Friends of the ROUGE
www.therouge.org
4901 Evergreen Rd,KM Bldg
Dearborn, MI 48128
(313) 792-9621

Rouge River Benthic Macroinvertebrate Monitoring Program Fall 2014 Report

This report contains benthic macroinvertebrate sampling results from 53 Rouge tributary and river sites. The Fall Bug Hunt on October 25 had 100 participants. There were 15 teams that sampled 29 sites that day. Additionally, this report includes data from additional FOTR sampling, one site sampled by Schoolcraft College students, five sites sampled by Sue Thompson and 16 sites sampled by Wayne County DPS.

Overall Scores

Of the 53 sites sampled this fall, the average score was 29, in the FAIR range for the Stream Quality Index (SQI) (map p. 4, Table 3). Two sites had an EXCELLENT SQI: John8 and Ton1. Fifteen sites scored GOOD; 30 sites were FAIR and six sites were POOR. The number of taxa found at sites was highest at John6 and John8 (20), and lowest at Fel4 (4).

Some mayflies, stoneflies and/or caddisflies (EPT, see box) were found at all but four sites. The Johnson Creek and Ton1 had the highest number of these families (5 at MR-27, 4 at John8, MR-25 & Ton1). MR-27 is a new site on the Johnson Creek that Sue Thompson sampled, near Ridge and Seven Mile.

Seven sites had sensitive families. Pronggill mayflies (Leptophlebiidae) were found in the Johnson Creek (John8, MR-22 and MR-27) and Fowl1. Net-tube (Psychomyiidae) caddisflies were found at Low3 and Fowl1. Saddle case-maker caddisflies (Glossosomatidae) were found at John5. Dobsonfly larvae (Corydalidae) were found at Sprag.

Understanding Benthic Scores

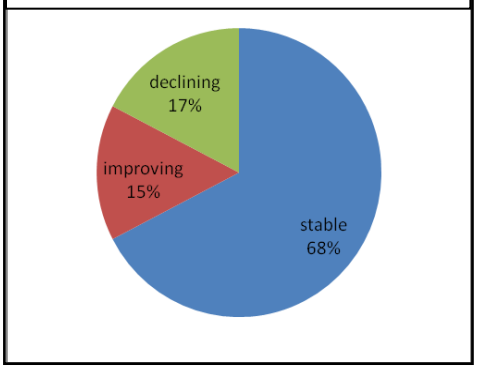
Each site is given a **Stream Quality Index** (**SQI**) which is determined by weighting each type and number of organisms found by their sensitivity ratings. A higher proportion of sensitive organisms such as mayflies and caddisflies results in a higher **SQI**. A greater number of different organisms also results in a high **SQI**. The **SQI** has four different levels: **>48=EXCELLENT, 34-48=GOOD, 19-33=FAIR, <19=POOR**.

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

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

Number of sensitive families refers to the number of families of insects that rate very sensitive on the Hilsenfhoff Biotic Index.

Chart 1: Macroinvertebrate Scores by Site



Forty-six sites had three years or more of past data. Of these, 68% were stable, 15% were improving and 17% were declining.

Long Term Trends

There is a lot of variability in the data due to seasonal fluctuations, conditions at the time of sampling, and volunteer effort. Fall data is only compared to fall data and spring data to spring data because different types of organisms are found in the two seasons. Once a site has been sampled every season for three years, a baseline can be established and comparisons made. Once there are a sufficient number of sites with three years of data on a branch, we are able to examine data trends by branch and make comparisons. The Johnson Creek is treated separately from the four branches and from the Middle branch where it is located because it is the only cold water stream in the Rouge River watershed and therefore has a different benthic macroinvertebrate community.

Table 1: Fall Bug Hunt Trend Summary 2001-2014

Branch	slope	p-value	R^2	scores increasing or decreasing?	Significant?
Lower	-0.27	0.35		decreasing	N
Lower	-0.13		0.11	decreasing	N
Middle	0.77	0.0003		increasing	**Y**
Middle	0.71		0.79	increasing	**Y**
Johnson Creek	0.64	0.03		increasing	**Y**
Johnson Creek	1.24		0.64	increasing	**Y**
Main	-0.45	0.04		decreasing	**Y**
Main	-0.65		0.79	decreasing	**Y**
Upper	-0.42	0.03		decreasing	**Y**
Upper	-0.34		0.61	decreasing	**Y**

There are several different ways to compare data trends for the branches and Johnson Creek. We have used two different methods. One is to plot the scores each fall and test whether the slope of a best fit line explains the data. The lower the p-value, the more likely the slope (trend) is significant and a p-value of 0.05 or less is considered significant. The second method is to plot the average over three years on a rolling basis and test whether there is a correlation between the three year rolling average scores over time. The closer the R^2 is to 1.00, the more likely the trend is significant and R^2 values of 0.50 and above are considered significant.

The two methods agreed on the trends and whether they are significant (Table 1). The Lower Branch was the only one without a significant trend. It had a slight negative slope (-0.27, -0.13) but it was not significant (p=0.35 and R^2=0.11). The Middle Branch and Johnson Creek had significant positive slopes, indicating an improving trend in scores. Both the Main branch and the Upper Branch had significant negative slopes. Plots for each branch and the Johnson Creek are on p. 7-9.

Individual sites were also examined for long term trends. Of the sites with sufficient data sampled in Fall 2014, only two had significant trends and they were both negative: Up2 (-1.4) and Fel4 (-2.4).

Table 2: Trend Summary 2001-2014 by site

Site	slope	*p*-value	True trend
Up2	-1.4146	0.0303	yes, negative
Fel4	-2.4103	0.0199	yes, negative

Range Extensions of the Tube-Making Caddisfly and Saddle Case Maker Caddisfly in the Rouge River Watershed
By Bruce McCulloch, FOTR Biologist

In the 2012 Fall Bug Hunt Report, I reported the first documented record of the tube-making caddisfly (*Lype diversa*, Family Psychomyiidae) in the Rouge River watershed. The specimen came from the Middle Branch at the Northville Recreation Area (MR-1). Two years later, *Lype diversa* was collected at two sites in the Lower Branch; Fowler Creek at Prospect and Cherry Hill Roads, (Fowl1); and Lower Rouge at Gotfredson Road (Low3). The SQI scores for the two sites were 38 and 41. Could this sensitive species have occurred at these sites before now and gone undetected? Possibly. These caddisflies reach only 10 mm (0.4 in) in total length, and do not build cases, thus making them more of a challenge to see. Low3 is a recently added site, with only two fall samples undertaken. Fowl1, however, has been sampled often enough and produced high quality results, that, at least I would like to think, these caddisflies are indeed new to the Rouge in the last few years. Their appearance, hopefully, is a sign of improved water quality in the watershed.

Additional good news this fall came in the form of *Glossosoma nigrior* (Family Glossosomatidae), which was collected at John5 (Johnson Creek at Fish Hatchery Park). *G. nigrior* is considered very sensitive, and has been assigned a value of 0 on the Hilsenhoff Biotic Index (HBI), which is a measure of tolerance or sensitivity to nutrient pollution measured at the genus or species level (Hilsenhoff 1987). This is a 0-10 index, with 10 assigned to the most tolerant organisms. John5 had a SQI score of 40 (a "Good" ranking), which is above its average of 32. Collection of a Glossosomatid this spring in Seeley Creek, as well as other recent records, suggest that their range is expanding as well.

Glossosomatids live in cool running water where they scrape periphyton, diatoms, and fine organic particles from the upper surfaces of rocks (Wiggins 2004). A unique characteristic of the family is the basal half of the anal proleg being fused with the abdomen. Only the pronotum is sclerotinized (plated), and prominent prosternal sclerites are also present (Wiggins 2004).

Glossosomatid caddisflies (Saddle Case Makers) get their name from the dome-shaped cases they construct with rock fragments. Spaces between these fragments allow water current for respiration. The case is fully enclosed except for two openings to accommodate the front and rear ends of the larva. This creates a plastron-like bottom to the case, similar to a tortoise (Wiggins 2004). The larva can reverse position within the case to graze from either end. Because the case is not designed to be incrementally enlarged as the larva grows, it must be rebuilt at each instar stage. This involves building the larger case at the end of the existing case, then severing it from the old one (Bohle and Fischer 1983 in Wiggins 2004).

Given the history of the Rouge River watershed, it is truly inspiring to continue to document range expansions of sensitive species of caddisflies.

Literature Cited

Hilsenhoff, W. L. 1987. An improved biotic index of organic stream pollution. Great Lakes Entomologist 20:31-39.

Wiggins, G.B. 2004. Caddisflies: The Underwater Architects. University of Toronto Press. Toronto, ON. 292 pp.

Lower Branch

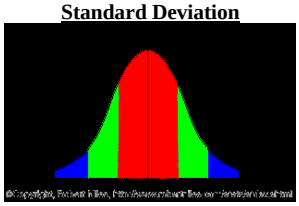
Seventeen sites were sampled on the Lower Branch of the Rouge (see Table 1). Two tributaries were sampled: Fellows Creek and Fowler Creek. Fellows Creek had four sites and Fowler Creek two. An additional eleven sites on the main branch of the Lower were sampled.

SQIs averaged FAIR (28). There were six GOOD, nine FAIR and two POOR. The six GOOD sites were Fel1, Fel5, Fowl1, Low3, LR-1 and LR-3. Fel2 and Fel4 had the only POOR scores. Sensitive families were found at Fowl1 (prongill mayflies and net-tube caddisflies) and Low3 (net-tube caddisflies).

Thirteen sites had three or more years of data (Fig. 1 p. 6). Overall, the majority of sites were below average. One site (Fel2) was significantly above average while three sites were significantly below (Fel4, LR-12 and Low2).

Long term trend analysis showed no significant change in the scores for the Lower Branch since 2001 though the trend line slopes are negative.

Standard Deviation



Some sites have consistent scores where others vary greatly year to year. Standard deviation is a measure of how spread out your data is. 68% of your data will fall within one standard deviation of the mean (red areas shown above). On the Figures in this report, one standard deviation is represented by the vertical lines for each site. Standard deviation helps us to determine whether the current score is within normal for the site.

Middle Branch

Eighteen sites were sampled on the Middle Branch including Johnson and Tonquish Creeks and the Walled Lake drainage. SQI scores averaged 33-FAIR. There were: two EXCELLENT (John8 & Ton1), six GOOD, eight FAIR and two POOR (Wall1 & MR-26). Sensitive families were found at John8, MR-22 & MR-27 (pronggill mayflies), and at John5 (saddle case-maker caddisflies). One interesting vertebrate was found at Wall4 (Ford Field in Northvile) – a spiny softshell turtle (see photo at right).

Sixteen sites had three years or more of data (Figure 2). Of these, five were above a standard deviation of the mean (John5, MR-9, MR-13, MR-25 & Ton1) and one was below (Wall1).

In long term trend analysis, the Middle and Johnson Creek have positive trends in scores since 2001 and for the three year rolling average.

Main Branch

Eight sites on the Main Branch were sampled. Three tributaries were sampled: Franklin, Pebble and Sprague Creeks. SQIs averaged FAIR (31). There were two GOOD and six FAIR SQIs. The GOOD sites were Peb1 and Sprag. Sensitive families were found at Sprag (dobsonfly larvae-Corydalidae).

Seven sites on the Main had three or more years of data (Figure 3). One site (Main1) was below a standard deviation of the mean and one site was below (MN-4).

Long term trend analysis shows a significant negative trend for the Main using both methods.

Upper Branch

Ten Upper branch sites were sampled this fall, including the Bell, Seeley and Tarabusi Creeks. SQIs averaged 24-FAIR. One site was Good (UR-1), seven sites were Fair and two POOR (Bell3 & Up2) FAIR. No sensitive families were found in the Upper Branch.

All ten sites had three years or more of data (Figure 4). Three sites were below a standard deviation of the norm (Bell3, Up2 and Tar2).

Long term trend analysis shows a significant decline in scores since 2001 using both the rolling three year average method and plotting the scores.

THANK YOU!!!!!

Thank you to all the **volunteers** and **Team Leaders, Schoolcraft College** for hosting the event**,** professor **Diane O'Connell and the Geography Department** for **providing refreshments**, **Wayne County** for sampling and providing data for 16 sites, Sue Thompson for sampling an additional 5 sites, helping with training, identification, trend analysis and reviewing the report and to biologist **Bruce McCulloch** for identifying most of the specimens, SQI comparison graphs and reviewing the report, **University of Michigan-Dearborn** for providing a lab for identification night and the **Alliance of Rouge Communities** for partially funding the program.

Join us for the

Winter Stonefly Search

Saturday February 14, 2015

9 am – 3 pm at UM-D

Celebrate Valentine's Day with us by finding stoneflies looking for love

We are moving this event later in the year as we have learned that Rouge River stoneflies hatch later in winter than we thought

Register today at www.therouge.org (deadline Jan. 30, 2015)

2014 Fall Bug Hunt Stream Quality Index Scores

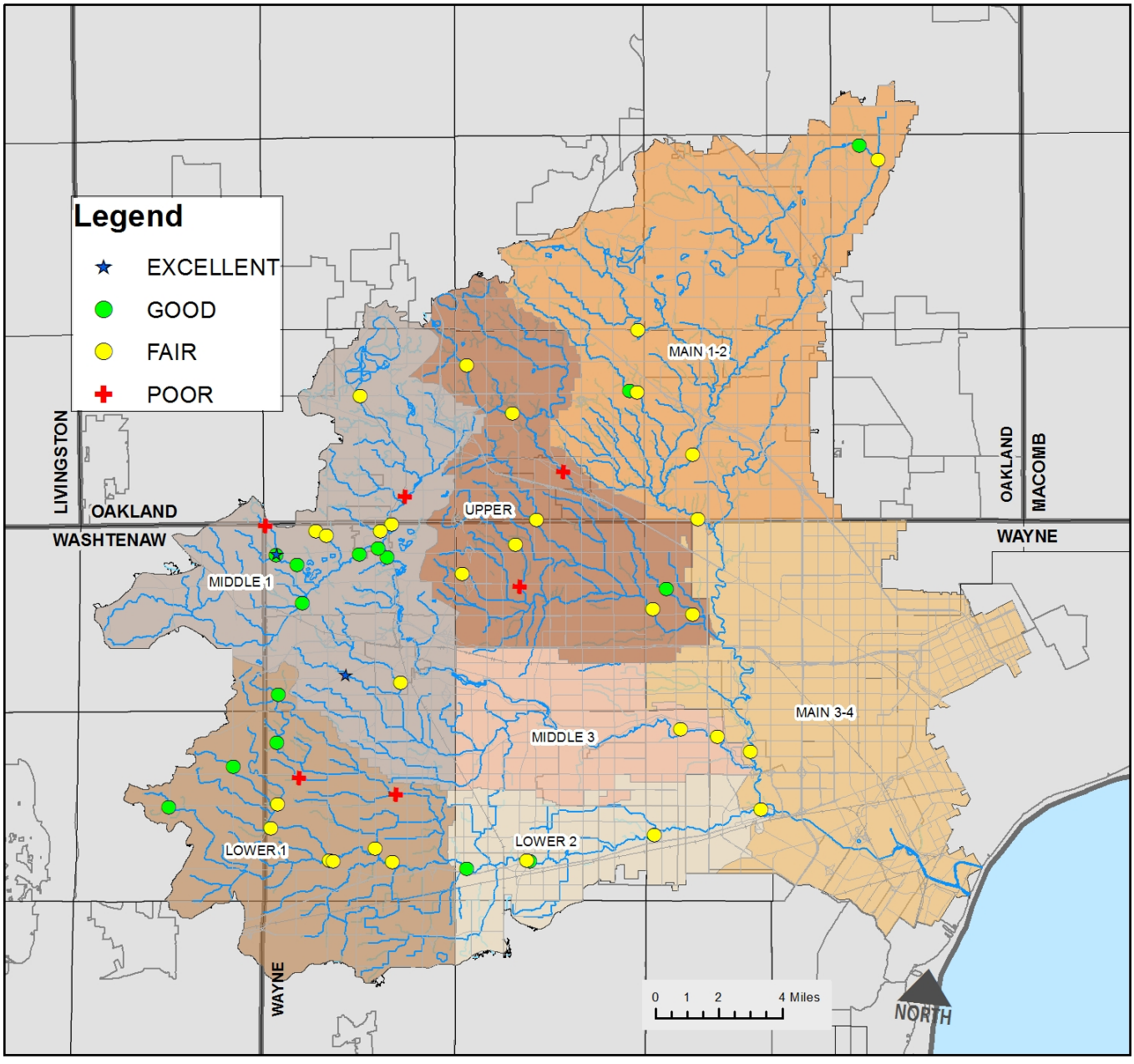


Table 3: 2014 Fall Bug Hunt Results							
FIELDID	**Stream Name**	**Location/Site Desc**	**SQI**	**Index**	**Taxa**	**EPT**	**Sensitive Family**
Lower Branch							
Fel1	Fellows Creek	Fellows Top of Hill	37	GOOD	16	2	
Fel2	Fellows Creek	Fellows Vintage Valley	18	POOR	8	0	
Fel4	Fellows Creek	Fellows Flodin Park	10	POOR	4	0	
Fel5	Fellows Creek	Fellows Warren Ridge	35	GOOD	18	3	
Fowl1	Fowler Creek	Fowler Prospect	38	GOOD	13	3	Leptophlebiidae, Psychomyiidae
Fowl2	Fowler Creek	Fowler Beck	26	FAIR	9	2	
Low2	Lower Rouge	Lower Cherry Hill	23	FAIR	8	1	
Low3	Lower Rouge	Lower Gotfredson Rd	41	GOOD	12	3	Psychomyiidae
Low4	Lower Rouge	Lower Sheldon Rd	22	FAIR	9	2	
LR-1	Lower Rouge	Lower Commerce Ct	34	GOOD	16	3	
LR-10	Lower Rouge	Lower John Daly	23	FAIR	11	2	
LR-11A	Lower Rouge	Lower Brady east	29	FAIR	9	2	
LR-12	Lower Rouge	Lower Morton Taylor	30	FAIR	12	2	
LR-2	Lower Rouge	Lower WTUA	31	FAIR	12	1	
LR-3	Lower Rouge	Lower Goudy Park	34	GOOD	13	2	
LR-6	Lower Rouge	Lower Wayne WDM	25	FAIR	8	2	
LR-8	Lower Rouge	Lower Ridge Proctor	25	FAIR	14	1	
Middle Branch							
John5	Johnson Creek	JC Fish Hatchery Park	40	GOOD	11	3	Glossosomatidae
John6	Johnson Creek	JC Hines	42	GOOD	20	3	
John7	Johnson Creek	JC Arcadia	34	GOOD	15	3	
John8	Johnson Creek	JC Maybury Angell	52	EXC	20	4	Leptophlebiidae
MR-22	Johnson Creek	JC Maybury south	34	GOOD	15	2	Leptophlebiidae
MR-23	Johnson Creek	JC Maybury north	31	FAIR	12	3	
MR-25	Johnson Creek	JC Maybury East	32	FAIR	12	4	
MR-26	Johnson Creek	JC Napier Rd	13	POOR	7	0	
MR-27	Johnson Creek	JC Ridge S of 7 Mile	39	GOOD	18	5	Leptophlebiidae
Mid1	Middle Rouge	Middle Northville Rec	38	GOOD	19	3	
MR-13	Middle Rouge	Middle Warrendale	23	FAIR	12	3	
MR-9	Middle Rouge	Middle Wallaceville	29	FAIR	12	3	
MR-24	Tonquish Creek	Tonquish Lion's Park	29	FAIR	10	2	
Ton1	Tonquish Creek	Tonquish Plym Twp Pk	51	EXC	16	4	
Wall0	Walled Lk Drainage	WL Parm Cider Mill	23	FAIR	12	1	
Wall1	Walled Lk Drainage	WL Rotary Park	15	POOR	7	1	
Wall3	Walled Lk Drainage	WL 12 M	28	FAIR	11	1	
Wall4	Walled Lk Drainage	WL Ford Field	32	FAIR	12	1	
Main Branch							
Frank2	Franklin Creek	Franklin Ink Pump Sta	30	FAIR	12	2	
Sprag	Sprague Creek	Main Lloyd Stage	44	GOOD	16	2	Corydalidae
Peb1	Pebble Creek	Pebble Danvers Ct	38	GOOD	13	1	
Peb3	Pebble Creek	Pebble Danvers Dr	30	FAIR	12	2	
Main1	Main Rouge	Main FF Park	28	FAIR	16	3	
Main7	Main Rouge	Main 10 Mile	30	FAIR	12	3	
MN-5	Main Rouge	Main Bridge St	33	FAIR	15	3	
MN-4	Main Rouge	Main Parkland Park	20	FAIR	11	2	
Upper Branch							
Bell1	Bell Branch	Bell Bicentennial Park	22	FAIR	11	2	
Bell2	Bell Branch	Bell Schoolcraft Coll	30	FAIR	14	1	
Bell3	Bell Branch	Bell Livonia 6 M	11	POOR	6	0	
UR-2	Bell Branch	Upper Bell Creek Park	30	FAIR	12	3	
See2	Seeley Creek	Seeley Sleepy Hollow	24	FAIR	7	2	
See3	Seeley Creek	Seeley Kennedy Ct	24	FAIR	10	2	
Tar2	Tarabusi Creek	Tara 8 Mile	22	FAIR	9	2	
Up2	Upper Rouge	Upper Shiawassee Park	16	POOR	6	1	
UR-1	Upper Rouge	Upper Lola Valley	34	GOOD	15	3	
UR-4	Upper Rouge	Upper 5M Beech Daly	28	FAIR	13	3	

Figure 1- Lower Branch Mean SQIs

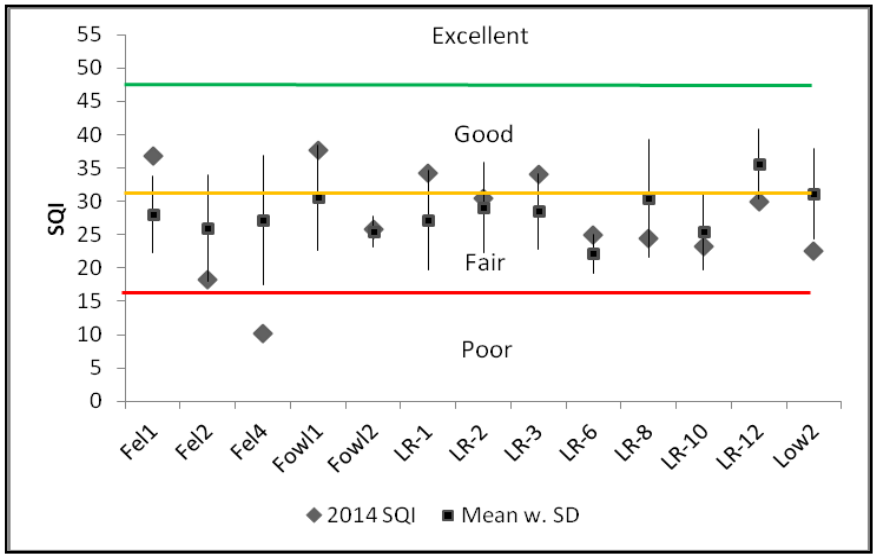


Figure 2- Middle Branch Mean SQIs

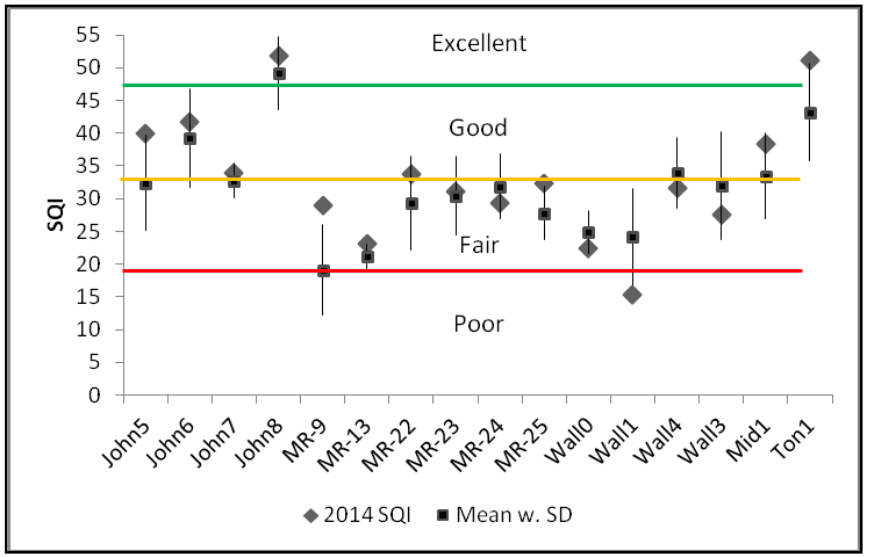


Figure 3- Main Branch Mean SQIs

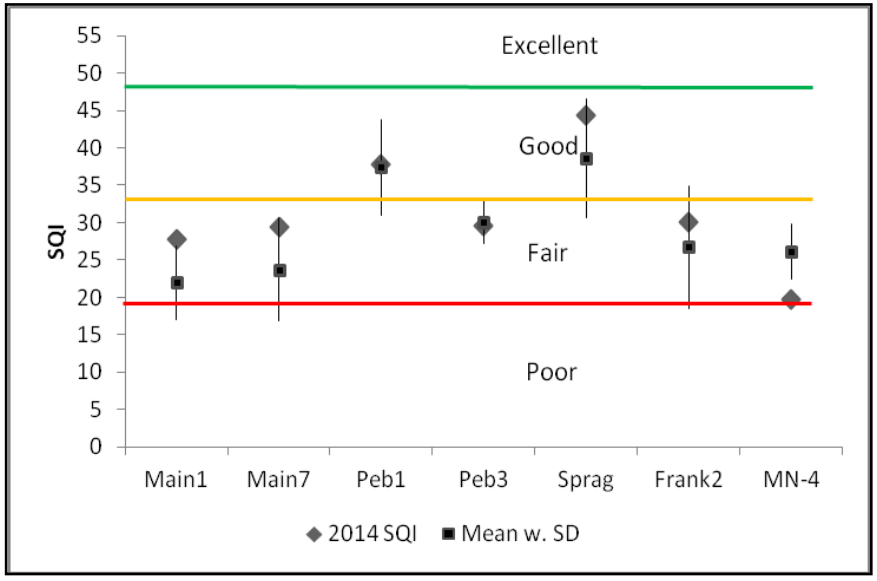


Figure 4 - Upper Branch Mean SQIs

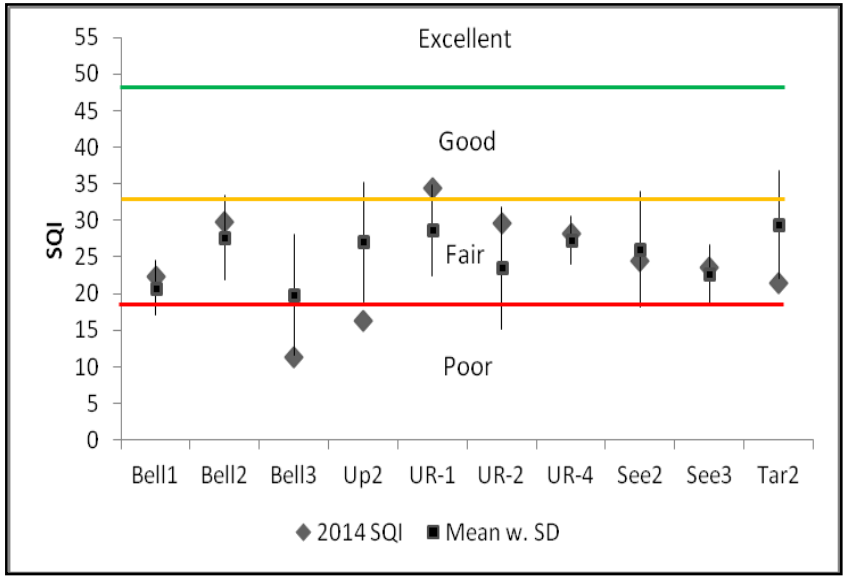


Figure 5- Lower Branch Mean SQIs

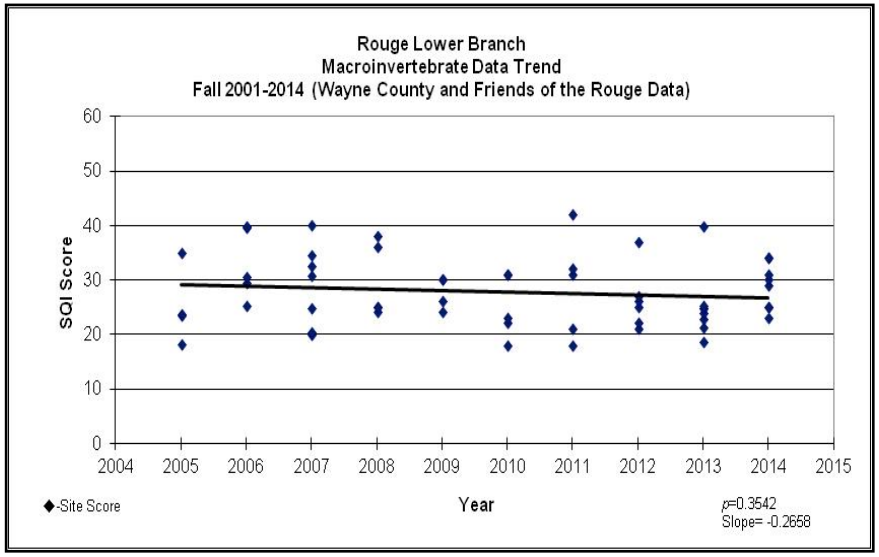


Figure 6- Lower Branch 3 Year Rolling Average SQIs

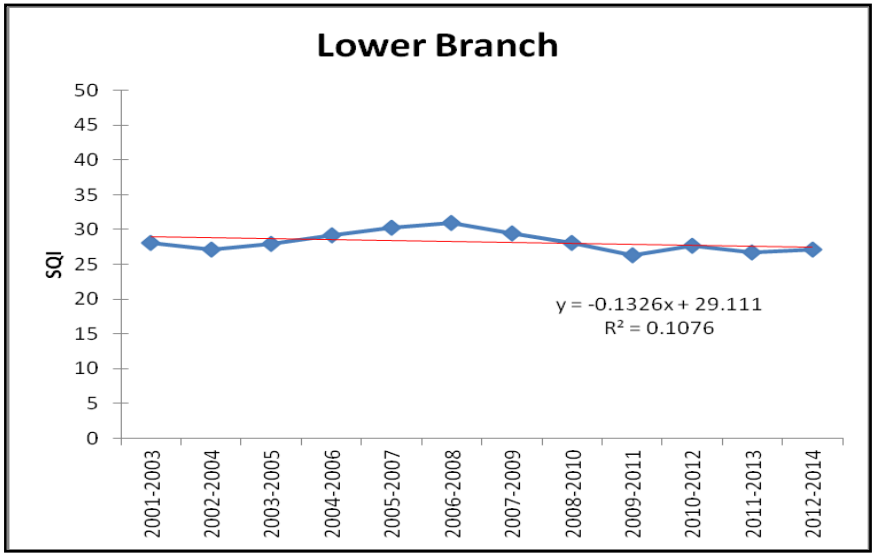


Figure 7- Middle Branch Mean SQIs

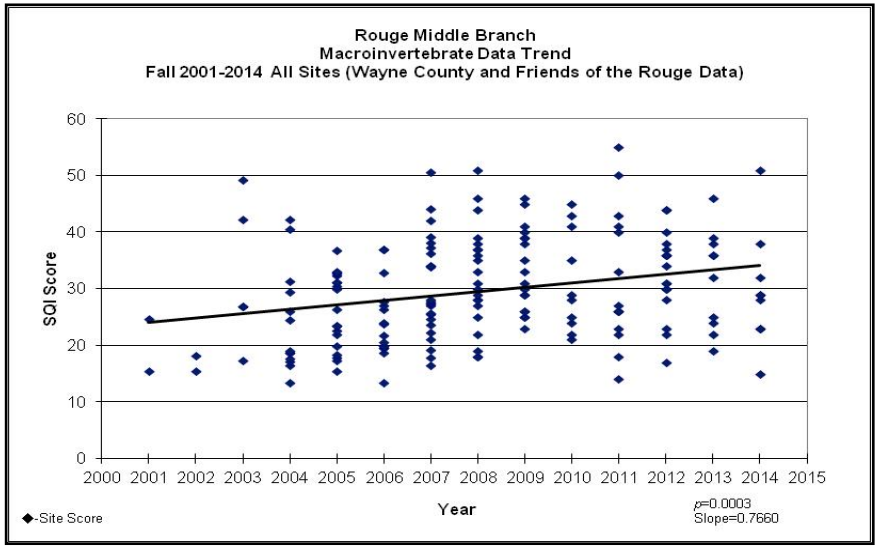


Figure 8- Middle Branch 3 Year Rolling Average SQIs

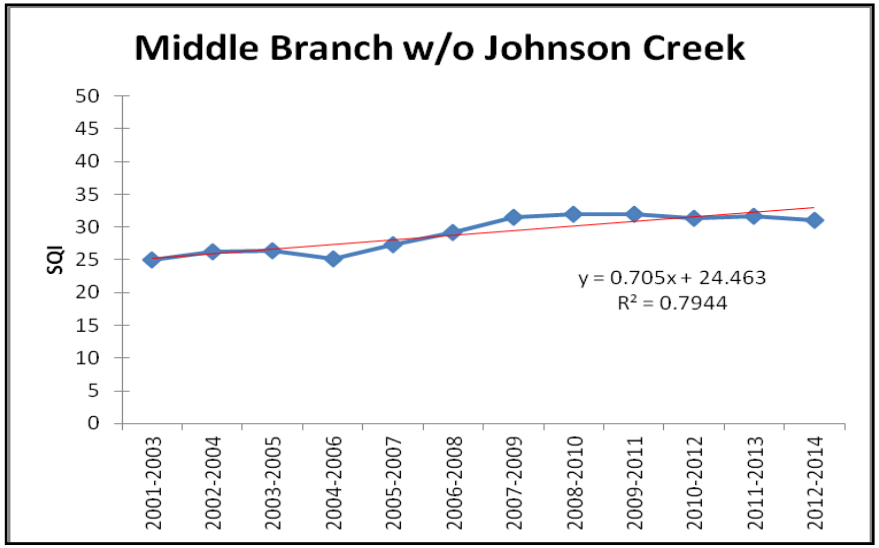


Figure 9 – Johnson Creek Mean SQIs

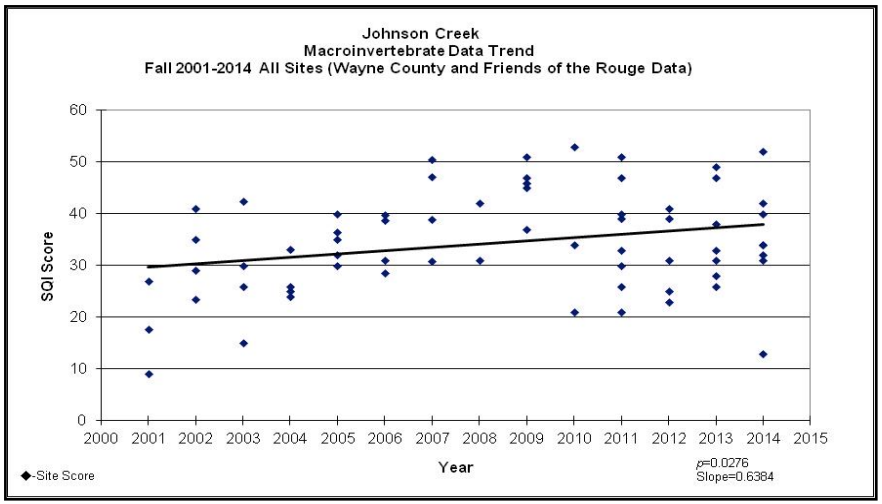


Figure 10 – Johnson Creek 3 Year Rolling Average SQIs

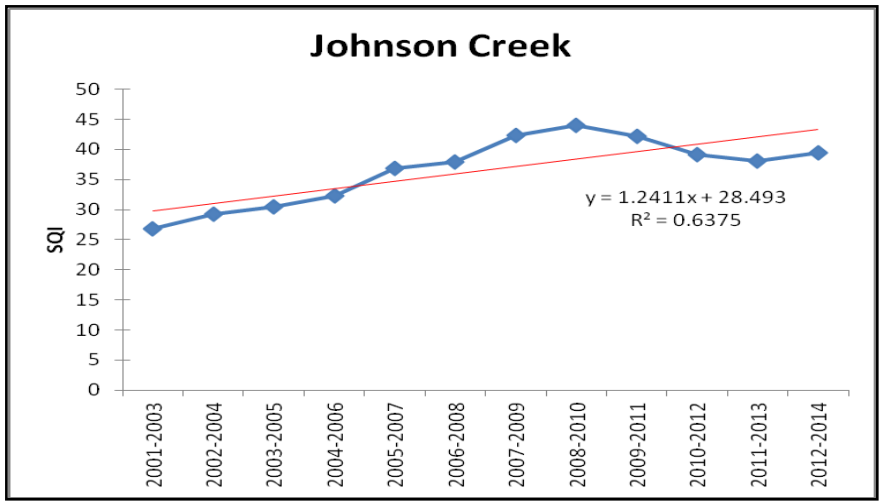


Figure 11 – Main Branch Meean SQIs

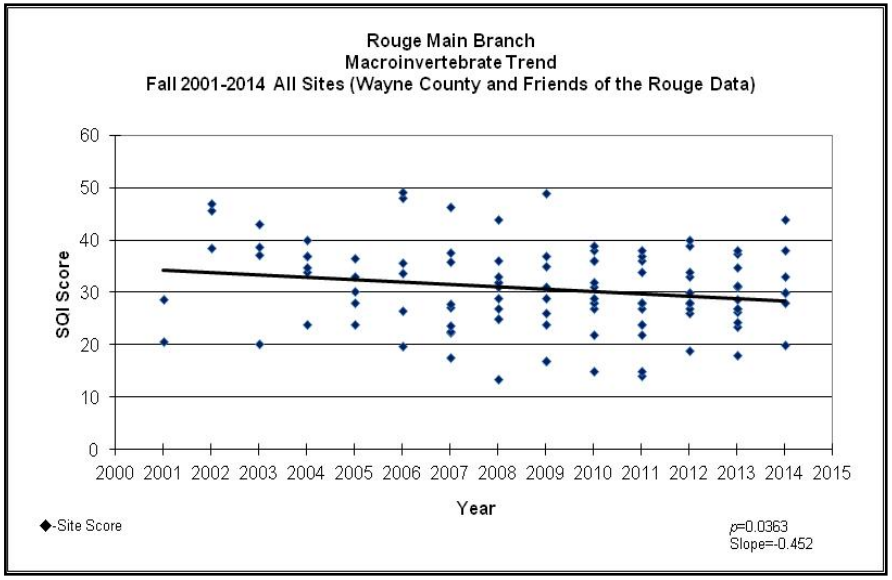


Figure 12 – Johnson Creek 3 Year Rolling Average SQIs

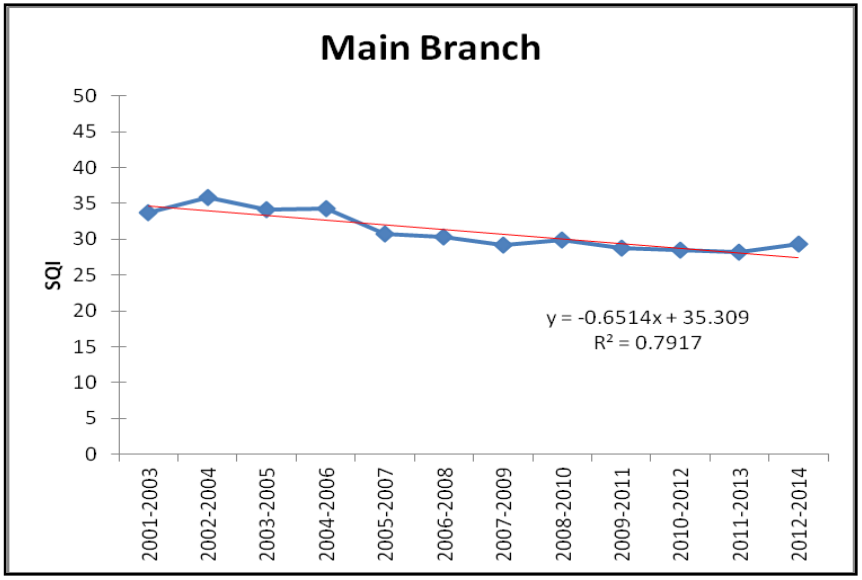


Figure 13 - Upper Branch Mean SQIs

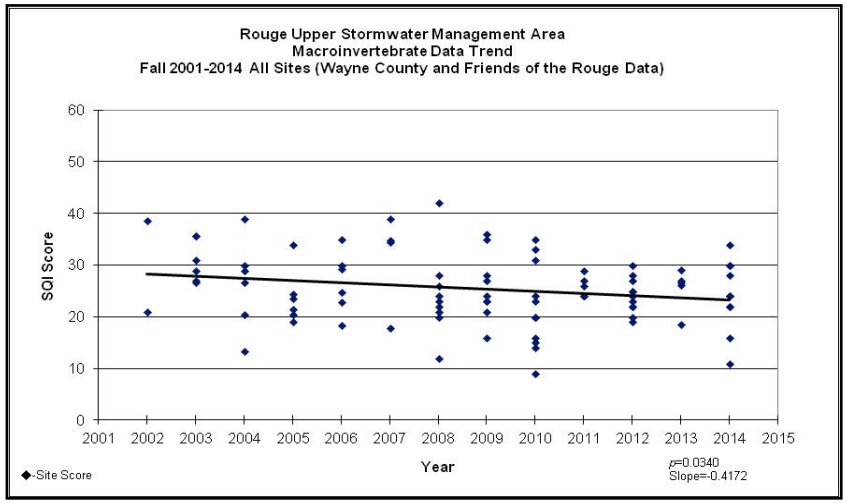


Figure 14 – Upper Branch 3 Year Rolling Average SQIs