2011 Stream Quality Monitoring Report

Columbia Run Stream Survey
Columbia Run Conservation Area

Report Compiled by: Marlo Perdicas
Natural Resources Management Department
Metro Parks, Serving Summit County
975 Treaty Line Road
Akron, OH 44313
(330) 865-8057

Introduction

The goal of the stream quality monitoring program in the Metro Parks is to identify pronounced stream quality problems and to gather information that will be useful in the long-term monitoring of the streams. The current methodology provides rapid means of assesment that can be accomplished by volunteers. The findings are produced on site within a short amount of time. If a problem is detected, further assesments can be made by Metro Parks staff.

Methods

Volunteers were trained in April 2011 for the stream monitoring program. The monitoring equipment, contained in a plastic bucket, consisted of a one meter square nylon mesh seine, plastic sheet (to place under seine while counting macro-invertebrates), hand lens or magnifying glass, thermometer, laminated macro-invertebrate identification guides, plastic spoons and brushes, forceps (for grasping macro-invertebrates), ruler, sorting tray, and a data sheet.

Stream assessments are conducted once per month from May through October, although the number of samples taken at each location varied according to the sampling team. Volunteers used the “kick seine technique” as described in the Ohio Division of Natural Areas and Preserves “Guide to Volunteer Stream Quality Monitoring” (see Appendix A). This technique is a simple, low cost means of sampling shallow riffle areas for macroinvertebrates. After organisms were collected in the seine, they were transferred to the sorting trays, identified, counted, and released. Participants use the instructions (Appendix B) to fill out the assessment form (Appendix C). A cumulative index value is calculated. The index value ranks the streams’ health at the time of monitoring as excellent, good, fair, or poor. Each volunteer monitored the stream site assigned to them during the stream quality training. There are a total of 26 sites currently in the stream program.

Results

Twenty-four sites were assigned for the 2011 season. However, information was only entered for twenty sites. Six surveys (once a month, May through October) is the recommended number of surveys to be completed. Of the twenty sites monitored, only 8 sites had 6 or more surveys completed. Four survey sites that were assigned were not monitored in 2011.

Sites were monitored this year at Goodyear Heights, Munroe Falls, Hampton Hills, Furnace Run, Sand Run, Silver Creek, Firestone, Liberty Park, O’Neil Woods and Cascade Valley Metro Parks, Clinton Towpath, Wetmore and Columbia Run Conservation Areas. Table 1 lists the minimum, maximum and average cummulative index values for each site surveyed. Standard deviation is also recorded. The

maximum assessment category given to each site during the season is also listed, along with the number of surveys completed.

Table 1. Stream Survey Site Scores for 2011.

Site Number	Number Samples Taken	Number Taxa Present	Minimum Index Value	Maximum Index Value	Average Index Value	Standard Deviation	Maximum Cumulative Index Value
ACR01	5	12	10.00	21.00	14.40	4.39	Good
ACV01	2	8	0.00	18.00	9.00	12.73	Good
ACV02	4	14	5.00	24.00	10.50	9.04	Excellent
AFR01	7	12	4.00	17.00	11.71	4.46	Good
AFR02	7	14	9.00	25.00	16.57	4.83	Excellent
AFR03	6	14	14.00	22.00	17.67	3.83	Good
AFR04	9	12	6.00	16.00	10.33	3.91	Fair
AFS01	5	11	8.00	15.00	11.20	2.86	Fair
AGH02	6	12	7.00	13.00	10.83	2.14	Fair
AHH01	7	9	1.00	11.00	5.14	4.22	Fair
AHH02	6	15	13.00	22.00	16.17	3.13	Good
ALP01	3	8	5.00	6.00	5.33	0.58	Poor
ALP02	1	2	7.00	7.00	7.00		Poor
AMF01	4	10	2.00	11.00	8.00	4.08	Fair
AMF02	3	6	6.00	12.00	8.33	3.21	Fair
AMFD1	4	5	7.00	10.00	8.75	1.26	Poor
AOW01	1	6	11.00	11.00	11.00		Fair
AOW03	1	3	6.00	6.00	6.00		Poor
ASC01	2	8	7.00	14.00	10.50	4.95	Fair
ASR01	1	2	9.00	9.00	9.00		Poor
ASR02	1	2	6.00	6.00	6.00		Poor
ASR03	1	3	6.00	6.00	6.00		Poor
ASR04	5	8	1.00	9.00	4.80	3.49	Poor
AVK01	6	14	10.00	24.00	17.00	4.47	Excellent

Figures 1-20 illustrate the average cumulative index values over time for each site surveyed in 2011. Many of the sites have been surveyed since 1994. Overall, ten sites

increased their average cumulative index value, eleven say a decrease and one site was surveyed for the first time in 2011. Accounts for each site are described below.

Columbia Run 1 was surveyed for the fourth season this year. It maximum assessment score was Good, down from its score of Excellent in 2011. Cascade Valley 1 scored a Good, on the rise from a low point in 2003. However, its average index value was 9, a score of Poor. Cascade Valley 2 slightly increased to Excellent, from its Good Assessment in 2009. During one survey event, it scored at 24, a score not often attained at any site within the program. We may be seeing effects of the efforts to improve water quality throughout the Cuyahoga River, including dam removals in nearby Kent and Munroe Falls.

Furnace Run 1 at Rock Creek saw a marked decrease this year. This is a flashy stream that has ranked Good in some years and Poor in others. This site received significant damage during numerous flash flood events in 2011.

Furnace Run 2 has also been on a gradual increase in the last 5 year, again scoring Excellent. Furnace Run 3 scored Excellent in its first year (2002) and declined to Fair by 2005. It leveled off in 2005 and has been on the rebound since, scoring Good in 2010 and 2011.

Furnace Run 4 is just downstream of the park where State Route 303 crosses the stream. It scored Fair this year, down from Excellent in 2010. This site too may have reaped the havoc of an exceptionally wet and stormy year.

Firestone 1 was the only stream site surveyed in Firestone Metro Park in 2011. The site saw a slight increase in average index value, but remained in the Fair category.

Goodyear Heights 2 was surveyed this year and scored Fair. Hampton Hills 1 just broke into the fair category with a maximum index value of 11. This stream has very nice substrate and therefore good stream bug habitat. However, it often has little or no water. This may have been a better year for this stream and the macro-invertebrates because of all the precipitation.

Hampton Hills 2 maintained a Good designation. This site is on Woodward Creek at the east end of the park.

Liberty Park 1 was surveyed for the first time in 2011 and received a Poor assessment. Liberty Park 2 was surveyed on one occasion by a staff biologist and also scored a Poor.

Munroe Falls 1 increased to Fair this year. Munroe Falls Dam fell to Poor in 2011.

O'Neil Woods 1 at Yellow Creek saw a slight increase and broke into the Fair category in 2011. O'Neil Woods 3 was surveyed by a staff biologist on one occasion and scored a Poor. This site has been difficult to survey due to lack of water at the site.

The average assessment score for Silver Creek 1 maintained is designation of Fair.

Sand Run 1 and 2 were surveyed by a staff biologist after these sites had been removed from the stream survey program for 4 years. They increased their average score, but remained in the Poor category.

Sand Run 3 and 4 fell into the Poor category in 2011. Wetmore Road Conservation Area (AVK1) scored an Excellent this year, but averages Good. It is a fine example to demonstrate the need to survey sites multiple times throughout the season, as it also received a score of Poor during this survey season.

This was a very wet year with several severe storm events. Volunteers continually had problems finding times of normal stream to conduct their surveys from month to month. Although several sites saw marked decreases in their assessment categories, it is very likely due to heavy rain events and flooding, showing the importance of this program as a long-term monitoring project.

Volunteers contributed 266 hours to the stream quality monitoring program in 2011. The stream quality monitoring program will continue in 2011.

Figure 1. Average stream quality index value for Columbia Run 1, Columbia Run Conservation Area, 2008-2011.

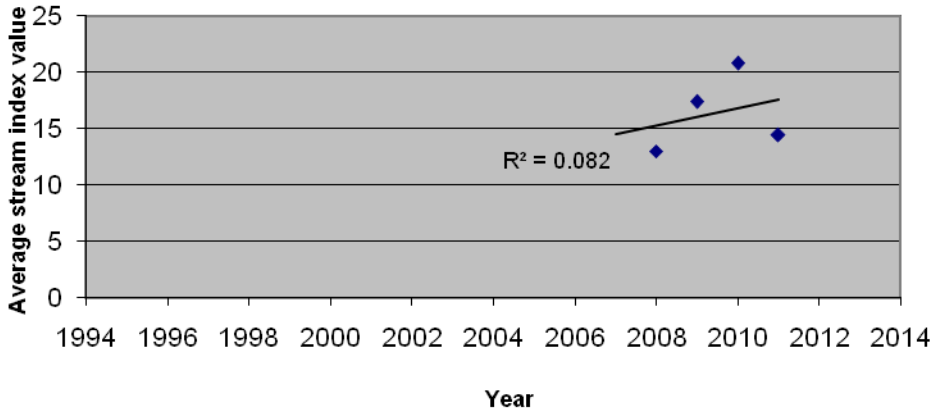


Figure 2. Average stream qulity index values for Cascade Valley 1, Cascade Valley Metro Park, 1994-2011.

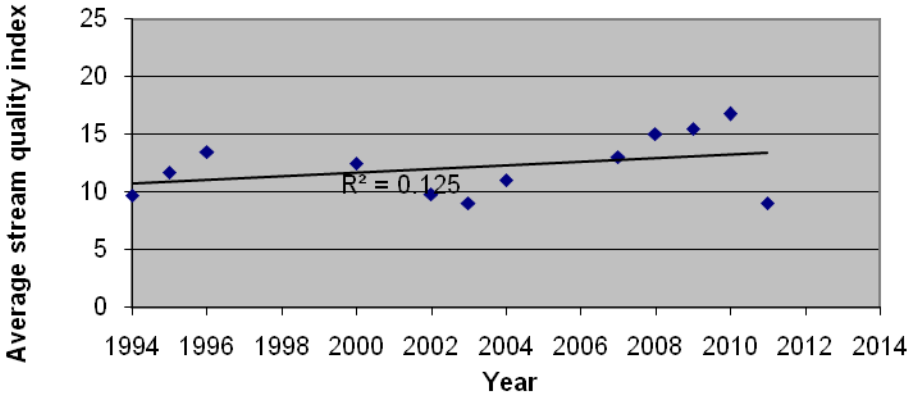


Figure 3. Average stream quality index values for Cascade Valley 2, Cascade Valley Metro Park, 2003-2011.

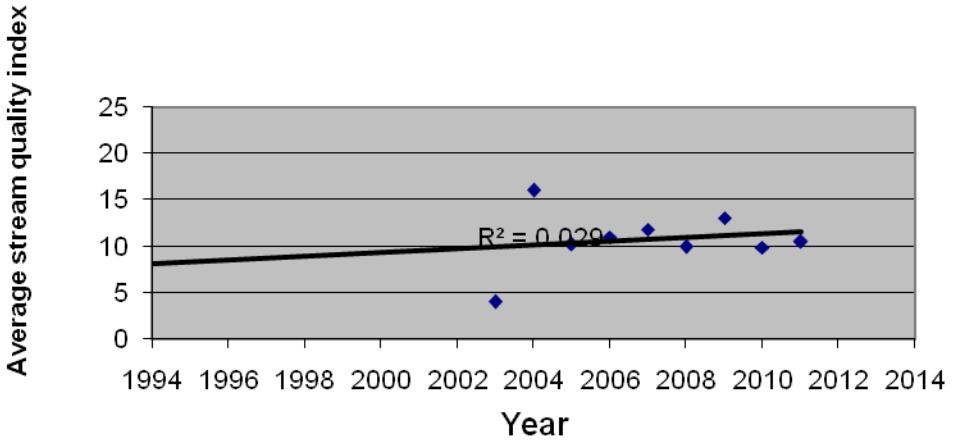


Figure 4. Average stream quality index values for Furnace Run 1, Furnace Run Metro Park, 1994-2011.

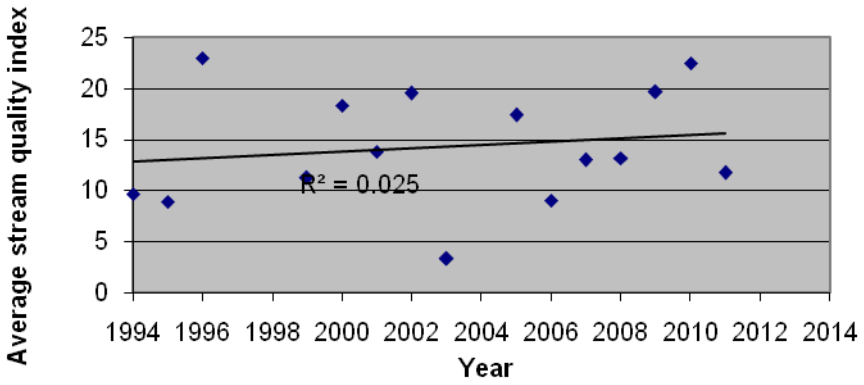


Figure 5. Average stream quality index values for Furnace Run 2, Buttonwood Trail Crossing, Furnace Run Metro Park, 1994-2011.

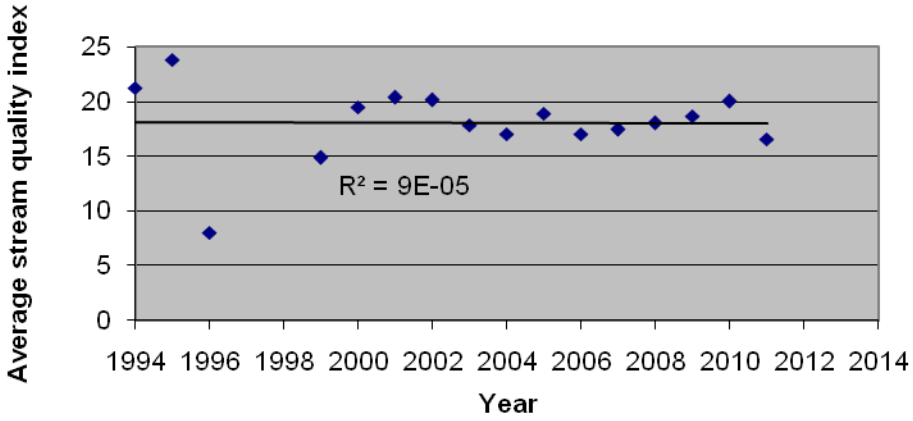


Figure 6. Average stream quality index value for Furnace Run 3, Furnace Run Metro Park, 1994-2011.

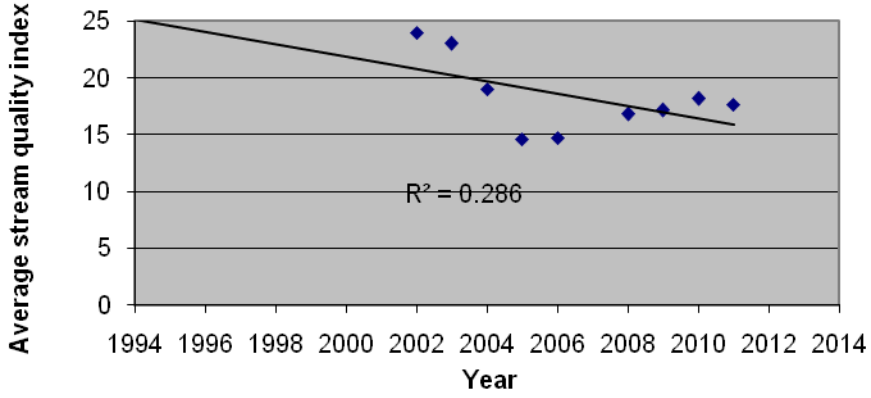


Figure 7. Average stream quality index value for Furnace Run 4, Furnace Run Metro Park, 2008-2010.

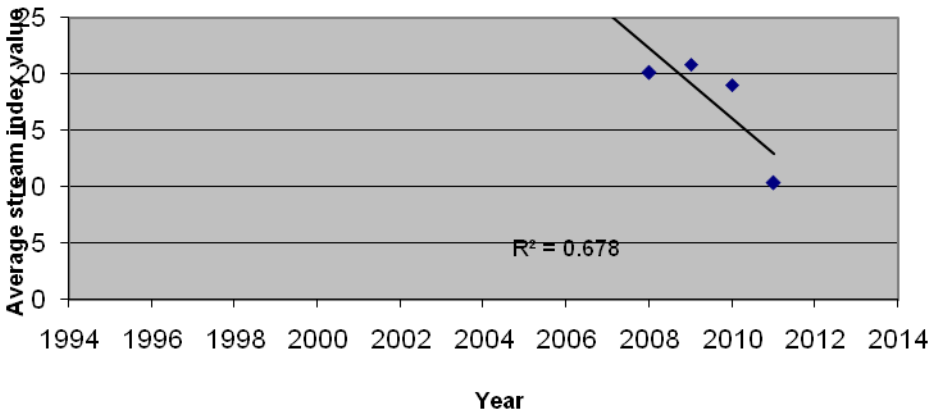


Figure 8. Average stream quality index values for Firestone 1, Firestone Metro Park, 2003-2011.

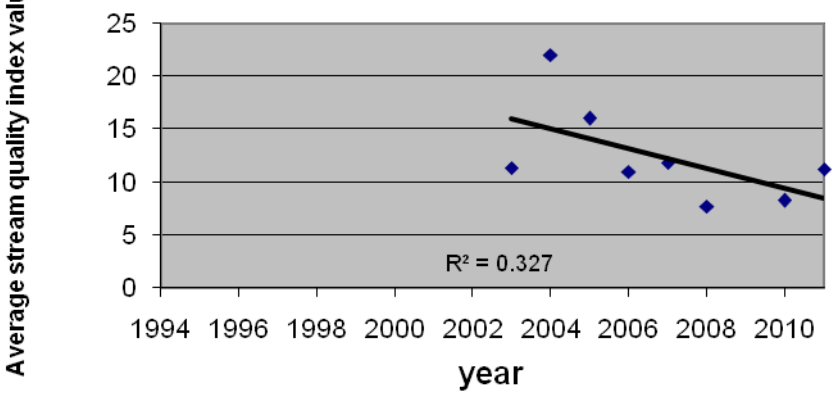


Figure 09. Average stream quality index values for Goodyear Heights 2, Goodyear Heights Metro Park, 1994-2010.

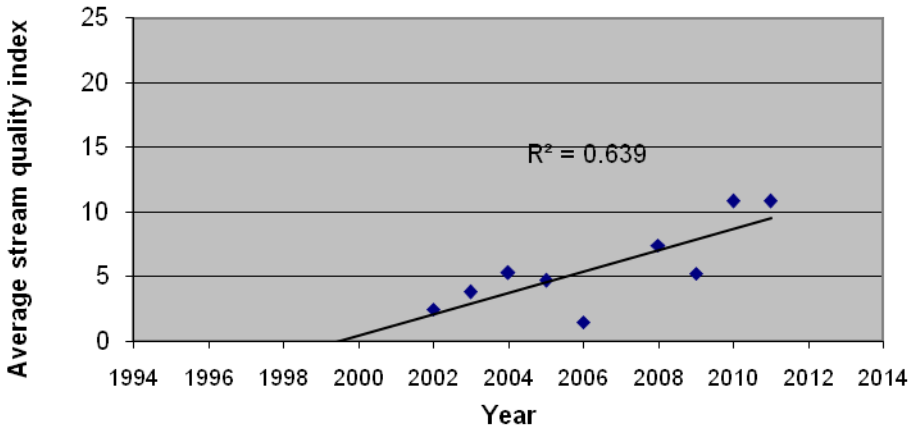


Figure 10. Average stream quality index values for Hampton Hills 1, Hampton Hills Metro Park, 1994-2011.

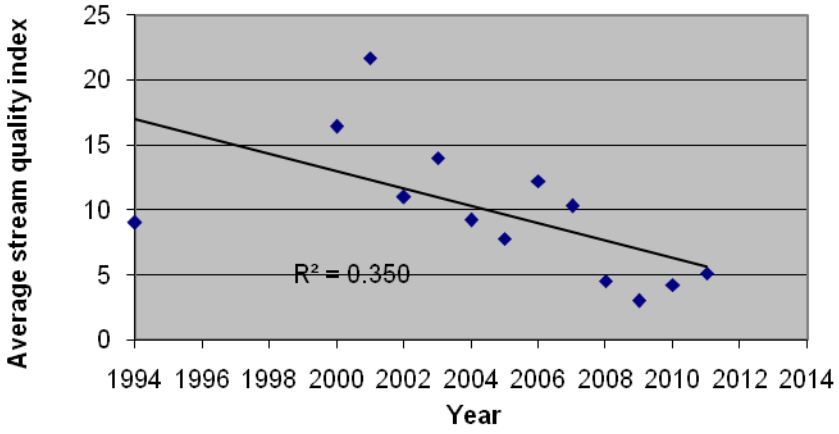


Figure 11. Average stream quality index value for Hampton Hills 2, Hampton Hills Metro Park, 2008-2010.

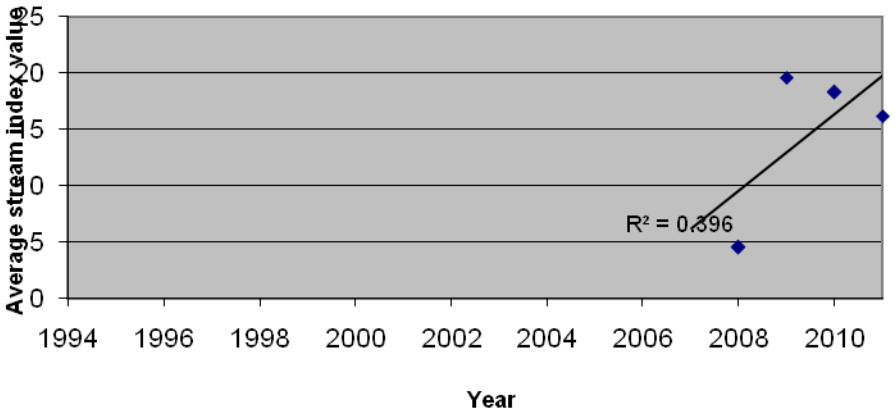


Figure 12. Average stream quality index value for Liberty Park 2, Liberty Park, 1994-2011.

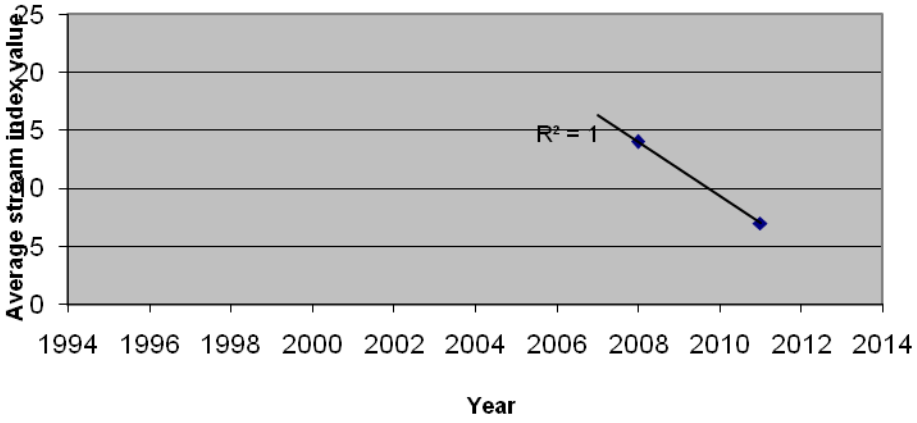


Figure 13. Average stream quality index values for Munroe Falls 1, Munroe Falls Metro Park, 1994-2011.

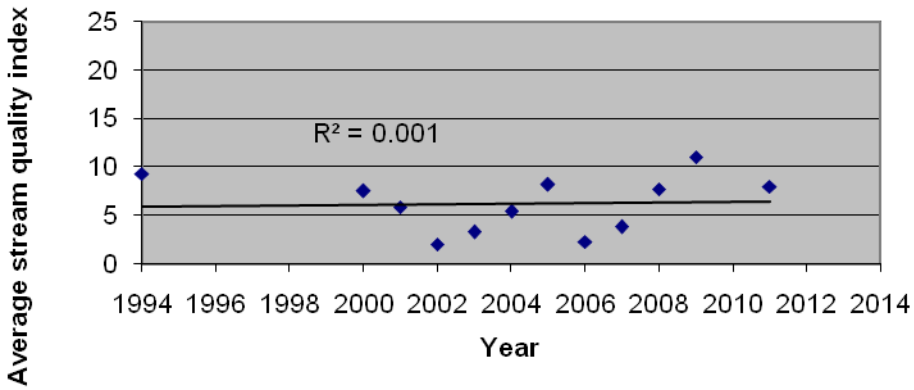


Figure 14. Average stream quality index values for Munroe Falls 2, Munroe Falls Metro Park, 1994-2011.

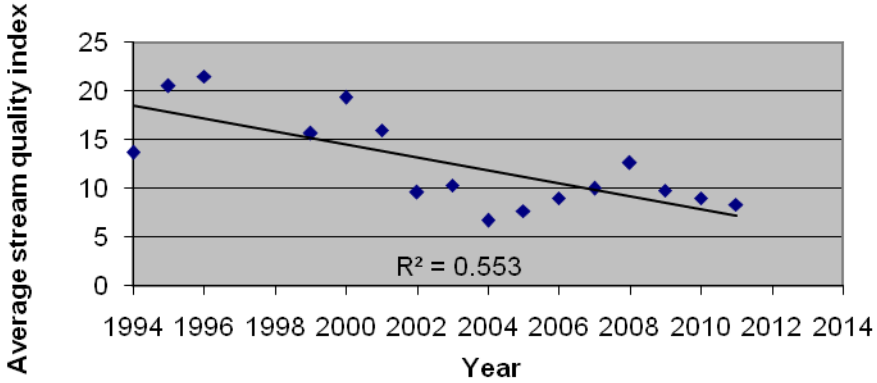


Figure 15. Average stream quality index values for Munroe Falls Dam 1, Bike and Hike Trail, 2005-2011.

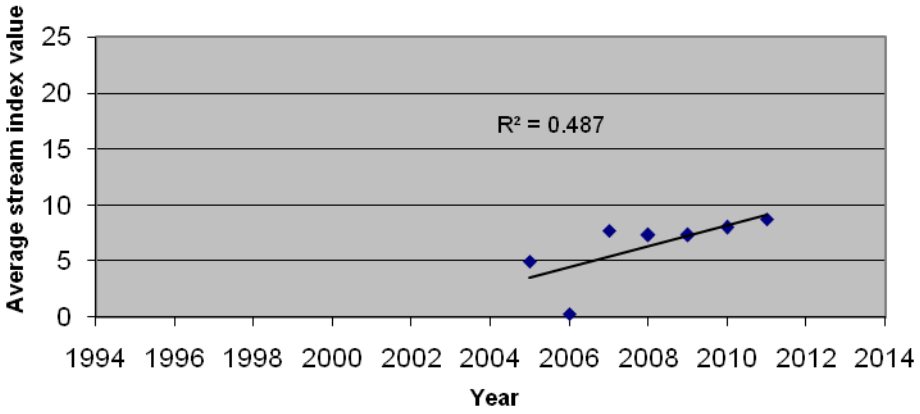


Figure 16. Average stream quality index values for O'Neil Woods 1, O'Neil Woods Metro Park, 1994-2011.

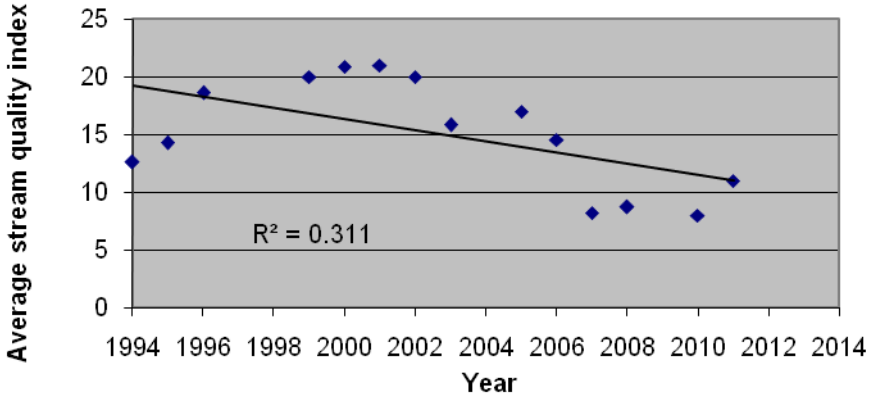


Figure 17. Average stream quality index value for O'Neil Woods 3, O'Neil Woods Metro Park, 2008-2009.

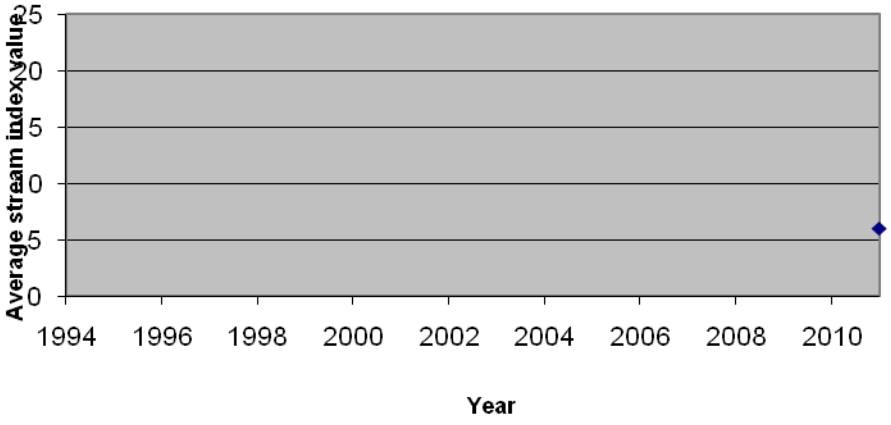


Figure 18. Average stream quality index values for Silver Creek 1, Silver Creek Metro Park, 1994-2011.

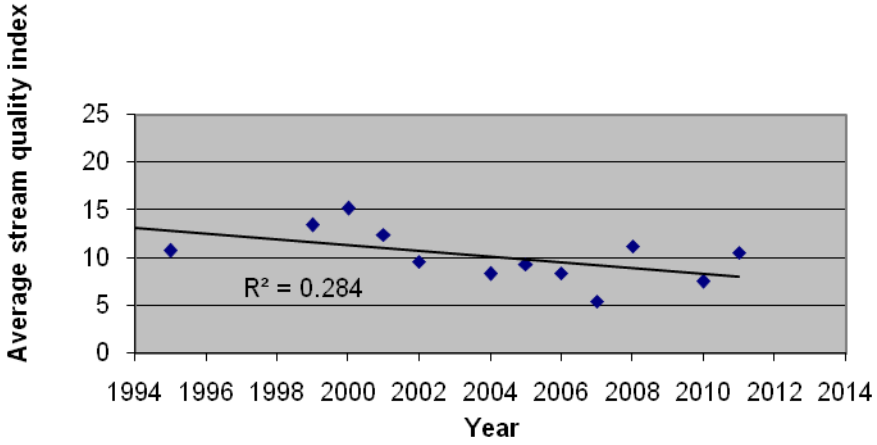


Figure 19. Average stream quality index values for Sand Run 1, Sand Run Metro Park, 1995-2011.

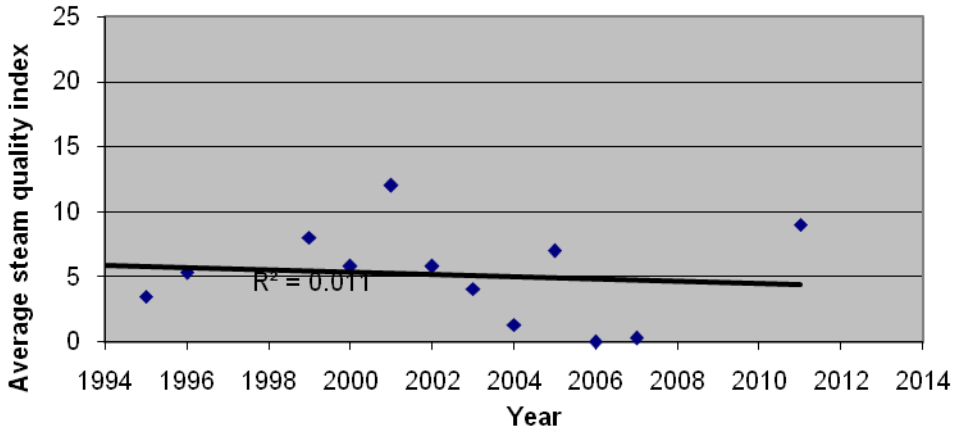


Figure 20. Average stream quality index value for Sand Run 2, Sand Run Metro Park 1994-2011.

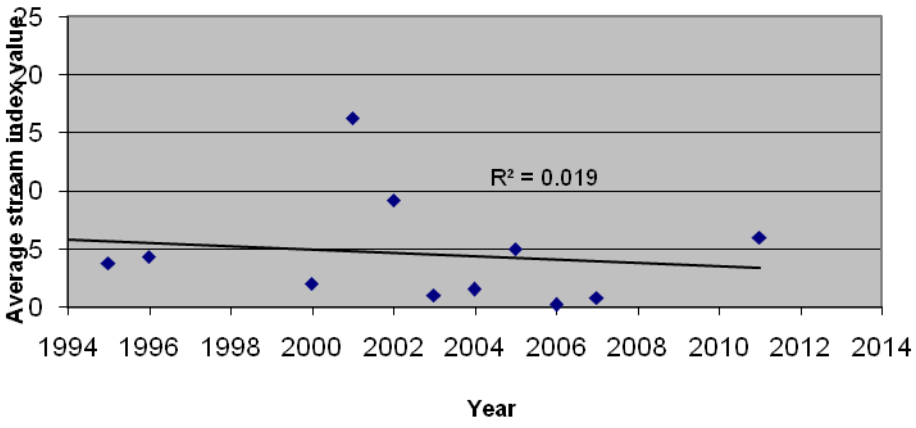


Figure 21. Average stream quality index values for Sand Run 3, Sand Run Metro Park, 1994-2011.

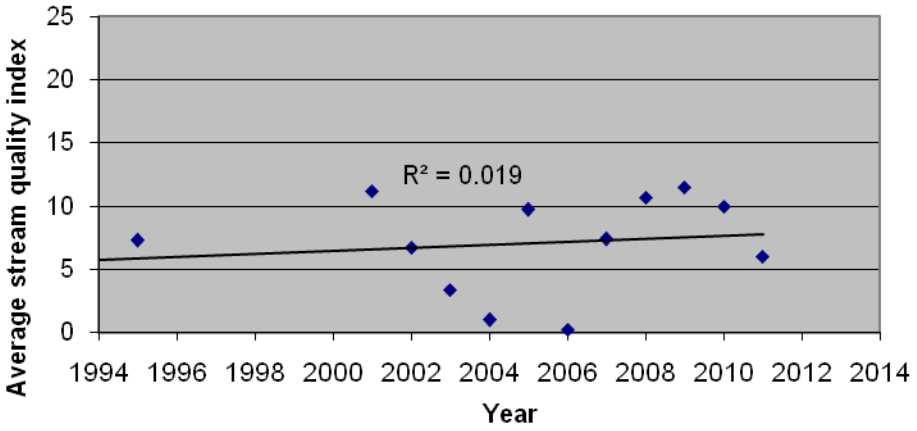


Figure 22. Average stream quality index value for Sand Run 4, Sand Run Metro Park, 2008-2011.

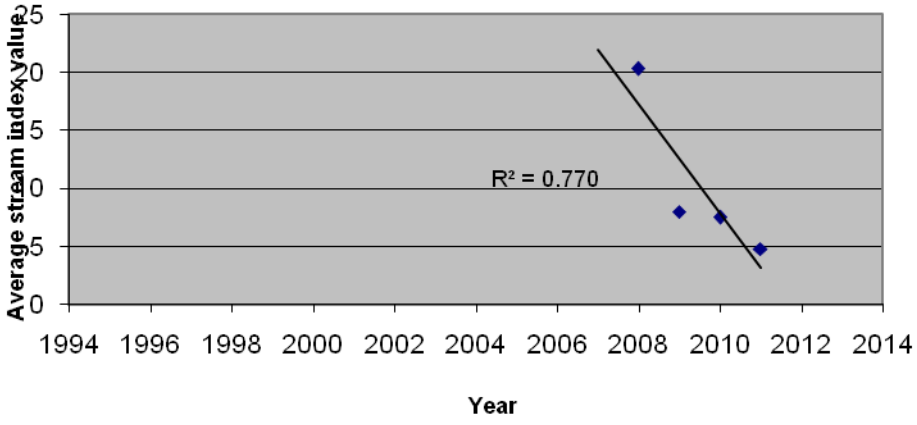
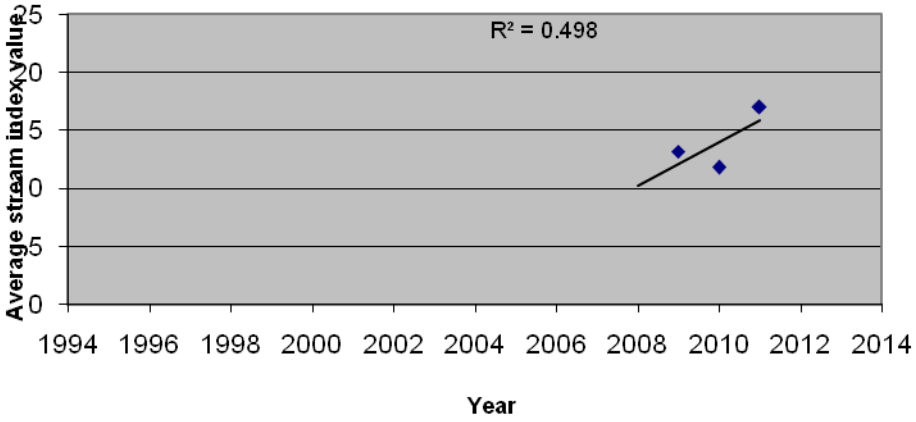


Figure 23. Average stream quality index value for Wetmore Conservation Area, 1994-2011.



Appendix A

KICK-SEINING TECHNIQUE

The kick-seining method is a simple procedure for collecting stream-dwelling macroinvertebrates. It is used in riffle areas where the majority of the organisms live. For stream quality assessment we examine the variety of macroinvertebrates in the collected sample.

The following is a detailed description of the kick-seining method. This technique can be quite effective in determining relative stream health. However, it is only as good as the sampler. Therefore, **please follow the procedures as closely as possible**.

SAMPLING PROCEDURE

1) Locate a "typical riffle". Such a riffle would have a stream bed uniformly composed of rocks, ranging in size from 10-inch cobbles down to ¼-inch gravel. The water will range in depth from approximately 2 inches to a foot, with a moderate swift flow. Avoid riffles located in an area of a stream that has been recently disturbed, such as any type of nearby construction.
2) Once the riffle has been located, select an area measuring 3 feet by 3 feet which is typical of the riffle as a whole. Avoid disturbing the stream bed above this area, so as not to alter the sample.
3) Prior to entering the stream, examine the net closely. Remove any organisms that might remain from the last time the net was used.
4) APPROACH THE SAMPLING AREA FROM DOWNSTREAM!
5) Have one person place the net at the downstream end of the sampling area. The net should be held perpendicular to the flow, but at a slight downstream angle. Stretch the net to approximately 3 feet, but be certain that the bottom edge is lying firmly against the bed. If water washes beneath or over the net you will lose organisms. You can place rocks along the bottom edge of the net to anchor it down.
6) Stand beside, not within the sampling area: place one foot at the upstream end of the area as a marker. Remove all stones and other objects 2 inches or more in diameter from the sampling area. Hold each one in front of the net and below the water surface as you brush or scrub all organisms from the rock surface. Before placing each rock outside the sampling area, examine the surface to be certain you have not missed any organisms.
7) When all materials, 2 inches or larger, have been brushed, step into the upstream end of the sampling area and kick the stream bed vigorously until you have disturbed the entire sampling area. Kick from the upstream end towards the net. Try to disturb the bed to a depth of at least 2 inches.
8) Once step 7 is completed, carefully remove the net with a forward scooping motion. DO NOT allow water to flow over the top of the net or you may lose organisms.
9) Carry the seine to a flat and clean area on the stream bank. Remove leaves, rocks, and other debris, examining each for any attached organisms. Using fingers or

forceps, remove the larger organisms from the net and place in the plastic container with water for later identification. Examine the smaller organisms that remain on the net.

10) Record the presence of each type of organism collected and give an estimate of the number of each type using the appropriate letter code on the stream quality assessment form.
11) Determine the stream quality assessment using the instructions for filling out the form.

Appendix B

STREAM QUALITY MONITORING
ASSESSMENT FORM INSTRUCTIONS

1) Enter the station number (given to you at beginning of monitoring season), the sample number (May is sample #1, June is #2, etc.), the names of the sample crew, Metro Park and stream name, the date, the time, and location on the stream (describe in relation to nearest landmark such as a bridge, trail, etc.).

2) Check the box that most describes the last time it rained.

3) Describe the water conditions (color, odor, vegetation or fungus growth, surface scum, rate of water flow, etc.).

4) Estimate the width and measure the depth (using the yard stick) of the stream at the sample site.

5) Measure the water temperature with the thermometer. Keep the thermometer under water for at least 1 minute.

6) Check the boxes that most describe the rate of stream flow and the clarity of the water.

7) Estimate the substrate composition of the stream bed. Write the percentage of silt, sand, gravel, cobbles, and boulders in the boxes. These percentages should add up to 100%. Silt is very fine-grained sediment usually composed of clay or mud, sand is composed of tiny rock particles <¼" in diameter, gravel is rock particles ¼"-2" in diameter, cobbles are 2"-10" in diameter, and boulders are >10" in diameter.

8) After you place the macroinvertebrates in the sorting trays (filled with water), count the number of each type of organism that you found. If you have from 1-9 individuals of the organism type, place a letter "A" next to the name of that organism on the data sheet. If you have from 10-99 individuals, place a letter "B" next to the name of the organism. If you have >100 individuals, place a letter "C" next to the name of the organism. These letters will not make a difference in the cumulative index value.

9) Macroinvertebrates are grouped into 3 categories:

    Group 1 (sensitive to pollution or good water quality indicators)
    Group 2 (organisms that are moderately tolerant to pollution)
    Group 3 (pollution-tolerant or poor water quality indicators)

Appendix B

10) Count up the number of types of organisms in each group (column) and put this number in the "Number of taxa" row of each column. The organisms in the 3 groups are assigned a group index value.

Group 1 = 3 points Group 2 = 2 points Group 3 = 1 point

In each column, multiply the number of taxa by the number of points for that group (group index value) and place these values in the "index value" row.

Example:	**Group 1 Taxa**	**Group 2 Taxa**	**Group 3 Taxa**
	Caddisfly(s)	Dragonfly(s)	Blackfly(s)
	Stonefly(s)	Crayfish	midge(s)
	Mayfly(s)	Clam(s)	
		Damselfly(s)	
	3 taxa x 3 = 9	4 taxa x 2 = 8	2 taxa x 1 = 2

Cumulative index value = 9 + 8 + 2 = 19

11) The respective group index values are then added together to find the cumulative index value. By referring to the following chart, the stream quality assessment can thus be determined.

Stream Quality Assessment	Cumulative Index Value
Excellent	23 and above
Good	17 - 22
Fair	11-16
Poor	10 or less

Metro Parks
SERVING SUMMIT COUNTY

Submit data to:
Marlo Perdicas
Metro Parks, Serving Summit County
975 Treaty Line Road
Akron, Ohio 44313
330-865-8057
Fax: 330-865-8068

Appendix C

Station:_____ Sample #:_____
Individuals:_____

Metro
Park/Stream:_____Date:_____Time:_____

Location:_____

Rainfall: ☐ today ☐ yesterday ☐ days ago > ☐ ays ago

Describe Water Conditions (Color, Odor, Bedgrowths, Surface Scum, Etc..:_____

_____

_____

Width at Site (Feet):_____ Depth at Site (in):_____ Water Temp. (°F):_____

Stream Flow Rate: high ☐ normal ☐ low ☐ Stream Appears: clear ☐ cloudy ☐ muddy

Bed Composition of Riffle (%): Silt_____ Sand_____ Gravel (1/4"-2")_____

Cobbles (2"-10")_____ Boulders (>10")_____

MACROINVERTEBRATE COUNT			ESTIMATED COUNT LETTER CODE A = 1 to 9 B = 10 to 99 C = 100 or more		
Sensitive (Group 1)	Letter code	Somewhat Sensitive (Group 2)	Letter code	Pollution Tolerant (Group 3)	Letter code
Water penny larvae		Damselfly nymphs		Blackfly larvae	
Mayfly nymphs		Dragonfly nymphs		Aquatic worms	
Stonefly nymphs		Crane fly larvae		Midge larvae	
Dobsonfly larvae		Beetle larvae		Pouch snails	
Caddisfly larvae		Crayfish		leeches	
Riffle beetle adult		Scuds		planaria	
Other snails		Clams			
		Sowbugs			
		Alderfly larvae			
		Watersnipe larvae			
		Fishfly larvae			
Number of taxa		Number of taxa		Number of taxa	
(*times*) Index Value 3		(*times*) Index Value 2		(*times*) Index Value 1	

Cumulative Index Value = ☐

Stream Quality Assessment:

Excellent (>22) ☐ Good (17-22) ☐
Fair (11-16) ☐ Poor (<11) ☐