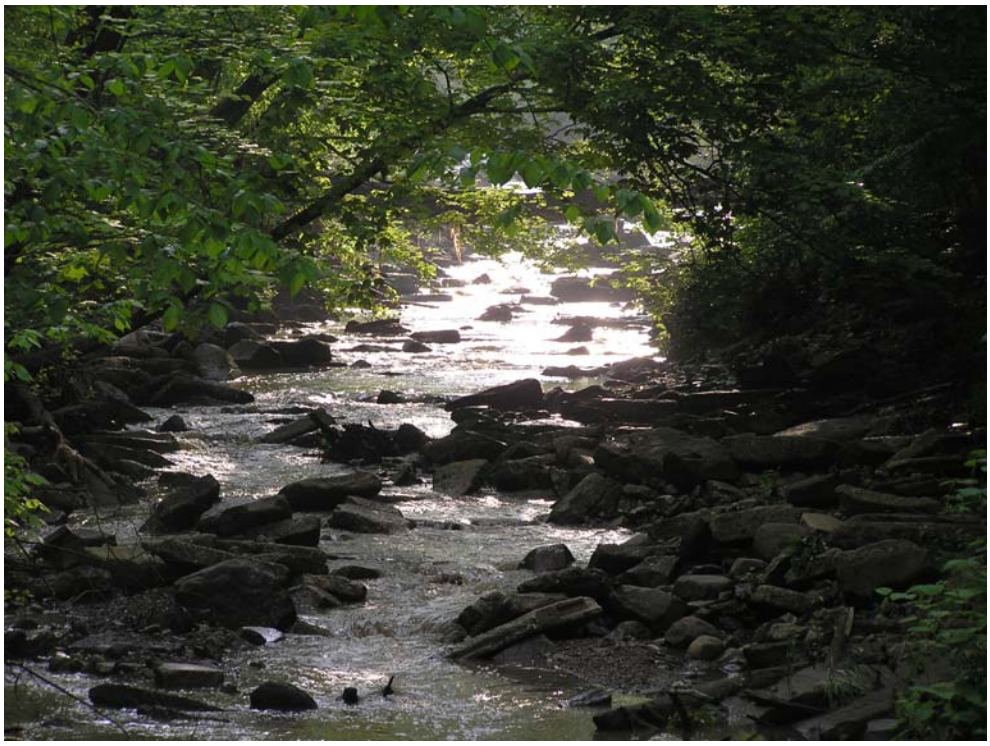
Stream Quality Monitoring Report
2006



Sand Run Stream, West of Vehicle Ford
By: Marlo Perdicas

Introduction

The goal of the stream quality monitoring 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 2006 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

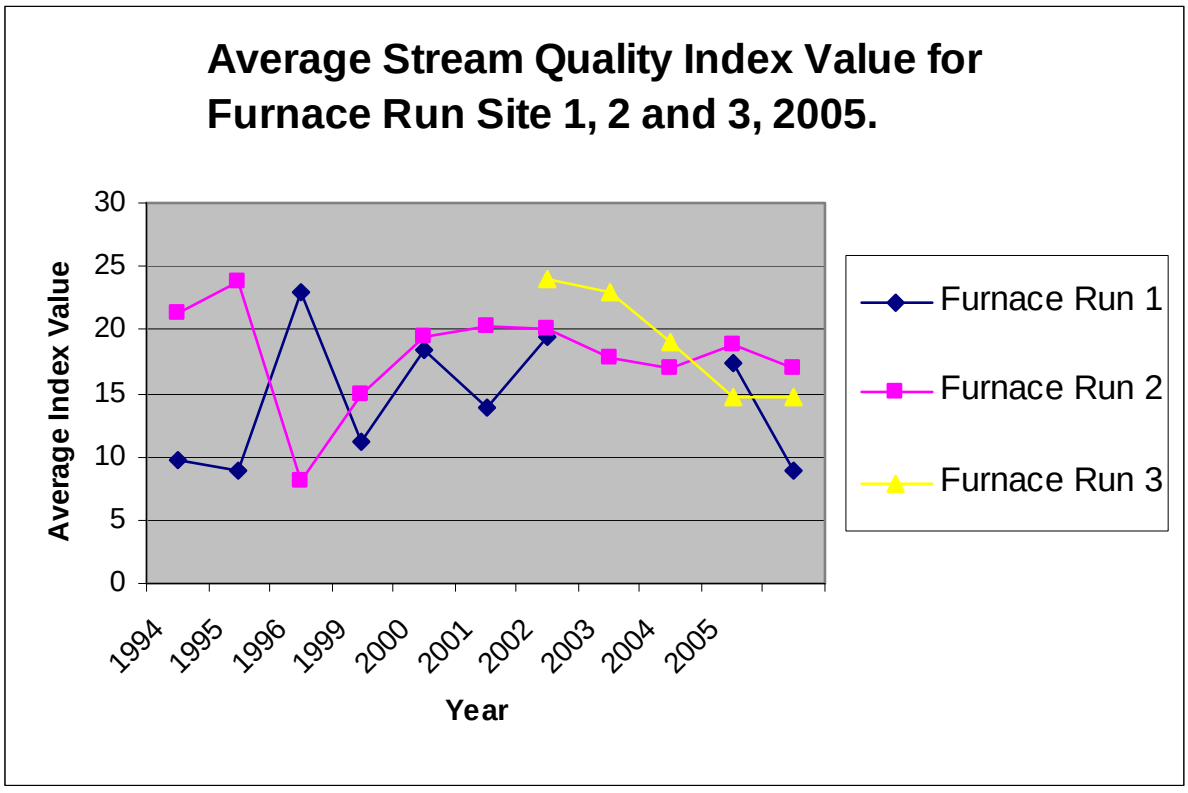
A total of 17 sites were monitored this year including sites at Munroe Falls, Goodyear Heights, Hampton Hills, Furnace Run, Sand Run, Firestone, Silver Creek, O’Neil Woods and Cascade Valley Metro Park. Table 1 bleow lists the minimum, maximum and average cummulative index values for each site surveyed. 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.

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	2	10	12	11	1.4	Fair
Firestone 2	Tuscarawas River-b/w bridge & Lonesome pond	N/A	N/A	N/A	N/A	N/A	N/A
Furnace Run 1	Rock Creek-second bridge	8	7	12	9	1.9	Fair
Furnace Run 2	Furnace Run-restoration site	6	14	20	17	2.1	Good
Furnace Run 3	Furnace Run - near bridge	6	11	18	14.7	2.7	Good
Goodyear Heights 1	Unnamed tributary -Alder Pond Inlet	6	0	4	1.3	1.8	Poor
Goodyear Heights 2	Unnamed tributary- bridge near par course	6	0	5	1.5	2.3	Poor
Hampton Hills 1	Adams Run- near 5th wooden bridge	5	9	15	12.2	2.4	Fair
Munroe Falls 1	Unnamed tributary - Swim lake outlet	3	1	3	2.3	1.2	Poor
Munroe Falls 2	Unnamed tributary - Indian Springs Trail	6	5	12	9	2.4	Fair
O'Neil Woods 1	Yellow Creek-west of second wooden bridge	2	12	17	14.5	3.5	Fair
O'Neil Woods 2	Yellow Creek - east of wooden bridges	2	9	13	11	2.8	Fair
Sand Run 1	Sand Run-upstream of ford	3	0	0	0	0	Poor
Sand Run 2	Sand Run-downstream of ford	5	0	1	0.2	0.4	Poor
Sand Run 3	Sand Run-just east of SR Rd. by Mingo trail	5	0	1	0.2	0.4	Poor
Silver Creek 1	Silver Creek Lake outlet below dam	7	4	14	8.4	3.8	Fair
Silver Creek 2	Silver Creek Lake inlet, N. of Wall Rd.	7	2	9	4.9	2.4	Poor
Gorge 1	Cuyahoga River-below dam	N/A	N/A	N/A	N/A	N/A	N/A
Cascade Valley 1	Cuyahoga River-upstream of Cuyahoga St.	N/A	N/A	N/A	N/A	N/A	N/A
Cascade Valley 2	Cuyahoga River-near picnic area (to Gorge)	8	8	15	11	2.7	Fair
Munroe Falls Dam 1	Cuyahoga River - below Munroe Falls Dam	5	0	3	0.6	1.3	Poor
Liberty Park 1	downstream of waste water treatment plant	N/A	N/A	N/A	N/A	N/A	N/A

Comparing average cumulative index values from 2005 and 2006, many values went down including sites Furnace Run 1 and 2, Goodyear Heights 1 and 2 Munroe Falls 1, Munroe Falls Dam 1, O'Neil Woods 1 and 2, Sand Run 1, 2 and 3, Silver Creek 1 and Firestone 1. Only Furnace Run 1 and O'Neil Woods 1 dropped enough points to fall into a lower assessment category. Furnace Run 1 fell from Good to Poor and O'Neil Woods 1 fell from Good to Fair.

It is interesting to note that both of these survey sites had volunteers new to the stream survey program. It could be inexperience that caused the change in score. However, Furnace Run 1 (Rock Creek) has been a stream in slow decline, with several indiscretions noted in the 2003 ecological report for the park (EnviroScience, 2003).

Furnace Run 3 was the site of a stream bank stabilization project in late 2004. The cumulative index values for this site continued to decline through the 2005 survey season (see graph below). It appears to have stabilized in 2006. At one time, this site was rated excellent, our only outstanding site in the entire program. It will be interesting to see if this site improves in the future.



Yellow Creek in O'Neil Woods Metro Park was the subject of a stream bank stabilization effort in June, 2005. Since this time, the average index value has decreased by 2.5 points. The progress of this site should be closely monitored.

Munroe Falls Dam 1 has been monitored for two years. It was monitored in 2005 before the dam was removed and in 2006 during the dam removal. The average index value

decreased to nearly zero in 2006. The bed composition, previously composed of cobble stones, was virtually covered with silt when the dam was removed. This site should be closely monitored in the years to come. The quality of the stream should eventually improve.

The graphs below illustrate the average cumulative index value over time for each site in the stream quality monitoring program.

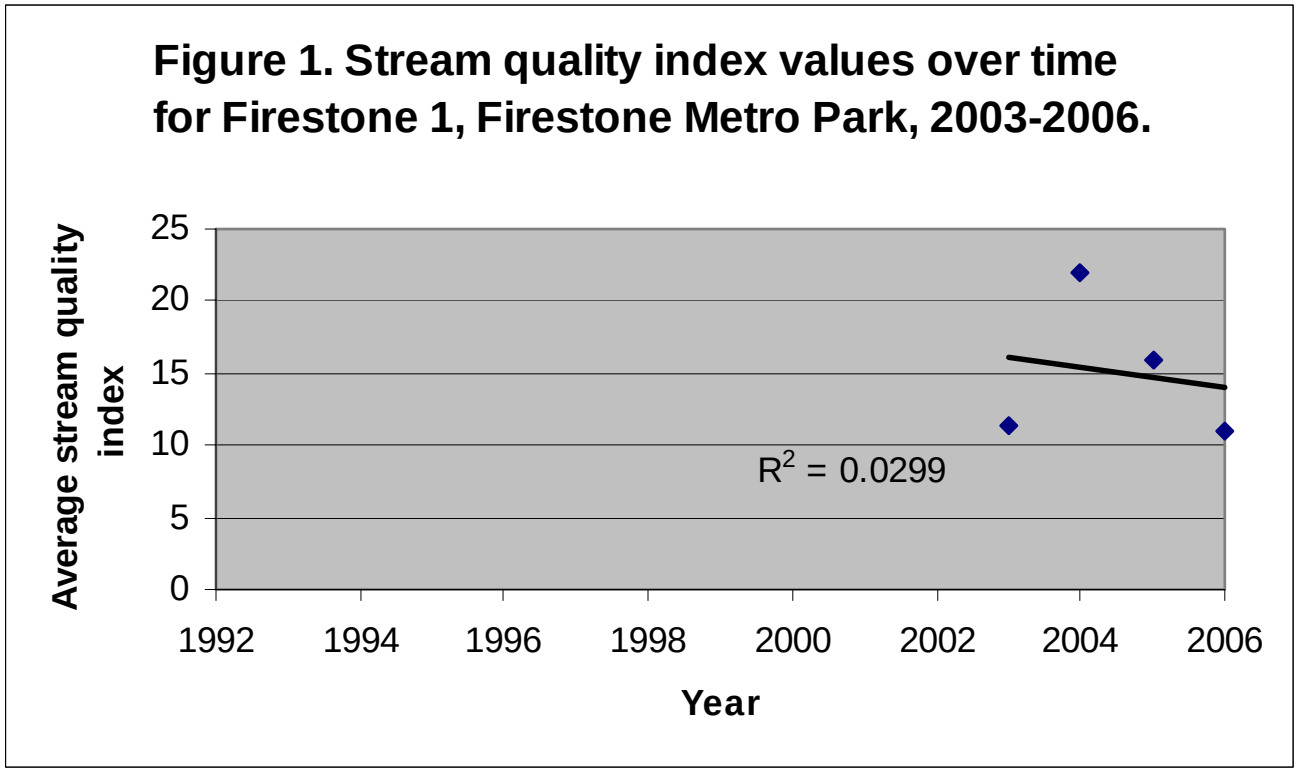


Figure 2. Average stream quality index values over time for the Firestone 2, Firestone Metro Park, 1994-2006.

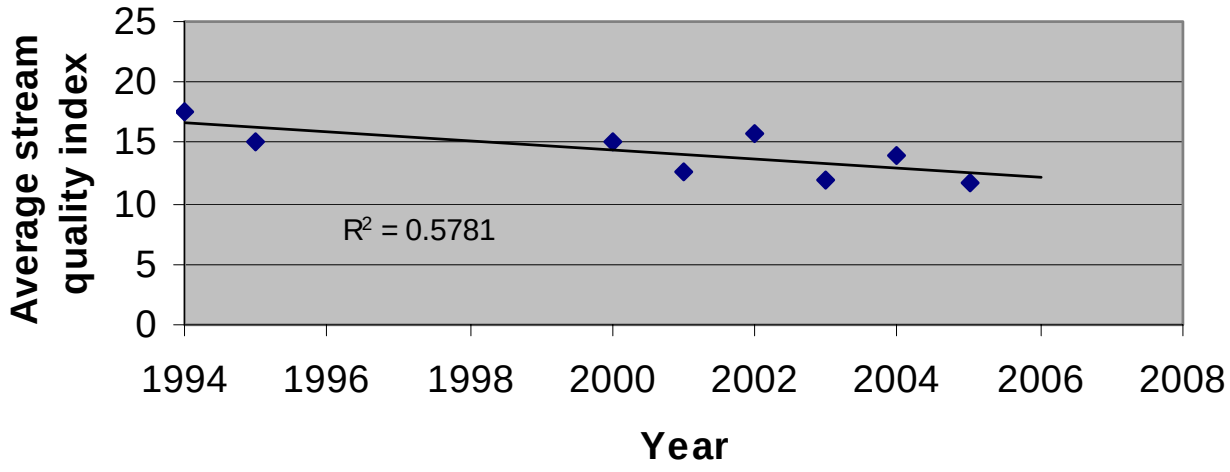


Figure 3. Average stream quality index values over time for Rock Creek (Furnace Run 1), Furnace Run Metro Park, 1994-2006.

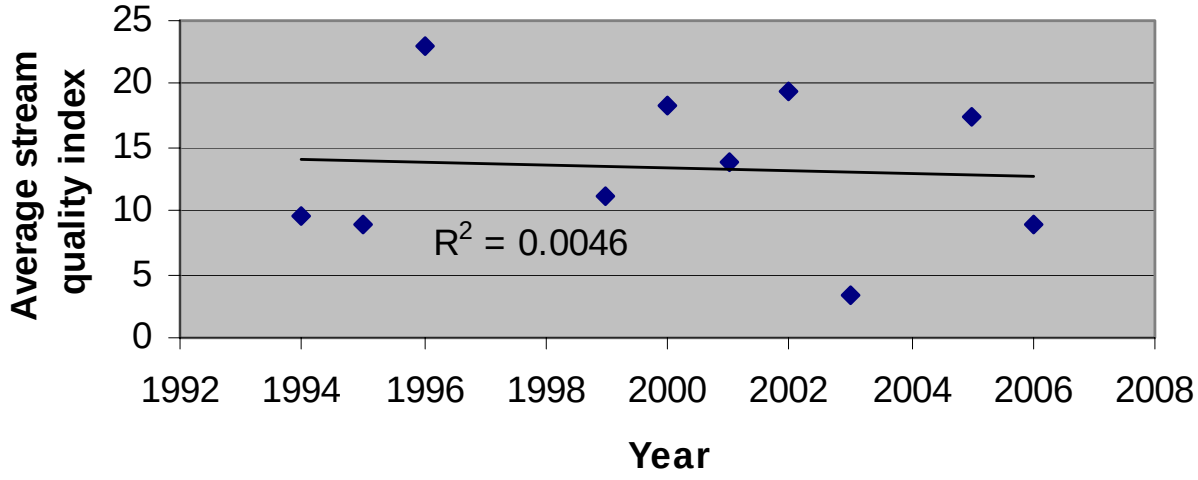


Figure 4. Average stream quality index values over time for Furnace Run 2, Buttonwood Trail Crossing, Furnace Run Metro Park, 1994-2006.

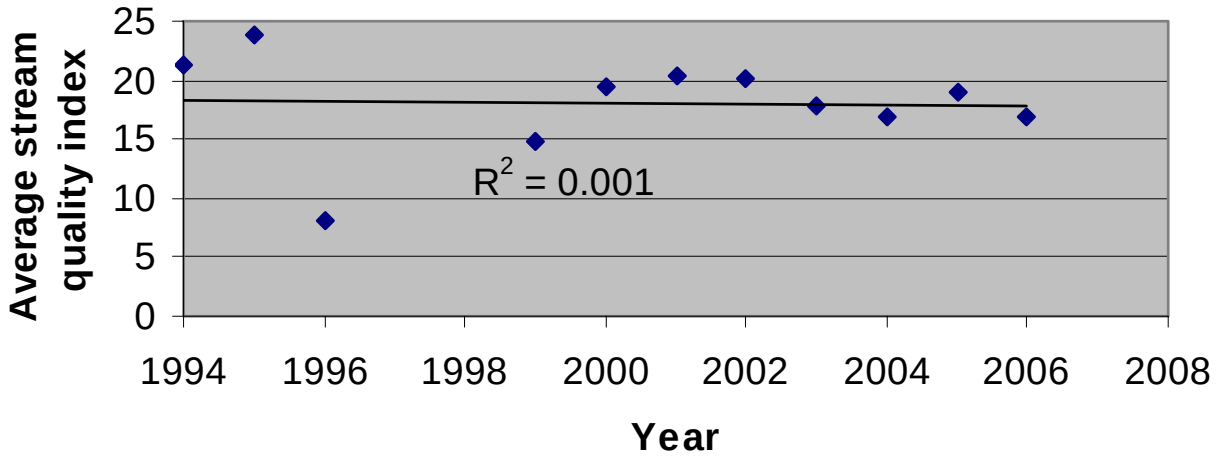


Figure 5. Average stream quality index value for Furnace Run 3, Furnace Run Metro Park, 1994-2006.

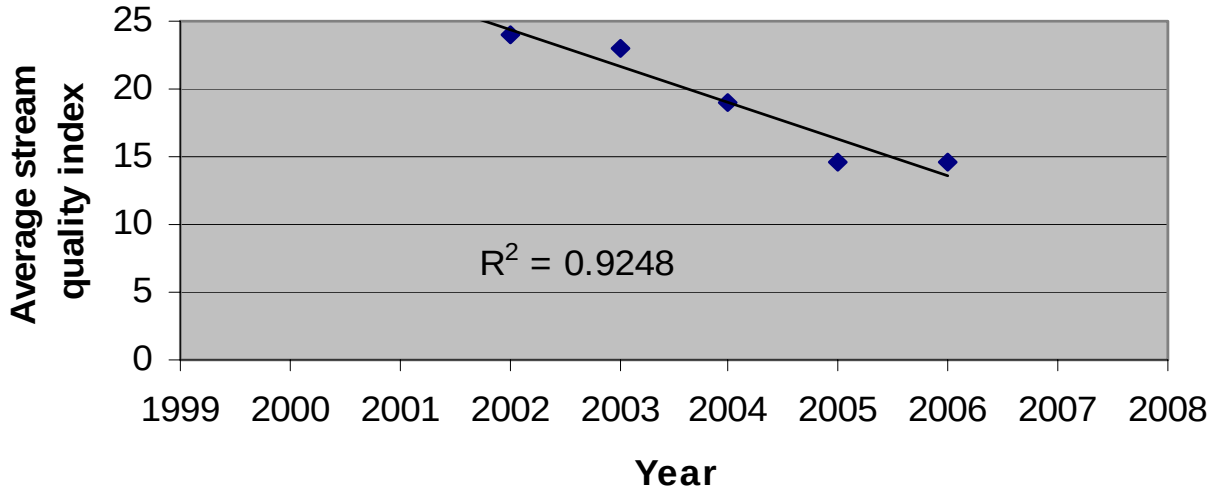


Figure 6. Average stream quality index values over time for Goodyear Heights 1, Goodyear Heights Metro Park, 1994-2006.

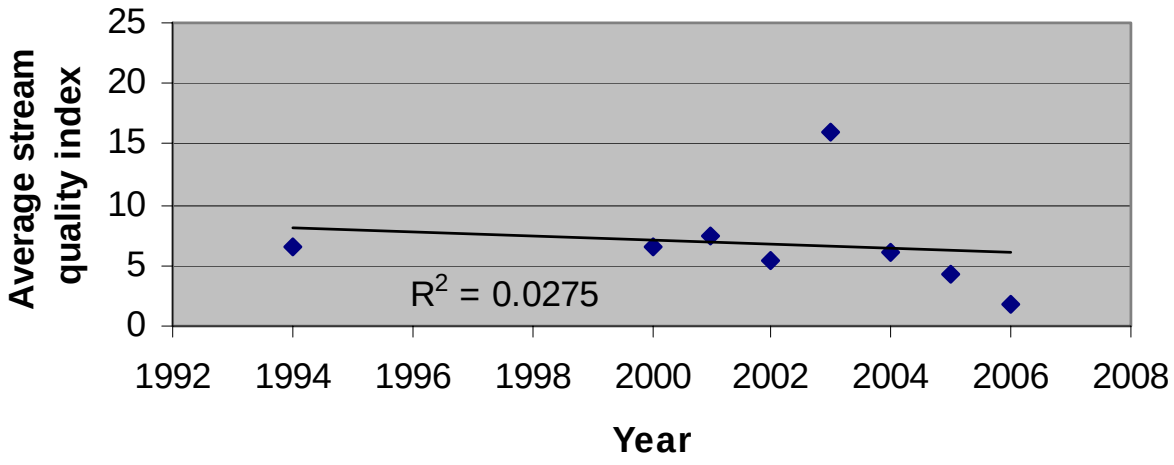


Figure 7. Average stream quality index values for Goodyear Heights 2, Goodyear Heights Metro Park, 1994-2006.

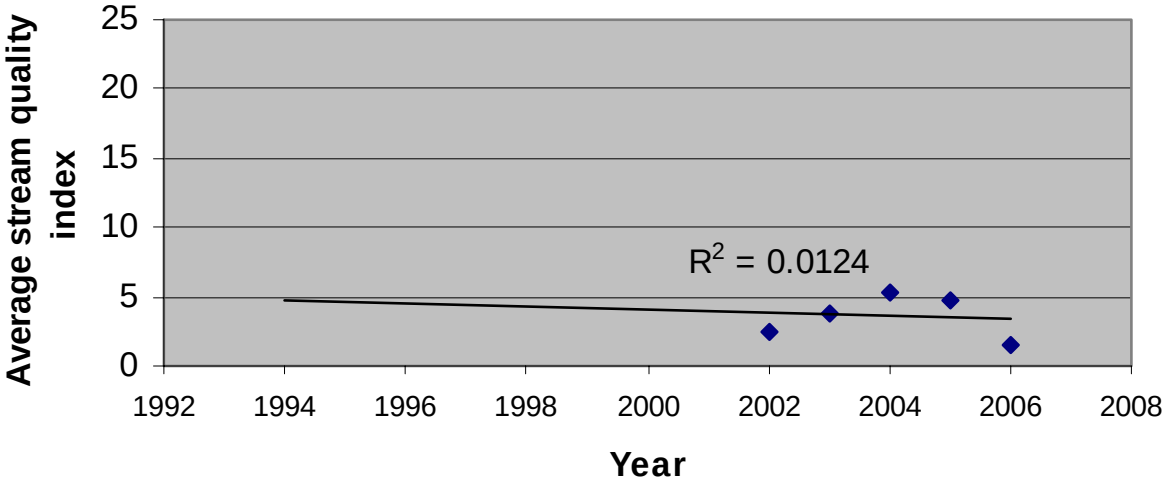


Figure 8. Average stream quality index values for Hampton Hills 1, Hampton Hills Metro Park, 1994-2006.

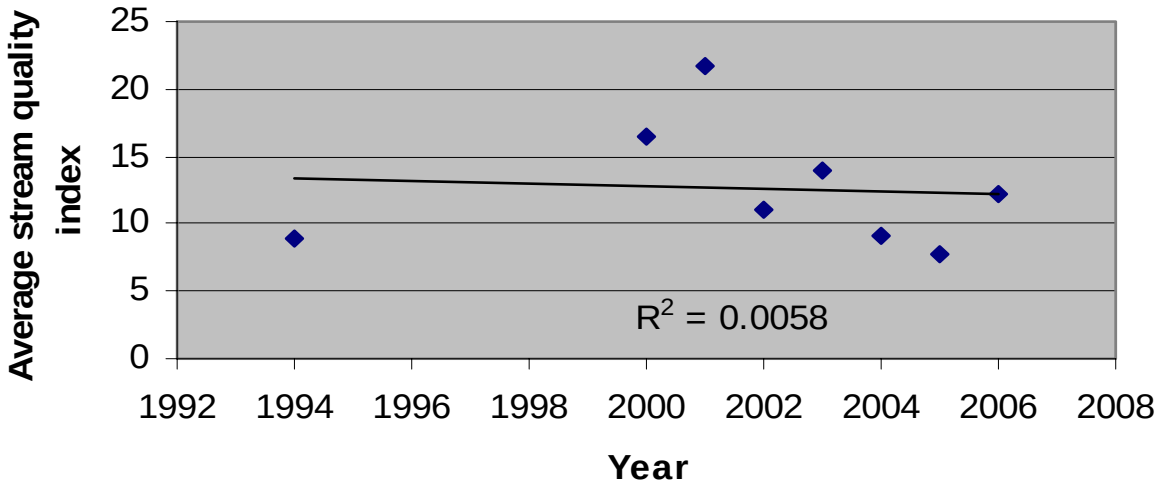


Figure 9. Average stream quality index values over time for Munroe Falls 1, Munroe Falls Metro Park, 1994-2006.

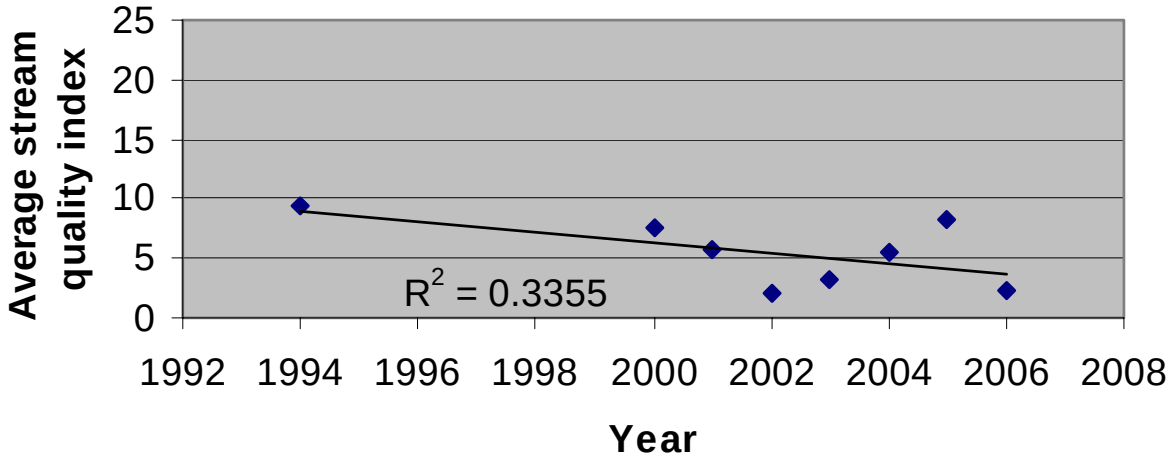


Figure10. Average stream quality index values over time for Munroe Falls 2, Munroe Falls Metro Park, 1994-2006.

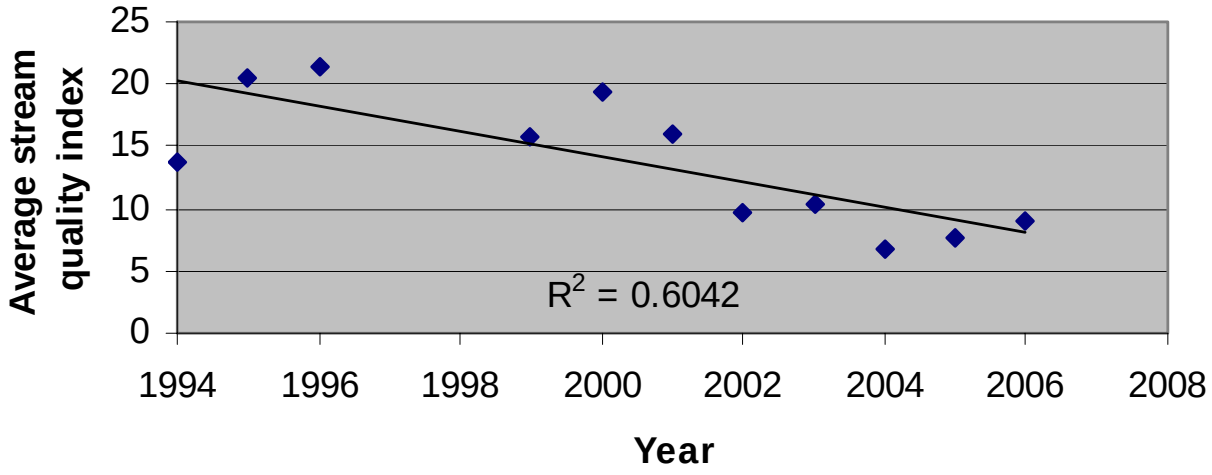


Figure 11. Average stream quality index values over time for O'Neil Woods 1, O'Neil Woods Metro Park, 1994-2006.

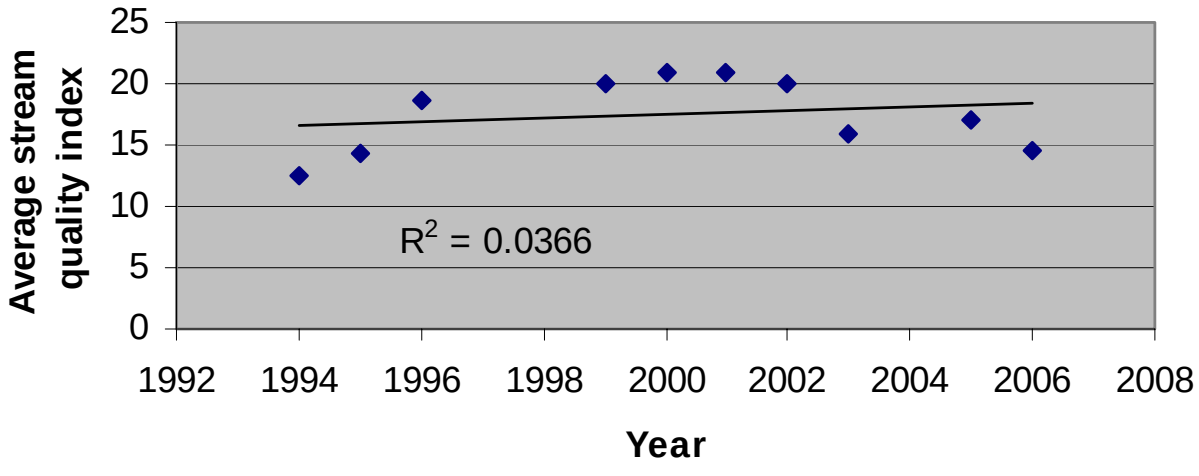


Figure 12. Average stream quality index value over time for O'Neil Woods 2, O'Neil Wood Metro Park, 1994-2006

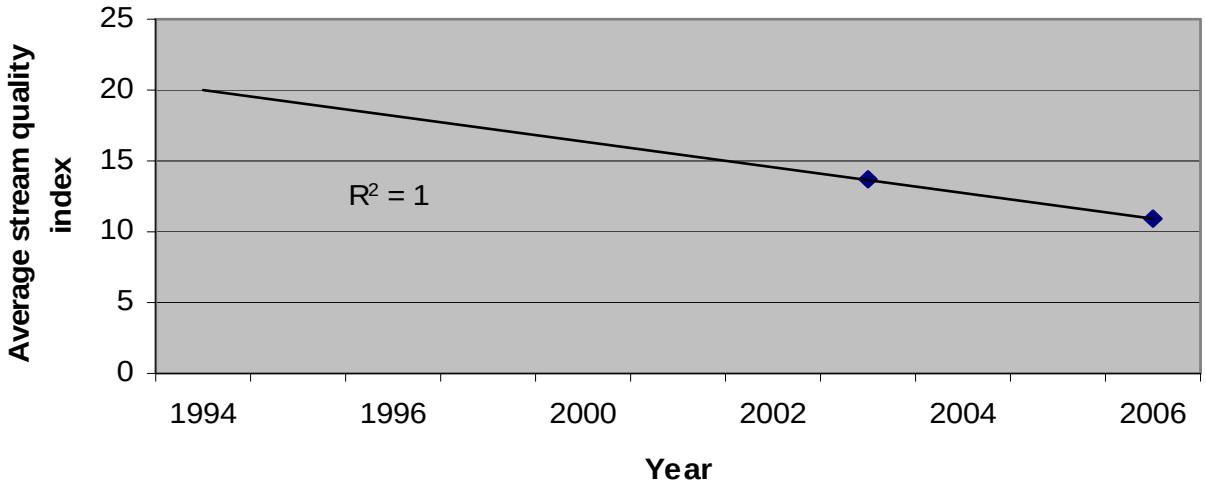


Figure 13. Average stream quality index values for Sand Run 1, Sand Run Metro Park, 1995-2006.

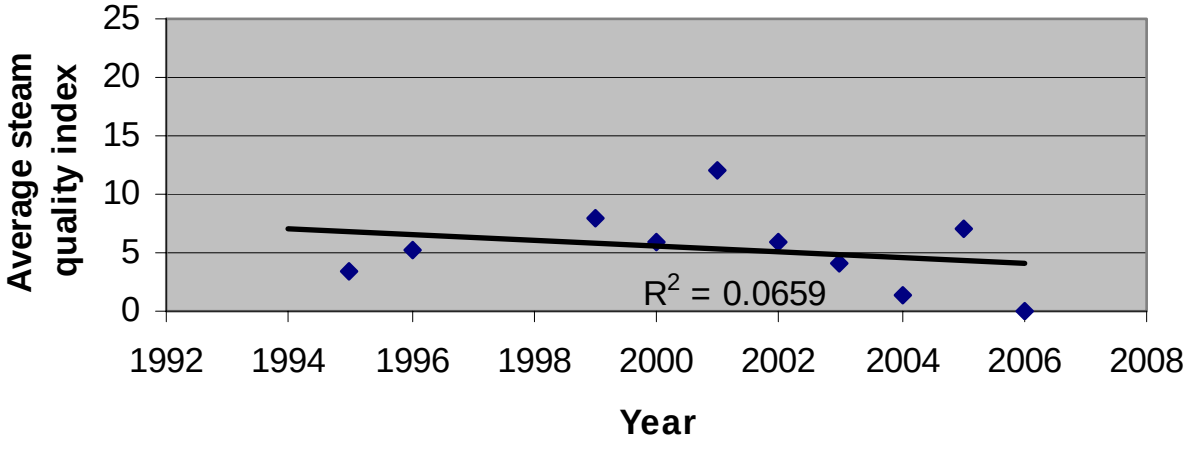


Figure 14. Average stream quality index values over time for Sand Run 2, Sand Run Metro Park, 1994-2006.

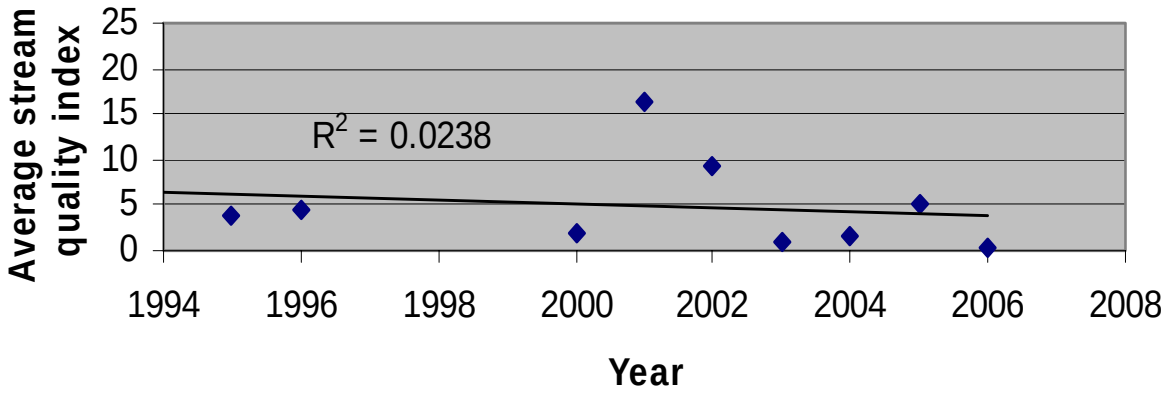


Figure 15. Average stream quality index values for Sand Run 3, Sand Run Metro Park, 1994-2006.

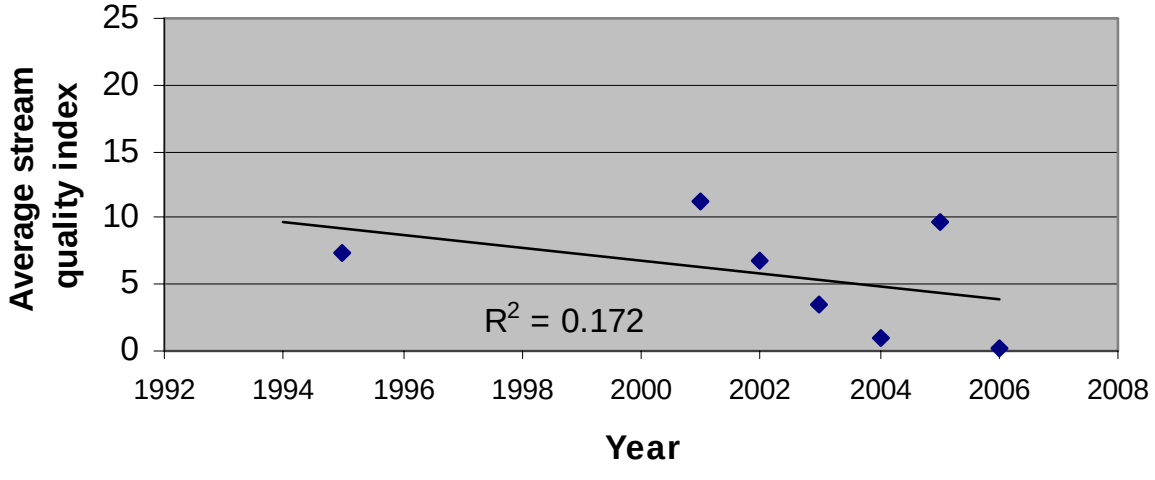


Figure 16. Average stream quality index values over time for Silver Creek 1, Silver Creek Metro Park, 1994-2006.

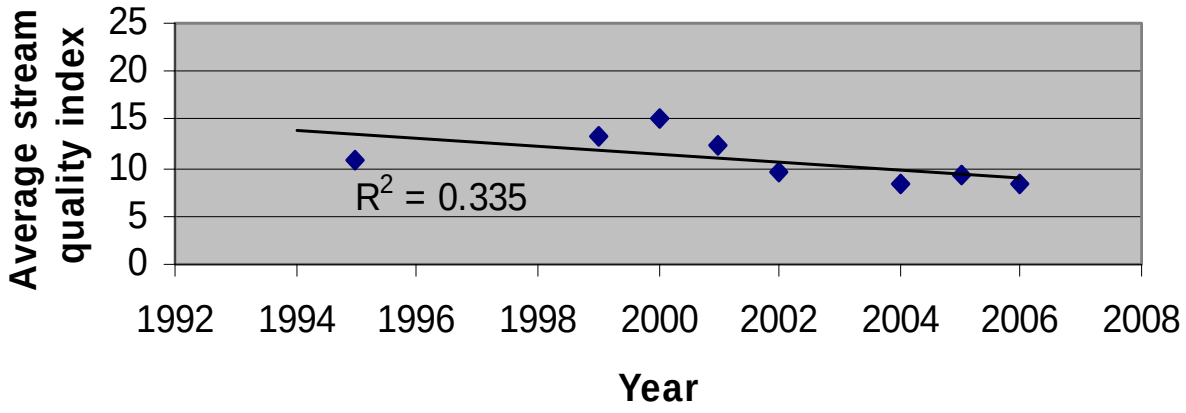


Figure 17. Average stream quality index values for Silver Creek 2, Silver Creek Metro Park, 1994-2006.

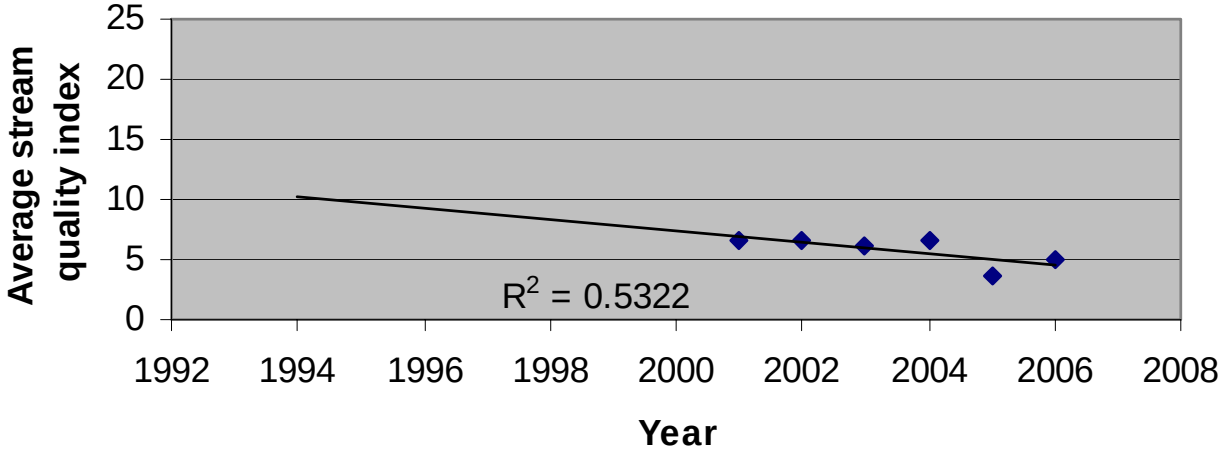


Figure 18. Average stream quality index value over time for Gorge 1, Gorge Metro Park, 1994-2006.

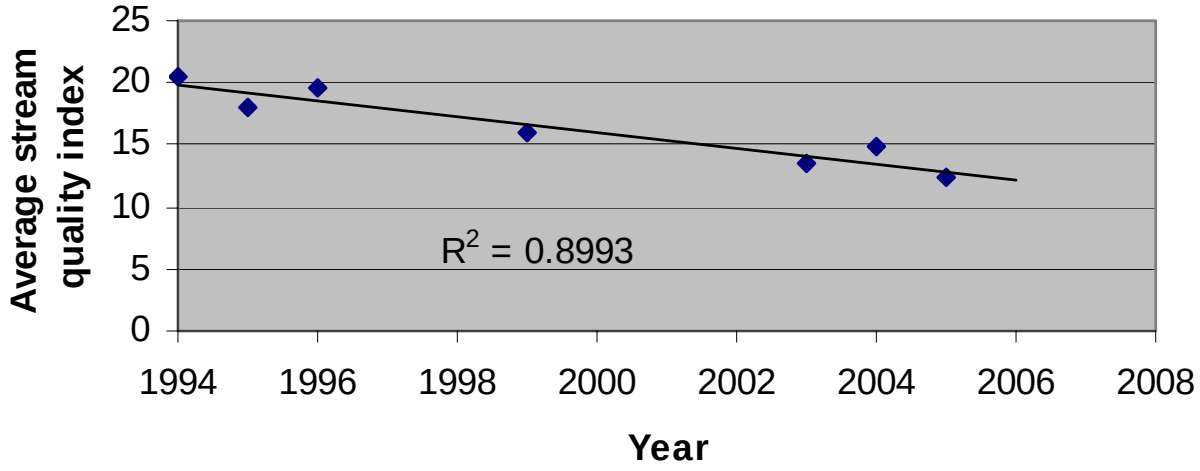


Figure 19. Average stream qulity index values over time for Cascade Valley 1, Cascade Valley Metro Park, 1994-2006.

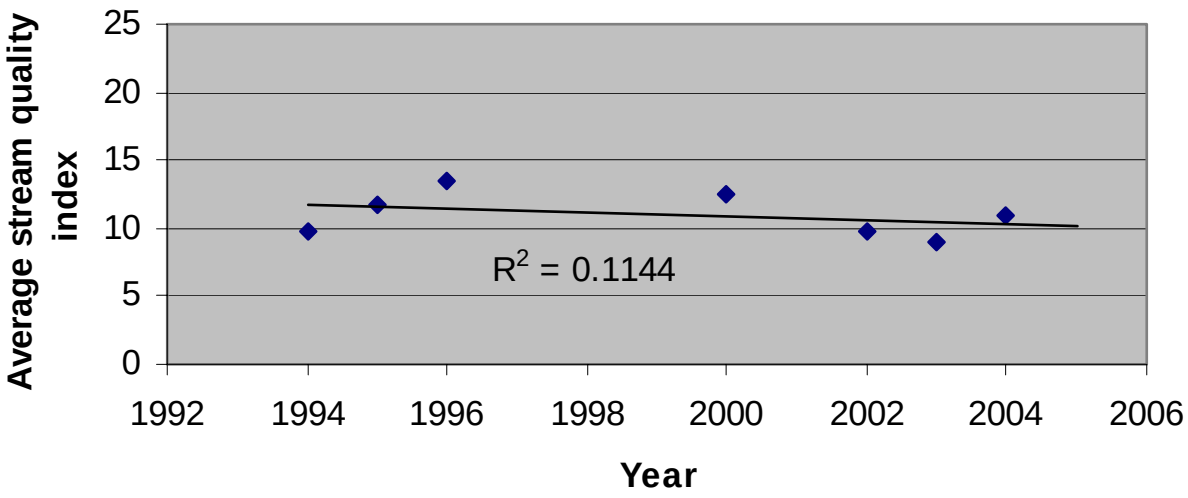


Figure 20. Average stream quality index values over time for Cascade Valley 2, Cascade Valley Metro Park, 2003-2006.

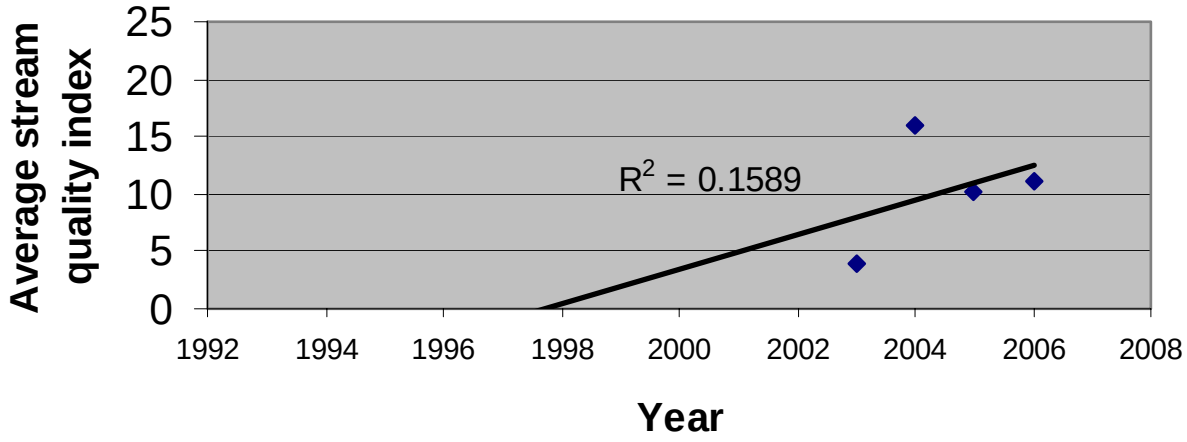
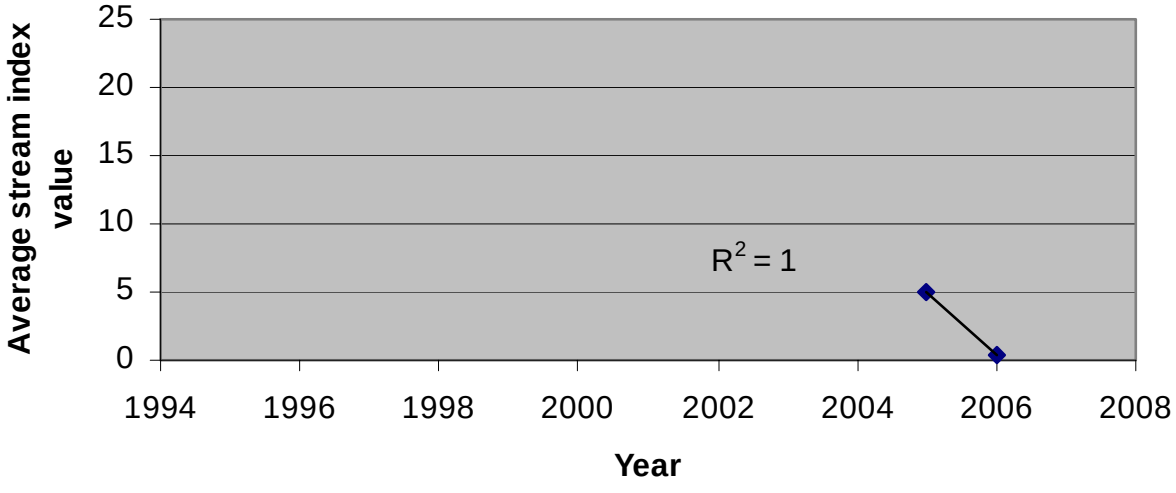


Figure 21. Average stream quality index values for Munroe Falls Dam 1, Bike and Hike Trail, 2005-2006



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 > ☐ 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) ☐