

Removal Recommendation Eutrophication or Undesirable Algae Beneficial Use Impairment River Raisin Area of Concern

Issue

Michigan Department of Environmental Quality (MDEQ), Office of the Great Lakes, Areas of Concern (AOC) program staff recommend the removal of the Eutrophication or Undesirable Algae Beneficial Use Impairment (BUI) for the River Raisin AOC based on the review of relevant documentation pursuant to the process and criteria set forth in the *Guidance for Delisting Michigan's Great Lakes Areas of Concern (Guidance)* (MDEQ, 2008). This recommendation is made with the support of staff from the United States Environmental Protection Agency (USEPA) Great Lakes National Program Office, the MDEQ, and the River Raisin Public Advisory Council (PAC).

Background

The boundary of the River Raisin AOC is defined as the lower 2.6 miles of the river, downstream of Dam No. 6 at the Winchester Bridge in the City of Monroe, and extending one-half mile into Lake Erie following the Federal Navigation Channel and along the nearshore zone of Lake Erie, both north and south, for one mile. The River Raisin was identified as an AOC primarily “because of heavy metals contamination of the sediments and PCB contamination of the fish and sediments” (MDNR, 1987).

According to the 1987 River Raisin Remedial Action Plan (RAP), the Eutrophication or Undesirable Algae BUI was listed for the River Raisin as the “water quality of the River Raisin during the 1960s and 1970s was considered generally poor”, and while monitoring data collected in 1976 and 1977 showed “uniformly tolerable” Biochemical Oxygen Demand (BOD) levels, “turbidity and total phosphorus was consistently high” indicative of highly eutrophic conditions. Furthermore, the “source of high phosphorus and sediment loadings appeared to be related to runoff from agriculture rather than municipal or industrial discharges (Southeast Michigan Council of Governments, 1978, as cited in MDNR, 1987). Additionally, low flow in the summer months caused nutrients from upstream sources to accumulate within the AOC, causing the water to assume a “sludge-like character” and undesirable algae growth (Cyr, 2002).

Seven BUIs remain impaired in the River Raisin AOC: Restrictions on Fish and Wildlife Consumption, Degradation of Fish and Wildlife Populations, Bird or Animal Deformities or Reproduction Problems, Degradation of Benthos, Restrictions on Dredging Activities, Beach Closings, and Loss of Fish and Wildlife Habitat.

Removal Criteria

According to the State's *Guidance*, the Eutrophication and Undesirable Algae BUI will be considered restored when:

- no waterbodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent Clean Water Act *Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report* (Integrated Report), which is submitted to U.S. EPA every two years.

The attached excerpt from the *Guidance* (pages 33-34) includes the rationale for the delisting criteria (Attachment A).

Analysis:

Integrated Report:

MDEQ staff performed a search of the Clean Water Act *Water Quality and Pollution Control in Michigan: Section 303(d), 305(b), and 314 Integrated Report*, dated March 2012, to determine if any of the waterbodies within the River Raisin AOC are included.

No waterbodies within the AOC are included in the list of impaired waters either due to nutrients or excessive algal growths; therefore the criterion outlined in the State's *Guidance* has been met.

River Raisin AOC Habitat Restoration:

The City of Monroe and the Lower River Raisin saw significant industrial development in the early part of the twentieth century, including the construction of multiple low head dams which contributed to low flow situations in portions of the river. However, in 2012, two low head dams were completely removed and "rock arch rapids" were installed at two additional dams providing continuous flow and fish passage. The lower 3.5 miles of the Lower River is now free flowing for the first time in nearly a century, significantly decreasing the low flow situations which were a contributing factor to the Eutrophication and Undesirable Algae BUI. Furthermore, construction is set to begin in September 2013 on three additional dams providing continuous flow and fish passage to an additional 19.5 miles of stream. The two phases of the project will result in opening up a total of 23 miles of the Lower Raisin from Lake Erie to Dundee.

Conservation Reserve Enhancement Program (CREP):

The River Raisin is one of three priority watersheds in the State of Michigan with the intent "to reduce sediment, phosphorus and nitrogen in the surface water supply" and "improve water quality; enhance habitat for fish and wildlife; and enhance nesting for upland birds, mammals, and waterfowl." The Conservation Reserve Enhance Program (CREP) accomplishes these goals through implementation of conservation practices such as filter strips, wetland restoration projects, field windbreaks to reduce wind erosion, native or introduced grass plantings to reduce erosion, and riparian buffers to provide filtration of pollutants and provide wildlife habitat.

In the River Raisin watershed, 15,557.5 acres is currently enrolled in CREP resulting in a 65% reduction in sediment delivery, a 75% reduction in phosphorus delivery, and a 70% reduction in nitrogen delivery to surface water (S. Shine, personal communication, July 17, 2013).

Conservation Practice	Acreage Enrolled in the River Raisin Watershed
Establishment of Permanent Introduced Grasses and Legumes	4,374.8
Establishment of Permanent Native Grasses	4,895.4
Establishment of Field Windbreaks	82.4
Shallow Water Areas for Wildlife	44.1
Establishment of Filter Strips	4,686.5
Establishment of Riparian Buffers	181
Wetlands Restored	1,261.3
Sediment Retention and Control Structure	32
Total	15,557.5 acres

Michigan Agriculture Environmental Assurance Program (MAEAP):

The mission of the Michigan Agriculture Environmental Assurance Program (MAEAP) is to “develop and implement a proactive environmental assurance program ensuring that farmers are engaging in cost-effective pollution practices and working to comply with state and federal environmental regulations” (MAEAP, 2013). The MAEAP program has a three system approach which examines the differing aspects of each farm and the specific environmental impact associated with each aspect. The three aspects are the livestock system, the farmstead system, and the cropping system. The livestock system has elements to protect water from farm operations and prevent soil erosion; the farmstead system focuses on protection of both surface and groundwater; and the cropping system deals with water use and irrigation, soil conservation, and nutrient management. Within each of the three systems, there are educational components, an on-farm risk assessment, risk reduction practices that can be implemented to address issues found during the on-farm assessment, and a third party verification system (MDARD, 2013).

As the focus of this program includes the protection of surface water, the benefits extend from the individual farm to the subwatershed, and to the watershed as a whole, including the areas within the boundary of the AOC.

In the River Raisin watershed, ten farms have been verified since 2007. Farms are verified for a period of three years.

In 2012, MAEAP verified that farmers were using practices that kept 20,200 tons of sediment, 34,200 pounds of phosphorus and 76,100 pounds of nitrogen on fields, compared to farms using conventional tillage without nutrient management plans. In the case of sediment, this is due primarily to the use of various forms of no-till, conservation tillage, and cover cropping. For nutrients, the reductions came from reducing erosion and runoff, and from putting in place nutrient management plans. In some cases, properly managing silage leachate gave large nutrient reduction benefits due to its concentrated nature (R. Pigg, personal communication, August 9, 2013).

Nitrate Total Maximum Daily Load (TMDL)

In 2005, a nitrate TMDL was developed for a sixteen mile reach of the River Raisin between Deerfield and Blissfield, upstream of the AOC. This TMDL addresses known sources of nitrates, including “commercial fertilizers...estimated to account for approximately 59 percent of the total nitrogen load to the River Raisin, the largest contributor of all sources of nitrogen.” Livestock waste is another main source of nitrates, accounting for 11 percent of the total nitrogen load to the river (MDEQ, 2005).

The combination of animal manure and fertilizer accounts for 70 percent of the annual nitrogen loads to the River Raisin in this reach. A main target of the TMDL is the reduction of these sources of nitrogen to the surface waters. An overall reduction of 40 percent in river nitrate levels is required by the TMDL, therefore a reduction of fertilizer and livestock manure loads must be reduced by 57% (MDEQ, 2005). These reductions are being accomplished, in part, by the two current Great Lakes Restoration Initiative (GLRI) grants and a Section 319 grant. These three grants have been provided to the Lenawee Conservation District which is working towards reduction of nitrate levels by reducing commercial fertilizer use, increasing the use of advanced Best Management Practices (BMPs), and reducing nitrates and dissolved phosphorus loadings through the installation of water control structures on tiled cropland.

Recommendation

The 1987 River Raisin RAP specifically refers to the phosphorus and sediment inputs from the agricultural areas of the watershed, describing the water quality of the River Raisin as “generally poor due to nutrient enrichment and low dissolved oxygen (MDNR, 1987). Since the 1980s, the programs described above have been implemented throughout the Area of Concern and within the River Raisin watershed which contribute to the reduction of nutrients and sediment to the surface waters. Dam removals allow the river to flow continuously, programs such as CREP and MAEAP result in drastic reductions to nutrient and sediment loadings, and the existing nitrate TMDL ensures attainment of water quality standards.

Based on the review of all pertinent data and with the support of the River Raisin PAC, MDEQ, AOC Program staff request approval of the recommendation to remove the Eutrophication or Undesirable Algae BUI in the River Raisin AOC.

This removal recommendation was discussed with the River Raisin PAC at their regular meeting on August 8, 2013. The River Raisin PAC submitted a formal letter of support for removal of the BUI, dated x (Attachment B). The proposed action was public noticed via listing in the MDEQ calendar. Supporting documents were posted on the MDEQ’s AOC program web page for public review and comment from x through x. **Written comments received/not received?**

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 August 15, 2013

Attachments

A – Eutrophication or Undesirable Algae, pages 33-34 of the Guidance for Delisting Michigan's Great Lakes Areas of Concern

B – River Raisin Commission on the Environment Meeting Minutes, **DATE**

C – River Raisin Commission on the Environment, Letter of Support for the Removal of the Beach Closings BUI, **DATE**

References

International Joint Commission. 2012. Protocol Amending the Agreement between the United States of America and Canada on Great Lakes Water Quality 1978, as amended on October 16, 1983 and November 18, 1987.

"Michigan Agriculture Environmental Assurance Program." History of MAEAP. N.p., n.d. Web. 14 Aug. 2013. http://www.maeap.org/about/history_of_maeap

"MDARD - Michigan Agriculture Environmental Assurance Program (MAEAP)." MDARD – Michigan Agriculture Environmental Assurance Program (MAEAP). N.p., n.d. Web. 14 Aug. 2013. http://www.michigan.gov/mdard/0,4610,7-125-1599_25432-12819--,00.html

Michigan Department of Environmental Quality, 2005. Total Maximum Daily Load for Nitrate for the River Raisin near Deerfield and Blissfield.
<http://www.deq.state.mi.us/documents/deq-wb-swas-tmdl-nitrate-raisin.pdf>

Michigan Department of Environmental Quality. 2008. Guidance for Delisting Michigan's Great Lakes Areas of Concern, revised. MI/DEQ/WB-060-001.

Michigan Department of Environmental Quality. 2012. Water Quality and Pollution Control in Michigan 2010 Sections 303(d), 305(b), and 314 Integrated Report. Water Resources Division, Michigan Department of Environmental Quality, Lansing, Michigan.

Michigan Department of Environmental Quality. 2012. Stage 2 Remedial Action Plan for the River Raisin Area of Concern. Office of the Great Lakes, Michigan Department of Environmental Quality, Lansing, Michigan.

Michigan Department of Natural Resources. 1987. Remedial Action Plan for the River Raisin Area of Concern. Great Lakes and Environmental Assessment Section, Surface Water Quality Division, Michigan Department of Natural Resources, Lansing, Michigan.

Shine, Stephen, personal communication, July 17, 2013

Pigg, Robert, personal communication, August 9, 2013

Attachment A

2008 Guidance for Delisting Michigan's Great Lakes Areas of Concern

Eutrophication or Undesirable Algae

Significance in Michigan's Areas of Concern

Eight of Michigan's AOCs are listed as impaired due to eutrophication, including: River Raisin, Rouge River, Clinton River, Saginaw River/Bay, St. Marys River, Deer Lake, Muskegon Lake, and White Lake.

Michigan Restoration Criteria and Assessment

This BUI will be considered restored when:

- no waterbodies within the AOC are included on the list of impaired waters due to nutrients or excessive algal growths in the most recent Clean Water Act *Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report* (Integrated Report), which is submitted to U.S. EPA every two years.

In addition, the MDEQ is in the process of developing nutrient criteria for state surface waters which will be adopted into Michigan's WQS. The MDEQ will evaluate restoration of this BUI consistent with the nutrient criteria when the nutrient criteria are approved by the U.S. EPA and adopted into rule.

Rationale

Practical Application in Michigan

The MDEQ regulates water pollution under the authority of Part 31 of the NREPA, P.A. 451 of 1994. The AOC restoration criteria are consistent with the state's WQS, and how the State identifies waters for inclusion on the Clean Water Act section 303(d) list, which is submitted to U.S. EPA every two years. If a waterbody exhibits growths of undesirable algae in quantities which interfere with a water body's "designated uses" as identified in rules R323.1060 and R323.1100 of the Michigan WQS (e.g., inhibits swimming due to the physical presence of algal mats and/or associated odor; inhibits the growth and production of warm water fisheries, and/or other indigenous aquatic life and wildlife), the waterbody is included on Michigan's Section 303(d) list.

1991 IJC General Delisting Guideline

When there are no persistent water quality problems (e.g., dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation, decreased water clarity, etc.) attributed to cultural eutrophication.

The IJC general delisting guideline is presented here for reference. The Practical Application in Michigan subsection above describes application of specific criteria for restoration based on existing Michigan programs and authorities.

State of Michigan Programs/Authorities for Evaluating Restoration

Michigan assesses water bodies throughout the state on a 5-year basin rotation cycle according to the MDEQ's "Strategic Environmental Quality Monitoring Program for Michigan's Surface Waters" (MDEQ, 1997) and "Michigan Water Quality Strategy Update" (MDEQ, 2005). Each year, a set of targeted watersheds are sampled at selected sites for conventional and toxic pollutants, and biological and physical habitat/morphology indicators. The set of watersheds sampled rotates each year, with each major watershed in the state revisited every 5 years (see Appendix 1 for maps of the basin rotations). Two particularly relevant elements of the strategy are expanded and improved water chemistry monitoring and the lake monitoring program. One of the specific objectives of these programs is to determine whether nutrients are present in surface waters at levels capable of stimulating the growth of nuisance aquatic plants/algae/slimes.

Under the water chemistry monitoring program, water samples generally are analyzed for nutrients, conventional parameters (i.e., temperature, conductivity, suspended solids, pH, dissolved oxygen), total mercury, and trace metals (i.e., cadmium, chromium, copper, lead, nickel, zinc). A much smaller number of samples are analyzed for organic contaminants such as PCBs and base neutrals. Other parameters may be included as appropriate at specific locations, including observations of nuisance algae in AOCs with this impairment. Nutrients and conventional parameters may also be monitored at sites where biological data are collected during routine watershed assessments. Data are reviewed each year to determine whether additional parameters should be added, removed, or analyzed at a greater or lesser frequency.

Some local AOC communities also have programs for monitoring water quality and related parameters which may be applicable to this BUI. If an AOC chooses to use local monitoring data for the assessment of BUI restoration, the data can be submitted to the MDEQ for review. If the MDEQ determines that the data appropriately address the restoration criteria and meet quality assurance and control requirements, they may be used to demonstrate restoration success.

Attachment B

**River Raisin AOC Commission on the Environment
Meeting Minutes**

Attachment C

**River Raisin Commission on the Environment
Letter of Support for the Removal of the Beach Closings BUI**