# 2008 Stream Quality Monitoring Report

Cuyahoga River, Cascade Valley Metro Park

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. 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 2008 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.

The stream macro-invertebrate guides were re-designed this year. They include full color illustrations from A Guide to Common Freshwater Invertebrates of North America by J.Reese Voshell. Jr. A dichotomous key, as well as a guide to the macro-invertebrate family groups was developed and printed in a format that reflected the old materials. The changes made to these tools were a significant improvement from the key and guide used for previous years.

Other improvements to the stream monitoring program include updating the power point presentation used during the training event in April. The scanned images created for the key and guide were used in the presentation. This provided continuity to the training program.

All of the stream survey sites were evaluated before the 2008 season began. Several sites were removed from the survey schedule including Sand Run 1, Sand Run 2, Gorge 1, Firestone 2, and O’Neil Woods 2. These sites were removed for several reasons including lack of interest in the program by volunteers, but more importantly consistently low index scores with no signs of improvement. These sites have not changed over the course of several years and staff felt monitoring could be suspended.

On the other hand, several new sites were added to the program including Columbia Run 1, Clinton Towpath 1, Furnace Run 4, Furnace Run 5, Goodyear Heights 3,

Hampton Hills 2, and Sand Run 4. The addition of these sites allowed for better coverage across the county with regard to the stream survey program, as well as including representation from all the major watersheds.

Volunteer interest in the stream monitoring program has been poor for the last four years. There are many volunteers who participate in the program every year, but others come and go with relative frequency. In an effort to secure more help for the 2008 season, the volunteer manager spent more time recruiting for this program. Because of this, we had record numbers of participants attend the training and all 28 sites were signed up for this year.

## Results

A total of 26 sites were monitored this year including sites at Goodyear Heights, Munroe Falls, Hampton Hills, Furnace Run, Sand Run, Firestone, Silver Creek, O'Neil Woods and Cascade Valley Metro Parks, Virginia Kendall and Columbia Run Conservation Areas and the Clinton Towpath. 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 2008.**

| Site | # Samples Taken | Minimum Index Value | Maximum Index Value | Average Cumulative Index Value | Standard Deviation | Maximum Assessment Category |
|---|---|---|---|---|---|---|
| **ACR01** | 6 | 9 | 19 | 13.00 | 3.63 | Good |
| **ACT01** | 9 | 4 | 20 | 9.56 | 4.77 | Good |
| **ACV01** | 8 | 10 | 18 | 15.00 | 2.67 | Good |
| **ACV02** | 10 | 7 | 13 | 9.90 | 2.18 | Fair |
| **AFR01** | 6 | 10 | 20 | 13.17 | 3.76 | Good |
| **AFR02** | 6 | 13 | 22 | 18.00 | 3.10 | Good |
| **AFR03** | 6 | 15 | 19 | 16.83 | 1.72 | Good |
| **AFR04** | 7 | 12 | 29 | 20.14 | 6.41 | Excellent |
| **AFR05** | 8 | 3 | 9 | 6.75 | 2.19 | Poor |
| **AFS01** | 6 | 6 | 11 | 7.67 | 2.07 | Fair |
| **AGH01** | 2 | 9 | 12 | 10.50 | 2.12 | Fair |
| **AGH02** | 5 | 4 | 12 | 7.40 | 3.13 | Fair |
| **AGH03** | 1 | 8 | 8 | 8.00 | | Poor |
| **AHH02** | 6 | 1 | 11 | 4.50 | 3.73 | Fair |
| **ALP02** | 1 | 14 | 14 | 14.00 | | Fair |
| **AMF01** | 9 | 1 | 11 | 7.67 | 3.08 | Fair |
| **AMF02** | 7 | 9 | 19 | 12.57 | 3.82 | Good |
| **AMFD1** | 6 | 1 | 12 | 7.33 | 3.61 | Fair |
| **AOW01** | 3 | 6 | 13 | 8.67 | 3.79 | Fair |
| **AOW02** | 4 | 3 | 10 | 6.50 | 3.51 | Poor |
| **AOW03** | 3 | 0 | 10 | 6.33 | 5.51 | Poor |
| **ASC01** | 5 | 3 | 22 | 11.20 | 7.60 | Good |
| **ASC02** | 7 | 1 | 8 | 4.00 | 2.45 | Poor |
| **ASC03** | 7 | 2 | 10 | 5.29 | 3.04 | Poor |
| **ASR03** | 3 | 9 | 12 | 10.67 | 1.53 | Fair |
| **ASR04** | 3 | 17 | 22 | 20.33 | 2.89 | Good |

Figures 1-26 illustrate the average cumulative index values over time for each site surveyed in 2008. Many of the sites have been surveyed since 1994. Overall, it appears that many of the streams saw increases in their average cumulative index values in 2008. Individual site accounts are described below.

Columbia Run 1 was surveyed for the first time in 2008. It maximum assessment score was Good. Clinton Towpath 1 on Pancake Creek was also surveyed for the first time this year. It also scored a Good.

Two new sites in Furnace Run were surveyed in 2008 (Furnace Run 4 and 5). Furnace Run 4 is just downstream of the park where State Route 303 crosses the stream. It scored an Excellent, the highest rated site in the program. Furnace Run 5, a small tributary to Furance Run off of Wheatly Road scored Poor.

Furnace Run 1 at Rock Creek continues to be unpredictable, coming in at Good 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 on Furnace Run stream holds steady at Good with a maximum assessment score of 22, nearly breaking back into the Excellent category which it hasn't seen since 1995.

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. It made a significant bound forward this year and scored Good.

Firestone 1 continues to score Fair. Goodyear Heights 1 also scored fair, but the average index value saw a marked increase from 1.3 in 2006 to 10.5 in 2008. Goodyear Heights 2 also saw an improvement in 2008. Its average index value improved nearly 6 points to achieve a Fair assessment.

Hampton Hills 1 data was not turned in this season, but has been surveyed in the past and maintained a Fair status for many years. Hampton Hills 2 was added to the program this year. This site is on Woodward Creek at the east end of the park. It received a Fair assessment.

Munroe Falls 1 increased from Poor to Fair in 2008, while Munroe Falls 2 increased from Fair to Good. Munroe Falls Dam 1 maintained a Fair assessment. O'Neil Woods 1 increased its average index value to 13, but maintained its Fair designation. O'Neil Woods 3, a new site in 2008 was Poor.

Silver Creek 1 jumped from Poor to Good status this year. Its average index value in 2007 was 7 and its highest value in 2008 was 22, nearly an Excellent assessment. Silver Creek 2 and the new Silver Creek 3 both scored Poor.

Sand Run 3 broke into the Fair category this year and the new site at Sand Run 4 scored Good. Sand Run 4 is near Portage Trail. This site was one point away from an Excellent Assessment.

Below are graphs for each site surveyed in 2008. Many of the graphs include data from 1994 to present. Each point on the graphs represents the average cumulative index value achieved by each site per year. These graphs represent the trends of each survey site over time.

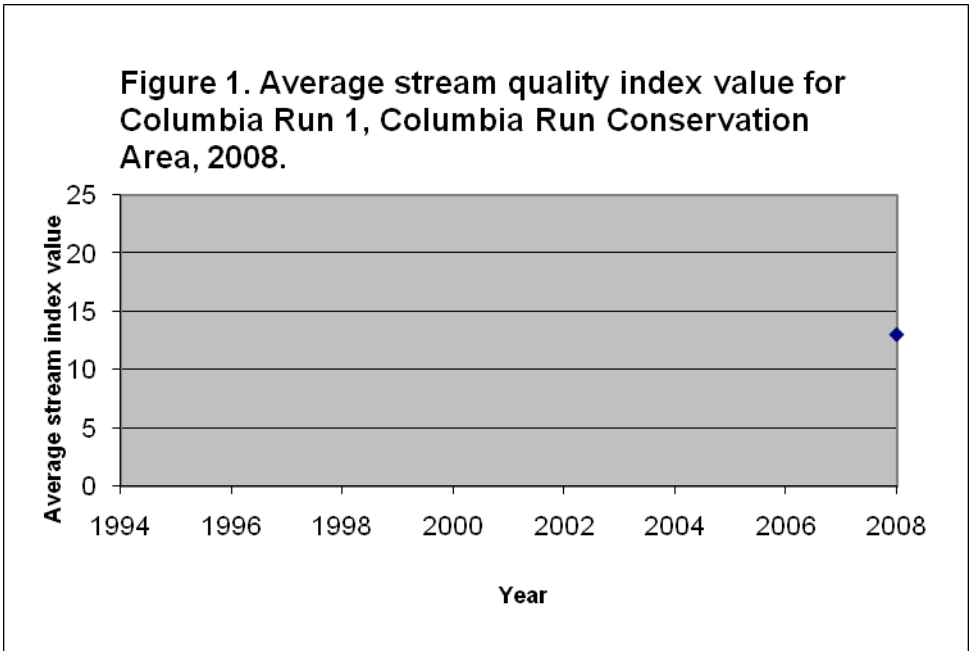


Figure 2. Average stream quality index value for Clinton Towpath 1, Clinton Towpath Area, 2008.

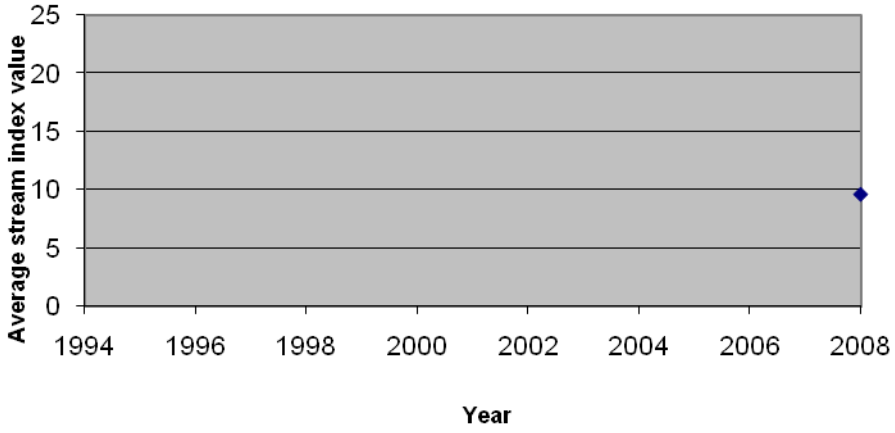



Figure 3. Average stream qulity index values for Cascade Valley 1, Cascade Valley Metro Park, 1994-2008.

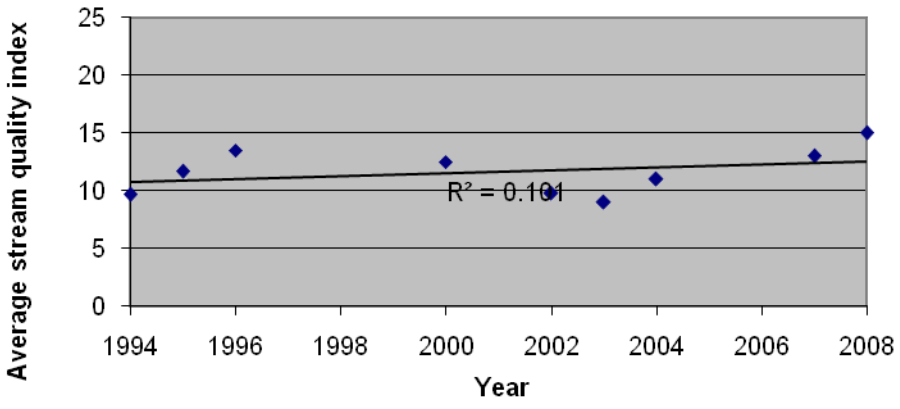


Figure 4. Average stream quality index values for Cascade Valley 2, Cascade Valley Metro Park, 2003-2008.

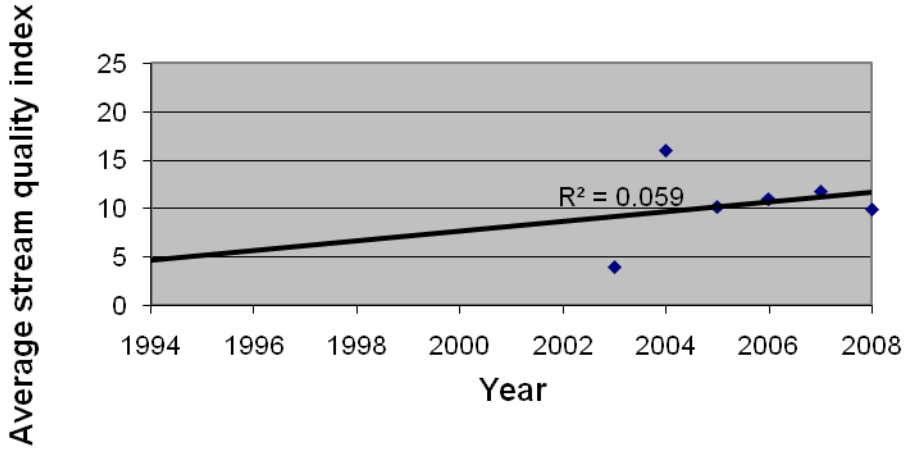



Figure 5. Average stream quality index values for Furnace Run 1, Furnace Run Metro Park, 1994-2008.

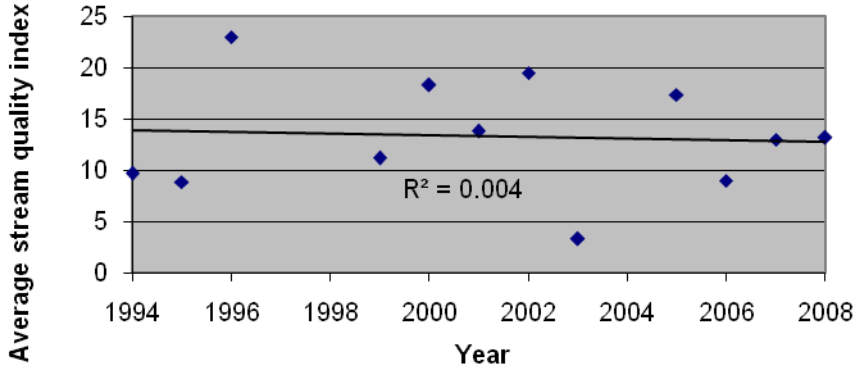


Figure 6. Average stream quality index values for Furnace Run 2, Buttonwood Trail Crossing, Furnace Run Metro Park, 1994-2008.

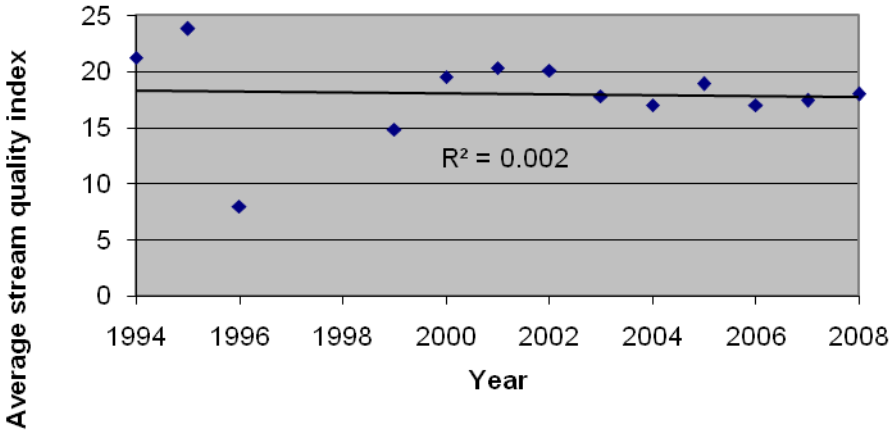



Figure 7. Average stream quality index value for Furnace Run 3, Furnace Run Metro Park, 1994-2008.

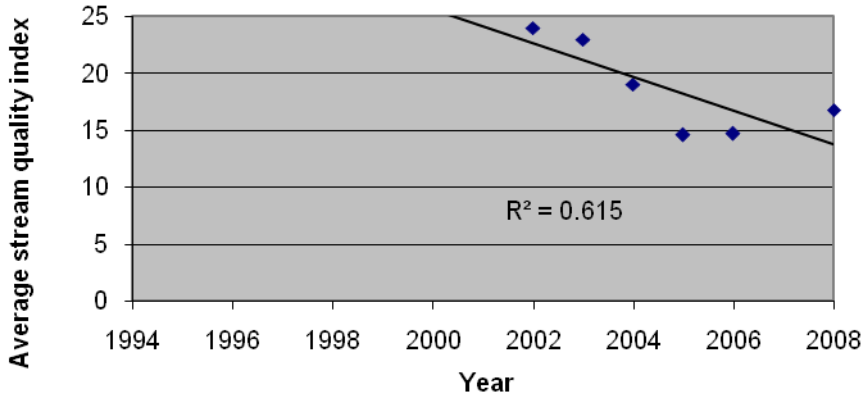


Figure 8. Average stream quality index value for Furnace Run 4, Furnace Run Metro Park, 2008.

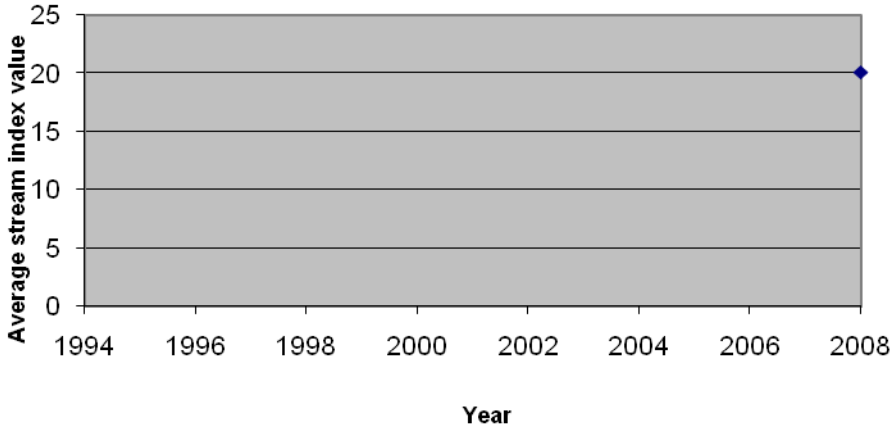



Figure 9. Average stream quality index value for Furnace Run 5, Furnace Run Metro Park, 2008.

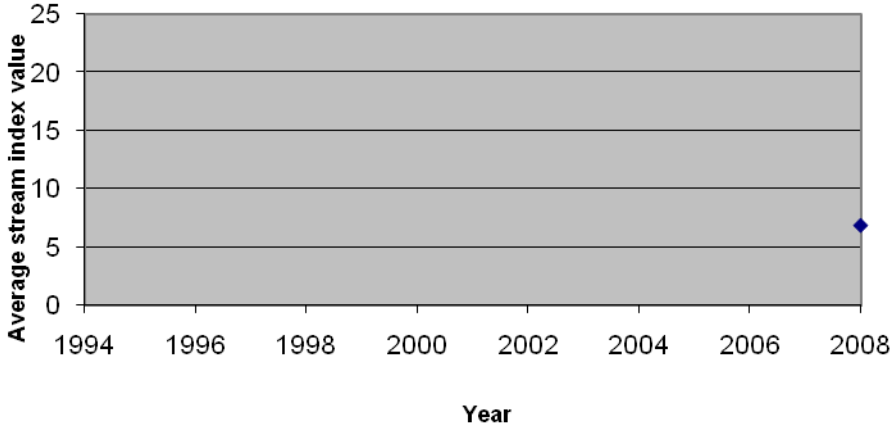


Figure 10. Average stream quality index values for Firestone 1, Firestone Metro Park, 2003-2008.

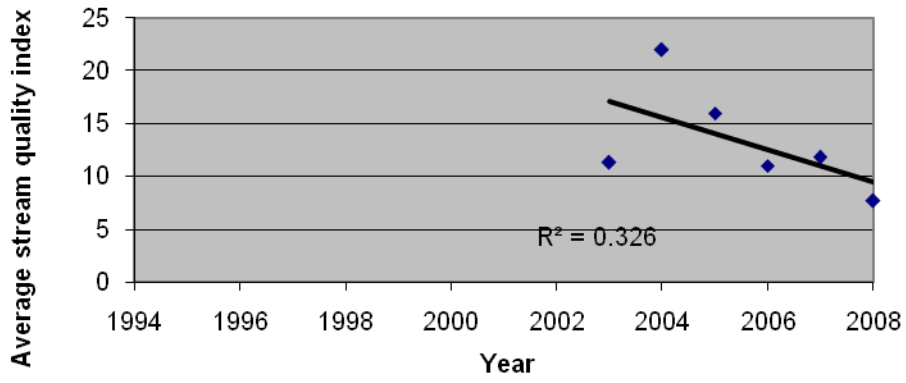



Figure 11. Average stream quality index values for Goodyear Heights 1, Goodyear Heights Metro Park, 1994-2008.

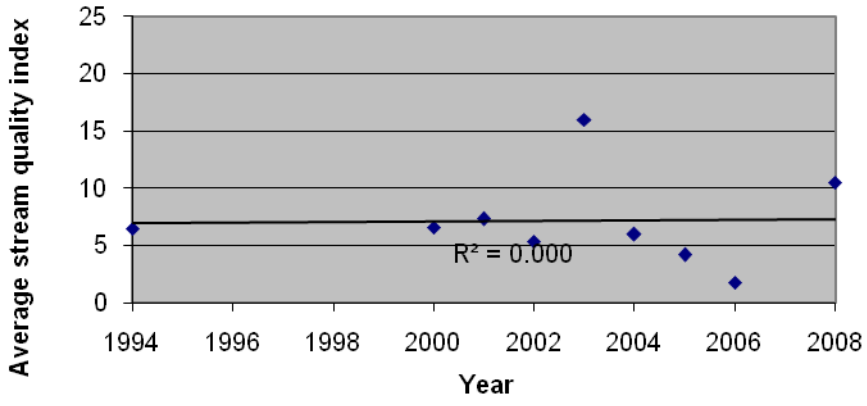


Figure 12. Average stream quality index values for Goodyear Heights 2, Goodyear Heights Metro Park, 1994-2008.

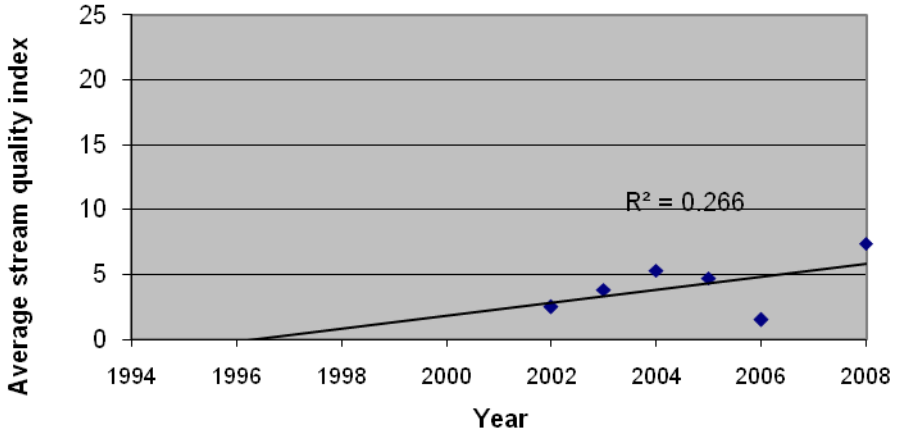



Figure 13. Average stream quality index value for Goodyear Heights 3, Goodyear Heights Metro Park, 2008.

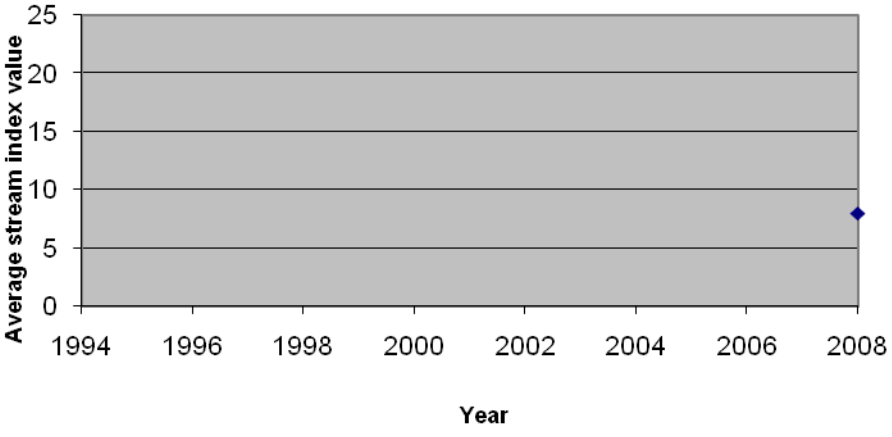


Figure 14. Average stream quality index value for Hampton Hills 2, Hampton Hills Metro Park, 2008.

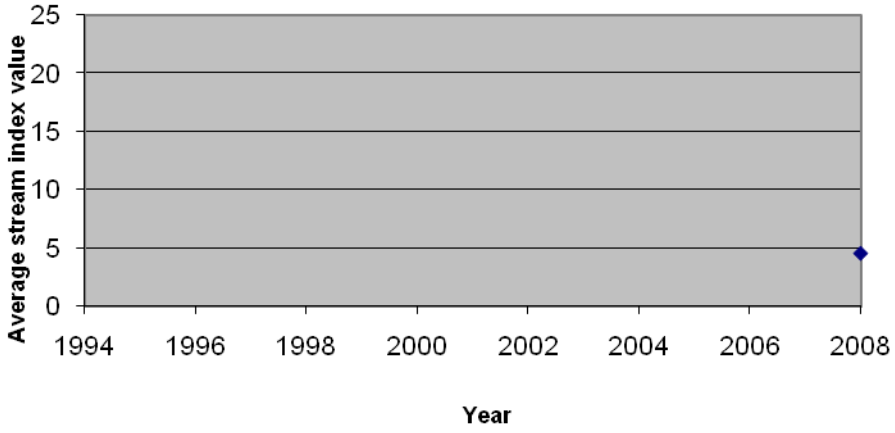



Figure 15. Average stream quality index value for Liberty Park 2, Liberty Park, 2008.

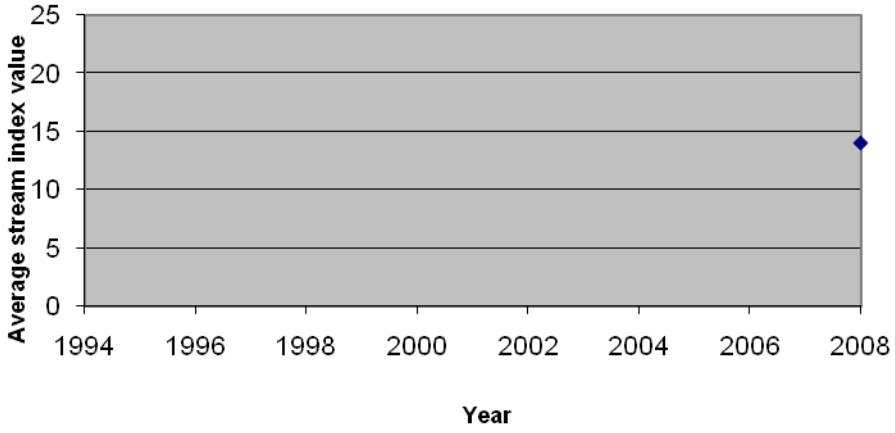


Figure 16. Average stream quality index values for Munroe Falls 1, Munroe Falls Metro Park, 1994-2008.

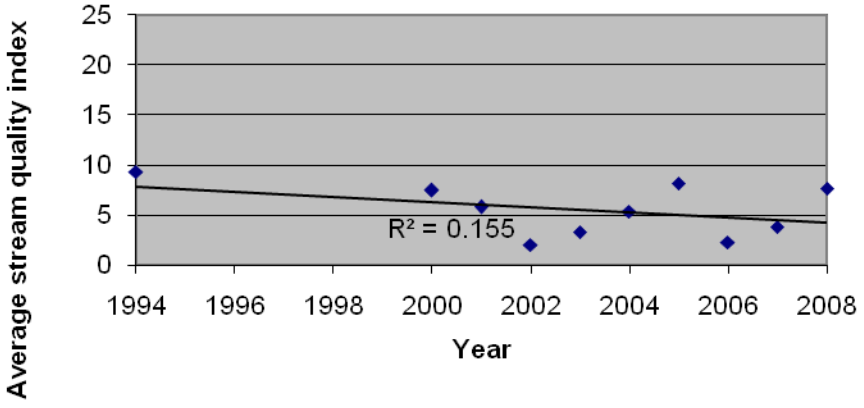



Figure 17. Average stream quality index values for Munroe Falls 2, Munroe Falls Metro Park, 1994-2008.

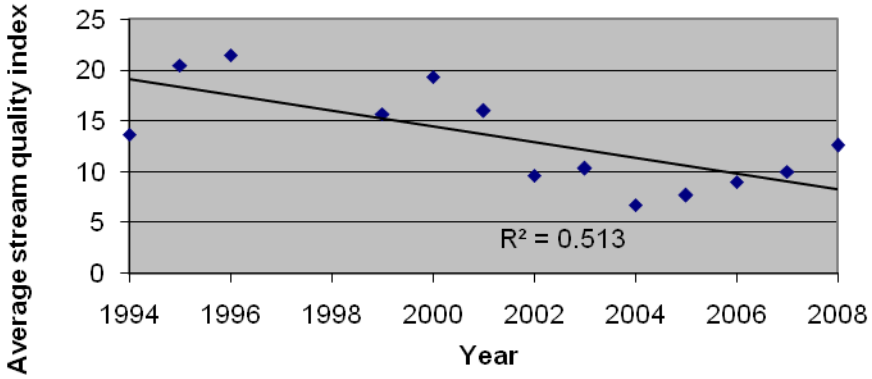


Figure 18. Average stream quality index values for Munroe Falls Dam 1, Bike and Hike Trail, 2005-2008.

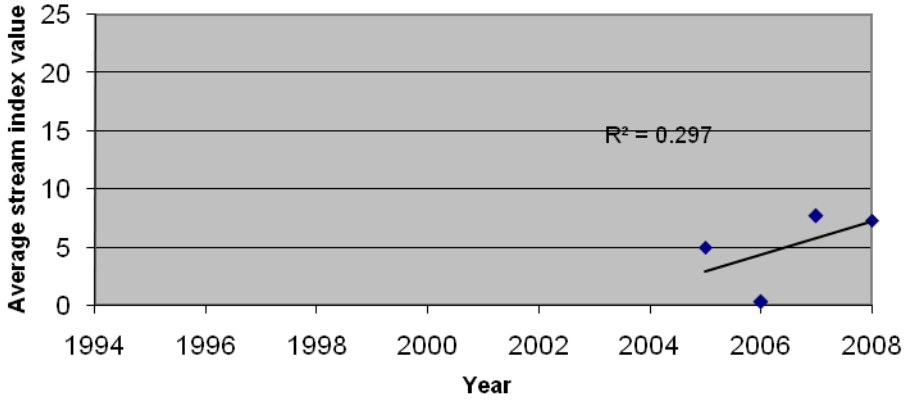



Figure 19. Average stream quality index values for O'Neil Woods 1, O'Neil Woods Metro Park, 1994-2008.

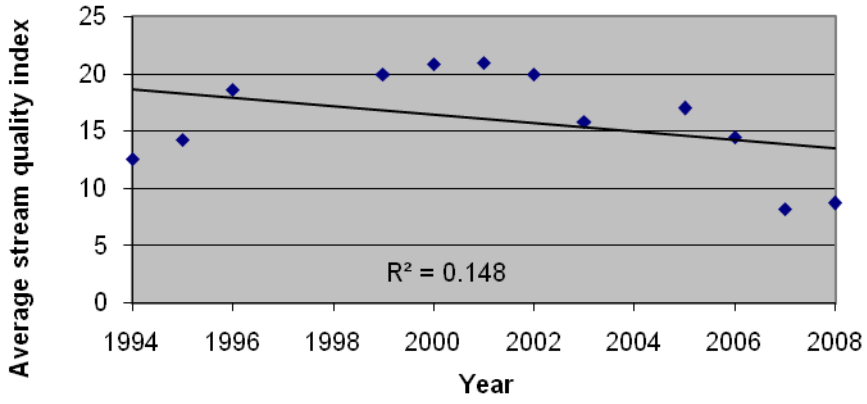


Figure 20. Average stream qulity index values for O'Neil Woods 2, O'Neil Woods Metro Park, 1994-2008.

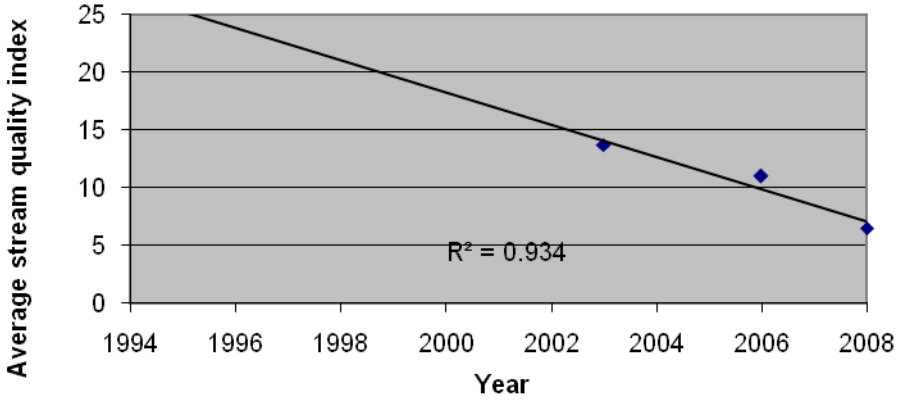



Figure 21. Average stream quality index value for O'Neil Woods 3, O'Neil Woods Metro Park, 2008.

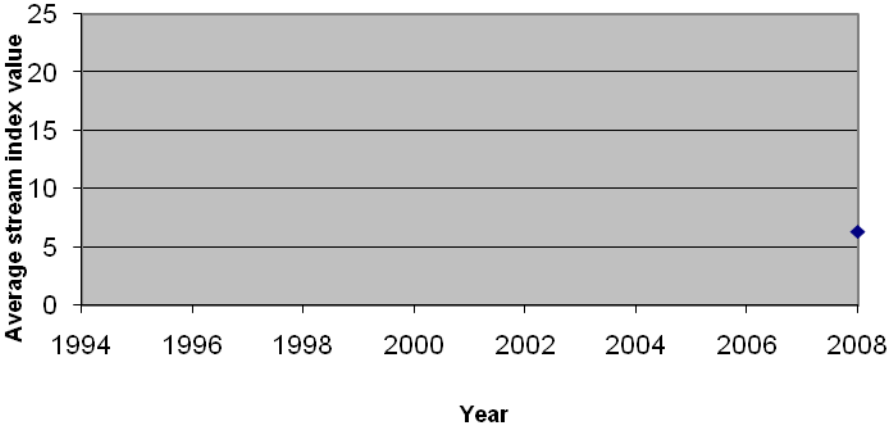


Figure 22. Average stream quality index values for Silver Creek 1, Silver Creek Metro Park, 1994-2008.

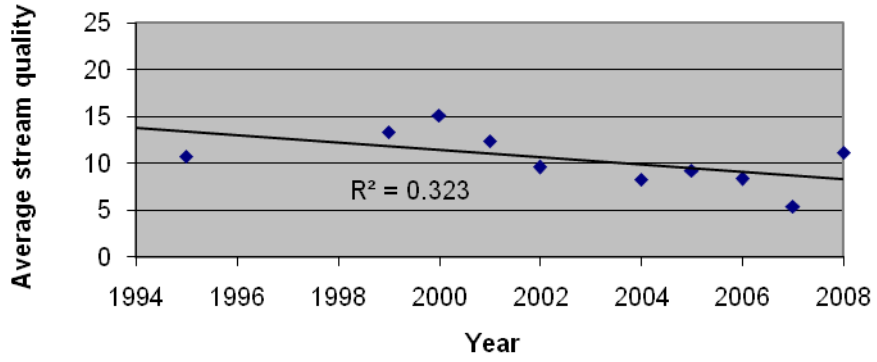



Figure 23. Average stream quality index values for Silver Creek 2, Silver Creek Metro Park, 1994-2008.

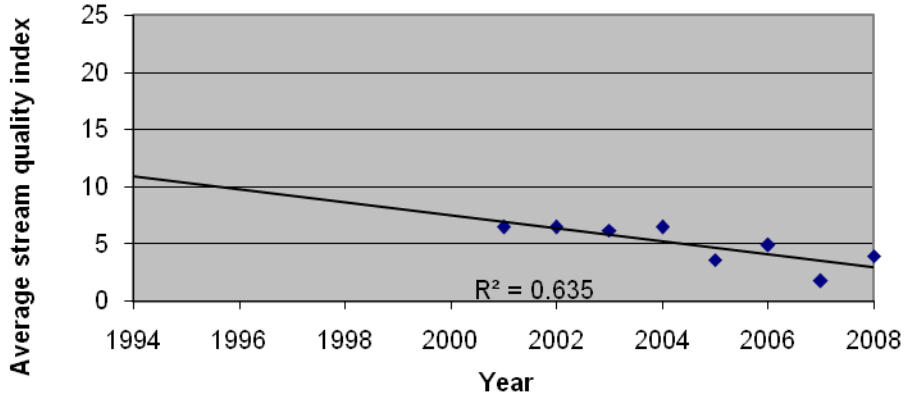


Figure 24. Average stream quality index value for Silver Creek 2, Silver Creek Metro Park, 2008.

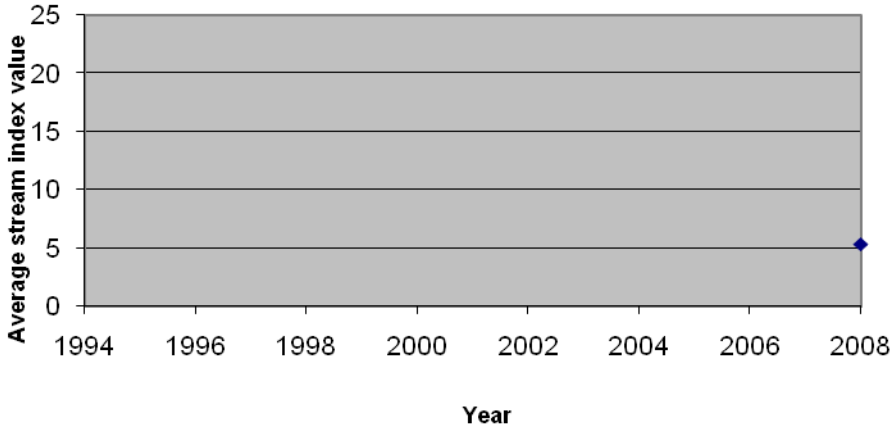
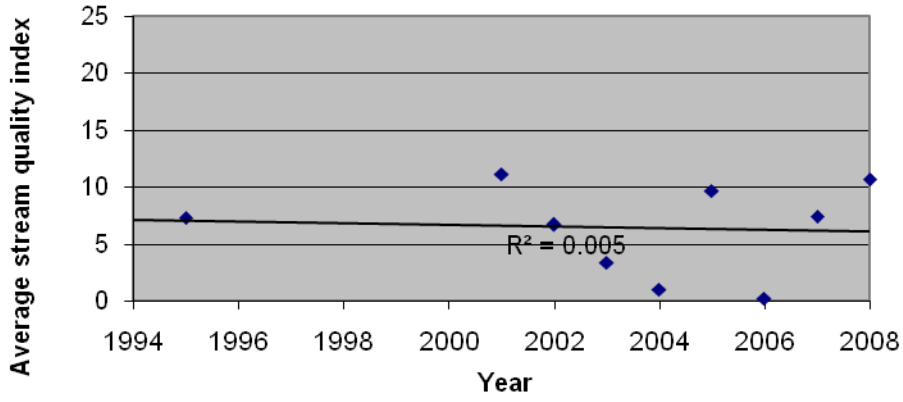
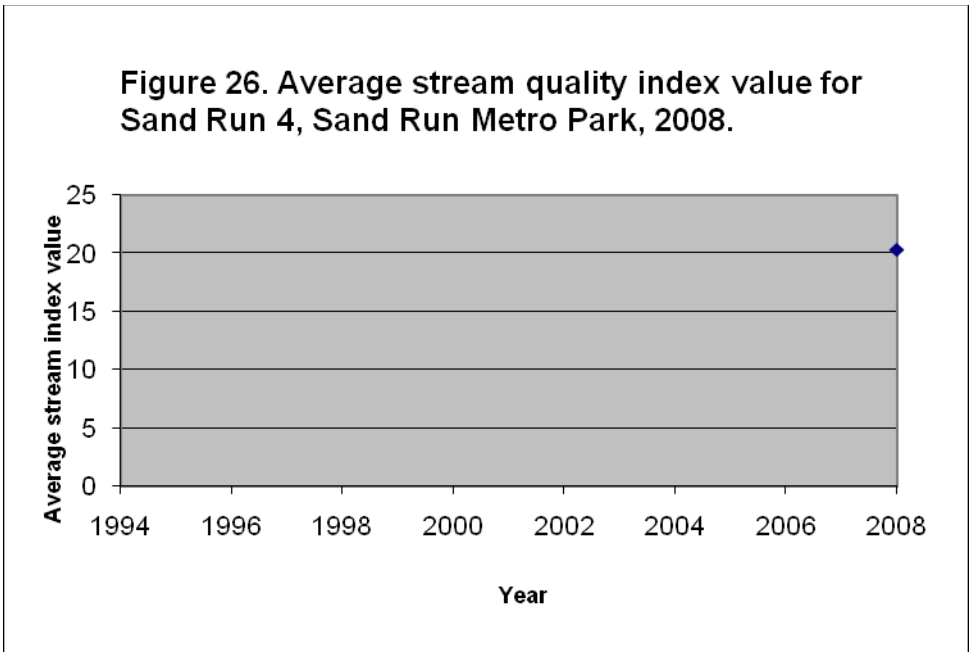



Figure 25. Average stream quality index values for Sand Run 3, Sand Run Metro Park, 1994-2008.






In general, most sites saw an upward trend in their scores in 2008. It is unclear why this happened. However, we did not have any major storms, floods or droughts this year. The streams may simply be rebounding from these events from recent history.

Overall the stream survey program was successful. The updated field guide and key are fantastic. Many new volunteers entered the program this year and hopefully they will return.

## 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) ☐