to be addressed separately through actions taken with riparian interests.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP included five actions needed for BUI removal (see table below). All actions have been completed, and the BUI was formally removed on August 14, 2014. The public input process included a 15 day comment period, public open house meeting, and press releases from WDNR and MPCA. The final removal package with USEPA approval can be viewed at http://dnr.wi.gov/topic/greatlakes/st.louis.html under the impairments tab.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost
8-1	Complaint File Review and Compilation	Compile and review logs and complaint files within the AOC to provide information suggesting that there have been no nuisance complaints on aesthetics-related issues greater than ten days in duration and occur more than twice a year.	~~2013~~ 2014 Completed	Operational support
8-2	Documentation of Aesthetics-Related Regulations	Demonstrate improvements in federal and state aesthetic regulation through documentation. This effort may include an evaluation of trends in air particulates over time.	2014 Completed	Operational support
8-3	US Steel Site Aesthetics Action	Track progress of oil sheen control.	2014 Completed	Operational support
8-4	Hog Island/Newton Creek Documentation	Prepare a justification document related to the reported odors at Hog Island/Newton Creek remediation site using existing data and reports to verify this site does not pose a human health or ecological risk.	~~2013~~ 2014 Completed	Operational support
8-5	Present BUI Removal Strategy to Stakeholders	Meet with SLRA Board of Directors to present BUI removal strategy	2014 Completed	Operational support

LOSS OF FISH AND WILDLIFE HABITAT

BUI Removal Target and Status

Loss of Fish and Wildlife Habitat (BUI #9)	Status
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.	In Progress

Additional Target Clarification from the 2013 RAP:

1. Remediation of contaminated sediment at "red" sites within the AOC has been completed (See BUI #5 Restrictions on Dredging).

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 (Figure 3). 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 (Figure 4).

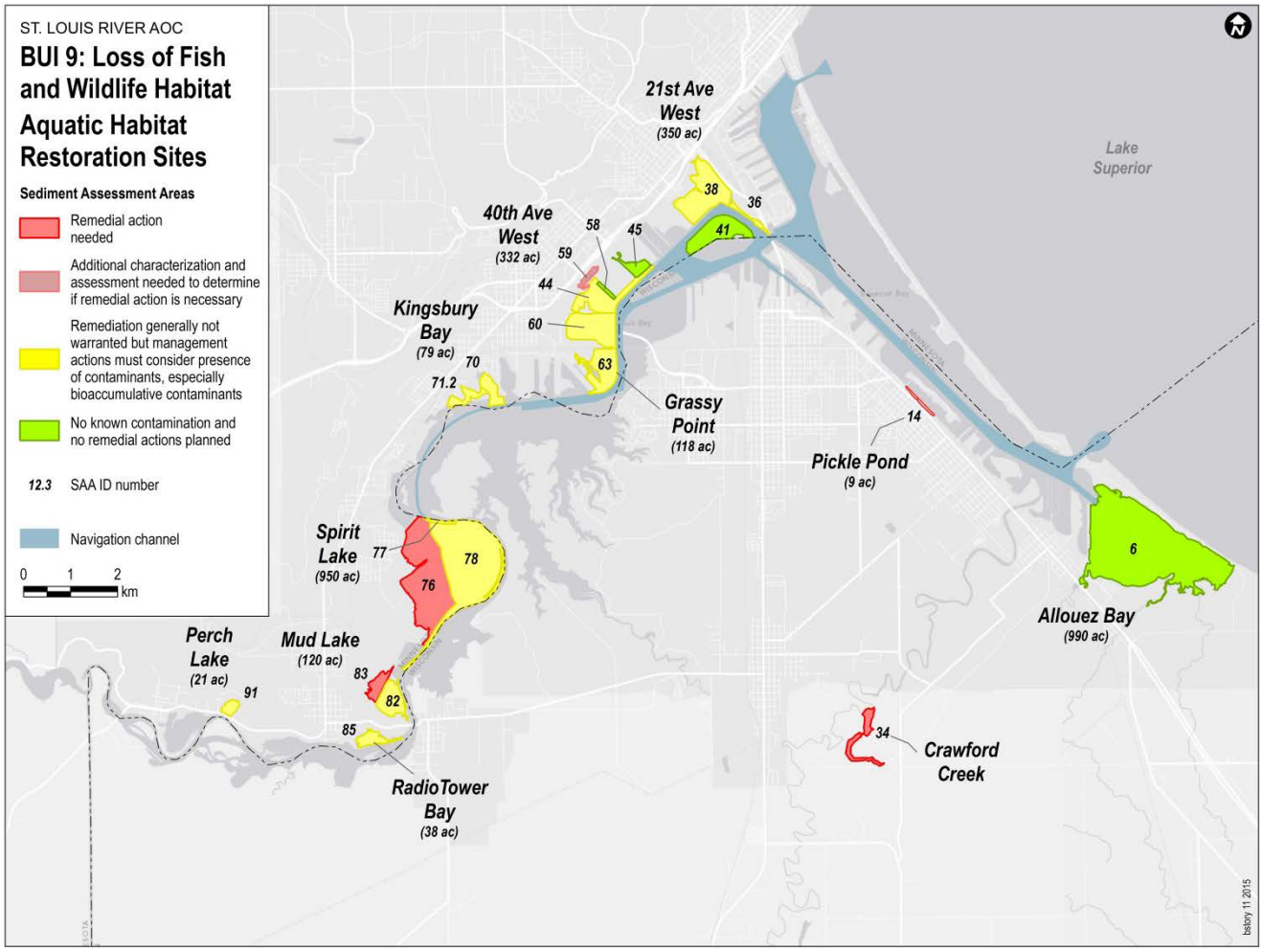

Figure 3: Aquatic habitat restoration sites in the St. Louis River Area of Concern

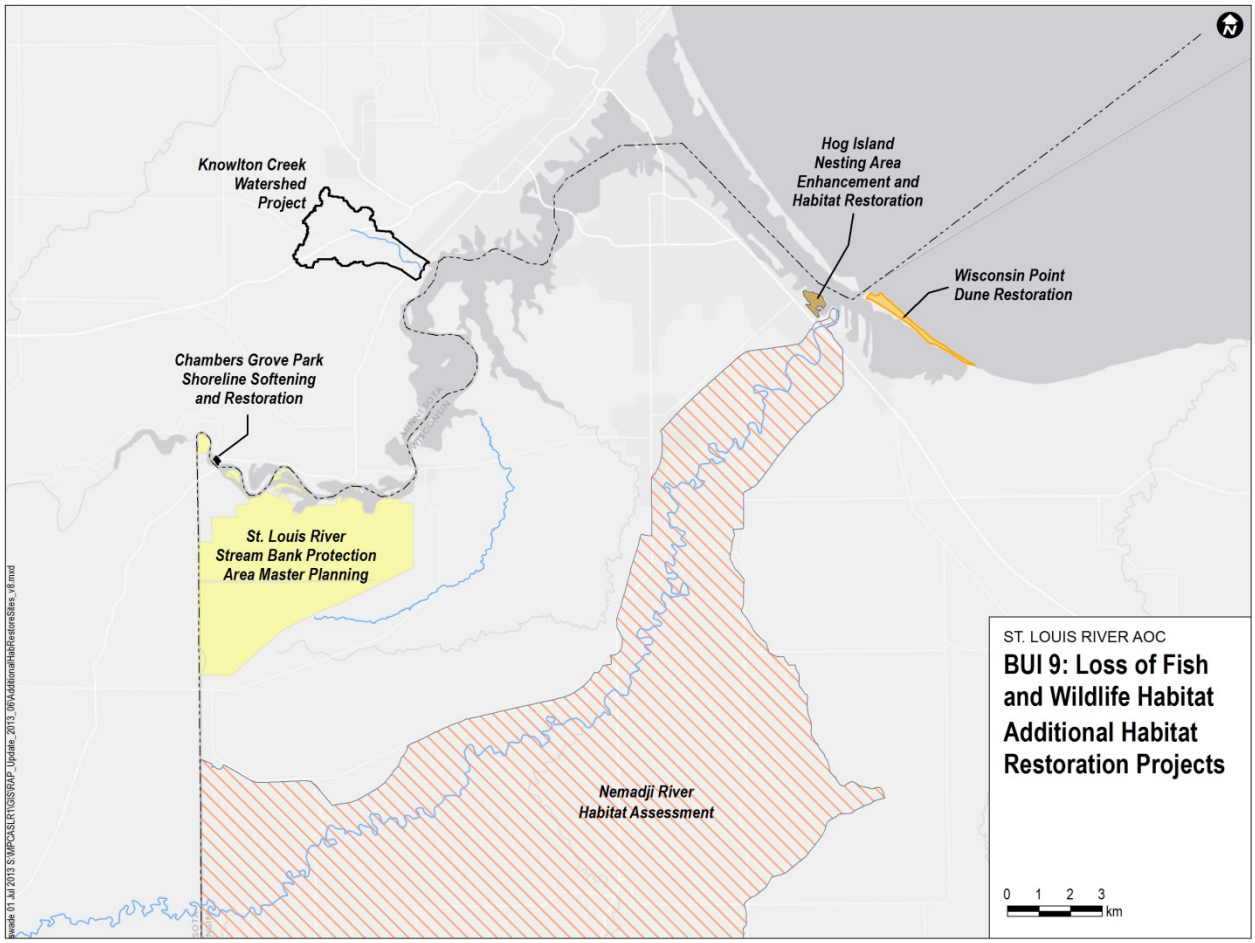

Figure 4: Hydrologically connected habitat restoration sites in the St. Louis River Area of Concern

Rational for Listing

At the time of AOC listing, fish and wildlife habitat was threatened by water quality impairment and physical habitat loss. Water quality impairment included inadequately treated municipal and industrial wastes, contaminated sediments, degraded benthic communities, and high sedimentation rates resulting in turbidity. Physical habitat impairment included loss through dredging and filling activities and decline in the quality of wetlands from invasion of non-native vegetation.

Summary of key remedial actions since the 2013 RAP, current status, and next actions needed

The strategy for BUI removal outlined in the 2013 RAP includes 21 management actions needed for BUI removal (see table below). No actions have been completed since the 2013 RAP, but all are in progress. Anticipated BUI removal date is 2025. AOC staff continue to follow the BUI removal strategy from the 2013 RAP to determine next actions needed. Changes in management action timelines since the 2013 RAP are indicated in the table below.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost	Project Status and Notes
9.01	Spirit Lake	Remediate contaminated sediments and restore emergent wetlands	~~2018~~ 2020	TBD in discussion with RP	FS underway with public comment in 2014.
9.02	40th Avenue West R2R Project	Remediate contaminated sediments and restore habitat	~~2018~~ 2020	$24,000,000	Sampling of sediment chemistry and bioassays complete and analysis underway. Working with USFWS consultant, USACE, and EPA-MED on applicability of preferred design.
9.03	Radio Tower Bay	Remove non-native material and restore optimum bathymetry	~~2014~~ 2016	$3,500,000 (Funded)	Under construction
9.04	Grassy Point Restoration	Remove non-native material and restore optimum bathymetry	~~2017~~ 2020	$30,000,000	Scope of work drafted and contracting underway with USACE.
9.05	21st Avenue West R2R Project	Remediate contaminated sediments and restore habitat. Note: the USACE 21st Ave W Pilot Project is a part of the larger planned site restoration listed here.	2020	$17,000,000	Working with USACE engineer and modelers and EPA-MED on applicability of preferred design. Plans are to have fully designed and permitted by the end of 2015.
9.06	Kingsbury Bay Restoration	Restore wetland complex at the mouth of Kingsbury Creek to pre-1961 condition	~~2018~~ 2020	$5,000,000	Sampling of sediment underway to assess applicability of in-water placement. 2015 plans are to pilot 1,500 CY of material as organic medium at 21st Ave W.
9.07	Knowlton Creek Watershed Project	Reduce runoff and sediment transport within watershed and restore cold-water stream habitat	2016	$6,000,000	Contract awarded to complete engineering design in first half of 2015.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost	Project Status and Notes
9.08	Mud Lake	Remediate contaminated sediments, establish more vital hydrologic connection and restore wetland habitat including wild rice; establish deep water	2020	$20,000,000	US. Steel has joined the voluntary remediation program for land and sediment issues at this site.
9.09	Perch Lake	Revitalize biological connection between estuary and Perch Lake and restore optimum bathymetry	2020	$7,000,000	Sampling of sediment underway to assess applicability of in-water placement.
9.10	Chambers Grove Park	Soften and restore shoreline in City of Duluth park	~~2015~~ 2016	$1,000,000	Fully funded for design and construction. The designs and permitting will be complete in early 2015 with construction in 2015-16.
9.11	Allouez Bay	Vegetation restoration including removal of AIS and re-establishment of wild rice.	~~2015~~ 2017	$121,954 (Funded 2014 SOGL)	Additional 35K funding secured from USFWS. Douglas Co. implementing in 2015. Sediment control not included in this project.
9.12	Crawford Creek Habitat Restoration	Remediate contaminated sediments and restore habitat within stream, wetland, and floodplain	2020	TBD in discussion with RP	USEPA contracted site characterization in 2014.
9.13	Nemadji River Watershed Habitat Assessment	Conduct habitat assessment and evaluation to determine priority locations for conifer restoration, land protection, and AIS control using lidar.	2017	~~$500,000~~ $195,000	Project objectives have been better defined and a proposal has been presented for 2015 Non-comp funding.
9.14	Pickle Pond	Sediment remediation and habitat restoration.	~~2015~~ 2018	$3,100,000	FS underway contracted by USFWS. Design will need to be contracted/funded in 2015.
9.15	Wisconsin Point Dune Restoration	Development of appropriate public access infrastructure to protect dunes and conduct dune restoration and invasive species control.	~~2015~~ 2018	$1,600,000	City & WDNR in discussions with NOAA & USEPA about potential funding through WI Coastal Program for this project in 2015.

Project No.	Project Name	Project Description	Date to be Completed	Estimated Project Cost	Project Status and Notes
9.16	Hog Island	Bird nesting habitat restoration as warranted by estuary wide survey.	~~2015~~ 2018	TBD	Project on hold until results from estuary wide bird survey are known.
9.17	Fish Passage Culverts	Replace or retrofit a minimum of two culverts to allow for fish passage and other aquatic organism passage.	2017	$960,000	WDNR will be conducting stream crossing surveys in 2015 to identify sites.
9.18	Document Wisconsin Habitat Protection & Rehabilitation	Document existing WI habitat protection and rehabilitation projects since 1987 AOC designation and prepare a map(s) showing locations of these projects.	~~2014~~ 2015	Operational Support	Documentation is underway. Initial document finished in 2015 with updates as needed until BUI removal.
9.19	St Louis River Stream Bank Protection Area	Initiate WDNR master planning including natural and undisturbed ecosystem management plan for islands and bays.	~~2014~~ 2016	$345,000	WDNR is working with NERR to conduct a Regional and Property Analysis. WDNR will conduct master planning based on statewide priority. Future funding may be needed to support this effort.
9.20	Document invasive species control efforts and regulations	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	~~2014~~ 2015	Operational Support	This action is underway by WDNR Habitat Coordinator. Completion is anticipated in early 2015. Information will be included with project 9.18.
9.21	Wild Rice Restoration Plan and Associated Restoration Sites	Develop a plan that identifies the high priority restoration sties and provides a process for restoring those sites. Restoration of 275 acres of wild rice.	2019	$510,000 (Funded)	This action has been added to the project list. Plan has been completed in 2014 with the goal of 275 acres restored by 2025.
Removal of this BUI relies on remediation of sites listed under BUI 5: Restrictions on Dredging.					

Stakeholder Engagement

As part of the communication plan developed with the 2013 RAP, each restoration site has a Restoration Site Team that includes partners and stakeholders involved in the technical aspects of the project design and implementation process. These teams are led and coordinated by agency staff and other stakeholders are updated and brought in to the team as needed.

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Appendix A- Focus areas for WI St. Louis River AOC Staff in 2015

The focus areas for Wisconsin's St. Louis River AOC Staff in 2015 are expected to be as follows:

- To organize and participate in restoration and remediation site teams by providing technical expertise, project planning and project management for RAP actions.
- Manage BUI monitoring and assessment grant projects (GLRI funds for AOCs provided by USEPA) and Citizen Advisory Committee (CAC) support funds.
- Document completion of measurable indicators for BUI removals.
- Participate in outreach opportunities with stakeholders, local governments, tribes, and citizens.

The following table shows the projects that are in progress for Wisconsin's St. Louis River AOC Staff:

Action	**Project Type**	**Lead WDNR Staff Person**	**Status & Comments**
7.02 Beaches Source Tracking	Monitoring /Assessment	Matt Steiger	Start 2015
9.14 Pickle Pond Phase II	Habitat Restoration Sediment Remediation	Matt Steiger (Joe Graham)	In-Progress
1.01 - 1.03 Fish Consumption BUI	Assessment	Matt Steiger, BUI Leader	In-progress
Coordinate 2015 grant proposals for USEPA GLRI AOC Project funds	Secure Funding	Matt Steiger	Final proposals complete and submitted to WDNR's Office of the Great Lakes (OGL)
Draft 2014 RAP Update	USEPA Reporting	Matt Steiger	In-progress
Phosphorus Sampling	Monitoring	Matt Steiger (Joe Graham)	On-going
6.05 Nemadji Basin Open Space Assessment	Assessment	Molly Wick	Proposal submitted to OGL for consideration of USEPA GLRI funds for AOCs
9.13 Habitat Assessment in Nemadji R Watershed using lidar	Assessment	Molly Wick	Proposal submitted to OGL for consideration of USEPA GLRI funds for AOCs
9.11 Allouez Bay Wild Rice Restoration	Habitat Restoration	Molly Wick	Funding secured implement 2015
2.05 Piping Plover Habitat & Beach Nourishment	Habitat Restoration Beach Nourishment	Molly Wick (Joe Graham)	USACE DFI final draft in review.

9.18 Document Historic Habitat Restoration & Protection	Inventory	Molly Wick	In development Draft map shared with partners
2.04 Small Mammal Survey	Monitoring	Molly Wick	In progress
Clough Island Invasive Species Control	Habitat Restoration	Molly Wick 2 Contracts	In progress – may seek grant extension for 2015 control
5.02 Howards Bay	Sediment Remediation	Joe Graham	Feasibility study in progress
9.12 Crawford Creek	Sediment Characterization	Joe Graham	USEPA Great Lakes National Program Office (GLNPO) Start 7/2014
5.0 WI AOC Sediment Sampling	Sediment Characterization	Joe Graham	2015 USEPA Legacy Funding requested
5.0 Clough Island Sediment Sampling	Sediment Characterization	Joe Graham	Not started – if grant extended may conduct in 2015
SLRAOC Database	Database Development	Kate Barrett (Joe Graham) (Matt Steiger)	In development