

DRAFT

STAGE 2 REMEDIAL ACTION PLAN

for the

MILWAUKEE ESTUARY AREA OF CONCERN

December 2011



**Wisconsin Department of Natural Resources
Office of the Great Lakes**

**Draft Stage 2 Remedial Action Plan
for the
Milwaukee Estuary Area of Concern**

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Disclaimer: The Great Lakes Water Quality Agreement is a non-regulatory agreement between the U.S. and Canada, and criteria developed under its auspices are non-regulatory in nature. Any actions identified in this document as needed to remove the impaired beneficial uses are not subject to enforcement or regulatory actions.

EXECUTIVE SUMMARY

The Milwaukee Area of Concern (AOC) is very large and many partners are working to improve the environment in the AOC. Thus, the focus in 2011 was to learn about on-going efforts and to re-introduce stakeholders to the AOC program while exploring ways that their efforts align with AOC program goals. Priority activities for the AOC emerged from many individual conversations and several stakeholder meetings.

Sediment cleanups are critically important for achieving AOC goals. While several sediment cleanups have been completed and others are currently underway, additional assessment and cleanup work is needed. The primary responsibility for sediment cleanups lies outside the AOC program; AOC staff will coordinate as needed with agency staff overseeing sediment cleanup projects. Specific sediment cleanup projects that will be active in 2012 include the Lincoln Creek Legacy Act Project and the areas near the Solvay Coke site.

A number of projects were identified in conversations with stakeholders that are important for achieving AOC goals and which the Wisconsin Department of Natural Resources (WDNR) will support where appropriate. These include the relocation of South Shore Beach as an important component of addressing the beach closings beneficial use impairment (BUI); restoration of the Grand Trunk Wetland as an important habitat project for the AOC; and development of Total Maximum Daily Loads (TMDLs) by local partners that will help to address several BUIs, including eutrophication/undesirable algae.

The Milwaukee AOC Coordinator's efforts in 2012 will be focused on the following activities:

- Convene a fish and wildlife technical team that will
 - Develop an approach to evaluating the bird/animal deformities BUI; and,
 - Review existing fish and wildlife plans and use the information to prepare an AOC-specific document that includes recommendations for further action on fish and wildlife habitat and population BUIs within the AOC.
- Review data from recent monitoring projects and assess any implications for the AOC (e.g., Little Menomonee wildlife monitoring; U.S. Fish and Wildlife Service fish tumors data).
- Work with stakeholders to develop a process to assess and/or monitor the aesthetics BUI.

The 2008 Milwaukee AOC Delisting Targets required revisions for a variety of reasons. As a result, this draft Stage 2 Remedial Action Plan captures modifications to the targets and provides a rationale for each change. Many of the changes were made to bring the targets into alignment with the Wisconsin Administrative Code and/or agency program guidance (e.g., Impaired Waters WisCALM procedures) so that WDNR can participate fully with partners in implementing the path to delisting the AOC.

Stakeholder engagement and partnerships are important for achieving AOC goals. In 2011, WDNR and University of Wisconsin-Extension worked together to establish a stakeholder input group, or SIG, for the Milwaukee AOC to facilitate discussions regarding AOC program goals and project opportunities. The approach to stakeholder engagement in the Milwaukee AOC was developed with consideration of existing organizations' missions and partners' availability to attend meetings. The SIG is expected to further evolve in 2012 as AOC partners identify the most effective means of coordinating and working together.

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List of Acronyms

AOC	Area of Concern
BCOC	Bioaccumulative chemicals of concern
BUI	Beneficial Use Impairment
CDF	Confined disposal facility
CSO	Combined sewer overflow
GLRI	Great Lakes Restoration Initiative
km	Kilometers
LOEL	Lowest observable effect level
mg/L	Milligrams per liter
MMSD	Milwaukee Metropolitan Sewerage District
NOAA	National Oceanic and Atmospheric Administration
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RAP	Remedial Action Plan
SEWRPC	Southeastern Wisconsin Regional Planning Commission
SIG	Stakeholder Input Group
SWWT	Southeastern Wisconsin Watersheds Trust (also known as Sweet Water)
TMDL	Total Maximum Daily Load
TP	Total phosphorus
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWM	University of Wisconsin-Milwaukee
WDNR	Wisconsin Department of Natural Resources
WisCALM	Wisconsin Consolidated Assessment and Listing Methodology

DEFINITIONS

Area of Concern (AOC)

Defined by Annex 2 of the 1987 Protocol to the U.S.-Canada Great Lakes Water Quality Agreement as “geographic areas that fail to meet the general or specific objectives of the Agreement where such failure has caused or is likely to cause impairment of beneficial use of the area’s ability to support aquatic life.” These areas are the “most contaminated” areas of the Great Lakes, and the goal of the AOC program is to bring these areas to a point at which they are not environmentally degraded more than other comparable areas of the Great Lakes. When that point has been reached, the AOC can be removed from the list of AOCs in the Annex, or “delisted.”

Beneficial Use Impairment (BUI)

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

Delisting Target

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

Goal

Goals are broad ideas that may take a long time to achieve. They usually don’t change significantly over the life of a project. An example goal statement is, “*Nesting populations of a diverse array of wetland-dependent and riparian-associated birds are consistently present within the AOC.*” The delisting targets for the impairments may also be considered the goal statements (in some cases they may be objectives).

Hotspot

An area where additional characterization is needed to determine if further remedial actions are necessary. Typically, potential hotspots are identified by information related to historic or adjacent land use.

Objective

Objectives are the detailed activities that are needed in order to meet goals. Objectives are normally accomplished in less time than goals. They are important because they provide a means of measuring progress toward plan implementation. Objectives should be SMART: Specific, Measurable, Achievable, Realistic, Time-Constrained.

Project

As defined for this document, a project is a specific activity that has been defined with enough detail to understand who will do the work, how it will be done, and where it will be done. The end result of the activity should be visible and concrete. One or more projects may be defined to meet the goals and objectives for the impairments, if the AOC is not yet eligible for delisting. With this definition, “Coordinating with partners to make sure data is consistently collected and used” would not be a project. However, “XY Agency will Host a data ‘slam’ and write a set of standards for data collection and analysis for the Example AOC,” would be a project.

Remedial Action Plan (RAP)

According to the 1987 Protocol to the U.S.-Canada Great Lakes Water Quality Agreement, a RAP is a document that provides “a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in Areas of Concern...” RAPs are required to be submitted to the International Joint Commission at three stages:

- Stage 1: Problem definition
- Stage 2: When remedial and regulatory measures are selected
- Stage 3: When monitoring indicates that identified beneficial uses have been restored

Remedial Action Plan (RAP) Update

A RAP Update fulfills the requirement for biennial progress reporting described in Annex 2 of the 1987 Protocol to the U.S.-Canada Great Lakes Water Quality Agreement. Some RAP updates are more comprehensive than others, and contain some of the elements of an AOC delisting strategy (e.g., remedial measures). Most RAP Updates for Wisconsin’s AOCs have not included project-specific information regarding who will do each project and how much each will cost.

Total Maximum Daily Load (TMDL)

A TMDL is the amount of a pollutant a waterbody can receive and still meet water quality standards. It can be thought of as a pollution "budget" for a water body or watershed that establishes the pollutant reduction needed from each pollutant source to meet water quality goals.

PURPOSE STATEMENT

The purpose of this document is to serve as a draft Stage 2 Remedial Action Plan (RAP). Stage 2 RAPs are described in the 1987 Protocol amending the *Revised Great Lakes Water Quality Agreement of 1978* as plans that evaluate and describe remedial measures needed to restore the beneficial uses. The Protocol indicates that the Stage 2 RAP should also contain a schedule and identify the organization responsible for implementation.

This Draft Stage 2 RAP is intended to be a concise summary of beneficial use impairment status and specific actions that will be important for reaching the delisting targets. "Actions" may include on-the-ground restoration projects, monitoring and assessment projects, and stakeholder engagement processes. It is also a tool for documenting and communicating progress to agency partners and technical stakeholders. The draft will be finalized in 2012 after additional meetings of the Stakeholder Input Group have been held. Subsequent updates will be completed as needed to incorporate new information that may become available.

The Wisconsin Department of Natural Resources prepares the Stage 2 RAPs in consultation with its partners. Wisconsin's AOC Program is guided by a set of core values, including strong citizen and stakeholder engagement, scientific defensibility, environmental stewardship, achieving timely progress, and documenting results. These values are reflected in the Stage 2 RAPs.

INTRODUCTION

Areas of Concern (AOCs) are severely degraded geographic areas within the Great Lakes. The areas – 43 within the Great Lakes region – were designated as AOCs primarily due to contamination of river and harbor sediments by toxic pollutants. Cleaning up these severely degraded areas is a first step toward restoring the chemical, physical, and biological integrity of the lakes as required by the Great Lakes Water Quality Agreement. When the areas have been cleaned up to the point where they are not more degraded than other, comparable non-AOC areas, they are “delisted” as AOCs; they are then managed in accordance with the Lakewide Management Plan (LaMP) program, a “whole lake” program that is also set forth in the Agreement. The Agreement is the means for the U.S. and Canada to work together to jointly manage the lakes.

The Milwaukee Estuary AOC is one of five Areas of Concern in Wisconsin (Figure 1). It was designated an AOC in the mid 1980s for several reasons. Sediments contaminated with toxic pollutants such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and heavy metals contributed to nearly all of the eleven beneficial use impairments (BUIs) within the original boundaries of the AOC. While loading of toxic substances was one of the primary drivers behind the AOC program, impacts from urbanization and terrestrial and aquatic habitat fragmentation also contribute to the impairments. The rivers within the AOC were also historically modified (straightened and dredged) to accommodate large vessel commercial shipping. Combined sewer overflows from wastewater treatment plants and soil erosion and nutrient enrichment from throughout the estuary’s watershed contributed to degraded water quality.

These sources of impairment led to designation of eleven of the possible fourteen BUIs as applicable to the Milwaukee Estuary AOC (two of the eleven were identified as “suspected”). In 2008, the AOC boundary was expanded to account for the discovery of additional contaminated sediment sites (Figure 2). In the expanded AOC boundary, the BUIs that are most closely tied to sediment contamination (e.g., fish and wildlife consumption, restrictions on dredging, degradation of benthos, degraded fish and wildlife populations¹) are identified as impaired (USEPA, 2009, p. 1-3). Please refer to Appendix C for the memorandum to the United States Environmental Protection Agency (USEPA) requesting a change in the AOC boundaries. Milwaukee Estuary AOC beneficial use impairments and sources are summarized in Table 1. Impairment status is summarized in Table 2. Note that some impairments must be addressed broadly for the whole AOC, while others must be addressed on a geographic sub-basis (tributaries are different from each other and are different than the estuary). While significant progress has been made since the first Remedial Action Plan (RAP) document in 1991, no impairments have been removed for this AOC to date.

The original boundaries of the AOC included the lower 5 kilometers (km) of the Milwaukee River downstream of North Avenue Dam (which has since been removed); the lower 4.8 km of the Menomonee River downstream of 35th Street; the lower 4 km of the Kinnickinnic River downstream of Chase Avenue; the inner and outer harbors; and the nearshore waters of Lake Michigan, bounded by a line extending north from Sheridan Park to the city of Milwaukee’s Linnwood water intake.

¹ Note that the Lincoln Park/Milwaukee River Channels Sediment project is a prime example of why the AOC boundaries were expanded. That particular site contributes the greatest mass loading of PCBs to the Milwaukee River and Harbor, and remediation of contaminated sediment within this area is expected to result in a long-term reduction in PCB mass transport in the Milwaukee River of up to 70 percent. The impairments listed above are specifically associated with this site, and are likely the impairments that also apply to the expanded portions of the Milwaukee River portion of the AOC.

The Wisconsin Department of Natural Resources (WDNR) worked with community stakeholders to develop a RAP in 1991, with updates in 1994 and 1999. Since that time, much work has been completed and significant progress made toward improving conditions in the AOC. WDNR is committed to making progress in the AOC sufficient to eventually delist, or eliminate, the Area of Concern designation, and to that end has begun working again with stakeholders to identify goals and actions necessary to address the impairments of the AOC.

The main priorities for the Milwaukee Estuary AOC include: remediation of contaminated sediments in tributaries and nearshore waters of Lake Michigan, nonpoint source pollution control, improvement of beach water quality, enhancement of fish and wildlife populations, and habitat rehabilitation.

Many projects have occurred in the AOC that have helped to address the impairments. Several formerly contaminated sites have been assessed and remediated through the Great Lakes Legacy Act, the Superfund program, or other efforts. Moreover, a total maximum daily loading study for phosphorus, fecal coliform bacteria, and sediment loading is currently underway for the Menomonee, Kinnickinnic, and Milwaukee Rivers and the Milwaukee Estuary. This study will identify substantial reductions needed to meet water quality goals in the AOC. Next steps include implementation planning and actions to reduce phosphorus, sediment, and bacteria loading to the AOC.

This Stage 2 RAP concisely lists the current status of each BUI, the next actions needed, and potential issues. This version of the RAP is a draft, pending further stakeholder input throughout 2012. An updated version will be submitted in 2012. Citizen engagement has been an integral component of the AOC program since the beginning and continues to be a priority as additional actions are identified and implemented.

Stakeholder Engagement

As of early 2011, the Milwaukee Estuary AOC did not have an established stakeholder group. In the early days of the RAP program, there was both a technical advisory committee and a citizen advisory committee, but both stopped meeting in the mid-1990s. During delisting target development in 2007, a steering committee was established and met several times to provide technical input to the targets. The *Delisting Targets for the Milwaukee Estuary Area of Concern* document (WDNR, 2008) came out of that work and provides an important basis for further target refinement. Since the report's release, however, a specific AOC stakeholder group had not existed.

The stakeholders have an active interest in the AOC and seeing progress. WDNR, assisted by the University of Wisconsin-Extension (UW-Extension), re-convened a stakeholder input group (SIG) in 2011. The stakeholder input group's purpose is to provide two-way communication between WDNR and the stakeholders as program goals and priority projects are identified. The SIG is the AOC staff's primary and direct conduit with the communities within the AOC. As such, they are called upon to provide feedback on goals and project plans from an integrated community viewpoint and to serve as ambassadors to the greater community. During 2011, the group met in April, June, July, and September. The stakeholder group (as well as other interested parties) was invited to comment on a draft of the Stage 2 RAP from Oct. 21, 2011 through November 14, 2011. Appendix A contains the current version of the stakeholder meeting schedule.

The process to involve stakeholders in determining priorities and ways of moving forward in the AOC has evolved, and will continue to progress as future meetings are held. The initial kickoff stakeholder meetings in early April were well attended, as have been subsequent meetings. The June meeting focused on the fish and wildlife-related impairments, but due to the complexity of the AOC with its three

tributaries, stakeholders recommended a geographic approach to organizing the meetings. The July meeting adopted that approach and focused on the BUIs as they pertained to the Kinnickinnic River. In September, the report *Proceedings from the Stakeholder Input Group Meeting of the Milwaukee Estuary Area of Concern, Kinnickinnic River Section* (WDNR, 2011a) was released following the Kinnickinnic River meeting to summarize the comments WDNR received during that meeting as well as provide feedback to the stakeholders. We expect that subsequent meetings will continue to use an approach similar to this, and will occur in 2012. While organized around certain geographic areas, the meetings also are progressive and build off one another since there are many common issues throughout the AOC. The geographic organization facilitates discussions about which action items are necessary in that tributary to make progress toward removal of a particular BUI.

In September, USEPA and WDNR sponsored a special stakeholder session to discuss the scope and purpose of the AOC program. Approximately 50 stakeholders attended, and during the meeting there was discussion of considerations from both the stakeholders' points of view and the agencies'.

The stakeholder process will work with local partners to expand education and outreach efforts to ensure acronyms and terminology are clearly understood by stakeholders. The UW-Extension Natural Resource Educator, Gail Epping Overholt, brings considerable experience and talent to the AOC in these areas. Additionally, UW-Extension, along with WDNR, has a commitment to ensuring that professionals and laymen alike understand both what the AOC is and what is being done to address its impairments.

Wisconsin's Great Lakes Areas of Concern



Figure 1. Wisconsin's five Great Lakes Areas of Concern. Note that two of the five are bi-state Areas of Concern, the Lower Menominee River AOC (Wisconsin and Michigan) and the St. Louis River AOC (Wisconsin and Minnesota).

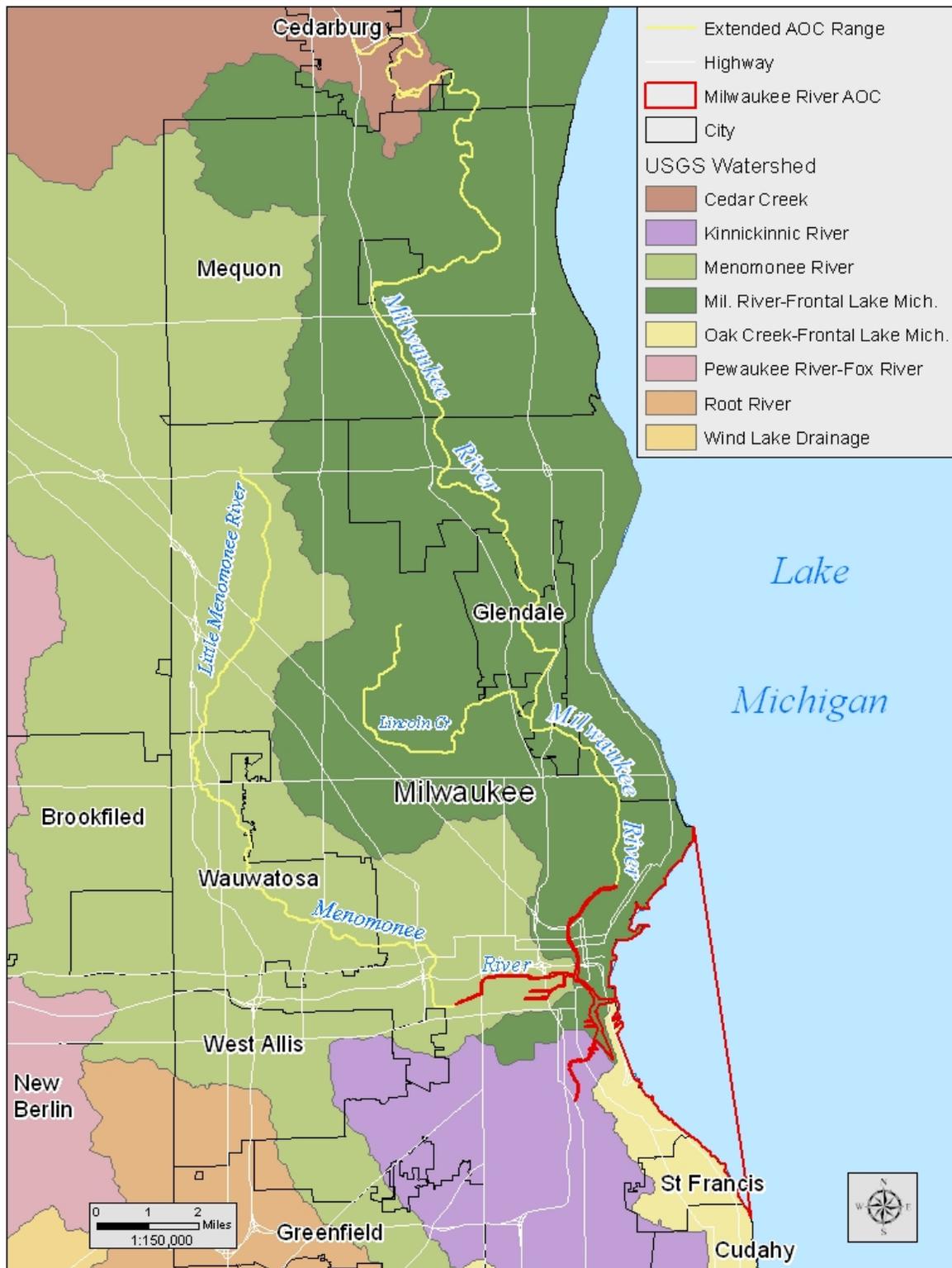


Figure 2. The Milwaukee Estuary AOC, with the original boundaries (red) and the expanded boundaries that were added because of additional contributions of contaminated sediment in the upper watersheds (yellow).

Table 1. Milwaukee Estuary Area of Concern Beneficial Use Impairments Summary

Impaired Beneficial Use (Original AOC boundaries)		Sources of Pollution or Problem				
		Toxic substances	Runoff pollution	Physical habitat alteration	Thermal discharges	Litter
2	Degradation of fish and wildlife populations	X	X	X	X	
11	Loss of fish and wildlife habitat	X	X	X	X	
5	Degradation of benthos	x	X	x	X	
6	Restrictions on dredging	X	X			
1	Restrictions on fish and wildlife consumption	X	X			
4	<i>Bird/animal deformities or reproduction problems (potentially impaired)</i>	x	x			
3	<i>Fish tumors or other deformities (potentially impaired)</i>	x	x			
8	Beach closings/recreational restrictions	X	X			
10	Degraded phytoplankton and zooplankton populations	X	X	X		
7	Eutrophication or undesirable algae		X	X	X	
9	Degraded aesthetics	x	X	x		X

 Impaired beneficial uses that apply to both the Expanded *and* Original AOC boundaries.
 Suspected impaired beneficial uses.

Source Explanations

Loading of toxic substances into AOCs was one of the primary drivers behind the AOC program. Sources of toxic substances include contaminated sediments, spills of such chemicals within the watershed, and atmospheric deposition.

Runoff pollution includes loading of sediment, nutrient, and/or bacteria as a result of nonpoint, or diffuse, sources of pollution and includes urban stormwater runoff. Sewer overflows are also a source of sediment, nutrients, and bacteria into the AOC and are included in this category. Additionally, noncontact cooling water is a significant source of phosphorus, a nutrient, into the waters of the AOC.

Dams, drop structures, concrete-lined channels, and poorly-sized culverts and stream crossings degrade aquatic habitat by impeding the fishes' ability to get to suitable spawning habitat further upstream. This category also includes shoreline alteration, such as sheet piling, that doesn't provide high-quality habitat the same way that more naturalized, meandering streambanks would.

In the time since the original RAP documents were written, there has been recognition of the importance of thermal discharges in affecting water quality, specifically dissolved oxygen levels. As water temperature increases, its ability to carry oxygen decreases. Therefore, discharges of water with elevated temperatures can have a significant negative impact on aquatic communities.

A lower case X indicates that at the time of the original RAP, these sources were not understood to be part of the source contributing to a particular impaired beneficial use, but are now considered to be a component of the impairment.

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Table 2. Milwaukee Estuary Beneficial Use Impairment Status Summary (refer to Appendix B for more detail)

Beneficial Use Impairment	Beneficial Use Remains Impaired	Summary Status
Restrictions on dredging	x	Several sediment cleanup projects completed; additional sediment cleanups are needed. Several projects are in line for Great Lakes Legacy Act funding or are being addressed by Superfund.
Restrictions on fish and wildlife consumption	x	Waterfowl consumption assessment is needed and has been proposed for GLRI funding. Funding not yet secured. Fish consumption is impaired so long as contaminated sediments are present and is reassessed on a 5-year monitoring cycle.
Degradation of benthos	x	USGS benthos study expected to occur in 2012; study will provide information for refining the target and determining if additional information is needed (there are different benthic communities in tributaries than in the estuary; may need separate targets).
Degradation of fish and wildlife populations	x	Convene a technical team for fish and wildlife related BUIs. Target needs to be refined. Compile existing information to determine if current plans, reports, and projects provide adequate population & habitat characterization (and restoration progress) or if there are gaps that should be addressed. Provide summary of findings and recommendations in writing.
Loss of fish and wildlife habitat	x	
Bird/animal deformities or reproduction problems (potentially impaired)	x	Assess whether existing information is enough to characterize impairment. With input from fish and wildlife technical team, determine if USGS tree swallow and NOAA mussel data collection should be expanded or if other data is needed for assessing this impairment.
Fish tumors or other deformities (potentially impaired)	x	USFWS study collected 40 fish in 2011 for fish tumors; results will be used as a screening tool to determine if this beneficial use is impaired for the AOC.
Beach closings/recreational restrictions	x	Target may need to be refined to be tributary- and estuary-specific. Bacterial contamination source identification is needed to address recreational restrictions. Support efforts to relocate South Shore Beach as appropriate.
Degraded phytoplankton and zooplankton populations	x	USGS phyto- and zooplankton study expected to occur in 2012. Study will provide information for refining the target and determining if additional information is needed.
Eutrophication or undesirable algae	x	Target may need to be refined to be tributary- and estuary-specific. TMDLs will inform sources and phosphorus loading reductions needed; TMDLs expected to be completed in 2013.
Degraded aesthetics	x	Develop a process with stakeholders to assess and/or monitor this BUI in 2012. Identify if a means of monitoring trash collection over time is available, since trash is known to be an important contributor to this impairment.

BENEFICIAL USE IMPAIRMENT UPDATES

The following pages summarize the current status of each Beneficial Use Impairment using the format below. An explanation of each section is provided after the heading. Note that the order in which the impairments are listed below is different than on pages 6 and 7; Impairments are addressed by the order in which the International Joint Commission lists them.

2008 Target and Status

Proposed Target from 2008	Suggested Modifications (if applicable)	Status
<p>The 2008 Milwaukee Estuary Delisting Targets are listed here as separate target components for each bullet. These are derived from the document <i>Delisting Targets for the Milwaukee Estuary Area of Concern: Final Report</i>.</p>	<p>The suggested modifications based on the most recent information available. If there are no suggested modifications to the 2008 target component, then “not applicable” is indicated by N/A. Whenever possible or practical, there is a corresponding modification line for each target component.</p>	<p>May be: “Complete” “In progress” “Addressed by current projects” “Action needed” “Unknown” (needs additional data) “Assessment in progress” (data collection occurring in years listed in parentheses) “Not applicable (N/A) at this time”</p>

Target Rationale

May list one or more of the following:

- Relevant background and explanation related to the proposed target and any applicable modifications
- If the 2008 target is being modified and details of any changes
- Why WDNR may be suggesting a revision to or clarification of the 2008 target

Please note that the information referring to the 2008 delisting targets can be found in the document *Delisting Targets for the Milwaukee Estuary Area of Concern: Final Report*. The page numbers indicated in the Proposed Target from 2008 correspond to page numbers from that document.

Rationale for Listing

The section briefly summarizes the reason the BUI was known or suspected at the time of listing. If sources contributing to the impairment have been identified since listing, those are included in this section as well. Typically, the information from this section is drawn from the existing RAPs for the Milwaukee Estuary that were developed in 1991 and 1994.

Summary of key remedial actions since the last RAP and current status

“Key remedial actions” are those that directly contributed to the current status of the BUI. Note that any items listed here are not an exhaustive list of the all remedial actions completed that may have helped make progress toward removing the BUI. A table may be included as an appendix to capture a detailed list of past projects. The narrative here explains and leads to the “Next action needed”.

Next action(s) needed

This section is a narrative listing of assessments and on-the-ground projects that are clearly delineated and directly address the specific BUI. This is also not an exhaustive list of all actions needed to address the impairment, but rather a list of actions that we know must be implemented to make progress toward removing the BUI. Plans for verifying achievement of delisting targets are listed here, if known. Please also note that because of the urban nature of the AOC, contaminated sediment projects listed in this section are not necessarily the only cleanups that would need to occur before removal of a particular impairment. Rather, the projects listed reflect the current knowledge of what must be addressed so that progress on an impairment can continue.

It is important to keep in mind that the primary goal of the AOC program is to address legacy contamination and issues related to severe water quality degradation. While there are some other important and necessary considerations for making progress toward removing impairments, areas with high concentrations of contaminated sediment that contribute to loading of toxic substances into the AOC may need to be addressed before additional work can occur, especially in the case of any physical habitat improvements. That said, it should be noted that more than contaminated sediment remediation will be required to removal all BUIs.

Issues (challenges, risks) affecting progress on this BUI

This section lists project contingency (i.e., one thing has to happen before another can occur), funding obstacles, and any other considerations that could affect the timeline for delisting.

RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION

2008 Target and Status

Proposed Target from 2008 (pp. 31-32)	Suggested Modifications (if applicable)	Status
<p>Fish The remediation of limitations to fish consumption is based on contaminants in fish tissue and the ability for the public to safely manage their consumption. Remediation of this BUI will be determined by the following steps and targets:</p> <ul style="list-style-type: none"> • All known man-made sources of BCOCs (including PCBs, mercury, dioxins, and furans) within the AOC and tributary watershed have been controlled or eliminated; and • A statistically valid sampling program demonstrates that the edible portion of fish tissues do not contain man-made BCOCs at levels exceeding fish consumption advisories for unrestricted consumption (currently identified as 0.05 ppm PCBs, and 10 ppt dioxin and furan congeners – as TCDD toxicity equivalent concentrations); and • Waters within the Milwaukee Estuary AOC are not listed as impaired due to fish consumption advisories in the most recent Clean Water Act 303(d) and 305(b) Wisconsin Water Quality Report to Congress (submitted to USEPA every two years); and • Waters within the Milwaukee Estuary AOC do not have special fish consumption advisories due to mercury in the Healthy Guide for Eating 	<p>Fish Approach to be used with current level of monitoring for fish consumption advisories within the AOC (every five years):</p> <ul style="list-style-type: none"> • N/A-Although it should be noted that for the Milwaukee Estuary AOC, PBC contamination of fish tissue is responsible for waterbody-specific fish consumption advisories. • State fish tissue monitoring confirms that waterbody-specific fish consumption advisories are no longer needed for PCBs for waters in the AOC. <i>Please see Target Rationale section below for further explanation.</i> • N/A-This should remain part of the target. • <i>This particular item should be deleted. There has not been and there is no waterbody-specific fish consumption advisory for</i> 	<p>In progress</p> <p>In progress</p> <p>In progress, <i>and</i> Action needed</p> <p>N/A</p>

<p>Fish in Wisconsin for two document cycles.</p> <p>Or if the above is not achievable within 10 years*:</p> <ul style="list-style-type: none"> • All known man-made sources BCOCs (including PCBs, mercury, dioxins, and furans) within the AOC and tributary watershed have been controlled or eliminated; and • A multi-year comparison study of fish tissue contaminant levels demonstrates that there is no statistically significant difference (with a 95% confidence interval) in fish tissue BCOC concentrations in the AOC compared to fish tissue BCOC concentrations in a representative non-impacted control site within the Lake Michigan Basin. <p>Wildlife <i>No targets were proposed for wildlife consumption.</i></p>	<p><i>mercury in the AOC. Please see the Target Rationale section below for further explanation.</i></p> <p>Approach to be used with funding to support additional monitoring:</p> <ul style="list-style-type: none"> • N/A • N/A <p>Wildlife <i>Recommended target: There are no waterfowl consumption advisories for resident waterfowl due to contamination originating within the AOC.</i></p>	<p>N/A at this time</p> <p>N/A at this time</p> <p>Action needed</p>
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*Note: 10-year timeline cited in the second part of the target begins with the end of the last sediment cleanup project.

Target Rationale

Contaminated sediments are the primary contributor of PCBs to fish and wildlife within the AOC. An effective source control and remediation program is therefore necessary in order to meet delisting goals. Post-remedial actions and taking appropriate source control measures and evaluation monitoring must be conducted to determine the state of recovery for this impairment. Please note that for this impairment, PCBs are the contaminant of concern; there are no additional fish consumption advisories pertaining to mercury in the AOC (i.e., beyond the state-wide fish consumption advice that applies for mercury). Please refer to WDNR’s *Fish Consumption Advice for the Milwaukee Estuary Area of Concern*

(WDNR, 2011b) and *Choose wisely: A health guide for eating fish in Wisconsin* (WDNR, 2011c) documents for more information about fish consumption advisories.

It should be noted that unrestricted consumption, as proposed in the 2008 targets, is not a goal that can be supported by the AOC program. For this reason, we have modified the target to reflect that waters in the AOC should be no worse than other unimpaired waters of the state. There is, however, statewide fish consumption advice because of other, more widespread sources of contamination.

Fish

According to Candy Schrank, WDNR fish toxicologist, WDNR monitors fish for contaminant burdens from rivers within the Milwaukee River basin (including the AOC) on a five-year schedule and from the open waters of Lake Michigan every other year. New data are reviewed in the context of the existing advisories and previous data. Fish consumption advisories are updated by the WDNR and Department of Health and Family Services as needed based on WDNR sampling results. The most current fish consumption advisories for the AOC are available at <http://dnr.wi.gov/fish/pages/consumption/>. Because the state regularly monitors fish tissue concentrations for the waters of the state, a new monitoring program is not necessary to assess this impairment. Additionally, the state Impaired Waters List is updated every two years, which means that new data are evaluated and trends over time are analyzed. If tissue concentrations consistently improve to the point where fish consumption advisories can be lifted so that there are no waterbody-specific advisories, then the desired outcome has been met and there is no need to wait to remove the impairment.

Listing guidelines for the state Impaired Waters Program considers a waterbody impaired for fish consumption if a water body has special PCB-based fish consumption advice of one meal per month or less frequent for resident fish species (like walleye, carp, smallmouth bass and others) or 1 meal per week or less frequent for resident panfish (like yellow perch or bluegill). Special advice for PCBs currently applies to several of these more resident fish species. There are no special fish consumption advisories due to mercury for the Milwaukee AOC.

The fish consumption advice that applies to fish from the Milwaukee Estuary AOC depends on the type of fish. Fish consumption advice is also provided for the Milwaukee River from Estabrook Falls downstream to the estuary and includes the Menomonee and Kinnickinnic Rivers and Lincoln Creek. This advice is for species primarily resident within these rivers and the inner harbor. These advisories will be used to determine when the Restrictions on Fish and Wildlife Consumption BUI in the Milwaukee AOC can be considered for removal.

Fish species like trout and salmon are migratory and may at times be found or caught in the river. However, these species spend most of their time in Lake Michigan; therefore, removal of the fish consumption BUI will not be dependent on these migratory species or on the Lake Michigan fish consumption advisory.

The Milwaukee River downstream from Estabrook Falls, the Menomonee, and Kinnickinnic Rivers (which include the river portions of the AOC) contain special advice for PCBs for several species. Since these species tend to be resident within the AOC and have no barriers to migration, it is appropriate to base delisting targets on resident species. The resident species that exceed the AOC delisting targets include:

- Yellow perch—1 meal/week
- Rock bass, smallmouth bass, walleye less than 18"—1 meal/month
- Black crappie, northern pike, walleye greater than 18", redhorse, white suckers—6 meals/year
- Carp—do not eat

Additionally, fish caught in Cedar Creek and Zeunert Pond should not be eaten (Candy Schrank, *personal communication*, 2011; WDNR, 2011b; WDNR, 2011c).

Wildlife

In the 2008 target document, there were no targets proposed for wildlife. The AOC does have a waterfowl consumption advisory that was issued in 1985, and since that time, no new data have been collected to evaluate the consumption advisory. Unlike fish consumption advisories, which are assessed for in all waters of the state in Wisconsin, waterfowl advisories are only assessed in areas with suspected contamination issues. Because of its legacy of contamination, the Milwaukee Estuary was assessed in the 1980s to determine if a waterfowl consumption advisory should exist for certain waterbodies or portions of waterbodies. According to the state guidelines for developing waterfowl consumption advice, portions of the Milwaukee Estuary AOC did exceed state waterfowl criteria, and thus, a waterfowl consumption advisory was issued. Since the advisory was issued in 1985, no additional data, to date, have been collected.

In the AOC, the following waterfowl consumption advisories apply (please note that in some cases a relevant structure or landmark may no longer be present. Assessing the waterfowl consumption advisory will be necessary to determine the exact locations of any waterfowl consumption advisory, should such advisories still be necessary after reassessment):

- Milwaukee River from Highway 167 (Thiensville) upstream to Lime Kiln Dam at Grafton and Cedar Creek from the Milwaukee River up to Bridge Road in the Village of Cedarburg—do not eat mallard ducks using this water
- Milwaukee Harbor—do not eat black ducks, mallards, scaup, and ruddy ducks using this water
- Waters in the City of Cedarburg—do not eat Canada geese using these waters

Rationale for Listing

Fish samples taken from the Milwaukee River system (which includes the Menomonee and Kinnickinnic Rivers) exceed standards established by the state of Wisconsin for the consumption of sport fish. The state issues consumption advisories for various population groups based on fish species and size classes. Advisories are collectively issued for the presence of mercury and PCBs. The Milwaukee River system has had waterbody-specific fish consumption advisories listed for PCBs for decades. As there is no waterbody-specific advice for mercury for waters of the AOC, waters within the AOC fall under the statewide consumption advisory for mercury.

Summary of key historical activities and current status

Because contaminated sediments are the primary contributor of contaminants to fish within the AOC, contaminated sediment cleanups (especially for PCBs) are necessary in making progress toward addressing this BUI. Thus far, several have occurred in the AOC to date (this list only contains PCB-related sediment projects):

- ✓ Kinnickinnic River Great Lakes Legacy Act Project
- ✓ Blatz Pavilion Great Lakes Legacy Act Project
- ✓ Ruck Impoundment on Cedar Creek (cleanup completed)
- ✓ Lincoln Park Great Lakes Legacy Act Project (Phase I currently underway)
- ✓ Cedar Creek Superfund Site (studies on-going)

Next action(s) needed

Work is still needed to assess and remediate areas contaminated with PCBs. The waterfowl consumption advisory that was issued in the 1980s also needs to be re-evaluated to determine if this component of the impairment can be removed.

- Complete the cleanup of PCBs at the Cedar Creek Superfund Site.
- Complete the cleanup of PCBs from the Lincoln Park Great Lakes Legacy Act project (finish Phase 1 and complete Phase 2).
- Assess the sediment in the Menomonee River downstream of its confluence with the Little Menomonee River.
- Collect new data to re-evaluate the waterfowl consumption advisory.
- Assess areas on the Milwaukee River downstream of confluence with Cedar Creek to Lincoln Park/Milwaukee River Channels Sediment Projects.

Issues (challenges, risks) affecting progress on this BUI

The main barrier to progress is ensuring enough funding through programs or responsible parties to complete all the contaminated sediment projects in a timely manner.

DEGRADATION OF FISH AND WILDLIFE POPULATIONS

2008 Target and Status

Proposed Target from 2008 (p. 33-34)	Suggested Modifications (if applicable)	Status
<p>Fish This BUI will be considered to be eligible for removal when the following have occurred:</p> <ul style="list-style-type: none"> • A local fish and wildlife management and restoration plan has been developed for the entire AOC that: <ul style="list-style-type: none"> ○ Defines the causes of all population impairments within the AOC ○ Establishes site specific local population targets for native indicator fish and wildlife species within the AOC ○ Identifies all fish and wildlife population restoration programs/activities within the AOC and establishes a mechanism to assure coordination among all these programs/activities, including identification of lead and coordinative agencies ○ Establishes a time table, funding mechanism, and lead agency responsibility for all fish and wildlife population restoration activities needed within the AOC. ○ The programs necessary to accomplish the recommendations of the fish and wildlife management and restoration plan are implemented. • Populations for native indicator fish species are statistically similar to populations in reference 	<p>Fish This BUI will be considered to be eligible for removal when the following have occurred:</p> <ul style="list-style-type: none"> • All contaminated sediment hotspots within the AOC have been identified, and implementation actions to remediate contaminated sites have been completed. • A local fish and wildlife management and rehabilitation plan has been compiled for the estuary that: <ul style="list-style-type: none"> ○ Defines the causes of all population impairments within the AOC ○ Establishes site specific local population targets for native indicator fish and wildlife species within the AOC ○ Identifies all fish and wildlife population rehabilitation programs/activities within the AOC and establishes a mechanism to assure coordination among all these programs/activities, including identification of lead and coordinative agencies ○ Establishes a time table, funding mechanism, and lead agency or organization responsibility for all fish and wildlife population activities needed within the AOC. ○ The actions/projects necessary to 	<p>In progress</p> <p>Action needed</p>

<p>sites with similar habitat but little to no contamination.</p> <p>Wildlife Assess wildlife populations and the possible extent of any impairment within the AOC before setting specific wildlife population targets.</p>	<p>accomplish the recommendations of the fish and wildlife management and restoration plan are implemented.</p> <ul style="list-style-type: none"> • Populations for native indicator fish species are statistically similar to populations in reference sites with similar habitat but little to no contamination. <p>Wildlife N/A</p>	<p>Action needed</p> <p>Action needed</p>
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Target Rationale

Since the time the targets were being developed in 2008, many partners in the AOC have developed plans that can be drawn from to determine the actions that are a priority to address this BUI. In order to build efficiency, we recommend using what already exists to draw together parts from the plans that have already been done to determine the priorities for this impairment. (Please see the References section for plans that have been completed that relate to this impairment.) In the near term, we will work with fish and wildlife experts to evaluate existing plans to determine the targets appropriate for particular habitat types and species (i.e., estuary vs. riverine).

It is important to point out that this impairment may apply to the entire AOC (i.e., the expanded and original boundaries), in so far as there is contamination in the entire AOC. The reason that the AOC was expanded was to address contamination originating from sources upstream of the original AOC boundaries. Therefore, activities pertaining to improvement of populations in the original AOC boundaries will be given higher priority than those in the expanded boundaries. That said, opportunities for addressing the populations impairment will probably be limited, due to the urban nature of the AOC, so some work in the expanded portions of the AOC may be necessary. Appendix C contains the memoranda regarding the boundary change.

Rationale for Listing

The Stage 1 RAP (WDNR, 1991) and 1994 RAP update indicated that fish populations in the AOC were severely degraded and that the fish species resident in the AOC were mostly pollution tolerant species due to poor water quality. The lack of natural shoreline and channel features throughout the AOC, urban runoff, point sources, and sediment accumulation were the major factors noted for this impairment (WDNR, 1994, p. 2-17). In terms of the wildlife component of this goal, at the time that the RAP documents were written, there was essentially no data about wildlife populations. In the first RAP document written in 1991, the wildlife component was not considered to be part of the impairment for the Milwaukee Estuary AOC (WDNR, 1991, p. V-3). The RAP revision in 1994 stated that declines in wildlife populations were likely attributable to degraded

water quality and loss of habitat, especially the loss of wetlands (WDNR, 1994, p. 2-17). The 1994 RAP also said that contaminants present in the AOC are known to affect wildlife reproduction and growth, and so the use should be considered impaired (WDNR, 1994, p. 2-18).

Historically, there is a component of these impairments that has been suspected as being tied to contamination. While it is unclear the degree to which contamination contributes to this impairment, the lack of suitable physical habitat in order to support populations of desired fish and wildlife species is also a key factor behind this impairment.

Summary of historical activities and current status

Projects to remediate contaminated sediment when combined with streambank and in-channel rehabilitation have helped in addressing this impairment. Projects to rehabilitate the in-stream habitat (i.e., the removal of dams/drop structures, removal of concrete-lined channels upstream of the AOC boundaries) have aided in making progress toward addressing this impairment. Additionally, the biochemical oxygen demand of sediments in the tributaries has decreased since the Deep Tunnel storage project came online in the mid-1990s. This project dramatically reduced the number and volume of sewer overflows that negatively impacted water quality in the estuary (Tom Slawski, 2011, personal communication).

Next action(s) needed

We need to work with stakeholders to determine what benchmarks are desirable and achievable for this impairment. There are a few projects in the AOC that will help in making progress toward removing this impairment in the meantime. They are:

- Assess and remediate contaminated sediment projects.
- Assess and rehabilitate wetlands, where feasible, especially any remnant coastal wetlands in the estuary portion of the AOC (i.e., the Grand Trunk Wetland).
- Enhance/improve the natural streambanks along the Kinnickinnic River in the upstream-most part of the AOC boundary.
- Enhance/rehabilitate herptile habitat in the former Moss-American Superfund Site (Little Menomonee River).
- Where feasible, restore shoreline buffers in the urban portion of the AOC to enhance habitat for fish and wildlife.
- Review existing fish and wildlife plans and use the information to prepare an AOC-specific document that includes recommendations for further action in the AOC on this BUI.
- Inventory existing data-gathering activities for the “native indicator fish and wildlife species” identified in a habitat planning process; assess if the existing activities are gathering the type and quantity of data that are needed for evaluating progress in the AOC. Evaluate the need to fill any data gaps, and, if appropriate, seek resources to conduct additional monitoring.
- Initiate a technical team to assist with preparing a fish and wildlife plan, or to assist with integrating goals and objectives from existing plans into an AOC-specific document that establishes measurable endpoints for the AOC for the population & habitat BUIs.

Issues (challenges, risks) affecting progress on this BUI

Answering the question of when do we know we have created/enhanced enough habitat will be challenging to determine. We are aware of the difficulties with establishing population-related objectives for this BUI since attracting desired species can be more complicated than just providing them with suitable habitat. Just because habitat is created does not necessarily mean that the desired species will then be there, but we would like to ensure that there are favorable conditions, to a reasonable extent, so that people can enjoy fish and wildlife in the AOC.

FISH TUMORS OR OTHER DEFORMITIES (POTENTIALLY IMPAIRED)

2008 Target and Status

Proposed Target from 2008 (p. 35)	Suggested Modifications (if applicable)	Status
<p>Removal may occur if:</p> <ul style="list-style-type: none"> • All known major sources of PAHs and chlorinated organic compounds within the AOC and tributary watershed have been controlled or eliminated • A fish health survey of resident benthic fish species such as white suckers finds incidences of tumors or other deformities at an incidence rate of less than 5 percent. <p>OR, in cases where tumors have been reported:</p> <ul style="list-style-type: none"> • A comparison study of resident benthic fish such as white suckers of comparable age and maturity, or of fish species found with tumors in previous fish health surveys in the AOC, with fish at non-impacted reference sites indicate that there is no statistically significant difference (with 95% confidence) in the incidence of liver tumors or deformities; and • A comparison study of resident non-benthic fish of comparable age and maturity in the AOC and non-impacted reference sites indicate that there is no statistically significant difference (with 95% confidence) in the incidence of external deformities, lesions and tumors related to contaminant exposure. 	<p>Removal may occur if:</p> <ul style="list-style-type: none"> • N/A • A fish health survey of resident benthic fish species, such as white suckers, finds incidences of tumors or other deformities at a statistically similar incidence rate of minimally impacted reference sites. <p>OR, in cases where tumors have been reported:</p> <ul style="list-style-type: none"> • A comparison study of resident benthic fish such as white suckers of comparable age and maturity, or of fish species found with tumors in previous fish health surveys in the AOC, with fish at minimally impacted reference sites indicate that there is no statistically significant difference (with 95% confidence) in the incidence of liver tumors or deformities. • <i>This item should be removed, since it is not an appropriate assessment for this particular target. (See rationale.)</i> 	<p>In progress</p> <p>Assessment in progress (2011)/Unknown</p> <p>Unknown</p> <p>Unknown</p>

Target Rationale

The 2008 document stated that the first step toward removing this impairment would be to determine if the use was impaired by sampling 50 fish to determine whether the tumor incidence rate was greater than 5%. WDNR's Office of the Great Lakes has used documented incidence rates and performed rigorous statistical analyses to help guide its approach to assessing the fish tumor impairment. The sampling design suggests a relatively large data collection effort in an attempt to achieve an acceptably high and known degree of confidence in the study results. For more detailed information about WDNR's sampling strategy for this BUI, please contact Andy Fayram, Great Lakes Monitoring Coordinator.

The proposed modifications to the 2008 target stipulate that the appropriate reference sites would be minimally impacted, as opposed to non-impacted, and that the tumors and deformities need to be contaminant-related since there can be other causes, like pathogens, of tumors and deformities in fish. A zero-percent incidence rate is not achievable, since tumors occur naturally in fish even in the absence of contaminants. How the term "minimally impacted reference site" is defined will be discussed and decided upon with local stakeholders, if it is determined that a comparison study is needed.

It should also be noted that for this impairment, the last bullet of the target referring to resident non-benthic fish should be removed, since there is no basis for doing this type of assessment, given the nature of this particular impairment, and its close connection to contaminated sediments.

Rationale for Listing

The 1994 RAP included this BUI as suspected because the concentrations of certain PAHs and metals in AOC sediments were similar to concentrations in areas with verified fish tumors. As of 2008, no fish health surveys had been conducted within the AOC to determine the extent (or existence) of the impairment. This has since changed (see information in next two sections).

Summary of historical activities and current status

In 2011, the U.S. Fish and Wildlife Service (USFWS) collected fish tumor data in Milwaukee for a contaminants of emerging concern study in the Great Lakes. The results of this study should be available later this year from the histopathology lab to determine the causes of irregularities in tissues. Although this study collected a small sample size (N=20 for white suckers and N=20 for small mouth bass), this data can be used as a screening-level study in order to determine if a larger-scale study would be likely to conclude that incidence rates in the Milwaukee Estuary AOC are similar to minimally impacted sites. If the small-scale study shows that a larger number of fish have contaminant-related deformities/tumors, then further cleanup actions will be necessary before a larger-scale fish tumor study should be done. While the 2011 analysis is not yet complete, a couple of fish collected for the USFWS study did have contaminant-related tumors (Sarah Warner, 2011, personal communication). Pending the full results of this initial study, we should know an approximate incidence rate.

To date, several sites that contained PAH- and metals-contaminated sediments have been remediated in the AOC. They are:

- ✓ Moss-American Superfund Project
- ✓ Kinnickinnic River Great Lakes Legacy Act Project

Next action(s) needed

Sites that contain high levels of PAHs and metals in the AOC should be controlled and/or eliminated.

WDNR is awaiting the results of the fish tumor analysis for the Milwaukee Estuary. If the results from 2011 show that there are relatively few contaminant-related tumors among the smaller sample sizes, WDNR will move forward with pursuing a larger fish tumor study. If the results from 2011 show that there are higher levels of contaminant-related tumors, then sources of contaminants that may be contributing to the problem will have to be re-examined and controlled or eliminated before another sampling event should occur. Sites that contain elevated amounts of PAHs, metals, and other substances that cause fish tumors and deformities should be addressed before removal of this impairment can occur. These actions include:

- Completing the assessment and clean up PAHs and metals from the Solvay Coke Superfund Alternative Site.
- Completing the assessment and clean up PAHs and metals from the Burnham Canal Superfund Alternative Site.
- And other necessary projects to clean up PAH-contaminated sediment.

Issues (challenges, risks) affecting progress on this BUI

In the future, it will be necessary to secure funding to conduct a larger-scale study to make sure that the incidence of fish tumors in the Milwaukee Estuary AOC does not significantly differ from other similar, but minimally-impacted sites.

BIRD OR ANIMAL DEFORMITIES OR REPRODUCTION PROBLEMS (POTENTIALLY IMPAIRED)**2008 Target and Status**

Proposed Target from 2008 (pp. 36-37)	Suggested Modifications (if applicable)	Status
<p>This BUI can be removed if:</p> <ul style="list-style-type: none"> • Studies conducted in the AOC indicate that the beneficial use should not be considered impaired, or • If studies conducted in the AOC determine that this use is impaired, then two approaches can be considered for delisting: <ul style="list-style-type: none"> ○ Approach 1 – Observational Data and Direct Measurements of Birds and other Wildlife <ul style="list-style-type: none"> ▪ Evaluate observational data of bird and other animal deformities for a minimum of two successive monitoring cycles in indicator species identified in the initial studies as exhibiting deformities or reproductive problems. If deformity or reproductive problem rates are not statistically different than those at minimally impacted reference sites (at a 95% confidence interval), or no reproductive or deformity problems are identified during the two successive monitoring cycles, then the BUI can be delisted. If the 	<p>This BUI can be removed if:</p> <ul style="list-style-type: none"> • Studies conducted in the AOC indicate that the beneficial use should not be considered impaired, or • If studies conducted in the AOC determine that this use is impaired, then two approaches can be considered for delisting: <ul style="list-style-type: none"> ○ Approach 1 – Observational Data and Direct Measurements of Birds and other Wildlife <ul style="list-style-type: none"> ▪ Evaluate observational data of bird or other animal deformities for a minimum of two successive monitoring cycles in indicator species identified in the initial studies as exhibiting deformities or reproductive problems. If deformity or reproductive problem rates are not statistically different than those at minimally impacted reference sites (at a 95% confidence interval), or no reproductive or deformity problems are identified during the two successive monitoring cycles, then the BUI can be delisted. If the rates within the 	<p>Assessment in progress</p>

<p>rates are statistically different than the reference site it may indicate a source from either within or from outside the AOC. Therefore, if the rates are statistically different or the data are insufficient for analysis, then:</p> <ul style="list-style-type: none"> ▪ Evaluate tissue contaminant levels in egg, young and/or adult wildlife. If contaminant levels are lower than the Lowest Observable Effect Level (LOEL) for that species for a particular contaminant that are not statistically different than those at minimally impacted reference sites (at a 95% confidence interval), then the BUI can be delisted. ▪ Where direct observation of wildlife and wildlife tissue data are not available, the following approach should be used: <ul style="list-style-type: none"> ○ Approach 2 – Fish Tissue Contaminant Levels as an Indicator of Deformities or Reproductive Problems <ul style="list-style-type: none"> ▪ If fish tissue concentrations of contaminants of concern identified in the AOC are at or lower than the LOEL known to cause reproductive or 	<p>AOC are statistically higher than the reference site it may indicate a source from either within or from outside the AOC. Therefore, if the rates are statistically higher or the data are insufficient for analysis to achieve agreed upon statistical power, then:</p> <ul style="list-style-type: none"> ▪ Evaluate tissue contaminant levels in egg, young and/or adult wildlife. If contaminant levels are lower than the Lowest Observable Effect Level (LOEL) for that species for a particular contaminant that are not statistically different than those at minimally impacted reference sites (at a 95% confidence interval), then the BUI can be delisted. ▪ Where direct observation of wildlife and wildlife tissue data are not available, the following approach should be used: <ul style="list-style-type: none"> ○ Approach 2 – Fish Tissue Contaminant Levels as an Indicator of Deformities or Reproductive Problems <ul style="list-style-type: none"> ▪ If fish tissue concentrations of contaminants known to cause deformities or reproductive suppression identified in the 	
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<p>developmental problems in fish-eating birds and mammals, the BUI can be delisted, or</p> <ul style="list-style-type: none"> ▪ If fish tissue concentrations of contaminants of concern identified in the AOC are not statistically different than Lake Michigan (at 95% confidence interval), then the BUI can be delisted. Fish of a size and species considered prey for the wildlife species under consideration must be used for the tissue data. 	<p>AOC are at or lower than the LOEL known to cause reproductive or developmental problems in fish-eating birds and mammals, the BUI can be delisted, or</p> <ul style="list-style-type: none"> ▪ If fish tissue concentrations of contaminants known to cause deformities or reproductive suppression identified in the AOC are not statistically different than Lake Michigan (at 95% confidence interval with sufficient and agreed upon statistical power), then the BUI can be removed. Fish of a size and species considered prey for the wildlife species under consideration must be used for the tissue data. 	
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Target Rationale

Before targets can be developed with confidence for the AOC, sufficient studies must be conducted to determine if this beneficial use is impaired. The targets identified above should be reviewed following completion of the studies and modified in accordance with the findings of those studies.

Rationale for Listing

Insufficient data are available to show if these problems exist with birds or other animals within the AOC. The 1991 RAP considered this use unimpaired because of lack of information. Because contaminants like PCBs and heavy metals that are found in AOC sediments may have the potential to impair reproduction and development in wildlife, this use was considered impaired in the 1994 RAP.

Summary of historical activities and current status

Several sites that had contaminated sediments in the AOC have been remediated since this BUI was listed for the AOC. Additionally, tree swallows have been suggested as appropriate using tree swallows as indicators of environmental contamination in areas across the United States. Tree swallows feed on emergent aquatic insects near their nests ("near" meaning within a few hundred meters diameter) and offer the ability to assess bioavailability of metals from contaminated sediments into aquatic insects, and into higher trophic levels. Two sites have been established in the Milwaukee Estuary AOC (one near Lincoln Park and one near Lakeshore State Park), as well as many of the other U.S. AOCs, for this type of monitoring. Using this data will allow us to determine if contaminants are impacting birds and other animals. Preliminary data from the tree swallow studies, although limited, suggests that the levels of contaminants in the Milwaukee Estuary AOC are not have effects on the reproductive success of tree swallows. See *Figure 3* on the following page.

Additionally, researchers with the National Oceanic and Atmospheric Administration (NOAA) have been collecting data around the Great Lakes for several years using resident *Dreissena* species of mussels (more commonly known as zebra and quagga mussels) to monitor for toxicity as part of the Mussel Watch program. A few sites have been monitored in the Milwaukee Estuary, and the most recent data and trends for the Western Great Lakes are expected in early 2012. This data may also provide some necessary information about this impairment. Because data was also collected from other non-AOC sites around the Great Lakes, this will aid in providing a comparison between the mussel toxicity in the sites monitored in Milwaukee and other similar non-AOC sites.

Next action(s) needed

A fish and wildlife technical team should be assembled to help identify appropriate species, metrics, sampling methods, timing, locations, and a lead entity to collect sufficient data to demonstrate whether or not this impairment is still impaired. Although remediation of contaminated sediments in the AOC is still underway, the current Great Lakes Restoration Initiative (GLRI) may provide an opportunity if additional funds are needed to support this work. Tree swallow monitoring results from Christine & Thomas Custer, U.S. Geological Survey (USGS), should be evaluated during this process, possibly considering: comparison of reproductive success to other, appropriate locations; comparison of tissue concentrations to levels known to cause adverse effects on avian reproduction; models of exposure of birds in higher trophic levels; and rates of deformities or other malformations in nestlings. Progress in remediating contaminated sites should also continue, since contamination was the primary driver behind listing this impairment.

Issues (challenges, risks) affecting progress on this BUI

There has been limited data until recently to aid in the assessment of this impairment. The data that have been gathered will help provide some insight into this impairment, but further data collection will probably be necessary.

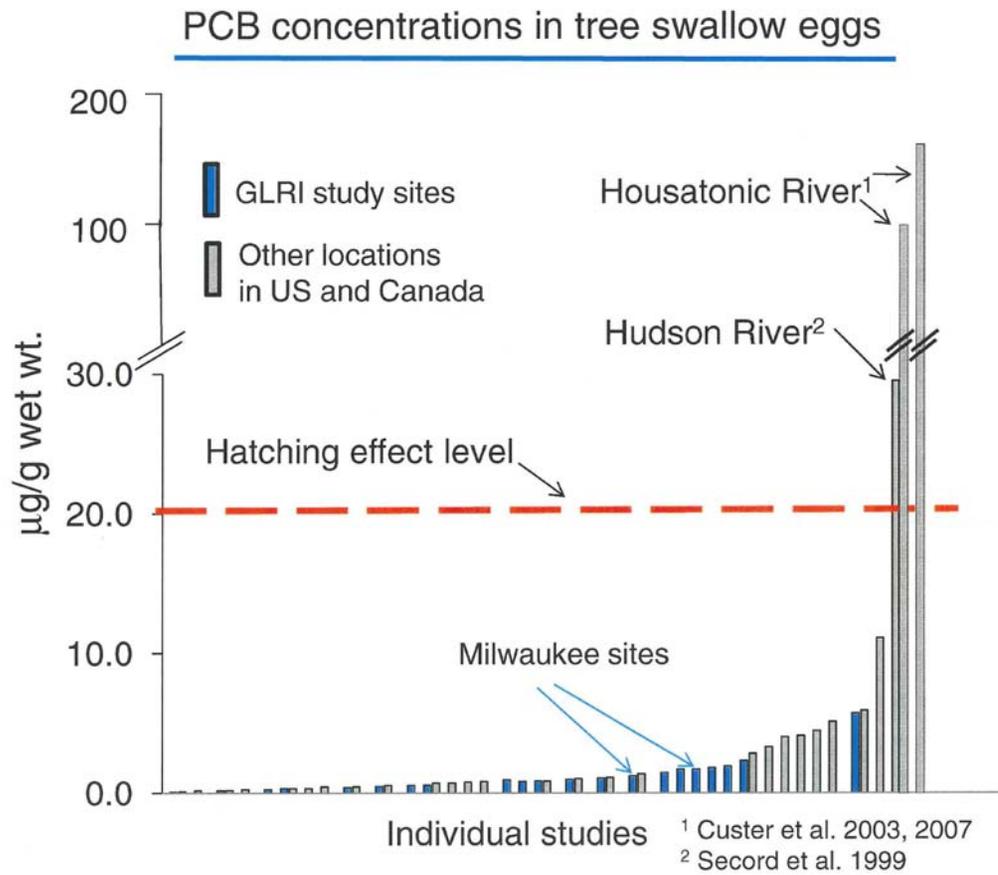
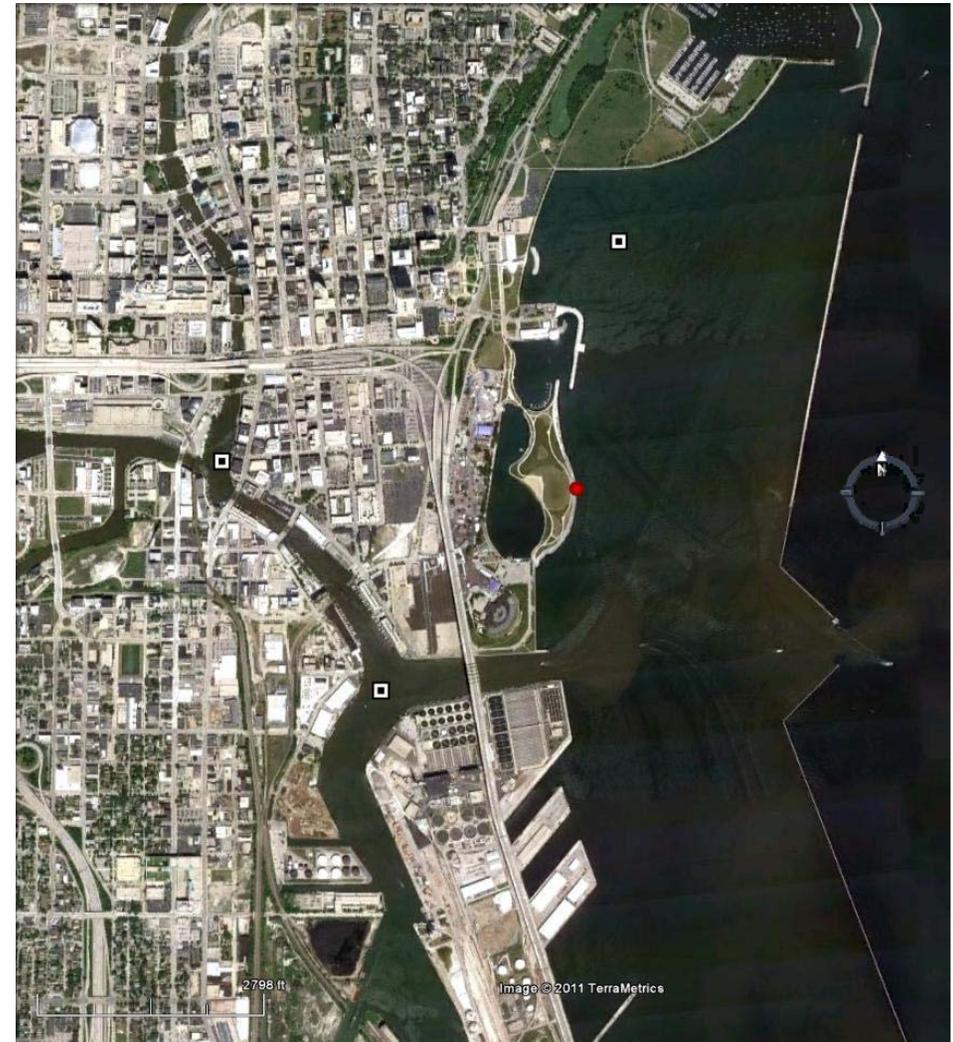


Figure 3 (above). Tree swallow data, including data points for the Milwaukee Estuary AOC sites. The concentrations are much lower than those that would affect hatching success. **Figure 4 (right).** NOAA Mussel Watch sites. Squares indicate where sediment is being monitored and the red dot indicates where mussels have been collected.



DEGRADATION OF BENTHOS

2008 Target and Status

Proposed Target from 2008 (pp. 37-38)	Suggested Modifications (if applicable)	Status
<p>Removal may occur if:</p> <ul style="list-style-type: none"> • Known contaminant sources contributing to sediment contamination and degraded benthos have been identified and control measures implemented, and • All remediation actions for contaminated sediments are completed and monitored according to the approved plan with consideration to using consensus based sediment quality guidelines and equilibrium partitioning sediment benchmarks; or • The benthic community within the site being evaluated is statistically similar to a reference site with similar habitat and minimal sediment contamination. 	<p><i>We recommend making minor changes to the target. See the Target Rationale section for further explanation.</i></p> <ul style="list-style-type: none"> • N/A • All remediation actions for contaminated sediments are completed and monitored according to the approved plan; or • N/A 	<p>In progress</p> <p>In progress</p> <p>Assessment in progress (2012)</p>

Target Rationale

There are several considerations for this impairment. First, the harbor portion of the AOC will support different benthic communities than will the tributaries. Benthic communities in the harbor/estuary are subjected to regularly disturbed and altered physical conditions (like dredging and shoreline hardening from the installation of sheet piling). Second, benthic communities, either in the harbor or in the tributaries, would also be impacted from pollution². The rationale for this target is to clean up contaminants so that they aren't substantially impacting benthic communities,

² The *Consensus-Based Sediment Quality Guidelines* for Wisconsin (see References) were developed through an assimilation of results from multiple published effects-based toxicity testing to freshwater benthos, so there is a clear and documented connection between contamination and deleterious benthic community impacts.

and then determine if the degradation of communities in the harbor is likely being caused by the poor physical conditions for which there is little that can be done to remedy. If there are degraded benthic communities in the tributaries, the main causes could be the presence of contamination or degraded physical habitat (e.g., substrates that don't provide adequate conditions for higher quality benthic communities). For both the harbor and the tributaries, contaminants and pollution must be assessed. Physical habitat should also be assessed to determine whether this could be contributing to the degraded communities, and, where feasible, habitat improvements should be made.

The second bulleted item has the suggested omission of the reference to the sediment quality guidelines and equilibrium partitioning sediment benchmarks because such measures and other sediment guidelines are part of the WDNR review to arrive at an approved remediation plan.

Rationale for Listing

According to earlier RAP documents, this beneficial use is considered impaired because of degraded physical habitat, low dissolved oxygen concentrations, and constituents in sediment toxic to macroinvertebrates, but the extent of the impairment is not well defined. The 1991 and 1994 RAP documents recognize that monitoring is required to better define this impairment. Furthermore, because physical conditions within the AOC are diverse, different final targets may be required for different habitat types within the AOC.

The RAPs also cite results of several benthic surveys in the AOC that showed benthos were lacking in diversity and were dominated by pollution-tolerant species. It was because of the lack of diversity and the prevalence of pollution-tolerant organisms that this impairment was listed.

Summary of key historical activities and current status

Cleaning up toxic sites, minimizing sewer overflows, improving physical habitat, and reducing runoff pollution where feasible are the necessary actions to help make progress toward removing this impairment from the Milwaukee Estuary AOC. We assume that cleanups for reducing ecological risk should also result in an improved benthic community. Based on this assumption, the following projects have helped improve conditions for benthos:

- ✓ Moss-American Superfund Project
- ✓ Kinnickinnic River Great Lakes Legacy Act Project
- ✓ Blatz Pavilion Great Lakes Legacy Act Project
- ✓ Lincoln Park Great Lakes Legacy Act Project Phase I (underway)

In early 2012, USGS will be surveying parts of the AOC and other non-AOC reference sites to see how the benthic communities compare. Benthic communities are important because they are the base of the food web, and if there aren't sufficient conditions for them to thrive, then we would expect there to be constraints on the populations of fish and other wildlife.

Next action(s) needed

Contaminated sites within the AOC need to be remediated. We will need to evaluate the findings of USGS benthos study, assess the need to supplement the study (to adequately characterize the range of benthic conditions in the AOC), and re-examine whether the beneficial use is impaired based on findings.

Issues (challenges, risks) affecting progress on this BUI

Given the urban nature of all of the AOC waterways, it is unlikely that high quality benthic communities can be established at all sites. Reference sites, if used, must be in areas that are urban. Reference sites will likely be degraded and the target will need to take into consideration the achievability of targets for BUI removal.

RESTRICTIONS ON DREDGING ACTIVITIES

2008 Target and Status

Proposed Target from 2008 (pp. 39-40)	Suggested Modifications (if applicable)	Status
<p>Removal of this BUI can occur when:</p> <ul style="list-style-type: none"> • Contaminated sediment hotspots within and upstream from the AOC have been identified. • Implementation actions to remediate contaminated sites have been completed. As a source control measure and for AOC remediation, known contaminated sites must be addressed before removal is possible. • There are no restrictions on routine navigational dredging done by the U.S. Army Corps of Engineers and/or private dredging companies due to contamination originating from controllable sources within the AOC. 	<p>Removal of this BUI can occur when:</p> <ul style="list-style-type: none"> • N/A • N/A • There are no special handling requirements of material from routine navigational dredging due to contamination originating from controllable sources within the AOC. 	<p>In progress</p> <p>In progress</p> <p>In progress</p>

Target Rationale

While many of the AOCs have defined this BUI to only federally maintained navigation channels, the Milwaukee Estuary RAP took a broader view of this issue. The Technical Advisory Committee for the 1994 RAP update recognized that contaminated sediments are linked to most of the BUIs in the AOC. Therefore, addressing contaminated sediments is central to removing this impaired beneficial use.

The intent is to eliminate special handling requirements that go beyond the normal handling requirements for dredged sediments. If sediments that are dredged for navigation, either by the U.S. Army Corps of Engineers or by private companies, contain moderate to high levels of contaminants, then there are addition costs incurred from the proper disposal of such sediments. We seek to eliminate those additional burdens imposed by the presence of contaminants so that parties can dredge and dispose of sediment by simply following required standard testing and disposal as mandated by state law.

Rationale for Listing

Contaminated sediments are recognized as one of the primary sources of pollution in the Milwaukee Estuary AOC. Historically, most of the AOC was modified, dredged, and maintained for large vessel navigation, making the estuary a settling basin for sediments. Over time, sections of the

rivers that were previously maintained are no longer needed for deep draft navigation, but the sediments and their associated contaminants remain. This impairment was listed due to the presence of a number of contaminated sediment sites. Contaminants that are issues within the AOC include PAHs, heavy metals, and PCBs.

Summary of key historical activities and current status

Remediation of contaminated sediment hotspots is necessary before this BUI can be removed. To date, several remediation projects have helped make progress toward removal:

- ✓ Moss-American Superfund Project
- ✓ Kinnickinnic River Great Lakes Legacy Act Project
- ✓ Blatz Pavilion Great Lakes Legacy Act Project
- ✓ Ruck Impoundment on Cedar Creek (cleanup completed)
- ✓ Lincoln Park Great Lakes Legacy Act Project (Phase I currently underway)
- ✓ Cedar Creek Superfund Site (studies on-going)

Next action(s) needed

Investigate suspected areas of contaminated sediment in upstream areas of the Milwaukee and Menomonee River portions of the AOC to identify the need for cleanup actions. An investigation of the upper Milwaukee River is currently underway. With regard to contaminated sediment projects, there are still some necessary actions that must be taken before the impairment can be removed. They are:

- Complete the cleanup of PAHs and metals from the Solvay Coke Superfund Alternative Site
- Complete the cleanup of PAHs and metals from the Burnham Canal Superfund Alternative Site
- Complete the cleanup of PCBs at the Cedar Creek Superfund Site
- Complete the cleanup of PCBs from the Lincoln Creek Great Lakes Legacy Act project (finish Phase 1 and complete Phase 2)
- Assess the sediment in the Menomonee River downstream of its confluence with the Little Menomonee River
- Assess areas on the Milwaukee River downstream of confluence with Cedar Creek to Lincoln Park/Milwaukee River Channels Sediment Projects.

For contaminated sediment cleanups, when possible upstream sources/sites should be addressed before addressing sites further downstream; however, anytime opportunities present themselves to address contamination, they should be taken, even if a downstream site is cleaned up ahead of a site further upstream.

Issues (challenges, risks) affecting progress on this BUI

Cleanup timelines is uncertain and affects ability to delist this impairment. Any reductions in federal Great Lakes Legacy Act funding could affect progress as well.

EUTROPHICATION OR UNDESIRABLE ALGAE

2008 Target and Status

Proposed Target from 2008 (pp. 40-41)	Suggested Modifications (if applicable)	Status
<p>Removal of this BUI can occur when:</p> <ul style="list-style-type: none"> • Total phosphorus (TP) concentrations within the AOC rivers do not exceed 0.05 mg/L OR in-river TP concentrations meet Wisconsin criteria when promulgated. • TP concentrations in the inner and outer harbor areas do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated. • TP concentrations in near shore waters do not exceed 0.02 mg/L OR TP concentrations meet WI criteria when promulgated. • There are no exceedances of the minimum dissolved oxygen (DO) concentrations established in Chapter NR 102, due to excessive sediment deposition or algae growth. • Chlorophyll-a concentrations within the AOC lake and impoundment areas do not exceed 4.0 µg/L. • No water bodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent WI Impaired Waters list. • There are no beach closures in the AOC due to excessive nuisance algae growth. 	<p>Removal of this BUI can occur when:</p> <ul style="list-style-type: none"> • Total phosphorus (TP) concentrations within the AOC rivers, harbors, and nearshore waters meet the criteria recommended for the State of Wisconsin, as established by WDNR. • When the results from the total maximum daily load study for phosphorus, total suspended solids, and bacteria are completed for the Menomonee, Kinnickinnic, and Milwaukee Rivers. • Measures to meet the Total Maximum Daily Loading Implementation Plan are being completed. • No water bodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent WI Impaired Waters list. • Chlorophyll-a concentrations within the AOC lake and impoundment areas do not exceed 4.0 µg/L. • No water bodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent WI Impaired Waters list. • There are no beach closures in the AOC due to excessive nuisance algae growth. 	<p>In progress</p> <p>In progress</p> <p>Action needed</p> <p>Action needed</p> <p>Unknown</p> <p>Action needed</p> <p>Unknown</p>

Target Rationale

The target revision is needed because at the time that the proposed targets were being developed in 2008, Wisconsin did not have any criteria for nutrients, but was in the process of developing them. Phosphorus criteria have since been established, and in the AOC, the Menomonee, Milwaukee, and Kinnickinnic Rivers (as well as many of their tributaries) are listed as impaired because of low dissolved oxygen concentrations caused by excessive phosphorus pollution (WDNR, Impaired Waters Program). The Milwaukee Metropolitan Sewerage District (MMSD) has received funding to determine where the sources of contamination are coming from (i.e., a total maximum daily load study, or TMDL), and the results of the study should inform future actions that will be necessary in order to reduce phosphorus pollution to the AOC.

The estuary rivers currently have variance criteria (see NR 104.06 of the Wisconsin Administrative Code) for dissolved oxygen concentrations (2 mg/L), indicating that the estuary is not capable of supporting full fish and aquatic life use designations that would require dissolved oxygen concentrations of at least 5 mg/L. Stakeholders have indicated that they would like waters of the AOC to meet the full fish and aquatic life standard of 5 mg/L, and significant strides have been made in improving water quality where it is possible this standard could be attained in cases where there are sometimes lower dissolved oxygen concentrations.

Rationale for Listing

The 1994 RAP considered this use impaired because phosphorus, nitrogen, and chlorophyll *a* concentrations within the AOC indicated eutrophic conditions (WDNR, 1994, p. 2-19). Low dissolved oxygen concentrations were also common within the AOC rivers. The estuary acts as a settling basin for suspended materials. The organic portion is broken down through chemical and biological processes that demand oxygen from the water column, leading to lower concentrations. The Milwaukee Estuary, including the lower Menomonee, Milwaukee, and Kinnickinnic Rivers are regularly listed on the Wisconsin Impaired Waters (303(d)) for excess phosphorus and low dissolved oxygen concentrations. In the 1994 RAP, total phosphorus levels in the AOC exceeded 0.1 mg/L in 40 to 75 percent of the samples taken from the Inner Harbor, and 10 to 25 percent of the time from the Outer Harbor.

Summary of historical activities and current status

While dissolved oxygen levels used to be low in the rivers because of sewer overflows, overflows have decreased substantially since the Deep Tunnel project went online in 1994. Despite these improvements, the rivers and estuary are still listed as impaired because of insufficient dissolved oxygen concentrations to support the designated fish and aquatic life uses of the rivers.

Results from the TMDL study should be helpful in determining what progress can be made with regard to the issue of phosphorus loading in the estuary.

Additionally, there are several monitoring programs sponsored by various organizations and agencies, such as Milwaukee Riverkeeper, MMSD, River Alliance of Wisconsin, and Ozaukee County Planning and Parks Department, which collect water quality data. This data is valuable in assessing this impairment; the River Alliance of Wisconsin and Milwaukee Riverkeeper received funding for a pilot volunteer phosphorus

monitoring project. The results from that effort will be available in early 2012. Because it was a pilot project, the program will be evaluated early in 2012 to determine if such a program should be continued or expanded in the AOC.

The Alliance for the Great Lakes also received funding through an AOC support grant to conduct beach monitoring in the AOC. While focused on overall beach monitoring, this information may also be useful for assessing nuisance algal growth at beaches. This information will also be available in early 2012.

The following is a list of the waters in the original AOC boundaries that are proposed for listing as impaired for the year 2012. The listing is for low dissolved oxygen attributed to phosphorus pollution:

- Last 2.8 river miles of the Kinnickinnic River
- Last 2.7 river miles of the Menomonee River
- Last 2.9 river miles of the Milwaukee River

MMSD received GLRI grants from USEPA to complete third party TMDL analyses on four water bodies in the Milwaukee River basin. TMDLs are the maximum amounts of specific pollutants that can be received by a river or water body and still meet water quality standards. The Federal Clean Water Act requires that TMDLs be prepared for impaired waters. The MMSD projects will focus on the Kinnickinnic, Menomonee, and Milwaukee Rivers and the Milwaukee River estuary. The pollutants to be examined in this work are fecal coliform bacteria, phosphorus, and sediments (total suspended solids/TSS). The Milwaukee River TMDL will focus on the reaches of that river that are included in the State's 303(d) Impaired Waters List.

A contractor has been selected for the project, and is currently working on developing the TMDL model. Meetings with stakeholders began in late 2011, and are expected to continue until the completion of the TMDL modeling effort in 2013.

Next action(s) needed

Nonpoint source pollution is a challenge to making progress on this impairment. Therefore, addressing nonpoint source pollution throughout the AOC watersheds is a priority issue for continuing to make progress in the estuary itself. Green infrastructure projects and implementation of other stormwater best management practice projects should be a priority to address this impairment.

The TMDL study, which includes an examination of phosphorus loading, is scheduled to be completed in 2013, at which point the following action will be necessary to address this impairment:

- Support for the TMDL implementation within the AOC boundaries.
- Re-evaluate the chlorophyll-a portion of this target to determine if it is an appropriate measure.

Issues (challenges, risks) affecting progress on this BUI

The physical conditions within the estuary itself have not changed, so despite the substantially decreased contributions of organic material from sewer overflows, meeting the designated fish and aquatic uses may still be difficult. Another challenge to addressing this impairment will be the contribution of orthophosphate to total phosphorus levels in waterbodies in the AOC. Some municipal water supplies in the AOC add orthophosphate as an anticorrosive agent. Under Wisconsin state statute and administrative code (Section 283.35, Wis. Stats. and Section NR 205.08, Wis. Adm. Code), this treated water is used in some non-process waters, (e.g., cooling systems) and directly discharged without having the orthophosphate removed. The orthophosphate increases the total phosphorus concentrations in waterbodies and can contribute to further algal growth. It is currently estimated that this contribution of phosphorus is quite significant in the AOC, but this will be examined in greater detail during the TMDL that is just beginning.

BEACH CLOSINGS/RECREATIONAL RESTRICTIONS

2008 Target and Status

Proposed Target from 2008 (pp. 42-43)	Suggested Modifications (if applicable)	Status
<p>This BUI will be considered removed when:</p> <ul style="list-style-type: none"> • All known sources of bacterial contamination to the AOC and tributary watersheds have been identified and, if feasible, have been controlled or treated to reduce possible exposures; and • No sanitary sewer overflows or un-permitted combined sewer overflows have occurred within the AOC during the previous five year period as a result of a less than 25-year precipitation event or snow/ice melt conditions; and • All municipalities within the AOC have adopted and are implementing storm water reduction programs including an illicit discharge elimination program; and • No water bodies within the AOC are included on the list of impaired waters due to contamination with pathogens or chemicals having a public health concern (i.e., carcinogenic, mutagenic) in the most recent Wisconsin Impaired Waters list that is submitted to USEPA every two years; and • No local or state contact advisories related to the presence of a chemical contaminant have been issued within the AOC during the previous five years. 	<p>This BUI will be considered removed when:</p> <ul style="list-style-type: none"> • N/A 	<p>Unknown</p>
	<ul style="list-style-type: none"> • N/A (at this time) 	<p>Unknown</p>
	<ul style="list-style-type: none"> • N/A 	<p>Complete</p>
	<ul style="list-style-type: none"> • N/A (at this time) 	<p>In progress</p>
	<ul style="list-style-type: none"> • N/A (at this time) • No water bodies within the AOC are included on the list of impaired waters for recreational restrictions in the most recent Wisconsin 	<p>Unknown</p> <p>In progress</p>

	<p>Impaired Waters list.</p> <ul style="list-style-type: none"> No beaches are included on the list of impaired waters for recreational restrictions in the most recent Wisconsin Impaired Waters list. <p><i>Please see further comments below for this impairment.</i></p>	<p>In progress, action needed</p>
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Target Rationale

At the time the time that the targets were being proposed, there were several beaches listed for pathogens, and there had been problems in the recent past with pathogens at beaches. Bradford Beach was closed 28 days in 2006 and South Shore Beach was closed 43 days in 2006. Bradford, McKinley, and South Shore Beaches were listed on the Wisconsin Impaired Waters list because they were not meeting their full recreational uses due to bacterial contamination.

Since that time, conditions at several of the beaches have substantially improved, and for the 2010 impaired waters list, Wisconsin recommended delisting, or removing, Bradford and McKinley beaches from the impaired waters list for pathogens.

The second bullet specifying that there should be no sanitary sewer overflows for a less than 25-year rainfall event will need to be revisited, since this language is inconsistent with WDNR’s wastewater permitting language.

The fourth and fifth bullets may need to be changed in order to be consistent with the state’s impaired waters program methodology. According to the current methodology in the Wisconsin Consolidated Assessment and Listing Methodology (WisCALM), waters can be listed as impaired for having contaminated sediments that would pose a risk to public welfare and safety (WDNR, 2011d, p. 55). While contaminated sediments are a problem in the AOC, high counts of bacteria pose a significant recreational hazard. While the 2008 targets address source control, items need to be added to the target that address the actual problems that bacteria loading causes, e.g., excessive beach closures or recommended limits for body contact on AOC rivers attributed to high bacteria levels.

Rationale for Listing

The 1991 RAP indicates that although there are no beaches within the river system, there are several public beaches within the Lake Michigan portion of the AOC that do not consistently meet water quality standards for total body contact recreation. Data from the lower river system also exceeds the state partial body contact recreation standards. The 1994 RAP Update indicates that there were essentially no changes in the status of this BUI between the initial RAP document and the update. Beach closings and recreation restrictions was still considered an impaired

beneficial use in the AOC. Potential sources of contamination are indicated as combined sewer overflow (CSO) events and both urban and rural storm water. The RAP Update states that the lower Milwaukee, Menomonee, and Kinnickinnic Rivers have no swimming beaches. In the early 1990s, South Shore beach along Lake Michigan closed periodically, for 48 to 96 hours, when high bacteria counts occur after CSO events (WDNR, 1994, p. 2-19).

In 1990 and 1991 there were 28 beach closings in Milwaukee County; all of the beach closings occurred after a rainfall (WDNR, 1994, p. 2-19). Because bacteria levels in the lower rivers exceed recreational standards, the waters were supporting partial body contact (e.g. boating, canoeing, fishing, and incidental contact) rather than full body contact. Hence, full recreational potential is not being realized within the AOC.

Summary of historical activities and current status

There are four beaches within the AOC: Bradford Beach, McKinley Beach and Jet Ski Launch, South Shore Beach, and Bay View Beach (Figure 5). Conditions have improved greatly at McKinley and Bradford Beaches. Bradford Beach received Blue Wave Certification through the Clean Beach Council in 2009. The program is the first national environmental certification for beaches, and aims to help maintain robust, healthy, and vibrant beaches. A \$500,000 donation from MillerCoors combined with the work of more than 20 business and community groups funded and implemented practices such as algae removal, gull control, and beachcombing equipment. The donation also paid for the Blue Wave application fee, and \$25,000 annually for five years to University of Wisconsin-Milwaukee's (UWM's) Great Lakes WATER Institute for Bradford water quality monitoring (Bay View Compass, 2009).

While there have been successes with regard to beaches, South Shore Beach continues to be on the impaired waters list for bacteria due to its specific location. Relocating South Shore Beach would contribute significantly toward achieving the goals for this BUI. However, the main impediment toward making progress on this impairment is that bacteria levels in the rivers themselves continue to be high and have, in many instances, actually increased. The TMDL study for all three rivers will also determine how bacteria levels might be reduced in order to comply with state criteria for pathogens.



Figure 5. Beaches in the Milwaukee Estuary AOC.

In 2011, Milwaukee Riverkeeper and UWM's Great Lakes WATER Institute received funds through an AOC support grant to analyze data for pathogen source identification. The analysis from this project will be combined with similar projects to determine areas where human waste is getting into storm sewers. The data from this work should be available in 2012. These studies can then inform where the most significant sources of bacteria are originating and, where feasible, measures can be taken to reduce this especially harmful source of bacteria to the AOC waterways.

Next action(s) needed

The fecal coliform bacteria TMDL needs to be completed for pathogens, and South Shore beach should be relocated in order to improve conditions at the beach. Consistently elevated levels of bacteria that result in beach closings at South Shore Beach are attributable to its current location. Milwaukee County Parks and Recreation Department is currently developing a scope of work that will be used to hire a third-party contractor to conduct a feasibility study that will determine the cost associated with relocating the beach to another location south of its present location. After completion of the feasibility study, the cost of moving the beach to another location will be known, and securing funding for the relocation can occur. The following actions should be supported, as appropriate, through the AOC program:

- Support for continued bacteria source identification that affects recreational uses of AOC waters.
- Where feasible, actions should be taken to control sources of bacteria that cause recreational restrictions on AOC waters.
- Relocate South Shore Beach.

Issues (challenges, risks) affecting progress on this BUI

Bacterial levels will continue to increase as infrastructure ages and lateral sewer lines continue to fail, posing a significant obstacle toward making progress on the recreational restrictions portion of this impairment.

DEGRADATION OF AESTHETICS

2008 Target and Status

Proposed Target from 2008 (pp. 44-45)	Suggested Modifications (if applicable)	Status
<p>This delisting target is consistent with Chapter NR 102, Water Quality Standards for Surface Waters. Delisting shall occur when monitoring data within the AOC and/or surveys for any five year period indicates that water bodies in the AOC do not exhibit unacceptable levels of the following properties in quantities which interfere with the Water Quality Standards for Surface Waters:</p> <ul style="list-style-type: none"> a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water shall not be present in such amounts as to interfere with public rights in waters of the state. b) Floating or submerged debris, oil, scum, or other material shall not be present in such amounts as to interfere with public rights in waters of the state. c) Materials producing color, odor, taste, or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state. <p>The following target will also be met to determine when restoration has occurred:</p> <ul style="list-style-type: none"> • Corrective action plans are in-place and being implemented for all known sources of materials contributing to the degradation of aesthetics within the AOC. 	<p>N/A for all.</p> <p><i>Please see further descriptions below for this impairment.</i></p>	<p>Unknown</p> <p>Unknown</p> <p>Unknown</p> <p>Needs action</p>

Target Rationale

The proposed target is consistent with existing state water quality standards, but we will need to evaluate the proposed five year period with stakeholders and also work with stakeholders to determine measurable endpoints for this impairment.

Rationale for Listing

This beneficial use is considered impaired because of the poor visual quality of the water resources and adjacent land. The 1994 Milwaukee RAP attributed the likely cause of the impairment to surface water debris, oil and grease, and overdevelopment along the estuary. The likely sources of these causes include point source pollution, nonpoint source pollution, and litter.

After storms, considerable debris can be seen near almost every combined sewer overflow and storm sewer outfalls. Floating litter significantly degrades aesthetic value and recreational enjoyment of our urban waterways. Floatable trash likely comes from many sources, including: illegal dumping of trash into streams; littering into the drainage area of our rivers; ill-maintained dumpsters; improper streambank modifications; sanitary sewer overflows and combined sewer overflows; marine sources and recreational users; and most importantly, from stormwater runoff.

Summary of historical activities and current status

Because sewer overflows have been substantially decreased since the Deep Tunnel project, it is expected that contributions of litter from overflows would have decreased. There are still some areas that accumulate trash and debris in the rivers. One such area on the Menomonee River near the Emmber Lane road crossing regularly accumulated debris and garbage until a structure was put in the river that allowed recreation access but prevented the accumulation of trash. There are several other areas in the AOC that may also benefit from similar structures. Significant progress could be made on this BUI by identifying such areas and implementing control measures.

Participants in the Social Uses work group at the Kinnickinnic River Section SIG meeting indicated that they remain concerned about the appearance and odor of the water (WDNR, 2011a).

Next action(s) needed

Assess areas where trash collects so that, where feasible, design measures can be implemented to reduce trash/debris collection. Determine if trends can be ascertained for trash/unit effort of collection to see if problem has improved since sewer overflow events have been reduced. Address source control, where necessary and feasible, for trash and debris.

Monitoring and/or assessment is required to determine what else must be done to address this BUI. The AOC support grant to the Alliance for the Great Lakes, while focused on beaches, may provide a means of assessing this impairment.

Additionally, in the Lower Green Bay and Fox River AOC, a citizen team was assembled to collect information related to this impairment to determine perceptions and to incorporate local opinions of AOC aesthetics. This WDNR-initiated citizen volunteer monitoring program will assess the current status of the Degraded Aesthetics BUI in September 2011. The fall 2011 is a pilot project and WDNR will use volunteer input to help

shape the program before launching it more broadly in Green Bay in spring 2012 (WDNR, 2011e). This is an effort that could be replicated in Milwaukee. Moreover, lessons learned from the Green Bay project could help inform modifications that may make such a program more likely to succeed in the Milwaukee Estuary.

In short, WDNR and UW-Extension will need to develop a process with stakeholders to assess and/or monitor this BUI in 2012.

Issues (challenges, risks) affecting progress on this BUI

The visual appearance and odor of the water were reasons that this impairment was listed. It is difficult to compare those properties to conditions today. For odor, in particular, there may not be much that can be done to control or eliminate sources.

DEGRADED PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS**2008 Target and Status**

Proposed Target from 2008 (p. 46)	Suggested Modifications (if applicable)	Status
<p>A stepped approach is needed for delisting for this impairment:</p> <ol style="list-style-type: none"> 1. The first step toward delisting will be to establish a baseline condition for the estuary to evaluate the extent of this impairment. Phytoplankton and zooplankton community surveys should be conducted and compared to a non-impacted or minimally impacted reference site to set the baseline condition. If the community structure is statistically different than the reference conditions, this BUI should be considered impaired. 2. Identify the factors leading to this impairment. <ol style="list-style-type: none"> a) Ambient water chemistry sampling should be conducted to determine if nutrient enrichment is the main contributor. If nutrients are the main contributor, sources causing nutrient enrichment to the outer harbor and nearshore waters are identified and controlled. b) b) If nutrient enrichment is not considered the cause of the impairment, conduct bioassays to determine if ambient water toxicity is causing impairment. 3. The Milwaukee Estuary AOC is not listed as impaired due to phytoplankton and/or zooplankton toxicity in the most recent Wisconsin Impaired Waters list (submitted to USEPA every two years). 	<ol style="list-style-type: none"> 1. N/A 2. N/A 3. N/A-see note below in <i>Target Rationale</i> section 	<p>Assessment in progress</p> <p>N/A at this time</p> <p>Unknown</p>

Target Rationale

Basic information regarding this impairment is lacking. Assessment is needed to verify the impairment before factors leading to the impairment can be identified.

The 1994 RAP indicated that this beneficial use was impaired because of the poor diversity of plankton, attributed to the eutrophic conditions and the increased conductivity in the estuary and Outer Harbor (WDNR, 1994, p. 2-20).

The third item in the targets should be modified to reflect the current listing methodology for impaired waters in the state. As of the most current version of WisCALM, there are no considerations for listing waterbodies as impaired due to plankton toxicity (WDNR, 2011d).

Rationale for Listing

This BUI is relevant to the outer harbor and nearshore Lake Michigan portions of the Milwaukee Estuary AOC. The 1994 RAP Update indicated that both phytoplankton and zooplankton populations within the Outer Harbor and near shore Lake Michigan are impaired. Like the eutrophication and undesirable algae BUI, these organisms are most affected by nutrient loading and dynamics in the estuary and lake.

According to the 1994 RAP, phytoplankton population data collected by MMSD in the Outer Harbor were representative of nutrient enriched (eutrophic) conditions. Nearshore phytoplankton assemblages had some tolerant organisms, but were more indicative of mesotrophic conditions. The data indicated that the three rivers draining to the Estuary have a significant influence on the phytoplankton community in the Outer Harbor. The nearshore waters in the AOC are also affected by the rivers, but to a lesser extent. Phytoplankton populations were noted to be affected by high nutrients loads to the rivers and harbor. An increase in species tolerant of eutrophic conditions indicated degraded water quality conditions.

Zooplankton populations were also affected. Studies in the 1980s done by MMSD found declining species richness, and dominance of pollution tolerant species in the outer harbor compared with the community structure of the open lake. Species abundance was greater in the Outer Harbor compared to the lake, which indicates nutrient enrichment (WDNR, 1994).

Summary of historical activities and current status

The MMSD had a phytoplankton and zooplankton monitoring program from 1979 to 1988, which provided the basis for listing this use as impaired. The program was suspended in 1988, and since that time there has not been consistent phytoplankton and zooplankton monitoring in the Estuary.

In 2012, USGS will be assessing plankton populations in the AOC and reference sites to provide necessary data so that we can decide how to move forward on this impairment. To view more information about the study design, please refer to Appendix D of the document *Proceedings from the Stakeholder Input Group* that is available online (see References section for link).

Next action(s) needed

See text above.

Issues (challenges, risks) affecting progress on this BUI

There is a lot of uncertainty about this impairment since we do not know much about the plankton communities in the AOC. It is likely that plankton communities have been affected by ecological changes in Lake Michigan, and actions carried out through the Lakewide Management Plan for Lake Michigan may be able to better address the root causes of degraded plankton communities.

LOSS OF FISH AND WILDLIFE HABITAT

2008 Target and Status

Proposed Target from 2008 (p. 48)	Suggested Modifications (if applicable)	Status
<p>This BUI will be considered eligible for delisting when the following have occurred:</p> <ul style="list-style-type: none"> • A local fish and wildlife management and restoration plan has been developed for the entire AOC that: <ul style="list-style-type: none"> ○ Defines the causes of all population impairments within the AOC; ○ Establishes site specific habitat and population targets for native indicator fish and wildlife species within the AOC; ○ Identifies all fish and wildlife habitat restoration programs/activities within the AOC and establishes a mechanism to assure coordination among the programs/activities, including identification of lead agencies ○ Establishes a time table, funding mechanism, and lead agency responsible for all fish and wildlife habitat restoration activities within the AOC. • The programs and actions necessary to accomplish the recommendations of the fish and wildlife habitat plan are implemented, and modified as need to ensure continual improvement. 	<p>This BUI will be considered to be eligible for removal when the following have occurred:</p> <ul style="list-style-type: none"> • All contaminated sediment hotspots within the AOC have been identified, and implementation actions to remediate contaminated sites have been completed. • A local fish and wildlife management and rehabilitation plan has been compiled for the estuary that: <ul style="list-style-type: none"> ○ Defines the causes of all habitat impairments within the AOC ○ Establishes site-specific habitat and population targets for native indicator fish and wildlife species within the AOC ○ Identifies all fish and wildlife habitat rehabilitation programs/activities within the AOC and establishes a mechanism to assure coordination among all these programs/activities, including identification of lead agencies ○ Establishes a time table, funding mechanism, and lead agency or organization responsibility for all fish and wildlife habitat rehabilitation activities needed within the AOC. • The programs and actions necessary to accomplish the recommendations of the fish and wildlife habitat plan are implemented, and modified as need to ensure continual improvement. 	<p>In progress</p> <p>Action needed</p> <p>Action needed</p>

Target Rationale

Since the time the targets were being developed in 2008, many partners in the AOC have developed plans that can be drawn from to determine the actions that are a priority to address this BUI. In order to build efficiency, we recommend using what already exists to draw together parts from the plans that have already been done to determine the priorities for this impairment. (Please see the References section for plans that have been completed that relate to this impairment.) In the near term, we will work with fish and wildlife experts to evaluate existing plans to determine the targets appropriate for particular habitat types and species (i.e., estuary vs. riverine).

It is important to point out that this impairment applies to the entire AOC (i.e., the expanded and original boundaries), in so far as there is contamination in the entire AOC. The reason that the AOC was expanded was to address contamination originating from sources upstream of the original AOC boundaries (i.e., the expanded boundary was not considered to be impaired due to loss of physical habitat). Therefore, activities pertaining to improvement of physical habitat in the original AOC boundaries will be given higher priority. Appendix C contains the memoranda regarding the boundary change.

Rationale for Listing

This beneficial use is considered impaired by the 1994 Milwaukee AOC RAP. The 1994 RAP cites urban development in areas adjacent to the estuary as having greatly diminished aquatic and wildlife habitat. Natural stream banks did not, and still do not, exist below the former North Avenue Dam on the Milwaukee River. Almost no natural areas exist on adjacent streambanks in the harbor or along the rivers. The rivers within the estuary have been heavily engineered for shipping and commerce, producing unnatural shorelines and a virtual “ecological desert” for many aquatic wildlife species. The habitat in the lower reaches of each of the watersheds draining into the Milwaukee Harbor estuary is typical of that found in a highly urbanized environment, with extensive channelization and placement of sheet piling for bank stabilization. From a water quality perspective, fish and aquatic habitat is impaired by excessive sedimentation (including contaminated sediments) and poor ambient water quality. Nutrient loading and low dissolved oxygen concentrations further degrade habitat available for fish forage and spawning. More natural habitat can be generally found in upstream areas of each of the major rivers. There is little cover for resident fish species, and few trees, shrubs and other vegetation to provide shade that could temper high water temperatures in summer months.

Loss of wildlife habitat was not considered impaired in the 1991 RAP because it was not considered to be caused by contamination, but by lack of physical habitat (WDNR, 1991, p. V-12). The 1994 RAP expanded the scope to include lack of physical habitat as an impairment. There is very little loafing and resting habitat for migratory waterfowl—it is not uncommon to see mallards and other ducks resting on submerged logs, and other floating debris as well as boats due to general lack of natural resting areas in our urban waterways (WDNR, 1994, p. 2-21).

The 1994 RAP added that the confined disposal facility (CDF) near Jones Island may be a source of contaminants for waterfowl. The CDF within the outer harbor provides sheltered water habitat and is used for loafing and forage by many migratory and resident duck species and geese. A sentinel duck study was conducted in the summer of 1990 to determine if waterfowl were accumulating contaminants from the Milwaukee CDF. The study concluded that ducks released into the CDF did not accumulate significant concentrations of contaminants compared to field and

background levels (WDNR, 1994, p. 2-16). This may be due to the fact that the most contaminated sediments within the CDF were originally deposited in the 1970s and are buried to the extent that they are no longer available to wildlife.

Summary of historical activities and current status

Projects to remediate contaminated sediment may have helped in addressing this impairment. Projects to rehabilitate the in-stream habitat (i.e., the removal of dams/drop structures, removal of concrete-lined channels upstream of the AOC boundaries) have also helped address this impairment. Additionally, the biochemical oxygen demand of sediments in the tributaries has decreased since the Deep Tunnel storage project came online in the mid-1990s. This project dramatically reduced the number and volume of sewer overflows that negatively impacted water quality in the estuary.

In 2011, a monitoring project, funded through AOC support funds administered by WDNR, assessed habitat in the Little Menomonee River. This work closely follows the remediation of contaminated sediments at the Moss-American Superfund site that was completed in December 2009. A report from this monitoring project is forthcoming and expected in early 2012. This information will provide a baseline and recommendations for future actions to increase habitat and biodiversity in the Menomonee River portion of the AOC.

Next action(s) needed

We need to work with stakeholders to determine what benchmarks are desirable and achievable for this impairment. There are a few projects in the AOC that will help in making progress toward removing this impairment in the meantime. They are:

- Assess and remediate contaminated sediment projects.
- Assess and rehabilitate wetlands, where feasible, especially any remnant coastal wetlands in the estuary portion of the AOC (i.e., the Grand Trunk Wetland).
- Enhance/improve the natural streambanks along the Kinnickinnic River in the upstream-most part of the AOC boundary.
- Enhance/rehabilitate herptile habitat in the former Moss-American Superfund Site (Little Menomonee River); informed by the 2011 *Little Menomonee River Wildlife Habitat Monitoring* project.
- Where feasible, restore shoreline buffers in the urban portion of the AOC to enhance habitat for fish and wildlife.
- Review existing fish and wildlife plans and use the information to prepare an AOC-specific document that includes recommendations for further action in the AOC on this BUI.
- Inventory existing data-gathering activities for the “native indicator fish and wildlife species” identified in a habitat planning process; assess if the existing activities are gathering the type and quantity of data that are needed for evaluating progress in the AOC. Evaluate the need to fill any data gaps, and, if appropriate, seek resources to conduct additional monitoring.
- Initiate a technical team to assist with preparing a fish and wildlife plan, or to assist with integrating goals and objectives from existing plans into an AOC-specific document that establishes measurable endpoints for the AOC for the population & habitat BUIs.

Issues (challenges, risks) affecting progress on this BUI

Answering the question of when do we know we have created/enhanced enough habitat will be challenging to determine. Fish and Wildlife populations are mobile and not restricted to habitat simply within the AOC boundary. Actions to address the habitat needs of local populations may need to occur in a broad area, beyond the AOC boundary. For example, restoring hydrologic connections between wetlands and the AOC will depend on implementing projects not only within the AOC but outside the AOC as well. Improving water quality in the AOC will depend on implementing projects in the upstream watersheds of the Menomonee, Milwaukee, and Kinnickinnic Rivers. Additionally, the continued influx of invasive species may make any habitat goals difficult to maintain in the long term.

CONCLUSION

Working with the stakeholders and project partners will be critical to securing support for projects and making overall progress in the AOC. Several key partnerships have been developed through the program, and with the GLRI, a lot of data have been collected around the Great Lakes that pertain to different BUIs. These partnerships help ensure efficiency in the AOC program, both in the state of Wisconsin and throughout the Great Lakes.

Although progress has been made in the AOC, there are still several key actions that need to continue or occur in order to address the impairments. First, the assessment and remediation of contaminated sites is necessary in order to address many of the impairments. Several sites to date have been addressed, but other parts of the AOC need to be characterized and addressed before contamination-related issues in the AOC no longer pose a substantial threat to fish and aquatic life in the AOC.

Second, the TMDL must be completed and implemented so that issues related to eutrophication, body contact, beach closings, and habitat (as a result of high sediment loads) are no longer impacting the AOC. Source identification of bacteria will also help determine where to most effectively focus efforts related to bacteria loading in the AOC.

Additionally, we will need to develop a process with stakeholders to assess and/or monitor aesthetics in the AOC in 2012. Such an assessment will be qualitative and quantitative and may also result in some additional projects that could be implemented to address problem areas that negatively impact this BUI in the AOC.

Furthermore, a fish and wildlife technical team should be convened as soon as possible so that priorities related to fish and wildlife can be determined for the AOC.

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RESOURCES FOR THE FISH AND WILDLIFE RELATED BENEFICIAL USE IMPAIRMENTS

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APPENDICES

Appendix A - Stakeholder Meeting Schedule

Appendix B - BUI Tracking Matrix

Appendix C - Memorandum to USEPA requesting a change in the AOC boundaries

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Appendix A

Stakeholder Meeting Schedule

Note that this schedule is subject to change.

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**Milwaukee Estuary Area of Concern
Stakeholder Input Group**

Updated Tentative* Timeline

2011

April 4/5, 2011	Kick off meetings
June 2, 2011	Fish and wildlife habitat meeting
July 27, 2011	Kinnickinnic River section meeting
Sept. 21, 2011	Special Session meeting with EPA and DNR
Oct. 21, 2011	Draft of Stage 2 Remedial Action Plan (RAP) update out to stakeholders for review (on web)
Nov. 3-4, 2011	Wisconsin Areas of Concern Conference in Green Bay
Nov. 14, 2011	Comments from stakeholders due on Stage 2 RAP update
Dec. 30, 2011	Draft Stage 2 RAP update submitted to EPA by this date

2012

Feb. 2012	Menomonee River section meeting
April 2012	Milwaukee River section meeting
August 2012	Updated version of Stage 2 RAP submitted to EPA

Please check our website for the latest schedule updates, other information about the Milwaukee Estuary AOC, and the draft Stage 2 Remedial Action Plan:

<http://dnr.wi.gov/org/water/greatlakes/priorities/milwaukee.htm>

*Subject to change
October 11, 2011

Megan O'Shea, DNR
414.263.8625, megan.oshea@wisconsin.gov

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Appendix B

BUI Tracking Matrix

Note that projects listed in the table below are the next clearly delineated action steps that have been identified by WDNR in collaboration with AOC partners and stakeholders to make progress toward delisting the AOC. This list does not necessarily reflect all actions that will ultimately be needed to remove impairments.

Milwaukee AOC BUI Tracking Matrix

December 2011

Beneficial Use Impairment Name	Assessment needed? If yes, is it scheduled? When?	Actions/Tasks Needed	Funding Source; estimated cost if known	Action status: In progress, Completed, Not started	Project type*	Project Lead	Timeframe for Project Completion	Comments
Restrictions on Dredging Activities - Kinnickinnic	Yes, area across from Solvay in line for Legacy Funding in (Year?)	Solvay Superfund Alternative site	RP	In progress	3	USEPA	Unknown	USEPA negotiating scope of project with RP.
		Sed. cleanup in area across from Solvay	Legacy Act	Not started	3	?WDNR & USEPA	Unknown	Submitted by WDNR as a priority Legacy Act project in 2011.
Restrictions on Dredging Activities – Menomonee	Yes, not scheduled	Assess river downstream of its confluence with the Little Menomonee River. Clean up of Burnham Canal also needed.	Legacy Act	Not started	1	USEPA	Unknown	One of several sites where sediment characterization is needed.
Restrictions on Dredging Activities - Milwaukee	Yes, see comments	Assess areas downstream of confluence with Cedar Creek and upstream from the Lincoln Park sites. Phase 2 of the Lincoln Park project also needs to be completed.	GLRI, Legacy Act	In progress, not started	1	USEPA	Unknown	Some areas downstream of Cedar Creek are being assessed, but additional characterization is needed.
Restrictions on Dredging Activities - Estuary	Yes, 2012	Assess areas adjacent to Solvay Coke site that are not dredged for navigation	Legacy Act	Not started	1	USEPA	2012	Sediment characterization is scheduled to take place in 2012.
Restrictions on Fish and Wildlife Consumption	Wildlife – needed, not scheduled; Fish – not needed until sediment cleanups are done.	Wildlife consumption study modeled after the one designed for the Sheboygan AOC.	Not secured. \$270,000	Not started.	1, 5	WDNR – Sean Strom	2014	GLRI proposals for wildlife consumption study in 2010 and 2011 were not funded. AOC waterbodies are included in the state’s fish consumption advisory program which revisits waterbodies every 5 years. AOC Stakeholder Input Group identified fish consumption outreach project as a priority for the AOC.
		Fish consumption outreach and education for subsistence anglers.	TBD	Not started	4	WDNR/Milwaukee City/County Health Depts.	2012	

Degradation of Benthos	Yes, scheduled for 2012	Develop outreach and education related to the 2012 assessment.	GLRI funding – part of Sheboygan project	In progress	1, 4	WDNR, USGS, UW-Extension – Andy Fayram, Amanda Bell, Gail Epping Overholt	2012	Sampling delayed in 2011 due to delay in arrival of federal funds. Study findings will be used to assess the need to revisit the 2008 target and to conduct additional characterization.
Degradation of Fish and Wildlife Populations	Yes	Compile related plan data to determine if there are gaps that need further data.	Unknown	Not started	2, 4	WDNR	2012-2013	Little Menomonee study contributed to understanding of population status.
Loss of Fish and Wildlife Habitat	Yes	Compile related plan data to determine if there are gaps that need further data.	Unknown	Not started	2, 4	WDNR	2012-2013	Little Menomonee study contributed to understanding of habitat conditions for herptiles.
Bird/animal deformities or reproduction problems	Yes	Compile existing data and work with stakeholders/tech teams to determine if which other indicators might be needed, and if current monitoring (tree swallow and mussels) should be expanded.	Unknown	In progress	1, 2, 4	WDNR, NOAA, USGS	2012	
Fish Tumors or other Deformities	Yes, pending results of 2011 data	Waiting for fish tumor analysis from USFWS data collected in 2011.	Unknown	In progress	1	WDNR, USFWS	2011	
Beach Closings/Recreational Restrictions	Yes	Source identification of bacteria necessary to determine human health threat, and to determine if source control is feasible.	SWWT, Great Lakes WATER Institute, GLRI	In progress	1	Unknown	Unknown	Feasibility study is being completed in 2012. The feasibility study will determine the cost associated with moving the beach. Funding has not yet been secured for moving the beach. Construction related to moving the beach, if funded, may be able to begin in 2013.
	Yes, 2012	Move South Shore Beach	Milwaukee County	In progress	2, 3	Milwaukee County Parks	2012	
Degraded Phytoplankton and Zooplankton populations	Yes, scheduled for 2012	Develop outreach and education related to the 2012 assessment.	GLRI funding – part of Sheboygan project	In progress	1	WDNR, USGS, UW-Extension – Andy Fayram, Amanda Bell, Gail Epping Overholt		Sampling delayed in 2011 due to delay in arrival of federal funds. Study findings will be used to assess the need to revisit the 2008 target and to conduct additional characterization.

Eutrophication or Undesirable Algae	Unknown, pending results of TMDL	Implementation of TMDL.	GLRI	In progress	2, 3	MMSD	2013	
Degraded Aesthetics	Yes	Develop a process with stakeholders to assess and/or monitor aesthetics in the AOC in 2012.	Unknown	Not started	4, 5	WDNR, UW-Extension	2012-2013	

*Project types:

- 1 Baseline assessment through data gathering
- 2 Compile & analyze existing data
- 3 On-the-ground remediation or restoration project
- 4 Stakeholder engagement and/or community education & outreach
- 5 Verification of target achievement through monitoring or other documentation

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Appendix C

Memoranda to USEPA Requesting a Change in the AOC Boundaries

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 19 2008

REPLY TO THE ATTENTION OF:
R-19J

Matthew J. Frank, Secretary
Wisconsin Department of Natural Resources
Post Office Box 7921
Madison, Wisconsin 53707-7921

Dear Mr. Frank:

This letter is in response to Governor Jim Doyle's February 26, 2008, submittal of a certification of a modification to the Milwaukee Estuary Area of Concern (AOC) boundary, which is an amendment to the approved Southeastern Wisconsin Water Quality Management Plan and the State's Water Quality Management Plan. Pursuant to Clean Water Act sections 208 and 303(e), and 40 C.F.R. Part 130, I am approving this modification.

The request to change the Milwaukee Estuary AOC boundary, while submitted as an amendment as described above, was also reviewed by EPA's Great Lakes National Program Office (GLNPO) under the terms of the Great Lakes Water Quality Agreement. In reviewing this submission and subsequent clarifications from the State of Wisconsin, GLNPO has concluded that:

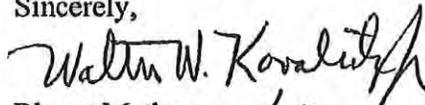
- 1) there is sufficient environmental justification for the requested boundary modification; and,
- 2) public hearings provided ample opportunity for public review and comment on the proposal and that no negative comments were received.

In addition, GLNPO forwarded the requested boundary modification to the International Joint Commission (IJC) for their comment. IJC staff concluded that the requested boundary modification and the inclusion of the additional stream reaches were reasonable steps for further addressing the environmental concerns in the AOC. Accordingly, GLNPO has recommended the approval to the requested boundary modification to which I concur. GLNPO will formally notify the IJC of this decision.

I share Governor Doyle's view that these approvals will help expedite the potential utilization of important Great Lakes Legacy Act Funding to address contaminated sediments issues and that they will spur the clean-up and formal delisting of the Milwaukee Estuary AOC.

If you have any questions on these matters, please have your staff contact Mr. William Tansey of the Water Division, at (312) 886-0125, or Mr. Mark Elster of GLNPO, at (312) 886-3857.

Sincerely,



Bharat Mathur *for*
Acting Regional Administrator

cc: Jim Doyle, Governor
Charles Ledin, WDNR
Marsha Burzynski, WDNR

bcc: Debbie Baltazar, USEPA-WD
William Tansey, USEPA-WD
Stephen Poloncsik, USEPA-WD
Peter Swenson, USEPA-WD
Linda Holst, USEPA-WD
Kevin Pierard, USEPA-WD
Gary Gulezian, Director, USEPA-GLNPO
Vicki Thomas, USEPA-GLNPO
Dave Cowgill, USEPA-GLNPO
Mark Elster, USEPA-GLNPO
Ajit Vaidya, USEPA-GLNPO



JIM DOYLE
GOVERNOR
STATE OF WISCONSIN

February 26, 2008

Ms. Mary A. Gade, Regional Administrator
United States Environmental Protection Agency, Region V
77 West Jackson Boulevard
Chicago, IL 60604

Subject: Milwaukee River Area of Concern Boundary Change

Dear Ms. Gade:

The Wisconsin Department of Natural Resources has sent me the attached modification to the Milwaukee Area of Concern boundary. Based upon the Department's approval and my review, I am certifying this material as an amendment to the Areawide Water Quality Management Plan meeting the requirements of the Clean Water Act of 1987 (Public Law 92-500 as amended by Public Law 95-217) and as outlined in the federal regulations 40 CFR, Part 35. Additional information on this amendment is contained in a letter to me from Matthew J. Frank, Secretary of the Wisconsin Department of Natural Resources, which is attached to and is part of this certification.

This certification makes two important Wisconsin sediment remediation projects eligible for federal funding under the Great Lakes Legacy Act Program. These are critical ecological restoration projects which will showcase federal-state partnerships and will result in sediment cleanup work, if they are implemented. State funding match for these two projects was included in the enacted 2007-2009 Biennial Budget. Wisconsin is very interested in working closely with USEPA to ensure that project implementation can proceed

Sincerely,

A handwritten signature in cursive script that reads 'Jim Doyle'.

Jim Doyle
Governor

Cc: Matthew J. Frank, Secretary - WDNR
Todd Ambs, Water Division Administrator - WDNR
Charles R. Ledin, Office of the Great Lakes Director - WDNR
Russ Rasmussen, Watershed Management Bureau Director - WDNR
Gary Gulezian, Director, Great Lakes Program Office - USEP A
Gloria McCutcheon, Southeast Regional Director - WDNR, Milwaukee
Phillip Evenson, Executive Director, Southeast Wisconsin Regional Planning Commission

DATE: February 7, 2008
TO: Governor Doyle
FROM: Matthew J. Frank, Secretary
Wisconsin Department of Natural Resources

SUBJECT: Certification of Milwaukee Area of Concern Boundary Change

I am pleased to forward to you an approved modification to the boundary of the Milwaukee Area of Concern which more accurately reflects ecosystem impacts connected with the beneficial use degradation described in the Milwaukee Remedial Action Plan and subsequent documents. The Wisconsin Department of Natural Resources (WDNR) has approved this change as an update to the Milwaukee River Areawide Water Quality Management Plan. This letter requests that you certify this report to the USEPA as meeting state and federal requirements under the Clean Water Act, Section 205j. A draft letter is attached to this memorandum that certifies this amendment to your agency. This certification is necessary before that amendment can be finalized.

Since the Milwaukee Estuary Area of Concern Boundary was first drawn in the late 1980s, we have accumulated more evidence showing contributions of toxic substances from upstream sources. Approved additions with supporting information include:

- ◆ *Cedar Creek downstream from Bridge Road to confluence with Milwaukee River.* This addition encompasses the entire Cedar Creek Superfund site, which contributes sediments contaminated with PCBs to the Milwaukee River.
- ◆ *Milwaukee River and Lincoln Creek from confluence with Cedar Creek to former North Avenue Dam.* This area includes the Milwaukee River area that is influenced by contaminated sediments from Cedar Creek and Lincoln Creek. This also includes a large deposit of contaminated sediments located upstream from the Estabrook Park Dam.
- ◆ *Little Menomonee River from Brown Deer Road to confluence with Menomonee River, and Menomonee River downstream from confluence with Little Menomonee River to 35th Street.* The Little Menomonee River contains the Moss American Superfund Site, which potentially contributes contaminated sediments to the Menomonee River.

A public involvement process following state rules and procedures was used to complete this amendment. Please certify this report to the USEPA as fulfilling the requirements of the Clean Water Act of 1987 (Public Law 92-500 as amended by Public Law 95-217) and as outlined in Federal Regulations 40 CFR, Part 35, as an update to the State of Wisconsin Areawide Water Quality Management Plan.

cc: Todd Ambs, Administrator, WDNR Water Division
Charles R. Ledin, Director, Office of the Great Lakes
Russ Rasmussen, Director, Bureau of Watershed Management
Gloria McCutcheon - SER, Milwaukee
Gary Gulezian, Director, Great Lakes Program Office

Attachment





State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor,
Matthew J. Frank, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

February 7, 2008

Mr. Phil Evenson, Executive Director
SEWRPC
W239 N1812 Rockwood Drive
PO Box 1607
Waukesha, WI 53187-1607

Dear Mr. Evenson,

This letter is to provide documentation that we are hereby amending the Milwaukee River Basin Areawide Water Quality Management Plan to expand the boundary of the Area of Concern to better reflect pollutant sources and sinks which contribute to the degradation of the Milwaukee River and its harbor. Below is a description of the change (see also attached map).

Current Boundary:

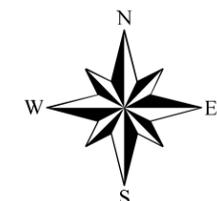
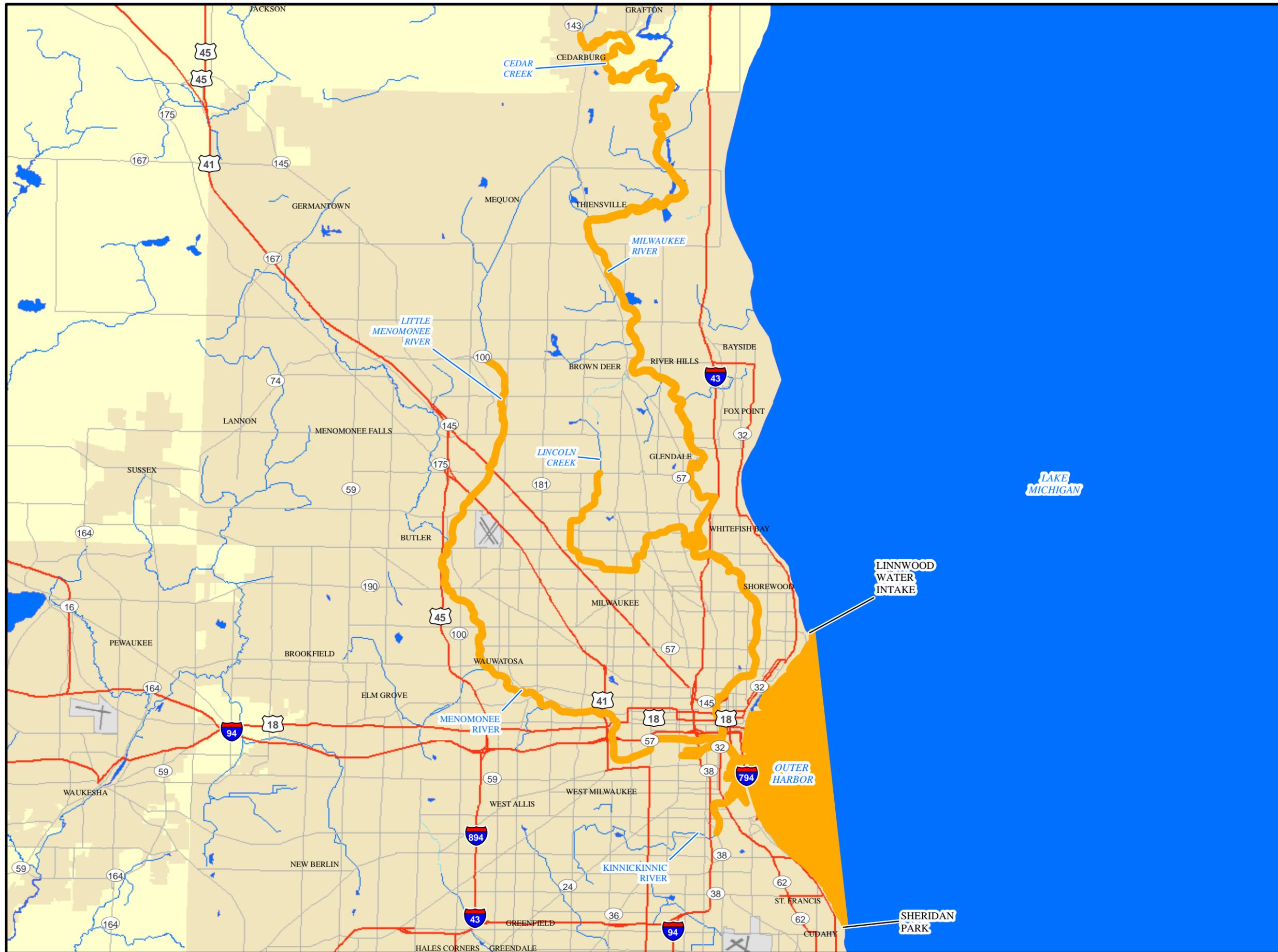
- Lower Milwaukee River downstream from former North Avenue Dam
- Lower Menomonee River downstream from 35th St. Bridge
- Lower Kinnickinnic River downstream from Chase Avenue
- Inner and Outer Harbor
- Near shore areas of Lake Michigan

Proposed Additions and supporting information:

- Cedar Creek downstream from Bridge Road to confluence with Milwaukee River. This addition encompasses the entire Cedar Creek Superfund site, which contributes sediments contaminated with PCBs to the Milwaukee River.
- Milwaukee River and Lincoln Creek from confluence with Cedar Creek to former North Avenue Dam. This area includes the Milwaukee River area that is influenced by contaminated sediments from Cedar Creek and Lincoln Creek. This also includes a large deposit of contaminated sediments located upstream from the Estabrook Park Dam.
- Little Menomonee River from Brown Deer Road to confluence with Menomonee River, and Menomonee River downstream from confluence with Little Menomonee River to 35th Street. The Little Menomonee River contains the Moss American Superfund Site, which potentially contributes contaminated sediments to the Menomonee River.

Sincerely,

Russ Rasmussen, Director
Bureau of Watershed Management
Wisconsin Department of Natural Resources

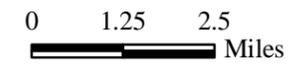


LEGEND

- MAJOR ROADS
- SURFACE WATER
- URBAN AREAS
- EXTENT OF AREA OF CONCERN (MILWAUKEE ESTUARY REMEDIAL ACTION PLAN, JULY 2008)

NOTE: AREA OF CONCERN BOUNDARY AS APPROVED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES ON JULY 11, 2008.

SOURCE: MODIFIED FROM THE WISCONSIN WATER QUALITY MANAGEMENT PROGRAM, 1991 AND 2008, AND ESRI, 2005.



MILWAUKEE ESTUARY, WISCONSIN AREA OF CONCERN

Great Lakes National Program Office

