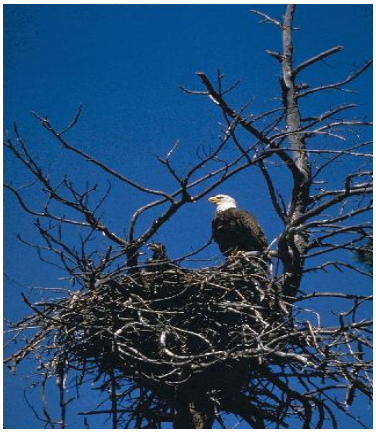
The Michigan Department of Environmental Quality Biennial Remedial Action Plan Update for the Manistique River Area of Concern



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Purpose of the Biennial RAP Update

A Michigan Department of Environmental Quality (MDEQ) Biennial Remedial Action Plan (RAP) Update will be prepared every 2 years for each Area of Concern (AOC), and will be the primary tool for documenting and communicating progress to the public and agencies. These documents are meant to be brief, user-friendly updates on recent remedial actions and assessments in the AOC. They are prepared by the MDEQ in consultation with the Public Advisory Council (PAC) and the U.S. Environmental Protection Agency (USEPA). These biennial RAP updates will also be posted on the MDEQ AOC web site.

The biennial RAP update is one component of the MDEQ's process for tracking AOC restoration, removing beneficial use impairments (BUIs), and ultimately delisting AOCs. These processes and relevant restoration criteria are described in more detail in the MDEQ's *Guidance for Delisting Michigan's Great Lakes Areas of Concern* (*Guidance)* (MDEQ, 2006).

The purpose of this Manistique River biennial RAP update is to track progress in the AOC by providing an update on those remedial actions completed in recent years. This update will discuss BUI assessment results that are based on the readiness of a BUI removal and subsequent technical committee review and recommendations. Comprehensive background information is provided in the 1987 Manistique River RAP document (Michigan Department of Natural Resources [MDNR], 1987).

How to Use this Document

For each of the five BUIs identified historically in the Manistique River AOC, this RAP Update includes:

- A description of the significance of the BUI based on previous RAP documentation
- A summary of the restoration criteria for the BUI outlined in the *Guidance* document
- A brief summary of relevant remedial actions, if any, completed in recent years
- A brief summary of the technical committee's assessment activities and results, if any, completed in recent years
- A list of annotated references and studies that may be used by a technical committee when the MDEQ AOC coordinator, in consultation with the PAC, determines the BUI is ready for formal review of remedial actions and restoration according to the applicable criteria.

Introduction

Background

In 1987, amendments to the Great Lakes Water Quality Agreement (GLWQA) were adopted by the federal governments of the U.S. and Canada. Annex 2 of the amendments listed 14 different BUIs which are caused by a detrimental change in the chemical, physical, or biological integrity of the Great Lakes system (International Joint Commission, 1988). The Annex directed the two countries to identify Areas of Concern (AOCs) that did not meet the objectives of the GLWQA. Remedial Action Plans (RAPs) addressing the BUIs were to be prepared for all 43 AOCs identified, including the Manistique River. The BUIs provided a tool for describing effects of the contamination, and a means for focusing remedial actions.

The Manistique River flows southwest through Schoolcraft County in Michigan's central Upper Peninsula, discharging into Lake Michigan at Manistique. The AOC is the last 1.7 miles of the river (Figure 1), from the dam in Manistique to the mouth of the harbor at Lake Michigan.

On February 15, 2006, the Manistique River PAC held a meeting and voted to adopt the delisting targets included in the *Guidance* to evaluate the status of their BUIs. The AOC had five BUIs determined under Annex 2 of the Great Lakes Water Quality Agreement; Restrictions on Dredging, Loss of Fish and Wildlife Habitat, Restrictions on Fish Consumption, Beach Closings, and Degradation of Benthos. The Degradation of Benthos BUI was removed in November of 2006. Table 1 is a matrix for tracking the progress of assessments and removal of these BUIs from the Manistique River AOC.

Table 1. Manistique River BUI Removal Matrix.

Beneficial Use Impairment	Beneficial Use Remains Impaired	Assessment in Progress	BUI Removed
Restrictions on fish and wildlife consumption	X		
Degradation of benthos			X
Restrictions on dredging activities	X		
Beach closings	X		
Loss of fish and wildlife habitat		X	

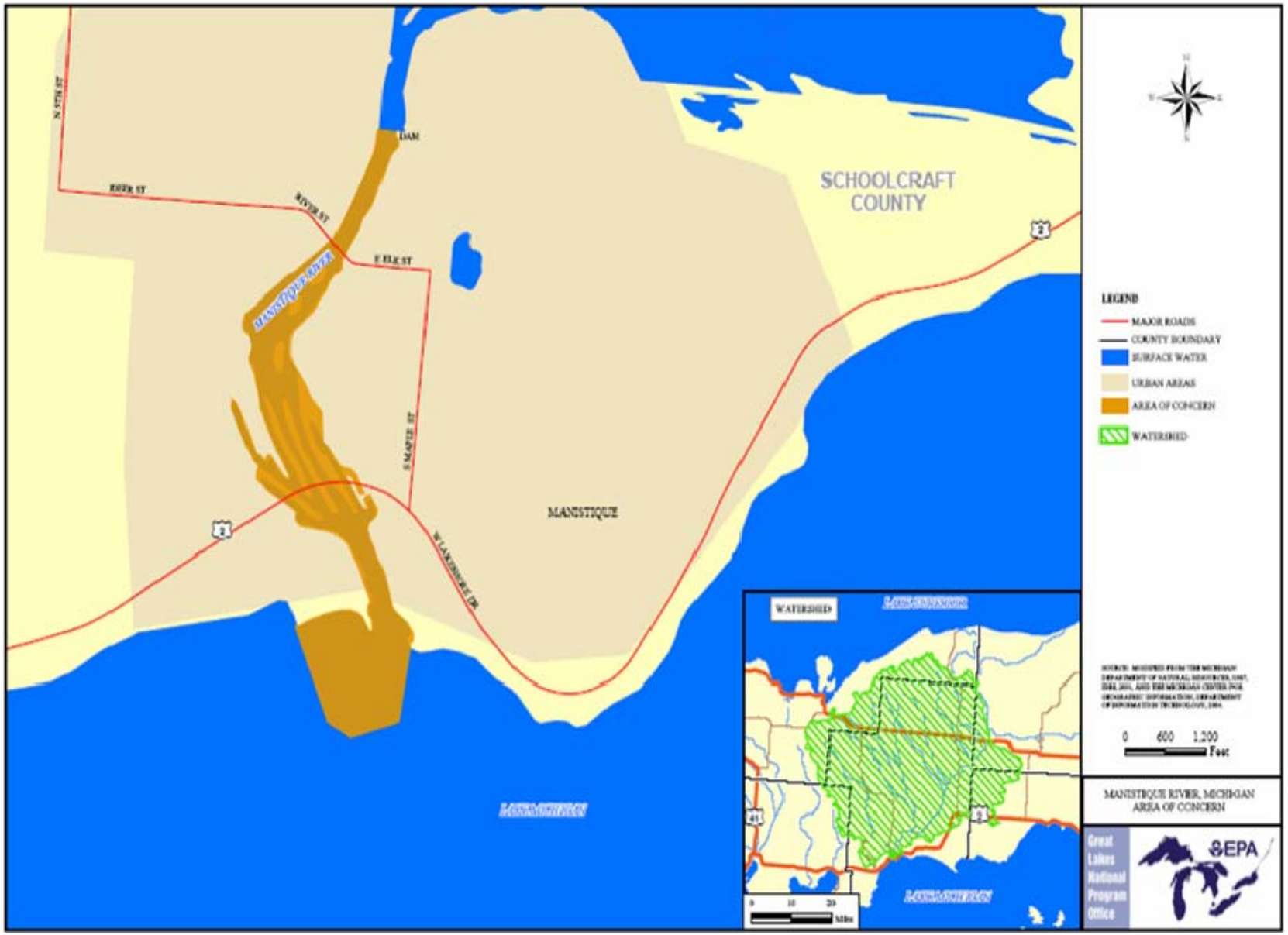

Figure 1. Manistique River Area of Concern.

Degradation of Benthos

Significance in the Manistique River Area of Concern
In the original 1987 RAP, the Degradation of Benthos BUI in the Manistique River AOC was identified primarily due to deposit of wood fibers and organic waste from the sawmill and paper mill operations, and chemical waste, such as polychlorinated biphenyls (PCBs), and sanitary waste from the city of Manistique (MDNR, 1987). Impacts to the Manistique River AOC were first indicated in the mid-1950's. Further studies conducted in the mid-1970's showed a reduction in numbers and variety of bottom dwelling organisms in the AOC, as compared to an area upstream of the AOC. In 2006, the MDEQ and the PAC assessed the status of the impairment per the criteria outlined in the *Guidance* and the US Environmental Protection Agency (USEPA) has concurred with the removal of this BUI (USEPA, 2006).

Restoration Criteria
According to the *Guidance*, the restoration criteria for this beneficial use requires that all remedial actions for known contaminated sediment sites with degraded benthos are completed (except for minor repairs required during operation and maintenance) and monitored according to the approved plan for the site.

Remedial Actions

1977
Manistique Wastewater Treatment Plant (WWTP) was upgraded to secondary (biological) treatment.

Manistique Papers, Inc. upgraded its wastewater treatment facilities to provide secondary treatment of process wastewater from its paper making operations. Manistique Papers, Inc. also dredged and filled the de-inking wastewater settling lagoon (MDNR, 1987).

1986
Manistique Papers, Inc. placed an erosion barrier along the west bank of the main river channel upstream from U.S. 2 Highway to control erosion of PCB impacted soils from the former de-inking lagoon (MDNR, 1987).

1993
The USEPA placed a 110-foot by 240-foot temporary cap over sediments in the vicinity of a combined sewer outfall that discharges directly to the Manistique River (MDEQ, 1996).

1996
Washed gravel was placed in the North Bay area (located on the west side of the river upstream and adjacent to the U.S. Route 2 Highway bridge) to improve the

river bottom as habitat for fish as well as to contain contaminated residuals (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

1999
The temporary cap was removed (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

According to Corey Barr, Water/Wastewater Superintendent for the city of Manistique, the Manistique WWTP biological control process was updated from rotating biological contactors to activated sludge, significantly increasing the hydraulic capacity of the plant (C. Barr, personal communication, May 24, 2006).

1995-2000
The 2002 RAP Update estimated that 141,000 cubic yards of PCBs and heavy metal impacted sediment were successfully removed from the harbor and river system from 1994 to 2000. Additionally, during dredging activities of PCB impacted sediments, approximately 31,100 cubic yards of wood chips, sawdust, and other solid materials were removed (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

2000
Dredging of impacted sediments was completed, and confirmation sediment sampling for PCBs was initiated. The completed dredging depth in the navigational channel was to bedrock, with depths ranging from approximately 20 to 22 feet (Weston Solutions, Inc., 2005a).

2001
The confirmation sampling was completed to ensure that the 10 parts per million (ppm) average PCB concentration goal for the harbor and river was met (Weston Solutions, Inc., 2005a), per the USEPA Removal Action Recommendation (USEPA, 1994). Superfund personnel collected a comprehensive round of sediment samples at 400 locations on a random grid spacing. The sampling data had an average PCB concentration of 7.7 ppm in the top six inches of sediment (Weston Solutions, Inc., 2005a).

2004
According to the post-dredging site investigation conducted in September 2004, natural re-sedimentation processes have resulted in average PCB concentrations in the surface sediments throughout the harbor and river of 0.71 ppm (Weston Solutions, Inc., 2005a).

Assessment Results
According to the post dredging site investigation conducted in September 2004, natural re-sedimentation processes have resulted in average PCB concentrations in the surface sediments throughout the harbor and river of 0.71 ppm (Weston Solutions, Inc., 2005a). Therefore, monitoring indicates that remediation goals

have been met. Based on review of the Superfund reports documenting that all remedial actions are complete and monitored, this BUI has been removed (USEPA, 2006).

Restrictions on Fish and Wildlife Consumption

Significance in the Manistique River Area of Concern

As a result of historical PCB contamination in the lower Manistique River, fish contamination and consumption advisory has been identified as the primary impaired use in the AOC (MDNR, 1987). The Michigan Department of Community Health (MDCH), Michigan Family Fish Consumption Guide, recommends that no one eat carp from the Manistique River downstream of the Manistique Papers Dam. In addition, restricted consumption of channel catfish and rock bass is advised (MDCH, 2004). However, since the MDCH Fish Consumption Guide has not been updated since 2004, it does not reflect current recommendations. After sampling in 2003 and 2004, the MDEQ recommended the MDCH add advisories restricting consumption of walleye, smallmouth bass, and redhorse in addition to carp, channel catfish and rock bass (Bohr, J. and J. Zbytowski, 2006.)

Restoration Criteria

The Manistique River PAC has accepted the state's criteria for restoring this beneficial use. The fish consumption advisory in the Manistique River AOC is more stringent than Lake Michigan and will need to be assessed using either a comparison study or trend analysis.

Remedial Actions

See Degradation of Benthos BUI above for recent remedial actions completed on contaminated sediments in the Manistique River AOC.

Assessment Results

Although this beneficial use is currently impaired, recent remedial actions completed by the USEPA Superfund program should allow for the re-assessment of this BUI in the near future. It is anticipated that the remedial actions described under the Degradation of Benthos BUI and natural burial of the remaining PCBs will show a significant downward trend in PCB concentration in the resident fish community. A technical committee will be convened when the MDEQ and the Manistique River PAC determine that this BUI is ready for a formal review and assessment. The technical committee will review the results of all remedial actions completed and other supporting documentation to provide a decision on whether or not to support a recommendation to formally remove this BUI.

Annotated References and Studies

Bohr, J. and J. Zbytowski. 2006. Michigan Fish Contaminant Monitoring Program: 2005 Annual Report. MDEQ-WB Report #MI/DEQ/WB-06/091.

www.michigan.gov/deq/0,4561,7-135-3313_3681_3686_3728-32393--,00.html
The MDEQ's fixed station whole fish contaminant trend monitoring project was initiated to measure spatial and temporal trends of certain bioaccumulative contaminants.

Michigan Department of Community Health. 2004. 2002 Michigan Family Fish Consumption Guide: Important Facts to Know if You Eat Michigan Fish. www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54784_54785---,00.html

Certain kinds and sizes of fish from the Great Lakes, and some Michigan lakes and streams, contain levels of toxic chemicals that may be harmful if those fish are eaten too often. The MDCH advises caution about eating Michigan fish for the general population, women of childbearing age, and children under 15 years old.

Restrictions on Dredging Activities

Significance in the Manistique River Area of Concern

The Restrictions on Dredging Activities BUI was identified as a result of historical PCB and heavy metal contamination in the lower Manistique River (MDNR, 1987). The United States Army Corps of Engineers (Corps) is responsible for navigational dredging in the Manistique River and Harbor. In 1995, the United State Congress reauthorized a change in the depth of the navigational channel from an 18 foot navigational dredge depth to a 12 foot recreational dredge depth (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002). The navigation channel has not been dredged by the Corps since 1967, primarily due to lack of demand and because of PCB and heavy metal contamination.

Restoration Criteria

The Manistique River PAC has accepted the state's criteria for restoring this beneficial use. According to the *Guidance*, this beneficial use will be considered restored when either there have been no restrictions on routine commercial or recreational navigational channel dredging by the Corps, based on the most recent dredging cycle; or, in cases where dredging restrictions exist, a comparison of sediment contaminant data from the commercial or recreational navigation channel (at the time of proposed dredging) in the AOC indicates that contaminant levels are not statistically different from other comparable, non-AOC commercial or recreational navigation channels.

Remedial Actions

See Degradation of Benthos BUI above for recent remedial actions completed on contaminated sediments in the Manistique River AOC.

Assessment Results

Although this beneficial use is currently impaired, recent remedial actions completed by the USEPA Superfund program should allow for the re-assessment of this BUI in the near future. It is anticipated that the remedial actions and natural burial of the remaining PCBs and heavy metals will demonstrate that contaminant levels are not statistically different from other comparable, non-AOC recreational navigation channels. A technical committee will be convened when the MDEQ and the Manistique River PAC determine that this BUI is ready for a formal review and assessment. Since the Corps has not dredged since 1967, Superfund program data will be used as the primary source of information to assess this BUI. The technical committee will review the results of all remedial actions completed and other supporting documentation to provide a decision on whether or not to support a recommendation to formally remove this BUI.

Annotated References and Studies

Great Lakes Dredging Team. 1999. Decision Making Process for Dredged Material Management. Draft Final, October 13, 1998, Amendment #1, January 18, 1999.

This document describes how to manage the dredged material, management options, treatment technologies available and the technical evaluation process, and regulatory information.

Weston Solutions, Inc. 2005a. *Data Evaluation Report.* Revision 1. 19 May 2005, U.S. EPA Contract No. 68-W700026, Work Assignment No. 236-TATA-05FV, Document Control No. RFW236-2A-ASJY.

The USEPA Superfund program has been collecting data including bathymetry, substrate types and PCB concentrations in the sediments (pre and post dredging) and releases yearly reports. The Superfund reports generated by each round of sampling will be used to evaluate when restoration is complete. Currently, the next round of comprehensive sampling is planned to be conducted in the field season of 2008.

Beach Closings

Significance in the Manistique River Area of Concern

There are no public beaches located in the Manistique River AOC. However, this BUI is defined as addressing potential restrictions on bodily contact in the Manistique River due to historical direct discharge of storm water and untreated waste to the Manistique Harbor from the city's WWTP (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002). Since the 1987 RAP was written, the city of Manistique has completed two out of the three Combined Sewer Overflow (CSO) separation projects. The remaining CSO separation project will begin

construction in 2007. The city is currently working to find funding to complete the last separation but currently has only funding to complete approximately one-third of the last remaining separation.

Restoration Criteria

The Manistique River has accepted the state's criteria for this BUI. The Guidance criteria requires that no waterbodies within the AOC are included on the list of impaired waters due to contamination with pathogens in the most recent Integrated Report. The last 0.5 miles of the Manistique River, from the Harbor to the U.S. 2 Highway bridge, is currently on the list of impaired waters due to contamination with pathogens. Since this reach of river is on the list because of the presence of a CSO and not because monitoring indicates the water is impaired, the MDEQ is currently working on revising the *Guidance* criteria to include a component for monitoring.

Remedial Actions

1973

Primary treatment was provided to all process waters.

1977

The Manistique WWTP was upgraded to secondary (biological) treatment.

1991

The city of Manistique completed two out of the three Combined Sewer Overflow (CSO) separation projects.

1999

The Manistique WWTP biological control process was updated from rotating biological contactors to activated sludge. This significantly increased the hydraulic capacity of the plant (C. Barr, personal communication, May 24, 2006).

2006

The city of Manistique received a Community Development Block Grant from the U.S. Department of Housing and Urban Development to begin construction toward completing the last CSO separation. Currently, they have funding to complete approximately one-third of the remaining CSO separation. The project is scheduled to begin construction in 2007.

Assessment Results

This beneficial use is currently impaired. A monitoring plan is currently being developed for the impaired reach of the river in the AOC. The monitoring plan will meet the monitoring component of the proposed 2007 amendment to the *Guidance*. It is anticipated that monitoring data will support the removal of this BUI. A technical committee will be convened when the MDEQ and the Manistique River PAC determine that this BUI is ready for a formal review and

assessment. The technical committee will review the results of all remedial actions completed and other supporting documentation to provide a decision on whether or not to support a recommendation to formally remove this BUI.

Annotated References and Studies

CSO & SSO Discharge website: *(The link provided was broken and has been removed.)*

Facilities are required to report that a CSO and SSO discharge event occurred within 24 hours of the initial discharge. Later, after the event ends, a written report is submitted which contains additional information including volume of the discharge, and the start/end date and time. This information is posted on the above website.

Madison, G., and R. N. Lockwood. 2004. Manistique River Assessment. Michigan Department of Natural Resources, Fisheries Special Report 31, Ann Arbor.

The Manistique River Assessment includes information about the history of the river, geology, hydrology, soils and land use, channel morphology, dams and barriers, water quality, special jurisdictions, biological communities, fisheries management, recreational use and management options.

MDEQ's beach website: https://www.egle.state.mi.us/beach/

The MDEQ awards grants each year to local health departments to monitor *E. coli* levels at Great Lakes and inland beaches. County health departments use the results to assess whether the total body contact recreation designated use is being attained and whether beach closings are necessary. Results are reported in annual beach monitoring reports and are posted on the MDEQ's beach website above (Edly and Wuycheck, 2006).

Loss of Fish and Wildlife Habitat

Significance in the Manistique River Area of Concern

Impacts to the fish and wildlife habitat in the Manistique River AOC were first indicated in the mid-1950's. These impacts were attributed primarily due to deposit of wood fibers and organic waste from sawmill and paper mill operations, and sanitary waste from the city of Manistique. The 1987 RAP stated that habitat studies of the Manistique River and harbor in the mid-1970's showed a reduction in numbers and variety of bottom dwelling organisms in the AOC, as compared to an area upstream of the AOC. This reduction was attributed to chemical and physical degradation of benthic habitat due to toxic levels of contaminants in the sediments, and the deposition of undesirable materials on the river and harbor substrates (MDNR, 1987).

Studies completed in 1969 and 1976-78 reported the presence of wood fibers chips, and slabs on the substrate in some of the channels and continuing into the harbor impacting fish habitat, particularly the benthos. The presence of these materials was attributed to historical pulping operations at Manistique Papers and historical sawmill operations that operated on the lower Manistique River. With the closing of the sawmills, improved wastewater treatment and facility upgrades at Manistique Papers and the change to recycled magazines as a source of paper fiber, the discharge of the wood fiber was eliminated (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002).

Fisheries management goals in the Manistique River have been closely tied to dam and flume operations, since these structures were built in the original river channel and greatly reduced fish habitat. These structures also were blocking sea lamprey and salmon from migrating up the river (Triad Engineering Inc. and Terrafirma Environmental, Inc., 2002). Though not mentioned in the original 1987 RAP, sea lamprey were highlighted as a problem in the 1996 RAP update (MDEQ, 1997). Currently, the Manistique River is the single largest source of sea lamprey to northern Lake Michigan, with numbers great enough to cause serious damage to the fish populations in the lake. Periodic treatments of the Manistique River reduce the number of larvae, but adult lamprey passage at the dam and flume remains a key problem. The U.S. Fish and Wildlife Service (USFWS), Sea Lamprey Control Program, with funding from the Great Lakes Fishery Commission, conducts treatments of the river and is continuing to work with other agencies and partners to develop proposals for actions that will address this problem. Because this issue is not directly related to the Loss of Fish and Wildlife Habitat BUI within the AOC and is being addressed by other programs, it will not be addressed under the AOC program.

Restoration Criteria

In an effort to clearly interpret previous RAP documentation and identify the historical impairments to set delisting targets in the Manistique River AOC, a habitat committee was formed. The Manistique River Habitat Committee is comprised of representatives from the MDEQ, MDNR, Manistique Papers, the Schoolcraft County Sports Fisherman Association, US EPA, USFWS and the city of Manistique.

The committee recommended that the Fish and Wildlife Habitat beneficial use will be considered restored when:

1. The Degradation of Benthos BUI has been removed in the Manistique River AOC.

2. The reach of the Manistique River in the AOC supports a diverse fish community.

These targets were approved by the Manistique River PAC and the MDEQ, and meet the requirements for setting local delisting targets outlined in the *Guidance*.

Assessment Results

In November 2006, the Degradation of Benthos BUI was removed from the Manistique River AOC. Additionally, data were collected by the MDNR, Fisheries Division, on the fish community diversity in the reach of the Manistique River in the AOC. A final report may be available in 2007. The Manistique Habitat Committee will reconvene when the final fisheries report becomes available. The technical committee will review the results of the report and other supporting documentation to provide a decision on whether or not to support a recommendation to formally remove this BUI.

Annotated References and Studies

Madison, G., and R. N. Lockwood. 2004. Manistique River Assessment. Michigan Department of Natural Resources, Fisheries Special Report 31, Ann Arbor.

The Manistique River Assessment includes information about the history of the river, geology, hydrology, soils and land use, channel morphology, dams and barriers, water quality, special jurisdictions, biological communities, fisheries management, recreational use and management options.

References

Barr, C. Personal communication, May 24, 2006.

Edly, K. and J. Wuycheck. 2006. Water Quality and Pollution Control in Michigan: 2006 Sections 303(d) and 305(b) Integrated Report. Report MI/DEQ/WB-6/019. http://www.michigan.gov/deq/0,1607,7-135-3313_3686_3728-12711--,00.html

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Michigan Department of Environmental Quality. 1996. Manistique River Area of Concern. Manistique, Michigan: Remedial Action Plan Update for the Michigan Department of Environmental Quality, Surface Water Quality Division, Lansing, MI.

Michigan Department of Environmental Quality. 2006. Guidance for Delisting Michigan's Great Lakes Areas of Concern. Report MI/DEQ/WB-06-001. http://www.michigan.gov/deq/0,1607,7-135-3313_3677_15430---,00.html

Michigan Department of Natural Resources. 1987. Remedial Action Plan for the Manistique River Area of Concern. Michigan Department of Natural Resources, Surface Water Quality Division. Lansing, MI.

Triad Engineering Inc. and Terrafirma Environmental, Inc. 2002. Remedial Action Plan Update, Manistique River and Harbor Area of Concern, Manistique, Michigan. Prepared for Great Lakes Commission and Michigan Department of Environmental Quality. September 2002.

USEPA. 1994. Removal Action Recommendation, Manistique River/Harbor Area of Concern, Manistique, Michigan. August, 1994.

USEPA. 2006. Letter from Mary A. Gade, Great Lakes National Program Manager, USEPA, to Steven E. Chester, Director, MDEQ, regarding the concurrence with the removal of the Degradation of Benthos BUI in the Manistique River AOC.

Weston Solutions, Inc. 2005a. Data Evaluation Report. Revision 1. 19 May 2005, U.S. EPA Contract No. 68-W700026, Work Assignment No. 236-TATA-05FV, Document Control No. RFW236-2A-ASJY.