2010 Stream Quality Monitoring Report

Columbia Run Stream Survey
Columbia Run Conservation Area

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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. These methods provide 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 February 2010 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 28 sites currently in the stream program. Twenty-five sites were assigned for the 2010 season. However, information was only entered for nineteen sites. Six surveys (once a month, May through October) is the recommended number of surveys to be completed. Of the nineteen sites monitored, only 8 sites had 6 or more surveys completed. Four survey sites that were assigned were not monitored in 2010.

Results

A total of 19 sites were monitored this year including sites at Goodyear Heights, Munroe Falls, Hampton Hills, Furnace Run, Sand Run, Silver Creek, O'Neil Woods and Cascade Valley Metro Parks, Virginia Kendall and Columbia Run Conservation Areas. No sites were surveyed in Clinton Towpath, Firestone Metro Park or Liberty Park. Table 1lists 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 2010.

Site #	Number Surveys Completed	Number Taxa Found	Minimum Index Value	Maximum Index Value	Average Cumulative Index Value	Standard Deviation	Maximum Cumulative Index Value
ACR01	4	15	16.00	24.00	20.75	3.40	Excellent
ACV01	4	16	8.00	24.00	16.75	6.90	Excellent
ACV02	6	13	6.00	13.00	9.83	2.79	Fair
AFR01	6	16	19.00	25.00	22.50	2.59	Excellent
AFR02	6	14	17.00	23.00	20.00	2.45	Excellent
AFR03	6	15	15.00	21.00	18.17	2.56	Good
AFR04	6	13	14.00	24.00	19.00	4.10	Excellent
AFR05	4	13	8.00	20.00	12.50	5.45	Good
AFS01	4	9	6.00	12.00	8.25	2.87	Fair
AFS02	1	8	14.00	14.00	14.00		Fair
AGH02	6	8	10.00	13.00	10.83	1.33	Fair
AHH01	4	7	0.00	7.00	4.25	3.10	Poor
AHH02	3	12	18.00	20.00	18.67	1.15	Good
AMF02	5	7	6.00	12.00	9.00	2.12	Fair
AMFD1	6	6	4.00	12.00	8.00	2.68	Fair
AOW01	4	8	6.00	10.00	8.00	1.83	Poor
ASC01	4	8	4.00	12.00	7.50	3.32	Fair
ASC02	4	4	2.00	9.00	5.50	2.89	Poor
ASR03	4	8	7.00	13.00	10.00	2.94	Fair
ASR04	6	9	4.00	12.00	7.50	3.27	Fair
AVK01	5	12	0.00	16.00	11.80	6.72	Fair

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, eleven sites increased their average cumulative index value and eight decreased. Accounts for each site are described below.

Columbia Run 1 was surveyed for the third season in 2010. It maximum assessment score was Excellent, up from its score of Good in 2009. Cascade Valley 1 scored an Excellent, on the rise from a low point in 2003. 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. Cascade Valley 2 slightly decreased to Fair, from its

Good Assessment in 2009. This site is much more difficult to survey and it's nearer the Gorge Dam, two possible reasons for its average water quality assessment.

Furnace Run 1 at Rock Creek has continued to improve over the last three years of surveys, coming in at Excellent this year. This is a flashy stream that has ranked Good in some years and Poor in others. There were some significant restoration activities downstream of the survey site in 2010. This may have improved water quality in the area of the survey work.

Furnace Run 2 has also been on a gradual increase in the last 5 years, scoring an Excellent this year. 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.

Furnace Run 4 is just downstream of the park where State Route 303 crosses the stream. It scored an Excellent. Furnace Run 5, a small tributary of Furnace Run, just upstream of the covered bridge, scored Good.

Firestone 1 and 2 were both surveyed in 2010. They increased their average assessment scores from 2008 and 2007 respectively. Both sites scored Fair.

Goodyear Heights 2 was surveyed this year and scored Fair. Hampton Hills 1 has continued to decline and now ranks Poor. This stream has very nice substrate and therefore good stream bug habitat. However, it often has little or no water. In dry years like 2010, the stream scores for this site fall.

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

Munroe Falls 1 was not surveyed in 2010. Munroe Falls 2 declined from Fair to Poor this year. This site had been on the rise from 2004 to 2008. However, it has since begun to decline and scored Fair in 2010. Munroe Falls Dam 1 increased to Fair in 2010.

O'Neil Woods at Yellow Creek saw a slight increase, but maintained its Poor designation. The average assessment score for Silver Creek 2 declined to Poor. Silver Creek 1 increased to Fair.

Sand Run 3 and 4 had slight declines in the average assessment scores in 2010. Both site's maximum cumulative index values were Fair. Wetmore Road Conservation Area (AVK1) scored a Fair its third year in the program.

Volunteers contributed 219 hours to the stream quality monitoring program in 2010. The stream quality monitoring program will continue in 2011.

Figure 1. Average stream quality index value for Columbia Run 1, Columbia Run Conservation Area, 2008-2010.

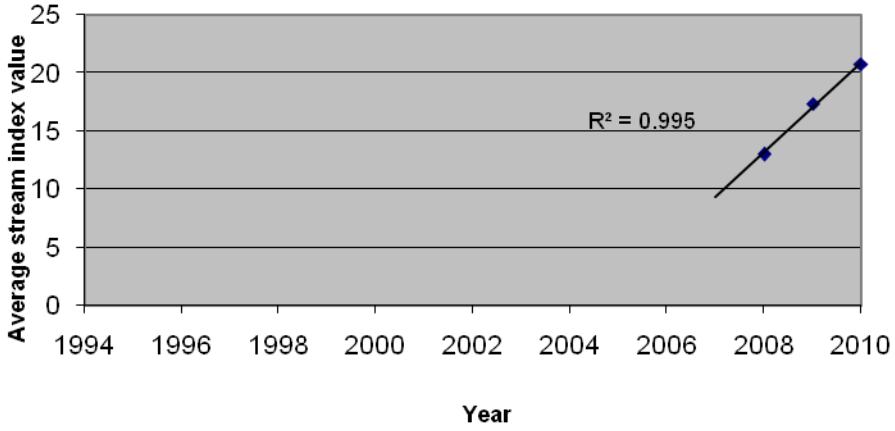


Figure 2. Average stream qulity index values for Cascade Valley 1, Cascade Valley Metro Park, 1994-2010.

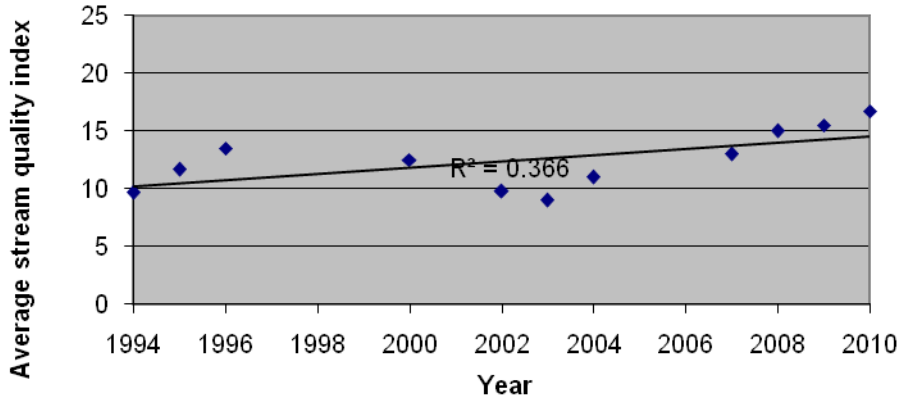


Figure 3. Average stream quality index values for Cascade Valley 2, Cascade Valley Metro Park, 2003-2010.

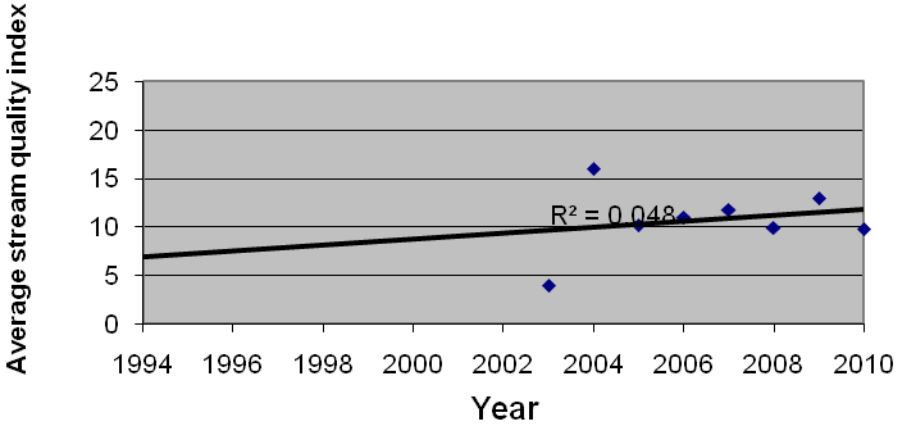


Figure 4. Average stream quality index values for Furnace Run 1, Furnace Run Metro Park, 1994-2010.

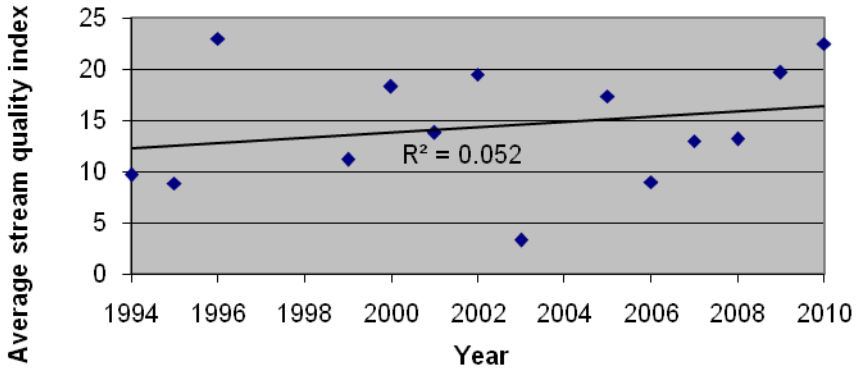


Figure 5. Average stream quality index values for Furnace Run 2, Buttonwood Trail Crossing, Furnace Run Metro Park, 1994-2010.

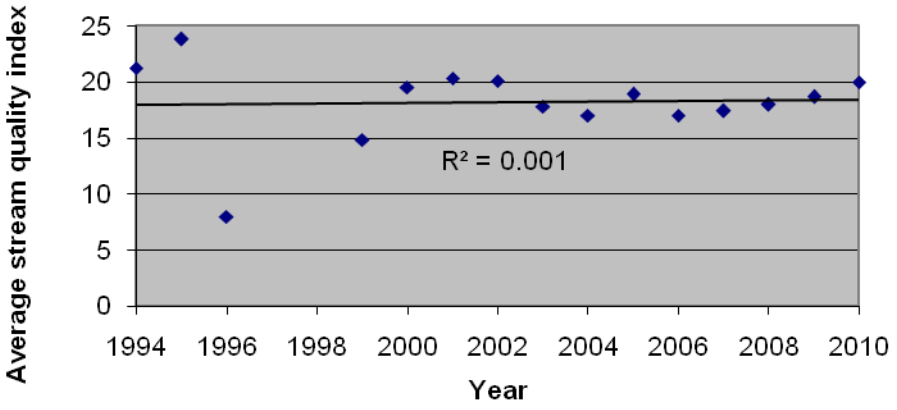


Figure 6. Average stream quality index value for Furnace Run 3, Furnace Run Metro Park, 1994-2010.

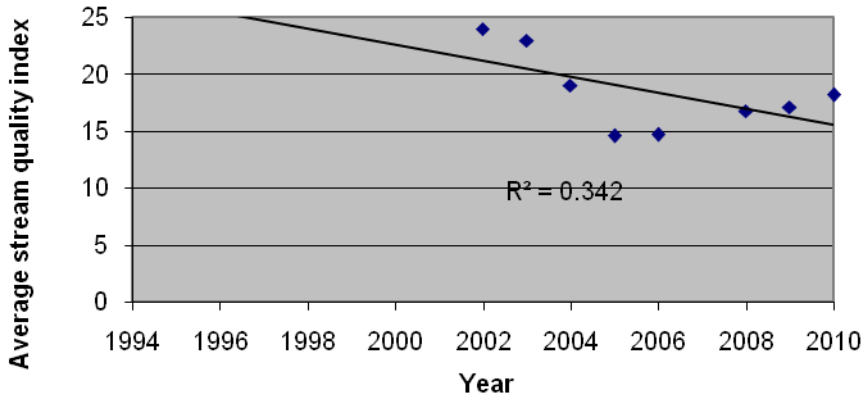


Figure 7. Average stream quality index value for Furnace Run 4, Furnace Run Metro Park, 2008-2010.

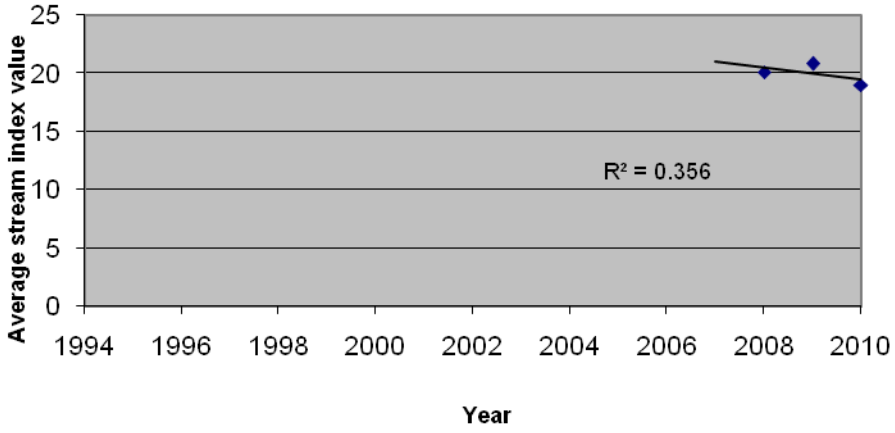


Figure 8. Average stream quality index value for Furnace Run 5, Furnace Run Metro Park, 2008-2010.

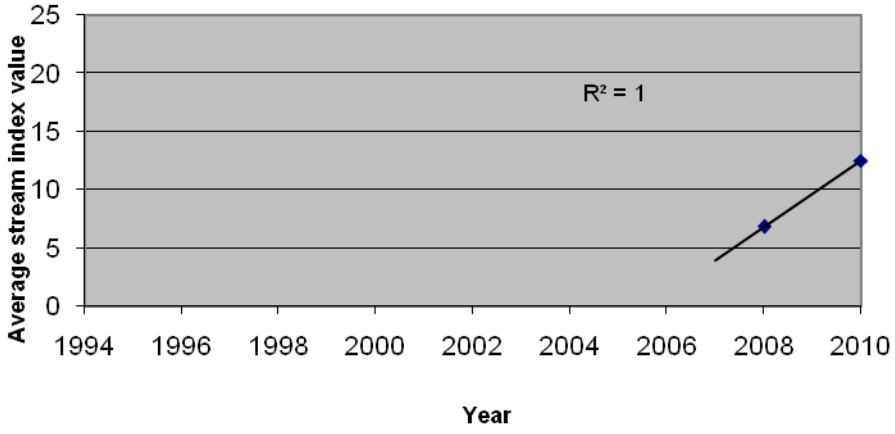


Figure 9. Average stream quality index values for Firestone 1, Firestone Metro Park, 2003-2010.

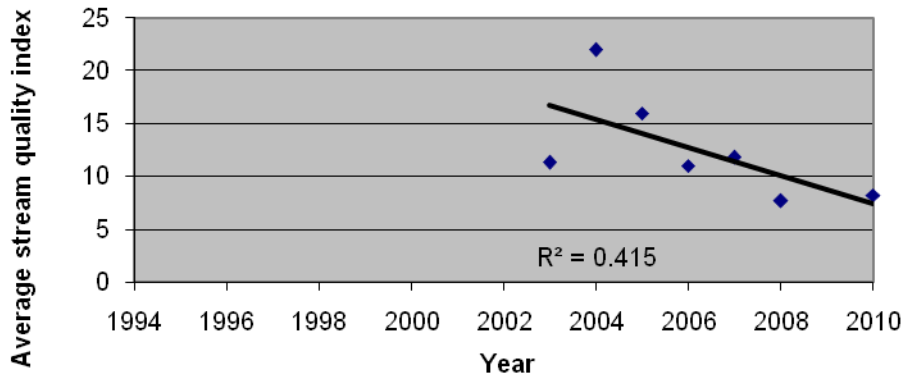


Figure 10. Average stream quality index values for the Firestone 2, Firestone Metro Park, 1994-2010.

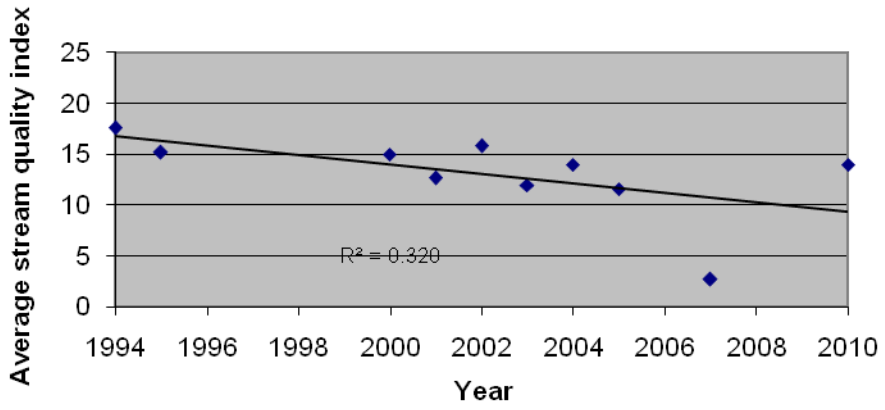


Figure 11. Average stream quality index values for Goodyear Heights 2, Goodyear Heights Metro Park, 1994-2010.

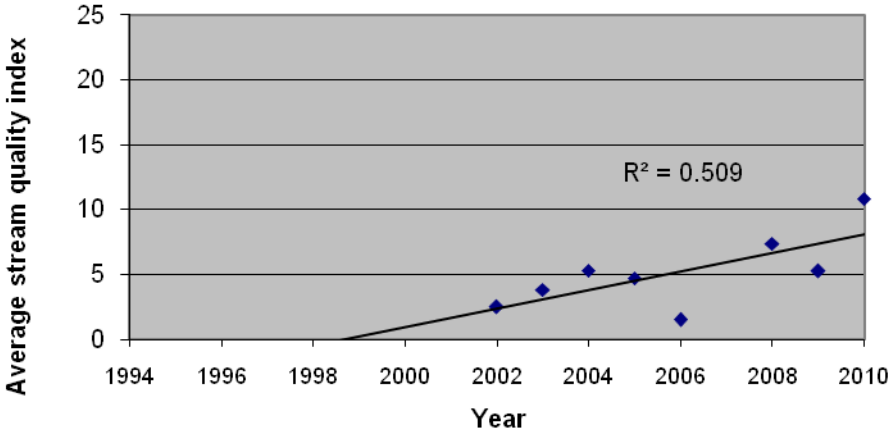


Figure 12. Average stream quality index values for Hampton Hills 1, Hampton Hills Metro Park, 1994-2010.

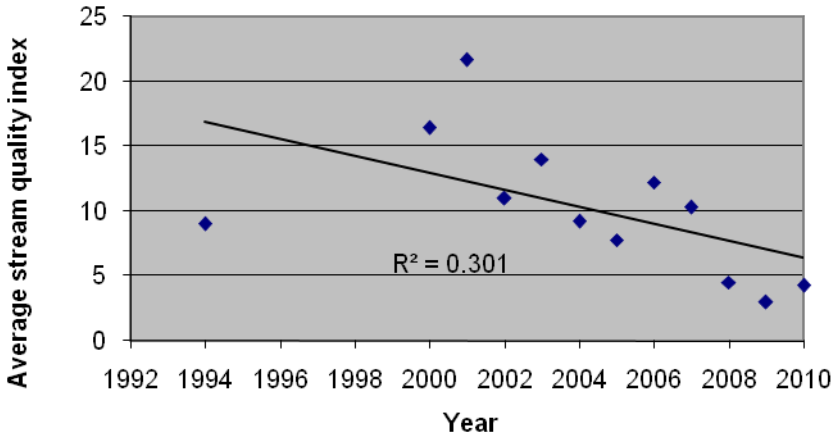


Figure 13. Average stream quality index value for Hampton Hills 2, Hampton Hills Metro Park, 2008-2010.

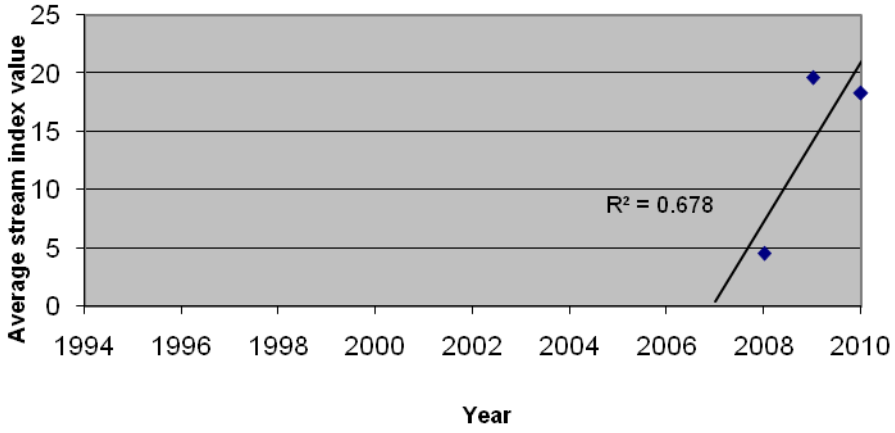


Figure 14. Average stream quality index values for Munroe Falls 2, Munroe Falls Metro Park, 1994-2010.

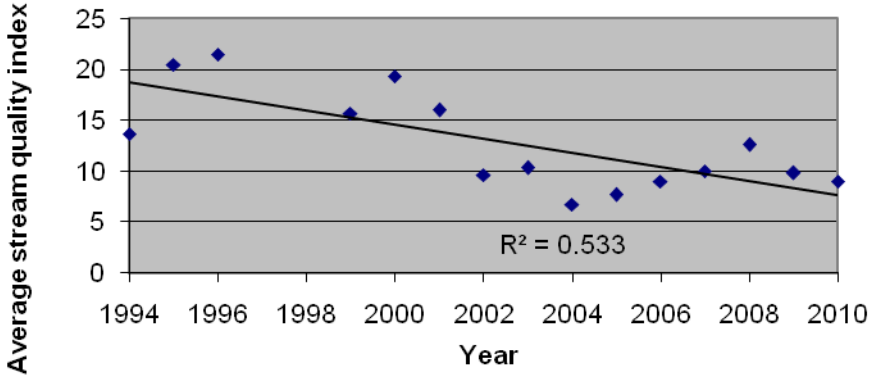


Figure 15. Average stream quality index values for Munroe Falls Dam 1, Bike and Hike Trail, 2005-2010.

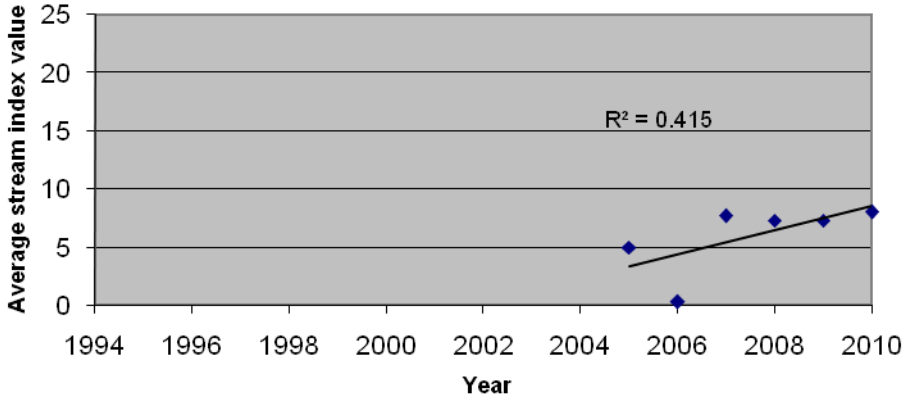


Figure 16. Average stream quality index values for O'Neil Woods 1, O'Neil Woods Metro Park, 1994-2010.

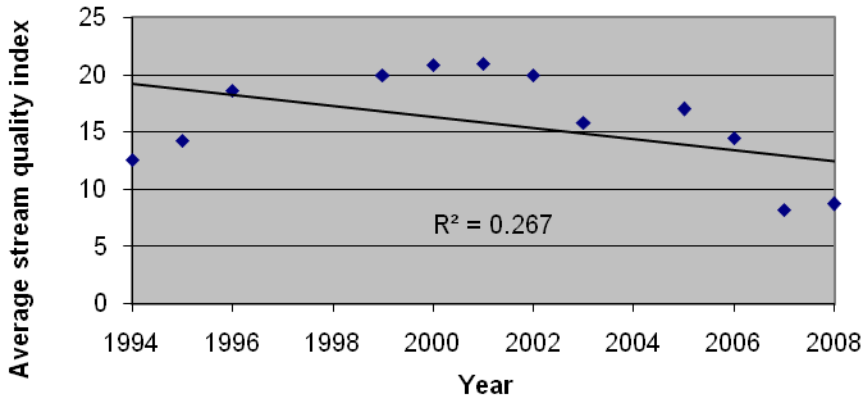


Figure 17. Average stream quality index values for Silver Creek 1, Silver Creek Metro Park, 1994-2010.

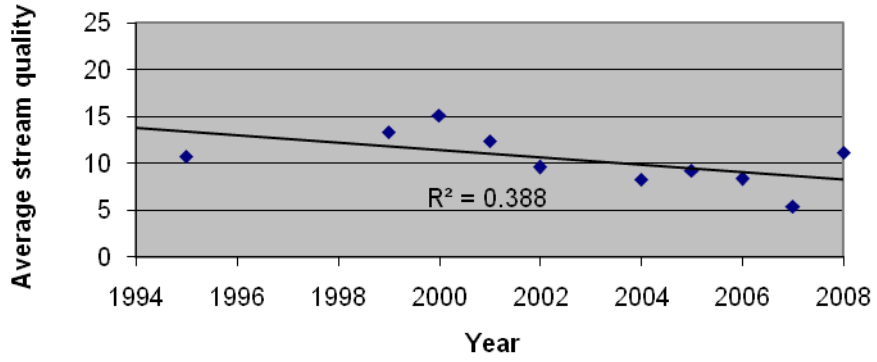


Figure 18. Average stream quality index values for Silver Creek 2, Silver Creek Metro Park, 1994-2010.

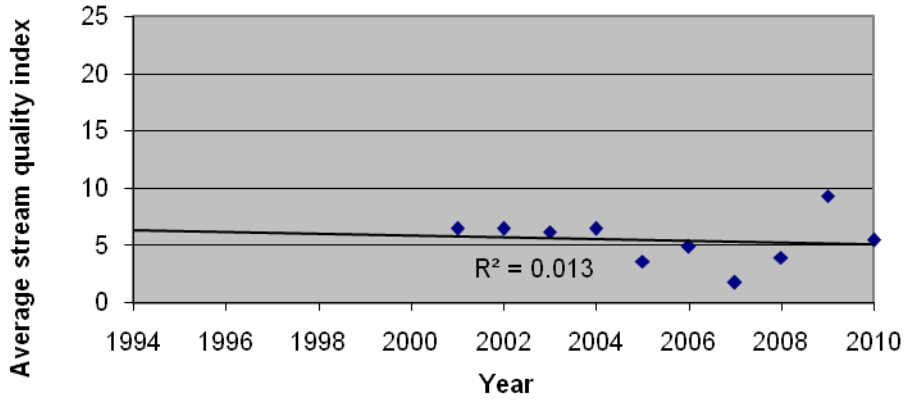


Figure 19. Average stream quality index values for Sand Run 3, Sand Run Metro Park, 1994-2010.

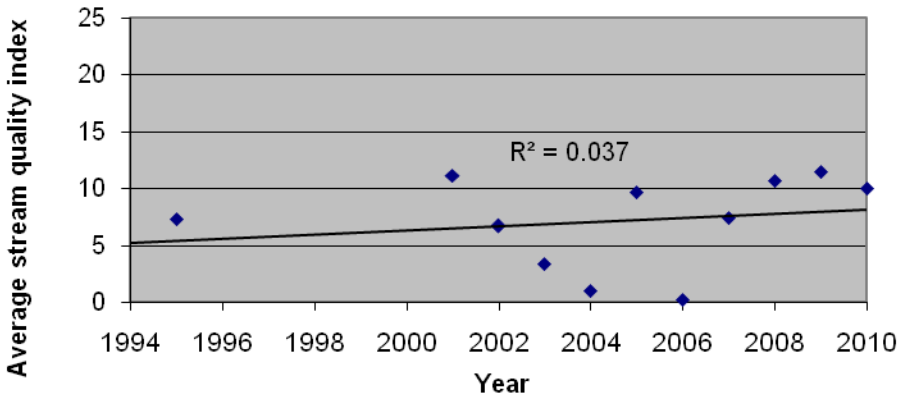


Figure 20. Average stream quality index value for Sand Run 4, Sand Run Metro Park, 2008-2010.

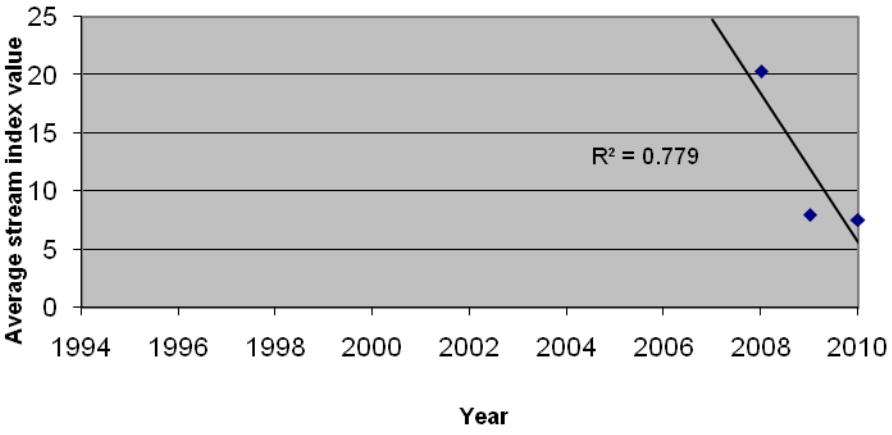
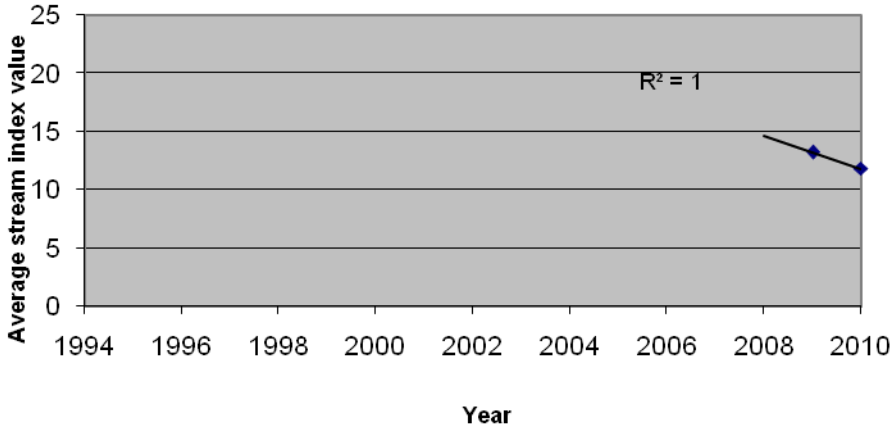


Figure 21. Average stream quality index value for Wetmore Conservation Area, 2010.



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) ☐