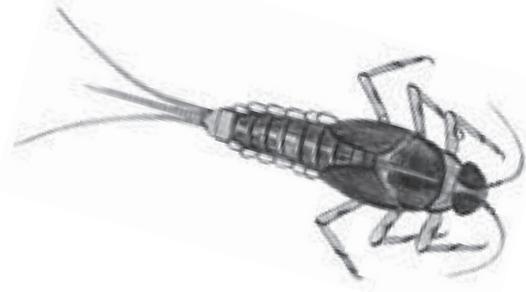


Stream Quality Monitoring 2009 Annual Report



Stillwater River & Greenville Creek State Scenic & Recreational River



Department of Natural Resources
Division of Watercraft



Stream Quality Monitoring 2009 Annual Report Stillwater River & Greenville Creek State Scenic & Recreational River

Contents

Introduction	1
Overview	2
Stream Quality Monitoring Station Map	3
Stream Quality Monitoring Participants.....	4, 5
Monitoring Station Descriptions	6-8
Sampling Results and General Trends	9
Total Suspended Solids TSS	10
Comparisons of Collected Stream Quality Monitoring Data.....	11
Table 1 - Macroinvertebrate Pollution Tolerance	11
Table 2.1, 2.2 - 2009 Mean CIVs by Reference Station.....	12
Figure 1.1, 1.2 -2009 CIV Ranges by Reference Station	12, 13
Figure 2.1, 2.2 - 2000-2009 Mean CIVs by Reference Station	14
Table 3.1, 3.2 - Qualitative Habitat Evaluation Index	15
Appendix - 2009 Stream Quality Monitoring Data by Station	16, 17

Introduction

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 Ohio 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 Ohio SQM Project is an excellent, simple and cost-effective method of assessing a stream's health.

Aquatic macroinvertebrates are organisms that lack a backbone (invertebrate), are large enough in size 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, changes observed in the macroinvertebrate community help the Ohio Scenic Rivers Program in detecting and addressing 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 Ohio 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, at least 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 2009 by volunteers and staff. It also represents a year of dedication and commitment shown to Ohio's special waterways by thousands of SQM volunteers.

Stillwater River & Greenville Creek State Scenic River Overview

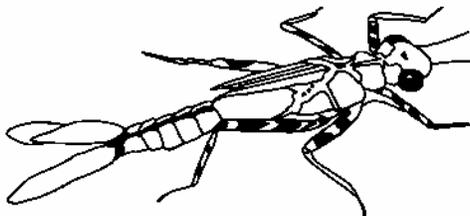
The Stillwater State Scenic River and its tributary, Greenville Creek, were dedicated as Ohio's eighth scenic river in 1975. Additional river miles were added in 1980. Designated stretches include the Stillwater River from Riffle Road Bridge in Darke County to its junction with the Great Miami River in Dayton. Greenville Creek is designated from the Ohio/Indiana border to its confluence with the Stillwater River. Throughout much of their length, the Stillwater River and Greenville Creek flow with a gentle grade through the glaciated rich soils of Ohio.

With excellent habitat and good water quality, the Stillwater State Scenic River provides some of Ohio's most prolific smallmouth bass fishing. Pollution-intolerant macroinvertebrates and 38 other fish species such as the northern hog sucker, rainbow darters and many others comprise the Stillwater's aquatic community. In addition, the river is adorned by numerous species of songbirds and waterfowl, such as the handsome wood duck and a large population of great blue herons.

Like many of Ohio's rivers and streams, history abounds in the Stillwater River valley. Shawnee and Miami Indians were living in the area when the first European traders arrived. Following the enactment of the Treaty of Greenville in 1795, the valley became an important area of settlement for early European settlers. This treaty represented the first of several agreements entered into with Ohio's Indian population, paving the way for extensive European settlement in the years to follow.

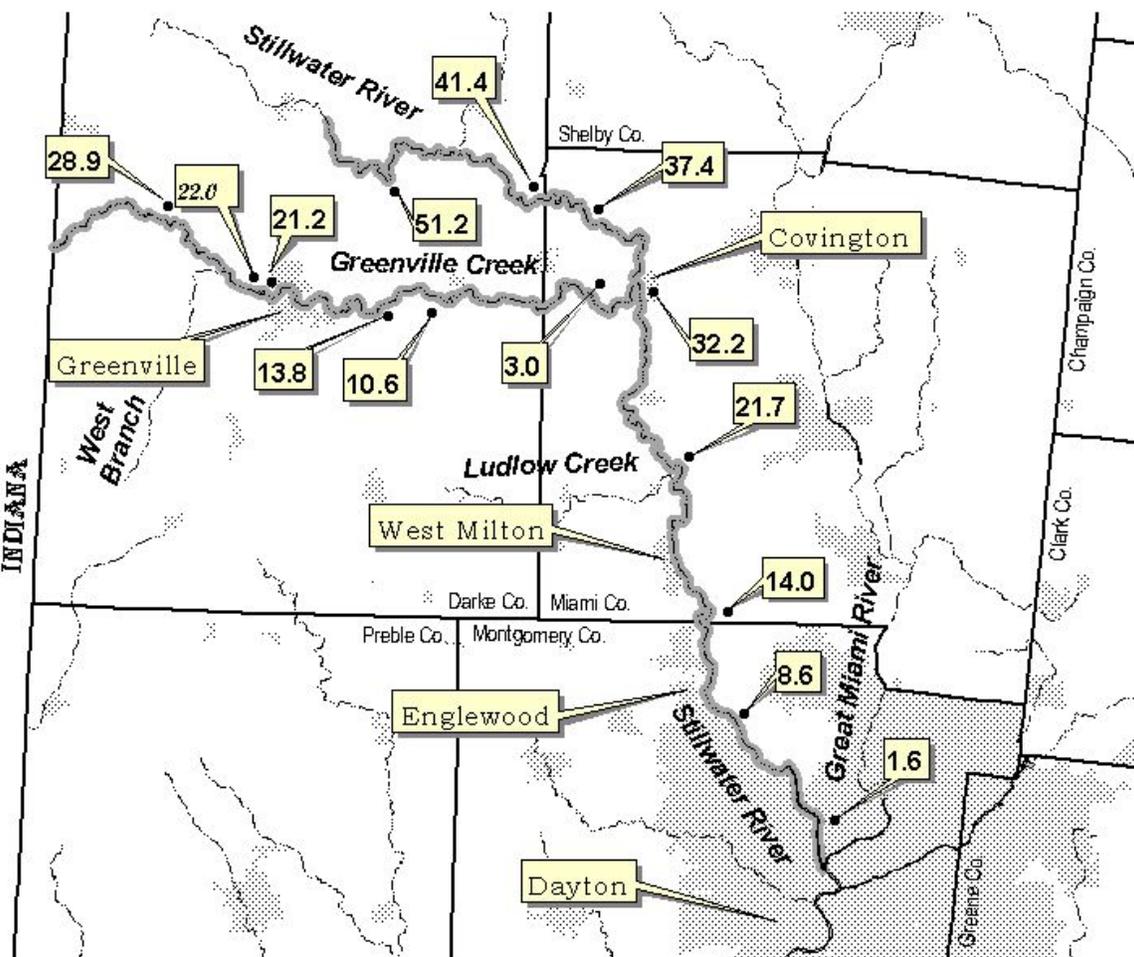
Public access to the Stillwater State Scenic River is available at a number of sites throughout the valley. With continued donations of land, conservation easements, and the tireless efforts of numerous volunteers and organizations, the excellent water quality of the Stillwater State Scenic River will continue.

For more information about public access and facilities along the river, contact the Southwest Ohio Assistant Regional Scenic River Manager at 513-934-0751, the Division of Watercraft at 614-265-6814 or visit www.ohiodnr.com/watercraft for more information.



STILLWATER RIVER & GREENVILLE CREEK

Stream Quality Monitoring Sampling Stations



Key

- Bold** = Reference Stations
- NUM** = Non-Reference Sampling Stations
- = Scenic River Designation



Map Created By:
Ohio Department of Natural Resources
Division of Real Estate & Land Management
GIS/Remote Sensing Services
614) 265-6769



- Designated recreational on July 1, 1975.
- Designated scenic on October 14, 1980 and April 27, 1982.
- Recreational Segment: Englewood Dam to the confluence with the Great Miami River.
- Scenic Segments: Stillwater River from Riffe Road bridge in Darke County to Englewood Dam. Greenville Creek from Ohio/Indiana state line to confluence with Stillwater River.
- Miles Designated: 83 miles scenic, 10 miles recreational.

Sources: Sampling Stations Ohio Department of Natural Resources, 2000
Hydrography United States Geological Survey, 1950
Political Boundaries Ohio Department of Transportation, 2000

2009 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 Stillwater River and the Greenville Creek. Their time and dedication to these rivers and the Ohio SQM Project is greatly appreciated. Special thanks are also extended to the Stillwater/Greenville Scenic River Advisory Council for their continued support and assistance.

Stillwater River

River Mile 1.6 - DeWeese Park Access

Lynn Tan & family

River Mile 8.6 - Aullwood Garden Access

Donna Melia
Rob Clifford
Margret Hensel

River Mile 14.0 - Wheelock Gravel Pit Access

Linda Raterman
Greg McGlinch

River Mile 21.7 - Bruckner Nature Center Access

DNAP

River Mile 32.3 - Covington Dam Access

Dan Wirrig
Cooley Howarth

River Mile 37.4 - Stillwater Prairie Access

Miami County Parks
John De Boer

River Mile 41.4 - Stillwater Beach Access

Judie Welch

River Mile 51.2 - Schroder Road Bridge Access

Judie Welch, Bill Corbin

Greenville Creek

River Mile 3.0 – Covington - Gettysburg Bridge Access (Three Bridges)

Dan Wirrig
Cooley Howarth

River Mile 10.6 - Gettysburg Cemetery Access

Friends of Darke County Parks

River Mile 13.8 - Bear's Mill Road Access

Friends of Darke County Parks

River Mile 21.25 - Tecumseh Point Access

Friends of Darke County Parks

River Mile 22.0 - Greenville Pet Cemetery Access (non-reference site)

River Mile 28.9 - Fisher-Dangler Road Access

Friends of Darke County Parks

The continued success of the Ohio 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 contact the Southwest Ohio Stream Quality Monitoring Coordinator at 937-968-3514 or the Southwest Ohio Assistant Regional Scenic Rivers Manager at 513-934-0751.

Station Descriptions

The Stillwater/Greenville River system has ample public access through a variety of County Park and scenic river access sites. As a result, most SQM sites on the Stillwater River and the Greenville Creek are located on public property and present little difficulty for volunteers to access and monitor regularly. The following are brief descriptions of the selected stream quality monitoring sites along the streams.

Stillwater River

River Miles 1.6 - DeWeese Park Access

Located near downtown Dayton, this sampling station has convenient access through the Dayton/Montgomery County Metro Parks. Although located in an urban area, this southern-most reference station of the Stillwater River typically provides fair to good Cumulative Index Values (CIVs). Trash and metal debris line both banks at this site and foam was observed during sampling.

Caution must be used when sampling this location due to the fast and sometimes powerful currents. The streambed is comprised of gravel, cobblestones and a handful of boulders, which create further hazards when wading. However, these conditions also provide excellent habitat for such macroinvertebrates as the pollution-intolerant mayfly nymphs and crayfish.

River Mile 8.6 - Aullwood Garden Access

Aullwood Gardens is a public facility, owned and administered by the Englewood Audubon Society. Located downstream from the Englewood Dam, the 40-foot-wide sampling area is readily accessible with ample parking nearby. The river bottom is comprised mainly of gravel and cobblestones; the riffle typically bears a strong current, therefore, caution is needed when sampling at this site. CIVs for this station typically score in the excellent range with a wide variety of macroinvertebrates inhabiting the riffle. This area is relatively shallow and creates premium habitat for water penny beetles.

River Mile 14.0 - Wheelock Gravel Pit Access

This riffle is surrounded by a heavily wooded river corridor, which facilitates this station and a braided channel design. This habitat contributes to the consistently high CIVs. A diversity of pollution-intolerant macroinvertebrates and large number of terrestrial wildlife species may be observed when sampling in this area.

River Mile 21.7 - Brukner Nature Center Access

Brukner Nature Center is north of Ludlow Falls, located off Horseshoe Bend Road. The riverbed is comprised of a mixture of gravel, cobblestones and boulders. This provides exceptional habitat for macroinvertebrates such as dobsonfly (hellgrammite) larvae, crayfish and others. The thick, forested corridor surrounding this site acts to filter incoming pollution, resulting in a diverse array of macroinvertebrates.

River Mile 32.33 - Covington Dam Access

Located in downtown Covington, the sampling area is immediately downstream from the Covington Water Plant and Dam. A new bridge was constructed at this site and the site is now easily accessible. The riverbed is a mixture of cobblestones and large boulders. Habitat is excellent and a variety of macroinvertebrates are found at this station. Typically, CIVs for this site are very high.

River Mile 37.4 - Stillwater Prairie Access

Stillwater Prairie is a pristine prairie maintained by Miami County Park District. It is located south of State Route 185 in Miami County. Access is safe and readily available, with ample parking and well-maintained trails to the river. The monitoring site is found near the far end of the prairie near a very large glacial erratic (boulder). The riffle area is nearly 50-foot-wide and provides a number of different areas to collect macroinvertebrates. CIVs are consistently in the excellent to good range with a variety of species collected including pollution-intolerant caddisflies and crane fly larvae.

River Mile 41.4 - Stillwater Beach Access

Located on Versailles Road in Darke County, this private campground provides easy access and ample parking. The sampling station is relatively shallow and narrow with a riverbed comprised mainly of cobblestones and gravel, providing ideal habitat for a wide range of macroinvertebrates. Typical CIVs for this site can be expected within the good range. It should be noted that some trees have been damaged or have fallen into the river, causing a change in the river morphology at this site.

River Mile 51.2 - Schroder Road Bridge Access

As the northern-most sampling station of the Stillwater Scenic River, this site is located in northeast Darke County. The riffle is quite shallow and rather small, at most 20 foot in width. Comprised mostly of sand and a few cobblestones, this station generally yields CIVs ranging from fair to poor. Although a wide variety of macroinvertebrates are collected at this site, persistence is required to collect the pollution-intolerant organisms.

Greenville Creek

River Mile 3.0 - Covington-Gettysburg Road Bridge Access (Three Bridges)

Located west of the popular Greenville Falls, this is the most downstream sampling station on Greenville Creek. The sampling site is immediately downstream from the bridge. Steep banks can make accessing the river treacherous.

The riffle area is approximately 60-foot-wide with a river bottom comprised of a good mixture of gravel, cobblestones and sand. A large number of stonefly nymphs as well as numerous dragonfly and damselfly nymphs are frequently collected at this station. CIVs are consistently within the excellent range.

River Mile 10.6 - Gettysburg Cemetery Access

CIVs for this site are typically very high with a wide variety of macroinvertebrates being collected. Swift currents flowing over a river bottom of cobblestones and gravel provide excellent habitat for such pollution-intolerant species as stonefly nymphs and caddisfly larvae.

River Mile 13.8 - Bear's Mill Road Access

Bear's Mill is a historic mill located on Arcanum-Bears Mill Road south of State Route 36 in Darke County. The riffle area is fairly shallow, with a river bottom comprised largely of cobblestones and gravel. Depending on the flow within the creek, the CIVs range from good to excellent with a large number of crane fly larvae and riffle beetles.

River Mile 21.25 - Tecumseh Point Access (new reference site)

Located in the heart of the city of Greenville, this new monitoring site is found at the junction of Mud Creek as it flows into Greenville Creek near the Tecumseh Point monument.

The riffle area is shallow, with the river bottom comprised of cobblestones, gravel and sand. This substrate is caused by the angle of entry into the Greenville Creek and the deposition of sediments at the mouth. The CIV range is good to excellent giving great habitat for the dobsonfly larvae, crayfish and riffle beetles. There is evidence of some possible agricultural impacts in the upper reaches of this tributary.

River Mile 22.0 - Greenville Pet Cemetery Access (non-reference site)

Located on State Route 571 in Greenville, the sampling station is found on the west end of the Greenville Cemetery. The river bottom is comprised of a good mixture of sand, cobblestones, and boulders and provides excellent habitat for a wide variety of pollution-intolerant macroinvertebrates. Dobsonfly (hellgrammite) larvae and riffle beetles are commonly collected at this site.

River Mile 28.9 - Fisher-Dangler Road Access

The Fisher-Dangler Road Access is the upper most sampling station on Greenville Creek. The riffle area is found on the west side of the bridge. The riverbed is comprised of a mixture of sand and cobblestones that yields consistently high CIVs. The creek is somewhat narrow and shallow and sampling at this site is relatively easy. A large number of macroinvertebrate species is typically collected at this site.

Sampling Results and General Trends

Mid-western Ohio experienced above average rainfall through the months of June and early July, according to the National Oceanic and Atmospheric Administration (NOAA). The above average rainfall led to an above normal flow during the spring and early summer on both river systems during the 2009 monitoring season. The trend reversed itself in late July, with little to no rainfall, according to NOAA, for the rest of the monitoring season. These differing trends of above and below normal flows during the monitoring season led to a wide range of CIVs.

Sampling results on Stillwater River during the 2009 season showed increased CIVs at three stations, while three stations decreased and two remained the same. The individuals of Group I taxa decreased slightly, with a slight decrease in the individuals in Group II and Group III taxa remaining the same. The 2009 season's CIV average value of 20.5 for the Stillwater River is down compared to 2008 season's average value of 21.2. The Stillwater River average taxonomic diversity per assessment was 12 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.).

Sampling results on Greenville Creek during the 2009 season showed a decrease in CIVs at one station, an increase at three stations, and one remained the same. The individuals of Group I taxa increased slightly, with a decrease in the individuals in Group II and an increase in Group III taxa. The 2009 season's CIV average value of 24.6 for Greenville Creek is up compared to the 2008 season's average value of 23.4. The Greenville Creek average taxonomic diversity per assessment was 13 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.).

Volunteer and staff data are used for the Ohio SQM 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 over time 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 Stillwater River and the Greenville Creek. Additional volunteers are needed to assist in monitoring reference stations on the Stillwater River and Greenville Creek 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 in the headwater streams. The equipment is calibrated to predict 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 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 are often not covered, causing an acute rise in the amount of 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 sampling 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 then 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 $\frac{1}{4}$ inch. A conversion table is then used to convert the sediment stick reading to a TSS measurement in the form of an estimate of the weight of solids suspended in the water column (mg/l).

The TSS measurement can further be used to estimate water quality through the use of 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

2009 TSS Results

Monitoring of Total Suspended Solids in the Stillwater River reflected excellent to normal water quality at six reference stations with one station showing the stream to be impaired. The median TSS value for the Stillwater River was 17 mg/L.

TSS measurements for the Greenville Creek indicated excellent to normal water quality with all five reference sites showing a TSS value of 28 mg/l or less. The median for Greenville Creek was 13 mg/L.

Comparison 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 used as basic indicators of long-term changes in a stream's macroinvertebrate community and help Scenic River 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 Pollution Intolerant	Group II Taxa Moderately Tolerant	Group III Taxa Pollution Tolerant
Water Penny Beetle Larvae (WP) Mayfly Nymphs (MF) Stonefly Nymphs (ST) Dobsonfly Larvae (DO) Caddisfly Larvae (CD) Riffle Beetle Adult (RI) Other Snails (OS)	Damselfly Nymphs (DA) Dragonfly Nymphs (DR) Crane Fly Larvae (CR) Beetle Larvae (BL) Crayfish (CF) Scuds (SC) Clams (CL) Aquatic Sowbugs (SW)	Black Fly Larvae (BF) Aquatic Worms (AW) Midge Larvae (MI) Pouch Snails (PS) Leeches (LE)

Tables 2.1 and 2.2 represents the mean Cumulative Index Values (CIVs) for each Stream Quality Monitoring reference station sampled on the river during 2009. 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 two-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 2.1 Stillwater River 2009 Mean CIVs by Reference Station

STATION	W P	M F	S T	D O	C D	R I	O S	D A	D R	C R	B L	C F	S C	S L	S W	B F	A W	M I	P S	L E	CIV
1.6	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆		◆		◆		◆	◆		28+
8.6	◆	◆	◆	◆	◆	◆	◆	◆					◆		◆		◆	◆		◆	21+
14		◆	◆		◆	◆		◆	◆	◆	◆	◆		◆	◆	◆	◆	◆			23+
21.7	◆	◆	◆		◆	◆					◆	◆	◆	◆			◆	◆			25=
32.2	◆	◆	◆		◆	◆	◆	◆		◆		◆					◆	◆			20-
37.4	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			◆		◆	◆	22-
41.4	◆	◆	◆		◆	◆	◆	◆		◆	◆		◆	◆		◆	◆		◆		22=
51.2									◆		◆							◆	◆		3-

Table 2.2 Greenville Creek 2009 Mean CIVs by Reference Station

STATION	W P	M F	S T	D O	C D	R I	O S	D A	D R	C R	B L	C F	S C	S L	S W	B F	A W	M I	P S	L E	CIV
3.0	◆	◆	◆	◆	◆	◆	◆	◆		◆		◆					◆	◆			23+
10.6	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆			◆			◆			25-
13.8	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆			◆			◆			24=
21.25	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆	◆		◆	◆	◆	◆	28+
28.9	◆	◆	◆		◆	◆	◆	◆		◆	◆	◆		◆	◆			◆			23+

Figure 1.1 and 2.1 represents the maximum and minimum CIV ranges recorded during the year for each reference station. Figure 1.2 and 2.2 represents mean CIVs at each reference station over many years.

Figure 1.1 Stillwater River 2009 CIV Maximum and Minimum Ranges

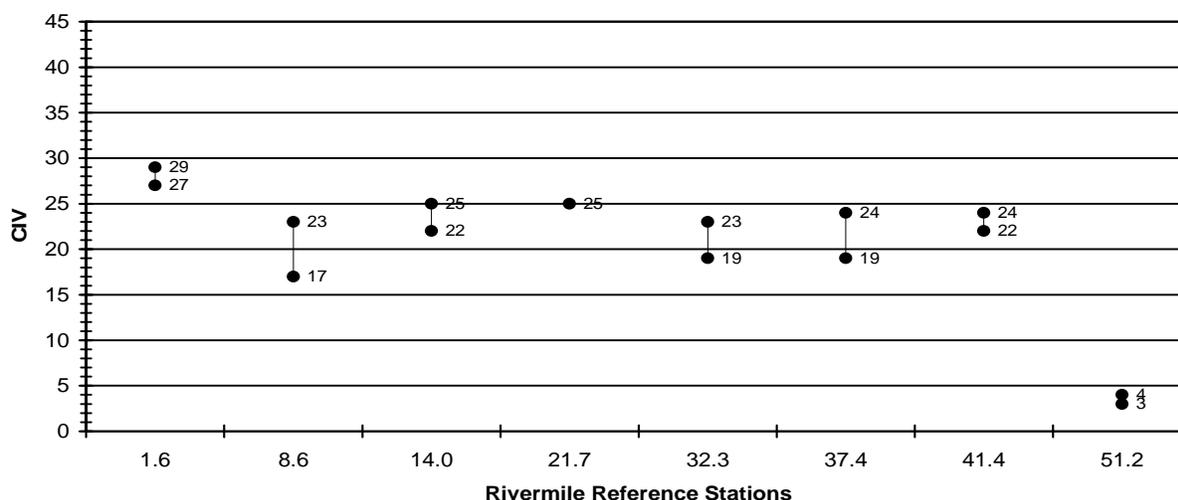


Figure 1.2 Stillwater River 2000-2009 Mean CIVs

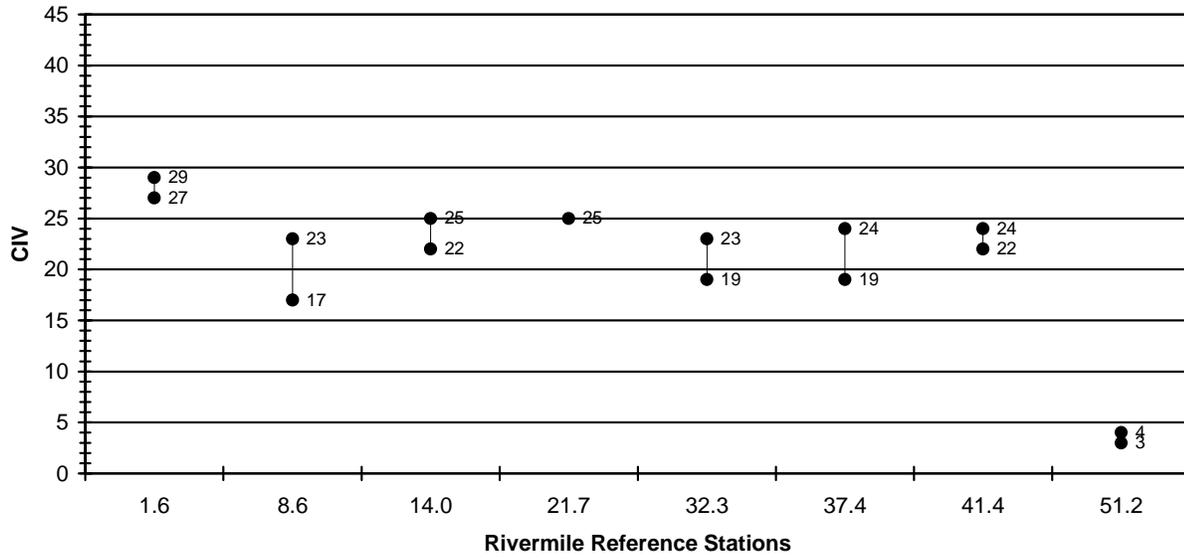


Figure 2.1 Greenville Creek 2009 Maximum and Minimum CIV Ranges

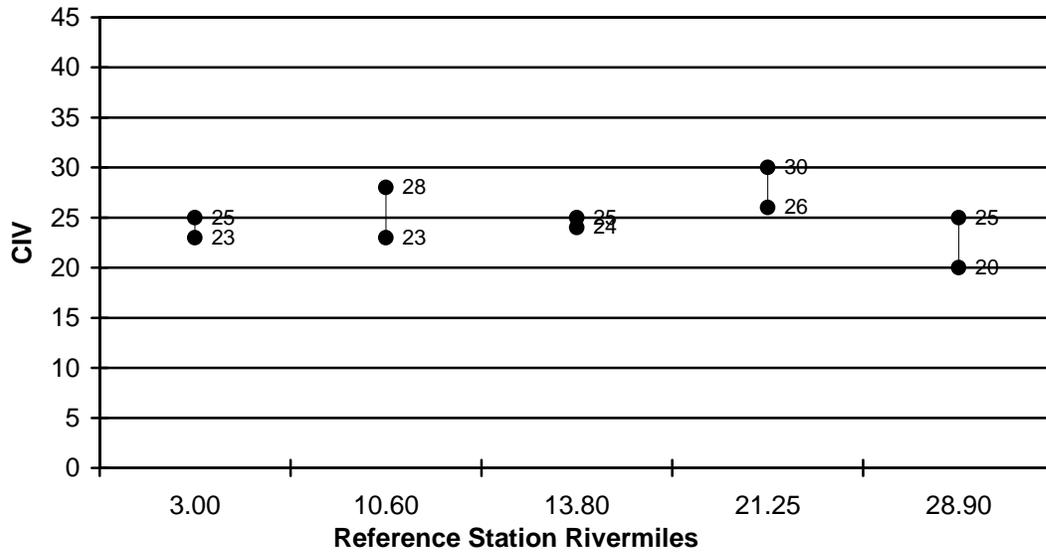
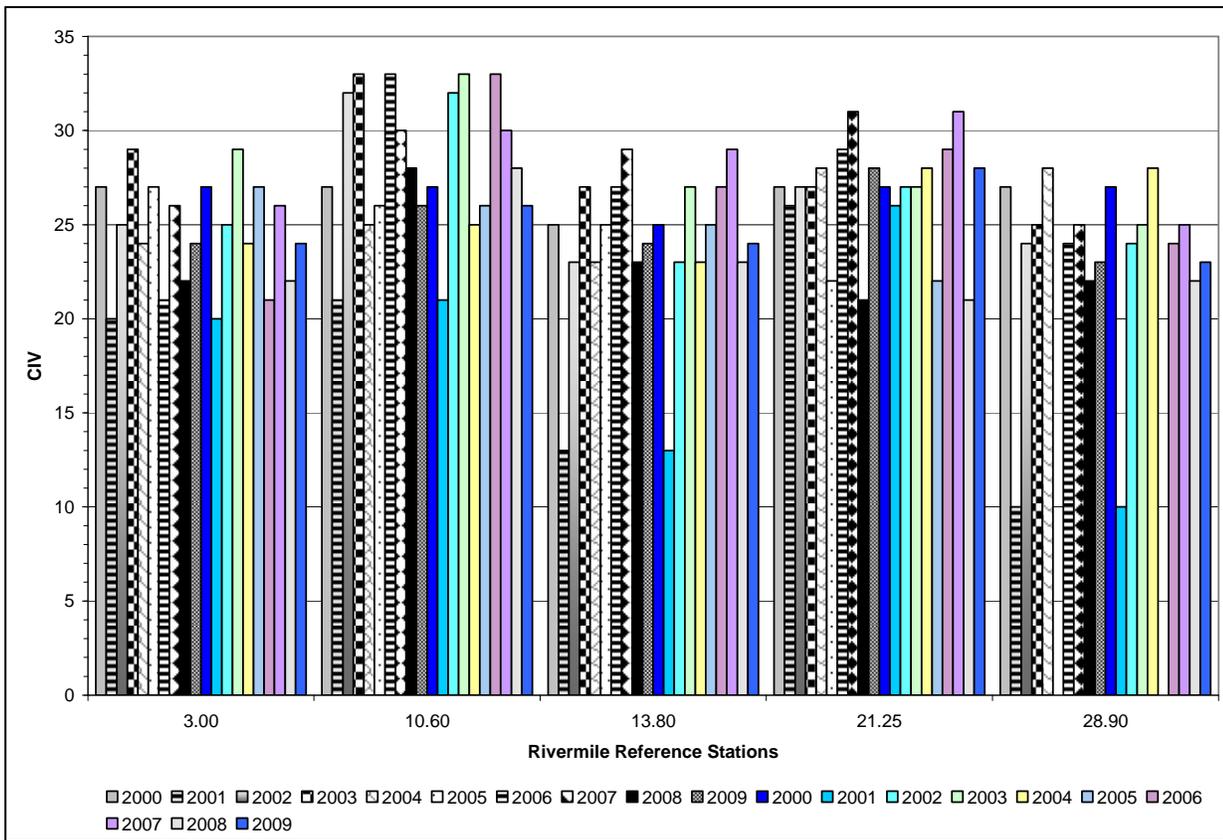


Figure 2.2 Greenville Creek 2000-2009 Mean CIVs



Qualitative Habitat Evaluation Index (QHEI)

The Qualitative Habitat Evaluation Index (QHEI) is a system developed and employed by the Ohio Environmental Protection Agency (OEPA) to measure physical habitat conditions in and around rivers and streams in Ohio. During 1998, SQM staff conducted a modified version of the QHEI, referred to as *Citizens 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.

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 3.1 Stillwater River 1999 QHEI and SQM Assessment Data

Reference Station	QHEI	Attainment Status	Average CIV	SQM Assessment
RM 1.6	63	FULL	21	GOOD
RM 8.6	83	FULL	27	EXCELLENT
RM 14.0	75	FULL	27	EXCELLENT
RM 21.7	65	FULL	26	EXCELLENT
RM 32.3	52	NON	28	EXCELLENT
RM 37.4	91.5	FULL	26	EXCELLENT
RM 41.4	72	FULL	18	GOOD
RM 51.2	73	FULL	20	GOOD

Table 3.2 Greenville Creek 1999 QHEI and SQM Assessment Data

Reference Station	QHEI	Attainment Status	Average CIV	SQM Assessment
RM 3.0	65	FULL	25	EXCELLENT
RM 10.6	75	FULL	31	EXCELLENT
RM 13.8	77	FULL	26	EXCELLENT
RM 22.0	54.5	NON	27	EXCELLENT
RM 28.9	64	FULL	26	EXCELLENT

Appendix

Stream Quality Monitoring Data by Monitoring Station

2009 CIVs by Monitoring Station STILLWATER RIVER																					
RM	DATE	W P	M F	S T	D O	C D	R I	O S	D A	D R	C R	B L	S C	C L	S W	B F	A W	M I	P S	L E	CIV
1.60	4/27/2009	A	A	A	B	B	A	B			A			A		B		A			28.00
1.60	6/19/2009	A	B	B	A	A	B	B		A				A		A		B			29.00
1.60	9/13/2009	B		A	A	B	A	A	A	B				A					B		27.00
8.60	7/18/2009	A	B		A	B	B	B						B			A				23.00
8.60	8/30/2009	A		A		B	B	B									A	A			17.00
8.60	10/3/2009	B	B		C	B	B	A						B			B			A	23.00
14.00	5/20/2009		B	B		B			A	A	A	A		A	B			A			23.00
14.00	6/29/2009		A	A		B	A		A		A	A		A	A			A			25.00
14.00	9/22/2009		A	A		C	A		A					B	A		C	A			22.00
21.70	7/8/2009	A	B	A		B	B					A	A	B			A	A			25.00
32.30	6/21/2009	A	B	B		A	A	A			A						A				23.00
32.30	8/22/2009	B	B	A		A	A										A	A			19.00
32.30	10/11/2009		B			A	A	A	A		A						A				19.00
37.40	5/28/2009		A	A		B	A	A				A		A			A			A	23.00
37.40	8/26/2009			A		C	A	A			A			A						A	19.00
37.40	9/23/2009	A	A			A	C	A	A	A			A						A		24.00
41.40	5/28/2009		A	A		A	A	A	A			A					A				22.00
41.40	8/26/2009	A	A			B	A	A	A					A			A	A			23.00
41.40	9/23/2009	A	A			B	A					A		A	A		A			A	22.00
51.20	7/18/2009																	A			3.00
51.20	10/21/2009									A											4.00
51.20	11/26/2009																		A		3.00

2009 CIVs by Monitoring Station GREENVILLE CREEK																					
RM	DATE	W P	M F	S T	D O	C D	R I	O S	D A	D R	C R	B L	S C	C L	S W	B F	A W	M I	P S	L E	CIV
3.00	6/21/2009	B	B	A		A	A	A			A						A				23.00
3.00	8/22/2009	B	B	A	A	A	A	A									A	A			25.00
3.00	10/11/2009	B	B	A		B	A	A	A								A				23.00
10.60	5/23/2009	A	B	A		A	A		B	A	A	A			A			A			28.00
10.60	7/18/2009	B	A			A	A	A	A	A		A			A		A				26.00
10.60	10/21/2009	B	B			B	A	A	B		A				A						23.00
13.80	5/23/2009	A	A	A		A		B	A		A				B		A				24.00
13.80	7/18/2009	B	B			B	B	B		A		A			A		A				24.00
13.80	10/21/2009	A	B			B	A	B	A		A	A			A						25.00
21.25	5/23/2009	B	A	A			A	A	A	A	A	A			A		A	A	A		30.00
21.25	7/18/2009	B	A			A	B	C		A	A	A		B				A			26.00
21.25	10/21/2009	B	B			B	A	A	A	A	A	A		A			A			A	29.00
28.90	5/23/2009	B	B	A		B		B	A		A				B	A					25.00
28.90	7/18/2009	B	A			A	A	C							B				A		20.00
28.90	10/21/2009	B	B	A		A		A	A		A	A		A							25.00

