

REMEDIAL ACTION PLAN UPDATE
for the
SHEBOYGAN RIVER AREA OF CONCERN



December 2014



Wisconsin Department of Natural Resources
Office of the Great Lakes

**Remedial Action Plan Update
for the
Sheboygan River Area of Concern**

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Disclaimer

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

The actions identified in this Remedial Action Plan Update do not constitute a list of preapproved projects, nor is it a list of projects simply related to BUIs or generally to improve the environment. Actions identified in this document are directly related to removing a BUI and are needed to delist the Area of Concern.

EXECUTIVE SUMMARY

Sheboygan River Area of Concern (AOC) partners built momentum throughout 2011 by planning multiple dredging and habitat restoration projects. The City of Sheboygan, Sheboygan County, Wisconsin Department of Natural Resources (WDNR), U.S. Army Corps of Engineers and U.S. Environmental Protection Agency worked closely together to plan both Great Lakes Legacy Act Dredging and Strategic Navigational Dredging projects. The WDNR, City, County and members of the Fish and Wildlife Technical Advisory Committee (TAC) worked on the “Pathway to Delisting Beneficial Use Impairments” project, which set the stage for the seven habitat restoration projects to occur while also providing for characterization of multiple impairments.

In 2012, the AOC partners, agencies and responsible parties worked together with private contractors to implement all of the priority AOC management actions including removing approximately 400,000 cubic yards of contaminated sediment from the Sheboygan River and constructing the priority habitat projects identified by the TAC. Significant public engagement and outreach occurred during project implementation in 2012.

In 2013, AOC partners collaborated with the Legacy Team to complete some minor dredging near the Pennsylvania Ave Bridge (known as Grid 40) and the placement of 6 inches of sand cover over selected areas in the river. These actions should further reduce residual contamination concentrations for polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) in the river and speed up recovery for biota. After spring flooding events in 2013, our AOC partners worked with habitat contractors to repair some damage caused by high flows and to conduct a variety of maintenance activities. We continued to work with our contractors to conduct invasive plant treatments along the river riparian areas. Office of the Great Lakes staff also worked with AOC partners to develop a draft AOC verification monitoring plan and initial work began on a final AOC fish and wildlife restoration plan. Additionally, some initial discussions occurred on the potential for removing two beneficial use impairments (BUIs): “Eutrophication and Undesirable Algae” and “Restrictions on Dredging”.

In 2014, agencies and local project partners implemented several management actions in the Sheboygan River AOC to achieve AOC goals. The actions include the following:

- Completed all follow-up actions for the sediment remediation projects that were substantially completed in 2012.
- Continued maintenance and monitoring of seven habitat restoration projects.
- Continued to provide oversight of invasive species’ contractor’s work.
- Prepared BUI removal package for “Restrictions on Dredging Activities” after holding a public informational meeting and public comment period.
- Evaluated preliminary data collected from the first year of the study, *Benthos & Plankton BUIs Evaluation in Wisconsin’s Lake Michigan Areas of Concern*, to assess the status of the benthos and plankton impairments.
- Analyzed 2014 phosphorus data and information to propose removing “Eutrophication and Undesirable Algae” BUI. Engaged stakeholders in adopting a clarification to the delisting target for this BUI.
- Finalizing fish and wildlife restoration plan which will document actions taken, measures of success, future monitoring and other habitat work that could compliment the AOC Tier 1 priority actions.
- Completed the first year of verification monitoring for the fish communities, benthic macroinvertebrate communities, mink, and fish habitat surveys.

- Continued collecting tree swallow eggs, nestlings, and diet samples from tree swallow box arrays being used to assess the “Bird or Animal Deformities or Reproduction Problems” BUI.
- Continued a second year of engaging stakeholders through citizen science programs led by University of Wisconsin-Extension.

In 2015, we hope to make the following progress in the Sheboygan AOC:

- Conduct an overall evaluation of the seven habitat restoration projects and invasive species treatment to determine if they meet criteria stated in the fish and wildlife restoration plan.
- Remove the BUI “Eutrophication and Undesirable Algae” by sharing information and data on how this AOC delisting target has been met. Opportunities for stakeholder and public input will be provided.
- Complete a second year of verification monitoring for the fish communities, benthic macroinvertebrate communities, mink, and fish habitat surveys (for the Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations BUIs).
- Complete final analysis from both first and second years of the study, *Benthos & Plankton BUIs Evaluation in Wisconsin’s Lake Michigan Areas of Concern*.
- Conduct monitoring for Sport Fish Contaminant Monitoring Program as an action for the “Restrictions on Fish and Wildlife Consumption” BUI.

This Remedial Action Plan (RAP) Update builds upon the work that was carried out in 2012 and completed in 2013 and concisely lists the current status of each beneficial use impairment, the next actions needed, potential issues, and stakeholder outreach needs associated with each. Citizen engagement has been an integral component of the Area of Concern program since the beginning and continues to be a priority as additional actions are identified and implemented.

TABLE OF CONTENTS

EXECUTIVE SUMMARY I

TABLE OF CONTENTS III

DEFINITIONS V

PURPOSE STATEMENT..... 1

INTRODUCTION..... 2

BENEFICIAL USE IMPAIRMENT UPDATES 9

 RESTRICTIONS ON DREDGING ACTIVITIES 10

 RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION..... 14

 DEGRADATION OF BENTHOS..... 16

 DEGRADATION OF FISH AND WILDLIFE POPULATIONS 17

 LOSS OF FISH AND WILDLIFE HABITAT 19

 BIRD OR ANIMAL DEFORMITIES OR REPRODUCTION PROBLEMS..... 21

 FISH TUMORS OR OTHER DEFORMITIES 23

 DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS 25

 EUTROPHICATION OR UNDESIRABLE ALGAE 27

CONCLUSION 29

REFERENCES..... 30

APPENDICES..... 32

List of Figures

Figure 1.	Boundaries of the Sheboygan River Area of Concern.....	3
Figure 2.	Sheboygan River Superfund Site Segments and Landmarks	13

List of Tables

Table 1.	Sheboygan River Area of Concern Beneficial Use Impairments Summary.....	4
Table 2.	Sheboygan River BUI Status Summary.....	5
Table 3.	Sheboygan River AOC Information/Education/Outreach Campaign 2013-2014.....	8
Table 4.	Summary of Sediment Removal Projects	11

List of Appendices

Appendix A	Sheboygan River AOC BUI Tracking Matrix
Appendix B	Memo documenting the target clarification for the Eutrophication BUI
Appendix C	Personal correspondence regarding Sheboygan AOC Boundaries

List of Acronyms

AOC	Area of Concern
BUI	Beneficial use impairment
CAC	Community Advisory Committee
CHL-a	Chlorophyll-a
DO	Dissolved oxygen
GLRI	Great Lakes Restoration Initiative
LOEL	Lowest observed effect level
MGP	Manufactured Gas Plant
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RAP	Remedial Action Plan
ROD	Record of Decision
TAC	Technical Advisory Committee
TP	Total phosphorus
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UW-Extension	University of Wisconsin-Extension
WDNR	Wisconsin Department of Natural Resources

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, 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.

Bioaccumulative

An adjective that describes a substance that builds up within the tissues of organisms.

Delisting Target

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

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 were 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

Note that a renegotiated Great Lakes Water Quality Agreement was signed in 2012 by the U.S. and Canada which removed the “stage” terminology from the AOC Annex, and simply requires Remedial Action Plans to be “developed, periodically updated, and implemented for each AOC.”

PURPOSE STATEMENT

The purpose of this document is to serve as a Remedial Action Plan Update. Remedial Action Plans are required by Annex 1 of the Great Lakes Water Quality Protocol of 2012 (which replaced the 1987 Protocol amending the Revised Great Lakes Water Quality Agreement of 1978). The 2012 Protocol indicates that Remedial Action Plans must include the following elements:

1. Identification of beneficial use impairments and causes;
2. Criteria for the restoration of beneficial uses that take into account local conditions and established in consultation with the local community;
3. Remedial measures to be taken, including identification of entities responsible for implementing these measures;
4. A summary of the implementation of remedial measures taken and the status of the beneficial use; and
5. A description of surveillance and monitoring processes to track the effectiveness of remedial measures and confirm restoration of beneficial uses.

This Remedial Action Plan Update was prepared by the Wisconsin Department of Natural Resources in consultation with its partners and is intended to be a concise summary of beneficial use impairment status and specific actions that will be important for reaching the delisting targets. "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 Remedial Action Plan will be updated as needed to incorporate new information that may become available.

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 (sometimes referred to as “legacy” pollutants due to the historical industrial development that often was the source of the pollution). 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 considered to be part of the Lakewide Action and Management Plan (LAMP) program, a “whole lake” program that is also set forth in the Agreement. The Agreement provides the framework for the U.S. and Canada to work together to restore the chemical, physical, and biological integrity of the lakes.

The Sheboygan River AOC encompasses the Lower Sheboygan River downstream from the Sheboygan Falls dam including the entire harbor¹ and is one of five Areas of Concern in Wisconsin (Figure 1). It was designated as an AOC primarily due to polychlorinated biphenyl (PCB) and polycyclic aromatic hydrocarbon (PAH) contamination in Sheboygan River sediments. One primary source of PCBs was an industrial facility operated by Tecumseh Products Company; a primary source of PAHs was a manufactured gas plant (MGP) operated by Wisconsin Public Service Corporation (WPSC). The Kohler Landfill was historically a source of various pollutants, including volatile organic compounds and heavy metals. The Sheboygan River Remedial Action Plan (RAP; WDNR, 1989) and Remedial Action Plan Update (RAP Update; WDNR, 1995) also identified nutrients and solids as significant pollutants for the AOC.

These sources of impairment led to designation of nine of the possible fourteen beneficial use impairments (BUIs) as applicable to the AOC. Sheboygan River AOC impairments and sources are summarized in Table 1. Impairment status is summarized in Table 2.

Since designation as an AOC, much progress has occurred to address pollutant sources. The Kohler Landfill was remediated in the late 1990s through the Superfund program. The Sheboygan River Priority Watershed Project (which ran from 1993 to 2003) resulted in installation of agricultural best management practices throughout the watershed to reduce nonpoint source pollution to the river. Sheboygan River stakeholders pursued Great Lakes Legacy Act funds to address contaminated sediments that fell outside of the Superfund program and Strategic Navigational Dredging to address minimally impacted sediments in priority navigational areas.

Efforts to improve the Sheboygan River accelerated in 2010 when the U.S. Environmental Protection Agency (USEPA) selected the Sheboygan River AOC as a focus for BUI removal. Careful planning throughout 2011 led to a great deal of activity in 2012 to remove contaminated sediments and enhance navigation through dredging, enhance habitat, and assess the status of selected BUIs. In 2013, activities focused on attending to the final details of the dredging projects, completing and maintaining the habitat restoration projects, and reviewing data gathered through the assessment projects. Efforts shifted toward BUI removal of the “Restrictions on Dredging Activities” in 2014, along with maintenance of habitat projects and monitoring of fish and wildlife populations.

¹ The boundary initially included “nearshore Lake Michigan”, but was dropped from the description after an early evaluation of the shoreline revealed that no remediation was necessary (Marsha Burzynski, Nancy Ryan, 2014, personal communication – appendix C).

Because of the dedicated resources made available through the Great Lakes Restoration Initiative (GLRI), AOC staff and partners are addressing the BUIs more aggressively than what the AOC delisting targets call for (e.g., sampling fish and examining them for tumors rather than only tracking complaints of tumors; more sediment remediation than just the Superfund projects, etc.). Implementation has moved at a faster pace than was anticipated when the targets were written.

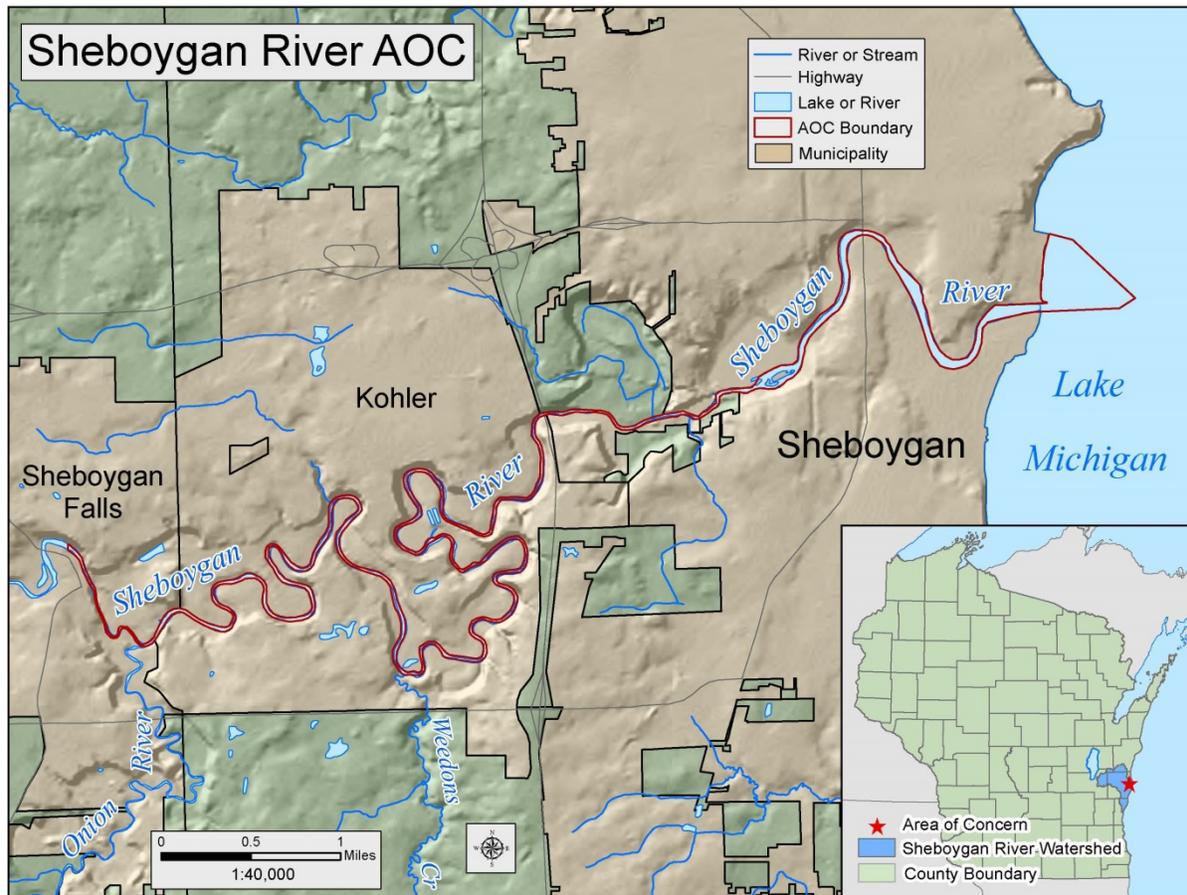


Figure 1. Boundaries of the Sheboygan River Area of Concern

Table 1. Sheboygan River Area of Concern Beneficial Use Impairments Summary

Impaired Beneficial Use	Contaminated Sediments	Non-point Source Pollution (sedimentation, excessive nutrients)	Physical Alteration (dams, urbanization, agriculture)	Invasive or Exotic Species
Restrictions on Dredging Activities	X			
Restrictions on Fish and Wildlife Consumption	X			
Degradation of Benthos	X			
Degradation of Fish and Wildlife Populations	X	X	X	X
Loss of Fish and Wildlife Habitat	X	X	X	
Bird or Animal Deformities or Reproduction Problems	X			
Fish Tumors or Other Deformities	X			
Degradation of Phytoplankton and Zooplankton Populations	X	X		
Eutrophication or Undesirable Algae		X	X	

Table 2. Sheboygan River BUI Status Summary (refer to Appendix A for more detail)

Beneficial Use Impairment	Beneficial Use Status	Summary Status
Restrictions on Dredging Activities	Impaired	Dredging for the two Superfund dredging projects, Great Lakes Legacy Act Dredging project, and the Strategic Navigational Dredging project has been completed. In 2014, documentation and maps were developed and made available in a public informational meeting to demonstrate that goals for removing this beneficial use impairment have been satisfied. Based on the completion of all known management actions, and with completion of the post-dredging documentation and public input, WDNR is submitting the proposal to remove this BUI to EPA.
Restrictions on Fish and Wildlife Consumption	Impaired	The four contaminated sediment remediation projects have been completed. Data collected in 2011 does not support removing fish consumption advisories at this time. Fish monitoring will occur again in 2015, in accordance with standard procedures for the Fish Consumption Advisory Program. A summary of the data collected in 2011 and 2012 does not support the removal of the wildlife consumption advisory. WDNR recommends reassessing wildlife consumption advisories beginning in 2017.
Degradation of Benthos	Impaired	The four contaminated sediment remediation projects have been completed. The Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern project was conducted in 2012 and preliminary data indicate that the Sheboygan River AOC is not degraded overall for the benthic community. A second round of sampling occurred in 2014, with data expected to be available by the end of 2015. If the results of both studies show that the target has been met, WDNR would anticipate proposing this BUI for removal in 2016.
Degradation of Fish and Wildlife Populations	Impaired	The four contaminated sediment remediation projects have been completed. The seven Tier 1 habitat restoration projects outlined in the Fish and Wildlife Habitat Restoration and Management Plan were completed in 2012 and maintenance and monitoring of those projects will continue through 2015. Verification monitoring began in 2014 for the multi-year studies in fish and macroinvertebrates. A mink study was also conducted in 2014 and will continue in 2015 if funding is secured. The remaining verification monitoring surveys for birds, bats, mussels, and herptiles will be conducted in 2016, so the data needed to assess the population BUI status will be available in 2017.
Loss of Fish and Wildlife Habitat	Impaired	The four contaminated sediment remediation projects have been completed. The seven Tier 1 habitat restoration projects outlined in the Fish and Wildlife Habitat Restoration and Management Plan were completed in 2012 and the three years of maintenance and monitoring of those projects will continue through 2015. Additional studies for aquatic habitat and macrophytes began in 2014 and will continue through 2016. The waters of the Sheboygan River AOC are currently not listed on the 303(d) list for aquatic toxicity, and results from the Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern project will determine the need for any further action.
Bird or Animal Deformities or Reproductive	Impaired	The four contaminated sediment remediation projects have been completed. A study design was developed in 2013, and a monitoring plan was funded for assessments that began in 2014. Preferred study species are tree swallows and mink. The tree swallow study is being conducted by the USGS and the data from 2014 is

Problems		currently being analyzed. Mink rafts were deployed in 2014 to track footprints and trap live mink for obtaining blood samples, but no live mink were trapped this year. The mink study will be continued for another year if funding is secured.
Fish Tumors or Other Deformities	Impaired	The four contaminated sediment remediation projects have been completed. A Fish Tumor BUI Evaluation study was conducted in 2012 and data showed that the target is not met. Reference site sampling occurred in 2013 and results show the tumor incidence rate in the AOC is significantly different than the reference site. Therefore, the study will be repeated in 2017, allowing for more recovery time following sediment remediation work.
Degradation of Phytoplankton and Zooplankton Populations	Impaired	The four contaminated sediment remediation projects have been completed. The Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern project was conducted in 2012 and preliminary data indicate that the Sheboygan River AOC is not degraded overall for phytoplankton and zooplankton communities. A second round of sampling will occur in 2014, with data expected to be available by the end of 2015. Data gathered in this study will be used to determine if bioassays are necessary to confirm that no aquatic toxicity is present in the river. If the results of both studies show that the target has been met, WDNR would anticipate proposing this BUI for removal in 2016.
Eutrophication or Undesirable Algae	Impaired	The target referring to the "most recent Wisconsin Impaired Waters list" was refined in 2014 to include more specific criteria, and the Sheboygan River within the AOC meets total phosphorus (TP), dissolved oxygen (DO) and chlorophyll-a (CHL-a) goals that were established for this BUI. The most recent data collected and analyzed in 2014 will be included with previous data in the BUI removal document and the BUI will be proposed for removal in 2015.

STAKEHOLDER ENGAGEMENT

Sheboygan River AOC stakeholder engagement has been a top priority for the Wisconsin Department of Natural Resources (WDNR) throughout the history of the AOC program. The first Sheboygan River AOC RAPs were written with the input of a variety of technical and community advisors. More recently, the University of Wisconsin-Extension (UW-Extension) received GLRI funding from USEPA for stakeholder outreach and education to develop public awareness of AOC projects and issues. There are two groups through which stakeholders provide input and guide AOC progress as well as a number of opportunities aimed at engaging the community.

Stakeholder Groups

UW-Extension led the development in 2011 of a Community Advisory Committee (CAC) to provide an opportunity for general community engagement. Members of the CAC are informed through a regular newsletter that is prepared and distributed by UW-Extension with input from partners. While the CAC does not hold regularly-scheduled meetings, CAC members are invited to provide feedback to WDNR and UW-Extension based on their interest in specific topics in the newsletter. They are also invited to attend public informational meetings scheduled by WDNR for significant decisions (for example, when proposing to remove a BUI). WDNR also consults with the Sheboygan River Basin Partnership to seek input on decisions and to request letters of support for BUI removal documents.

Another important avenue for stakeholder engagement is the Fish and Wildlife Technical Advisory Committee (TAC). With leadership and facilitation from WDNR and UW-Extension, the group has met regularly since 2009 to provide technical input on the fish and wildlife related BUIs. The TAC contributed greatly, both in time and expertise, to the development of the "Pathway to Delisting" project and to the assessment projects which laid the foundation for it. The TAC has been an important group moving forward on development of a final fish and wildlife restoration plan and to coordinate verification monitoring work and review results.

Public Information, Education & Outreach

The information sharing, education and outreach campaign that has been undertaken by our outreach team in 2014 is detailed in Table 3. Efforts transitioned in 2013 to focus more on citizen science programs and opportunities continued in 2014 to volunteer for bird walks, nest box monitoring, bat monitoring, frog and toad surveys, native plant walks, and invasive plant pulls. The goal of these activities is to build a local support network to continue efforts to improve the river once it is no longer an AOC. Newsletters, interpretive exhibits, and canoe trips have kept the local community updated on and aware of projects and volunteering activities happening within the AOC.

Table 3. Sheboygan River AOC Information/Education/Outreach Campaign 2013-2014

Media	Target Audience	Messages	Implementer	Collaborators	Funded By
Group facilitation	Citizens, City of Sheboygan	Local citizens value the historical, cultural and natural resources found in Schuchardt Valley and want to preserve it.	UWEX	Citizens, SRBP, Glacial Lakes Conservancy, multiple conservation groups	UWEX-GLRI
Periodic newsletters	CAC, general public, residents, river businesses, tourists, project partners. Distributed via US mail and email.	Project updates and news Education opportunities For more info, contact.	UWEX	USEPA, WDNR	UWEX-GLRI
Sheboygan AOC web page	CAC, general public, residents, river businesses, tourists, project partners	Sheboygan AOC info and resources more in-depth than newsletter.	UWEX	USEPA, WDNR	UWEX-GLRI
Canoe trips	CAC, general public	Sheboygan AOC story and river awareness and appreciation – sense of place.	Camp Y-Koda	UWEX, WDNR	WDNR CAC grant
Land-based citizen stewardship programs and field outings.	CAC, general public, agency staff	Various AOC topics: Birds, frogs and toads, bats, invasive plants, native plants.	UWEX	WDNR, USEPA, City, County	UWEX-GLRI,
Photo contest	CAC, general public	Get in touch and take notice of YOUR Sheboygan River.	UWEX	UWEX	UWEX-GLRI
Litter clean-up May 17, 2014	CAC, general public	You can help improve the health of the Sheboygan River	Camp-Y-Koda	UWEX, SRBP	WDNR – CAC grant
Testing the Waters of the Sheboygan River	High school students	How healthy is the Sheboygan River? What can be done to improve its health even more?	Camp Y-Koda	UWEX SRBP High schools	SRBP, UWEX-GLRI
Permanent exhibits along river	General public	The Sheboygan is a HEALING River; what happened, what is next.	UWEX	UWEX, WDNR, IL/IN Sea Grant	UWEX-GLRI, WDNR

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.

2008 Target and Status

Beneficial Use Impairment Name	Status
The 2008 Sheboygan River AOC delisting targets (WDNR, 2008) are listed here as separate target components on each row to clearly show status of each part of the target.	May be: <ul style="list-style-type: none"> - "Complete" - "Addressed by Current Projects" - "Not Complete" - "Unknown"

Note: may list one or more of the following:

- potential concerns about the target, particularly if the target is not specific enough to define a measurable endpoint for the BUI
- if revisions are anticipated and how such changes might be approached including responsible party and timeline
- if the 2008 target was modified and details of any changes

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.

Summary of key remedial actions since the 2012 RAP and current status

"Key remedial actions" are those that directly contributed to the current status of 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, on-the-ground projects, and stakeholder engagement processes that are clearly delineated and directly address the specific BUI. Plans for verifying achievement of delisting targets are listed here if known.

Issues (challenges, risks) affecting progress on this BUI

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

Stakeholder Engagement

This section is included only if BUI-specific stakeholder engagement activities are anticipated in the next year. General AOC education, outreach, and stakeholder engagement activities are addressed on pages 9-10.

RESTRICTIONS ON DREDGING ACTIVITIES**2008 Target and Status**

Restrictions on Dredging Activities	Status
1) All remediation actions for contaminated sediments are completed and 2) monitored according to the approved remediation plans.	Complete
A dredging alternatives plan is developed that includes an evaluation of the following: <ul style="list-style-type: none"> ▪ Restrictions that must remain in place to protect human health and the environment ▪ Restrictions that must remain in place due to Superfund or RCRA requirements that are based upon state and federal law ▪ Priority areas for navigational use ▪ Priority areas where dredging is needed for other purposes (i.e., utilities) ▪ Costs associated with removing dredging restrictions in priority areas ▪ Funding available to address removing dredging restrictions in priority areas 	Complete

The development of dredging alternatives plan was listed as a delisting target in anticipation that significant sediment contamination would remain at depth and that a plan would be needed to focus on dredging priorities with limited opportunity or funding to address many of the dredging restrictions. However, more funding led to additional remediation actions (in addition to Superfund actions) that eliminated the need for a dredging alternatives plan. Therefore, rather than a plan, a technical memorandum will be provided which will include a summary of actions and the process through which the restrictions were addressed; it will also document the condition of the river after these projects are complete.

Rationale for Listing

Contaminated sediments were present throughout the Sheboygan River AOC, which shares the same boundaries with the Sheboygan River and Harbor Superfund site. PCBs are the contaminants of concern throughout the Superfund site. (Note that although heavy metals are present, they are not the contaminant that is driving sediment remediation plans or work. Two additional Superfund sites are present within the AOC: Kohler Landfill and Camp Marina (a former manufactured gas plant). While contaminated sediments were not associated with the Kohler Landfill site, there were contaminated sediments at the Camp Marina site. The major contaminant of concern in this area is coal tar by-products known as PAHs.

Due to the presence of contaminated sediments, dredging in the lower Sheboygan River and Harbor were restricted. Although the Harbor was a U.S. Army Corps of Engineers (USACE) federally authorized navigational channel, it had not been dredged for navigation purposes since 1969 because of contaminated sediment disposal concerns.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

Much progress has been made in removing contaminated sediments in recent years (Table 4).

Table 4. Summary of Sediment Removal Projects

Project Name	Year	Funding Source(s)	Approximate Cost of Planning and Dredging	Approximate # of Cubic Yards removed
Sheboygan River and Harbor Superfund Site: Upper River Dredging	2006-2007	Tecumseh Corporation and Pollution Risk Services (PRS)	\$9,000,000	20,728
Sheboygan River and Harbor Superfund Site: Lower River Dredging	2011-2012	Tecumseh Corporation and Pollution Risk Services (PRS)	\$13,500,000	63,744
Camp Marina Former MGP Site	2011	Wisconsin Public Service	\$10,000,000	23,240
Great Lakes Legacy Act Project	2012-2013	GLRI/USEPA-GLNPO, State of Wisconsin, Sheboygan County, City of Sheboygan	\$32,776,000	147,822
Sheboygan Harbor Navigational Dredging	2012-2013	GLRI/EPA, State of Wisconsin, Sheboygan County, City of Sheboygan	\$20,797,000	154,273
TOTAL	-	-	\$86,073,000	409,807

Sheboygan River and Harbor Superfund Site

In 2000, a Record of Decision (ROD) was completed for the Sheboygan River & Harbor Superfund project. In 2006, contaminated sediment cleanup work began in the upper river segment of the site (Figure 2), which was completed in 2007. No sediment cleanup was necessary under the ROD for the middle river segment of the site. In spring 2011, dredging began in the lower river and inner harbor sections of the site and was completed in October 2012. Floodplain soils were also removed from the Upper River segment in 2012.

Camp Marina Former MGP Site

The Camp Marina former MGP site remediation has been split into two separate actions, the upland portion and river portion. The site is located near "Boat Island" in the City of Sheboygan (Figure 2). The upland portion of the site was cleaned up in 2002. The river section was dredged in 2011 as a Superfund Alternative or emergency action. This is due to the other Superfund clean-up that was also taking place in 2011 which would have exposed PAH contamination during operations to clean up PCB contamination. The PAH and PCB contaminated sediment removal projects were coordinated in order to address these areas at the same time. Work at the Camp Marina site was completed by the end of 2011.

Great Lakes Legacy Act Project

River stakeholders pursued a Great Lakes Legacy Act project as a betterment to the two Superfund projects. Community stakeholders desired to remove contaminated sediment left behind after the Superfund actions were complete. The Legacy Act dredging project was implemented in 2012 in the lower river between Kiwanis Park and the 8th Street Bridge and was completed in 2013.

Sheboygan Harbor Navigational Dredging

During the investigation stage of the Legacy Act project, sediments below the 8th Street Bridge were found to have much lower levels of contamination than were previously thought to exist in this area. As a result, USACE was able to design a navigational dredging project, something they were previously unable to do. Sediments in the lower portion of the river between the 8th Street Bridge and the outer harbor were dredged in 2012 and completed in 2013, improving the navigation of this area of the river.

Following completion of all dredging activities, WDNR prepared a BUI removal document in 2014 that was reviewed by state agency staff, external partners, and US EPA staff. Copies of the draft BUI removal document, fact sheets, and maps of water depths and post-dredging contaminant levels were available for the public to review in an open house public informational meeting held on September 16, 2014 at the Mead Public Library in Sheboygan. Comments submitted during the public comment period from September 16, 2014 to September 30, 2104 were reviewed and responded to. No concerns were expressed in opposition of the BUI removal.

Next Actions Needed

Submit the final BUI removal document to USEPA.

Issues Affecting Progress on this BUI

There are currently no issues affecting progress on this BUI.

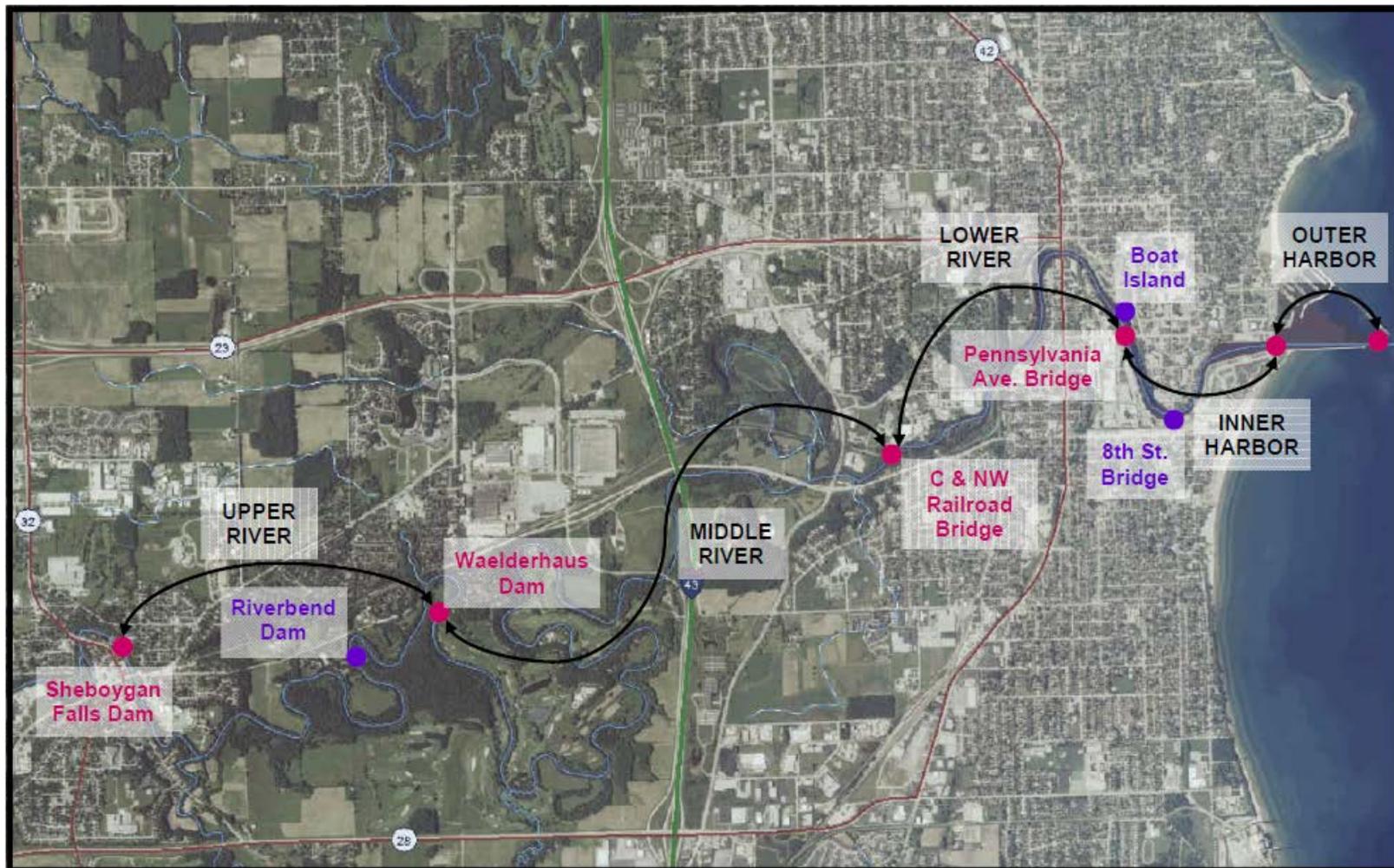


Figure 2. Sheboygan River Superfund Site Segments and Landmarks

RESTRICTIONS ON FISH AND WILDLIFE CONSUMPTION

2008 Target and Status

Restrictions on Fish and Wildlife Consumption	Status
Fish Consumption	
The Superfund PCB cleanup and Manufactured Gas Plant cleanup have been implemented.	Complete
All other known sources of bioaccumulative contaminants of concern (PCBs, mercury, pesticides, and PAHs) have been identified and controlled or eliminated.	Complete
Waters within the Sheboygan River AOC are no longer listed as impaired due to PCB fish consumption advisories in the most recent Impaired Waters (303(d)) list.	Not Complete
Wildlife Consumption	
The floodplain cleanup action that is part of the Superfund Cleanup is implemented.	Complete
All other known sources of bioaccumulative contaminants of concern (PCBs, mercury, pesticides, and PAHs) have been identified and controlled or eliminated.	Complete
Waters within the Sheboygan River AOC are no longer listed as impaired due to wildlife consumption advisories listed in the annual Wisconsin Migratory Bird Regulations.	Not Complete

Rationale for Listing

The Sheboygan River has fish and waterfowl consumption advisories due to PCB contamination. Fish consumption advisories were issued for the Sheboygan River due to PCBs in 1979 and waterfowl consumption advisories were issued due to PCBs in 1987. Currently there is a “do not eat” advisory for all resident fish, mallards and lesser scaup from the river and “no more than 1 meal/week” advisory on Canada geese using the river. It is not known whether the Sheboygan River is the only source of the PCBs in the waterfowl.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

As described in the “Restrictions on Dredging” section, all sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils were completed in 2013.

Sport fish have been monitored for contaminants for the Sport Fish Contaminant Monitoring Program and the Superfund Program, so evidence supports the current advice. WDNR has sampled fish each year from 1976-1997 and in 1999, 2000, 2004 and 2011. These fish have been tested for PCBs and a subset for other contaminants. While the goal of WDNR’s monitoring program is to resample fish from PCB advisory waters every five years, the next sampling event is scheduled for 2015.

Due to lack of information on the waterfowl in the AOC, WDNR pursued and received GLRI grant funding for a three-year study of contaminants in waterfowl in the Sheboygan River AOC to assess the status of this BUI. The project was initiated in fall 2011 and was scheduled to continue through fall 2014. WDNR collected mallard, scaup and Canada geese in 2011 and 2012 and analyzed them for legacy contaminants (PCBs, lead, mercury, DDT/DDE, organochlorine pesticides) as well as emerging contaminants such as polybrominated diphenylethers (PBDEs), perfluorooctane sulfonate (PFOS), and perfluorooctanoic acid (PFOA). The results from the *Contaminant Concentrations in Waterfowl from the Sheboygan River Area of Concern Update: 2012 Samples* project suggest that contaminants in waterfowl currently exist at levels that are too high to pursue a change in consumption advice and as such additional collection efforts were suspended for 2013 (Strom, 2014).

Next Actions Needed

1) *Monitor contaminants in fish and wildlife populations for recovery to assess consumption advisories.* Monitoring of contamination in fish and assessment of the consumption advisories will continue through the existing WDNR program. Sampling for fish was last conducted in 2011. The WDNR goal for PCB advisory sites is to resample fish every five years so that fish consumption advice remains up to date, but the schedule may be adjusted considering workload. After new data is obtained, consumption advice will be re-evaluated using the *Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory* (Great Lakes Sport Fish Advisory Task Force, 1993) for PCBs.

Given recent sediment remediation activities, it is anticipated that contaminant concentrations will decrease. Therefore, WDNR anticipates resuming waterfowl collection for contaminant monitoring in 2017 in accordance with guidance provided by WDNR's Wildlife Toxicologist and Great Lakes Monitoring Coordinator. Three years of data are required to remove the BUI. At the conclusion of the renewed study, consumption advice will be reevaluated. Therefore the earliest that this BUI may be removed is likely to be 2020. If the data does not support lifting the consumption advisory, additional sampling should be repeated at an interval determined in consultation with the WDNR's Wildlife Toxicologist and Great Lakes Monitoring Coordinator.

Issues Affecting Progress on this BUI

While the WDNR goal for PCB advisory sites is to resample fish every five years, the schedule may be adjusted considering workload. Fish and waterfowl sampling that occurred in 2011 and 2012 documented that levels of PCBs remain high such that AOC-specific advisories remain in place.

Stakeholder Engagement

WDNR and UW-Extension will work with the Wisconsin Department of Health Services (WDHS) to provide information and education to the community regarding any changes in consumption advisories that may occur.

DEGRADATION OF BENTHOS

2008 Target and Status

Degradation of Benthos	Status
Known contaminant sources contributing to sediment contamination and degraded benthos have been identified and control measures implemented.	Complete
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.	Complete
The benthic community within the site being evaluated is statistically similar to a reference site with similar habitat and minimal sediment contamination.	Addressed by Current Projects

Rationale for Listing

Due to the contaminated sediments that were present in the river, there was concern that benthos populations might be negatively impacted, but little evidence existed to show that they were actually degraded. A subsequent study, the Aquatic Ecological Risk Assessment (EVS and NOAA, 1998), found that macroinvertebrate populations in sediment depositional areas of the AOC were degraded due to chemical contamination.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

As described in the “Restrictions on Dredging” section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2013.

Due to lack of information on the benthic and planktonic communities in the Sheboygan River compared to reference sites, WDNR received GLRI grant funding for a comparison study. This study, *Benthos & Plankton Community Data for Selected Rivers and Harbors along Wisconsin’s Lake Michigan Shoreline* (Scudder-Eikenberry, 2014), is being carried out by the United States Geological Survey (USGS) for WDNR and includes all four of the Lake Michigan AOCs and six reference sites. Benthos, phytoplankton and zooplankton communities were sampled and assessed in each of the AOCs and in the reference sites in 2012. Because 2012 was an unusual drought year, the study was also repeated in 2014 to increase data rigor. Preliminary analysis of 2012 samples indicate that the Sheboygan River is not considered to be degraded for benthic communities when compared to two non-AOC reference sites. Samples collected in 2014 are currently being processed and analysis should be complete in 2015. This study will be used to evaluate the status of this BUI in the Sheboygan River AOC.

Next Actions Needed

- 1) *Complete data analysis for the 2014 Benthos & Plankton BUIs Evaluation in Wisconsin’s Lake Michigan Areas of Concern project.*

This project assessed the benthic, phytoplankton and zooplankton communities of the river and will be used to assess this BUI. Because 2012 was an anomalous year for weather conditions, it was necessary to repeat the study in 2014 to ensure that data are representative of average conditions. Results from sampling done in 2014 are expected by the end of 2015. If 2014 results indicate that the benthic communities in the Sheboygan River is similar to non-impacted reference sites, the BUI can be considered for removal in 2016. If the data from 2014 indicate that the benthic communities is not similar, then the study should be repeated in the future when more time has been allowed for recovery after contaminated sediment removal.

Issues Affecting Progress on this BUI

If 2014 results indicate that the Sheboygan River is degraded for benthos, the study will need to be repeated.

DEGRADATION OF FISH AND WILDLIFE POPULATIONS

2008 Target and Status

Degradation of Fish and Wildlife Populations	Status
Approved remedial actions (Superfund and RCRA) for contaminated sediment and floodplains have been fully implemented; and	Complete
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. 	Complete
The programs necessary to accomplish the recommendations of the fish and wildlife management and restoration plan are implemented.	Addressed by Current Projects
Populations of native indicator fish/wildlife species are statistically similar to populations in reference sites with similar habitat but little to no contamination.	Addressed by Current Projects

Rationale for Listing

The reasons for listing this BUI that were identified in the 1989 RAP include concern that fish populations might be negatively impacted by exotic species, sedimentation, and dams. The 1995 RAP update also raises the possibility that contaminants may impact fish populations and their forage base. Although fish populations appeared to be good, all of these issues were present in the AOC and it was thought that they could be having a negative effect. There was concern that some wildlife species, such as mink, kingfishers and swallows were at lower-than-normal population levels in the AOC for the habitat available. Contaminants in the food chain were suspected as the cause of the low population levels.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

Since the 1995 RAP update, several actions have occurred that addressed impairments in the Sheboygan River AOC. These included sediment load reduction and erosion control as well as contaminated sediment cleanup. As described in the “Restrictions on Dredging” section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2013.

Baseline information necessary for assessing the fish and wildlife related BUIs was collected as part of a GLRI survey and assessment project that was completed in 2011. In 2011, the TAC prioritized potential habitat projects based on land available, project location within the AOC, feasibility, partnerships and need for habitat work. They produced a list of seven Tier I projects that were necessary to implement before the habitat and population BUIs can be removed. Additional habitat projects (Tier 2 and 3) were also identified that will further restore the Sheboygan River, but were not determined to be feasible or necessary for BUI removal.

The seven Tier 1 projects selected included Kiwanis Park Shoreline Restoration, Wildwood Island Area Restoration, Taylor Drive and Indiana Avenue Wetland Restoration, Shoreline Stabilization in Problem Areas, In-Stream Habitat Improvements, Targeted Invasive Species Control and Schuchardt Property Conservation Planning.

Next Actions Needed

1) Complete the Fish and Wildlife Habitat Restoration and Management Plan.

In order to fulfill the delisting targets developed in 2008, a Fish and Wildlife Habitat Restoration and Management Plan was developed that contains the following information for the Degradation of Fish and Wildlife Populations BUI:

- 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.

While the delisting targets included specific quantitative approaches to be used for local population targets, the TAC decided to incorporate broader, project based conservation goals into the plan instead. The plan incorporates data from the 2011 fish and wildlife survey and assessment project and describes the verification monitoring that is needed to demonstrate achievement of AOC population goals. The plan also describes the habitat projects and the goals they helped to achieve. Measures of success for habitat projects and fish and wildlife assessments were recently incorporated into the plan and it will be reviewed by the TAC and finalized in 2015.

2) Projects and activities identified in the Fish and Wildlife Habitat Restoration and Management Plan are implemented and monitored to evaluate habitat goals.

The summary of project and activities identified to evaluate habitat goals is echoed in #2 of next actions needed for "Loss of Fish and Wildlife Habitat" section (refer to page 21).

3) Projects and activities identified in the Fish and Wildlife Habitat Restoration and Management Plan are implemented and monitored to evaluate population goals.

The verification monitoring identified within the Fish and Wildlife Habitat Restoration and Management Plan includes assessments of the Fish and Wildlife Populations BUI that were approved for GLRI funding in 2014. The plan includes both aquatic community assessments (evaluating fish and benthic macroinvertebrate communities) and riparian wildlife assessments (evaluating birds, bats, mussels, herptiles, and mink populations). The first of multi-year studies for fish and macroinvertebrates began this year and will continue through 2016. A mink study was also conducted in 2014 comparing the number of footprints tracked in mink rafts located on both the Sheboygan River AOC and a reference site. Sample sizes were low throughout both sites, so the survey will continue for another two years. The remaining surveys for birds, bats, mussels and herptiles will be conducted in 2016, so the data needed to assess the population BUI status should be available in 2017.

Issues Affecting Progress on this BUI

There are currently no issues affecting progress on this BUI.

LOSS OF FISH AND WILDLIFE HABITAT**2008 Target and Status**

Loss of Fish and Wildlife Habitat	Status
A local fish and wildlife habitat management and restoration/rehabilitation plan has been developed for the entire AOC that accomplishes the following: <ul style="list-style-type: none"> • Defines the causes of all habitat impairments within the AOC. • Establishes site-specific habitat and population targets for fish and wildlife species within the AOC. • Identifies primary and secondary habitat restoration goals, management activities, and projects that would adequately restore or rehabilitate fish and wildlife habitat within the Sheboygan River AOC. 	Complete
All primary habitat restoration goals, management activities, and projects identified in the fish and wildlife management and restoration plan are implemented, and modified as needed to ensure continual improvement.	Addressed by Current Projects
Waters within the Sheboygan River AOC are not listed as impaired due to aquatic toxicity in the most recent Clean Water Act 303(d) and 305(b) Wisconsin Water Quality Report to Congress (submitted to USEPA every two years).	Addressed by current projects

Rationale for Listing

The reasons for listing this BUI that were identified in the 1989 RAP included concern that fish habitat was being degraded by sedimentation, dams, and contaminants. There was also concern that agricultural and urban development had resulted in the loss of wildlife habitat, placing a greater importance on the remaining habitat.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

Actions that have been taken to decrease sediment loads to the AOC were documented in the 2011 RAP. On-going programs that implement actions to decrease sediment loads include a Sheboygan County buffer program and municipal ordinances for construction site erosion control and storm water management in the cities of Sheboygan Falls and Sheboygan.

As described in the "Restrictions on Dredging" section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2012. The summary of key remedial actions since the 2011 RAP and current status echoes the summary provided in the "Degradation of Fish and Wildlife Populations" section (refer to pages 17-18).

Next Actions Needed*1) Complete the Fish and Wildlife Habitat Restoration and Management Plan.*

In order to fulfill the delisting targets developed in 2008, a Fish and Wildlife Habitat Restoration and Management Plan needs to be developed that contains the following information for the Loss of Fish and Wildlife Habitat BUI:

- Defines the causes of all habitat impairments within the AOC.
- Establishes site-specific habitat and population targets for fish and wildlife species within the AOC.
- Identifies primary and secondary habitat restoration goals, management activities, and projects that would adequately restore or rehabilitate fish and wildlife habitat within the Sheboygan River AOC.

Refer to #1 of next actions needed in the “Degradation of Fish and Wildlife Populations” section (page 19) for a description of the plan’s content.

- 2) *Projects and activities identified in the Fish and Wildlife Habitat Restoration and Management Plan are implemented and monitored to evaluate habitat goals.*

The WDNR obtained GLRI funding for the seven Tier 1 projects and activities identified by the TAC to restore and remediate fish and wildlife habitat, which included Kiwanis Park Shoreline Restoration, Wildwood Island Area Restoration, Taylor Drive and Indiana Avenue Wetland Restoration, Shoreline Stabilization in Problem Areas, In-Stream Habitat Improvements, Targeted Invasive Species Control and Schuchardt Property Conservation Planning. These projects were completed in 2012 and the required three-year maintenance for those projects began in 2013. Additional assessments to evaluate aquatic habitat include fish habitat assessments and aquatic macrophyte surveys. These studies began in 2014 and will continue through 2016.

Measures of success for both riparian habitat projects and aquatic habitat assessments were recently incorporated into the Fish and Wildlife Habitat Restoration and Management Plan. These include measuring the amount of restored habitat area and the quality of the improved habitat. An overall habitat remediation project evaluation is scheduled to occur in 2015 to document and evaluate success of all habitat remediation efforts.

- 3) *Waters of the Sheboygan River AOC are not listed as impaired due to aquatic toxicity in the most recent 303(d) or 305(b) lists.*

The results from the Benthos & Plankton BUIs Evaluation project will determine the need for this action. Preliminary data from the 2012 sampling suggest that Sheboygan River is not degraded for benthos or plankton. Samples collected in 2014 are currently being processed and analysis should be complete in 2015. If the plankton community is found to be degraded following analysis of the 2014 samples, bioassays will need to be performed to determine if aquatic toxicity is the cause of this impairment. The waters of the Sheboygan River AOC are not currently listed on the 303(d) list for aquatic toxicity. If plankton and benthos assessments indicate that the waters of the Sheboygan AOC are not impaired, that will provide the evidence that additional aquatic toxicity testing is not necessary.

Issues Affecting Progress on this BUI

There are currently no issues affecting progress on this BUI.

BIRD OR ANIMAL DEFORMITIES OR REPRODUCTION PROBLEMS**2008 Target and Status**

Bird or Animal Deformities or Reproduction Problems	Status
Superfund and RCRA sediment and floodplain remedial actions have been implemented.	Complete
Studies conducted in the AOC indicate that the beneficial use should not be considered impaired; or	Not Complete
If studies conducted in the AOC determine that this use is impaired, then two approaches can be considered for delisting:	Not Complete
<p>Approach 1 – Observational Data and Direct Measurements of Birds and other Wildlife</p> <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 from 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 are statistically different from the reference site, it may indicate a source from either within or outside the AOC. Therefore, if the rates are statistically different or the data are insufficient for analysis, then • 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 and are not statistically different from those at minimally impacted reference sites (at a 95% confidence interval). 	Addressed by Current Projects
Where data from direct observation of wildlife and wildlife tissue data are not available, the following approach should be used:	Not Complete
<p>Approach 2 – Fish Tissue Contaminant Levels as an Indicator of Deformities or Reproductive Problems</p> <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 developmental problems in fish eating birds and mammals, the BUI can be delisted, or • If fish tissue concentrations of contaminants of concern identified in the AOC are not statistically different from those found in 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. 	Not Complete

Note that LOELs (cited in Approach 1 of the target) may not exist for all species and/or all contaminants.

Rationale for Listing

Bird and animal deformities or reproductive problems were listed as a BUI because the levels of contamination present in the AOC were known to be high enough to cause these types of impairments in wildlife. While no deformities had been reported, reproductive problems were suspected. One example is mink populations in the AOC whose populations were low or non-existent despite available habitat. PCBs are known to impact mink reproduction (Aulerich and Ringer, 1977; Leonards et al., 1995).

Since the 1995 RAP Update was written, several studies have been completed that documented contaminant levels in the food chain high enough to cause reproductive problems. Tree swallow (Patnode et al., 1998a) and snapping turtle (Patnode et al., 1998b) reproduction studies documented impaired hatching success. The Aquatic Ecological Risk Assessment (EVS and NOAA, 1998) determined

that mink and great blue heron were likely to suffer adverse reproductive effects from eating Sheboygan River small mammals, fish, and crayfish. The Terrestrial Ecological Risk Assessment (Chapman, 1999) determined that robins were likely to suffer adverse reproductive effects from foraging in contaminated sections of the floodplain.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

As described in the “Restrictions on Dredging” section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2013.

Next Actions Needed

1) *Complete study to determine if BUI is no longer impaired.*

Now that the sediment remediation projects are completed, further studies are needed to determine if any significant bird or animal deformities or reproductive impairments remain. The study should follow general guidelines from the delisting target approaches listed above. Based on past or on-going studies, preferred study species are tree swallows and mink.

A monitoring plan that includes assessment of the Bird or Animals Deformities or Reproduction Problems BUI has been developed by WDNR and the TAC and received GLRI funding in 2014. The plan includes a riparian wildlife assessment to evaluate tree swallow and mink populations, the two species that have been selected as appropriate indicators of potential impairment for this BUI in this AOC. The tree swallow project conducted by USGS began in 2011. The USGS collected tree swallow eggs, nestlings, and diet samples from tree swallow box arrays along the Sheboygan River in 2010 and found high concentrations of PCBs. Additional box arrays were added along the Sheboygan River from 2012-2014 and samples collected are awaiting laboratory analysis. Mink populations were assessed by using mink rafts designed to track footprints placed throughout the Sheboygan River AOC and reference site in 2014. If prints are found, a live trap is set in an effort to obtain a blood sample. However, no live mink were trapped in 2014. Plans are to repeat the study for another 2 year period to account for potential differences related to annual species populations, sampling techniques, or other factors throughout the AOC and reference site in 2015 and 2016.

Issues Affecting Progress on this BUI

If no live mink are trapped to obtain blood samples, another species will be considered for the study or fish tissue will be examined according to Approach 2 in the delisting target.

FISH TUMORS OR OTHER DEFORMITIES**2008 Target and Status**

Fish Tumors or Other Deformities	Status
All known sources of PAHs and chlorinated organic compounds within the AOC and tributary watershed have been controlled through issuance of the appropriate regulatory control document or eliminated.	Complete
The Superfund PCB cleanup and Manufactured Gas Plant cleanup have been implemented.	Complete
There have been no reports of external Deformities, Lesions, and Tumors (DLTs) or internal organ/system impacts that have been verified by qualified WDNR personnel to have been caused by chemical contaminants for a period of five years.	Addressed by Current Projects
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.	Addressed by Current Projects
OR, in cases where any tumors have been reported a comparison study of resident benthic fish (e.g., brown bullhead or white suckers) of comparable age and at maturity (3 years), or of fish species which have historically been associated with this BUI, in the AOC and a non-impacted control site indicates that there is no statistically significant difference (with a 95% confidence interval) in the incidence of liver tumors or deformities.	Addressed by Current Projects

Rationale for Listing

Due to the high levels of contamination that were known to be present in the AOC when it was listed, it was assumed that these levels were high enough to cause fish tumors or deformities, although none had been observed. A study of white suckers in the Sheboygan River (Schrack et al., 1997) found hepatic (liver) lesions in the white suckers, and at least some were preneoplastic. In addition, the Aquatic Ecological Risk Assessment (EVS and NOAA, 1998) evaluated health effects based on chemical concentrations and a review of the literature for reproductive effects. Potential reproductive effects from PCBs exist, especially for smallmouth bass. Reproductive effects from PAHs are less certain.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

As described in the "Restrictions on Dredging" section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2013.

Due to lack of information on the fish tumor incidence rate in the AOC, WDNR assessed this BUI via a study funded through GLRI. The study, Evaluation of Fish Tumors or Other Deformities, began in spring 2012. The 2012 sampling and analysis was carried out by University of Wisconsin-Madison and University of West Virginia/USGS Cooperative Science Center. The Sheboygan River Fish Tumor Evaluation project describes how white suckers from the Sheboygan River AOC were collected for tumor incidence rate as well as stable isotope analysis to determine residency patterns. While data was collected related to other lesions and carcinomas, the liver neoplasm rate is the metric used to assess the BUI. Results of this 2012 sampling show that neoplasms of the liver occurred in 8.3% of the suckers collected. Since the rate was above the 5% target, a second year of reference site sampling was done in 2013. The Fish Tumor Assessment at the Milwaukee River Area of Concern and the Kewaunee River Reference Site project conducted in 2013 included the results of the Kewaunee River reference site. The rate of neoplasms of the liver in the Kewaunee River occurred in only 3.5% of the suckers collected.

Next Actions Needed

1) *Complete the Evaluation of Fish Tumors or Other Deformities study and repeat if necessary.*

This project will determine the tumor (liver neoplasm) incidence rate in fish in the Sheboygan River AOC and be used to evaluate if this BUI can be considered for removal. White suckers are used as the indicator species. The second phase (reference site sampling) was necessary because the tumor (liver neoplasm) incidence rate was determined to be above 5% in the AOC. Since 2013 data from the reference site sampling is significantly different from the Sheboygan River AOC, the study will be repeated in 5 years (2017), allowing for more recovery after the completed contaminated sediment remediation.

Issues Affecting Progress on this BUI

There are currently no issues affecting progress on this BUI.

DEGRADATION OF PHYTOPLANKTON AND ZOOPLANKTON POPULATIONS**2008 Target and Status**

Degradation of Phytoplankton and Zooplankton Populations	Status
Sources causing nutrient enrichment to the outer harbor and near shore waters are identified and controlled if nutrients are the main contributor; OR Sources resulting in ambient water toxicity in the outer harbor and near shore waters are identified and controlled if toxicity is the main contributor.	Addressed by Current Projects
Phytoplankton or zooplankton bioassays confirm no toxicity in ambient waters and the community structure is diverse and contains species indicative of clean water.	Addressed by Current Projects
The phytoplankton and zooplankton communities within the site being evaluated are statistically similar to a reference site with similar habitat and minimal sediment contamination.	Addressed by Current Projects

Rationale for Listing

Due to the known contaminated sediments present in the river and associated toxicity, there was concern that plankton populations might be negatively impacted. Also, there was a concern that excess nutrients might be affecting these populations. However, there was little or no evidence that the populations were actually degraded. Prior to 2012, no phytoplankton or zooplankton studies had been conducted within the AOC to assess this BUI, so it was not known whether their populations are degraded or, if they are, what the cause might be.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

As described in the "Restrictions on Dredging" section, all Superfund and contaminated sediment remediation projects are now complete. Dredging of contaminated sediments in the river and cleanup of floodplain soils was completed in 2013.

Due to lack of information on the benthic and planktonic communities in the Sheboygan River compared to reference sites, WDNR received GLRI grant funding for a comparison study. This study, *Benthos & Plankton Community Data for Selected Rivers and Harbors along Wisconsin's Lake Michigan Shoreline* (Scudder-Eikenberry, 2014), is being carried out by USGS for WDNR and includes all four of the Lake Michigan AOCs and six reference sites. Benthos, phytoplankton and zooplankton communities were sampled and assessed in each of the AOCs and in the reference sites in 2012. Because 2012 was an unusual drought year, the study was also repeated in 2014 to increase data rigor. Preliminary analysis of 2012 samples indicate that the Sheboygan River is not considered to be degraded for phytoplankton and zooplankton communities when compared to two non AOC reference sites. Samples collected in 2014 are currently being processed and analysis should be complete in 2015. This study will be used to evaluate the status of this BUI in the Sheboygan River AOC.

Next Actions Needed

2) *Complete data analysis for the 2014 Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern project.*

This project assessed the benthic, phytoplankton and zooplankton communities of the river and will be used to assess this BUI. Because 2012 was an anomalous year for weather conditions, it was necessary to repeat the study in 2014 to ensure that data are representative of average conditions. Results from sampling done in 2014 are expected by the end of 2015. If 2014 results indicate that the plankton communities in the Sheboygan River is similar to non-impacted reference sites, the BUI can be considered for removal in 2016. If the data from 2014 indicate that the plankton communities is not

similar, then the study should be repeated in the future when more time has been allowed for recovery after contaminated sediment removal.

3) *Determine if “bioassays to confirm that no aquatic toxicity is present in the river” are necessary based on results of current assessment project.*

Data gathered by the current Benthos & Plankton BUIs Evaluation project will be used to determine if plankton communities are degraded. If these communities are not found to be degraded, no bioassays will be necessary to determine if aquatic toxicity is an issue or cause of population degradation. If they are found to be degraded, bioassays will need to be performed to determine if aquatic toxicity is the cause of this impairment. Data from 2014 samples is expected to be available by the end of 2015.

Issues Affecting Progress on this BUI

If results from 2014 indicate that the Sheboygan River is degraded for plankton communities, the study will need to be repeated.

EUTROPHICATION OR UNDESIRABLE ALGAE**2014 Target and Status**

Eutrophication or Undesirable Algae	Status
In-river total phosphorus concentrations meet Wisconsin AOC target criteria with a 95% level of confidence; and	Complete
There are no violations of the minimum dissolved oxygen concentrations established in NR 102 within the AOC due to excessive sediment deposition or algae growth; and	Complete
The Wisconsin AOC target criteria will be considered to have been met when the sample population does not exceed nutrient targets or evidence indicates the lack of biological impairment (as determined by fish and macroinvertebrate Indicators of Biological Integrity, or IBIs).	Complete

The 2008 target referenced the Wisconsin Impaired Waters List (WDNR, 2008). The Sheboygan River AOC is currently meeting the water quality related target that was developed in 2008. However, the methods used to determine if a water body is to be included on Wisconsin's Impaired Waters 303(d) List will change over time.

In 2014, WDNR clarified the target to separate the AOC water quality target set in 2008 from the regulatory process used to add or remove waterways from Wisconsin's Impaired Waters List (Appendix B). This will allow the 2008 Sheboygan AOC criteria to be maintained as the benchmark to assess whether the AOC goals have been met, regardless of Wisconsin's Impaired Waters 303(d) List.

Rationale for Listing

When the AOC was listed, both phosphorus and nitrogen concentrations in the river were elevated due to excessive nutrient loads and undesirable algal blooms were occasionally seen. The source of the nutrients was assumed to be nonpoint source pollution from upstream sources and developing urban areas.

Summary of Key Remedial Actions since the 2012 RAP & Current Status

Historically, many actions have been taken to decrease nutrient loads to the AOC. The Sheboygan River Priority Watershed Project, which ended in 2003, resulted in significant reductions in phosphorus contributed by agricultural areas. Sheboygan County continues to run its own buffer strip program. The Cities of Sheboygan Falls and Sheboygan have adopted construction site erosion control ordinances. The City of Sheboygan Storm Water Management Plan was completed in 1998. The City also adopted a Storm Water Management Ordinance and Erosion Control Ordinance in 2006. In addition, numerous wetland restorations and enhancements have been completed in the Sheboygan River watershed.

WDNR monitoring of total phosphorus (TP) concentrations, dissolved oxygen (DO), and chlorophyll-a (CHL-a) in the Sheboygan River was used to assess if this BUI should still be considered impaired. In addition, the original target referring to the "most recent Wisconsin Impaired Waters list" was modified to include more specific criteria. The refined target states "In-river total phosphorus concentrations meet the Sheboygan AOC target of 100 micrograms per liter (ug/L) with a 95% level of confidence when analyzed, or evidence indicates the lack of biological impairment within the AOC (as determined by fish and macroinvertebrate Indicators of Biological Integrity, or IBIs)."

As such, the WDNR performed an assessment suggesting that the "Eutrophication or Undesirable Algae" BUI is not supported by current TP, DO, or CHL-a data. Our comparisons were made with reference to the 303(d) listing criteria, which indicate a level of impairment.

The results of this analysis are not meant to indicate that further improvements with regard to TP, DO, CHL-a or eutrophication in general cannot or should not be made or that other analyses may suggest results that do not support our conclusions here. Broader habitat alterations currently underway to address other BUIs in the Sheboygan River AOC will most likely improve the status of this AOC relative to the eutrophication BUI as well.

Next Actions Needed

1) Complete BUI Removal Documentation and public input process.

Samples and data of TP concentrations, DO, and CHL-a collected in 2014 were analyzed and will be included with previous data that will be incorporated into the BUI removal package. This information is anticipated to be provided to the public in the spring of 2015.

Issues Affecting Progress on this BUI

There are currently no issues affecting progress on this BUI.

Stakeholder Engagement

WDNR will provide opportunities for public comment on the proposal to remove the BUI.

CONCLUSION

With the final stages of sediment remediation and the establishment of new habitat complete, the Sheboygan River continues to recover. Efforts in 2013 and 2014 have shifted towards BUI removal and monitoring of populations and habitat. The public responded positively to documentation supporting the removal of the “Restrictions on Dredging Activities” BUI presented in an informational meeting and the removal package is now being submitted to U.S.EPA for final approval. Verification monitoring began this year for fish communities, benthic macroinvertebrate communities, and fish habitat and these surveys will continue for another two years. The final samples were collected this year for the Benthos and Plankton BUIs Evaluation in Wisconsin’s Lake Michigan Areas of Concern study and preliminary data from the 2012 samples indicate that the benthic and plankton communities are not degraded in the Sheboygan River AOC. The second year of citizen science programs led by UW-Extension has continued to set the stage for the local community to lead river protection efforts when the AOC is eventually able to be delisted. Data of TP concentrations, DO, and CHL-a collected in 2014 were analyzed and will be included with previous data into a BUI removal package request to be initiated for the “Eutrophication of Undesirable Algae” BUI in 2015. Also scheduled for the upcoming year is a final evaluation for invasive species and the Tier 1 habitat projects, which follows the three years of maintenance and treatment that began in 2012. The Sport Fish Contaminant Monitoring Program will sample fish again in 2015 to evaluate fish consumption advisories and the tree swallow and mink study will continue for another year to evaluate the “Bird or Animal Deformities or Reproductive Problems” BUI. Additional surveys for birds, bats, mussels, and herptiles will be done in 2016.

REFERENCES

- Aulerich, R. J. and R. K. Ringer. 1977. Current Status of PCB Toxicity to Mink, and Effect on Their Reproduction. *Archives of Environmental Contamination and Toxicology*. 6: 279-292.
- Chapman, J. 1999. Sheboygan River and Harbor floodplain terrestrial ecological risk assessment. Prepared for U.S. Environmental Protection Agency.
- EVS Environment Consultants and National Oceanic and Atmospheric Administration (NOAA). 1998. Sheboygan River and Harbor Aquatic Ecological Risk Assessment. Volumes 1 through 3. Prepared for U.S. Environmental Protection Agency.
http://archive.orr.noaa.gov/book_shelf/99_ShebVol1.pdf
http://archive.orr.noaa.gov/book_shelf/100_ShebVol2.pdf
http://archive.orr.noaa.gov/book_shelf/101_ShebVol3.pdf
- Leonards, P. E. G., T. H. De Vries, W. Minnaard, S. Stuijzand, P. De Voogt, W. P. Cofino, N. M. van Straalen, and B. van Hattum. 1995. Assessment of experimental data on PCB-induced reproduction inhibition in mink, based on an isomer- and congener-specific approach using 2,3,7,8-tetrachlorodibenzo-*p*-dioxin toxic equivalency. *Environmental Toxicology and Chemistry*, 14: 639–652.
- Patnode, K. A., B. L. Bodenstein, and R. R. Hetzel. 1998a. Using tree swallows to monitor impacts of aquatic contamination in Great Lakes Areas of Concern. Professional meeting Poster-session presentation report. Wisconsin Department of Natural Resources, Madison, Wisconsin.
- Patnode, K., B. Bodenstein, R. Hetzel, J. Puente, and M. Barman. 1998b. Effects of PCBs on hatching, development and growth of snapping turtles. Professional meeting Poster-session presentation report. Wisconsin Department of Natural Resources, Madison, Wisconsin.
- Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. 1993. Great Lakes Sport Fish Advisory Task Force.
<http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/pcbprotocol.pdf>
- Scudder-Eikenberry, B.C., Bell, A.H., Burns, D.J., and Templar, H.A. 2014. Benthos and plankton community data for selected rivers and harbors along Wisconsin's Lake Michigan shoreline, 2012. USGS Data Series: 824.
- Schrank, C. S., S. M. Cormier, and V. S. Blazer. 1997. Contaminant exposure, biochemical, and histopathological biomarkers in white suckers from contaminated and reference sites in the Sheboygan River, Wisconsin. *J. Great Lakes Res.* 23(2):119-130.
- Strom, S. M. 2014. Contaminant concentrations in waterfowl from the Sheboygan River Area of Concern update: 2012 samples. Wisconsin Department of Natural Resources, Madison, Wisconsin.
- Wisconsin Department of Natural Resources (WDNR). 1989. The Sheboygan River Remedial Action Plan. Madison, Wisconsin.
- Wisconsin Department of Natural Resources (WDNR). 1995. Sheboygan River Remedial Action Plan Update. Madison, Wisconsin.

Wisconsin Department of Natural Resources (WDNR). 2008. Delisting Targets for the Sheboygan River Area of Concern: Final Report.
<http://dnr.wi.gov/topic/greatlakes/documents/SheboyganRiverFinalReport2008.pdf>

APPENDICES

- Appendix A Sheboygan River AOC BUI Tracking Matrix
- Appendix B Memo documenting the target clarification for the Eutrophication BUI
- Appendix C Personal correspondence regarding Sheboygan AOC Boundaries

Appendix A

Sheboygan River AOC BUI Tracking Matrix

Note that projects listed in the table below represent the action steps that were identified by WDNR in collaboration with AOC partners and stakeholders to make progress toward delisting the AOC. This list may not reflect all actions that will ultimately be needed to remove impairments.

Sheboygan River AOC Tracking Matrix 2014

Project Name	BUI Addressed	Project Type	Action Type	Action Modifier	Project Status	Project Start Date	Project End Date	Project Cost	Primary Funding Source	Project Lead Organization
Education and Outreach UW-Extension		Community Involvement	Education	Reporting	Completed	2011	2012	\$83,000	Wisconsin	UW-Extension
Raising community and CAC awareness through "Explore and Restore the Sheboygan River" Initiative		Community Involvement	Education	Reporting	In Progress	2011	2014	\$51,689	Wisconsin	Camp Y-Koda
Supporting & Developing A Sheboygan AOC Community Advisory Committee		Community Involvement	Capacity	Reporting	Completed	2011	2012	\$28,655	Wisconsin	Sheboygan River Basin Partnership
Assessment of Benthos and Plankton in Wisconsin's Lake Michigan Areas of Concern	BUI 6, BUI 13	Fish and Wildlife	Assessment	Reporting	In Progress	2013	2014	\$414,300	Wisconsin	USGS
Benthos & Plankton BUIs Evaluation in Wisconsin's Lake Michigan Areas of Concern	BUI 6, BUI 13	Fish and Wildlife	Assessment	Reporting	In Progress	2011	2015	\$451,500	Wisconsin	USGS
Evaluation of Fish Tumors or Other Deformities	BUI 4	Fish and Wildlife	Assessment	Reporting	Completed	2012	2013	\$168,500	Wisconsin	Wisconsin DNR
Evaluation of Waterfowl Consumption Advisories within the AOC	BUI 1	Fish and Wildlife	Assessment	Reporting	Completed	2011	2013	\$136,000	Wisconsin	Wisconsin DNR
Exposure to PCBs of tree swallows nesting along the Sheboygan River, WI	BUI 5, BUI 3	Fish and Wildlife	Assessment	Implementation	In Progress	2012	2015	\$18,920	Wisconsin	USGS
Fish & Wildlife Habitat Restoration and Management Plan	BUI 3, BUI 14	Fish and Wildlife	Assessment	Implementation	In Progress	2012	2015	In-kind	Wisconsin	Wisconsin DNR
Fish Contaminant Monitoring and Advisory Program	BUI 1	Fish and Wildlife	Assessment	Implementation	In Progress	1980	ongoing	In-kind	Wisconsin	Wisconsin DNR
In-Stream Habitat Improvements	BUI 3, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	Completed	2011	2012	\$141,000	Wisconsin	Wisconsin DNR
Kiwanis Park Shoreline Restoration	BUI 1, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	In Progress	2011	2015	\$2,115,000	Wisconsin	Wisconsin DNR
Plankton Verification/Bioassays	BUI 13	Fish and Wildlife	Assessment	Planning	Not Started	Unknown	Unknown	\$50,000	TBD	Wisconsin DNR
Schuchardt Property Conservation Planning	BUI 3, BUI 14	Fish and Wildlife	Assessment	Reporting	Completed	2011	2012	\$40,000	Wisconsin	Wisconsin DNR

Sheboygan River AOC Tracking Matrix 2014

Project Name	BUI Addressed	Project Type	Action Type	Action Modifier	Project Status	Project Start Date	Project End Date	Project Cost	Primary Funding Source	Project Lead Organization
Schuchardt Property Invasive Species Mngt Planning	BUI 3	Fish and Wildlife	Restoration	Reporting	Completed	2011	2012	\$85,000	USACE	USACE
Sheboygan AOC Pathway to Delisting Habitat BUI's--Survey and Assessment - actually 11 projects	BUI 3, BUI 14	Fish and Wildlife	Assessment	Reporting	Completed	2010	2012	\$202,181	Wisconsin	Wisconsin DNR
Shoreline Stabilization in Problem Areas	BUI 3, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	In Progress	2011	2015	\$292,000	Wisconsin	Wisconsin DNR
Small Mammal Contaminant Monitoring in the Sheboygan River AOC	BUI 3, BUI 5	Fish and Wildlife	Assessment	Reporting	Completed	2011	2012	\$16,768	Wisconsin	Wisconsin DNR
Targeted Invasive Species Control	BUI 3, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	In Progress	2011	2015	\$132,500	Wisconsin	Wisconsin DNR
Taylor Dr & Indiana Ave Riparian Area and Wetland Restoration	BUI 3, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	In Progress	2011	2015	\$795,000	Wisconsin	Wisconsin DNR
Verification Monitoring - Benthic & aquatic community	BUI 3, BUI 14	Fish and Wildlife	Assessment	Implementation	In Progress	2014	2016	\$27,882	Wisconsin	USGS
Verification Monitoring - Bird, bat, mussel, and herptiles study	BUI 3, BUI 14	Fish and Wildlife	Assessment	Planning	Not Started	2016	2016	unknown	Wisconsin	Wisconsin DNR
Verification Monitoring - Fish Community Assessment	BUI 3, BUI 14	Fish and Wildlife	Assessment	Implementation	In Progress	2014	2016	\$120,000	Wisconsin	Wisconsin DNR
Verification Monitoring - Macroinvertebrates and Fish Habitat Assessment	BUI 3, BUI 14	Fish and Wildlife	Assessment	Planning	Not Started	2015	2016	unknown	Wisconsin	Wisconsin DNR
Verification Monitoring - Mink Survey and Contaminant Monitoring	BUI 3, BUI 5	Fish and Wildlife	Assessment	Implementation	In Progress	2014	2016	\$127,500	Wisconsin	Wisconsin DNR
Wildwood Island Area Restoration	BUI 3, BUI 14	Fish and Wildlife	Restoration	Confirmation Monitoring & Reporting	In Progress	2011	2015	\$790,000	Wisconsin	Wisconsin DNR
Evaluate Eutrophication BUI	BUI 8	Nonpoint	Assessment	Implementation	In Progress	2013	2015	In-kind	TBD	Wisconsin DNR
Camp Marina Superfund Alternative Dredging	BUI 1, BUI 3, BUI 4, BUI 5, BUI 6, BUI 7, BUI 14	Sediment	Remediation	Confirmation Monitoring & Reporting	Completed	2011	2011	\$10,000,000	Responsible Party	USEPA

Sheboygan River AOC Tracking Matrix 2014

Project Name	BUI Addressed	Project Type	Action Type	Action Modifier	Project Status	Project Start Date	Project End Date	Project Cost	Primary Funding Source	Project Lead Organization
Dredging Technical Memo	BUI 7	Sediment	Remediation	Confirmation Monitoring & Reporting	Completed	2012	2014	unknown	Great Lakes Legacy Act	CH2M Hill
Sheboygan Harbor Navigational Improvement Dredging	BUI 7	Sediment	Navigational Dredging	Confirmation Monitoring & Reporting	Completed	2012	2012	\$20,797,000	USEPA	USEPA
Sheboygan River & Harbor Superfund Dredging-Upper River Dredging	BUI 1, BUI 3, BUI 4, BUI 5, BUI 6, BUI 7, BUI 14	Sediment	Remediation	Confirmation Monitoring & Reporting	Complete	2006	2007	\$9,000,00	Responsible Party	USEPA
Sheboygan River & Harbor Superfund Dredging-Lower River Dredging	BUI 1, BUI 3, BUI 4, BUI 5, BUI 6, BUI 7, BUI 14	Sediment	Remediation	Confirmation Monitoring & Reporting	Completed	2011	2012	\$13,500,000	Responsible Party	USEPA
Sheboygan River Great Lakes Legacy Act Project	BUI 1, BUI 3, BUI 4, BUI 5, BUI 6, BUI 7, BUI 14	Sediment	Remediation	Confirmation Monitoring & Reporting	Completed	2011	2012	\$32,776,000	Great Lakes Legacy Act	USEPA

Appendix B

Target clarification for Eutrophication BUI

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
Plymouth Service Center
1155 Pilgrim Road
Plymouth WI 53073

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711



Proposal to change wording to clarify the Sheboygan River Area of Concern Delisting Target for the "Eutrophication and Undesirable Algae" beneficial use impairment April 2014

In 2008, the Department of Natural Resources worked with local stakeholders on the development of "delisting targets" for the nine impairments within the Sheboygan River Area of Concern. With respect to the impairment called "Eutrophication and Undesirable Algae," the target focused on some key water quality parameters.

As established by the original 2008 Delisting Targets for the Sheboygan River Area of Concern (AOC), removal of this impairment can occur when:

- In-river total phosphorus concentrations meet Wisconsin criteria when promulgated;
- and
- There are no violations of the minimum dissolved oxygen concentrations established in NR 102 within the AOC due to excessive sediment deposition or algae growth;
- and
- 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 Wisconsin Impaired Waters list submitted to U.S. EPA every two years (303(d) designation).

The Sheboygan River AOC is currently meeting the water quality related target that was developed in 2008. However, the methods used to determine if a water body is to be included on Wisconsin's Impaired Waters 303(d) List will change over time.

This proposed clarification separates the AOC water quality target set in 2008 from the regulatory process used to add or remove waterways from Wisconsin's Impaired Waters List. This will allow us to maintain the 2008 Sheboygan AOC criteria as the benchmark to assess whether the AOC goals have been met, regardless of Wisconsin's Impaired Waters 303(d) List. We propose to modify the target wording as follows:

- In-river total phosphorus concentrations meet Wisconsin AOC target criteria with a 95% level of confidence;
- and
- There are no violations of the minimum dissolved oxygen concentrations established in NR 102 within the AOC due to excessive sediment deposition or algae growth;
- and
- The Wisconsin AOC target criteria will be considered to have been met when the sample population does not exceed nutrient targets or evidence indicates the lack of biological impairment (as determined by fish and macroinvertebrate Indicators of Biological Integrity, or IBIs).

Referring to "nutrient targets" in the third bullet rather than the Wisconsin Impaired Waters List allows us to separate the target from the Impaired Waters 303(d) program methods, which may change with proposed updates to administrative rules and agency guidance related to water quality assessment methods. Adding the option to consider evidence indicating biological impairment allows us to consider the natural variance among streams and

Appendix C

Personal correspondence regarding Sheboygan AOC Boundaries

From: Ryan, Nancy D - DNR
Sent: Tuesday, December 16, 2014 8:39 AM
To: Pappas, Victor C - DNR
Subject: RE: Blue Harbor (C. Reiss Coal site) Sheboygan

Your memory is spot on, Vic, at least, it's the same as mine. They removed contaminated berms that were present along the lake and, as you say, built a revetment and restored the dunes. I agree that there wouldn't be much if any residual contamination based on the wave action.

From: Pappas, Victor C - DNR
Sent: Tuesday, December 16, 2014 8:19 AM
To: Ryan, Nancy D - DNR
Subject: Blue Harbor (C. Reiss Coal site) Sheboygan

Hi Nancy

Do you recall any sort of contamination issue on the lake side of the C. Reiss Coal site in Sheboygan. As mentioned below, I recall there was a solid waste issue along the lake and my faint recollection is they removed some material near the beach when they were working on this site. They have since added a rock revetment and a restored dune along the lake. We are trying to decide whether there is any reason to keep the Great Lakes Area of Concern boundary along the lake because of possible contamination there. The river and harbor are listed because of PCB and PAH contamination from Tecumseh and an MGP site on the river. Any thoughts on this? Thanks. Vic.

From: Burzynski, Marsha B - DNR
Sent: Monday, October 27, 2014 3:56 PM
To: Pappas, Victor C - DNR
Cc: Marcangeli, April N - DNR; Axness, Kendra A - DNR
Subject: RE: Short turnaround request for some AOC boundary information

Sounds like a solid plan

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Visit our survey at <http://dnr.wi.gov/customersurvey> to evaluate how I did.

Marsha Burzynski
Phone: (414) 263-8708
Marsha.burzynski@wi.gov

From: Pappas, Victor C - DNR
Sent: Monday, October 27, 2014 3:32 PM

To: Burzynski, Marsha B - DNR
Cc: Marcangeli, April N - DNR; Axness, Kendra A - DNR
Subject: RE: Short turnaround request for some AOC boundary information

Thanks Marsha!

That makes sense. I believe the shoreline on Lake Michigan was studied as part of the brownfield work that was done for C. Reiss Coal (now Blue Harbor). I do recall that there was one small area of debris that was removed at the beach as part of that work (mainly some solid waste) – Nancy Ryan was the R&R project manager. That shoreline was reworked (revetment and dune restoration was installed and a chunk of the lake was filled on a lakebed grant). I don't believe any sampling took place of sediment in the lake itself. That area is open to the lake proper and was known as a good surfing area because of the waves generated by a southeast wind. If there was something out there, it's my guess that it was scoured away by wave action over the years. We can touch base with Nancy. If things check out, I think we can declare victory and I would feel comfortable changing the AOC boundary to the lower 14 miles of the river and the harbor only. Thoughts on that? Vic.

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Victor C. Pappas

Phone: (920) 893-8512

victor.pappas@wi.gov

From: Burzynski, Marsha B - DNR
Sent: Monday, October 27, 2014 12:59 PM
To: Pappas, Victor C - DNR
Cc: Marcangeli, April N - DNR
Subject: RE: Short turnaround request for some AOC boundary information

I think the reason they included nearshore Lake Michigan was related to the C Reiss coal company site. I think the side facing the lake was not within the outer harbor, but rather Lake Michigan proper and the thought may have been that they needed a way to capture the impact of a potentially potent source of contamination to the lake, since the AOC program on the rivers was also meant to protect the nearshore. I know they suspected contaminated sediment adjacent to that site in relation to leaking tanks, etc., but since left working on that in the mid 1990s, don't know where things have left off.

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Marsha Burzynski

Phone: (414) 263-8708

Marsha.burzynski@wi.gov

From: Pappas, Victor C - DNR
Sent: Monday, October 27, 2014 12:38 PM
To: Burzynski, Marsha B - DNR
Cc: Marcangeli, April N - DNR
Subject: FW: Short turnaround request for some AOC boundary information

Memory Test! Memory Test!

Why were the nearshore waters of Lake Michigan included in the original RAP documents for the narrative description of the Sheboygan AOC boundaries . The nearshore area is not apparently defined and no BUI's seem to relate to those locations (like no beach closing/restrictions BUI).

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Victor C. Pappas

Phone: (920) 893-8512

victor.pappas@wi.gov

From: Marcangeli, April N - DNR
Sent: Monday, October 27, 2014 12:00 PM
To: Axness, Kendra A - DNR
Cc: Pappas, Victor C - DNR
Subject: RE: Short turnaround request for some AOC boundary information

Hi Kendra,

Vic and I were chatting about Sheboygan's description that says "nearshore Lake Michigan". I looked at our 1989 and 1995 RAP and it's also listed in those, but seems a little vague and like something we might want to consider removing. I'll probably seek some clarification in our meeting with EPA, so just wanted to give you a heads up. We'd also like to add "14 miles" before Sheboygan River as well.

Thanks,

April

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April Marcangeli

Phone: (920) 893-8527

april.marcangeli@wisconsin.gov