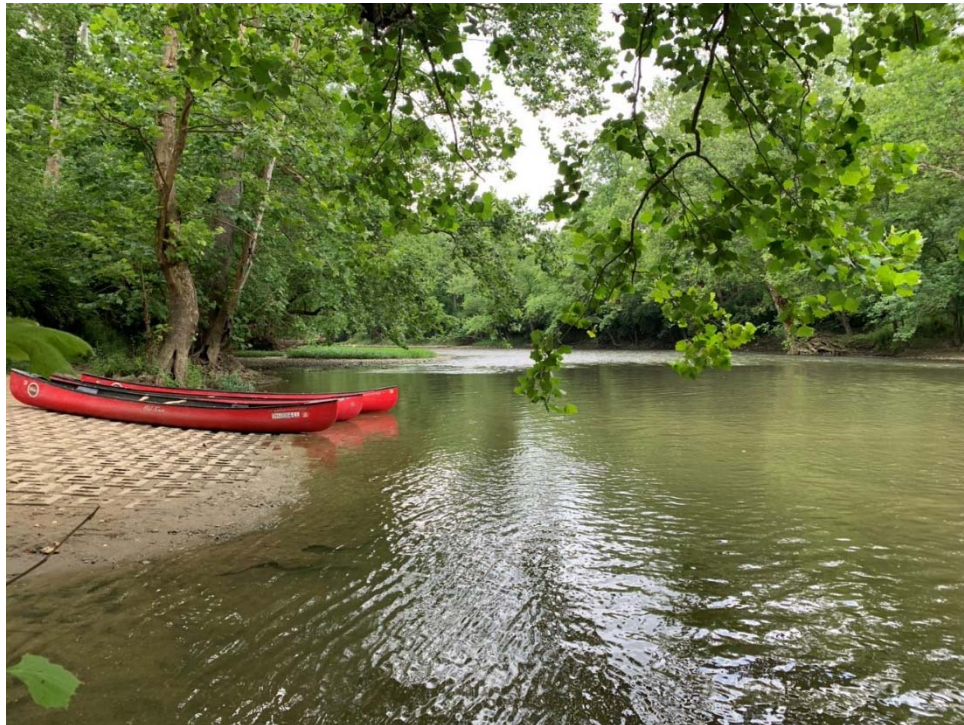


Loading Analysis Plan and Supporting Data Acquisition Needed for Recreation/*E. coli* TMDLs in Selected Watersheds Around the State of Ohio

Total Maximum Daily Load Development



Little Miami River, Ohio

Ohio EPA Technical Report AMS/2020-MULBAC-3

Division of Surface Water
Assessment and Modeling Section
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Introduction

This document provides an overview of the information considered in proposing the strategy to address the recreation beneficial use impairment in various watershed assessment units (WAUs) throughout the state of Ohio. These recommendations are based on data collected as part of Ohio EPA's routine basin surveys over the past 16 years and as documented in various biological and water quality reports (BWQR) (see Ohio EPA, BWQR citation below).

WAUs throughout Ohio have been assessed for recreation use attainment. The attainment of recreation use is based on specific water quality criteria. This document outlines the targets and lays out a proposal for addressing each recreation use impaired WAU. A method is also outlined to develop TMDLs.

Some of the WAUs this recreation TMDL addresses may also have other beneficial use impairments, such as aquatic life use and/or public water supply use. However, impairments for these uses, if any, will be addressed outside of this project via other means, TMDL or otherwise. This project is entirely focused on recreation use. The benefits of grouping assessment units throughout the state into one recreation TMDL report are 1) a systematic and automated method for calculating the recreation TMDL and 2) the ability to focus attention and resources for restoration implementation activities.

Recreation Use

Evaluation of Criteria

Attainment of the recreation use goal is based on a comparison the ambient concentration of *Escherichia coli* (*E. coli*) to the applicable numeric water quality criteria. These criteria are set forth in paragraph (C) of 3745-1-37 of the Ohio Administrative Code (epa.ohio.gov/portals/35/rules/01-37.pdf), shown in Table 1, are also the targets used for TMDLs.

Table 1 – Water quality criteria for recreation use

Recreation Use	<i>Escherichia coli</i> (colony forming units per 100 mL)	
	90-day geometric mean	Statistical threshold value ¹
Bathing water	126	410 ^a
Primary contact recreation	126	410
Secondary contact recreation	1030	1030

¹ These criteria shall not be exceeded in more than 10 percent of the samples taken during any 90-day period.

^a A beach action value of 235 *E. coli* colony counts per 100 mL shall be used for the purpose of issuing beach and bathing water advisories.

Recreation use impairment status for a given WAU was determined with the water quality standards in place at the time it was originally assessed. It is not Ohio EPA's intent to reassess sites as per more recent water quality standards; however, the TMDL will be calculated based on current criteria.

Project WAUs

All WAUs in this project are equivalent to the U.S. Geologic Service 12-digit hydrological unit code (HUC-12) subwatershed classification. A HUC-12 watershed is the smallest defined hydrologic unit covering a geographic area with an average drainage area of 10-30 square miles. This project has identified 476 WAUs that do not meet

the recreation use criteria. Most of these WAUs are within larger watersheds for which a BWQR has been previously completed (see Ohio EPA, BWQR citation below). However, no recreation use TMDL exists for these assessment units. Appendix A includes three tables that list which WAUs are included in this project. Table A-1 lists the most downstream assessment site in each WAU that has been documented to exceed the recreation use water quality standard criteria. This table also includes the geometric mean and maximum *E. coli* values observed at this site. The methodology used to calculate the geometric mean is described in [Section F](#) of the 2020 Integrated Water Quality Monitoring and Assessment Report (Integrated Report). Table A-2 shows the BWQR associated with each WAU. Table A-3 lists the WAUs (HUC-12s) that are included in this project and this table includes the official WAU name. There are 28 WAUs included in this project that have not been included in a BWQR. These WAUs were assessed for recreation use based on data from discharge monitoring reports submitted to Ohio EPA from permittees regulated by the National Pollutant Discharge Elimination System (NPDES) program.

Also included as an attachment to this loading analysis plan (LAP) is Appendix B. Appendix B consists of a series of maps zoomed into the 8-digit HUC scale. Only the HUC-8s with watersheds in this project scope are included in this series.

Table 2 below summarizes the number of WAUs within each of Ohio's large, HUC-8 watersheds that will receive a TMDL in this project. Figure 1 below shows a map that indicates which WAUs are included in this project; they are noted as "Impaired: part of bacteria TMDL project area."

Table 2 – Number of WAUs included in this project by large, 8 digit hydrologic units

Large Watershed (HUC-8)	Number of WAUs	Large Watershed (HUC-8)	Number of WAUs
Lake Erie drainage			
<i>Ottawa-Stony (04100001)</i>	8	<i>Cedar-Portage (04100011)</i>	4
<i>Raisin (04100002)</i>	1	<i>Huron-Vermillion (04100012)</i>	3
<i>Saint Marys (04100004)</i>	16	<i>Cuyahoga (04110002)</i>	4
<i>Auglaize (04100007)</i>	22	<i>Ashtabula -Chagrin (04110003)</i>	5
Ohio River drainage			
<i>Upper Ohio (05030101)</i>	17	<i>Licking (05040006)</i>	28
<i>Shenango (05030102)</i>	7	<i>Upper Scioto (05060001)</i>	21
<i>Mahoning (05030103)</i>	17	<i>Lower Scioto (05060002)</i>	58
<i>Upper Ohio-Wheeling (05030106)</i>	17	<i>Upper Great Miami (05080001)</i>	40
<i>Little Muskingum-Middle Island (05030201)</i>	4	<i>Lower Great Miami (05080002)</i>	19
<i>Upper Ohio-Shade (05030202)</i>	23	<i>Little Scioto-Tygarts (05090103)</i>	15
<i>Hocking (05030204)</i>	8	<i>Ohio Brush-Whiteoak (05090201)</i>	11
<i>Tuscarawas (05040001)</i>	23	<i>Little Miami (05090202)</i>	35
<i>Walhonding (05040003)</i>	42	<i>Middle Ohio-Laughery (05090203)</i>	3
<i>Muskingum (05040004)</i>	25		

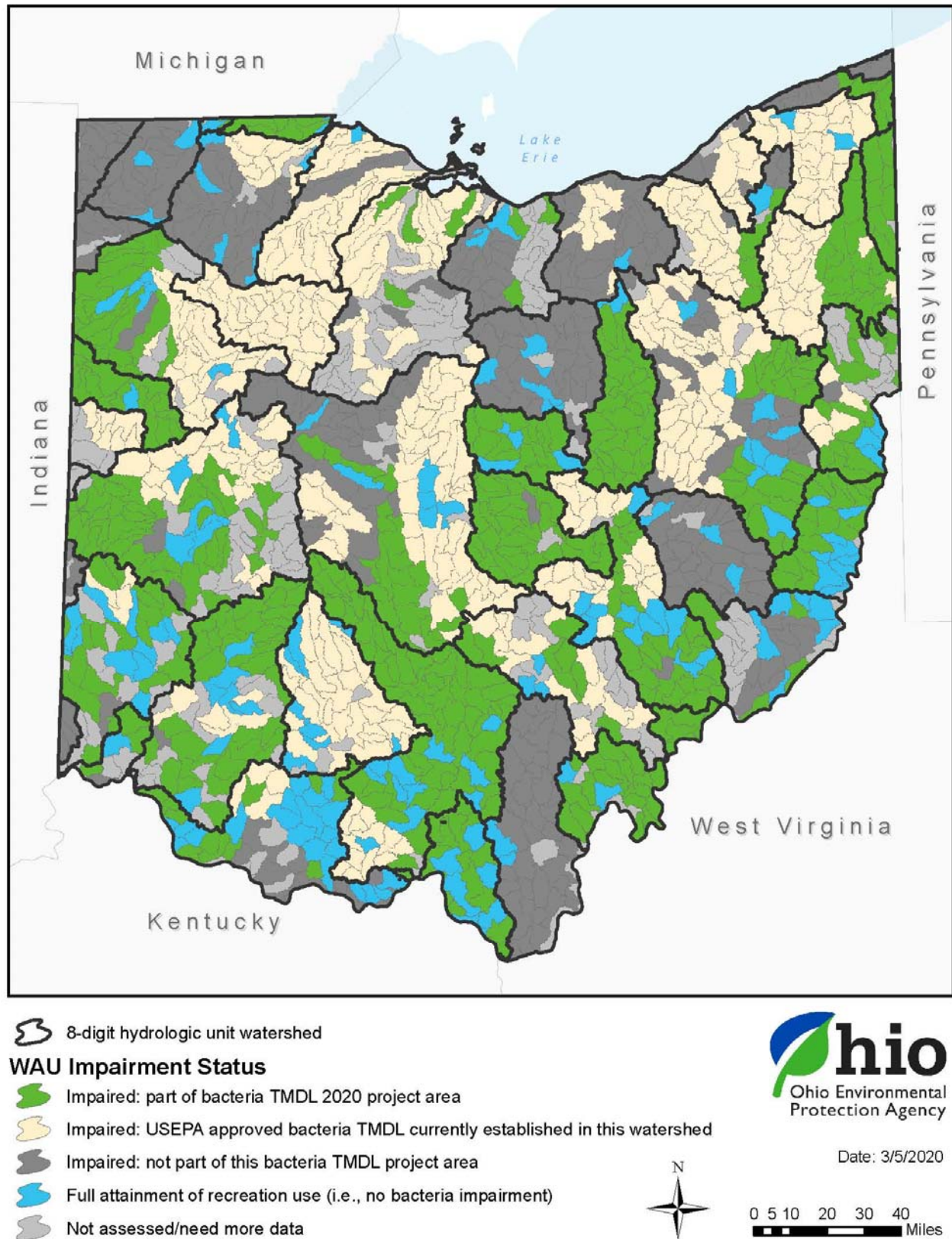


Figure 1 -- Map summarizing recreation TMDL and impairment status in the various WAUs throughout the state of Ohio. The WAUs with the green "Impaired: part of bacteria TMDL project area" color are included in this project.

Proposed Actions

Concentrations of *E. coli* exceeding the water quality criteria are due to both pervasive and direct sources. Two predominant pathways exist for pathogen delivery to water bodies. The first pathway is pathogen-rich discharge, including material such as poorly treated or untreated effluent from wastewater treatment plants, combined sewer overflows, sanitary sewer overflows, failing household sewage treatment systems and livestock access to streams. This is delivered to the stream by direct discharge. The second pathway is pathogen-rich runoff/drainage from nonpoint sources. The associated delivery mechanism is precipitation-driven wash-off. This type of transport involves the delivery of pathogen-rich material by overland flow during precipitation and runoff events (e.g., summer storms, snowmelt, etc.).

Due to these differing mechanisms of delivery, the sources of pathogens in surface waters can be determined to some extent via the level of stream flow observed. Therefore, Ohio EPA proposes using the load duration curve (LDC) framework for recreation use TMDLs. LDCs are an empirical method of determining TMDL pollutant loading and needed reductions. The main advantage of the use of LDCs is in this method's ability to differentiate loads from various types of sources based on stream flow regime. While this is a fairly basic modeling method, relationships between bacteria source contributions and flow regimes are straight forward. In-stream processes and interactions between pathogen sources are assumed conservative (i.e., not occurring) in this method. Figure 2 shows an example LDC with corresponding TMDL calculations represented in

Table 22.

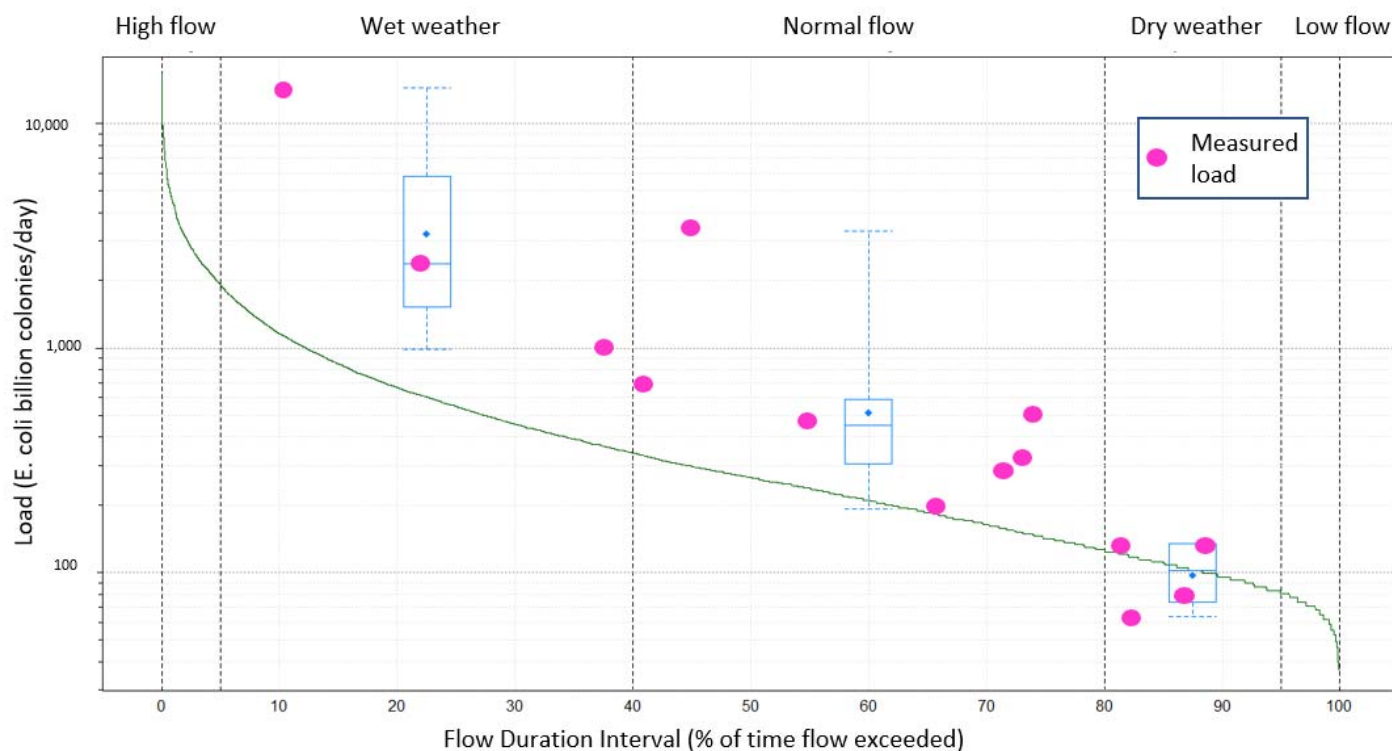


Figure 2 – Example load duration curve.

Table 22 – Example TMDL table calculations (from load duration curve in Figure 2).

TMDL and duration intervals	High 0-5%	Wet weather 5-40%	Normal range 40-80%	Dry weather 80-95%	Low 95-100%
Samples Per Regime	No samples	3	7	4	No samples
Median Sample load	NA	2372.2	451.0	105.5	NA
Total Load Reduction Required	NA	79.6%	62.8%	22.9%	NA
Total Maximum Daily Load	2790.5	604.2	209.6	101.7	70.9
Margin of Safety: 20%	558.1	120.8	41.9	20.3	14.2
Allowance for Future Growth	0	0	0	0	0
Load Allocation	2232.4	483.4	167.7	81.4	56.7
Wasteload Allocation Total	NA	NA	NA	NA	NA
MS4	NA	NA	NA	NA	NA
Example Town WWTP XPX00XXX	NA	NA	NA	NA	NA

This project will be updated every two years following the release of a new Integrated Report to include any additional WAUs found to require a TMDL. Therefore, the next project will follow the release of the 2022 Integrated Report.

References

Ohio EPA, BWQR. Biological and water quality reports for watersheds included in this project can be accessed at this webpage: epa.ohio.gov/dsw/document_index/psdindx Please contact Ohio EPA Division of Surface Water for assistance in locating the BWQR any particular WAU included in this report.