www.therouge.org
650 Church Street Suite 209
Plymouth, MI 48170
734-927-4904

Rouge River Benthic Monitoring Program
Fall 2024 Report

This report contains benthic macroinvertebrate sampling results from 42 Rouge tributary and river sites. The Fall Bug Hunt on October 12, 2024 had 127 attendees that sampled 29 sites, and it was a beautiful fall day. Groups that participated included Lawrence Tech University's Environmental Alliance student group; Wayne State University; and the University of Michigan-Ann Arbor. Additional sites were sampled during the Team Leader Training, during a sampling day in which University of Michigan-Dearborn students participated at Shiawassee Park, and by Wayne County for a total of 42 sites. Funding for the monitoring was provided by the communities of Beverly Hills, Farmington, Livonia, Northville Township, Novi, Plymouth, Plymouth Township, Southfield, Troy, Birmingham, Washtenaw County Water Resources, Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the United States Environmental Protection Agency's Great Lakes Restoration Initiative, and the Michigan Clean Water Corps.

FRIENDS OF THE ROUGE BENTHIC MONITORING PROGRAM

FOTR's benthic monitoring program was started in 2001 to involve a large number of volunteers in monitoring the health of the watershed by sampling the creeks of the Rouge River. The types and number of benthic macroinvertebrates found can be used to assess water quality. Each team of volunteers samples two sites under the direction of a trained team leader. Samples of each organism are collected and field identifications are verified in the lab.

Understanding Benthic Scores

Stream Quality Index (**SQI**) is determined by weighting each type and number of organisms found by their sensitivity ratings. SQI a measure of the degree of organic pollution that is calculated by rating and scoring organisms based on their sensitivity (sensitive, somewhat sensitive and tolerant) and frequency in the sample (rare or common). A higher proportion of sensitive organisms such as mayflies and caddisflies results in a higher **SQI**. A greater number of different organisms also results in a high **SQI**. Higher scores reflect better quality sites. The **SQI** has four different levels: **>48=EXCELLENT, 34-48=GOOD, 19-33=FAIR, <19=POOR**.

Number of taxa represents the number of different families of organisms. Like SQI, a higher number of taxa indicate a healthier site.

Number of insect taxa – insects are more sensitive than the non-insect taxa.

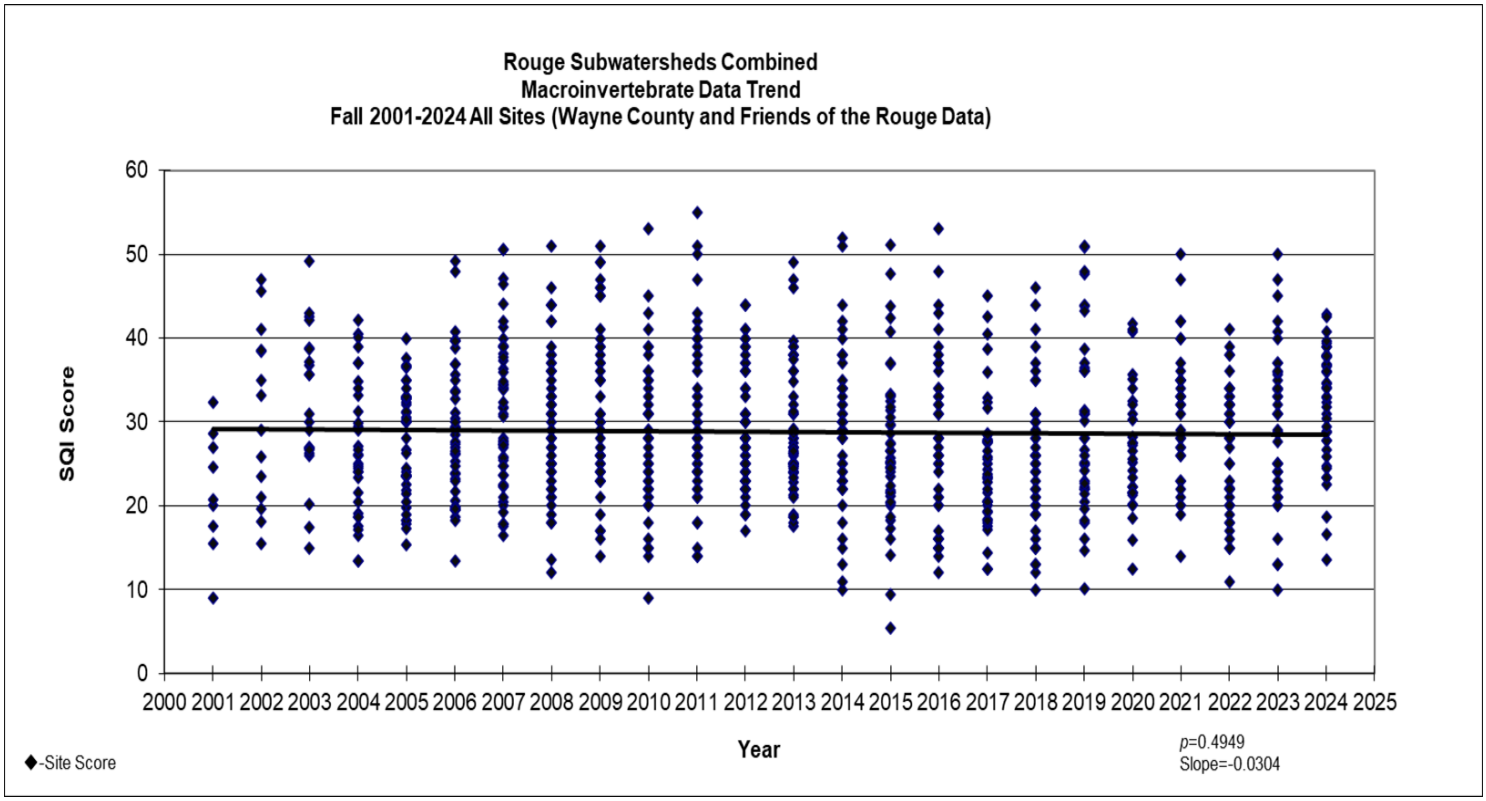
EPT refers to the number of mayfly, caddisfly and stonefly families found (Ephemeroptera, Plecoptera, and Tricoptera); these three orders contain some of the most sensitive organisms.

WQR – Water Quality Rating is a measure of the degree of organic pollution similar to SQI. Organisms are rated based on the Hilsenhoff Index of Biotic Integrity and scores are weighted by the number of individuals found. Unlike SQI, a LOWER score is indicative of less pollution. There are seven categories rather than four. 0.0-3.50=**Excellent**, 3.51-4.50=**Very Good**, 4.51-5.50=**Good**, 5.51-6.50=**Fair**, 6.51-7.50=**Fairly Poor**, 7.51-8-50=**Poor**, 8.51-10.0=**Very Poor**. WQR is calculated based on family level identification.

Overall Summary:

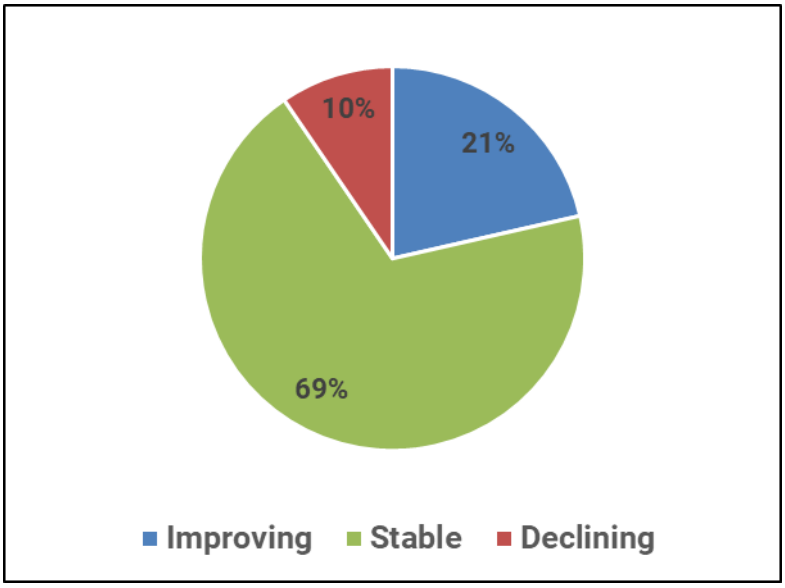
Stream Quality Index (SQI) averaged 29 or FAIR and the Water Quality Index (WQR) averaged FAIR (maps pg. 13-14, Table 2, and graph below). Taxa averaged 14.4 Families per site, EPT 2.3, and Chloride 156.8 (chronic level).

To compare trends over time, we analyzed the trends in SQIs. When all of the sites were compared, there was not a significant trend in SQIs (see graph below).



Data Trends

In comparison to past years, 69% of sites were stable, 21% of the sites improving and 10% declining.



To compare change over time, we analyzed the trends by subwatershed, with Johnson Creek analyzed separately as it is a coldwater tributary (Table 1 and graphs p. 17-26). The Middle 3 subwatershed had significant positive trends. The Main 1-2, and the Lower 1 subwatersheds had significant negative trends. These trends are similar to last year.

Table 1: Fall Bug Hunt Trend Summary All Sites 2001-2024

Subwatershed	slope	*p*-value	True Trend	Subwatershed SQI average score	Water Quality Rating
Main 1-2	-0.2068	0.0449	yes, negative	29	Fair
Upper	-0.1379	0.1028	no trend	25	Fair
Johnson Creek	0.1332	0.1688	no trend	35	Good
Middle 1	-0.1637	0.1054	no trend	31	Fair
Middle 3*	0.4571	0.0000	yes, positive	23	Fair
Lower 1	-0.2138	0.0348	yes, negative	28	Fair
Lower 2*	-0.0906	0.5451	no trend	26	Fair
Main3-4**	-0.4411	0.2203	no trend	27	Fair

* no sites sampled in Fall 2020-2021, **no sites sampled in Fall 2019-2024

The data was further analyzed for trends by tributaries and subareas. Table 2 contains a summary of this analysis; the graphs are on p. 17-26. When the upper and lower sections of the Main, Middle and Lower subwatersheds were combined, the trends were negative for the Main and Lower and positive for the Middle. When all the sites were combined, there was no significant trend.

Table 2: Fall Bug Hunt Trend Summary Branches/Tributaries 2001-2024

Branch	Slope	*p*-value	True Trend	Branch Average SQI Score	Water Quality Rating
Rouge All Subwatersheds combined	-0.0304	0.4949	no trend	29	Fair
Main (Main 1/2 and Main 3/4)	-0.2423	0.0133	yes, negative	29	Fair
Bell Creek only	-0.0662	0.6163	no trend	23	Fair
Upper only	-0.2129	0.1985	no trend	27	Fair
Middle (Middle 1 and Middle 3)	0.1184	0.1771	no trend	29	Fair
Tonquish Creek only	0.0252	0.8861	no trend	31	Fair
Johnson Creek and Middle (Middle 1 and Middle 3)	0.1839	0.0103	yes, positive	31	Fair
Sump Creek (Johnson Creek tributary)	-0.1788	0.6632	no trend	36	Good
Middle without Tonquish Creek	0.1491	0.1438	no trend	29	Fair
Lower 1 and Lower 2	-0.1878	0.0258	yes, negative	27	Fair

Individual sites were examined for long term trends (Table 3). Of the sites sampled in fall 2024, four had a significant trend: two negative and two positive.

Table 3: Friends of the Rouge and Wayne County Fall Bug Hunt Data Trend 2001-2024 by site

Site	slope	*p*-value	Statistically significant trend	Site average SQI score	Water Quality Rating
Main6	-0.3268	0.0398	yes, negative	33	Fair
Nott	-0.0462	0.0462	yes, negative	26	Fair
MR-4	0.5463	0.0252	yes, positive	31	Fair
Fel1	0.8631	0.0252	yes, positive	27	Fair

Friends of the Rouge

SALT WATCH™
IZAAK WALTON LEAGUE OF AMERICA

Since 2020, we have been testing sites for road salt (chloride) through the Izaak Walton League's Salt Watch program during the Stonefly Search and Bug Hunts. Salt we apply to our roads and sidewalks for snow and ice removal washes into our streams and is toxic to aquatic life when it reaches high levels. Recognizing this, the State of Michigan Department of Environment, Great Lakes and Energy (EGLE) set water quality values aiming to protect surface water from chloride, based on parts per million (ppm) concentrations.

These are:
150 ppm and above - causes long term effects to aquatic life (chronic)
320 ppm and above - causes acute effects to aquatic life (toxic)

This fall, two sites had toxic levels of chloride, and eighteen sites had chronic levels (table 4, map p. 15). This is particularly concerning as one would expect road salt applied last winter to be washed out of the system by October. EGLE has already listed Bishop Creek as "impaired" due to high salt levels, and more areas of the water may be listed in the future due to elevated chloride levels throughout the watershed.

Table 4: Sites With Elevated Chloride Levels

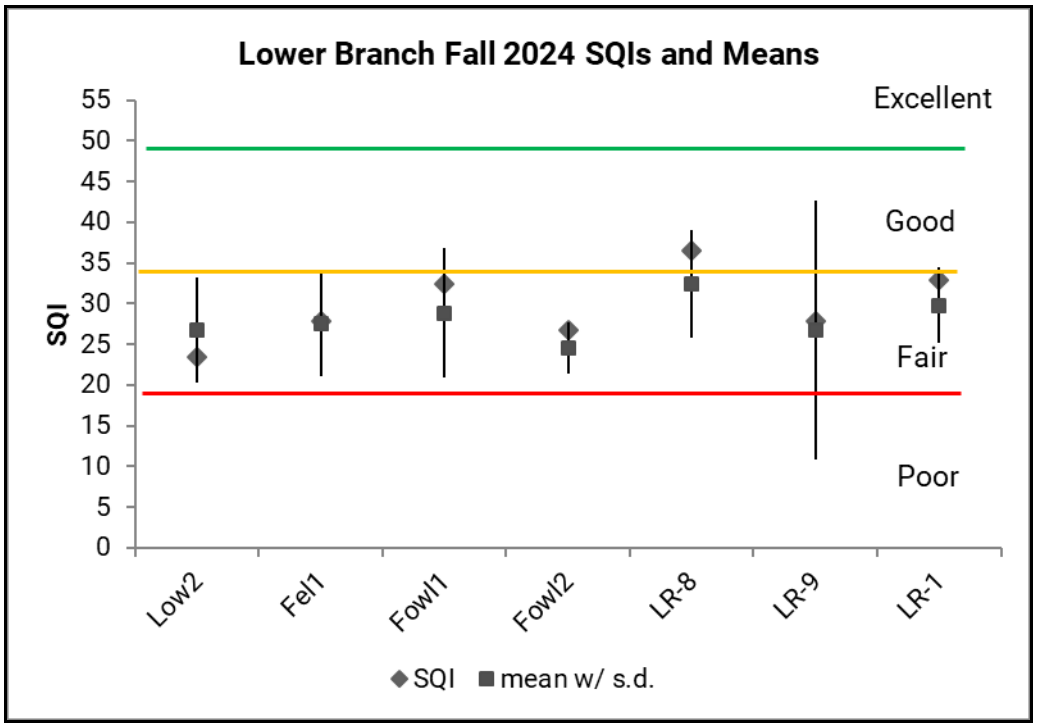
BRANCH	Stream Name	FIELDID	Site Description	Cl ppm	Cl Rating
Lower	Fellows Creek	LR-9	Fellows Beck Warren	166	chronic
Main	Sprague Creek	Sprag	Main Lloyd Stage	213	chronic
Main	Main Rouge	Main1	FF Pk	213	chronic
Main	Main Rouge	Main3	Booth Park	152	chronic
Main	Main Rouge	Main11	Quarton at Lakeside	231	chronic
Main	Main Rouge	Main4	Linden Park	213	chronic
Main	Main Rouge	Main4.5	Fairway Park	213	chronic
Main	Nottingham Creek	Nott	Country Day	166	chronic
Main	Main Rouge	Main6	Sfld Civic Ctr	181	chronic
Main	Evans Creek	Evan2	LTU	531	toxic
Middle	Walled Lk Drainage	Wall1	Rotary Pk	152	chronic
Middle	Walled Lk Drainage	Wall2	WL 10 M	213	chronic
Middle	Tonquish Creek	Nton	S Evergreen St	330	toxic
Middle	Middle Rouge	MR-4	Levan Knoll	194	chronic
Middle	Middle Rouge	MR-5	Valley View	211	chronic
Middle	Middle Rouge	MR-6	Sherwood	227	chronic
Upper	Upper Rouge	Up2	Shiawasee Park	304	chronic
Upper	Bell Branch	Bell1	Bicentennial Park	308	chronic
Upper	Bell Branch	Bell3	Livonia 6 Mile	287	chronic
Upper	Bell Branch	Bell2	Schoolcraft College	181	chronic

We also began tested nitrate levels throughout the watershed since high levels in the water can be due to human impacts such as fertilizer application on the land or sewage outfalls/discharge. Too much nitrate in the water can also encourage the growth of algae which could result in algal blooms. In the 1990s, the Environmental Protection Agency created a drinking water standard for nitrate which is nitrogen is 10 mg/L (equivalent to 10 parts per million), research suggests that prolonged exposure to nitrate levels below 10 mg/L can still lead to increased health risks. There was one site with elevated levels of nitrate this fall: Up2 (table 5).

Table 5: Sites With Elevated Nitrate Levels

BRANCH	Stream Name	FIELDID	Site Description	Nitrate ppm
Upper	Upper Rouge	Up2	Shiawasee Park	10

Lower Branch

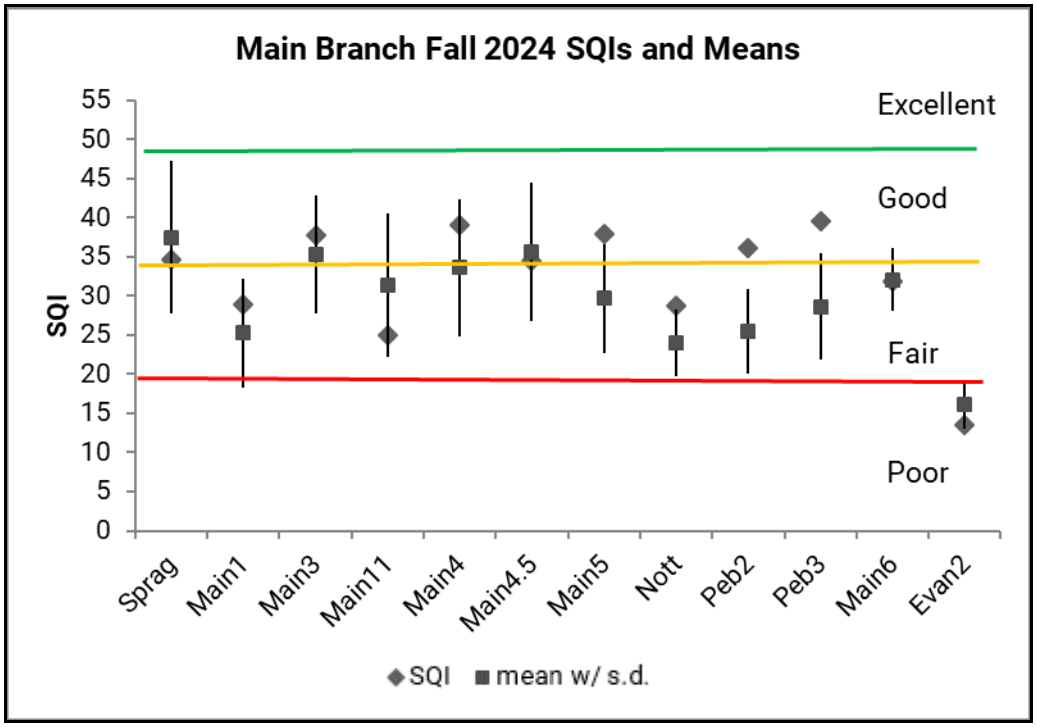


Seven sites were sampled on the Lower Branch (Table 6, p. 16), including two tributaries: Fellows Creek and Fowler. SQIs averaged FAIR (29). One site had a GOOD SQI score, and six had FAIR SQIs. In the new WQR system, sites averaged fair (5.79). Sites had an average of 13 taxa, 9 insect taxa and 2 EPT. Chloride levels ranged from a low of 30 ppm at Fowl2 to a high of 166 ppm at LR-9; one site had chronic levels (LR-9) with no sites at the toxic level (Table 6, p. 16). No sites had elevated nitrate levels.

SQI scores were compared with past data (chart above). All sites were within a standard deviation of the average for the site.

Long term trend analysis showed a significant negative trend for the Lower 1 and for all of the Lower when the subwatersheds are combined (Table 1 and 2, graphs p. 25-26). Fel1 had a significant positive trend (Table 3).

Main Branch

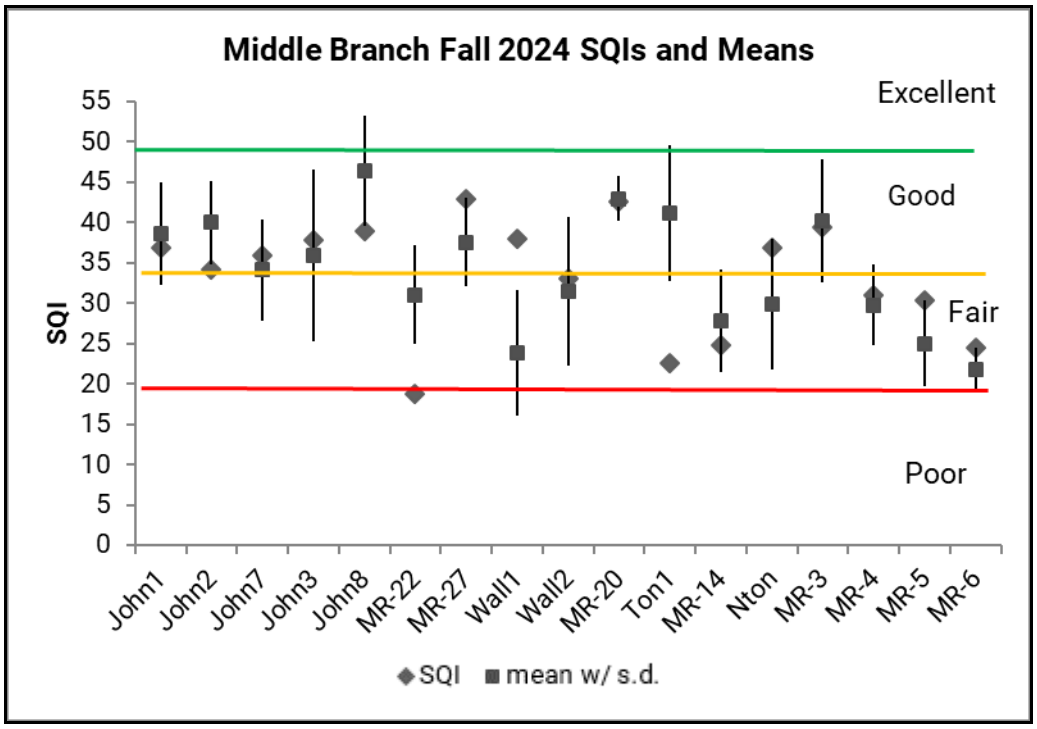


Twelve sites on the Main Branch were sampled, including the following tributaries: Evans, Nottingham, Pebble and Sprague Creek. SQIs averaged FAIR (32). Seven rated GOOD, four rated FAIR, and one rated POOR. WQRs averaged fair (5.7). Taxa averaged 14, 8 Insect taxa, and 3 EPT. Chloride levels averaged 202 ppm, and eight sites were at the chronic effects level (>150 ppm), with one site at the toxic level (Evan1) (Table 6, p. 16). No sites had elevated nitrate levels.

SQI scores were compared with past data (chart above). Eight were within a standard deviation of the average for the site and four were above.

Long term trend analysis shows a significant negative trend for the Main 1-2 subwatershed as well as for all of the Main when the subwatersheds are combined (Table 1 and 2, graphs p. 17-18). Nott and Main6 had significant negative trends when considered separately (Table 3).

Middle Branch

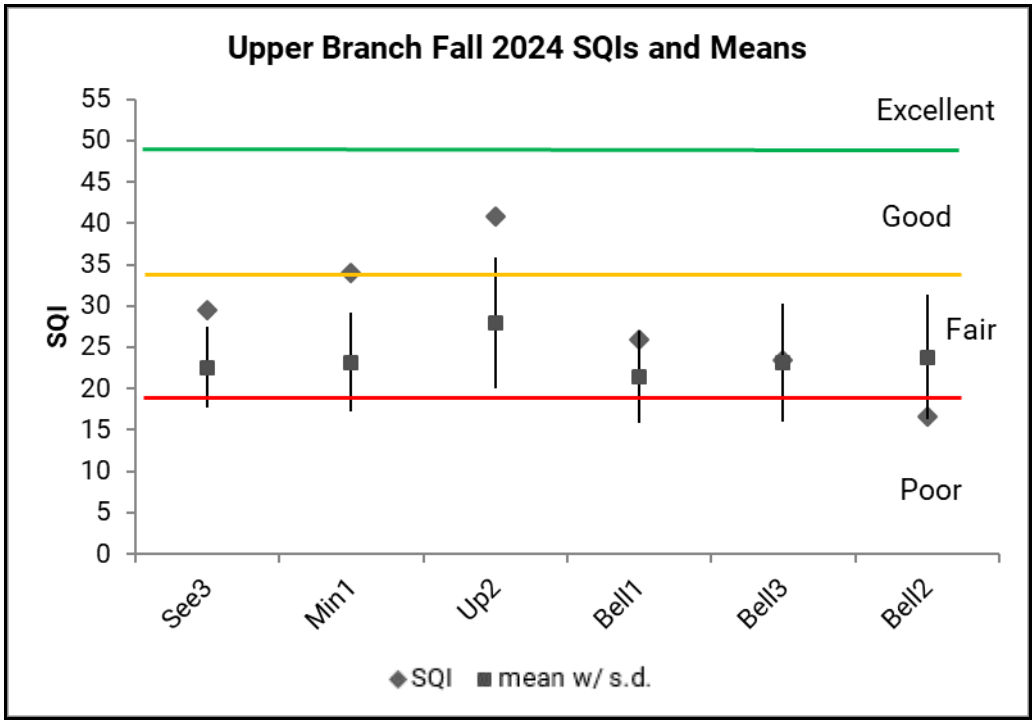


Seventeen sites were sampled on the Middle Branch; Johnson Creek had 7 sites, Tonquish Creek had 3 sites, the Walled Lake Drainage had two sites, and the final five sites were in the Middle Rouge. SQI scores averaged FAIR (33), with ten GOOD, and seven FAIR. WQRs averaged fair (5.56). Taxa averaged 16, 10 insect taxa and 3 EPT.

In comparing averages and past data (chart above), the majority of sites (11) were within a standard deviation of the average for the sites. Two sites were above (Wall1 & MR-5) and four sites were below (John2, John8, MR-22, and Ton1). Chloride levels averaged 143 ppm, with five sites at the chronic level, and one site at the toxic level: Nton (Table 6, p. 16). No sites had elevated nitrate levels.

In long term trend analysis, the Middle 3 had a positive trend (Table 1). When the Johnson Creek, Middle subwatersheds were combined, there was a significant positive trend (Table 2, graphs p. 21-24). MR-4 had a positive trend when considered by site (Table 3).

Upper Branch



Six Upper branch sites were sampled including Seeley Creek, Bell Creek, and Minnow Pond, as well as the Upper Rouge at Shiawasee Park. SQIs averaged FAIR (28). Two sites were GOOD, three sites were FAIR, and one site was POOR. WQR averaged fair (6.42). Taxa averaged 13, 8 insect taxa and 2 EPT.

In comparing averages and past data (chart above), three sites were above a standard deviation of the average, and three were within the standard deviation of the average for a given site. Chloride levels averaged 197 ppm, with four sites at the chronic level. One site had elevated levels of nitrate: Up2 (Shiawassee Park) (Table 6, p. 16).

Long term trend analysis shows no significant trend in scores for the Upper Branch (Table 1 and 2, graphs p. 19-20).

THANK YOU!!!!!

Thank you to all the **volunteers** and **Team Leaders, Sue Thompson** for sampling additional sites, helping with identification, analyzing trends and reviewing the report. Funding for the event was provided by the communities of Beverly Hills, Farmington, Livonia, Northville Township, Novi, Plymouth, Plymouth Township, Southfield, Troy, Birmingham, Washtenaw County Water Resources, Michigan Department of Environment, Great Lakes, and Energy and the United States Environmental Protection Agency's Great Lakes Restoration Initiative, the Alliance of Rouge Communities, and the Michigan Clean Water Corps.

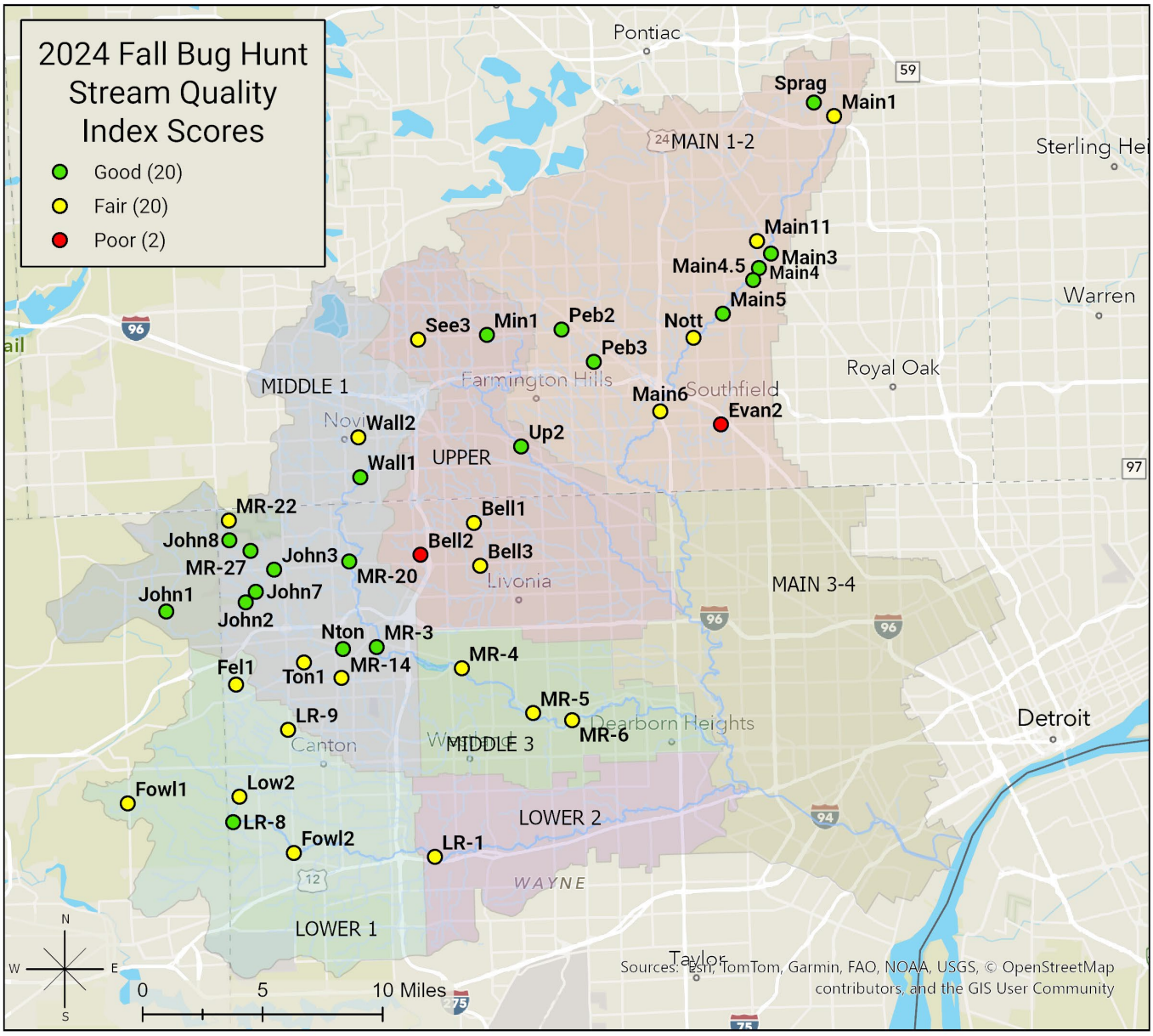
Friends of the ROUGE

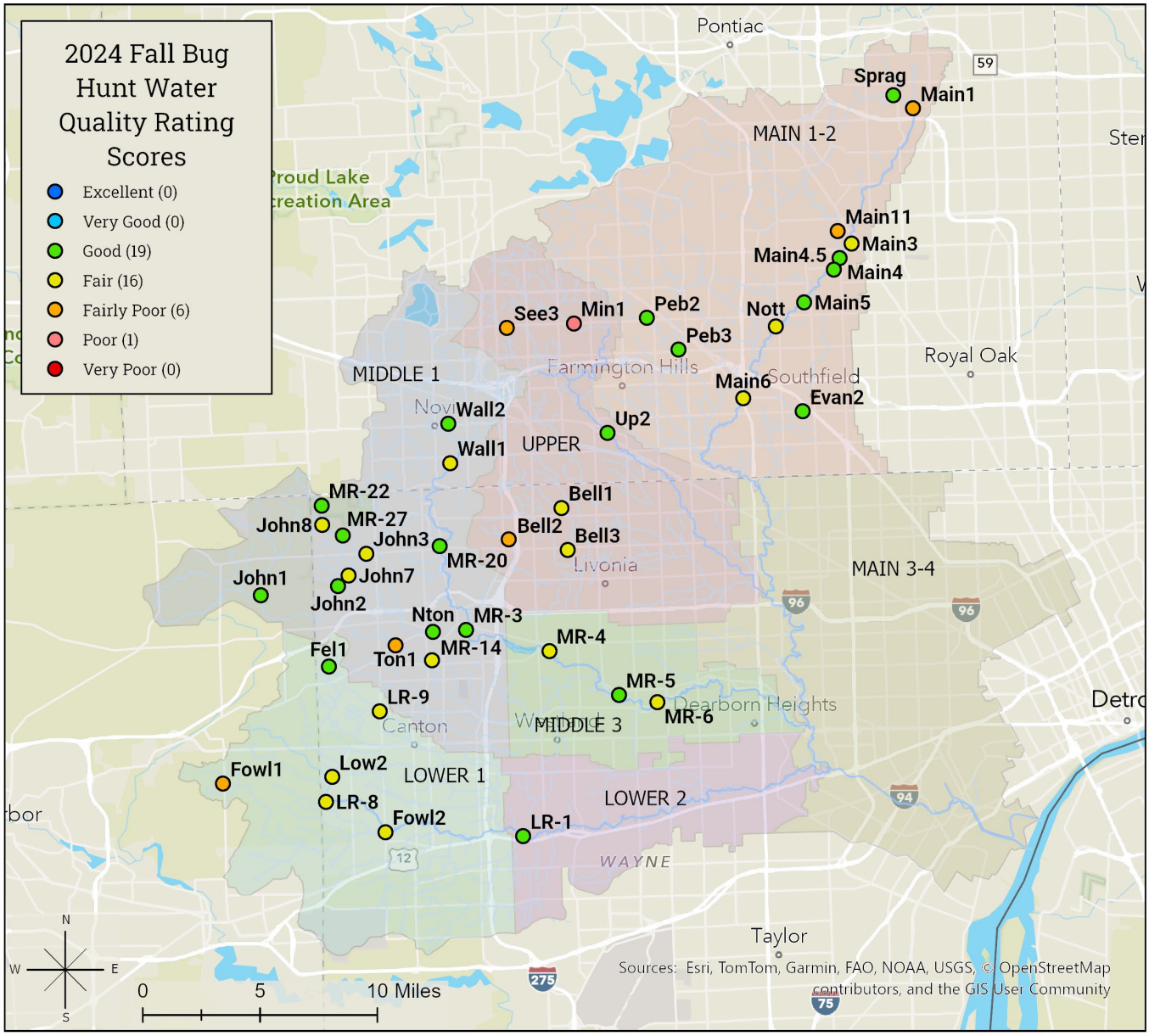
Join us for the Winter Stonefly Search
Sat. Jan. 25th, 2025 10 am – 3 pm
Deadline to register: January 15th

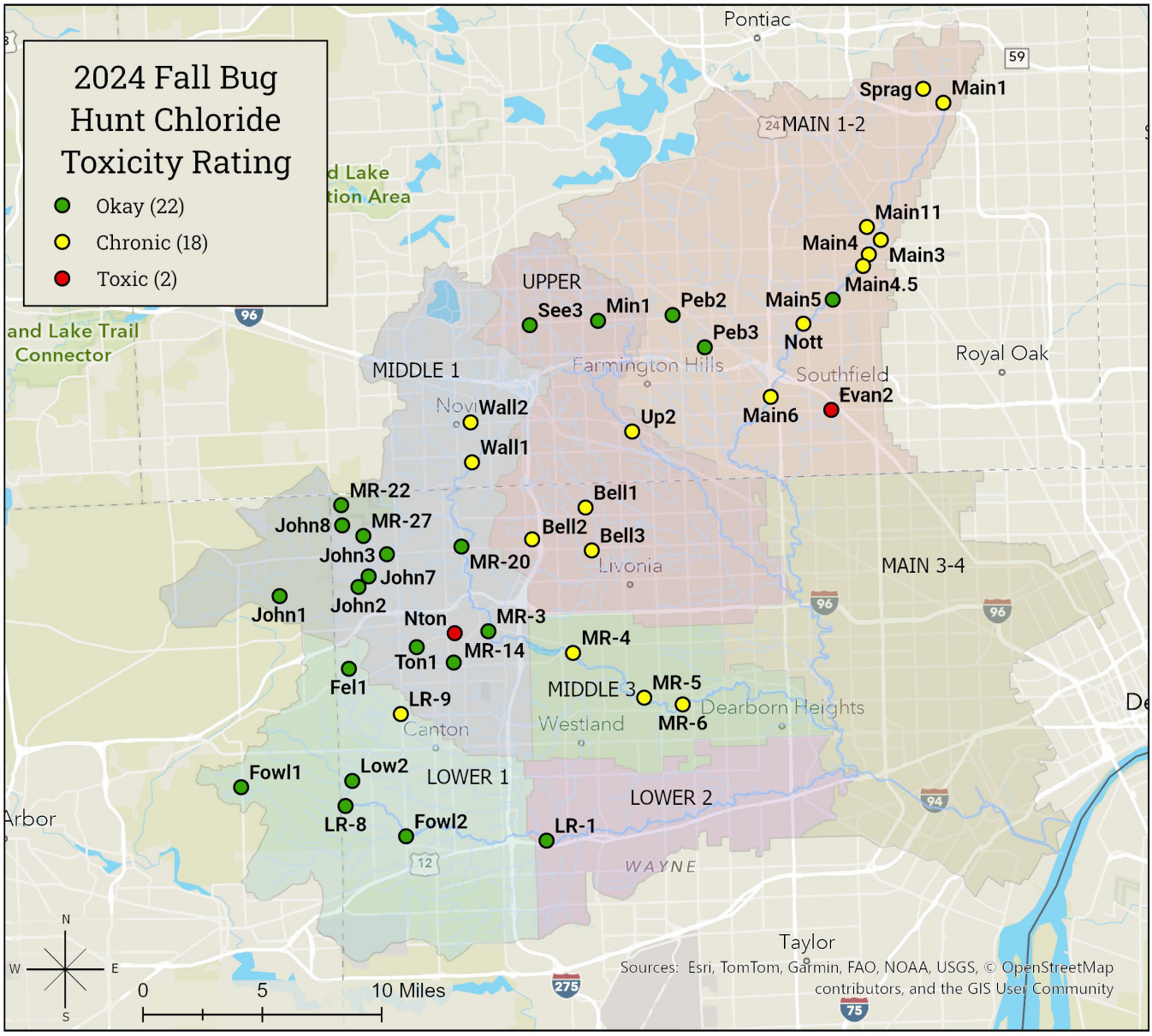
Register Here:
2025 Stonefly Search

Volunteers meet at 10am at the Plymouth Cultural Center (525 Farmer St., Plymouth). There will be an indoor welcome from 10am-11am where volunteers will have a chance to meet their team, enjoy refreshments (coffee, juice, bagels, and donuts), and watch a short presentation before heading out to two sites throughout the watershed. Ending times for each team will vary, but most teams should be able to finish by 3pm.

Holding it this way means people can meet all of the rest of the volunteers and it makes it easier for us to make adjustments so that each team has enough volunteers. For those who would rather meet in the field, that can still be arranged.


2024 Fall Bug Hunt
Stream Quality
Index Scores
Good (20)
Fair (20)
Poor (2)
Pontiac
Sprag
Main1
MAIN 1-2
Sterling Hei
Main11
Main3
Main4.5
Main4
Main5
Warren
See3
Min1
Peb2
Nott
Peb3
Royal Oak
MIDDLE 1
Farmington Hills
Southfield
Main6
Evan2
Novi
Wall2
Up2
Wall1
UPPER
MR-22
Bell1
John8
Bell2
Bell3
John3
MR-27
MR-20
Livonia
MAIN 3-4
John1
John7
John2
Nton
MR-3
MR-4
Fel1
Ton1
MR-14
MR-5
LR-9
Dearborn Heights
MR-6
Detroit
Canton
MIDDLE 3
Fowl1
Low2
LR-8
LOWER 2
Fowl2
LR-1
WAYNE
LOWER 1
Taylor
N
W
E
S
0
5
10 Miles
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community


2024 Fall Bug Hunt Water Quality Rating Scores
Excellent (0)
Very Good (0)
Good (19)
Fair (16)
Fairly Poor (6)
Poor (1)
Very Poor (0)
Pontiac
Sprag
Main1
MAIN 1-2
Main11
Main3
Main4.5
Main4
Main5
Nott
See3
Min1
Peb2
Peb3
MIDDLE 1
Farmington Hills
Royal Oak
Southfield
Main6
Evan2
Novi
Wall2
Up2
Wall1
UPPER
MR-22
Bell1
John8
MR-27
Bell2
Bell3
John3
MR-20
Livonia
MAIN 3-4
John1
John7
John2
Nton
MR-3
MR-4
Fel1
Ton1
MR-14
MR-5
LR-9
Dearborn Heights
MR-6
Canton
MIDDLE 3
Fowl1
Low2
LOWER 1
LOWER 2
LR-8
Fowl2
LR-1
WAYNE
Taylor
N
W
E
S
0
5
10 Miles
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

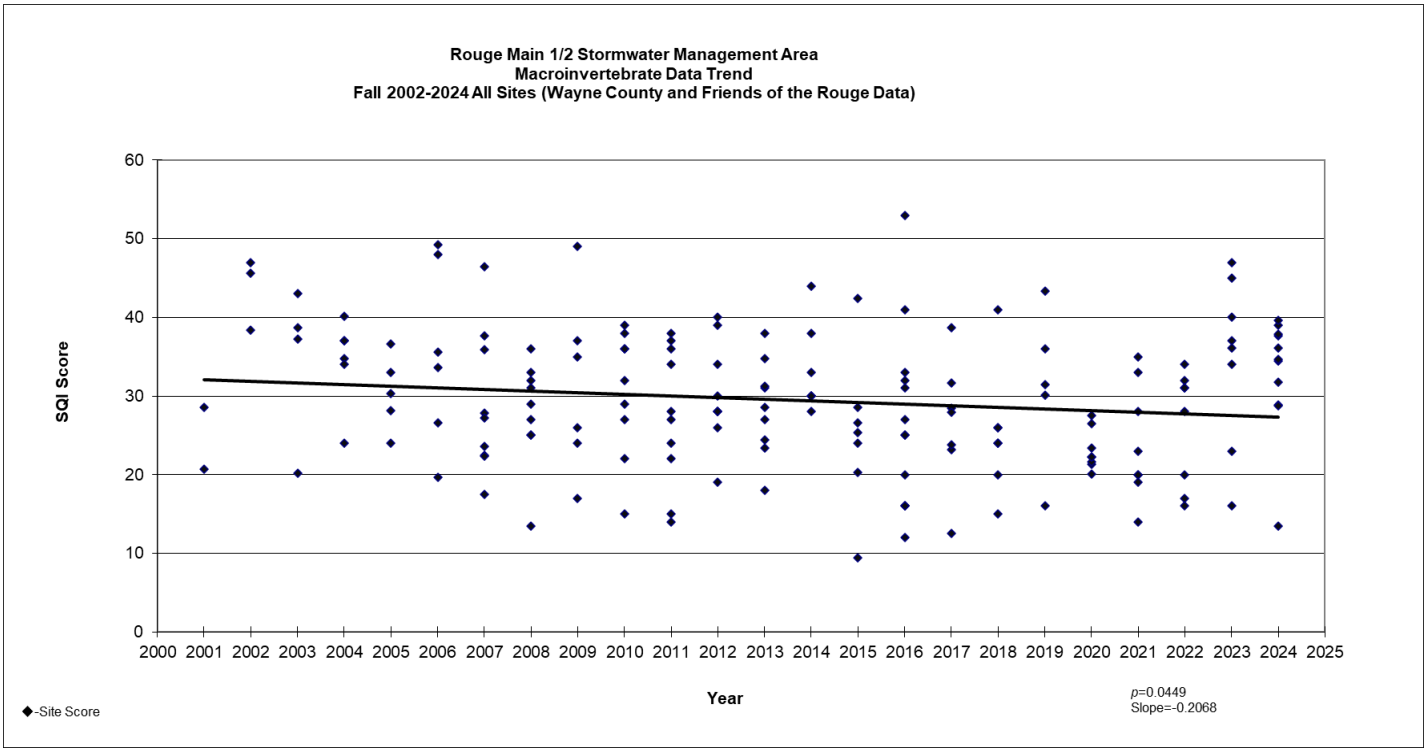

2024 Fall Bug Hunt Chloride Toxicity Rating
Okay (22)
Chronic (18)
Toxic (2)
Pontiac
Sprag
Main1
MAIN 1-2
Main11
Main4
Main3
Main4.5
Main5
Nott
Peb2
Peb3
Min1
See3
UPPER
MIDDLE 1
Farmington Hills
Southfield
Royal Oak
Evan2
Main6
Up2
Wall2
Wall1
Novi
MR-22
John8
MR-27
John3
John7
John2
John1
MR-20
Bell1
Bell2
Bell3
Livonia
MAIN 3-4
Nton
MR-3
MR-4
MR-14
Ton1
Fel1
LR-9
Canton
MIDDLE 3
MR-5
MR-6
Dearborn Heights
Westland
Fowl1
Low2
LOWER 1
LOWER 2
LR-8
Fowl2
LR-1
WAYNE
Taylor
Arbor
and Lake Trail Connector
N
W
E
S
0
5
10 Miles
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

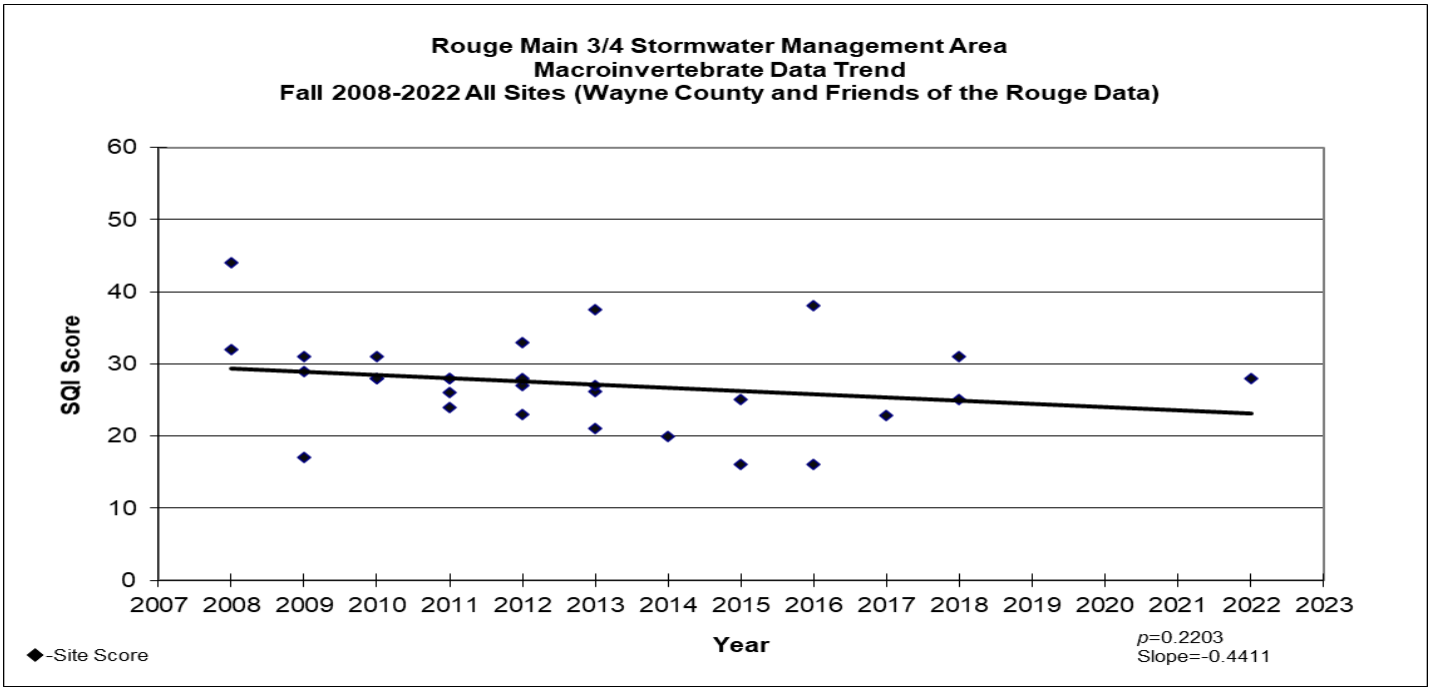
Friends of the Rouge

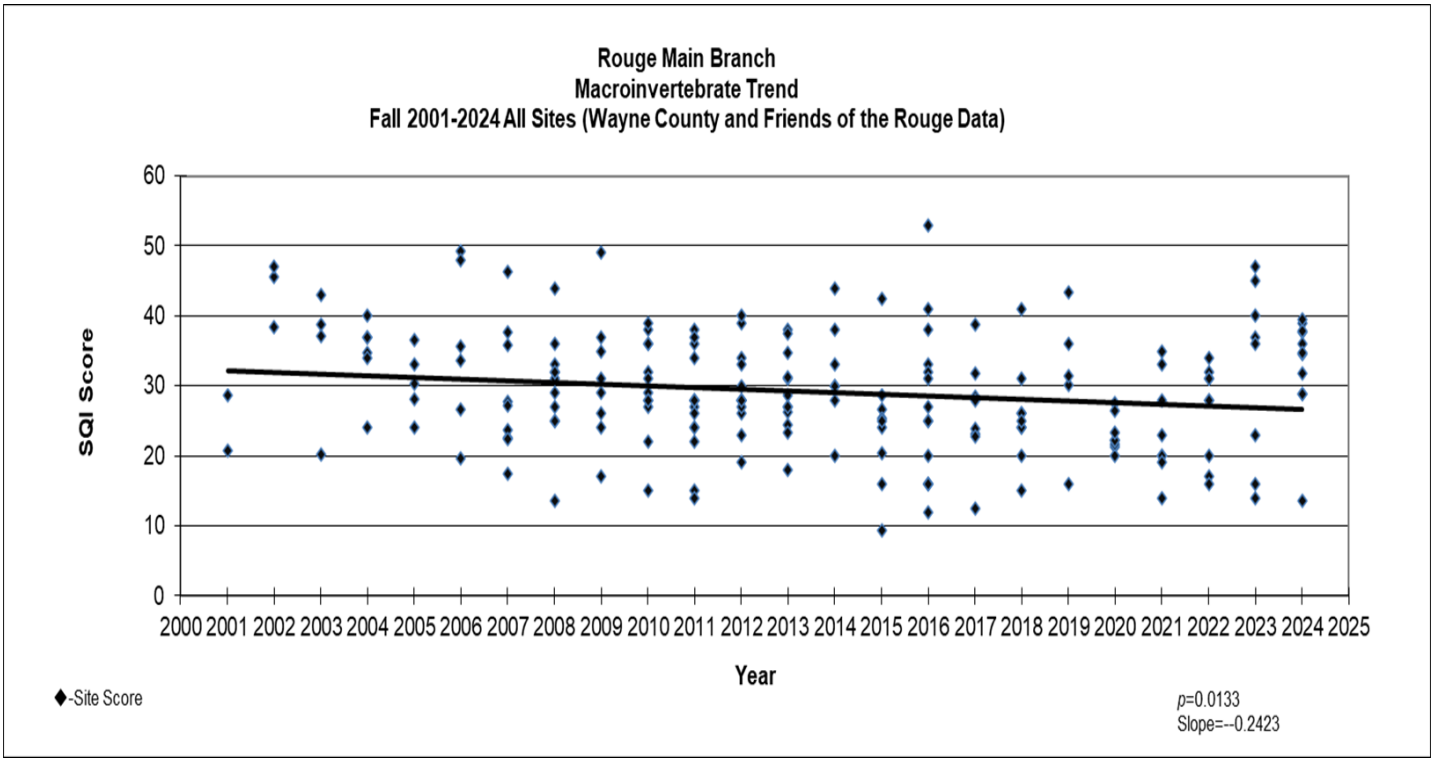
Table 6: Fall 2024 Data													
BRANCH	Stream Name	FIELDID	Site Description	SQI	SQI Rating	Taxa	Insect Taxa	EPT	WQR	WQR Score	Cl ppm	Cl Rating	Nitrate ppm
Lower	Lower Rouge	Low2	Cherry Hill	23	Fair	11	7	1	6.03	Fair	36	ok	1
Lower	Fellows Creek	Fel1	Top of Hill Ct	25	Fair	11	10	1	5.08	Good	92	ok	0
Lower	Fowler Creek	Fowl1	Prospect	32	Fair	15	11	2	7	Fairly Poor	50	ok	0
Lower	Fowler Creek	Fowl2	Fowler Beck	27	Fair	13	8	2	5.85	Fair	30	ok	0
Lower	Lower Rouge	LR-8	Ridge Proctor	37	Good	17	12	3	5.73	Fair	56	ok	1
Lower	Fellows Creek	LR-9	Fellows Beck Warren	28	Fair	13	9	1	5.82	Fair	166	chronic	0
Lower	Lower Rouge	LR-1	Commerce Ct	33	Fair	13	8	2	5.08	Good	124	ok	5
Main	Sprague Creek	Sprag	Main Lloyd Stage	35	Good	11	8	3	4.63	Good	213	chronic	0
Main	Main Rouge	Main1	FF Pk	29	Fair	14	7	4	7.23	Fairly Poor	213	chronic	0
Main	Main Rouge	Main3	Booth Park	38	Good	15	8	2	5.79	Fair	152	chronic	1
Main	Main Rouge	Main11	Quarton at Lakeside	25	Fair	11	6	1	7.13	Fairly Poor	231	chronic	1
Main	Main Rouge	Main4	Linden Park	39	Good	15	9	4	5.17	Good	213	chronic	1
Main	Main Rouge	Main4.5	Fairway Park	35	Good	12	8	4	5.07	Good	213	chronic	1
Main	Main Rouge	Main5	Douglas Evans	38	Good	15	10	4	5.26	Good	126	ok	0
Main	Nottingham Creek	Nott	Country Day	29	Fair	13	8	1	6.49	Fair	166	chronic	0
Main	Pebble Creek	Peb2	Pebble 13 Mile	36	Good	17	10	2	5.37	Good	102	ok	2
Main	Pebble Creek	Peb3	Pebble d/s Dam	40	Good	15	12	3	5.24	Good	82	ok	1
Main	Main Rouge	Main6	Sfld Civic Ctr	32	Fair	18	11	4	5.97	Fair	181	chronic	2
Main	Evans Creek	Evan2	LTU	14	Poor	10	4	0	4.99	Good	531	toxic	2
Middle	Johnson Creek	John1	5M Salem	37	Good	22	18	4	5.43	Good	73	ok	2
Middle	Johnson Creek	John2	5M NV	34	Good	19	16	5	4.87	Good	92	ok	1
Middle	Johnson Creek	John7	Arcadia	36	Good	16	10	3	5.62	Fair	82	ok	0
Middle	Johnson Creek	John3	6M NV	38	Good	17	12	3	5.74	Fair	87	ok	1
Middle	Johnson Creek	John8	Maybury Angell	39	Good	17	12	2	5.65	Fair	113	ok	0
Middle	Johnson Creek	MR-22	Maybury south	19	Fair	10	8	1	4.89	Good	137	ok	2
Middle	Johnson Creek	MR-27	Ridge	43	Good	18	12	5	4.76	Good	81	ok	1
Middle	Walled Lk Drainage	Wall1	Rotary Pk	38	Good	19	12	2	5.89	Fair	152	chronic	5
Middle	Walled Lk Drainage	Wall2	WL 10 M	33	Fair	15	10	2	5.4	Good	213	chronic	5
Middle	Middle Rouge	MR-20	Waterford Bend	43	Good	21	10	3	5.36	Good	137	ok	1.5
Middle	Tonquish Creek	Ton1	Plym Twp Pk	23	Fair	11	6	1	7.33	Fairly Poor	82	ok	0
Middle	Tonquish Creek	MR-14	Smith Elem	25	Fair	13	7	1	6.25	Fair	81	ok	0
Middle	Tonquish Creek	Nton	S Evergreen St	37	Good	16	10	3	5.06	Good	330	toxic	
Middle	Middle Rouge	MR-3	Plym Riverside	39	Good	15	9	4	4.81	Good	137	ok	1.5
Middle	Middle Rouge	MR-4	Levan Knoll	31	Fair	16	8	2	6.25	Fair	194	chronic	1.5
Middle	Middle Rouge	MR-5	Valley View	30	Fair	12	7	2	5.46	Good	211	chronic	1.5
Middle	Middle Rouge	MR-6	Sherwood	25	Fair	11	7	2	5.82	Fair	227	chronic	1.5
Upper	Seeley Creek	See3	Kennedy Ct	30	Fair	13	8	1	7	Fairly Poor	64	ok	2
Upper	Minnow Pond	Min1	Minnow 13 M	34	Good	15	10	2	7.56	Poor	36	ok	1
Upper	Upper Rouge	Up2	Shiawasee Park	41	Good	16	10	3	5.1	Good	304	chronic	10
Upper	Bell Branch	Bell1	Bicentennial Park	26	Fair	14	8	2	6.19	Fair	308	chronic	5.8
Upper	Bell Branch	Bell3	Livonia 6 Mile	23	Fair	10	6	1	5.6	Fair	287	chronic	1
Upper	Bell Branch	Bell2	Schoolcraft College	17	Poor	10	7	0	7.07	Fairly Poor	181	chronic	1

Data Trend Tables

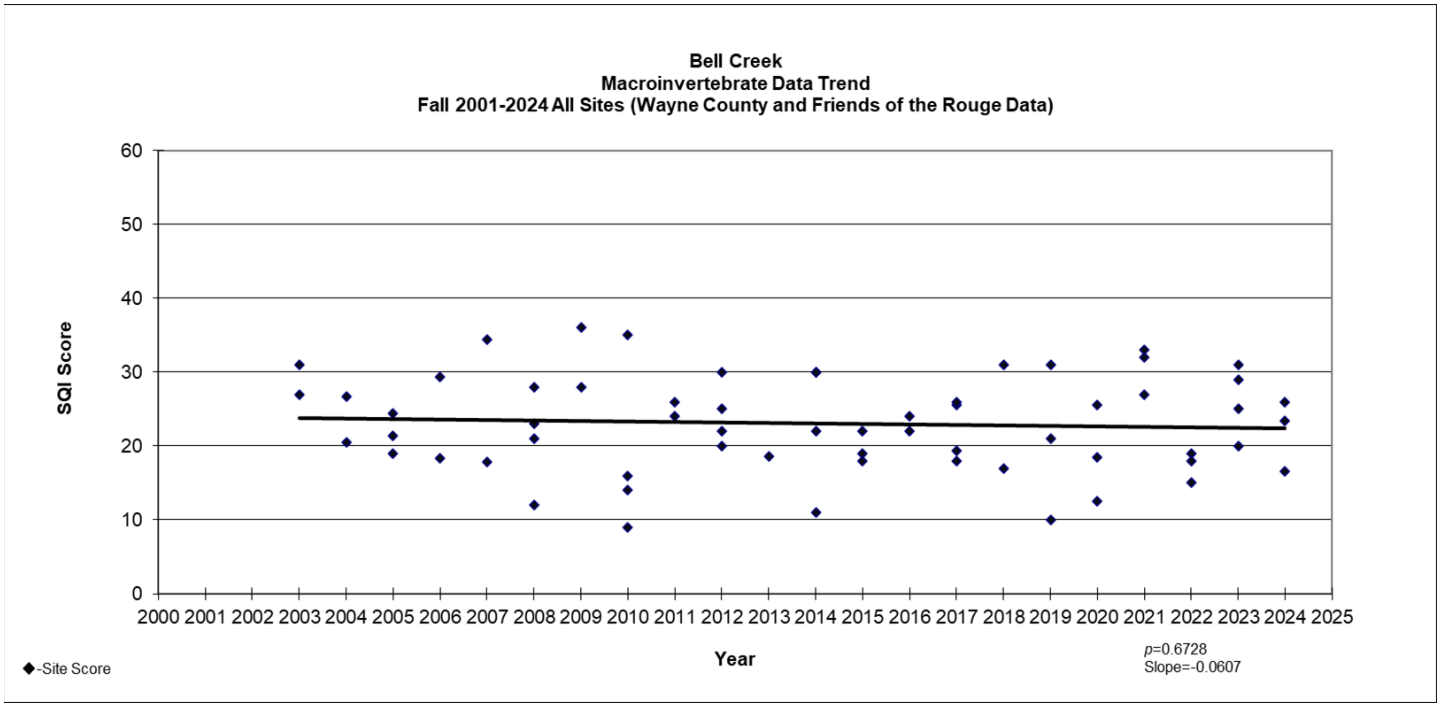
Main

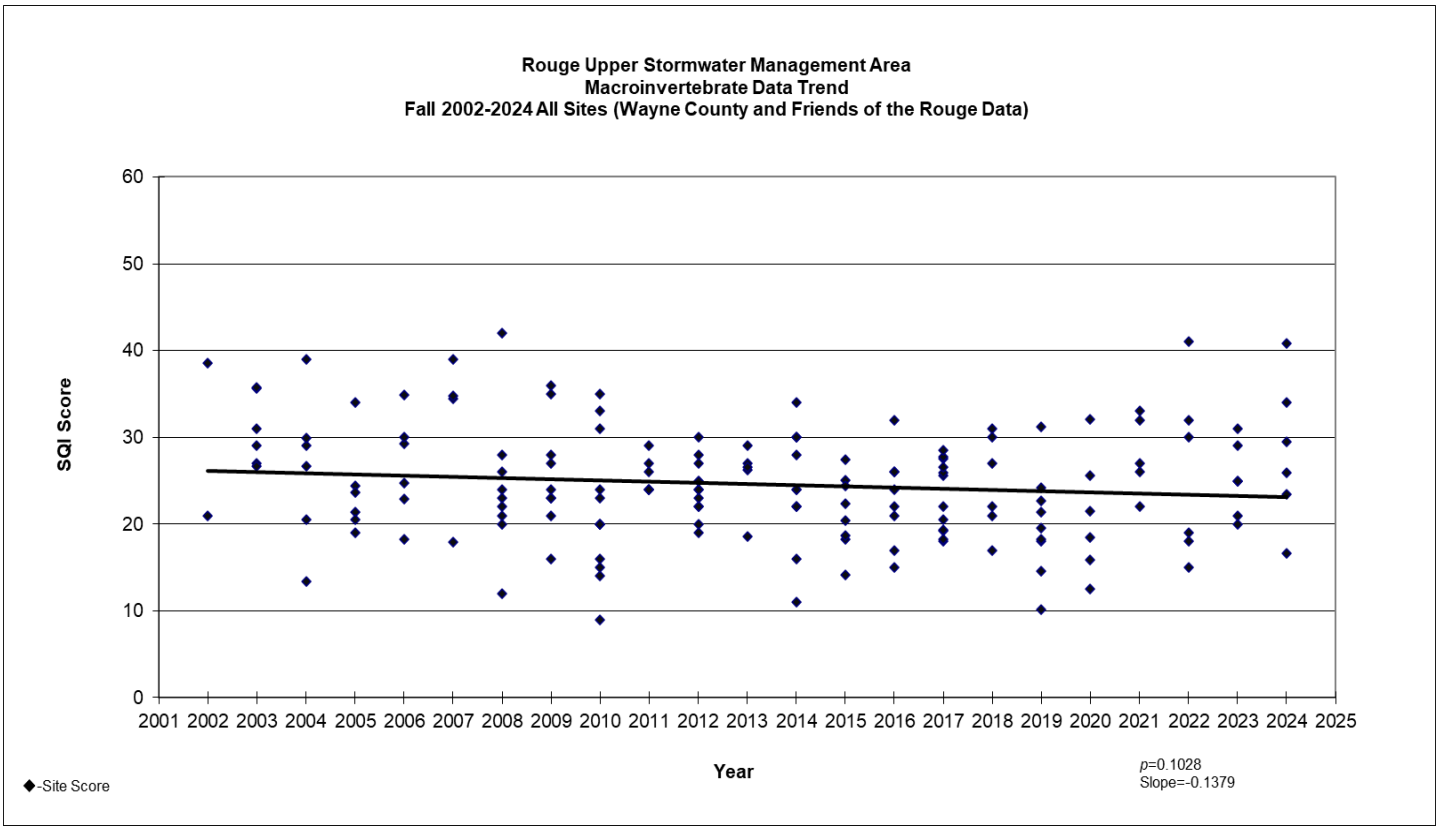




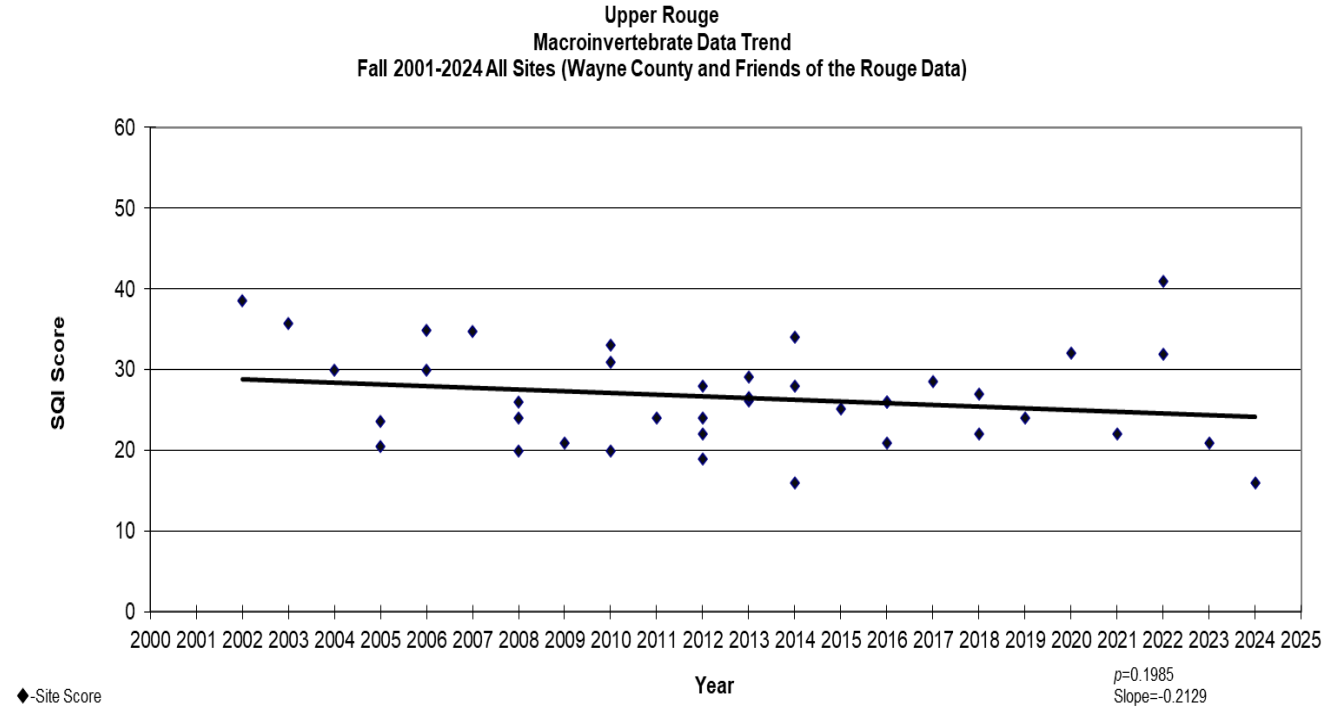

Rouge Main Branch
Macroinvertebrate Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
♦-Site Score
p=0.0133
Slope=--0.2423

Upper

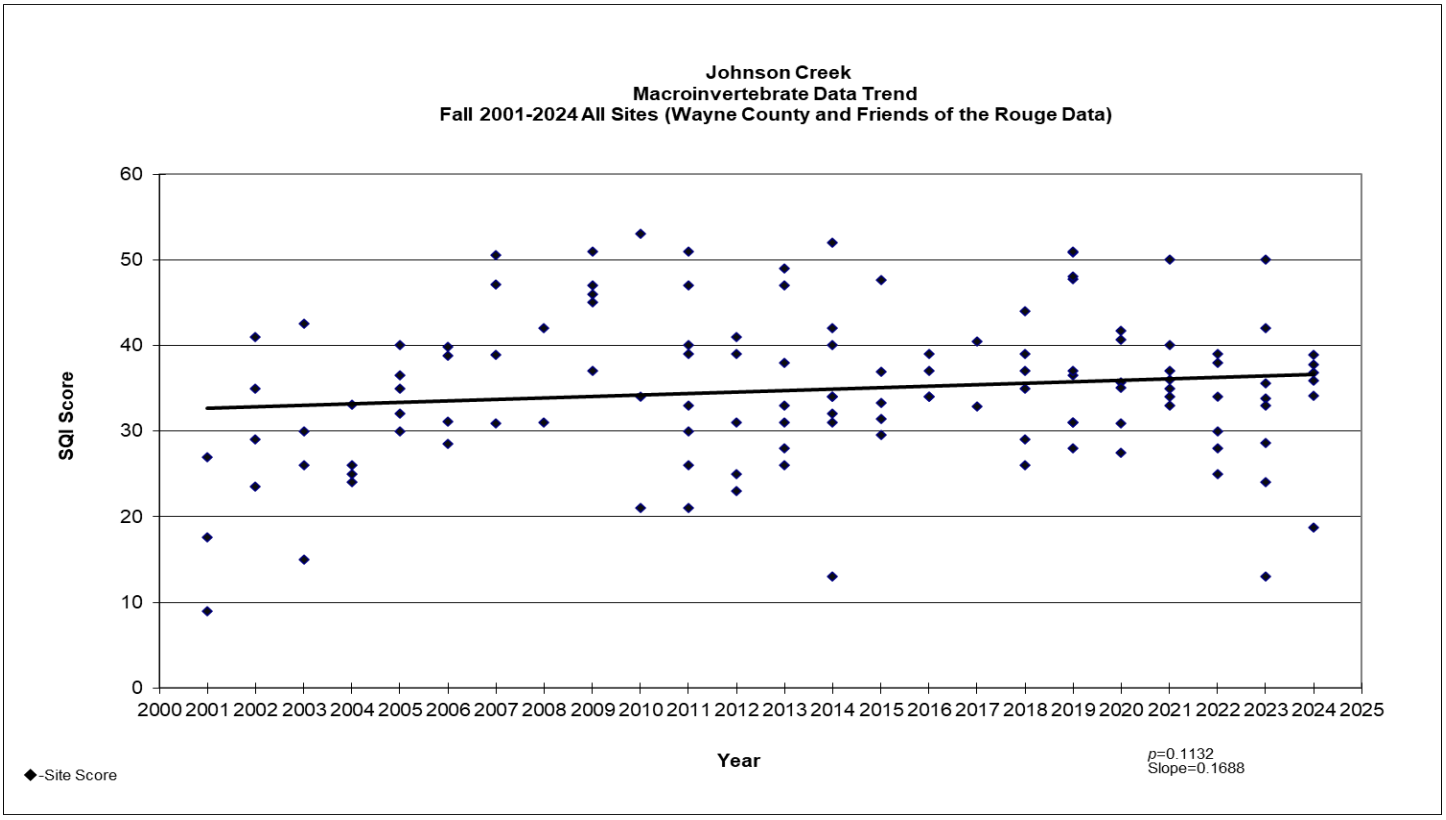

Bell Creek
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
◆-Site Score
p=0.6728
Slope=-0.0607

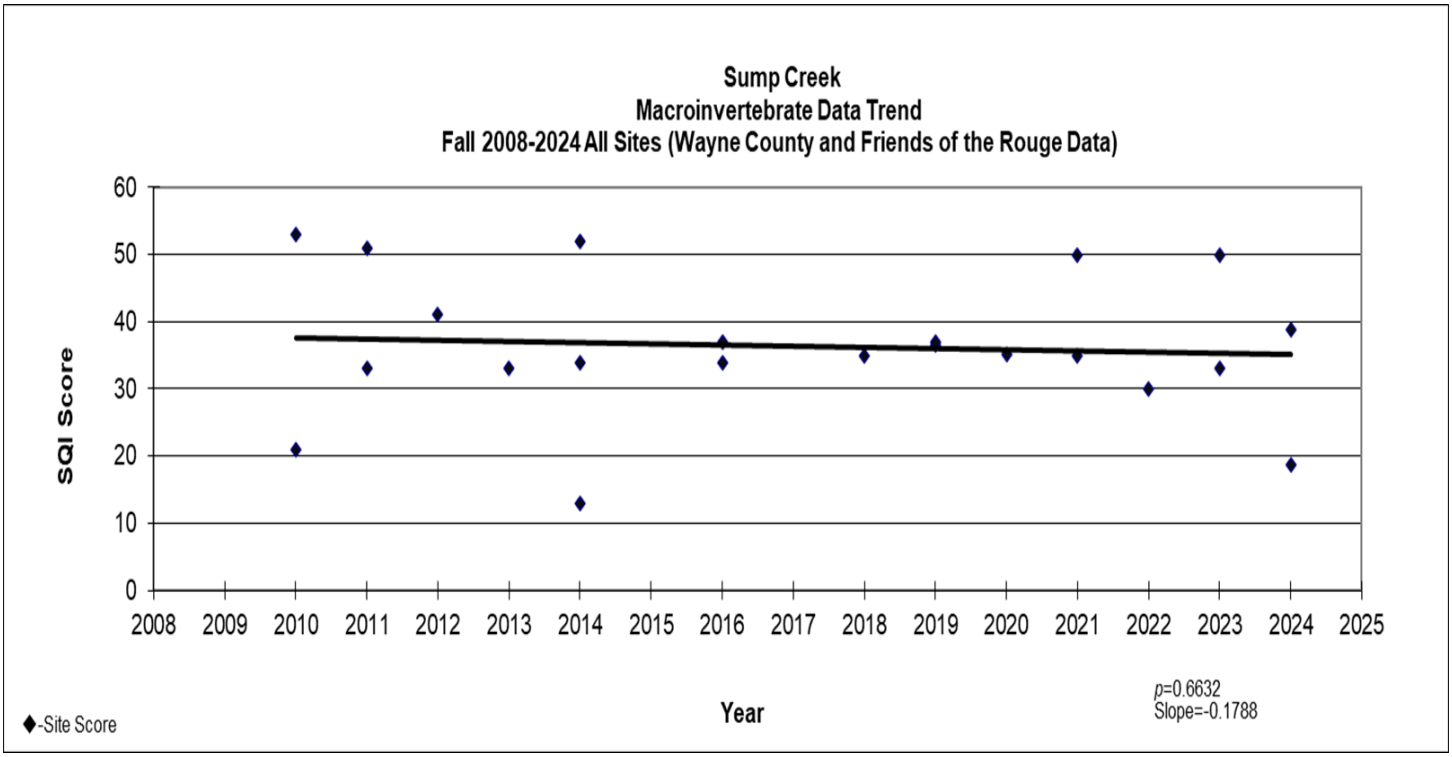

Rouge Upper Stormwater Management Area
Macroinvertebrate Data Trend
Fall 2002-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
◆-Site Score
p=0.1028
Slope=-0.1379

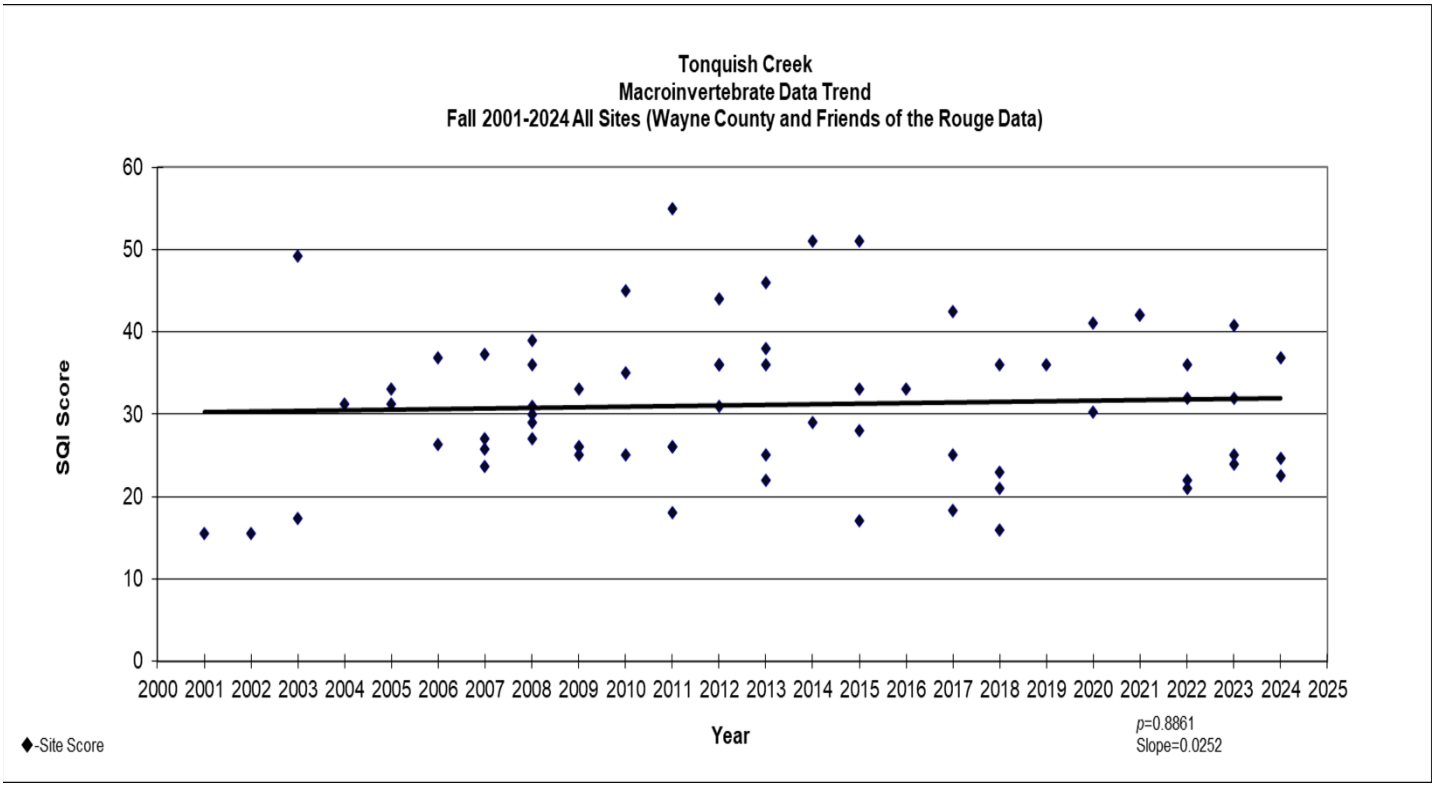
Upper with no tributaries

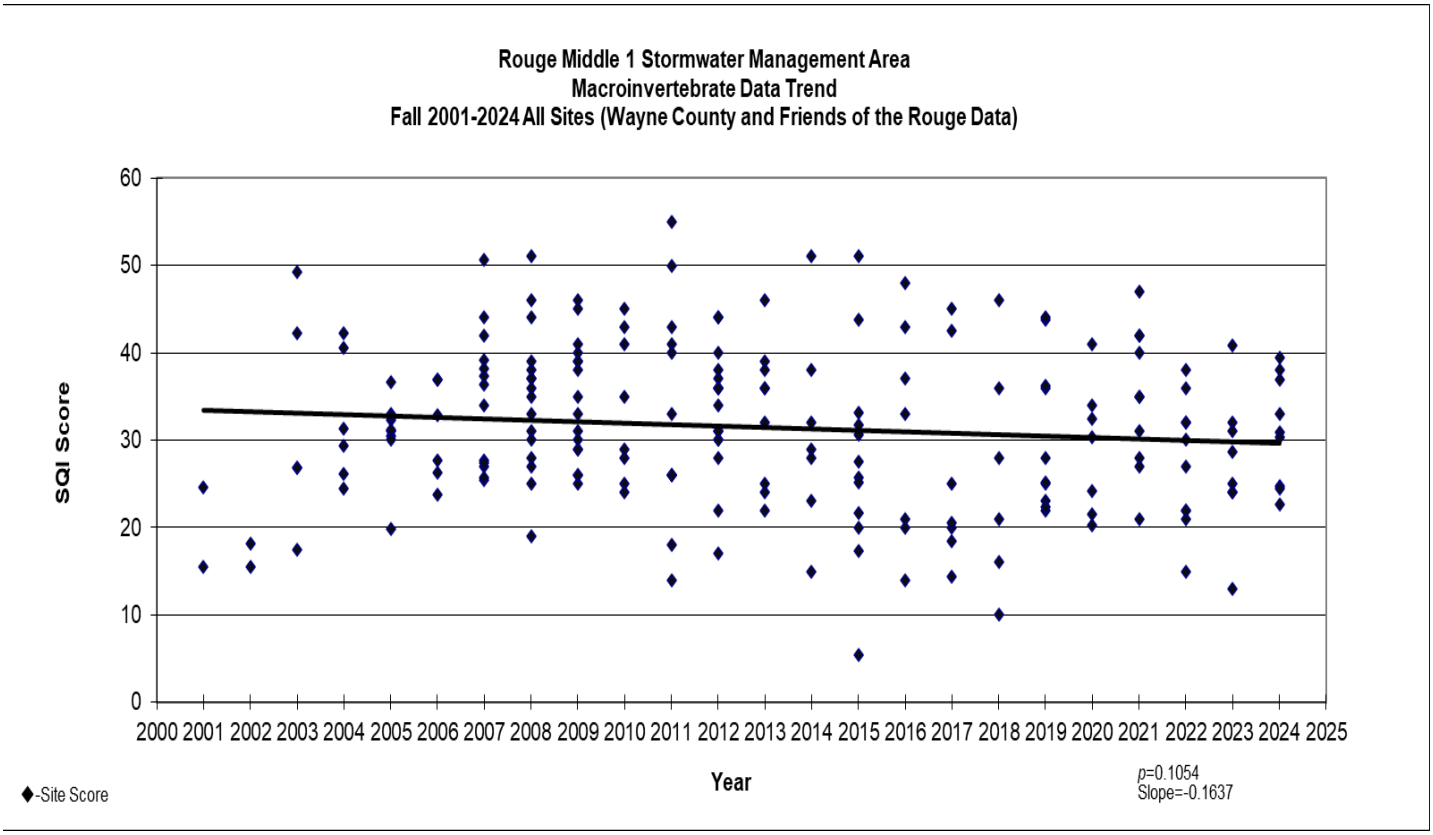


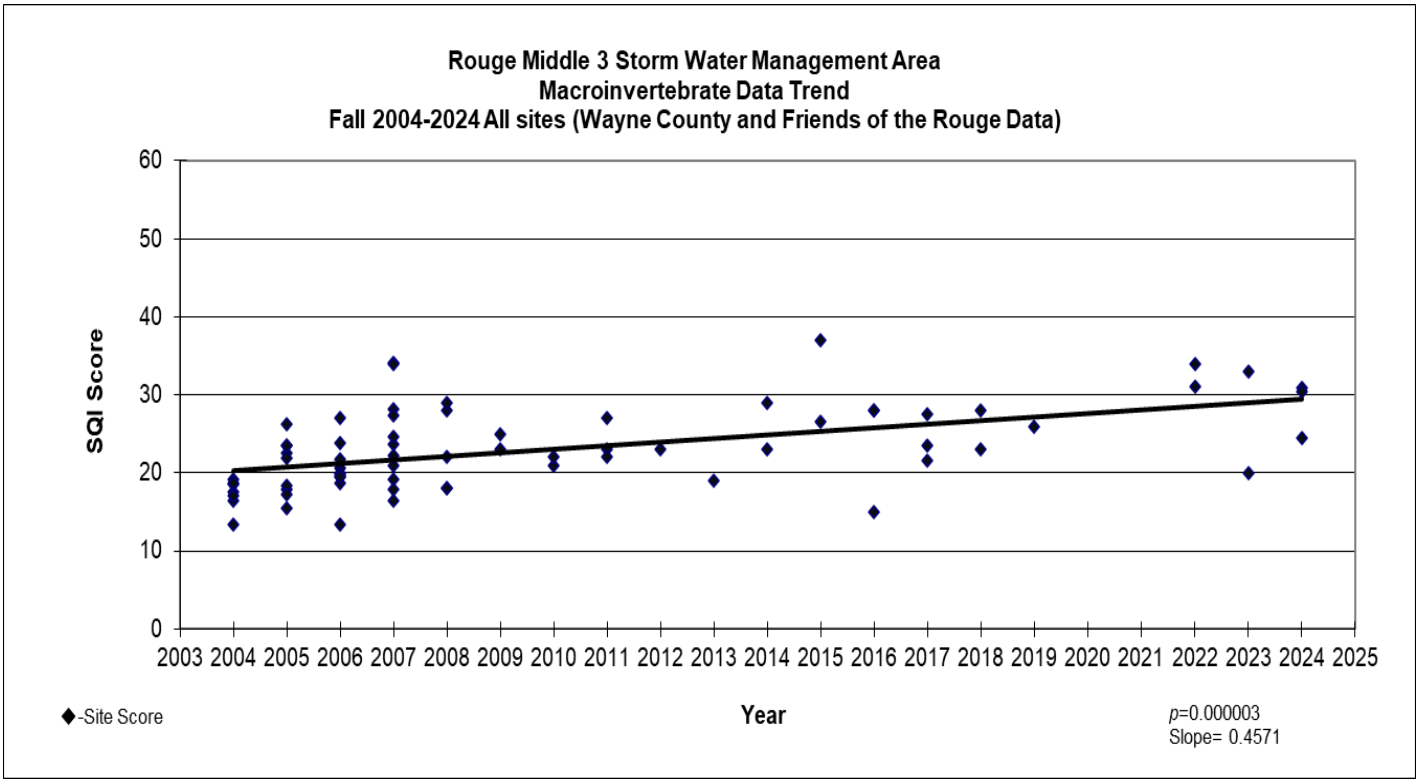
Middle

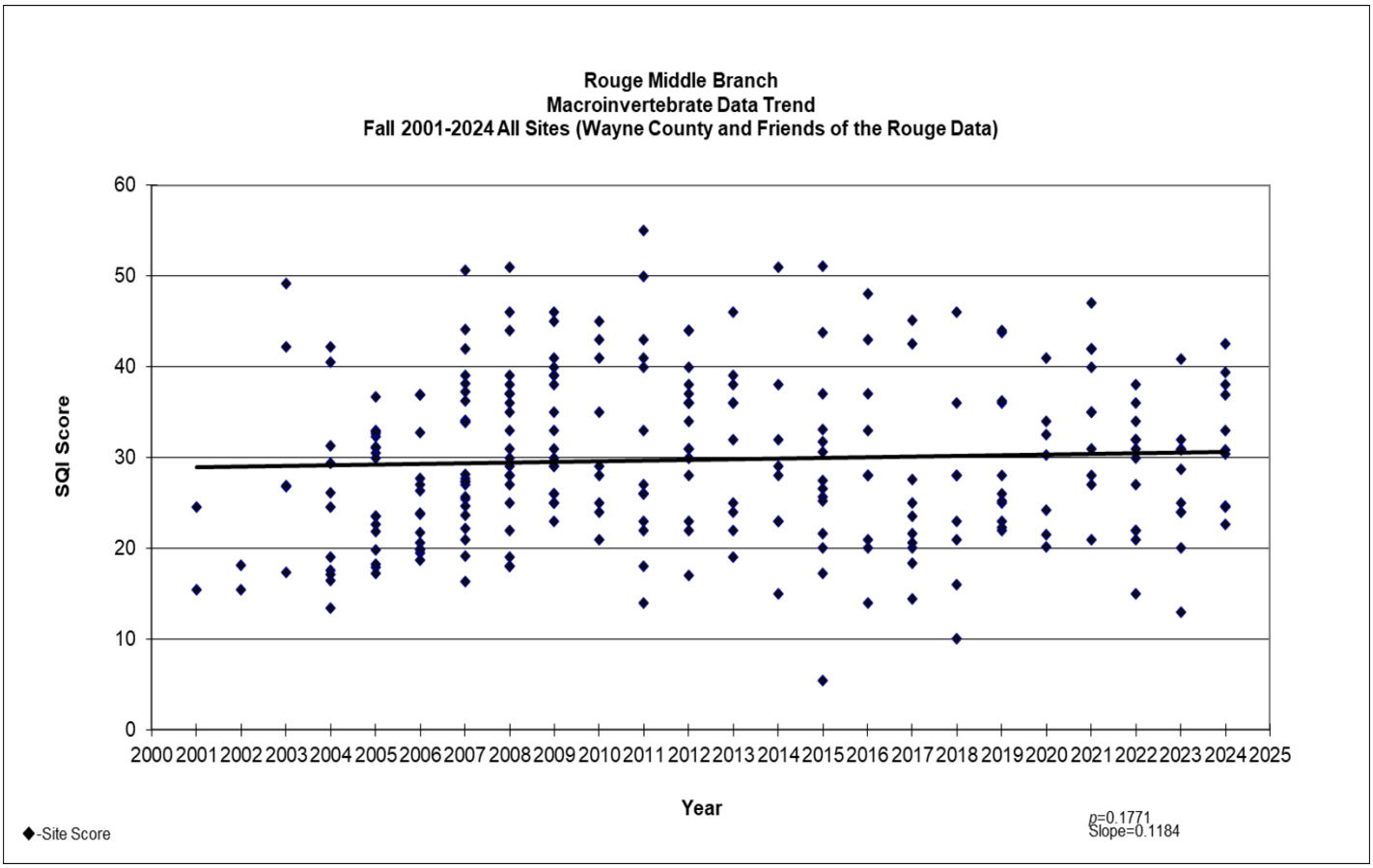

Johnson Creek
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
p=0.1132
Slope=0.1688
◆-Site Score

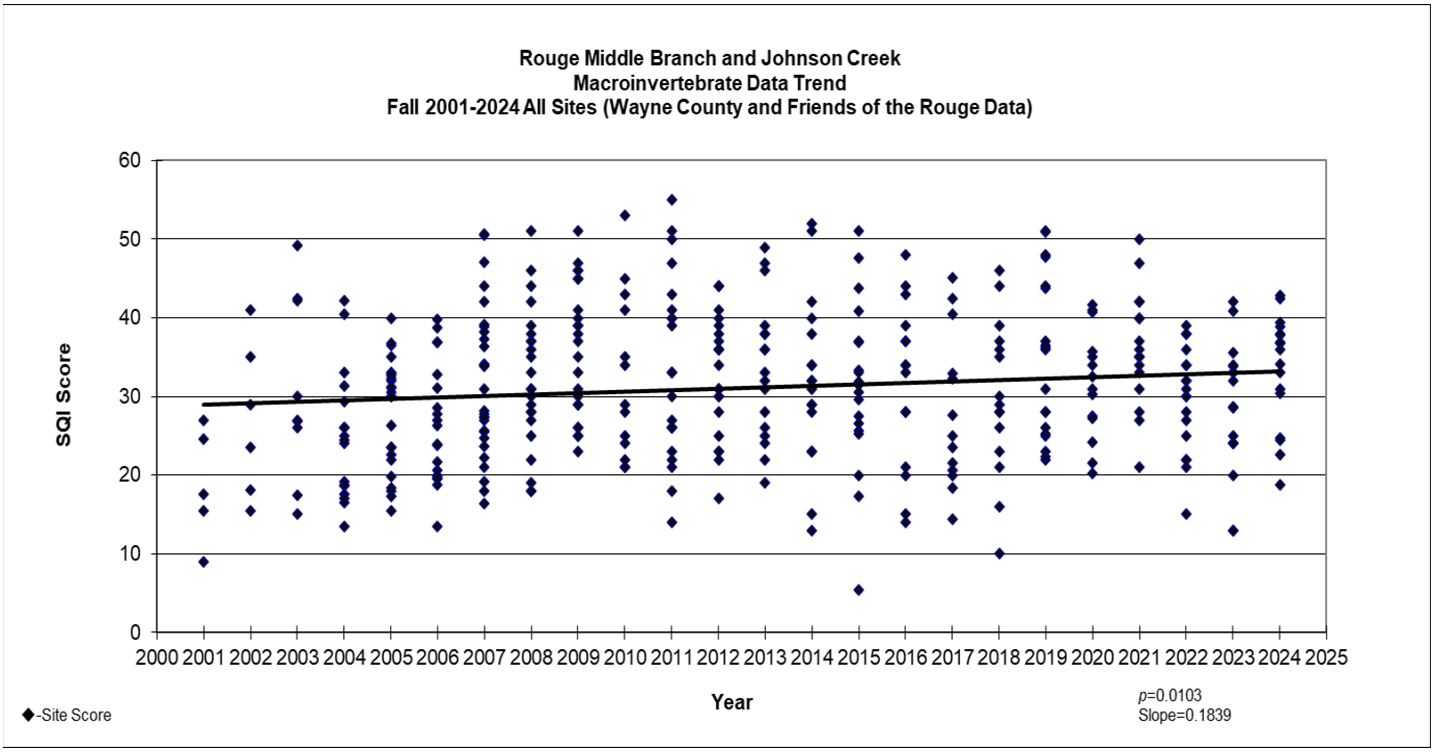

Sump Creek
Macroinvertebrate Data Trend
Fall 2008-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
60
50
40
30
20
10
0
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
p=0.6632
Slope=-0.1788
◆-Site Score

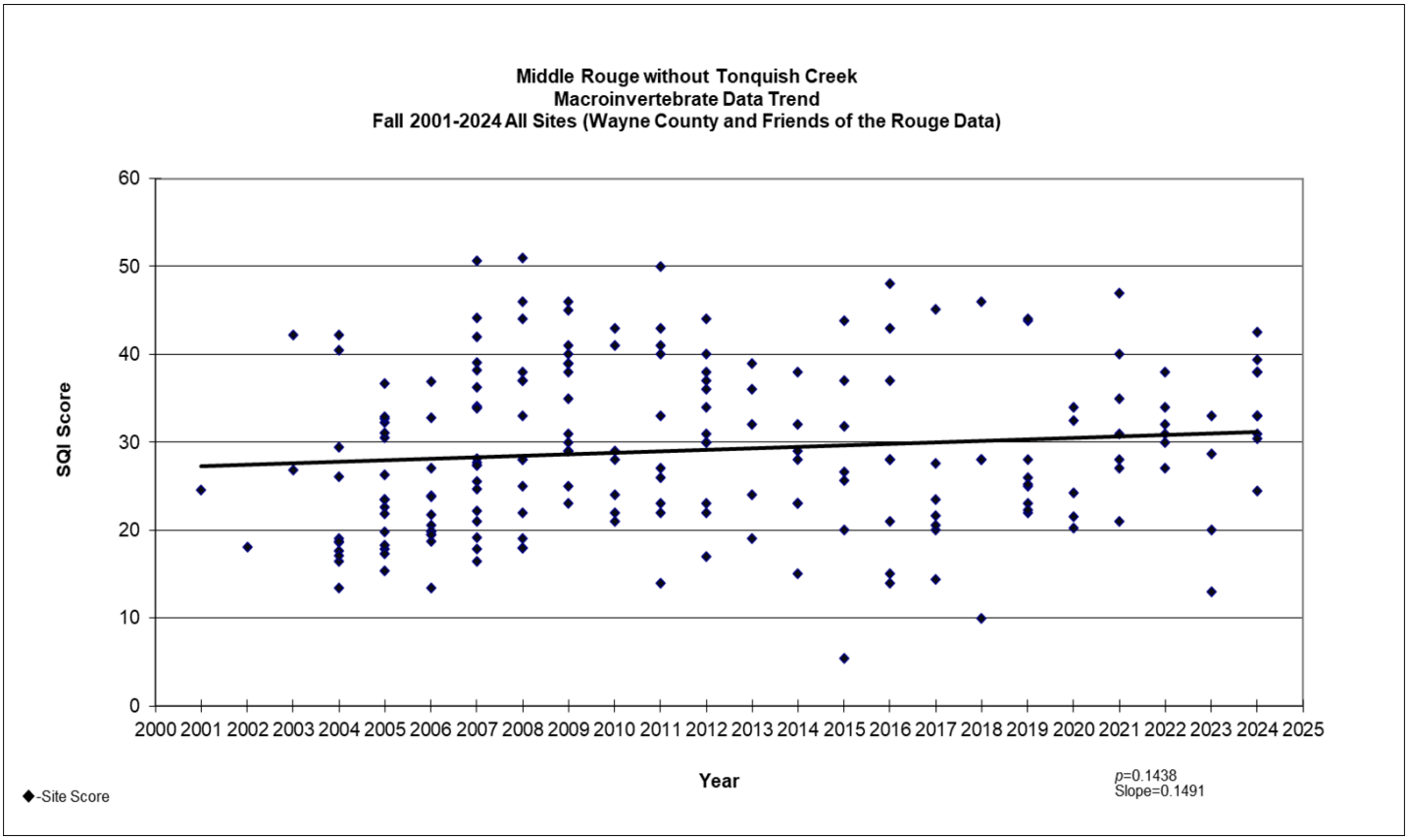

Tonquish Creek
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
♦-Site Score
p=0.8861
Slope=0.0252


Rouge Middle 1 Stormwater Management Area
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
♦-Site Score
p=0.1054
Slope=-0.1637

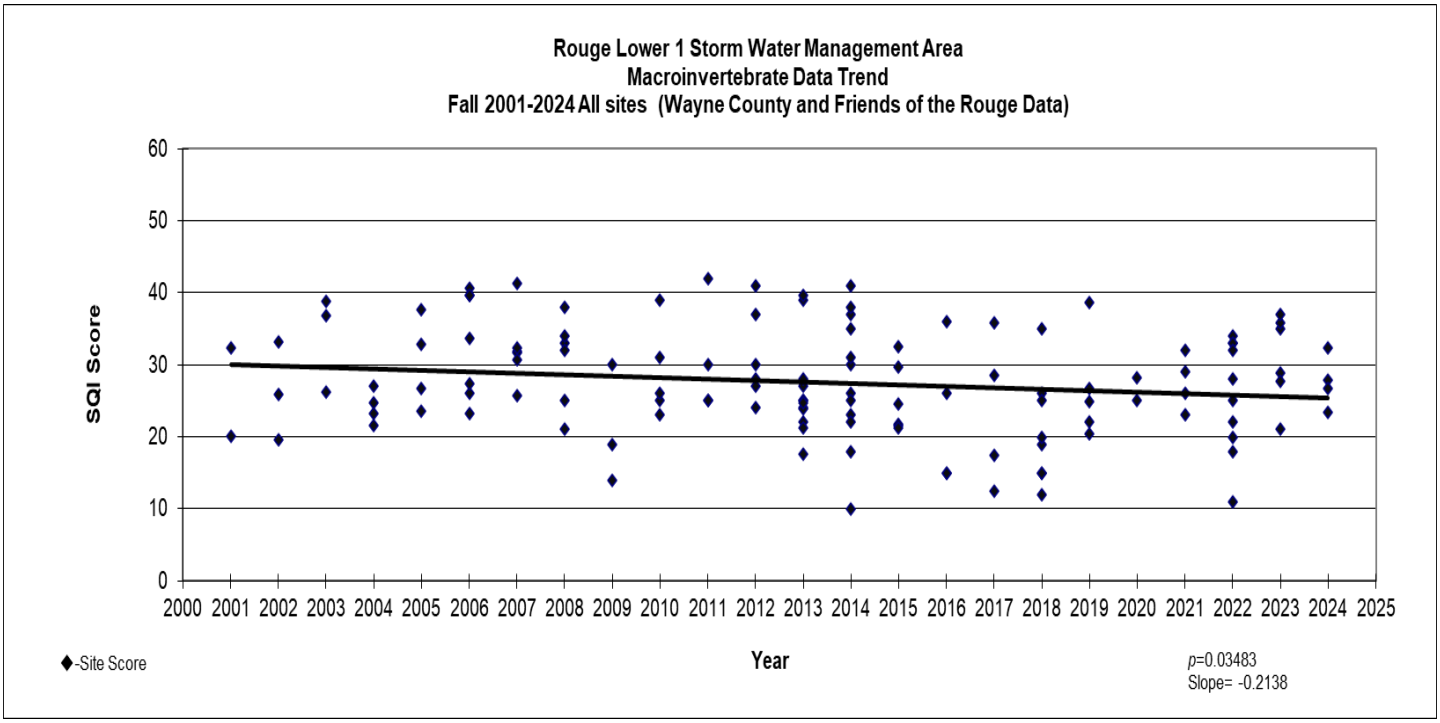

Rouge Middle 3 Storm Water Management Area
Macroinvertebrate Data Trend
Fall 2004-2024 All sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
◆-Site Score
p=0.000003
Slope= 0.4571

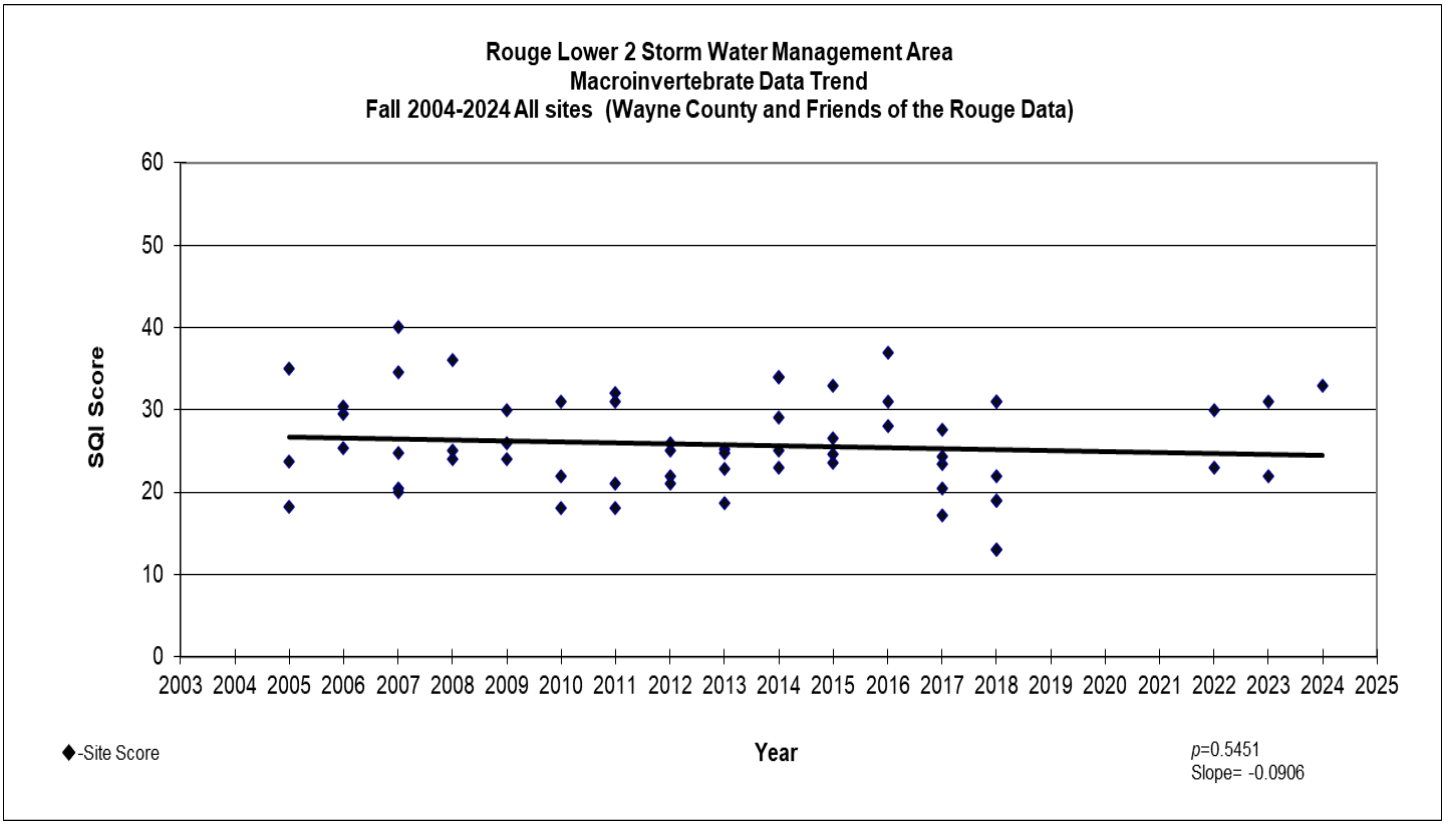

Rouge Middle Branch
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
◆-Site Score
p=0.1771
Slope=0.1184

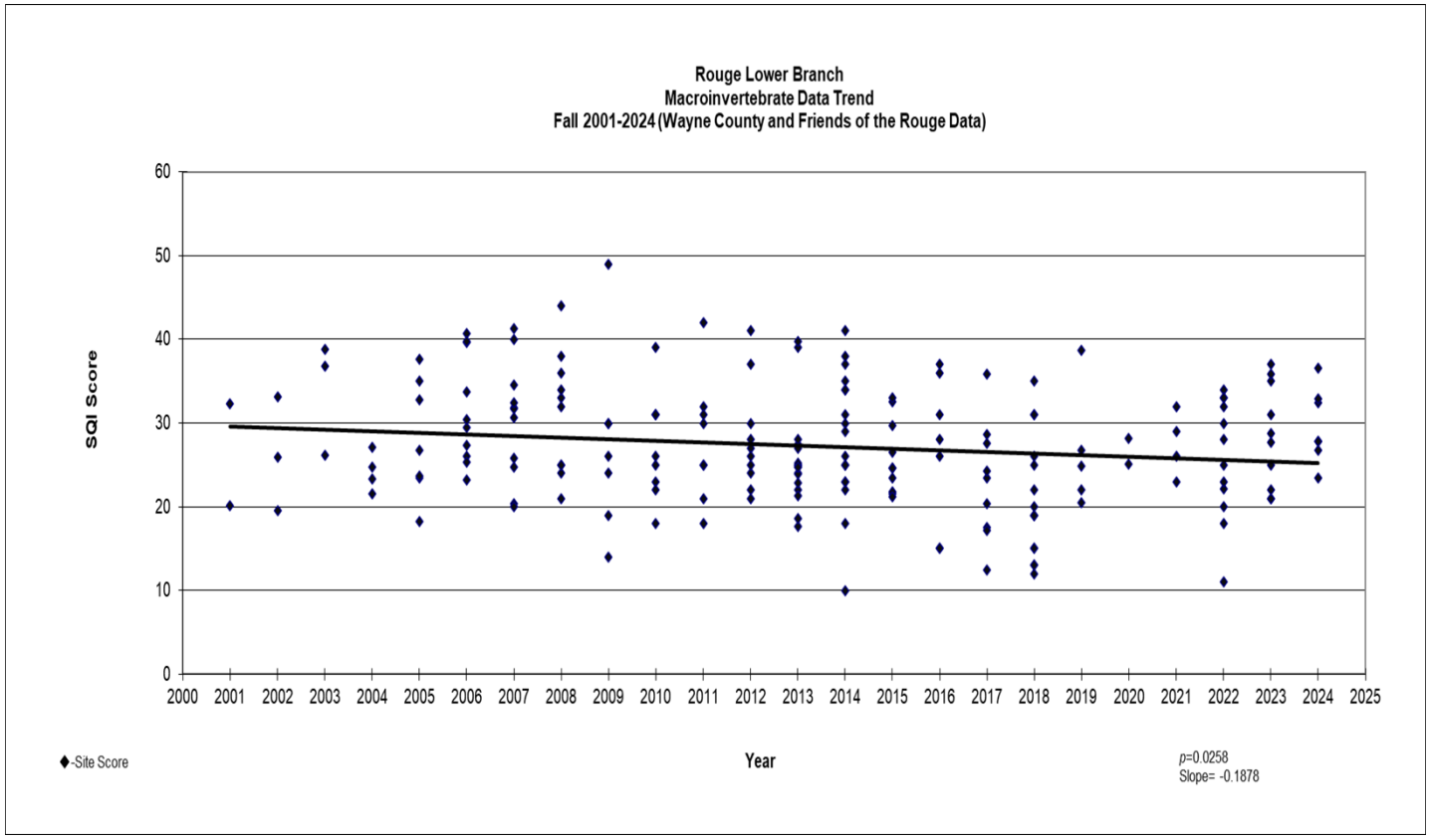

Rouge Middle Branch and Johnson Creek
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
0
10
20
30
40
50
60
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
◆-Site Score
p=0.0103
Slope=0.1839


Middle Rouge without Tonquish Creek
Macroinvertebrate Data Trend
Fall 2001-2024 All Sites (Wayne County and Friends of the Rouge Data)
SQI Score
0
10
20
30
40
50
60
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
◆-Site Score
p=0.1438
Slope=0.1491

Lower


Rouge Lower 1 Storm Water Management Area
Macroinvertebrate Data Trend
Fall 2001-2024 All sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
♦-Site Score
p=0.03483
Slope= -0.2138


Rouge Lower 2 Storm Water Management Area
Macroinvertebrate Data Trend
Fall 2004-2024 All sites (Wayne County and Friends of the Rouge Data)
SQI Score
Year
♦-Site Score
p=0.5451
Slope= -0.0906


Rouge Lower Branch
Macroinvertebrate Data Trend
Fall 2001-2024 (Wayne County and Friends of the Rouge Data)
SQI Score
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025
Year
♦-Site Score
p=0.0258
Slope= -0.1878