Stream Quality Monitoring 2011 Annual Report

Olentangy River
State Scenic River

Ohio

Department of Natural Resources
Division of Watercraft

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Olentangy State Scenic River

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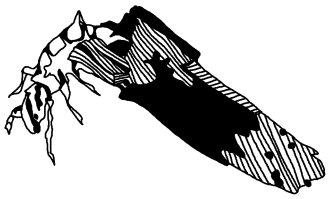
Ohio Scenic Rivers Program



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 River 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, 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 Olentangy River was the third scenic river designated in Ohio. It is designated for 22 river miles from just below the Delaware Dam in Delaware County, downstream to the old Wilson Bridge Road in the City of Worthington.

The river is located within the rapidly developing area of northern Columbus and southern Delaware County. While development has been intense, a section of the river in southern Delaware County still maintains an exceptional warm water habitat classification by the Ohio Environmental Protection Agency. The river is within a half hour drive of more than 1.5 million people.

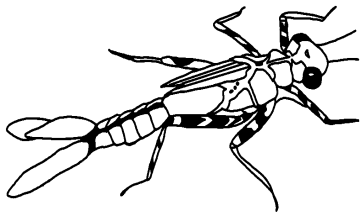
The river valley is characterized by gently rolling to relatively flat topography. The steep shale banks flanking the stream enhance the natural quality that signifies this river. The most spectacular shale banks, rising some 110 feet above the streambed, are along Highbanks Metro Park. These banks are often dissected by ravines, which cut through and expose the underlying rock strata including the Ohio black shale, noted for its presence of large "ironstone" concretions.

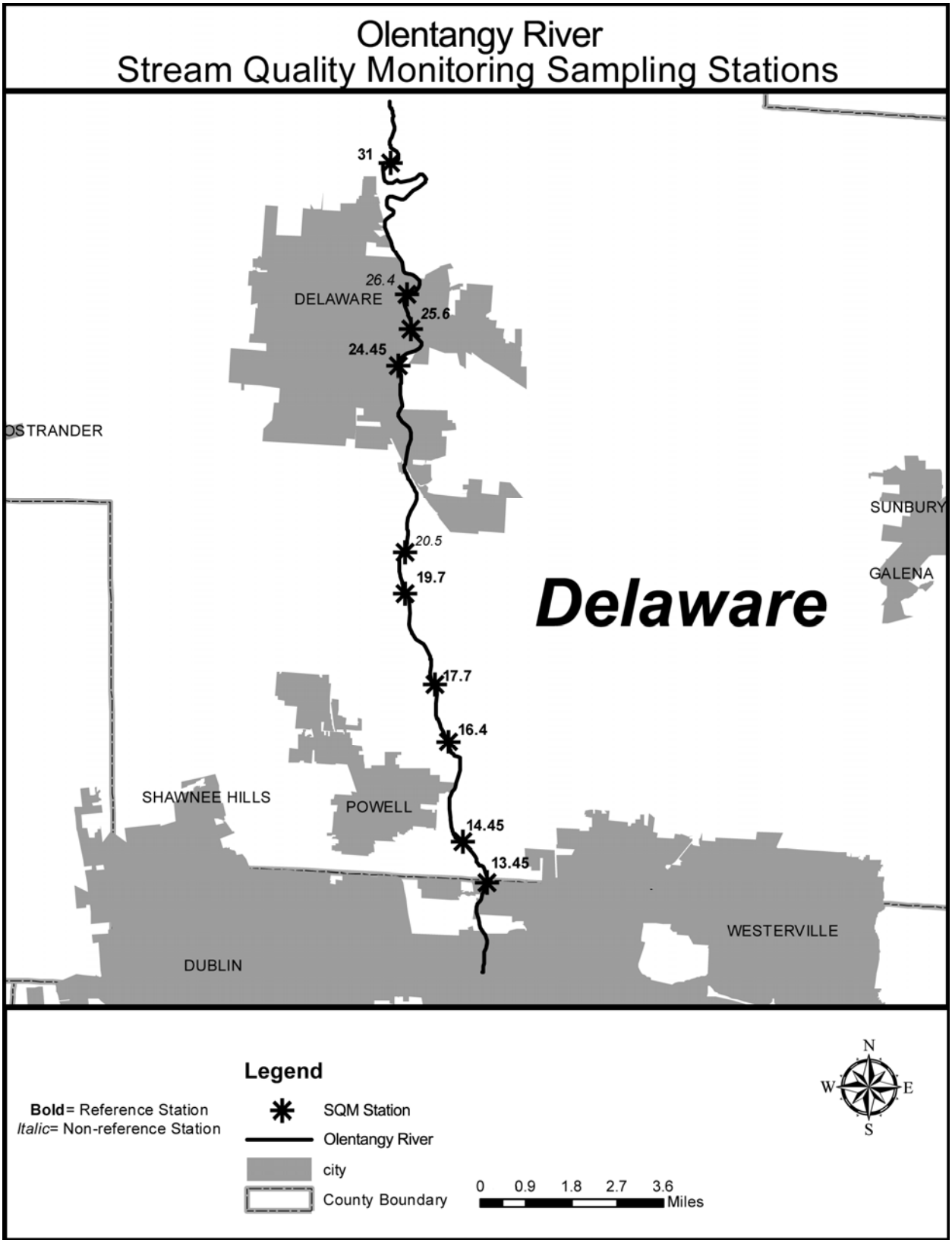
The river's name has an interesting history. Olentangy was the name given to this river in 1833 by a legislative act that was attempting to restore Native American names to certain rivers in the state. The word Olentangy literally means "river of red face paint." This name originally belonged to Big Darby Creek further to the west, where the Wyandots of the Columbus area got their red face paint.

The Olentangy River should have been named the Whetstone River. The literal translation of the Delaware Indian name for the Olentangy River, "Kiin ansh ikan Siipunk," is "sharp/more and more/tool/river," or more precisely “Whetstone”. Both the Native Americans and early settlers used the black Ohio and Olentangy shale found along the river for whetstones to sharpen their tools.

The Olentangy River, while continuing to experience development pressure, has retained a forest corridor, which has greatly assisted in protecting its 54 species of fish. The relatively high quality of the Olentangy River and its wooded banks provides habitat for a variety of breeding birds and other animals. The dominant species of trees that make up the forested streamside include willow, red and silver maple, sycamore, oak, and basswood.

Information about the Olentangy State Scenic River is available by contacting the Ohio Division of Watercraft by calling 740-548-5490 or by visiting www.ohiodnr.com/watercraft.




Olentangy River
Stream Quality Monitoring Sampling Stations
31
26.4
DELAWARE
25.6
24.45
OSTRANDER
SUNBURY
GALENA
20.5
19.7
Delaware
17.7
16.4
SHAWNEE HILLS
POWELL
14.45
13.45
WESTERVILLE
DUBLIN
Legend
Bold= Reference Station
Italic= Non-reference Station
SQM Station
Olentangy River
city
County Boundary
0 0.9 1.8 2.7 3.6
Miles
N
W
E
S

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 Olentangy River. Their time and dedication to this river and the Ohio SQM Project are greatly appreciated. Special thanks are extended to Highbanks Metro Park, Olentangy Environmental Control Center, City of Delaware Water Treatment Facility, City of Delaware Water Pollution Control Facility, and other Olentangy River partners for their continued support and assistance. These reference stations are also monitored closely by Division of Watercraft staff.

River Mile 13.4 - Olentangy Environmental Control Center
John Edwards
Marie Burleson

River Mile 14.55 - Highbanks Metro Park
Samantha Spence

River Mile 16.4 - Orange Road Bridge *(new reference station)*
Paul and Marshall Adam
Chuck Richardson

River Mile 17.7 - Home Road Bridge *(new reference station)*
Bill Dudrow
Adelaide Negrete
Ann Marie Shibler

River Mile 19.7 - Neuenschwander Riffle
Mark and Brenda Layman

River Mile 20.5 - Beiber Mill *(non-reference station)*
Cynthia Tizzano

River Mile 24.45 - Olentangy Avenue Bridge
John Edwards
Brian McCombs

River Mile 25.6 - Stanton Riffle *(non-reference station)*
Paul Stewart
Brian McCombs

River Mile 26.4 - Mingo Park *(non-reference station)*
Comer Family
Brian McCombs

River Mile 31.0 - City of Delaware Water Treatment Facility
Brian McCombs

The continued success of the Ohio SQM Project depends on the commitment and dedication of these (and past) volunteers. We would like to recognize volunteers *John Edwards, Paul Stewart, Mark and Brenda Layman; Brian McCombs, Chuck Richardson, Bill Dudrow, Adelaide Negrete, Ann Marie Shible,; Cynthia Tizzano, and Samantha Spence* for monitoring three times or more during the 2011 season. If you are interested in becoming a volunteer, please contact the Central Ohio SQM Coordinator at 740-548-5490.

Station Descriptions

Stream quality monitoring (SQM) sites along the Olentangy River were selected based on suitable macroinvertebrate habitat and access. Sites are located approximately every five river miles along the designated segment. There are other suitable riffle sites but most are on private property and are generally inaccessible. Brief descriptions of the Olentangy Scenic River SQM monitoring stations follow.

River Mile 13.4 - Olentangy Environmental Control Center, Liberty Township
Located in Delaware County, the Olentangy Environmental Control Center is located at 10333 Olentangy River Road. Permission to access the river at this facility is necessary. The riffle area is located behind the plant just downstream from the effluent discharge. The substrate is mainly composed of sand, gravel and shale.

River Mile 14.55 - Highbanks Metro Park, Liberty Township (new reference station)
Highbanks Metro Park is located in both Delaware and Franklin Counties and is owned and operated by Columbus/Franklin County Metro Parks. Located off U.S. Route 23, 2.5 miles north of Interstate 270, this site offers ample parking and restroom facilities. The sampling site is located upstream of the park's streamside study area. This station is ideal for larger groups.

River Mile 16.4 - Orange Road Bridge, Liberty Township *(new reference station)*
The Orange Road bridge site is located at the intersection of State Route 315 and Orange Road. Turn right off of State Route 315 on to Orange Road; parking is immediately on the left. The riffle is located approximately 75 yards north of the bridge. An island divides the riffle; the riffle on the right bank is being monitored. Access to the site is through private property and prior approval from the landowner is required. Please contact the SQM Coordinator before entering the property.

River Mile 17.70 - Home Road Bridge, Liberty Township *(new reference station)*
This site is located downstream of Home Road along Old State Route 315, approximately 4 miles south of the Home Road intersection. Parking is along the river side of the road; there is room for several vehicles to park on the gravel area next to the road. A path leads down to two riffles within the site. The first riffle downstream is much smaller and is not as well developed as the second riffle. As a result, the second riffle may yield more invertebrates.

River Mile 19.7 - Neuenschwander Riffle, Liberty Township
This Delaware County site is located on the former property of the late Mr. Fred Neuenschwander, a past Scenic River Advisory Council member. The property is privately owned. The access is on the east side of the river on Chapman Road, approximately 0.25 miles north of Hyatts Road. Although this site is open to volunteers, prior approval from the landowner is required. Please contact the SQM Coordinator before entering the property.

River Mile 20.50 - Beiber Mill, Liberty Township *(non-reference)*
The Beiber Mill site is between Hyatts Road and Bean-Oller Road, just south of the City of Delaware in Delaware County. A pull-off for one vehicle is located just south of Bean-Oller Road on the right side of Old State Route 315. A narrow, densely vegetated path will lead down to the riffle. The riffle contains boulders and has a relatively swift current compared to other sites on the Olentangy River.

River Mile 24.5 - Olentangy Avenue Bridge, Delaware City)
This riffle site is being monitored to replace the River Mile 25.2 riffle that is no longer in existence. Located off of Stratford Road in Delaware, parking access is on Spring Lake Court. Parking is available in the first parking lot; the site access is directly behind the apartment building. The riffle is located just up stream, south of the Olentangy Avenue Bridge. The riffle is made up of mainly bedrock and can be extremely dangerous in times of elevated water levels. The site is located on the Long Real Estate Property and is open to volunteers; however, permission from the office must be obtained prior to accessing the property.

River Mile 25.2 - City of Delaware Water Pollution Control Facility, Delaware City
The City of Delaware Water Pollution Control Facility is located at the end of Cherry Street in the City of Delaware. The sampling site is about 0.3 miles downstream from the plant's effluent discharge. Permission from the plant superintendent or the City of Delaware Public Works Commission is required to access this site. Over the last several years this riffle has been slowly washed downstream. It was decided to move the monitoring station to a riffle just downstream, River Mile 24.45, in an attempt to continue to collect the most accurate information.

River Mile 25.6 - Stanton Riffle, Delaware City *(non-reference station)*
This riffle is located just off of State Route 36 on River Street, in Delaware City. In 2005, a lowhead dam was removed from this site exposing a small riffle. The riffle is made up of mainly artificial substrate and gravel. Parking at this site is limited.

River Mile 26.4 - Mingo Park, Delaware City *(non-reference station)*
This site was added in 2009 to continue to monitor the impact of urbanization on the river. The riffle is located along Mingo Park in the City of Delaware with public parking and easy access to the riffle. The substrate is composed of mainly gravel and cobble.

River Mile 31.0 - City of Delaware Water Treatment Facility, Troy Township
Located slightly more than one mile south of the Delaware Dam in Delaware County, the site is the furthest upstream sampling station on the Olentangy River. The substrate is mainly large cobble, which can make collecting samples difficult.

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 at 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, with the exception of River Mile 13.4, were monitored at least three times for the 2011 monitoring season.

Volunteers and ODNR staff on the Olentangy River conducted 40 assessments in 2011. A total of seven official reference sites, and three non-reference sites along the Olentangy River were monitored. Volunteers and staff recorded an average CIV of 26.35, corresponding to the excellent range for stream quality. The average CIV has increased from the 2010 CIV average of 25.33. The average taxonomic diversity per assessment was 11 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.). This has been the average for the past five years.

Most of the reference stations between the Delaware Dam and Hyatt Road have shown stable trends over the past 29 years of data collection. However, reference stations south of Hyatt Road are starting to show some impacts of the heavy development in the Orange Township, Lewis Center and Powell areas. The Ohio EPA performed a comprehensive study of the watershed in 2003. Their resulting report corresponds to our findings, showing that the change in land use to a developing urban community was beginning to show impacts on this portion of the Olentangy River.

River Mile 14.45 continued to show a decline over the past several years. In 2010, the river levels dropped due to below average levels of precipitation and the sampling station completely dried up. Upon observation of the area, it was clear that the continuous build up of shale had filled in the riffle. Since the Olentangy watershed is predominantly comprised of shale, it is likely that this is a natural occurrence. The monitoring station was moved at the beginning 2011, just upstream to River Mile 14.55.

The average CIV of River Mile 31.0, located just south of the Delaware Dam, had begun to decline beginning in 2008; in 2011, the site showed a four-point increase. It remains unclear why there was a continuous three-year decline in water quality. The Scenic Rivers Program staff and other local and state partners will continue to monitor the station closely.

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.

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 on the Olentangy River 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.

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Total Suspended Solids (TSS)

In 1999, the Scenic Rivers Program added Total Suspended Solids (TSS) monitoring to the Stream Quality Monitoring (SQM) Program. 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 total suspended solids 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 18 TSS readings were taken in the Olentangy River. The Olentangy had a median value of 11 mg/l of TSS, corresponding to a “normal” stream rating for Ohio streams. The data set ranged from <6.2 to 32 mg/l of total suspended solids.

Comparison of Collected Stream Quality Monitoring Data

Frequent monitoring of the same reference station is performed a minimum of three times annually, 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 the Scenic Rivers staff identify pronounced stream quality problems.

The following 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)	

Table 2 represents 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. A CIV of 23 or greater indicates *Excellent* stream quality; a CIV of 17-22 indicates *Good* stream quality; a CIV ranging from 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*.

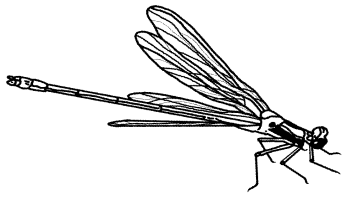


Table 2. - Olentangy River 2011 Mean CIVs by Reference Station

STATION	WP	MF	ST	DO	CD	RI	OS	DA	DR	CR	BL	CF	SC	CL	SW	BF	AW	MI	PS	LE	CIV
13.40	◆	◆	◆		◆	◆	◆				◆			◆			◆	◆		◆	
14.55	◆	◆	◆		◆	◆	◆	◆		◆	◆	◆		◆	◆	◆	◆	◆		◆	28+
16.40	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆		◆	◆	◆	◆	◆	◆	◆	25+
17.70	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	28+
19.70	◆	◆	◆		◆	◆	◆	◆		◆	◆	◆		◆			◆	◆		◆	25-
24.45	◆	◆	◆	◆	◆	◆	◆	◆			◆	◆		◆	◆	◆	◆	◆		◆	29+
31.00		◆	◆	◆	◆	◆		◆		◆		◆		◆	◆		◆	◆		◆	21+

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

Figure 1. Olentangy River 2011 CIV Maximum and Minimum Ranges

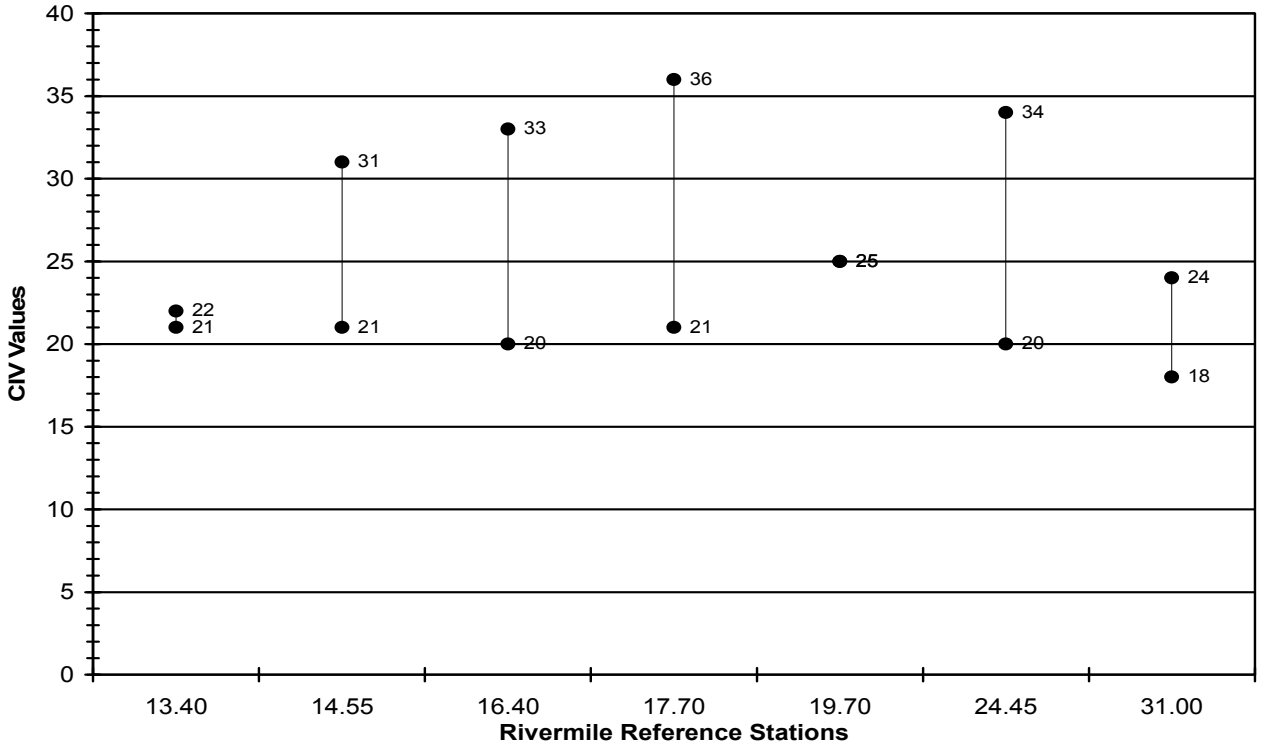
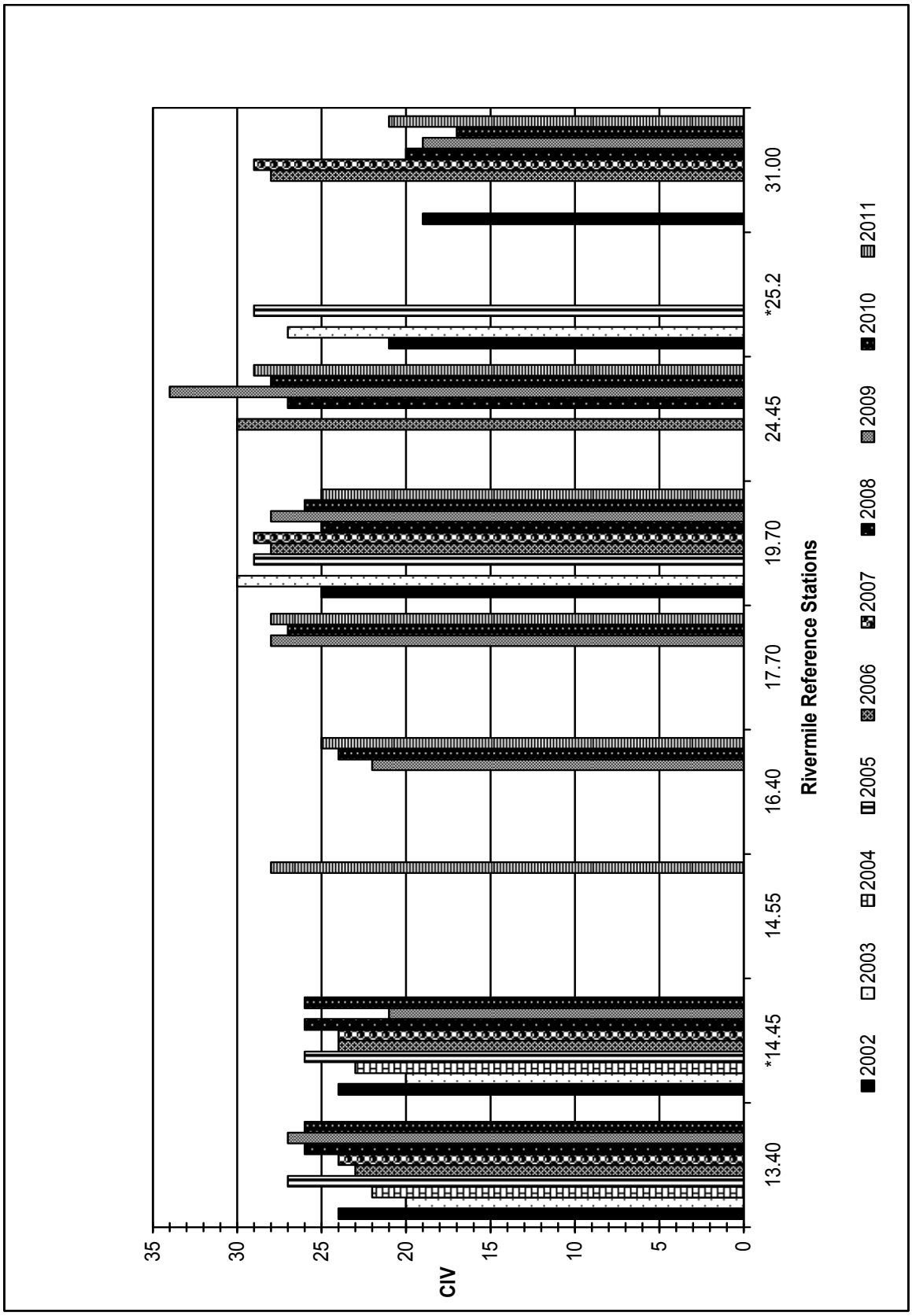


Figure 2. Olentangy River 2002-2011 Mean CIVs



* denotes the reference station is no longer monitored

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, the Stream Quality Monitoring Project 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.

Results from 2007 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 75 are generally believed to contain exceptional habitat conditions for warm water communities.

Table 3 have 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 - Olentangy River 2007 QHEI and SQM Assessment Data

Reference Station	QHEI	Attainment Status	2007 Average CIV	SQM Assessment
RM 13.4	82	FULL	24	Excellent
RM 14.45	88.5	FULL	24	Excellent
RM 16.4	*	*	*	*
RM 17.7	*	*	*	*
RM 19.7	88.5	FULL	29	Excellent
RM 24.45	80	FULL	30	Excellent
RM 31	84	FULL	29	Excellent

*No data available

Appendix: Stream Quality Monitoring Data by Monitoring Station

2011 CIVs by Monitoring Station: OLENTANGY RIVER																					
RM	DATE	WP	MF	ST	DO	CD	RI	OS	DA	DR	CR	BL	CF	SC	CL	SW	BL	AW	MI	PS	LE	CIV
13.45	6/15/2011		B	B		A	A	A				A			A			A	B			21.00
13.45	8/2/2011	A	B			B	A	B				A			A			A	A		A	22.00
14.55	6/15/2011	B	A	B		B	B	A	A		A	B	A		A			A	B			30.00
14.55	6/18/2011		B	B		C	A				A	A	A				B	A	C			21.00
14.55	8/23/2011	B	A	B		B	B	A	A			B	A		A	A		A	A		A	31.00
14.55	8/24/2011	B	B	C		B	B	B	B		A	B	A		A			A	A		A	31.00
14.55	10/14/2011	B	A	B		B	A	A	A			B						A	B		A	25.00
16.40	6/30/2011	A	B	A		B	A	A				A	A									22.00
16.40	7/20/2011	A	C	A		C	B	B	A			B	A		A			A	B		A	29.00
16.40	8/22/2011	A	B	B		B	A						A						A			20.00
16.40	9/19/2011	A	A	C	A	A	B	A				A	A		A	A	C	A	B	A		33.00
16.40	10/6/2011	A	A	B		A	A	A							A							20.00
17.70	6/18/2011	B	A	B		A	A	A					A					A				21.00
17.70	7/6/2011	B	C	A		C	B	A		A	A		A	A	A		A	A	B		A	32.00
17.70	7/21/2011	A	B			C	B					A			A			A	A			18.00
17.70	8/23/2011	B	C	B		C	B	A	A	A	C	A	A	A	A		B	B	B		A	36.00
17.70	10/11/2011	B	C	B	A	B	B	A	A		C			A	A	A	A		A		B	34.00
19.70	6/5/2011	A	A	A		A	A	B			B		A		A						A	25.00
19.70	8/12/2011	A	A	A		B	A	A	A				A		A			A				25.00
19.70	9/17/2011	B	B	B		B	B		A			A	A		A			A	A			25.00
20.20	7/7/2011	A	A	A		B	A											B				16.00
20.20	8/20/2011	A	A	B		B	A					B						B	A			19.00
20.20	10/8/2011	A		A		B	A								A			B				15.00
24.45	6/17/2011	B	A	A		B	B	A	A			A	A		B	B		A	B		A	31.00
24.45	6/28/2011	B	B	A	A	C	B		A			A			A	A		A			A	28.00
24.45	8/25/2011	B	B	B	A	B	B	A	B			B	A		B	A		A	B		A	34.00
24.45	8/31/2011	B	A	B	A	C	C	B				B	A		B		B	A	B		A	31.00
24.45	11/3/2011	A		B	A	C	A						A		B			A				20.00
25.60	6/29/2011	B	A	A	A	B	B						A		B			B	A			24.00
25.60	7/9/2011	B	B	A		B	B	A	A	A		B	B		A			A	B			30.00
25.60	8/27/2011	B	B	A		B	B	A	A			A	A		B			A	A			28.00
25.60	8/30/2011	B	A	B	A	C	B					B	A		B		B	A	B			27.00
25.60	10/26/2011	B	A	B		B	A	A	A			A	A		A	A					A	29.00
25.60	11/3/2011	B	B	A	A	C		A							B	A		B				23.00
26.40	8/30/2011	B	A	B	A	C	A	B				A	A		A			A	B		A	30.00
26.40	11/3/2011	A	B	C	A	C			A						B			A		A		21.00
26.40	11/8/2011	C	B	C	A			A	A		B	C			B			A				24.00
31.00	6/29/2011		A	A		C	B						A		B			C	B			18.00
31.00	8/29/2011		A	A	A	C	A						A		A			B			A	21.00
31.00	11/3/2011		B	A	A	C	A		A		A		A		C	A		C			C	24.00