

Cover Photo: Aerial view from above the Park Mill Dam looking east toward Green Bay. Copyright 2007 © by North American Hydro Holdings, Inc., Photo by Brian Holbrook - Bird's Eye Aviation.

DISCLAIMER

The Great Lakes Water Quality Agreement (GLWQA, 1987) is a non-regulatory agreement between the United States and Canada which describes the commitment of each country to restore and maintain the chemical, physical, and biological integrity of the Waters of the Great Lakes and their intention to prevent further pollution and degradation of the Great Lakes Basin Ecosystem (GLWQA, 2013). The actions identified in this document are needed to meet beneficial use impairment (BUI) removal targets leading to the delisting of the Lower Menominee Area of Concern (AOC). These actions are not subject to enforcement or regulatory actions. Implementation of the recommendations described within should result in fish and wildlife population and habitat benefits.

The actions identified in this document 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 “the degradation of fish and wildlife populations” and “loss of fish and wildlife habitat” BUIs. Removal of these BUIs is needed to delist the AOC.

ACKNOWLEDGMENTS

We, the Wisconsin Department of Natural Resources (WDNR) and the Michigan Department of Environmental Quality (MDEQ), would like to acknowledge the many contributions of members of the Lower Menominee River AOC Citizens Advisory Committee (CAC) and Technical Advisory Committee (TAC) in the development of this Fish and Wildlife Population and Habitat Management and Restoration Plan Update. Collaboration with these groups has resulted in materials and activities which reflect local issues and concerns.

**2013 Fish and Wildlife Population and Habitat
Management and Restoration Plan Update
for the
Lower Menominee River Area of Concern**

AUTHOR RECOGNITION

This document was compiled by Benjamin Uvaas, WDNR and Sharon Baker, MDEQ with input and assistance from the Citizens Advisory Committee:

Mark Erickson, Michigan Committee Co-chair
Steve Zander, Wisconsin Committee Co-chair
Gail Clark, M&M Great Lakes Sport Fishermen
John Clark, M&M Great Lakes Sport Fishermen
Jim Cox, Tyco International
Michael Cramer, City of Menominee
Nancy Douglas, Menominee Business Development Corporation
John Groleau, Resolute Forest Products
Stephen Kellner, Northern Anglers Fishing Club
Jon Kukuk, Nest Egg Marine
Trygve Rhude, Chappee Rapids Audubon Society
Keith West, University of Wisconsin Marinette

and Technical Advisory Committee:

Craig Albright, Michigan Department of Natural Resources (MDNR)
Rory Alsberg, North American Hydro
Kendra Axness, WDNR
Joe Bohr, MDEQ
Cheryl Bougie, WDNR
Mike Bryant, U.S. Environmental Protection Agency
Steve Choy, U.S. Fish and Wildlife Service (USFWS)
Chad Cook, University of Wisconsin Extension
Donalea Dinsmore, WDNR
Mike Donofrio, WDNR
Andrew Fayram, WDNR
Betsy Galbraith, USFWS
David Halfmann, WDNR
Patrick Hanchin, MDNR
John Huff, WDNR
Ryan McCone, MDEQ
Jessica Mistak, MDNR
Tammie Paoli, WDNR
Vic Pappas, WDNR
Derek Strohl, Bureau of Land Management
Nick Utrup, USFWS

EXECUTIVE SUMMARY

The *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update* (Plan) documents the current status of the “**degradation of fish and wildlife populations**” and the “**loss of fish and wildlife habitat**” BUIs and provides a strategic plan for their removal. Restoration goals, objectives, and the activities needed to achieve them have been clarified and updated by consensus of the WDNR, MDEQ, the Lower Menominee River AOC CAC, and Lower Menominee River AOC TAC and are now considered final. Information contained in this Plan supersedes the *2011 Fish and Wildlife Population and Habitat Management and Restoration Plan* (2011 Plan). This Plan along with the most current Remedial Action Plan (RAP) Update for the Lower Menominee River AOC constitutes a complete strategy for removing all BUIs in the Lower Menominee River AOC.

Significant changes have been made to the format of this Plan compared to the 2011 Plan. The INTRODUCTION section describes in detail how to navigate and use this Plan. Goals, objectives, and activities language has not changed. Goals represent the desired outcomes of implementing this Plan in the AOC. The objectives are the sum outputs of individual projects working towards a common goal. Activities are the individual projects and their outputs. While the goals of this Plan have changed relatively little, the objectives and activities contained in Tables 1-2 have been significantly modified. Changes are recorded and discussed in the HABITAT AND POPULATION GOALS, OBJECTIVES, AND ACTIVITIES and ACTIVITIES NOT REQUIRED FOR BUI REMOVAL sections.

This Plan is built around the contents of Tables 1-2, which were previously integrated as the GOAT, or Goals, Objectives, and Activities Table and found in the 2011 Plan’s appendix. Table 1 lists the goals and objectives and Table 2 lists the activities of this Plan. The restoration target for the “**degradation of fish and wildlife populations**” and the “**loss of fish and wildlife habitat**” BUIs is achieving all five goals listed in Table 1. When all of the objectives listed below a goal have been achieved, the goal itself is considered achieved. Objectives are considered achieved when the WDNR, MDEQ, CAC, and TAC agree that all applicable activities have been completed. The WDNR, MDEQ, CAC, and TAC agree that only activities listed in Table 2 are required to achieve objectives.

Some activities, especially habitat restoration and protection or monitoring projects, require the completion of sediment remediation projects before work can proceed. Dredging of the Ansul arsenic site began in July 2012, following years of dedicated effort by many entities to contain or clean up sources of arsenic on land. Later in 2012, near-shore sediment remediation at the WPS coal tar site began and was completed by March 2013. More than a quarter million cubic yards of contaminated sediment was collectively removed by November 2013, although the bulk of the material came from the Ansul arsenic site. Further information on these cleanups is available in the “CAUSES OF FISH & WILDLIFE HABITAT AND POPULATION IMPAIRMENTS” section.

Many of the required activities in Table 2 have been completed or are currently in progress. In addition to completing sediment remediation projects, as mentioned above, adequate funding is also needed to continue making progress. The Great Lakes Restoration Initiative (GLRI) has been identified as the sole or a contributing funding source for nearly all activities requiring external funding in this Plan.

TABLE OF CONTENTS

DISCLAIMER i

ACKNOWLEDGMENTS i

AUTHOR RECOGNITION ii

EXECUTIVE SUMMARY iii

ACRONYMS..... v

DEFINITIONS..... v

INTRODUCTION 5

CAUSES OF FISH & WILDLIFE HABITAT AND POPULATION IMPAIRMENTS..... 7

 Loss of Historic Wetlands, Aquatic Vegetation, and Shoreline Habitat..... 7

 Sediment Contamination 7

HABITAT AND POPULATION GOALS, OBJECTIVES, AND ACTIVITIES 10

 Goals..... 10

 Objectives 10

 Activities 13

ACTIVITIES NOT REQUIRED FOR BUI REMOVAL 18

 Green Island..... 18

 Nature-Like Fishway for Upstream Fish Passage 18

 Fish Passage at Upstream Dams 18

 Rio Vista Slough..... 19

 River Park Campground Canal 19

SUMMARY AND NEXT STEPS 20

REFERENCES 21

FIGURES

Figure A: Lower Menominee River AOC as delineated by USEPA 1

Figure B: Segments of the Lower Menominee River AOC 2

Figure C: Menominee River Watershed including tributaries and dams 3

Figure D: Habitat restoration and protection projects. 4

TABLES

Table 1: Goals and objectives of the 2013 Plan 12

Table 2: Activities to be completed in order to achieve all Plan objectives 14

LIST OF APPENDICES

Appendix A: Letter of Support from the Citizen’s Advisory Committee

Appendix B: Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree

ACRONYMS

[As]	Arsenic concentration
AOC	Area of Concern
BLM	Bureau of Land Management of the United States Department of the Interior
BUI	Beneficial Use Impairment
CAC	Citizen's Advisory Committee
FERC	Federal Energy Regulatory Commission
GLNPO	Great Lakes National Program Office
GLRI	Great Lakes Restoration Initiative
GOAT	Goals, Objectives, and Actions Table
GLWQA	Great Lakes Water Quality Agreement
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
NAH	North American Hydro
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
ppm	parts per million
RAP	Remedial Action Plan
SPMD	semi permeable membrane device
TAC	Technical Advisory Committee
USACE	United States Army Corp of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WDNR	Wisconsin Department of Natural Resources
WPS	Wisconsin Public Service Corporation

DEFINITIONS

Activity - A specific action or project that's completion will contribute towards the achievement of one or more objectives. Details regarding who will do the work, how it will be done, costs, location, and timeframe should also be included. Activities are listed in Table 2.

Area of Concern (AOC) - Defined by Annex 2 of the 1987 Protocol to the U.S.-Canada Great Lakes Water Quality Agreement (GLWQA) 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 or of the area's ability to support aquatic life." These areas are, or were, the "most contaminated" areas of the Great Lakes, and the purpose of the AOC program is to bring these areas to a point at which they are not environmentally degraded more than other comparable areas of the Great Lakes. When that point has been reached, the AOC can be removed from the list of AOCs in the Annex, or "delisted." The GLWQA can be found at: <http://www.iijc.org/rel/agree/quality.html>.

AOC In Recovery - Annex 1 of the 2012 QLWQA states that, "A Party may elect to identify an AOC as an AOC in Recovery when all remedial actions identified in the RAP have been implemented and monitoring confirms that recovery is progressing in accordance with the RAP. A Party shall monitor and take further action, if required, to restore beneficial uses within an AOC in Recovery. A Party shall remove the designation of an AOC or AOC in Recovery when environmental monitoring confirms that beneficial uses have been restored in accordance with the criteria established in the RAP."

Beneficial Use Impairment (BUI) - Defined by the Great Lakes Water Quality Agreement (QLWQA) as a reduction in the chemical, physical, or biological integrity of the waters of the Great Lakes sufficient to cause impairment to a designated use (GLWQA, 2012). The Lower Menominee River AOC has five BUIs remaining

including: restrictions on fish and wildlife consumption; restrictions on dredging activities; degradation of benthos; degradation of fish and wildlife populations; and loss of fish and wildlife habitat.

Beneficial use(s) are ways that a water body can improve the quality of life for people or for fish and wildlife. For example, providing habitat for fish and wildlife is a beneficial use of a water body. If a beneficial use is suppressed or unavailable due to environmental problems, like loss of habitat, then that beneficial use is considered impaired. The International Joint Commission provided a list of 14 possible beneficial use impairments in the 1987 amendments to the GLWQA.

Bioaccumulation - The uptake and retention of substances by an organism from its surroundings and from its food. Toxic chemicals tend to concentrate in organisms higher up in the food chain, such as predator fish, and in people and birds who eat these fish.

Biomagnification - A result of bioaccumulation through which the concentration of a chemical in fish or wildlife tissue increases as the chemical passes up two or more food chain levels.

Fish Consumption Advisory - Some fish from certain waterbodies contain harmful chemicals. These chemicals build up in the fish over time, and can build up in people when they eat the fish. WDNR and MDEQ routinely test fish and issue recommendations typically to “eat no more than” or “eat up to,” on how much fish a person could eat based on protecting human health from contaminants which may be found in fish. Current Wisconsin and Michigan fish consumption advisories are available online at <http://dnr.wi.gov/topic/fishing/consumption/> and www.michigan.gov/eatsafefish.

Great Lakes Restoration Initiative (GLRI) - A federal program that provides unprecedented funding for protection and restoration efforts on the five Great Lakes. State and local governments and non-profit organizations are eligible to receive grants from the U.S. Environmental Protection Agency (USEPA) for projects addressing toxic substances, invasive species, non-point source pollution, habitat protection and restoration or accountability, monitoring, evaluation, communication, and partnership building.

Goal - Goals are qualitative overarching ideas that may take a long time to achieve. They usually don't change significantly over the life of a project. An example goal statement is, “Nesting populations of a diverse array of wetland-dependent and riparian-associated birds are consistently present within the AOC.” Goals are listed in Table 1.

Natural Areas - A "natural area" is an area that currently has value as fish and wildlife habitat or has the potential to be restored so that it has value as fish and wildlife habitat. Natural areas can be publically or privately held, and can include wetlands or riparian lands within the AOC. Natural areas are not necessarily formally designated State Natural Areas.

Objective - Objectives are the detailed and quantitative components of a goal. They are important because they provide a means of measuring progress toward achieving a goal. Objectives should be SMART: Specific, Measurable, Achievable, Realistic, Time-Constrained. An example objective is, “Invasive, non-native species comprise no more than 33% of the vegetation community in protected natural areas of the AOC.” Objectives are listed in Table 1.

Polychlorinated Biphenyls (PCBs) – As a group of more than 200 compounds, PCBs have been manufactured since 1929 for uses including electrical insulation, hydraulics, fluorescent lights, and carbonless paper to name a few. In 1979, PCBs were banned because of their persistence in the environment and tendency to magnify up the food chain. They have been linked to reproductive problems in wildlife and are suspected of causing developmental problems in human infants.

Polycyclic Aromatic Hydrocarbons (PAH) - Chemicals commonly associated with oils, greases, and other components derived from petroleum, and are often associated with former coal gasification plants. Some PAH compounds have been identified as cancer or mutation causing.

Potamodromous - Truly migratory fish whose migrations occur wholly in freshwater.

Protected - For a natural area to be considered protected, the WDNR, MDEQ, CAC, and TAC must come to a consensus that measures in place adequately restrict people from diminishing its current fish and wildlife habitat value. Those measures may be existing state environmental regulations, state, county, or city ordinances, or other means deemed adequate by the WDNR, MDEQ, CAC, and TAC.

Remedial Action Plan (RAP) - A RAP is developed for each AOC to: identify the status of BUIs and their sources, document restoration targets, and list actions needed to reach those targets. RAPs are updated periodically to report progress towards achieving the restoration targets. This Plan along with the most current RAP Update for the Lower Menominee River AOC constitutes a complete strategy for removing all BUIs in the Lower Menominee River AOC.

Restoration Target - Specific goals and objectives established to track restoration progress of beneficial use impairments. Once targets have been met, the beneficial use is no longer considered impaired. Targets should be locally derived. Working with the Lower Menominee AOC Citizens Advisory Committee, restoration targets were developed in partnership with the WDNR and the MDEQ. Wisconsin and Michigan use different criteria when assessing BUIs. The agencies and CAC agreed to implement the most restrictive criteria from either state when developing the Lower Menominee River AOC specific targets.

Semi-Permeable Membrane Device (SPMD) - A passive sampling device used to measure concentrations of lipophilic (mixing more easily with oils than water) environmental pollutants like PCBs. SPMDs consist of “lay-flat” low-density polyethylene tubing containing a thin film of a pure, high molecular weight lipid. The tubing allows for the selective diffusion of the target compounds through the membrane which are then sequestered in the lipid. The compounds are extracted from the membrane and analyzed for components. SPMDs are used to mimic the uptake of toxicants suspended in the water column by fish.

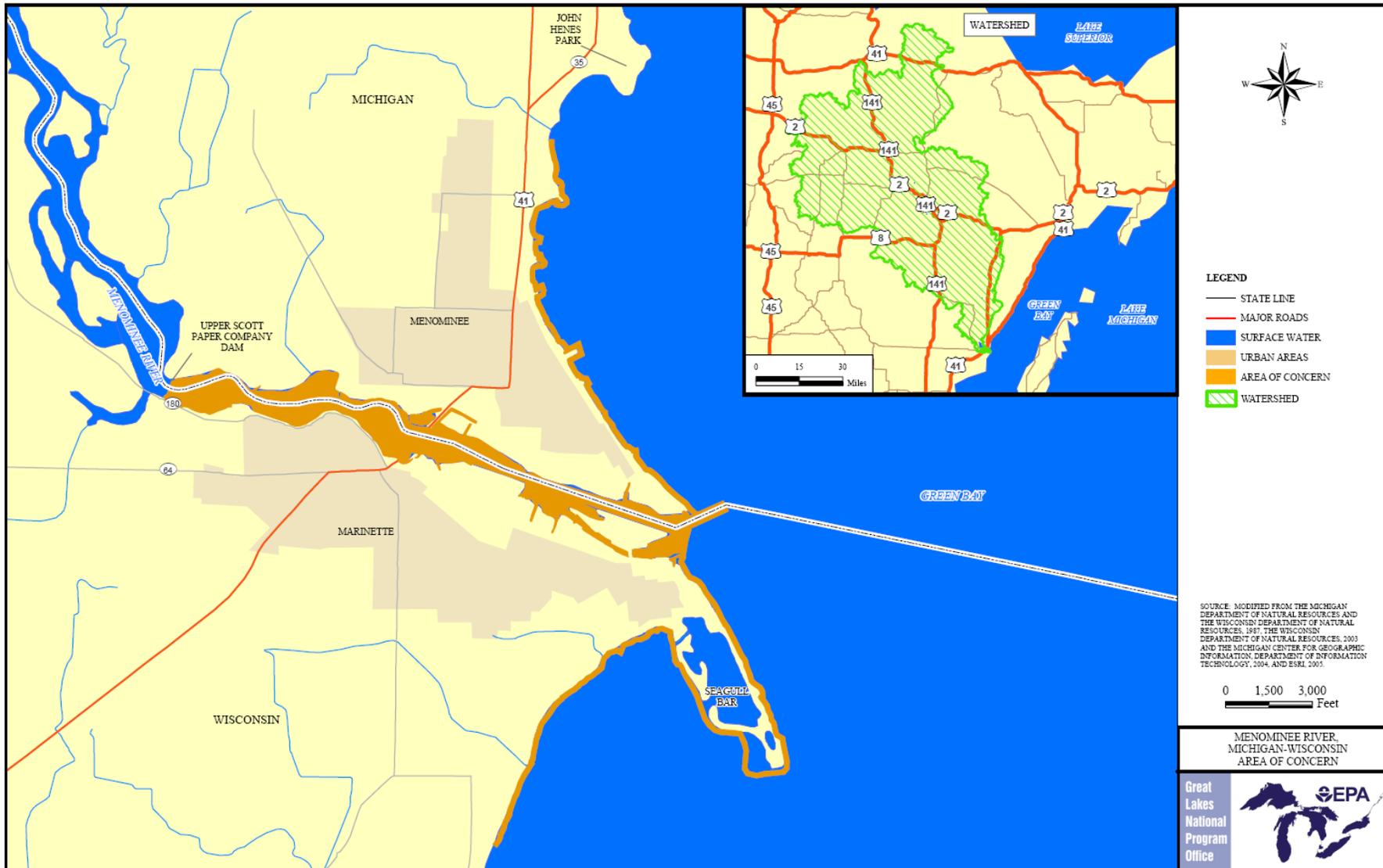


Figure A. The Lower Menominee River AOC as delineated by USEPA. Green Island, which was included in the AOC in the 1996 RAP, is not visible on this map and is located approximately 5 miles east from Seagull Bar. The watershed inset includes the drainage area of major Menominee River tributaries including the Paint, Brule, Michigamme, Pine, and Sturgeon Rivers.

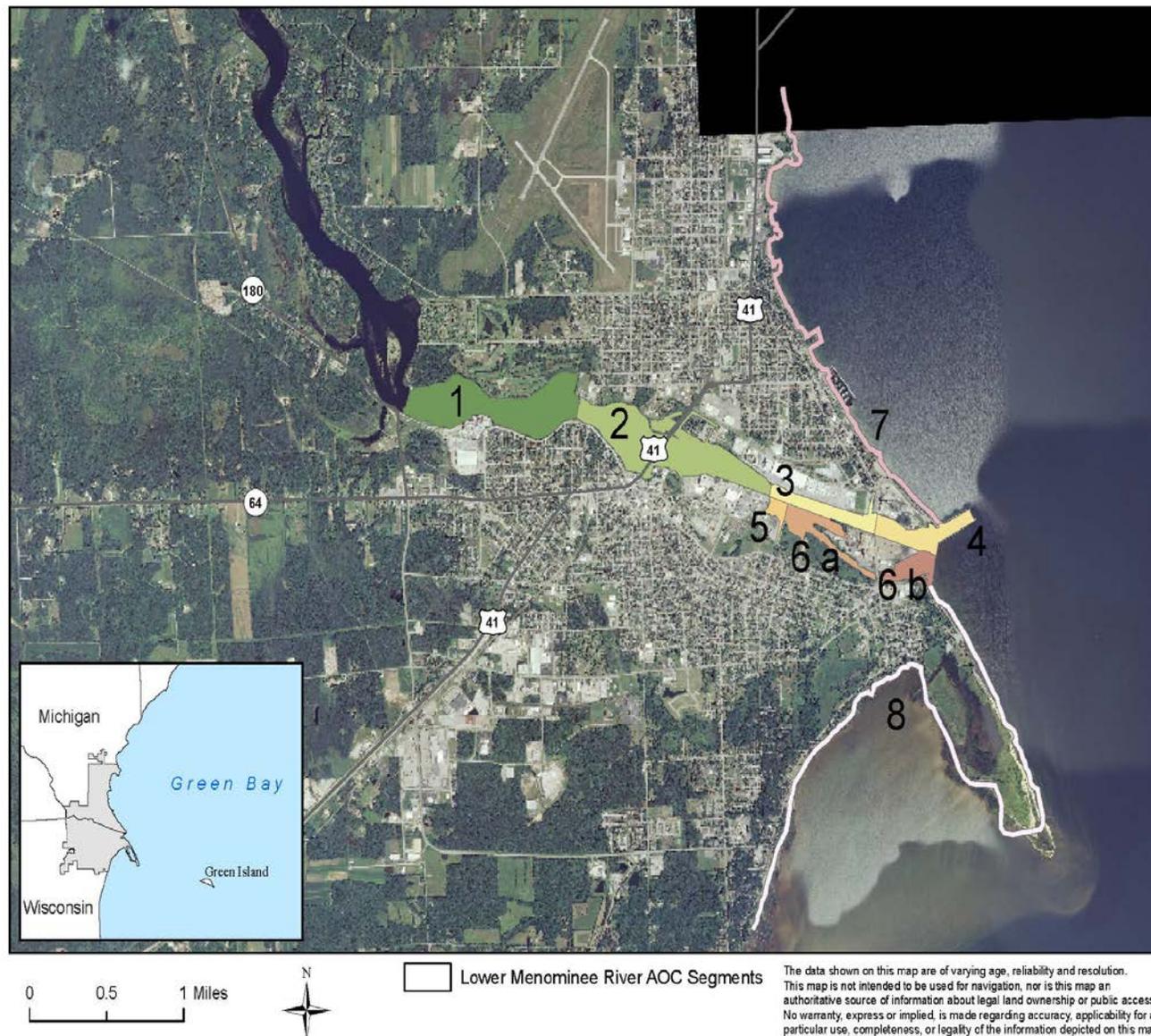


Figure B. Segments of the Lower Menominee River AOC. Used throughout this Plan, segment numbers are used to describe the general location of a place within the AOC. Green Island, seen in the map inlay, has not been assigned a segment number.

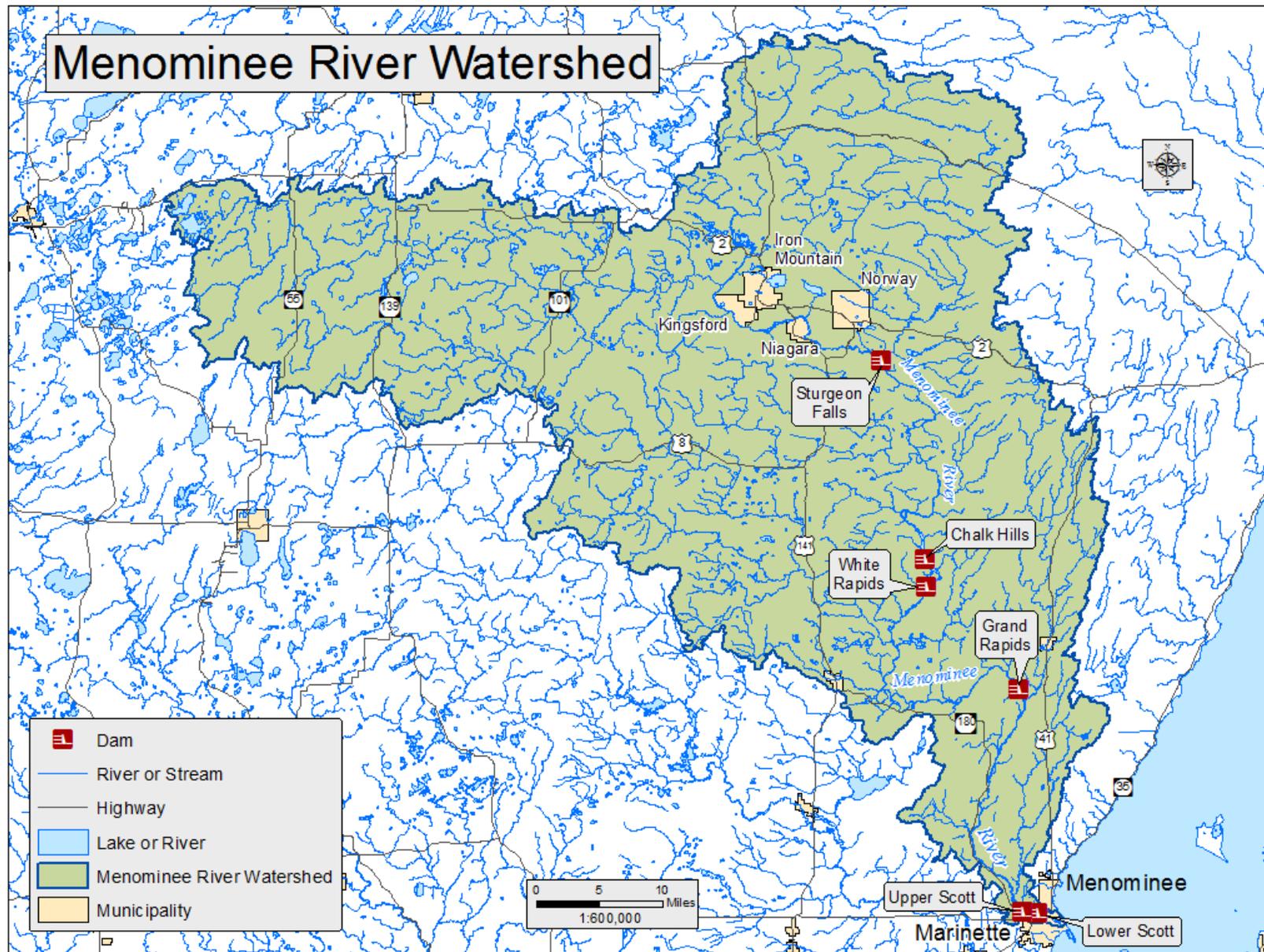


Figure C. Menominee River Watershed including tributaries and dams as they pertain to the Fish Passage Project. The Upper and Lower Scott Dams are commonly referred to as the Park Mill and Menominee Dams respectively.

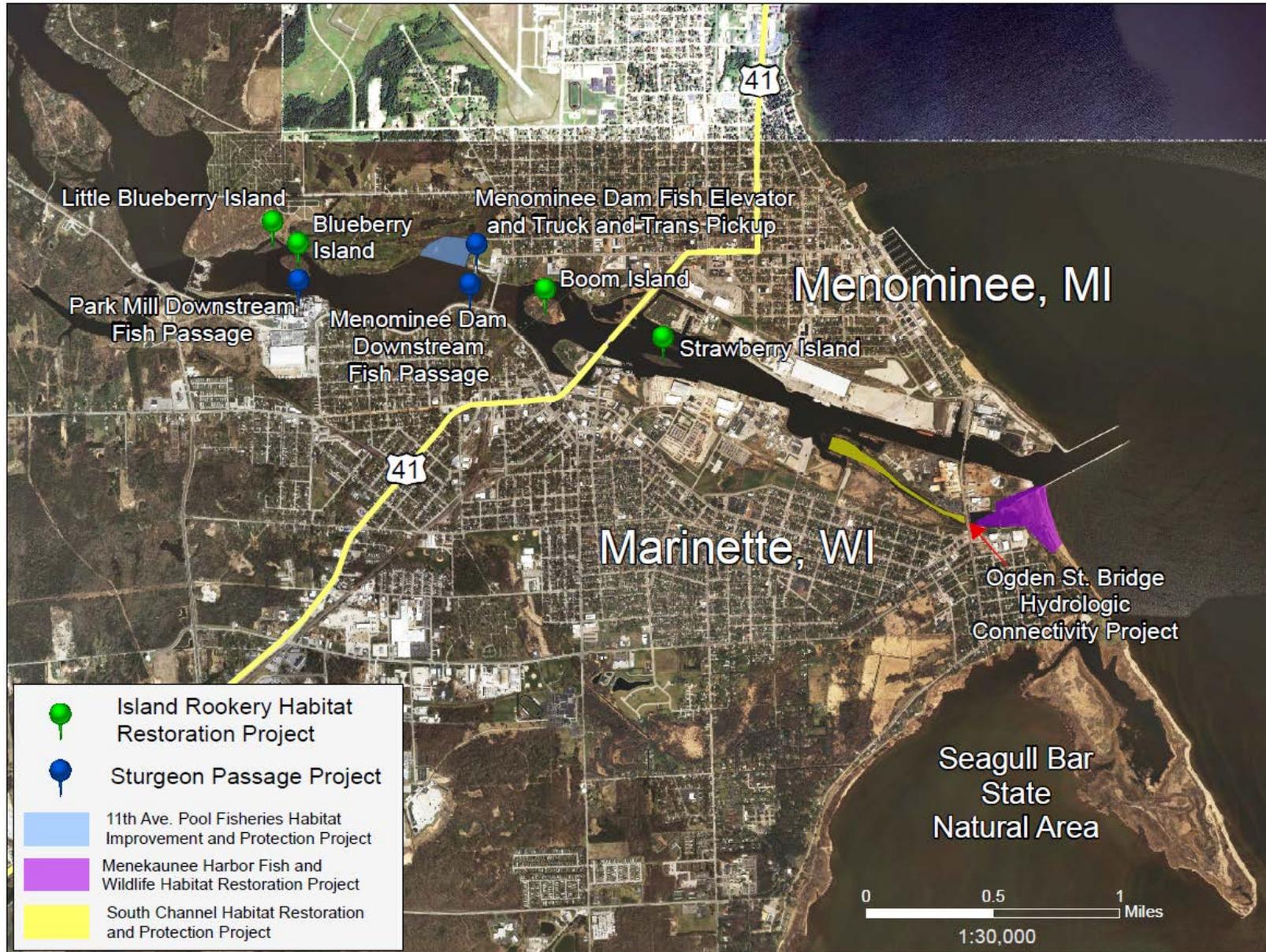


Figure D. Map of the habitat restoration and protection projects listed in Table 2.

INTRODUCTION

The *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update* (Plan) documents the current status of the “**degradation of fish and wildlife populations**” and the “**loss of fish and wildlife habitat**” beneficial use impairments (BUIs) and provides a strategic plan for their removal. Restoration goals and objectives, and the activities needed to achieve them, contained in this Plan, have been clarified and updated by consensus of the Wisconsin Department of Natural Resources (WDNR), Michigan Department of Environmental Quality (MDEQ), the Lower Menominee River Area of Concern (AOC) Citizens Advisory Committee (CAC), and Lower Menominee River AOC Technical Advisory Committee (TAC) and are now considered final. Information contained in this Plan supersedes the *2011 Fish and Wildlife Population and Habitat Management and Restoration Plan* (2011 Plan). This Plan along with the most current Remedial Action Plan (RAP) Update for the Lower Menominee River AOC constitutes a complete strategy for removing all BUIs in the Lower Menominee River AOC.

AOCs are severely degraded geographic areas within the Great Lakes, and BUIs represent the degraded designated uses of an AOC. RAPs are developed to identify BUI sources, develop site specific restoration targets, and document BUI status and removal progress (see the DEFINITIONS section for more information). Restoration targets are needed for BUIs because they provide the decision criteria for determining when a BUI may be removed. Whenever possible, restoration targets should be developed in consultation with local stakeholders and technical experts. The need for this Plan was established in the *2008 Lower Menominee River AOC BUI Restoration Targets* and reaffirmed in the *2011 Stage 2 RAP for the Lower Menominee River AOC* (WDNR and MDEQ, 2008 and WDNR and MDEQ, 2011). This Plan meets all requirements of those targets by:

- Defining the causes of fish and wildlife population and habitat impairments within the AOC
- Establishing site specific habitat and population objectives for fish and wildlife species within the AOC
- Identifying fish and wildlife population restoration programs and activities within the AOC and establishing a mechanism to assure coordination among states and programs for assessment monitoring, implementation activities, and associated monitoring

The Lower Menominee River AOC includes the lower three miles of the river from the Park Mill Dam (Upper Scott Dam) to the river’s mouth (Figure A). The AOC Boundary extends north of the river mouth to John Henes Park and south of the river mouth past Seagull Bar State Natural Area along Green Bay. Green Island in Green Bay is part of the AOC because of its strong habitat value and biological link to Seagull Bar State Natural Area (Figure B, segment 8). There are six islands in the river within the AOC boundary.

This Plan was developed through consultation with the CAC and TAC. The CAC was formed as a means of incorporating stakeholder feedback into the RAP documents and to serve as ambassadors on AOC issues to the Marinette and Menominee communities. Members of the TAC include representatives from the WDNR, MDEQ, Michigan Department of Natural Resources (MDNR), University of Wisconsin Extension, U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (USEPA), Bureau of Land Management (BLM), private environmental consulting firms, and members of the CAC. Members of the CAC help the agencies by: identifying local issues, developing restoration targets, serving as a resource for historical information, and assisting in project implementation when possible. Members of the TAC assist through providing input regarding project feasibility, existing site conditions, species habitat needs, and habitat restoration opportunities. The WDNR and MDEQ

strongly prefer that requests to remove the impaired designation of a BUI be agreed to by the CAC. The CAC has provided a letter of support to show their endorsement of this Plan (Appendix A).

This Plan is broken into four sections in addition to the EXECUTIVE SUMMARY and INTRODUCTION. The CAUSES OF FISH & WILDLIFE HABITAT AND POPULATION IMPAIRMENTS section defines the causes of fish and wildlife population and habitat impairments within the AOC. The HABITAT AND POPULATION GOALS, OBJECTIVES, AND ACTIVITIES section establishes site specific habitat and population goals and objectives for fish and wildlife species within the AOC and illustrates how measurable objectives relate to qualitative goals (Table 1). This section also lists specific activities that must be completed to meet objectives and provides a status update of each activity (Table 2). Tables 1 and 2 were previously integrated as the GOAT, or Goals, Objectives, and Activities Table, and found in the appendix of the 2011 Plan, but have been moved into the body based on feedback received from users. The ACTIVITIES NOT REQUIRED FOR BUI REMOVAL section lists activities discussed in depth with the TAC and CAC, but not required to complete any objective. Lastly, the SUMMARY AND CONCLUSIONS section provides a review of the status of the “degradation of fish and wildlife populations” and the “loss of fish and wildlife habitat” BUIs and what activities must be undertaken to maintain progress toward their removal. This section also discusses potential hurdles to BUI removal and means to overcome them.

This Plan draws direction from Michigan’s *2007 DRAFT Supporting Guidance for Local Restoration Criteria Development: Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife* (MDEQ, 2007). This guidance establishes that the fish and wildlife population and habitat management plan should focus on specific issues that are directly responsible for causing impairments locally within the AOC. It reiterates that the goal of the AOC program is to restore beneficial uses, not to create a pristine habitat reflective of pre-settlement conditions. Implementation of the *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update*, and subsequent removal of the fish and wildlife BUIs, can be one step along the way for a broader and more ambitious restoration effort if the community chooses to strive for improvements beyond removal of the BUIs.

CAUSES OF FISH & WILDLIFE HABITAT AND POPULATION IMPAIRMENTS

The “degradation of fish and wildlife populations” and “loss of fish and wildlife habitat” BUIs were listed because of the loss of historic wetlands and localized toxicity caused by contaminated sediment. An extensive wetland complex near the mouth of the river was destroyed by log driving activities in the 1800s. Afterwards, land near the mouth of the River was filled for industrial expansion, and the shorelines hardened to prevent erosion. Remaining quality habitat and wetlands are threatened by encroaching invasive plants and access to spawning and juvenile habitat for potamodromous fish, like lake sturgeon, has been severely limited due to the lack of a safe passage beyond several dams (Figure C). Sediment contaminated with arsenic, polycyclic aromatic hydrocarbons (PAHs, or coal tars), and other heavy metals has impacted fish populations throughout the AOC (WDNR and MDEQ, 1990). Sediment was contaminated through industrial activities and stormwater discharges that took place throughout the 1900s.

Loss of Historic Wetlands, Aquatic Vegetation, and Shoreline Habitat

Historically, an extensive wetland complex existed near the river mouth with wide swaths of wild rice (*Zizania spp.*). These and other wetland areas along the river were largely eliminated by log driving activities. The river was also used to dispose of vast quantities of bark and sawdust during the 1800s, which are still found in river sediment and occasionally washed up on local beaches. Cut logs, trees, and stumps are found at depth buried within the sediment. At this time the CAC is not interested in pursuing remedial actions for historic logging wastes. Land near the mouth of the River was filled for industrial expansion, and the shorelines hardened to prevent erosion.

Dams within the Menominee River Watershed and the AOC restrict the ability of fish populations to migrate upstream or safely downstream (Figure C). Less available habitat for fish, especially for potamodromous fish, can negatively impact total population size, natural recruitment, species diversity, and genetic diversity. Five dams on the Menominee River limit the spawning migration of lake sturgeon in the system. Sturgeon Falls, also the site of a dam, was the historic point at which the lake sturgeon could not pass. The lowest two, the Upper and Lower Scott Dams are within the AOC and are owned by North American Hydro (NAH). Presently, the Lake Michigan sturgeon population only has access to two miles of the Menominee River for spawning and juvenile rearing habitat (USFWS, 2012).

Remaining quality habitat and wetlands are threatened by encroaching invasive species (NES, 2012). Areas along Green Bay are dominated by the invasive Eurasian Phragmites (*Phragmites australis*). However, due to the ubiquitous distribution of this species around the Great Lakes, this Plan does not aim for large-scale control of the European phragmites, but seeks to control the species where necessary to protect specific, sensitive areas, such as Seagull Bar State Natural Area or habitat restoration sites. Purple loosestrife (*Lythrum salicaria*) continues to be a problem along the river corridor and associated wetlands. Non-native buckthorn (*Rhamnus spp.*) and honeysuckle (*Lonicera spp.*) are a significant presence on riverine islands, degrading upland habitat used by wildlife.

Sediment Contamination

Toxic contaminants in the river sediment are a major concern in the lower Menominee River. Poor water quality caused by these sediments has contributed to loss of habitat and degraded fish populations. The known source areas are commonly referred to as the Ansul arsenic and WPS coal tar sites. Menekaunee Harbor (segment 6b) contains sediment contaminated with elevated levels of heavy metals, but is not as heavily contaminated as the previously mentioned sites (Weston Solutions, 2008). WDNR is currently working with the City of Marinette and

USEPA to remove contaminated sediment and restore the harbor. The WDNR, MDEQ, and USEPA are also actively pursuing ways to identify any unknown sources of contamination, including characterizing sediment in the Lower Scott Flowage (Figure B, segment 1) and Rio Vista Slough (Figure B, within segment 2). Work in the Lower Scott Flowage has been funded through the Great Lakes Legacy Act and will be completed by the Great Lakes National Program Office (GLNPO), and results are expected in 2014. Another significant site, the Lloyd Flanders Paint Sludge Site, was successfully remediated in 1995. For more information on the remediation, see the *1996 Lower Menominee River RAP Update* (WDNR, 1996).

Ansul Arsenic Site

Sediment near the turning basin (Figure B, segment 5) and south channel (Figure B, segment 6a) are contaminated with high to elevated levels of arsenic. The contamination is a result of past practices at the nearby Ansul Incorporated facility, which manufactured an arsenic-based herbicide from the 1950s to the 1970s. As noted in the 1996 RAP, arsenic contamination does not biomagnify up the food chain, but it does bioaccumulate in exposed aquatic life, including fish. Toxicity testing indicated lethality to aquatic test organisms (WDNR, 1996).

Tyco International, owners of Ansul Incorporated, began removing contaminated sediment from the Menominee River in July 2012 under an Administrative Order on Consent with the USEPA. Tyco hoped to remove approximately 100,000 cubic yards of contaminated sediment in 2012, but when dredging ceased for the 2012 season, only 26,913 cubic yards of material had been removed from the River (Foth, 2012). Greater than expected amounts of large woody debris were encountered during dredging, which slowed progress and required additional screening/grinding steps during sediment processing. Dredging was halted for approximately 30 days while sediment stabilization protocols were modified to comply with the leachable arsenic, free water, and shear strength requirements of disposal. Dredging resumed in May, 2013.

The Administrative Order on Consent requires Tyco to remove sediment with equal to or greater than 50 parts per million (ppm) arsenic if practical (USEPA, 2012). It also allows Tyco to leave sediment with arsenic concentrations between 50 and 20 ppm in place and monitor its natural recovery (dilution) to a concentration of 20 ppm arsenic or less by November 1, 2023, (USEPA, 2012). However, the 20 ppm arsenic concentration could be reached earlier through faster than anticipated natural recovery or additional anthropogenic remediation. Reaching the 20 ppm arsenic concentration, and completing this remediation, is a prerequisite to some habitat restoration activities. To record how habitat activities can proceed while accounting for this uncertainty, the Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree was developed (Appendix B).

Many remedial activities were conducted before the Administrative Order on Consent was signed, see previous RAPs or the USEPA web page <http://www.epa.gov/region5/cleanup/rcra/ansul/index.html> for additional information.

WPS Coal Tar Site

During the construction of the Marinette Waste Water Treatment Plant expansion in 1989, soils contaminated with coal tar and polycyclic aromatic hydrocarbons (PAHs), were discovered (WDNR and MDNR, 1990). Site investigations from 1994 to 2002 discovered approximately 4 acres of contaminated soil and 1.3 acres of contaminated sediment in the nearby Menominee River (Figure B, within segment 2). The source was determined to be a coal gasification plant which operated prior to 1960. Wisconsin Public Service Corporation (WPS) was found to be responsible for the remediation of contaminated soils and sediments. From the 1996 RAP,

“WDNR conducted solid-phase sediment toxicity tests using *Daphnia magna* with sediments collected near the plant’s outfall. Using a 48-hour acute test, toxicity was 100%.”

The cleanup goal for this site was to remove oil-coated sediment (non-aqueous phase liquid, NAPL) and sediment with concentration of PAHs greater than 22.8 ppm. Over 15,200 cubic yards of sediment was mechanically removed from the Menominee River by WPS between October 2012 and January 2013 (NRT, 2013). Confirmation sampling found some residual contamination to be irretrievably intermingled with the uneven bedrock surface. To protect benthic organisms, ten inches of clean sand cover was placed over these areas (NRT, 2013). Reactive core matting was installed around the outfall structure and former slough to the river. The matting was installed to keep upland contamination that was unable to be removed from migrating into the river (NRT, 2013). A long term monitoring and maintenance plan for the sand cover is being developed and will be implemented until a decision can be made as to whether the sediment cleanup criteria have been met. Upland source contamination will be further investigated and potentially remediated in the future. More information on the WPS coal tar site remediation is found in previous RAPs.

HABITAT AND POPULATION GOALS, OBJECTIVES, AND ACTIVITIES

The restoration target for the “degradation of fish and wildlife populations” and the “loss of fish and wildlife habitat” BUIs is essentially achieving all five qualitative overarching goals listed in Table 1. Because the goals are qualitative, they are not easily measured, and difficult to assess. To overcome this hurdle, quantitative measurable objectives were developed for each goal (Table 1). When all of the objectives listed below an individual goal have been achieved, the goal itself is considered achieved. An objective is considered achieved when the WDNR, MDEQ, CAC, and TAC agree that all applicable activities have been completed. While the objectives are quantitative and measurable, additional details on how they will be achieved (i.e., who will do the work, when will it be done, how much will it cost, etc.) is needed. Table 2 is the list of activities required to achieve objectives. It also includes details on project status, management, cost estimates, and other necessary information. The WDNR, MDEQ, CAC, and TAC agree that only activities listed in Table 2 are required to achieve objectives.

To summarize, goals represent the desired outcomes of implementing this Plan in the AOC. The objectives are the sum outputs of individual projects working towards a common goal. Activities are the individual projects and their outputs.

Since the 2011 Plan, the “Applicable AOC Segments” row was removed. It was considered redundant since all AOC segments are applicable unless mentioned specifically in goal or objective language.

Goals

Restoration goals contained in this Plan have been clarified and updated by consensus of the WDNR, MDEQ, CAC, and TAC and are now considered final. Since the 2011 Plan, there have been only minor changes to goals. Some goals were rewritten for consistency in punctuation and tense, but the content has not been changed. At this time no goals are considered achieved.

Objectives

Objectives contained in this Plan have been clarified and updated by consensus of the WDNR, MDEQ, CAC, and TAC and are now considered final. An objective is considered achieved when the WDNR, MDEQ, CAC, and TAC agree that all applicable activities have been completed. Since the 2011 Plan, there have been significant changes to some of the objectives regarding wording, intent, and how progress is measured. These changes are discussed below:

The objective worded, “XX acres of natural areas within segments 1-6 and XX linear feet within segments 7-8 are protected” has been removed and replaced with “Long term protections deemed acceptable by the WDNR, MDEQ, TAC, and CAC have been established for all natural areas where habitat improvement work has taken place and contributes to achieving one or more BUI removal objectives.” The change was made to adjust the objective’s focus towards protecting natural areas where habitat improvement work has taken place, versus protecting natural areas distributed throughout the AOC (TAC, 2013a).

The objective worded, “At least five nesting pairs of birds per acre representing at least 10 different species from the Lower Menominee River AOC Bird List (to be developed) is found within segments XX (to be determined) of the AOC” was removed and replaced by two objectives. Those objectives are: “Maintain or enhance habitat conducive to colonial waterbird rookery activity on known or prospective rookeries” and “Monitor the rookery activity of known or prospective rookeries”. The change was made to avoid complications that may stem from the development of a Lower Menominee River AOC Bird List and quantitative small scale

monitoring of migratory bird populations (TAC, 2012a). Achievement of the “Maintain or enhance...” objective is based on the completion of habitat restoration activities. Achievement of the “Monitor the rookery...” objective requires the TAC only to qualitatively assess existing colonial waterbird populations primarily for the purpose of public education.

The objectives worded, “Provide access to approximately 21 river miles to the Lake Michigan sturgeon population (version 1.1 of the Fish Passage and Protection Plan, October 29, 2009)” and “Provide safe downstream passage beyond AOC segment 1 to sturgeon (version 1.1 of the Fish Passage and Protection Plan, October 29, 2009)” were rewritten and have had their citations updated. The rewrite is reflective of language changes in the Final Environmental Assessment, which these objectives are meant to mirror (USFWS, 2012). Achievement is based on completion of fish passage structures required in NAH's current FERC license agreement.

Species listed in the objectives worded, “There is evidence of recruitment within the AOC below the Lower Scott Dam for the following fish species: walleye, yellow perch, smallmouth bass, muskellunge, lake whitefish, largemouth bass, and northern pike” and “There is evidence of recruitment in segment 1 for the following fish species: walleye, yellow perch, smallmouth bass, largemouth bass, and northern pike” have been changed. The changes are reflective of the fish species used during the “Lower Menominee River AOC Fisheries Data Roundup” (Fisheries Data Roundup) activity (WDNR, 2013). Except for lake sturgeon, the Fisheries Data Roundup activity also defined the term “evidence of recruitment” and dictated what monitoring data should be pursued to measure it (WDNR, 2013). When prescribed monitoring has demonstrated each species’ evidence of recruitment, the objective has been achieved.

The Fisheries Data Roundup suggested removing whitefish from the list of target species since work that might be needed to improve recruitment would be outside the scope of the AOC program. Understanding strong stakeholder interest in the species, the TAC has recommended adding a new objective to require monitoring to understand whitefish recruitment in the AOC, but not hold BUI removal to a population goal.

The term “non-native” was added in the objective worded, “Invasive species comprise no more than 33% of the vegetation community in protected natural areas of the AOC” to be consistent with the 2012 riparian vegetation survey. Achievement of this objective is based on the completion of habitat restoration activities and the results of post-restoration vegetation surveys.

Table 1: Goals and objectives of the 2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update for the Lower Menominee River AOC. The achievement of goals is dependent on achieving corresponding objectives. The achievement of all goals is the restoration target for the “degradation of fish and wildlife populations” and the “loss of fish and wildlife habitat” BUIs. Objectives quantify the goals, making assessment possible.

GOALS				
Long-term protection is in place for natural areas and wetlands within the AOC, including Seagull Bar and riverine islands.	Nesting populations of a diverse array of wetland-dependent and riparian-associated birds are consistently present within the AOC.	The lake sturgeon population is enhanced.	Diverse and functional native fish and mussel assemblages are present in the AOC that sustain natural recruitment.	A healthy and diverse native vegetation community has been restored.
OBJECTIVES				
Long-term protections deemed acceptable by the WDNR, MDEQ, TAC, and CAC have been established for all natural areas where habitat improvement work has taken place and contributes to achieving one or more BUI removal objectives.	Maintain or enhance habitat conducive to colonial waterbird rookery activity on known or prospective rookeries.	Provide additional spawning and juvenile rearing habitat for lake sturgeon by providing passage upstream of both Menominee and Park Mill Dams (USFWS, 2012).	There is evidence of recruitment within segments 2-8 for the following fish species: lake sturgeon walleye, yellow perch, muskellunge, smallmouth bass, largemouth bass, and northern pike.	Invasive, non-native species comprise no more than 33% of the vegetation community in protected natural areas of the AOC.
			There is evidence of recruitment in segment 1 for the following fish species: walleye, rock bass, bluegill smallmouth bass, largemouth bass, and northern pike.	
	Monitor the rookery activity of known or prospective rookeries.	Provide a means for fish to pass safely downstream of both Menominee and Park Mill Dams (USFWS, 2012).	There is evidence of recruitment within the AOC for native mussel species.	
			Monitor for larval lake whitefish to determine necessity of future habitat improvements.	

Activities

Activities contained in this Plan have been clarified and updated by consensus of the WDNR, MDEQ, CAC, and TAC and are now considered final, and they agree that only activities listed in Table 2 are required to achieve objectives. Since the 2011 Plan, there have been significant changes to this table. Activities have been added, combined with other similar activities, or removed. Activities that were removed from the table are discussed in the ACTIVITIES NOT REQUIRED FOR BUI REMOVAL section. Many activities have also been completed or started since the 2011 Plan. These developments are reflected in the reformatted table.

The 2011 Plan attempted to identify what activities affect which goals. This Plan does not attempt to make these connections, instead it records critical information about each activity (who will do the work, when will it be done, how much will it cost, etc.). The result is a reformatted table with many new columns. To help explain the new table, a list of column headers and a description of terms used follows.

Type - Used to group similar projects together, type can be "Review of Existing Data and Restoration Plans", "Field Studies", "Habitat Restoration and Protection Projects", or "Monitoring".

Activity - A narrative description of the activity.

Funding Status - Labeled "Funded" if funding was required and has been received, "Needs Funding" if additional funding is required to complete the activity, or "None Required" if external funding for the activity is/was not needed.

Funded By - Source(s) of funding, or probable source of future funding. Capacity grants are direct allocations to governmental agencies from the GLRI for work in AOCs.

Cost or Cost Estimate - Estimate of the cost required to complete an activity. Actual cost is reported if the "Status..." column is labeled "complete" including the year completed. All costs exclude state or federal agency staff time which may have been funded through the GLRI.

Management - Entity responsible, or most likely to be responsible, for completing an activity.

Status and Date Completed - Labeled "Complete" including the year completed, "In Progress", or "Incomplete" if the activity has not been started.

Prerequisites - A description of any external activities that must be completed before the activity can be initiated or completed.

Additional Comments - Any additional information applicable to this activity.

Table 2: List of activities needed to be completed in order to achieve all objectives of the 2013 *Fish and Wildlife Population and Habitat Management and Restoration Plan Update* for the Lower Menominee River AOC.

Type	Activity	Funding Status	Funded By	Cost or Cost Estimate	Management	Status/Date Completed	Prerequisites	Additional Comments
Review of Existing Data and Restoration Plans	Compile historical monitoring data to establish trends and assess fishery status. Also, assess the potential for existing fisheries programs to provide the needed data regarding fish assemblage and recruitment within the AOC.	Funded	WDNR Capacity Grant	\$5,000	WDNR	Complete, 2013		Project titled "Fisheries Data Roundup"
	Analyze the results of the 2010 aquatic vegetation survey and 2011 riparian vegetation survey. Identify aquatic and riparian natural areas.	None Required			TAC	Complete, 2011		Completed through TAC discussions
	Identify existing mechanisms in place for wetland, aquatic, and riparian protection. Identify possible gaps and ways to fill protection gaps.	None Required			TAC	In Progress		Needs additional discussion
	Review results of the 2011 SPMD study and assess implications for habitat restoration.	None Required			TAC	Complete, 2012		Indicated Lower Scott Flowage as a potential source of PCBs, GLNPO pursuing sediment characterization in segment 1 and upstream of the AOC
	Review Ansul arsenic site remediation plans and assess the implications for habitat restoration.	None Required			TAC	Complete, 2013		Habitat work in segment 6a is not possible until arsenic concentrations are less than 20 ppm
	Review segment 1 GLNPO sediment characterization and assess the implications for habitat restoration.	None Required			TAC	In Progress	Completion of GLNPO sediment characterization	Sediment requiring remediation may result in additional habitat work
	Review the Menekaunee Harbor (segment 6b) sediment remediation plan for habitat restoration implications.	None Required			TAC	Complete, 2013		Habitat work moving forward as part of sediment remediation
	Determine whether or not carp exclusion should be pursued in the Seagull Bar State Natural Area (segment 8) pocket.	None Required			TAC	Complete, 2013		Access considered largely dependent on water levels, carp exclusion also outside AOC goals
	Review WPS coal tar site remediation plans and assess the implications for habitat restoration.	None Required			TAC	Complete, 2013		Remediation complete, no habitat implications

Type	Activity	Funding Status	Funded By	Cost or Cost Estimate	Management	Status/Date Completed	Prerequisites	Additional Comments
Field Studies	Conduct an aquatic vegetation survey.	Funded	WDNR and MDEQ Capacity Grants	\$15,690	WDNR	Complete, 2010		Rio Vista Slough and lakeshore excluded from survey
	Conduct a riparian vegetation survey. Inventory, map, and ground-truth lands within the AOC, include information about ownership and protection status for these lands.	Funded	WDNR Capacity Grant	\$16,500	WDNR	Complete, 2012		Survey area dependent on landowner agreements
	Conduct an SPMD study including segment 1 and below the Menominee Dam, and assess the implications for habitat restoration.	Funded	MDEQ Capacity Grant	\$70,000	MDEQ	Complete, 2012		Lower Scott Flowage suspected as a source of PCBs, further sediment characterization through GLNPO pending
	Conduct a mussel survey upstream of the AOC and segments 1, 2, 3, 4, and 6a. Surveys will assess hydro dam impacts as well as serve as a baseline for evaluating subsequent sediment remediation and habitat enhancement efforts.	Funded	NAH and WDNR Capacity Grant	\$6,093	WDNR	Complete, 2012		Provided evidence of recruitment within the AOC for native mussel species
	Conduct additional fish population surveys in the AOC and select reference sites to determine target species recruitment status.	Needs Funding	WDNR and MDEQ Capacity Grants	\$30,000	WDNR, MDNR	In Progress	Approximately \$20,000 is needed for 2014 and 2015	Project titled "Fisheries Data Roundup Reference Site Monitoring" funded (\$10,000) in 2013

Type	Activity	Funding Status	Funded By	Cost or Cost Estimate	Management	Status/Date Completed	Prerequisites	Additional Comments
Habitat Restoration and Protection Projects (For a map of proposed habitat restoration and protection projects, see Figure D)	Complete safe downstream fish passage around the Park Mill Dam.	Funded	NAH and GLRI	\$2,158,660	NAH, USFWS, River Alliance of Wisconsin	In Progress		\$1.5 million from GLRI and \$658,660 from NAH. Scheduled for completion in 2014.
	Complete fish lift and research facility construction at the Menominee Dam for upstream fish passage.	Funded	NAH and GLRI	\$3,162,053	NAH, USFWS, River Alliance of Wisconsin	In Progress		\$1.5 million from GLRI and \$1,662,053 from NAH. Scheduled for completion in 2015.
	Acquire means and materials to conduct the truck and transfer of lake sturgeon above the Menominee Dam.	Needs Funding	NAH and GLRI	\$100,000	NAH, USFWS, River Alliance of Wisconsin	Incomplete	Planning and design work	\$20,000 from NAH and remainder requested from GLRI. Needed by 2015 to complete upstream passage.
	Complete safe downstream passage below the Menominee Dam for adult lake sturgeon and other large fish.	Funded	NAH, USACE, and GLRI	\$1,278,500	NAH, USFWS, USACE	In Progress		\$866,025 from USACE and 412,475 from NAH. Scheduled for completion in 2015.
	Provide safe downstream passage below the Menominee Dam for juvenile lake sturgeon and other small fish.	Needs Funding	GLRI	\$5,000,000	NAH, USFWS, River Alliance of Wisconsin	Incomplete	Planning and design work	NAH does not have available match at this time, funding to be requested from GLRI.
	Improve the vegetation communities of Strawberry, Blueberry, and Boom Islands to maintain habitat conducive to rookery activity.	Needs Funding	MDEQ Capacity Grant	\$52,500	MDEQ, Great Lakes Commission	In Progress	Approximately \$35,000 is needed for 2014 and 2015	Project titled "Island Rookery Habitat Restoration" funded (\$17,500) in 2013.
	Protect rookery habitat of Strawberry, Blueberry, and Boom Islands from human development.	None Required		unknown	TAC	In Progress		Blueberry and Strawberry Islands protected through respective ownership, further discussion is needed regarding Boom Island.
	Increase the hydrologic connection between South Channel and Menekaunee Harbor by removing debris and excess riprap under the Ogden Street Bridge.	None Required	City of Marinette	\$1,000	City of Marinette	Incomplete	Completion of Ansul arsenic site and Menekaunee Harbor sediment remediations	See "Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree" for more information on timing.
	Complete a habitat restoration and protection project in the South Channel for increased fish and wildlife habitat.	unknown	GLRI	unknown	WDNR	Incomplete	Completion of Ansul arsenic site sediment remediation	See "Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree" for more information on timing.
	Complete a habitat restoration and protection project in Menekaunee Harbor for increased fish and wildlife habitat.	Needs Funding	City of Marinette, WDNR, GLRI	\$600,000	WDNR, City of Marinette	In Progress	Completion of Menekaunee Harbor sediment remediation	Design being developed in 2013 through larger "Menekaunee Harbor Restoration" Project.
Complete a fisheries habitat improvement and protection project in the 11th Avenue Pool.	Needs Funding	GLRI	unknown	MDEQ	Incomplete	Completion of GLNPO sediment characterization	TENATIVE, this project will only occur if sediment remediation is required in this area.	

Type	Activity	Funding Status	Funded By	Cost or Cost Estimate	Management	Status/Date Completed	Prerequisites	Additional Comments
Monitoring	Monitor rookery activity on all riverine islands.	unknown		unknown	TAC	Incomplete	TAC must determine if existing datasets are adequate or if new data must be collected	Data will be used primarily for public education.
	Conduct biological monitoring of the South Channel (segment 6a) to document ecological recovery.	Funded	USFWS Capacity Grant	\$116,000	USFWS	In Progress	Completion of Ansul arsenic site sediment remediation	See "Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree" for more information on timing.
	Conduct monitoring for larval lake whitefish.	Needs Funding	Great Lakes Protection Fund	\$36,000	WDNR	Incomplete	Receipt of funding	Characterize larval whitefish outmigration from Menominee River, results will inform the design and operation of other habitat restoration activities.
	Repeat fish recruitment studies, mussel survey, bird survey, and aquatic vegetation survey after the restoration and protection projects have been completed to confirm targets have been achieved.	Needs Funding		unknown	Various	Incomplete	To be completed after sediment remediation and habitat restoration activities are complete, 2016	Studies will be repeated only as needed to confirm the objectives have been met.

ACTIVITIES NOT REQUIRED FOR BUI REMOVAL

During development of this Plan, the WDNR, MDEQ, CAC, and TAC discussed several activities that were ultimately determined not to be required for BUI removal. They were either considered to be in excess of what is needed to restore beneficial uses, determined not to be feasible due to cost or land ownership, or more effective or efficient alternatives were pursued instead. These activities are not included in Table 2, and may have been removed from the table since the 2011 Plan.

The implementation of the *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update*, and subsequent removal of the fish and wildlife BUIs, can be one-step along the way for a broader and more ambitious restoration effort if the community chooses to strive for improvements beyond removal of the BUIs. These activities are recorded here to provide guidance for those wishing to pursue a broader and more ambitious restoration effort.

Green Island

Green Island is an approximately 80 acre privately owned island located 5 miles east of Seagull Bar State Natural Area (Figure B, inset). Green Island was identified as critical wildlife habitat in the 1990 RAP and included within the boundaries of the AOC to facilitate bird population recoveries. The CAC and TAC support public acquisition of the island for conservation purposes. Public acquisition of Green Island, or other conservation easements, is not required to achieve the removal of any impairment to the AOC. In 2011, a plan to fully develop the Island as vacation housing and a resort was proposed by the island's owner. No development has begun to date. Environmental and archaeological considerations remain an issue (Schiefelbein, C. L. 2013). In August 2013, the *Peshigo Times* reported that the Island's owner had requested permission from the City of Marinette to have an archaeological investigation take place at Red Arrow Park (Marinette, 2013). Red Arrow Park is the proposed location for an underground power supply cable to the Island from Marinette.

Nature-Like Fishway for Upstream Fish Passage

The volume of sturgeon being passed upstream is expected to be small enough that truck and transfer should be adequate for the foreseeable future (USFWS, 2012). Costs for constructing a nature-like fishway are considerable, and the loss of hydraulic head would diminish economic returns for the existing hydropower dams. Support from riparian landowners would be necessary. In addition, truck and transfer is guaranteed safe passage, whereas fish may refuse to use a fish-way for many reasons.

Fish Passage at Upstream Dams

The USFWS and other agencies are interested in developing safe fish passage between Lake Michigan and Sturgeon Falls, which is believed to be the historic range of the lake sturgeon in the Menominee River. To accomplish this, passage would be required at the Lower Scott, Upper Scott, Grand Rapids, White Rapids, and Chalk Hills Dams (Figure C). Each dam opened for passage provides additional river miles and habitat for sturgeon, positively impacting sturgeon populations. Sturgeon passage beyond the Upper and Lower Scott Dams is required to remove the "degradation of fish and wildlife populations" and the "loss of fish and wildlife habitat" BUIs. Both the TAC and CAC strongly support safe fish passage at the remaining dams, but it is not required to remove beneficial use impairments.

Rio Vista Slough

In its current state, Rio Vista Slough provides habitat for fish, birds, turtles, and amphibians (White Water Associates, 1996). However, the TAC believes that fish and wildlife habitat could be improved by removing invasive plants and improving fish passage into the slough (TAC, 2012b). The CAC has proposed leaving the Slough in its current state, or developing means to protect it from further degradation, but is widely opposed to habitat improvement work here for BUI removal. Unclear ownership, perceived low cost effectiveness, and adjacent landowner's potential liability drive the CAC's concerns (CAC, 2012).

Rio Vista Slough is potentially a contaminated sediment site. In 1996, Great Lakes Pulp and Fiber was considering the site for a wetland mitigation project. Site investigations by White Water Associates indicated PAH compounds were present, but at levels deemed acceptable for residential cleanup criteria (White Water Associates, 1996). All metals tested were found to be present in concentrations that exceed one or more categories described under soil residential cleanup criteria (White Water Associates, 1996). All analysis was conducted on surficial sediment, the condition of sediment at depth is unknown. Residential criteria were used because sediment criteria do not exist.

After several months of discussion, the CAC and TAC have agreed not to pursue habitat improvement activities for BUI removal. The MDEQ intends to characterize sediment in the slough in 2014 to resolve contaminated sediment concerns.

River Park Campground Canal

River Park Campground Canal is used extensively by small panfish (TAC, 2012b). The canal is also used year round by local anglers and visitors staying at River Park Campground. The canal is bordered by River Park Campground in Menominee, US Highway 41, and an active railroad track. The TAC suggested that opening the lower end of the canal might increase water circulation and improve the fishery, but this would likely close the popular campground during construction. Other actions like shoreline softening were discussed, but user conflict was determined to be too high. Further discussions determined that habitat restoration work in the canal is unnecessary for BUI removal. Protections against development or filling in are strongly encouraged to maintain the existing habitat.

SUMMARY AND NEXT STEPS

This 2013 *Fish and Wildlife Population and Habitat Management and Restoration Plan Update* documents the current status of the “**degradation of fish and wildlife populations**” and the “**loss of fish and wildlife habitat**” BUIs and provides a strategic plan for their removal.

Restoration goals and objectives, and the activities needed to achieve them, contained in this Plan have been clarified and updated by consensus of the WDNR, MDEQ, CAC, and TAC and are now considered final. Information contained in this Plan supersedes the 2011 Plan. This Plan along with the most current RAP Update for the Lower Menominee River AOC constitutes a complete strategy for removing all BUIs in the Lower Menominee River AOC.

Recent sediment remediation progress (discussed in the CAUSES OF FISH & WILDLIFE HABITAT AND POPULATION IMPAIRMENTS section) is allowing the shift of restoration activity in the AOC toward these BUIs. All activities related to the review of existing data and restoration plans or field studies have been completed or are currently in progress. Several habitat restoration and projection projects are in progress although none have been completed. Many of these activities need funding or require additional funding to be completed. The GLRI has been identified as the sole or a contributing funding source for nearly all activities requiring external funding in this Plan. Future GLRI funding is considered critical to remove these BUIs and delist the Lower Menominee River AOC.

Pending adequate funding, activities in Table 2 are generally expected to be completed by the end of 2016. Some exceptions include monitoring activities and habitat restoration and protection activities around the 11th Avenue Pool and South Channel. Implementation of several habitat restoration and protection activities is dependent on sediment arsenic concentrations reaching 20 ppm. To record how to proceed with habitat activities given this uncertainty, the Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree was developed (Appendix B). Furthermore, if GLNPO sediment characterization work in the Lower Scott Flowage finds contamination in the area of the 11th Avenue Pool, habitat there will need to be restored after remediation is complete. Characterization results will not be available until 2014. If no contamination requiring cleanup is discovered by GLNPO, no additional habitat work is required here.

REFERENCES

- Foth, 2012. *Construction Observation Report: December 3-9, 2012*. Foth for Tyco Fire Products LP. U.S. Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604.
- GLWQA, 1987. Agreement on Great Lakes water quality, 1978, with annexes and terms of reference. Signed at Ottawa November 22, 1978. Entered into force November 22, 1978. 30 UST 1383; TIAS 9257; 1153 UNTS 187. Amendments: October 16, 1983 (35 UST 2370; TIAS 10798), November 18, 1987 (TIAS 11551; 2185 UNTS 504).
- GLWQA, 2013. Agreement on Great Lakes water quality, 1978, with annexes and terms of reference. Signed at Ottawa November 22, 1978. Entered into force November 22, 1978. 30 UST 1383; TIAS 9257; 1153 UNTS 187. Amendments: October 16, 1983 (35 UST 2370; TIAS 10798), November 18, 1987 (TIAS 11551; 2185 UNTS 504), September 7, 2012 (TIAS 13-212), last amendment entered into force February 12, 2013. Retrieved 8/12/2013 from the USEPA website: http://www.epa.gov/glnpo/glwqa/20120907-Canada-USA_GLWQA_FINAL.pdf.
- CAC, 2012. *Lower Menominee River Area of Concern Citizens Advisory Committee Meeting Minutes*. May 2012. Retrieved from the UW-Extension website: <http://fyi.uwex.edu/aocs/files/2011/09/CAC-Minutes-5-17-12.pdf>
- TAC, 2012a. *Lower Menominee River Area of Concern Technical Advisory Committee Meeting Minutes*. February 2012. Wisconsin Department of Natural Resources, 101 South Webster Street, Madison, WI 53707.
- TAC, 2012b. *Lower Menominee River Area of Concern Technical Advisory Committee Meeting Minutes*. April 2012. Wisconsin Department of Natural Resources, 101 South Webster Street, Madison, WI 53707.
- TAC, 2013. *Lower Menominee River Area of Concern Technical Advisory Committee Meeting Minutes*. March 2013. Wisconsin Department of Natural Resources, 101 South Webster Street, Madison, WI 53707.
- Marinette, 2013. *Marinette Board Oks Green Island Study*. Peshtigo Times, August 28, 2013. Page A3.
- MDEQ, 2007. *DRAFT Supporting Guidance for Local Restoration Criteria Development: Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife*. Michigan Department of Environmental Quality, 525 West Allegan Street, Lansing, MI 48909.
- NRT, 2013. *DRAFT Final Report: Focused NAPL and Sediment Removal Action*. Natural Resources Technology for Integry's Business Support LLC and Wisconsin Public Service Corporation. Wisconsin Department of Natural Resources, 101 South Webster Street, Madison, WI 53707.
- NES, 2012. *Vegetation Survey Report Lower Menominee River Area of Concern*. NES Ecological Services for WDNR. Wisconsin Department of Natural Resources, 101 South Webster Street, Madison, WI 53707.

- Schiefelbein, 2013. Personal communication from C.L. Schiefelbein in 2013. Wisconsin Department of Natural Resources Water Management Specialist, 2984 Shawano Avenue, Green Bay, WI 54313.
- USEPA, 2012. *Administrative Settlement Agreement and Order on Consent for Removal Action*. EPA ID No. WID 006 125 215. Retrieved from the USEPA website: <http://www.epa.gov/region5/cleanup/marinette/pdfs/marinette-aoc-201210.pdf>
- USFWS, 2012. *Final Environmental Assessment: Proposed Upstream and Downstream Fish Passage for Lake Sturgeon at Menominee Dam and Park Mill Dam on the Lower Menominee River in the Cities of Marinette Wisconsin and Menominee Michigan*. Retrieved from the USFWS website: <http://www.fws.gov/midwest/greenbay/hydropower/pdf/MenomineeRiverFishPassageEA.pdf>.
- Weston Solutions, 2008. *Menekaunee Harbor Sediment Investigation Report*. Weston Solutions Inc. for USEPA. U.S. Environmental Protection Agency, 77 West Jackson Boulevard, Chicago, IL 60604.
- White Water Associates, 1996. *Phase II: Draft Mitigation Plan (for the) Lower Menominee River Wetland Enhancement Project*. White Water Associates Inc. for Great Lakes Pulp and Fibre. Great Lakes Pulp and Fibre, 701 Fourth Avenue, Menominee, MI 49858.
- WDNR and MDNR, 1990. *The Lower Menominee River Remedial Action Plan: Stage One Report*. PUBL WR-246 90. Retrieved from the WDNR website: <http://dnr.wi.gov/topic/greatlakes/documents/MenomineeRiverRAPStage1Report1990.pdf>.
- WDNR and MDEQ, 2008. *Lower Menominee River AOC Beneficial Use Impairment Restoration Targets*. Retrieved from the WDNR website: <http://dnr.wi.gov/topic/greatlakes/documents/MenomineeRiverDelistingTargets2008.pdf>.
- WDNR and MDEQ, 2011. *Stage 2 Remedial Action Plan for the Lower Menominee River Area of Concern*. Retrieved from the WDNR website: <http://dnr.wi.gov/topic/greatlakes/documents/Stage2RAPLowerMenomineeRiver.pdf>.
- WDNR, 2013. *Lower Menominee River AOC Fisheries Data Roundup Final Report*. Retrieved from the WDNR website: <http://dnr.wi.gov/topic/GreatLakes/documents/MenomineeRiverFisheriesDataRoundupFinalReport.pdf>.

Appendix A: Letter of Support from the Citizen's Advisory Committee



Lower Menominee River Area of Concern Citizens Advisory Committee

November 21, 2013

Michigan Department of Environmental Quality
Office of the Great Lakes
Richard Hobrla, AOC Program Manager
Constitution Hall 6 Floor, South Tower
525 West Allegan Street
Lansing, Michigan 48909-7973

Wisconsin Department of Natural Resources
Office of the Great Lakes
Kendra Axness, LAMP and AOC Coordinator
PO Box 7921
101 S Webster Street
Madison, WI 53703-7921

Dear Mr. Hobrla and Mrs. Axness,

The Lower Menominee River Citizens Advisory Committee (CAC) has reviewed and supports the *Fish and Wildlife Population and Habitat Management and Restoration Plan for the Lower Menominee River AOC* and requests your review and concurrence. The Plan was prepared by the Michigan Department of Environmental Quality and Wisconsin Department of Natural Resources in cooperation with the Lower Menominee River Technical Advisory Committee. This plan describes sources of the "degradation of fish and wildlife populations" and "loss of fish and wildlife habitat" beneficial use impairments (BUIs), sets measurable and attainable restoration targets, and lays out a detailed process to achieve them.

The CAC is composed of local concerned citizens, industry leaders, and governmental representatives representing a balanced viewpoint of Marinette, WI & Menominee, MI. We are tasked with assisting resource agencies with removing designated BUIs in the Lower Menominee River AOC. The CAC has provided local perspective and feedback into the development of this plan. Restoration goals, objectives, and the activities needed to achieve them have been clarified and updated by consensus of the CAC and groups mentioned above. This Plan along with the most current Remedial Action Plan (RAP) Update for the Lower Menominee River AOC constitutes a complete strategy for removing all BUIs in the Lower Menominee River AOC. Complete implementation of this plan will result in the removal of two of the remaining five BUIs in the Lower Menominee River AOC.

If you have any questions please contact Mark Erickson Michigan CAC Co-Chair at 906-863-1954, or Keith West Wisconsin CAC Co-Chair at 715-735-4300 x4352.

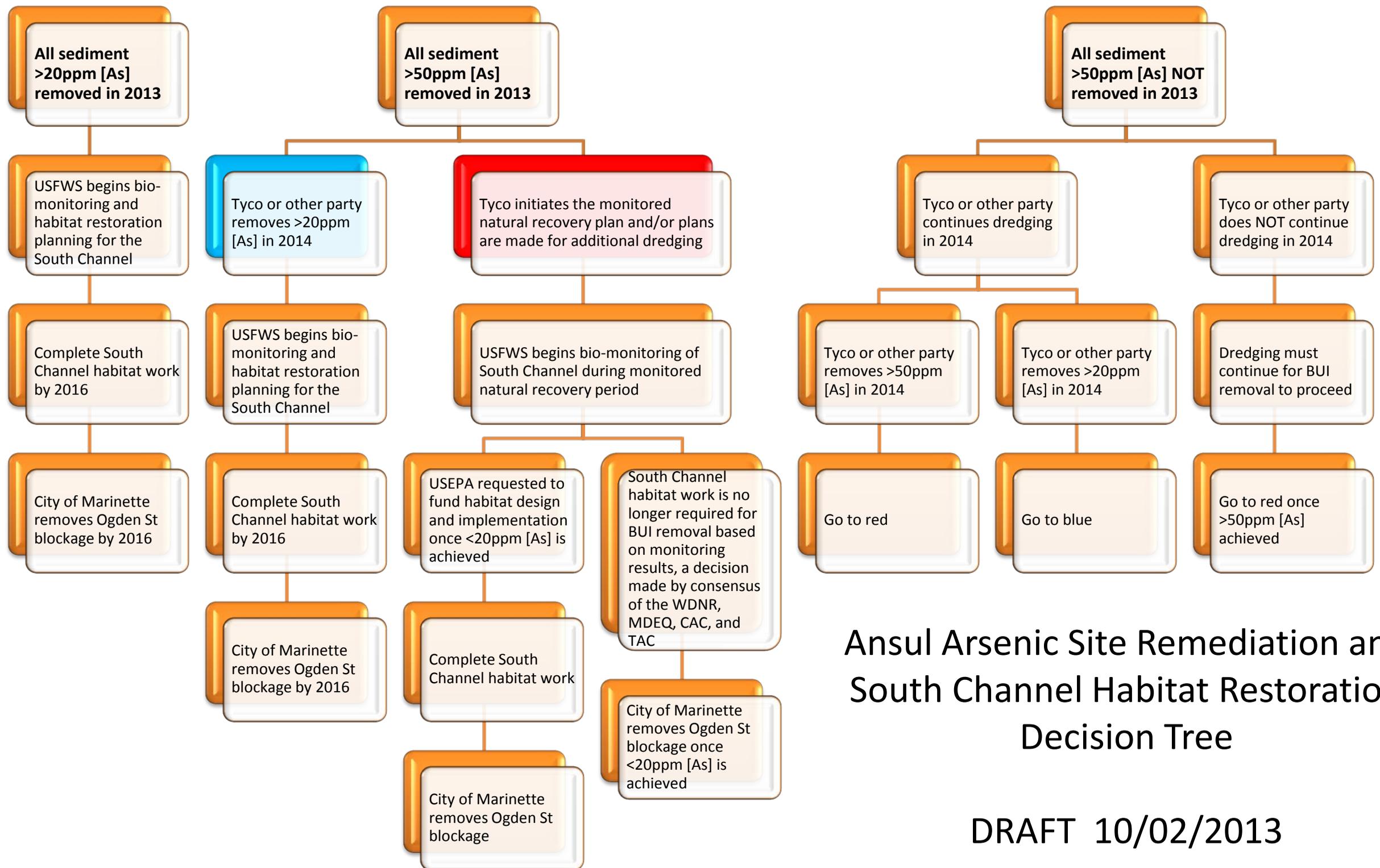
Sincerely,

Mark Erickson, Michigan Co-chair

Keith West, Wisconsin Co-chair

C.C. Benjamin Uvaas, WDNR
Sharon Baker, MDEQ

Appendix B: Ansul Arsenic Site Remediation and South Channel Habitat Restoration
Decision Tree



Ansul Arsenic Site Remediation and South Channel Habitat Restoration Decision Tree

DRAFT 10/02/2013