White Lake Area of Concern
Final Delisting Report

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Office of the Great Lakes
Michigan Department of Environmental Quality

August 2014

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This document should be cited as follows:

Michigan Department of Environmental Quality. 2014. White Lake Area of Concern Final Delisting Report.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 4

1. INTRODUCTION 4

2. BACKGROUND 5
   2.1 White Lake Area of Concern 5
   2.2 Great Lakes Approach to Restoring Beneficial Uses 6
   2.3 Historical Information 7
   Figure 1. White Lake Area of Concern 8
   Figure 2. Geopolitical Map of White Lake with Landmarks 9

3. ROLES 10
   3.1 Michigan Department of Environmental Quality 10
   3.2 U.S. Environmental Protection Agency 10
   3.3 Local Government 10
   3.4 White Lake Public Advisory Council 10
   3.5 Others 11
   Figure 3. White Lake Environmental History Timeline 12

4. BENEFICIAL USE IMPAIRMENT REVIEW 13
   4.1 Restrictions on Dredging Activities 13
   4.2 Eutrophication or Undesirable Algae 14
   4.3 Degradation of Benthos 15
   4.4 Restrictions on Fish Consumption 18
   4.5 Degradation of Aesthetics 21
   4.6 Restrictions on Drinking Water Consumption 24
   4.7 Degradation of Fish and Wildlife Populations, and Loss of Fish and Wildlife Habitat 29

5. POST-DELISTING RESPONSIBILITIES AND MONITORING 37

6. PUBLIC INVOLVEMENT IN THE DELISTING PROCESS 37

7. RECOMMENDATION TO DELIST 39
   7.1 Restoration and Removal of the Beneficial Use Impairments 39
   7.2 Delisting Recommendation 39

8. ACKNOWLEDGEMENTS AND APPRECIATION 39

REFERENCES 40

ATTACHMENTS 41
   White Lake PAC Letters of Support for Each BUI Removal
   USEPA Concurrence Letters for Each BUI Removal
   MDEQ Internal Memo re: DuPont Corrective Action Obligations
   MDEQ Response to White Lake PAC's Drinking Water BUI Removal Support Letter
   White Lake PAC Letter to MDEQ Requesting Area of Concern Delisting

EXECUTIVE SUMMARY

Great Lakes Areas of Concern (AOCs) were, at the time of their listing, places where surface water and sediment pollution posed the greatest potential for negative impacts to the Great Lakes ecosystem. White Lake no longer poses a threat to the Great Lakes or to the human or natural communities surrounding it. All reasonable actions have been taken to eliminate local sources of contaminants to White Lake. Remedial activities as identified in the Remedial Action Plans (RAPs) developed over the years have been implemented to address the various use impairments. White Lake can now be removed from the international list of Great Lakes Areas of Concern.

White Lake has become comparable to other West Michigan drowned rivermouth lakes. Many of those waterbodies, including White Lake, will continue to struggle with the effects of nutrient inputs from urban, agricultural, and other non-point source inputs. Many, including White Lake, will continue to wrestle with finding the right balance between economic development and environmental protection, particularly as it relates to maintaining valuable shoreline habitat for the flora and fauna that make their living in riparian areas. Many areas, including the White Lake community, will continue to pursue remediation of persistent groundwater contamination from a variety of sources.

Delisting White Lake does not mean that it has become a pristine environmental utopia. It simply means that the most egregious problems impacting the lake from an industrial past have been solved. Ongoing vigilance and advocacy to prevent recurrence of those problems and continuing efforts to advance the improvements made over the last 27 years are still required. White Lake can now move ahead with the other communities in West Michigan toward a future without the drag of impairments and legacy contaminants.

1. INTRODUCTION

In 1987, the Michigan Department of Natural Resources (MDNR) prepared the first RAP for White Lake. This document identified a number of impairments and attempted to identify sources of contaminants, along with necessary actions to restore ecological integrity to the system. Over the next 27 years, federal, state, and local government agencies in cooperation with local advocates, academic researchers, industrial interests, and many other stakeholders, have described known impairments, conducted studies, and identified actions necessary to further define and remediate the problems. Numerous individuals, agencies, and others worked diligently over the years to implement those actions, leading to the systematic removal of all eight Beneficial Use Impairments (BUIs) identified as impacting White Lake. Much of that important work occurred in between regulatory programs where the AOC program operates, and would not have been possible without cooperative partnering.

As the lead agency for AOC coordination, the Michigan Department of Environmental Quality (MDEQ) was charged with developing quantifiable targets to measure progress toward restoring the state's 14 AOCs. However, the White Lake Public Advisory Council (PAC) collaborated with academics and federal and state agencies to identify more specific local criteria to address local circumstances. The MDEQ, the White Lake PAC, the U.S. Environmental Protection Agency (USEPA), the Muskegon Conservation District, and many other stakeholders, have collectively determined that the cumulative impacts of scores of completed remedial activities now support the delisting of White Lake from the international registry of Great Lakes AOCs.

This document serves as the final delisting report and provides the rationale to support the delisting decision. The focus of this report is to summarize efforts undertaken to remove all eight BUIs from the AOC: Restrictions on Fish and Wildlife Consumption, Degradation of Fish and Wildlife

Populations, Loss of Fish and Wildlife Habitat, Degradation of Benthos, Restrictions on Dredging Activities, Eutrophication or Undesirable Algae, Restrictions on Drinking Water Consumption, and Degradation of Aesthetics. References to supporting documentation regarding each BUI have largely been omitted here for ease of readability, but can readily be found in the respective BUI Removal Recommendations, linked at the end of each section. Abundant information regarding the State of Michigan's AOC program can be found by visiting: www.michigan.gov\degaocprogram.

2. BACKGROUND

2.1 White Lake Area of Concern

White Lake is a 2,571 acre drowned river mouth lake, tributary to Lake Michigan, located in Muskegon County, Michigan. In 1985, White Lake was designated as one of 42 Great Lakes AOCs, primarily as a result of toxic organic compounds entering the lake through contaminated groundwater. A long history of chemical manufacturing, dubious waste disposal practices, municipal wastewater discharges, tannery process operations, and other activities all contributed to the impairment of biological systems and human enjoyment of the resource.

The Whitehall Leather Company began operations on the east side of the lake in 1865 as Eagle Tanning Works, using wood bark as the original tanning agent. In the 1940s, the tanning agent was changed to chromic sulfate. A series of six waste treatment lagoons were constructed near an area of the shoreline which came to be known as Tannery Bay. Effluent from these lagoons containing chromium, mercury, arsenic, and animal hides was discharged directly into the bay. Dredged materials from the lagoons and other process wastes were disposed of in landfill areas adjacent to the shore. Direct discharge of effluent to Tannery Bay was discontinued in 1976.

Process wastewater effluent from several chemical companies was also discharged into White Lake in the second half of the 20th century. Chemical manufacturers were recruited to set up manufacturing facilities in the area beginning in the 1950s, as a way to promote economic development in the region. The former Hooker Electrochemical Company (now Occidental Chemical, or OxyChem) facility discharged a variety of chlorinated solvents and pesticide-related materials into the lake near Dowies Point. Chlorinated organic chemicals from the E.I. du Pont de Nemours and Company (DuPont) and Muskegon Chemical (now Koch Chemical) entered White Lake through groundwater and surface water discharges over the years.

The extent of the White Lake AOC is the lake proper, from the wetlands on the north end at the mouth of the White River, downstream through the federally-maintained navigation channel to the outlet at Lake Michigan (Figure 1). The original boundary included a ¼ mile area of land surrounding the lake, recognizing sources of nutrients and groundwater contaminants adjacent to the waterbody. In 2006, the AOC boundary was revised to include just the lake itself, based on the assertion that the AOC is defined as the *waterbody* and is considered the impacted area. The impacted area is the only location where BUIs were assessed and removed according to the criteria and process in the Guidance for Delisting Michigan's Areas of Concern (2008). The major environmental problems affecting the lake at the time of listing were contaminated groundwater discharges to the lake from the OxyChem property, heavy metals and other compounds contaminating sediment from the Whitehall Tannery property, and excess nutrients from municipal wastewater discharges, among other concerns. Over time, other facilities were found to be contributing to water quality concerns in the lake and nearby groundwater, including the DuPont and the former Whitehall Wastewater Treatment facility, among others. See Figure 2 for a map of the lake with significant landmarks.

In 1995, MDNR updated the RAP document to specify eight BUIs associated with White Lake, consistent with the 1987 Amendments to the GLWQA. In 2002, the White Lake PAC coordinated another update to the RAP entitled, "White Lake Community Action Plan," which was revised in 2005. In 2011, the MDEQ produced the Stage 2 RAP for the White Lake AOC. The Stage 2 document provided an update with regard to the status of each BUI and included a list of remedial activities needed to remove each BUI and delist the AOC. This Final Delisting Report is intended to complete the reporting cycle now that White Lake has been determined to be restored to the point where it is comparable to any other non-AOC area in the Great Lakes Basin. This is not to say that there are no remaining environmental problems in the area, but the severity of issues that remain no longer justify inclusion on the international list of priority areas.

2.2 Great Lakes Approach to Restoring Beneficial Uses

Two agreements between the United States and Canada form a governing framework for monitoring and improving the Great Lakes internationally. The 1909 Boundary Waters Treaty was signed as a way to provide for dispute resolution regarding the waters that border the two nations. It also created the International Joint Commission (IJC). The IJC has two primary responsibilities: regulating shared water uses, and investigating cross-boundary issues and recommending solutions. The Great Lakes Water Quality Agreement (GLWQA), originally signed in 1972, expressed the commitment of both countries to restore and maintain the Great Lakes ecosystem. In 1985, in consultation with the State of Michigan, the Great Lakes Water Quality Board, advisor to the International Joint Commission, identified White Lake as one of 42 AOCs (GLWQB, 1985). In 1987, amendments to the 1978 GLWQA were adopted by the federal governments of the United States and Canada (GUSC) and established more specific guidelines for identifying geographical AOCs based on the presence of conditions that caused or are likely to cause impairment of the area's ability support aquatic life (GUSC, 2012). Annex 2 of the 1987 Amendments listed 14 BUIs which are caused by a detrimental change in the chemical, physical, or biological integrity of the Great Lakes system (GUSC, 2012). The Annex directed the two countries to designate AOCs that did not meet the objectives of the GLWQA. In 1991, Presque Isle Bay in Pennsylvania was the final site added to the list of AOCs. 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 scope of the AOC program is based on the concept that each area had at least one BUI that was an extraordinary problem; one that set the area apart from other sites with less severe contamination in the region. When AOCs were originally designated, no specific, quantitative criteria for listing or delisting these areas existed. The IJC issued general listing and delisting guidelines in 1991. The U.S. Policy Committee adopted general guidance on the process for AOC delisting in 2001 (USEPA, 2001). However, these documents were not specific enough for use in determining the final restoration point of individual BUIs by either the State of Michigan or the U.S. federal government.

In response to the need for specific BUI restoration criteria, the MDEQ developed the Guidance for Delisting Michigan's Great Lakes Areas of Concern (Guidance). The purpose of the document is to: 1) provide guidance to AOC program participants about Michigan's process for delisting AOCs; and 2) identify specific quantitative or qualitative criteria which Michigan uses to determine when BUIs have been restored. The criteria within the Guidance are Michigan's position on what constitutes restoration of the BUIs, and any AOC that meets these criteria will be considered restored by the State. In addition to the State's established BUI restoration criteria, the White Lake PAC developed its own local criteria for several of the BUIs, to more specifically address issues that are unique to the White Lake AOC. All the approved local criteria are consistent with the state's Guidance document and the scope of the AOC program. While all the state and approved local criteria have been met to justify removal of each BUI, the White Lake PAC

continues to advocate for additional actions it considers necessary to further protect and enhance water quality at White Lake, including nutrient reduction strategies and shoreline habitat protection, for example.

2.3 Historical Information

Over the years, much has been written and otherwise documented about the history of industrial and municipal pollution at White Lake. There is a great deal of information available from various sources regarding the cleanup and restoration efforts resulting in the delisting of the White Lake AOC. www.restoringwhitelake.com has a wealth of historical information and details of restoration projects completed at White Lake. It includes a timeline (Figure 3), which provides an abbreviated summary of important events that have impacted the lake and the community: http://restoringwhitelake.com/restoration_history_timeline.pdf. A 1968 Life Magazine article about extensive pollution throughout the Great Lakes includes dramatic photos and mentions White Lake, along with other future AOCs: http://restoringwhitelake.com/Life_BlightedGreatLakes_082368.pdf

At least two documentary films were made detailing industrial pollution and impacts to the surrounding communities. "The Tragedy of White Lake" was produced in 1978 and is available online here: http://www.youtube.com/watch?v=5d_J_05ljvU. "This is Not a Chocolate Factory" was produced in the early 2000s and can also be found online: http://www.youtube.com/watch?v=b5Oe1GzMjXg.

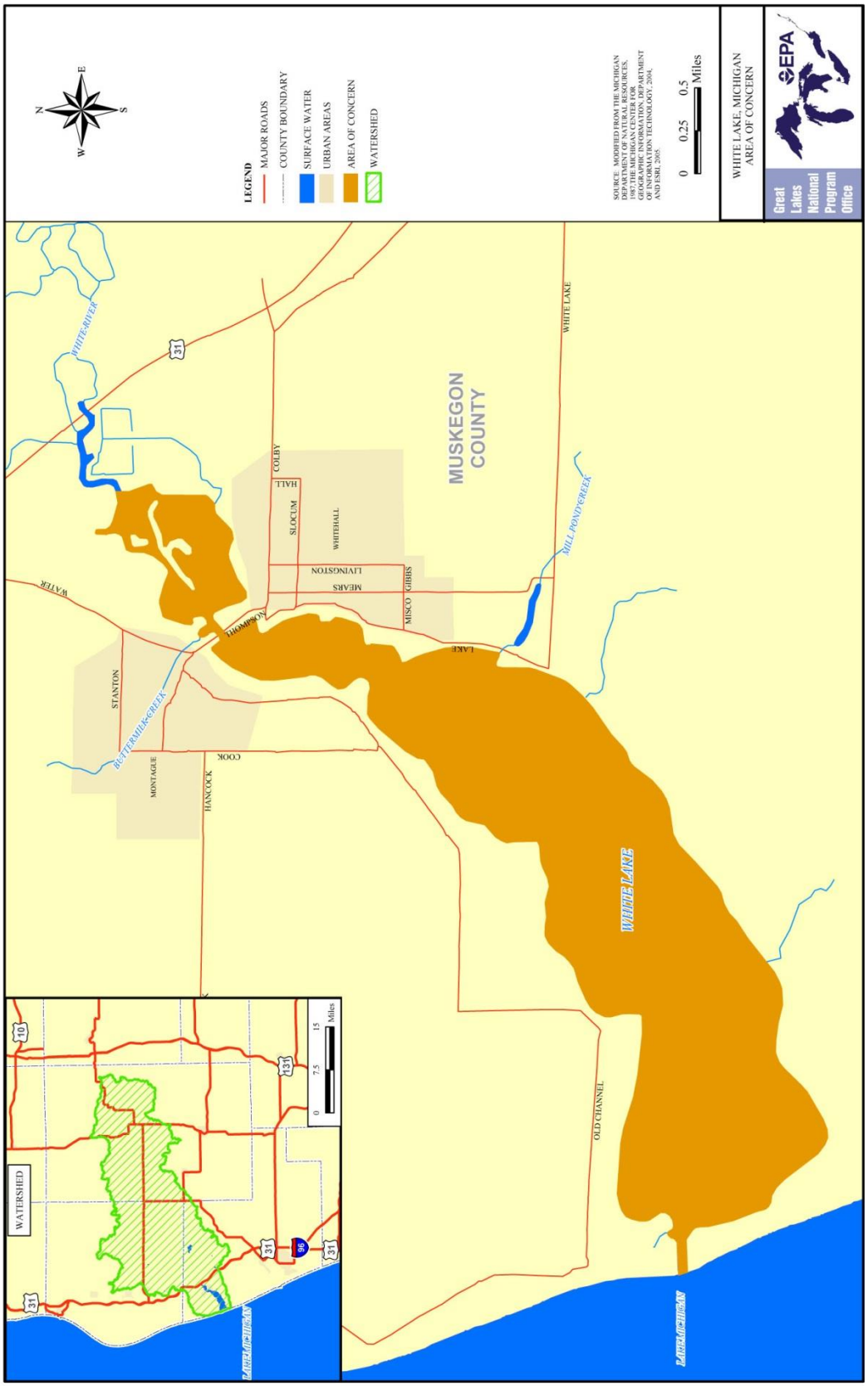


Figure 1. White Lake Area of Concern

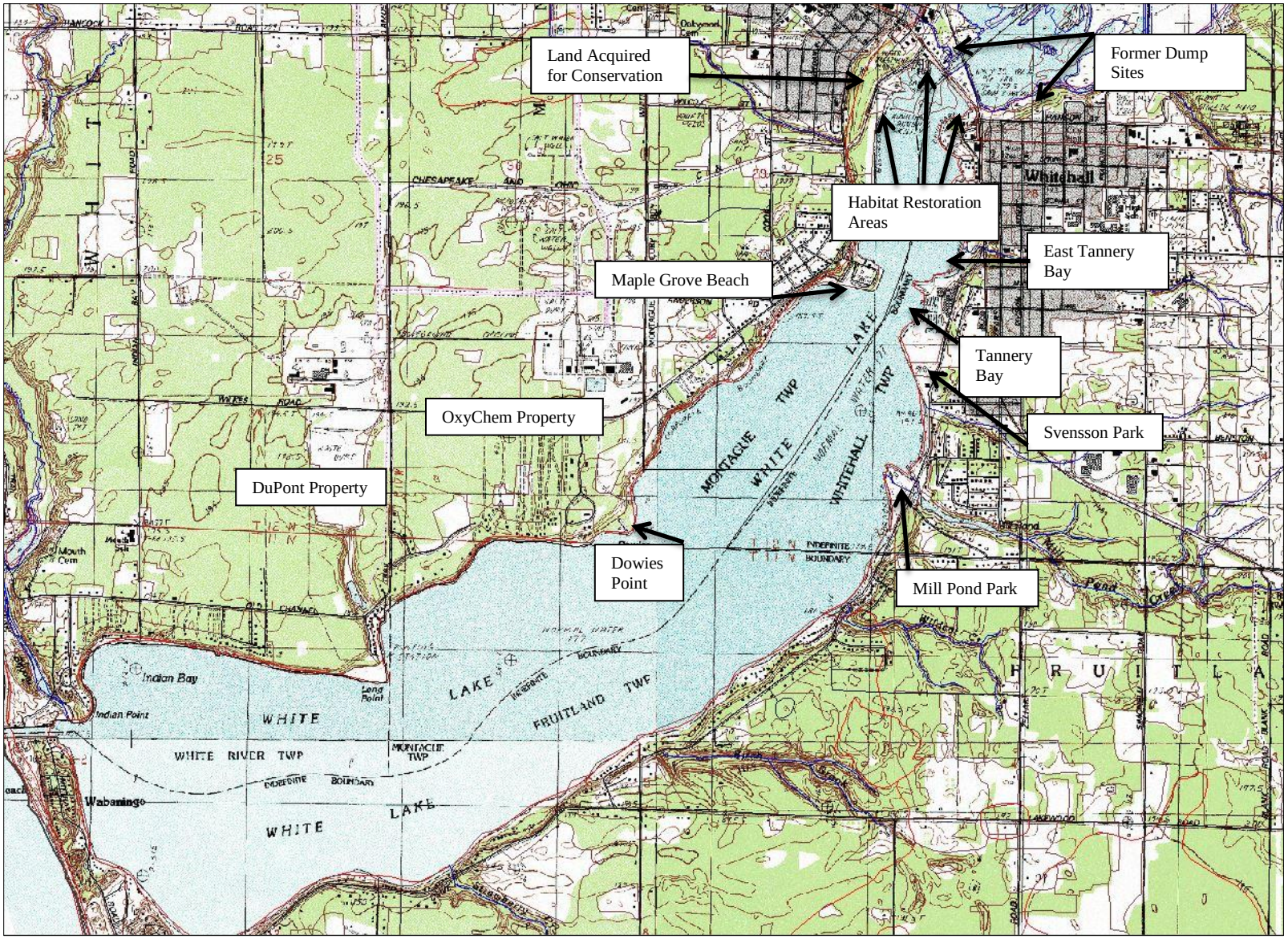


Figure 2. Geopolitical Map of White Lake with Landmarks

3. ROLES

3.1 Michigan Department of Environmental Quality

The MDEQ, Office of the Great Lakes is the lead agency for coordination of BUI assessments, development of RAPs, and it consults on management actions at the White Lake AOC. The MDEQ coordinates communication, sampling, and on the ground restoration between the federal, state, and local partners. Once the White Lake AOC is delisted, the MDEQ regulatory programs will remain responsive to environmental concerns and activities in the area, as they are for other sites throughout the State of Michigan.

3.2 U.S. Environmental Protection Agency

The USEPA has primary responsibility for oversight and funding of the American AOC program in the Great Lakes under the GLWQA. The USEPA works with the PAC and the State of Michigan to identify key needs for the AOC, including management actions necessary for delisting. This includes responsibility for approving the removal of BUIs and providing recommendations to the U.S. Department of State that AOCs be delisted. The USEPA's Great Lakes National Program Office staff members work collaboratively with other federal, state, and local agencies and other stakeholders to advance the goals of the AOC program.

3.3 Local Government

The Muskegon Conservation District (MCD) has been instrumental in organizing and leading local efforts to restore White Lake. For instance, MCD competed for and obtained a $2.1 million Great Lakes Restoration Initiative (GLRI) grant to implement the White Lake AOC Shoreline Habitat Restoration project, which directly led to the removal of the Degradation of Fish and Wildlife Populations and Loss of Fish and Wildlife Habitat BUIs. The MCD staff also performed hours of legwork to document the status of various contaminated groundwater sites, and took on leadership roles in the White Lake PAC.

Several PAC members over the years have been local elected officials, including a Mayor, City Council members, County Commissioners, and township trustees, among others. The Muskegon County Health Department has also been a consistent partner at PAC meetings for a number of years. This level of local involvement has facilitated a broad local understanding of White Lake AOC issues.

3.4 White Lake Public Advisory Council

Public involvement is a key component of the AOC program in Michigan. Each AOC has a PAC or equivalent organization. The White Lake PAC has a long history of involvement with the AOC program, dating back to before the development of the original 1987 RAP. A number of individuals remain involved to this day, having spent nearly 30 years advocating for improved environmental quality in their communities. The White Lake PAC has diligently and successfully tried to include a diversity of stakeholder involvement in its membership ranks. PAC members are or have been: concerned citizens, local business owners, riparian property owners, local government officials, environmental advocates, retirees, farmers, and industry representatives, among others. The White Lake PAC's mission statement is as follows: "The White Lake Public Advisory Council is a formal council of members from throughout the White Lake area that works to provide the public with information, services, and projects which will improve the environmental quality of White Lake and its affiliated watersheds. Through these activities, the Council works to advise agencies, express views, and voice the concerns of the local community."

The White Lake PAC took an active role in developing local restoration criteria for seven of the eight BUIs associated with the White Lake AOC. Six of those (Restrictions on Fish Consumption, Degradation of Fish and Wildlife Populations, Degradation of Benthos, Eutrophication or Undesirable Algae, Degradation of Aesthetics, and Loss of Fish and Wildlife Habitat) criteria were accepted by the MDEQ as being functionally equivalent to the state criteria and within the scope of the AOC program. For the seventh BUI, Restrictions on Dredging Activities, the White Lake PAC adopted the state criteria as established in the *Guidance*. The eighth set of local criteria, for Restrictions on Drinking Water Consumption, was not accepted by the MDEQ because the requirements adopted by the PAC went beyond the scope of the AOC program (2009), based on the 1987 Amendments to the Great Lakes Water Quality Agreement. Nevertheless, the PAC continued to pursue restoration of the Drinking Water beneficial use, according to its criteria, due to ongoing concerns regarding groundwater contamination in the area.

The MDEQ sincerely commends and thanks all the dedicated individuals and organizations that have contributed to the success of the PAC since its inception. Without such outstanding perseverance and commitment, the remarkable progress achieved over the years would simply not have been possible.

3.5 Others

Many other organizations have contributed greatly to the restoration of the White Lake AOC, including but not limited to: Grand Valley State University's Annis Water Resources Institute, E. I. du Pont de Nemours and Company, Occidental Petroleum Corporation, Genesco, Inc., the MDNR, the United States Army Corps of Engineers, the National Oceanographic and Atmospheric Administration, the White Lake Association, the White River Watershed Partnership, area schools and several divisions within the MDEQ, including the Water Resources Division, the Remediation and Redevelopment Division, the Office of Drinking Water and Municipal Assistance, and the Office of Waste Management and Radiological Protection, among others. Each of these organizations has played an important role in advancing White Lake to the point of restoration and eventual delisting from the international designation as an AOC. Additionally, local media outlets, including the *White Lake Beacon* and *Muskegon Chronicle,* have fulfilled their commitments to serve the public interest by keeping area residents informed of developments and opportunities surrounding the AOC.

Figure 3. The White Lake Environmental History Timeline on the following page is included, compliments of the White Lake Environmental History Project.

Restoring White Lake

Exploring White Lake's Environmental History

www.restoringwhitelake.com

WHITE LAKE ENVIRONMENTAL HISTORY PROJECT

The goal of the White Lake Environmental History Project is for residents and visitors of the area to learn about and understand the impact of White Lake's environmental history, including pollution issues and restoration efforts.

The Early Days

- Native Americans inhabited the White Lake area
- 1700s – 1830s ... Fur trading
- 1837 ... First sawmill on White Lake established by Charles Mears
- 1837 – 1900 ... Logging practices, including the channelizing of the White River marsh, drastically changed the White River and White Lake by causing sedimentation and decreasing the capacity of the wetlands to reduce nutrient loads, absorb floods, and filter water
- 1860 ... Mears/Whitehall platted
- 1865 ... Eagle Tanning Works (Whitehall Leather Company) opens
- 1867 ... Montague platted
- Late 1800s/early 1900s ... End of logging era

1940s - 1950s

- 1940 ... Whitehall Leather Company stopped using bark for tanning and began using chromium
- 1951 ... Misco opens
- 1952/54 ... Hooker Chemical opens
- 1956 ... E.I. duPont de Nemours opens

1960s

- 1967 ... State of Michigan documents steep decline in benthos and high levels of sodium chlorides at Hooker Chemical discharge site
- 1968 ... Occidental Chemical (OxyChem) purchases Hooker Chemical

1970s

- 1974 ... Industrial and municipal discharges diverted from White Lake to county wastewater site
- 1975 .. Muskegon Chemical opens
- 1977 ... Groundwater contamination found at Muskegon Chemical
- 1977 ... OxyChem closes the Hooker Chemical/OxyChem fine chemicals plant

1980s

- 1980 ... Whitehall municipal well #3 discovered to be contaminated
- 1981/82 ... Hooker Chemical/OxyChem investigation and cleanup of soils
- 1982 ... Groundwater cleanup begun at Hooker Chemical/OxyChem
- 1982 ... Hooker Chemical/OxyChem closes
- 1985 ... White Lake named an Area of Concern
- 1986 ... Koch Chemical purchases Muskegon Chemical

1990s

- 1991 ... Muskegon Chemical/Koch Chemical closes
- 1992 ... White Lake Public Advisory Council (PAC) established
- 1992 ... E.I. duPont de Nemours conducts investigation of landfills on its site
- 1993 ... EPA orders Hooker Chemical/OxyChem to conduct second site investigation
- 1995 ... Whitehall Leather Company land site and Tannery Bay investigation begins
- 1995 ... 8 problems were officially determined for the White Lake Area of Concern
- 1996 ... Hooker Chemical/OxyChem production facilities demolished
- 1996 ... E.I. duPont de Nemours closes
- 1998 ... E.I. duPont de Nemours facility demolished
- 1999 ... White Lake Landfill closes

2000s

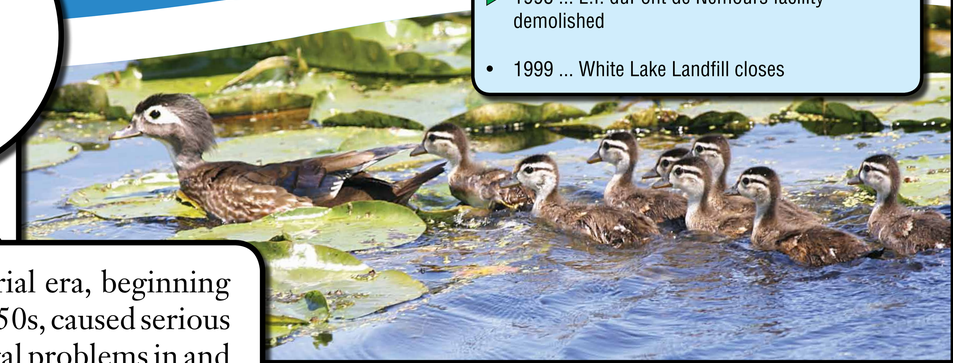
- 2000 ... Whitehall Leather Company closes
- 2002 ... Whitehall Leather Company removes contaminated sediments from Tannery Bay in White Lake
- 2003 ... Hooker Chemical/OxyChem removes contaminated sediments from White Lake

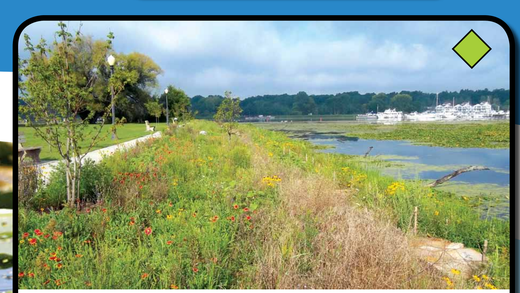
2010s

- 2010 ... E.I. duPont de Nemours site investigation begins
- 2010 ... Whitehall Leather Company land site cleanup begins
- 2011 ... Whitehall Leather Company land site cleanup completed
- 2011/2012 ... Habitat restoration project
- 2011/2012 ... 3 of 8 problems officially removed for the White Lake Area of Concern

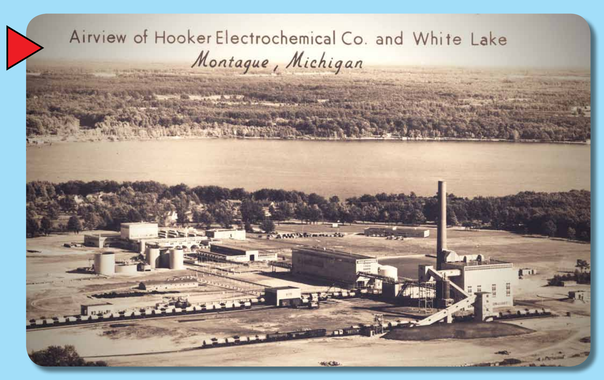
The Future

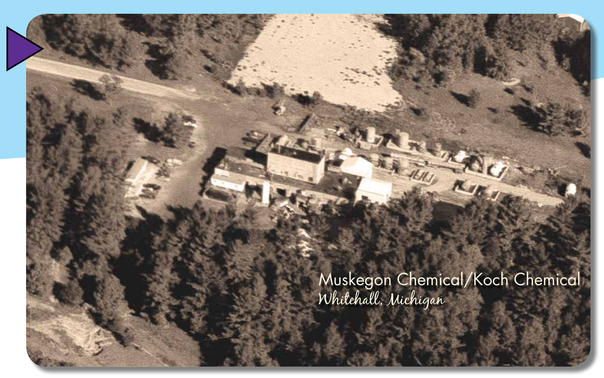
- Area of Concern delisting
- Citizens and businesses strive to be good environmental stewards

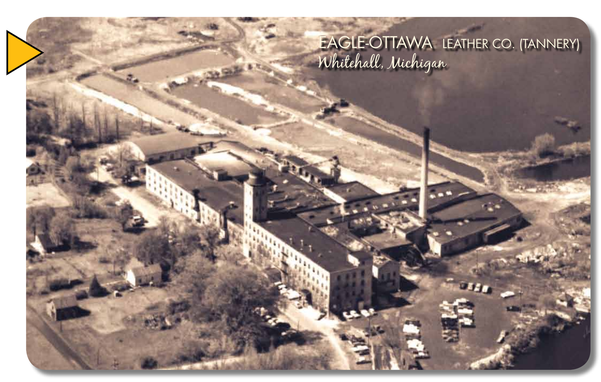




Two of the problems identified for the White Lake Area of Concern were loss of fish and wildlife habitat and degraded fish and wildlife populations. A $2.1 million project, funded by the federal Great Lakes Restoration Initiative, was led by the Muskegon Conservation District, in partnership with the White Lake Public Advisory Council in 2011/2012 to restore fish and wildlife habitat along White Lake's shoreline, address the two problems, and help to remove White Lake from the Great Lakes Area of Concern list.

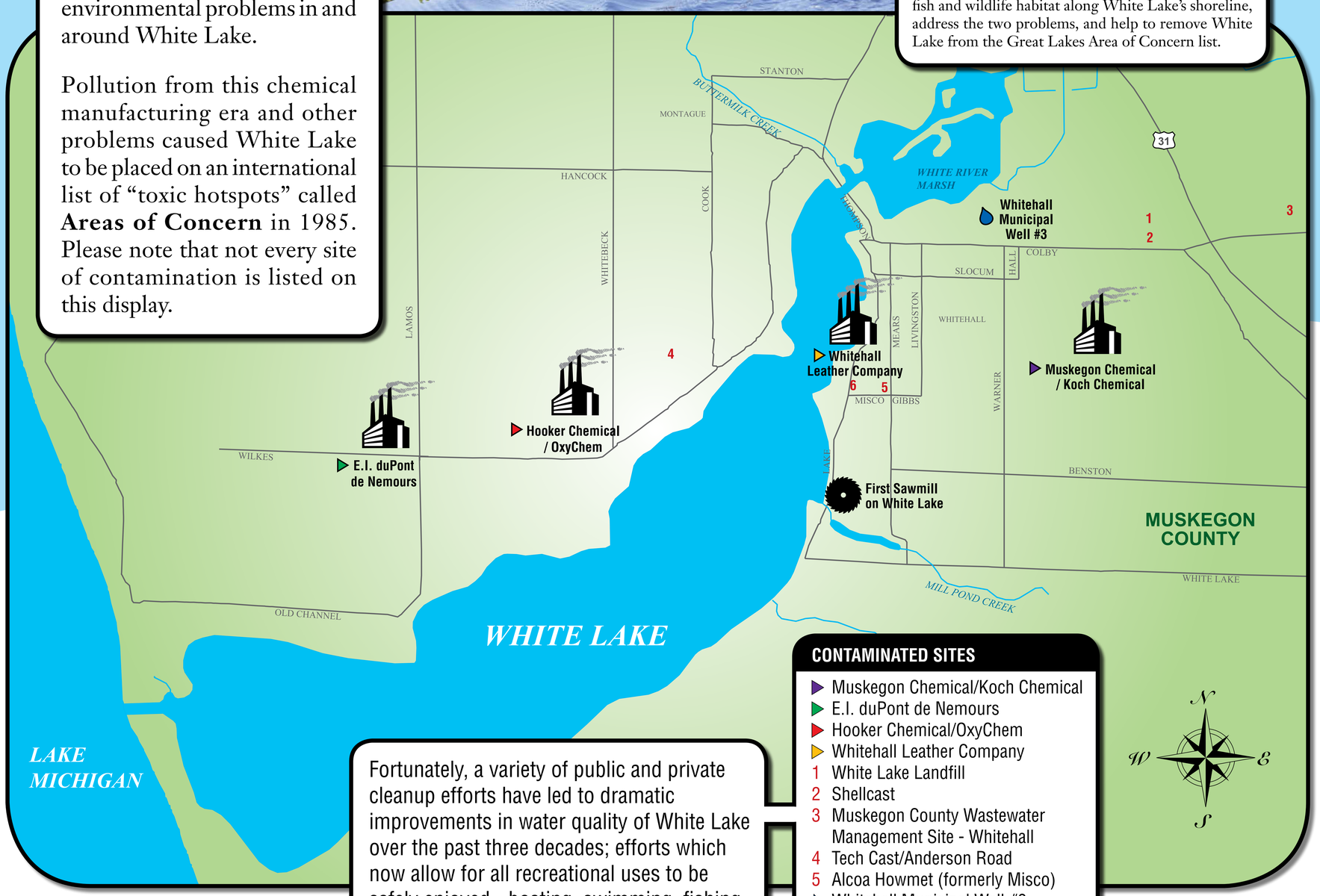






An industrial era, beginning in the 1950s, caused serious environmental problems in and around White Lake.

Pollution from this chemical manufacturing era and other problems caused White Lake to be placed on an international list of "toxic hotspots" called **Areas of Concern** in 1985. Please note that not every site of contamination is listed on this display.



Fortunately, a variety of public and private cleanup efforts have led to dramatic improvements in water quality of White Lake over the past three decades; efforts which now allow for all recreational uses to be safely enjoyed - boating, swimming, fishing.

CONTAMINATED SITES

- Muskegon Chemical/Koch Chemical
- E.I. duPont de Nemours
- Hooker Chemical/OxyChem
- Whitehall Leather Company
- 1 White Lake Landfill
- 2 Shellcast
- 3 Muskegon County Wastewater Management Site - Whitehall
- 4 Tech Cast/Anderson Road
- 5 Alcoa Howmet (formerly Misco)
- Whitehall Municipal Well #3
- 6 5-A Oil

The White Lake Environmental History Project was made possible by:

MichiganHumanitiesCouncil — our stories, our lives
Alcoa Howmet — ALCOA
WLCF — White Lake Community Fund — Bridging Our Communities
community foundation — Muskegon County
White Lake Historical Society
White Lake Community Library
Montague Museum and Historical Association
Friends of White Lake Community Library

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4. BENEFICIAL USE IMPAIRMENT REVIEW

In the early years of the AOC program, the White Lake AOC was identified as having eight Beneficial Use Impairments, as listed above. Those impairments were chosen via a thorough examination of environmental conditions and with input from federal, state, and local agencies, PAC members, advocacy organizations, user groups, and community members. All eight beneficial uses have now been restored for the White Lake AOC, through the process established by the state's *Guidance*. The rationale for the removal of each impairment is presented here in abbreviated fashion, excerpted and edited from their respective removal documents and listed in the order in which they occurred. For additional details including the circumstances leading to the addition of each BUI and proper citations for supporting documentation, please consult the final removal documents themselves. Letters written by the White Lake PAC supporting the removal of each BUI and letters of concurrence from the USEPA's Great Lakes National Program Office are included as attachments at the end of this document.

4.1 Restrictions on Dredging Activities, removed September 2011

The appropriate criteria for determining when this impairment was restored, according to the *Guidance*, was when there were no restrictions on routine commercial or recreational navigational channel dredging by the U.S. Army Corps of Engineers (ACE), based on the most recent dredging cycle, such that special handling or use of a confined disposal facility would be required for dredge spoils due to chemical contamination.

Comments regarding the re-designation of this BUI were solicited from the Restrictions on Dredging Activities Technical Committee, which was formed in 2008 to bring together state and federal agency dredging experts and technical staff to determine whether restrictions on dredging activities due to sediment contamination existed. In accordance with the *Guidance*, the Committee reviewed the most recent dredge cycle data available, which was collected in 2008.

The most recent ACE sediment analysis from the 2008 dredge cycle indicated that contaminant concentrations in the dredge spoils were less than USEPA open water disposal criteria. Based on those results, dredged sediments from the navigation channel were approved for and used in the federal beach nourishment program for Lake Michigan. No special handling or use of a confined disposal facility was required for the spoils generated by the dredging of the White Lake navigation channel.

The preferred disposal option for the White Lake harbor is Lake Michigan beach nourishment. The Technical Committee determined that there were no restrictions on routine navigational channel dredging by the ACE because there were no restrictions on the preferred disposal method. Therefore, according to the *Guidance* restoration criteria, the BUI was considered restored. The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/WL_Dredging_BUI_Final_Removal_Recom_docs_445450_7.pdf.

4.2 Eutrophication or Undesirable Algae, removed April 2012

The MDEQ accepted the locally-developed target for the Eutrophication and Undesirable Algae BUI as being functionally equivalent to the restoration criteria in the *Guidance*, while remaining within the scope of the AOC program. According to the White Lake PAC's criteria, the Eutrophication and Undesirable Algae BUI was to be considered restored when:

1) no waterbodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the current Clean Water Act Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report; and

2) the following average annual concentrations/values meet criteria in White Lake after 5 years.

- *Total Phosphorus – 30 µg/l*
- *Chlorophyll a – 10 µg/l*
- *Secchi Disk depth ~2.0 m*
- *Trophic Status Index – 50-55*

The MDEQ staff searched the *2010 Clean Water Act Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report*, as well as the 2012 draft version of the report, and found that no waterbodies within the AOC were included in either list of impaired waters due to nutrients or excessive algal growths. Therefore, achievement of criterion number one was met.

Beginning in 2009, Dr. Richard Rediske at Grand Valley State University's Annis Water Resources Institute worked with the White Lake PAC to evaluate existing nutrient-related data. Early in the process it was determined that previously collected data showed White Lake had met the State's delisting criteria, in addition to meeting the more specific locally-developed criteria, between 2004 and 2006. Although the mean values for some parameters (i.e., Chlorophyll *a* in 2006) slightly exceeded the local criteria (10.3 µg/l vs 10 µg/l), data averaged over three years showed that the delisting targets were met. The grand mean for the Trophic Status Index (TSI) during 2004-2006 was 50, indicating that White Lake was in the target range (50 - 55). Since the TSI integrates Chlorophyll *a*, Total Phosphorus, and Secchi Disc Depth, these data demonstrated that water quality was significantly improved and that eutrophication was no longer an impairment in White Lake.

One aspect of the local criteria specified by the White Lake PAC for meeting annual water quality standards was that a five year interval between samplings be used for the assessment. This requirement was meant to ensure that water quality targets were being met over a longer period of time rather than merely during a single annual sampling. Therefore, additional monitoring was conducted.

Water quality sampling was coordinated by Dr. Rediske in 2011. Samples were collected on July 19, (summer) and October 24, (fall turnover) at three locations. Mean total phosphorus (TP) and Chlorophyll *a* results were below the target values during the summer and fall sampling events. Secchi Disc depth exceeded the target values. The 2011 results were similar to 2005 data and were below target values indicated in criterion number two. The Trophic Status Index Total was calculated to be 50 during the summer and 48 for the fall sampling event, both consistent with the target value developed by the PAC. The results indicate that the restoration progress of White Lake achieved the target values for removal of the Eutrophication or Undesirable Algae BUI.

The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/Final_White_Lake_Eutrophication_Removal_Recommendation_2012_445447_7.pdf.

Notwithstanding the restoration of the Eutrophication BUI, excess nutrient inputs present continual challenges for White Lake and indeed for surface waters throughout North America. Beyond the scope of the AOC program, the White Lake PAC continues to advocate for the implementation of additional management practices to keep nutrient levels in check.

4.3 Degradation of Benthos, removed June 2012

Because of the importance of White Lake as a recreational resource and due to 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:

Indicator	*Target*
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^2)	*> 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 4) *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 4). *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.*

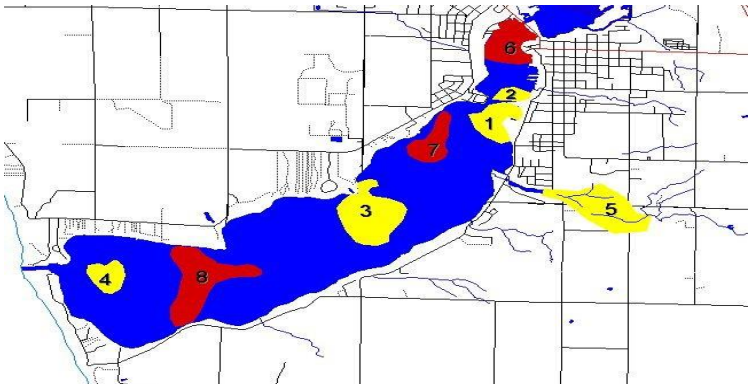

Figure 4. White Lake Sampling Areas for Benthic Survey

Assessment Results

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 percent for 18 of the 19 sites, while the survival rate at the remaining site was 78 percent, comfortably meeting the target of 60 percent, set by the White Lake PAC.

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 percent survival was achieved. Actual survival rates were 78 percent and above, again, comfortably meeting the target.

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 six of White Lake (Figure 4). 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.

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 4, before and after contaminated sediment remediation. Among the findings of this assessment, the percentage of Oligochaetes decreased from 65 percent in 2001 to 53 percent in 2009, below the target of 75 percent. Chironomid population densities exceeded the restoration target of 500 per square meter, averaging 937 per square meter. Shannon-Weaver species diversity increased from 1.38 prior to initiation of remedial activities to 1.52, which exceeds the target of 1.5.

Area 5 in Figure 4 is Mill Pond Creek. This was not assessed by Rediske because, as a wadeable stream, it required employment of the MDEQ's Surface Water Assessment Section Procedure 51 for wadeable streams. 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 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 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.

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. The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/Final_Benthos_Removal_Recommendation_2012_445449_7.pdf.

4.4 Restrictions on Fish Consumption, removed February 2013

In 2008, the White Lake PAC submitted, and the MDEQ approved, locally-developed targets which are functionally equivalent to Tier 2 of the *Guidance* for this BUI. Those targets focus on the edible portions of largemouth bass and common carp. The target itself is paraphrased as follows: the BUI will be considered restored when contaminant levels in edible portion analyses of key fish species are not significantly different from Pentwater Lake for two consecutive five year sampling periods. An analysis of covariance will be conducted to determine if there are statistically significant differences between the two lakes. Fish size serves as the covariate. If a significant difference between fish contaminant levels in White Lake and Pentwater Lake is present at the end of the monitoring period, all available fish contaminant monitoring data for White Lake will be evaluated for a decreasing trend in concentration. In this situation, the BUI will be considered restored when edible portion analyses of key fish species in White Lake show a similar decreasing trend as other appropriate Great Lakes trend sites. [The results of both 2006 and 2011 analyses showed no significant difference in contaminant levels between White and Pentwater Lakes. Therefore, the trend analysis was not required.]

Pentwater Lake is similar in geographic location but did not have the intensity of industrial operations impacting water quality that White Lake did, making it suitable as a control site. For purposes of the comparison study, the edible portions of largemouth bass and carp were analyzed for two consecutive five-year periods by Dr. Richard Rediske, with the Grand Valley State University Annis Water Resources Institute. Largemouth bass were selected as an important resident game fish species in White Lake. Carp are consumed by subsistence fishermen and have a greater exposure to contaminated sediments than most game fish due to their feeding behavior.

Michigan Department of Community Health (MDCH) fish consumption advisories remain for White Lake and for every waterbody in the state, due to mercury contamination throughout the Great Lakes region. The research supporting the recommendation to remove the Restrictions on Fish Consumption BUI demonstrates that there is no statistically significant difference in fish tissue concentrations of contaminants causing fish consumption advisories in the AOC compared to the control site, not whether fish advisories exist in the AOC or the control site. Please refer to the MDCH, Eat Safe Fish guide for all fish consumption guidelines at www.michigan.gov/eatsafefish. The AOC program has reached the goal of demonstrating that conditions in the AOC are no different than conditions in comparable non-AOC areas, with regard to fish contaminant concentrations. All known local sources of mercury and PCB inputs to White Lake have been controlled, and depositional areas in the lake were removed by dredging.

Analysis

Dr. Rediske, staff, and students collected and analyzed fish from Muskegon Lake, Pentwater Lake, and White Lake in 2006 and 2011. The assessments were designed to focus specifically on Tier two of the *Guidance* and the White Lake target described above, comparing AOC fish tissue to the control site. The full scope and methods can be found in Dr. Rediske's reports, which are fully referenced in the removal documents linked at the end of this section.

In 2006, ten carp and ten largemouth bass were analyzed for PCBs and mercury (Figures 5 and 6). There was no statistically significant difference in concentrations of PCBs and mercury in largemouth bass from White Lake and Pentwater Lake. There was also no significant difference in concentrations of PCBs and mercury in carp from the lakes. Contaminant

concentrations varied with fish size; however, there were no statistically significant differences between length, weight, and percent lipids of the sample groups between Pentwater Lake (control) and White Lake.

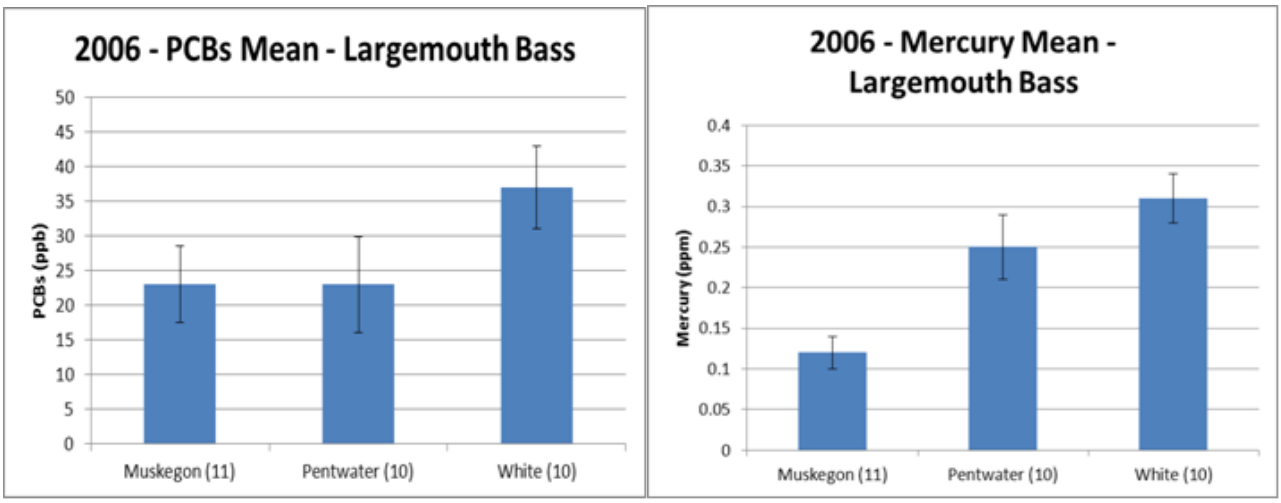

Figure 5: PCB and mercury data from largemouth bass in Muskegon, Pentwater, and White Lakes with the number of fish analyzed in parenthesis after the lake name. Mercury is in parts per million and PCBs in parts per billion. The vertical lines on the graphs represent the standard error.

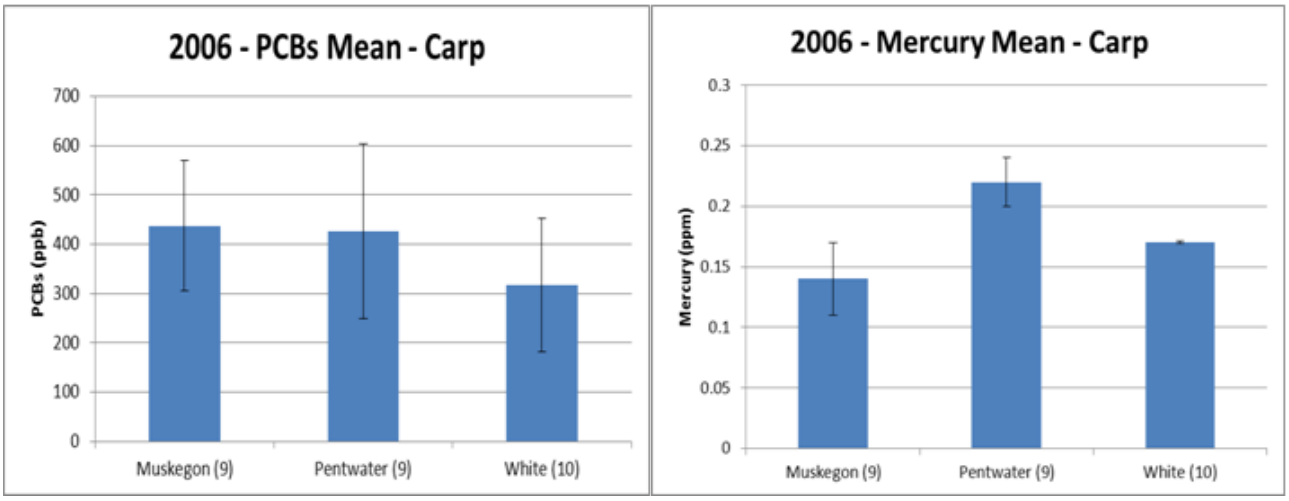

Figure 6: PCB and mercury data from carp in Muskegon, Pentwater, and White Lakes with the number of fish analyzed in parenthesis after the lake name. Mercury is in parts per million and PCBs in parts per billion. The lines on the graphs represent the standard error.

In 2011, ten largemouth bass were taken from both White Lake and Pentwater Lake with a size range of 30-42 cm. Twenty carp were taken from each lake with a size range of 49-71 cm. The sample size of the carp population was increased to raise the confidence level of the results. There was no statistically significant difference between PCBs and mercury in largemouth bass from White Lake and Pentwater Lake (Figure 7). There was also no difference between PCBs and mercury in carp from White Lake and Pentwater Lake (Figure 8).

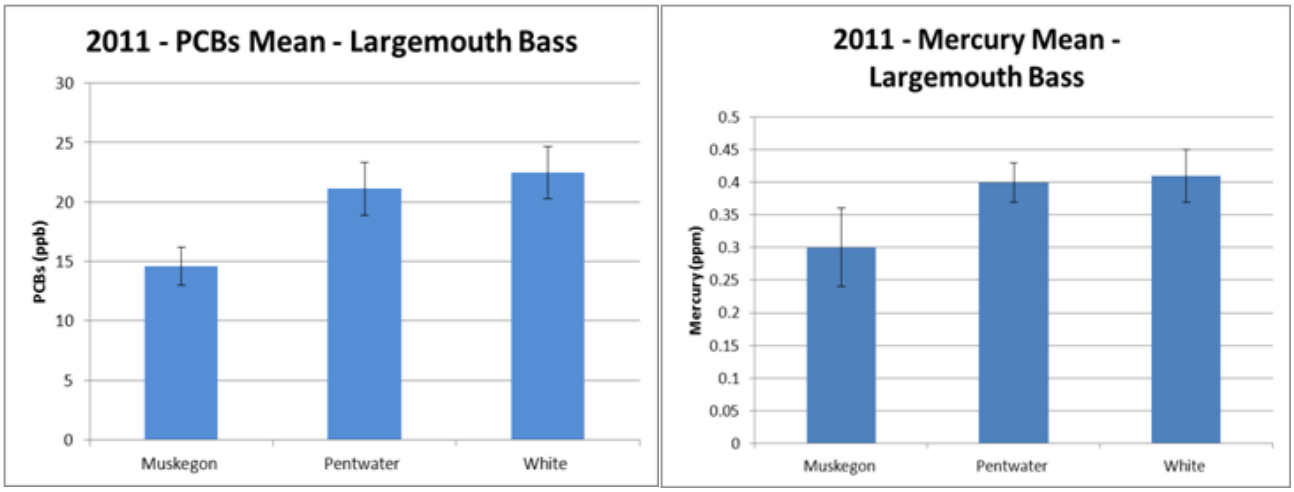

Figure 7: PCB and mercury data from largemouth bass in Muskegon, Pentwater, and White Lakes. Mercury is in parts per million and PCBs in parts per billion. The vertical lines on the graphs represent the standard error.

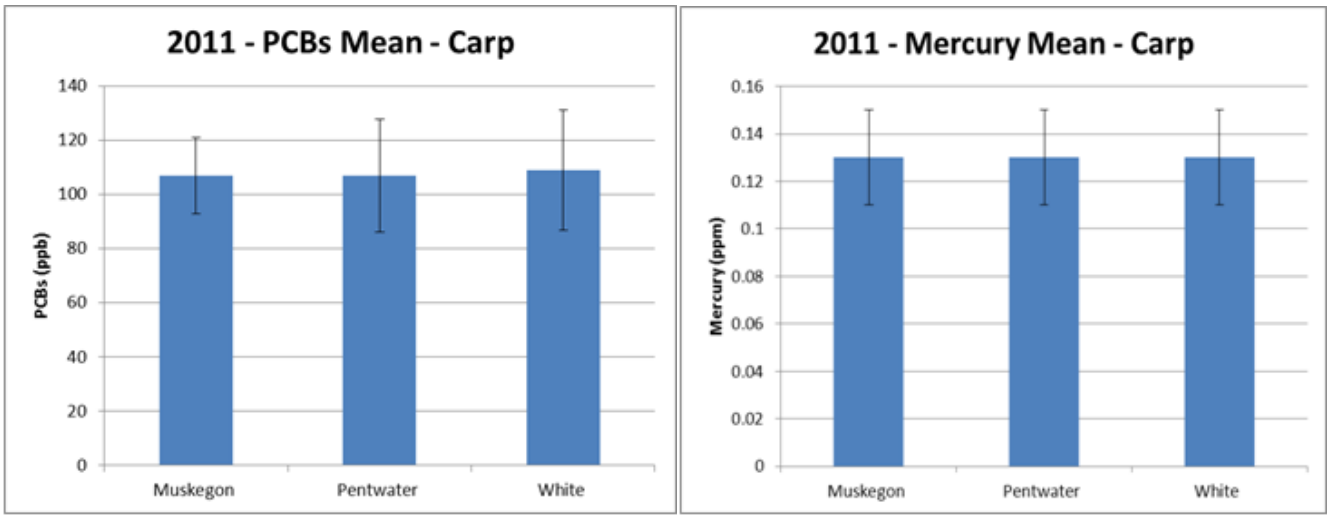

Figure 8: PCB and mercury data from carp in Muskegon, Pentwater, and White Lakes. Mercury is in parts per million and PCBs in parts per billion. The vertical lines on the graphs represent the standard error.

Conclusions

A comparison of the 2006 with the 2011 data indicated that mean concentrations of PCBs in largemouth bass decreased in both lakes over the five year period, while mercury concentrations rose slightly in both. The increase in mercury is thought to be the result of a regional phenomenon, such as atmospheric deposition.

From 2006 to 2011 mean concentrations of PCBs in carp decreased by about 75 percent in Pentwater Lake, while they decreased by about 66 percent in White Lake. Mean concentrations of mercury in carp rose slightly in both lakes.

The results from the 2006 and 2011 fish tissue sampling found no statistically significant difference between the White Lake AOC and the control site. Therefore, according to the *Guidance* restoration criteria outlined above, this BUI was restored in the AOC. The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/Musk_White_Lakes_Fish_BUI_Removal_FINAL_444369_7.pdf?20140128142832.

4.5 Degradation of Aesthetics, removed March 2014

In 2009, the MDEQ approved local aesthetics criteria, developed by the White Lake PAC, that parallel the state criteria and additionally specify that particular "important public areas" do not exhibit any designated use impairments, as follows:

> *The **Degradation of Aesthetics BUI** will be considered restored when monitoring data for two successive monitoring cycles indicates that important public areas in the White Lake AOC do not exhibit persistent, high levels of the following "unnatural physical properties"* (as defined by Rule 323.1050 of the Michigan WQS) *in quantities which interfere with the State's designated uses for surface waters: …*
> *Important public locations in White Lake include: the Bush Creek/east bay and Genesco property where hides are present, shallow water areas with submerged debris, and the abandoned Whitehall and Montague dumps in the wetlands*.

The White Lake AOC was assessed on July 12, 2011, and June 27, 2013. See Figure 9 for locations. Five sites were assessed from shore, including: Covell Park, the former Montague dump site, Maple Grove Beach, East Tannery Bay, and Mill Pond Park. The initial assessment was completed prior to the start of any shoreline habitat restoration work. The second assessment was completed following those restoration efforts. Approximately 70 photos were taken and 30 water samples were assessed through both monitoring cycles.

Figure 9. White Lake Aesthetics Monitoring Locations

The first assessment near the former Montague Dump site was conducted adjacent to the footbridge where the White River empties into White Lake. The second assessment at that location was moved a couple hundred yards west to capture the restoration of the former dump site following removal of trees, landfill waste and the re-grading and re-planting of the area. Small pieces of glass and other remnants of trash from the former landfill were observed on top of the soil in the newly restored area.

Covell Park was chosen as a monitoring site for its proximity to the area previously used as a dump on the Whitehall side of the causeway. Apparently, the actual location of the former dump site was capped and made into what is now known as Lions Park. Lions Park was dismissed as a monitoring location due to the wall of vegetation that restricted useful observation to just a few feet, in addition to the absence of any potentially aesthetically impaired conditions.

Fish, ducks, swans, and other birds were commonly observed at most locations, as were people fishing from boats and evidence of people having fished from

shore: Children were observed playing on the Maple Grove Beach shoreline during the second assessment. Sailboats were observed on the lake near Mill Pond Park during the first assessment.

Throughout both assessments, all water samples collected were clear and free of color or any suspended sediment. None of the samples contained any detectable unnatural odors. A small amount of trash was noted along the shorelines, including empty bait containers, occasional candy wrappers, and empty bottles. No oil sheens, foams, films, scum, or discolorations were observed at any monitoring site during either of the assessments.

Slab wood was observed in shallow water in the East Tannery Bay, at Mill Pond Park, and to a far lesser degree, at Maple Grove Beach during both assessments. During visits to East Tannery Bay in January and May of 2013, when lake water levels were significantly lower than when the aesthetics assessments took place, tannery hides, bricks, glass, and slab wood were all observed along the exposed shoreline. The debris was less visible and less accessible when the water level was higher, causing it to be largely submerged.

Although there is no doubt that this debris is unsightly and does not belong, there is no evidence to suggest that any of the state's designated uses are impaired as a result of its presence. In areas where tannery wastes have been found along with liquid process wastes, chemical analyses may result in the presence of metals. However, the scrap hides along the shoreline do not appear to co-occur with liquids, sludge, or other process waste of any kind. Rooted aquatic vegetation and fish were observed in the water in this area, indicating no impairment to the ability of those organisms to live and thrive. Empty bait containers along the shoreline suggest that people fish in the East Tannery Bay area.

Michigan's Water Quality Standards list the following designated uses for surface water quality to be protective of: navigation, industrial water supply, agriculture, public water supply at the point of intake, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and total body contact recreation during the warm weather months. Following two monitoring cycles, it is the opinion of the MDEQ staff that there are no designated use impairments resulting from the existence of debris along the shoreline of East Tannery Bay, nor is there a designated use impairment at any other aesthetics monitoring location in the White Lake AOC.

The MDEQ acknowledges and appreciates the White Lake PAC's concern regarding residual tannery hides and other debris along the shoreline of the East Tannery Bay area. We encourage the community and the property owner to continue working to address these conditions. However, the position of the MDEQ is that this debris does not exist in quantities that interfere with any of the State's designated uses for surface waters and therefore no longer constitutes an impairment.

On the other side of the tannery peninsula, the USEPA completed remedial activities in Tannery Bay in early November 2013. This remediation was done in the area adjacent to remedial work that was completed in 2003, but generally nearer to the shoreline. Apparently, the original project had budget limitations that did not allow for complete removal of contaminants. In 2013, approximately 8,630 cubic yards of discolored sediment, hair, and associated tannery process waste were removed, dewatered, and disposed. The area was subsequently backfilled with clean sand. Consistent with discussions with the White Lake PAC leading up to the project, the Tannery Bay cleanup was the final on-the-ground remedial activity required to restore the Aesthetics beneficial use. In accordance with the state's

Guidance and with the support of the White Lake PAC, the Degradation of Aesthetics BUI was restored. The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/Final_White_Lake_Aesthetics_Removal_Recommendation_443801_7.pdf?20140402095826.

4.6 Restrictions on Drinking Water Consumption, removed March 2014

The State's *Guidance* provides the following requirements for removal of the Restrictions on Drinking Water Consumption impairment:

> *This BUI will be considered restored when monitoring data for 2 years indicates that public water supplies:*
>
> - *meet the current and most stringent human health standards, objectives, or guidelines (at the point of distribution into the water system) for levels of disease-causing organisms, hazardous or toxic chemicals, or radioactive substances; and*
> - *treatment needed to make raw water potable and palatable does not exceed standard methods in those supplies. In the event a public drinking water intake must be closed due to contamination of surface water, standard treatment methods are considered to have been exceeded.*

Local Criteria *Proposed*

In 2008, the White Lake PAC submitted the following as part of its request to the MDEQ for approval to become the applicable local criteria required for restoration of the Restrictions on Drinking Water BUI:

> *Currently, all public drinking water supplies in the White Lake area utilize groundwater resources. Because of the importance of groundwater as the only potable water source currently available in the White Lake AOC, the history of severe groundwater contamination, and the presence of large areas of contaminated groundwater that are undergoing remediation and further delineation, the White Lake Public Advisory Council has voted to adopt a target for delisting the Restrictions on Drinking Water Consumption BUI that is more restrictive than the State of Michigan criteria and includes the protection of critical groundwater resources. The proposed delisting target is:*
>
> > *This BUI will be considered restored when monitoring data for 2 consecutive years indicates:*
> >
> > *1. All public and private drinking water supplies contaminated due to Resource Conservation Recovery Act and Comprehensive Environmental Response Compensation and Liability Act sites meet the MDEQ criteria for potable water based on annual monitoring. Public water supplies include associated wellhead protection areas.*
> >
> > - *DuPont*
> > - *Muskegon / Koch Chemical*
> > - *Hooker / Occidental Chemical*
> > - *Whitehall Well #3*
> >
> > *2. Sites outside of RCRA and CERCLA areas, with known groundwater contamination such as Part 201 sites, will be documented and remediation/monitoring efforts recorded. If site impacts groundwater and contamination exceeds MDEQ criteria for drinking water, an alternate supply source (public or private) of potable water must be available to the impacted landowners. In addition, contamination plumes must be delineated, migration pathways documented, and an approved MDEQ/EPA remediation plan established for each site. Effectiveness of each remediation plan will be confirmed by annual monitoring. The WLPAC identifies the following sites where contaminated groundwater may pose a threat to drinking water:*
> >
> > - *White Lake Landfill / Shellcast*
> > - *Anderson Road Plume (Tech Cast)*
> > - *Howmet*
> > - *Silver Creek / Whitehall Wastewater*

In a letter dated May 28, 2009, the MDEQ responded to the White Lake PAC's request for approval of its proposed criteria in relevant part as follows:

> *The White Lake PAC and the DEQ have worked diligently for the past year to negotiate local criteria for the Restrictions on Drinking Water Consumption or Taste and Odor BUI that balance community standards for environmental restoration with the DEQ's concerns regarding the overall scope of the AOC program. Unfortunately, we have been unable to agree on criteria that achieve that balance despite these efforts.*
>
> *Portions of the proposed local criteria for this BUI invoke other regulatory programs in a manner that is not necessarily consistent with their legal authority. While the DEQ does have programs in place to address contaminated groundwater, it is not an issue the AOC program was intended to address under Annex 2 of the 1987 Amendments to the Great Lakes Water Quality Agreement except in situations where it vents to surface waters. Annex 16 of the Agreement is devoted to contaminated groundwater.*
>
> *Historical records document a long-standing disagreement between the White Lake PAC and the agencies administering the AOC program over whether groundwater contamination that does not affect White Lake must be addressed as part of this BUI. There is considerable documentation of the White Lake PAC's interest in remediating contaminated groundwater that could serve as a source of drinking water. The DEQ recognizes that contaminated groundwater is of major concern to the community and is likely to remain a long-term problem in the area. However, clean drinking water is available and corrective actions to protect White Lake are in place.*
>
> *Therefore, the DEQ approves only that portion of the local criteria for this BUI taken from the statewide criteria.*

Despite the fact that the MDEQ did not approve the local criteria that were proposed, the White Lake PAC continues to advocate that specific areas of groundwater contamination must be adequately characterized, monitored, and slated for remedial action. The MDEQ and USEPA both agree on the importance of cleaning up contaminated groundwater in these areas. Regulatory programs are in place to do just that. Unfortunately, the pace of those clean ups is slower than the parties would prefer. However, the AOC program at either the federal or state level does not have legal authority to require additional remedial activities.

In an internal memo (Attachment K) dated June 19, 2013, regarding the DuPont site in Montague, the Chief of the MDEQ's Office of Waste Management and Radiological Protection (OWMRP) stated that, "DuPont will be required to continue with the investigation and remedy evaluation and selection Process for the remaining ten (waste management) units identified above." Out of 18 waste management units on the DuPont property, no further corrective action is required for seven of them. As for the remaining ten units, the memo goes on to state, "The final remedy proposals will be subject to public participation and review and approval by the OWMRP. Implementation of the final remedies will then occur."

Progress in the cleanup of the DuPont property will continue regardless of the status of the Restrictions on Drinking Water BUI, as the memo points out. "The corrective action obligations described herein are independent of any other state or federal requirements. Neither the removal of the Beneficial Use Impairment for White Lake nor the removal of the listing of White Lake as an AOC under the program established pursuant to the Great Lakes Water Quality Agreement between the United States and Canada will have any bearing on DuPont's corrective action obligations. The OWMRP will work with DuPont and continue its oversight of activities at the facility to ensure that the corrective action process progresses forward."

The AOC program has supported the White Lake PAC and the Muskegon Conservation District in particular, in their efforts to document the current status, extent of contamination, required next steps, monitoring plans, and any other relevant information pertaining to groundwater contamination sites around the White Lake community. Some of those sites have been documented as closed, others no longer pose a threat to the surface water of White Lake or private drinking water wells in the vicinity, but at least one site requires ongoing remedial activities to eliminate those threats. The Conservation District has drafted a document that describes the most up to date information available on each of these sites. The AOC program supports continued investigation and remediation of these sites as appropriate, but maintains the position that this work is beyond what the AOC program is able to address with the legal authority, funding, and other tools available to it.

PAC Support for BUI Removal

The White Lake PAC maintains its position that additional groundwater remediation and related actions are necessary to protect environmental and human health in the vicinity, while supporting the removal of the Drinking Water BUI at the same time. The PAC wrote a letter of support that specified its remaining concerns. The following is an excerpt from that letter, dated December 19, 2013 (Attachment J):

> *State and federal environmental authorities have considered that public drinking water supplies have met state water quality standards since 2006. However, because the two cities, Montague and Whitehall, rely on groundwater for drinking water and many private residents rely on private wells, the PAC added additional criteria for removal of this Beneficial Use Impairment. The PAC stipulated confirmation that pollution at area contaminated sites is controlled, with cleanup plans and monitoring in place, to ensure there are no existing or imminent threats to public and private drinking water supplies.*
>
> *In 2011, the Muskegon Conservation District (MCD), which supplies administrative and technical support to the PAC, was provided federal financial support to research and document that local criteria for the drinking water impairment have been met. Over the course of its research, MCD staff developed a briefing report and determined that all but the following area sites currently meet the local criteria:*
>
> *1. Anderson Road/Tech Cast area*
> *2. Former Whitehall wastewater facility*
> *3. E.I. DuPont de Nemours*
>
> *At its December 5, 2013 meeting, recognizing that our public drinking water supplies have met state and federal water quality criteria for participation in the Area of Concern program, the PAC voted unanimously to support approval of removal of the Drinking Water Consumption or Taste and Odor Problems Beneficial Use Impairment, acknowledging the following work remains for the three sites:*
>
> ***Anderson Road/Tech Cast area***
> *Enactment by the City of Montague of an ordinance disallowing the use of groundwater by private residences in the plume area.*
>
> ***Former Whitehall wastewater facility***
> *Finalization of a Remedial Action Plan by the county of Muskegon to address control of contaminants at the site and institutionalize monitoring programs and protocols.*

E.I. DuPont de Nemours
A completed investigation and Remedial Action Plan for the site. E.I. DuPont de Nemours has not yet completed its investigation of suspected sources of soil and groundwater contamination at the site and a completed Remedial Action Plan appears to be, at minimum, several years in the future. The PAC is reviewing available information to confirm that private drinking water wells in the vicinity of the Pierson Creek landfill on the site are not impacted nor threatened by contamination. We have also formally requested that the Michigan Department of Environmental Quality (MDEQ) continue its regulatory oversight of the site in a timely fashion. Finally, the PAC has informed the White Lake area's state elected officials about the status of the site, and they have communicated their willingness to help ensure the site remains a state priority.

The PAC has reviewed the formal documentation prepared by the MDEQ regarding removal of the Drinking Water Consumption or Taste and Odor Problems Beneficial Use Impairment and agrees that removal criteria have been met, while acknowledging the outstanding issues relating to local criteria summarized in this letter. We request acknowledgement of these outstanding issues by the MDEQ.

In response to the stated concerns of the community, the MDEQ acknowledged the validity of those concerns and stated its agreement that additional steps should be taken to ensure the protection of human and environmental health with regard to contaminated groundwater in a letter dated January 13, 2014 (Attachment L), which is excerpted in part here:

While the Office of the Great Lakes (OGL) is confident that the state's restoration criteria for this BUI have been met, we understand that the White Lake Public Advisory Council (PAC) remains concerned about the current status of three sites of groundwater contamination in the area. Those three sites appear to pose no threat to public drinking water supplies in the White Lake area. However, there may be some potential for private wells to be affected. There are a number of actions, both proposed and underway, that should minimize the risk and address these issues.

Specifically, residents of the Anderson Road/former Tech Cast area could be protected by a local ordinance that restricts use of private wells for domestic water supplies in the affected area. The OGL would favor such an ordinance.

With regard to the former Whitehall wastewater treatment facility, the OGL understands that a remedial action plan is being developed by the Department of Environmental Quality (DEQ) and Muskegon County. The OGL supports the effort to complete this plan and institute continuing remedial activities and long-term monitoring in the area.

Finally, the OGL also supports ongoing remedial investigations and the development of a remedial action plan to address contaminants at the DuPont property, along with any potential off-site migration. The DEQ's Office of Waste Management and Radiological Protection will continue to work with DuPont, according to the established regulatory framework, until the DEQ is satisfied that regulatory requirements have been met.

The OGL applauds the PAC's efforts to ensure that groundwater contamination sites in the White Lake area do not threaten the health of the people living in the community. We also appreciate the fact that you would like these sites to be fully remediated as soon as possible.

While much has been done over the years to clean up many sites around White Lake, we acknowledge that the work is far from over. We encourage you to continue working with us and with other agencies to address local environmental issues and restore the White Lake Area of Concern.

Assessment Results

When assessing whether the White Lake community's public water supplies are meeting the established restoration criteria, we again look to the state's *Guidance for Delisting Michigan's Great Lakes Areas of Concern*:

> *The U.S. EPA establishes and enforces drinking water standards nationwide. The state adopts and enforces those standards under the Michigan Safe Drinking Water Act (Act 399, 1976 as amended). The MDEQ carries out the community public water supply program directly, and contracts with local health departments to issue construction permits, oversee the monitoring, and carry out enforcement for noncommunity public water systems.*
>
> *Under the Michigan Safe Drinking Water Act, public water suppliers in Michigan must submit regular reports of treated water quality to the MDEQ. The MDEQ will use these reports to evaluate whether this BUI has been restored.*

According to the MDEQ Office of Drinking Water and Municipal Assistance, Community Drinking Water program, neither the Whitehall nor Montague public water supply systems had any water quality violations in more than two years based on review of laboratory reports, chemical monitoring data, and annual water quality reports for 2011 and 2012. The water quality reports, also referred to as Consumer Confidence Reports, provide annual water quality monitoring results based on all state and federal water quality standards, and are sent to citizens served by the facilities.

Based on the review of all available chemical monitoring data, water quality reports, and communication with technical staff, both drinking water supplies meet all federal and state drinking water standards for water quality during the relevant time period. Each drinking water supply employs conventional treatment methods (i.e., filtration and disinfection) to treat source water. Treatment has not exceeded standard methods, nor have there been any incidences of municipal well closures during the last two years. Both Whitehall and Montague drinking water sources are groundwater from municipal well fields.

Portions of the White Lake area continue to utilize private drinking water wells. Private drinking water supplies are outside the scope of the AOC Program. Potential issues related to private drinking water sources are addressed by the MDEQ Office of Drinking Water and Municipal Assistance, the MDEQ Remediation and Redevelopment Division, the MDEQ Office of Waste Management and Radiological Protection, and the Muskegon County Health Department. In accordance with the criteria set forth in the Guidance, the Restrictions on

Drinking Water Consumption BUI is restored. The complete Removal Recommendation and all supporting data can be found at:
http://www.michigan.gov/documents/deq/Final_White_Lake_Drinking_Water_Recommendation_with_Attachments_opt_449992_7.pdf?20140402095826.

4.7 Degradation of Fish and Wildlife Populations, and Loss of Fish and Wildlife Habitat, removed concurrently in April 2014

This section addresses two separate, but related BUIs: Degradation of Fish and Wildlife Populations and Loss of Fish and Wildlife Habitat. The PAC developed site-specific criteria for these BUIs by considering fish populations and habitat separately from wildlife populations and habitat. Using layers of Geographic Information Systems (GIS) mapping technology, the PAC was able to establish restoration priority rankings for several parcels of property (both privately and publicly-owned), based on habitat value and other relevant characteristics. This process was especially critical to the creation of the wildlife restoration criteria. Now that targets have been met for both fish and wildlife, the GLWQA-identified BUIs can be removed. Throughout this section, text formatted in italics indicates direct quotation of the local criteria developed by the White Lake PAC.

"Fish Habitat and Populations" Removal Criteria

In 2009, the White Lake PAC submitted and the MDEQ approved local criteria consistent with the *Guidance*, focusing on restoration of Fish Habitat and Populations, as follows:

- ***Maintain an average IBI score of 43 ± 4 for three consecutive years.*** *This numerical target is based on the mean and standard deviation IBI score for White Lake during the past three years (2004, 2005 & 2006, Figure 8). On average, 68 percent of observations should be within one standard deviation of the mean, assuming the population is normally distributed.*
- ***If target is not achieved*** *(i.e., average IBI score <39),* ***then fish monitoring will continue for an additional 3 years to determine whether the numerical target is achieved.***
- ***Fish sampling will occur in other drowned river mouth lakes to provide an opportunity to determine whether temporal trends in IBI scores are specific to White Lake or associated with regional fluctuations in biotic and abiotic factors****; especially Pentwater and Kalamazoo (Figure 8). For instance, if regional fluctuations, not associated with human-induced disturbance, caused multiple drowned river mouth lakes to experience declines in IBI scores, then the numerical target for White Lake should be reassessed to determine its scientific validity (i.e., the numerical target may need to be shifted).*

A multi-metric index—termed an index of biotic integrity or IBI—will be used to set quantitative delisting targets for White Lake based on annual fish-sampling records collected by the Annis Water Resources Institute (AWRI) between 2004 and 2006. The IBI approach is widely used across the United States to monitor water quality. Fish that live in the water body are integrators of the overall habitat and water quality; they also reveal both episodic and cumulative human-induced disturbance in a system. Fish sampling for calculating IBI scores only will be required annually because the fish themselves are integrators of time (i.e., the fish community is there continuously). A fish-based IBI can be used to address questions concerning both fish populations and fish habitat because it is an indicator of both fish community health and the overall ecological health of the lake.

A typical IBI includes metrics such as number and composition of species sampled, focuses on indicator species that are particularly sensitive to water quality and habitat alterations, and considers groups of organisms that have similar feeding modes. Once the sampling is completed, scientists calculate a "score" for each metric in the IBI. The final IBI score is the total of all metrics and is indicative of ecosystem health. A high

score suggests a "healthier" ecosystem, whereas a low score is indicative of a "degraded" ecosystem.

The IBI proposed for use in setting delisting targets in White Lake is modified from a fish-based IBI developed for Great Lakes coastal wetlands. The IBI developed by Uzarski et al. (2005) was modified to better represent human-induced disturbance (based on land use and water quality) across a gradient of drowned river mouth lakes[1]. The disturbance gradient suggested that Pentwater Lake was indicative of a "healthier" ecosystem and Kalamazoo Lake was more indicative of a "degraded" ecosystem among the lakes sampled by AWRI (see Figure 10 for list of lakes). The newly-modified, fish-based IBI consists of 11 metrics (Table 1) and also is being used to set delisting targets for fish populations and habitat in the Muskegon Lake AOC.

The IBI scores calculated during 2005 and 2006 suggest two clusters of lakes in the sample (Figure 8): a group with scores >33 indicative of "healthier" ecosystems and another with scores ≤33 representing "degraded" ecosystems.[2] Moreover, Pentwater Lake has been used as a reference system when setting targets for other beneficial use impairments in the White Lake AOC (i.e., restriction of fish and wildlife consumption and eutrophication or undesirable algae). Therefore, the finding that Pentwater, Muskegon, and White lakes form a group among the lakes AWRI sampled (Figure 10) suggests that they are "healthier" than Kalamazoo and Pigeon lakes.

At least two pieces of evidence suggest that fish populations and, therefore, habitat are no longer severely degraded in White Lake. First, the fish-based IBI calculated from recent years suggests that the ecosystem health of White Lake is comparable to Pentwater Lake, a drowned river mouth lake that did not suffer the types of severe environmental degradation experienced by White Lake. Second, White Lake has a popular and valuable sport fishery, which was noted in the 1987 RAP and both the 1995 and 2002 RAP updates.

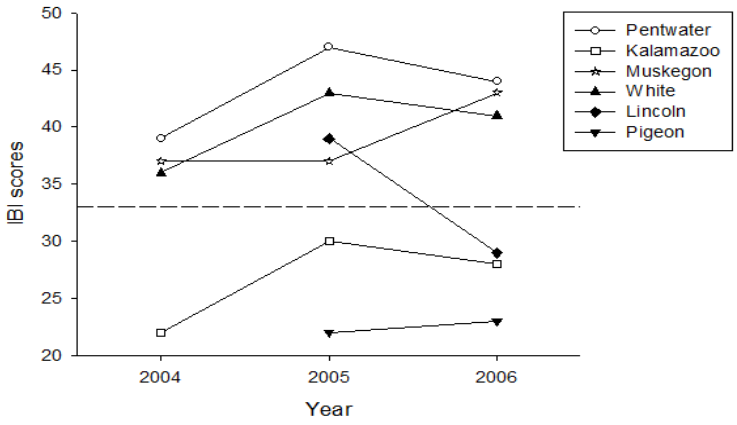

Figure 10. Scores from fish-based index of biotic integrity (IBI) for six drowned river mouth lakes. Data from 2004 was used to build the IBI. The dashed line represents the break (at an IBI score of 33) between relatively "healthy" and "degraded" ecosystems among the six lakes studied. Metrics used in the IBI are described in Table 1.

[1] Note that only the 2004 fish data was used to re-calibrate the IBI proposed by Uzarski *et al*. (2005). There was a significant correlation (r = 0.92, P = 0.076, n = 4) between disturbance gradient and IBI score for 2004. The disturbance gradient was calculated using the approach described by Uzarski *et al*. (2005). Data collected from 2005 and 2006 provide evidence for relatively high precision of the IBI and suggest inter-annual variation is not driving IBI scores (see Figure 10).
[2] The IBI score of 33 was arbitrarily defined based on visual interpretation of Figure 10.

Preliminary Drowned River Mouth Lake IBI – Submerged Aquatic Vegetation habitat only

1. Percent omnivore abundance:
   >70 percent score = 0 | 50 to 70 percent score = 3 | <50 percent score = 5

2. Percent piscivore richness:
   <25 percent score = 0 | 25 to 35 percent score = 3 | >35 percent score = 5

3. Percent carnivore (insectivore+piscivore+zooplanktivore) richness:
   <70 percent score = 0 | 70-80 percent score = 3 | >80 percent score = 5

4. Smallmouth bass (*Micropterus dolomieu*) mean catch per net-night:
   0 score = 0 | >0 to 5 score = 3 | >5 score = 5

5. Insectivorous Cyprinidae richness:
   >3 score = 0 | >1 to 3 score = 3 | 0 to 1 score = 5

6. Percent Centrarchidae abundance:
   0-30 score = 0 | >30 to 60 score = 3 | >60 to 80 score 5 | >80 score = 7

7. Centrarchidae richness:
   0 to 1 score = 0 | >1 to 3 score = 3 | >3 score = 5

8. Mean evenness:
   <0.2 score = 0 | 0.2 to 0.6 score = 3 | >0.6 score = 5

9. Rock Bass (*Ambloplites rupestris*) catch per net-night:
   0 to 1 score = 0 | >1 to 5 score = 3 | >5 score = 5

10. Bluegill (*Lepomis macrochirus*) abundance per net-night:
    0 to 3 score = 0 | >3 to 20 score = 3 | >20 to 30 score = 5 | >30 score = 7

11. *Lepomis* catch per net-night:
    >50 score = 0 | >20 to 50 score= 3 | >5 to 20 score = 5 | 0 to 5 score = 7

Table 1. Metrics for fish-based index of biotic integrity (IBI) for drowned river mouth lakes. The IBI is modified from Uzarski *et al*. (2005). Fish sampling should be conducted with fyke nets (Cooper *et al*. 2007) at shallow (depth ≤1 m) sites with submerged vegetation. At least three fyke nets should be fished at each site. The catch of fish is then standardized across nets at a site to calculate IBI scores.

"Fish Habitat and Populations" Monitoring Results and Analysis

The following are excerpts from Dr. Carl Ruetz' 2011 report, *Evaluating Targets for Delisting Two Beneficial Use Impairments: Loss of Fish Habitat and Degradation of Fish Populations*, and details monitoring results:

> *Sampling was done in July and August of 2009, 2010, and 2011. In each lake, we set three 4-mm mesh fyke nets at each site overnight (approximately 24 hours). The dimensions of the fyke nets are described by Breen and Ruetz (2006). Two of the fyke nets were set parallel to shore with mouths facing each other and connected at the lead. The third fyke net was placed about 30-50 m from the parallel nets, perpendicular to shore, with the mouth facing the shore. Wings of all nets were set at a 45° angle and leads were placed at the center of the mouth of the net.*
>
> *Fish collected from fyke nets were identified to species, measured for total length (cm), and released at the point of capture (except for round gobies Neogobius*

melanostomus, which were euthanized). Any fish that could not be identified in the field was euthanized or a digital photo was taken for identification in the laboratory. For each fish species encountered, a digital photograph was taken for the reference collection. The IBI score was calculated for each site.

A total of 1,100 fish consisting of 23 different species was collected from White Lake over the sampling period. The five species that accounted for most of the fyke-net catch were round goby (26.6 percent), largemouth bass (25.4 percent), pumpkinseed (14.9 percent), yellow perch (13.4 percent), and bluegill (6.2 percent). White Lake varied the least among years (compared to the other drowned river mouth lakes) with the same species dominating each year in similar proportions.

The mean IBI score for White Lake during 2009-2011 was 40.0 (Figure 11), which exceeded the numerical delisting target of 39 set for the loss of fish habitat and degradation of fish populations beneficial use impairments. Moreover, there was not a declining trend in the IBI score for White Lake during 2009-2011, which was a secondary criteria set for the delisting target. Therefore, the numerical delisting target regarding fish IBI scores was achieved.

Following review of the final report and a presentation by Dr. Ruetz, the White Lake PAC agreed that the fish habitat and populations target had been met.

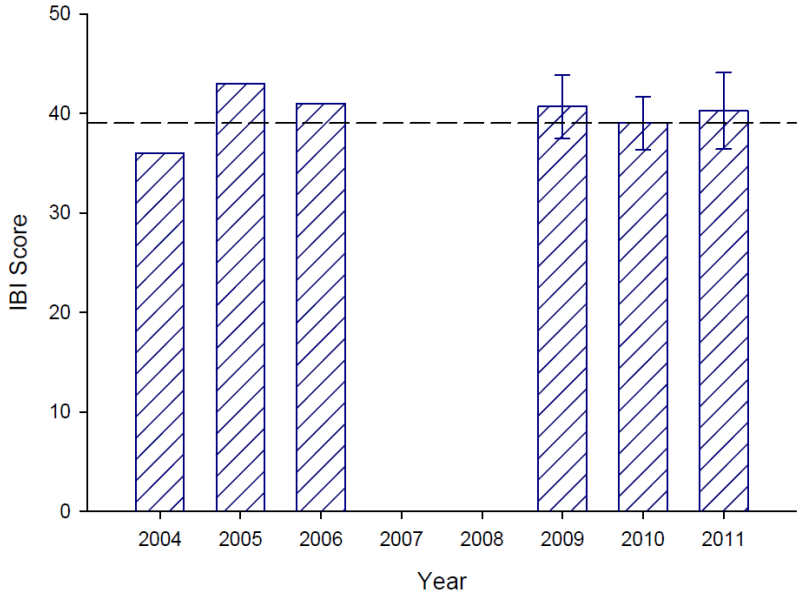

Figure 11. Scores from fish-based index of biotic integrity (IBI) for White Lake. The dashed line represents the numerical delisting target of 39. Error bars represent ± 1 standard error.

"Wildlife Habitat and Populations" Removal Criteria and Results

In 2009, the PAC submitted and the MDEQ approved local criteria, consistent with the *Guidance,* focusing on the restoration of Wildlife Habitat and Populations. The local criteria describe a number of impairments and prescribe activities that were intended to address and correct those impairments. Activities one through three in the criteria below correspond to specific locations indicated in Figure 12. Following each of the listed targets are completed actions describing how those targets were met.

Description of Impairment: *Loss of habitat primarily at northeast end of White Lake, near Whitehall and Montague, due to residential development, marina construction,*

dredging, seawall construction, "weed control", wetland filling, and industrial development. [This impairment was addressed by Activities 1 and 2 below.]

Activity 1: *Critical shoreline areas owned by the City of Montague and City of Whitehall (Fig. 12).*

Restoration Target: Critical areas (30.9 acres)[3] owned by the City of Montague and City of Whitehall are restored and protected through a charter designation or via a conservation easement (see Activity 5 for total restoration acreage).

Completed Actions:
All identified Activity 1 locations in both cities were restored as part of the GLRI habitat project and are protected through long term management agreements, or may soon be covered by charter park designations. The total acreage amounts to 31.59 acres and includes the following sites:

- Montague Dump Site, **3.83 acres**
- Svensson Park, **7.88 acres**
- Causeway, **3.32 acres**
- Montague Boat Launch – Shoreline, **1.51 acres**
- Montague Boat Launch – Two Track, **3.5 acres**
- Maple Beach, **3.45 acres**
- Mill Pond Park, **5.2 acres**
- Weathervane Inn Property, **2.9 acres** (This area was originally thought to belong to the City of Montague and was included in the acreage calculated above, but was subsequently determined to be owned by the Weathervane. It now enjoys a 30 year protective management agreement.)

Target Acreage

At the time the PAC was developing specific criteria for restoration of the wildlife habitat and populations BUI, critical habitat areas (both public and private) were identified for restoration and protection at the northeast end of the lake. The identified critical habitat areas (referred to as Activity 1 and 2 locations) were restored through the GLRI-funded shoreline habitat restoration project, and with additional remediation at the former tannery property. However, it now appears that there were minor discrepancies in the original acreage figures as approved in the local criteria.

Specifically, the total correct acreage for the combined Activity 1 and 2 locations is 40.9 acres. Of that total, the public sites (Activity 1) comprise 30.9 acres, while the private lands (Activity 2) make up 10 acres. The restoration target identified in the local criteria for private lands incorrectly listed the total acreage number, rather than the correct figure.

With regard to Activity 3 locations, areas owned by DuPont and Occidental, the approved restoration target acreage listed is 46.8 acres. According to the Muskegon Conservation District, it was determined during GLRI project implementation that this was an overestimate based on GIS data available at the time and an inability to perform field verifications during criteria development. Keeping in mind that the anticipated restoration work was successfully implemented at the critical habitat areas, the actual areas restored amount to 12.5 acres at the DuPont property and 17.8 acres at Occidental, totaling 30.3 acres.

While these discrepancies may make it appear that site restoration fell short of achieving the intended targets, this is not the case. Restoration targets were determined by identifying parcels of critical shoreline habitat area for protection, all of which were successfully completed, regardless of the acreages specified for each.

[3] Acreage calculations include upland buffers, shoreline, and aquatic bottomlands for sites designated in the White Lake Shoreline Habitat Management Plan.

Activity 2: *Private lands designated as critical habitat[3] (Fig. 12).*

> *Restoration Target:* *Private lands designated as critical habitat (40.9 acres)[3]* [this should be 10 acres, as noted above in the Target Acreage box] *are restored and protected through municipal planning processes, voluntary conservation easements, or deed restrictions. (see Activity 5 for total restoration acreage).*

Completed Actions:
Activity 2 parcel locations were defined as part of the White Lake Shoreline Habitat Blueprint and GLRI Shoreline Habitat Restoration project planning process. All the habitat restoration sites (public and private) originally proposed for inclusion in the GLRI project totaled 40.9 acres, including 10 acres of restored wetlands on the south end of the former tannery property. All private sites are now protected or are in process through conservation easements, deed restrictions, or long term management agreements.

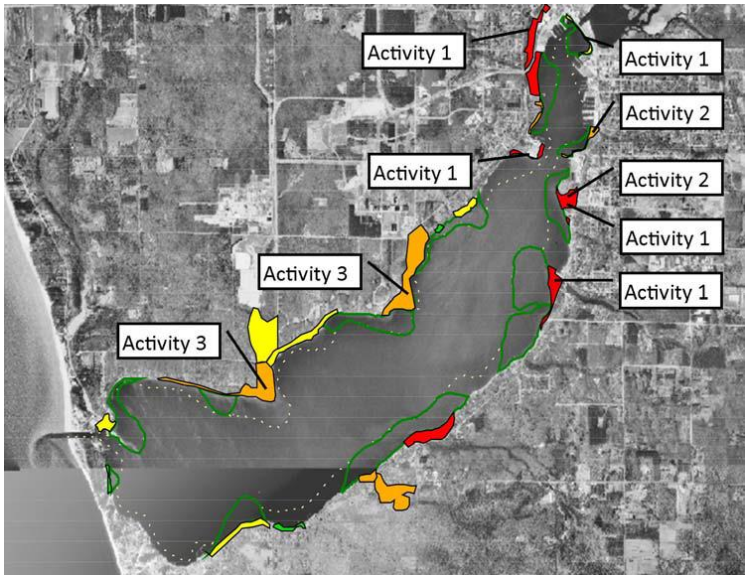

Figure 12. Delisting Target Areas for Activities 1 through 3 with Blueprint ranking criteria map.

Description of Impairment: *Protect large contiguous tracts of shoreline habitat already existing and avoid fragmentation of natural habitat throughout the landscape that is critical to reproduction, growth, and survival of fish and wildlife. With continued sediment and groundwater clean-up activities associated with DuPont and Occidental Chemical, and increased public awareness, the PAC continues to revisit and discuss the same issues (toxicity impacts to habitat and populations, sedimentation, habitat fragmentation, exotic species, and shoreline alteration). Designated areas are two of the largest "natural" shoreline sections remaining.* [This impairment was addressed by Activity 3 below.]

Activity 3: *Shoreline areas owned by DuPont and Occidental (Fig. 12).*

> *Restoration Target:* *Evaluate shoreline areas as part of Activity 4, and restore anthropogenic/industrial impacts at sites owned by DuPont and Occidental (46.8 acres – shoreline/wetland areas only)* [This should be 30.3 acres, as noted above in the Target Acreage box]. *Long term objective to have shoreline acreage*

donated to local municipalities for public use, and placed in conservation easements.

Completed Actions:
A site inspection revealed that all industrial impacts and debris at DuPont were removed, with the exception of a cement 10' x 10' docking platform, which is now privately owned. The Muskegon Conservation District performed invasive species control on the site. The Occidental property was part of the GLRI restoration project and is protected via conservation easement. Restoration and invasive species control work at these two Activity 3 locations was completed, totaling 30.3 acres.

Description of Impairment: *Lack of relevant scientific data on wildlife for White Lake AOC in previous RAP documents. Establish a baseline database of wetland / marsh species within the White Lake AOC which quantifies and qualifies key wildlife species and locations. Utilize database to determine AOC impacts in relation to other Great Lakes marsh sites.* [This impairment was addressed by Activity 4 below.]

Activity 4: *Marsh Monitoring*

Restoration Target: Monitoring data[4] indicates that White Lake "marsh" habitats and populations do not significantly vary from other Great Lakes coastal sites[5].

Completed Actions:
Baseline population studies have been conducted since 2006. Pre-restoration data trends showed the need for restoration in shoreline areas. Muskegon Conservation District staff conducted monitoring beginning in 2010. In 2011 and 2012, both reference and GLRI restoration sites were monitored.

Population dynamics may not show beneficial trends for some time following the completed restoration work at those sites. The MDEQ has agreed to fund an additional three years (2014, 2015 and 2016) of monitoring to fully establish population and community trends at each restoration site and in the AOC as a whole, based on recommendations from Bird Studies Canada. Restoration work is complete and a funded monitoring plan is in place.

Description of Impairment: *Shoreline hardening and filling, alteration of native vegetation, elimination of wetland, shoreline, and littoral habitat, deposition of industrial / construction debris, and habitat fragmentation have all steadily increased during the last 60 years. Original fish and wildlife population decreases and habitat loss have been part of the legacy of industrial contamination on White Lake. Since that period,*

[4] Monitoring data will be according to Bird Studies Canada - Marsh Monitoring Program's protocols and be collected by White Lake volunteers and Muskegon Conservation District staff. All volunteers will be trained by Bird Studies Canada trainers.

[5] Comparisons will be made between White Lake and three other non-AOC Great Lakes coastal sites with similar habitat characteristics and sampling points. Habitat characteristics will be determined by Bird Studies Canada - Marsh Monitoring Program's – Habitat Description protocols; "Monitoring and Assessing Marsh Habitats in Great Lakes Areas of Concern Final Project Report - December 2006". This report summarizes and interprets the final results of a two-year Marsh Monitoring Program project which assessed the health of coastal and inland marsh habitats within and among 12 U.S. and binational Great Lakes Areas of Concern (AOCs). Using a multiparameter approach, marsh health assessments were made to assess the status of five wetland and aquatic-related Beneficial Use Impairments at several selected sites within each AOC and surrounding watershed. http://www.bsc-eoc.org/mmpaocreport2007.html.

issues caused by other urban growth have been more dramatic and been exacerbated because populations and habitats have yet to rebound from original impacts. Restoration work must include areas of original industrial impact as well as other sites indirectly impacted to ensure sustainable habitat and population recovery. [This impairment was addressed by Activity 5 below.]

Activity 5: *Shoreline and Littoral Zone Restoration*

Restoration Target: Initiate restoration and enhancement work on "immediate", "high", and "intermediate" ranked sites and defined in the White Lake Shoreline Habitat Management Plan and delineated in the White Lake Shoreline Habitat Restoration Blueprint. Implement the following restoration work delineated in the blueprint including:

- *Soft engineering work (11.7 acres total)*
- *Shoreline and littoral zone enhancement / re-establishment (25.6 acres total)*
- *Removal of debris (5.6 acres total)*
- *Conservation easement and shoreline protection workshops (2 sessions)*
- *One-on-one landowners assistance (119 acres total)*
- *Establishing shoreline buffers (17.5 acres total)*
- *Exotic species control (29.6 acres total)*

Completed Actions:
Work completed as part of the GLRI shoreline habitat restoration project, Fish and Wildlife Landowner Assistance project, and other efforts by the Muskegon Conservation District include:

- Soft engineering work (53.03 acres)
- Shoreline and littoral enhancement (38.16 acres)
- Removal of debris (51,851 cubic yards, over 7.9 acres)
- Conservation easement and shoreline protection workshops (2 sessions as part of the Fish and Wildlife Landowner Assistance project)
- One-on-one Landowner Assistance (236 acres, not including phragmites control work in the summer of 2013)
- Establishing shoreline buffers (24.27 acres)
- Exotic species control (34.62 acres, not including phragmites control work in the summer of 2013)

In almost every case as noted above, the actions completed were in excess of the target acreages listed in the restoration criteria.

Therefore, with the support of the PAC, in accordance with the state's *Guidance*, and consistent with the local criteria developed for the White Lake AOC, the Loss Fish and Wildlife Habitat and the Degradation of Fish and Wildlife Populations are restored. The complete Removal Recommendation and all supporting data can be found at: http://www.michigan.gov/documents/deq/White_Lake_FW_Hab_Pops_Removal_Recommendation_446204_7.pdf?20140402095826.

5. POST-DELISTING RESPONSIBILITIES AND MONITORING

While AOC-based restoration work is complete and all eight BUIs have been removed from the White Lake AOC, it is prudent to monitor natural system recovery, particularly as it relates to wildlife. Relatively speaking, changes in wildlife habitat should be reflected in the populations and community assemblages within a short time period. The Muskegon Conservation District has agreed to conduct avian and amphibian population monitoring in consultation with Bird Studies Canada, and with the support of the MDEQ and the USEPA during 2014, 2015, and 2016. A final report will be submitted in early 2017 that chronicles the findings of the monitoring program which actually began in the area in 2006. It is anticipated that the results may show significant changes in both bird and frog communities, given their susceptibility to habitat alteration. White Lake wetland and riparian habitats appear to have improved during the period so far. This monitoring program is intended to demonstrate and quantify to what extent those improvements are changing faunal community makeup.

Independent from the restoration of BUIs and delisting of the White Lake AOC, White Lake Association members voluntarily monitor water quality parameters at regular intervals, following protocols established through the Michigan Clean Water Corps. This includes tracking changes in the lake's nutrient concentrations and trophic status, assessing the lake's macrophyte community (including native and nuisance exotic species), and maintaining vigilance for potential introductions of invasive plant and animal species (including cyanobacteria).

The MDEQ's Resource Conservation and Recovery Act (RCRA) program remains committed to active engagement in the ongoing remediation of the DuPont property, as indicated in an internal memo from the MDEQ's Office of Waste Management and Radiological Protection, dated June 19, 2013, (Attachment K). The RCRA program operates within a regulatory framework, where both the MDEQ and DuPont have legal obligations to assess and clean up the property.

Regarding local concerns with remaining groundwater contamination, the City of Montague is working in concert with the MDEQ to adopt an ordinance restricting domestic use of groundwater in the vicinity of a plume near Anderson Road. Residents of this area are connected to the municipal water supply, but an ordinance will preclude any new or existing residents from using groundwater in the affected area.

It is certainly worth mentioning that Occidental Chemical and DuPont both invest substantial amounts of money to continuously operate pump-and-treat systems that prevent contaminated groundwater from reaching White Lake. These systems will continue to run for the foreseeable future, in order to protect the ecological integrity and health of the ecosystem. The costs of continuous operation of the systems are considerable, but there are potential risks to the lake and to community members if those systems are not maintained in operation.

6. PUBLIC INVOLVEMENT IN THE DELISTING PROCESS

The White Lake PAC and the MDEQ have consistently worked to both inform the affected communities in the AOC and to seek their input with regard to remedial activities and BUI removals. The same holds true during the process of delisting the AOC. At least one public meeting in the White Lake community was held to present evidence supporting each BUI removal and to seek public comment.

In keeping with those efforts, the White Lake PAC hosted a public meeting at the White Lake Community Library on June 25, 2014 to present this document, review progress made to date in the

AOC, and explain the delisting process. Approximately 40 people, not counting agency staff and media, were in attendance. A 30-day public comment period was publicized to solicit input with regard to the Delisting Report and the delisting itself.

On July 21, 2014, the USEPA and MDEQ held a joint public meeting with the support of the White Lake PAC to solicit public input on the proposed delisting of the White Lake AOC. Less than ten members of the community attended, not counting PAC members, media and agency staff. Again the Delisting Report was discussed, BUI restorations were reviewed and the delisting process explained. This time however, opportunity was given to all in attendance to provide comments “on the record” with regard to the proposed delisting and the Delisting Report itself. All input received was generally in agreement with the proposed delisting of the White Lake AOC and much appreciation was expressed for the years of hard work by all those who made the delisting a possibility. There were no specific suggestions for changes to the Delisting Report and no one chose to go “on the record.”

Only one set of written comments was received during the 30-day public comment period. They included two constructive suggestions for ideas to be included that were not part of the document. MDEQ agreed with the suggestions and has added two brief paragraphs as a result of the suggestions.

The White Lake PAC submitted a letter to MDEQ dated May 20, 2014, requesting that the White Lake AOC be officially removed from the international list of Great Lakes Areas of Concern (Attachment P).

7. RECOMMENDATION TO DELIST

7.1 Restoration and Removal of the Beneficial Use Impairments

The White Lake AOC had eight out of 14 possible BUIs. Over nearly 30 years of the existence of the AOC program, millions of dollars were spent remediating toxic pollution and restoring natural systems in the White Lake area, largely outside the realm of regulatory programs. Significant advances were achieved in the White Lake Area of Concern through years of collaborative efforts among diverse stakeholder groups. The results of those efforts could not possibly be duplicated through regulatory programs alone. Thanks largely to the Great Lakes Restoration Initiative that began in 2010, tremendous progress was made that would not otherwise have been possible in such a short time frame. All eight BUIs have now been removed with the help of countless individuals and many diverse organizations, businesses, and government agencies. It is recognized that White Lake is not a pristine ecological system, but it has been returned to a state that is comparable with other similar lakes in the area that did not suffer the severe consequences of an industrial history.

7.2 Delisting Recommendation

The transformation of this AOC is a significant success story in the overall restoration and protection of the Great Lakes. The restoration from a highly contaminated and nutrient-rich lake to a sportfishing destination with successfully reproducing fish and wildlife populations is a result of long-term and substantial commitments from many partners over many years. These changes result in this recommendation to delist the White Lake AOC.

All eight BUIs have been removed and environmental conditions in the White Lake AOC are once again comparable to non-AOC locations in the Great Lakes. All local sources of impairments have been addressed to the extent possible, and all BUI restoration criteria have been met. The MDEQ, with the concurrence of the White Lake Public Advisory Council, recommends delisting the White Lake AOC.

8. ACKNOWLEDGEMENTS AND APPRECIATION

The number of individuals and organizations that have made the restoration of White Lake possible is huge. It is not possible to name each and every one of them here. However, it is important to recognize that community members whose homes are in the White Lake area were absolutely critical to the success of this process. Without the dedication, commitment, and support of White Lake PAC members past and present, the Muskegon Conservation District, Muskegon County, the Cities of Whitehall and Montague, area Townships, Grand Valley State University, the White Lake Area Chamber of Commerce, concerned citizens, and legislators at the state and federal levels, White Lake might have remained an AOC for years to come. Your efforts are deeply appreciated. Thank you.

Similarly, staff members of several state and federal agencies deserve appreciation for their hard work and commitment to achieving the delisting of White Lake, including: MDNR, MDEQ, MDCH, USEPA, USACE, NOAA, USFWS and others. Many thanks.

Finally, thank you to staff of the USEPA's Great Lakes National Program Office, staff of the International Joint Commission, White Lake PAC members, and staff of the MDEQ's Office of the Great Lakes for providing valuable input on the development of this Final Delisting Report.

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ATTACHMENTS

ATTACHMENT A – White Lake PAC Letter of Support for Removal of Restrictions on Dredging BUI

ATTACHMENT B – USEPA Letter of Concurrence for Removal of Restrictions on Dredging BUI

ATTACHMENT C – White Lake PAC Letter of Support for Removal of Eutrophication or Undesirable Algae BUI

ATTACHMENT D – USEPA Letter of Concurrence for Removal of Eutrophication or Undesirable Algae BUI

ATTACHMENT E – White Lake PAC Letter of Support for Removal of Degradation of Benthos BUI

ATTACHMENT F – USEPA Letter of Concurrence for Removal of Degradation of Benthos BUI

ATTACHMENT G – White Lake PAC Letter of Support for Removal of Restrictions on Fish and Wildlife Consumption BUI

ATTACHMENT H – USEPA Letter of Concurrence for Removal of Restrictions on Fish and Wildlife Consumption BUI

ATTACHMENT I – White Lake PAC Letter of Support for Removal of Degradation of Aesthetics BUI

ATTACHMENT J – White Lake PAC Letter of Support for Removal of Restrictions on Drinking Water Consumption BUI

ATTACHMENT K – MDEQ Internal Memo Re: DuPont Corrective Action Obligations

ATTACHMENT L – MDEQ Response to White Lake PAC's Drinking Water BUI Removal Support Letter

ATTACHMENT M – USEPA Letter of Concurrence for Removal of Degradation of Aesthetics and Restrictions on Drinking Water Consumption BUIs

ATTACHMENT N – White Lake PAC Letter of Support for Removal of Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations BUIs

ATTACHMENT O – USEPA Letter of Concurrence for Removal of Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations BUIs

ATTACHMENT P – White Lake Pac Letter Requesting Delisting of the White Lake Area of Concern

Attachment A

White Lake PAC Letter of Support for Removal of Restrictions on Dredging BUI

White Lake Public Advisory Council

September 2, 2011

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:

Over the past couple months the White Lake Public Advisory Council has been reviewing materials and documents for the final delisting of the Restrictions on Dredging BUI. As part of this process we have reviewed the 2008 navigation channel sediment data collected for the US Army Corps of Engineers as well as the determinations of DEQ Water Resource Division and Remediation Division staff. Data from the US Army Corps of Engineers and DEQ staff statements concur that the sediments from the navigational channel would be appropriate for unrestricted upland disposal and for beach nourishment.

White Lake PAC members are concerned that contaminated sediments remain in other areas of White Lake, outside the federally maintained navigation channel, which are not addressed by the Dredging BUI. However, we trust that the evaluation of those areas and the impacts on White Lake will be addressed through the mechanisms integrated into the targets and indicators associated with the Degradation of Benthos BUI and through existing permitting and regulatory programs.

Lastly, the PAC has also reviewed your Restrictions on Dredging BUI Removal Recommendation document. After lengthy discussions prior to and during our September 1, 2011 meeting, the PAC voted unanimously to support the removal of the Restrictions on Dredging BUI. Please proceed with the Public Notice process and other document preparation necessary to remove this BUI.

Sincerely,

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

Attachment B

USEPA Letter of Concurrence for Removal of Restrictions on Dredging BUI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 30 2011

REPLY TO THE ATTENTION OF:

Mr. Dan Wyant
Director
Michigan Department of Natural Resources
525 West Allegan
Lansing, Michigan 48909

Dear Mr. Wyant:

Thank you for your September 26, 2011 request to remove the "Restrictions on Dredging" Beneficial Use Impairment in the White Lake Area of Concern (AOC), Muskegon County, Michigan.

The U.S. Environmental Protection Agency approves your removal request based upon a review of your submittal and the supporting data. We share your desire to restore all of the Great Lakes AOCs and to formally delist them. EPA will notify the International Joint Commission of this significant positive change in the environmental health of the White Lake AOC.

We congratulate all of the parties involved in this federal/state/local partnership. They have been instrumental in achieving this important environmental improvement, which will benefit people who work and live near the White Lake AOC, the State of Michigan, and the Great Lakes basin. 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 further questions, please contact me at (312) 353-4891 or your staff may contact John Perrecone, Great Lakes National Program Office, at (312) 353-1149.

Sincerely,

Chris Korleski, Director
Great Lakes National Program Office

Cc: Patricia Birkholz, MDEQ, Office of Great Lakes
Frank Ruswick, MDEQ, Office of Great Lakes
John Riley, MDEQ, Office of Great Lakes
Dr. Saad Jasmin, IJC
Chris Korleski, EPA, GLNPO
Wendy Carney, EPA, GLNPO
John Perrecone, EPA, GLNPO

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Attachment C

White Lake PAC Letter of Support for Removal of Eutrophication or Undesirable Algae BUI

February 3, 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:

Over the past couple months the White Lake Public Advisory Council has been reviewing materials and documents for the final delisting of the Eutrophication or Undesirable Algae BUI. As part of this process we have reviewed the water quality indicator data collected for years 2004, 2005, 2006, and 2011 as well as the Section 303(d) and 305(b) Integrated Report. All water quality data and review of reports support that criteria have been met for BUI removal.

White Lake PAC members agree that eutrophication issues related to White Lake's designation as an Area of Concern have been addressed, while expressing a continued interest to work on eutrophication issues within the watershed as it relates to the ongoing water quality of the lake. We look forward to making continued progress in this effort and will work within state and federal watershed programs to achieve these additional water quality goals.

The White Lake Public Advisory Council unanimously voted to support the removal of the Eutrophication or Undesirable Algae BUI during our February 2, 2012 meeting. Please proceed with the Public Notice process and other document preparation necessary to remove this BUI.

Sincerely,

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

Attachment D

USEPA Letter of Concurrence for Removal of
Eutrophication or Undesirable Algae BUI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 24 2012

REPLY TO THE ATTENTION OF:

Ms. 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 March 28, 2012 request to remove the "Eutrophication or Undesirable Algae" 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 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,

Chris Korleski, Director
Great Lakes National Program Office

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Attachment E

White Lake PAC Letter of Support for Removal of Degradation of Benthos BUI

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,

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

Attachment F

USEPA Letter of Concurrence for Removal of Degradation of Benthos BUI

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,

Chris Korleski, Director
Great Lakes National Program Office

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Attachment G

White Lake PAC Letter of Support for Removal of Restrictions on Fish and Wildlife Consumption BUI

June 15, 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 Restrictions on Fish and Wildlife Consumption BUI. As part of this process we have reviewed the historic fish contaminant data as well as recent studies completed by Dr. Richard Rediske. 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 Restrictions on Fish and Wildlife Consumption BUI during our June 7, 2012 meeting. Please proceed with the Public Notice process and other document preparation necessary to remove the BUI for White Lake.

Sincerely,

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

Attachment H

USEPA Letter of Concurrence for Removal of
Restrictions on Fish and Wildlife Consumption BUI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

FEB 25 2013

REPLY TO THE ATTENTION OF:

Ms. Lynelle Marolf
Deputy Director, Office of the Great Lakes
Michigan Department of Environmental Quality
525 West Allegan
P.O. Box 30273
Lansing, Michigan 48909-7773

Dear Lynelle:

Thank you for your December 3, 2012 request to remove the "Restrictions on Fish and Wildlife Consumption" 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 progress 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,

Chris Korleski, Director
Great Lakes National Program Office

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Attachment I

White Lake PAC Letter of Support for Removal of Degradation of Aesthetics BUI

C/o Muskegon Conservation District
4735 Holton Road
Twin Lake, MI 49457

Via email

December 14, 2013

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

Dear Mr. Riley,

The White Lake Public Advisory Council has reviewed materials and documents prepared for the removal of the Degradation of Aesthetics Beneficial Use Impairment (BUI) for the White Lake Area of Concern. As part of this process we have reviewed the Michigan Department of Environmental Quality (DEQ) 2011 Statewide Aesthetics Assessment Workplan and Monitoring Protocol, as well as monitoring data collected by the DEQ in 2011 and 2013. All data support that the removal criteria for this BUI have been met.

The White Lake Public Advisory Council voted unanimously to support the removal of the Degradation of Aesthetics BUI at its November 7, 2013 meeting. We support proceeding with the public notice process, a public meeting, and other document preparation necessary to remove the Degradation of Aesthetics BUI for White Lake.

Sincerely,

Greg Mund

Greg Mund, Chair
(231) 740-9309
grmund@aol.com

Attachment J

White Lake PAC Letter of Support for Removal of Restrictions on Drinking Water Consumption BUI

C/o Muskegon Conservation District
4735 Holton Road
Twin Lake, MI 49457

Via email

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

December 19, 2013

Dear Mr. Riley,

Groundwater in the White Lake area in northern Muskegon County, Michigan, has been contaminated from pollution at a number of former industrial sites, which attracted national attention to our small community in the 1970s/1980s and helped to place the lake on the list of Great Lakes Areas of Concern. Because of this, the White Lake Public Advisory Council (PAC), working with state and federal environmental authorities, determined that Drinking Water Consumption or Taste and Odor Problems was one of eight Beneficial Use Impairments (BUIs) thought to be causing significant changes to White Lake's ecology, water quality, and economic vitality. It is important to note that cleanups have been underway at the contaminated groundwater sites for many years now, and there are no longer active polluted discharges or leaks or spills to groundwater that we are currently aware of at this time.

State and federal environmental authorities have considered that public drinking water supplies have met state water quality standards since 2006. However, because the two cities, Montague and Whitehall, rely on groundwater for drinking water and many private residents rely on private wells, the PAC added additional criteria for removal of this Beneficial Use Impairment. The PAC stipulated confirmation that pollution at area contaminated sites is controlled, with cleanup plans and monitoring in place, to ensure there are no existing or imminent threats to public and private drinking water supplies.

In 2011, the Muskegon Conservation District (MCD), which supplies administrative and technical support to the PAC, was provided federal financial support to research and document that local criteria for the drinking water impairment have been met. Over the course of its research, MCD staff developed a briefing report and determined that all but the following area sites currently meet the local criteria:

1. Anderson Road/Tech Cast area
2. Former Whitehall wastewater facility
3. E.I. DuPont de Nemours

At its December 5, 2013 meeting, recognizing that our public drinking water supplies have met state and federal water quality criteria for participation in the Area of Concern program, the PAC voted unanimously to support approval of removal of the Drinking Water Consumption or Taste and Odor Problems Beneficial Use Impairment, acknowledging the following work remains for the three sites:

Anderson Road/Tech Cast area
Enactment by the City of Montague of an ordinance disallowing the use of groundwater by private residences in the plume area.

Former Whitehall wastewater facility
Finalization of a Remedial Action Plan by the county of Muskegon to address control of contaminants at the site and institutionalize monitoring programs and protocols.

E.I. DuPont de Nemours
A completed investigation and Remedial Action Plan for the site. E.I. DuPont de Nemours has not yet completed its investigation of suspected sources of soil and groundwater contamination at the site and a completed Remedial Action Plan appears to be, at minimum, several years in the future. The PAC is reviewing available information to confirm that private drinking water wells in the vicinity of the Pierson Creek landfill on the site are not impacted nor threatened by contamination. We have also formally requested that the Michigan Department of Environmental Quality (MDEQ) continue its regulatory oversight of the site in a timely fashion. Finally, the PAC has informed the White Lake area's state elected officials about the status of the site and they have communicated their willingness to help ensure the site remains a state priority.

The PAC has reviewed the formal documentation prepared by the MDEQ regarding removal of the Drinking Water Consumption or Taste and Odor Problems Beneficial Use Impairment and agrees that removal criteria have been met, while acknowledging the outstanding issues relating to local criteria summarized in this letter. We request acknowledgement of these outstanding issues by the MDEQ.

The PAC also understands there are a number of contaminated groundwater sites in the White Lake area that will need continued attention, including monitoring and oversight by state and federal agencies and the local community for many years to come.

With your acknowledgement of the outstanding open issues described, we support proceeding with the public notice process, a public meeting and other document preparation necessary to remove the Drinking Water Consumption or Taste and Odor Problems BUI.

Sincerely

Greg Mund, Chair
(231) 740-9309
grmund@aol.com

Attachment K

MDEQ Internal Memo Re: DuPont Corrective Action Obligations

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Lynelle Marolf, Deputy Director, Office of the Great Lakes

FROM: De Montgomery, Chief, Hazardous Waste Section
Office of Waste Management and Radiological Protection

DATE: June 19, 2013

SUBJECT: Corrective Action Obligations; DuPont – Montague, Michigan, MID 000 809 640

The DuPont site is a former hazardous waste management facility and, as such, is subject to corrective action under Part 111, Hazardous Waste Management, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and its administrative rules. Corrective action involves the assessment, investigation, evaluation, and implementation of remedies to address contamination from waste management units (WMUs) and areas of concern (AOCs), as used under the Part 111 program. The following WMUs/AOCs have been identified at Dupont.

1. Former polychlorinated byphenols spill area
2. Former hazardous waste storage area
3. Former flammable hazardous waste storage area
4 Former injection well
5. Air stripper condensate accumulation area
6. Hydrogen chloride storage tanks
7. East railcar un/loading area
8. West railcar un/loading area
9. Former waste neoprene landfill
10. Basin sludge area
11. National Pollutant Discharge Elimination System (NPDES) surface impoundments
12. Northeast landfill
13. North landfill
14. Bury pit landfill
15. Calcium fluoride basin
16. Pierson Creek landfill, including Pierson Creek
17. Lime pile
18. Mirror Lake

The environmental protection standards used under the corrective action program are the criteria established under Part 201, Environmental Remediation, of Act 451. DuPont has provided information regarding many of the WMUs/AOCs at the facility. Based on a review of the information, the Office of Waste Management and Radiological Protection (OWMRP) has made a preliminary determination that no further corrective action is warranted for the first seven WMUs/AOCs listed above. With respect to the West railcar un/loading area and the plume of groundwater contaminated with Freon 113, carbon tetrachloride, and tetrachloroethylene, the mixing zone and enhanced groundwater pump and treat system that is in place will remain in operation for the foreseeable future. DuPont will be required to continue

with the investigation and remedy evaluation and selection process for the remaining ten units identified above. The final remedy proposals will be subject to public participation and review and approval by the OWMRP. Implementation of the approved final remedies will then occur.

The corrective action obligations described herein are independent of any other state or federal requirements. Neither the removal of the Beneficial Use Impairment for White Lake nor the removal of the listing of White Lake as an Area of Concern under the program established pursuant to the Great Lakes Water Quality Agreement between the United States and Canada will have any bearing on Dupont's corrective action obligations.

The OWMRP will work with DuPont and continue its oversight of activities at the facility to ensure that the corrective action process progresses forward.

If you have any questions, please contact Ms. Ronda L. Blayer, Environmental Engineering Specialist, OWMRP, at 517-373-9548 or blayerr@michigan.gov or you may contact me at 517-373-7973 or montgomeryd1@michigan.gov.

cc: Jack Schinderle/Ronda Blayer, OWMRP
Corrective Action File

Attachment L

MDEQ Response to White Lake PAC's
Drinking Water BUI Removal Support Letter

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
OFFICE OF THE GREAT LAKES
LANSING

JON W. ALLAN
DIRECTOR

January 13, 2014

Mr. Greg Mund, Chair
White Lake Public Advisory Council
c/o Muskegon Conservation District
4733 Holton Road
Twin Lake, Michigan 49457

Dear Mr. ~~Mund:~~ Greg:

Thank you for your December 19, 2013, letter to Mr. John Riley of my staff supporting the removal of the Restrictions on Drinking Water Beneficial Use Impairment (BUI) from the White Lake Area of Concern (AOC). This action represents a significant milestone in the process to remove White Lake from the international list of AOCs.

While the Office of the Great Lakes (OGL) is confident that the state's restoration criteria for this BUI have been met, we understand that the White Lake Public Advisory Council (PAC) remains concerned about the current status of three sites of groundwater contamination in the area. Those three sites appear to pose no threat to public drinking water supplies in the White Lake area. However, there may be some potential for private wells to be affected. There are a number of actions, both proposed and underway, that should minimize the risk and address these issues.

Specifically, residents of the Anderson Road/former Tech Cast area could be protected by a local ordinance that restricts use of private wells for domestic water supplies in the affected area. The OGL would favor such an ordinance.

With regard to the former Whitehall wastewater treatment facility, the OGL understands that a remedial action plan is being developed by the Department of Environmental Quality (DEQ) and Muskegon County. The OGL supports the effort to complete this plan and institute continuing remedial activities and long-term monitoring in the area.

Finally, the OGL also supports ongoing remedial investigations and the development of a remedial action plan to address contaminants at the DuPont property, along with any potential off-site migration. The DEQ's Office of Waste Management and Radiological Protection will continue to work with DuPont, according to the established regulatory framework, until the DEQ is satisfied that regulatory requirements have been met.

The OGL applauds the PAC's efforts to ensure that groundwater contamination sites in the White Lake area do not threaten the health of the people living in the community. We also appreciate the fact that you would like these sites to be fully remediated as soon as possible.

While much has been done over the years to clean up many sites around White Lake, we acknowledge that the work is far from over. We encourage you to continue working with us and with other agencies to address local environmental issues and restore the White Lake Area of Concern.

If you need further information or assistance, please contact me at 517-284-5043, or at hobrlar@michigan.gov.

Sincerely,

Rich Hobrla

Richard Hobrla, P.E., Chief
Great Lakes Management Unit
Office of the Great Lakes

cc: Mr. Tom Berdinski, DEQ
Ms. Heather Hopkins, DEQ
Mr. David Monet, DEQ
Ms. Ronda Blayer, DEQ
Mr. John Riley, DEQ

Attachment M

USEPA Letter of Concurrence for Removal of
Degradation of Aesthetics and
Restrictions on Drinking Water Consumption BUIs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

10 MAR 2014

REPLY TO THE ATTENTION OF:

Mr. Roger Eberhardt
Acting Deputy Director, Office of the Great Lakes
Michigan Department of Environmental Quality
525 West Allegan
P.O. Box 30473
Lansing, Michigan 48909-7773

Dear Roger:

Thank you for your February 12, 2014, request to remove the "Degradation of Aesthetics" and "Restrictions on Drinking Water Consumption or Taste and Odor" Beneficial Use Impairments (BUIs) from 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 two BUI removal requests for 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. Removal of these BUIs 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 the local coordinating committee 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,

Chris Korleski, Director
Great Lakes National Program Office

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Attachment N

White Lake PAC Letter of Support for Removal of
Loss of Fish and Wildlife Habitat and
Degradation of Fish and Wildlife Populations BUIs

C/o Muskegon Conservation District
4735 Holton Road
Twin Lake, MI 49457

January 28, 2014

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 removal of the Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations Beneficial Use Impairments (BUIs) for the White Lake Area of Concern. As part of this process, we have reviewed the data and monitoring completed by Dr. Carl Ruetz of the GVSU-Annis Water Resources related to the fisheries components of the BUIs, as well as completed restoration actions and acreages achieved through work by the Muskegon Conservation District for the habitat components. We have also reviewed the BUI removal recommendations and associated documentation prepared by the MDEQ Office of the Great Lakes. All data, reports, and information support that removal criteria for both BUIs are met.

At its January 9, 2014 business meeting, the White Lake Public Advisory Council voted to support the removal of the Loss of Fish and Wildlife Habitat and Degradation of Fish and Wildlife Populations BUIs. Please proceed with the public notice process and other document preparation necessary to remove these BUIs for the White Lake Area of Concern.

Sincerely,

Greg Mund

Greg Mund, Chair
(231) 740-9309
grmund@aol.com

Attachment O

USEPA Letter of Concurrence for Removal of
Loss of Fish and Wildlife Habitat and
Degradation of Fish and Wildlife Populations BUIs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

2 APR 2014

REPLY TO THE ATTENTION OF:

Mr. Roger Eberhardt
Acting Deputy Director, Office of the Great Lakes
Michigan Department of Environmental Quality
525 West Allegan Street
P.O. Box 30473
Lansing, Michigan 48909-7973

Dear Roger:

Thank you for your March 12, 2014, request to remove the "Degradation of Fish and Wildlife Populations" and "Loss of Fish and Wildlife Habitat" Beneficial Use Impairments (BUIs) from 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 two BUI removal requests for 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. Removal of these BUIs 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. With the removal of these final two BUIs, all eight of the White Lake AOC BUIs will have been removed. We look forward to working with you and your staff to formally delist this AOC.

We look forward to the continuation of this important and productive relationship with your agency and the local coordinating committee 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,

Chris Korleski, Director
Great Lakes National Program Office

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Attachment P

White Lake PAC Letter Requesting Delisting of the White Lake Area of Concern

C/o Muskegon Conservation District
4735 Holton Road
Twin Lake, MI 49457

May 20, 2014

Mr. John Riley
Michigan Department of Environmental Quality
Office of the Great Lakes
P.O. Box 30273
Lansing, Michigan 48909-7773

SUBJECT: Request to Delist the White Lake Area of Concern

Dear Mr. Riley,

On May 1, the White Lake Public Advisory Council (PAC) unanimously voted to request the State of Michigan to officially initiate delisting of White Lake as a Great Lakes Area of Concern. This letter serves as our official request.

This request marks the near completion of a successful twenty-two year partnership between the PAC and the state environmental agency to identify and address the eight Beneficial Use Impairments present in the White Lake Area of Concern.

Much has been accomplished:

- ✓ 1995: Initiation of an investigation of pollution on the tannery site and nearby lake bottom sediments
- ✓ 2002: Removal of polluted sediments in Tannery Bay
- ✓ 2003: Removal of polluted sediments associated with the former Hooker Chemical discharge
- ✓ 2010-2011: Cleanup of polluted soils and groundwater at the former Whitehall Leather Company tannery site
- ✓ 2010-2013: Restoration of eleven public and private shoreline habitat sites with Great Lakes Restoration Initiative funds
- ✓ 2013: Final cleanup of polluted sediments in Tannery Bay
- ✓ 2011-2014: Removal of the eight BUIs

Other important actions include: Monitoring and advancing cleanups at Muskegon Chemical (Koch Chemical), Hooker Chemical/OxyChem, and E.I. DuPont de Nemours; Working with the White Lake Association and Grand Valley State University - Annis Water Resources Institute on a nutrient study of the lake and lower river; Coordination on watershed issues with the White River Watershed Partnership, and ensuring meaningful community involvement in decisions regarding restoring White Lake.

There are many people, entities and agencies to credit for the restoration and delisting of White Lake. From local community members, staff of the Muskegon Conservation District, scientists at the GVSU - Annis Water Resources Institute, to state and federal environmental agency officials. This was truly a collaborative and effective partnership.

White Lake will require continued attention and vigilance. Issues still remain, such as sedimentation, eutrophication, cleanup of contaminated sites, control of invasive species, protection of shoreline habitat, and attention to overall water quality. In addition, ongoing education and stewardship initiatives are essential. We look forward to continued collaborative efforts as we move beyond delisting, out of the Great Lakes Area of Concern program, and into the category of a safe and healthy, State of Michigan water resource.

We thank you for your hard work in helping to restore White Lake and your dedication to protecting Michigan's natural resources.

Sincerely,

Greg Mund

Greg Mund, Chair

C: Representative Collene Lamonte, Representative Marcia Hovey-Wright, Senator Goeff Hansen, U.S. Representative Bill Huizenga, U.S. Senator Carl Levin, U.S. Senator Debbie Stabenow, John Perrecone, U.S. EPA, City of Whitehall, City of Montague, White River Township, Montague Township, Whitehall Township