



Rouge River Benthic Macroinvertebrate Monitoring Program Fall 2022 Report

This report contains benthic macroinvertebrate sampling results from 46 Rouge tributary and river sites. The Fall Bug Hunt on October 15, 2022 had 89 attendees that sampled 30 sites in 16 teams. Groups that participated included Wayne State University’s Transformative Research in Urban Sustainability Training program and the Sustainability Learning Community; Schoolcraft College; and teachers in Wayne County RESA’s Master

Science Teacher Fellowship. Additional sites were sampled during the Team Leader Training, with the University of Michigan-Dearborn’s Watershed Analysis class, by Wayne County Department of Public Services Environmental Services Division separately and with FOTR staff and interns, and by Sue Thompson for a total of 46 sites. Funding for the monitoring was provided by the communities of Beverly Hills, Canton Township, Farmington, Livonia, Northville Township, Novi, Plymouth, Plymouth Township, Southfield, Troy and Washtenaw County Water Resources who sponsored sites the Michigan Clean Water Corps and a donation from Lynn DeGrande and Stuart Steele.

Overall Scores

The average Stream Quality Index (SQI) for sites was FAIR (26) (map p.6-8, Table 1 & 5). Seven sites rated GOOD; 29 sites were FAIR and nine sites scored POOR. The average Water Quality Rating (WQR) was FAIR (6.00) with 1 site very good, 17 good, 16 fair, 7 fairly poor, 1 poor, and 3 very poor. Sites averaged 12 taxa, 8 Aquatic Insect Taxa, and 2 EPT. SQI was highest at Up2 and John1 (41) and WQR highest at Sprag (4.45). The number of taxa found at sites was highest at Main6 (19) and lowest at Fel2 (6). Insect taxa which includes the more sensitive groups, was highest at Up2 (14) and lowest at MR-24 (4). Some mayfly, stonefly and caddisfly families (EPT) were found at all but nine sites with an average of 2 of these families per site. Up2 had the highest number of EPT (5). In comparison to last fall, SQI and taxa were lower but WQR was higher and EPT was the same.

Table 1: Averages

	Average SQI	Average WQR	Average # of taxa	Average # Insect Taxa	Average EPT
2022	26 fair	6.00 fair	12	8	2
2021	30 fair	6.25 fair	13		2

Data Trends

In comparison to past years, 78% of sites were stable, more than last year (Chart 1). But only 11% were improving and 9% were declining. Last fall, 22% were improving and 6% were declining.

Understanding Benthic Scores

Each site is given a **Stream Quality Index (SQI)** which is determined by weighting each type and number of organisms found by their sensitivity ratings. 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. The SQI has four different levels: >48=EXCELLENT, 34-48=GOOD, 19-33=FAIR, <19=POOR.

SQI – Stream Quality Index, 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). Higher scores reflect better quality sites. Recommend keeping SQI paragraphs together

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

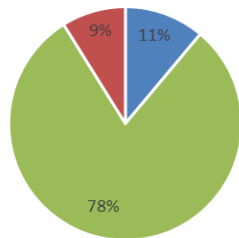
Number of insect taxa – insects are more sensitive than the non-insect taxa.

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

NEW in Fall 2021

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.

Chart 1: Data Trends



Improving Stable Declining

To compare change over time, we analyzed the trends by subwatershed, with Johnson Creek analyzed separately as it is a coldwater tributary (Table 2 and graphs p. 11-19). The Middle 3 subwatershed and Johnson Creek had significant positive trends. The Main 1-2, the Upper and the Lower 1 subwatersheds had significant negative trends. These trends are similar to last year.

Subwatershed	slope	p-value	True trend	Subwatershed average score	Water Quality Rating
Main 1-2	-0.4679	0.00007	yes, negative	29	Fair
Upper	-0.2446	0.0123	yes, negative	24	Fair
Johnson Creek	0.2765	0.0330	yes, positive	35	Good
Middle 1	-0.1539	0.1948	no trend	32	Fair
Middle 3*	0.5255	0.00002	yes, positive	23	Fair
Lower 1	-0.3435	0.0052	yes, negative	28	Fair
Lower 2**	-0.2370	0.1790	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 2019-2021					

The data was further analyzed for trends by tributaries and subareas. Table 3 contains a summary of this analysis; the graphs are on p. 11-19. When the upper and lower sections of the Main, Middle and Lower subwatersheds were combined, the trends stood – negative for the Main and Lower and positive for the Middle. The Middle also remained positive when combined with Johnson Creek. When all the sites were combined, there was no significant trend.

Branch	slope	p-value	True trend	Branch average score	Water Quality Rating
Main combined (Main 1/2 and Main 3/4)	-0.4671	0.00002	yes, negative	29	Fair
Bell Creek only	-0.1479	0.3554	no trend	23	Fair
Upper only	-0.0878	0.0652	no trend	27	Fair
Middle 1 and 3 combined	0.1491	0.1468	yes, positive	29	Fair
Tonquish Creek only	0.0877	0.6783	no trend	31	Fair
Johnson Creek and Middle Rouge	0.2459	0.00320	yes, positive	31	Fair
Middle without Tonquish Creek	0.1407	0.23750	no trend	29	Fair
Lower 1 and Lower 2 combined	-0.3223	0.0015	yes, negative	27	Fair
Rouge all subwatersheds combined	-0.0599	0.3024	no trend	29.5	Fair

Individual sites were examined for long term trends (Table 4). Of the sites sampled in fall 2022, six had a significant negative trend.

Site	slope	p-value	Statistically significant trend	Site average score	Water Quality Rating
Main6	-0.3841	0.0348	yes, negative	33	Fair
Nott	-0.5540	0.0178	yes, negative	26	Fair
Bell2	-0.5925	0.0418	yes, negative	24	Fair
MR-14	-0.9744	0.0061	yes, negative	28	Fair
Fowl2	-0.4070	0.0468	yes, negative	24	Fair
LR-3	-0.6013	0.0448	yes, negative	27	Fair



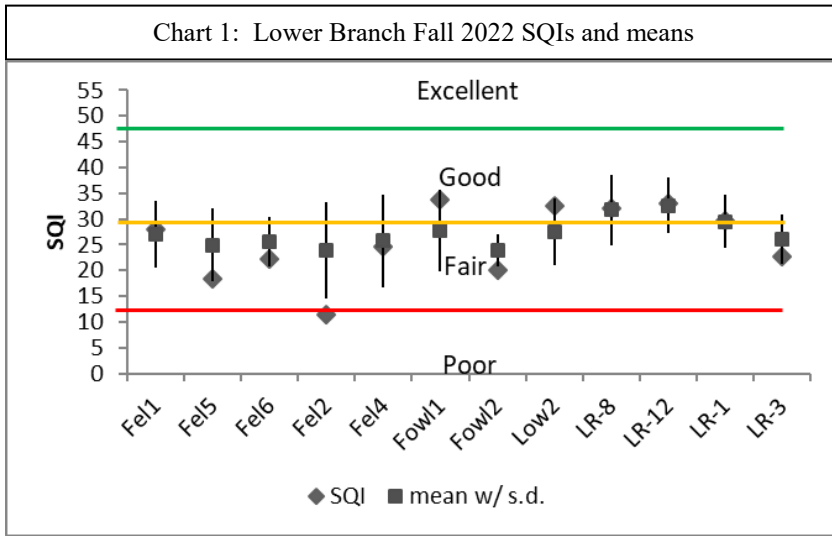
Since 2020, we have been testing sites for road salt (chloride) through the Izaak Walton League’s Salt Watch program during the Stonefly Search and Bug Hunts. Salt we apply to our roads and sidewalks for snow and ice removal washes into our streams and is toxic to aquatic life when it reaches high levels. 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, seven sites had toxic levels of chloride (table 5, map p. 9). 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. Tonquish Creek, Bell Creek and Evans Creek also need further examination due to elevated concentrations.

BRANCH	Stream Name	FIELDID	Site Description	Cl ppm
Main	Evans Creek	Evan2	LTU	551
Middle	Bishop Creek	Bish2	Bishop Scarborough	637
Middle	Tonquish Creek	Nton	S Evergreen St	365
Middle	Tonquish Creek	MR-24	Lion's Pk	440
Middle	Tonquish Creek	Ton2	Ann Arbor Rd	341
Upper	Bell Branch	Bell1	Bicentennial Park	418
Upper	Bell Branch	Bell3	Livonia 6 Mile	391

Lower Branch



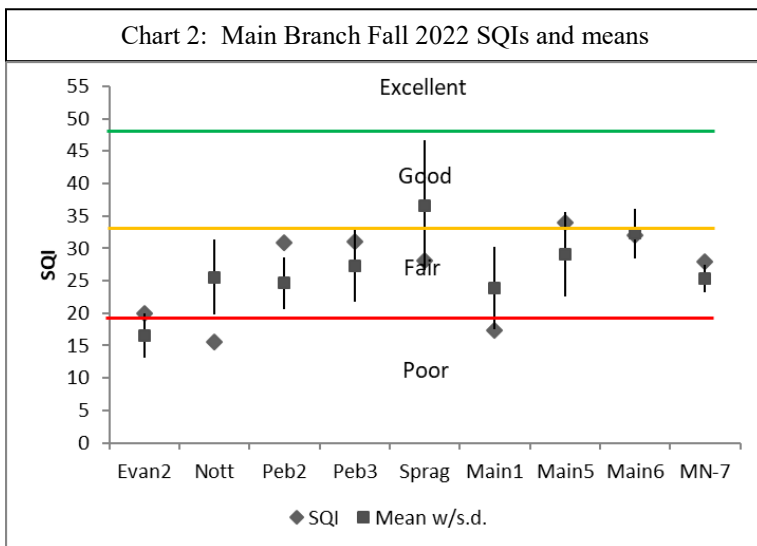
Thirteen sites were sampled on the Lower Branch (Table 5), including two tributaries: Fellows and Fowler Creeks. LR-9 was sampled but the results were not included in the analysis since water was too low to adequately sample. SQIs averaged FAIR (24). One site had a GOOD SQI, nine had FAIR SQIs and two were POOR. In the new WQR system, sites averaged fair – 6.45. Sites had an average of 11 taxa, 7 insect taxa and 1 EPT. Chloride levels were the lowest overall in the Lower branch with most below the standard, two sites at chronic levels (Fel2 and Fel4) and none at the toxic level.

SQI scores were compared with past data (Chart 1). Eleven were within a standard deviation of the average for the site and one was below.

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 2-3 above, graphs p. 17-18). Fowl2 and LR-3 both had significant negative trends (Table 4).

Main Branch

Nine sites on the Main Branch were sampled, including four tributaries: Evans, Nottingham, Pebble and Sprague Creek. Creeks. SQIs averaged FAIR (25). One rated GOOD, six rated FAIR and two POOR. WQRs averaged fair (6.27). Taxa averaged 12, 7 insect taxa and 2 EPT. Chloride levels averaged 238 ppm, and most sites were at the chronic effects level, with one site at the toxic level (Evan2).



In comparing averages and past data (Chart 2), one site was above a standard deviation of the mean (Peb2) and one was below (Nott).

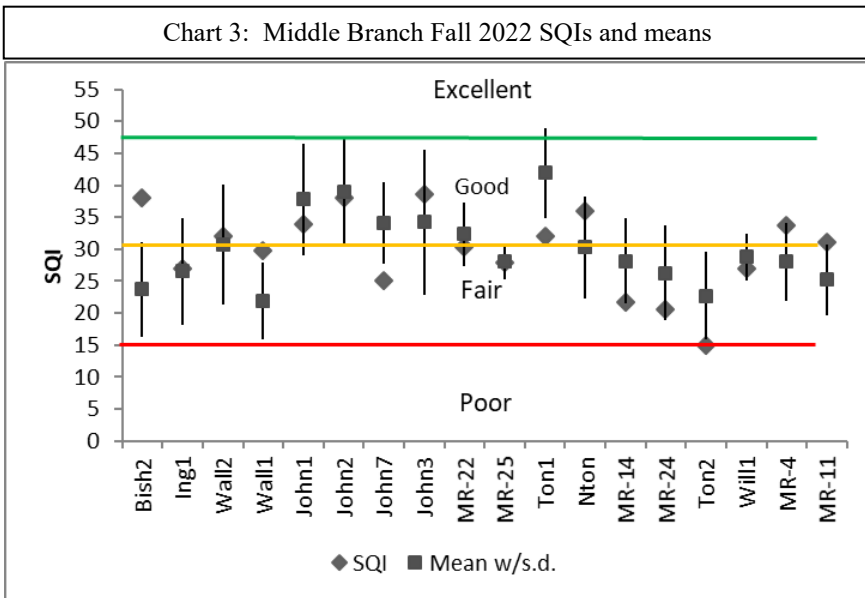
Long term trend analysis shows a significant negative trend for the Main 1-2 subwatershed as

well as for all of the Main when the subwatersheds are combined (Table 2-3 above, graphs p. 11-12). Main6 and Nott had significant negative trends when considered separately (Table 4).

Middle Branch

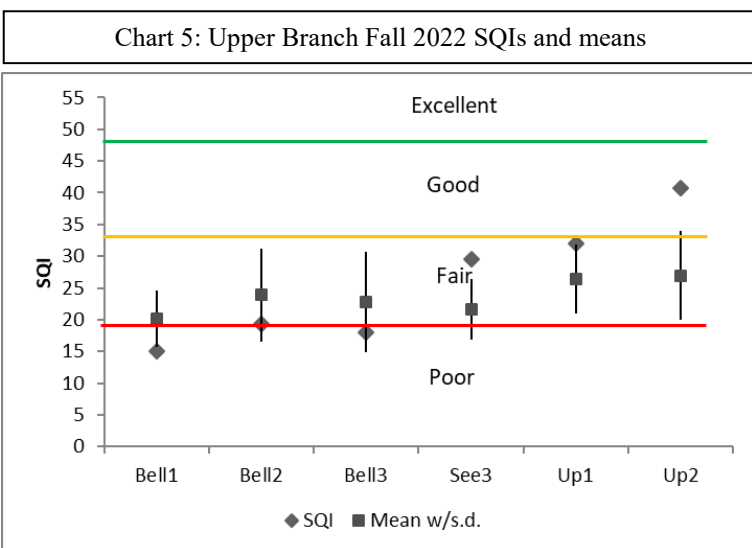
Eighteen sites were sampled on the Middle Branch including Johnson (6), Tonquish (5), the Walled Lake drainage (4 – includes Bishop and Ingersoll Creeks) and Willow Creek. SQI scores averaged FAIR (29). There were six GOOD, 11 FAIR and one POOR SQIs. WQRs averaged fair (5.63). Taxa averaged 13, 8 insect taxa and 2 EPT.

In comparing averages and past data (Chart 3), the majority of sites (14) were within a standard deviation of the average for the sites. Two sites were above (Bish2 & Wall1) and two sites were below (John7 and Ton1). Chloride levels averaged 230 ppm and three sites had toxic levels, all on Tonquish Creek.



In long term trend analysis, the Middle 3 and Johnson Creek had positive trends (Table 2 above, graphs p. 9-10). When the Middle 1 and Middle 3 subwatersheds were combined, there a significant positive trend (Table 3 above, graphs p. 14-17). When Johnson Creek was combined with the Middle branch, there was also a significant positive trend. MR-14 had a negative trend when considered by site (Table 4).

Upper Branch



Six Upper branch sites were sampled including Bell (3), and Seeley Creeks. SQIs averaged FAIR (22). One site was GOOD, three FAIR and two POOR. WQR averaged fair (5.81). Taxa averaged 12, 8 insect taxa and 2 EPT. Chloride levels averaged 296 and 2 sites had toxic levels (Bell1 and Bell3).

In comparing averages and past data (Chart 5), two sites were above a standard deviation of the average (See3 and Up2).

Long term trend analysis shows a significant decline in scores for the Upper Branch but not for Bell Creek or

the Upper considered without Bell Creek (Table 2 & 3, graphs p. 12-13). Bell2 had a negative trend when considered separately.

THANK YOU!!!!

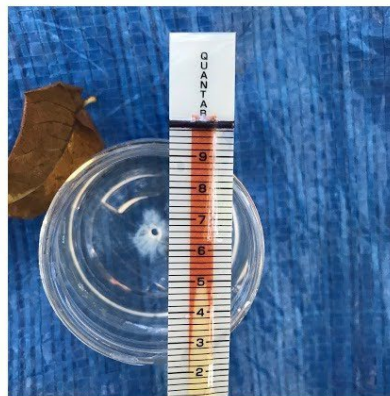
Thank you to all the **volunteers** and **Team Leaders, Sue Thompson** for sampling additional sites, helping with identification, analyzing trends and reviewing the report, and Beverly Hills, Canton Township, Farmington, Livonia, Northville Township, Novi, Plymouth, Plymouth Township, Southfield, Troy and Washtenaw County Water Resources who sponsored sites, the Michigan Clean Water Corps and a donation from Lynn DeGrande and Stuart Steele for funding the program.

Join us for the **Winter Stonefly Search**

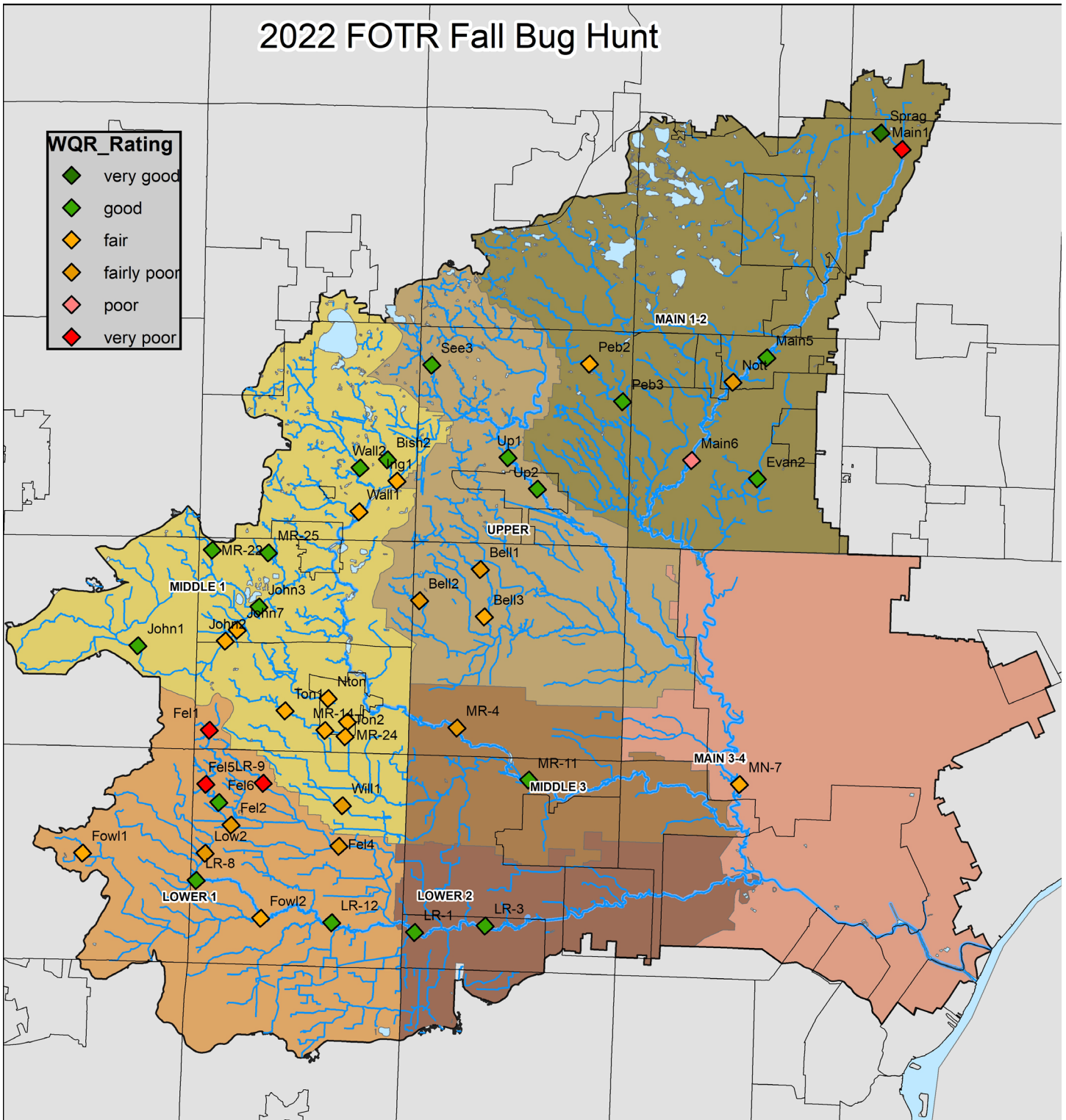
Sat. Jan. 21, 2023 10 am – 3 pm

Register at www.therouge.org by Jan. 6, 2023

Virtual Stonefly Primer Thurs. Jan. 12 6-7:00 pm on Zoom to get ready



2022 FOTR Fall Bug Hunt



2022 FOTR Fall Bug Hunt

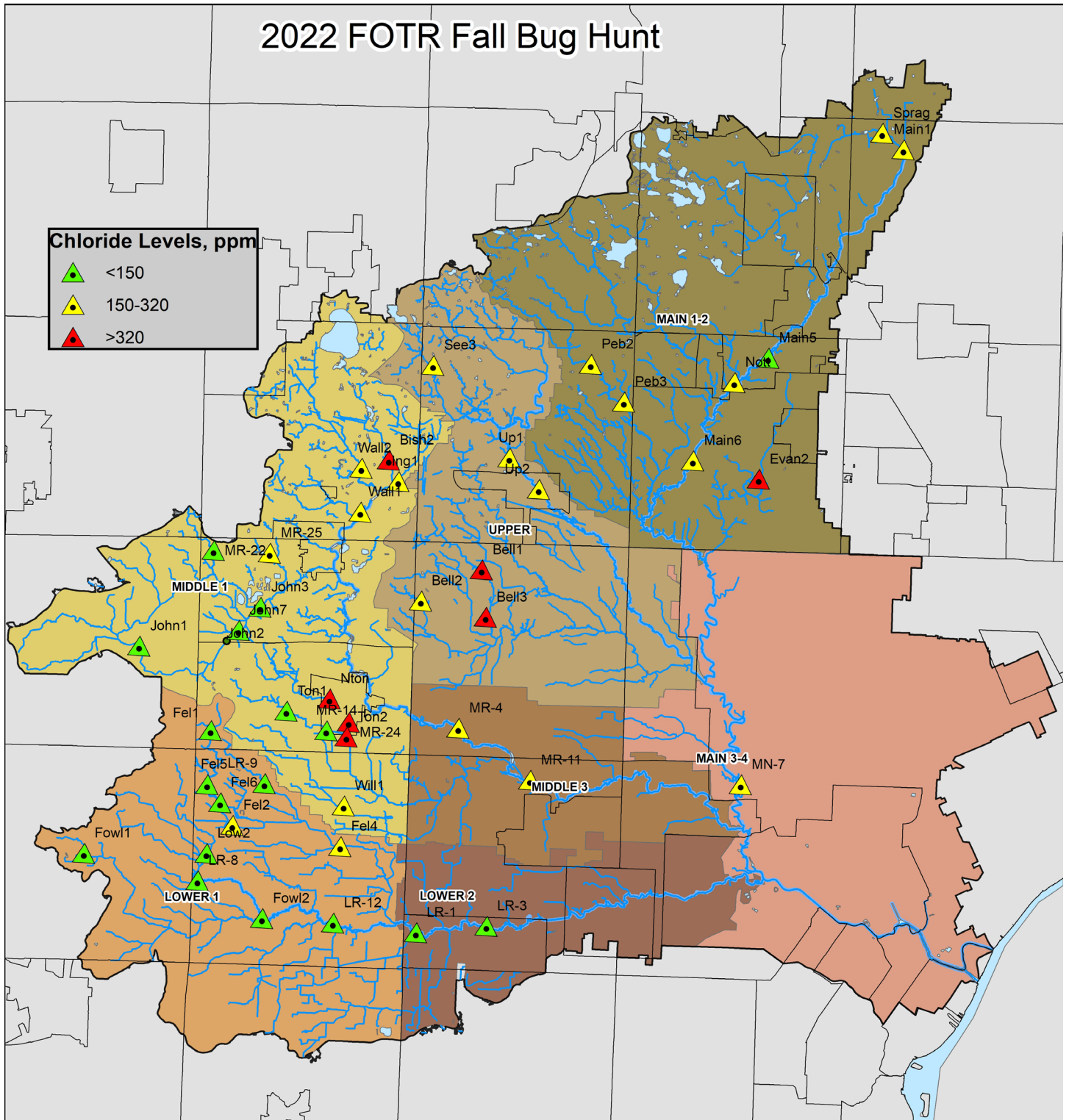
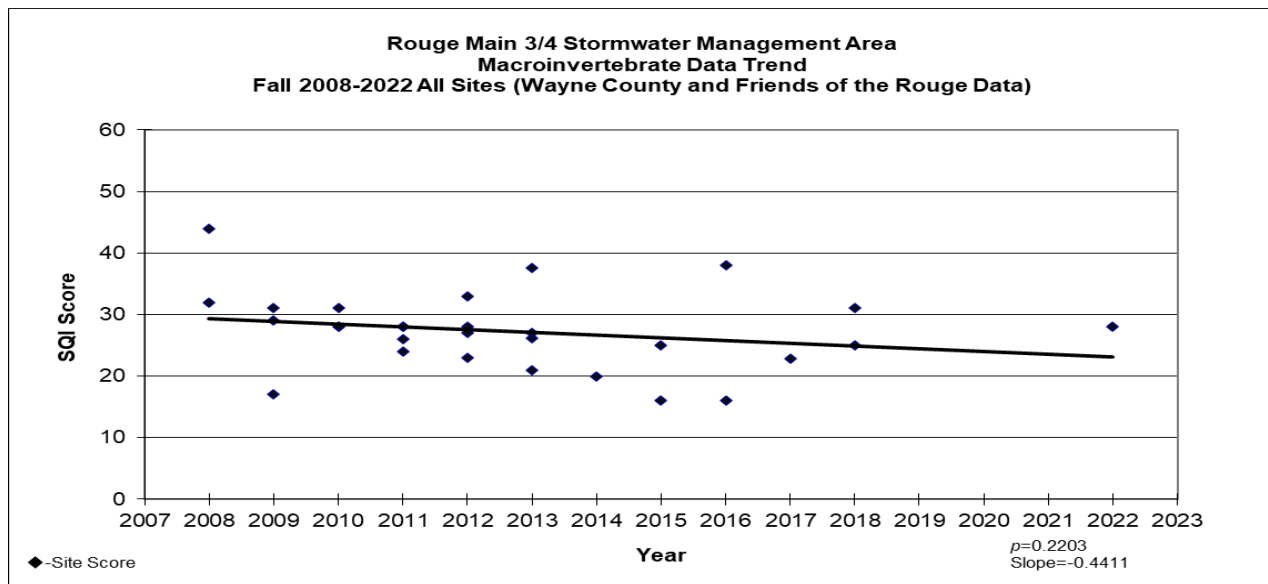
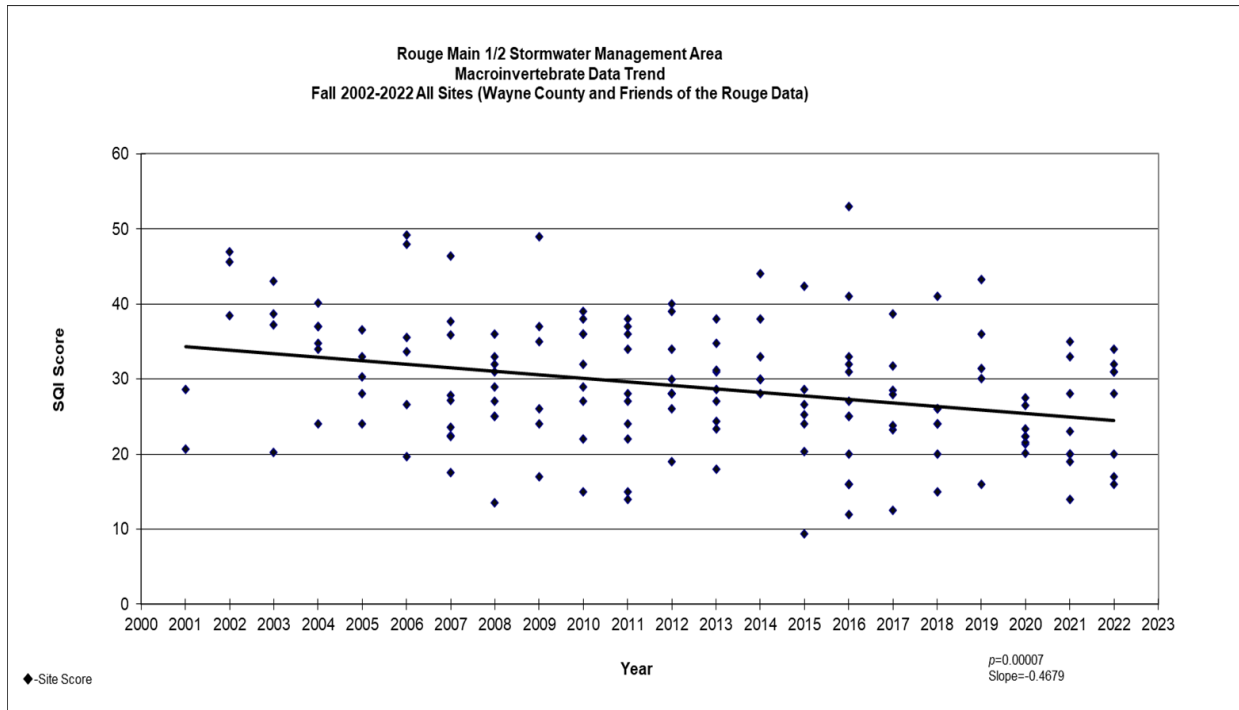


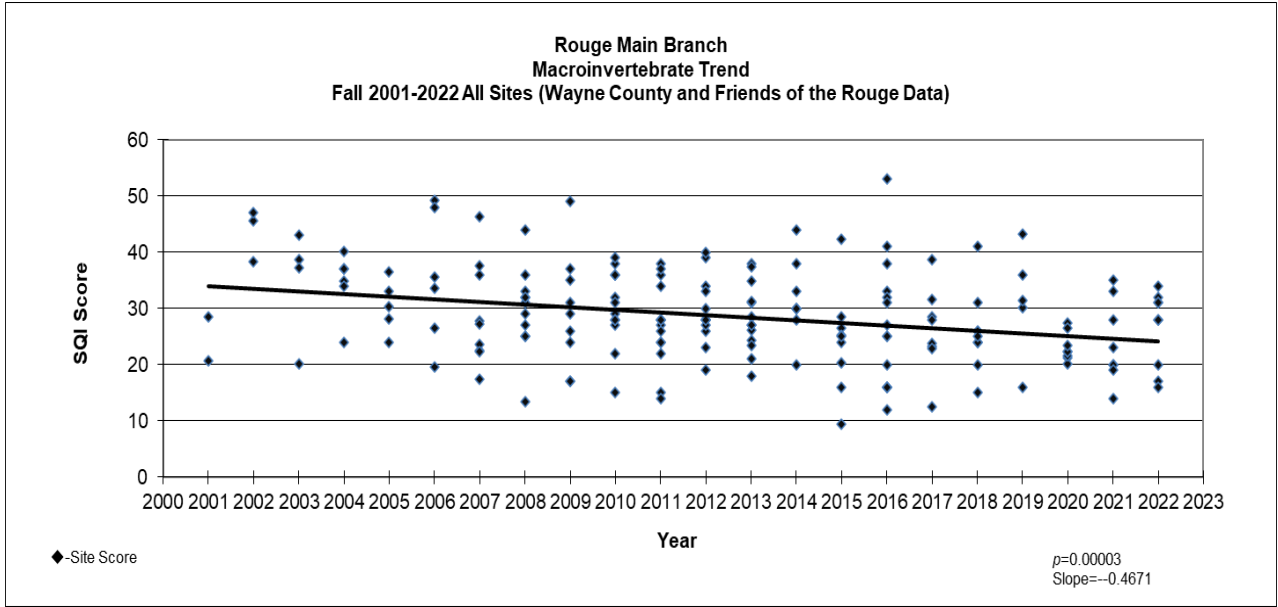
Table 5: Fall 2022 Data

BRANCH	Stream Name	FIELDID	Site Description	SQL	SQL Rating	Taxa	Insect Taxa	EPT	WQR	WQR Score	CI ppm	CI Rating
Lower	Fellows Creek	Fel1	Top of Hill Ct	28	fair	10	6	2	10.00	very poor	106	ok
Lower	Fellows Creek	Fel5	Warren Ridge	18	poor	8	6	0	10.00	very poor	95	ok
Lower	Fellows Creek	Fel6	Hanford	22	fair	9	7	2	5.23	good	95	ok
Lower	Fellows Creek	Fel2	Vintage Valley	11	poor	6	6	0	7.00	fairly poor	276	chronic
Lower	Fellows Creek	LR-9	Fellows Beck Warren	5	poor	3	2	0	10.00	very poor	143	ok
Lower	Fellows Creek	Fel4	Flodin Pk	25	fair	13	4	0	6.61	fairly poor	172	chronic
Lower	Fowler Creek	Fowl1	Prospect	34	good	17	11	2	5.97	fair	31	ok
Lower	Fowler Creek	Fowl2	Fowler Beck	20	fair	9	6	3	5.88	fair	44	ok
Lower	Lower Rouge	Low2	Cherry Hill	33	fair	15	8	1	7.40	fairly poor	44	ok
Lower	Lower Rouge	LR-8	Ridge Proctor	32	fair	12	8	2	4.72	good	85	ok
Lower	Lower Rouge	LR-12	Morton Taylor	33	fair	15	11	2	4.67	good	133	ok
Lower	Lower Rouge	LR-1	Commerce Ct	30	fair	13	8	2	5.17	good	133	ok
Lower	Lower Rouge	LR-3	Goudy Park	23	fair	11	7	2	4.80	good	144	ok
Main	Evans Creek	Evan2	LTU	20	fair	11	7	1	5.02	good	551	acute
Main	Nottingham Creek	Nott	Country Day	16	poor	8	5	0	6.73	fairly poor	172	chronic
Main	Pebble Creek	Peb2	Pebble 13 Mile	31	fair	14	8	2	6.50	fair	238	chronic
Main	Pebble Creek	Peb3	Pebble d/s Dam	31	fair	13	8	2	5.11	good	220	chronic
Main	Sprague Creek	Sprag	Main Lloyd Stage	28	fair	11	9	2	4.45	very good	220	chronic
Main	Main Rouge	Main1	FF Pk	17	poor	10	5	0	9.40	very poor	157	chronic
Main	Main Rouge	Main5	Douglas Evans	34	good	17	8	2	5.40	good	106	ok
Main	Main Rouge	Main6	Sfld Civic Ctr	32	fair	19	10	3	8.21	poor	187	chronic
Main	Main Rouge	MN-7	Rouge Park	28	fair	13	6	3	6.15	fair	292	chronic
Middle	Bishop Creek	Bish2	Bishop Scarborough	38	good	15	10	2	4.74	good	637	acute
Middle	Ingersoll Creek	Ing1	Brookfarm Park	27	fair	14	10	1	6.06	fair	238	chronic
Middle	Walled Lk Drainage	Wall2	WL 10 M	32	fair	12	8	2	4.96	good	276	chronic
Middle	Walled Lk Drainage	Wall1	Rotary Pk	30	fair	16	9	3	5.70	fair	257	chronic
Middle	Johnson Creek	John1	5M Salem	34	good	15	12	2	5.48	good	95	ok
Middle	Johnson Creek	John2	5M NV	38	good	17	11	3	5.52	fair		
Middle	Johnson Creek	John7	Arcadia	25	fair	12	9	1	5.99	fair	50	ok
Middle	Johnson Creek	John3	6M NV	39	good	14	10	3	4.69	good	58	ok
Middle	Johnson Creek	MR-22	Maybury south	30	fair	13	8	2	5.23	good	144	ok
Middle	Johnson Creek	MR-25	Maybury East	28	fair	14	10	2	5.14	good	203	chronic
Middle	Tonquish Creek	Ton1	Plym Twp Pk	32	fair	12	6	1	6.50	fair	78	ok
Middle	Tonquish Creek	Nton	S Evergreen St	36	good	12	8	3	5.73	fair	365	acute
Middle	Tonquish Creek	MR-14	Smith Elem	22	fair	11	6	1	5.56	fair	121	ok
Middle	Tonquish Creek	MR-24	Lion's Pk	21	fair	9	4	1	6.23	fair	440	acute
Middle	Tonquish Creek	Ton2	Ann Arbor Rd	15	poor	9	7	1	5.85	fair	341	acute
Middle	Willow Creek	Will1	Willow Barchester Pk	27	fair	13	5	0	6.60	fairly poor	172	chronic
Middle	Middle Rouge	MR-4	Levan Knoll	34	good	12	8	3	6.69	fairly poor	202	chronic
Middle	Middle Rouge	MR-11	Elm Grove	31	fair	14	8	2	5.20	good	235	chronic
Upper	Bell Branch	Bell1	Bicentennial Park	15	poor	9	6	0	7.01	fairly poor	418	acute
Upper	Bell Branch	Bel2	Schoolcraft College	19	fair	11	8	1	7.23	fairly poor	313	chronic
Upper	Bell Branch	Bel3	Livonia 6 Mile	18	poor	11	7	1	6.00	fair	391	acute
Upper	Seeley Creek	See3	Kennedy Ct	30	fair	14	10	1	4.52	good	157	chronic
Upper	Upper Rouge	Up1	Heritage Park	32	fair	16	11	1	5.39	good	220	chronic
Upper	Upper Rouge	Up2	Shiawassee Park	41	good	18	14	5	4.78	good	275	chronic
LR-9 water levels too low to effectively sample, not included in averages and trends												

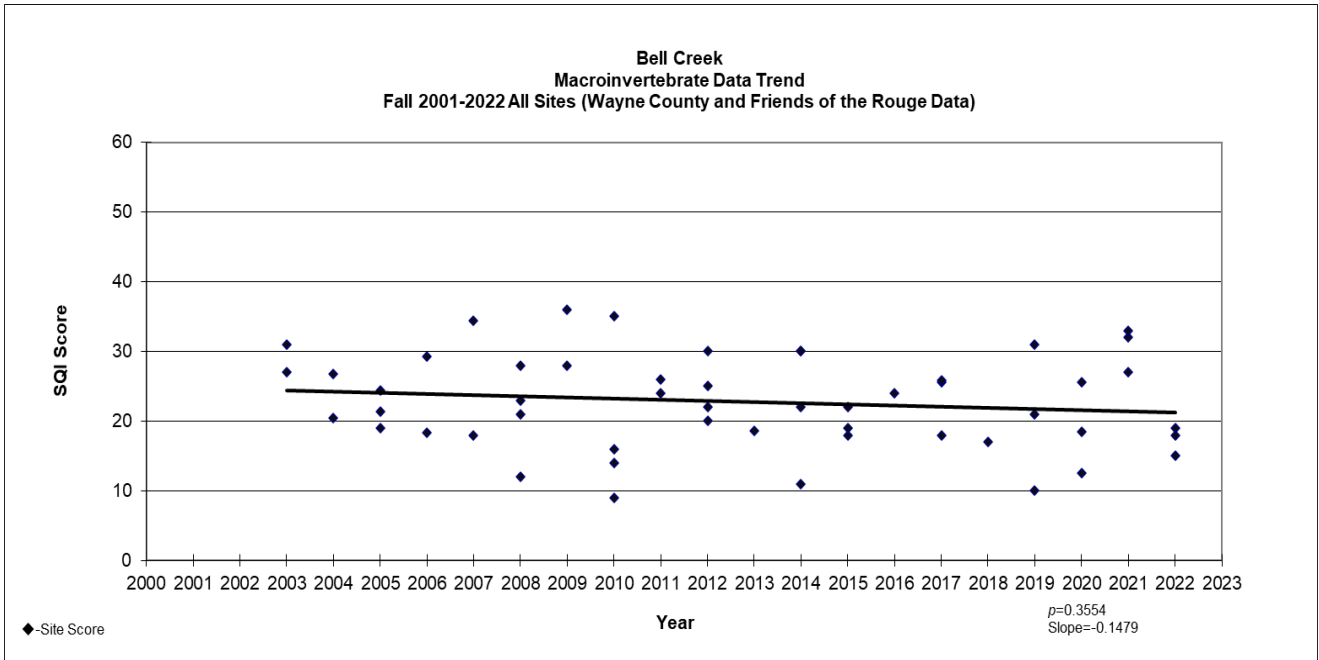
Data Trend Tables

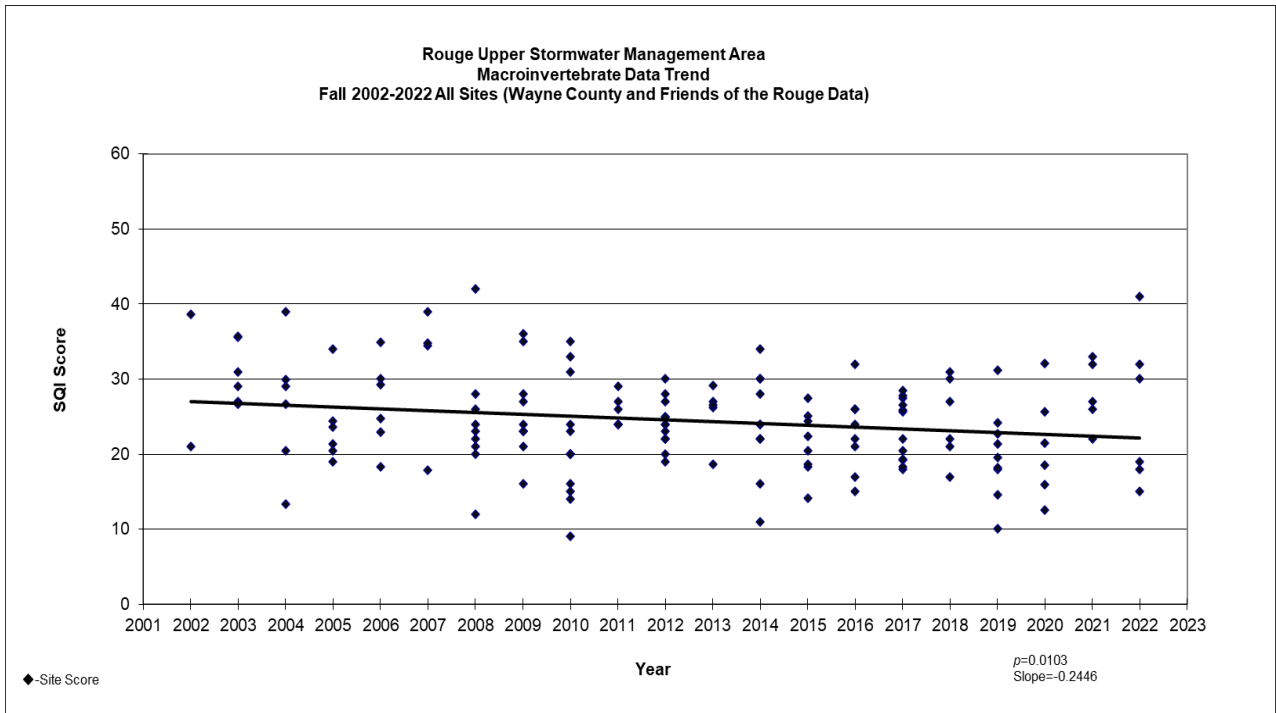
Main



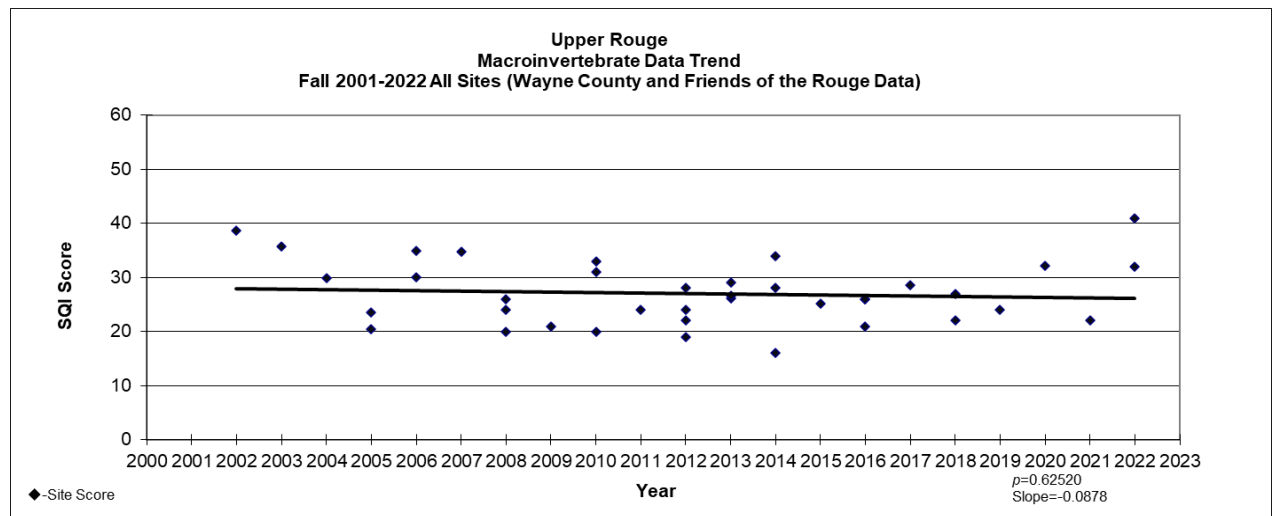


Upper



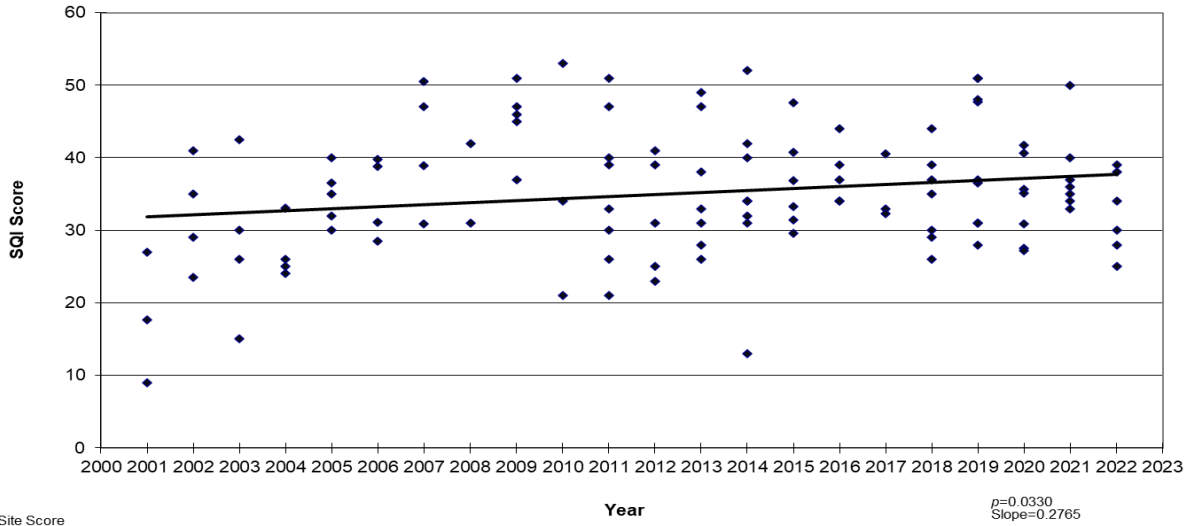


Upper with no tributaries

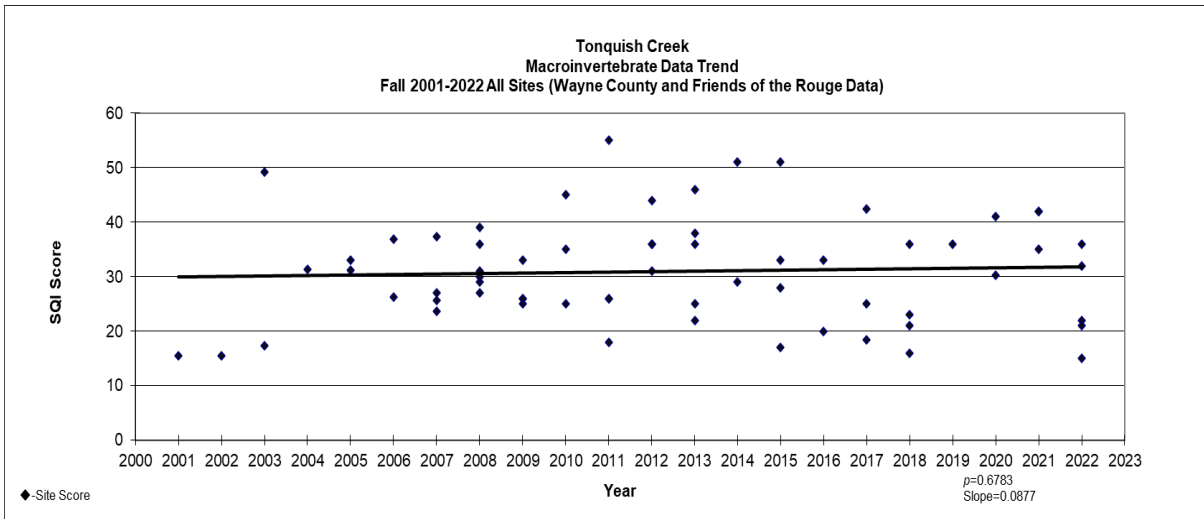


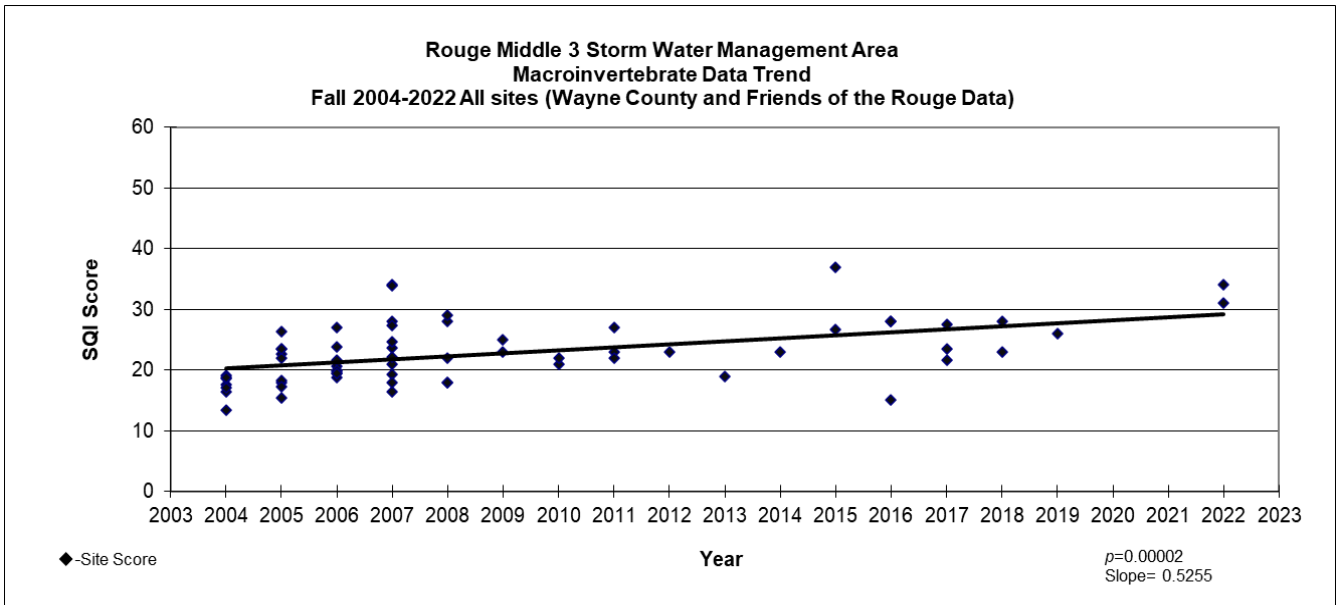
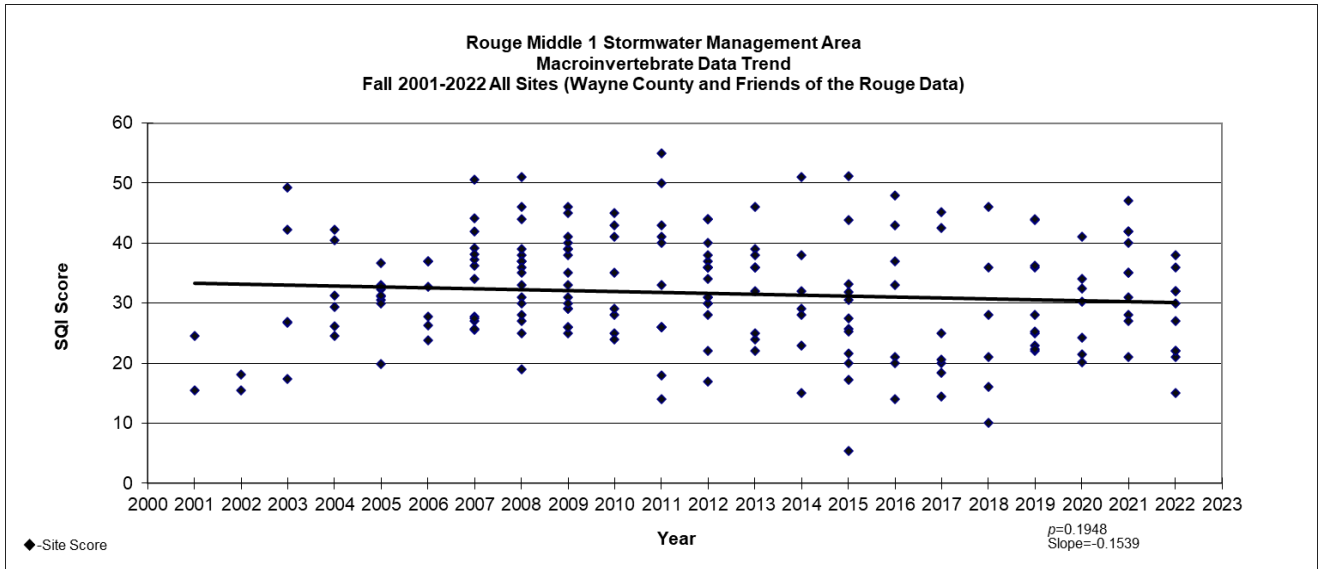
Middle

Johnson Creek
Macroinvertebrate Data Trend
Fall 2001-2022 All Sites (Wayne County and Friends of the Rouge Data)

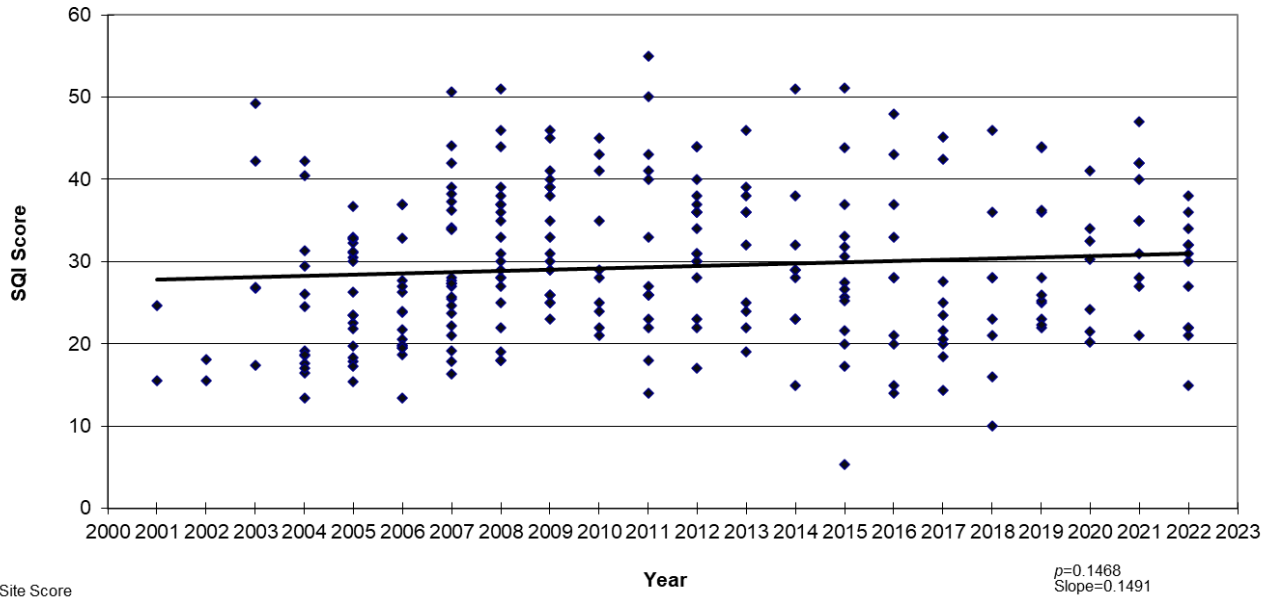


Tonquish Creek
Macroinvertebrate Data Trend
Fall 2001-2022 All Sites (Wayne County and Friends of the Rouge Data)

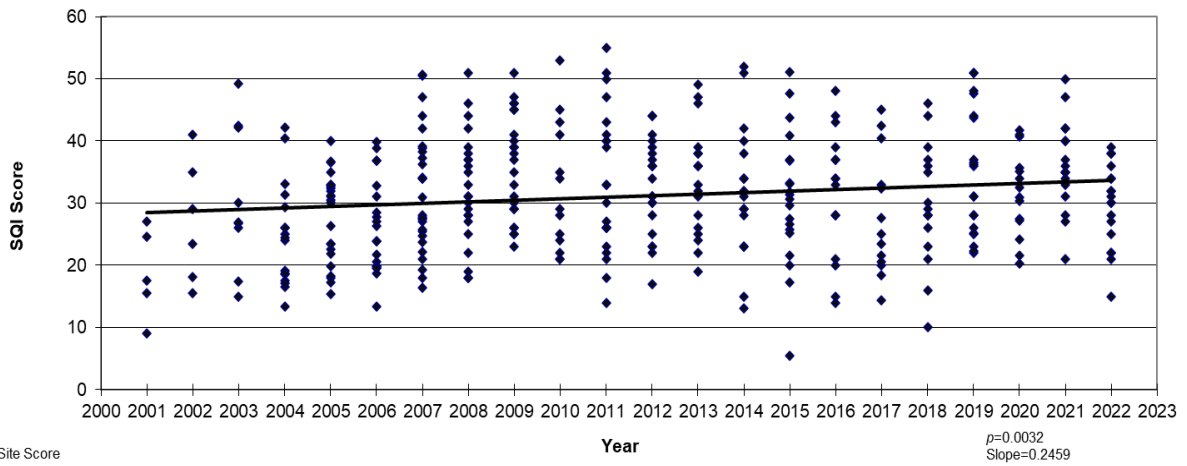


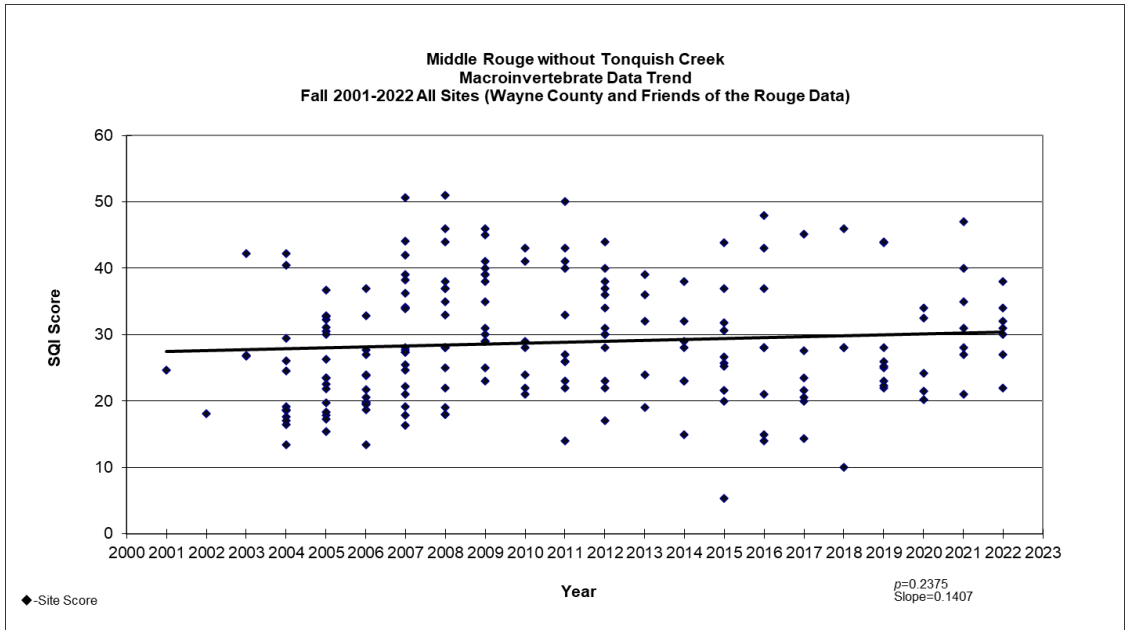


Rouge Middle Branch
Macroinvertebrate Data Trend
Fall 2001-2022 All Sites (Wayne County and Friends of the Rouge Data)

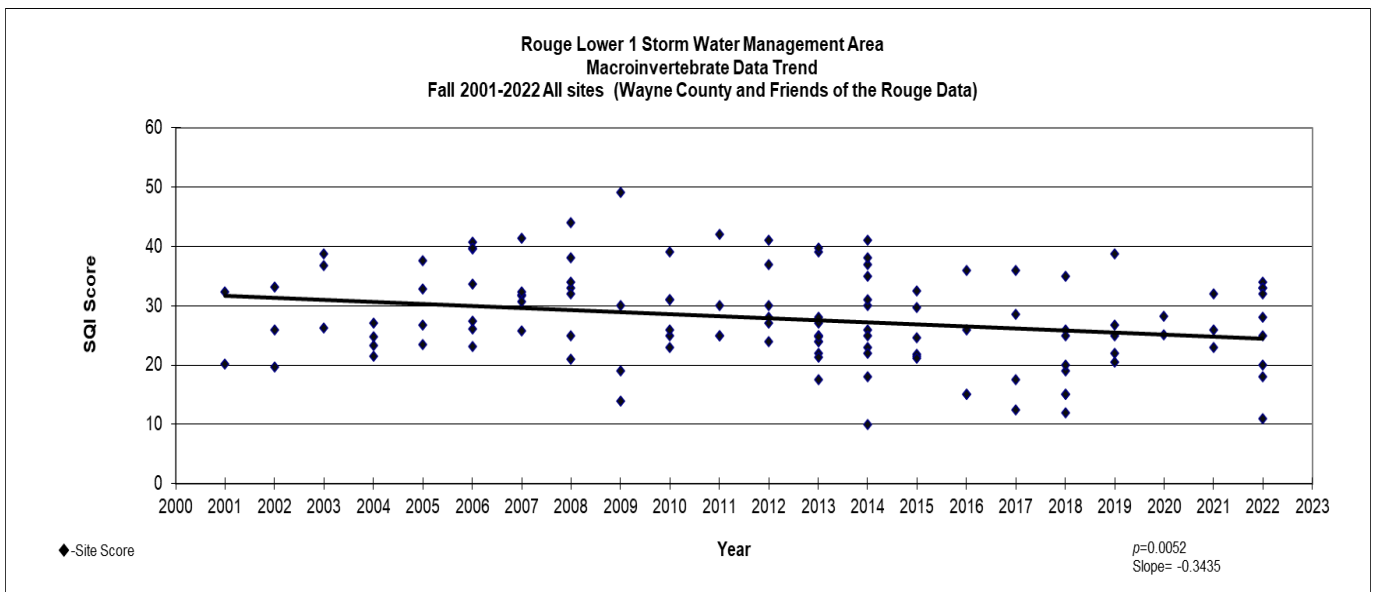


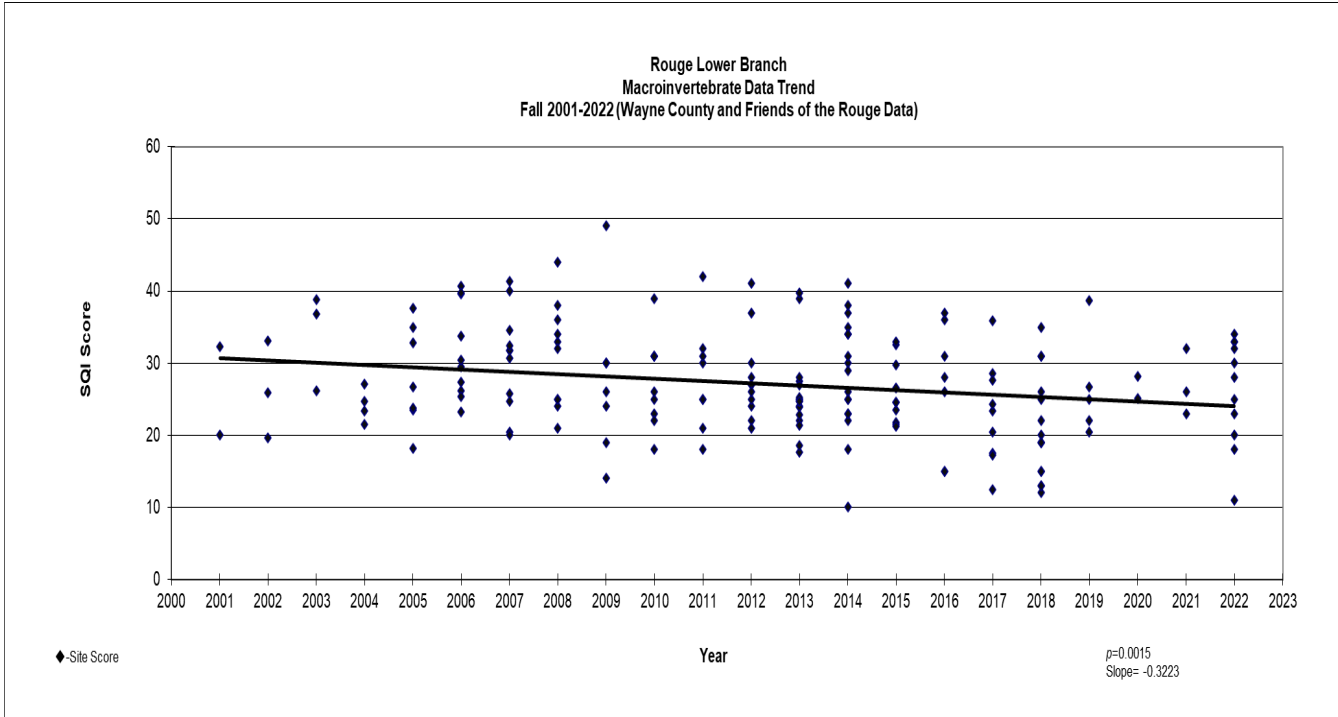
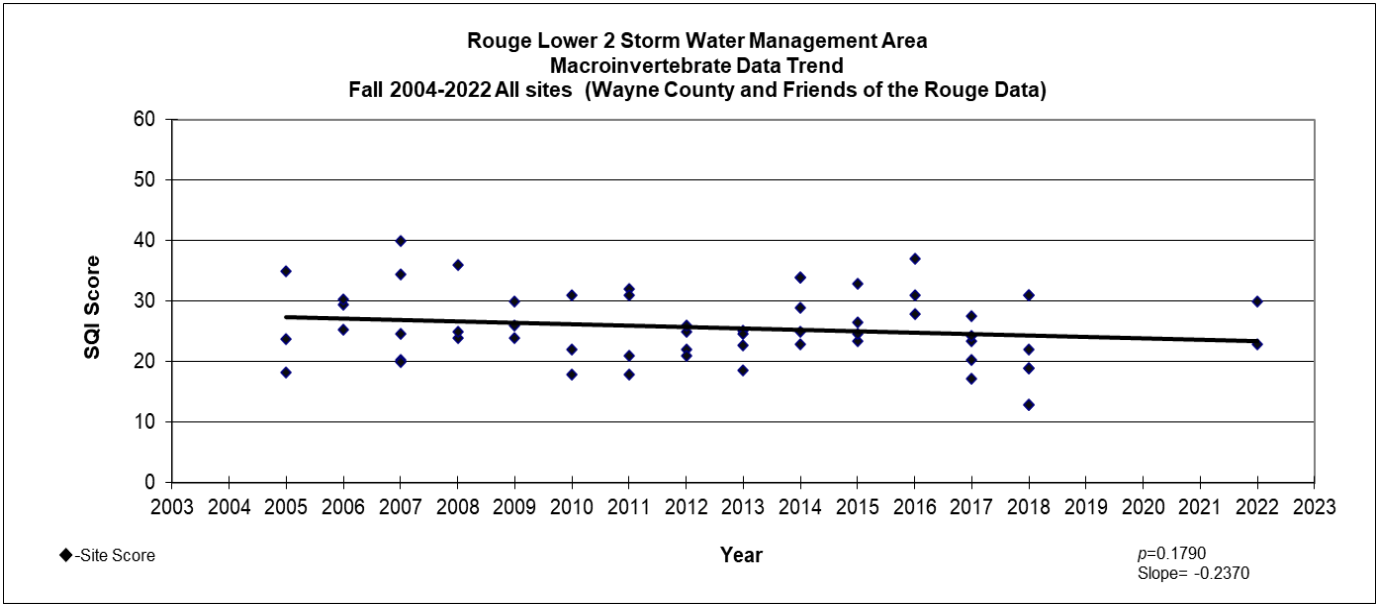
Rouge Middle Branch and Johnson Creek
Macroinvertebrate Data Trend
Fall 2001-2022 All Sites (Wayne County and Friends of the Rouge Data)



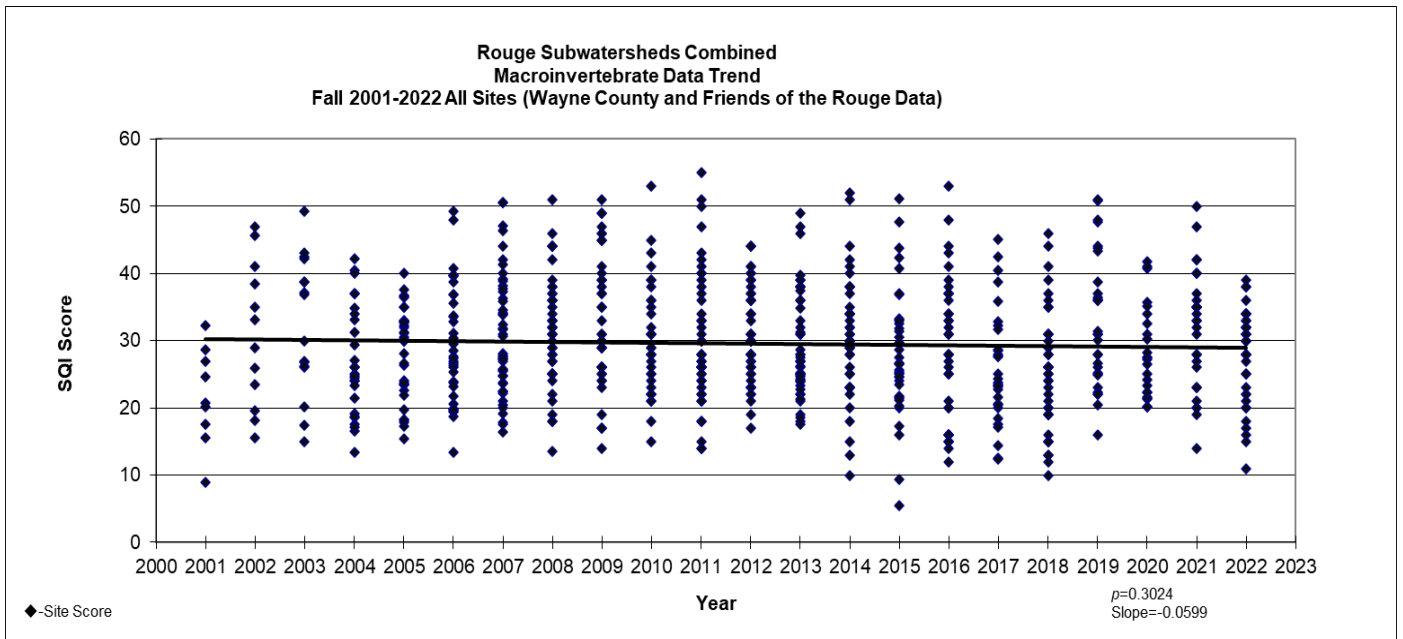


Lower





All Sites





Rouge River Benthic Macroinvertebrate Monitoring Program Fall 2023 Report

This report contains benthic macroinvertebrate sampling results from 44 Rouge tributary and river sites. The Fall Bug Hunt on October 14, 2023 had 68 attendees that sampled 22 sites, which was a great turn out given that it poured rain on the volunteers for most of the day. Groups that participated included the Detroit Zoo’s Conservation Interns; Schoolcraft College; and participants in the Wayne County Conservation Stewards Program. Additional

sites were sampled during the Team Leader Training, with FOTR staff and volunteers, and by Wayne County for a total of 44 sites. Funding for the monitoring was provided by the communities of Beverly Hills, Canton Township, 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, and the Michigan Clean Water Corps.

Overall Scores

The average Stream Quality Index (SQI) for sites was FAIR (30) (map p.6-8, Table 1 & 5). One site rated EXCELLENT (John8); fourteen sites rated GOOD; twenty five sites were FAIR; four sites scored POOR. The average Water Quality Rating (WQR) was FAIR (6.00) with one site rated very good, nineteen good, 12 fair, 8 fairly poor, and 4 very poor. Sites averaged 13 taxa, 8 Aquatic Insect Taxa, and 2 EPT. SQI was highest at John8 (50) and Main3 (47), and Sprag (45); WQR highest at Nton (4.13). The number of taxa found at sites was highest at Main4.5 (21) and lowest at Bish2 (5). Insect taxa which includes the more sensitive groups, was highest at Main4.5, Main 11 and Fel6 (14) and lowest at Evan1 (1). Some mayfly, stonefly and caddisfly families (EPT) were found at all but four sites with an average of 2 of these families per site. John1 had the highest number of EPT (5).

Table 1: Averages

	Average SQI	Average WQR	Average # of taxa	Average # Insect Taxa	Average EPT
2023	30 fair	6.00 fair	13	8	2
2022	26 fair	6.00 fair	12	8	2
2021	30 fair	6.25 fair	13		2

Understanding Benthic Scores

Stream Quality Index (SQI)- 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.

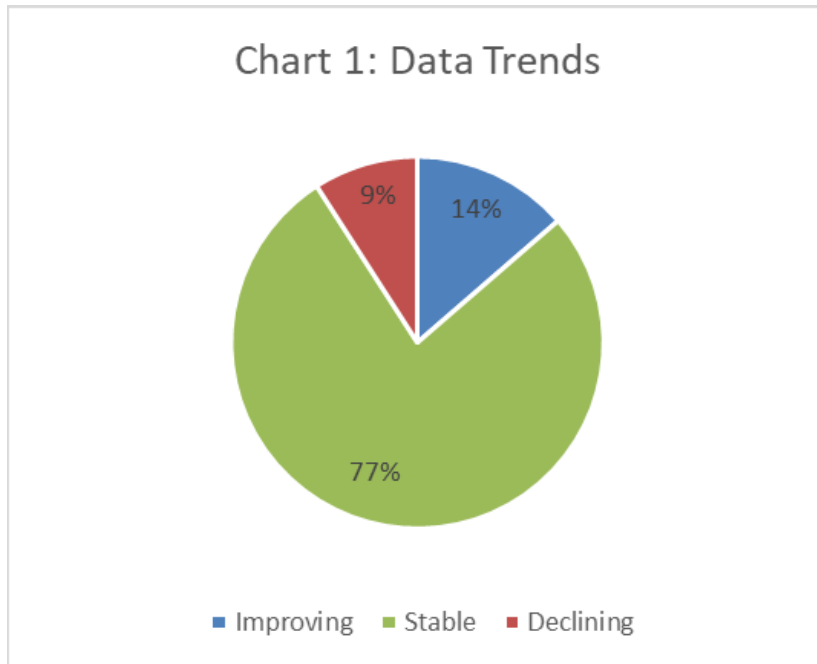
EPT refers to the number of mayfly, caddisfly and stonefly families found; these three orders contain some of the most sensitive organisms.

NEW in Fall 2021

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.

Data Trends

In comparison to past years, 77% of sites were stable, 14% of the sites improving and 9% declining.



To compare change over time, we analyzed the trends by subwatershed, with Johnson Creek analyzed separately as it is a coldwater tributary (Table 2 and graphs p. 14-22). The Middle 3 subwatershed had significant positive trends. The Main 1-2, the Upper and the Lower 1 subwatersheds had significant negative trends. These trends are similar to last year.

Table 2: Fall Bug Hunt Trend Summary All Sites 2001-2023

Subwatershed	slope	<i>p</i> -value	True Trend	Subwatershed SQI average score	Water Quality Rating
Main 1-2	-0.3553	0.0019	yes, negative	29	Fair
Upper	-0.2110	0.0185	yes, negative	24	Fair
Johnson Creek	0.1915	0.1132	no trend	35	Good
Middle 1	-0.0057	0.2197	no trend	31	Fair
Middle 3*	0.4760	0.00002	yes, positive	23	Fair
Lower 1	-0.2610	0.0199	yes, negative	28	Fair
Lower 2**	-0.1512	0.3285	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 2019-2023

The data was further analyzed for trends by tributaries and subareas. Table 3 contains a summary of this analysis; the graphs are on p. 13-21. When the upper and lower sections of the Main, Middle and Lower subwatersheds were combined, the trends stood – negative for the Main and Lower and positive for the Middle. When all the sites were combined, there was no significant trend.

Branch	Slope	p -value	True Trend	Branch Average SQI Score	Water Quality Rating
Rouge All Subwatersheds combined	-0.0071	0.1037	no trend	28	Fair
Main (Main 1/2 and Main 3/4)	-0.3564	0.0009	yes, negative	29	Fair
Bell Creek only	-0.0725	0.6240	no trend	23	Fair
Upper only	-0.1330	0.4354	no trend	27	Fair
Middle (Middle 1 and Middle 3)	-0.0064	0.1554	yes, positive	28	Fair
Tonquish Creek only	0.0648	0.7327	no trend	31	Fair
Johnson Creek and Middle	-0.0048	0.3034	no trend	30	Fair
Sump Creek (Johnson Creek tributary)	-0.0962	0.8361	no trend	37	Good
Middle without Tonquish Creek	0.0926	0.4222	no trend	29	Fair
Lower 1 and Lower 2	-0.2365	0.0098	yes, negative	27	Fair

Individual sites were examined for long term trends (Table 4). Of the sites sampled in fall 2023, three had a significant trends: two negative and one positive.

Site	Slope	p -value	Statistically significant trend	Site Average SQI Score	Water Quality Rating
Nott	-0.5100	0.0124	yes, negative	26	Fair
MR-4	0.5917	0.0336	yes, positive	28	Fair
LR-3	-0.5813	0.0204	yes, negative	27	Fair



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, one site had toxic levels of chloride (table 5, map p. 11). 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. Evans Creek also need further examination due to elevated concentrations.

Table 5: Sites with Toxic Levels of Chloride

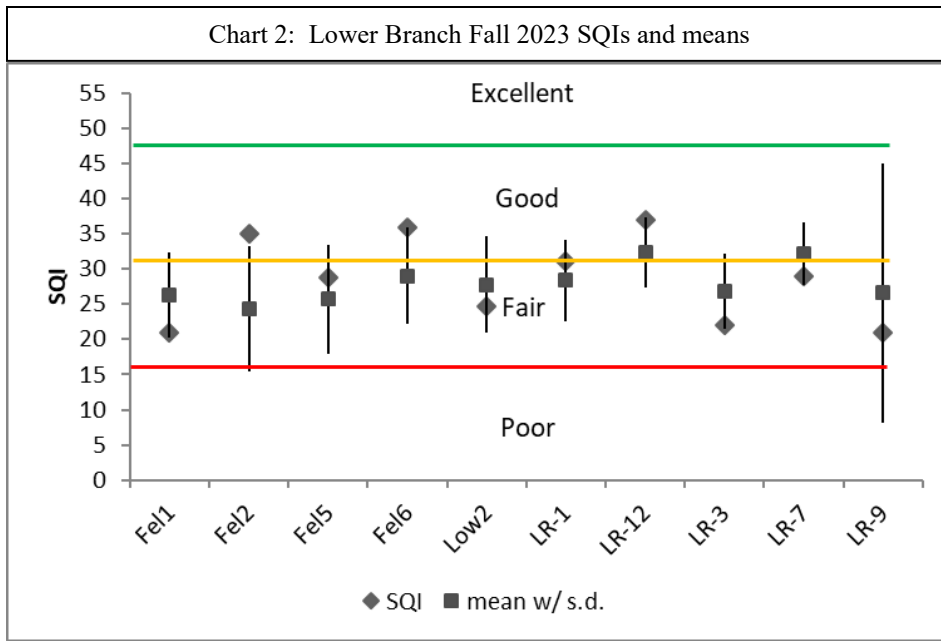
BRANCH	Stream Name	FIELDID	Site Description	Cl ppm
Main	Evans Creek	Evan1	Evans Green Spruce	391

This fall, we also began testing for nitrate and nitrite throughout the watershed. High levels of nitrate 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 were two sites with elevated levels of nitrate this fall (table 6).

Table 6: Sites with Elevated Levels of Nitrate

BRANCH	Stream Name	FIELDID	Site Description	Nitrate ppm
Lower	Lower Rouge	LR-1	Commerce Ct	20
Lower	Lower Rouge	LR-3	Goudy Park	10

Lower Branch



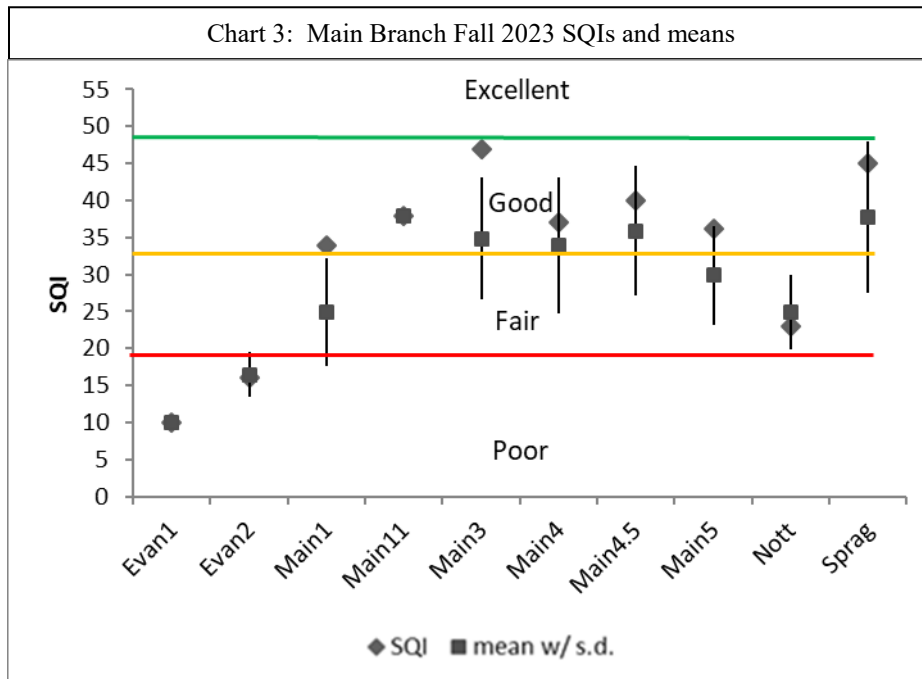
Ten sites were sampled on the Lower Branch (Table 7, p. 13), including one tributary: Fellows Creek. SQIs averaged FAIR (28). Three sites had GOOD SQIs, and seven had FAIR SQIs. In the new WQR system, sites averaged fair (6.45). Sites had an average of 13 taxa, 8 insect taxa and 2 EPT.

Chloride levels ranged from a low of 31 ppm at Fel6 to a high of 195 ppm at LR-3; three sites had chronic levels (LR-9, LR-1, and LR-3) with no sites at the toxic level (Table 7, p. 13). Two sites in the Lower had elevated levels of nitrate, LR-1 (20 ppm) and LR-3 (10 ppm). According to the Izaak Walton League of America’s Nitrate Watch, nitrate levels above 10 ppm in surface waters could be a cause for concern. Further monitoring at these sites could be required.

SQI scores were compared with past data (Chart 2). Nine were within a standard deviation of the average for the site and one was above.

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 2-3 above, graphs p. 21). LR-3 had a significant negative trends (Table 4).

Main Branch

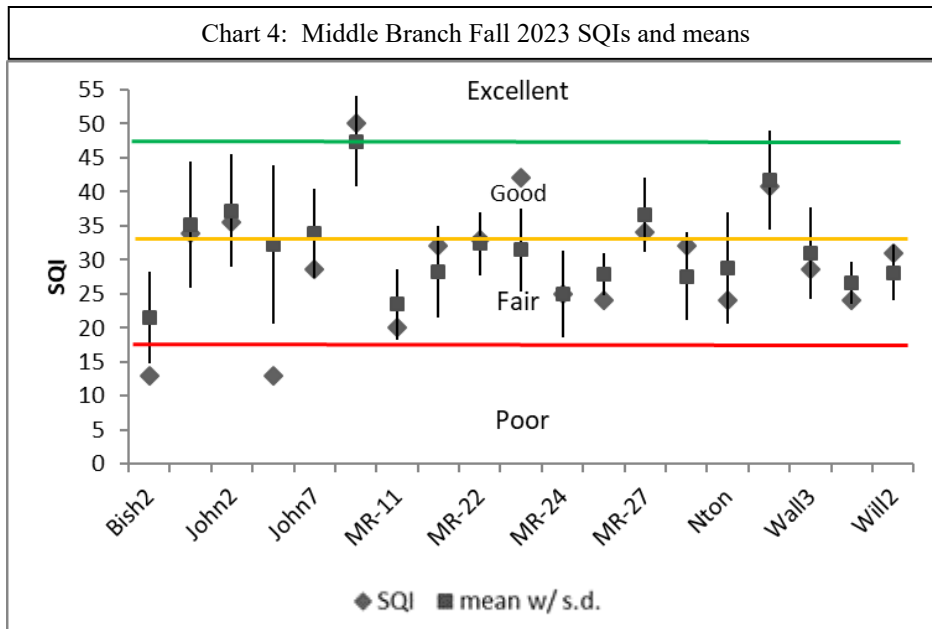


Ten sites on the Main Branch were sampled, including the following tributaries: Evans, Nottingham, and Sprague Creek. SQIs averaged FAIR (33). Seven rated GOOD, one rated FAIR, and two rated POOR. WQRs averaged fairly poor (6.57). Taxa averaged 15, 9 Insect taxa, and 2 EPT. Chloride levels averaged 167 ppm, and most sites were at the chronic effects level (>150 ppm), with one site at the toxic level (Evan1) (Table 7, p. 12).

SQI scores were compared with past data (Chart 3). Eight were within a standard deviation of the average for the site and two 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 2-3 above, graphs p. 14-15). Nott had a significant negative trend when considered separately (Table 4).

Middle Branch

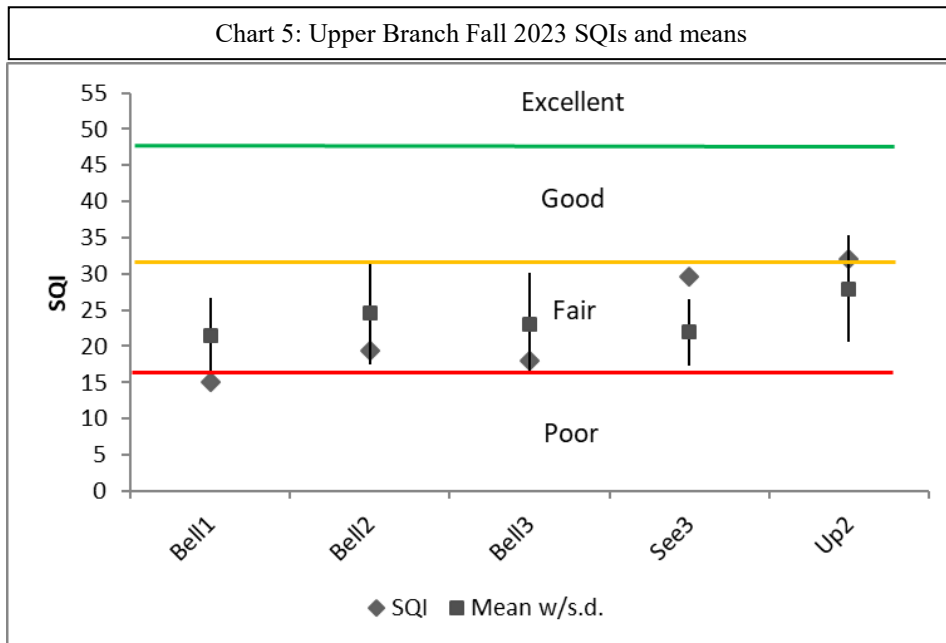


Nineteen sites were sampled on the Middle Branch; Johnson Creek had 9 sites, Bishop Creek had 1 site, Tonquish Creek had 4 sites, Willow Creek had 2 sites, the Walled Lake Drainage had one site, and the final two sites were in the Middle Rouge. SQI scores averaged FAIR (30), with one EXCELLENT (John8), four GOOD, twelve FAIR and two POOR SQIs. WQRs averaged fair (6). Taxa averaged 13, 8 insect taxa and 2 EPT.

In comparing averages and past data (Chart 4), the majority of sites (14) were within a standard deviation of the average for the sites. Two sites were above (MR-23 & Will2) and two sites were below (Bish2 and John3). Chloride levels averaged 116 ppm and five sites were at the chronic level (Table 7, p. 1).

In long term trend analysis, the Middle 3 had a positive trend (Table 2 above). When the Middle 1 and Middle 3 subwatersheds were combined, there a significant positive trend (Table 3 above, graphs p. 17-20). MR-4 had a positive trend when considered by site (Table 4).

Upper Branch



Five Upper branch sites were sampled including Bell and Seeley Creeks, as well as the Upper Rouge at Shiawasee Park. SQIs averaged FAIR (25). All five sites were FAIR. WQR averaged fair (6.48). Taxa averaged 11, 6 insect taxa and 1 EPT.

In comparing averages and past data (Chart 5), one site was above a standard deviation of the average (See3), the rest were within the standard deviation of the average for a given site.

Long term trend analysis shows a significant decline in scores for the Upper Branch but not for Bell Creek or the Upper considered without Bell Creek (Table 2 & 3, graphs p. 15-16).

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, and funding for the event provided by the communities of Beverly Hills, Canton Township, 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, and the Michigan Clean Water Corps.



Join us for the **Winter Stonefly Search**

Sat. Jan. 20th, 2024 10 am – 4 pm

Register at www.therouge.org by Jan. 12th

**Stonefly Refresher (for Team Leaders) Sat. Jan. 13th 9am-11am at the FOTR Office
(650 Church St. Suite 209, Plymouth, MI)**

2023 Fall Bug Hunt

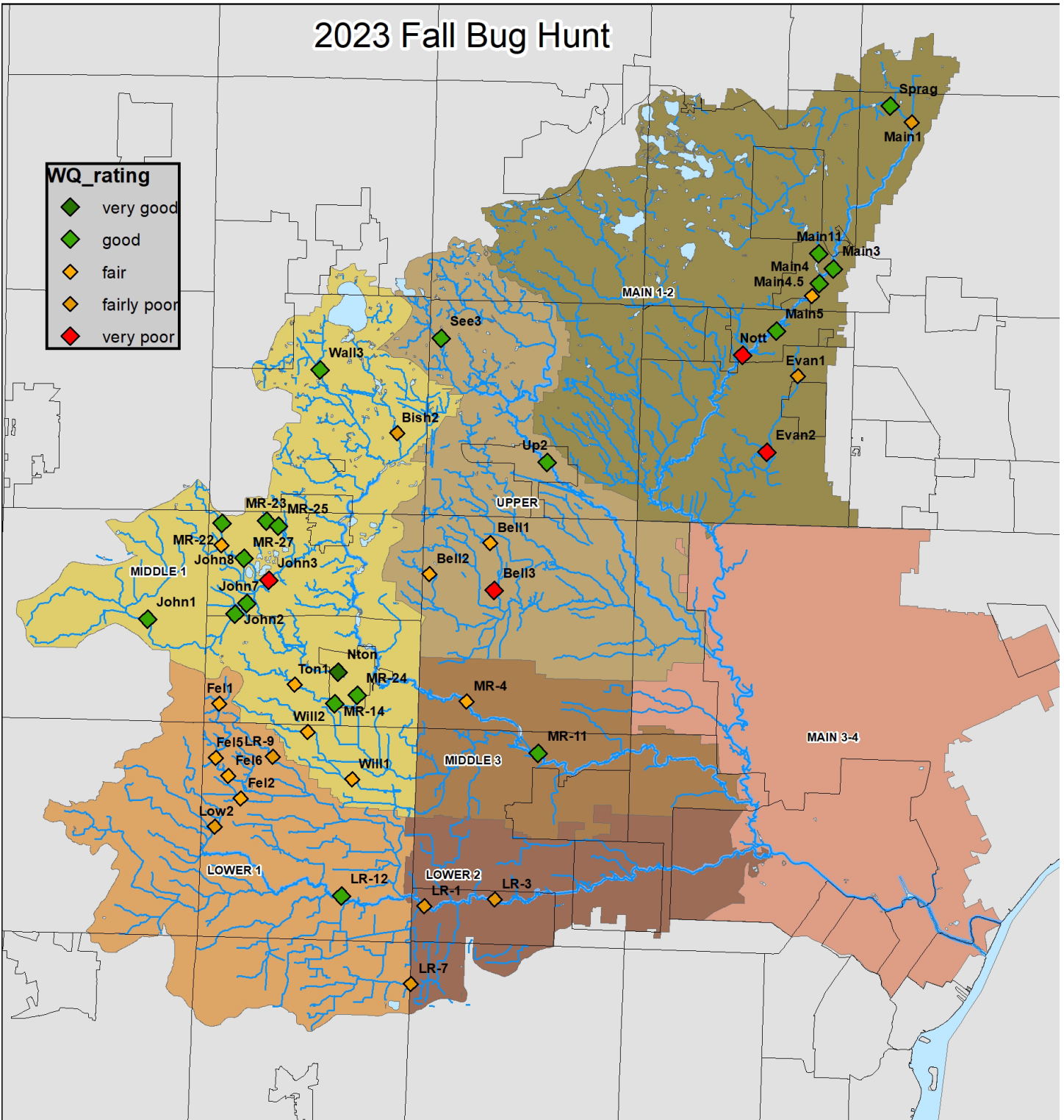
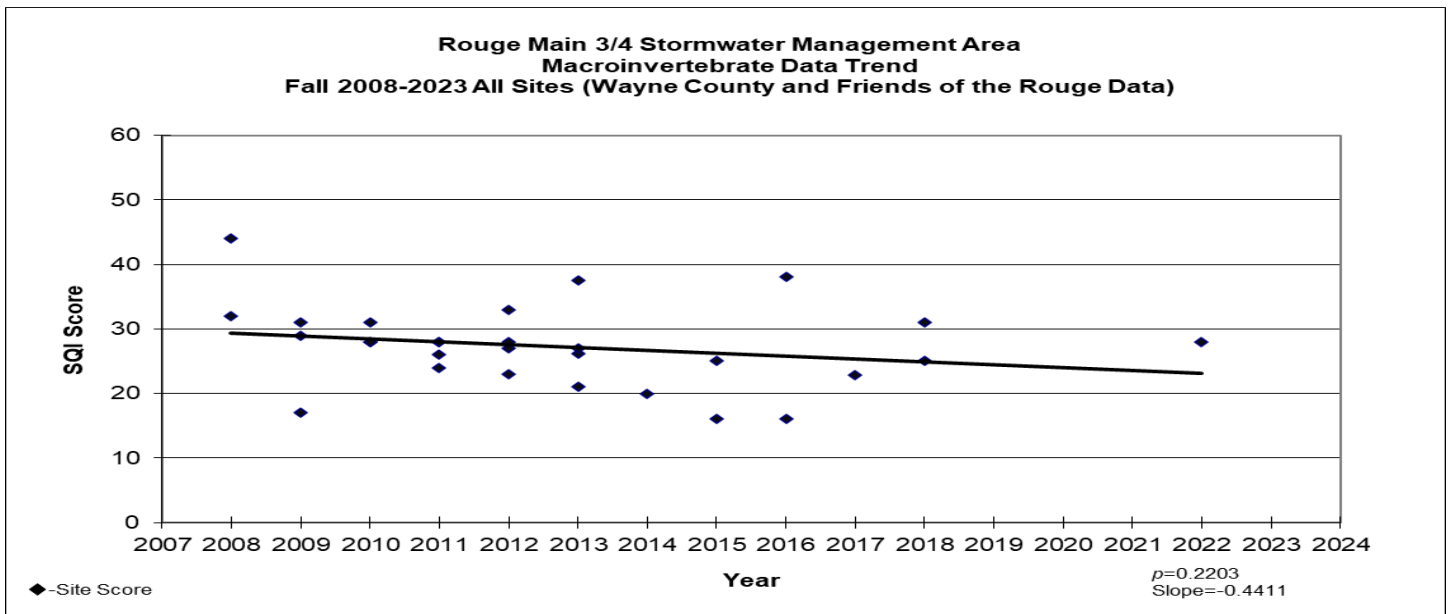
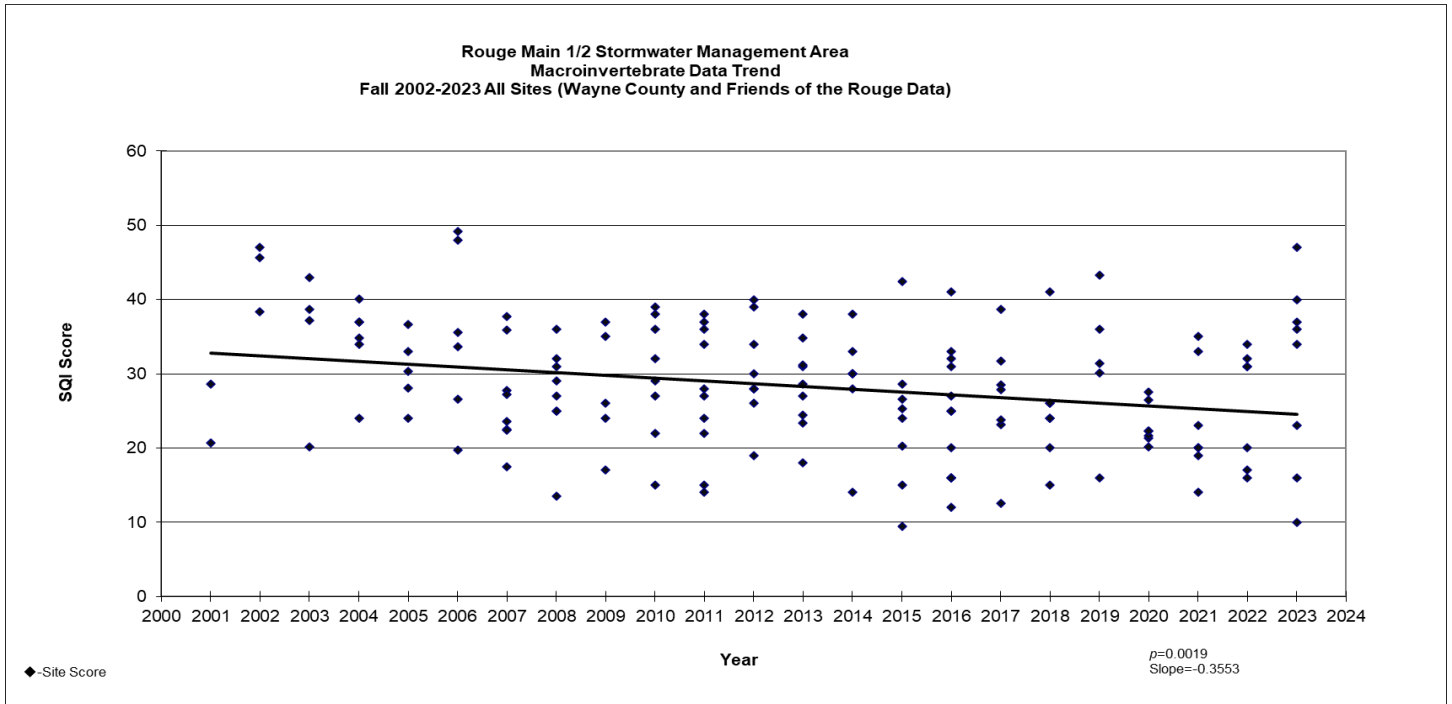


Table 7: Fall 2023 Data

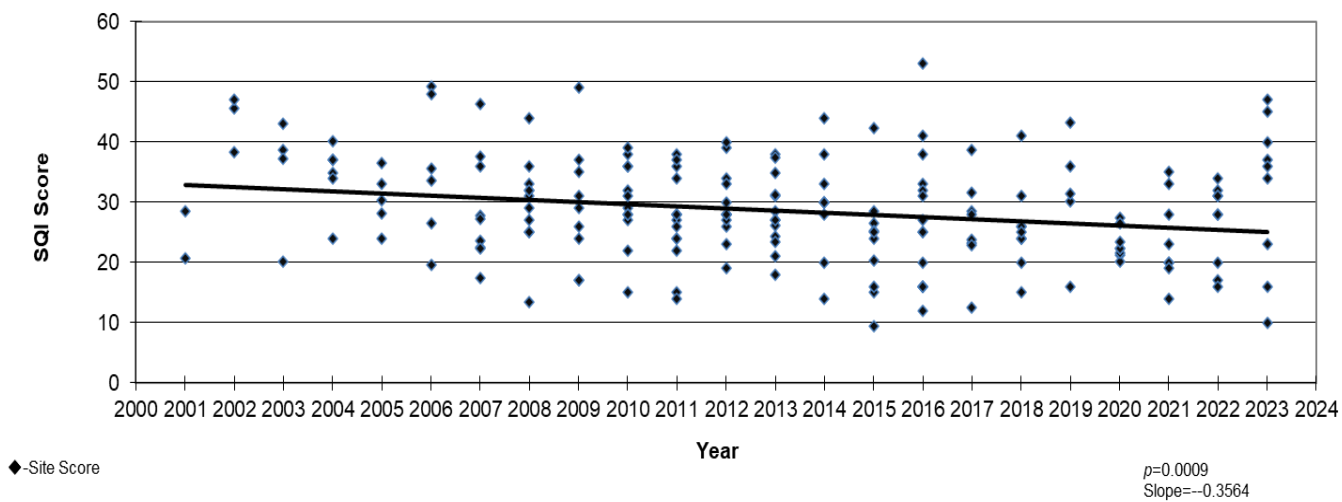
BRANCH	Stream Name	FIELDID	Site Description	SQI	SQI Rating	Taxa	Insect Taxa	EPT	WQR	WQR Score	Cl ppm	Cl Rating	Nitrate ppm	Nitrite ppm
Lower	Fellows Creek	Fel6	Hanford	35.9	Good	19	14	3	6.24	Fair	31	ok	2	1.5
Lower	Fellows Creek	Fel2	Vintage Valley	35	Good	16	8	1	5.78	Fair	37	ok	1	0.15
Lower	Lower Rouge	Low2	Cherry Hill	27.7	Fair	12	8	1	7.42	Fairly Poor	50	ok	0	
Lower	Fellows Creek	Fel1	Top of Hill Ct	21	Fair	11	8	1	5.59	Fair	75	ok	1	0.15
Lower	Fellows Creek	Fel5	Warren Ridge	28.8	Fair	14	10	2	5.94	Fair	85	ok	1	0.15
Lower	Lower Rouge	LR-12	Morton Taylor	37	Good	13	8	2	5.04	Good	119	ok	5	0
Lower	Lower Rouge	LR-7	McClagherty Creek	29	Fair	13	6	2	7.24	Fairly Poor	145	ok	0	0
Lower	Fellows Creek	LR-9	Fellows Beck Warren	21	Fair	13	7	0	7.2	Fairly Poor	157	chonic	0	
Lower	Lower Rouge	LR-1	Commerce Ct	31	Fair	13	8	2	7	Fairly Poor	167	chonic	20	0
Lower	Lower Rouge	LR-3	Goudy Park	22	Fair	9	7	2	7	Fairly Poor	195	chonic	10	0
Main	Evans Creek	Evan2	LTU	16	Poor	6	2	0	10	Very Poor	31	ok	1	0.15
Main	Nottingham Creek	Nott	Country Day	23	Fair	9	6	2	10	Very Poor	117	ok	0	
Main	Main Rouge	Main3	Booth Park	47	Good	18	10	3	5.47	Good	143	ok	1	0
Main	Sprague Creek	Sprag	Main Lloyd Stage	45	Good	14	10	3	5.12	Good	157	chonic	1	0.15
Main	Main Rouge	Main4	Linden Park	37	Good	18	9	2	5.17	Good	157	chonic	1	0
Main	Main Rouge	Main1	FF Pk	34	Good	19	10	2	6.76	Fairly Poor	157	chonic	1	0.15
Main	Main Rouge	Main11	Quarton at Lakeside	37.9	Good	19	14	4	4.92	Good	172	chonic		
Main	Main Rouge	Main5	Douglas Evans	36.1	Good	16	9	1	5.49	Good	172	chonic	2	0
Main	Main Rouge	Main4.5	Fairway Park	40	Good	21	14	3	5.76	Fair	172	chonic	1	0
Main	Evans Creek	Evan1	Evans Green Spruce	10	Poor	7	1	0	7	Fairly Poor	391	acute	1	0.15
Middle	Johnson Creek	MR-22	Maybury south	33	Fair	13	8	2	4.64	Good	75	ok	1	0
Middle	Johnson Creek	John7	Arcadia	28.6	Fair	11	10	3	5.08	Good	75	ok	1	0.15
Middle	Bishop Creek	Bish2	Bishop Scarborough	13	Poor	5	4	1	7	Fairly Poor	75	ok	0	0
Middle	Johnson Creek	John3	6M NV	13	Poor	6	6	3	10	Very Poor	75	ok	1	0.15
Middle	Johnson Creek	John2	5M NV	35.6	Good	15	11	4	5.06	Good	85	ok		
Middle	Tonquish Creek	MR-14	Smith Elem	32	Fair	17	8	2	5.35	Good	85	ok	0	0
Middle	Johnson Creek	John1	5M Salem	33.8	Fair	13	9	5	5.46	Good	85	ok	2	
Middle	Johnson Creek	John8	Maybury Angell	50	Excellent	20	12	3	5.53	Fair	85	ok	0	0
Middle	Tonquish Creek	Ton1	Plym Twp Pk	40.8	Good	18	11	3	5.93	Fair	95	ok	1	0
Middle	Willow Creek	Will1	Willow Barchester Pk	24	Fair	10	5	1	6.34	Fair	95	ok	0	0.15
Middle	Johnson Creek	MR-27	Ridge	34	Good	15	9	1	4.78	Good	96	ok	1	0.3
Middle	Tonquish Creek	MR-24	Lion's Pk	25	Fair	8	5	3	4.78	Good	106	ok	0	0
Middle	Tonquish Creek	Nton	S Evergreen St	24	Fair	14	8	3	4.13	Very Good	130	ok	1	0.15
Middle	Johnson Creek	MR-23	Maybury North	42	Good	17	11	4	4.85	Good	131	ok	0	0
Middle	Johnson Creek	MR-25	Maybury East	24	Fair	13	9	1	4.89	Good	159	chonic	0	0
Middle	Middle Rouge	MR-4	Levan Knoll	33	Fair	16	9	2	6.41	Fair	167	chonic	2	0
Middle	Middle Rouge	MR-11	Elm Grove	20	Fair	11	6	2	4.98	Good	172	chonic	0	0
Middle	Walled Lake Drainage	Wall3	WL 12 M	28.7	Fair	11	7	1	5.22	Good	203	chonic	5	0.15
Middle	Willow Creek	Will2	Canton High School	31	Fair	19	11	2	6	Fair	203	chonic	0	0
Upper	Bell Branch	Bell3	Livonia 6 Mile	20	Fair	8	3	0	10	Very Poor	130	ok	1	0.15
Upper	Seeley Creek	See3	Kennedy Ct	25	Fair	10	6	1	4.66	Good				
Upper	Upper Rouge	Up2	Shiawasee Park	21	Fair	10	7	1	5.41	Good				
Upper	Bell Branch	Bell2	Schoolcraft College	29	Fair	11	8	1	5.99	Fair				
Upper	Bell Branch	Bell1	Bicentennial Park	31	Fair	14	8	2	6.35	Fair				

Data Trend Tables

Main

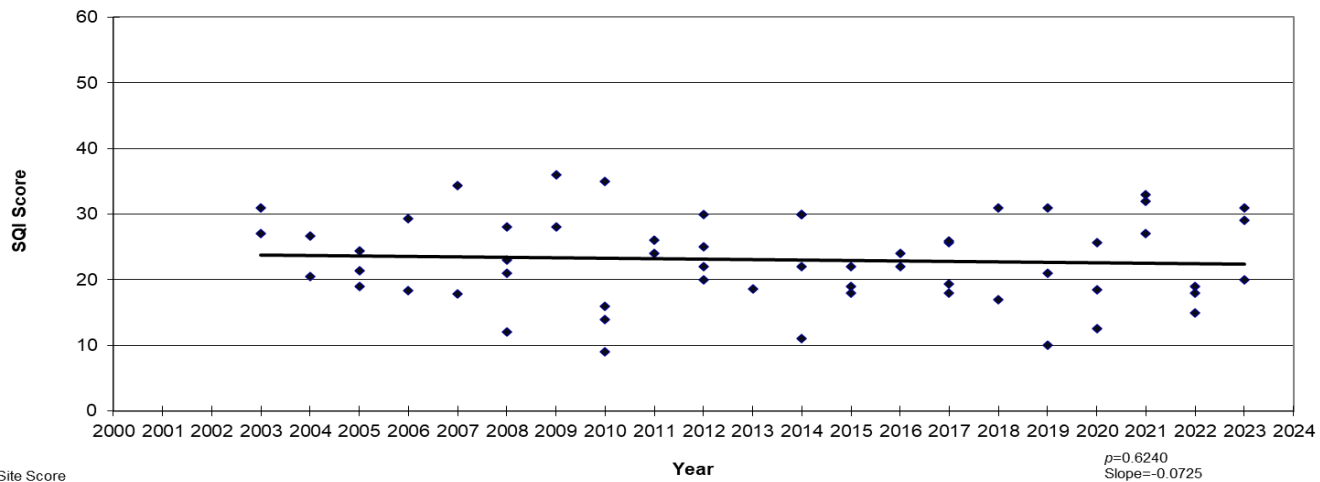


**Rouge Main Branch
Macroinvertebrate Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)**

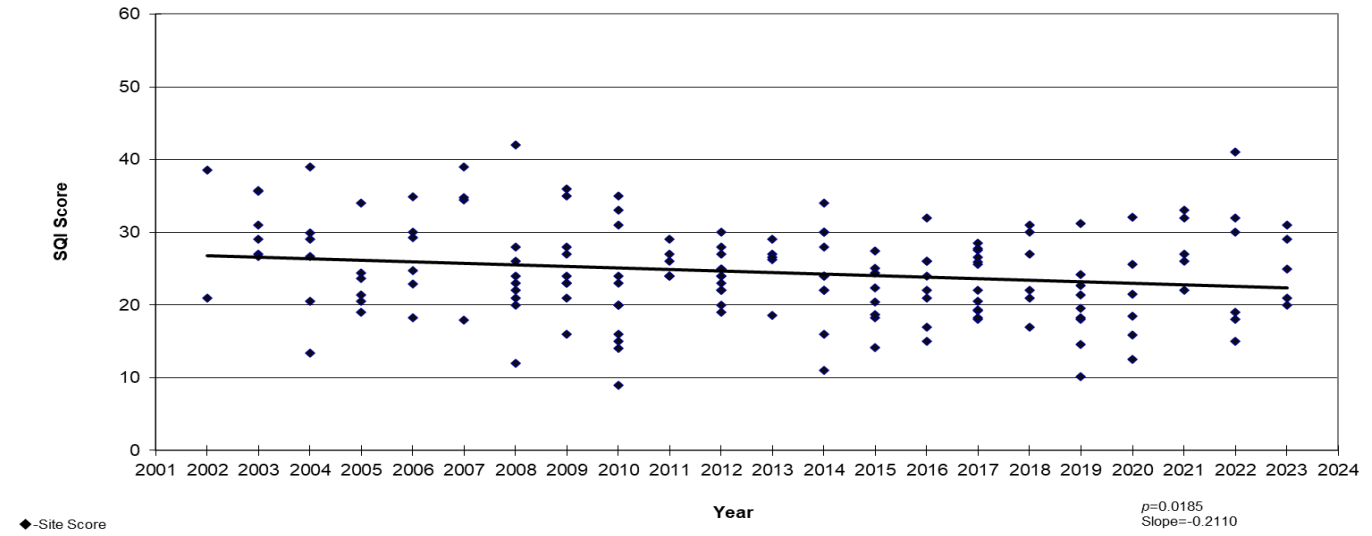


Upper

**Bell Creek
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)**

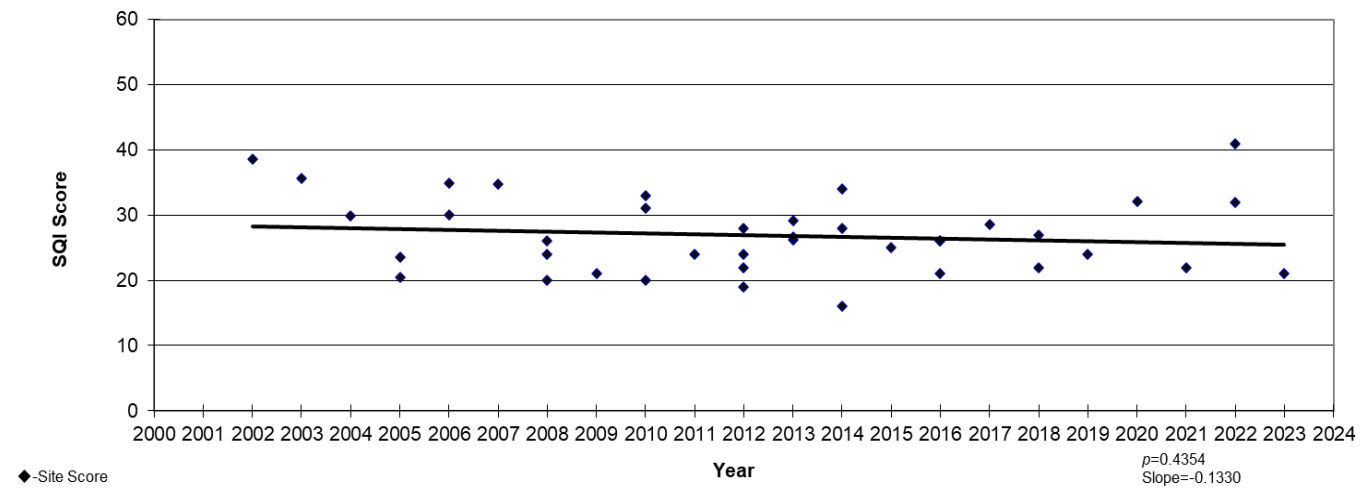


Rouge Upper Stormwater Management Area
 Macroinvertebrate Data Trend
 Fall 2002-2023 All Sites (Wayne County and Friends of the Rouge Data)

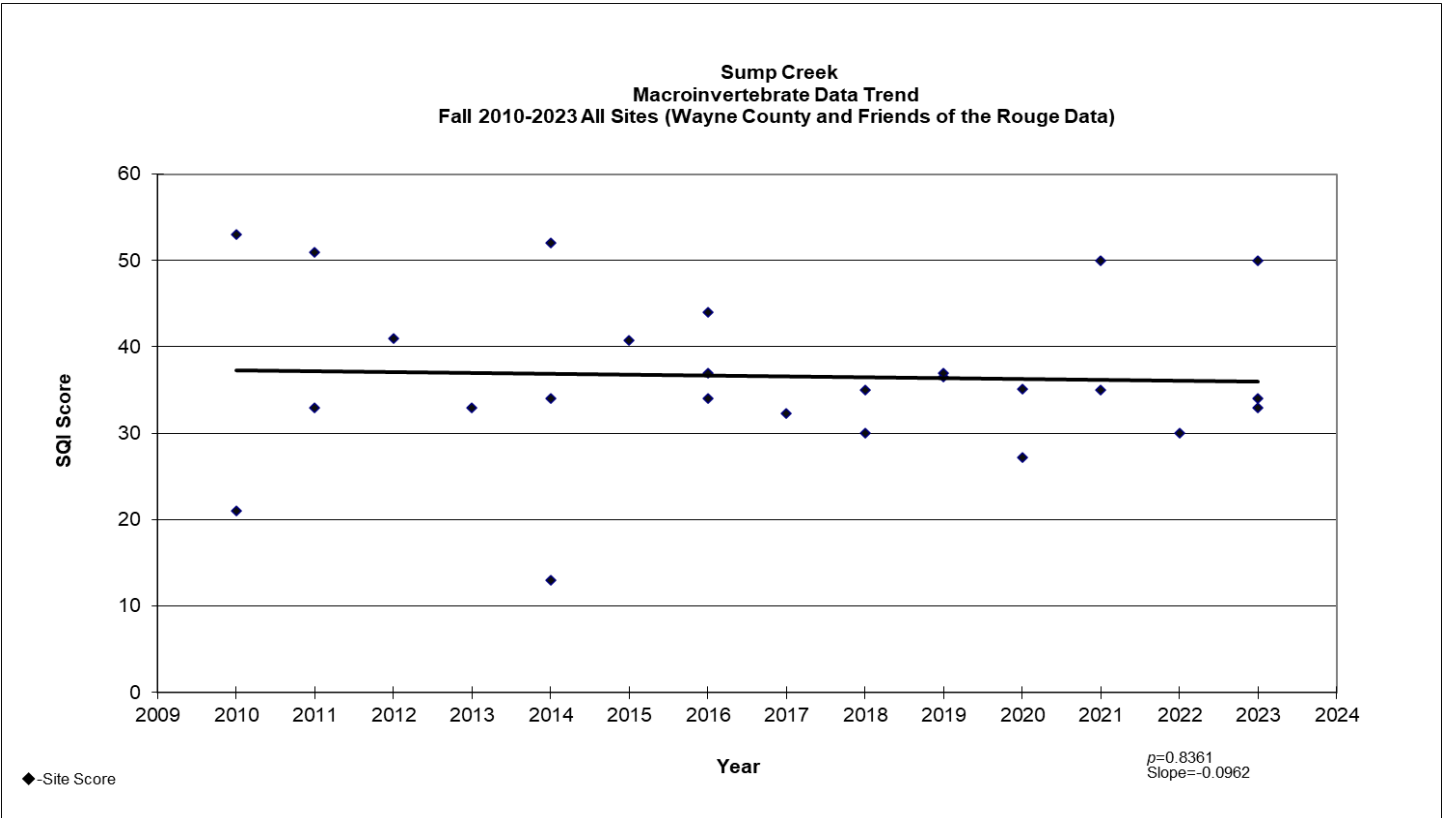
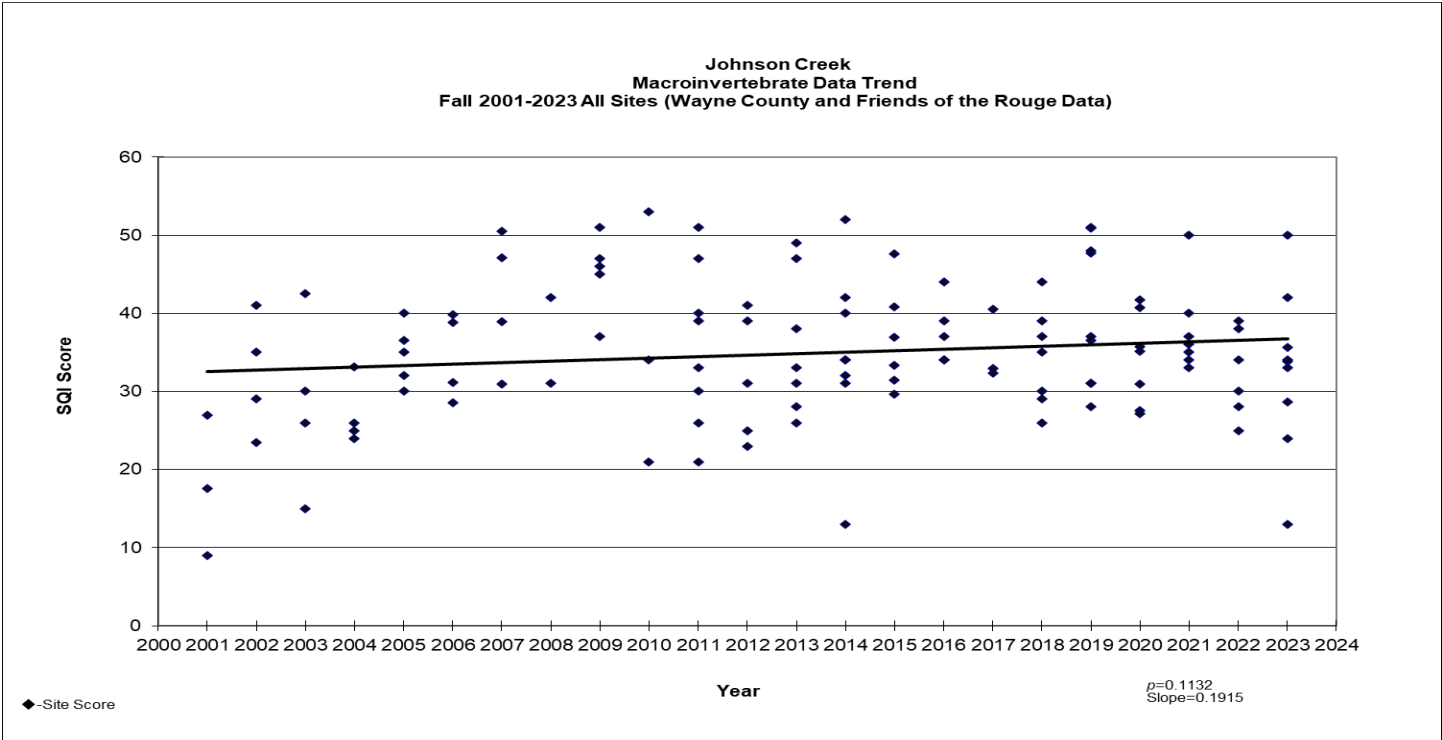


Upper with no tributaries

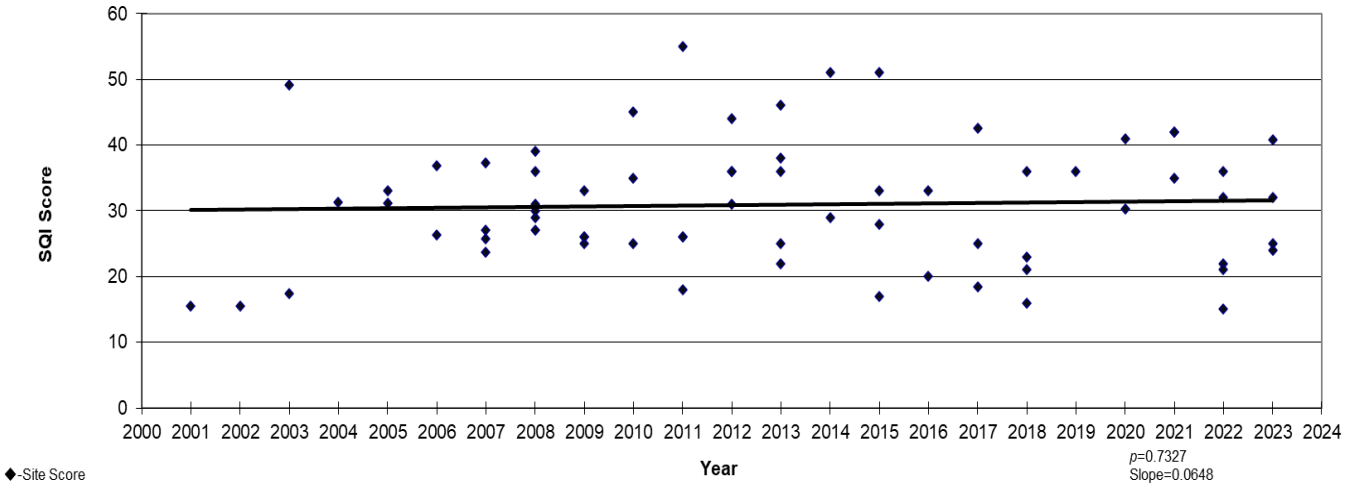
Upper Rouge
 Macroinvertebrate Data Trend
 Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



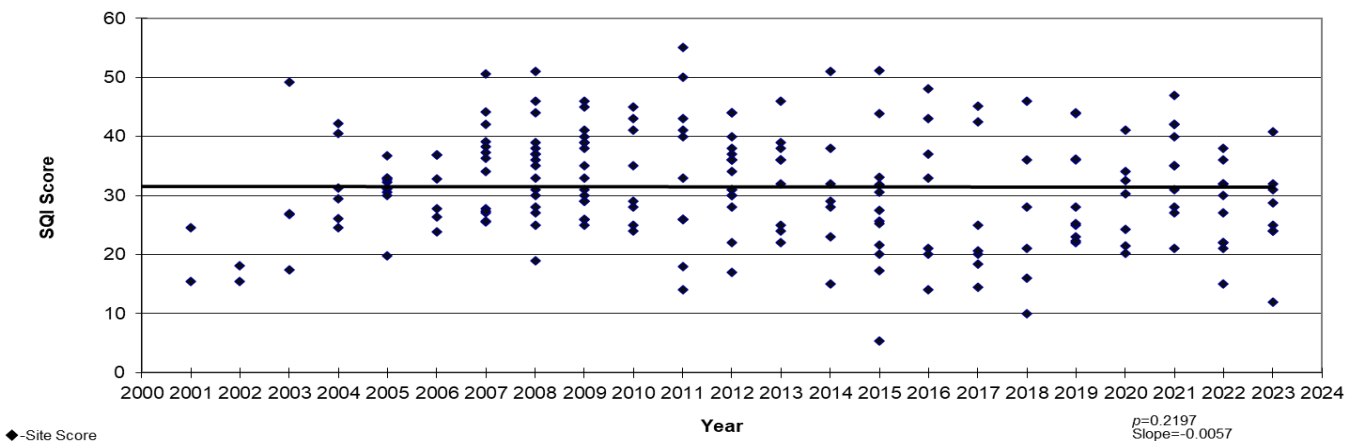
Middle



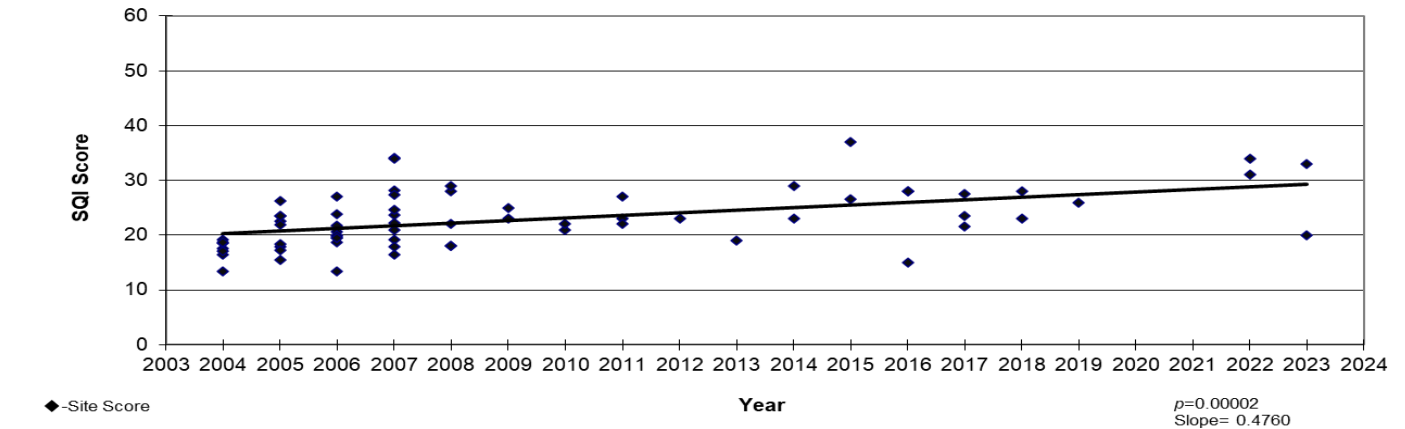
Tonquish Creek
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



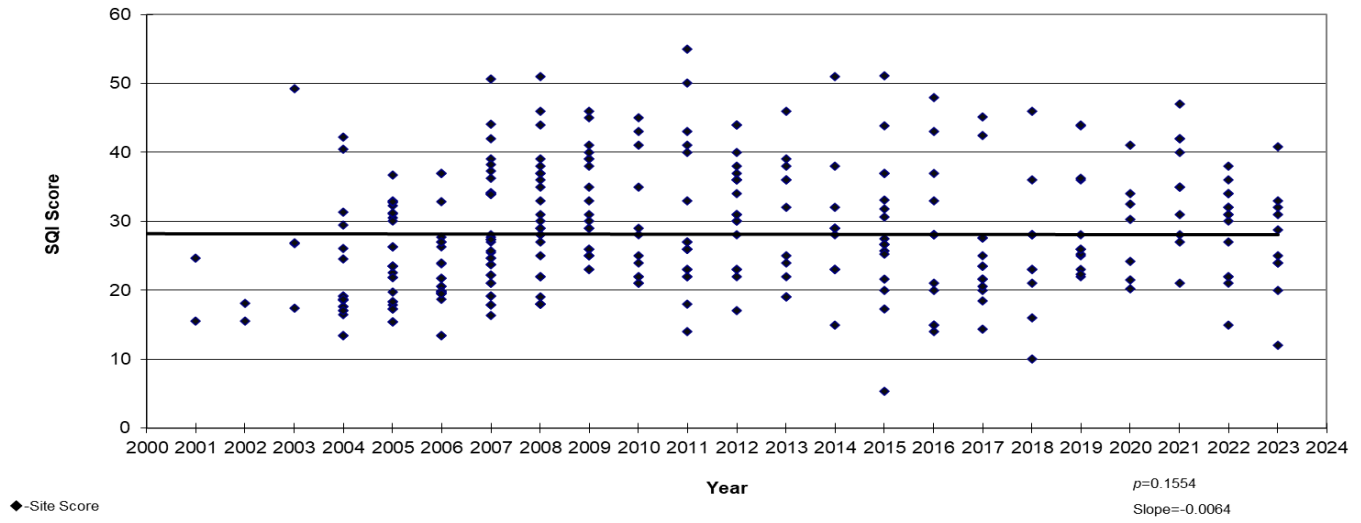
Rouge Middle 1 Stormwater Management Area
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



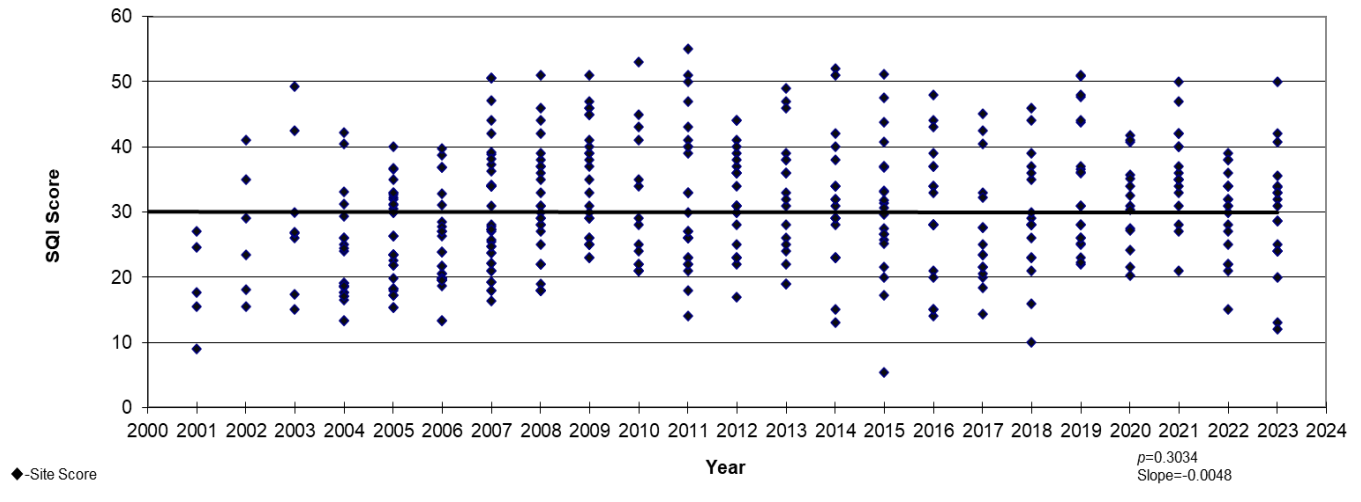
Rouge Middle 3 Storm Water Management Area
Macroinvertebrate Data Trend
Fall 2004-2023 All sites (Wayne County and Friends of the Rouge Data)



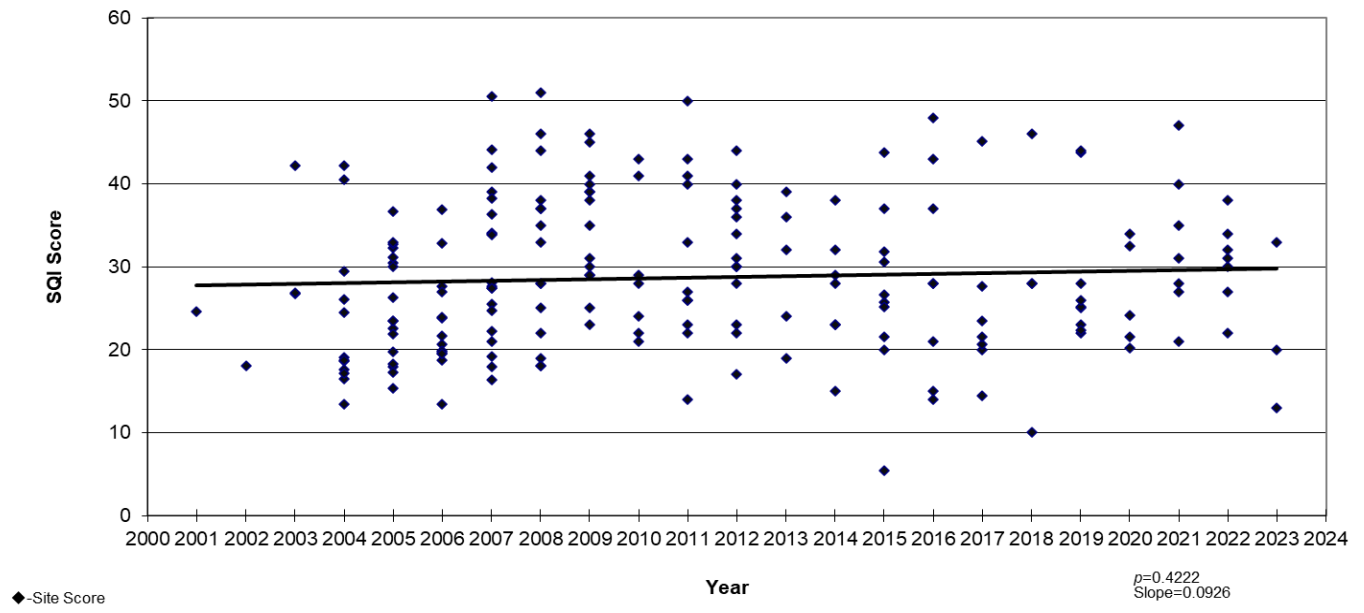
Rouge Middle Branch
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



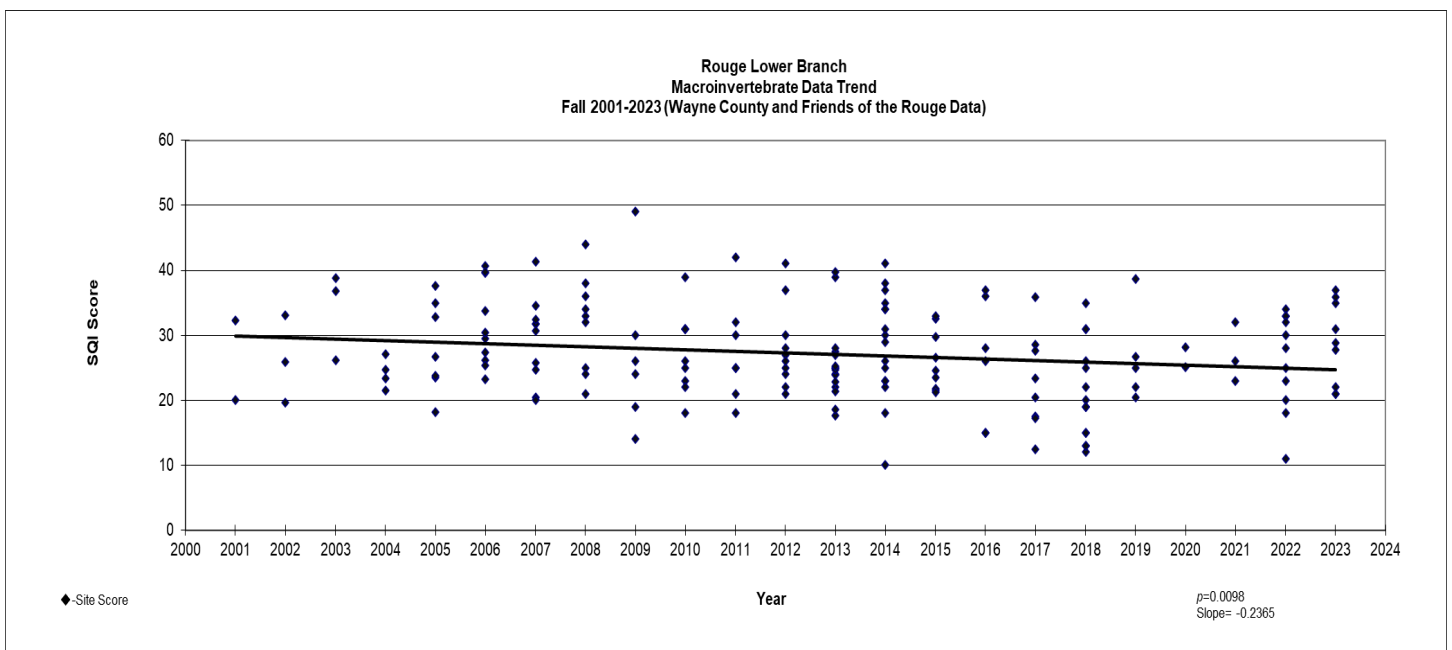
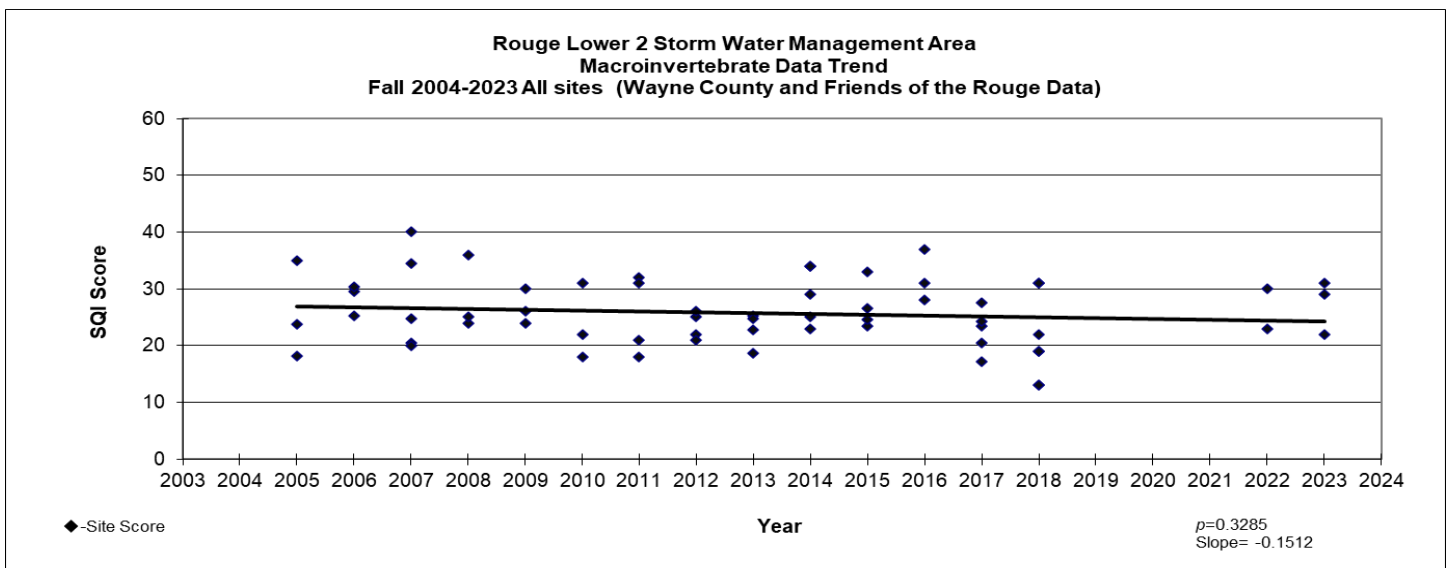
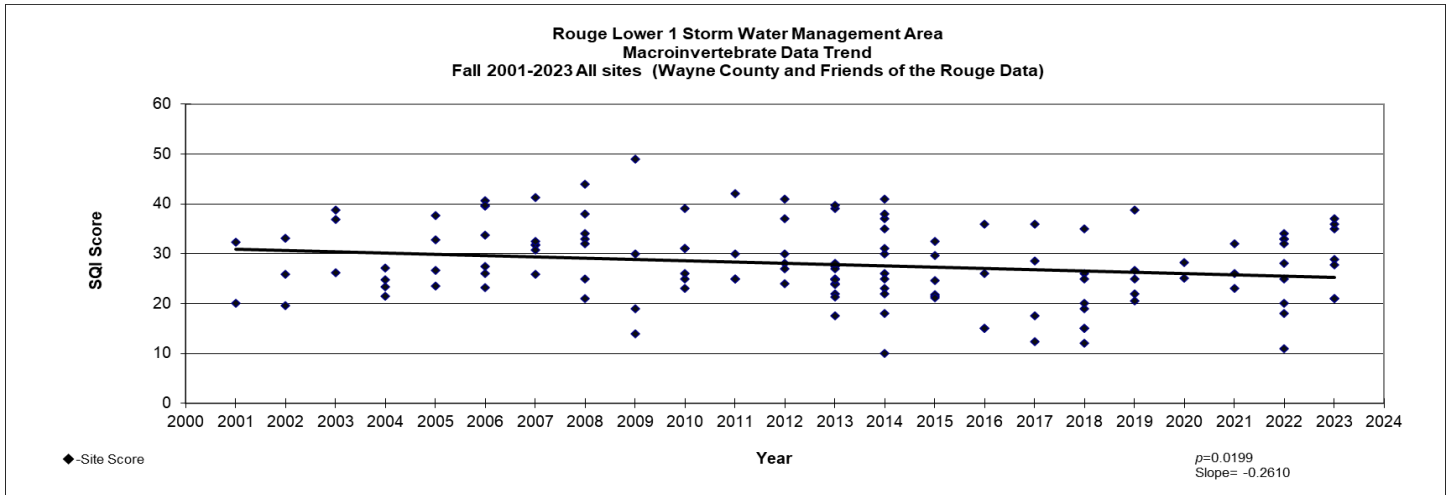
Rouge Middle Branch and Johnson Creek
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



Middle Rouge without Tonquish Creek
Macroinvertebrate Data Trend
Fall 2001-2023 All Sites (Wayne County and Friends of the Rouge Data)



Lower



All Sites

