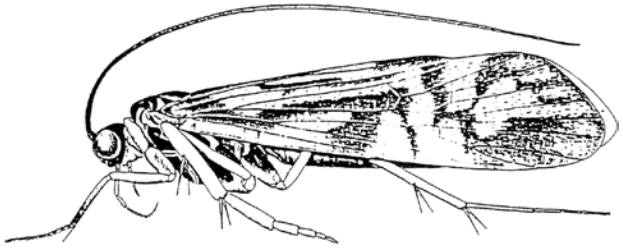
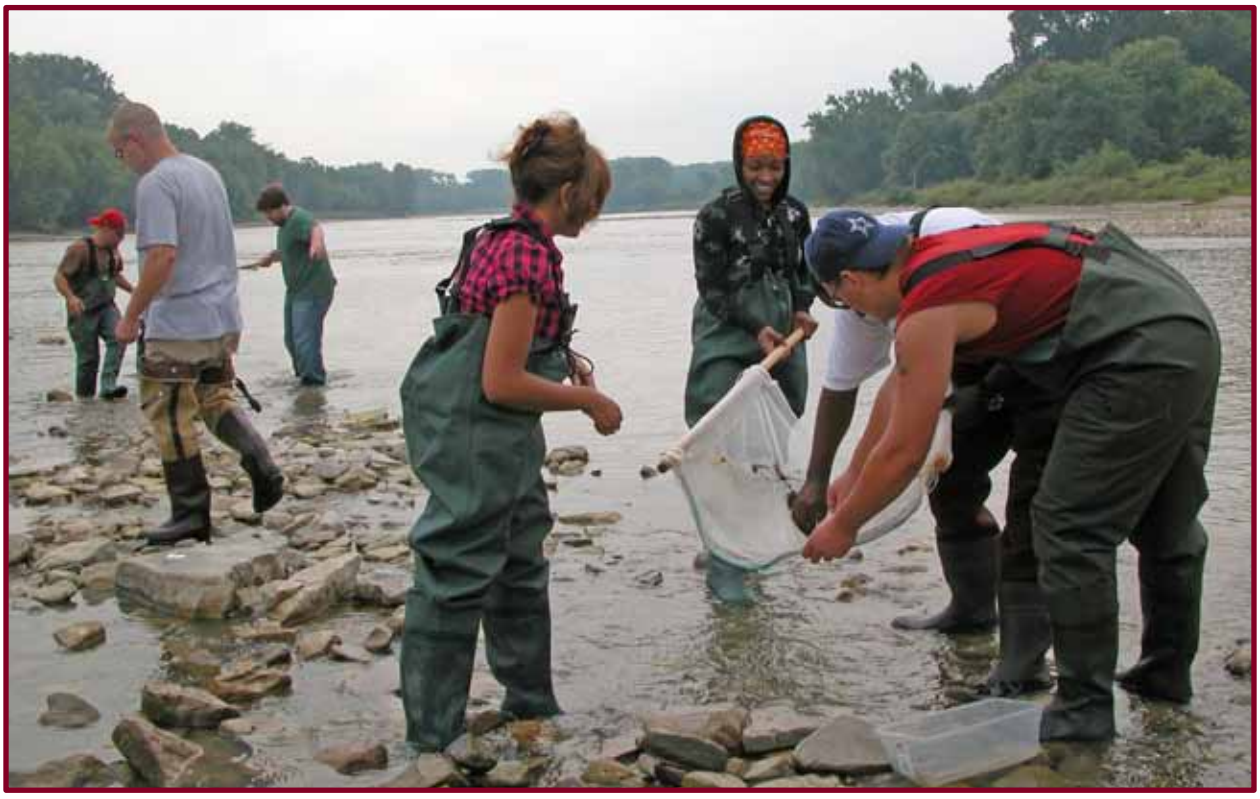
Stream Quality Monitoring 2010 Annual Report



Conneaut Creek
State Wild & Scenic River



Ohio

Ohio Department of Natural Resources
Division of Watercraft

Stream Quality Monitoring 2010 Annual Report
Conneaut Creek State Wild & Scenic River

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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 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 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 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 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.

Conneaut Creek State Wild & Scenic River Overview

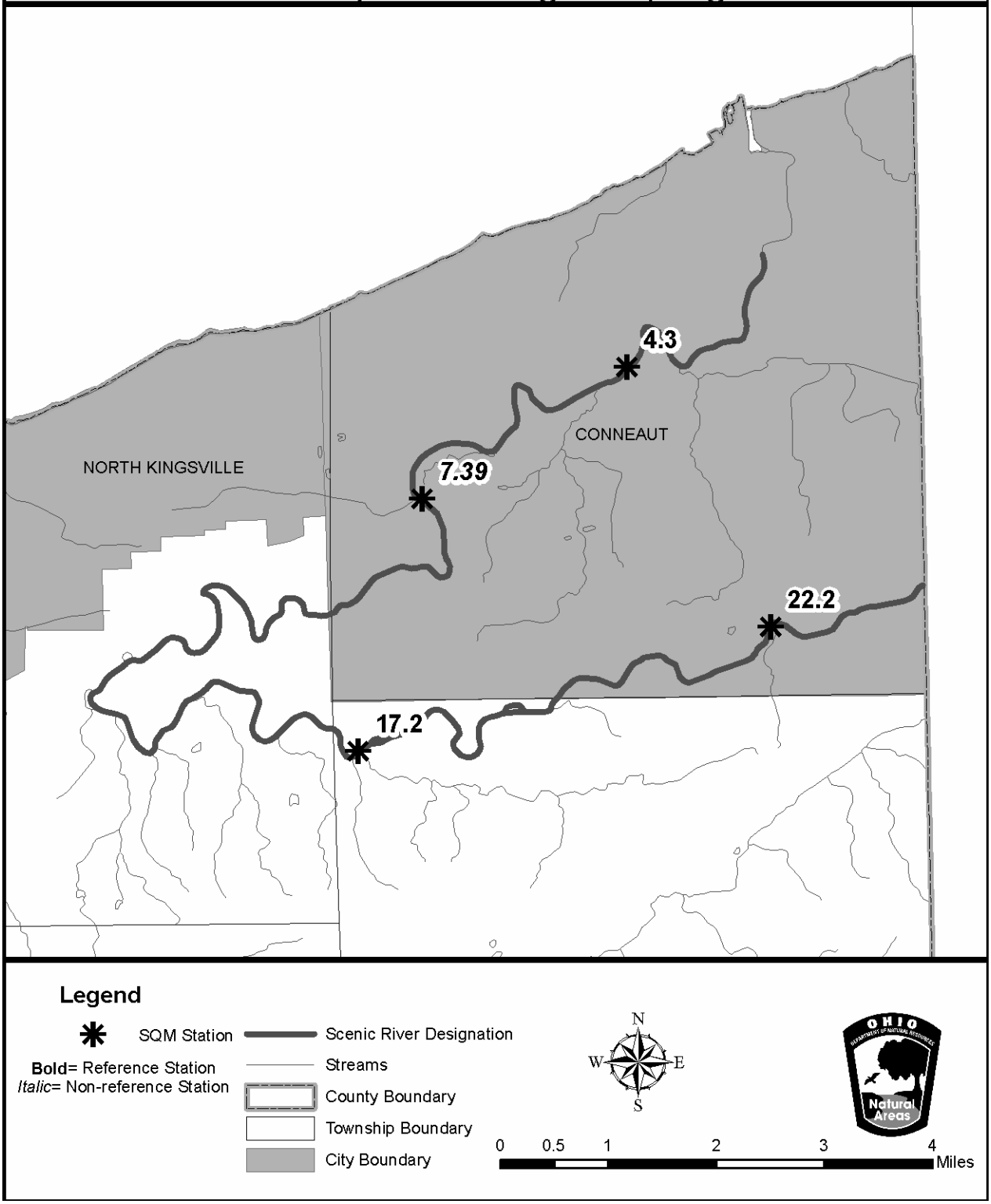
On October 6, 2005, Conneaut Creek was designated a State Wild and Scenic River by the Ohio Department of Natural Resources. The wild portion is more than 16 miles and flows from the Ohio-Pennsylvania state line at river mile 23.83 downstream to the Creek Road bridge crossing at river mile 7.39. From the Creek Road bridge crossing at river mile 7.39 downstream to the Penn Central railroad bridge crossing (known locally as “The Arches”) at river mile 2.0 lies the scenic portion. Conneaut Creek is one of only three waterways in the state to receive the wild designation. This top honor recognizes Conneaut Creek as one of the most naturally occurring streams remaining in Ohio.

Conneaut Creek has an extensive forested corridor, which varies from 25 feet wide up to a mile wide. As a result, the creek is one of the most biologically diverse of all Lake Erie tributaries. Recent surveys resulted in the identification of 78 fish species, 32 species of amphibians and reptiles and 90 bird species in or along Conneaut Creek. The surveys also revealed 33 threatened and endangered plant and animal species as well.

Although Conneaut Creek is presently in excellent condition, the potential for future adverse impacts to the watershed still exist from non-point source pollution, timbering, filling of wetlands and floodplains and the development of oil and gas. Like most rivers in northeastern Ohio, Conneaut Creek is experiencing increased development pressure. Although steep shale cliffs hinder residential and riverfront development in many areas, development in other areas is less restricted, often occurring within view of the river. A non-profit group, the Friends of Conneaut Creek, is currently working with the Ohio Scenic Rivers Program, local governments and conservation organizations to increase preservation efforts and access points along the creek.

For additional information about Conneaut Creek State Wild and Scenic River, including conservation options for landowners and ways to participate in the preservation of this important resource, contact the Northeast Ohio Regional Scenic River Manager at 330-872-0040 or the Northeast Ohio Stream Quality Monitoring Coordinator at 330-527-2961. For online information, go to *www.ohiodnr.com/watercraft*.

Conneaut Creek
Stream Quality Monitoring Sampling Stations



2010 Stream Quality Monitoring Participants

Whether their contribution was a one-time event or a recurring adventure in stream exploration, the individuals listed below played a significant role in protecting Conneaut Creek State Wild and Scenic River. Their time and dedication to this river and the Stream Quality Monitoring Project is greatly appreciated.

River Mile 4.3 - Center Road Bridge
The Coltman Family
Watercraft SQM Volunteer Training Workshop
The Darby Family
Conneaut High School Zoology Class
Babs Lageza & Family

River Mile 5.3 – Parrish Road Bridge
Elliott & Gary Pagenkopf

River Mile 7.39 - Creek Road Covered Road Bridge
The Coltman Family
Volunteers Needed

River Mile 10.3 – The Nierzejewski Property *(Private, non-reference)*
Mike Nierzejewski

River Mile 17.2 - State Road Covered Bridge
Babs Lageza & Family

The continued success of the Stream Quality Monitoring Project depends on the commitment and dedication of these (and other) volunteers and participants. If you would like to participate as a volunteer in Ohio's Stream Quality Monitoring Project, please contact the Northeast Stream Quality Monitoring Coordinator at 330-527-2961 or the Northeast Ohio Regional Scenic River Manager at 330-872-0040.

Stream Quality Monitoring Station Descriptions

Stream quality monitoring (SQM) stations along the Conneaut Creek have been selected based upon their ease of access, macroinvertebrate habitat and adequate sampling areas. Wherever possible, sampling stations are located on public property or where public access to the riffle areas is convenient and safe. Following are brief summaries of the stream quality monitoring stations located on Conneaut Creek.

River Mile 4.3 - Center Road Bridge
The sampling area at this station is located immediately upstream from the bridge. Access to the river is relatively easy with ample parking directly across from the CLYO Field. This is also a popular fishing location used year round depending on weather conditions.

The streambed is composed largely of cobblestones and gravel with occasional boulders. The habitat is quite good and contributes to the wide variety of organisms usually collected here. Cumulative Index Values (CIVs) at this site have been consistently in the excellent range with pollution intolerant organisms comprising the majority of the samples. All nine CIVs recorded during 2010 fell within the good to excellent range for relative water quality.

River Mile 5.30 – Parrish Road Bridge
This station was added in 2009 and is located immediately downstream of the old overhead steel truss bridge that has been closed for many years. To arrive at this site one must travel down Parrish Road from the south side of Conneaut Creek. Parking is adequate with easy access to the sampling area.

The riffle area is composed of a mixture of sand, gravel, and cobblestones, which makes excellent macroinvertebrate habitat. A small number of boulders can also be seen here. Three samples were completed throughout the season resulting in good to excellent readings.

River Mile 7.39 - Creek Road Covered Bridge
Access to this sampling station is down a relatively steep path leading to the river. The site is a popular fishing area and is heavily used by the public despite the challenging terrain. The composition of the streambed at this location consists predominately of gravel and cobblestones with a small percentage of sand. Habitat in the area is very good as reflected by the large number of pollution-intolerant organisms collected at this site. During 2010 three samples were performed at this station resulting in good to excellent readings.

River Mile 10.3 – The Nierzejewski Property *(Private, non-reference station)*

This station is located on private property and is sampled solely by the landowners. The substrate quality is very good with a high percentage of sand, gravel, and cobblestones. Results of stream quality monitoring during 2010 resulted in excellent readings.

River Mile 17.2 - State Road Covered Bridge
The riffle area at this site is located slightly downstream of the covered bridge adjacent to a small island located on the left side of the creek channel. Adequate parking and easy access to the creek make this area ideal for the aquatic sampler.

The streambed is composed of a relatively equal mixture of cobblestones and gravel where the sampler can find a diverse macroinvertebrate population. The aquatic sampling done at this station during 2010 resulted in good to excellent CIVs.

River Mile 22.2 – Middle Road Covered Bridge (non-reference site)
Prior to performing a sample at this location, permission must be obtained from the property owner at the southeast corner of the bridge. This site along the creek is also a popular spot for sport fishing. The predominant substrate in this riffle is extremely slippery shale bedrock that is not a desirable habitat for macroinvertebrates. If macroinvertebrates are found, they tend to be Group 1, pollution intolerant organisms.

Sampling Results and General Trends

Stream Quality Monitoring results for Conneaut Creek in 2010 ranged from good to excellent despite higher than normal temperatures beginning in early spring. According to the National Oceanic and Atmospheric Administration (NOAA), the National Weather Service in Cleveland recorded the warmest April on record with an average temperature of 56.0 degrees. This topped the previous record of 55.9 degrees set in 1955. The warm trend continued through the summer months and resulted in Ohio's second warmest summer on record. Cleveland recorded sixteen days with 90 degree temperatures or higher. Despite the higher than normal temperatures, the macroinvertebrate populations proved their resiliency. CIV's for the sampling season were consistent with those in recent years with high numbers of insects collected per sample. TSS (Total Suspended Solids) values throughout the sampling year were in the normal to excellent range as well. Overall, the 2010 sampling results from Conneaut Creek indicate an excellent diversity of aquatic insects, especially the pollution sensitive species. On average, 12 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.) were found per assessment on Conneaut Creek.

Long-term stream quality monitoring data on Conneaut Creek is limited at this time, mainly due to the fact that the river has only been a component of the Scenic Rivers system since October 2005; the SQM program began in the Conneaut Creek during the spring of 2006. SQM samples were taken sporadically over the years by volunteers assigned on other designated rivers in northeast Ohio as well as by ODNR staff. This previous information supports the data recorded during 2010 with high cumulative index values and predominately pollution-intolerant organisms in all samples performed.

The staff of the Ohio Scenic Rivers Program appreciates the assistance we received from our dedicated volunteer monitors. It is only through their efforts that it was possible to complete the SQM samples along Conneaut Creek during 2010. Working together has produced significant results but more help is needed. For more information please contact the Northeast Stream Quality Monitoring Coordinator at 330-527-2961 or the Northeast Ohio Regional Scenic River Manager at 330-872-0040.

Volunteer and staff data results are used for the purposes of 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.

Total Suspended Solids (TSS)

In 1999, the Scenic Rivers Program added Total Suspended Solids (TSS) monitoring to the Ohio 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 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 impact 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 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 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 ¼ 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

2010 TSS Results: A total of 20 TSS readings were taken in Conneaut Creek. The median was <6.0 mg/l of TSS, which corresponds to the excellent range. The data set ranged from <6.0 mg/l to 13 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 River's 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)

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 year's CIV.

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

Table 2. Conneaut Creek 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
4.3	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆		◆	◆	◆			27-
5.3	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆		◆							24
7.39	◆	◆	◆	◆	◆	◆		◆		◆	◆	◆		◆	◆	◆	◆	◆			22-
17.2	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆		◆		◆	◆	◆		◆	23-

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

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

Figure 1. Conneaut Creek 2010 Maximum and Minimum CIV Ranges

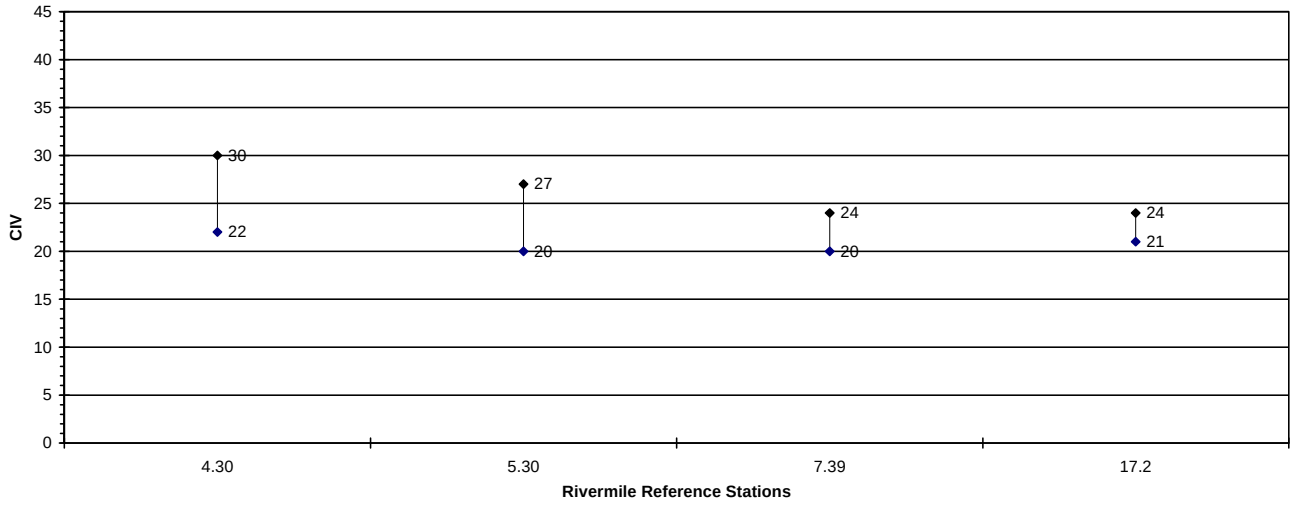
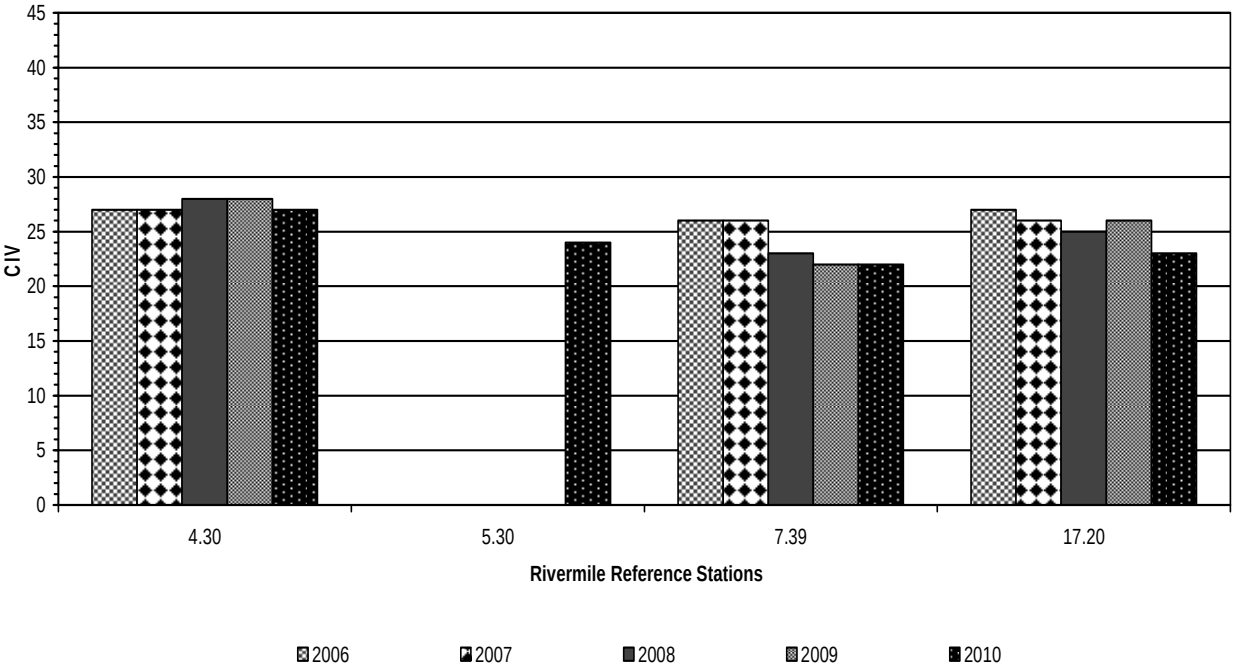


Figure 2. Conneaut Creek 2010 Mean CIVs



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 2006, SQM staff tested the 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.

Habitat conditions are re-evaluated every five years. SQM staff and volunteers are scheduled to perform evaluations next in 2011. Until then, results from the 2006 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. Conneaut Creek Wild & Scenic River 2006 QHEI & SQM Assessment Data

Reference Station	QHEI	Attainment Status	2006 Average CIV	SQM Assessment
RM 4.3	86.5	FULL	27	EXCELLENT
RM 7.39	81.5	FULL	26	EXCELLENT
RM 17.2	76.5	FULL	27	EXCELLENT

Appendix

Stream Quality Monitoring Data by Monitoring Station

2010 CIVs by Monitoring Station CONNEAUT CREEK																					
RM	DATE	WP	MF	ST	DO	CD	RI	OS	DA	DR	CR	BL	CF	SC	CL	SW	BF	AW	MI	PS	LE	CIV
4.30	5/13/2010	A	B	B		A	B		A				A		A				B			22.00
4.30	6/15/2010	A	B	A	A	B	A		A	A	A				A			A	A			28.00
4.30	6/16/2010	B	B	B	A	A	B	B		A			B		B		A	A	B			30.00
4.30	8/24/2010	B	B	A	A	A	B		A			A	A		A			A	B			28.00
4.30	8/30/2010	A		A		B	A	A		A			A		A	A	A		A			25.00
4.30	9/1/2010	B	A	A	A	B	B		A				A						A			23.00
4.30	9/23/2010	B	B	A	A	B	A	A	A		A		A					A				28.00
4.30	10/13/2010	B	B	B	A	A	A	A	A		A		A		A							29.00
4.30	10/31/2010	B	A	B	A	A	B	A			A		A		A			A				28.00
5.30	6/1/2010	A	A	A	A	B	B	A	A				A		A							27.00
5.30	7/1/2010	A	B	A		B	A	A	A				B		A							24.00
5.30	9/26/2010	B	B			B	A		A		A		A		A							20.00
7.39	6/15/2010	A		A	A	B	A				A	A	A									21.00
7.39	8/20/2010	A	A	A	A	A						B	A					A				20.00
7.39	9/1/2010	B	B	A	A	B	B					A	A						A		A	24.00
10.30	10/21/2010	B	B	B	A	B	A		A				A		A			A	A			26.00
10.30	10/26/2010	B	B	B	A	B	A		A		A			A				A	B			26.00
17.20	6/23/2010	B	A	A	A	B	B				A	A						A	A			24.00
17.20	8/30/2010	A		A	A	B	A	A			A		A		A				A			25.00
17.20	9/1/2010	A	B	A	B	A	B						A						A			21.00