Lower Manistee River Watershed Macroinvertebrate Assessment

Volunteer Stream Monitoring Program (VSMP)

Presented by the
Manistee Conservation District
In partnership with
Michigan Clean Water Corps

Spring and Fall 2024 Results

MANISTEE CONSERVATION DISTRICT

The Manistee Conservation District's (MCD) Volunteer Stream Monitoring Program (VSMP) was created to evaluate the health of the Lower Manistee River Watershed, pinpoint areas of concern, monitor changes over time, and compare site conditions. Since its launch in 2016 under the leadership of former Conservation Specialist Kayla Knoll, the program has consistently collected local stream data. With bi-annual sampling events held each year, the dataset has grown steadily, with only one event missing due to the COVID-19 pandemic.

In both 2021 and 2024, staff from MiCorps conducted an in-depth review of scoring methodologies used in the program, identifying some areas for refinement in their categorization techniques. While these updates highlight the evolving nature of scientific procedures, the historical data collected under earlier scoring methods remains valuable and reflects the commitment to maintaining exacting standards. The improvements, led by Dr. Paul Steen and the MiCorps team, were implemented thoughtfully to ensure that the updated scoring methods remain compatible with previous data, although minor discrepancies may arise. These adjustments will enhance the program's accuracy and provide an even more reliable picture of local stream health.

The MCD appreciates the ongoing support of the Michigan Clean Water Corps network, whose dedication to rigorous quality control and fostering positive volunteer experiences has been instrumental. Despite challenges posed by the pandemic, 2024 has been a milestone year for the VSMP, marked by two significant developments. These include adjustments to macroinvertebrate scoring metrics and the addition of a 10th monitoring site to the original network of nine.

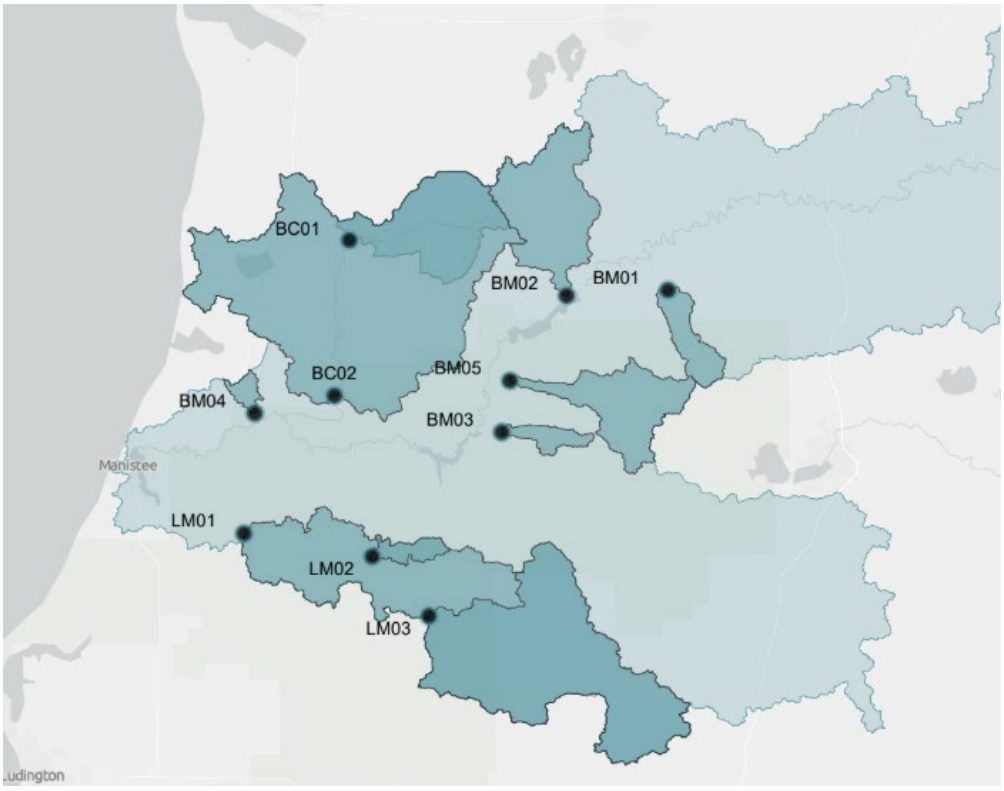
The MCD extends its heartfelt gratitude to the volunteers who have contributed to the program's growth and success. With their continued involvement, the VSMP will remain a valuable tool for safeguarding the Lower Manistee River Watershed—a remarkable and cherished natural resource.

Tyler Dula,

Conservation Specialist

Manistee Conservation District

Manistee Conservation District's 10 sample stream locations:



BC01 – Bear Creek at Leffew Rd (44.456039, -86.03155)

BC02 – Bear Creek at Spirit of the Woods Conservation Club (443404896.-86.050584)

BM01 – Adams Creek at 16 Rd (44.40996, -85.61461)

BM02 – Fletcher Creek at Fletcher Creek Rd (44.404896, -85.747899)

BM03 – Hinton Creek at Warfield Rd (44.277361,-85.831611)

BM04 – Sickle Creek at River Rd (44.295754, -86.154444)

NEW* BM05 – Slagle Creek at N. 1 Rd

LM01 – Little Manistee at 6 Mile Bridge (44.183491,-86.16764)

LM02 – Cool Creek at Hamilton Rd (44.183491,-86.16764)

LM03 – Little Manistee at Johnson Bridge ((44.10537,-85.927329)

The 10 monitoring sites represent wadable sections of streams chosen for their direct contributions to the larger river system. Citizen scientist volunteers visit these locations during sampling events to gather macroinvertebrate samples from designated 300-foot stretches. These samples provide valuable insights into ecological factors that may impact stream health. Benthic macroinvertebrates, which are visible to the naked eye and lack backbones, inhabit a range of habitats in streams and rivers and are highly sensitive to environmental changes.

Macroinvertebrate sampling is conducted in both spring and fall, with the fall event holding particular significance for comparison to the typically abundant spring samples. Fall sampling captures the effects of stressors that may accumulate during the low-flow summer months, a period often marked by increased recreational activity and development due to the region's temperate climate. This makes the fall data especially important for assessing seasonal impacts on macroinvertebrate communities.

Conducting two sampling events annually is essential for producing an accurate representation of stream conditions. The data presented in this report incorporates results from both sampling periods to generate a comprehensive analysis of stream health.

Materials and methods:

At each site location, volunteers used D-nets to sample pre-selected sections of the stream. Within each 300-foot stretch, volunteers sample various habitats and record which habitats they encountered. Volunteers are trained how to follow their data sheets to stay consistent and to sample as many different habitats as they can to increase diversity.
Each site location is responsible for collecting at least 100 macroinvertebrates out of the stream, which are sorted on site. After sorting, our collection samples are then preserved in 95% ethanol and transported back to the MCD. Following the event, volunteers spend the next week collaboratively identifying macro species here in the office with the assistance of staff and various identification guides and keys. Macroinvertebrates are identified according to their taxonomic order and family and rated based on MiCorps' sensitivity scoring method (*see next page*). Following this, samples are stored indefinitely for reference and then final scores are recorded and added to MCD's historical and electronic files.

Understanding the metrics:

The metrics below are used to evaluate water quality. For each location, a ***lower numerical value on a 0-10 scale*** indicates a healthier stream.

- Water Quality Rating (WQR) is determined by weighing each type and number of organisms collected by their sensitivity ratings. A larger proportion of sensitive insects like stoneflies and caddisflies results in a higher WQR. Also, higher overall diversity typically results in a higher WQR. There are 7 WQR ratings: Excellent, Very Good, Good, Fair, Fairly Poor, Poor, and Very Poor.
- Total Taxa represents the categories of different orders/family groupings sampled.

*Sensitive refers to the number of macroinvertebrate species that rate very sensitive on the *Hilsenhof Biotic Index,* which is what MiCorps has based their scoring system on. This biotic index bases scores for each organism on the overall tolerance of the organismal family, calculating a final score between 1 and 10 with the highest quality having a score less than 1.

Results:

Site ID	Stream (Spring 2021)	WQR	Result:
BM01	Adam's Creek @ 16 Rd	3.22	EXCELLENT
BM02	Fletcher Creek	4.43	VERY GOOD
BM03	Hinton Creek	2.63	EXCELLENT
BM04	Sickle Creek	4.34	VERY GOOD
LM01	Little Manistee (Downstream)	4.08	VERY GOOD
LM02	Cool Creek	2.79	EXCELLENT
LM03	Little Manistee (Upstream)	3.69	VERY GOOD
BC01	Bear Creek @ Leffew Rd	3.78	VERY GOOD
BC02	Bear Creek at SOTW	3.48	EXCELLENT

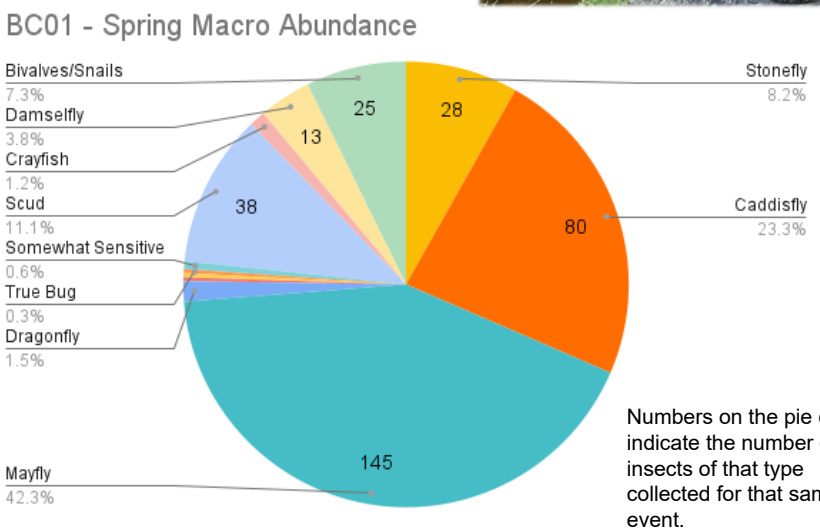
Site ID	Stream (Fall 2024)	WQR	Result:
BM01	Adam's Creek @ 16 Rd	3.84	VERY GOOD
BM02	Fletcher Creek	4.69	GOOD
BM03	Hinton Creek	3.0	EXCELLENT
BM04	Sickle Creek	5.8	FAIR
BM05	Slagle Creek	3.81	VERY GOOD
LM01	Little Manistee (Downstream)	5.14	GOOD
LM02	Cool Creek	4.29	VERY GOOD
LM03	Little Manistee (Upstream)	3.52	VERY GOOD
BC01	Bear Creek @ Leffew Rd	4.22	VERY GOOD
BC02	Spirit of the Woods	3.82	VERY GOOD

Water Quality Rating			Degree of Organic Pollution
0.0-3.50	excellent		Pollution unlikely
3.51-4.50	very good		Slight pollution possible
4.51-5.50	good		Some pollution possible
5.51-6.50	fair		Fairly substantial pollution likely
6.51-7.50	fairly poor		Substantial pollution likely
7.51-8.50	poor		Very substantial pollution likely
8.51-10.0	very poor		Severe pollution likely

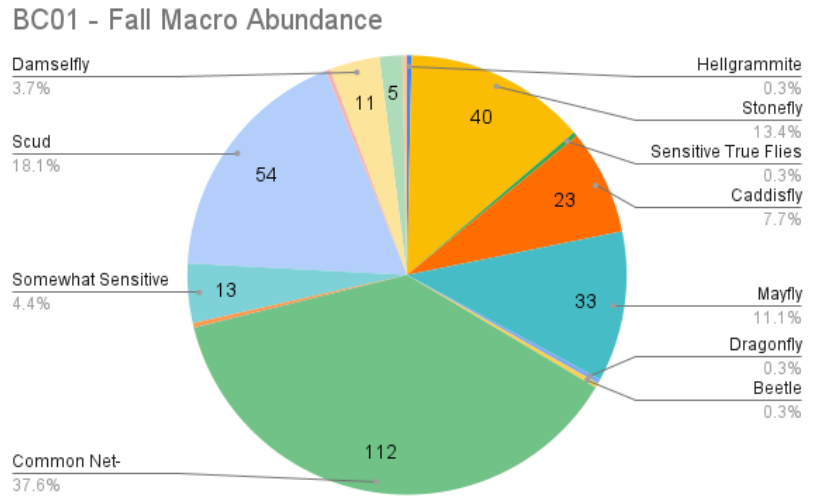
*Changes in scoring protocol did take place between the spring and fall sampling event, resulting in certain species scoring worse than they would have in the spring. This resulted in worse scores overall in the fall than were anticipated. More years under the current scoring structure will be needed to parse out any relevance to this trend.

Site Results and Trends
BC01 – Bear Creek at Leffew Rd
Annual Average Score

Year	Rating
2016	Excellent
2017	Good
2018	Fair
2019	Good
2020	Excellent
2021	Excellent
2022	Very Good
2023	Very Good
2024	Very Good

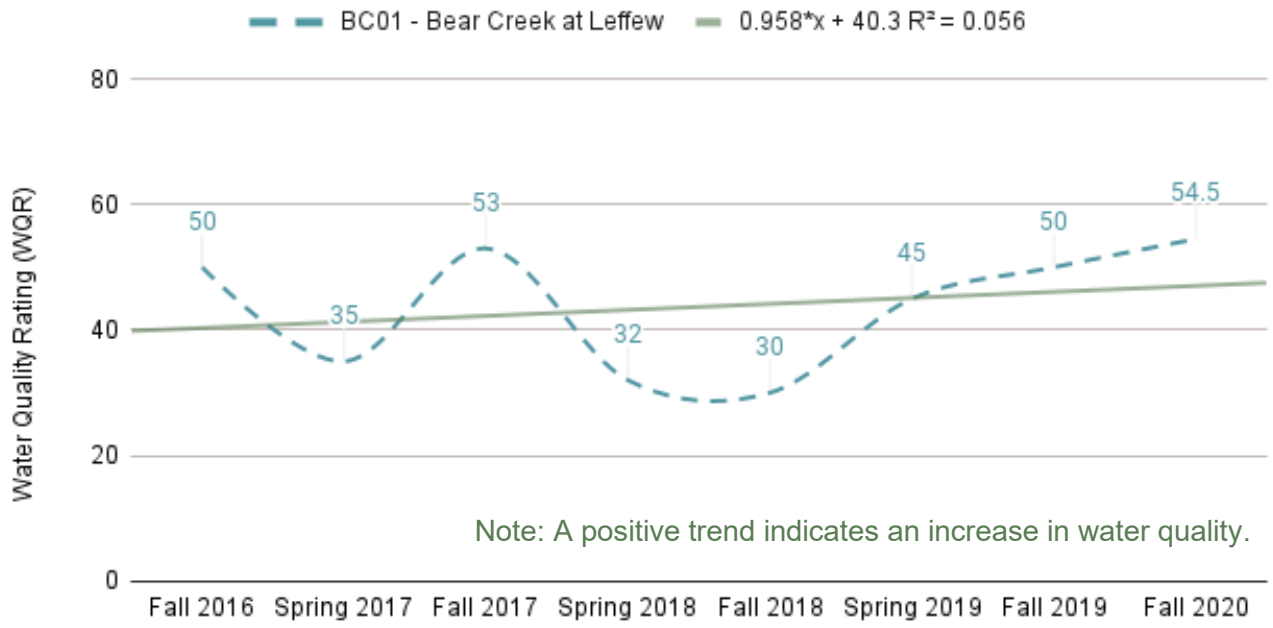


Numbers on the pie charts indicate the number of insects of that type collected for that sampling event.



Water Quality Rating Pre-2021 Methodology

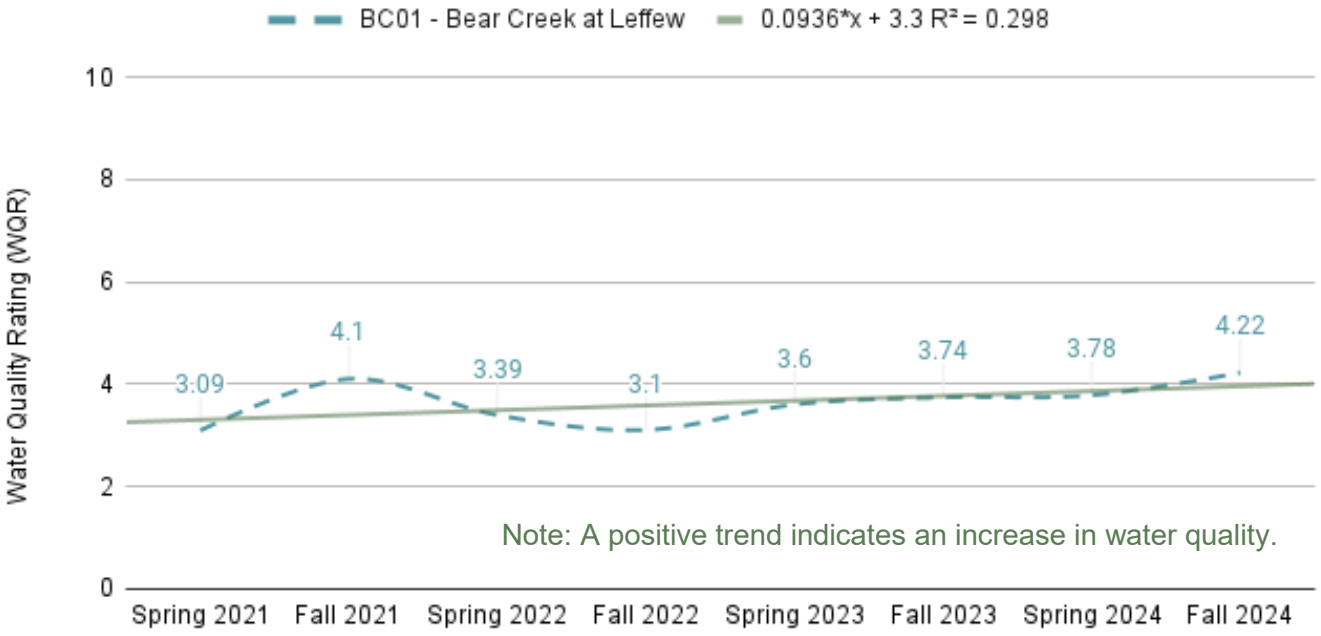
Poor (<19), Fair (19-33), Good (34-48), Excellent (>48)



Note: A positive trend indicates an increase in water quality.

Water Quality Ratings 2021 Methodology

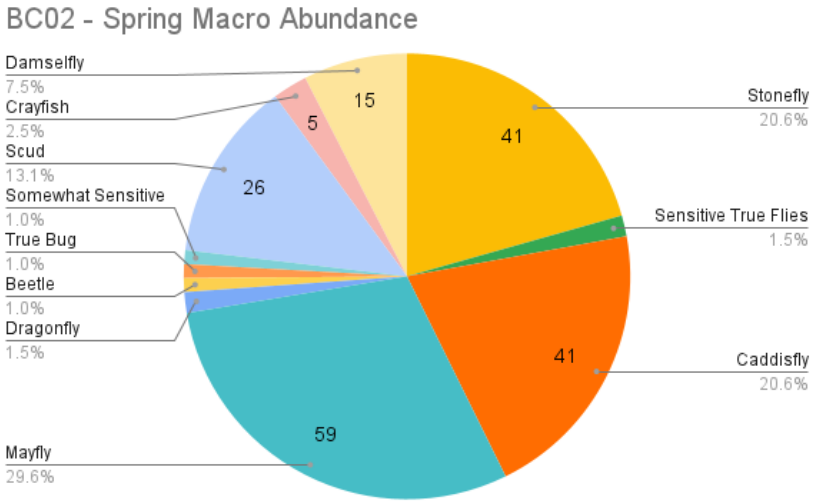
Excellent (<3.5), Very Good (3.51-4.5), Good (4.51-5.5), Fair (5.51-6.5), Fairly Poor (6.51-7.5), Poor (7.51-8.5), Very Poor (>8.5)

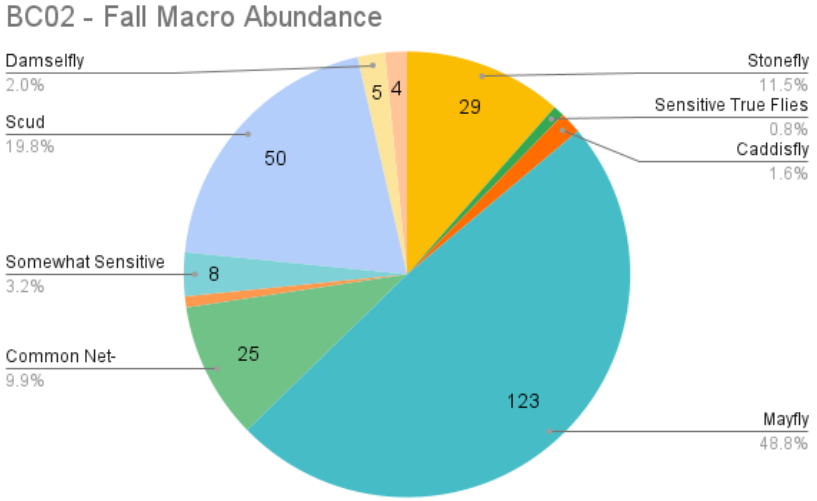


Note: A positive trend indicates an increase in water quality.

Site Results and Trends
BC02 – Bear Creek at Spirit of the Woods Annual Average Score

Year	Rating
2016	Excellent
2017	Good
2018	Good
2019	Good
2020	Good
2021	Excellent
2022	Very Good
2023	Very Good
2024	Very Good





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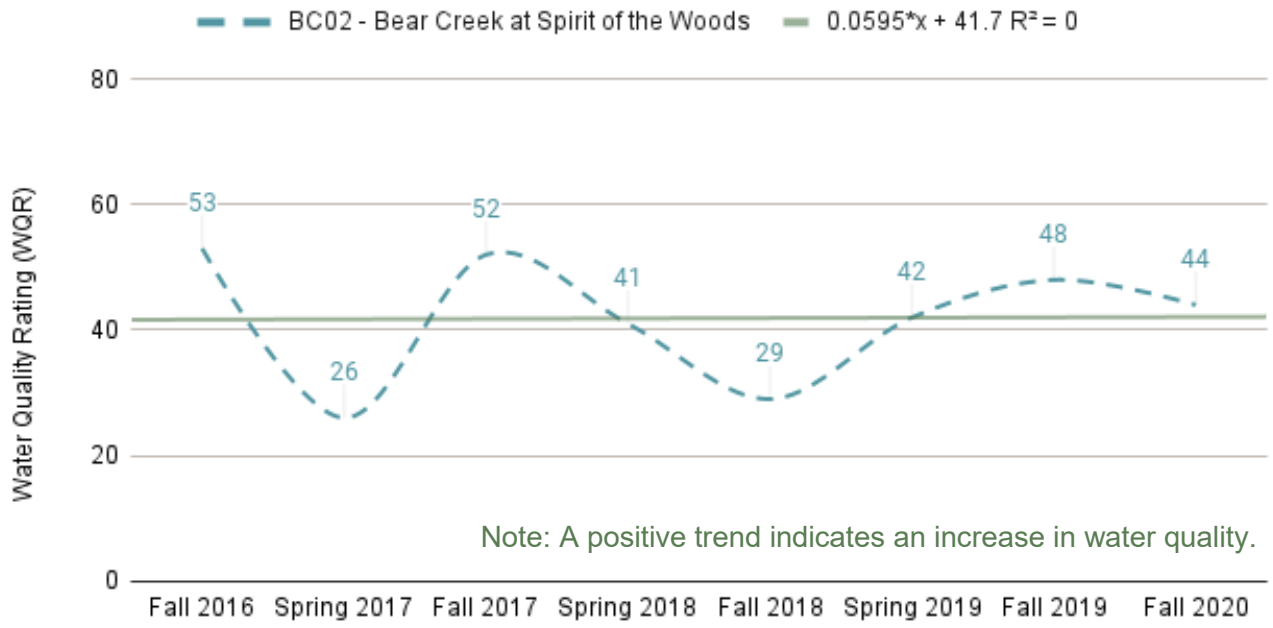

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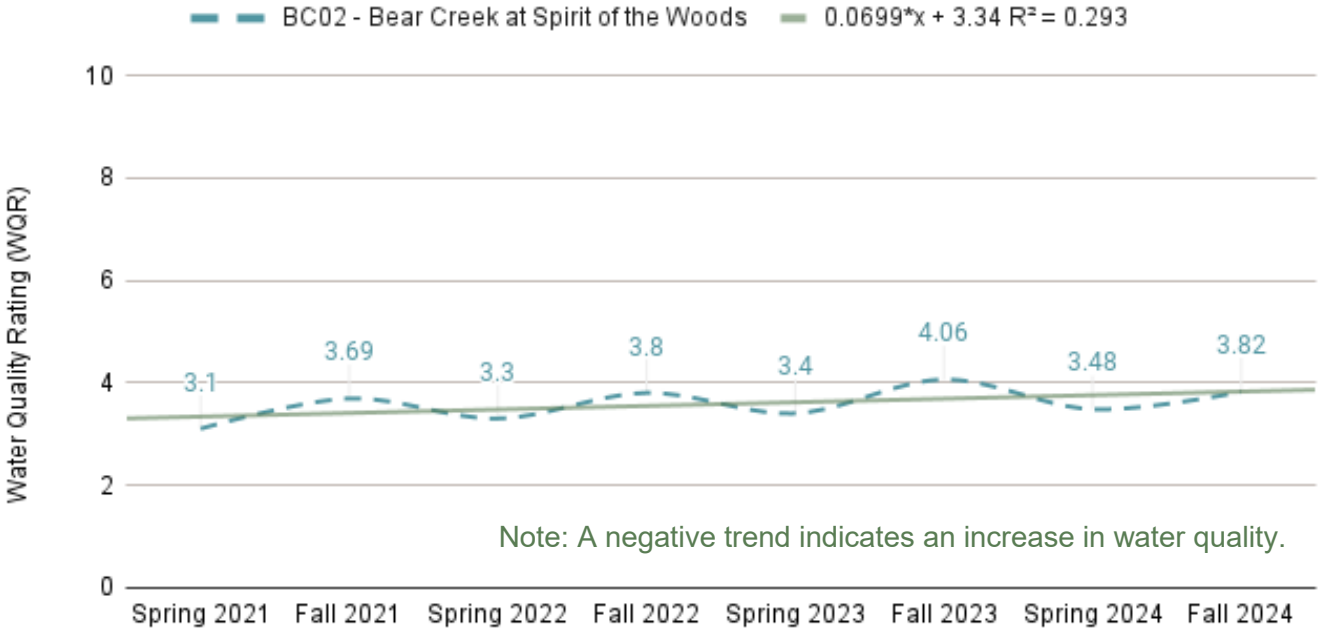
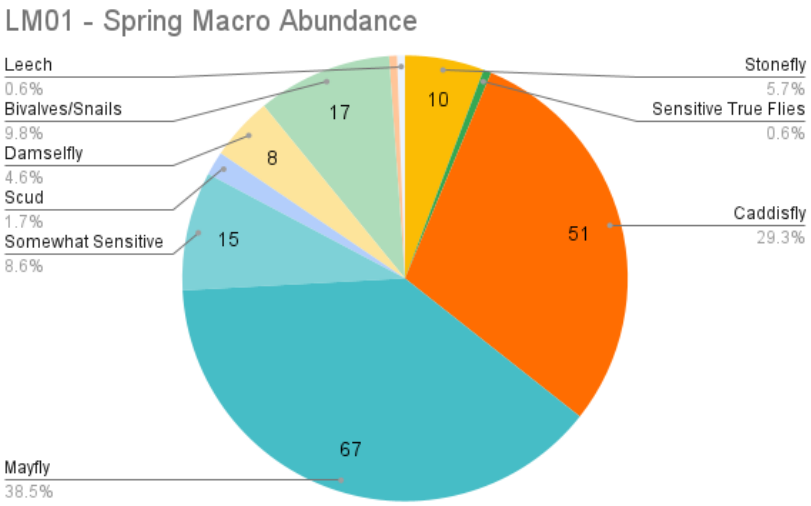
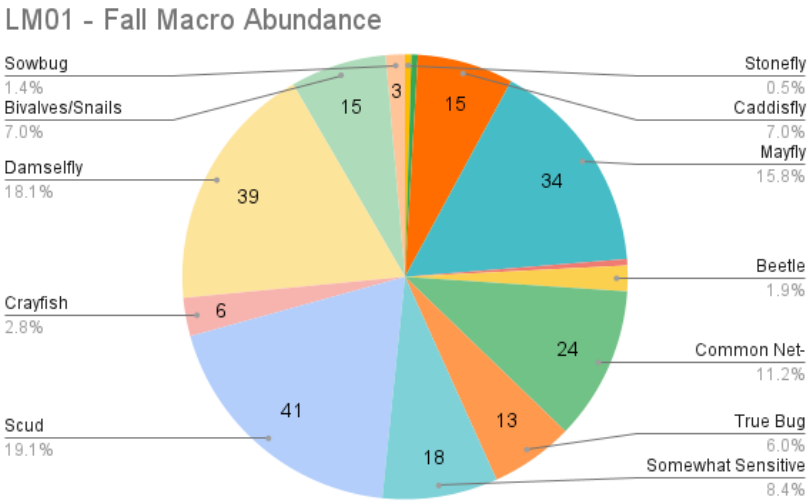


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
LM01 – Little Manistee at 6 Mile
Annual Average Score

Year	Rating
2016	Excellent
2017	Fair
2018	Good
2019	Excellent
2020	Good
2021	Excellent
2022	Excellent
2023	Very Good
2024	Good





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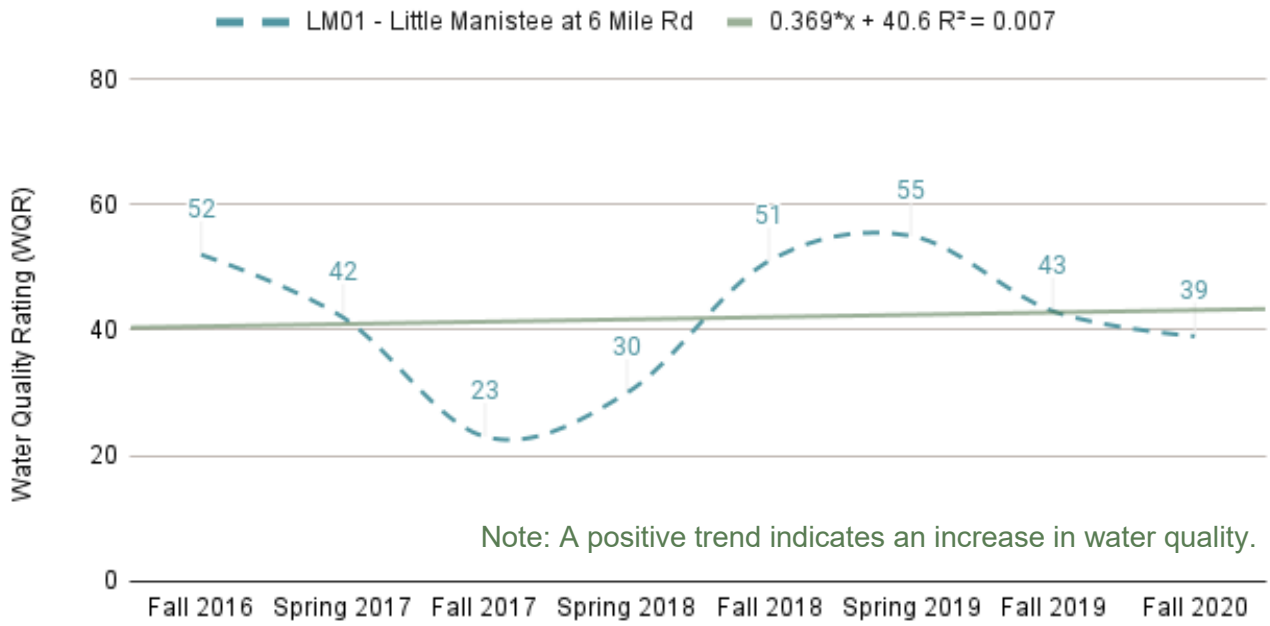

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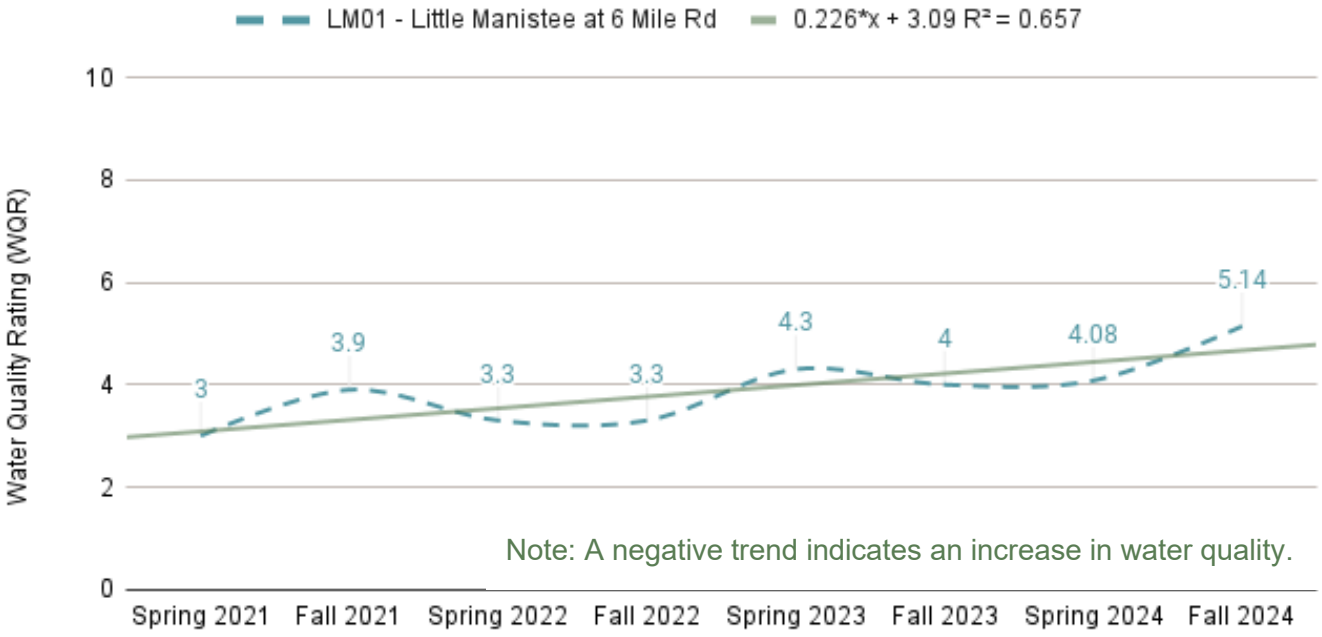
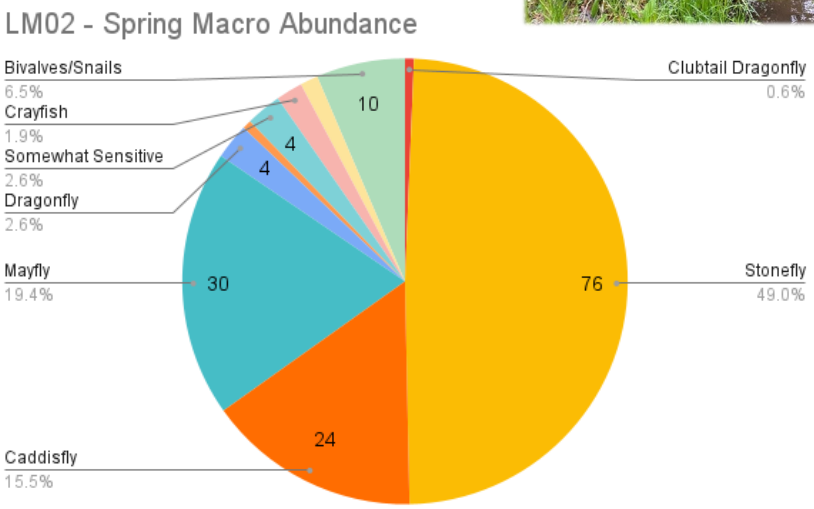
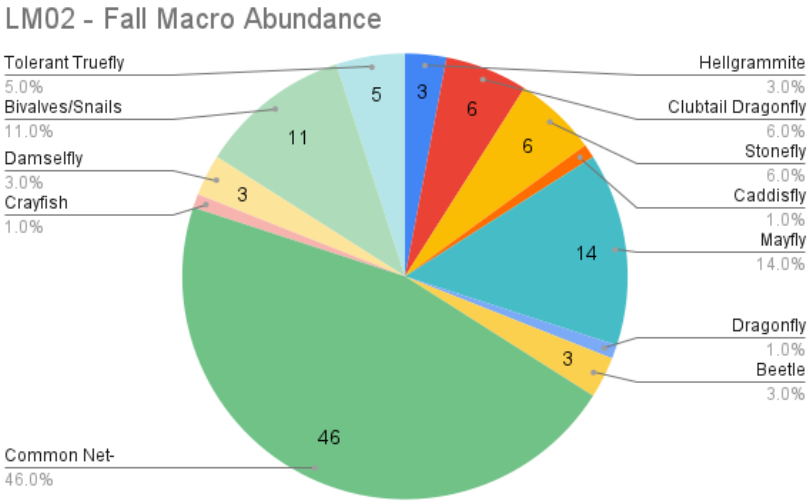


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
LM02 – Cool Creek
Annual Average Score

Year	Rating
2016	Good
2017	Good
2018	Good
2019	Good
2020	Good
2021	Very Good
2022	Excellent
2023	Very Good
2024	Very Good





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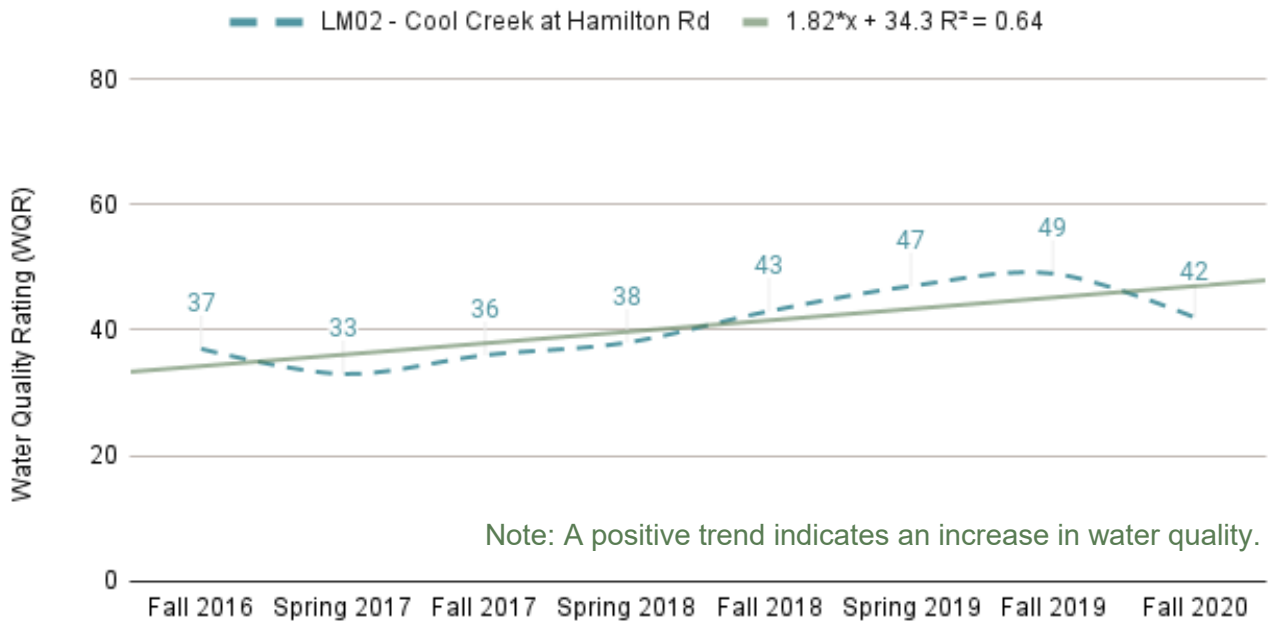

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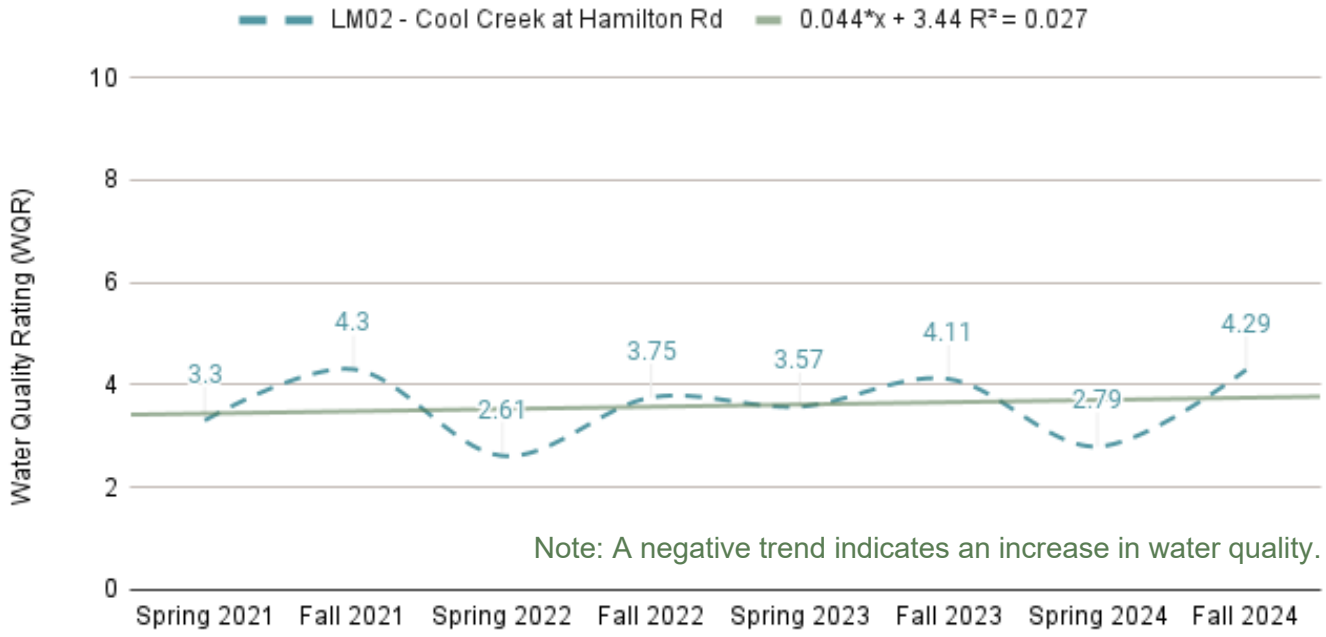
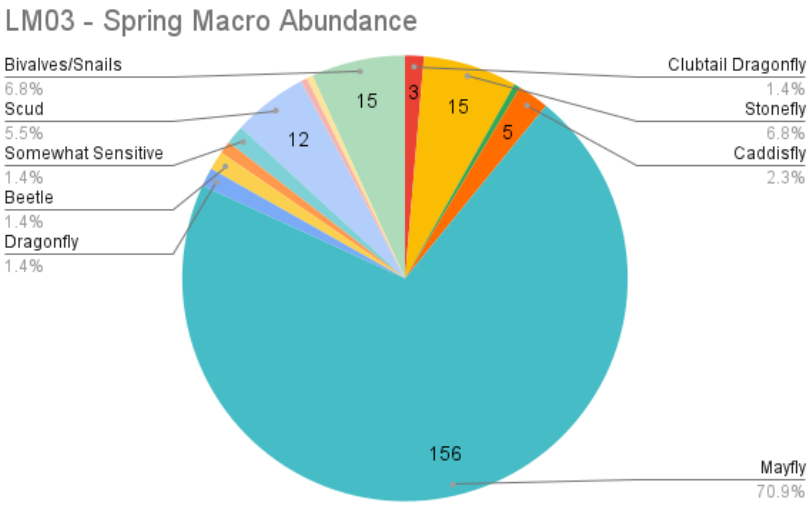
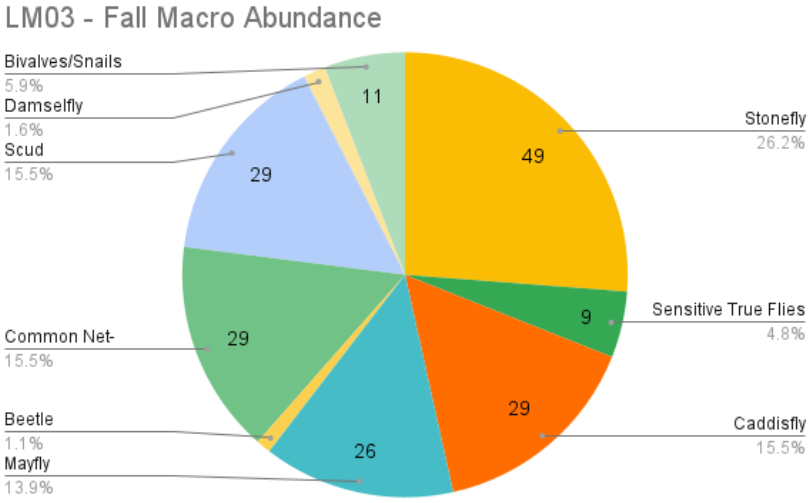


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
LM03 – Little Manistee at Johnson Rd
Annual Average Score

Year	Rating
2016	Good
2017	Fair
2018	Fair
2019	Excellent
2020	Good
2021	Excellent
2022	Excellent
2023	Excellent
2024	Very Good





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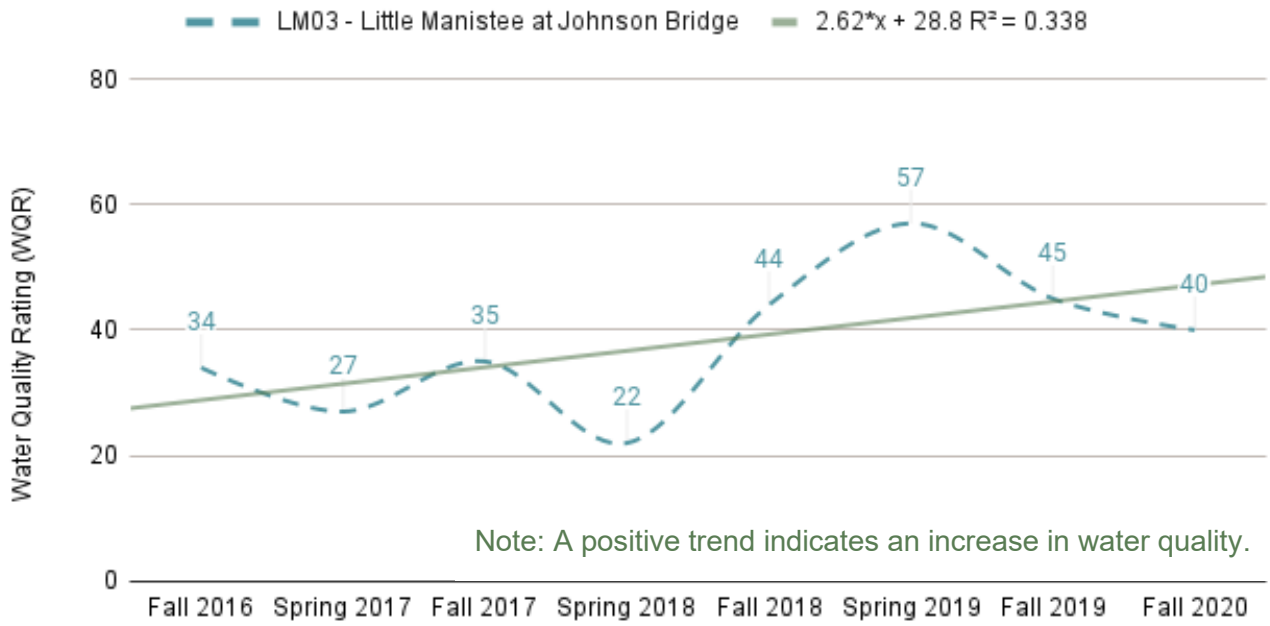

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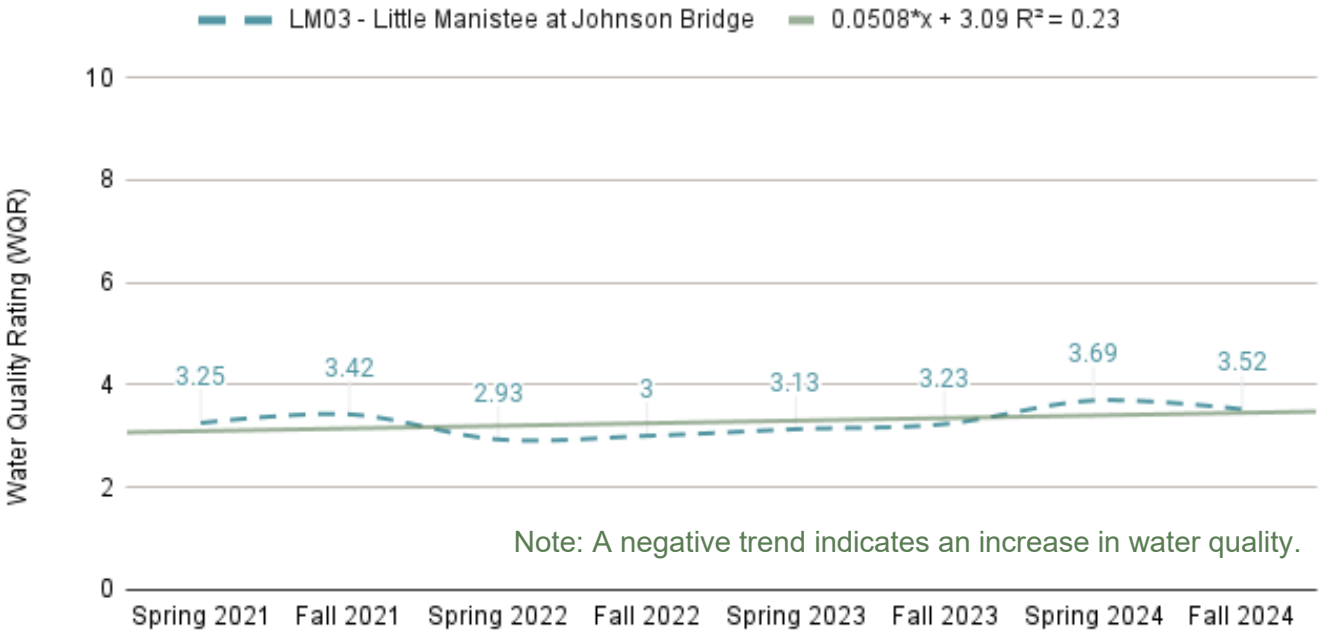
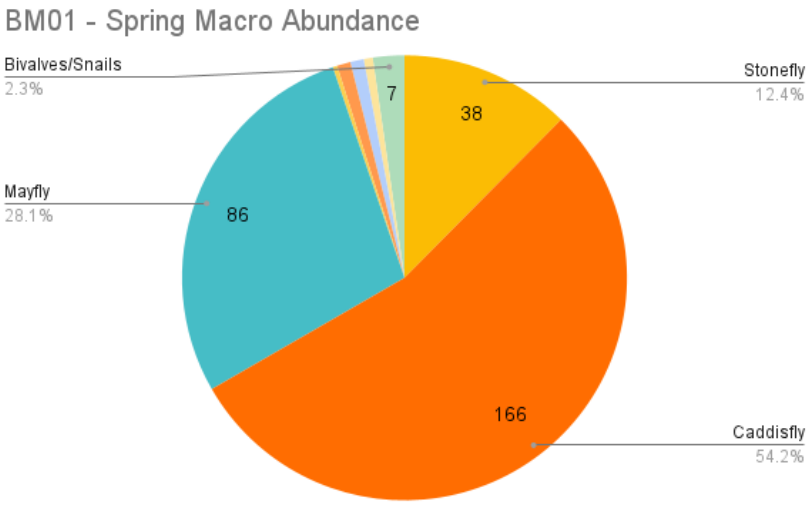
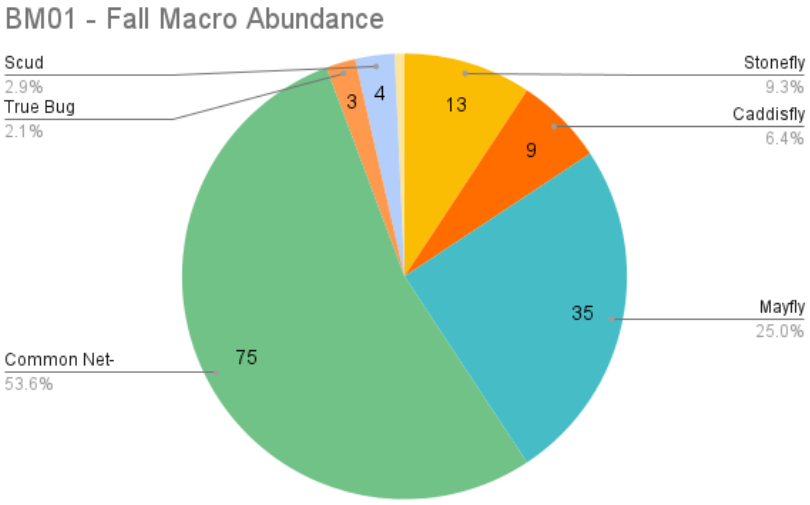


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
BM01 – Adams Creek at 16 Rd
Annual Average Score

Year	Rating
2016	Good
2017	Fair
2018	Good
2019	Good
2020	Excellent
2021	Excellent
2022	Fair
2023	Very Good
2024	Very Good





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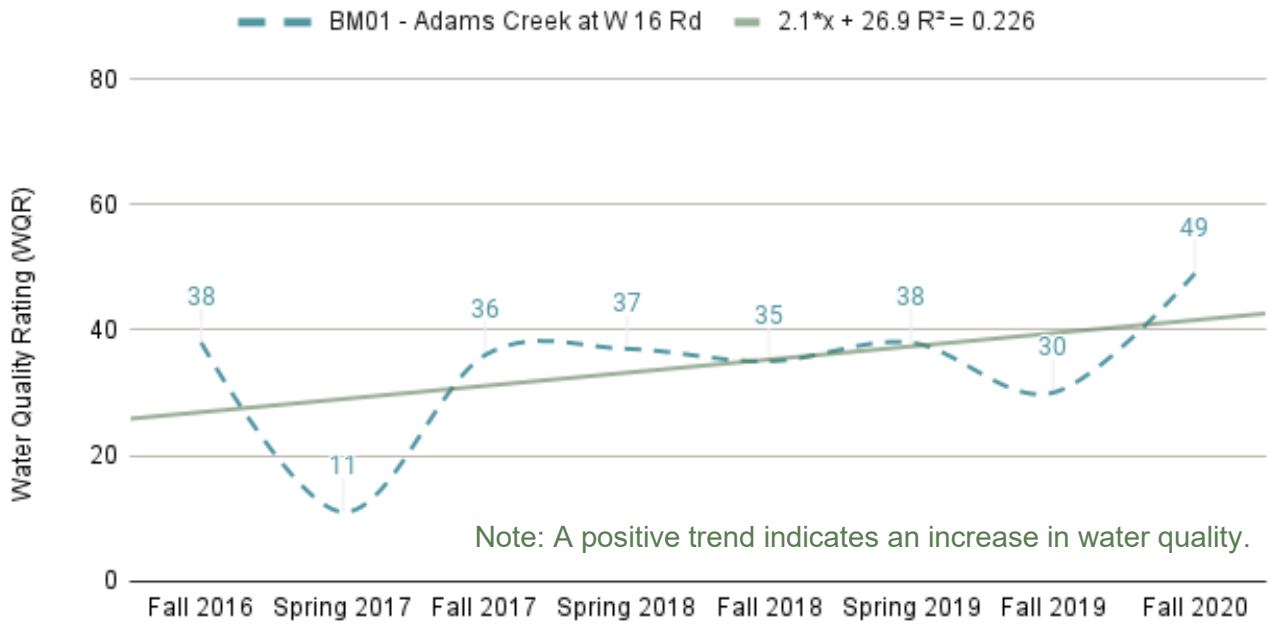

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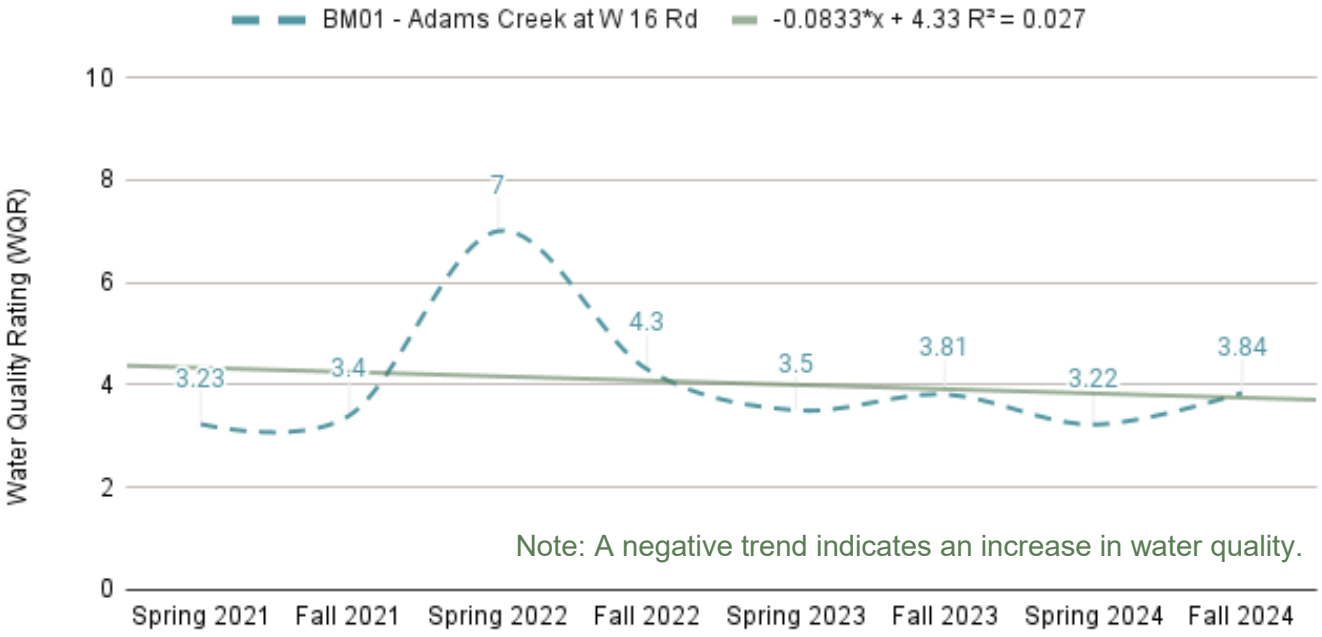
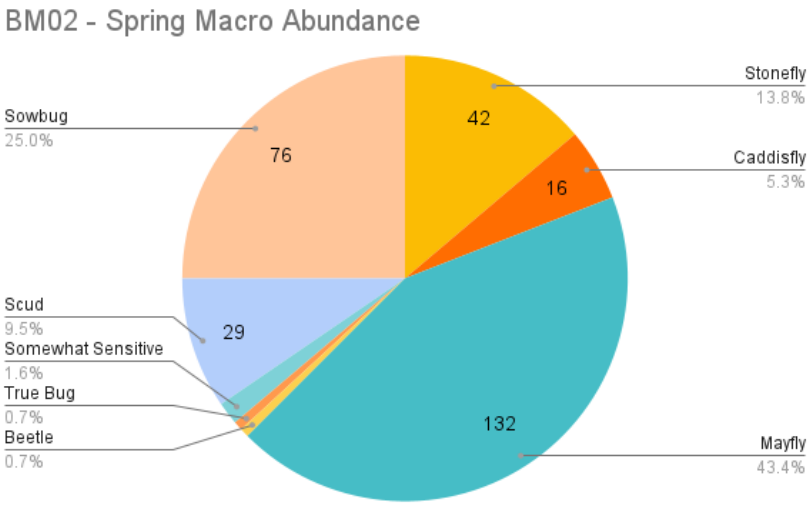
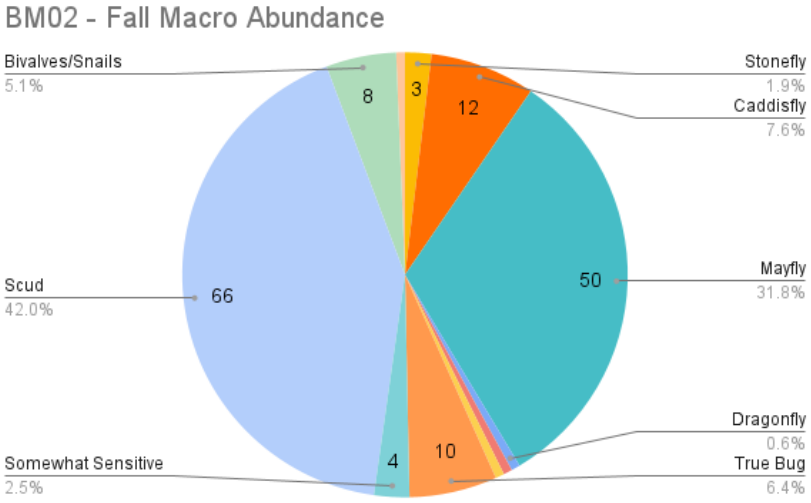


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
BM02 – Fletcher Creek
Annual Average Score

Year	Rating
2016	Good
2017	Fair
2018	Fair
2019	Good
2020	Good
2021	Good
2022	Very Good
2023	Good
2024	Good





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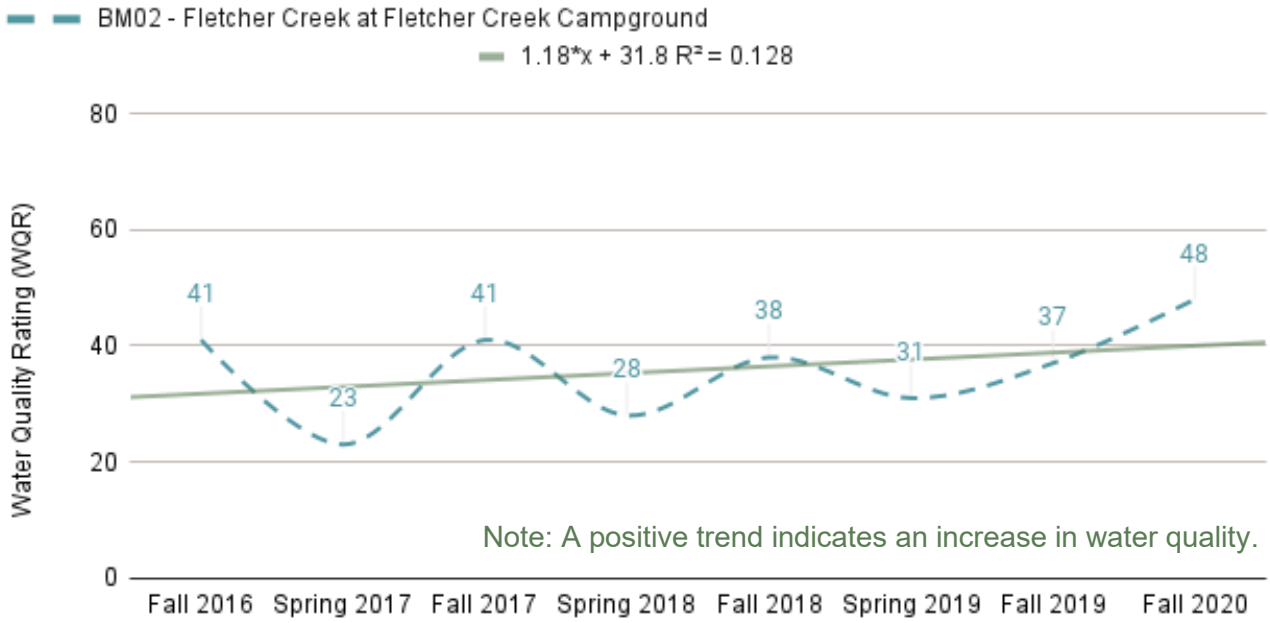

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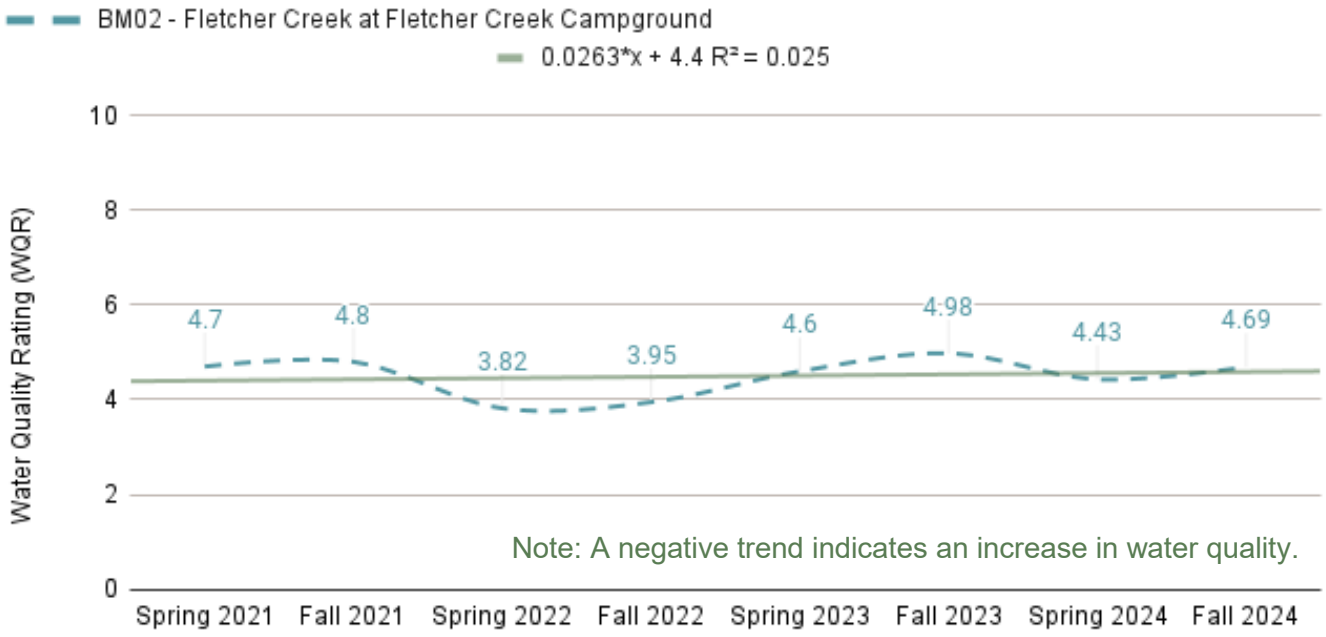
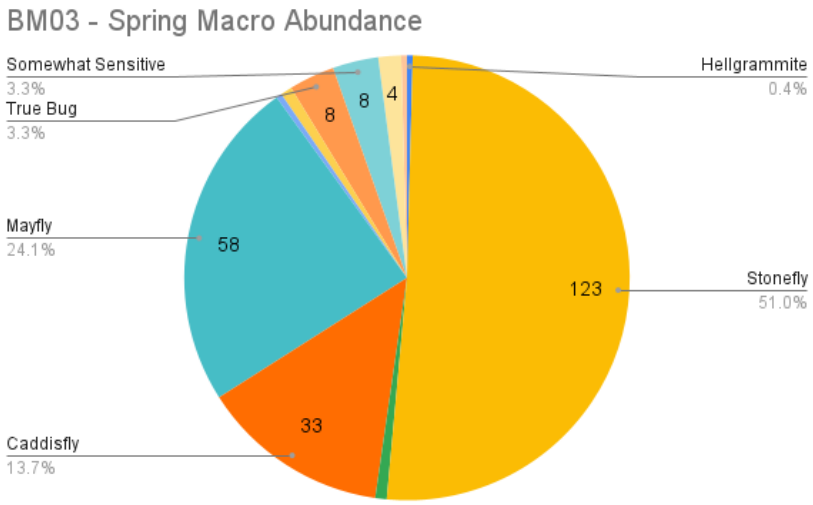
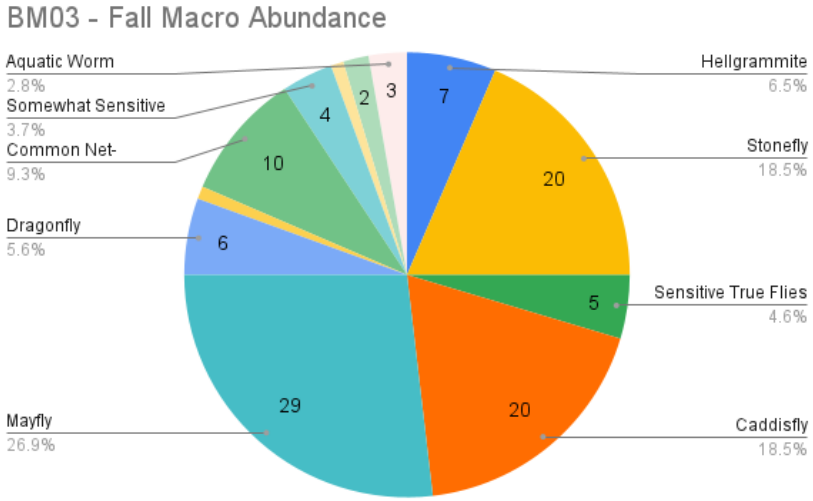


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
BM03 – Hinton Creek
Annual Average Score

Year	Rating
2016	Good
2017	Good
2018	Fair
2019	Good
2020	Good
2021	Excellent
2022	Very Good
2023	Very Good
2024	Excellent





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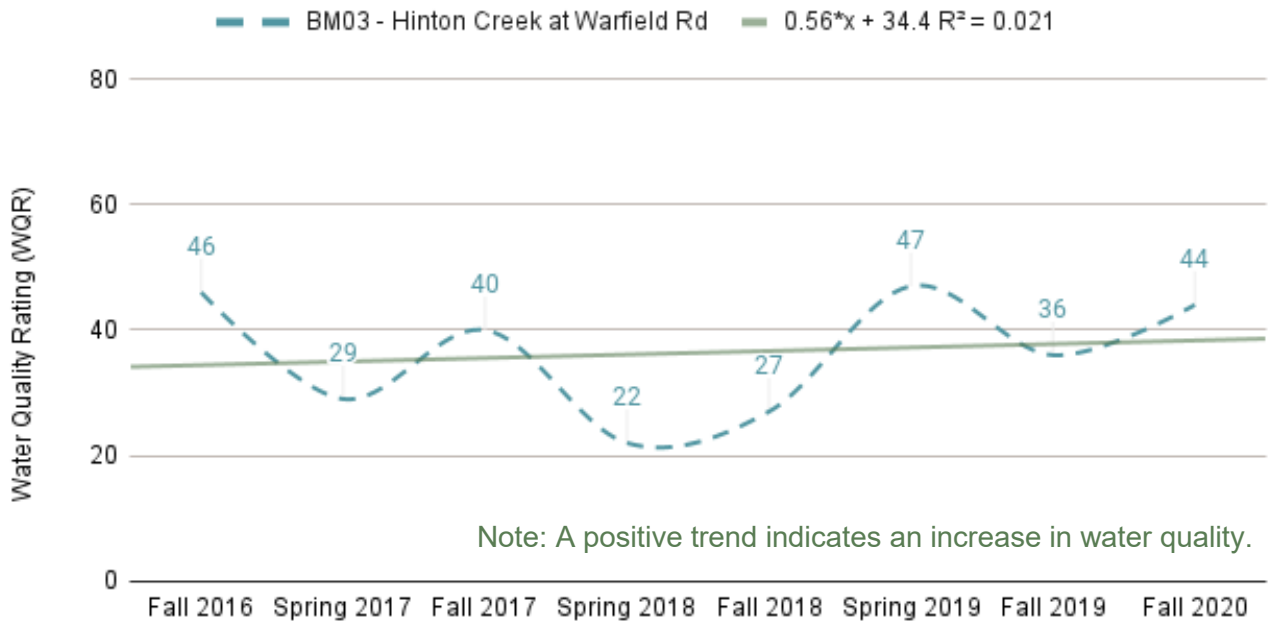

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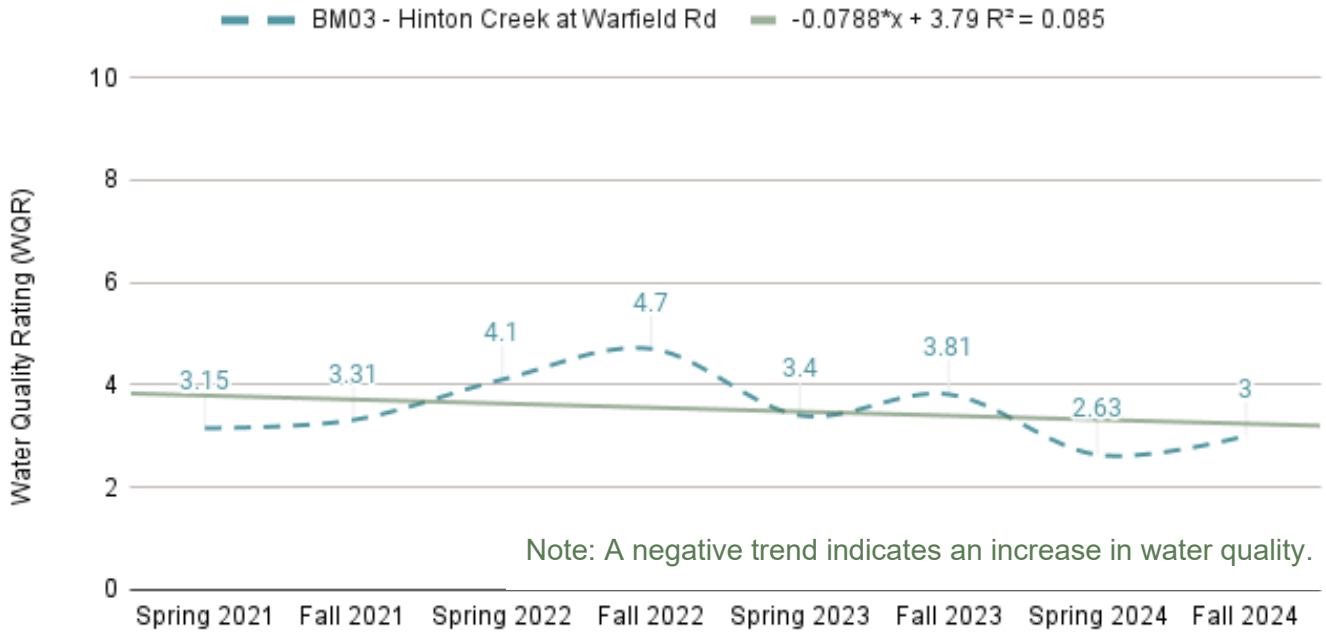
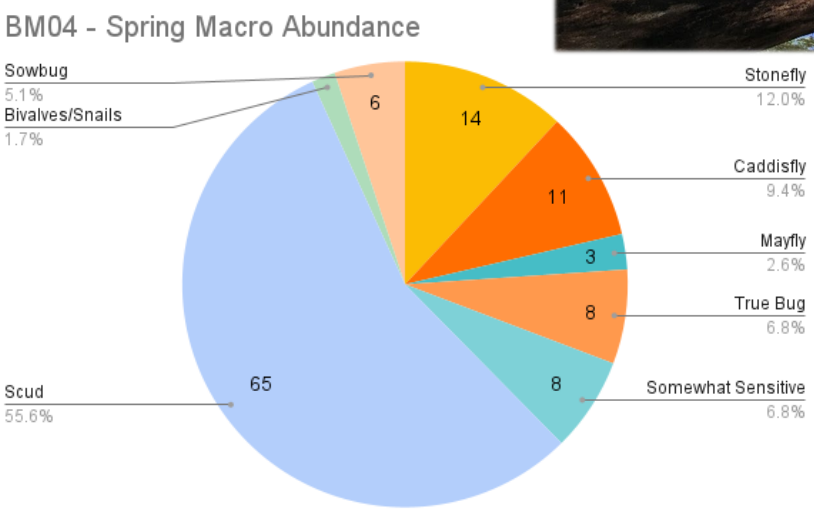
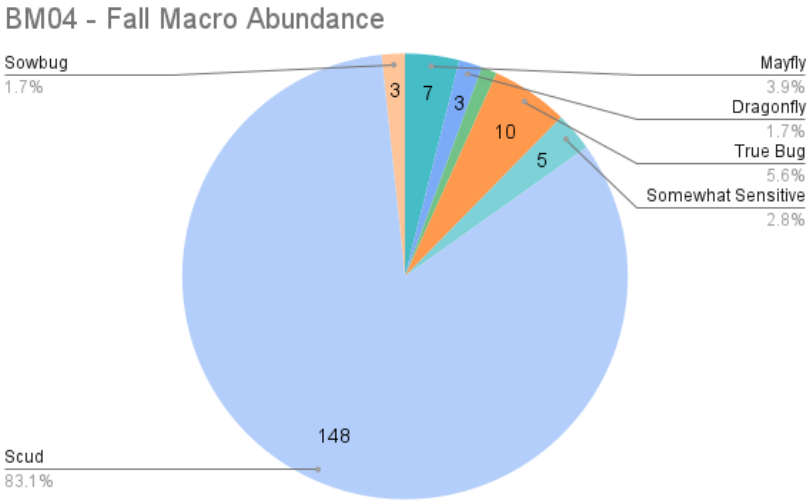


Note: A negative trend indicates an increase in water quality.

Site Results and Trends
BM04 – Sickle Creek
Annual Average Score

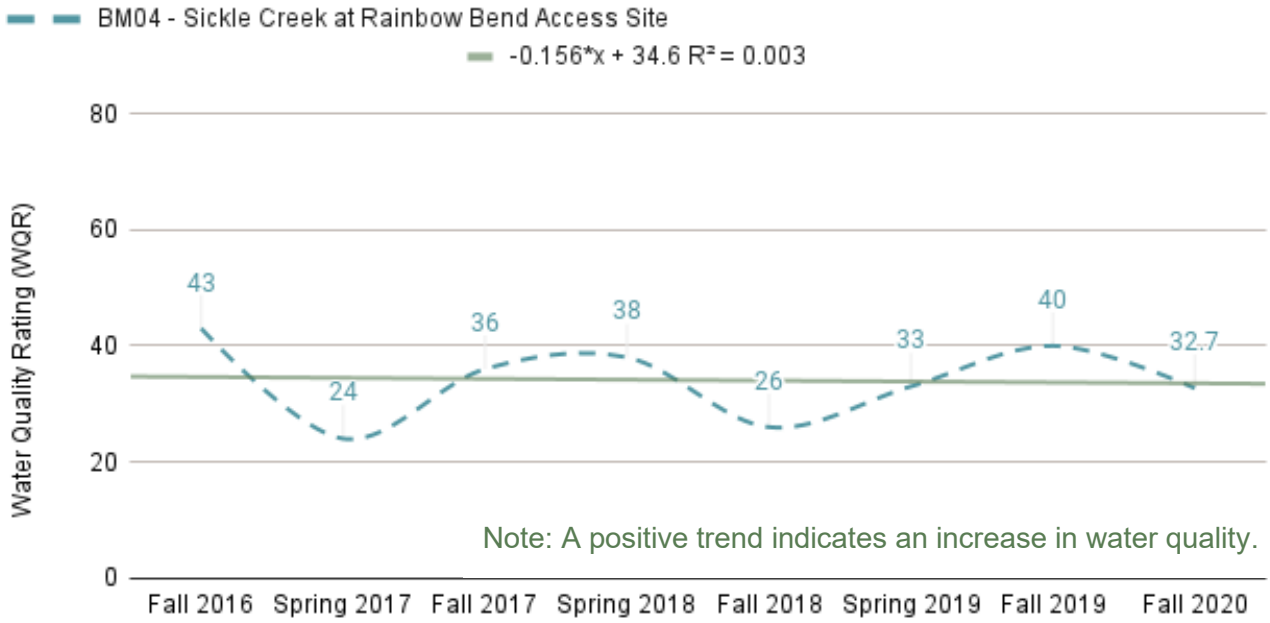
Year	Rating
2016	Good
2017	Fair
2018	Fair
2019	Good
2020	Fair
2021	Very Good
2022	Very Good
2023	Very Good
2024	Good





Water Quality Rating Pre-2021 Methodology

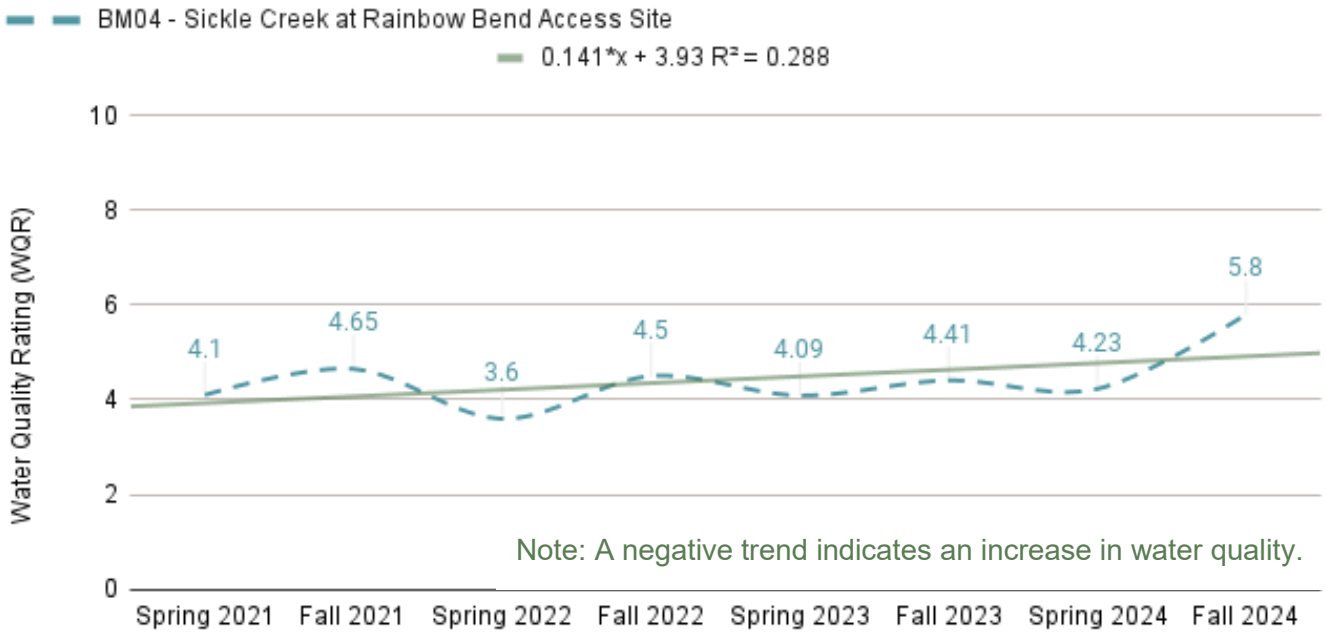
Poor (<19), Fair (19-33), Good (34-48), Excellent (>48)



Note: A positive trend indicates an increase in water quality.

Water Quality Ratings 2021 Methodology

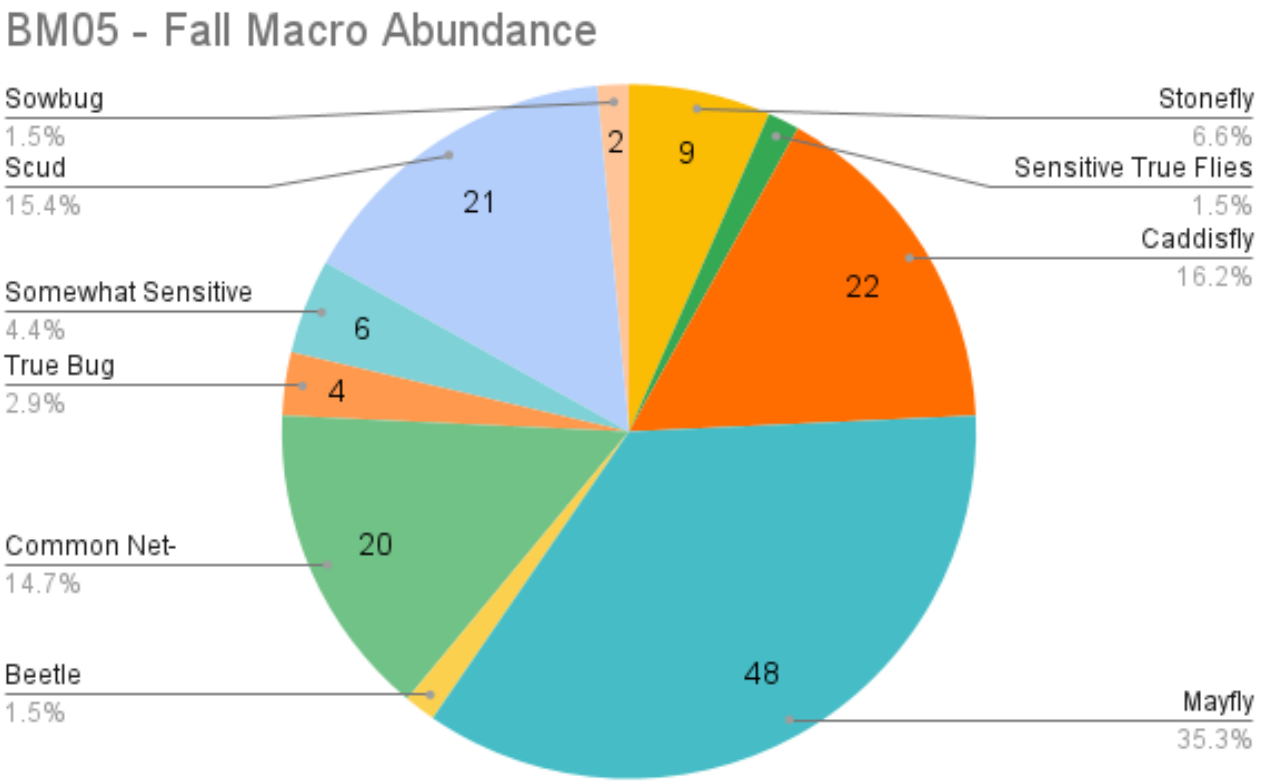
Excellent (<3.5), Very Good (3.51-4.5), Good (4.51-5.5), Fair (5.51-6.5), Fairly Poor (6.51-7.5), Poor (7.51-8.5), Very Poor (>8.5)



Note: A negative trend indicates an increase in water quality.

Site Results and Trends
BM05 – Slagle Creek
Annual Average Score

Year	Rating
2024	Very Good



Stream Habitat Assessment 2024:

The Stream Habitat Assessment is an assessment of stream conditions and watershed characteristics. Macroinvertebrate sampling procedures are used in conjunction with the Stream Habitat Assessment because each approach provides a different piece of the stream condition puzzle. MiCorps recommends repeating habitat assessments every 1 to 5 years, depending on the level of your concern for changes or impacts. Below are the MCD's stream habitat assessments from 2024 only. Habitat Assessments were conducted in 2016 and 2021 as well, but our previous data was not stored in a format able to be recovered. Henceforth, this report does not compare historical data to current. Moving forward Habitat Assessment data should be able to look at changes to stream characteristics over time that may not be immediately apparent each year. Habitat Assessments use 10 cross-sectional transects through the 300 ft. stream stretch that can be used to gauge average stream width and bank stability at each transect. "Pebble Counts" are also conducted along each transect to capture depth and substrate type. Each transect will record at least ten depth and substrate measurements. Those figures are then averaged for the whole stretch to give us substrate percentages and average stream depth.

BM01	This site had an average width of 20.7 ft. and an average depth of 1.5 ft. The dominant substrate was sand (53%), then silt (39%), gravel (4%), woody debris (3%) and cobble (1%). The average bank height was 0.5 ft. on the left bank and 0.7 ft. on the right bank (looking downstream). Both banks received an **Excellent** score for stability and desirable habitat. An excellent bank score means that the bank is stable. No evidence of erosion or bank failure and little potential for problems during floods. Less than 5% of the bank is eroded.
BM02	This site had an average width of 20.2 ft. and an average depth of 0.5 ft. The dominant substrate was sand (78%), then silt (18%), woody debris (4%). The average bank height was 0.6 ft. on the left bank and 1.7 ft. on the right bank (looking downstream). The left bank received an **Excellent** score, and the right bank received a **Good** score for stability and desirable habitat. A good bank score means that the bank is moderately stable with slight potential for problems in extreme floods. 5%-30% of the reach has areas of erosion.
BM03	This site had an average width of 10.6 ft. and an average depth of 0.4 ft. The dominant substrate was gravel (36%), then sand (33%), cobble (17%), silt (7%), woody debris (4%), clay or bedrock (3%), and boulders (1%). The average bank height was 2.2 ft. on the left bank and 1.7 ft. on the right bank (looking downstream). Both banks received a **Good** score for stability and desirable habitat.

BM04	This site had an average width of 8.5 ft. and an average depth of 0.3 ft. The dominant substrate was sand (77%), then gravel (12%), silt (11%). The average bank height was 10.5 ft. on the left bank and 3.4 ft. on the right bank (looking downstream). The left bank received a **Marginal** score, and the right bank received a **Good** score for stability and desirable habitat. A marginal score indicates that a bank is moderately unstable with erosion areas frequent and potential for erosion is high during floods. 30-60% of the bank in the reach are eroded.
BM05	This site had an average width of 29.9 ft. and an average depth of 0.7 ft. The dominant substrate was gravel (45%), then sand (33%), silt (15%), woody debris (3%), and cobble (1%). The average bank height was 0.8 ft. on the left bank and 1.3 ft. on the right bank (looking downstream). Both banks received an **Excellent** score for stability and desirable habitat.
LM01	This site had an average width of 49.9 ft. and an average depth of 2.2 ft. The dominant substrate was gravel (75%), then sand (13%), silt (8%), woody debris (5%), boulders and cobble (1% each). The average bank height was 0.1 ft. on the left bank and 1.0 ft. on the right bank (looking downstream). Both banks received an **Excellent** score for stability and desirable habitat.
LM02	This site had an average width of 26.2 ft. and an average depth of 0.6 ft. The dominant substrate was sand (56%), then silt (27%), gravel (11%), woody debris (5%), and boulders (1%). The average bank height was 1.4 ft. on the left bank and 1.2 ft. on the right bank (looking downstream). The left bank received a **Good** score, and the right bank received an **Excellent** score for stability and desirable habitat.
LM03	This site had an average width of 41.5 ft. and an average depth of 2.0 ft. The dominant substrate was gravel (53%), then sand (23%), silt (14%), cobble (4%), woody debris & boulders (3% each). The average bank height was 0.8 ft. on the left bank and 1.3 ft. on the right bank (looking downstream). Both banks received a **Good** score for stability and desirable habitat.
BC01	This site had an average width of 29.7 ft. and an average depth of 1.3 ft. The dominant substrate was sand and gravel (each 33%), then silt (14%), cobble (12%), clay or bedrock (5%), artificial (2%), and boulders (1%). The average bank height was 0.8 ft. on the left bank and 1.3 ft. on the right bank (looking downstream). The left bank received a **Good** score, and the right bank received an **Excellent** score for stability and desirable habitat. **Only 6 transects completed due to the depth of water in areas.
BC02	This site had an average width of 49.9 ft. and an average depth of 2.2 ft. The dominant substrate was gravel (75%), then sand (13%), silt (8%), woody debris (5%), boulders and cobble (1% each). The average bank height was 0.1 ft. on the left bank and 1.0 ft. on the right bank (looking downstream). Both banks received an **Excellent** score for stability and desirable habitat.

Closing Remarks on 2024

The 2024 sampling results reflect the continued commitment of the Manistee Conservation District's Volunteer Stream Monitoring Program to track and protect the health of the Lower Manistee River Watershed. All 10 test streams scored within the three highest quality tiers of the MiCorps biotic index scoring system, reinforcing the high-quality conditions of our monitored sites. This year's average score reflects a consistent "Very Good" rating across the sites, with one site even earning an "Excellent" classification.

Since the program's inception in 2016, we have amassed a robust dataset that now provides critical insights into long-term stream health trends. However, the transition to MiCorps' updated scoring methodology marks a new chapter for the program. This year, our dataset incorporates these updated metrics, and efforts will begin to reanalyze historical samples under the new system. This work will strengthen our ability to compare past and present results, providing an even clearer picture of how our streams have evolved over time.

Looking ahead, the program will focus on further strengthening the volunteer experience and ensuring that the monitoring process continues to provide high-quality data. Volunteer training and exploring new ways to engage participants will remain a key priority. These efforts will help maintain the program's long-standing reputation for accuracy and reliability while fostering a deeper connection between our community and the watershed.

The success of the VSMP would not be possible without the dedication of our volunteers, whose hard work and enthusiasm drive this program forward. We extend our deepest gratitude to everyone who participated in 2024. Your efforts ensure that the Lower Manistee River Watershed remains a thriving and cherished natural resource. We look forward to continuing this important work together in 2025 and beyond.

A special thanks to our 2024 Volunteers

Jan Sapak	Josh Clark	Thomas Powrie
Trish Wellman	Arielle Breen	Dale Downes
Nita Greahm	Kevin Ennis	Tom Martuch
Annette Sturdevant	Jack Epstein	Margie Clark
Sarah Whitaker	Brett Wakefield	Rick Rowe
Charles Driscoll	Mary Kay Wakefield	Elizabeth Christy
David Vailliencourt	Taylor Rathbum	Tim Snook
Jean Capper	Zoe Zanderbrug	Gerald Wilgus
Wayne Anderson	Joyce Durdel	Dave Myers
Leslie Cuppett	Armas Soorus	Jan Myers
Theresea Flaherty	Rose Soorus	George Vitta
Anna Wilson	Denise Connolly	Wolf Bowman