# Stream Quality Monitoring 2010 Annual Report
# Little Miami State & National Scenic River

## Contents

# Introduction

### Ohio Scenic Rivers Program

With more than 60,000 miles of streams, Ohio is a water-rich state. Many of Ohio's streams support thriving plant and animal communities, including Ohio's state designated scenic rivers. Administered by the Ohio Division of Watercraft, the Ohio Scenic Rivers Program oversees 14 state designated scenic river systems, comprising 800 river miles along 26 stream segments. These streams represent some of the best of Ohio's waterways.

### Stream Quality Monitoring Project

Developed in 1983, the Stream Quality Monitoring (SQM) Project uses volunteers in aquatic macroinvertebrate monitoring to compile biological and water quality data on the state's scenic rivers. The SQM project is an excellent, simple and cost-effective method of assessing a stream's health.

Aquatic macroinvertebrates organisms lack a backbone (invertebrate), are large enough to view with the naked eye (macro), and spend at least a portion of their lives in the water (aquatic). Macroinvertebrates, such as various aquatic insects (e.g. mayfly, stonefly), are good indicators of stream health. When negative impacts to a stream occur, the result may show a decline or absence of certain macroinvertebrate species. Through consistent monitoring in the SQM Project, changes observed in the macroinvertebrate community help the Ohio Scenic Rivers Program detect and address potential impacts to a stream.

The Ohio Scenic Rivers Program compiles volunteer field assessment information into a statewide database. The database serves as a tool to track short- and long-term changes and trends over time.

### SQM Project Relies on Volunteers

Coordinated by the Division of Watercraft, the SQM Project provides opportunities for public participation in scenic river protection efforts. Many local, youth and conservation organizations, individuals and families are committed to monitoring more than 150 stations along Ohio's scenic rivers.

SQM volunteers collect macroinvertebrate data from selected monitoring stations, also referred to as monitoring sites or reference stations, three times during the monitoring season. Volunteers complete field assessment forms which document taxonomy, tolerance and abundance of collected organisms.

### SQM Annual Report

The information collected by volunteers has become a critical tool for the documenting of the health of Ohio's state scenic, wild and recreational rivers. This report is a compilation of field data collected during 2010 by volunteers and staff. It also represents a year of dedication and commitment shown to Ohio's special waterways by thousands of SQM volunteers.

# Overview

On April 23, 1969, the Little Miami River earned the distinction of becoming Ohio's first designated State Scenic River. From its headwaters in Clark County, the Little Miami flows southwesterly for more than 100 miles, traversing five counties before arriving at its confluence with the Ohio River. The Little Miami River was also the first Ohio stream to be designated as a National Scenic River.

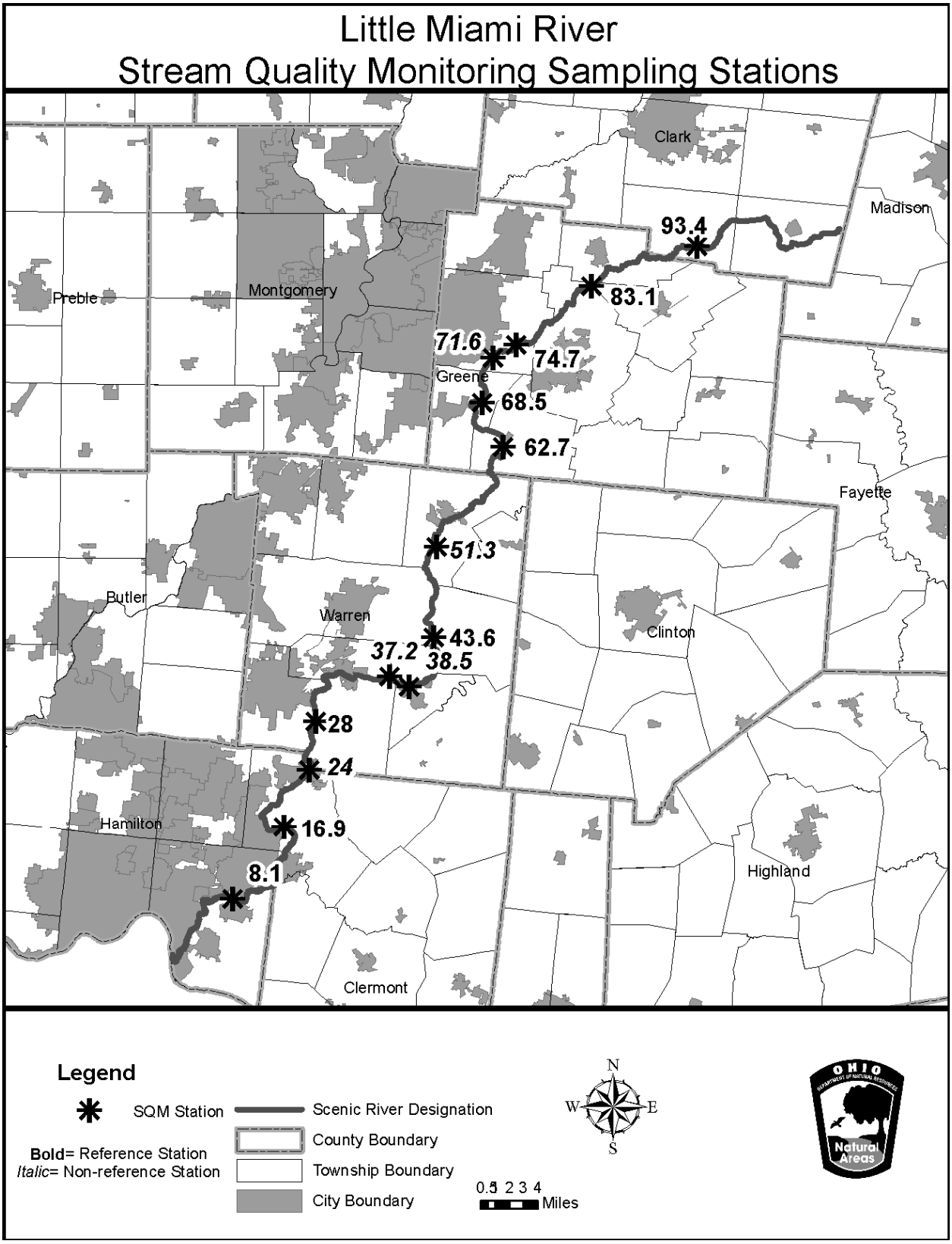
Noted for breathtaking vistas and scenery, the Little Miami River supports rich and abundant aquatic life. More than 87 species of fish, 36 species of mussels (including five state endangered species) and untold species of breeding birds reside within the river valley. Exceptional water quality in the Little Miami also supports diverse populations of pollution-intolerant macroinvertebrates, such as dobsonfly larvae, water penny beetles and many others.

Public access to the Little Miami Scenic River is readily available through a variety of facilities including Clifton Gorge State Nature Preserve, John Bryan State Park, several Greene County parks, the Little Miami State Park and several scenic river access sites. Additionally, numerous private campgrounds and canoe liveries offer a variety of activities for enjoying the river. Due to its unique combination of spectacular beauty and easy access, the Little Miami Scenic River is a popular venue for hikers, canoeists, fishermen and bicyclists.

The Little Miami River valley is also home to many of Ohio's significant historical and archaeological sites. Fort Ancient, located in Warren County and managed by the Ohio Historical Society, was home to at least two of Ohio's prehistoric mound-building tribes. The Little Miami valley was also home to the Shawnee Indians and the influential chief, Tecumseh. Arrowheads, pottery shards and many other Indian artifacts commonly are found along the river.

The Little Miami flows through several natural areas that highlight the wide diversity of Ohio's ecology. For instance at Clifton Gorge State Nature Preserve, the high dolomite cliffs of the narrow gorge provide an exceptional display of plants commonly seen in climates much farther north. Boreal relicts, such as hemlocks and white cedars, provide an interesting view into Ohio's glacial past. Additionally, more than 340 species of wildflowers are found in the preserve during the spring and summer months.

The Little Miami Scenic River is one of Ohio's exceptional waterways and an ideal place to spend a weekend exploring the natural heritage of our state. For more information about public access and facilities along the river, contact the Southwest Ohio Regional Scenic River Manager at 513-934-0751 or the Division of Watercraft at 614-265-6814.


Little Miami River
Stream Quality Monitoring Sampling Stations
Clark
Madison
Preble
Montgomery
Greene
Fayette
Butler
Warren
Clinton
Hamilton
Highland
Clermont
93.4
83.1
71.6
74.7
68.5
62.7
51.3
43.6
37.2
38.5
28
24
16.9
8.1
Legend
SQM Station
Scenic River Designation
County Boundary
Township Boundary
City Boundary
Bold= Reference Station
Italic= Non-reference Station
N
W
E
S
0.5 2 3 4
Miles
OHIO
Natural Areas

# 2010 Stream Quality Monitoring Participants

Whether their contribution was a one-time event or a recurring adventure in stream exploration, the individuals and organizations listed below played a significant role in protecting the Little Miami River. Their time and dedication to this river and the Ohio SQM Project are greatly appreciated. Special thanks are extended to the Little Miami Scenic River Advisory Council for their continued support and assistance.

**River Mile 8.1 - Bass Island Park Access**
Steve and Gerri Lilly

**River Mile 16.9 - Rock Pit Access**
Steve and Gerri Lilly

**River Mile 24.0 – Nesbit Park Access *(non- reference site)***

**River Mile 28.0 - Carl Rahe Memorial Access**
Friends of Simpson Creek
Diana Halligan

**River Mile 37.2 - Hall's Creek Access *(non-reference site)***

**River Mile 38.5 – Confluence of Todd's Fork *(non-reference site)***

**River Mile 43.6 - Fort Ancient Access**
Marsha Rolph

**River Mile 51.3 - Caesar Creek Access**
Volunteer needed

**River Mile 62.7 – Constitution Park *(new reference site)*** Bill Schiemanver **Mile 68.5 - Washington Mills Access**
Bishop Liebold - Roseanne Place – Bill Schieman

**River Mile 71.6 - The Narrows Reserve *(non-reference site)***
Bishop Liebold – Roseanne Place

**River Mile 74.7 - Glen Thompson Reserve**
Bishop Liebold – Roseanne Place, Bill Schieman

**River Mile 83.1 - Jacoby Road Access**
Bill Schieman

**River Mile 93.4 - Garlough Road Access**
Bill Schieman

The continued success of the Stream Quality Monitoring Project is dependent upon the commitment and dedication of these (and other) volunteers and participants. If you would like to participate in Ohio's volunteer Stream Quality Monitoring Project, please the Southwest Ohio Stream Quality Monitoring Coordinator at 937-968-3514 or the Southwest Ohio Scenic River Manager at 513-934-0751.

# Station Descriptions

Public access to the Little Miami River is widely available. As a result, many stream quality monitoring stations are located on public property and present little difficulty for volunteers to access and regularly monitor. The following are brief summaries of selected stream quality monitoring sites along the Little Miami River.

**River Mile 8.1 - Bass Island Park Access**
Bass Island is managed and maintained by the Hamilton County Park District. The area is heavily used and easily accessed by fishermen, hikers and canoeists. It is an excellent site to access the lower stretch of the Little Miami. The riffle is very deep at this station and is comprised of mostly cobbles and gravel, providing excellent habitat for dobsonfly larvae and stonefly nymphs. Cumulative Index Values (CIVs) for this station are good to excellent, an improvement from last year's moderate values. The sampling site is located directly downstream from the City of Milford, possibly contributing to the lower values previously recorded.

**River Mile 16.9 - Rock Pit Access**
An excellent sampling station on the Little Miami, the riffle area here is approximately 100 feet wide. A high diversity of macroinvertebrates inhabits this site with damselfly nymphs being quite common. CIVs for this area are generally quite high.

**River Mile 28.0 - Carl Rahe Memorial Access (Glenn Island)**
This monitoring station is easily accessible with ample parking available. The Carl Rahe Memorial Access, once called Glen Island, is one of the more popular fishing sites along the Little Miami in Warren County. Large cobbles, gravel and boulders make up the river bottom with a wide variety of macroinvertebrates inhabiting this riffle. Many pollution-intolerant species are found here, including a large number of caddis fly larvae. CIVs for this station are consistently in the mid-20s.

**River Mile 43.6 - Fort Ancient Access**
Famous for the nearby Indian burial mound site administered by the Ohio Historical Society, the Fort Ancient station provides access to a variety of activities along the Little Miami River. Used heavily by fishermen and canoeists, this access provides plenty of parking and well-established trails to the sampling area. The riffle area is composed mainly of gravel and cobbles, which provide excellent habitat for a wide variety of macroinvertebrates. CIVs for this site are usually in the excellent range with numerous organisms such as crayfish and pollution-intolerant caddis fly larvae being collected.

**River Mile 51.3 - Caesar Creek Access**
Due in part to the shallowness of this riffle area, water penny beetle larvae are abundant at this site. In addition, the large variety of pollution-intolerant species at this site consistently contribute to high CIVs.

**River Mile 62.7 - Constitution Park**
This riffle is shallow and mostly sand, gravel and some cobblestones. Numerous water penny larvae are at this site along with a large variety of other pollution-intolerant species, contributing to high CIVs.

**River Mile 68.5 - Washington Mills Access**
This sampling station is located adjacent to Stewart Road in the small town of Bellbrook. The riffle area is located under and immediately downstream from the bridge. Large gravel and cobbles comprise the majority of the river bottom and macroinvertebrate habitat at this site is generally good. CIVs consistently range in the good to excellent categories with a wide variety of species represented in samples.

**River Mile 74.7 - Glen Thompson Reserve**
Glen Thompson Reserve is a small park area owned by the Division of Natural Areas and Preserves; it is located immediately adjacent to State Route 35 and managed by the Greene County Park District. The riffle area, located about 200 yards upstream from the State Route 35 bridge crossing is composed primarily of gravel and cobbles and is considerably deep. This composition results in excellent habitat for dobsonfly larvae (hellgrammites), which are known to prefer deep, swift-moving riffles. Presently the CIVs remain consistently high at this location showing no influence from erosion on an upstream bank.

**River Mile 83.1 - Jacoby Road Access**
Located northwest of the City of Xenia, the Jacoby Road Access area is both easily accessible and an excellent site to sample. It is also a popular canoe access. Adequate parking is available for school groups wishing to utilize the river for the study of the macroinvertebrates and water quality relationship. The heavily forested river corridor in this area, when combined with a riverbed comprised of sand, gravel, cobble and boulders results in exceptional aquatic habitat. Within the 40-foot-wide riffle area, nearly all pollution-intolerant organisms may be collected at this sampling station. CIVs are consistently high at this riffle.

**River Mile 93.4 - Garlough Road Access**
The northern most sampling station on the Little Miami, this area is located on Garlough Road in southern Clark County. Access is difficult due to thick brush and undergrowth and parking is restricted to the bridge area. Caution must be exercised when sampling this station. The riffle area is quite narrow and the riverbed is comprised mostly of sand and gravel. As a result, habitat is limited and CIVs recently are in the excellent range. At times in the late summer and fall, the water is so clear that it is difficult to determine the depth of the water.

# Sampling Results and General Trends

According to the National Oceanic and Atmospheric Administration (NOAA), in 2010, Mid-western Ohio experienced above average rainfall through the months of late May and June, according to the National Oceanic and Atmospheric Administration (NOAA). The above average rainfall led to an above normal flow during the entire spring monitoring season, therefore most testing did not begin until the summer monitoring season on the Little Miami River. The trend reversed itself in late July, with little to no rainfall, according to NOAA, for the rest of the monitoring season. From late July through September, the Little Miami River corridor experienced little or no rainfall, with that trend continuing for the remainder of the 2010 monitoring season.) These differing trends of above and below normal flows during the monitoring season led to a wide variety of CIVs.

With the continuing development along the Little Miami River come adverse environmental impacts to river's ecosystem. Deforesting of stream banks, runoff, alteration of riverbed, changes to riffle structures and the increase of impermeable surfaces are all examples of the impacts of development. However, sampling results on Little Miami River during the 2010 season showed an increase of the average CIV at one station, while seven the stations decreased and one remained the same. The individuals of Group I, II and III taxa all decreased slightly. The 2010 season's CIV average of 25.2 on the Little Miami River is down compared to 2009 season's average of 29.6. The Little Miami River average taxonomic diversity per assessment was 15 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.).

Attention should be paid to the increasing percentage of impermeable surfaces within this watershed. Impermeable surfaces create an increase of non-point source pollution. This can also affect soil and tree root systems that would normally absorb and filter water, forcing the unfiltered water and sediments to enter directly into the river system. Furthermore, new developments have minimized the existing forest corridor along the river. The forest corridor plays many important roles in the watershed community. It acts as a large buffer system that filters incoming non-point source pollution. The root system of the trees prevents erosion by holding the soil in place. The shade cast by the forest canopy sustains a generally constant water temperature. Also the forest corridor provides organic matter as a food source for many organisms in the river system.

Volunteer and staff data are used for the Ohio Stream Quality Monitoring Project as a water quality-screening method. The data helps in detecting significant changes in stream quality based on CIV data from sites that have been monitored for many years by staff and trained volunteers. In the event that significant CIV declines are noticed for a particular site, potential problems that may be causing stream degradation can be further investigated and addressed.

The Southwest Ohio Scenic Rivers Staff would like to thank our dedicated volunteer monitors. It is only through their efforts that it was possible to complete the SQM samples on the Little Miami River. Additional volunteers are needed to assist in monitoring reference stations on the Little Miami River in the upcoming year. Interested persons should contact the Southwest Ohio SQM Coordinator at 937-968-3514 to request the necessary training and monitoring equipment.

# Total Suspended Solids (TSS)

In 1999, the Scenic River Program added Total Suspended Solids (TSS) monitoring to the Stream Quality Monitoring (SQM) Project. The purpose of this addition is to estimate the amount of soil sediments impacting a stream by estimating the turbidity of the water. These sediments are attributed to problems originating upstream of the sampling site. The equipment is calibrated to predict Total Suspended Solids (TSS) at 90% accuracy. The measurements are accurate enough to determine the changes in sediment rates in a stream at a given location and time.

Variables such as amount of precipitation, slope and gradient of the river system, soil type, time of year data is collected, amount of development, amount of riparian corridor, velocity of the river flow, and the amount of waste water effluent have an effect on the TSS value.

Precipitation amount is important because of the increased potential for sediments to be carried into the river during a rain event. The TSS value may appear higher than normal if precipitation amounts are not taken into account. Since large rain events usually happen in the spring and early summer, the time of year the samples are taken could affect the TSS score. The gradient (or slope) of the stream is important as well. Sediments do not settle out as easily in high gradient streams because the velocity of the water washes it downstream. In low gradient streams, sediment has a chance to settle out, resulting in a lower TSS value. Soil types impact TSS values because some soil types erode faster than others. A better understanding of the types of soils within the watershed may give way to a better understanding of the baseline TSS values for a stream.

Development in an area can cause changes in the TSS score. Areas cleared for new buildings often are not covered, causing an acute rise in suspended solids in nearby streams. Impermeable surfaces can also cause chronic elevation of TSS values because there is no buffer to absorb or trap runoff. Wastewater treatment plant effluent would only affect TSS scores in low flow situations and only if the plant employs only primary or secondary treatment.

The actual process of taking a sample is simple. Using a clear Lucite sediment stick developed by the Lake Soil and Water Conservation District, a water sample is collected from the stream. Keeping the sample materials suspended, water is poured out of the tube until the 0.4-inch target dot is visible on the tube bottom. A reading of the water column height is taken from the markings on the stick to the nearest ¼ inch. A conversion table is used to convert the sediment stick reading to total suspended solid measurement in the form of an estimate of the weight of solids suspended in the water column (mg/l).

The TSS measurement is used to estimate water quality using the following scale:

TSS <10 mg/l = excellent water quality
TSS 10-28 mg/l = normal water quality
TSS 29-133 mg/l = impaired water quality
TSS >133 mg/l = severely impacted water quality

**2010 TSS Results:** A total of 27 TSS readings were taken in the Little Miami River. The Little Miami River had a median value of 9 mg/L of TSS, corresponding to the excellent range. The data set ranged from <6.2 to 97 mg/L of total suspended solids.

# Comparisons of Collected Stream Quality Monitoring Data

Frequent monitoring of the same reference station is performed a minimum of three times per year consistently year after year. An assessment of the diversity and tolerance levels of taxonomy collected generates the Cumulative Index Value (CIV) for the site on a given date.

Field assessment results are basic indicators of long-term changes in a stream's macroinvertebrate community and help Scenic Rivers staff identify pronounced stream quality problems.

Table 1 identifies the 20 macroinvertebrates assessed and their general tolerance to pollutants. Pollution-intolerant organisms, such as those listed in Group I, require unpolluted, high quality water in order to survive. Pollution-tolerant organisms, such as those listed in Group III, are extremely tolerant of deteriorated water conditions.

**Table 1. Macroinvertebrate Pollution Tolerance**

| Group I Taxa<br>Pollution Intolerant | Group II Taxa<br>Moderately Tolerant | Group III Taxa<br>Pollution Tolerant |
|---|---|---|
| Water Penny Beetle Larvae (WP) | Damselfly Nymphs (DA) | Black Fly Larvae (BF) |
| Mayfly Nymphs (MF) | Dragonfly Nymphs (DR) | Aquatic Worms (AW) |
| Stonefly Nymphs (ST) | Crane Fly Larvae (CR) | Midge Larvae (MI) |
| Dobsonfly Larvae (DO) | Beetle Larvae (BL) | Pouch Snails (PS) |
| Caddis fly Larvae (CD) | Crayfish (CF) | Leeches (LE) |
| Riffle Beetle Adult (RI) | Scuds (SC) | |
| Other Snails (OS) | Clams (CL) | |
| | Aquatic Sowbugs (SW) | |

Table 2 represents the mean Cumulative Index Values (CIVs) for each Stream Quality Monitoring reference station sampled on the river during 2010. In addition, the table uses symbols (◆) to indicate those macroinvertebrates found to be present at least once during the year at the respective reference station. Each macroinvertebrate is identified by a 2-letter code given in Table 1. CIVs of 23 or greater indicate *Excellent* stream quality; CIVs of 17-22 indicate *Good* stream quality; CIVs ranging from 11-16 suggest *Fair* stream quality; and CIVs of 10 or less reflect *Poor* stream quality. Situated beside the CIV are the symbols + (improved), = (equal), or – (declined) indicating the relationship to the previous years CIV.

For the full range of CIV attained at all sites monitored during the year, including non-reference stations, please see the *Appendix*.

**Table 2 Little Miami River 2010 Mean CIVs by Reference Station**

| Station | WP | MF | ST | DO | CD | RI | OS | DA | DR | CR | BL | CF | SC | CL | SW | BF | AW | MI | PS | LE | CIV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **8.1** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | | | ◆ | ◆ | | ◆ | | | ◆ | ◆ | ◆ | | *24- |
| **16.9** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | ◆ | | | ◆ | ◆ | ◆ | ◆ | 24= |
| **28** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | | | | ◆ | | | ◆ | | | ◆ | | ◆ | ◆ | 19- |
| **43.6** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | 28- |
| **51.3** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | | ◆ | ◆ | | ◆ | ◆ | | ◆ | 24- |
| **62.7** | ◆ | ◆ | | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | *26+ |
| **68.5** | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | | | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | | 26- |
| **74.7** | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | 26= |
| **83.1** | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | | ◆ | | | ◆ | ◆ | | ◆ | 25- |
| **93.4** | ◆ | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | ◆ | ◆ | | ◆ | | ◆ | ◆ | 30- |

* Not enough samples were taken to determine an average CIV for the year.

Figure 1 represents the maximum and minimum CIV ranges recorded during the year for each reference station. Figure 2 represents the mean CIVs at each reference station over many years.

**Figure 1. Little Miami River 2010 Maximum and Minimum CIV Ranges**

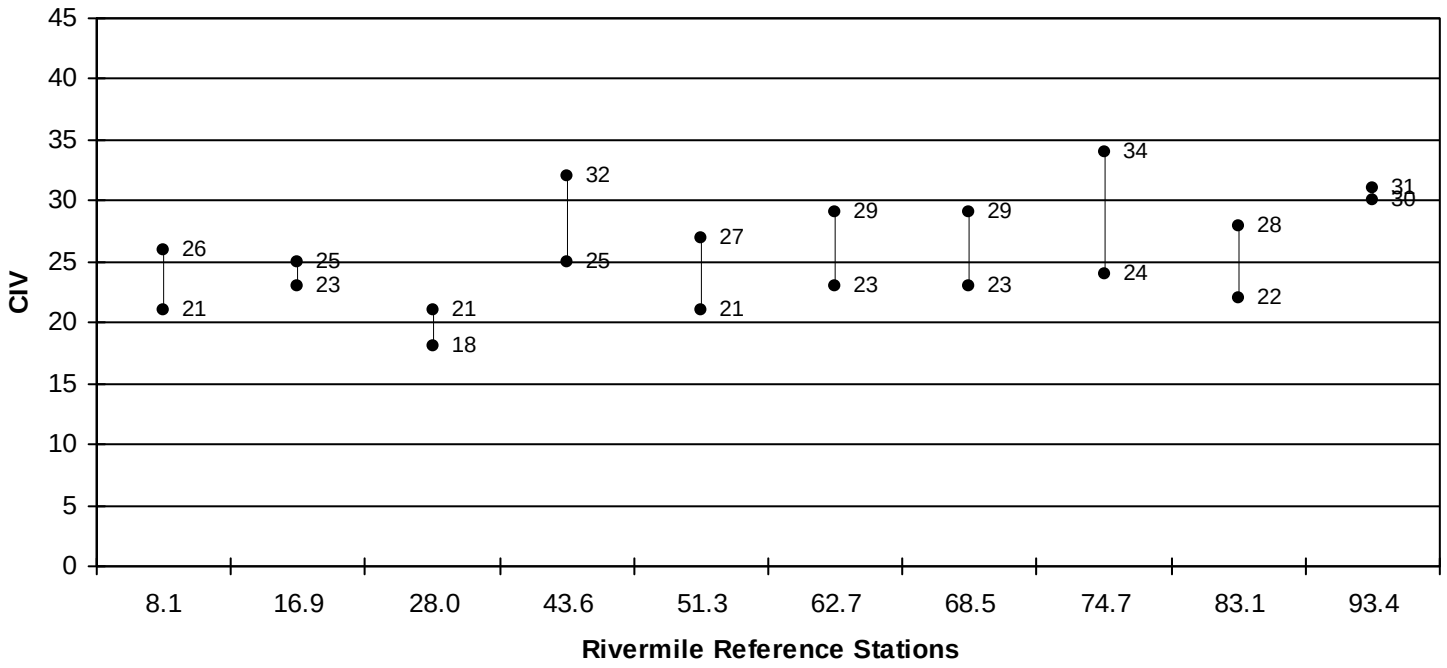
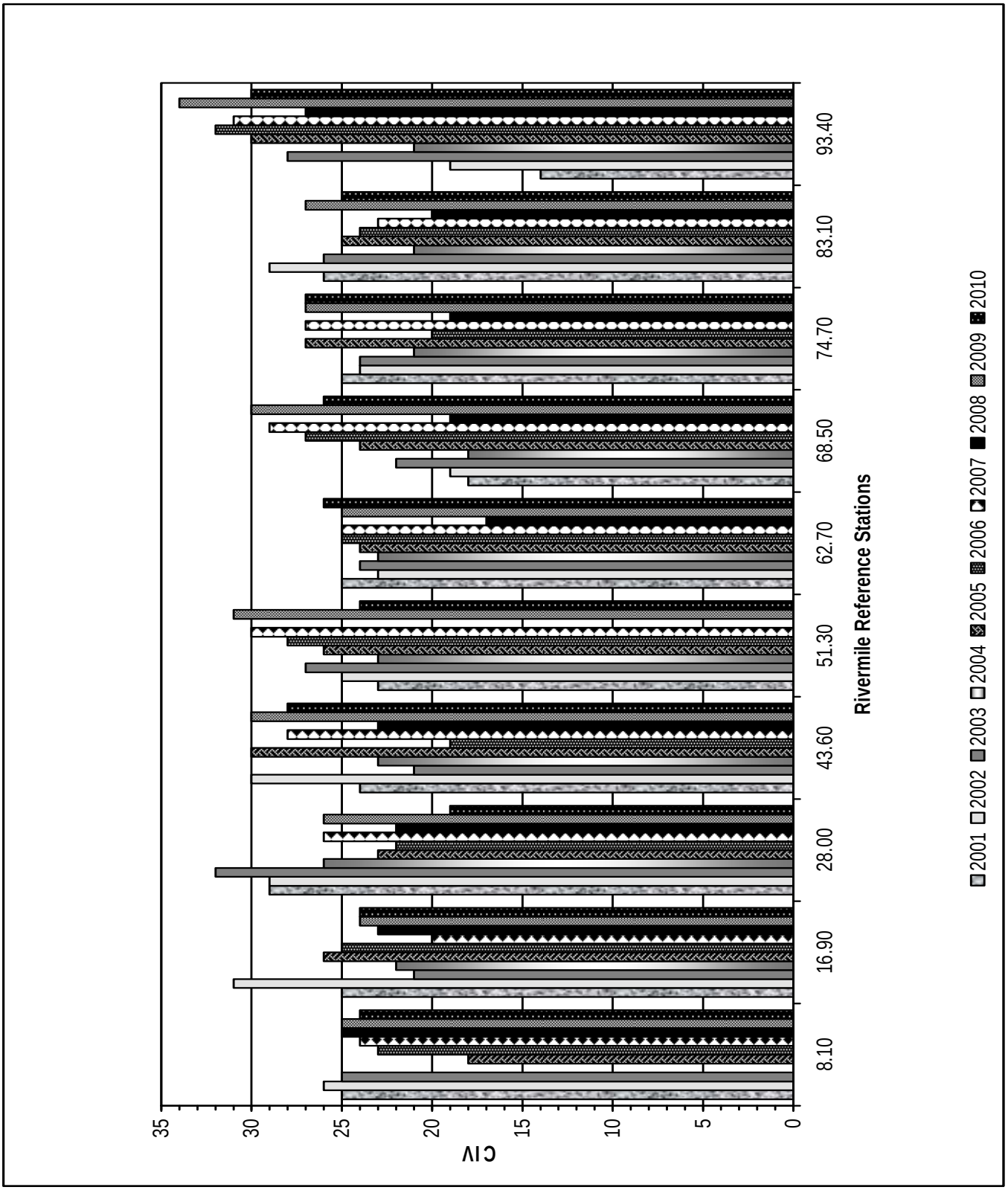


**Figure 2. Little Miami River 2001-2010 Mean CIVs**



# Qualitative Habitat Evaluation Index (QHEI)

The Qualitative Habitat Evaluation Index (QHEI) is a system developed and employed by the Ohio Enironmental Protection Agency to measure physical habitat conditions in and around rivers and streams in Ohio. During 1998, the SQM Project staff conducted a modified version of the QHEI, referred to as C*itizen's QHEI,* to gather baseline measurements at reference stations on several of Ohio's scenic rivers. It is anticipated that such measurements will become yet another annual tool that will be used to monitor habitat and water quality conditions on all Ohio scenic rivers.

The SW Ohio Scenic Rivers staff performed QHEI evaluations at reference stations on the lower half of the Little Miami River in 2000. In addition, volunteer monitors are also encouraged to receive training and perform Citizen's QHEI on Southwest Ohio Scenic Rivers. Results from 2000 QHEI are included below. When attempting to interpret this data, it is important to recognize that OEPA generally concludes that any site receiving a QHEI value greater than 60 meets current warmwater habitat (WWH) standards. Meeting WWH standards suggests that such locations should be adequate for supporting reproducing communities of fish and macroinvertebrate life. Sites attaining QHEI scores of greater than 80 are generally believed to contain exceptional habitat conditions for warmwater communities.

The following table has been prepared to assist with determining the relationship between habitat conditions, measured by the QHEI, and macroinvertebrate community performance, measured by the Cumulative Index Value, at each of the reference stations on selected rivers.

**Table 3. Little Miami River 2000 QHEI & SQM Assessment Data**

| Reference Station | QHEI | Attainment Status | Average CIV | SQM Assessment |
|---|---|---|---|---|
| **RM 8.1** | **84** | **FULL** | **28** | **EXCELLENT** |
| **RM 16.9** | **78** | **FULL** | **31** | **EXCELLENT** |
| **RM 28.0** | **82** | **FULL** | **30** | **EXCELLENT** |
| **RM 43.6** | **84** | **FULL** | **26** | **EXCELLENT** |
| **RM 51.3** | **84.5** | **FULL** | **24** | **EXCELLENT** |
| **RM 62.7** | * | * | * | * |
| **RM 68.5** | * | * | * | * |
| **RM 74.7** | * | * | * | * |
| **RM 83.1** | * | * | * | * |
| **RM 93.4** | * | * | * | * |

*No QHEIs were completed for the station.

# Appendix

| 2010 CIVs Monitoring Stations<br>LITTLE MIAMI RIVER | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RM | DATE | WP | MF | ST | DO | CD | RI | OS | DA | DR | CR | BL | CF | SC | CL | SW | BF | AW | MI | PS | LE | CIV |
| 8.10 | 5/29/2010 | A | B | B | | B | B | A | | | | B | | | A | | | B | A | | | 24.00 |
| 8.10 | 7/1/2010 | A | A | B | | B | B | A | A | | | | A | | A | | | | A | A | | 26.00 |
| 8.10 | 11/15/2010 | A | A | A | | C | | C | B | | | | | | A | | | C | | B | | 21.00 |
| 16.90 | 5/29/2010 | B | B | B | | A | A | C | A | | | | | | A | | | B | | A | A | 25.00 |
| 16.90 | 8/31/2010 | B | C | C | | C | | C | | A | | A | A | | A | | | B | C | | | 25.00 |
| 16.90 | 11/15/2010 | A | C | B | | C | A | C | C | | | | | | A | | | A | | | | 23.00 |
| 28.00 | 7/5/2010 | A | A | | | C | B | C | | | | | | | A | | | B | | | | 18.00 |
| 28.00 | 10/13/2010 | A | A | B | | C | B | B | | | | | | | B | | | C | | | | 21.00 |
| 28.00 | 11/15/2010 | B | A | B | | C | | | | | | B | | | A | | | A | | A | | 18.00 |
| 43.60 | 8/21/1930 | B | B | | | A | A | C | | | A | A | A | | B | B | | B | | | | 26.00 |
| 43.60 | 7/10/2010 | B | A | | | A | B | A | A | A | A | B | B | | A | A | | | A | A | A | 32.00 |
| 43.60 | 10/30/2010 | A | A | A | | A | C | | A | A | | B | A | | | A | | | | | | 25.00 |
| 51.30 | 7/10/2010 | A | B | A | | B | | | A | A | B | | | | A | | | A | | | | 21.00 |
| 51.30 | 8/13/2010 | A | C | | | B | A | B | A | | | | A | | A | B | | | | | A | 24.00 |
| 51.30 | 10/30/2010 | B | A | A | | | A | B | A | A | | | A | | A | B | | A | A | | | 27.00 |
| 62.70 | 9/21/2010 | | B | | | C | A | A | A | A | A | | | | A | | A | A | A | | | 23.00 |
| 62.70 | 11/6/2010 | A | A | | | B | A | A | A | | A | | A | | | A | | A | | | A | 25.00 |
| 62.70 | 8/8/2018 | B | B | | | C | B | B | B | A | | A | B | | A | A | | A | A | | | 29.00 |
| 68.50 | 6/26/2010 | | A | A | | B | A | A | | | | | A | | B | A | | A | A | | | 23.00 |
| 68.50 | 7/29/2010 | A | B | | | B | A | A | A | | | A | A | A | A | | | A | A | | | 27.00 |
| 68.50 | 9/20/2010 | B | B | A | | B | B | B | B | | | A | B | | A | A | | | A | | | 29.00 |
| 74.70 | 6/26/2010 | A | B | A | | A | A | A | | | | | A | | | A | | A | A | | | 24.00 |
| 74.70 | 7/29/2010 | A | B | A | B | | | A | | | | B | A | | A | | | A | A | | A | 24.00 |
| 74.70 | 9/23/2010 | A | B | | A | B | A | B | A | A | A | A | A | A | A | | | A | | A | | 34.00 |
| 83.10 | 7/10/2010 | A | B | | | C | A | B | | | A | | A | | A | | | | | | A | 22.00 |
| 83.10 | 9/20/2010 | B | C | | A | C | A | A | A | | | B | A | | A | | | A | A | | | 28.00 |
| 83.10 | 11/6/2010 | B | C | A | | A | | B | | | A | B | A | | A | | | A | B | | | 25.00 |
| 96.40 | 7/10/2010 | A | B | | A | B | A | A | A | | A | B | A | | | A | | A | | A | | 30.00 |
| 96.40 | 9/20/2010 | C | B | | A | B | B | A | A | A | A | B | A | | | | | A | | | A | 30.00 |
| 96.40 | 11/6/2010 | A | A | | A | B | A | A | | A | A | B | A | | A | | | A | | A | A | 31.00 |