



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

JUN 4 2012

REPLY TO THE ATTENTION OF:

Mrs. Patricia Birkholz  
Director, Office of the Great Lakes  
Michigan Department of Environmental Quality  
525 West Allegan  
P.O. Box 30273  
Lansing, Michigan 48909-7773

Dear Patty:

Thank you for your May 10, 2012 request to remove the "Degradation of Benthos" Beneficial Use Impairment (BUI) at the White Lake Area of Concern (AOC) in Michigan. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them. Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency hereby approves your BUI removal request at the White Lake AOC. In addition, EPA will notify the International Joint Commission of this significant positive environmental change at this AOC.

We congratulate you and your staff, as well as the many federal, state and local partners who have worked so hard and been instrumental in achieving this important environmental improvement. This improvement will benefit not only the people who live and work in the White Lake AOC but all the residents of Michigan and the Great Lakes basin as well.

We look forward to the continuation of this important and productive relationship with your agency and local coordinating committees as we work together to fully restore all of Michigan's AOCs.

If you have any further questions, please contact me at (312) 353-4891, or your staff may contact John Perrecone, at (312) 353-1149.

Sincerely,

A handwritten signature in blue ink that reads "Chris Korleski".

Chris Korleski, Director  
Great Lakes National Program Office

cc: Dan Wyant, Director, MDEQ  
Frank Ruswick, MDEQ, Office of Great Lakes  
Rick Hobria, MDEQ, Office of Great Lakes  
John Riley, MDEQ, Office of Great Lakes  
Dr. Saad Jasmin, IJC  
Wendy Carney, EPA, GLNPO  
John Perrecone, EPA, GLNPO  
Jeff Auch, Muskegon Conservation District



RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
OFFICE OF THE GREAT LAKES  
LANSING



PATRICIA BIRKHOLZ  
DIRECTOR

May 10, 2012

Mr. Chris Korleski, Director  
Great Lakes National Program Office  
United States Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard (G-17J)  
Chicago, Illinois 60604-3507

Dear Mr. Korleski:

I am writing to request the United States Environmental Protection Agency (U.S. EPA), Great Lakes National Program Office's (GLNPO) concurrence with the removal of the Degradation of Benthos Beneficial Use Impairment (BUI) from the White Lake Area of Concern (AOC). The Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes (OGL) has assessed the status of the BUI in accordance with the state's *Guidance for Delisting Michigan's Great Lakes Areas of Concern*, and recommends that the BUI be removed from the list of impairments in the White Lake AOC.

Enclosed, please find documentation to support this recommendation, including the BUI Removal Recommendation document prepared by MDEQ staff. The White Lake Public Advisory Council (PAC) submitted a letter supporting this recommendation, which is included with this package. The proposed BUI removal was public noticed via the Mich-RAP listserv, the MDEQ Calendar, the MDEQ AOC program web site, and via the PAC's e-mail list. No written comments were received in response to the public notice period, which ran from April 9, to May 8, 2012.

We value our continuing partnership in the AOC Program and look forward to working with GLNPO in the removal of additional BUIs in the near future. If you need further information concerning this request, please contact Mr. John Riley, OGL, at 517-335-4122, or you may contact me.

Sincerely,

Patricia Birkholz  
Director  
517-335-4056

Enclosures

cc: Mr. Jeff Auch, Muskegon Conservation District  
Mr. John Perrecone, U.S. EPA  
Mr. Dan Wyant, MDEQ  
Mr. Frank Ruswick, OGL  
Mr. Richard Hobrla, OGL  
Mr. John Riley, OGL



March 28, 2012

Mr. John Riley  
Office of the Great Lakes  
Michigan Department of Environmental Quality  
525 West Allegan St.  
P.O. Box 30273  
Lansing, MI 48909

Dear Mr. Riley:

The White Lake Public Advisory Council has reviewed materials and documents for the final delisting of the Degradation of Benthos BUI. As part of this process we have reviewed the historic benthic monitoring data as well as recent studies completed by Dr. Richard Rediske and the Muskegon Conservation District. All data support that the removal criteria for this BUI have been met.

The White Lake Public Advisory Council unanimously voted to support the removal of the Degradation of Benthos BUI during our March 1, 2012 meeting. The White Lake Public Advisory Council also hosted a public meeting regarding the removal of this BUI on March 14, 2012 at which time the community expressed support for the removal of the Degradation of Benthos BUI and expressed no concerns regarding the data or removal criteria. Please proceed with the Public Notice process and other document preparation necessary to remove the Degradation of Benthos BUI for White Lake.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Auch".

Jeff Auch, Chair  
White Lake Public Advisory Council  
White Lake Area of Concern

# **Removal Recommendation Degradation of Benthos Beneficial Use Impairment White Lake Area of Concern**

## **Issue**

The Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes, Areas of Concern (AOC) program requests concurrence with this recommendation to remove the Degradation of Benthos Beneficial Use Impairment (BUI) from the White Lake AOC. This request is being made with the support of the White Lake Public Advisory Council (PAC), the United States Environmental Protection Agency (US EPA) Great Lakes National Program Office, and the MDEQ Water Resources Division. This request is made in accordance with the process and criteria set forth in the *Guidance for Delisting Michigan's Great Lakes Areas of Concern* (Guidance) (MDEQ, 2008a). Post-remedial data demonstrate that local criteria developed by the White Lake PAC, and approved by the MDEQ, have been met.

## **Background**

White Lake is a 10.4 km<sup>2</sup> drowned river mouth lake located in western Michigan. The lake was listed as an AOC in 1987 because of severe environmental impairments related to the historic discharge of municipal and industrial wastes. The Degradation of Benthos BUI was listed because of sediment toxicity related to heavy metals and organic chemicals, and impacts to species diversity from the discharge of municipal sewage. Data from 1972 showed that pollution-tolerant oligochaete worms comprised 95% of the total benthic population, pollution-sensitive chironomid numbers were low (< 100/m<sup>2</sup>), and Shannon-Weaver species diversity (SW) was only 0.68 (higher numbers indicate greater diversity) (Evans, 1976). In 1974, the direct discharge of municipal and industrial wastewater to White Lake was eliminated by the construction of an advanced tertiary treatment facility that now discharges to the Muskegon River.

In addition, industrial pretreatment programs, hazardous waste site remediation projects, and numerous conservation and non point source reduction efforts have resulted in significant improvements to water quality. By 2001, Shannon-Weaver diversity improved to 1.37, oligochaetes were reduced to 82% of the total benthic population, and chironomid numbers increased to over 500/m<sup>2</sup> (Rediske et al, 2004).

## **Removal Criteria**

The *Guidance* provides the following requirements for removal of this impairment.

“This BUI will be considered restored when:

An assessment of benthic community, using either MDEQ's Surface Water Assessment Section (SWAS) Procedure #51 (MDEQ, 2008b) for wadeable streams or MDEQ's pending rapid assessment procedure for non-wadeable rivers yields a score for the benthic metrics which meets the standards for aquatic life in any 2 successive monitoring cycles (as defined in the two procedures).

OR, in cases where MDEQ procedures are not applicable and benthic degradation is caused by contaminated sediments, this BUI will be considered restored when: 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 and monitoring are conducted under authority of state and federal programs, such as Superfund, Resource Conservation and Recovery Act, Great Lakes Legacy Act, or Part 201 of Michigan's National Resource and Environmental Protection Act (NREPA) of 1994" (MDEQ, 2008a).

### Local Target

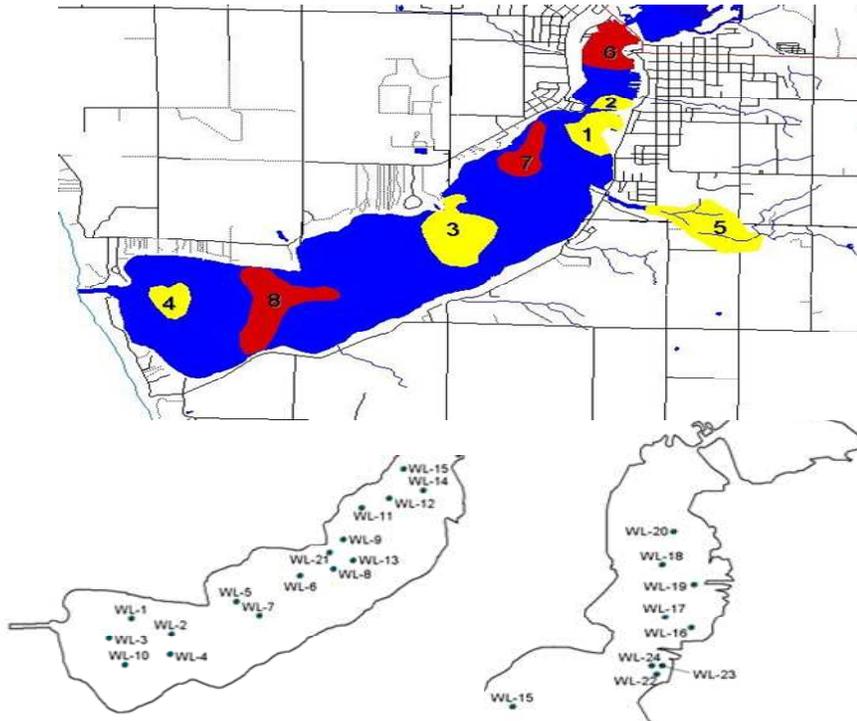
As indicated from the *Guidance*, the MDEQ provides two options for target development: using SWAS Procedure #51 or completing all necessary remedial actions. SWAS Procedure #51 is applicable only to wadeable streams and while completing sediment remediation projects at individual sites is important, White Lake has been impacted on a system-wide basis by chemical and nutrient pollution. Because of the importance of White Lake as a recreational resource and public concern related to sustaining the current trend of improving water quality, the White Lake PAC voted to adopt a target for delisting the Degradation of Benthos BUI that exceeds the State of Michigan criteria. The target, which was approved by the MDEQ, is presented below:

*The Degradation of Benthos BUI will be considered restored when 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 and monitoring are conducted under authority of state and federal programs. The known contaminated sediment sites with degraded benthos are Tannery Bay and the Hooker/Occidental Outfall. In addition, average benthic macroinvertebrate populations in White Lake should reflect the following conditions:*

| <u>Indicator</u>                 | <u>Target</u>  |
|----------------------------------|--|
| Sediment Toxicity                | Amphipod Survival >60%   |
| Hexagenia                        | Present in river mouth littoral zone with an increasing trend over 3 years |
| Amphipods                        | Present in river mouth littoral zone with an increasing trend over 3 years |
| % Oligochaeta                    | < 75% or a decreasing trend  |
| Chironomidae (#/m <sup>2</sup> ) | > 500 or an increasing trend   |
| Diversity (SW)                   | 1.5 or an increasing trend   |

*Compliance with the sediment toxicity indicator in White Lake will be determined by review of pre and post remediation data for Tannery Bay and Occidental Chemical, with additional testing of two sites in the northwestern (deep) basins near the channel. Compliance with the Oligochaete, Chironomid, and Diversity indicators will be based on a benthic survey conducted at all eight areas (Figure 1) examined by Evans (1976) and Rediske et al. (2004) both before and after remediation, respectively. Compliance with the Hexagenia and amphipod targets will be based on*

*three years of post remediation monitoring at one station that was established in the littoral zone near the mouth of the White River where it enters White Lake (Area #6, Figure 1). If any station shows an indication of statistically significant degradation (as listed in criteria above) from the previous sampling event, the area will require re-sampling and analysis to determine the source of the problem.*



**Figure 1.** White Lake Sampling Areas for Benthic Survey and Historical Sampling Locations (Rediske, 2012b).

## **Assessment Results**

Recent benthic assessments were designed in direct response to the requirements listed in the locally-developed criteria, which focused on specific areas where remedial activities are complete (former Hooker/Occidental Chemical outfall and Tannery Bay), and where previous assessments provide baseline data for comparison purposes.

### Sediment Toxicity

Beginning with the sediment toxicity portion of the local criteria listed above, Rediske, Smythe and Hughes performed a post-remedial investigation of sediment toxicity in the Tannery Bay area in 2004, after approximately 80,000 cubic yards of contaminated sediment were removed in 2002 and 2003. Relative to the targets listed above, this investigation determined that amphipod survival in the Tannery Bay area was greater than 80% for 18 of the 19 sites, while the survival rate at the remaining site was 78%, comfortably meeting the target of 60%, set by the White Lake PAC (Rediske et al, 2004b).

In 2011, Rediske examined sediment toxicity in the areas of the former Hooker/Occidental Chemical Outfall, where approximately 12,000 cubic yards of

contaminated sediment were removed in 2003, and at sites in the deep basin near the channel leading to Lake Michigan, as required by the local criteria. The results indicate that sediment toxicity did not inhibit amphipod survival at sampling locations in the vicinity of the former Hooker/Occidental Outfall and the deep basins near the channel, and that the target of greater than 60% survival was achieved. Actual survival rates were 78% and above, again, comfortably meeting the target (Rediske, 2012a).

### Benthic Populations

Consistent with the local criteria, Rediske sampled three sites in 2009, 2010 and 2011 to assess the Hexagenia and amphipod targets in Area 6 of White Lake (Figure 1). Both species' population densities followed the required increasing trend over the three year period. In 2011, the Hexagenia population was almost three times what it was in 2001, while the number of Amphipods increased more than five times during the same period. These data show that the restoration target for Hexagenia and amphipods were met (Rediske, 2012b).

As part of the benthic community analysis, Rediske also compared Oligochaete, Chironomid, and species diversity in seven of the eight areas of the lake indicated in Figure 1, before and after contaminated sediment remediation. Among the findings of this assessment, the percentage of Oligochaetes decreased from 65% in 2001 to 53% in 2009, below the target of 75%. Chironomid population densities exceeded the restoration target of 500 per square meter, averaging 937 per square meter. Shannon-Weaver species diversity was found to have increased from 1.38 prior to initiation of remedial activities to 1.52, which exceeds the target of 1.5 (Rediske, 2012b).

Area 5 in Figure 1 is Mill Pond Creek. This was not assessed by Rediske, because as a wadeable stream, it required employment of the MDEQ's SWAS Procedure 51 for Wadeable Streams (MDEQ, 2008b). Mill Pond Creek was included in the MDEQ's Section 303(d) list of impaired waters in 1992, not attaining water quality standards for "other indigenous aquatic life" due to problems related to chemical venting groundwater plumes. However, a June 2002 Procedure 51 assessment of the benthic community by MDEQ staff (MDEQ, 2004) rated sites in Mill Pond Creek as "acceptable" and "excellent," providing evidence that the creek was indeed meeting the State's water quality standards for aquatic life. As a result, Mill Pond Creek was removed from the state's 2004 impaired waters list.

In December 2011, the Muskegon Conservation District (MCD) performed a biological assessment of Mill Pond Creek and found that the benthic community again rated between "acceptable" and "excellent." This confirms that Mill Pond Creek continues to meet the BUI removal criteria (MCD, 2012).

Each of the assessments described above were undertaken to assess the condition of the White Lake AOC's benthic community. Each of the results provides a subset of the total amount of data required to determine whether the local criteria is being met. All remedial actions for known contaminated sediment sites have been completed. As a result of contaminated sediment removals, other remedial activities, and natural processes, the benthic community is recovering in terms of population size, density and composition. Sediment samples no longer indicate toxicity to reference organisms. The data referred to above demonstrate that not only is the White Lake AOC meeting the State's BUI removal criteria, but it also meets the more restrictive locally-developed criteria.

### **Recommendation**

Based upon review of the data and technical input from Grand Valley State University's Annis Water Resources Institute, the Muskegon Conservation District, MDEQ and US EPA staff, removal of the Degradation of Benthos BUI in the White Lake AOC is recommended. The data and this Removal Recommendation were shared and discussed with the White Lake PAC. The PAC held a public informational meeting on this proposal on March 14, 2012. The PAC submitted a formal letter of support for removal of the BUI, dated March 28, 2012.

This proposed action was public noticed for 30 days via posting to the Mich-RAP listserv, listing in the MDEQ Calendar, and posting to the White Lake PAC's email list. Supporting documents were posted on the MDEQ's AOC program web page for public review and comment from April 9 through May 8, 2012. No written comments were received during the public comment period.

### **References**

- Evans, E. 1976. Final report of the Michigan Bureau of Water Management's investigation of the sediments and benthic communities of Mona, White, and Muskegon Lakes, Muskegon County, Michigan, 1972.
- Michigan Department of Environmental Quality. 2004. A Biological Survey of Selected Tributaries of White Lake, Muskegon County. MI/DEQ/WD-03/063.
- Michigan Department of Environmental Quality. 2008a. *Guidance for Delisting Michigan's Great Lakes Areas of Concern*, revised. MI/DEQ/WB-06/001.
- Michigan Department of Environmental Quality. 2008b. Qualitative Biological and Habitat Survey Protocols for Wadeable Streams and Rivers, revised. WB-SWAS-051.
- Muskegon Conservation District. 2012. A Biological Review of Mill Pond Creek Near Previous Koch Chemical Company and Howmet Corporation Contaminated Groundwater Discharges, Whitehall, Michigan, Muskegon County.
- Rediske, R., G. Fahnenstiel, P. Meier, T. Nalepa, and C. Schelske. 1998. Preliminary Investigation of the Extent and Effects of Sediment Contamination in White Lake, Michigan. EPA-905-R-98-004.  
<http://www.epa.gov/glnpo/sediment/whitelake/white.pdf>
- Rediske, R., M. Chu, D. Uzarski, G. Peaslee, J. Gabrosek. 2004a. Phase II Investigation of Sediment Contamination in White Lake. EPA-905-R-04-001.  
<http://www.epa.gov/glnpo/sediment/whitelake/phase2/index.html>
- Rediske, R.R., G. Smythe, and R. Hughes. 2004b. Post Remediation Investigation of Sediment Toxicity in the Tannery Bay Area of White Lake, Michigan. Report to Michigan Department of Environmental Quality. Lansing, MI.

Rediske, R.R. 2012a. Investigation of Sediment Toxicity in White Lake for Removing the Degradation of Benthos Beneficial Use Impairment. Report to Michigan Department of Environmental Quality. Lansing, MI.

Rediske, R.R. 2012b. Assessment of Benthic Invertebrate Populations in the White Lake Area of Concern. Report to Michigan Department of Environmental Quality. Lansing, MI.

White Lake Public Advisory Council. 2008. Final Delisting Targets for the White Lake Area of Concern. Whitehall, MI.

Prepared by: John Riley, AOC Coordinator  
Great Lakes Management Unit  
Office of the Great Lakes  
Michigan Department of Environmental Quality  
May 9, 2012