Stream Quality Monitoring 2011 Annual Report

Kokosing River
State Scenic River

Ohio

Department of Natural Resources
Division of Watercraft

Stream Quality Monitoring 2011 Annual Report
Kokosing State 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 Ohio Stream Quality Monitoring (SQM) Project uses volunteers who assist 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 macroinvertebrate 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, 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's Scenic Rivers Program, 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, three times during the monitoring season. Volunteers complete field assessment forms that document taxonomy, tolerance and abundance of collected organisms.

SQM Annual Report

The information collected by volunteers has become a critical tool for documenting the health of Ohio's state scenic, wild, and recreational rivers. This report is a compilation of field data collected during 2011 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

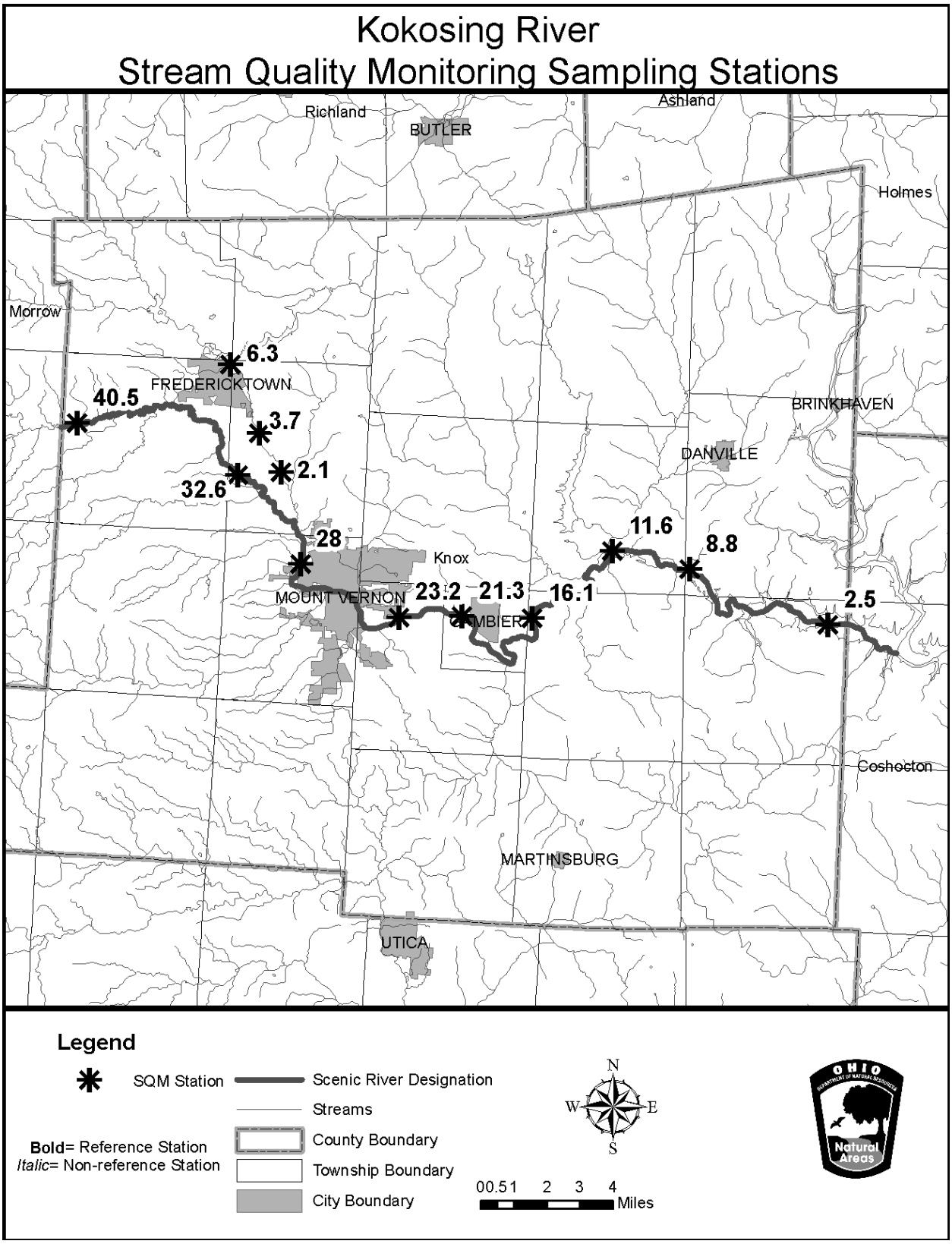
The Kokosing River watershed is situated between two urban centers, Mansfield and Columbus, in the central northeast Ohio rural countryside. Most of the watershed lies within Knox County, which lies on the outer edge of an area once covered by continental glaciers. Two main glacial events left their mark on the landscape. The first was the Illinoian glacier that moved across the watershed and covered most of the eastern part of Knox County. The ice flowed around and between the hills leaving glacial deposits of varying thickness. The second glacial event only covered the western part of Knox County. It also left thick deposits of gravel, sand, and silt.

Forty-eight miles of the Kokosing River system were designated as Ohio's 11th scenic river in 1997. The mainstem Kokosing is designated from the confluence with the Mohican and Walhonding Rivers, totaling 41.1 miles upstream to the Knox/Morrow County line. The North Branch Kokosing is designated from the confluence with the mainstem of the Kokosing River, upstream 6.5 miles, to the confluence with the East Branch Kokosing, just north of Fredericktown. More than 70 species of fish, five species of freshwater mussels, and 24 species of amphibians including the state endangered hellbender inhabit the Kokosing River system. Nearly 90 species of breeding birds also may be found in the forested lands along the riverbanks. These forested banks are a vital part of the Kokosing's exceptional habitat, water quality, and scenery.

The Kokosing River name has an interesting history. The name "Kokosing" in the Delaware Indian language is said to mean "river of many Delaware villages." Other sources say that the word "Kokosing" was used by the Algonquin Indians to mean "river of little owls." In addition, many early historians referred to the river as "Owl Creek." Use of this name prior to 1866 is corroborated by the names used for the Owl Creek Bank of Mt. Vernon, Owl Creek Baptist Church and the Owl Creek Bookstore among others. There are also records of the name "Vernon River" being promoted by Bishop Philander Chase, founder of Kenyon College.

Over two centuries have passed since the first pioneers settled the Kokosing watershed. Remarkably, the population has not quite doubled since 1840. This slow growth rate combined with fairly stable land-use patterns has benefited the river system. Since the initial period of change, the river system has adapted fairly well and has been able to maintain a higher quality than many other Ohio streams. This high quality status may be attributed largely to the diverse stream substrate left by the glaciers and to the presence of a healthy wooded corridor maintained by landowners over the years.

The Kokosing River and North Branch of the Kokosing River are popular streams for canoeing, fishing, bird watching, and other outdoor activities. Additional information about public access facilities on the Kokosing is available by contacting the Division of Watercraft at 740-548-5490 or visiting www.ohiodnr.com/watercraft.


Kokosing River
Stream Quality Monitoring Sampling Stations
Richland
BUTLER
Ashland
Holmes
Morrow
6.3
FREDERICKTOWN
40.5
3.7
2.1
32.6
28
Knox
MOUNT VERNON
23.2
21.3
16.1
MBIER
11.6
8.8
2.5
BRINKHAVEN
DANVILLE
Coshocton
MARTINSBURG
UTICA
Legend
SQM Station
Scenic River Designation
Streams
County Boundary
Township Boundary
City Boundary
Bold= Reference Station
Italic= Non-reference Station
N
W
E
S
0 0.5 1 2 3 4
Miles
OHIO
Natural Areas

2011 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 the preservation of the Kokosing River. Their time and dedication to this river and the Ohio SQM Project are greatly appreciated. Special thanks are also extended to the Knox Soil and Water Conservation District, Kenyon College Brown Family Environmental Center, private landowners, and the Kokosing Scenic River Advisory Council for their continued support and assistance. These reference stations are also closely monitored by Division of Watercraft staff.

Kokosing River

River Mile 2.5 - Riley Chapel Road Bridge
Volunteer Needed

River Mile 8.8 - Bridge Street
Paul Stewart
Volunteer Needed

River Mile 11.6 - Howard Riffle
Stan Conwell

River Mile 16.1 - Zion Road Bridge
Marcia Morgan and Nancy Badet

River Mile 21.3 - Village of Gambier
Joan and Bill Heiser

River Mile 23.2 - Lower Gambier Road
Volunteer Needed

River Mile 28.0 - Mt. Vernon Riverside Park
Jean and Larry Smith

River Mile 32.6 and 32.7 - Beckley Road Bridge
Robert Bostard
Robert Kyle
Phyllis and Dave Randall

River Mile 40.5 - Lucerne Road Bridge
Lauren Blyth
Ben Warner

Kokosing River - North Branch

River Mile 2.1 - Beckley Road Bridge
Volunteer needed

River Mile 3.7 - Hyatt Road Bridge
Sharon Tinianow

River Mile 6.3 - Fredericktown Community Park
Robert Bostard
Robert Kyle

The continued success of the Ohio SQM Project is dependent upon the commitment and dedication of these (and past) volunteers. We would like to recognize volunteers *Robert Kyle; Robert Bostard; Joan and Bill Heiser; Sharon Tinianow; Jean Smith; and Phyllis and Dave Randall* for monitoring three times or more during the season. If you are interested in becoming a volunteer, please contact the Central Ohio SQM Coordinator at 740-548-5490.

Station Descriptions

The Kokosing River and the North Branch of the Kokosing River both largely are surrounded by agriculture. Most land adjacent to the rivers is privately owned and there are few public access sites. When possible, sampling stations are located in or adjacent to areas where public access is permitted. The following are brief descriptions of selected SQM stations on the Kokosing Scenic River.

Kokosing River

River Mile 2.5 - Riley Chapel Road, Butler Township

Located downstream from Riley Chapel Road Bridge in Knox County, this site is the furthest downstream reference station on the Kokosing River. Unlike much of the river, this section lacks a riparian buffer and erosion along the stream banks is apparent. Access to the riffle can be difficult during periods of moderately high water and impossible during periods of high water.

River Mile 8.8 - Bridge Street, Millwood

Located just upstream from Bridge Street in Millwood, Knox County, this site is accessed on the south side of the bridge. The riffle is wide and a number of different habitats may be sampled with varying depth, flow and substrate composition. However, the current may be very swift in some areas so caution should be exercised.

River Mile 11.6 - Pipesville Road, Howard

This riffle in Knox County is located 200 yards upstream from Pipesville Road. Upon reaching the site, two riffles divided by a gravel bar will be apparent. Monitoring is conducted at the riffle left of the gravel bar as you approach from downstream. Access is via private property with landowner consent.

River Mile 16.10 - Zion Road, Harrison Township

This site is located in Knox County immediately upstream from the Zion Road Bridge. The site is accessible from the eastern side of the bridge, where a path leads to the river. This site has a steep gradient so the water current is quite swift.

River Mile 21.3 – Lamyon Road Bridge, Gambier

This site is located 0.30 miles upstream from the Laymon Road Bridge in Knox County. Access to this site is along the Kokosing Gap Trail, which runs adjacent to the river. Plenty of parking is available at the gravel lot located near the Brown Family Environmental Center.

River Mile 23.2 - Lower Gambier Road, Pleasant Township

Located in Knox County, this riffle is located immediately upstream of Pine Bridge on the Kokosing Gap Trail and continues underneath the bridge. The site is accessed along the Gap Trail or Lower Gambier Rd.

River Mile 28.0 - Riverside Park, Mt. Vernon

This site is constantly changing due to the Army Corps of Engineers, City of Mount Vernon, and Knox County's dike management. The availability of public access and ample parking space for several vehicles makes this is an ideal site for large groups interested in monitoring.

River Mile 32.6 and 32.7 - Beckley Road, Morris Township

Upstream from the Beckley Road Bridge in Knox County, this riffle is located on private property and permission from the landowner is required. River Mile 32.7 was acquired in 2003 to replace a former downstream site, River Mile 32.6. The stream channel was altered significantly at the former site due to bridge construction in the summer of 2003. In mid-summer of the 2005 season, the bridge construction was finished and the former site, River Mile 32.6, was restored.

River Mile 40.5 - Lucerne Road, Wayne Township

This riffle is located upstream from the Lucerne Road Bridge in Knox County on private property. There is limited space for one vehicle to park at this site. This site makes up the smallest riffle area (approximately 15 feet by 3 feet) monitored on the Kokosing River. Although small, this site consistently scores in the excellent range.

Kokosing River - North Branch

River Mile 2.1 - Beckley Road, Morris Township

Located upstream from the Beckley Road Bridge in Knox County, this site is on private property and permission from the landowner is necessary. The mouth of this riffle terminates just before a bend in the river and the current can be quite swift at times.

River Mile 3.7 - Hyatt Road, Morris Township

This site is located 100 yards downstream from the Hyatt Road Bridge in Knox County. Access is available on the east side of the river along the bridge right-of-way.

River Mile 6.3 - Fredericktown Community Park, Village of Fredericktown

Located just downstream from the confluence with the East Branch of the Kokosing River in Knox County, this public site is excellent for large groups and has ample parking. The river is accessed directly from the park.

Sampling Results and General Trends

The 2011 field-monitoring season was the third wettest year on record (data from the National Oceanic and Atmospheric Administration). The increased amount of precipitation made accessing the rivers for sampling a challenge in the spring and fall. In several cases, the spring samples could not be taken until July. The Scenic Rivers SQM Project requires that each assessment be conducted a minimum of 30 days apart. Because of this year's wet weather and SQM Project requirements for the 30 day minimum, samples were often conducted later in the season than normal. Additionally, the SQM Project requires a minimum of three readings to calculate a Cumulative Index Value (CIV). All sites were monitored at least three times for the 2011 monitoring season.

Volunteers and staff on the Kokosing River conducted 31 assessments in 2011. The mainstem of the Kokosing River recorded an average CIV of 25.1, corresponding to the excellent range for stream quality. The CIV average is up from the average score of 24.32 in 2010. Looking at the mainstem of the Kokosing as a whole, in the past 15 years since Scenic River designation, the river continues to show improvement or stabilization at the majority of sites. All of the river miles had an average CIV scoring in the excellent range except for two: River Miles 11.6 and 32.6. In 2009, several large trees fell from the river bank during a flood event at River Mile 11.6. The fallen trees forced the river to flow behind the root masses, eroding away the right bank of the river. The subsequent erosion widened the channel and slowed the flow of the river, causing the riffle to diminish in habitat. River mile 32.6 has continued to show improvement over the past two years. Scenic Rivers' staff will work with state agencies and local government to continue to improve the water quality in these areas. The average taxonomic diversity per assessment was 11 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc). The average of taxonomic diversity per assessment has remained consistent for the past three years.

Volunteers and staff on North Branch of the Kokosing River conducted 10 assessments in 2011. The North Branch recorded an average CIV of 26.0, meeting the excellent range of stream quality. This is roughly a one-point decrease from the average of 26.9 in 2010. However, the North Branch of the Kokosing River scored very well, with each of the river miles sampled scoring in the excellent range. The North Branch has shown consistent improvement since its designation in 1997. The average taxonomic diversity per assessment was 11 macroinvertebrate orders, a one point decrease from the 2010 season average.

Data collected by SQM Project volunteers and ODNR staff is used as a water quality-screening method. The data helps to detect significant changes in stream quality based on CIV data from sites monitored for many years. If there is a significant decline in the average CIV, potential problems that may be causing stream degradation can be investigated and addressed.

Ohio Scenic Rivers Program staff appreciates the assistance received from dedicated volunteer monitors. It is only through their efforts that it was possible to complete the SQM samples on the Kokosing River mainstem and North Branch during 2011. Working together has produced significant results but additional Scenic Rivers volunteers are needed to monitor reference sites, ensuring accurate and thorough data collection. For more information, please contact the Central Ohio SQM Coordinator at 740-548-5490.

Total Suspended Solids (TSS)

In 1999, the Scenic River 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 affecting 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 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 affect 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 be used to estimate water quality with 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

2011 Results: A total of 16 TSS readings were taken in the Kokosing River mainstem. The Kokosing River had a median value of <6.2 mg/L of TSS, corresponding to the maximum stream rating possible for the instrument. The data set ranged from <6.2 to 10 mg/L of total suspended solids. A total of 10 TSS readings were taken in the North Branch of the Kokosing River with a median value of <6.2 mg/L, corresponding with the excellent range. The data set ranged from <6.2 to 17 mg/L.

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 used as basic indicators of long-term changes in a stream's macroinvertebrate community and help the 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 Pollution Intolerant	Group II Taxa Moderately Tolerant	Group III Taxa 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)
Caddisfly Larvae (CD)	Crayfish (CF)	Leeches (LE)
Riffle Beetle Adult (RI)	Scuds (SC)	
Other Snails (OS)	Clams (CL)	
	Aquatic Sowbugs (SW)	

Tables 2 and 3 represent the mean CIV for each SQM reference station sampled on the river during 2011. 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 (above). A CIV of 23 or greater indicates *Excellent* stream quality; a CIV of 17-22 indicates *Good* stream quality; a CIV of 11-16 suggests *Fair* stream quality; and a CIV of 10 or less reflects *Poor* stream quality. Situated beside the CIVs 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. Kokosing River 2011 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
2.5	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆			◆	◆	◆		24+
8.8	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆		◆	28+
11.6	◆	◆			◆	◆		◆	◆	◆	◆	◆		◆	◆	◆	◆	◆		◆	22-
16.1	◆	◆			◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆		◆	27+
21.3	◆	◆			◆	◆	◆	◆		◆	◆	◆	◆	◆			◆	◆			23=
23.2	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆		◆	◆	◆			28+
28.0	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆			◆	◆	◆	◆	27-
32.6	◆	◆	◆		◆	◆	◆			◆		◆	◆	◆		◆	◆	◆			21+
40.5	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆		◆		◆	◆	◆	◆		28+

Table 3. Kokosing River - North Branch 2011 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
2.1	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆		◆	◆	◆		29-
3.7	◆	◆	◆		◆	◆	◆	◆		◆	◆	◆		◆			◆		◆		27-
6.3	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆		◆		◆	◆	◆		◆	23=

Figures 1.1 and 1.2 represent the maximum and minimum range of CIVs recorded during the year for each reference station. Figures 2.1 and 2.2 represent mean CIVs at each reference station over many years.

Figure 1.1 - Kokosing River 2011 CIV Maximum and Minimum Ranges

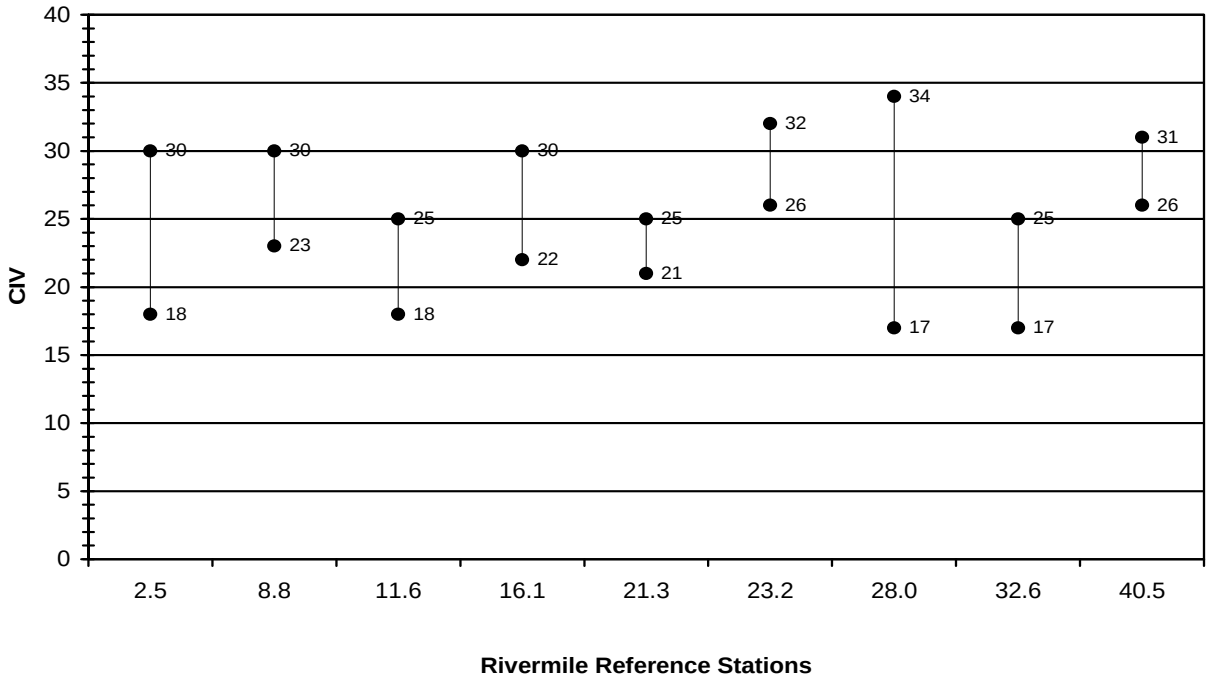


Figure 2.1 - Kokosing River 2002- 2011 Mean CIVs

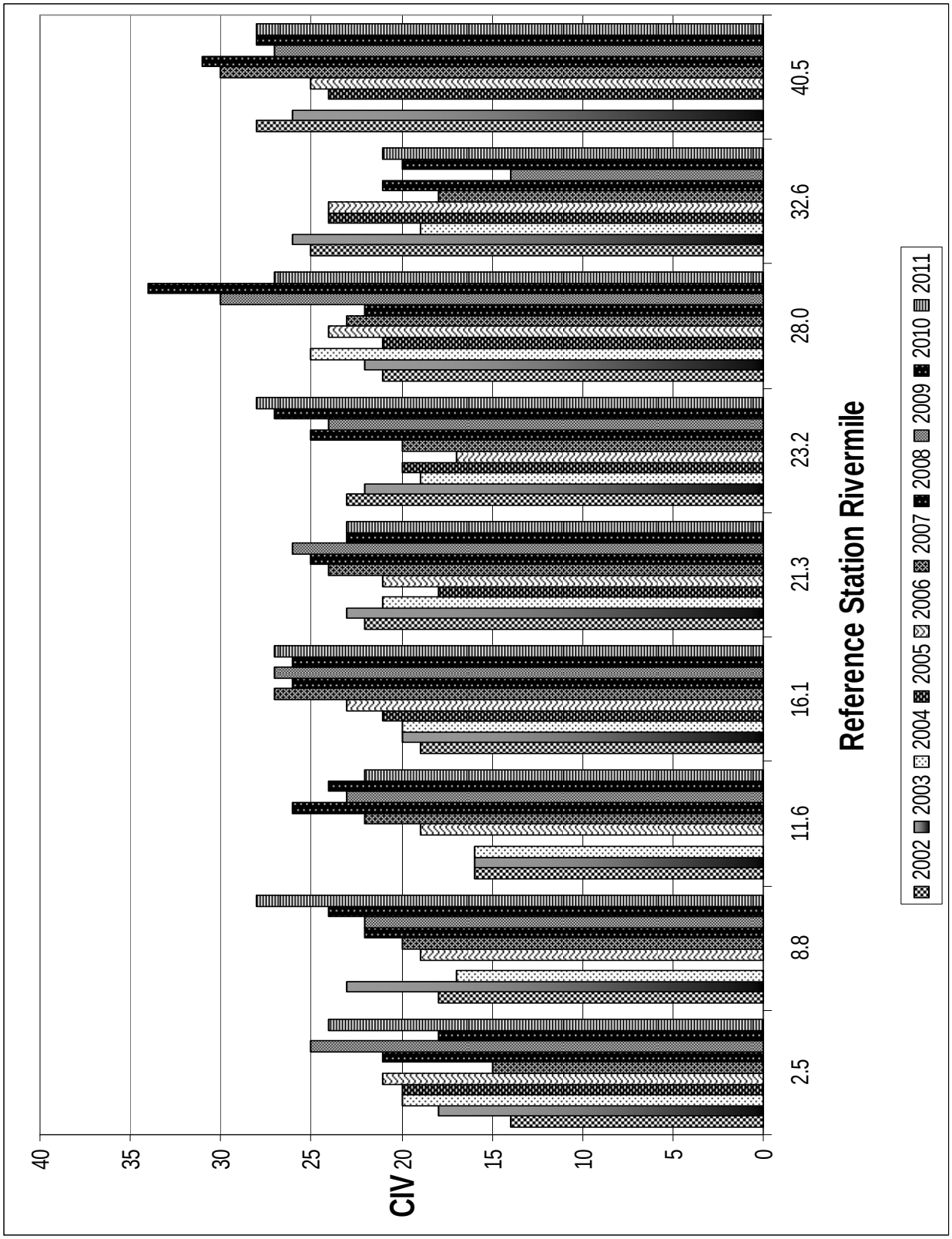


Figure 1.2 - Kokosing River - North Branch 2011 CIV Maximum and Minimum Ranges

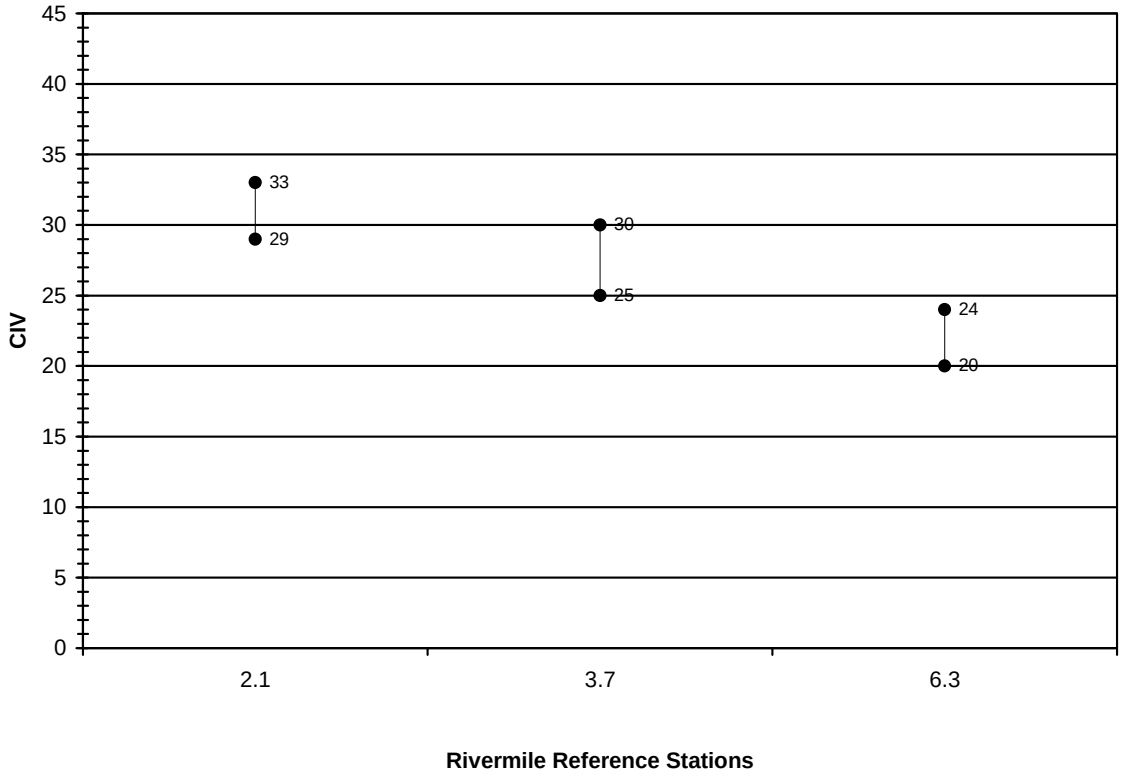
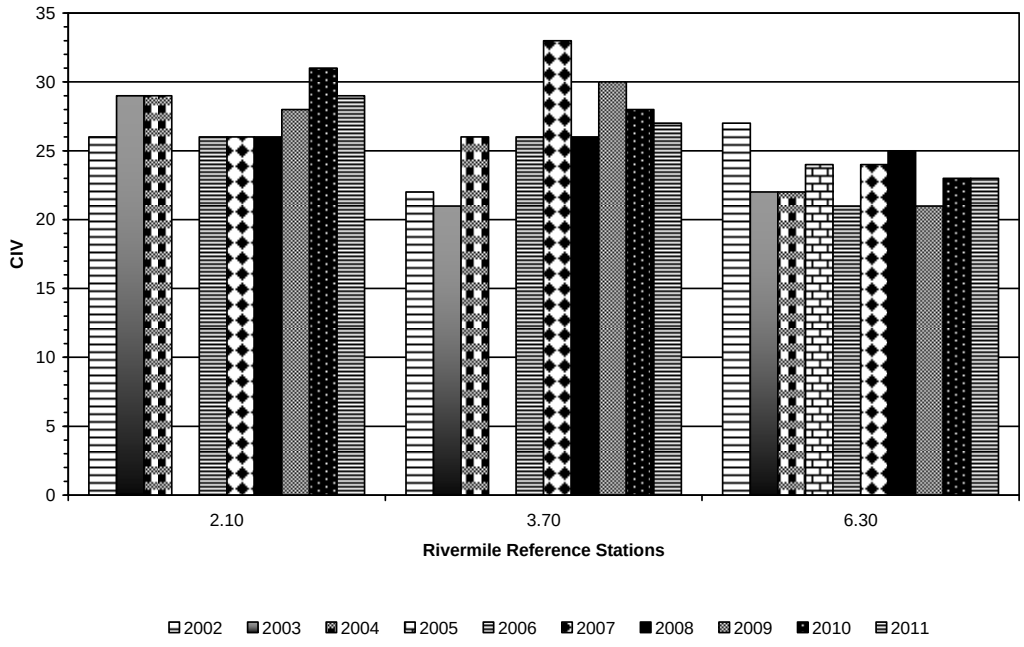


Figure 2.2 - Kokosing River - North Branch 2002-2011 Mean CIVs



Qualitative Habitat Evaluation Index (QHEI)

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

Beginning in 2001, SQM staff began performing QHEI evaluations at reference stations on the Kokosing River and Kokosing River, North Branch but discontinued evaluations due to low water conditions. These habitat conditions will be re-evaluated every five years.

Results from 2008 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 warm water 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 warm water 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 4. Kokosing River 2008 QHEI and SQM Assessment Data

Reference Station	QHEI	Attainment Status	2008 Average CIV	SQM Assessment
RM 2.5	78	FULL	21	GOOD
RM 8.8	90	FULL	22	GOOD
RM 11.6	76	FULL	26	EXCELLENT
RM 16.1	86.5	FULL	26	EXCELLENT
RM 21.3	83.5	FULL	25	EXCELLENT
RM 23.2	87.5	FULL	24	EXCELLENT
RM 28.0	80.5	FULL	23	EXCELLENT
RM 32.6	69	FULL	21	GOOD
RM 40.5	66	FULL	31	EXCELLENT

Table 5. Kokosing River- North Branch 2008 QHEI and SQM Assessment Data

Reference Station	QHEI	Attainment Status	2008 Average CIV	SQM Assessment
RM 2.1	87	FULL	26	EXCELLENT
RM 3.8	74.5	FULL	26	EXCELLENT
RM 6.3	84.5	FULL	25	EXCELLENT

Appendix

Stream Quality Monitoring Data by Monitoring Station

2011 CIVs by Monitoring Station KOKOSING RIVER																					
RM	DATE	WP	MF	ST	DO	CD	RI	OS	DA	DR	CR	BL	CF	SC	CL	SW	BF	AW	MI	PS	LE	CIV
2.50	7/21/2011		B	A		C	A					A	A					A	A			18.00
2.50	9/14/2011	A	B			C	A	B	A	A		A		A				A	A			25.00
2.50	11/10/2011	B	C	A		C	A	B	A		A	A			A		A	A	A	A		30.00
8.80	7/21/2011	B	B	A		C	A	A	B		A	B	A		A			A	A			30.00
8.80	8/26/2011	A	B			B	A	B	A			B	A				B		B			23.00
8.80	11/9/2011	B	B	A		C	A	B		A		B		A	B		A	A	A		A	30.00
11.60	7/21/2011		B			C	A					A	A		A		B	A	B			18.00
11.60	9/9/2011	A	B			B	A	A	A	A		A	A					A	A			25.00
11.60	10/14/2011	A	B			B		A	A		A	B			A			A	A		A	23.00
16.10	11/9/2010	B	B			C		B	A	A	A	B		A	B		A	B	A			30.00
16.10	6/28/2011	A	B			C	C	C		A	A		A	B	A			C	A		A	28.00
16.10	8/16/2011	B	C			C	B	B			A				A			B	B		A	22.00
21.30	6/29/2011	B	B	A		C	B	B			A		A						A			23.00
21.30	8/2/2011	B	B			B	B	A			A		A					A	A			21.00
21.30	9/13/2011	A	C		A	B	A	B			A		A		A				A			25.00
23.20	9/14/2011	B	B		A	C	B	B	A			B			B			A	B			26.00
23.20	11/9/2011	B	B			C	A	B				B	A	A	B		A	A	A			26.00
23.30	7/20/2011	A	B	B	A	C	B	A	A		A	B	A				B	A	A			32.00
28.00	6/22/2011	B	A	B		A	A	A			A	A	A		A			A	A		A	29.00
28.00	7/1/2011	A	C	B		C	B												B	B		17.00
28.00	8/27/2011	B	C	A	A	C	B	A	A		A	B	A		B			B	C	A		34.00
28.00	10/16/2011	B	C	A		C	A	A	A		A	A		A				B	B			28.00
32.60	6/2/2011	B		A		B	A	A			A											17.00
32.60	6/19/2011	A		A		B	A	A			A		A		A		A	A	A			24.00
32.60	7/12/2011	A		A		B	A	A			A		A		A							21.00
32.60	8/11/2011	A	A	A			A	A			A		A	A	A			A	A			25.00
32.60	8/23/2011	A	A	A		B	A	B					A		A				A			23.00
32.60	10/11/2011	B	B	A		B		B			A		B		A							21.00
40.50	6/24/2011	B	C	B	A	C	B	B			B	C	B		B		C		B			31.00
40.50	8/25/2011	C	C			C	B	B	A		B	B	B		C		A			A		27.00
40.50	11/9/2011	B	C			C	B	B			B	B	A		C		A	A	A			26.00

2011 CIVs by Monitoring Station NORTH BRANCH																					
RM	DATE	WP	MF	ST	DO	CD	RI	OS	DA	DR	CR	BL	CF	SC	CL	SW	BF	AW	MI	PS	LE	CIV
2.10	7/20/2011	B	B	A		C	B	A			A	B	A					A	A			26.00
2.10	9/14/2011	C	B	A		B	B	A	B		A	B	A		B				A			29.00
2.10	11/9/2011	C	C	B	A	C	B	B	A		A	B	A		B				A	A		33.00
3.70	6/12/2011	B	B	A		C	B	A	A		A	C	B		B			B		A		30.00
3.70	8/28/2011	C	B	A		B	B	B			A	B			B			A				25.00
3.70	10/2/2011	C	C	A		C	B	B	B		A	C			C			A				27.00
6.30	6/2/2011	B	A				A	A				A	B		A			A	A			20.00
6.30	7/12/2011	A	A	A	A	C	A			A		A	A									24.00
6.30	8/23/2011	B	B	A		C	B		A				A		B				A			22.00
6.30	10/11/2011	B	A	B		C		A	B				A		A		A	A			A	24.00