# St. Louis River Area of Concern Implementation Framework: Roadmap to Delisting

## (Remedial Action Plan Update)

**July 15, 2013**

*Photo by Dave Witt/Aero-Environmental Consulting; courtesy Duluth Seaway Port Authority*


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## About this Report:

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This report and correlating appendices can be found on the following web sites:

- U.S. Environmental Protection Agency Great Lakes National Program Office
- Minnesota Pollution Control Agency
- Wisconsin Department of Natural Resources

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# Executive Summary

## Background

This St. Louis River Area of Concern (AOC) Remedial Action Plan Update presents a comprehensive plan for delisting the AOC. The AOC Delisting Roadmap (Roadmap) contained herein details the actions necessary to remove each of the beneficial use impairments (BUIs) identified for the St. Louis River AOC.

Development of the Roadmap was made possible through a grant from the U.S. Environmental Protection Agency (U.S. EPA) Great Lakes Restoration Initiative awarded to the Minnesota Pollution Control Agency (MPCA). Capacity funding from U.S. EPA allowed AOC coordinators and leaders from multiple organizations to work together in a concerted effort to complete the Roadmap. AOC coordinators and leaders include representatives from the MPCA, Wisconsin Department of Natural Resources (WDNR), Minnesota Department of Natural Resources (MDNR), the Fond du Lac Band of Lake Superior Chippewa (FDL), and the St. Louis River Alliance (SLRA). The Roadmap effort marks the first time these groups have had the capacity to sustain a focused and coordinated effort aimed at removing BUIs and delisting the AOC by 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 landuse 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 (RAP; MPCA and WDNR, 1992) determined that nine of 14 possible 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

In addition to its long list of BUIs, the St. Louis River AOC is spatially large and geographically complex, spanning the Minnesota and Wisconsin state line and including tribal interests. The AOC boundary

includes the lower 39 miles of the St. Louis River, from upstream of Cloquet, Minnesota, to its mouth at the Duluth/Superior Harbor and Lake Superior, and the Nemadji River watershed (Figure ES-1). However, most of the actions included in the Roadmap focus on the St. Louis River below Fond du Lac Dam, Crawford Creek, and the Nemadji River watershed, as they represent those portions of the AOC most impacted by historical actions.

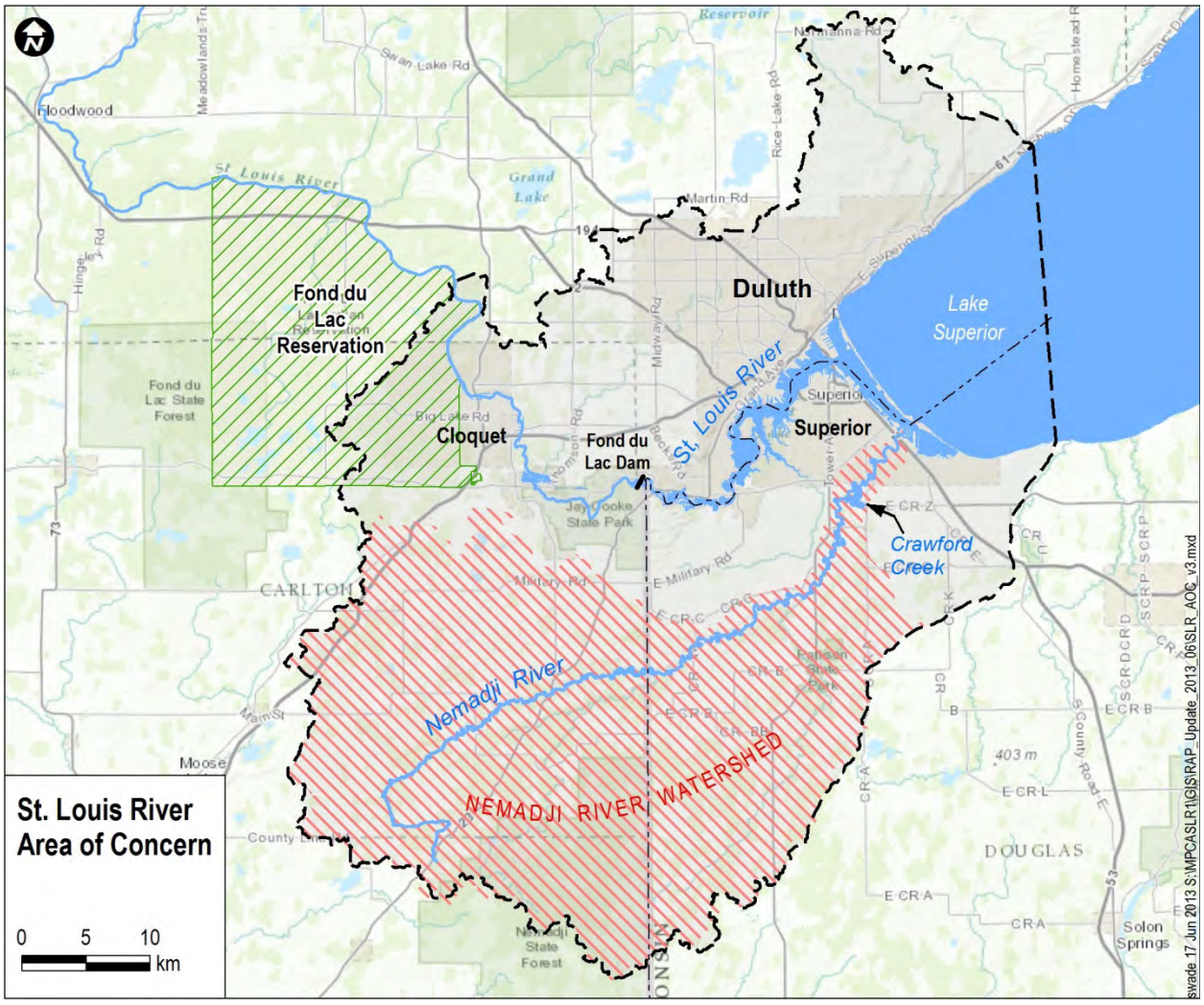


**Figure ES-1: St. Louis River AOC Boundary**

Since the Stage I RAP was written in 1992, significant work has been done to restore the AOC with well over $420M invested since 1978 on infrastructure upgrades, remediation, and habitat restoration and protection in the AOC. Improved municipal wastewater treatment and significant progress on control of wet weather overflows have contributed to water quality improvement and returning fish and wildlife populations. Some contaminated sites have been remediated and/or restored, including Hog Island/Newton Creek in Wisconsin and the St. Louis River Interlake/Duluth Tar Superfund site in Minnesota (Figure ES-2). In addition, numerous habitat protection and restoration projects have been completed across the AOC. A few examples include:

- Protection of Clough Island
- Sturgeon spawning habitat creation in the St. Louis River followed by observations of young-of-the year sturgeon
- Restoration of Tallas Island at the mouth of Knowlton Creek
- Protection of 6,500 square miles of geologically sensitive habitat in the St. Louis/Red River Streambank Protection Area
- Colonial waterbird habitat creation at Wisconsin Point
- Protection of more than 4,500 acres in two Wisconsin State Natural Areas within the Pokegama River watershed

Despite this progress, legacy sediment contamination and lost wetland habitat remain significant stressors to ecosystem health of the St. Louis River estuary.

## Attributes of the AOC Delisting Roadmap

The Roadmap contained in this RAP Update was developed through the combined efforts of numerous AOC partners/stakeholders in addition to the AOC coordinators and leaders who represent the agencies responsible for BUI removal and AOC delisting. The Roadmap was developed to embody four key attributes:

- **Inclusive** – It was developed with an extensive stakeholder involvement process with over 70 individuals from approximately 30 partner agencies, local units of government, research institutions, nongovernmental organizations, and stakeholder groups were involved in its development. Work completed by BUI teams and other supporting groups composed of these groups forms the basis of the Roadmap.
- **Comprehensive and Targeted** – It addresses all nine BUIs and their interrelationships. For each BUI, targeted removal objectives, removal strategies, and actions still needed to achieve BUI removal along with associated timelines and estimated costs are provided. The plan also includes a management and decision-making framework necessary to sustain AOC-wide communication and implement the actions in the plan.
- **Aggressive** – The ultimate goal of the Roadmap is delisting of the AOC by 2025. This will require coordination of state agencies and partners in an unprecedented fashion as they work to implement the identified actions and adapt to BUI removal needs as more information becomes available.
- **Timely** – It allows the agencies and AOC partners to make the most of available funding sources that may not exist in the future, including the federal Great Lakes Restoration Initiative and Minnesota Clean Water, Land and Legacy funding.

# Outcomes

Implementation of the actions included in the Roadmap will result in:

- Restoration of more than 1,700 acres of aquatic habitat in the St. Louis River estuary (Figure ES-2).
- Remediation of a minimum of 13 contaminated sites, including the U.S. Steel Superfund site and Minnesota Slip in Minnesota and Crawford Creek and Howard's Bay in Wisconsin (Figure ES-3).
- Restoration of additional hydrologically connected habitat, including creation of suitable nesting habitat for the endangered Piping Plover (Figure ES-3).
- Removal of five BUIs by 2018, with the remaining four BUIs removed and the AOC delisted in 2025 (Table ES-1).
- Sustainable partnerships for managing the St. Louis River estuary into the future.

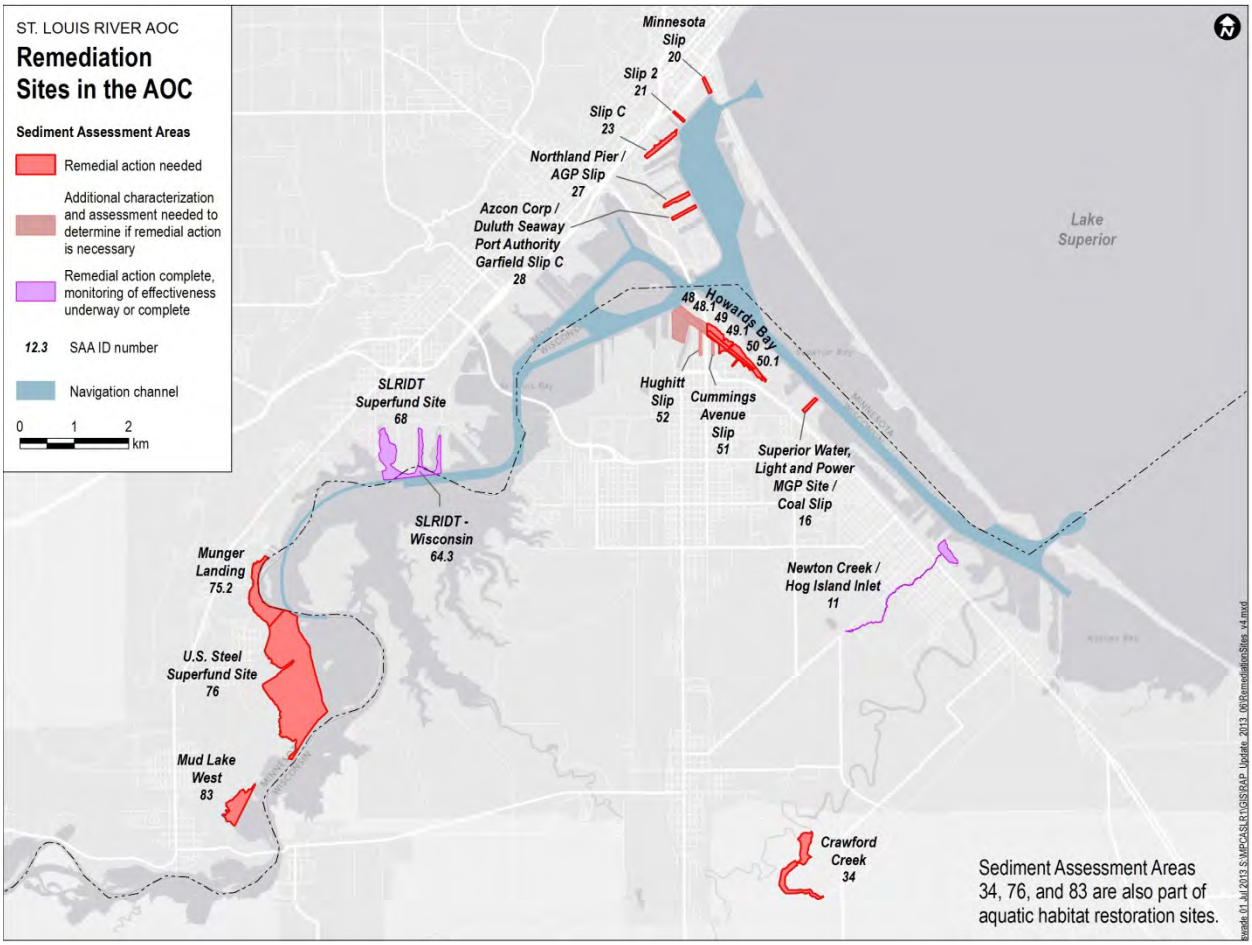


**Figure ES-2: Remediation Sites in the St. Louis River AOC**

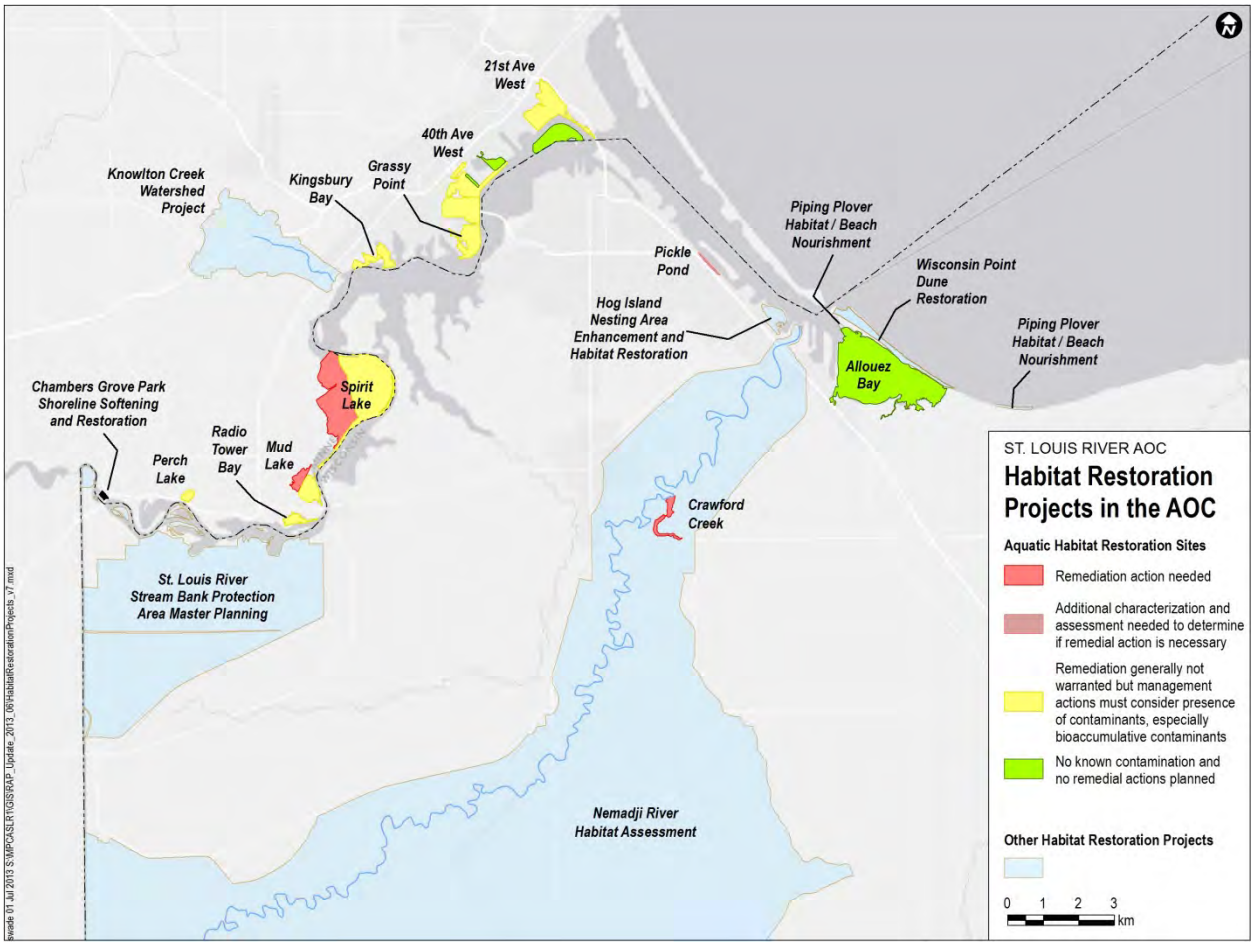


**Figure ES-3: Habitat Restoration Projects Planned in the St. Louis River AOC**

**Table ES-1: Anticipated BUI Removal Timelines**

| BUI | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 Sediments and Nutrients | | | | ● | | | | | | | | | |
| BUI 7: Beach Closings and Body Contact Restrictions | | | | | | ● | | | | | | | |
| BUI 8: Degradation of Aesthetics | | | ● | | | | | | | | | | |
| BUI 9: Loss of Fish and Wildlife Habitat | | | | | | | | | | | | | ● |

## Getting There

Costs associated with implementation of the actions in the Roadmap and delisting of the AOC are currently estimated to range from $300-$400M. In addition, operational support from U.S. EPA for AOC staff at MPCA, WDNR, MDNR, and FDL is crucial for successful completion of the plan. This support must be both stable and sustained; completion of this aggressive plan requires program staff positions to be maintained over the long term without interruption.

This plan defines a reasonable and effective path forward to restoring the AOC, so the legacy of the St. Louis River estuary can be redefined for local residents and visitors in this generation and generations to come.

# Section 1: Introduction

This Remedial Action Plan (RAP) Update presents a comprehensive plan for delisting the St. Louis River Area of Concern (AOC). The AOC Delisting Roadmap (Roadmap) contained herein details the actions necessary to remove each of the nine beneficial use impairments (BUIs) identified for the St. Louis River AOC. The Roadmap was developed through the Implementation Framework Project funded by a U.S. EPA Great Lakes Restoration Initiative Grant awarded to the MPCA in 2011.

The two-year Implementation Framework Project (Framework) was led by AOC Coordinators from the Minnesota Pollution Control Agency (MPCA), Wisconsin Department of Natural Resources (WDNR), Minnesota Department of Natural Resources (MDNR), the Fond du Lac Band of Lake Superior Chippewa (FDL), and the Executive Director of the St. Louis River Alliance (SLRA). An extensive stakeholder involvement process was undertaken for the project to develop this important AOC plan. The following partners were involved with its development:

- Minnesota Pollution Control Agency
- Wisconsin Department of Natural Resources
- Minnesota Department of Natural Resources
- Fond du Lac Band of Lake Superior Chippewa
- St. Louis River Alliance
- Harbor Technical Advisory Committee
- Port Authority
- Duluth-Superior Metropolitan Interstate Council
- U.S. EPA Mid-Continent Ecology Division (U.S. EPA MED)
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers Detroit District (USACE)
- City of Duluth, MN
- City of Superior, WI
- Western Lake Superior Sanitary District
- Douglas County, WI
- Douglas County Health Department
- Minnesota Department of Health
- Minnesota Land Trust
- West Wisconsin Land Trust
- National Oceanic and Atmospheric Administration Lake Superior National Estuarine Research Reserve
- University of Minnesota–Duluth (UMD)
- University of Wisconsin-Superior (UWS)
- University of Wisconsin-Superior Extension
- University of Minnesota Natural Resources Research Institute (NRRI)
- U.S. Department of Agriculture

- Audubon Minnesota
- Wisconsin Sea Grant
- AMI Consultants
- Barr Engineering
- LimnoTech
- Marine Tech
- Short, Elliot, Hendrickson

This Volume I: RAP Update is organized in the following major sections:

Section 1: Introduction

Section 2: Background

Section 3: Overview of the Implementation Framework Project

Section 4: AOC Delisting Roadmap

Section 5: St. Louis River AOC Management and Decision-Making Framework

Section 6: References

Appendices are provided under separate cover in Volume II.

# Section 2: Background

This section provides a brief background on the Great Lakes Water Quality Agreement (GLWQA), listing of the St. Louis River AOC, and a timeline of important AOC work products leading up to this St. Louis River AOC RAP Update.

## Great Lakes Water Quality Agreement

Initially signed in 1972, the GLWQA is a non-regulatory agreement between the U.S. and Canada that requires the governments to take specific steps to reduce discharge of conventional pollutants, and signals a commitment to reverse the progressive decline and deterioration of the Great Lakes ecosystem. The GLWQA reflects each country's commitment "to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem" and includes a number of objectives and guidelines to achieve these goals.

There were noticeable improvements in Great Lakes water quality following the implementation of the GLWQA. An estimated nine billion dollars was spent toward controlling conventional pollutants through upgrades or construction of wastewater treatment plants. In the years following the 1972 GLWQA, continued monitoring and research showed that toxic chemicals in the environment presented a potentially greater threat than conventional pollutants. Consequently, the GLWQA was amended in 1978 to address toxic pollutants. It soon became clear, however, that the GLWQA generally lacked an effective means of implementation.

In 1987, the GLWQA was amended once again to strengthen the programs, practices, and technology described in the 1978 amendment, and to increase accountability for their implementation. As a result, timetables were developed for implementation of specific programs. The 1987 amendment also established the concept of "Areas of Concern" that represented the most severely impacted geographic areas around the Great Lakes Basin and set forth the remedial action plan (RAP) process to address them. The RAP process incorporated a systematic and comprehensive ecosystem approach that also included substantial citizen participation. The 1987 amendment required that RAP documents be submitted at three stages: I. Definition of the problem is complete; II. Remedial and regulatory measures have been selected; and III. Monitoring indicates that beneficial uses have been restored (and the AOC can be delisted). An amendment to the GLWQA signed in 2012 consolidated the previously described stages of the RAP process (i.e., Stages I, II, and III) into one inclusive RAP process. The St. Louis River AOC was identified as one of 43 AOCs across the Great Lakes. MPCA and WDNR are the regulatory agencies designated by U.S. EPA to address AOCs in their respective states.

# Listing of the St. Louis River AOC

The St. Louis River AOC is the single 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 (SLRCAC, 1992), Stage II RAP (MPCA and WDNR, 1995) and the Lower St. Louis River Habitat Plan (SLRCAC, 2002).

The geographic region outlining the St. Louis River AOC was initially defined as the St. Louis River below Fond du Lac Dam and including St. Louis Bay and Superior Bay. Consideration is to be given to "any factor within the St. Louis River watershed contributing to problems of the water resource" (SLRCAC, 1992). Later, the AOC was expanded to include the St. Louis River from upstream of the City of Cloquet downstream to Lake Superior, and the Nemadji River watershed (Stage II RAP; MPCA and WDNR, 1995). The current AOC boundary is shown in Figure 1.

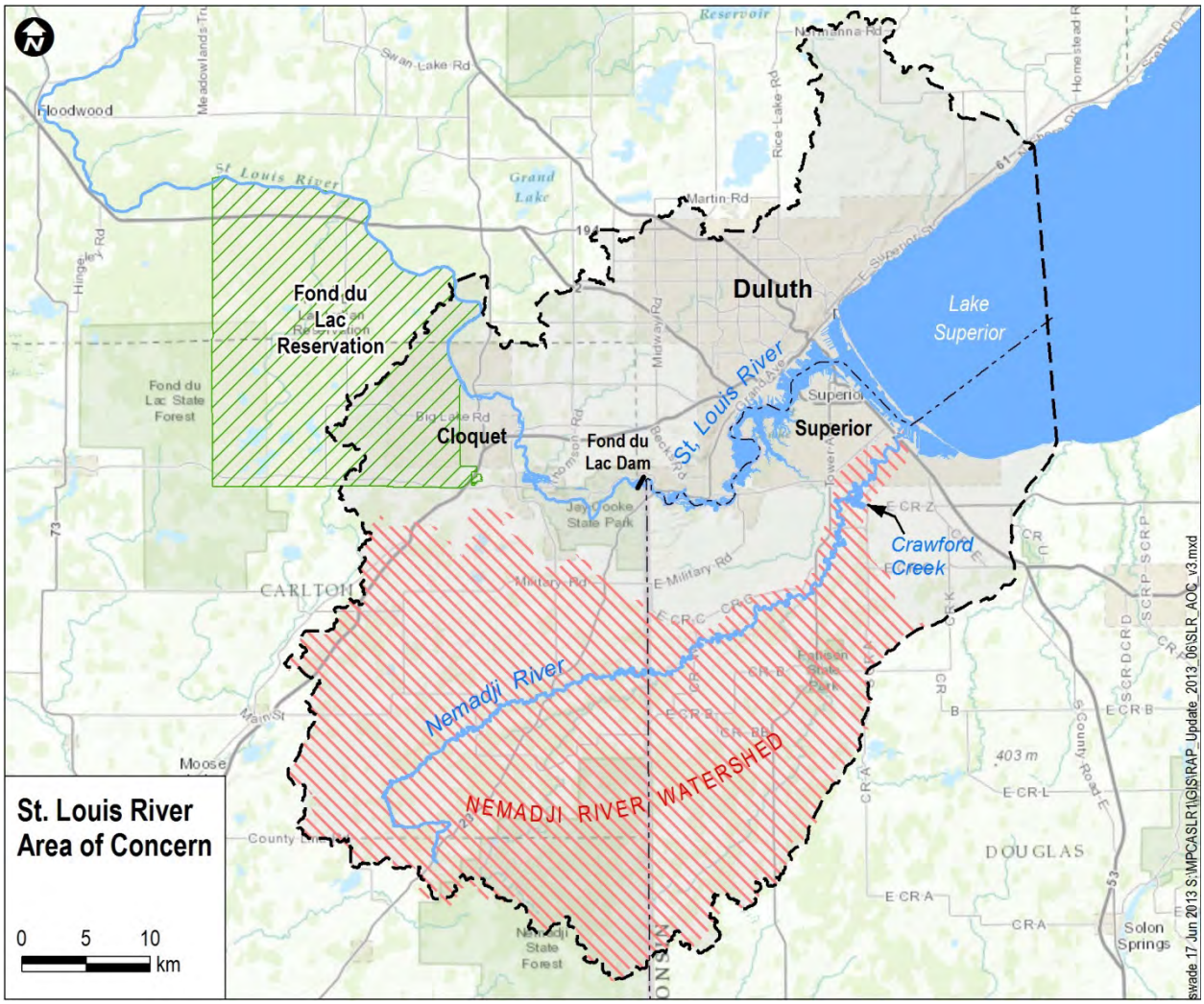


**Figure 1: St. Louis River AOC Boundary**

Most of the actions included in this St. Louis River AOC RAP Update focus on the St. Louis River below Fond du Lac Dam, Crawford Creek, and the Nemadji River watershed, as they represent those portions of the AOC most impacted by historical actions.

The St. Louis River was originally listed as an AOC in 1987 because of the large amount of suspended solids, nutrients, and biochemical oxygen demand discharged to the river from various industries and communities (SLRCAC, 1992). By the time the Stage I RAP was developed in 1992, much of these discharges were being treated as required by the Clean Water Act, and the primary concerns for the AOC were legacy contamination and historical habitat degradation, as well as excess sediment and nutrient inputs. These sources of impairment led to the designation of nine of the possible 14 beneficial use impairments (BUIs):

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 majority of the BUIs for the St. Louis River AOC are related to historical 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, but it has also 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 or hydrologically connected habitat.

# Timeline of AOC Work Products

The St. Louis River AOC Stage I RAP (SLRCAC, 1992) was developed as a collaborative effort between the MPCA and the WDNR. At that time, these agencies supported an extensive public participation process that resulted in the development of the Stage 1 RAP and the Stage 2 RAP Progress Report (MPCA and WDNR, 1995). Many efforts in association with the RAP have taken place since this time. These efforts and associated publications are briefly described chronologically in the following sections.

## Stage I RAP (1992)

The St. Louis River System Stage I RAP was published in 1992 (SLRCAC, 1992). A 32-member Citizen Advisory Committee (CAC) was formed to oversee development of the document, which was a collaborative effort between MPCA and WDNR. The Stage I RAP described the environmental problems in the St. Louis River AOC and presented 16 overall goals for the RAP process. These goals were intended to provide a framework for the development of recommendations to address BUIs. For each of the nine BUIs, the RAP details the rationale for listing, provides historical perspective, and describes the available data and supporting evidence used as the basis for impairment selection in the St. Louis River AOC.

## St. Louis River Remedial Action Plan Progress Report (1995)

A progress report containing recommendations to restore the beneficial uses in the AOC was published in 1995 by MPCA and WDNR (MPCA and WDNR, 1995). The document outlined 43 recommendations, approved by the CAC, to address the environmental problems identified in the Stage I RAP.

Implementation of these recommendations began immediately and continues today. Some recommended actions have been completed or are well underway, such as: (1) land acquisition, with 34,000 acres bordering the St. Louis River permanently protected by purchase or donation; (2) connection of the Fond du Lac neighborhood of Duluth, MN, responsible for a high percentage of failing septic systems, to the WLSSD; (3) programs to reduce sewage bypasses by keeping stormwater out of sanitary sewer systems; and (4) completion of a habitat plan for the lower St. Louis River.

## Progress Report Update (2001)

The 2001 Progress Report Update (MPCA and WDNR, 2001) outlines the 43 RAP recommendations from the 1995 Progress Report. The brief report details the up-to-date progress made toward implementing each recommendation, including the percent complete for each recommendation and an assigned grade for the level of implementation based on percent completion.

## Lower St. Louis River Habitat Plan (2002)

The Lower St. Louis River Habitat Plan (Habitat Plan; SLRCAC, 2002) was published in 2002. The plan was developed by the St. Louis River CAC and was funded by a grant through the U.S. EPA with additional support from the MDNR Conservation Partners Program, the U.S. Fish and Wildlife Service, and The Nature Conservancy. The Habitat Plan was developed to “to facilitate protection of the ecological diversity of the Lower St. Louis River” (SLRCAC, 2002).

Conservation targets were developed to define the native species, plant communities, aquatic habitats, and ecological systems that are the focus for conservation in the Lower St. Louis River. The Habitat Plan presents 18 strategies to address the most significant identified threats to the conservation targets and to move toward achieving conservation goals.

## Hog Island and Newton Creek Ecological Restoration Master Plan (2007)

The Hog Island and Newton Creek Ecological Restoration Master Plan (Biohabitats, 2007) was developed to provide a plan for the restoration of natural communities and ecosystem processes for Newton Creek, the Hog Island Inlet, and Hog Island in Superior, Wisconsin. The plan incorporated specific recommendations of the Lower St. Louis River Habitat Plan and was intended to address a suite of AOC BUIs.

WDNR and U.S. EPA partnered to use Great Lakes Legacy Act (GLLA) funds to implement contaminated sediment remediation of the Newton Creek and Hog Island Inlet system in 2005. This work resulted in the removal of ecological and human health hazards. Following sediment remediation, additional work was completed at the site to provide habitat enhancements.

## St. Louis River Area of Concern Complete Delisting Targets (2011)

In 2008, the SLRA facilitated a process to combine delisting targets from Minnesota and Wisconsin. A list of targets describing desired outcomes for each BUI was provided to the U.S. EPA (MPCA and WDNR, 2008). In 2011, The Complete Delisting Targets document (MPCA and WDNR, 2011) was developed to include the 2008 delisting targets along with International Joint Commission (IJC) guidelines that were established for a particular BUI ("IJC Criteria"), the basis for listing nine of the fourteen possible BUIs in the St. Louis River AOC ("Rationale for Listing"), and the basis for the target chosen for a particular BUI ("Rationale for Removal"). The 2008 delisting targets are referred to as "BUI removal targets" in this RAP Update.

## Lower St. Louis River Habitat Plan Appendix 9 Strategies Implementation Planning Worksheets (2011)

Appendix 9 of the Lower St. Louis River Habitat Plan (SLRCAC, 2002) was published in 2011 (SLRCAC, 2011). As described above, the Habitat Plan was prepared to facilitate protection of the ecological diversity in the St. Louis River. Appendix 9 contains a set of project descriptions termed "Implementation Strategies Worksheets" associated with 15 of the 18 strategies included in the Habitat Plan. The projects were identified by AOC stakeholders to mitigate threats to the St. Louis River.

Each project worksheet includes background information, goals, a listing of BUIs addressed, project locations, relative project priority, anticipated duration, potential funding mechanisms, partnering organizations, estimated costs, any special considerations surrounding the project, and description of how success of the project will be measured.

Appendix 9 is updated and maintained by the SLRA Habitat Work Group. This group has worked to support implementation of the projects listed in the Implementation Strategies Worksheets. Several of

the habitat restoration projects listed in the Roadmap for BUI 9: Loss of Fish and Wildlife Habitat (see Section 4) originated as Implementation Strategies Worksheets.

## Stage 2 Remedial Action Plan Update for the St. Louis Area of Concern (2011)

The 2011 Stage 2 Remedial Action Plan Update (WDNR, 2011) served as an update to the 1995 St. Louis River AOC RAP Progress Report. It was produced by the WDNR, with input from AOC partners, to provide short-term direction for overall statewide AOC coordination in Wisconsin. The document was intended to be a concise summary of BUI status and specific actions necessary for reaching the BUI delisting targets. Actions included on-the-ground restoration projects, monitoring and assessment projects, and/or stakeholder engagement processes. The 2011 Progress Update also identified challenges affecting progress on each BUI.

## Remedial Action Plan Update for the St. Louis River Area of Concern (2012)

The 2012 Remedial Action Plan Update (WDNR, 2012) was developed by WDNR, with input from AOC partners, as an interim document to assist in providing direction in the short-term for overall statewide AOC coordination in Wisconsin. The 2012 update followed the same format as the 2011 update, presenting the current status of each BUI, next actions identified, and issues affecting BUI progress.

# Section 3: Overview of the Implementation Framework Project

This section provides an overview of the Implementation Framework Project, including description of project goals and process, the stakeholder involvement process, BUI Blueprints, and the St. Louis River Area of Concern Remediation to Restoration Template.

## Goals and Process

The MPCA was awarded a competitive Great Lakes Restoration Initiative grant from U.S. EPA in 2011 for the "Implementation Framework" (Framework) project. The primary goal of the project was to support AOC coordinators for Minnesota, Wisconsin, and the Fond du Lac Band of Lake Superior Chippewa (FDL) in developing a plan for delisting the St. Louis River AOC. This goal was achieved through the development of BUI blueprints, which were subsequently used to design a roadmap to delist the AOC. A secondary goal of the project was to support restoration planning for priority sites through development of remediation to restoration (R2R) concept plans that could be used to seek funding for project implementation. This goal was achieved through development of an R2R Template that established a common understanding of the R2R process, as well as development of six concept plans for high-priority R2R sites.

The Framework project was supported by the MPCA contractor, LimnoTech, as selected by AOC coordinators from MPCA, WDNR, MDNR, and FDL, and the Executive Director of the St. Louis River Alliance (SLRA; the AOC's citizen action committee).

Beginning in June 2011, the four AOC coordinators and the SLRA Executive Director began meeting twice monthly for the Framework project with LimnoTech. This group was responsible for developing the coordinated bi-state approach for project completion. Their responsibilities included:

- Defining project deliverables and timelines
- Decision-making on AOC program direction
- Defining the stakeholder process that would be used throughout the project
- Review and approval of all project documents
- Decision-making regarding the necessary and sufficient actions to address each BUI
- Representation of their respective agency viewpoints on BUI removal objectives and strategies during development of the AOC Delisting Roadmap

The primary outcome of the Framework is the AOC Delisting Roadmap (Roadmap; Section 4), which defines the measureable targets, removal strategies, and prioritized management actions for each of the nine BUIs in the St. Louis River AOC. The Roadmap contains the prioritized management actions necessary to address each BUI based on the current body of knowledge for each BUI. It is an adaptive

management plan, and therefore will be updated regularly by the AOC coordinators to incorporate new information and progress.

The Roadmap is based on the set of BUI blueprints created by the stakeholder process designed for the Framework project. The stakeholder involvement plan, BUI blueprints, and the St. Louis River AOC R2R Template are described briefly below and are provided in full in Appendices A, D, and E, respectively. The AOC Delisting Roadmap is provided in Section 4. The management and decision-making framework for implementing the AOC Delisting Roadmap is provided in Section 5.

## Stakeholder Involvement

A stakeholder involvement plan (SIP) was developed at the start of the Framework project (Appendix A). The primary objective of the stakeholder process was to enable all AOC stakeholders, not only the State regulatory agencies, to take action to improve the AOC in a coordinated, cooperative, and directed manner. Therefore, the SIP resulted in comprehensive contributions to BUI removal objectives and provided a sense of ownership of the AOC Delisting Roadmap.

Because of the complexity of issues addressed in the Framework project, a key element for project success involved educating and informing stakeholders early on. Stakeholders were informed of how the project would proceed and the vision for the primary work products. In addition, given the significant knowledge and experience of the stakeholders in the AOC, the SIP was designed to involve stakeholder groups in meaningful ways throughout the project to maximize the value of their contributions.

The SIP identified key existing stakeholder groups (AOC Coordinators, SLRA, and the Harbor Technical Advisory Committee) to be involved in the project, and described additional groups that were formed for the project (BUI Teams, Scientific Advisory Group). The organization of the stakeholder groups is presented in Figure 2. Engagement was categorized as follows:

- **Inform** through presentations at regularly scheduled meetings.
- **Solicit comment** on project elements after providing documents for review or presentations at regularly scheduled meetings. Comments were considered for incorporation into final documents.
- **Direct input** was requested to develop project elements at task-specific workshops or meetings.
- **Review and approval** of documents for incorporation into final project deliverables.

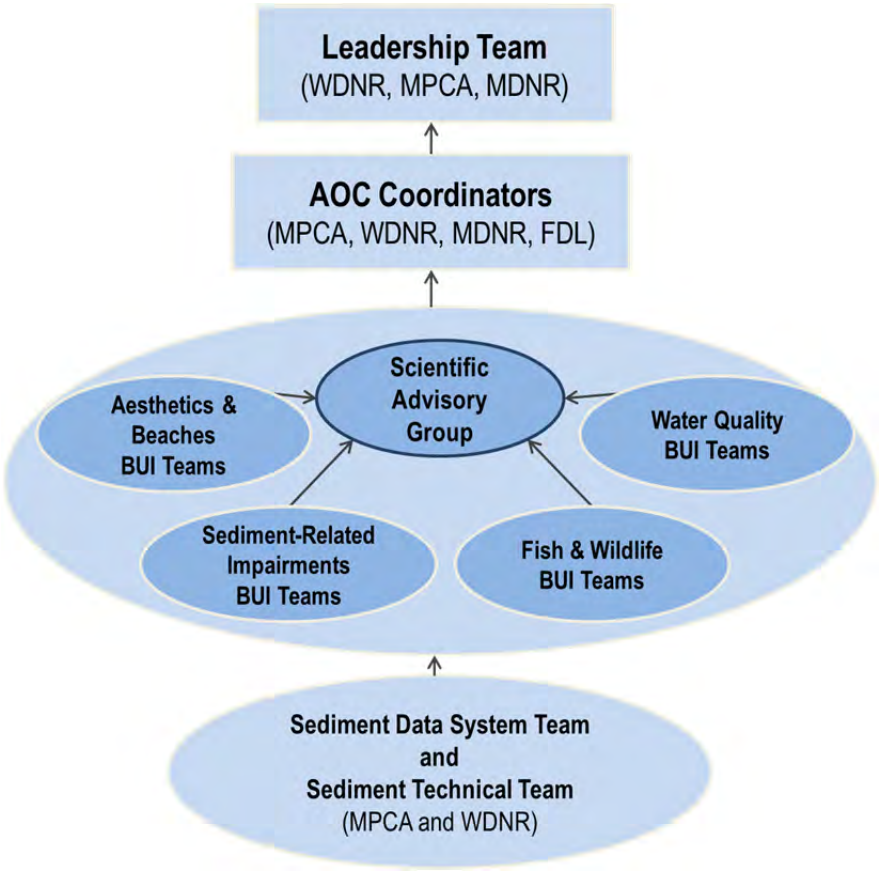


**Figure 2: Organizational and Decision-Making Structure of AOC Stakeholders**

The two primary groups charged with developing the Roadmap were the AOC Coordinators and BUI Teams. A Science Advisory Group (SAG) reviewed project elements at key points in the process. Two additional teams, the St. Louis River AOC Data System Team and the Sediment Technical Team, were formed to provide technical support to the Framework project on sediment contaminant issues. Development of the stakeholder teams, including their roles and responsibilities, is described below.

## BUI Teams

BUI Teams were formed with the charge of developing BUI Blueprints (described in the following section) for each BUI. The intent of the AOC coordinators in forming and tasking the BUI Teams was twofold: 1) incorporate the wealth and breadth of local stakeholders' knowledge and expertise of AOC issues; and 2) align ongoing research and projects to better serve AOC delisting actions.

Four BUI Teams were formed to address the nine BUIs as follows:

**Aesthetics and Beaches** – Led by SLRA Executive Director

- Degradation of Aesthetics
- Beach Closings and Body Contact Restrictions

**Sediment-Related BUIs** – Led by WDNR AOC Coordinator

- Fish Consumption Advisories
- Fish Tumors and Deformities
- Restrictions on Dredging
- Degradation of Benthos

**Fish and Wildlife** – Led by MDNR and FDL AOC Coordinators

- Degraded Fish and Wildlife Populations
- Loss of Fish and Wildlife Habitat

**Water Quality** – Led by MPCA AOC Coordinator

- Excessive Loading of Sediment and Nutrients

The BUI Team leader(s) were tasked with developing initial lists of possible members for their teams with a focus on bi-state and tribal representation. These lists were reviewed and refined by the AOC coordinators. Members of the SLRA Habitat Work Group, Harbor Technical Advisory Committee (HTAC), SLRA, local units of government, federal agencies, non-governmental organizations, private sector firms, and research institutions were invited to join one or more BUI Teams. AOC coordinators sent invitations to potential team members; volunteers were also accepted (no one was excluded from the BUI Teams). The resulting BUI Team participants are provided in Appendix B. The nine teams consist of over 50 individuals representing the breadth of AOC partners and stakeholders.

## Scientific Advisory Group

The SAG was formed to provide technical advice and peer review of the BUI Blueprints. The SAG was requested to review the scientific basis of the BUI Blueprints as well as specific components of the blueprints, such as source/stressor models and cause-effect relationships in the system.

A list of potential members for the SAG was developed by the AOC leadership team from MPCA and WDNR, with a focus on developing a bi-state and a tribal panel of experts that covered the breadth of topics involved with the nine BUIs. The list of nine SAG members is provided in Appendix B.

## St. Louis River AOC Data System Team and Sediment Technical Team

The St. Louis River AOC Data System Team was formed to oversee expansion and improvement of the AOC sediment contaminant database into an AOC Data System. The team was led by staff from MPCA and WDNR, and consists of a diverse group of members from MPCA, WDNR, MDNR, and other AOC partners. The Sediment Technical Team consists of staff from MPCA and WDNR responsible for developing protocols for assessing sediment contaminant data across the AOC (contained with the AOC data system), determining the need for remedial action at locations across the AOC, and supporting AOC coordinators and the leadership team in decision-making on necessary actions to address sediment contamination.

# BUI Blueprints

BUI Teams were tasked with developing blueprints following the BUI Team Charge (Appendix C), which served as a work plan for BUI Team tasks. Each team was provided with a preliminary BUI Blueprint prepared by LimnoTech to serve as a starting point. The complete blueprints developed by the BUI Teams were reviewed by the SAG. The BUI Teams considered SAG comments in finalizing the blueprints. The work began in November 2011, and the majority of BUI Blueprints were completed by June 2012.

BUI Team leaders developed their own meeting schedules and communication methods. A website was set up for the project to facilitate information and document sharing; the website also allowed online document editing. The team leaders convened bimonthly with LimnoTech to discuss issues arising from team efforts, processes, and format and to make project decisions. Assistance was provided by LimnoTech at BUI Team meetings and in finalizing team documents, as requested by the team leaders.

Each BUI Blueprint consists of the following major sections:

- **Summary Statement** - A summary documenting the BUI Team process, including important decisions regarding BUI delisting target interpretation and removal strategies.
- **Source/Stressor Model** - The source/stressor model, developed based on existing research and monitoring in the AOC, identifies the primary sources of each system stressor and the relationships between the sources and the nine BUIs. The intent of the conceptual model was to assist in identifying applicable BUI indicators, remaining legacy sources, and priority actions that affect multiple BUIs.
- **Measureable Indicators Specific to the BUI –** This includes the set of BUI-specific indicators, including status indicators and other measureable indicators that were selected by the BUI Team to measure BUI condition. Indicators were selected to provide measurable objectives for the Final Delisting Targets developed in 2008.
- **Rationale for Listing** - Historical conditions of stressors and sources are described in this section based on information from the Stage I RAP. The rationale focuses on the original basis for listing the BUI.
- **Statement of Current Conditions** - Current conditions of stressors and sources and measurable indicators are described based on the most recent available assessments of monitoring and research data, as reviewed and compiled by the BUI Team.
- **Information Gaps** - Information gaps on historical conditions, current conditions, stressors and sources, and measurable indicators are listed. Projects to address identified information gaps are included in the prioritized list of actions.
- **Sequential List of Prioritized Actions to Achieve BUI Removal** - A sequential list of prioritized actions was developed by BUI Teams based on several sources including action items defined to address any identified information gaps; priority R2R projects identified by stakeholder groups; and applicable projects already described in existing AOC plans (e.g., Lower St. Louis River Habitat Plan). Priorities were assigned by each BUI Team.

- **Permitting and Regulatory Process** - Listing of important regulatory process steps and permits that may be required to implement the actions to achieve BUI removal.
- **Resources Needed** - Identified partners, landowners, potential funding resources, etc., that may be required to implement identified action items/R2R projects.
- **Anticipated Timeline for Achieving BUI Removal** - Anticipated timelines for removing the BUI. The timelines were developed using best professional judgment of the BUI Team.
- **Costs** - Order of magnitude cost projections for implementing the identified action items using best professional judgment and information on-hand.
- **Ongoing Monitoring Needs** - Monitoring needs related to ongoing tracking of measureable indicators are described.
- **Future Issues or Concerns**- A "parking lot" section for upcoming issues identified by the BUI Team that may affect the BUI but were not part of the original rationale for listing.

The final BUI Blueprints, as developed and reviewed by stakeholder teams, are provided in Appendix D. These blueprints represent the final product of each BUI stakeholder process, and are therefore written with different voices and perspectives based on the varied history, knowledge, and status of a particular BUI. The blueprints served as the basis for the development of the Roadmap (Section 4).

# Remediation to Restoration (R2R) Template

The St. Louis River AOC has adopted a systematic approach for simultaneously addressing contaminated sediments and degraded habitat while incorporating desired environmental and economic outcomes. This approach has been termed Remediation to Restoration (R2R).

During the Framework project, the need to document the major steps in the R2R process to more effectively communicate it to AOC stakeholders and partners was identified. As a result, the St. Louis River Remediation to Restoration (R2R) Template (LimnoTech, 2012; Appendix E) was developed. The document describes the major steps in the R2R process, as indicated in Figure 3.

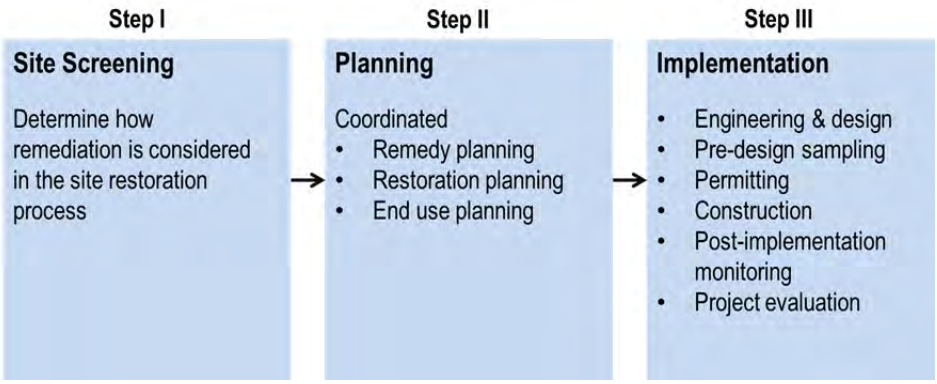


**Figure 3: Major Components of the R2R Process**

The R2R template is intended to create a common understanding throughout the decision-making and planning process for those elements that should be considered concurrently when undertaking restoration activities. A restoration plan for any R2R site guided by the template ensures that continuity and critical oversight are embedded with remediation recommendations, restoration objectives, and human use needs. The R2R process described in the template ensures compatibility among remediation targets, restoration objectives, and resulting human use services.

A draft of the R2R template was reviewed by a wide group of AOC partners, including MPCA, MDNR, WDNR, FDL, HTAC, Minnesota Land Trust, U.S. Fish and Wildlife Service, U.S. EPA Great Lakes National Program Office, U.S. EPA Mid-Continent Ecology Division, U.S. Army Corps of Engineers Detroit District, and SAG. Comments from reviewers were carefully considered by a subset of AOC coordinators (MPCA and FDL) and the document was revised and finalized to reflect the body of comments received.

## St. Louis River AOC Data System and AOC-Wide Sediment Characterization

Prior to and during the development of the RAP Update, the St. Louis River AOC sediment contaminant database (previously called the Phase IV database) underwent improvements to organize past, present and future data to serve the short- and long-term needs of the St. Louis River AOC. This effort included importing the extensive sediment contaminant datasets for the AOC from sampling efforts in 2010 and 2011 by U.S. EPA and USACE. The data system project was initiated when partners/stakeholders asked for a user-friendly and accessible tool that contained the data that had been collected over the years. This led to the conceptualization of the St. Louis River AOC Data System that would serve as a tool to help assess the various data on a site-by-site basis, inform resource management decisions, and evaluate and track implementation progress to inform BUI removal strategies. Data System improvement efforts were overseen by the Sediment Data System Team (as described above; Figure 2).

The St. Louis River AOC Data System is now designed to accept new data, standardize elements within the data for statistical analysis, calculate benthic macroinvertebrate community metrics, calculate sediment contaminant measures for comparison to consensus-based sediment quality guidelines established for the AOC, calculate additional sediment contaminant measures (i.e., sediment quality index or SeQI), assist in identifying data gaps, and act as a central data repository for the AOC. The Data System currently includes sediment data (both physical and contaminant), benthic macroinvertebrate data, and sediment toxicity data. Additional data types important to the St. Louis River AOC delisting efforts may be incorporated into the database over time (e.g., bird surveys, water quality, vegetation). Efforts are now underway to develop the Data System into a web-based system.

The sediment contaminant data contained in the St. Louis River AOC Data System was used to conduct an AOC-wide sediment characterization to support development of the RAP Update. This effort, which is described further in Section 4, was overseen by the Sediment Technical Team (as described above; Figure 2) and is documented in the *St. Louis River Area of Concern Sediment Characterization: Final Report* (LimnoTech, 2013; Appendix F).

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# Section 4: AOC Delisting Roadmap

This section presents the AOC Delisting Roadmap (Roadmap) and is organized in the following sections:

- **Overview of the Roadmap** is intended to provide readers with a concise summary of actions and timelines and describes the organization, contents, and format of the Roadmap
- **Sediment Characterization and BUI Roadmaps** presents the Roadmap sections for sediment characterization and the nine BUIs

## Overview of the Roadmap

The Roadmap contained in this section is based on information in the BUI Blueprints developed by the extensive list of stakeholders as described in Section 3. Using the BUI Blueprints as a basis, AOC coordinators and leaders worked to refine the BUI removal target interpretations, articulate BUI removal strategies, and develop the actions needed to achieve removal of each BUI. The removal strategies and actions selected through this process are intended to represent the work that is necessary and sufficient to delist the AOC, while recognizing that the plan is a tool for management and must be adaptive as information becomes available and action items are completed.

Many efforts are already underway throughout the AOC that will contribute directly to BUI removal as defined by the BUI removal strategies described in this Roadmap. Current projects include:

- St. Louis River AOC Data System updates and maintenance
- Pre-construction biological monitoring at R2R Sites
- Development of a wild rice plan and wild rice restoration at Rask Bay and additional sites in the estuary in Minnesota
- USACE pilot project for dredge material placement at 21$^{st}$ Ave W and associated monitoring
- Bathymetric data collection and volume estimates for R2R sites
- Bioaccumulation study to inform prioritization of R2R site restoration efforts based on bioavailability
- Baseline environmental data assessment at Pickle Pond
- Clough Island conifer restoration, invasive species control and aquatic/terrestrial condition assessment
- Construction engineering evaluation of proposed restoration concept at Grassy Point
- Debris removal at Radio Tower Bay
- Preliminary concept restoration proposal for 40th Avenue West
- Common Tern survey
- Piping Plover habitat restoration at Wisconsin Point and Schaefer Beach
- Howards Bay sediment characterization and environmental dredging proposal
- Fish tumor sampling and analysis
- Communications and outreach to stakeholders and the community at large

The primary focus of the majority of "on the ground" management actions represented in the Roadmap is remediation of contaminated sediments and habitat restoration. Sediment contamination in the AOC contributes directly or indirectly to eight of the nine BUIs (BUI 6: Excess Loading of Sediment and Nutrients is the exception); cleanup of contaminated sediments is an obvious focus of AOC restoration efforts, not only from an ecological standpoint but also from the standpoint of stakeholder concern. On the habitat front, recent estimates confirm that approximately 3,400 acres of aquatic habitat has been lost over time in the St. Louis River (Hollenhorst et al., 2013). A goal for AOC delisting is restoration of 50% of this lost habitat (1,700 acres).

Sites identified for remediation of contaminated sediments in the AOC are shown in Figure 4. Planned habitat restoration projects are shown in Figure 5, and include both aquatic habitat restoration sites and additional projects in important hydrologically connected habitats. In both figures, aquatic sites are color coded according to a scheme adopted by MPCA and WDNR to represent the level of remedial action necessary. The scheme and its development are described in the Sediment Characterization section to follow.

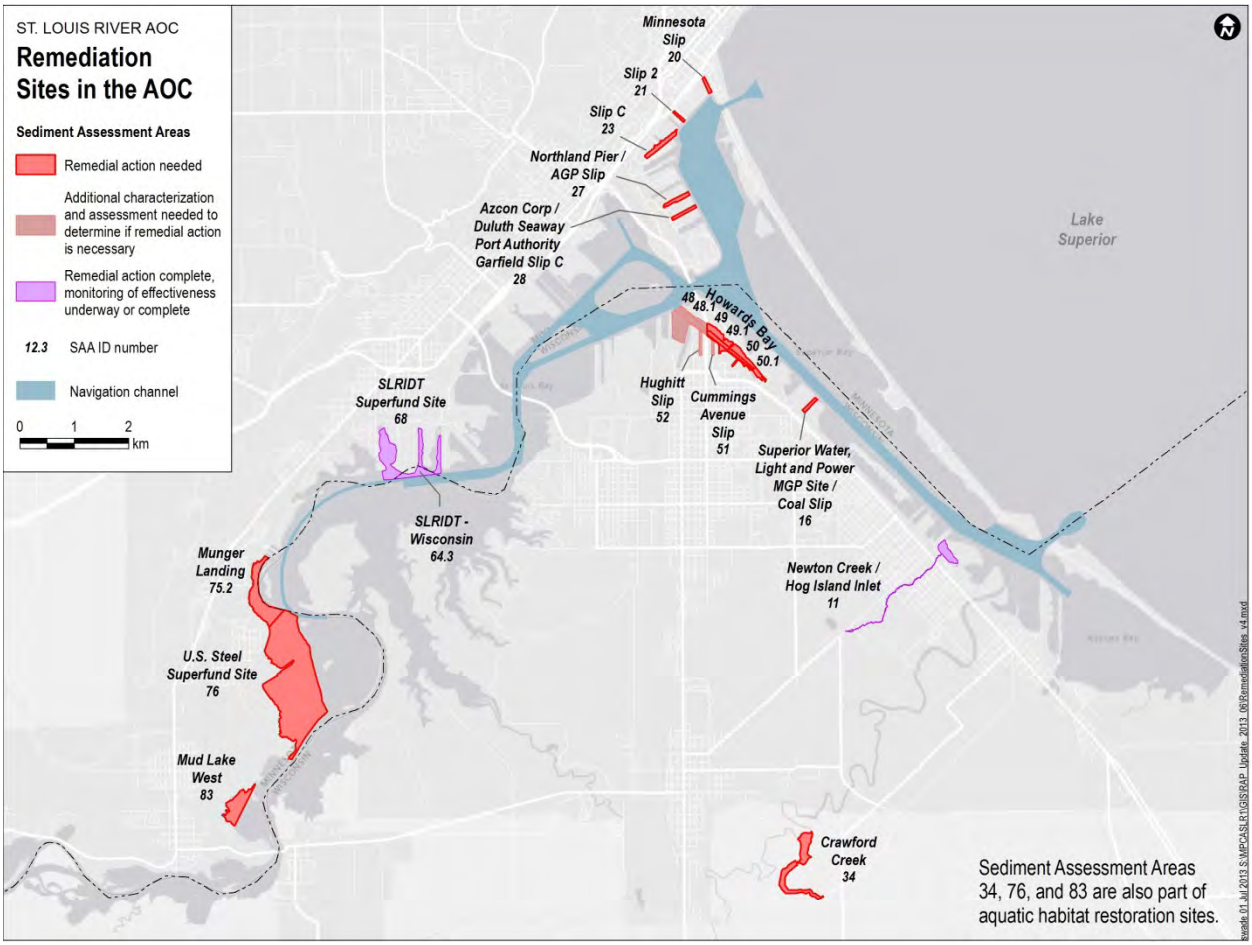


**Figure 4: Remediation Sites in the St. Louis River AOC**

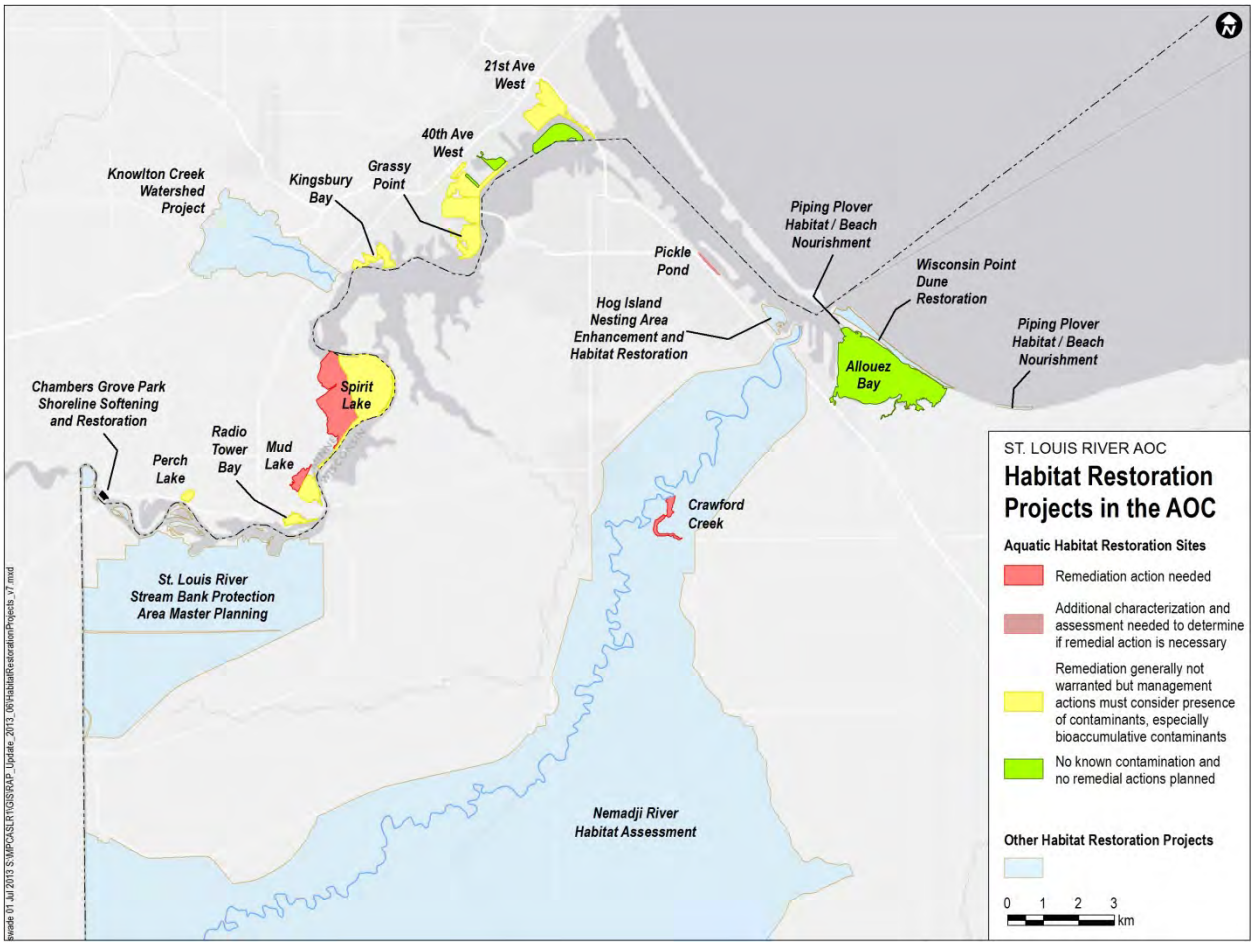


**Figure 5: Habitat Restoration Projects Planned in the St. Louis River AOC**

The Roadmap describes the BUI removal strategies that led to selection of these remediation sites and habitat restoration sites and additional projects to achieve BUI removal objectives. A list of actions necessary to achieve removal is provided for each BUI that includes planning-level costs and dates for completion of each identified action. Based on these lists of actions, anticipated BUI removal timelines are given. The target date for delisting the St. Louis River AOC is 2025; the removal timelines for each BUI are shown in Table 1.

**Table 1: Anticipated BUI Removal Timelines**

| BUI | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 Sediments and Nutrients | | | | ● | | | | | | | | | |
| BUI 7: Beach Closings and Body Contact Restrictions | | | | | | ● | | | | | | | |
| BUI 8: Degradation of Aesthetics | | | ● | | | | | | | | | | |
| BUI 9: Loss of Fish and Wildlife Habitat | | | | | | | | | | | | | ● |

Best professional judgment based on currently available information and level of planning indicates that contractual costs for implementation of the BUI removal strategies and associated actions included in the Roadmap could range from $300-$400M. As refined cost estimates become available for identified actions, they will be incorporated in future RAP updates. It is important to note that these are estimated funds needed to implement future actions and do not include costs already expended on the significant efforts already made towards AOC delisting. Preliminary estimates indicate that more than $420M has been invested since 1978 on infrastructure upgrades, remediation, and habitat restoration and protection in the AOC.

## Roadmap Organization

The Roadmap is organized into ten sections, including a section on sediment characterization followed by nine individual BUI roadmaps.

The sediment characterization section describes the work done by MPCA and WDNR to evaluate sediment contaminant levels across the AOC based on data contained in the St. Louis River AOC Data System. This section also describes additional sediment characterization needs identified by MPCA and WDNR that are necessary to support the removal strategies and actions described in this RAP Update.

The individual BUI roadmaps include the following sections:

- **Rationale for Listing** – The rationale for listing as stated in the Stage I RAP.
- **BUI Removal Target** – The BUI delisting targets established in 2008 (MPCA and WDNR, 2008). It includes definitions of terms and interpretations of the BUI, presented as specific removal

objectives, as refined for the purposes of this RAP Update. An emphasis was placed on defining measureable and achievable removal targets for each BUI.

- **BUI Removal Strategy** – The 2013 strategy developed to meet the BUI removal target based on the BUI removal objectives and interpretations of the removal target. Major steps necessary to reach the BUI removal target are described.
- **BUI Status** – Provides the status of the BUI in relationship to major phases of BUI removal . The major phases include:
    - *Targets:* Are indicators set?
    - *Assessment*: Is data collection needed for target assessment? Is data assessed against targets?
    - *Implementation Projects*: Are management actions necessary? Are management actions underway? Are management actions complete?
    - *Monitoring*: Is monitoring to confirm removal in progress? Is monitoring to confirm removal complete?
    - *Removal*: Is the BUI ready for removal?
- **BUI Actions Still Needed to Achieve Removal** – The table includes a list of projects needed for BUI removal. Actions included for each BUI stem from the BUI Blueprints and were further refined by roadmap development process. Final projects were selected based on their measurable contribution to BUI removal. Details for each action include:
    - *Project number:* a unique number given to a project
    - *Project name*
    - *Project description:* a brief description of the project intent
    - *In-house/contractual* : indication of who will conduct the work
    - *Date to be completed*
    - *Estimated project cost:* costs provided are **planning-level estimates**
- **Anticipated Timeline to Remove BUI** – The year in which the BUI is anticipated to be removed, based on successful completion of the BUI removal strategies and actions.

The sediment characterization and individual BUI roadmaps are presented in the following subsections.

# Sediment Characterization

Legacy sediment contamination in the AOC contributes directly or indirectly to eight of the nine BUIs. This section describes the sediment characterization work conducted in the St. Louis River AOC to provide information for the development of action items that support BUI removal strategies and define where additional sediment contaminant sampling is needed.

To support development of the RAP Update, MPCA (with GLRI funds) sponsored an AOC-wide sediment characterization project in 2012 to support analysis of the sediment contaminant data contained in the St. Louis River AOC Data System (described in Section 3). The data were analyzed to provide a planning-level view of the status of sediment contamination across the AOC. The Sediment Technical Team (described in Section 3), consisting of staff from MPCA and WDNR, directed analyses and presentation of the data for their respective states. The AOC-wide characterization work is documented in the *St. Louis River Area of Concern Sediment Characterization: Final Report* (LimnoTech, 2013; Appendix F).

To establish a common framework for assessing and displaying sediment contaminant data, the AOC was divided into sediment assessment areas (SAAs). Each SAA was given an individual number and unique name. Maps showing the SAAs within each are provided in Appendix G.

The primary goal of the sediment characterization project was to support MPCA and WDNR staff in designating SAAs according to remedial action needs. The SAA remedial needs were categorized as follows:

1. SAAs in need of remediation;
2. SAAs needing further sediment contaminant sampling to determine remedial designation; and
3. SAAs that may need some form of remediation before habitat restoration occurs.

Note: remediation and/or restoration sites can be comprised of multiple SAAs, each with an SAA-specific remedial designation. The color scheme adopted for each SAA designation is given in Table 2.

**Table 2: 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. |

The color scheme for remedial designations defined in the table above is used throughout the Roadmap. The SAAs designated as red constitute the sites in need of remediation as shown on Figure 4. Many of the aquatic habitat restoration sites (Figure 5) contain SAAs designated as yellow. In these locations, consideration will be given to the presence of contamination when planning for restoration actions at the site, but full site remediation is not warranted.

Another important outcome of the AOC-wide sediment assessment and data review was identification of SAAs in need of further sediment contaminant sampling to confirm their remedial designation. Of particular interest are SAAs designated as red-gray. For these locations, if a remedial designation of red is confirmed, the sites will be added to the list of remediation sites to be addressed in the Roadmap. Figure 6 indicates the red and red-gray SAAs in need of further sediment contaminant sampling; these SAAs are the priority sampling areas for the AOC. Sediment contaminant data on the Wisconsin side of the AOC are limited spatially compared to available data for the Minnesota side. Consequently, the need for targeted sampling at additional SAAs with remedial designations other than red-gray was also identified in Wisconsin (SAAs include 5, 7, 8, 9, 12, 47, 54, 56, 57, 64.2, 72.1, 72.2, 72.3, 79, 86, 87).

The total estimated cost for sediment contaminant sampling and analysis needs for the AOC is approximately $1.2M, of which $350,000 is for Minnesota and $850,000 is for Wisconsin.

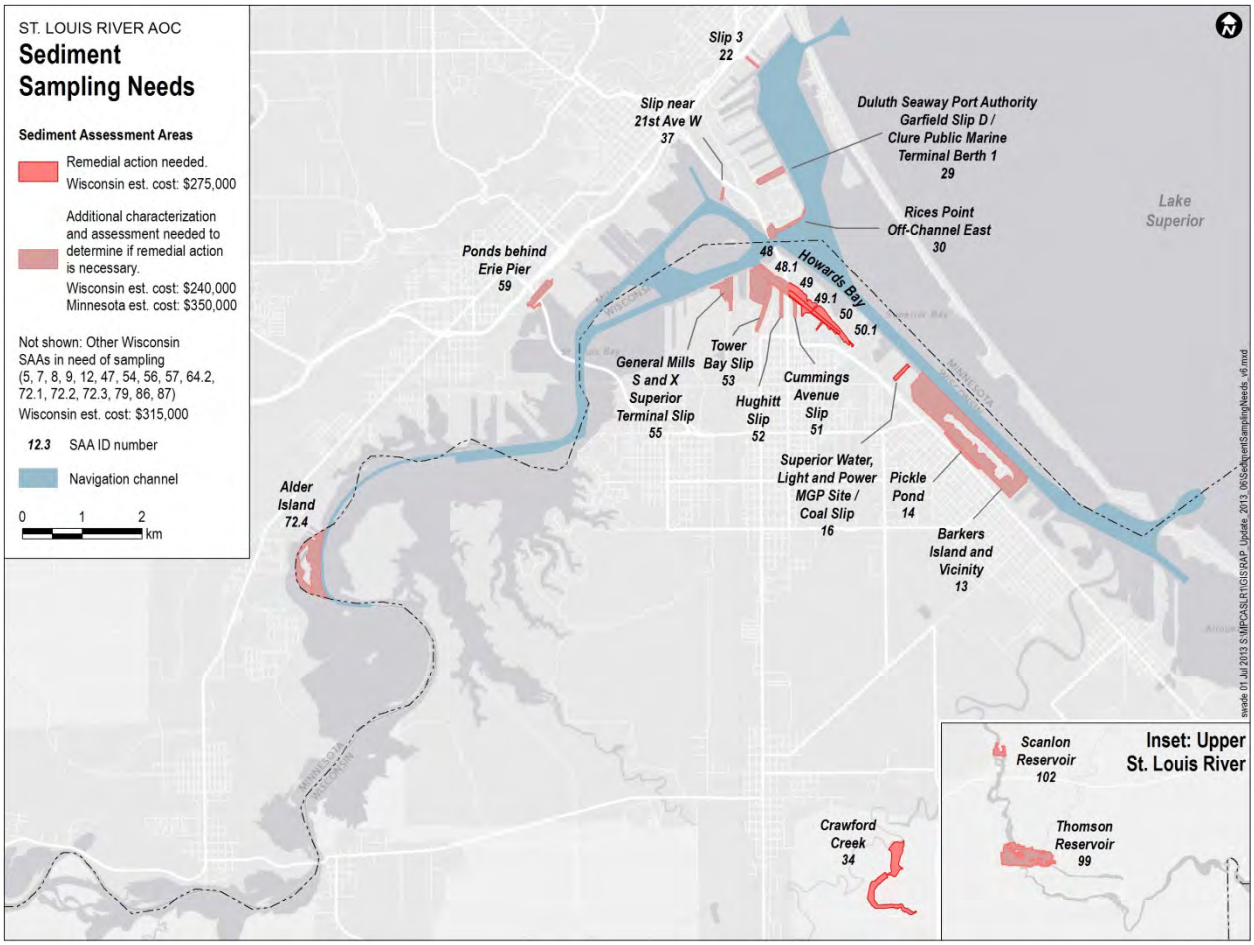


**Figure 6: Sediment Assessment Areas Designated as Red and Red-Gray in Need for Further Sediment Sampling**

# BUI 1: Fish Consumption Advisories

The individual roadmap for BUI 1: Fish Consumption Advisories is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 1 Rationale 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 polychlorinated biphenyls 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.

## BUI 1 Removal Target

The Target for this BUI, as established by stakeholders in 2008, is:

> *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.*

The two contaminants of concern are mercury and PCBs, as those are the reasons for current consumption advisories in the AOC.

Removal of the Fish Consumption BUI will be justified when:

> There are no fish consumption advisories 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.

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 northwest Wisconsin and northeast Minnesota

*PCBs* - St. Louis River upstream of Cloquet and/or Lake Superior

## BUI 1 Removal Strategy

The strategy for removal of the Fish Consumption BUI is as follows:

- Evaluate candidate river and lake systems in northeast Minnesota and northern Wisconsin for which the external source of mercury and PCBs is limited to atmospheric deposition to determine habitat settings that are comparable to the St. Louis River.
- Compare consumption advice between background sites and the St. Louis River downstream of Cloquet (the AOC). If similar consumption advice exists for background areas as the AOC, then complete a more thorough assessment of consumption advice for species that are co-occurring. If the advice is the same, consider whether it is also necessary to evaluate tissue concentrations.
- If consumption advice or fish tissue concentration comparisons indicate that mercury and/or PCB concentrations are elevated in AOC fish:
    - Identify and remediate sites in the AOC with mercury- and PCB-contaminated sediments, incorporating available bioaccumulation research into site selection.
    - Determine whether existing routine fish tissue contaminant monitoring programs are sufficient to evaluate recovery. Consider the necessity of more intensive post-remediation fish contaminant monitoring to evaluate fish tissue contaminant trends. Develop a long-term monitoring program as appropriate.
    - If fish tissue contaminant levels are not recovering as anticipated, study bioaccumulation in the estuary to develop an understanding of factors that are driving mercury and PCB accumulation in the system, and to determine if it is AOC related. Note: a bioavailability study is currently being conducted in the estuary by Nate Johnson of University of Minnesota-Duluth . The goal of the study, which is funded by the U.S. Army Corps of Engineers, is to develop a protocol for prioritizing restoration sites in the AOC based on site-specific bioavailability considerations.

## BUI 1 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | ● | ● | | | | |

## BUI 1 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 3: Actions Still Needed to Achieve Removal of BUI 1**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost |
|---|---|---|---|---|---|
| 1-1 | Evaluate Consumption Advice for Hg and PCBs | Identify candidate waterbodies and indicator fish species for comparison of Hg and PCB consumption advice. | In-house WDNR and MPCA | 2013 | Operational support |
| 1-2 | Study of AOC Fish Tissue vs Regional Background | Compare Hg and PCB fish tissue concentrations in the estuary to fish in regional background areas. | In-house: Preliminary study being conducted by Bruce Monson of MPCA | 2013 | Operational support |
| 1-3 | Study of AOC Consumption Advice vs. Regional Background | Using information from Project 1-1, compare Hg and PCB consumption advice for the AOC to that of identified candidate waterbodies. | Contractual | 2014 | $50,000 |
| 1-4 | Recovery Monitoring of Consumption Advice | Monitor fish consumption advice over time after remediation in AOC. | In-house MPCA and WDNR | Ongoing until BUI removal | Operational support |
| This BUI relies on remediation of sites contaminated with mercury and PCBs. | | | | | |

## Anticipated Timeline to Remove BUI 1

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | ● |

# BUI 2: Degraded Fish and Wildlife Populations

The individual roadmap for BUI 2: Degraded Fish and Wildlife Populations is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 2 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.

## BUI 2 Removal Target

The BUI Removal Target, as established by stakeholders in 2008, is:

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

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 for fish are based on goals established in the 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**

*Trapnet 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 small 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 (action item 2-5) in this Roadmap 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.*

**Invasives**

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

**Small Aquatic Mammals**

*Removal of this BUI is not dependent on specific small aquatic mammal population numbers. However, to support development of concurrence among state resource management agencies, a small mammal survey will be conducted in the estuary to verify that populations are not limited by physical habitat, food sources, water quality, or contaminated sediments.*

## BUI 2 Removal Strategy

The strategy for removal of the Loss of Fish and Wildlife Populations BUI is as follows:

- Complete a thorough inventory and assessment of populations of the selected target species of birds (as listed above in the removal objectives) across the estuary. Available data on additional bird species from historical and recent monitoring may also be used to assess the overall status of the bird populations.
- Continue routine MDNR and WDNR fish population monitoring to confirm continued health of walleye and muskellunge and continued recovery of lake sturgeon. Lake sturgeon populations that meet the objectives above must be documented for two index periods.
- Complete an analysis of historical fish population data to confirm that ruffe are not inhibiting the native fish population.
- Complete an estuary-wide small aquatic mammal survey.
- Increase available Piping Plover nesting habitat within area designated critical habitat (Figure 7) through beneficial reuse of clean dredge material.

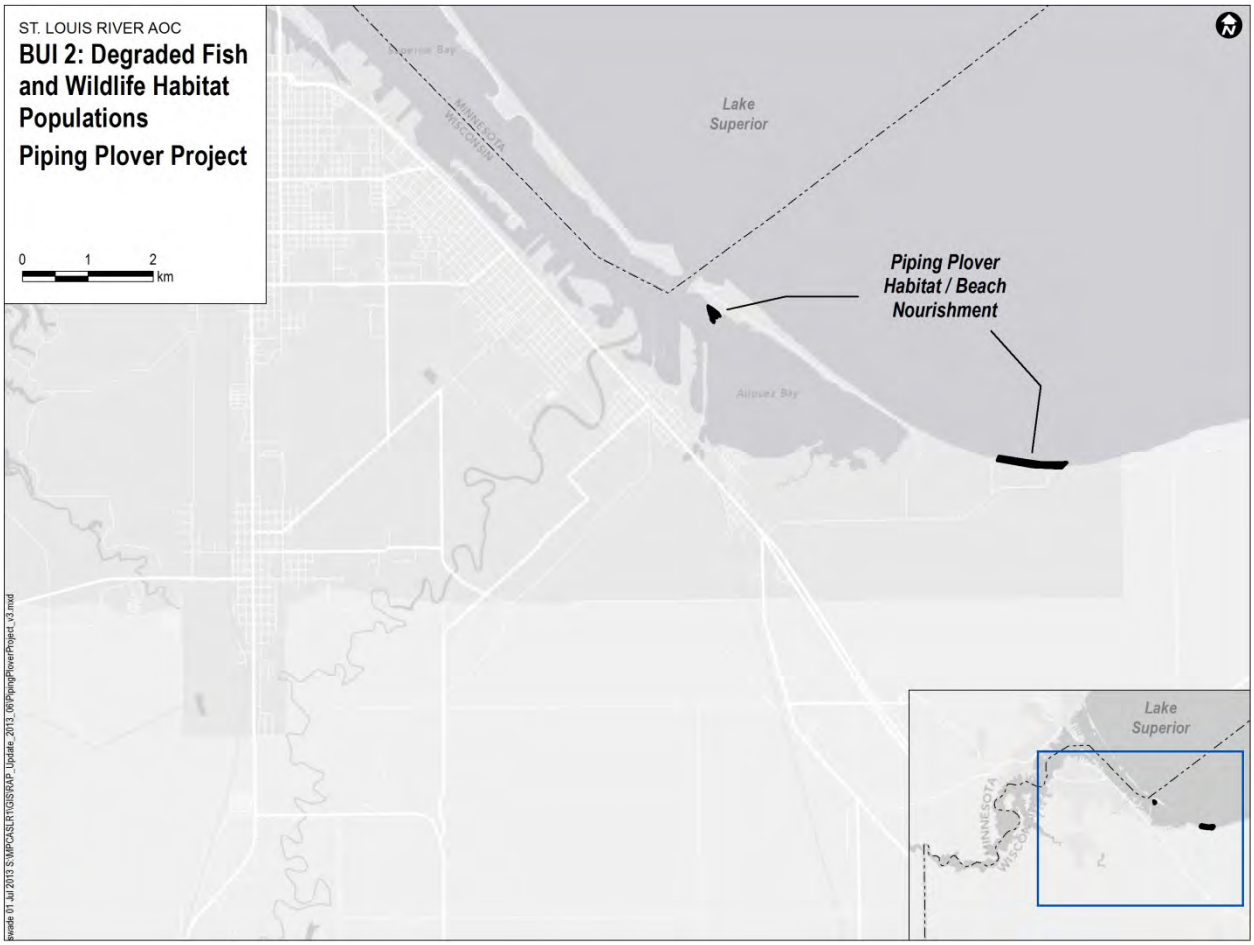


**Figure 7: Piping Plover Habitat and Beach Nourishment Project Location**

## BUI 2 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | | | ● | ● | | |

## BUI 2 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 4: Actions Still Needed to Achieve Removal of BUI 2**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost* |
|---|---|---|---|---|---|
| 2-1 | Bird Inventory and Assessment | Conduct an estuary-wide bird inventory for target species to be combined with existing inventory data available for Minnesota. Complete an AOC-wide assessment using the combined dataset. | Contractual | 2014 | $135,000 |
| 2-2 | 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. | In-house: Sampling conducted by MDNR, WDNR, and other partners | Yearly | Operational support |
| 2-3 | Ruffe Assessment | Document ruffe populations in relation to native fish populations within the estuary. | In-house MDNR and WDNR | 2014 | Operational support |
| 2-4 | Small Aquatic Mammal Survey | Conduct an estuary-wide small aquatic mammal survey. | Contractual | 2014 | $300,000 |
| 2-5 | Piping Plover Habitat / Beach Nourishment | Increase available nesting habitat within area designated critical habitat through beneficial reuse of clean dredge material. | COE, SLRA, LSRI, FWS, County, City, WDNR | 2016 | $600,000 |

* Project costs were generated by different parties, with varying levels of detail and available information, using differing assumptions. Therefore, the costs must be taken as having an inherent level of uncertainty. Opportunities may arise to leverage partnerships and resources in currently unanticipated ways that may lead to reduced costs.

## Anticipated Timeline to Remove BUI 2

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ● | | | | | | | | | |

# BUI 3: Fish Tumors and Other Deformities

The individual roadmap for BUI 3: Fish Tumors and Other Deformities is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 3 Rationale 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.

## BUI 3 Removal Target

The BUI Removal Target, as established by stakeholders in 2008, is:

> *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.*

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 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). The reference site is anticipated to be Mountain Bay, Ontario, which is the reference site that has been established for the Jackfish Bay AOC.

## BUI 3 Removal Strategy

The strategy for removal of the Fish Tumors and Other Deformities BUI is as follows:

- Determine if Mountain Bay is an applicable reference site for the St. Louis River AOC based on results from planned 2013 Canadian AOC sampling. If information indicates that fish in Mountain Bay are mostly living in Lake Superior versus in the bay, then they are not representative of the reference site, and a more appropriate reference site must be established.
- Determine appropriate method for determining residency. Fish tagging methods could be used as a substitute for residency time estimates if stable isotope measures are not acceptable.
- Evaluate St. Louis River AOC white sucker liver tumor incidence rate:

- 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 trending towards the reference site incidence rate, as evidenced by data from three sampling rounds, will be an acceptable basis for BUI removal in this case.

## BUI 3 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | ● | | | | | |

## BUI 3 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 5: Actions Still Needed to Achieve Removal of BUI 3**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost |
|---|---|---|---|---|---|
| 3-1 | Fish Sampling | Conduct representative sampling from the entire AOC. | Contractual | 2015 (3rd round) | $77,000 per round |
| 3-2 | 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. | In-house – U.S. EPA MED | 2014 | Operational support |
| 3-3 | Residency Determination | Determine appropriate methods for fish residency determination (i.e., fish tagging or stable isotopes). | In-house – U.S. EPA MED | 2014 | Operational support |

## Anticipated Timeline to Remove BUI 3

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ● | | | | | | | | | |

# BUI 4: Degradation of Benthos

The individual roadmap for BUI 4: Degradation of Benthos is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 4 Rationale 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.

## BUI 4 Removal Target

The BUI removal target, as established by stakeholders in 2008, is:

> *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.*

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.

## BUI 4 Removal Strategy

The strategy for removal of the Degradation of Benthos BUI is as follows:

- Identify appropriate reference condition and determine useful benthic community diversity metrics used for comparisons.
- Determine the pre-construction biological community condition by monitoring prioritized R2R project sites. Prioritized R2R project sites are listed in the in the Roadmap for BUI 9: Loss of Fish and Wildlife Habitat and shown on Figure 10. Note that the area associated with the prioritized

R2R project sites exceeds 1,700 acres of aquatic habitat; however, the BUI removal objectives for Degradation of Benthos will be achieved when a total of 1,700 acres from any combination of these sites or portions of these sites is not significantly different from selected reference conditions.

- Identify and implement remedial actions as necessary and then complete habitat restoration at prioritized restoration sites.
- Conduct post-construction biological monitoring at prioritized sites and compare to pre-construction biological metrics, or compare to metrics from a St. Louis River AOC reference site to evaluate status.
- Assess biological condition by implementing a long-term monitoring plan until the benthic community shows increasing improvement or meets a reference site condition.

## BUI 4 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | ● | ● | ● | | | | |

## BUI 4 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 6: Actions Still Needed to Achieve Removal of BUI 4**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost |
|---|---|---|---|---|---|
| 4-1 | Post-Construction Biological Monitoring | Establish post-construction biological community characteristics evaluation SLR estuary-wide | Contractual | 2022 | $600,000 |
| This BUI relies on benthic recovery of 1,700 acres from aquatic habitat sites listed under BUI 9: Loss of Fish and Wildlife Habitat. | | | | | |

## Anticipated Timeline to Remove BUI 4

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ● | | | |

# BUI 5: Restrictions on Dredging

The individual roadmap for BUI 5: Restrictions on Dredging is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 5 Rationale 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.

## BUI 5 Removal Target

The BUI removal target, as established by stakeholders in 2008, is:

> *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.*

The following definitions are given for the purposes of interpreting the 2008 targets:

> *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 reuse). 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.
>
> *Hotspots* - sediment assessment areas (SAAs) 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 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 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.

Removal of the Restrictions on Dredging BUI will be justified when SAAs designated as red are remediated to their respective State's cleanup criteria. 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.

## BUI 5 Removal Strategy

The strategy for removal of the Restrictions on Dredging BUI is as follows:

- Remediate contaminated sediments in SAAs that have been designated as red as shown in Figure 8 and listed below in Table 7; develop any necessary dredge alternative plans for the site(s).
- Conduct additional sediment characterization where needed to confirm remedial designations as described in the Sediment Characterization section. If any of the SAAs located within navigable portions of the St. Louis River AOC are determined to be red, remediate contaminated sediments at these locations, and develop any necessary dredge alternative plans for the site(s).
- 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/citing 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.

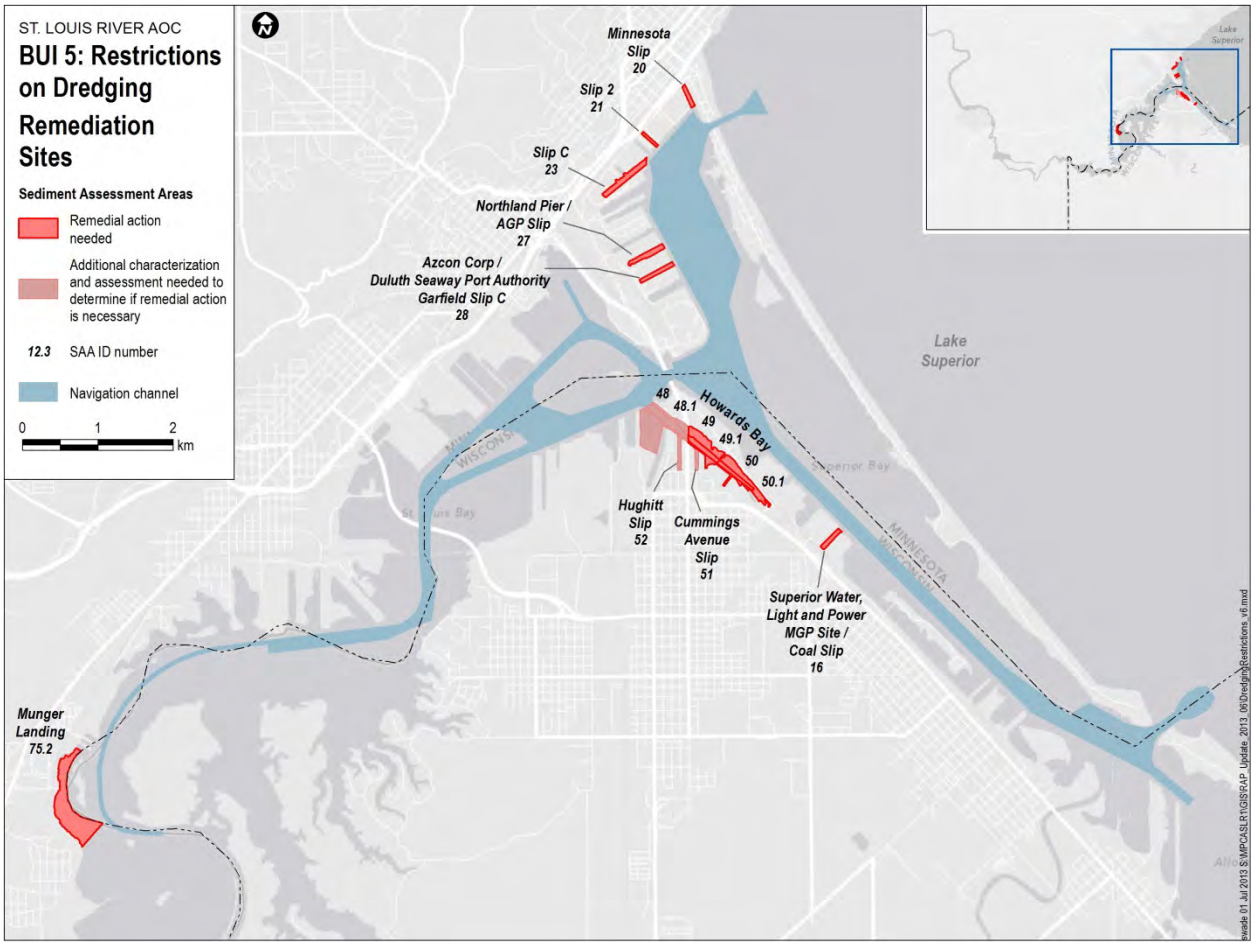


**Figure 8: Sites to be Remediated for BUI 5: Restrictions on Dredging**

## BUI 5 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | ● | ● | ● | | ● | | |

## BUI 5 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 7: Actions Still Needed to Achieve Removal of BUI 5**

| Project No. | Project Name* | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost** |
|---|---|---|---|---|---|
| 5-1 | Update Sediment Database | Include current and future USACE data sets into St. Louis River database | Contractual | 2015 | $25,000 |
| 5-2 | Howard's Bay (including Hughitt and Cummings Slips) SAAs 49, 49.1, 50, 50.1, 51, 52 | Remediate contaminated sediments | Contractual | 2018 | To be determined; In discussions with RP |
| 5-3 | Superior Light & Power MGP Site/ Coal Slip (SAA 16) | Remediate contaminated sediments | Contractual | 2023 | $4,000,000 |
| 5-4 | Minnesota Slip (SAA 20) | Remediate contaminated sediments | Contractual | 2015/16 | $7,000,000 |
| 5-5 | Slip 2 (SAA 21) | Remediate contaminated sediments | Contractual | 2015/16 | $4,000,000 |
| 5-6 | Slip C (SAA 23) | Remediate contaminated sediments | Contractual | 2020 | $18,000,000 |
| 5-7 | Northland Pier/ AGP Slip (SAA 27) | Remediate contaminated sediments | Contractual | 2020 | $11,000,000 |
| 5-8 | Azcon Corp/ Duluth Seaway Port Authority Garfield Slip C (SAA 28) | Remediate contaminated sediments | Contractual | 2020 | $9,000,000 |
| 5-9 | Munger Landing (SAA 75.2) | Remediate contaminated sediments; restoration | Contractual | 2020 | $32,000,000 |
| 5-10 | Communication Strategy | Develop a communication strategy to inform partners and public about the Restrictions on Dredging BUI | In-house MPCA and WDNR | 2014 | 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. | In-house MPCA and WDNR | 2014 | Operational support |

*SAA refers to sediment assessment areas. See Appendix G for SAA location maps.

** Project costs were generated by different parties, with varying levels of detail and available information, using differing assumptions. Therefore, the costs must be taken as having an inherent level of uncertainty. Costs for remediation and restoration sites were estimated using a generalized approach; certain site-specific needs may arise that are not represented in the costs given. Where a more firm cost estimate was available for a site, such as from an existing concept plan, that estimate was used. Opportunities may arise to leverage partnerships and resources in currently unanticipated ways that may lead to reduced costs.

## Anticipated Timeline to Remove BUI 5

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | ● | | |

# BUI 6: Excessive Loading of Sediment and Nutrients

The individual roadmap for BUI 6: Excessive Loading of Sediment and Nutrients is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 6 Rationale for Listing

Prior to the improvements in wastewater treatment in the late 1970s, water quality and biological investigations characterized the St. Louis River estuary (SLRE) 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 International Joint Commission eutrophication criterion to reflect local conditions.

## BUI 6 Removal Target

The BUI removal target, as established by stakeholders in 2008, is:

> *Nutrient and sediment levels have not been shown to impair water quality and habitat, and do not restrict recreation, including fishing, boating, or body contact in the estuary and within western Lake Superior based on the following criteria:*
>
> 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 phosphorous), organic matter, and sediment; and*
> 2. *Total phosphorus concentrations in the Lake Superior portion of the AOC do not exceed 0.010 mg/l (upper limit of oligotrophic range); and*

3. *There are no exceedances of the most protective water quality standard for either state in the western basin of Lake Superior due to excessive inputs of organic matter or algal growth attributed to loadings from wastewater overflows into the St. Louis River; and,*
4. *Total phosphorus concentrations within the St. Louis River portion of AOC do not exceed an interim guide of 0.030 mg/l (upper limit of mesotrophic range) or the most restrictive water quality standards. This ensures that anthropogenic sources and activities in the St. Louis River AOC do not result in excessive productivity and nuisance conditions within the St. Louis River Estuary.*

The 2008 delisting target was based on total phosphorus data in available reports from Minnesota, Wisconsin, and the 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.

Removal of the Excessive Loading of Sediment and Nutrients BUI will be justified when:

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.
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 threshold criteria established by the strategy below.
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.

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 threshold criteria and assess the trends and current condition of the St. Louis River estuary in relation to BUI removal. The seven status indicators include:

- *Chemical* - total phosphorus, un-ionized ammonia, dissolved oxygen
- *Biological* – chlorophyll *a*
- *Physical* - total suspended solids (TSS) and turbidity or other loading metric based on tons of sediment
- *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 threshold criteria 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.

## BUI 6 Removal Strategy

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

- Develop the threshold criteria necessary to establish reference conditions (eutrophic limit for riverine and estuarine portions, mesotrophic limit for Lake Superior portion of the AOC). Results from the four steps below will be used to define current water quality conditions and place them in a broader spatial and historical context. The water quality conditions and watershed management objectives will be used to establish a set of measurable targets for BUI removal. The threshold criteria may not necessarily involve all six status indicators (TP, NH3, DO, Chl-a, TSS, Turbidity.

    1. Continue to perform area-wide water quality analyses in the St. Louis River estuary based on the monitoring protocols in Bellinger et al. (2012). The objective of this project is to work with AOC program staff and other groups responsible for monitoring and assessing conditions in the St. Louis River estuary by identifying data needs, developing a sampling design to meet those needs, and evaluating the relevancy of the results. 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. Understanding changes in water quality and associated biological conditions that meet BUI removal objectives is the focus of the work in 2013 and 2014. This work will include all six water quality status indicators to help address the following:

        a. Provide a summary of the six water quality indicators for a period of two to three years.
        b. Assess and verify relevance of all six status indicators within the St. Louis River estuary or by geographic zone if necessary as a means to determine if the estuary is impaired for these parameters based on agreed-upon reference conditions and accounting for any unique conditions.

    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 threshold criteria 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 AOC. A key watershed objective was to manage land by hydrological units of about 10 square miles in size. The watershed objective for each hydrological unit is to strive to limit percentage of open land and young forest to 40% of the land area.

- Once the work above is complete, assess the status of the St. Louis River estuary in relation to BUI removal:
  1. For the six water quality indicators:
     a. If the assessments show the current conditions have been sustained and the water quality has improved to where it meets the threshold criteria, then removal targets have been met.
     b. If the assessments show the current conditions have not been sustained and water quality is not meeting the threshold criteria, 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 threshold criteria for two consecutive years.
  2. For the watershed indicator:
     a. 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.

## BUI 6 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | | | | | | |

## BUI 6 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 8: Actions Still Needed to Achieve Removal of BUI 6**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost* |
|---|---|---|---|---|---|
| 6-1 | Perform Area-wide Water Quality Sampling and Analyses | Identify data needs, develop sampling design based on Bellinger et al. (2012) and evaluate results. | In-house - U.S. EPA MED | Sampling: 2012, 2013, 2014 (tentative), 2015<br>Analysis and Reporting: 2015 | Operational support |
| 6-2 | 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. | In-house - U.S. EPA MED | 2015 | Operational support |
| 6-3 | 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. | Contractual | 2016 | $350,000 |
| 6-4 | Compilation of 6-1, 6-2, and 6-3 | Determine appropriate threshold criteria for the reference condition of biological, chemical and physical indicators of water quality. | In-house U.S. EPA MED (reviewed by MPCA and WDNR) | 2016 | Operational support |
| 6-4 | Document Progress Toward Watershed Objectives for the Nemadji River Watershed | Document progress in watershed land coverage objectives through mapping projects and evaluate MN TMDL loading objectives and USACE Sediment Model results to assist with achieving the watershed objectives if necessary,. Support implementation of the Nemadji Basin project recommendations to reduce sedimentation to the St. Louis River AOC. | In-house WDNR and MPCA<br>Contractual | 2014 | $120,000 |

* Project costs were generated by different parties, with varying levels of detail and available information, using differing assumptions. Therefore, the costs must be taken as having an inherent level of uncertainty. Opportunities may arise to leverage partnerships and resources in currently unanticipated ways that may lead to reduced costs.

## Anticipated Timeline to Remove BUI 6

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ● | | | | | | | | | |

# BUI 7: Beach Closings and Body Contact Restrictions

The individual roadmap for BUI 7: Beach Closings and Body Contact Restrictions is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 7 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 USX site in Minnesota.

## BUI 7 Removal Target

The BUI Removal Target, as established by stakeholders in 2008, is:

> *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.*
>
> *There are no body contact advisories due to the presence of harmful chemicals at contaminated sites.*
>
> *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.*

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 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 USX 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.

## BUI 7 Removal Strategy

The strategy for removal of the Beach Closings and Body Contact Restrictions BUI is as follows:

- Document compliance status of municipal wastewater treatment and MS4 discharge permits within the AOC.
- For four impaired AOC beaches (Figure 9) as listed on the 2012 Wisconsin 303(d) list (Barker's Island Inner Beach, Wisconsin Point Beach #2) and as proposed to be listed on the 2014 Minnesota 303(d) list (Clyde Avenue, Leif Erickson Park), conduct microbial source tracking to identify whether pathogens are of human origin. Sand and sediment will be included, in addition to water in beach testing, as they can harbor pathogenic populations.
    - If pathogens are of a human origin, conduct beach restoration to address human sources.
    - If pathogens are not of a human origin, the beach impairment will not be considered an AOC issue.
- Track cleanup progress of USX site. Once sufficient progress has been made to remove the "No Swimming" sign at that site, coordinate sign removal.

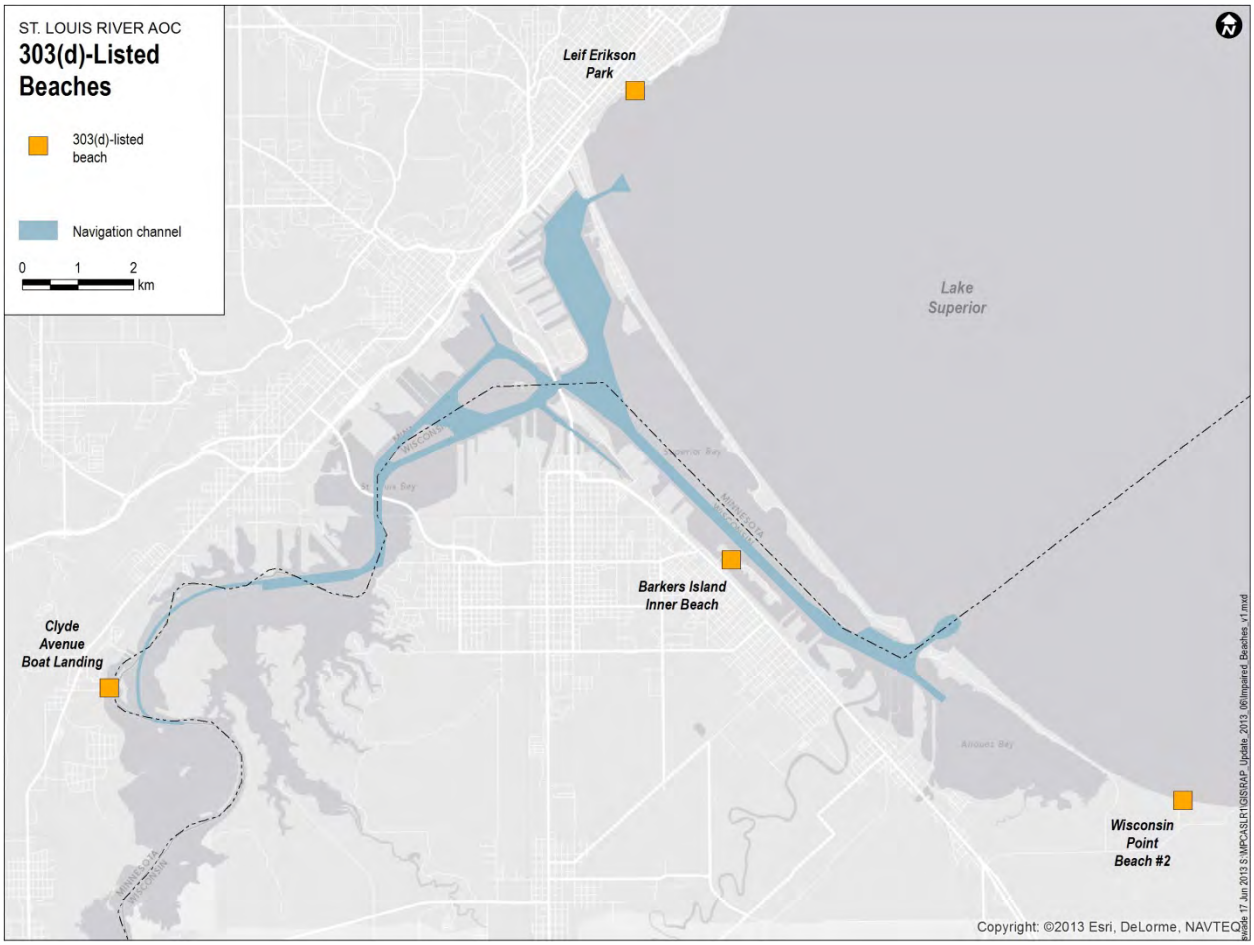


**Figure 9: Beaches to be Addressed for BUI 7: Beach Closings and Body Contact Restrictions**

## BUI 7 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | ● | ● | | | | |

## BUI 7 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 9: Actions Still Needed to Achieve Removal of BUI 7**

| Project No. | Project Name | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost* |
|---|---|---|---|---|---|
| 7-1 | Document Permit Compliance Status | Document compliance status of municipal WWTP and MS4 discharge permits in the AOC. | In-house WDNR and MPCA | 2013 | Operational support |
| 7-2 | Barkers Island Beach Restoration | Design a beach restoration that addresses the stormwater, trash, debris and sources identified in the sanitary survey. | Contractual | 2015 | $400,000 |
| 7-3 | 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). | Contractual | 2014 | $60,000 |
| 7-4 | Track USX Superfund Cleanup Process | Track the cleanup process at the USX site to determine when the "No Swimming" sign can be removed. Coordinate sign removal. | In-house MPCA | 2018 | Operational support |

* Project costs were generated by different parties, with varying levels of detail and available information, using differing assumptions. Therefore, the costs must be taken as having an inherent level of uncertainty. Opportunities may arise to leverage partnerships and resources in currently unanticipated ways that may lead to reduced costs.

## Anticipated Timeline to Remove BUI 7

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ● | | | | | | | |

# BUI 8: Degradation of Aesthetics

The individual roadmap for BUI 8: Degradation of Aesthetics is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 8 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.

## BUI 8 Removal Target

The BUI Removal Target, as established by stakeholders in 2008, is:

> *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.*

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 USX site are complete.

## BUI 8 Removal Strategy

The strategy for removal of the Degradation of Aesthetics BUI is as follows:

- Review and compile existing complaint logs and files to assess existence of persistent occurrences of objectionable properties in the previous five-year period.
- Demonstrate improvements in federal and state aesthetic regulations through documentation of:
    - Federal vessel discharge regulations and status of upcoming NPDES Vessel General Permit
    - NPDES regulations and discharge permits
    - Water quality standards related to aesthetics
    - Air quality regulations related to air particulates
    - Best management practices (BMPs) to reduce particulates at the ore docks and grain elevators. A comparison of air quality data may be conducted to document improvements in air particulates since AOC listing.
- Control oil sheens at USX site. Plans are underway to remove this nuisance by 2014. This BUI can be removed once the oil sheens at USX are addressed.
- 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.
- Meet with the SLRA Board of Directors and any concerned stakeholder groups on the BUI removal strategy. If there is concern about the strategy, additional actions may be necessary.

## BUI 8 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | | ● | ● | | | | |

## BUI 8 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 10: Actions Still Needed to Achieve Removal of BUI 8**

| Project No. | Project Name | Project Description | In-house/ Contractual | 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. | In-house MPCA and WDNR | 2013 | 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. | In-house MPCA and WDNR | 2014 | Operational support |
| 8-3 | USX Site Aesthetics Action | Track progress of oil sheen control. | In-house MPCA | 2014 | 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. | In-house WDNR | 2013 | Operational support |
| 8-5 | Present BUI Removal Strategy to Stakeholders | Meet with SLRA Board of Directors to present BUI removal strategy | In-house MPCA and WDNR | 2014 | Operational support |

## Anticipated Timeline to Remove BUI 8

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ● | | | | | | | | | | |

# BUI 9: Loss of Fish and Wildlife Habitat

The individual roadmap for BUI 9: Loss of Fish and Wildlife Habitat is presented below and is organized in the following sections:

- Rationale for Listing
- BUI Removal Target
- BUI Removal Strategy
- BUI Status
- BUI Actions Still Needed to Achieve Removal
- Anticipated Timeline for BUI Removal

## BUI 9 Rationale 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.

## BUI 9 Removal Target

The BUI removal target, as established by stakeholders in 2008, is:

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

Removal of the Loss of Fish and Wildlife Habitat BUI will be justified when:

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

## BUI 9 Removal Strategy

The strategy for removal of the Loss of Fish and Wildlife Habitat BUI is as follows:

- Complete remediation of contaminated sediments at prioritized sites. Prioritized sites include those SAAs that are to undergo remediation as listed in the Roadmap for BUI 5: Restrictions on Dredging shown on Figure 8, and the SAAs designated as red and yellow within the prioritized R2R sites listed in Table 11 and as shown in Figure 10. Apply the St. Louis River Area of Concern Remediation to Restoration (R2R) Template (LimnoTech, 2012) at sites within the AOC that are impaired by contaminated sediments and do not have identified responsible parties.
- For the USX Superfund site, work cooperatively with the responsible government agencies to complete the remedial process. Integration of AOC and Superfund processes will ensure that restoration and mitigation associated with implementing the selected remedy will also achieve outcomes that are consistent with the AOC Delisting Roadmap and R2R Template. AOC partners have already submitted the Spirit Lake Concept Plan, which will assist with the Superfund decision-making process.
- Provide information that shows that ongoing actions to control invasive species are being implemented in the AOC through the statutory authority of the States of Wisconsin and Minnesota and are reflective of recommendations in the LaMP Lake Superior Aquatic Invasive Species Complete Prevention Plan.
- Complete restoration of aquatic habitat at the prioritized R2R sites listed below in Table 11 and totaling at least 1,700 acres (Figure 10).
- Protect and rehabilitate additional aquatic or hydrologically connected habitat throughout the AOC watersheds to maintain healthy fish and wildlife populations. Completion of the management actions at prioritized sites listed in Table 11 and shown on Figure 11 will result in achievement of this criterion.

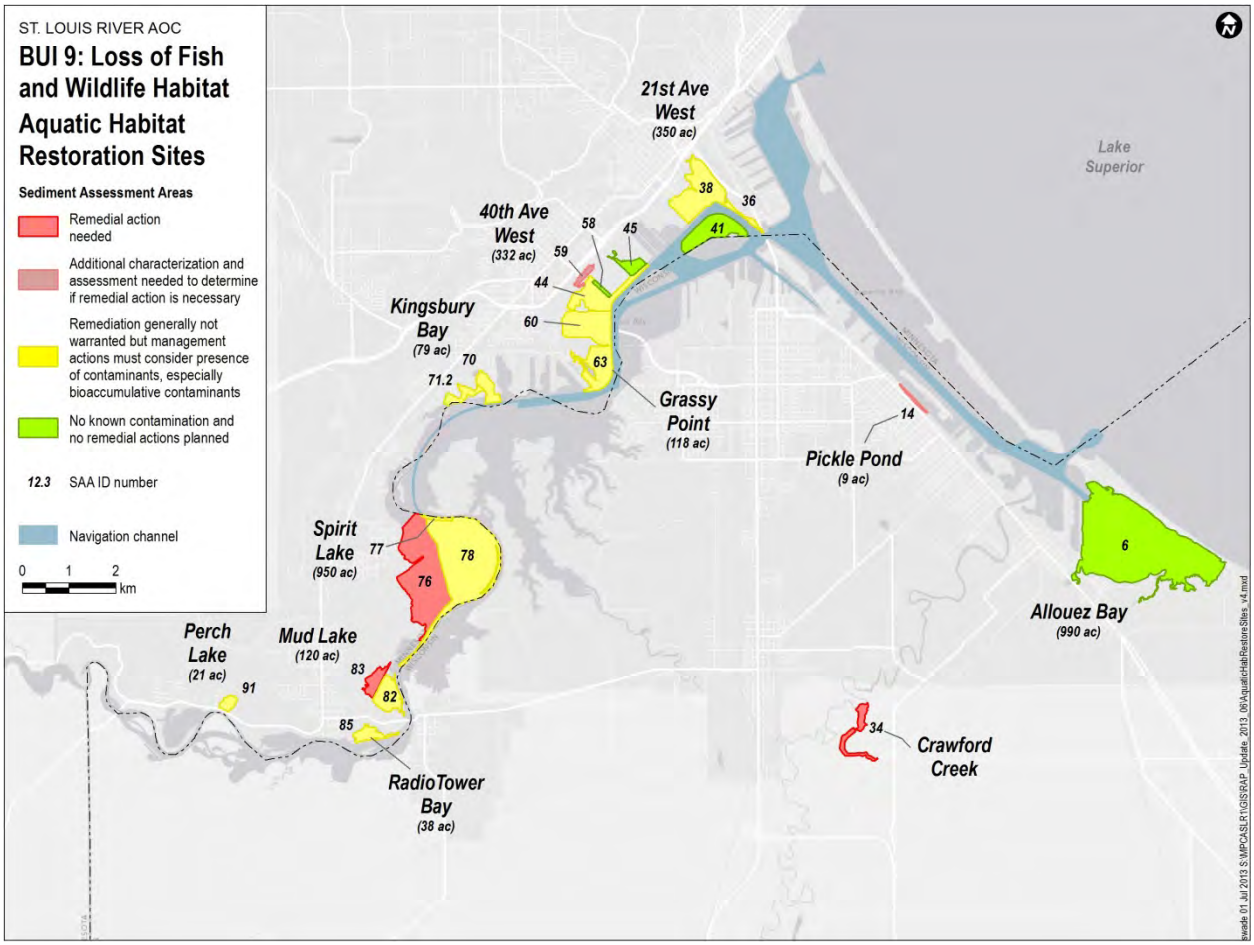


**Figure 10: Aquatic Habitat Restoration Sites for BUI 9: Loss of Fish and Wildlife Habitat and BUI 4: Degradation of Benthos**

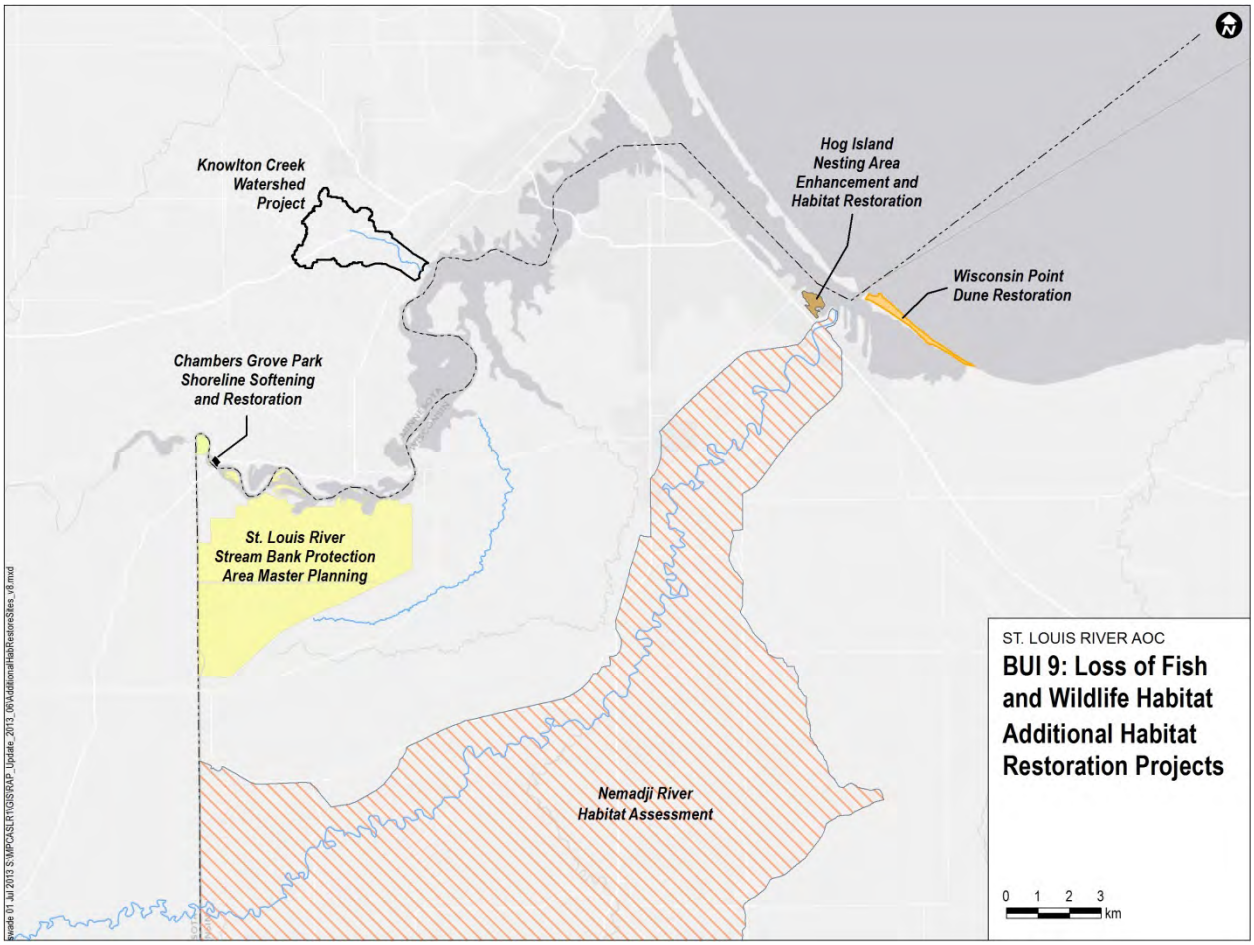


**Figure 11: Hydrologically Connected Habitat Restoration Sites for BUI 9: Loss of Fish and Wildlife Habitat**

## BUI 9 Status

| Targets | Assessment | | Implementation Projects | | | Monitoring | | Removal |
|---|---|---|---|---|---|---|---|---|
| Indicators Set | Data Collection is Needed for Target Assessment | Data Assessed Against Targets | Actions Necessary | Actions Underway | Actions Complete | Monitoring to Confirm Removal in Progress | Monitoring to Confirm Removal is Complete | BUI Ready for Removal |
| ● | ● | ● | ● | ● | | | | |

## BUI 9 Actions Still Needed to Achieve Removal

The actions needed to complete the BUI removal strategy given above are listed in the table below.

**Table 11: Actions Still Needed to Achieve Removal of BUI 9**

| Project No. | Project Name* | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost** |
|---|---|---|---|---|---|
| 9-1 | Spirit Lake (Worksheet 2-7; SAAs 76, 77, 78) | Remediate contaminated sediments and restore emergent wetlands | Contractual | 2018 | To be determined; In discussion with RP |
| 9-2 | 40th Avenue West R2R Project (Worksheet 2-9; SAAs 44, 45, 58, 59, 60) | Remediate contaminated sediments and restore habitat | Contractual | 2018 | $24,000,000 |
| 9-3 | Radio Tower Bay (Worksheet 2-11; SAA 85) | Remove non-native material and restore optimum bathymetry | Contractual | 2014 | $4,000,000 |
| 9-4 | Grassy Point Restoration (Worksheet 2-27; SAA 63) | Remove non-native material and restore optimum bathymetry | Contractual | 2017 | $30,000,000 |
| 9-5 | 21st Avenue West R2R Project (Worksheet 2-28; 36, 38, 41) | 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. | Contractual | 2020 | $17,000,000 |
| 9-6 | Kingsbury Bay Restoration (Worksheet 2-31; SAA 70, 71.2) | Restore wetland complex at the mouth of Kingsbury Creek to pre-1961 condition | Contractual | 2018 | $5,000,000 |
| 9-7 | Knowlton Creek Watershed Project (Worksheet 8-1) | Reduce runoff and sediment transport within watershed and restore cold-water stream habitat | Contractual | 2016 | $6,000,000 |
| 9-8 | Mud Lake (Worksheets 2-8 and 2-26; SAAs 82, 83) | Remediate contaminated sediments, establish more vital hydrologic connection and restore wetland habitat including wild rice; establish deep water | Contractual | 2022 | $20,000,000 |
| 9-9 | Perch Lake (Worksheet 2-12; SAA 91) | Revitalize biological connection between estuary and Perch Lake and restore optimum bathymetry | Contractual | 2020 | $7,000,000 |
| 9-10 | Chambers Grove Park | Soften and restore shoreline in City of Duluth park | Contractual | 2015 | $1,000,000 |
| 9-11 | Allouez Bay (Worksheets 1-2, 1-3, 2-24,SAA 6) | Vegetation restoration including removal of AIS and re-establishment of wild rice. Upstream sediment control outreach. | County, City, LSRI, FDL, GLIFWC, WDNR | 2015 | $110,000 |
| 9-12 | Crawford Creek Habitat Restoration (SAA 34) | Remediate contaminated sediments and restore habitat within stream, wetland, and floodplain | Contractual | 2025 | To be determined; In discussion with RP |

| Project No. | Project Name* | Project Description | In-house/ Contractual | Date to be Completed | Estimated Project Cost** |
|---|---|---|---|---|---|
| 9-13 | Nemadji River Watershed (Worksheets 1-3, 2-24, 9-1) | Conduct habitat assessment and evaluation to determine priority locations for conifer restoration, land protection, and AIS control. | County, City, NERR, WWLT, LSRI, WDNR | 2017 | $500,000 |
| 9-14 | Pickle Pond (SAA 14) | Habitat enhancement as warranted by R2R evaluation | Contractual | 2015 | $3,100,000 |
| 9-15 | Wisconsin Point Dune Restoration (Worksheets 2-1, 2-2, 2-3) | Development of appropriate public access infrastructure to protect dunes and conduct dune restoration and invasive species control. | Contractual | 2015 | $1,400,000 |
| 9-16 | Hog Island (Worksheet 2-16) | Nesting area enhancement, habitat restoration | In-house WDNR, County | 2015 | $120,000 |
| 9-17 | Fish Passage Culverts (Worksheet 12-2) | Replace or retrofit a minimum of two perched culverts to allow for fish passage and other aquatic organism passage. | Contractual | 2017 | $960,000 |
| 9-18 | Wisconsin Habitat Protection & Rehabilitation | Document existing WI habitat protection and rehabilitation projects since 1989 AOC designation and prepare a map(s) showing locations of these projects. | In-house WDNR | 2014 | Operational support |
| 9-19 | St Louis River Stream Bank Protection Area | Initiate WDNR master planning including natural and undisturbed ecosystem management plan for islands and bays. | In-house WDNR | 2014 | $345,000 |
| 9-20 | Document actions taken to control invasive species | 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 | In-house WDNR and MDNR | 2014 | Operational support |

*Note: Where given, "worksheet" and number refer to the Lower St. Louis River Habitat Plan Appendix 9 Implementation Strategies Worksheet number (SLRA, 2011); SAA refers to the sediment assessment areas addressed with the listed project (see Appendix G for SAA location maps).

** Project costs were generated by different parties, with varying levels of detail and available information, using differing assumptions. Therefore, the costs must be taken as having an inherent level of uncertainty. Costs for remediation and restoration sites were estimated using a generalized approach; certain site-specific needs may arise that are not represented in the costs given. Where a more firm cost estimate was available for a site, such as from an existing concept plan, that estimate was used. Opportunities may arise to leverage partnerships and resources in currently unanticipated ways that may lead to reduced costs.

## Anticipated Timeline to Remove BUI 9

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | ● |

# Section 5: St. Louis River AOC Management and Decision-Making Framework

Management of the St. Louis River AOC is complex not only because of its large size and large number of BUIs, but also because of the numerous partner agencies involved in decision-making, funding, contracting, and project management. To implement this RAP Update, a coordinated management and decision-making plan that outlines the roles and responsibilities of the partner agencies is needed. This section presents an overview of the management and decision-making framework that is in development for the St. Louis River AOC.

## Partner Agencies and Organizations

The management and decision-making framework for the St. Louis River AOC will build on the complex agency involvement process that was developed first for the RAP Update process as the AOC moves into site-specific and AOC-wide on-the-ground projects, a variety of groups and resources will need to be engaged at different stages. The roles and responsibilities of each group will be further defined as this management and decision-making framework is finalized.

The following groups are responsible for implementing actions for this RAP Update:

**Interagency Manager's Team** - The state agencies responsible for implementing the AOC program who report to U.S. EPA are MPCA and WDNR. Therefore, managers from these two agencies make up the Interagency Manager's Group and will coordinate outcomes and progress with the U.S. EPA.

**Leadership Team** - In Minnesota, MDNR is a sister agency to the MPCA with responsibilities for fish and wildlife population management, invasive species control, and habitat restoration, protection, and management. Therefore, the AOC Leadership Team includes leaders from MPCA, WDNR, and MDNR.

**AOC Coordinator Team** – The AOC Coordinator Team includes a representative from MPCA, WDNR, MDNR, and FDL. While FDL does not have regulatory obligations associated with the AOC, they are a key stakeholder and partner in implementing restoration and management actions.

**Site Teams** – Site teams will be formed with the partners, expertise, and skills necessary to manage and implement projects at a R2R (remediation and/or restoration) site. Site teams may include people from each of the teams/agencies listed here as well as other

stakeholder organizations (i.e., property owners, researchers). Different people may be involved in different phases of projects occurring at the site.

**St. Louis River Alliance (SLRA)** – The SLRA is the citizens advisory committee for the AOC and is also an independent 503(c) organization. They are an important partner in AOC outreach, education, and communication efforts.

**Partner Agencies** – The federal agencies of the USACE, U.S. EPA, USFWS, and NOAA are current partners in the AOC RAP process. These agencies provide funding for BUI action items, technical expertise, implement and manage contractual work, and in some cases provide in-house services to implement projects.

**Stakeholder Groups** – Stakeholders involved in the implementation of the RAP Update include the Harbor Technical Advisory Committee, local units of government (e.g., Duluth, Superior), nongovernmental organizations (e.g., SLRA, Minnesota Land Trust), and research institutions (e.g., UMD, UWS, NRRI, U.S. EPA-MED). These partners provide technical feedback related to data collection and analysis. In addition, they provide important collaboration related to funding, outreach, and project support.

## State Agency Coordination and Management

In order to enable MPCA and WDNR to effectively carry out the responsibility for implementing the AOC program, AOC coordinators and leaders have agreed that maintenance of a centralized method of information gathering and communication connected to these agencies is essential. Complex external partnerships may in some cases involve the development of more detailed communications plans related to specific spheres of responsibility, but these will be connected to the locally based process and developed in coordination with the implementing agencies.

The AOC coordinators forum has served to date as a key point of contact and this group will continue to meet monthly to:

- Discuss overall AOC-related issues;
- Stay informed of project progress and issues on a site-by-site basis; and
- Direct challenges and concerns to state agency leaders for their bi-monthly meetings or sooner if the need arises.

Meeting coordination, which includes scheduling, agenda develop, and preparation and distribution of meeting minutes, will rotate through the AOC Coordinators month to month.

State agency leaders will meet formally every two months or quarterly to:

- Review monthly meeting minutes from the AOC coordinators and hear from other project managers;
- Address and resolve challenges and concerns;

- Evaluate policy implications and identify strategic opportunities;
- Ensure appropriate allocation of financial and human resources; and
- Document and distribute meeting decisions to AOC coordinators and others as necessary.

Meeting coordination, which includes scheduling, agenda development, and preparation and distribution of meeting minutes, will alternate among each of the three state agencies (MPCA, MDNR, WDNR).

## Community Involvement and Outreach/Education

The SLRA currently provides community involvement and outreach/education opportunities through its regular programming, as well as for specific projects they are involved with in the AOC. For the RAP process, MPCA and WDNR will work with partners to develop a community involvement and outreach/education plan specifically for the elements included in this RAP Update. An important aspect of this plan will be a process to ensure dissemination of coordinated, accurate, timely and consistent messaging reflective of the shared vision this document represents and of progress toward achieving identified goals.

## Adaptive Management

The BUI removal strategies and actions still needed to achieve removal contained in the Roadmap (Section 4) were developed based on the current body of knowledge for each BUI. A number of ongoing sampling efforts, studies, modeling efforts, and other assessments will provide valuable information for the AOC in the coming months and years. AOC coordinators and leaders recognize the importance of putting forth a comprehensive plan for delisting the AOC while still acknowledging the value and need to incorporate new information as it becomes available.

The Roadmap is considered a plan developed based on the principles of adaptive management: it puts forth a solid set of management actions to be implemented now and will be updated to incorporate new information and lessons learned as the plan moves forward. At this time, AOC leaders have agreed that AOC coordinators will prepare an updated Roadmap once per year for the purpose of officially documenting progress and updates to the St. Louis River AOC RAP. The draft plan will be reviewed and revised as necessary by the state agency leaders and, upon approval, will be sent to the U.S. EPA as an official RAP Update.

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