

Stage 2 Remedial Action Plan Deer Lake Area of Concern



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Acknowledgements

The efforts to restore the Deer Lake Area of Concern are the work of many dedicated and caring individuals over more than 2 decades. The summary information presented here only touches the surface of the good work carried out by those who live in the Deer Lake Area of Concern and those who staff the federal and state agencies involved.

Of special note is the work of the members of the Deer Lake Public Advisory Council, who have worked tirelessly to restore the place they call home.

It is a privilege to work with my colleagues in the Departments of Environmental Quality and Natural Resources and with our counterparts in the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service, among others.

Thank you.

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Deer Lake Area of Concern Stage 2 Remedial Action Plan

Purpose of the Stage 2 Remedial Action Plan

A Michigan Department of Environmental Quality (MDEQ) Stage 2 Remedial Action Plan (RAP) for each Area of Concern (AOC) is the primary tool for documenting and communicating restoration progress. The AOC-specific Stage 2 RAPs are meant to be brief, user-friendly documents that identify actions needed to restore Beneficial Use Impairments (BUIs) in each AOC. The Stage 2 RAPs are prepared by the MDEQ in consultation with the respective AOC Public Advisory Council (PAC) and the U.S. Environmental Protection Agency (USEPA), Great Lakes National Program Office.

Identifying specific actions necessary to remove a BUI is one component of the MDEQ's process for tracking AOC restoration, removing 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, 2008). Comprehensive background information on the AOC is provided in previous RAP documents which are listed in the Reference section of this publication.

Disclaimer

The Great Lakes Water Quality Agreement (GLWQA) is a non-regulatory agreement between the United States and Canada, and criteria developed under its auspices are non-regulatory in nature. The actions identified in this document as needed to achieve BUI restoration criteria are not subject to enforcement or regulatory actions by virtue of being listed in this document.

The actions identified in this Stage 2 RAP do not constitute a list of pre-approved projects, nor is it a list of projects simply related to BUIs or generally to improve the environment. Actions identified in this document are directly related to removing a BUI and are needed to delist the AOC. However, in many AOCs, further information is needed to determine all actions required to remove a BUI. Thus, the AOC-specific BUI Tracking Matrix is not necessarily comprehensive and will be updated to reflect additional actions that are needed.

Introduction

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

The Deer Lake AOC is located in Marquette County in Michigan's central Upper Peninsula. The AOC includes Carp Creek from the old Ishpeming Township Wastewater Treatment Plant (at the end of Southwood Drive) downstream to the 1,010-acre Deer Lake impoundment and the Carp River from the dam at the north basin of Deer Lake to Lake Superior near the City of Marquette (Figure 1).

The 1987 Remedial Action Plan for the Deer Lake AOC was written by the Department of Natural Resources (MDNR) (MDNR, 1987). It described problems known at the time and identified actions and studies needed to further define and remediate those problems.

However, the RAP was written before the 1987 amendments to the GLWQA that outlined new guidelines for RAPs were published. The guidelines included identifying which of 14 potential beneficial use impairments existed in the AOC. Based on information in the original RAP, three BUIs were identified in the Deer Lake AOC as part of development of the *Guidance* (MDEQ, 2006). The identified BUIs were: restrictions on fish and wildlife consumption, eutrophication or undesirable algae, and bird or animal deformities or reproductive problems.

In 2006, the Deer Lake Public Advisory Council (PAC) voted to adopt the restoration criteria for the eutrophication or undesirable algae and bird or animal deformities or reproductive problems BUIs included in the *Guidance*. In September of 2007, the Deer Lake PAC agreed to adopt the restoration criteria for the restrictions on fish and wildlife consumption BUI included in the *Guidance*. Table 1 is a summary of the status of BUI assessments and removals from the Deer Lake AOC.

Table 1. Status of the Deer Lake AOC BUIs			
Beneficial Use Impairment	Beneficial Use Remains Impaired	Assessment in 2011	BUI Removed
Restrictions on Fish and Wildlife Consumption	x		
Eutrophication or Undesirable Algae			x
Bird or Animal Deformities or Reproductive Problems			x

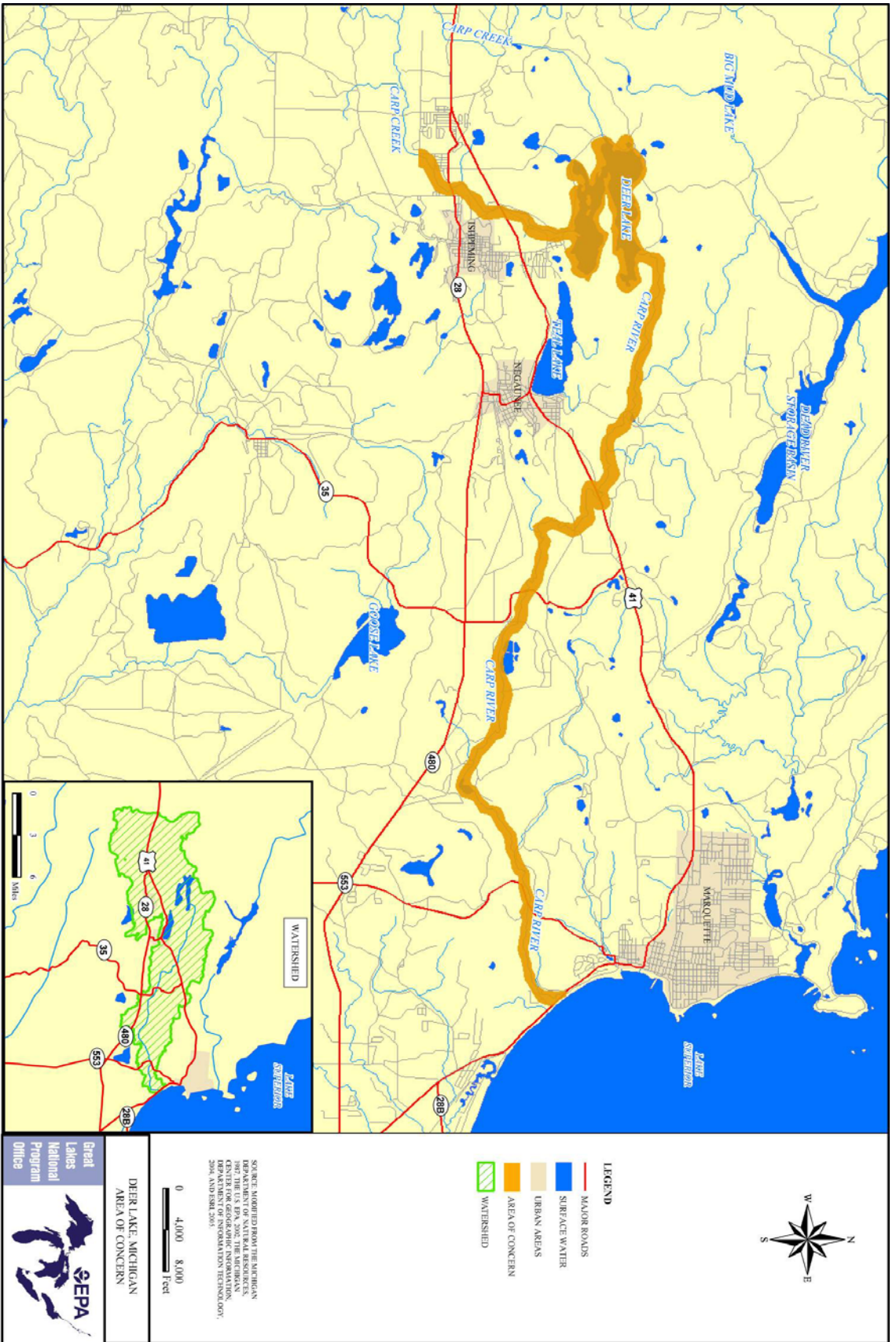


Figure 1. The Deer Lake Area of Concern

Restrictions on Fish and Wildlife Consumption

Significance in the Deer Lake Area of Concern

According to the 1987 RAP, mercury contamination resulted in issuance of a fish consumption advisory in 1981 by the Michigan Department of Community Health (MDCH) for all species in the Carp River, Carp Creek, and Deer Lake (MDNR, 1987).

The MDCH, *A Family Guide for Eating Michigan Fish* recommends restricted consumption of brook trout and smaller sized suckers in Carp Creek and northern pike in the Carp River due to elevated levels of mercury. No restrictions exist on the consumption of brook trout and suckers in the Carp River. The guide recommends no consumption of all other species from the Carp River and Carp Creek, and no consumption of all species from Deer Lake due to elevated levels of mercury (MDCH, 2011).

Restoration Criteria

The Deer Lake PAC accepted the state's criteria for restoring this beneficial use. The fish consumption advisory in the Deer Lake AOC is more stringent than other inland lakes and needs to be assessed using either a comparison study or trend analysis of fish tissue contaminant concentrations. Additionally, the *Guidance* criteria requires that local sources must be controlled.

Current Status and Actions to be Undertaken

Although this beneficial use is currently impaired, actions are occurring to eliminate the remaining source of mercury to Carp Creek and thereby Deer Lake. The City of Ishpeming will implement a multi-phase project that will divert Partridge Creek out of Cliffs Natural Resources (Cliffs) historic mine workings. Phase 1 of this project will began in the summer of 2012 through a grant from the Great Lakes Restoration Initiative, funds from the City of Ishpeming, and assistance from Cliffs. Phase 1 involves the structural stabilization of closed culverts and enhancement and day lighting of Partridge Creek on the east side of the City of Ishpeming. Phase 2 of the project will be to structurally strengthen the existing storm water system as well as day light portions of Partridge Creek to the west of the city. Once Phase 2 of the project has been completed, a controllable source of mercury will be eliminated and the BUI will be re-assessed for possible removal. In addition, the elimination of the Partridge Creek source of mercury will help the Lake Superior Zero Discharge Demonstration Program move toward their 2020 goal of virtually eliminating discharges and emissions of nine persistent, bioaccumulative and toxic pollutants (including mercury) in the Lake Superior basin.

The MDNR Fisheries Division and the MDEQ Water Resources Division collected fish for tissue analysis in 2011 and an MDCH Great Lakes Restoration Initiative Grant will aid in future fish sampling and tissue analysis. Samples of sport fish have been taken and analyzed since the early 1980s. Recent sampling by state agencies and Cliffs indicates that mercury concentrations in northern pike and walleye may have stabilized at levels similar to those found in species from other lakes in the region. Additional samples by MDCH and Cliffs may verify this conclusion (Bohr, 2011). In 2010 and 2011, samples of white suckers were obtained from Deer Lake and Carp Creek. Also in 2011, samples of northern pike, walleye, yellow perch, and white sucker were collected in the Carp River basin (Bohr, 2011). If mercury levels in fish from Carp Creek and Carp River are the same or lower than previous samples, it may not be necessary to sample those streams again (Bohr, 2011). Cliffs is scheduled to sample Deer Lake every five years. This additional data may show the trend downward or similarity to mercury concentrations in fish from other regional lakes.

Infrastructure improvement activities associated with Partridge Creek and fish tissue data should allow for the re-assessment of this BUI when completed. A technical committee will be convened when the MDEQ and the 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.

Eutrophication or Undesirable Algae

Significance in the Deer Lake Area of Concern

The Eutrophication or Undesirable Algae BUI was identified as a concern in the original RAP due to historic discharges of untreated and partially treated wastewater from the City of Ishpeming and Ishpeming Township (MDNR, 1987). Large algal blooms in Deer Lake were occurring due to nutrient enrichment and the lake was identified as hypereutrophic. The 1987 RAP also indicated that the Carp River just below the dam was showing signs of eutrophication (MDNR, 1987).

Restoration Criteria

The Deer Lake PAC has accepted the states criteria for restoring this beneficial use. According to the *Guidance*, this beneficial use will be considered restored when there are no waterbodies within the AOC included on the list of impaired waters due to nutrients or excessive algal growths in the most recent *Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report*.

Current Status and Actions to be Undertaken

Deer Lake is not on the Category 5 list of impaired waters in the 2011 Integrated Report (MDEQ, 2011) due to nutrients or excessive algal growths. Dissolved oxygen levels have recovered enough to support fish growth and survival (USEPA, 1986 and 2000). The Ishpeming Wastewater Treatment Plant has undergone upgrades and their National Pollution Discharge Elimination System permit has a limit for Total Phosphorous. A technical committee was convened and reviewed the results of all the Deer Lake monitoring data, historical information, and wastewater treatment plant data. Based on the available data and the Integrated Report, this BUI was removed in September of 2011 (Swart, 2011b).

Bird or Animal Deformities or Reproductive Problems

Significance in the Deer Lake Area of Concern

The original 1987 RAP identified bald eagle (*Haliaeetus leucocephalus*) reproduction problems as a concern (MDNR, 1987). The eagle nest on the lake failed to produce any young from 1964 to 1996 (Best, 2011). Since bald eagles are piscivorous, it was suggested that the elevated concentration of mercury in the fish was the cause of the reproductive failure in the bald eagles. A fish sample taken from Deer Lake at the same time, indicated traces of DDT and PCBs as well as high levels of mercury (MDNR, 1987).

Restoration Criteria

The Deer Lake PAC has accepted the states criteria for this BUI, which outlines a two tiered approach. The first approach evaluates restoration on field assessment of birds and/or other wildlife in those AOCs where the MDEQ or other State-approved bird and wildlife data are available. The second tier applies to those AOCs where bird or other wildlife data are not available, and uses levels of contaminants in fish tissue known to cause reproductive or

developmental problems as an indicator of the likelihood that deformities or reproductive problems may exist in the AOC.

Current Status and Actions to be Undertaken

The eagle pair at Deer Lake has been successfully reproducing since 1997. Documentation by the United States Fish and Wildlife Service (USFWS) indicates that bald eagles have successfully fledged an average of 1.73 young per year for the period 1997 through 2011 (Best, 2011). There have been no documented deformities in the eaglets nesting at Deer Lake. A technical committee was convened and reviewed the results of from the USFWS monitoring data and additional historic information. Based on the available data, this BUI was removed in September 2011 (Swart, 2011a).

Actions to Delist: Deer Lake AOC BUI Tracking Matrix

The following BUI Tracking Matrix is intended as a simple way to track ongoing progress with the remedial activities identified as being necessary to remove each BUI, and subsequently to delist the AOC entirely. As progress is made, the matrix will be updated to reflect current conditions. Completed activities will remain in the matrix as it is updated, but updates will reflect completed status and completed BUI removals.

The matrix lists each BUI, indicates whether each BUI is scheduled for assessment in the current year, and lists the actions/tasks necessary to advance toward BUI removal. If a funding source has been identified, it is listed along with the targeted start and end dates for each action. Project leads are identified as appropriate, along with the targeted BUI removal date.

The matrix represents the AOC program's current best effort to assess activity in an AOC at the time the document was updated. The matrix does not necessarily commit the listed entities/individuals to any particular activity. Contracts, grant agreements, etc. are the documents governing commitments that have been or will be made.

The dates listed reflect the MDEQ's best estimate of project completion, given currently available information. Work does not always proceed as planned, and the MDEQ recognizes that unforeseen circumstances can arise at any time. The MDEQ is dedicated to facilitating the completion of each of the projects listed in the timeliest manner possible.

Deer Lake AOC BUI Tracking Matrix

November 23, 2011

Area of Concern Name	Beneficial Use Impairment Name	Assessment in 2011? (Y/N)	Actions/Tasks Needed	Funding Source	Start Date	Targeted Completion Date	Project Lead	Targeted BUI Removal Date	Comments
Deer Lake	Restrictions on Fish and Wildlife Consumption	No	Assess fish tissue samples from Deer Lake and Carp River	Fisheries Division, MDNR	April 2011	October 2012	Madison (MDNR), Bohr (MDEQ), MDCH, Swart (MDEQ)	November 2015	
Deer Lake	Restrictions on Fish and Wildlife Consumption	No	Additional fish tissue assessment and comparison study	GLRI	April 2012	January 2013	MDCH, MDEQ	November 2015	
Deer Lake	Restrictions on Fish and Wildlife Consumption	No	Eliminate Partridge Creek source (Phase I)	GLRI	June 2012	September 2013	City of Ishpeming	November 2015	\$2 million GLRI, \$700,000 City of Ishpeming match
Deer Lake	Restrictions on Fish and Wildlife Consumption	No	Eliminate Partridge Creek source (Phase 2)	TBD	December 2013	December 2015	City of Ishpeming	November 2015	Dependant on funding, estimated need \$6 million
Deer Lake	Eutrophication or Undesirable Algae	N/A	None					2011	
Deer Lake	Bird or Animal Deformities or Reproductive Problems	N/A	None					2011	

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