



# Mohican State Scenic River



Ohio  
Stream Quality Monitoring  
2008 Annual Report



# Mohican State Scenic River 2008 Stream Quality Monitoring Annual Report

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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 Natural Areas and Preserves, 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 Ohio Division of Natural Areas and Preserves, 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 2008 by volunteers and staff. It also represents a year of dedication and commitment shown to Ohio's special waterways by thousands of SQM volunteers.

# Mohican State Scenic River

## Overview

The Mohican River is located between Columbus and Cleveland, making it a favorite centralized retreat for many Ohioans. Draining nearly 1000 square acres, the designated stretches of river are nestled within a narrow gorge running through Ashland, Holmes, Knox and Coshocton counties. Three main tributaries flow together to form the main stem of the Mohican River: the Clear Fork (the lower portion of which is included in the designation), the Black Fork and the Lake Fork.

The main stem of the Mohican River, 27.6 miles, and the lower portion of the Clear Fork, 4.8 miles, were designated the 13<sup>th</sup> state scenic river in 2006. When the Illinoian glacier pushed through the region 130,000 years ago, a significant change in the direction of the flow occurred. The ancient pre-glacial Mohican River was pushed due south, altering it from its original southwesterly flow. The Clear Fork is a younger river, forming only a few thousand years ago. Originally a divide between two watersheds, the Clear Fork was carved by the Wisconsin glacier about 13,000 years ago. Both areas are comprised mainly of Black Hand sandstone, sand, and gravel. The soft composition allowed for the debris from the receding glaciers to easily erode away the land forming the narrow valleys that the rivers flow through today. Large populations of hemlocks remain in the region as evidence of the last glacial advance.

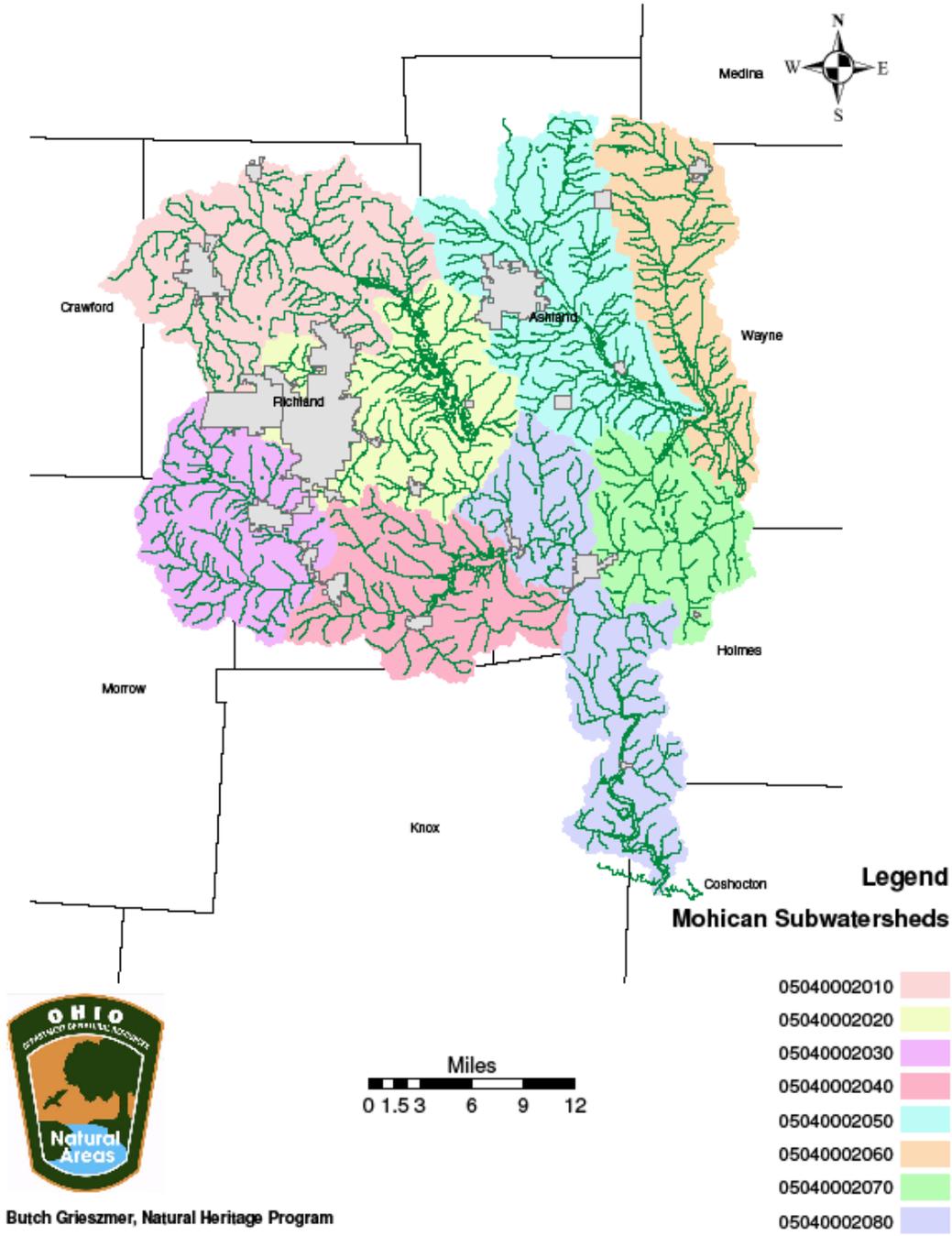
Historically, the Mohican River valley was a popular area for several Native American tribes such as the Delaware and Mohegan. With lush forest, abundant game, fertile land and waters that are easy to navigate year round, the region was also popular for European settlers. The Delaware tribe laid claim to the region until the signing of the Greenville Treaty in 1795 when they were moved to the northwestern portion of the Ohio territory.

When European settlers moved into the area, several towns flourished with the construction of canals and railroads. The easily navigated waters and the connection with the Muskingum River allowed settlers to move goods such as lumber, wheat and whiskey all the way down to New Orleans. John Chapman, also known as “Johnny Appleseed”, carved his name in the sandstone wall at Lyon Falls at the upper end of the Clear Fork gorge (now faded with time). A regular visitor to the area, he spread nurseries throughout the valley.

With the desertion of the canals and railroads, the local economy has come to depend mainly on agriculture and tourism. A variety of outdoor activities are offered including canoeing, horseback riding, hiking, fishing, hunting and camping. Additional information about public access facilities on the Mohican and Clear Fork Rivers are available by the Ohio Division of Natural Areas and Preserves by calling 614-265-6453 or visiting [www.ohiodnr.com/dnap](http://www.ohiodnr.com/dnap)



# Mohican Watershed



Butch Grieszmer, Natural Heritage Program

## 2008 Stream Quality Monitoring Annual Report Mohican River State Scenic River

# 2008 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 Darby Creeks. Their time and dedication to this river and the Ohio SMQ Program are greatly appreciated. Special thanks are also extended to the Mohican State Park, River Run Campground, private landowners and to all of the Mohican River partners for their continued efforts. These reference stations are also closely monitored by the Division of Natural Areas and Preserves staff.

## Mohican River

### **River Mile 1.7 - County Rd 366**

Carolyn and Rich Hagopian

### **River Mile 6.53 - County Rd 365, Mickley Property**

Volunteer Needed

### **River Mile 11.6 - Main St, Brinkhaven**

Volunteer Needed

### **River Mile 17.2 - Greer, Golovchenko Property**

Mary Golovchenko and son

### **River Mile 27.3 - County Rd 366, River Run Camp Grounds**

Mark Boynton

## Clear Fork

### **River Mile 0.5 - Loudonville, Mohican State Park**

Volunteer Needed

### **River Mile 4.03 - Cover Bridge, Mohican State Forest**

Heironimus Family

# Stream Quality Monitoring Station Descriptions

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

## Mohican River

### **River Mile 1.7 - County Rd 366, New Castle Twp**

Located directly off of County Road 366 in Coshocton County, this site is easily accessed from the west side of the road. An easement owned by the US Army Corps of Engineers, this land falls below the 890 foot elevation that is thus within the “storage area” for the Mohawk Dam. Organic debris in trees fifty feet above the riffle is evidence of the flood control by the dam.

### **River Mile 6.53 - County Rd 365, Mickley Property, Triverton Twp.**

This riffle is located just north of the County Road 365 Bridge in Coshocton County and is accessed by private property along the west side of the river. Permission from the land owner is necessary to access the property.

### **River Mile 11.6 - Main St, Village of Brinkhaven**

This site is located north of the Mohican Trail’s Bridge of Dreams just off Main Street in Brinkhaven within Knox County. Access to the riffle is from the Ohio Department of Natural Resources, Division of Wildlife’s property, the Mohican River Wildlife Area. An island divides the riffle at this location; the riffle west of the island is monitored. The riffle is large offering a variety of habitats for several species of macroinvertebrates. The giant stonefly is frequently collected at this site.

### **River Mile 17.2 – ST RT 514 Golovchenko Property, Unincorporated town of Greer**

Located north of the State Route 514 Bridge in Knox County, this reference site is accessed by private property along the east side of the river. Permission from the land owner is necessary to access the property. The riffle at this site offers a variety of substrate and habitats making this an ideal site for macroinvertebrate collection.

### **River Mile 27.3 - Wally Rd., River Run Camp Grounds, Hanover Twp.**

This riffle is located just south of the confluence of the Black Fork and the Clear Fork. Access to the riffle is through the River Run Campgrounds on Wally Road in Ashland County. All volunteers must give notice to the office or to the owner of the campground before accessing the site. The riffle at this site spans the river; however the length is short, providing little diversity in habitat for the macroinvertebrates.

## **Clear Fork**

### **River Mile 0.5 – State Route 3, Mohican State Park, City of Loudonville**

This riffle is located in the Mohican State Park Campgrounds. Access to the site is through the main entrance and turning left on the drive before the park check-in. Public parking is located at the end of the drive. Enter on river left and the riffle is located just upstream next to a patch of water willow. The substrate is diverse ranging from sand to boulders. The variation in the substrate creates ideal habitats for a large number of species. This site scores consistently in the excellent range of our assessment.

### **River Mile 4.03 - Covered Bridge, Mohican State Forest, St. Rt. 97**

Less than a mile south of the Pleasant Hill Dam, this riffle is located in the Mohican State Park near the modern covered bridge. The site is easily accessible by using unnamed park roads, following the signs for the covered bridge off of State Route 97. There is plenty of public parking as well as a picnic area making this is a great site for larger groups. The substrate at this site is mainly comprised of boulders and gravel. The ease of public access to this site makes the riffle venerable to human disruption. People often move the large rocks to make a small man-made dam. The regular movement disrupts the macroinvertebrate communities moving some of the more sensitive species downstream.

## **Sampling Results and General Trends**

Weather conditions for the 2008 season were favorable for field monitoring in the summer and fall months. However, April and May experienced above normal rainfall and prohibited volunteers and staff from accessing some the riffles until after June 30, the typical deadline for spring monitoring. Central Ohio was subjected to a year of slightly above-normal levels of precipitation, as data from the National Oceanic and Atmospheric Administration (NOAA) indicates. We require three readings to calculate a Cumulative Index Value (CIV), a value measuring the amount and diversity of macroinvertebrates within the stream. All sites were monitored at least three times for the 2008 monitoring season.

Volunteers and staff on the main stem of the Mohican River conducted a total of 15 assessments at five official monitoring sites in 2008. The Mohican River recorded an average CIV of 28.4, corresponding to the excellent range for stream quality. The average taxonomic diversity per assessment was 13 macroinvertebrate orders (e.g. stonefly, damselfly, mayfly, etc.).

Volunteers and staff on the Clear Fork conducted a total of six assessments at three official monitoring sites in 2008. The Clear Fork recorded an average CIV of 28.5, also meeting the excellent range of stream quality. The average taxonomic diversity per assessment was 13 macroinvertebrate orders.

Since 2008 was the first year of regular data collection for the Scenic Rivers Program there is no previous data for result comparison. However, the 2008 data supports the findings of the 2006 designation study; the main stem of the Mohican River and the Clear Fork River, below the Pleasant Hill Dam, meets or exceeds the requirements to obtain Scenic River status.

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 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 in the Mohican and Clear Fork Rivers during 2008. Working together has produced significant results but additional volunteers are needed to monitor at all reference sites to ensure accurate and thorough data. For more information, please contact the Central Ohio SQM Coordinator at (614) 265-6456.

# Total Suspended Solids (TSS)

In 1999, the Scenic River Program added Total Suspended Solids (TSS) monitoring to the Stream Quality Monitoring (SQM) Project. The purpose of this addition is to estimate the amount of soil sediments impacting a stream by estimating the turbidity of the water. These sediments are attributed to problems originating upstream of the sampling site. The equipment is calibrated to predict 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 within the stream have an effect on the TSS value.

Precipitation 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 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  $\frac{1}{4}$  inch. A conversion table is then used to convert the sediment stick reading to 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 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 stream
- TSS >133 mg/l = severely impacted stream

**2008 Results:** A total of seven TSS readings were taken on the Mohican River. The river had a median of 8 mg/l of TSS, which corresponds to the excellent range. The data set ranged from <6.2 mg/l to as high as 39 mg/l of total suspended solids. A total of two TSS readings were taken on the Clear Fork. The Clear Fork had a median of 7 mg/l of TSS, which corresponds to the excellent range. The data set ranged from <6.2 mg/l to 8 mg/l of total suspended solids.

# Comparisons of Collected Stream Quality Monitoring Data

Typically, 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 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**

<b>Group I Taxa Pollution Intolerant</b>	<b>Group II Taxa Moderately Tolerant</b>	<b>Group III Taxa Pollution Tolerant</b>
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 and 3 represent the mean CIV for each SQM reference station sampled on the river during 2008. 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. 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.

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

**Table 2. Mohican River 2008 Mean CIVs by Reference Station**

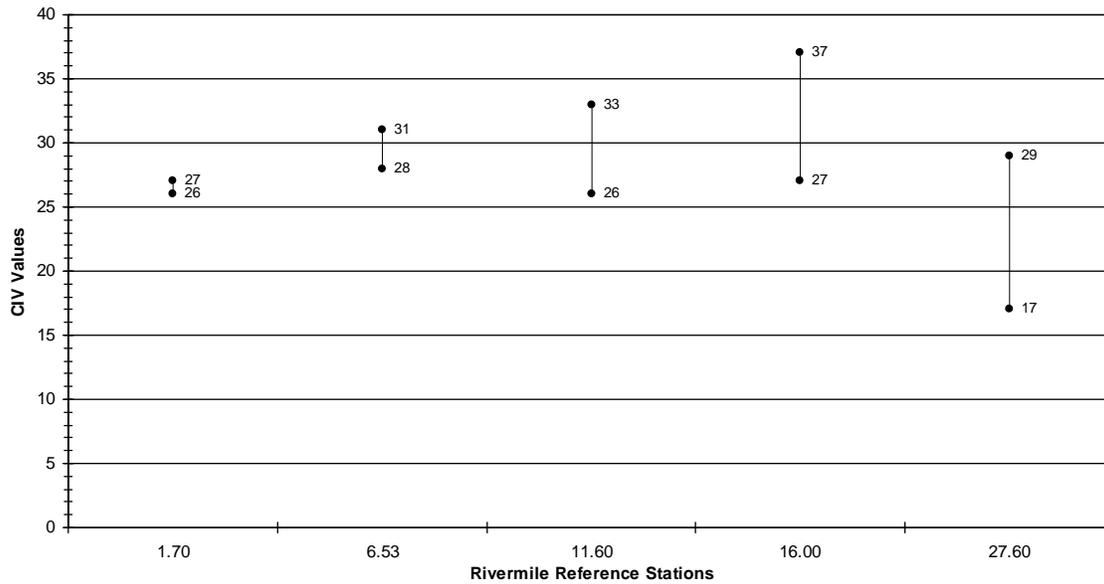
STATION	W	M	S	D	C	R	O	D	D	C	B	C	S	C	S	B	A	M	P	L	CIV
	P	F	T	O	D	I	S	A	R	R	L	F	C	L	W	F	W	I	S	E	
1.7	◆	◆	◆		◆	◆	◆	◆	◆		◆	◆		◆		◆	◆	◆		◆	26
6.53	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆		◆		◆	◆	◆		◆	29
11.6	◆	◆	◆	◆	◆	◆	◆		◆		◆	◆		◆		◆	◆	◆		◆	30
16.0	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	33
27.6	◆	◆	◆		◆		◆			◆	◆	◆	◆	◆	◆	◆	◆		◆		23

**Table 3. Clear Fork 2008 Mean CIVs by Reference Station**

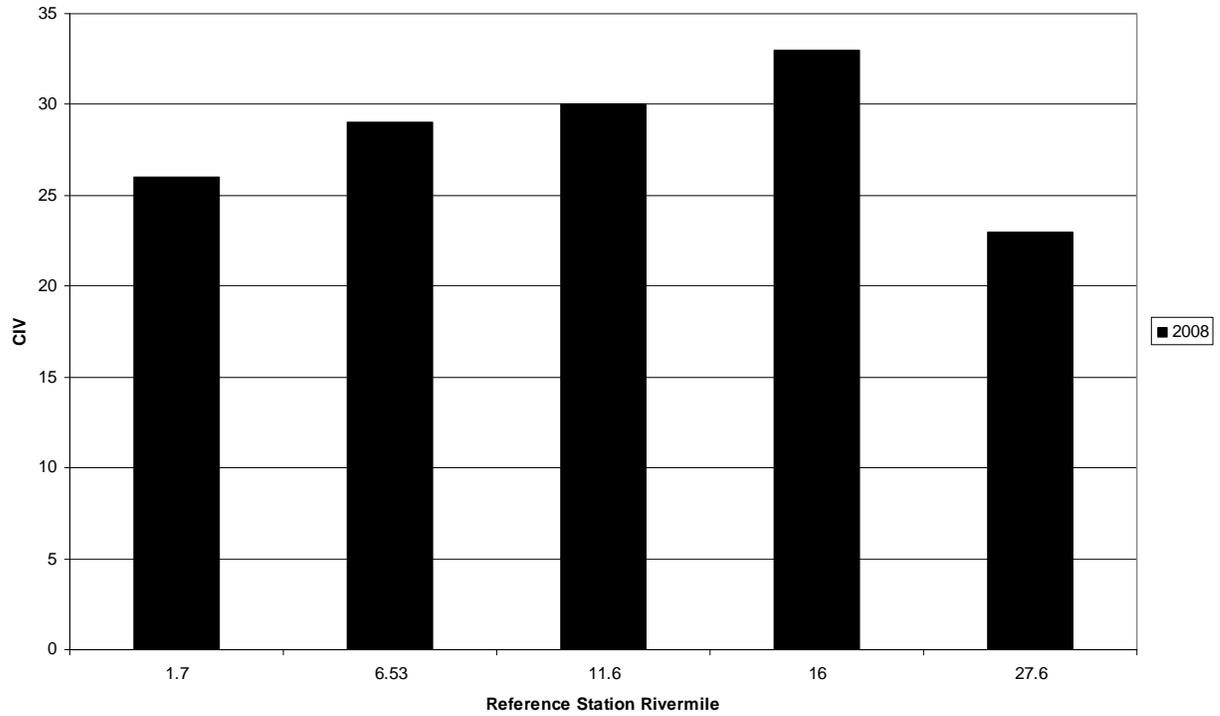
STATION	W	M	S	D	C	R	O	D	D	C	B	C	S	C	S	B	A	M	P	L	CIV
	P	F	T	O	D	I	S	A	R	R	L	F	C	L	W	F	W	I	S	E	
0.5	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆		◆	◆	◆			34
4.03		◆		◆	◆	◆	◆		◆		◆	◆	◆	◆	◆	◆	◆	◆			23

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

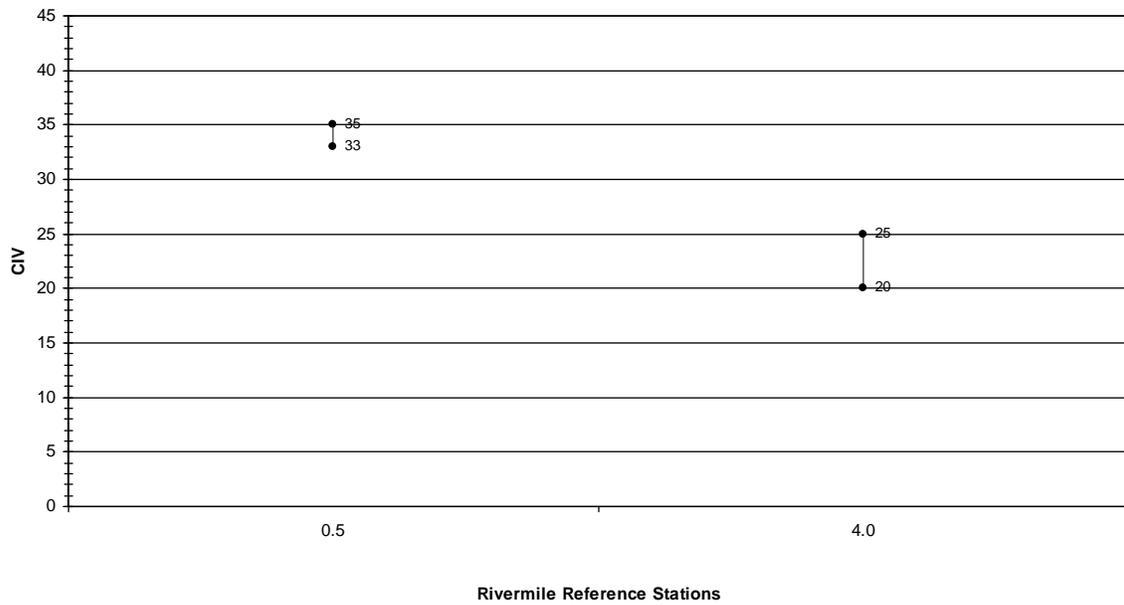
**Figure 1.1. 2008 Mohican River CIV Maximum and Minimum Ranges**



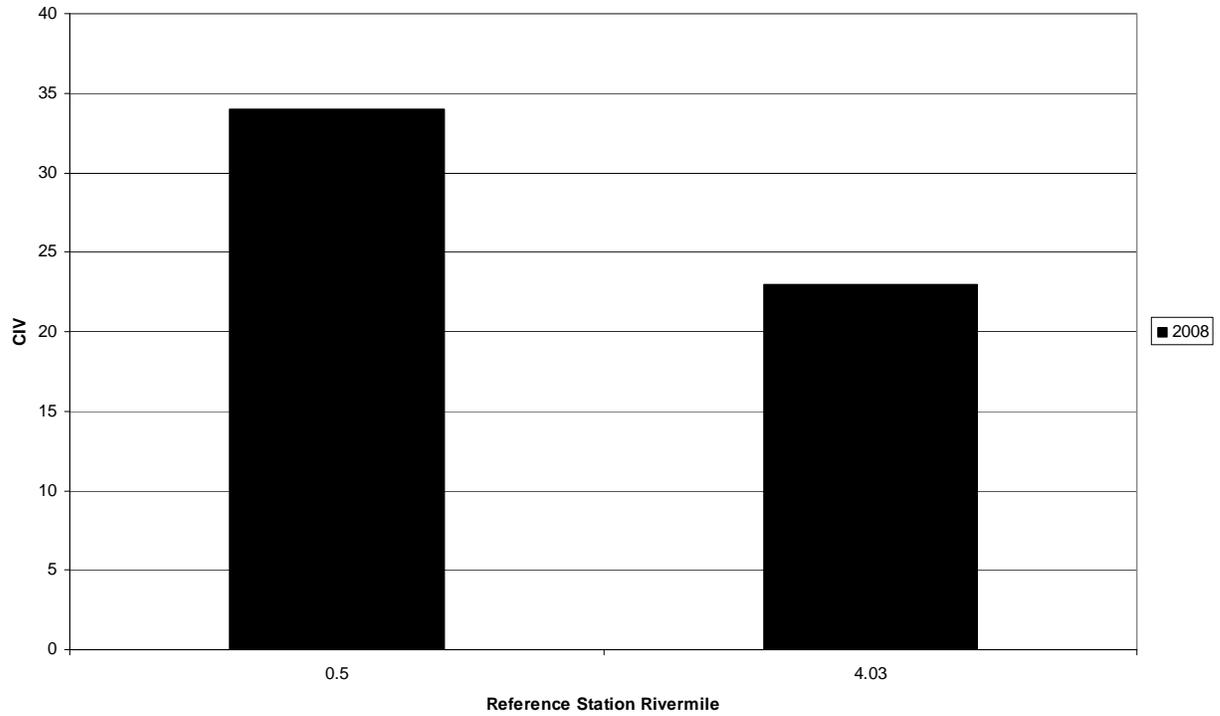
**Figure 1.2. 2008 Mohican River Mean CIVs**



**Figure 2.1. 2008 Clear Fork CIV Maximum and Minimum Ranges**



**Figure 2.2. 2008 Clear Fork Mean CIVs**



# Appendix

## Stream Quality Monitoring Data by Monitoring Station

2008 CIVs by Monitoring Station																							
MOHICAN RIVER																							
STATION	DATE	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	B W	A F	M W	P I	L S	E	CIV	
1.70	6/25/2008	B	B	B		C	A	B		B		A	A		B				B				27.00
1.70	8/8/2008	B	B	B		B	A	B	B				A		C				B		A		26.00
1.70	10/8/2008	B	C	B		B	A	C	A	A					B		B	B					26.00
6.53	6/25/2008	B	B	B		B	A	B		A		B	A		B			B	A				28.00
6.53	8/20/2008	B	B	A	A	B	B	B		A		A	A		B			A	B				31.00
6.53	10/19/2008	A	B	A		C		A	A	A		B	A		B		A	A	B		A		29.00
11.60	6/25/2008	A	B	A		B		B		A		A	A		A		A	B	A				26.00
11.60	8/20/2008	A	C	A	B	C	B	B		A		A	A		B		B	B	B				32.00
11.60	10/10/2008	B	C	B	B	C	A	B		A		A	A		B		A	B	A		A		33.00
16.00	6/25/2008	A	A	B	A	B	A	B	A	A		A	A	A	B	A		B	A				37.00
16.00	9/10/2008		B		A	B	A	B	A	B	A	A	A	A	B	A		B	A	A	A		35.00
16.00	10/10/2008		B	B	A	C		B	A	A		A			B	A		A	B				27.00
27.60	8/27/2008		B	A		B		A				A	B	A		B		B	B	B			23.00
27.60	10/18/2008		B	A		C		A							A	A		A					17.00
27.60	11/19/2008	A	B	A		C		A			A	A		A	B	B	A	B	B		A		29.00

2008 CIVs by Monitoring Station																							
CLEAR FORK																							
STATION	DATE	W P	M F	S T	D O	C D	R I	O S	D A	D R	C R	B L	C R	S C	S L	B W	A F	M W	P I	L S	E	CIV	
0.50	6/25/2008	B	B	B	A	B	A	B		A	B	B	B		A	B		A	B				35.00
0.50	8/23/2008	B	B	B	A	B	A	B			A	A	A		A	A		A	B				33.00
0.50	10/21/2008	A	B	A	A	B	A	B	A		A	B			B	A	B	B	A				34.00
4.00	6/25/2008		B		B	B		A		A		B	B	A	B		C	A	B				25.00
4.00	8/23/2008		B		A	C	A	A				A	A		B		B	B	B				24.00
4.00	9/21/2008		A		B	C		B						A		A		C	B	B	A		20.00