# Section 9. Total Maximum Daily Load (TMDL) Implementation Plan Report

## TMDLs and Water Quality Data

Permittees within the Middle Huron River Watershed agreed to work with the Huron River Watershed Council to develop and conduct an annual water quality monitoring program to collect data and assess the water quality within the river and its tributaries. In the Middle Huron River Watershed, there are five stormwater-related TMDLs. While the current permit does not specifically require reporting on TMDLs, Permittee and watershed partners have funded monitoring to determine progress toward meeting each TMDL. This monitoring program is also used in determining the status and trends of water quality parameters within the Middle Huron River Watershed affected by stormwater. HRWC submitted a plan for this monitoring as an appendix to Storm Water Management Plans (SWMPs), and subsequent permit applications, submitted by permittees within the watershed. That appended plan is titled “Monitoring Progress for TMDLs in the Middle Huron Watershed.”

HRWC conducts water quality monitoring annually from April through September at eleven long-term sites in the Middle Huron River and its tributaries, including Mill, Boyden, Honey, Allens, Traver, Millers, Malletts, Fleming, and Swift Run Creeks. Long-term sites help HRWC determine current status and changing conditions over time. HRWC also monitors for a single season at investigative sites located upstream of selected long-term sites to gain a better understanding of upstream conditions. HRWC also collaborates with researchers at the University of Michigan to install and maintain a network of real-time water level and flow sensors. Water level and flow sensor data is publicly available at [maps.open-storm.org](http://maps.open-storm.org/). HRWC presents the results of these monitoring activities and updates a dynamic report following the inclusion of results through September. The latest report is available at [www.hrwc.org/washtenaw-results](http://www.hrwc.org/washtenaw-results). HRWC also shared data via a geographically navigable, interactive data explorer web tool called Info Stream ([www.hrwc.org/maps](http://www.hrwc.org/maps)). This portal includes all water quality, habitat, biota, and natural area information collected within the watershed, and is updated at the end of the season after data is quality-assured. Info Stream is in the process of being updated to improve data accessibility and user experience. The updated Info Stream is set to be shared with the public in late 2023.

Following disruptions of routine sampling in 2020, Middle Huron monitoring returned to its normal cadence and coverage in 2021, which continued throughout the reporting period in the 2022 and 2023 monitoring seasons. In the 2021, 2022, and 2023 seasons, monitoring was conducted at the 11 long-term sites across the Middle Huron. In addition, investigative sites were selected to supplement the long-term sites: Huron River at Central Street in Dexter (2021), Mill Creek at Jerusalem Road (2021), Willow Run at Van Buren Park (2022), Letts Creek at Veterans Park in Chelsea, Arms Creek at Scully Road (2023), and Huron River at Superior Road in Ypsilanti (2023). At each site, volunteers used a hand-held YSI multimeter to collect real-time data on conductivity, dissolved oxygen, pH, temperature, and total dissolved solids. The Ann Arbor Drinking Water Treatment Plant laboratory analyzed the volunteer-collected samples for total phosphorus, total suspended solids, *Escherichia coli,* sulphate, nitrate, nitrite, and chloride concentrations.

In total, 17 sites were monitored across the 2021, 2022, and 2023 seasons. Since the beginning of the Chemistry and Flow Monitoring program, over sixty sites have been sampled and over 500 volunteers have been trained and involved in the program since its launch in 2003.

Much of this data analysis was also included in the evaluation of four water quality impairments within the watershed. Based on this analysis and discussion with watershed partners, implementation plans were developed and submitted to EGLE for each of the following five TMDLs:

1. [Ford Lake and Belleville Lake – impaired for excessive phosphorus](https://www.hrwc.org/wp-content/uploads/2011/11/Ford-Belleville_Phosphorus_FINAL.pdf)
2. [Huron River between Argo and Geddes Dams – impaired for pathogens](https://www.hrwc.org/wp-content/uploads/2011/11/Geddes_ecoli_FINAL.pdf)
3. [Malletts Creek – impaired for aquatic life and habitat](https://www.hrwc.org/wp-content/uploads/2011/11/MallettsCreek_BiotaTMDL_FINAL.pdf)
4. [Swift Run -- impaired for aquatic life and habitat](https://www.hrwc.org/wp-content/uploads/2011/11/SwiftRunBiotaTMDL_FINAL.pdf)
5. [Honey Creek – impaired for pathogens](https://www.hrwc.org/wp-content/uploads/Honey_Creek_WMP.pdf)

An umbrella WMP was developed and revised for the entire Middle Huron River watershed in 2011[. Click here to view the 2011 Middle Huron River Watershed Management Plan](https://www.hrwc.org/wp-content/uploads/Middle_Huron_WMP-2011.pdf). That plan is in the process of being revised in sections. [Section 2 (Ann Arbor-Ypsilanti)](https://www.hrwc.org/what-we-do/programs/watershed-management-planning/middle-huron-WMP-section-2/) was completed and approved in 2020 and Section 1 was completed in 2022 and is awaiting final approval. Section 3 is in the process of being redeveloped but is on track for submittal to EGLE in late 2023.

**TMDL Progress Summary**

HRWC and Middle Huron Partners have engaged in numerous projects to implement recommendations from TMDL and watershed management plans. Some projects and best management practices (BMPs) have been implemented collectively across the watershed, while others have been implemented locally. Appendix A is a table that includes a list of BMPs that work to address TMDL impairments, which we included with our permit application. The table also includes a summary of progress on each practice.

[Review the appendix table and revise as necessary before including. After doing so, delete this guidance.]

**Water Quality Summary**

In general, monitoring data on watershed stressors shows the following key results in the Middle Huron River Watershed:

**A. Ford Lake and Belleville Lake – impaired for excessive phosphorus**

Watershed monitoring in the Huron River and tributaries indicates some total phosphorus (TP) trends. At the main Huron River sites, TP concentrations fluctuate seasonally around the TMDL target concentration of 30 µg/l at the upstream site at North Territorial Road in Dexter from 2003 through about 2014. Since then, TP concentrations have declined considerably, with only a handful of samples above 30 µg/l. Over the last five seasons of monitoring (2018-2022; 2023 is still ongoing), the mean TP concentration was 29 µg/l and the downward TP trend is significant. The downstream site at Forest Avenue in Ypsilanti just above the inflow to the Ford Lake impoundment also shows a statistically significant downward trend. However, concentrations have been higher, with a mean over the last five years of 60 µg/l. While TP in the river appears to be coming down over time, concentrations entering the impoundment system (where the TMDL is targeted) are still well above 30 µg/l.

Generally, total phosphorus concentration trends in Middle Huron tributaries have been mixed. All show mean concentrations above the TMDL target concentration. Average five-year (2018-2022) TP concentrations in Middle Huron tributaries ranged from 35 µg/l at [Boyden Creek](https://www.hrwc.org/gis-online/BC01_TP_large.jpg) to 119 µg/l at [Swift Run](https://www.hrwc.org/gis-online/MH09_TP_large.jpg). Most mean TP concentrations are driven by high concentrations from samples during high-flow precipitation events. Five-year geomean TP concentrations for the same two tributaries are 31 µg/l and 84 µg/l respectively. A couple tributaries ([Mill Creek](https://www.hrwc.org/gis-online/MH02B_TP_large.jpg) and [Swift Run](https://www.hrwc.org/gis-online/MH09_TP_large.jpg)) show no trend in TP concentrations over time, but the other seven show declining trends, including [Honey](https://www.hrwc.org/gis-online/MH03_TP_large.jpg), [Allens](https://www.hrwc.org/gis-online/MH04_TP_large.jpg), and [Traver](https://www.hrwc.org/gis-online/MH05B_TP_large.jpg) creeks.

Recent modeling and analysis by HRWC and academic partners indicates phosphorus loading in the Middle Huron has decreased by 29% since sampling began in 2003. Results suggest that Swift Run is the best target for loading reduction in the target watershed given the overall size of phosphorus load. Traver and Millers Creeks also show increasing loads, but their total contribution is much lower. Malletts Creek is also a good target, given the size of the load and the number of sources. However, loading decreased by 42% from efforts and practices to date already, so allowing more time for recent practices to achieve their full potential may be the best approach in that creekshed. Mill Creek and Superior Drain are also good targets for reduction activities.

**B. Excessive bacteria (E. coli) in the Huron River and multiple tributaries in the watershed**

HRWC has monitored each of the major tributaries (though not direct drainages) in the watershed for E. coli since 2006. At most sites, volunteers generally collect single samples twice per month from April through September, rather than triplicate samples monthly, though there are some exceptions where triplicate sampling has been incorporated. However, the methods do not exactly replicate EGLE standard methods. HRWC results would be expected to be somewhat more variable, and therefore may overstate concentration levels. Overall, HRWC’s data on counts for E. coli and fecal coliform bacteria in the Middle Huron River watershed vary widely.

All of the tributaries along the Middle Huron River watershed have average bacteria counts (whether calculated as means or geomeans) that are above the TMDL targets (and state standard for full-body contact). However, data trends suggest conditions in the tributaries are becoming less conducive to bacteria growth over time. All show declining trends, and the trends at [Allens](https://www.hrwc.org/gis-online/MH04_eColi_large.jpg) and [Millers](https://www.hrwc.org/gis-online/MH08B_eColi_large.jpg) creeks are statistically significant. Geomeans for the most recent five years are all close to (with [Traver Creek](https://www.hrwc.org/gis-online/MH05B_eColi_large.jpg) below) the standard for a single sample set (300 bacteria per 100 ml), but occasional high counts still occur in all tributaries.

Since the TMDL sets a seasonal limit (May through October), HRWC also evaluated monthly geomeans to determine if there are any seasonal patterns (Table 4). Bacteria counts are at their lowest across all sites in April, before the TMDL takes effect, and all tributaries are either below the TMDL or within 30% of it then. Concentrations in May also are a bit lower than the rest of the season, but there do not appear to be substantive differences between the months of June through September. HRWC does not monitor in October. If anything, remedial activities should be focused on the June to September period to have the greatest impact.

In addition to the continuous monitoring program, HRWC also conducted a bacteria study in 2020-21 of Huron River drainages, as part of a larger study of Lake Erie drainages, funded by EGLE. Within the TMDL watershed, sites matching those from annual monitoring included Allens, Traver, and Malletts Creeks. Additionally, a river site at the Fuller Road bridge was sampled. Table 5 includes the five-week sampling results. **The river site was shown to be meeting the state standard for the five-week period and each sample set.** The tributary sites had bacteria counts that exceed the standards. Traver and Malletts Creek five-week geomeans are comparable to the current 5-year geomeans. Allens Creek was quite different, however, with a five-week geomean that was almost 3 times the 5-year monitoring geomean. Microbial source tracking was also conducted as part of the study for any E. coli sample results that exceeded 1,000 #/100ml. For the TMDL area, that only included two Allens Creek samples. These results showed that **one sample showed strong evidence of human-sourced bacteria and canine-sourced bacteria.** The other sample did not show any evidence of selected sources of bacteria DNA. Due to the extensive underground network of storm sewers in the Allens Creek catchment, canine scent tracking was not conducted within the watershed.

The more recent results from the bacteria study indicate that the main stem of the Huron River is currently meeting the state’s standards for bacteria, so the river itself should not be a focus for remediation. EGLE should consider adjusting the TMDL to reflect this. However, tributary streams are not meeting the standards. The entire area should be targeted for bacteria reduction activities. While progress can be seen in the data trends, more effort is necessary to meet water quality standards and return these creeks to full recreational use. Particular targets for remedial activities are Allens, Malletts and Swift Run creeks, as these are the largest drainages that likely contribute the most bacteria to the river and ponded waters where most recreation occurs.

Mean concentrations of total suspended solids across the Middle Huron are well below sample standards. Most samples from main river and tributaries sites in the Middle Huron River watershed had TSS concentrations below the target threshold and, as a result, are clear of sediments. The mean TSS concentration across all sites for 2021 was 9 mg/l with a median of 5 mg/l and for 2022 was 1 mg/l with a median of 6 mg/l. However, a few sites, namely [Fleming Creek](https://www.hrwc.org/gis-online/MH06_TSS_large.jpg), [Malletts Creek](https://www.hrwc.org/gis-online/MH07_TSS_large.jpg), and [Mill Creek](https://www.hrwc.org/gis-online/MH02B_TSS_large.jpg), exceed the TSS standard during storms with concentrations reaching 222 mg/l likely due to erosion and sediment runoff from urban and agricultural areas.

HRWC also coordinates a macroinvertebrate monitoring program, which analyzes benthic communities at 25 sites in the Middle Huron annually in April and October, and then looks for only stoneflies in January prior to them emerging in late winter (see Table 1). Most sites in the Middle Huron show a stable, healthy aquatic insect community. However, some show significant improvements like the highly urban Malletts Creek and the suburban Fleming Creek. The problems areas are Honey Creek, which is declining at both sample sites, Letts Creek which has low diversity and poor IBI score, and Swift Run, which has very low insect diversity and counts.

*Table 1 - Macroinvertebrate Communities at HRWC River Roundup Program Monitoring Sites in the Watershed, 2020-2022 unless otherwise noted.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Study Site** | **Population Trends** | **Avg. Hilsenhoff IBI** | **Avg. Insect Families** | **Avg. EPT Families** | **Avg. Sensitive Families** | **Winter Stonefly (Presence/ Absence)** |
| Averages Across Huron River Watershed |   | 4.9 (Good) | 11.2 | 4.5 | 1.2 |   |
| 2: Boyden Creek, Delhi Rd | Sensitive Families Improving | 4.8 (Good) | 14.0 | 6.0 | 2.0 | Sampled twice; found once. |
| 9: Fleming Creek: Botanical Gardens | EPT Families Improving | 4.1 (Very Good) | 11.5 | 5 | 1.5 | Sampled thrice, found thrice |
| 11: Fleming Creek, Parker Mill County Park | Sensitive Families Improving | 3.9 (Very Good) | 12.5 | 5 | 2 | Sampled twice, found twice |
| 13: Fleming Creek: Warren Road | Sensitive & EPT Families Improving | 4.1 (Very Good) | 13.5 | 7.5 | 3 | Sampled twice, found twice |
| 18: Honey Creek, Jackson Rd | Sensitive Families Declining | 4.7 (Good) | 8.3 | 2.3 | 0.3 | Sampled thrice, found thrice |
| 20: Honey Creek, Wagner Rd | Sensitive Families Declining | 4.9 (Good) | 9.5 | 3.3 | 1.3 | Sampled thrice, found twice. |
| 22: Huron Creek, Dexter-Pinckney Road (Main branch tributary) | EPT and Sensitive Families increasing | 3.8 (Very Good) | 15.3 | 8.3 | 3.3 | Sampled twice, found twice. |
| 24: Huron River, Riverside Park (Ypsi) | Stable | 4.6 (Good) | 7.5 | 3 | 0.5 | Sampled once, found once |
| 26: Huron River, Zeeb Rd | Stable | 3.9 (Very Good) | 18.3 | 8.0 | 3.0 | Sampled twice, found twice. |
| 27: Malletts Creeks: Chalmers DriveS | EPT Families Improving | 4.8 (Good) | 8 | 2.7 | 0 | Sampled twice, not found. |
| 31: Mill Creek, Fletcher Rd | Stable | 6.64 (Fairly Poor) | 13.0 | 4.0 | 0.0 | Sampled once, not found. |
| 32: Mill Creek, Ivey Rd | Stable | 4.1 (Very Good) | 11.5 | 4.5 | 1.0 | Sampled once, found once. |
| 33: Mill Creek: Jackson Rd | Stable | 4.8 (Good) | 9.7 | 3.0 | 0.7 | Sampled twice, found twice. |
| 34: Letts Creek, M-52 (Mill creekshed)  | Total and EPT families declining | 5.7 (Fair) | 9.5 | 4.0 | 1.0 | Sampled twice, found twice. |
| 35: Millers Creek: Glazier Way | Stable | 5.4 (Good) | 9.5 | 1.0 | 0.0 | Sampled once, not found. |
| 41: Swift Run: Shetland Drive | Stable | 5.2 (Good) | 5.3 | 1.3 | 0.0 | Sampled once, not found. |
| 42: Traver Creek: Broadway Ave | Stable | 6.2 (Fair) | 13.0 | 4.0 | 0.0 | Sampled thrice, found thrice. |
| 55: Mill Creek, Manchester Road | Stable | 4.2 (Very Good) | 16.0 | 8.0 | 1.0 | Sampled twice, found once. |
| 57: Mill Creek, Klinger Road | Stable | 4.2 (Very Good) | 9.0 | 3.0 | 0.0 | Sampled twice, found twice. |
| 61: Huron River, Island Park | Sensitive Families Improving | 4.5 (Good) | 12.7 | 6.3 | 2.0 | Sampled thrice, found thrice |
| 62: Huron River, Bell Road | Stable | 4.6 (Good) | 15.0 | 5.5 | 1.5 | Sampled twice, found once. |
| 79: Mill Creek, Mill Creek Park | Sensitive Families Improving | 4.3 (Good) | 16.7 | 8.7 | 4.0 | Sampled thrice, found thrice |
| 80: Mill Creek, Shield Road | Stable | 5.4 (Good) | 10.0 | 5.0 | 2.0 | Sampled thrice, found thrice |
| 84: Fleming Creek: Galpin Road | Stable | 5.3 (Good) | 17.5 | 3.5 | 0.5 | Sampled twice, found twice. |
| 96: Mill Creek, Parker Road | Stable | 6.7 (Fairly Poor) | 11.3 | 3.0 | 0.3 | Sampled once, not found. |

In addition to the TMDL-related parameters measured in the HRWC water quality monitoring programs, HRWC also observed the following results on non-regulated parameters:

* All eleven long-term monitoring sites in the Middle Huron River watershed had average values for dissolved oxygen that are within the normal range for Michigan surface waters. Every DO measurement collected during the two-year reporting period was above the 5 mg/l statewide water quality standard, indicating acceptable conditions for aquatic life.
* Six of the eleven long-term sites had average and median conductivity values that exceed values for healthy streams and rivers of 800 µS/cm. Most of these sites are highly urbanized, such as Allens, Traver, Millers, Swift Run, and Malletts creeks. However, the main Huron River monitoring sites in Dexter and Ypsilanti had average and median conductivity values below the 800 µS/cm standard.
* All eleven long-term sites exhibit measured pH values that are within the expected range for Michigan surface waters.

 [Permittees can add monitoring activities they have engaged outside of the program developed by HRWC.]