2007 Stream Quality Monitoring Report

Cuyahoga River, Cascade Valley Metro Park

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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 April 2007 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 macroinvertebrates), hand lens or magnifying glass, thermometer, laminated macroinvertebrate identification sheet, plastic spoons and brushes, forceps (for grasping macroinvertebrates), yard stick, sorting tray, data sheet and a writing implement.

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.

Results

A total of 17 sites were monitored this year including sites at Munroe Falls, Hampton Hills, Furnace Run, Sand Run, Firestone, Silver Creek, O'Neil Woods and Cascade Valley Metro Park. Table 1 below 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 2007 Season.

Sample Site	Stream	# Samples Taken	Min. Index Value	Max. Index Value	Average Index Value	Standard Deviation	Maximum Assessment Category
Firestone 1	Tuscarawas River- bridge at Tuscarawas Parking	8	1	20	9.5	2.65	Good
Firestone 2	Tuscarawas River- b/w bridge & Lonesome pond	3	0	4	2.7	2.31	Poor
Furnace Run 1	Rock Creek- second bridge	6	10	15	13	2.37	Fair
Furnace Run 2	Furnace Run- restoration site	5	10	20	17.4	4.34	Good
Furnace Run 3	Furnace Run - near bridge	5	10	21	16.8	4.44	Good
Hampton Hills 1	Adams Run- near 5th wooden bridge	4	5	15	10.3	4.57	Fair
Munroe Falls 1	Unnamed tributary - Swim lake outlet	6	0	8	3.8	2.79	Poor
Munroe Falls 2	Unnamed tributary - Indian Springs Trail	6	7	14	10	2.53	Fair
O'Neil Woods 1	Yellow Creek- west of second wooden bridge	9	3	12	8.2	3.27	Fair
Sand Run 1	Sand Run- upstream of ford	4	0	1	0.3	0.5	Poor
Sand Run 2	Sand Run- downstream of ford	5	0	3	0.8	1.3	Poor
Sand Run 3	Sand Run-just east of SR Rd. by Mingo trail	5	1	10	7.4	3.97	Poor
Silver Creek 1	Silver Creek Lake outlet below dam	5	3	7	5.4	1.82	Poor
Silver Creek 2	Silver Creek Lake inlet, N. of Wall Rd.	5	0	3	1.8	1.3	Poor
Cascade Valley 1	Cuyahoga River- upstream of Cuyahoga St.	3	10	15	13	2.65	Fair
Cascade Valley 2	Cuyahoga River- near picnic area (to Gorge)	6	6	17	11.8	4.17	Good
Munroe Falls Dam 1	Cuyahoga River - below Munroe Falls Dam	3	5	10	7.7	2.51	Poor

Figures 1-17 illustrate the average cumulative index values over time for each site surveyed in 2007. Many of the sites have been surveyed since 1994. Two sites at Firestone have been surveyed in recent years. Firestone 1, on the Tuscarawas River and near the Tuscarawas Meadow has suffered declines over the past three years. However, it appears to be slowly rebounding this year, and had an average index value of Fair.

Although Firestone 2 has continued to hover around the Fair mark, it saw a huge decline in 2007. According to the surveyor, this part of the stream was nearly devoid of macro invertebrate life. This site should be closely evaluated next year.

Furnace Run 1 at Rock Creek continues to be unpredictable, coming in at Fair this year. This is a flashy stream that has ranked Good in some years, and poor in others. There is no telling where this stream will rank from year to year. On the other hand, Furnace Run 2 along Furnace Run holds steady as our highest quality stream surveyed. It, along with Furnace Run 3 both scored ratings of Good. Furnace Run 3 used to score Excellent in early 2000, but has slowly declined through 2004. It leveled off in 2005 and has been on the rebound since.

While Munroe Falls 1 continues to be Poor (swim lake outlet), Munroe Falls 2 continues to hover around Fair. This section of stream, between Beaver Pond and the swim lake, receives groundwater from Indian Spring. If it were not so heavily impacted by Beaver Pond, this stretch would likely score much higher.

Yellow Creek in O'Neil Woods Metro Park has continued to decline in recent years. Its average assessment value was Poor in 2007. From 1999-2002, this site scored as one of only a few high quality streams in the district. It has declined since 2003, with a sharp decrease in average index value this year (from 14 to 8). This site should be closely monitored next year. Yellow Creek is considered one of the cleanest tributaries of the Cuyahoga River.

Stream sites in Sand Run Metro Park and Silver Creek continue to score poorly. On the other hand, the Cuyahoga River in Cascade Valley is slowly increasing its average cumulative index value. While it is still scoring Fair, it has been on a slow rise to Good status. In fact, Cascade Valley 2 did have one survey this season where it scored a 20, nearly an Excellent rating.

Munroe Falls Dam 1, located just downstream of the dam removal site, scored Poor this year. The average cumulative index value was 7.7, much improved from its score of nearly zero in 2006. The stream quality at this site should continue to improve as time passes since the dam was removed in 2005.

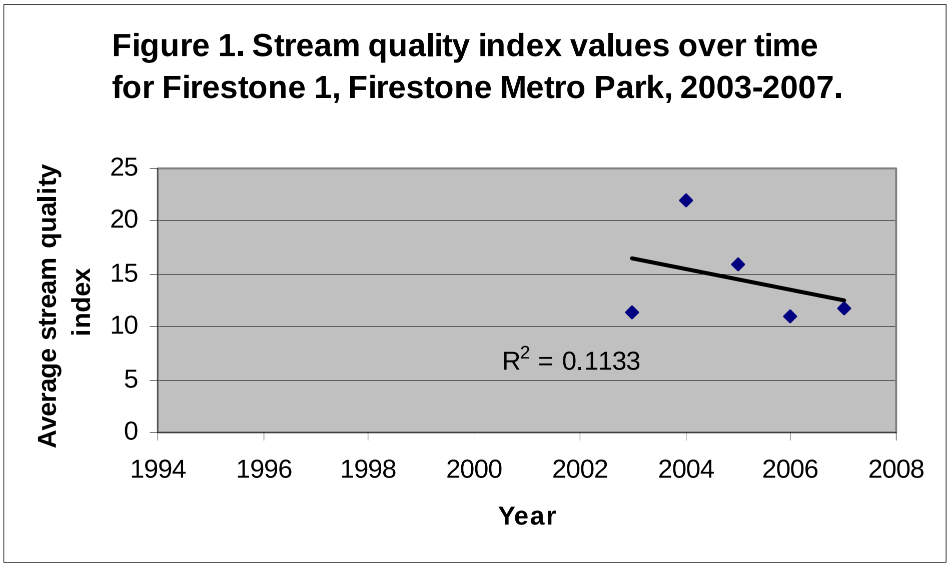


Figure 1. Stream quality index values over time
for Firestone 1, Firestone Metro Park, 2003-2007.
Average stream quality index
25
20
15
10
5
0
R2 = 0.1133
1994
1996
1998
2000
2002
2004
2006
2008
Year

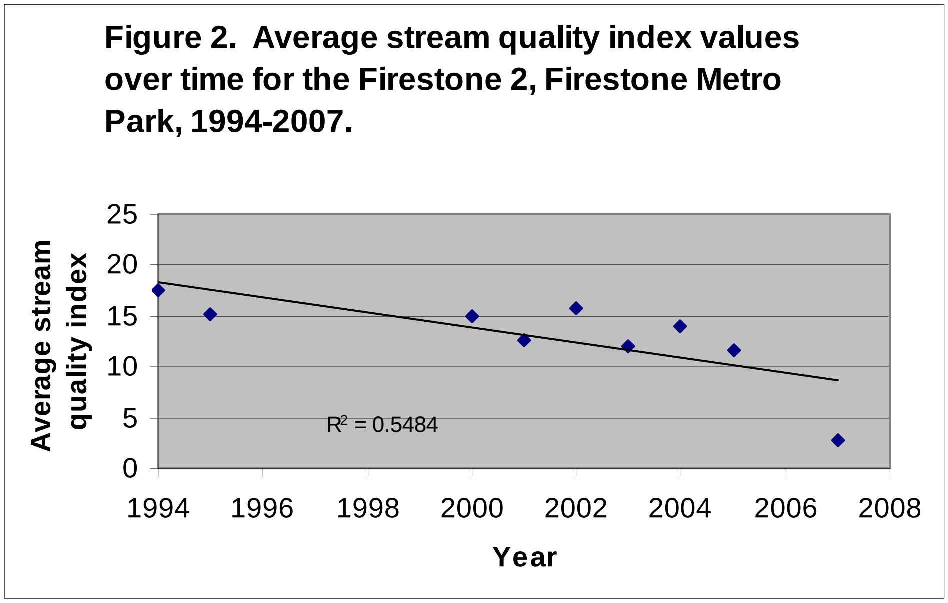


Figure 2. Average stream quality index values
over time for the Firestone 2, Firestone Metro
Park, 1994-2007.
Average stream quality index
25
20
15
10
5
0
R2 = 0.5484
1994
1996
1998
2000
2002
2004
2006
2008
Year

Figure 3. Average stream quality index values over time for Rock Creek (Furnace Run 1), Furnace Run Metro Park, 1994-2007.

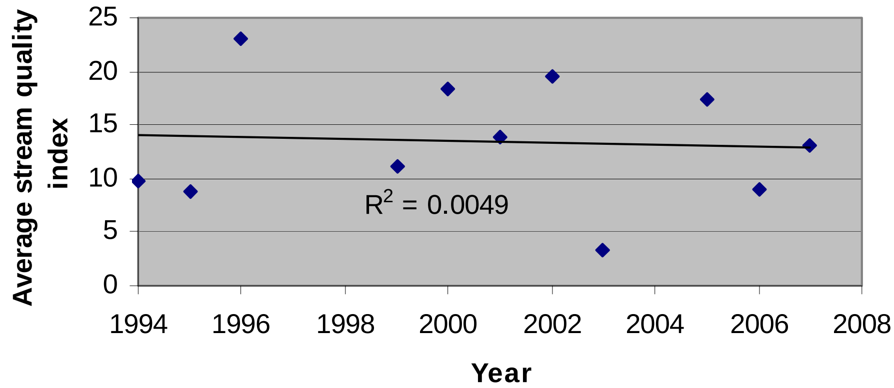
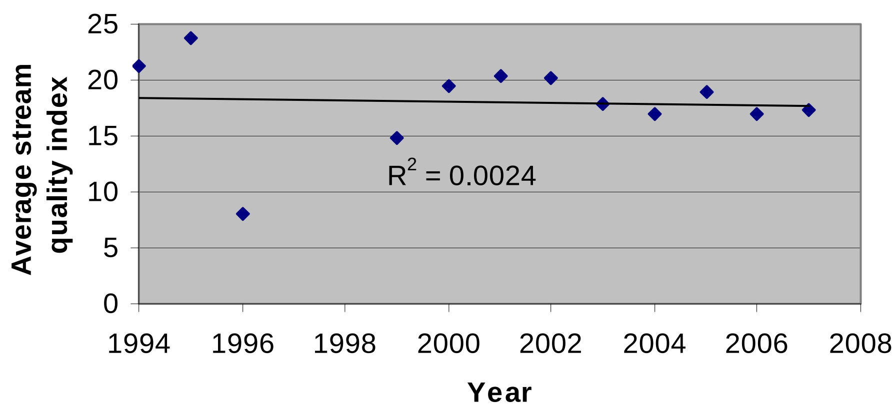


Figure 4. Average stream quality index values over time for Furnace Run 2, Buttonwood Trail Crossing, Furnace Run Metro Park, 1994-2007.



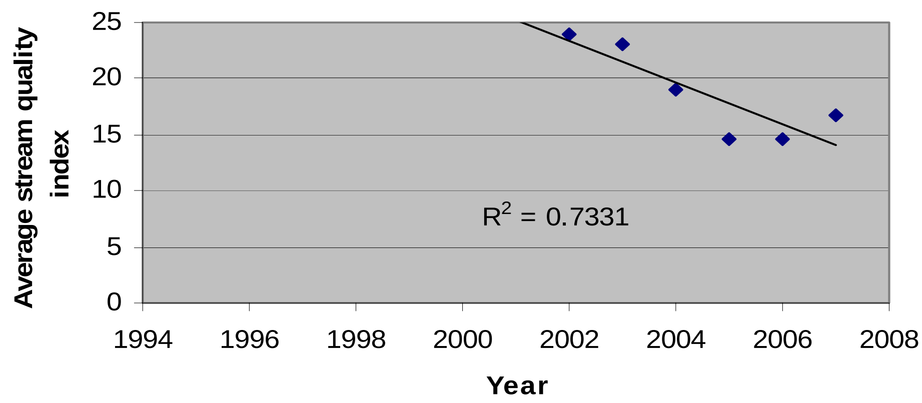


Figure 5. Average stream quality index value for Furnace Run 3, Furnace Run Metro Park, 1994-2007.

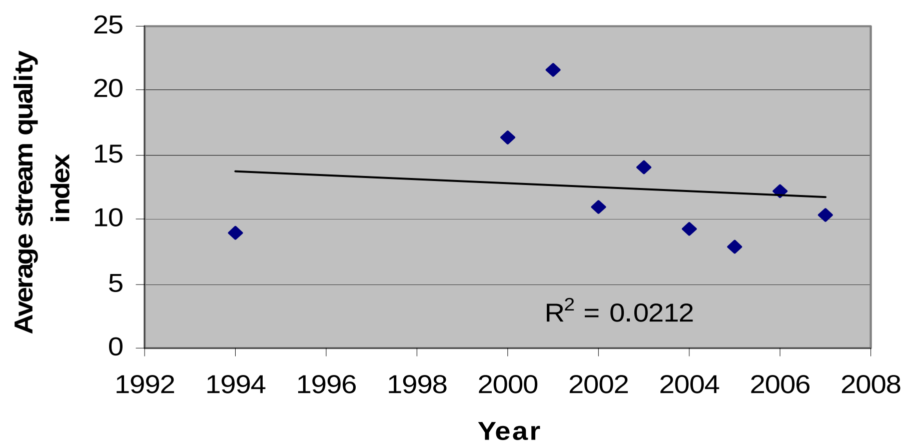


Figure 6. Average stream quality index values for Hampton Hills 1, Hampton Hills Metro Park, 1994-2007.

Figure 7. Average stream quality index values over time for Munroe Falls 1, Munroe Falls Metro Park, 1994-2007.

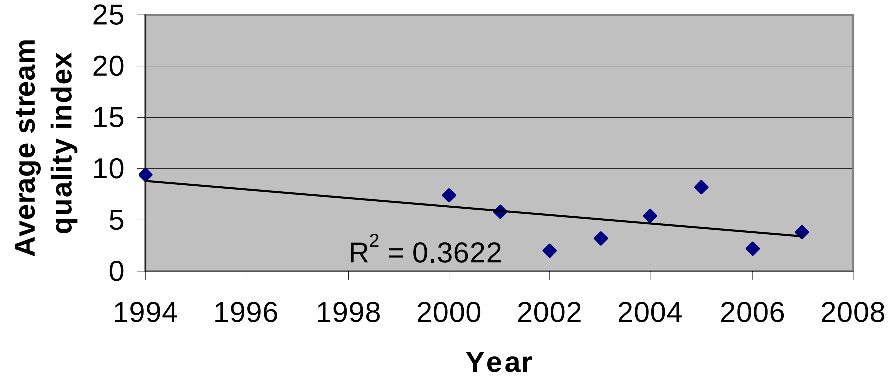


Figure 8. Average stream quality index values over time for Munroe Falls 2, Munroe Falls Metro Park, 1994-2007.

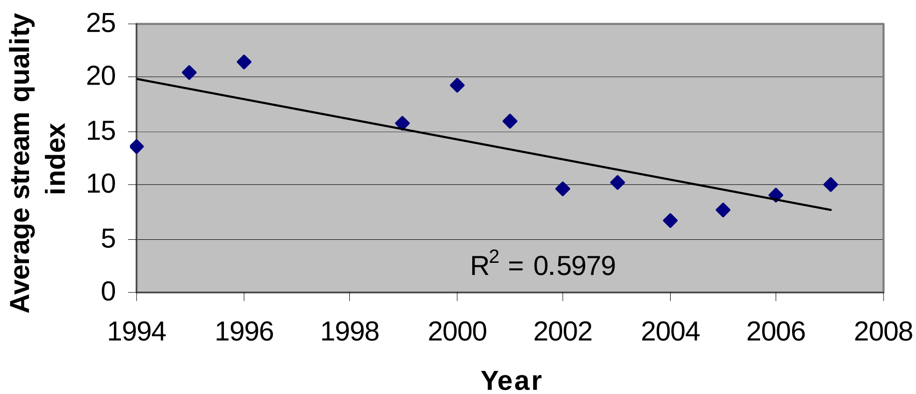


Figure 9. Average stream quality index values over time for O'Neil Woods 1, O'Neil Woods Metro Park, 1994-2007.

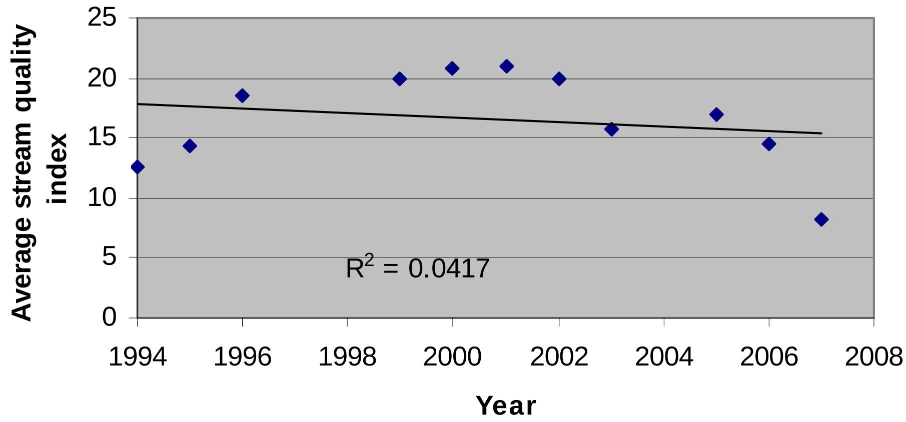


Figure 10. Average stream quality index values for Sand Run 1, Sand Run Metro Park, 1995-2007.

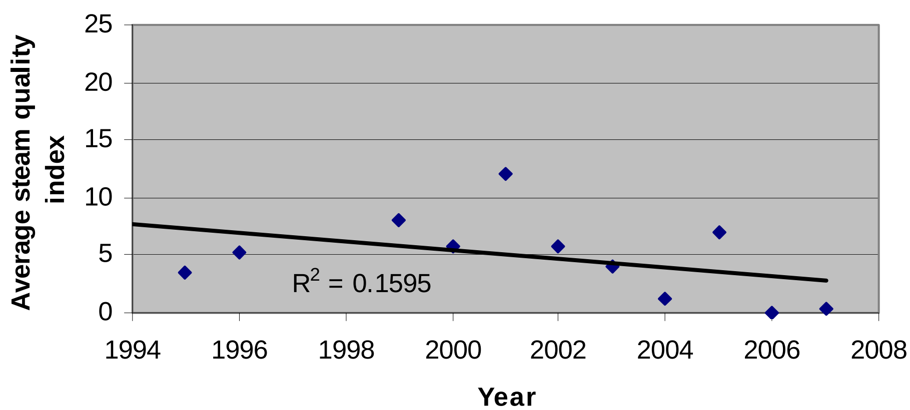


Figure 11. Average stream quality index values over time for Sand Run 2, Sand Run Metro Park, 1994-2007.

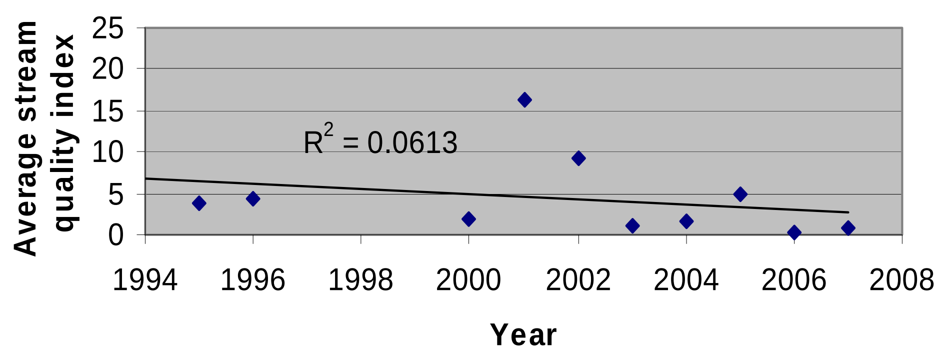
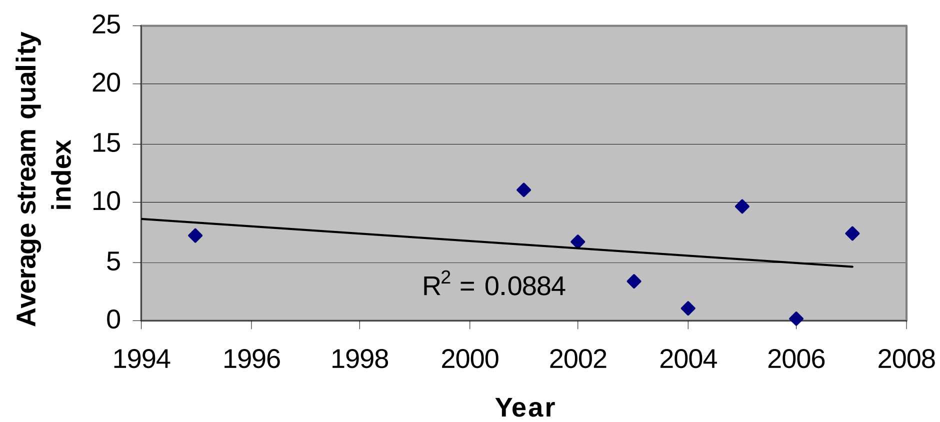


Figure 12. Average stream quality index values for Sand Run 3, Sand Run Metro Park, 1994-2007.



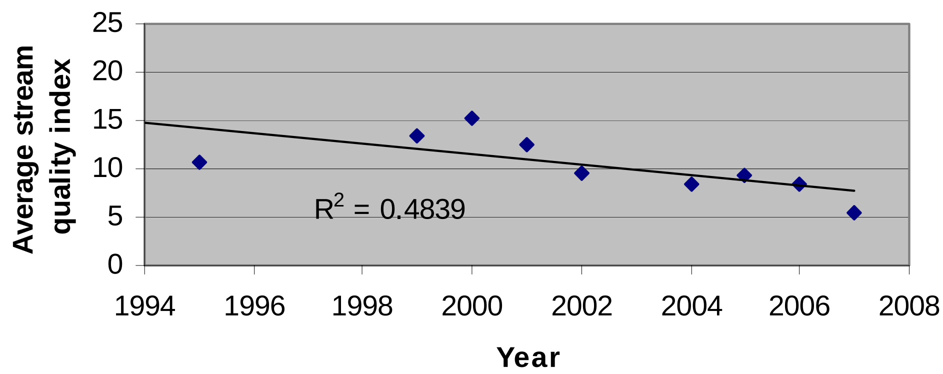


Figure 13. Average stream quality index values over time for Silver Creek 1, Silver Creek Metro Park, 1994-2007.

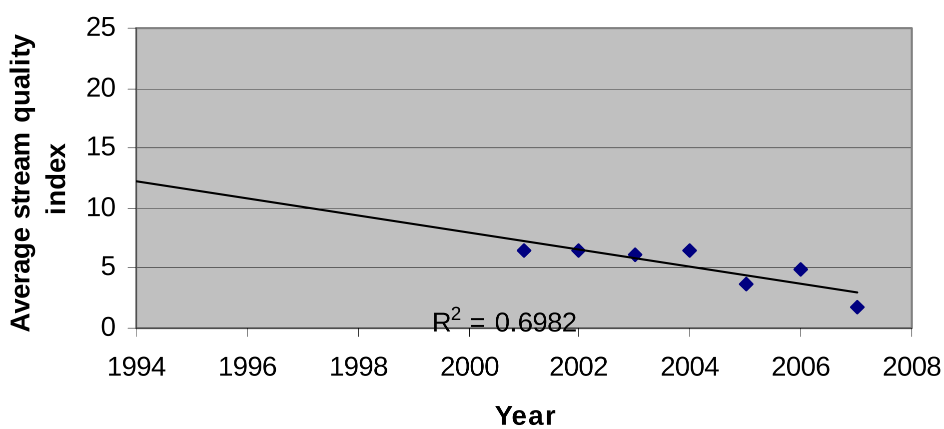


Figure 14. Average stream quality index values for Silver Creek 2, Silver Creek Metro Park, 1994-2007.

Figure 15. Average stream qulity index values over time for Cascade Valley 1, Cascade Valley Metro Park, 1994-2007.

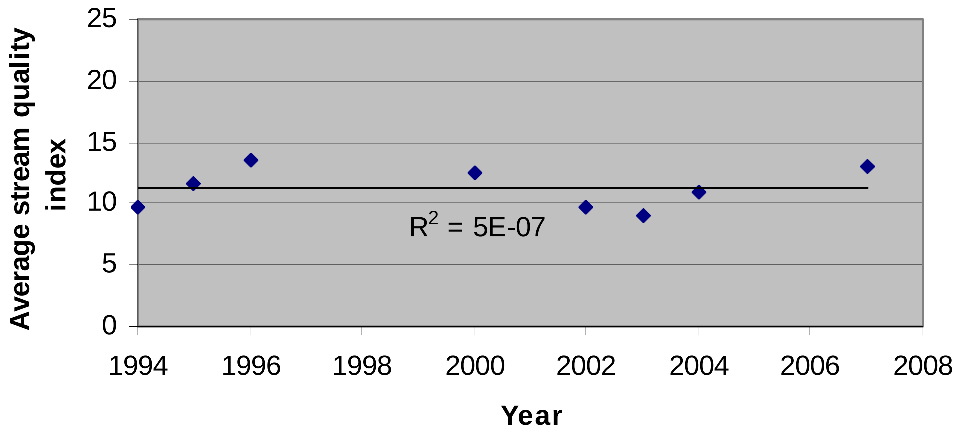


Figure 16. Average stream quality index values over time for Cascade Valley 2, Cascade Valley Metro Park, 2003-2007.

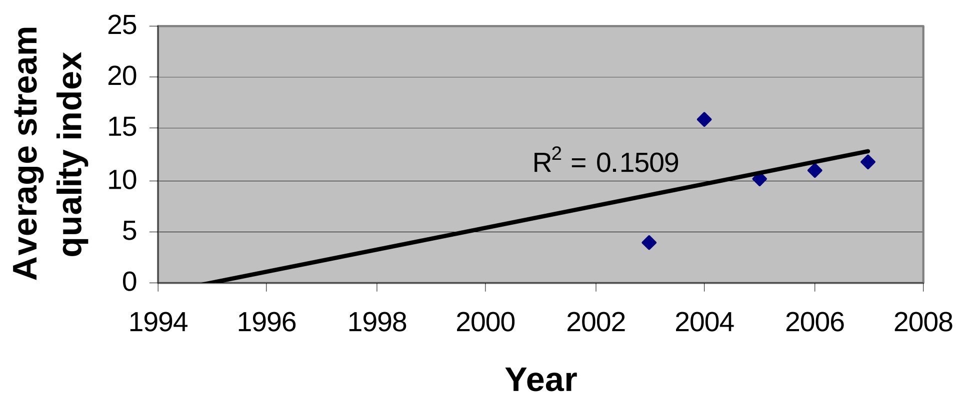
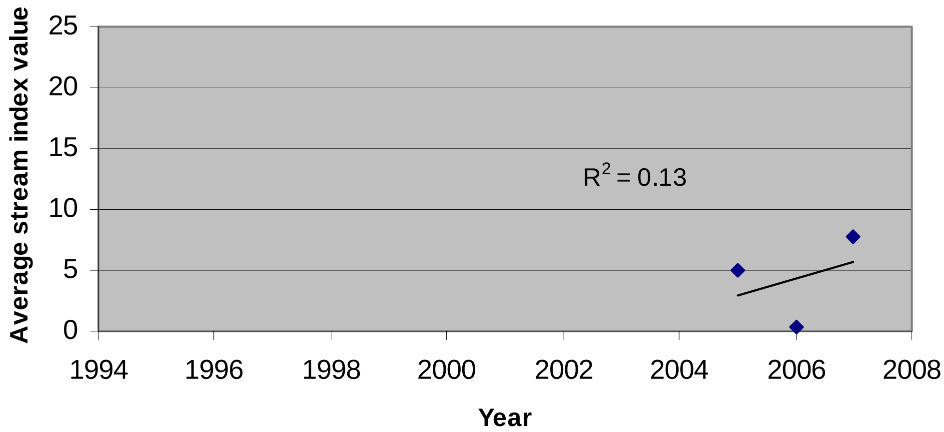


Figure 17. Average stream quality index values for Munroe Falls Dam 1, Bike and Hike Trail, 2005-2007.



Overall the stream survey program was successful. Goodyear Heights did not get surveyed as planned. However, we did have a couple of new volunteers that participated in the program that did a nice job. We will try to recruit more new volunteers for this program next year. Natural Resource Department staff intends to survey each of the stream sites in 2008 as a reference for future use.

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

MetroParks
SERVING SUMMIT COUNTY

Submit data to:
Marlo Perdicas
Metro Parks, Serving Summit County
975 Treaty Line Road
Akron, Ohio 44313
330-923-0720
Fax: 330-867-4711

Appendix C

Station:_____________ Sample #:___________
Individuals:____

Metro
Park/Stream:_____________________________________Date:_____________Time:______________

Location:____

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