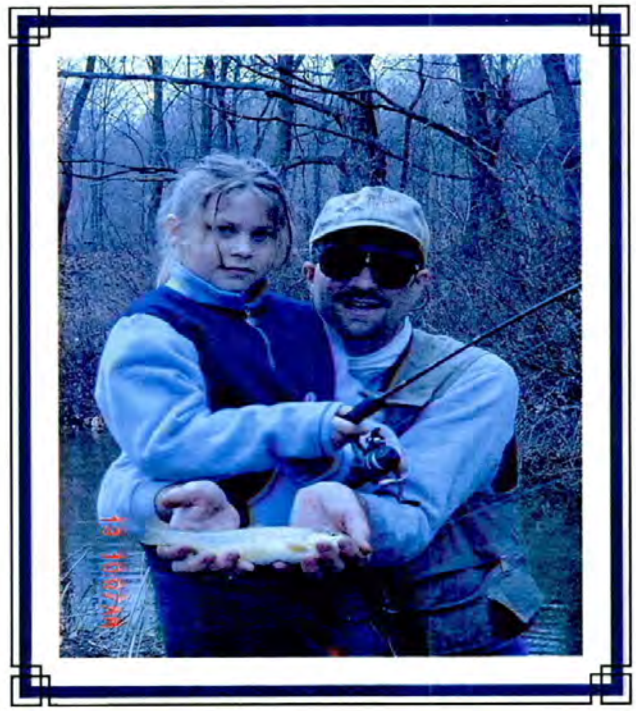
QUEMAHONING CREEK WATERSHED RESTORATION PLAN



A Watershed On The Rebound

Created by
The Southern Alleghenies Conservancy

With Funding Provided by
Pennsylvania Department of Environmental Protection
and the
Western Pennsylvania Watershed Program

The Restoration Plan was created by the

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I. WATERSHED DESCRIPTION

I.A. THE WATERSHED

The Quemahoning Creek watershed is located in the northwest portion of Somerset County on the eastern slope of the Laurel Ridge. The main stem originates near the village of Husband just north of the PA Turnpike in Somerset Township and flows northwestward 18 miles to its confluence with the Stonycreek River near the village of Benson.

The North Branch of Quemahoning Creek arises from springs and seeps on the eastern face of the Laurel Ridge in Lincoln Township and joins the main stem at Coal Junction Station in Jenner Township.

The Quemahoning Creek watershed encompasses 98 square miles and is impounded 1.3 miles upstream from its mouth by the 364 acre Quemahoning Reservoir. The 92 billion gallon capacity reservoir was constructed in the early part of the 20th Century to provide water for the Johnstown industrial complex. The reservoir was publicly acquired in 2000 and now supplies industrial grade water as well as treated water to customers served by the Cambria-Somerset Authority (CSA) that now owns and manages the reservoir and its facilities.

The Quemahoning Creek is in watershed Hydrologic Unit Code 05010007 that is listed as a high priority watershed by the Pennsylvania Department of Environmental Protection (DEP). Quemahoning Creek is classified as a Coldwater Fishery by the Pennsylvania Fish and Boat Commission (PFBC).

The main stem begins as a slow moving low gradient stream with minimal canopy cover and flows through an agricultural area. Gradient is higher and more pronounced along the North Branch as are several tributaries such as Beam Run and Spruce Run that cascade off of the Laurel Ridge and empty into the North Branch. The main stem, however, retains its low gradient until just a few miles upstream of the Quemahoning Reservoir where the gradient increases, the forest canopy is more abundant and the water becomes well oxygenated all the way to the Quemahoning Reservoir.

In an assessment for a PA DEP Growing Greener grant with statistics derived in 1997, the Somerset Conservation District determined that the land use of the 48,512 acre drainage area of the Quemahoning Creek drainage included 14,165 acres of farmland, 7809 acres as cropland, 19,276 acres forested, 100 acres urban and 23,971 acres used for other purposes such as mining, other industry and open space. The 16,124 total acres of drainage of the North Branch include 5,335 acres of farmland, 2,785 acres as cropland, 9,715 acres forested and 1,074 as other.

The Pennsylvania 1996 Water Quality Assessment 305 (b) Report by the PA DEP Bureau of Water Quality Management identifies resource extraction and agriculture as the two most significant non-point source pollution sources in the Commonwealth. The Quemahoning Creek is impacted by both non-point pollution sources. Water quality in the watershed is degraded by pollution from agriculture runoff, sedimentation inadequately treated sewerage and abandoned mine drainage (AMD). As a result fish habitat is impaired from effects of low pH, siltation and metal precipitates.

Since 1990 the Stonycreek River watershed, of which the Quemahoning Creek watershed is a sub basin, has received a great deal of assistance in dealing with non-point source pollution problems. The initiative began at the grassroots level with the formation of the Stonycreek-Conemaugh River Improvement Project (SCRIP) created with the assistance of the Somerset Conservation District, Cambria County Conservation District and U.S. Congressman John Murtha. SCRIP, guided by a 16 member volunteer board of directors, began to assess and document AMD pollution sources in the Stonycreek watershed. SCRIP sponsored the creation of "Effects of Coal Mine Discharges on the Quality of the Stonycreek River and its Tributaries" prepared by the U.S. Geological Survey and completed in 1996. A study prepared by the Cambria County Conservation District in 1994 known as the "Assessment of Non-point Source".

With this documentation SCRIP, the Somerset and Cambria Conservation Districts, PA DEP, Southern Alleghenies RC&D and Conservancy, U.S. Congressman John Murtha, local sportsmen, conservationists and citizens began developing public-private partnerships to plan, design and implement AMD treatment systems in the Stonycreek watershed. The six site 5 million dollar Oven Run Project has been implemented with the exception of one site that will go online in 2002. This project set the standard for the results that can be achieved from a public-private watershed approach to water quality problems.

With ongoing and successful implementation of projects on the Stonycreek main stem the opportunity arrived to also address the water quality problems in major sub basins of the Stonycreek as well.

In February of 1995, the Mountain Laurel Chapter of Trout Unlimited (MLTU) began to create a plan to sponsor a Quemahoning Creek Watershed Improvement Project at the urging of its stream improvement chairman. In May of 1995 the chapter adopted the project with the goal of bringing the stream back as a recreational and economic force. MLTU also joined and enhanced the efforts of the Jenner Community Sportsmen's trout stocking efforts in the less impaired section of the stream in April of 1995.

MLTU took the project concept to the Somerset Conservation District, which adopted the effort as a project and created the Quemahoning Creek Water Quality Improvement Project Regional Geographic Initiative EPA Region III work plan on August 31, 1995. This study detailed problems in the watershed's water quality, created project goals along with work elements and expected goals. The Conservation District submitted the project to the Southern Alleghenies RC&D Council that also adopted it as a project.

Through these initiatives the abatement of non-point source pollution in the Quemahoning Creek watershed began. Results so far include an AMD passive treatment system at Jenners that was completed in 1997 and is abating the second highest rated discharge in the Quemahoning watershed. The funding was provided by the EPA and the Federal Office of Surface Mining (OSM) Appalachian Clean Streams Initiative and was administered by the Somerset Conservation District in cooperation with SCRIP. Design was provided by the USDA Natural Resources Conservation Services' Somerset Technical Field Office in cooperation with then Southern Alleghenies Conservancy's Survey and Design Team and the PA Mountain Service Corps (AmeriCorps Program).

A second AMD passive treatment system has been designed for the fourth largest discharge just one mile downstream from the treatment site in Jenners. The Boswell Passive Treatment System Phase that will include the relocation of Beaverdam Creek will occur in 2002. The Phase II portion, that will include the enhanced wetland treatment system will be completed in 2003 and will prevent 80 tons of iron a year from entering Quemahoning Creek.

The Somerset Conservation District sponsored and administered the Quemahoning Creek Stream bank Improvement Project funded by a $60,000.00 grant from PA DEP's Growing Greener Program. This project completed in 2001, stabilized a mile of stream bank through bioengineering technology and is assisting in neutralizing acid in the stream. The project is located in the one-mile corridor between the Jenners treatment system and the Boswell Passive Treatment System.

In 1998, the Somerset Conservation District sponsored the implementation of a limestone dosing project on acidic tributaries to the North Branch. Beams Run and Spruce Run were treated to enhance the pH of the North Branch. The project was not continued beyond the one year.
The Somerset Conservation District has also identified 12 farms in the watershed that are interested in implementing Best Management Practices (BMP)'s to reduce nutrient runoff. The conservation district is now working on implementing these procedures.

In February, the Somerset Conservation Distinct submitted a request to PA DEP's Growing Greener Grant Program for a designation of a Geographic Priority area for the Stonycreek River basin that could open up additional funding mechanisms for both agricultural runoff as well as AMD abatement in sub- watersheds such as the Quemahoning.

In February of 1997, the PFBC conducted a first ever fish survey of the Quemahoning Creek. In conjunction with this survey the PA DEP conducted the first ever macroinvertbrate survey of the watershed as well. The Commission has also conducted surveys of tributaries such as Beams Run, Higgins Run, Coal Run and Beaverdam Run as well as the Quemahoning Reservoir. The data gathered has provided information so that future project impacts can be gauged.

In addition to these grassroots and agency driven initiatives, the ownership and operation of the Quemahoning Reservoir changed from private ownership to public ownership in November of 2000. This historic effort was initiated by SCRIP and supported and driven at the grassroots level from conservation and sportsmen's organizations that actively pursued the processes that eventually led to the public acquisition through a two county cooperative effort.

In 1997 Bethlehem Steel Corporation made it known that all of the property owned and operated by the Manufacturers Water Company that consisted of five water reservoirs including the Quemahoning Reservoir were to be sold. SCRIP determined that a course of action should be pursued and determined what that action should be. SCRIP charged the Southern Alleghenies Conservancy to facilitate a professionally operated and publicly tracked feasibility study to determine if a public acquisition was possible. SAC procured funding for the study from the PA Department of Conservation and Natural resources (DCNR). The 6 month long study culminated with a public meeting and announcement that a public acquisition was indeed feasible. With this information in hand the residents of Somerset and Cambria Counties charged the County Commissioners in each county with finding a method to acquire the properties. After over a year of negotiations a sales agreement was signed in November of 1999 that allowed the properties to be transferred to the newly formed Cambria-Somerset Authority. The actual transfer was consummated in August of 2000.

The public acquisition of the Quemahoning Reservoir has placed even greater emphasis on the need to improve the water quality of the Quemahoning Creek watershed. Through the public input process conducted by SAC citizens and watershed stakeholders indicated improvement of the water quality in the Quemahoning Reservoir was a top priority. In order for that goal to be met and for the recreational as well as economic benefits to be derived the non-point source pollution abatement efforts in the watershed already underway must continue. SAC and SCRIP published a document entitled "The Conemaugh River Water Resource Conservation and Management Plan" Concept Paper that clearly outlines the benefits that can be achieved through the public acquisition. However, only if water quality improvements continue to occur in the Quemahoning Creek watershed can these goals be achieved.

This watershed restoration plan will take into account the completed and ongoing projects in the watershed. The restoration plan will mesh the initiatives already completed or underway with the blueprint for future projects that will effectively address the remaining pollution problems in the watershed.

I.B. **HISTORY**

The Quemahoning Creek watershed's first documented exploration by Europeans occurred when Colonel Henry Bouquet camped along its banks at a section that is now impounded by the Quemahoning Reservoir. Colonel Bouquet was the leader of the advance party that scouted the terrain for the expedition led by General John Forbes as he blazed what came to be known as the Forbes Road from Bedford to Pittsburgh in 1758. Colonel Bouquet reported in his journals that the stream was originally called Drowning Creek by white men that had come that way before but the origin of that name is unclear. The name Quemahoning is an Iroquois Native American name that means a Lick in the Pines and Colonel Bouquet's journal reports that the stream flowed through heavy forested land including large pines. A year prior to Colonel Bouquet in 1757 a young British army officer by the name of George Washington passed the same way as he led a survey crew on a separate but related mission for the British army.

The construction of the Forbes Road pushed the western frontier through the Quemahoning Creek watershed. This advance allowed a full progression of trappers, travelers, soldiers and adventurers to pass through the region. The first recorded settler in the watershed was James McMullen in 1772.

The area remained sparsely settled throughout much of the 18th and 19th centuries. Jenner Township, that is 66.3 square miles encompasses much of the Quemahoning Creek drainage, was founded in 1811 and named for Dr. Edward Jenner who discovered the vaccine for smallpox. Throughout most of the 19th century the watershed developed as an agriculture district. The population in Jenner Township was 1,129 in 1820 and remained constant with a population of 1,637 in 1900. Timbering also was an early industry. The first two sawmills were operated by Moses Fream in 1813 and Samuel Steele in 1817. An iron furnace was in operation in 1825 that was an early prelude to extractive industry to come.

Most communities in the area came into existence because of the transportation routes such as the Forbes Trail. The earliest community was Jennerstown founded by James Wells and was incorporated into a borough in 1874. The early history of Jennerstown is spiced by numerous Indian attacks involving James Wells and other early settlers. The community served as an early stagecoach stop and the agriculture community slowly formed nearby.

At the turn of the 20th Century the industrial revolution was to begin in the Quemahoning Creek watershed and the region would never again be the same. In 1900 Thomas T. Boswell purchased property along Quemahoning Creek for the purpose of operating a coal and lumber business. Prior to this event the areas was described as filled with virgin timber and large trees of enormous proportion. The Merchants Coal Company, with Boswell as President, soon changed the landscape.

The Boswell Improvement Company, a subsidiary of the Merchants Coal Company, laid out a town on a plot of one square mile consisting of 1600, 50 x 1200 foot lots. The town was named after the company's president in 1901. All of the company buildings and some of the houses were constructed of ashlar stone procured in the area that gave the town of Boswell such a different look than the many other mining towns in the Appalachian coal region. The Baltimore and Ohio Railroad laid a railroad line to Boswell in 1902. The Merchants Coal Company also immediately began the constructing an industrial complex that would both extract coal and load it onto railroad cars for market. The formal opening of the operation occurred on September 22, 1902. The mine employed at minimum 900 men.

Because the mine opening was separated from the railroad by Quemahoning Creek a method had to be devised to transport the coal over the creek to the awaiting railroad cars. A steel viaduct utilizing 824 tons of steel spanning 1200 feet and 120 feet over the creek was constructed to convey the coal to the tipple for loading. The complex included a stone powerhouse that was 250 feet long and 47 feet wide that made for a striking site of Boswell from all approaches. The viaduct and tipple was the largest such complex of its type in the world at the time of its construction and use. It could carry up to 6,000 tons daily from the mine opening. The entire complex included a machine shop, blacksmith shop, car shop and brick plant making for one of the most complete and self-sufficient industrial complexes of its day.

The coal mined at Boswell in the Quemahoning Creek watershed was of such a fine generation steam grade the company named the coal Orenda. This set it apart from others who also mined Quemahoning coal. The Orenda name came from the Iroquois language and means 'magic power."

At the same time that Boswell and the Merchants Coal Company complex began to take form, other coal patch towns within the Quemahoning Creek watershed also began to grow from what was either forest or farmland. The coal towns of Acosta along the Quemahoning main stem and Gray situated along the North Branch began to take shape. The Acosta mines began in 1905 and the town was laid out in 1911 along with Gray. The village of Jenners was born 5 miles downstream of Acosta and a mile upstream of Boswell with operations initiated by the Consolidation Coal Company. In addition, to mines and towns immediately adjacent to the creek other towns and mines within the watershed also began to take form. Coal patch towns such as Ralphton, Randolph and Harrison, later known as Quecreek, also were born because of the rich vein of bituminous coal beneath them.

The landscape in the watershed suddenly attracted business and people because of the burgeoning industrial revolution and thirst for inexpensive energy primarily in the form of steam generated coal. In addition the impending build up for World War I added even greater demand for power and energy that the C prime coal in the watershed could provide.

The Quemahoning Creek provided both the industrial mining complexes and the influx of immigrants, primarily from Eastern Europe, with water. Unfortunately, through open sewers that drained directly into Quemahoning Creek and its tributaries, the water quality almost immediately began to be degraded.

Water was also a problem in the mines as well. Air and later electric pumps were installed in the mines to remove water that was the largest hindrance to the mining itself. At the Merchants Coal Company Orenda mine in Boswell four pumps were required to remove 1,000 gallons a minute from the mine. The outflow of water from the mines was essential to the mining operations existence. However, the very same outflow spelled doom to the aquatic life and vitality of the Quemahoning Creek.

I.C. ARCHEOLOGICAL AND HISTORICAL

Native Americans utilized the Quemahoning Creek watershed from 2000 BC to 1600 AD. Documentation of this has been verified by an archeological dig at a rock shelter just east of Boswell conducted by the Somerset County Archeological Society. Populations of Delaware and Shawnee of Native Americans as well as Iroquois used the area as hunting grounds. The Delaware were primarily agrarian and normally settled in areas suitable for agriculture. A well know native American village known, as Kichenapaulin Town existed along the banks of the Quemahoning creek near the mouth of the creek. The area today is inundated by the Quemahoning Reservoir.

The following is a list of historical entities in the watershed. It was compiled from "Somerset County, People An Inventory of Historic Engineering and Industrial sites," By Scott C. Brown, Frances C. Robb and Elaine Will and published by America's Industrial Heritage Project and the National Park Service in 1994.

Boswell Borough National Historic District, Jenner Brewery, Boswell Lumber Company, Quemahoning Reservoir, Quemahoning Coal Co., Ralphton, Quemahoning Creek Coal Co., Quecreek, Randolph Coal Co.; Randolph.

In addition, the Somerset County Planning Commission completed "A Selection of Significant Structures Somerset County Historic Resource Survey Phase III Area Laurel Mountain North" in 1987. The following structures and areas are catalogued and recorded by the PA Historic and Museum Commission for historic preservation and are contained in the Planning Commission report.

Located in Jenner Township

John A. Blough Barn	Jacob Hoffman Barn
James O'Conner House	David Simpson House
Shaulis Springhouse	Mathew Hair House
Philip Coleman House	Michael Korns House
Hoffman School	Hotel Sipe
Michael Horner House	Solomon Log House
John Biesecker House	Roaring Run Stone Arch
Solomon Stone House	Bell's Mill
Jacob Fleck House	John Griffith House
Henry Fisher House	Hoffman Lime Kiln

Located in Boswell Borough

Merchants Coal Co. Power House	All Saints Parish Church
Boswell Co. house	All Saints Parish School
Merchant's Coal Co. Offices	SS. Peter & Paul Greek Orthodox Church
National Bank of Boswell	SS. Peter & Paul Greek Orthodox Church
The Daimond	Boswell Co. House
Joseph Kudasik House and Market	Mountain House
Charles J. Newman House	Boswell Post Office

Located in Jennerstown Borough

Mountain Playhouse	Croner Grist Mill
Green Gables Restaurant	John Dennison House
Christine Clawson House	Samuel Gohn House
Samuel Turrillo House	Jacob Hoffman House
White Star Bed and Breakfast	

I.D. GEOLOGICAL FEATURES

The entire watershed is within the Central Appalachian Ecoregion. This ecoregion is divided into two parts that are the Forested Hills and Mountains and the Upland Valleys of mixed use. The Quemahoning Creek land drainage receives influences from the Forested Hills and Mountains due to its drainage on the west slope of the Laurel Ridge that consists of the Casselman formation of the Conemaugh Group. The Quemahoning Creek itself, however, is in the region of the Upland and Valleys that consists of the Allegheny Group.

The Casselman Formation is cyclic sigumes of shale, siltstone, sandstone, impure limestone and non-persistent coal. The Allegheny Group is cyclic sigumes of sandstone, shale, limestone, clay and coal and includes clay deposits of vanport limestone. Also included are the commercially valuable Freeport, Kittanning and Brookville-Clarion coals.

Another geological group, the Pottsville Group, is also located within the watershed. This group is characterized by gray sandstone and conglomerate, thin beds of shale, claystone, limestone and coal. This group is primarily located on the northerly downstream portions of the watershed.

The majority of the mining has been in the Allegheny Group coals that contain both surface and deep mines. Some of the AMD discharges related to these mining operations in this group have flows measuring in the several hundred of gallons a minute. The drainage from the surface mines varies depending on the presence of limestone strata above the coal. Clay and limestone deposits have also been mined and quarried. The Pottsville Group also contains mineable coal and high alumina clays. This group is found on the ridge tops and the western slope of the Laurel Ridge within the watershed. The Mauch Chunk and the Burgoon sandstone formations are present here as well along the slopes and ridge tops.

The soil in the basin is primarily Brinkton-Wharton Cavode. These soils are poorly to moderately well drained soils that formed in colluvail and residual materials. These soils are best used for agricultural purposes. Out of 64,636 acres 30,094 are in some type of agriculture use in 1994 according to the "Assessment of Non-point Source Pollution within the Stonycreek and Little Conemaugh Watersheds Report."

A portion of the watershed mostly encompassing the Quemahoning Reservoir consist of Gilp-Ernest-Wharton soils that are moderately deep and gently sloping to moderately steep, well drained and moderately drained soils that are found in residual and colluvial materials.

I.E. BIOLOGICAL FEATURES

There is little public game land or state forestland within the watershed. State Game Lands 42 extends across Laurel Ridge on the northern fringe of the watershed. Deer, turkey and bear are plentiful games species as listed by the Pennsylvania Game Commission. The Commission has also worked in partnership with Somerset County Pheasants Forever and local landowners to improve habitat on two specific tracts of land within the basin. Cuttings to increase cover as well as the planting of warm season grasses have occurred in the watershed.

Laurel Ridge State Park stretches along the Laurel Ridge where tributaries to Quemahoning Creek such as Beams Run and Spruce Run, Beaverdam Run, Pickings Run, Card Machine Run and Roaring Run originate. The Laurel Ridge State Park is encompassed by the 40,850 acre Forbes State Forest. The state forest provides public access for a variety of outdoor pursuits. The park encompasses the Laurel Highlands Hiking Trail that connects Johnstown with Ohiopyle. The trail is blazed every 100 feet with 2"x5" yellow blazes and includes shelters, lookouts and parking areas for access. Trails also lead from the main trail to natural areas such as Beams Rocks where a natural outcropping of large rock is often visited by hikers as well as rock climbers.

The Laurel Ridge State Park protects and harbors the springs that provide the birthplace of much of the flow of the Quemahoning Creek basin.

The Pennsylvania Natural Diversity Index identifies species of concern in the Quemahoning Creek watershed.

Scientific Name Common Name Federal Status State Status
Observed after 1980 SRank GRank
Cimicfuga Americana Mountain Bugbane
NO G5 S3
Oxpolis rigidior Stiff Cowbane
TU NO G5 S3S4
Platanthera peramoena Purple-Fringeless Orchid
TU YES G5 S2
Viola appalachiensis Appalachian Blue Violet
Yes G3 S2
Myotis Leibii Eastern small-footed bat
PT NO G3 S1B S1N

I.F. MACROINVERTEBRATE SAMPLING

On July 22 through July 24, 1997 the Pennsylvania Department of Environmental Protection Bureau of Abandoned Mine Reclamation (BAMR) performed an Aquatic Survey of the Quemahoning Creek main stem not including the North Branch. The results were prepared by Pamela J. Milavec in a report completed on July 17, 1998. The sampling was done in cooperation with the PFBC's fish survey occurring at the same time and at the same sites. A total of nine macroinvertebrate sample points were surveyed within the four Fish and Boat commission sampling sections. Macroinvertabrate and water samples were collected at each station, a habitat evaluation form was completed and stream flows were measured by the DEP.

The results of the survey indicate biologically that the Quemahoning Creek is impacted by a variety of non-point source pollution. The upper reaches of the creek demonstrate severe impacts from agricultural runoff. The middle segment is impacted by both AMD as well as untreated sewerage. The lower segments are primarily impacted by AMD. The complete survey information is included in Appendix A. The findings of this survey provide essential data the specifics of which will be discussed as they relate to potential abatement efforts in the recommendations section of this assessment.

On October 7 and 8, 2002 a second water chemistry and macroinvertebrate sampling was conducted at the same sites as the 1997 survey with the exception of the site below the Quemahoning Reservoir. Results will be analyzed and used for comparison against the 1997 survey.

I.G. **FISH SURVEYS**

Quemahoning Creek—Main Stem

The Pennsylvania Fish and Boat Commission conducted a fish survey on Quemahoning Creek July 22 and 23, 1997 concurrently with a PA DEP macroinvertebrate survey. Quemahoning Creek had last been surveyed by the Commission in 1983. A total of nine stations were sampled within four different sections of the creek. All fish species were collected and enumerated because the data was used to calculate the Index of Biotic Integrity (IBI) metrics. The IBI is a composite index based on an array of ecological attributes of the communities in regard to species richness, indicator taxa, trophic guilds, fish abundance and the incidence of hybridization, disease and anomalies. The IBI ranking will provide comparisons among the eight sites upstream of the Quemahoning Reservoir survey and a tool to measure the degree of change for future improvements to the watershed.

Overall the survey found that water chemistry and fish communities have improved since 1983. The pH levels in 1997 were similar to 1983. Total alkalinity increased at least three times the levels from 1983. Total numbers of fish species increased in three sections and in the fourth section it was similar to that found in 1983. However, the 1997 survey clearly provided evidence of specific water quality problems within the watershed. The specific data for certain segments will be detailed in the recommendations section of this assessment. The complete survey is included as Appendix B.

I.H. **TRIBUTARY FISH SURVEYS**

Higgins Run

Additional PA Fish and Boat Commission surveys have been conducted on tributaries. Higgins Run is a 5 kilometer long cold water stream near Stoystown and is a tributary directly to the Quemahoning Reservoir. The upper reaches of the stream is designated as Coldwater Fishes and the lower section is High Quality Cold Water Fishes and contains a Class A wild brown trout population. The commission has conducted fish surveys over the last four years on the stream. The results have indicated that trout biomass has steadily increased from original surveys conducted in 1993 through 2002. Although not yet compiled the survey conducted in July 2002 indicated that the wild trout population has at least maintained its numbers, which puts it apart from many other wild trout streams in the state where numbers have decreased because of the lessening of flows due to recent drought conditions. Currently Higgins Run receives much of its water from the Stonebridge borehole. The water from the borehole originates from the underground Quemahoning mine pool. Recent changes in stream flow because of a closing of one active mine and the opening of a new mine that is discharging its treated water into the Quemahoning mine pool will require additional monitoring of the stream. The PA DEP has increased its water quality monitoring wells. The PA DEP, however, indicates the new mine discharge amounts to less than one percent of the total amount of water in the Quemahoning mine pool which accounts for a stable flow and may be a major reason that the wild trout population has prospered.

The Mountain Laurel Chapter of Trout Unlimited has proposed a project for Higgins Run that would base line the current conditions of the stream and make recommendations for improvements in the watershed. This will be detailed in the Recommendations Section of this report.

Coal Run

Coal Run is a 2.2-kilometer long stream located along the western slope of Laurel Ridge. It is a tributary to Beaverdam Run that empties into Lake Gloria before its confluence with the North Branch of Quemahoning Creek. The stream is designated a Coldwater Fishes by the PA Fish and Boat Commission and was surveyed by the Commission in 2000. The stream has a relatively good pH of 6.9 and hold a Class D wild trout fishery. It has a positive water chemistry influence on Beaverdam Run.

Beaverdam Run

Beaverdam Run is a small stream near Gray and originates on the eastern slope of the Laurel Ridge. It flows 5 kilometers to its confluence with the North Branch of Quemahoning Creek. Beaverdam Run is designated Coldwater Fishes. The stream was surveyed in 2000 and trout biomass was considered to be at the Class C level. Beaverdam Run upstream of Coal Run had a Ph of 5.6 while below Coal Run the PH was 6.7 indicating the positive influence of Coal Run.

Beam Run

Beam Run is a small stream near Gray and originates along the eastern slope of the Laurel Ridge. It flows 2.1 kilometers to its confluence with the North Branch of Quemahoning Creek. The stream survey in 2000 produced no fish at any survey sites. Very low levels of pH measurements of 4.7 and alkalinity of zero account for the total lack of fish species. William Sharpe has documented acid precipitation along Laurel Ridge in reports prepared on similar streams along the ridge. In addition, the geology of the underlying strata of Beam Run also plays a primary role in the streams historic pH levels. There are no abandoned mines in the watershed that contribute to the high acidity levels.

Spruce Run

Spruce Run is also a small tributary to the North Branch of Quemahoning Creek and enters the North Branch just downstream of Beam Run. Spruce Run's pH levels mirror that of Beam Run and it too is devoid of aquatic life.

II. PROBLEM AND OPPORTUNITY IDENTIFICATION

II.A. The 303 (D) List of Impaired Streams

PA Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards, identify the water quality standards fro which stream based Total Maximum Daily Loads (TMDL's) should be developed. Assessments for Quemahoning Creek so far include:

Quemahoning Creek
Segment 20010516 –0930 2.6 miles – Impaired by siltation and nutrients
Segment 20010504-1200 .2 miles – impaired by metals and low pH
Segment 20010504-1300 2.6 miles impaired by metals and nutrients
Segment 20010508-1330 .2 miles impaired by metals
Segment 20010510-0930 2.8 miles impaired by metals and low pH
Segment 20010516-1000 3.2 miles impaired by metals and low pH
Segment 991012-1525 .3 miles impaired by siltation and nutrients
Segment 991012-1530 .2 miles impaired by metals, siltation and nutrients

North Branch Quemahoning Creek
Segment 20010503-1200 2.4 miles impaired by siltation and nutrients

Hoffman Run
Segment 991012-1555 1.5 miles impaired by siltation other habitat alterations and metals

At this time no date has been set by PA DEP for TMDL's to be developed on these stretches to date.

II.B. **Community Input and Involvement**

The Quemahoning Creek watershed is a sub basin of the Stonycreek River watershed, which is a sub-basin of the Kiski- Conemaugh River Basin. An innovative effort began in 1991 when U.S. Congressman John Murtha, in cooperation with the Cambria County and Somerset Conservation Districts, formed the Stonycreek-Conemaugh River Improvement Project (SCRIP). A 12 member volunteer board of directors made up of local citizen stakeholders and agency personnel was formed in order to orchestrate and coordinate AMD abatement efforts in the Stonycreek and Little Conemaugh River watersheds. SCRIP initially held public meetings on June 23, 1991 and May 21, 1992 at the University of Pittsburgh at Johnstown to elicit public participation for forming a restoration plan.

SCRIP in cooperation with the Somerset Conservation District approached the U.S. Geological Survey (USGS) for support to develop a complete inventory and survey of AMD discharges in the Stonycreek watershed. The result of this effort produced USGS Water Resources Investigation Report 96-4133 entitled "Effects of Coal Mine Discharges on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, PA." The report describes the results of the USGS's investigation and sampling of AMD discharges in the Stonycreek River watershed and prioritized the discharges for remediation. The discharges were sampled from October 1991 through November 1994 with a final report completed in 1996.

A prioritization index (PI) was utilized to rank AMD discharges with respect to their loading capacity to the receiving stream. The PI lists the most severe discharges in a descending order for the Stonycreek River watershed and its sub-basins including Quemahoning Creek. The study was the foundation upon which the six site 5 million dollar Oven Run AMD abatement project on the Stonycreek River was built. The study has also proved to be the impetus for other watershed remediation efforts in the Stonycreek watershed including Quemahoning Creek.

SCRIP also pioneered the first volunteer monitoring effort in the Stonycreek watershed. Volunteer SCRIP Riverkeepers provided additional supplemental water quality data that ahs been used in conjunction with the U S.G.S. study to further pinpoint and assess AMD discharge sites.

In 1997 SCRIP joined with other watershed groups to create the Kiski-Conemaugh River Basin Alliance (KCRBA). The Alliance, with the Conemaugh Valley Conservancy acting as the conduit, received a $285,000.00 grant from the PA DCNR to develop a River Conservation Plan for the entire basin. The final plan was completed in August of 1999. The plan identifies the resources, problems and recommends solutions to conserve and enhance water and land resources within the basin. The plan has placed the Kiski-Conemaugh River Basin on the PA Rivers Registry. The Registry promotes river conservation. The registry listing qualifies entities within the basin to receive PA DCNR grants for implementation, development or acquisition purposes.

During the development of the plan a series of public meetings was held throughout the basin including a meeting on April 29, 1998 at the Boswell American Legion in the Quemahoning watershed.

In 1995 MLTU stream improvement chairman Len Lichvar approached the Somerset Conservation District and the Southern Alleghenies Resource Conservation and Development Council with a request and draft plan to remediate the AMD and other pollution sources in the Quemahoning Creek watershed. With adoption of the project by the Conservation District and the RC&D Council, the first focus of attention to the nearly century long pollution in the Quemahoning Creek watershed became a reality. With information available from the USGS report, DEP monitoring and SCRIP Riverkeepers, the District, RC&D, SCRIP and MLTU identified an alkaline artesian discharge number 176 located in the village of Jenners as potential abatement site. With the recent creation of the Appalachian Clean Stream Initiative (ACSI) by the federal Office of Surface Mining and the federal Environmental Protection Agency the local partnership requested funding for a passive AMD treatment system locate on the property of the Municipal Water Authority of the Township of Jenner. The Authority cooperated fully in the concept and made the plan possible.

The first ever AMD passive treatment system in the watershed, known as the Jenners Passive Treatment System, was designed by the Southern Alleghenies Conservancy's technical design team with support from the PA Mountain Service Corps (AmeriCorps) with design oversight provided by the USDA NRCS's Technical Field Office in Somerset. The treatment system was completed and went on line in 1997. In February of 1998 U. S. Secretary of the Interior Bruce Babbitt visited and held a public meeting and press conference at the site and hailed the public-private partnerships and local initiatives that created the project as one of the finest examples of cooperation and success in the field of water quality improvement in the nation.

With the success of the Jenners Passive Treatment System and at the urging of grassroots organizations such as SCRIP, MLTU, Jenner Township Supervisors, Boswell Lions Club, Boswell Area Jaycees and the Boswell Area Historical Society the Somerset Conservation District applied for and received a $60,000.00 PA DEP Growing Greener grant to stabilize the stream banks of a one mile long section of Quemahoning Creek just downstream of the Jenners Passive Treatment System. The project was completed in August of 2001 and now protects and stabilizes a formerly eroded stretch of stream below the treatment system and adjacent to the Boswell Lions and Jaycees Community Park.

On July 23, 1997 the PA DEP identified a previously unidentified source of AMD pollution while conducting an aquatic survey on Quemahoning Creek. This alkaline 6 to 6.5 pH discharge contained iron loadings ranging from 200 to 1000 pounds a day that directly entered Quemahoning Creek from a discharge located in a man made wetland adjacent to the stream at Boswell. In order for the project to be implemented the 25 acre site known as the Dunlap discharge site had to be acquired when the owner was not willing to proceed with the project under his ownership. Len Lichvar and Lester McNutt requested a $25,000.00 donation from the Jenner Rod and Gun Club in order to purchase the property and transfer ownership to the Somerset County Conservancy. The local club, whose home is located adjacent to Quemahoning Creek at Jenners, donated the funds and the property was transferred to the Conservancy enabling funding for the design and construction to be applied for. The project is designed in two phases. After numerous permitting concerns were finally addressed the Beaverdam Creek stream relocation as Phase I began on July 21, 2002. Phase II, which is the re-contouring of the wetland to create retention time for the AMD water, is set to occur in 2003. Over 80 tons of iron a year will be removed with the completion of this project.

As a continual outgrowth of the locally initiated efforts the Somerset Conservation District applied for and received funding assistance trough the EPA Regional Geographic Initiative to address agricultural non-point source pollution impacts in the Stonycreek River watershed. A watershed Assessment was conducted in 1994 that determined the extent of agricultural non-point source pollution in sub watershed such as Quemahoning Creek. A dozen farms have been identified and the Conservation District is now assisting in the development of Best Management Practices (BMP's) to reduce this source of pollution.

Local community service organizations in the Quemahoning Creek watershed have also actively pursued initiatives that have created greater public attention to and access of the Quemahoning Creek. The Boswell Area Lions Club in partnership with the Boswell Area Jaycees have constructed the Community Recreation Park that includes a Little League Field, softball field and pavilions along the banks of the Quemahoning Creek at Ferrelton. The two service organizations have collected over $100,000.00 to implement this all volunteer recreational enhancement initiative. The Conservation District's stream bank improvement project parallels much of the park and members of the two organizations provide volunteer labor for the project as well.

In addition, the Boswell Area Historical Society has created the publicly accessible Orenda Park one mile downstream from the Community Recreation Park. This entire project was locally funded and volunteer effort have now allowed for a green area and historic interpretation of the area. Additionally the park serves as public access for canoeists and boaters who regularly utilize the lower Quemahoning Creek for recreation.

For the past 19 years the Jenner Community Sportsman's Club, under the direction of Fish Hatchery manager Allen Berkey, have stocked the Quemahoning Creek watershed with over 15,000 trout from its cooperative trout nursery. For many of those years the fish were put in isolated upstream sections or tributaries. For the last six years the MLTU has assisted the sportsman's club in stocking the stream below the Jenners Passive Treatment system and greatly expanding the fishery. Over 1,000 trout are now planted in this section each spring. Taking advantage of the water quality improvement projects in place. This effort has resurrected a year round fishery in Quemahoning Creek upstream of Boswell for the first time in three generations.

At the educational level North Star High School under the direction of two science teachers has implemented an environmental education program under the school's science department that now involves students in monitoring and assessing water quality conditions in the Quemahoning Creek. The group has aligned itself with the Kiski-Conemaugh River Basin Alliances' Stream Team monitoring program that provides support and technical assistance. The program now uses Quemahoning Creek as an outdoor classroom and its comeback story as an educational textbook.

Although there is not a specific watershed group formed in the Quemahoning Creek watershed local stakeholders have effectively utilized organizations and agencies that are already in place to orchestrate and promote positive resource oriented changes. Groups that have effectively worked in partnership in the watershed include:

Stonycreek-Conemaugh River Improvement Project
Southern Alleghenies RC&D and Conservancy
Jenner Township Supervisors
Mountain Laurel Chapter Trout Unlimited
Boswell Lions Club
Boswell Area Jaycees
Boswell Area Historical Society
Bens Creek Canoe and Kayak Club
Kiski-Conemaugh River Basin Alliance
Somerset County Conservancy
Jenner Rod and Gun Club
Jenner Community Sportsman's Club
North Star High School
PA Department of Environmental Protection
Environmental Protection Agency
Office of Surface Mining
Somerset Conservation District
USDA Natural Resources Conservation Service
PA Mountain Service Corps (AmeriCorps)
U.S. Geological Survey
PA Fish and Boat Commission
Somerset County Commissioners

II.C. **Economic Impact and Opportunity**

Economic enhancements are directly tied to the availability of clean and available sustainable natural resources. The Quemahoning Creek watershed, primarily due to extractive industry development, has experienced impairment to much of its natural resources. The Quemahoning Creek Restoration Plan is an attempt to restore and sustain the watershed's natural resources in order for economic opportunities to once again prosper.

The Restoration Plan will realize economic benefits from:

- Protecting and enhancing the water quality of the publicly acquired
- Quemahoning Reservoir
- Restoration of a fishery
- Enhanced white water boating
- Improved quality of life and self-image

A grassroots led effort originated in 1997 and initiated by SCRIP and facilitated by the Southern Alleghenies Conservancy with financial support from the PA DCNR led to the public acquisition of over 5,200 acres of land and water in Cambria and Somerset Counties that included the Quemahoning Reservoir. The 92 billion gallon capacity reservoir was constructed just after the turn of the 20th century to provide water for the burgeoning Johnstown industrial complex. Under private ownership for over 90 years the reservoir supplied these industrial needs.

With the demise of the steel industry in the latter half of the 20th Century, however, Manufacturers Water Company, a subsidiary of Bethlehem Steel, gradually became more of a liability than an asset to the parent company.

The acquisition initiative, planned and pursued by local conservationists and sportsmen culminated with a historic two county effort led by the County Commissioners of both Cambria and Somerset Counties that publicly acquired the Hinckston Run, Wilmore and South Fork Reservoirs in Cambria County and the Border and Quemahoning Reservoirs in Somerset County in August of 2000. The Cambria- Somerset Authority was created by the Commissioners to own and operate the facilities.

The public acquisition has now created a vast array of recreational and economic opportunities regarding the reservoirs and its resources that were never possible under private ownership. Although manmade, the damming of the Quemahoning Creek to create the reservoir makes the impoundment a key component and unique resource within the Quemahoning Creek watershed.

SAC in cooperation with SCRIP issued the "Conemaugh River Water Resource Conservation and Management Plan" Concept Paper on January 15, 1999. The Concept Paper outlined five specific objectives that the public acquisition can create. Among those is to develop recreation that will create economic stimulus and at the same time not jeopardize the water quality needs of water customers.

Throughout the history of the Cambria –Somerset region water impoundments that have been used for public and industrial needs have been off limits to public recreation due to unfounded fears of contamination. During the public consensus building part of the public acquisition process SAC and SCRIP researched and documented water companies and authorities that permitted recreation to occur on its reservoirs that supplied water for other users. Through this investigation it was found that recreation and other uses can and do coexist.

Under the management of the Cambria-Somerset Authority the Quemahoning Reservoir is open to public access and fishing is permitted. On May 22, 2001 the reservoir was officially opened for public boating for the first time as well.

Jim Welsh, Director of Summer Best Two Weeks, an organization that is partnering with the CSA to develop additional recreational facilities at the reservoir, has detailed recreational use of the reservoir during the 2001 season which is the first full year of public recreation.

It includes:

Day Passes Sold – 1121
Season Passes Sold – 33
Summer's Best Two Weeks trips – 11 one day and one-night trips for 20 people – Total 220 people
Pine Springs Camp – Five day trips for 16 people each – Total 80 people
Laurel Mountain Camp 6 one day and one night trips for 12 people - Total 72 people
St. Scoalastica youth Group 1 one day and one night trip for 6
Boy Scouts I three day and 2 night trip fro 20

Bens Creek Canoe and Kayak Club for 300 people
Pen Del Regional Concrete Canoe and steel Bridge Competitions fro 400 people
Outdoor Odyssey 30 one night trips for 20 people each Total 600 people
Simmer's Best Two Weeks 11 one day and one night trips for 20 people each Total 220 people

The importance of monitoring and more importantly improving the water quality of the Quemahoning Reservoir by eliminating upstream sources of pollution is paramount in continuing and enhancing the recreational opportunities at the reservoir.

The PFBC conducted a fish survey on the Quemahoning Reservoir in April, May and August of 1999. The survey found that fish populations can be characterized as low in density overall. The lake is low in fish productivity because of low alkalinity levels (76 mg/l) creating infertile water quality due to the historic AMD pollution in the watershed. The survey clearly states, "It is imperative that efforts to improve water quality of tributary streams to the lake be pursued. The production potential of the lake can improve with each water quality improvement whether it is mine drainage, sewerage or agriculture related."

In addition the Somerset County Commissioners have embarked on a design plan to transport Quemahoning Reservoir water to communities south of the reservoir via a pipeline with an eventual destination of Somerset Township and Somerset Borough. In order for this project to be fully completed the PA DEP will have to justify and approve an inter-basin transfer of water. If and when this project becomes a reality initiatives that reduce pollution into the reservoir will translate into less expensive water treatment costs for the communities that will utilize the transported water thus reducing the costs to the consumer and enhancing business development while supplying a needed reliable source of water.

II.D. Value of Fisheries

The PA Fish and Boat Commission calculates that fishermen spend on average $28.00 to $42.00 a day on fishing. Boaters who typically stay overnight at Raystown Lake spend on average $76.00 a day according to a study for the Army Corps of Engineers. The PFBC also has determined that trout stocked fisheries attract 1,100 trips per mile per year. Wild trout streams attract 500 trips per mile per year. Of course these numbers can vary depending on nearby populations, access, aesthetics of the stream, availability of similar or better fishing opportunities and other criteria.

Using these criteria an estimate can be made as to the value of lost revenue each year due to the amount of unfishable water in the Quemahoning Creek watershed. With the exception of the 1.5-mile section between the village of Jenners and the Jenners Passive Treatment System and the Dunlap discharge at Boswell a viable fishery does not exist on the main stem of Quemahoning Creek. Likewise because of acidic tributaries the North Branch does not hold a viable fish population. The AMD impacts to Roaring Run downstream of Route 601 also impair its fish holding capabilities.

Using best available information the beneficial impact of restoring these stream segments is as follows:

Stream	Miles	Use	Projected Use Rate	Valuation Trip $	Lost Value
Quemahoning Main stem	14	TSF	1100	$42.00	$ 646,800.00
Quemahoning North Branch	4	TSF	1100	$42.00	$ 184,800.00
Roaring Run	3	TSF	1100	$42.00	$ 138,000.00
Beam Run	2	TSF	1100	$42.00	$ 92,000.00
Spruce Run	2	TSF	1100	$42.00	$ 92,000.00
Total	**25**				**$1,155,000.00**

This projection is, of course, an estimate and presumes a best-case scenario of restoring all miles fishable within the watershed. Despite an estimate, however, it clearly demonstrates that increasing angling opportunities in the watershed has a positive impact and is lost revenue for each year that it does not occur. The recent upswing in use of the 1.5 mile section of stream that has been most positively impacted by water quality improvement projects between Jenners and Boswell, clearly demonstrates that angler use will surely increase in other parts of the watershed as opportunities for fish survival occur.

II.E. **ENHANCED WHITEWATER BOATING**

Whitewater boating is available and utilized by white water enthusiasts from Boswell downstream to the Quemahoning Reservoir. The gradient of the creek drops in this section of the creek and normally in the spring of the year boaters, rafter and kayakers access the creek at the Boswell Area Historical Society's Orenda Park, which provides parking and easy public access to Quemahoning Creek along State Route 601 at the northern portion of Boswell.

American Whitewater and the Bens Creek Canoe and Kayak Club quantified the impact of the whitewater opportunities downstream of the Quemahoning Reservoir with the publication of "The Position Paper for Stonycreek Whitewater Releases from Quemahoning Dam" on June 10, 1999. The position paper makes the case that the Quemahoning Creek watershed makes up one third of the Stonycreek watershed. The construction of the reservoir in 1912 removed a historic natural flow from the last mile of Quemahoning Creek as well as the Stonycreek River. With the public acquisition and change in ownership of the reservoir in 2000 a conservation release was mandated by the PA DEP to restore a portion of that flow. The 10.8 million gallon a day conservation release will be implemented in 2003 or 2004 when a new valve mechanism is installed at the reservoir. This reintroduction of water back into the last mile of Quemahoning Creek and the Stonycreek River will assist in enhancing the impacts of the current AMD abatement efforts occurring upstream on the Stonycreek River by reinstating a historic flow of water that will further dilute, assimilate, and buffer remaining pollution.

The Bens Creek Canoe and Kayak Club has advocated periodic recreational releases of water from the Quemahoning Reservoir in addition to the conservation release. Results from surveys included in the position paper indicated that a kayaker, canoeist or rafter spends on average $106.00 for a weekend whitewater excursion in the Stonycreek watershed. This number includes expenditures such as food, beverages, lodging, souvenirs, clothing, paddling gear, laundry and phone service. The Club had over 500 people participate in its Annual Stonycreek Rendezvous whitewater event on the Stonycreek River downstream of the Quemahoning Reservoir. The annual Rendezvous to date is relegated to an early spring single event since that is the only time of years that adequate flows can be reasonably assured of occurring.

If whitewater releases could be secured from the Quemahoning Reservoir through an agreement with the CSA whitewater events could occur on additional weekends throughout the summer and provide additional use and expenditures. These occasional high level releases also flush the Stonycreek River of sediment as well as loosens and removes the AMD induced metal armoring of the stream bottom. These releases would allow the last mile of Quemahoning Creek and the Stonycreek River to experience high water levels that all streams experience with beneficial impacts to the aquatic ecosystem as result. The lack of this historic natural occurrence have reduced these benefits of natural river dynamics to both the last mile of Quemahoning Creek and the Stonycreek River.

Currently the CSA has not committed to any periodic whitewater releases. However, if whitewater releases were to be secured six times a year and making the assumption of 500 participants expending $106.00 for a weekend event as documented in the position paper an economic impact of $901,000.00 can be reasonably estimated as a result of such activity.

II.F CONCLUSION

What occurs in the Quemahoning Creek watershed not only impacts economic parameters in that watershed but also has significant impacts well beyond into the Stonycreek and the entire Kiski-Conemaugh River Basin as well. The numbers used are predicated on best available researched data. Of course the numbers calculated from the data are estimates since actual economic impact cannot be precisely measured other than to be reasonably assured that the impact will be positive.

The potential annual economic impact is estimated to be the following:

Restored Fisheries	$1,155,000.00
Increased Whitewater Boating	$901, 000.00
Total	$2,056,000.00

III. EXPECTATIONS

The current water quality improvement project impacts in the watershed have already been felt by local residents and visitors. These projects as well as the public acquisition of the Quemahoning Reservoir have placed local expectations of the return of water quality to their watershed at an all time high level. Successful locally led and supported projects have provided momentum that must be maintained through the development, design, funding and implementation of future water quality improvement projects detailed in this report.

IV. PROBLEMS IN THE WATERSHED

The "Assessment of Nonpoint Source Pollution in the Stonycreek and Little Conemaugh Watersheds" (Cambria County Conservation District 1994) documented agricultural non-point source pollution and sediment erosion with the introduction of excess nutrients is a serious water quality problem and high priority for remediation in the North Branch and mainstem of Quemahoning Creek.

Acidic tributaries, such as Beam Run, have been identified by the PFBC through water chemistry measurements taken during fish surveys in 2000. Spruce Run also exhibits similar characteristics. pH levels on Beam Run range from 3.4 to 4.8 and alkalinity levels range from 0 to 2. Data compiled by the Somerset Conservation District and SAC indicate pH levels in Spruce Run ranged from 4.45 to 6.22 with alkalinity levels ranging from 0 to 8 in 1998. Additional sampling by SAC in June of 2002 recorded pH levels of 5.1 in Beam Run and pH levels of 5.7 in Spruce Run a hundred yards from their confluence with the North Branch of Quemahoning Creek. Sampling conducted by PA DEP and SAC both confirmed depressed levels of pH in the North Branch below the confluence of both tributaries further documenting the impacts on the downstream reaches of Quemahoning Creek further reducing the ability of the creek to buffer acidity from both acid rain and AMD.

A study conducted by the USGS entitled,"Effects of Coal Mine Drainage on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, PA," Report 96-4133 quantified the AMD discharges in the Stonycreek River watershed. The report documented 20 AMD discharges in the Quemahoning Creek watershed.

As an example the USGS Report ranked AMD discharge site 208 located at the village of Quecreek as the number one discharge in its the Priority index (PI). The PI ranks each discharge by their relative severity with respect to all other sampled discharges in the watershed, the pH level of 6.2 with iron loadings of 935.000 UG/L and Aluminum of 509.000 UG/L. A hundred yards downstream the iron was 403.000 UG/L and Aluminum was 226.000 UG/L indicating that the metals drop out quickly given the pH of the discharge at that time.

The next significant AMD impact comes from Discharge Site 209 located near the village of Acosta. This discharge registers a low pH of 3.5 as sampled by the USGS. According to the PA DEP sampling iron loadings at this site contribute a much as 59 lbs/day to Quemahoning Creek.

The next area of impact is Hoffman Run which intersects the main stem near Jenner Crossroads. Several seeps originate near the Hoffman Church that contributes significant iron loading to Hoffman Run. The Somerset Conservation District and PA DEP have sampled these seeps as well as Hoffman Run and have recorded fluctuating levels of metals as well as depressed pH levels. Sampling by SAC in June of 2002 recorded iron loadings of 379.000 UG/L in Quemahoning Creek above the mouth of Hoffman Run. At the mouth iron loadings were 7000.00 UG/L and 100 yards downstream from the mouth on Quemahoning Creek the iron loading was 984.999 UG/L indicating that Hoffman Run is a significant contributor of metal contaminant to Quemahoning Creek. Aluminum levels were similarly elevated by Hoffman Run as well.

The next discharge is located at an area known as the Stoughton Lake bottom in Jennerstown Borough. The PA DEP, while conducting an aquatic survey of the watershed, first documented this discharge on July 23, 1997. The net alkaline discharge, also known as the Dunlap discharge, emanates in a man made wetland from an abandoned underground mine pool. The pH ranges from 6.0 to 6.5 and iron loadings range from 200 to 1,000 lbs./day with net alkaline conditions. Results of water sampling downstream of the discharge as well as the macro invertebrate study show degradation of Quemahoning Creek. The phase I treatment of this discharge will be completed in 2002 and the Phase II treatment will be completed in 2003. This will be further discussed in the next section.

Only several hundred yards downstream of the outflow of the Dunlap AMD discharge is the net alkaline Gonder AMD discharge with an average flow of 357.4 GPM. The Gonder discharge is documented in the USGS report as discharge 173. The discharge pH was recorded at 6.2 with sulfate loadings of 4,570 lb/day and iron loadings of 192 lb/day. Iron loadings from DEP samples show 110 lb/day with a flow of 270 GPM.

Roaring Run intersects Quemahoning Creek one and one half miles upstream from the Quemahoning Reservoir. Roaring Run emanates on the eastern slope of Laurel Ridge. The headwaters are classified as wilderness trout waters by the PFBC and hold a population of wild brook trout. The Boswell Area Water Authority has procured its water supply from this watershed for many decades. First from a water reservoir and later from wells. AMD impacts first degrade the water quality in the lower reaches of Roaring Run at the intersection of State Route 601 and Pilltown Road a mile north of Boswell. The USGS identified two discharges in this area. Site 174 has a pH of 5.0 and a total iron loading of 16.2 lb/day with a7.5 G/M flow. Sampling by the PA DEP indicates a 29.6-lb/day iron loading and 15G/M flow. USGS Site 175 just downstream has 3.2 pH with a 2.33 lb/day iron loading. There are three additional discharges located between these discharges that have been identified by the PA DEP but minimal data is available on them. Samples taken by SAC in June of 2002 in Roaring Run just upstream of its confluence with Quemahoning Creek show Roaring Run has a pH of 6.4 and alkalinity of 13.6 MG/L with an iron loading of 847.000 UG/L. Iron coating is visibly evident from just downstream of Route 601 to its confluence with Quemahoning Creek. Just upstream of the mouth of Roaring Run, Quemahoning Creek indicates a pH of 6.3 and alkalinity level of 13.4 MG/L with a 1580.000 UG/L loading of iron. A mile downstream from the mouth of Roaring Run, Quemahoning Creek shows pH of 6.3 with alkalinity of 28.0 MG/L and an iron loading of 1350.000 UG/L. More data will need to be derived from the Roaring Run watershed in order to better examine its impacts to its lower reaches and to Quemahoning Creek.

The next impacted tributary is actually now a receiving stream of the Quemahoning Reservoir. Two Mile Run begins near Ralphton in Jenner Township and flows two miles to its entry to the Quemahoning Reservoir. The USGS located three AMD Sites that measured AMD discharges into the stream. USGS Sites 172, 47 and 48 are characterized by low pH levels ranging from 2.8 to 4.5 and iron loadings ranging from .61 lb/day to 2.38 lb/day. Sampling by SAC in June of 2002 of Two Mile Run 100 yard upstream from its confluence with the reservoir indicated a 6.2 pH and alkalinity levels of 9.8 MG/L. Iron loadings were 255.000 UG/L.

Higgins Run is a five-mile long stream that also flows directly into the Quemahoning Reservoir. This small tributary receives much of its flow from the Stonebridge Bore Hole, USGS discharge site 259, emanating from the Quemahoning Mine Pool that encompasses 702.4 acres with a volume of 343 million gallons. No known AMD seeps are located in the watershed. The closing of the Solar 7 deep mine in March of 2002 has resulted in no post mining discharge. Analysis of the Stonebridge Bore Hole by Genesis Mining indicates that pH levels range from 6.0 to 7.5 with alkalinity levels ranging from 90 mg/l to 107.5 mg/l. Iron and other metal loadings can be characterized as low. In 2001 the new Genesis 17 deep mine began discharging its treated mine water into the Quemahoning Mine Pool. It is estimated that the discharge will amount to less than one percent of the flow of water in the mine pool over the expected life of the mine. The PA DEP has positioned additional testing wells to monitor the water in the pool in its impact on Higgins Run. MLTU requested a proposal from Eugene Macri Jr. Aquatic and Environmental Biologist in order to base line the stream from many parameters due to the uniqueness of the stream and in regard to safeguarding the Class A wild brown trout population and protecting the water quality of the Quemahoning Reservoir. The Macri preliminary report indicates that the most current water quality impairment to Higgins Run and subsequently the Quemahoning Reservoir is sediment deposition from agricultural runoff and eroded stream banks.

The final mile of Quemahoning Creek, prior to its confluence with the Stonycreek River, is impacted primarily by the Quemahoning Reservoir. From the time of its construction in 1916 to the time of the public acquisition in November of 2000 the only flow of water to the last mile of Quemahoning Creek came from an overflow spillway of the Quemahoning Reservoir and from ground water providing an unstable flow to the last mile and the Stonycreek River. The construction of the reservoir eliminated the natural historic flow of water to the last mile of Quemahoning Creek and the Stonycreek River and has led to the dewatering of both for nearly a century that is the most serious concern in the last mile as well as for the downstream receiving streams. With the transfer of ownership the PA DEP has mandated a conservation release of 10.8 million gallons a day from the Quemahoning Reservoir. The CSA is currently working on funding and a potential feasibility study that will lead to the installation of a release mechanism that will enable the mandated conservation release to occur. In the interim a small siphon conservation release has been implemented by the CSA to provide a measure of flow until the release mechanism can be installed in 2003 or 2004.

The Quemahoning Reservoir also provides water to the Johnstown industrial complex via a 66-inch pipeline. This transmission system has also altered and reduced the natural historic flow of water into the last mile of Quemahoning Creek and subsequently the Stonycreek River and the balance of the Kiski-Conemaugh River Basin.

The most recent impacts, although yet to be quantified, to the Quemahoning Creek watershed occurred in late July of 2002 when miners working in the Quecreek # 1 deep mine inadvertently broke into the former Saxman Coal Company's Harrison #2 abandon mine pool causing the flooding of the mine shaft and trapping the miners. The nine miners were rescued after 77 hours underground in an event that captured the attention of the world. In order to save the lives of the miners and to examine the cause of the event as well as to restart the mining 50 to 60 million gallons of water needed to be pumped out of the mine. The receiving stream for this untreated mine water was Quemahoning Creek. Untreated mine water was released into Quemahoning Creek from two separate locations that included the mine portal at Quecreek and a second location upstream along Enoch Road for eight consecutive days, including five of them after the rescue was completed, causing visible iron staining and sediment deposition on the stream bottom from the source of the outflows downstream to Boswell. On August 1, 2002 all pumping was halted and retention ponds were constructed to allow the remaining water that needed to be removed to meet state mandated effluent standards.

MLTU and the Somerset Conservation District immediately requested the PA DEP assess any potential damage that may have been caused to the stream from the water pumping efforts. The Cambria Field Office of PA DEP responded by performing a preliminary assessment and has initiated efforts to develop a longer term assessment to determine what if any impacts occurred. On October 7 and 8, 2002 the PA DEP conducted a water flow, water chemistry and macroinvertebrate survey on Quemahoning Creek at the same sites as were utilized for the same type of survey in 1997. Results will be assimilated at a later date. Obviously, this event may alter some of the data and chemistry used to make recommendations in this report. As an example, the USGS Site 208 discharge that emanated from the Saxman mine pool has altered in both flow and water chemistry since the event. It is unknown if these changes are permanent or temporary at this time. Other potential impacts to macroinvertebrate and fish life are also undocumented at this time. However, it will be difficult to accurately gauge new impacts on stream segments that have long suffered from similar unabated sources of impairment.

V. THE CURRENT SOLUTIONS IN THE WATERSHED

The Quemahoning Creek Restoration Plan is already a successful work in progress.

The design and construction of the Jenners Passive Treatment System in the village of Jenners in 1997 marked the first quantifiable effort in abatement of the historic water quality problems in the watershed. This project site abates the USGS Site 176 discharge from an artesian flow on the property of the Municipal Water Authority of the Township of Jenner. The site was chosen as the initial step because there was a willing and cooperative landowner as well as clearly documented data and impacts of the discharge. It was also in a highly visible area where local residents and stakeholders could witness the implementation and impacts of the project. The treatment system was designed by the Southern Alleghenies Conservancy and the USDA Natural Resources Conservation Service using the technology of passively treating AMD. Funding came from the federal Office of Surface Mining and the federal Environmental Protection Agency's Appalachian Clean Streams Initiative. The sponsors of the project are the Authority and the Somerset Conservation District.

According to an analysis by Dan Seibert of the USDA NRCS Technical Field Office in Somerset, the system is removing 10.6 tons of iron a year and is 96.59 percent effective at removing iron. The system is 100 percent effective at removing 19.35 tons of acidity a year and adds 9.52 tons of alkalinity. All of the discharge is passing through the system.

The establishment of this treatment system has allowed the reestablishment of a year round trout fishery in a one and one half mile section below the treatment system due to the efforts of an ongoing stocking program by the Jenner Community Sportsman's Club and the Mountain Laurel Chapter of Trout Unlimited. Interviews with anglers by members of the sportsmen's club and MLTU indicate that trout have been caught throughout the summer, autumn and winter, as well as the following spring prior to the replanting of trout that occurs in mid-April of each year. The Somerset Conservation District acquired a $54,000.00 Growing Greener stream bank enhancement grant for Quemahoning Creek. The targeted section begins a half mile downstream of the Jenners Passive Treatment System at Route 30 and extends one mile downstream. This corridor was severely eroded and presented an opportunity for alkaline addition in order to increase pH levels. The project, completed in 2001, restored both sides of the stream bank with bioengineering techniques in conjunction with limestone structures. The project also assisted in restoring and improving fish habitat in a section that was already being replanted with trout each year. The project also enhanced the opportunity for local community involvement and many service organizations and other groups provided volunteer assistance to the project.

The Somerset Conservation District has received $225,000.00 Stonycreek River Geographic Priority Area Grant through the PA DEP Growing Greener Grant Program to develop a geographic priority for the Stonycreek River Basin. The goal, of the program is to reduce the total loading of agricultural non-point source sediment pollution. This is currently being accomplished through cooperative efforts with landowners to plan, design and install Best Management Practices (BMPs) identified in nutrient management plans that have been created. The District is partnering with organizations such as Ducks Unlimited and other funding sources to begin to install the identified BMP's.

The district has also received additional financial assistance from the PA DEP's 319 Non-Point Source Abatement Grant Program in the form of two separate grants in the amounts of $142,000.00 and $156,742.00. These funds will address the sediment pollution identified in the 1994 "Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds." Much of the funding will be directed toward sediment run off abatement in the Beaverdam Creek, Roaring Run, North Branch Quemahoning Creek and main stem Quemahoning Creek since these waterways have been identified as high priority watersheds that are impaired by sediment pollution through the 303D list of streams.

The Jenner Area Joint Sewer Authority (JAJSA) completed the installation of sanitary sewer lines along Quemahoning Creek in Jenner Township in 2000 with 314 customers now connected to sanitary sewer lines. The 2.6 million dollar U. S. EPA funded project treats 63,000 gallons a day that also transfers the treated water via transmission piping from the upper watershed to the lower watershed.

Committed funding of 1.6 million from the state's Penn Vest fund will provide treatment of additional effluent in the Route 30 and Route 219 intersection corridor of the watershed. Construction dates hinge on the Authority's board approving the implementation of the project. Another U.S. EPA grant of $1,935,700.00 has been awarded to the JAJSA for sewage collection and treatment for the villages of Sipesville and Quecreek. Construction of this project is set for spring of 2003.

In 1998 the Somerset Conservation District along with many other partners, requested funding for the treatment of an artisan 2,000 GPM AMD discharge with iron loadings ranging from 200 to 1000 lbs/day contributing approximately 80 tons a year of iron deposition from the Dunlap discharge located in Jennerstown Borough in a former mine site that was transformed into a man made lake and then abandoned creating a wetland. Funding for the project, known as the Boswell Passive Treatment System, was procured as a pass through grant from the U.S. Department of the Interior to the PA DEP BAMR and the USDA Natural Resources Conservation Service as well as the federal Office of Surface Mining. The site was first documented by the PA DEP on July 23, 1997 while conducting an aquatic survey of Quemahoning Creek.

The primary goal of the project is to treat the highest source of iron loading in the Quemahoning Creek watershed. In addition, the separation of unimpacted water currently flowing into the wetland from Beaverdam Creek is also being achieved.

During the general environmental assessment for the project a listed state endangered plant species, the Purple Fringeless Orchid (Platnathera peramoena), was encountered. Changes in the design and construction of the project were accomplished in an attempt to ensure its survival both during and after construction of the project. The project permit outlined a number of special provisions that were to be followed in order to ensure the best possible opportunity for the plants continued existence at the site.

On August 21, 2002 Phase I of the Boswell Passive Treatment System began. The Phase I will consist of the reconstruction of a portion of the Beaverdam Creek stream channel in order to separate unimpacted water from the mine discharge. This will also protect and enhance a portion of the wetland that is presently only slightly impacted by AMD and will not be utilized for treatment. It is also anticipated that preventing the water from entering the AMD impacted wetland will begin to reduce the iron loading into Quemahoning Creek. The $550,000.00 Phase I construction will be completed by the end of 2002.

Phase II will begin in the late summer of 2003 and will consist of created aerobic wetlands in an area of existing wetlands formed as a result of surfacing mine drainage by re-contouring and berm construction in order to increase hydraulic retention time allowing for the dissolved metals to precipitate out prior to entering Quemahoning Creek and eliminating the single worst iron and aluminum metal pollution discharge in the watershed. The Phase II will be completed by the end of 2003. A maintenance plan will be developed by the Somerset Conservation District in cooperation with the USDA NRCS, PA DEP and the Somerset County Conservancy.

VI. OBJECTIVES

The goal of the Quemahoning Creek Watershed Restoration Plan is to chart a course that will build upon current projects and achievements and complete the goal of improving the watershed so that its resources can provide water quality conducive for increased recreation, economic development and the proliferation of life as we know it. Increased alkalinity generation, reduction of soil erosion and excess nutrients and reduction of the influx of AMD are the needs that will be addressed in order to achieve the goal.

The emphasis for this need was greatly increased with the public acquisition of the Quemahoning

Reservoir. The water impounded is now an ever-increasing destination for recreational users. The water is also an important industrial water supply and treated drinking water supply. The Somerset County Commissioners have already commissioned a design for a transportation system that will utilize Quemahoning water for water supplies for municipalities in northern Somerset County including Somerset Township. In order for treatment costs to be reduced and for this water to be to be utilized for the greatest and safest benefit the water quality in the Quemahoning Reservoir must not only be protected but also enhanced. The goal outlined in this plan is also driven by this objective.

VII. **PROJECT SCOPING**

The USGS Study, "Effects of Coal Mine Drainage on the Quality of the Stonycreek River and its Tributaries, Somerset and Cambria Counties, Pennsylvania," along with the 1994, "Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds," serve as the foundation on which the current projects in the watershed have been built. These full reports, along with the "Position Paper for Stonycreek Whitewater Releases from Quemahoning Dam," are available for public viewing at the Somerset Conservation District Office at 1590 North Center Avenue, Somerset, PA 15501. Future projects will also rely on these important studies as well as additional data gathered by the Somerset Conservation District, SCRIP, USDA NRCS, PA DEP, SAC, PBS Coals, the CSA, Robindale Energy, PFBC and other sources. This data indicates the location of sections of the watershed where abatement of sources of pollution have yet to be addressed. Combining this with current abatement technology and funding sources will allow the money partners, already at work in the watershed, to continue and finalize the work outlined in this plan.

VIII. **PLAN DEVELOPMENT**

The completed and ongoing on the ground restoration work in the Quemahoning Creek watershed, thanks to locally initiated efforts initiated in the mid 1990's and outstanding agency, political and organizational support, is already well underway. The construction of the Jenners Passive Treatment system in 1997 created the first opportunity for the restoration of a one and one half mile recreational fishery downstream to the Dunlap discharge. The completion of Phase I of the Boswell Passive Treatment System in 2002 and Phase II of the project in 2003 will eliminate the largest single source of AMD pollution in the watershed and will provide the opportunity for additional stocking of trout to occur below the abated Dunlap discharge.

The mile long section of stream bank enhancement completed in 2001 is reducing soil erosion and adding alkalinity between the Jenners and Boswell systems and it can be reasonably anticipated that the three projects combined will increase the ability of an additional two to three miles of Quemahoning Creek to reestablish both its macroinvertebrate and fish communities by improving instream water quality.

Approximately two miles upstream from the Jenners Passive Treatment System the PA DEP BAMR has already designed the Hoffman Run AMD Abatement Project which will address the second most severely AMD impacted section of Quemahoning Creek. The Hoffman Run Project is anticipated to begin in 2003 and will potentially connect in stream water quality improvements with the downstream recovering sections at Jenners and Boswell creating a corridor of five or more miles that will have the ability to reestablish macroinvertebrate and fish communities. By the end of 2003 this corridor will provide the opportunity to expand recreational use opportunities in the watershed.

In addition, the metal contaminates removed will begin to reverse the decades long armoring of the stream strata and iron precipitate deposition that has been evident and destructive to aquatic life as documented by the 1997 PA DEP survey and PFBC Commission fish surveys from Hoffman Run to downstream of the Dunlap discharge. Also the constant metal loading into the public Quemahoning Reservoir, that serves as a public and industrial water supply will also be reduced proportionately, further enhancing the ability of the reservoir to provide for both its recreational potential and water sales capabilities. The CSA has received approval of a $34,925.00 grant request to the PA DEP's Growing Greener Program to implement continuous water quality monitoring at all five of its reservoir including Quemahoning. This project will allow for the development of a water quality database and a water quality characterization and assessment report enabling the CSA and other partners to accurately measure improvements in upstream water quality. This project will provide extremely valuable data of in-stream water quality and will assist in documenting results from the projects now in place and those yet to be implemented.

The "Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds" documents that out of a total of 16,124 acre North Branch watershed, 5,335 is farmland. On the main stem of Quemahoning Creek out of a 48,512-acre watershed, 14,165 acres are in farmland. The report documented that few farms in the watershed have any type of nutrient management plans. According to the parameters utilized in the report the Quemahoning Creek appeared to be impacted from farming practices. Water tests at half of the monitoring sites in the watershed indicated elevated nutrient levels. Heavy siltation was found at sampling sites on the North Branch and Quemahoning Creek main stem. The study concludes that erosion control BMP, and animal management practices such as stream bank fencing and pasture management would result in a significant positive impact on in stream water quality. The Somerset Conservation District's implementation of its $140,000.00 grant to create management plans and implement BMP's for farmland that drains into the North Branch and upper main stem of the Quemahoning Creek is expected to reduce soil erosion and resultant sediment loading into the watershed. As the project is implemented it is reasonably expected to reduce the sediment responsible for the smothering of aquatic habitat that has inhibited development of a macroinvertebrates community in the upper reaches of the watershed.

The Somerset Conservation District, as well as PA DEP, has also identified the Gonder Discharge that is 1300 feet downstream from the wetland that encompasses the Dunlap discharge as an additional AMD abatement project. The Gonder Discharge, identified as Site 173 in the USGS Survey, ranges in flow from a low of 136 GPM to a high of 954 GPM with a 357.4 GPM average flow by recordings taken by the Conservation District from July of 1996 to June of 2000. The iron loading ranges from 15.60 mg/l to 67.70 mg/l. with a net alkaline flow. The Boswell Passive treatment System is designed to assimilate and treat the Gonder Discharge if the flow from the Gonder Discharge is diverted into the treatment system. The eventual treatment of the Gonder Discharge is considered Phase III of the Boswell project.

Additional AMD discharge sites at Quecreek (USGS 208) and at Acosta (USGS Site 209) do not presently have specific abatement initiatives. The recent Quecreek mine accident has altered the chemistry of the discharge at Quecreek and additional data will need to be compiled and analyzed regarding the impact it is now having on Quemahoning Creek.

Roaring Run presents the most significant AMD impacts to the lower three miles of Quemahoning Creek upstream of the Reservoir. Existing data on Roaring Run is presented elsewhere in this plan and as of yet no specific implementation initiative has been targeted for this sub-watershed.

Refuse coal piles in the watershed present a continued threat to water quality from runoff emanating from them. Robindale Energy Services Inc. is working under a 16 year contract with Reliant Energy to locate, inventory and examine refuse piles in the watershed. Reliant Energy will start up its Seward Beneration Plant in December of 2003. The plant will rely primarily on refuse coal for a source of fuel and will require 120-million tons of fuel over the next 30 years. Robindale has identified several smaller refuse piles along the North Branch for a potential source of fuel. Two refuse piles adjacent to the confluence of Beam Run and the North Branch have exploration permits to determine BTU's and quantity of fuel that may be available. There are two smaller piles on the Eller and Penrod properties that have also been identified. The Straw Construction site pile and the Marmon pile near the confluence of the North Branch have had the exploration process completed on them. The Marmon pile has six and one-half million tons of refuse and could be the first pile in the Quemahoning watershed that is actually removed for a fuel source.

The Dixon pile at the intersection of U.S. Route 30 and State Route 601, as well as the pile on either side of Route 219 near Ralphton may also be utilized for fuel. No exact commitment or confirmation as to when any of these piles may begin to be removed is in place. As an example, the Marmon pile alone would take 12 years to completely eliminate from the yet to be determined start date.

However, according to Mike Meehan of Robindale Energy Services Inc., an effort has been made or will be made to test virtually all of the refuse piles in the watershed and reach a commercial agreement with the owner for removal during the 16-year life of the contract with Reliant.

Acidic tributaries such as Beam Run and Spruce Run have been documented elsewhere in this plan. Mr. Edward Callahan, DCNR District Forest Manager for the Forbes State Forest has indicated a strong willingness to cooperate with any alkalinity enhancement projects that might be targeted on these two streams in the Forbes State Forest. As of yet no formal project has been adopted aside from the one-time limestone sand dosing project sponsored by the Somerset Conservation District. In June of 1998, 159.25 tons of 83.8% Calcium Carbonate Equivalent (CCE) limestone sand was delivered to the two adjacent watersheds. Spruce Run received 68.75 tons and Beam Run received 90.5 tons. Monitoring for several weeks after the in-stream dosing demonstrated increased pH levels, increased alkalinity levels and reduced acidity levels. The project was not pursued after the initial effort in 1998.

Another non-acidic tributary in the watershed that enters the Quemahoning Reservoir is Higgins Run. Data for Higgins Run is included elsewhere in this report. MLTU has sponsored the examination of this watershed by contracting with Eugene Macri, Aquatic and Environmental Biologist, for a proposal that sets a plan for extensive macroinvertebrate sampling, chemical water testing, substrate mapping, vegetation mapping and assimilation of data and recommendations of potential improvement projects. Higgins Run receives much of its flow from the Stonebridge Bore Hole, USGS Site 259. The constant flow from the bore hole has enabled the wild trout population to be sustained even in drought years. During the summer of 2002, Higgins Run, upstream of the bore hole, was completely dry.

The last mile of Quemahoning Creek below the reservoir holds potential as a tail water trout fishery and source of renewed historic flows to the Stonycreek River. The PA DEP is mandating a PFBC recommended conservation release of 10.8 million gallons a day from the reservoir to in part restore the historic flow removed from the Stonycreek River with the construction of the Quemahoning Reservoir. The CSA has initiated a siphon release from the reservoir until new valving can be installed at the reservoir outflow site that will be able to safely release the mandated conservation release and potential larger short term whitewater releases as determined feasible by the CSA.

American Whitewater and the Bens Creek Canoe Club in 2002 have applied for PA DCNR funding assistance to conduct a feasibility study for white water releases from the Quemahoning Reservoir. This study will also examine safe yields and water quantities in the reservoir that may provide data that can be useful for revisions of the conservation release as well as data that could lead toward timed whitewater releases for recreation.

A steady flow of water into the last mile of Quemahoning Creek should increase the opportunity for both aquatic life and fish life to become more stable. In addition, the Stonycreek River will benefit from restoration of at least a portion of its historic flow better enabling it to assimilate and buffer upstream pollution sources.

IX. RECOMMENDATIONS

The recommendations in this plan are designed to continue and compliment the restoration efforts already underway or planned in the watershed. The goal is to suggest concepts and projects as well as document additional information and data requirements that should be pursued in order to complete and maintain the restoration of the watershed.

IX.A. Maintenance of Completed Projects

The continued proper functioning of the completed on the ground projects is crucial to the continued efforts in the watershed being able to produce their anticipated results. The Jenners Passive Treatment System, given inflow and outflow data from the Somerset Conservation District recorded in June 2000, is removing 10.6 tons of iron a year and is 96.59% effective at removing iron. The system is effective at removing 100% of the 19.35 tons of acidity a year and adds 9.52 tons of alkalinity. There is no short-circuiting of the system, which indicates that all of the water discharge water is passing through the system.

Upon examination of this data Dan Seibert, of the USDA NRCS Somerset Technical Filed Office, recommends the following to improve and maintain the system. Replacement of the existing agri-drain flush valves with cast iron valves. Placing baffling in settling ponds 1 and 2 to slow down the travel time through the system. Flush the SAP completely dry and physically evaluate the depth of iron precipitate on top of the compost in the SAP. If more than two inches have accumulated on the surface of the compost it should be removed. If the iron is removed the compost will have to be replaced. Additional rock should also be placed in the SAP to replace the rock that has dissolved since the system was constructed.

Recommendation: Funding for implementation of the recommended upgrade and maintenance needs of the Jenners Passive Treatment system should be pursued. More consistent sampling of the outflow and inflow of the system should also be implemented. This will ensure the in stream water quality improvements currently occurring will be properly gauged and maintained.

IX.B. **Data Coordination**

The water quality data utilized by decision makers so far to determine projects has come from several reliable sources such as USGS, PA DEP, Somerset Conservation District and SAC. The Somerset Conservation District has established many sampling points as has PA DEP. However, much of the sampling is done randomly and inconsistently.

Recommendation: In order to implement appropriate projects that are suggested more consistent data needs to be obtained. In addition, macroinvertebrate sampling should be conducted annually or bi-annually. The PA DEP should consider funding, coordinating and pooling sampling resources
with the Somerset Conservation District so that these types of samples are taken consistently and in locations that will provide the most usable data. This would create a more accurate and complete record of current and changing water quality in the watershed that would enhance and enable future initiatives to be designed for optimum impact and create measurable results.

IX.C. **Beam Run and Spruce Run Alkaline Addition**

Both Beam Run and Spruce Run have been documented as having non-mining related natural acidic pH levels that inhibit aquatic life in both tributaries and contribute acidic water into the North Branch of Quemahoning Creek. The short term limestone sand dosing project in 1998 and resultant monitoring proved that alkaline addition can have a positive impact to these streams.

Recommendation: The implementation of Anoxic Limestone Drains (ALDs) on both Beam Run and Spruce Run is recommended as a viable method of adding alkalinity to the two streams and into the North Branch of Quemahoning Creek. ALDs alone function solely to add alkalinity to water changing net acidic water to net alkaline water. ALDs eliminate the presence of atmospheric oxygen by enclosing the limestone trench to prevent contact with air. This allows the carbonate material to be utilized without the decrease in effectiveness caused by armoring of the limestone. The reactivity of the limestone is dependent on the percent of calcium Ca in the $CaCO_3$ and the size of the particles. A variation of the size of the particles is considered best. Since both Beam Run and Spruce Run are virtually devoid of aquatic life forms due to high acidity no loss of aquatic life should be anticipated because of the channeling of the flow of the streams into an ALD. In order for this project to be implemented weirs should be installed near the headwaters of both streams to gauge stream flow. Additional water chemistry sampling should also be conducted. Tentative approval from the District Manager of the Forbes State Forest has already been procured in order for access to the streams. A local project sponsor should be identified to sponsor and pursue funding for this project.

IX.D. **North Branch AMD Abatement**

The USGS AMD Discharge Site 54 is the only AMD discharge entering the North Branch. This net alkaline discharge emanates in a residential yard and is piped via a 5-inch pipe into an adjacent stream channel that flows directly into the North Branch.

Recommendation: There is room for wetland treatment development and there is some evidence of existing wetland soils in the vicinity. The property owner has again, in 2002, expressed an interest in treating the discharge on his property that he owns below the discharge adjacent to the North Branch. More specific flow measurements from the discharge need to be established. The discharge often ceases to flow in late summer and autumn. A local project sponsor needs to be identified.

IX.E. **Agricultural Non-Point Source Abatement**

The North Branch of Quemahoning Creek was sampled at nine sites from its origin to its confluence with the main stem and the main stem was sampled at seven locations from its headwaters to its confluence with the North Branch in the "Assessment of Non-Point Source Pollution in the Stonycreek and Little Conemaugh Watersheds." Heavy siltation was found at three sampling points and evaluations indicated additional agricultural impacts at every other station on the North Branch. Siltation was also documented at each site on the main stem as well as algal plant growth was also in evidence. The PA DEP has also designated the North Branch, Main stem, Beaverdam Run and Roaring Run as high priority watersheds with in the Stonycreek watershed targeted for non-point source pollution abatement.

Recommendation: Implementation of nutrient management plans for agricultural operations in the North Branch, upper main stem, Beaverdam Creek and Roaring Run watersheds with implementation of recommended BMP's to reduce soil erosion from the currently funded projects through the Somerset Conservation District. Additional funding partnerships need to be formed in order to make implementation of the BMP's more feasible and attractive to the landowners. In addition, more emphasis should be directed toward streamside buffers throughout the watershed. Buffer areas have the ability to filter out sediment and pollutants even if BMP's are not existent on adjoining land. Local watershed sponsors should be encouraged to partner with Ducks Unlimited since they fund wetland and streamside buffer projects. Successful stream bank stabilization projects, such as that implemented by the Somerset Conservation District at Ferrelton, should be considered for other parts of the watershed as well and smaller sized projects could be implemented by organizations such as the Mountain Laurel Chapter of Trout Unlimited that has experience in such projects. In addition, utilization of the Conservation Reserve and Enhancement Program (CREP) that compensates landowners for taking land out of agriculture and allowing buffers of vegetation to naturally occur along the steam corridor could also be utilized to reduce sediment loadings. In addition, sportsmen's clubs and other watershed partners should consider the creation and funding of conservation easements with landowners where the landowner agrees not to disturb or farm a specific area along a waterway. These filter buffer areas could also be utilized as additional wildlife habitat furthering the partnership between the sportsmen and the landowner.

APPENDIX A

COMMONWEALTH OF PENNSYLVANIA
STD 502 REV. 2/93

DESK MEMORANDUM

SUBJECT

Quemahoning Creek Aquatic Survey

TO (NAME & ADDRESS)	FROM (NAME & ADDRESS)
Dave Steele, Somerset Conservation Dist.	Pam Milavec, Ebg. Dist. Office
DATE SENT 6/17/98	DATE NEEDED

	PLEASE CALL:		APPROVAL		SEE ME
	RETURNED YOUR CALL		AS REQUESTED		COMMENT
X	INFORMATION & FILE		PREPARE REPLY/REPORT		NOTE AND RETURN
	NECESSARY ACTION		SIGNATURE		

RECEIVED BY	DATE	TIME

ROUTE	INITIAL	DATE	ROUTE	INITIAL	DATE
Rick Lorson, PFBC					
Len Lichvar, S. Alleg. Cons.					

MESSAGE:

Dave,

Finally, I've finished this report. We should get together soon to discuss the pass through grant agreement and progress on the rehabilitation plan. Call when you get a chance so we can set up a meeting.

Pam

AQUATIC SURVEY OF QUEMAHONING CREEK WATERSHED

SOMERSET COUNTY

Prepared By:

Pamela J. Milavec

Department of Environmental Protection
Bureau of Abandoned Mine Reclamation
Division of Field Operations

July 17, 1998

ABSTRACT

The PA Department of Environmental Protection's (DEP), Bureau of Abandoned Mine Reclamation is partnering with several local, state and federal agencies to develop a rehabilitation plan for Quemahoning Creek in Somerset County, PA. Other agencies involved include the Somerset County Conservation District, the Southern Alleghenies Conservancy, the PA Fish and Boat Commission, the Natural Resources Conservation Service, the U. S. Environmental Protection Agency, the Federal Office of Surface Mining, and the United States Geologic Survey. Locally, efforts to rehabilitate this watershed have been initiated by the Stony Creek - Conemaugh River Improvement Project. Quemahoning Creek, a tributary of Stony Creek, has been impacted throughout much of the watershed by a variety of non-point pollution sources, including abandoned mine drainage (AMD), nutrients and sediment from agricultural operations, and untreated sewage. The Bureau of Abandoned Mine Reclamation (Bureau), through its Ten Percent Set Aside AMD Abatement Program, and the PA Fish and Boat Commission conducted an assessment of existing water quality, habitat, benthic macroinvertebrates, and fish in July, 1997. Assistance in the survey was provided by the Somerset County Conservation District and the Southern Alleghenies Conservancy.

Results of the assessment indicated impairment of Quemahoning Creek's ability to support aquatic life as a result of the pollution sources listed above. The primary source of impairment was found to be AMD. Comparison of the macroinvertebrate community at stations sampled on Quemahoning Creek with a reference stream also located in Somerset County indicated impairment at all nine stations sampled. Water quality chemistry also reflected this impairment. Data collected on fish populations was analyzed by the PA Fish and Boat Commission and discussed in a report produced by them. Their assessment also indicated impairment, although improvement was noted when compared to a previous survey done in 1983.

The information provided by this assessment will be used to assist in prioritizing and recommending water quality improvement projects as part of the rehabilitation plan. Upon completion of the rehabilitation plan, water quality improvement projects will be funded using a variety of sources. One project, near the village of Jenners, has already been completed and is treating an AMD discharge using passive treatment technology. This Bureau will likely provide funding for additional projects using Set Aside funds and/or the Appalachian Clean Streams Initiative (funds were earmarked in 1997 for Quemahoning Creek by the Federal Office of Surface Mining). Funding from other sources is also possible.

INTRODUCTION

The Quemahoning Creek watershed is located in the northwest quadrant of Somerset County, on the eastern flank of the Laurel Ridge. From its headwaters near the village of Husband, Quemahoning Creek flows in a generally northern direction until it enters Stony Creek near the village of Benson, a distance of approximately 18 miles. Primary land uses in the watershed include agriculture and mining. Farmland and woodlots are interspersed with numerous small villages throughout the watershed. A large (364 ha), privately owned water supply reservoir is located on Quemahoning Creek just upstream of its mouth. Much of the land in the watershed is privately owned.

Quemahoning Creek is classified as a Cold Water Fishery (CWF) by the PA DEP. However, the creek starts out as a fairly sluggish, low gradient stream with minimal canopy in an agricultural area, characteristics more indicative of a warm water stream. Gradient and canopy cover are much higher in the North Branch and in the western tributaries draining off Laurel Ridge. However, the main stem remains low gradient until just a few miles upstream of the reservoir, where increased gradient, cover, and substrate provide habitat more typical of a cold water stream.

The non-point source problems in the watershed are numerous and widespread. The upper portion of the watershed, above all sources of mine drainage, showed impairment due to excessive sediment and nutrient loads from agricultural activities. The middle portion was impacted by untreated and improperly treated sewage discharged directly to the stream from adjacent villages, as well as heavy accumulations of iron precipitate from mine drainage. Fortunately, Quemhoning Creek is very well buffered throughout its length, and much of the mine drainage it receives is alkaline. Therefore, the mine drainage impacts appear to be due primarily to habitat impairment from iron precipitate, rather than an acidity or metal toxicity problem. The lower portion of the watershed, just above the reservoir, is a recovery zone showing water quality and habitat improvement. The reservoir itself is apparently improving water quality by allowing for the precipitation of remaining iron. Water quality downstream of the reservoir is very good and appears to improve the quality of the Stony Creek below its confluence with Quemahoning Creek. However, severe flow fluctuations from the reservoir have impacted the stream below the reservoir.

In order to evaluate current conditions, nine stations were sampled along the length of Quemahoning Creek. In order to compare results with a Fish and Boat Commission survey done in 1983, the location of stations was kept the same as in the previous survey. The survey was conducted July 22 through July 24, 1997.

METHODS

At each of the nine stations, a fish survey was conducted by the Fish and Boat Commission. Three sites were surveyed in Section 01, two sites were surveyed in Section 02, three sites were surveyed in Section 03, and one site was surveyed in Section 04, below the reservoir. Fish sampling was done with a Coffelt model BP-1C backpack electrofisher operated at 100-150 volts AC and 150 watts. Three netters were used at each site to collect fish. All fish were collected, identified to species, and counted in the field. Analysis of the data was done using an Index of Biological Integrity (IBI) developed for fish.

Macroinvertebrates and water samples were collected at each station, a habitat evaluation form was completed, and stream flows were measured by the Bureau. Water samples were collected by grab method at each station using one 500 ml bottle and two 125 ml bottles (one fixed with hydrochloric acid for ferrous iron analysis and one fixed with nitric acid for all other metal analyses). Water samples were then placed in a cooler with ice until they were transported to the laboratory for analysis. Chemical analysis was performed by the Department's Harrisburg laboratory, using Standard Methods. Parameters analyzed included those generally monitored in AMD impacted situations, including pH, alkalinity, acidity, iron, aluminum, and manganese. Parameters measured in the field using field meters included temperature, conductivity, and pH.

Macroinvertebrates were collected using a D-frame net and then preserved in a 90% alcohol solution so that samples could be identified in the laboratory at a future date. Total net contents were placed in the alcohol solution and insects were sorted from the debris in the laboratory under a magnifying glass. All insects were counted and identified to genus when possible, although a 100 insect subsample was used to determine relative abundance of individual species. The relative abundance of each species collected for each macroinvertebrate sample was statistically analyzed so that sample points could be statistically compared to reference points (EPA 1989). Five metrics were used to determine percent comparability to a reference station. This information was used to determine if a stream was nonimpaired (>83%), slightly impaired (54-79%), or impaired (< 50%). The reference station was located on Wills Creek, a cold water fishery located on the eastern flank of the Allegheny Front, in southeastern Somerset County. Habitat evaluations were done using Rapid Bioassessment Protocol III field forms. Stream flow was measured using a Marsh-McBirney digital meter to determine velocity at approximately 6/10 of the stream depth at one foot intervals along the stream cross section. Stream width and depth were measured to calculate flow.

RESULTS

Water sample results are listed in Attachment A, macroinvertebrate data can be found in Attachment B, the macroinvertebrate metric comparisons can be found in Attachment C, the fish survey data can be found in Attachment D, and the fish IBI can be found in Attachment E. Generally, the survey found that Section 1 of Quemahoning Creek showed impairment primarily attributed to agricultural activities, Section 2 was impaired primarily by mine drainage, as well as sewage, Section 3 continued to be impaired by mine drainage although some recovery was evident at the station furthest downstream, and Section 4 showed good water quality but was impacted by the fluctuating water releases from the Quemahoning Reservoir. Attachment F consists of topgraphic map sections of the watershed showing sample station locations.

Section 01. Station 0101

This station was located in a pasture, with surrounding areas primarily in use as cropland. The stream velocity was very low, and both nutrient enrichment (evidenced by anaerobic odors, and a high percentage of fine particulate organic matter and black muck) and stream bank erosion were apparent. The stream substrate consisted of fine silt and clay. No riffles were present. Chemical analysis of water samples was for mine drainage contaminants rather than agricultural contaminants, so the presence or absence of these pollutants was not determined. The sample results did not indicate AMD contamination: the pH was 6.9, and metals levels were very low. This station had the lowest habitat score of all stations, at 135. The low score was due primarily to suboptimal instream cover, disturbed substrate, sediment deposition, unstable stream banks, lack of stream vegetative cover, grazing impacts, and an impacted riparian zone.

Surprisingly, a total of 15 taxa of macroinvertebrates were sampled at this station, with 181 individuals. These taxa however, were primarily pollution tolerant Dipterans and Oligochaetes (worms). When compared to the reference station on Wills Creek, this station was determined to be impaired. This was due primarily to low taxa richness, a low modified EPT score (measures the number of taxa from the less pollution tolerant Orders of ephemeroptera, plecoptera, and tricoptera), and a low % modified mayflies score. The total biological condition score was 12, while the reference station score was 30, resulting in a percent comparability to reference of 40%.

Eleven species of fish were found at this station, and the total catch-per-unit-effort (CPUE) was the highest of the 9 stations. However, 87% of the individuals were pollution tolerant species, and the trophic composition consisted primarily of generalists and omnivores. The 11 species collected compared favorably to the 1983 survey, when 7 species were collected. This station had an IBI score of 57, which ranked it third of the 8 stations ranked (Station 0401 was not ranked with the others due to a difference in environmental conditions downstream of the reservoir).

Station 0102

While stream flow remained sluggish at this station, a riparian area of trees and shrubs provided some improvement over Station 0101. One riffle area was present that had a rocky substrate. However, stream banks remained largely unstable, and sediment was evident on the stream bed. The habitat score improved to 157, primarily due to better substrate, improved bank vegetation, the lack of grazing pressure, and improved riparian zone. Water quality was similar to the first station, although the levels of iron, manganese, and aluminum had increased for unknown reasons.

A total of 17 taxa of macroinvertebrates were collected at this site, the highest number of all stations (sampling was done within the one riffle at this station). A total of 514 individuals was collected. The large number of insects collected was due primarily to a large number (255) from the Tricopteran family Hydropsychidae. This family of insects are filter feeders - they ingest particles of organic matter collected in nets. High numbers of individuals from this family are often found in streams contaminated with sewage or nutrients of some kind. These numbers are likely reflecting the impact of the agricultural area (particularly pastures) just upstream. This station compared poorly to the reference station due to low taxa richness, low modified EPT, high percent dominant taxa, and low percent modified mayflies. The total biological condition score of 4 was only 13% of the reference station. This station was considered impaired.

There were 13 species of fish collected at this station, including 3 intolerant species. One brown trout (appeared to be wild) was collected. This station had the highest number of fish species collected of the 9 sampled. The trophic composition was still primarily made up of generalists and omnivores. This station also had the highest IBI ranking of the 8 ranked.

Station 0103

This station is located just downstream of a small unnamed tributary carrying the first known source of AMD into Quemahoning Creek. Iron coating was evident on the rubble substrate. While the pH was still good at 6.5, iron, manganese, and aluminum levels had increased. The stream temperature had dropped several degrees at this station, likely due to the influx of colder drainage from the deep mine. Habitat had improved in spite of the iron precipitate problem, with a habitat score of 169. Except for low scores for imbeddedness due to iron precipitate and a narrow riparian zone due to nearby homes, this station was characterized by relatively good habitat. Better bank stability, the lack of erosion, and better substrate and stream velocities were seen when compared to earlier stations. Unfortunately, this was also the first station where untreated or improperly treated sewage was apparent from the nearby village of Quecreek.

Sixteen taxa of invertebrates were collected at this station, with a total of 519 individuals. The large number of individuals was again due to a very large number of Hydropsychidae. Sewage and/or upstream agricultural contamination was the likely cause at this station. Metric scores were very similar to the previous station - the total biological condition score was 6, a 20% comparability to the reference station. This station was considered impaired.

As a fish sampling station, this station was actually considered a part of stream section 2, due to its change in stream gradient and habitat (this was the first station with a riffle/run prevalence). Only 6 species of fish were collected compared to 12 species in 1983. However, this is not a good comparison because the station was actually sampled a few hundred meters further upstream in 1983, above the mine drainage impacted tributary. Of the individuals collected, 98% were pollution tolerant species. One brown trout was collected that appeared to be of hatchery origin. This station had the fifth highest IBI score of the 8 ranked.

Section 2, Station 0201

This station was located next to the village of Accosta. Sewage discharges from the village were evident, and a gray precipitate that appeared to be sewage sludge coated the substrate. This station showed an improvement in water quality AMD parameters: iron and aluminum levels decreased significantly, while the pH remained good. The habitat consisted of a glide/pool prevalence. The habitat score decreased from 169 to 152, primarily due to significant sediment deposition, lack of channel sinuosity, eroded stream banks, and an impacted riparian zone.

The number of macroinvertebrate taxa at this station was identical to the last station: 16. The total number of individuals had increased to 781. Again, the numbers of Hydropsychidae were very high, and the numbers of Chironomids and Oligochaetes had also increased. The macroinvertebrate populations certainly reflected the observed sewage contamination. The metric scores were similar to the previous station, with the exception of a reduced modified HBI score. This low score usually indicates impairment due to organic load, another indication of the impacts from sewage. The total biological condition score at this station was 2, with a % comparability to reference of 7. This was tied as the lowest score in the watershed.

Five species of fish were collected at this station in 1997, compared to 6 species in 1983. White suckers dominated the total catch, while 97 % of the total catch were tolerant species. The trophic condition was predominantly generalists/omnivores. The total IBI score was 96, ranking this station as the seventh worst among the eight ranked.

Station 0202

This station was located in a partially wooded area, with some nearby residences. The macroinvertebrate sampling was done approximately 1200 feet downstream of the fish sampling, where riffles were present. The station had severe riparian impacts from adjacent residences - garbage and unstable fill had been placed on the stream banks. There was a heavy accumulation of iron precipitate on the substrate. Water quality analyses showed a significant increase in iron and manganese levels when compared to the last station. A severely AMD impacted tributary, Hoffman Run, enters between this station and the previous one, accounting for the deterioration in water quality. The habitat consisted of a riffle/run prevalence. The habitat score had decreased to 138 when compared to the upstream stations, primarily due to marginal instream cover, embeddedness due to iron precipitate, the presence of only 2 of 4 velocity/depth regimes, unstable banks with marginal vegetative cover, and an impacted riparian zone.

The number of macroinvertebrate taxa at this station decreased from 16 to 11. Total numbers of individuals also decreased significantly, to 107. The biological condition score actually increased, to 14. This was due primarily to an improvement in the modified HBI score and an improvement in the % dominant taxa due to a reduction in dominance by the family Hydropsychidae. These improvements were likely a result of a decrease in organic pollution. However, this station was still considered impaired when compared to the reference station.

This station had the lowest fish species total of the nine sites surveyed in 1997. Four species were collected in 1997, one more than in 1983, with only 36 individuals collected. This was the second lowest number of individuals collected at the 9 stations. This station had a final fish IBI ranking of sixth among the eight ranked.

Section 3, Station 0301

This station is located just downstream of the village of Jenners, where treated mine drainage enters, and the North Branch tributary, which is moderately impacted by AMD. Analysis of water chemistry showed only a slight decrease in iron and manganese from the previous station. Cementing of the stream substrate had occurred due to a heavy accumulation of iron precipitate. This station is partially shaded, and has the second highest habitat score in the watershed, at 187. The improvement occurred in spite of the heavy iron precipitate due to improvements in instream cover, well developed riffle/run sequences, the presence of all 4 velocity/depth regimes, a large number of riffles, well vegetated, stable banks, and a minimally impacted riparian zone.

Macroinvertebrates continued to show impacts, likely due to the heavy iron precipitate. Ten taxa were identified, with only 84 individuals. The total biological condition score was slightly lower than the last station at 10, but was still improved over earlier stations due to a lack of dominance by the family Hydropsychidae. The station was only 33% comparable to the reference station, signifying impairment.

Fish species showed dramatic improvement from the 1983 survey, with 10 species collected in 1997, and only one species in 1983. Only 70% of the individuals collected were tolerant species, the second lowest percentage of the 9 stations. The total IBI score was 65, which ranked this station as fourth among the 8.

Station 0302

This station was located near Boswell Borough, and was known to be downstream of a relatively large alkaline, iron discharge from an abandoned deep mine. What was not known at the time of sampling was that another discharge was entering between Stations 0301 and 0302 that has since been determined to be the single largest iron contributor to the watershed. This discharge was discovered when a large amount of unaccounted for iron loading was observed while comparing lab results and flows between 0301 and 0302. Iron concentrations in Quemahoning Creek had increased from 3.52 to 4.19 mg/l, while flows increased from 2168 to 7076 gpm between stations 0301 and 0302. A field investigation located a large wetland area receiving flow from an unpolluted tributary (Beaverdam Creek) below Stoughton Lake that discharges heavily iron contaminated water to Quemahoning Creek.

It was determined that an abandoned deep mine entry was located within the wetland, with a discharge upwelling within the wetland. Water discharging from the wetland to Quemahoning Creek was alkaline, with elevated iron concentrations and flows as high as 4000 gpm. As a result, Station 0302, just downstream, showed severe substrate cementation, which also resulted in a lower habitat score of 159, even though other aspects of the habitat were relatively good.

The severe substrate cementing had profound impacts on macroinvertebrates. Only one individual was found, a Chironomidae, resulting in a total biological condition score tied for lowest in the watershed at 2. With only a 7% comparability to the reference station, this station is considered impaired, which seems to be quite an understatement.

This station was tied with Station 0202 for the lowest number of fish species at 4. This station also had the lowest catch per unit effort among the 9, so the impacts to fish species were nearly as severe as the impacts to macroinvertebrates. The total IBI score for this station was last of the eight ranked, at 99. This station did show a slight improvement from 1983 however, when only 2 species were collected.

Station 0303

This station, which was located just upstream of the beginning of the reservoir, showed some recovery from the upstream AMD impacts. While iron precipitate was still evident, the substrate was not cemented as at the previous stations. Water quality had improved considerably at this station, with iron levels decreasing from 4.19 mg/l at the last station to 0.6 mg/l at this station. This station had the highest habitat score of the 9 at 192, and was generally characterized by excellent instream cover, well developed and frequent riffles, a lack of manmade impacts to the channel or riparian area, and stable, well vegetated banks.

The macroinvertebrates reflected the water quality recovery, with 9 taxa and 159 individuals collected. The total biological condition score improved to 8, although this was still only 27% of the reference condition, and still indicated impairment. This was due to relatively low numbers for all 5 metric scores.

The fish species also reflected the water quality improvements, with 12 species collected. This was also an improvement over 1983, when only 9 were collected. This station received the second highest IBI ranking of the 8 ranked. The species were primarily generalists/omnivores and were 84% tolerant species.

Section 4, Station 0401

This station is located just downstream of the Quemahoning dam, and just upstream of Quemahoning Creek's confluence with Stony Creek. While there is a significant improvement in water quality parameters, particularly in relation to AMD pollutants, there is evidence of nutrient enrichment from unknown sources. There was a heavy growth of algae, and leeches were observed on the stream bottom. This station is also impacted by extreme fluctuations in flows due to fluctuations in releases from the reservoir. At the time of this survey, the station just upstream of the reservoir had a stream flow of 9310 gpm, while this station had a stream flow of 485 gpm. This station, which had a glide/pool prevalence, had a relatively low habitat score of 147, due primarily to the lack of channel sinuosity, a marginal channel flow status, unstable stream banks, and human impacts to the riparian vegetation.

Macroinvertebrates were at a moderate level of 10 taxa and 137 individuals. Low scores were received for all 5 metrics, resulting in a total biological condition score of 4 and % comparability to reference of 13. This score of course indicates impairment, in spite of the good water quality at this site. The extreme flow fluctuations and nutrient enrichment are the likely reasons for macroinvertebrate impairment.

This station had the highest number of fish species of the 9 stations, at 15. This station also had the lowest percentage of tolerant species at 24%, as well as the lowest percentage of generalists/omnivores, and highest percentage of insectivores. The station IBI was not ranked with the others due to significant changes in environmental conditions as a result of the presence of the reservoir. However, it seems apparent that the fish are not being as severely impacted as macroinvertebrates. The reasons for this are unknown, but may have something to do with fish moving up from Stony Creek into this area.

DISCUSSION

The results of this survey indicate that Quemahoning Creek is impacted by a variety of anthropogenic conditions, generally non point source in nature. Stations 0101 and 0102 showed severe impacts from adjacent agricultural practices. It appears that the impacts could be reduced by an improvement in those practices. Attempts to restore the riparian area to a more natural vegetative cover by the use of livestock fencing and planting of a more suitable riparian vegetation would likely provide a significant improvement. Also, fertilizer use and manure handling on adjacent farms should be reviewed and modifications made where necessary.

Station 0103 was the first to show impacts from abandoned mine drainage. Although those impacts were not severe, they may have been enough to adversely affect aquatic life. This was primarily due to a water quality impact from elevated metals levels and impact to the stream bottom from the resulting precipitate. The deep mine discharge (known as the USGS 208 discharge) that is the AMD source has been evaluated from a treatment/abatement standpoint. It has been determined that passive treatment of this discharge will be very difficult due to the location of the discharge only several feet from the receiving tributary. The possibility of relocating the discharge has been given a preliminary evaluation. Although there is some potential to bring the discharge to the surface at a higher elevation, there is still only a very limited work area. Also, the water quality of this discharge is not severe (net alkaline, iron levels less than 10 mg/l, aluminum and manganese levels less than 5 mg/l, an estimated flow of 300 gpm) and the impact to Quemahoning Creek appears to be limited to a relatively short length of stream. No mine drainage impacts were evident at the next station downstream (a distance of approximately 9000 ft.). Finally, although impacts to fish life were apparent in comparison to upstream stations, it is difficult to differentiate between mine drainage impacts and sewage and other nutrient impacts when reviewing the fish data. The macroinvertebrate taxa numbers were similar to the upstream stations and continued to reflect nutrient impacts. While treatment or abatement of the USGS 208 discharge will likely have beneficial impacts for a limited stream distance, remediation of this discharge probably should not receive high priority in the overall watershed rehabilitation plan for the reasons discussed above.

Sewage impacts were evident at Stations 0103 and 0201 due to a lack of sewage collection and treatment facilities in the villages of Accosta and Quecreek. There are known to be agricultural impacts from a few large farms located between Stations 0102 and 0103 that were also likely reflected in the macroinvertebrate data. Installing sewage treatment facilities and addressing agricultural problems may mouth of Roaring Run, but their impact appears to be fairly minimal. A closer investigation of these discharges and their impact should be done at some point. It probably should not be given a high priority at this time, however.

Some of the problems at Station 0401 can be remedied by requiring the owner of the Quemahoning Reservoir to provide a minimum conservation flow from the reservoir. At this time, the reservoir is up for sale, and will probably soon have new ownership. When the ownership transfer occurs, the Department should have the ability to put new minimum flow requirements on the new owners. This should benefit not only the short distance remaining of Quemahoning Creek, but also the Stony Creek downstream of their confluence.

The source of the apparent nutrient impacts at Station 0401 could not be determined. It may have been related to a build up of organic matter within the reservoir, depending upon what level releases were occurring from the reservoir. However, an overall increase in flows should also improve the nutrient problems.

CONCLUSIONS

Non point source pollution impacts to Quemahoning Creek are considerable and have a variety of sources. The upper reaches appear to be most impacted by agricultural practices, the middle reaches by both AMD and untreated sewage, and the lower reaches by AMD. A successful rehabilitation of Quemahoning Creek must address all three of these sources. The agricultural and sewage impacts will need to be addressed by the appropriate local government agencies. The AMD impacts, which are the primary focus of this Bureau, have had a profound impact on the lower half of the watershed. The deep mine discharge below Stoughton Lake is providing the most significant iron load to the watershed of any single source. Treatment of this discharge by removal of iron through passive methods is considered the top priority by this Bureau. The nearby Gonder discharge, due to its close proximity, should be addressed along with the Stoughton Lakes discharge. Funding to address these discharges is available from OSM's Appalachian Clean Streams Initiative, through this Bureau. If necessary, additional funding can be provided by the Bureau's Ten Percent Set Aside AMD Abatement Program. The area that seemed to be providing the second greatest AMD impact is the Hoffman Run tributary. Treatment/abatement of the discharges in this tributary appears feasible and should receive a high priority. Funds and projects from reclamation in lieu of civil penalties may be available through the Ebensburg District Mining Office. The USGS 208 discharge in Quecreek should also be given additional consideration for treatment facilities, particularly since it is the first significant source of AMD in the watershed. Other sources near Roaring Run and in the North Branch need to be further evaluated as time allows.

REFERENCES

EPA/440/4-89/001. Rapid Bioassessment Protocols For Use In Streams And Rivers. United States Environmental Protection Agency. 1989.

Quemahoning Creek (818E) Management Report, Section 01 -01. 1998. PA Fish and Boat Commission, Fisheries Management Area 8.

Quemahoning Creek Project Development Files. Department of Environmental Protection, Bureau of Abandoned Mine Reclamation, Ebensburg District Office.

have a more profound impact on this portion of the watershed than AMD treatment facilities constructed on the 208 discharge.

Station 0202, which is just downstream of an AMD impacted tributary known as Hoffman Run, was the first to show severe impacts from AMD. Iron and manganese levels were particularly high, at 5.17 and 2.91 mg/l, respectively. The drop in taxa numbers of both fish and macroinvertebrates at this station reflected the water quality degradation. Abatement of AMD into Hoffman Run clearly needs to be given priority as part of an overall watershed rehabilitation plan for Quemahoning Creek. Preliminary evaluations of Hoffman Run have determined that acidic mine drainage enters the tributary from several older reclaimed surface mine sites. Collection and passive treatment of these discharges appears feasible. Flow monitoring weirs are being installed by this Bureau to assist in data collection. Conceptual solutions need to be developed and funding sources determined. Interest has been expressed by the Ebensburg District Mining Office in having local coal mining companies construct facilities in lieu of civil penalties. This possibility needs to be examined more closely with staff from that office.

The riparian impacts to Station 0202, including placement of garbage and fill along the stream banks by local residents, should be investigated by local government agencies and reported to the DEP regulatory offices for enforcement action if necessary.

Station 0301, located downstream of the North Branch of Quemahoning Creek, showed slight improvements in water chemistry and metals loading, no improvement in macroinvertebrates, probably due to significant cementing related to iron precipitation, and some improvement in fish species. While the North Branch is known to receive AMD from abandoned sites, this tributary has not been closely evaluated. Since the North Branch provides a slight improvement in water quality, abatement of AMD into the North Branch should probably not be a high priority of the rehabilitation plan. However, at some point, a closer investigation of the North Branch is warranted to locate significant sources and evaluate their impacts.

The impact of AMD to aquatic life was quite severe at Station 0302, with both macroinvertebrates and fish nearly decimated at this station. Cementing of the stream bottom with iron was very severe. With the large deep mine discharge below Stoughton Lakes which was discovered as a result of this survey, and the previously known discharge (called the Gonder discharge) determined to be the most significant sources of iron in the watershed, it becomes obvious that rehabilitation efforts must give treatment/abatement of these discharges a very high priority. Removal of the pollutant load from these sources will have a profound impact on the lower portion of Quemahoning Creek, probably as far downstream as the reservoir, a distance of more than 4 miles. Funds are available to address AMD discharges in the Quemahoning Creek watershed from the Federal Office of Surface Mine's (OSM) Appalachian Clean Streams Initiative through this Bureau. If necessary, these funds can be supplemented with the Bureau's Ten Percent Set Aside AMD Abatement Program. Discussions between Bureau staff and local government officials have determined that there is a mutual interest in addressing these discharges with the OSM and Bureau funds.

Station 0303, located approximately 3 miles downstream of 0302, showed a fairly substantial recovery. However, the continuing presence of iron precipitate indicated that AMD impacts remained. While the fish and macroinvertebrate numbers indicated a significant recovery when compared to Station 0302, the numbers of taxa and individuals remained well below what would be expected in a non impacted stream. This station had the highest habitat score of the 9, and this stream segment appears to have great potential as a recreational fishery with upstream improvements to water quality. There are a few known sources of AMD entering between Stations 0302 and 0303, particularly in the vicinity of the

Attachment A: Water quality analyses for samples collected in the Quemahoning Creek watershed on July 22 and 23, 1997, by the Bureau of Abandoned Mine Reclamation

Quemahoning Creek Stream Survey Water Quality Results

Station	Flow GPM	Lab pH	Field Conductivity uS	Alk. mg/L	Iron mg/L	Mang. mg/L	Alum. mg/L	SO4 mg/L	Field Temperature Celcius	Total Residual Solids mg/L	Total Hardness mg/L	Alk. Load lb/day	Iron Load lb/day	Mang. Load lb/day	Alum. Load lb/day	SO4 Load lb/day
0101	163.4	6.9	460	64.0	0.01	<.01	<.20	68.0	19.5	20.00	114.00	125.70	0.03	NA	NA	133.56
0102	333.9	6.8	360	58.0	1.05	0.22	0.49	16.0	20.0	30.00	90.00	232.78	4.21	0.90	1.98	64.22
0103	623.4	6.5	480	56.0	3.04	0.63	1.17	137.0	16.0	22.00	182.00	419.62	22.78	4.74	8.77	1026.58
0201	1382.8	6.7	440	56.0	1.00	0.69	0.51	98.0	19.0	20.00	161.00	930.79	16.54	11.39	8.39	1628.88
0202	1550.2	6.5	520	32.0	5.17	2.91	0.48	179.0	18.5	18.00	240.00	596.27	96.33	54.22	8.96	3335.38
0301	2167.7	6.3	390	22.0	3.52	1.40	0.32	137.0	20.0	32.00	175.00	573.23	91.72	36.48	8.31	3569.64
0302	7075.8	6.4	410	46.0	4.19	1.18	<.20	175.0	19.0	16.00	245.00	3912.35	356.36	100.36	NA	14883.95
0303	9309.9	6.7	550	38.0	0.61	0.52	<.20	244.0	19.5	<2.00	254.00	4252.39	68.71	58.64	NA	27304.82
0401	485.2	6.5	230	26.0	0.33	0.25	<.20	57.00	19.0	16.00	78.00	151.63	1.91	1.47	NA	332.43

Attachment B: Macroinvertebrates collected on Quemahoning Creek, Somerset County on July 22 and 23, 1997, by the Bureau of Abandoned Mine Reclamation using a D-frame net.

	Quemahoning Creek 0101	Quemahoning Creek 0102	Quemahoning Creek 0103	Quemahoning Creek 0201	Quemahoning Creek 0202	Quemahoning Creek 0301	Quemahoning Creek 0302	Quemahoning Creek 0303	Quemahoning Creek 0401
EPHEMEROPTERA (MAYFLIES)									
Ephemeroptera									
Heptageniidae		3	1						
Epeorus sp.				1					
Baetidae									
Baetis sp.			3	8				24	
Siphlonuridae		7		2					
Ameletus sp.			6						
Ephemeridae									
Ephemera sp.	2								
PLECOPTERA (STONEFLIES)									
Plecoptera									
Leuctridae									
Leuctra sp.		3	24	7	3	3		1	
Perlidae									
Acroneuria sp.			2						
Perlesta sp.				1	1				
Nemouridae									
Amphinemura sp.			1	1					
TRICHOPTERA (CADDISFLIES)									
Trichoptera									
Hydropsychidae									
Diplectrona sp.			1					3	
Hydropsyche sp.		6	194	172	14	31		56	14
Cheumatopsyche sp.	8	249	188	338	30	13		24	59
Limnephilidae									
Pycnopsyche sp.					5				
Philopotamidae									
Chimarra sp.		6							2
Polycentropidae									1
Leptoceridae									
Nectopsyche sp.									1

Attachment B: Macroinvertebrates collected on Quemahoning Creek, Somerset County on July 22 and 23, 1997, by the Bureau of Abandoned Mine Reclamation using a D-frame net.

	Quemahoning Creek 0101	Quemahoning Creek 0102	Quemahoning Creek 0103	Quemahoning Creek 0201	Quemahoning Creek 0202	Quemahoning Creek 0301	Quemahoning Creek 0302	Quemahoning Creek 0303	Quemahoning Creek 0401
DIPTERA (TRUE FLIES)									
Tipulidae									
Hexatoma sp.		1	1			1			
Dicranota sp.	5	7	12	4	14	1		4	2
Tipula sp.	1	1							
Chironomidae	47	120	66	190	27	27	1	44	52
Dolichopodidae				1					
Simulidae									
Simulium sp.		2							1
Prosimulium sp.									2
Tabanidae		1							
Ceratopogonidae						2			
ODONATA (DRAGON-, DAMSELFLIES)									
Gomphidae									
Lanthus sp.	1								
Gomphus sp.									
Aeshnidae		2							
Boyeria sp.	2								
Coenagrionidae									
NON-INSECT TAXA									
DECAPODA (CRAYFISH)									
Cambaridae									
Cambarus sp.		2	1	3	2	1			3
OLIGOCHAETA	49		8	48				2	
MEGALOPTERA									
Corydalidae									
Nigronia sp.		17	10	2	9	4			
COLEOPTERA									
Elmidae									
Optioservus sp.	1	14		1	1	1			
Promoresia sp.					1				
Stenelmis sp.	3	73							
Dubiraphia sp.	18								
ISOPODA									
Asellidae									
Caecidotea sp.			1	1					

Attachment B: Macroinvertebrates collected on Quemahoning Creek, Somerset County on July 22 and 23, 1997, by the Bureau of Abandoned Mine Reclamation using a D-frame net.

	Quemahoning Creek 0101	**Quemahoning Creek 0102**	**Quemahoning Creek 0103**	**Quemahoning Creek 0201**	**Quemahoning Creek 0202**	**Quemahoning Creek 0301**	**Quemahoning Creek 0302**	**Quemahoning Creek 0303**	**Quemahoning Creek 0401**
AMPHIPODA									
Talitridae									
Hyalella sp.	6								
MOLLUSCA									
Bivalvia	7								
Gastropoda	31								
Total No. of Taxa	15	17	16	16	11	10	1	9	10
Total No. of Individuals	181	514	519	781	107	84	1	159	137
# grids counted-subsample	16	6	7	5	total	total	total	18	25
(# of insects in subsample)	104	115	116	137	107	84	1	107	101
Habitat Score	135	157	169	152	138	187	159	192	147

Attachment C: Rapid Bioassessment Protocol Metric comparisons for Quemahoning Creek, Somerset County (Macroinvertebrates were collected July 22 & 23, 1997). This table determines the extent of biological impairment of the candidate station in comparison to the reference stations, based on sample subsets.

	STATION									
METRIC*	Quemahoning Ck. near SR4009 bridge 101	Quemahoning Ck. at T436 bridge at Enoch 102	Quemahoning Ck. at SR4015 bridge at Quecreek 103	Quemahoning Ck. at SR4006 Bridge at Acosta 201	Quemahoning Ck. at SR 4023 bridge 202	Quemahoning Ck. near SR4023 south of Jenners Crossroads 301	Quemahoning Ck. at Rt.601 bridge at Boswell 302	Quemahoning Ck. near Rt.219 bridge 303	Quemahoning Ck. at SR4019 near mouth 401	Wills Creek (reference station)
1. Taxa richness	14	11	11	7	11	10	1	9	10	20
Cand/Ref (%)	0.70	0.55	0.55	0.35	0.55	0.5	0.05	0.45	0.5	1
Biol. Cond. Score	4	0	0	0	0	0	0	0	0	6
2. Mod. EPT	1	2	3	1	3	1	---	2	2	8
Cand/Ref (%)	0.125	0.25	0.375	0.125	0.375	0.125	---	0.25	0.25	1
Biol. Cond. Score	0	0	0	0	0	0	0	0	0	6
3. Mod. HBI	6	5.5	5.2	5.8	4.8	5.1	6.0	5.5	5.7	4.3
Cand-Ref	1.7	1.2	0.9	1.5	0.5	0.8	1.7	1.2	1.4	0
Biol. Cond. Score	0	2	4	0	6	4	0	2	0	6
4. % Dom. taxa	27	49	45	45	28	37	100	354	43	22
Cand-Ref	5	27	23	23	6	15	78	13	21	0
Biol. Cond. Score	6	0	0	0	6	4	0	4	2	6
5. % Mod. May.	1	0	1	0	0	0	0	0	0	25
Ref-Cand	24	25	24	25	25	25	25	25	25	0
Biol. Cond. Score	2	2	2	2	2	2	2	2	2	6
Total biological Condition Score	12	4	6	2	14	10	2	8	4	30
% Comparability to reference	40	13	20	7	47	33	7	27	13	
Level of impairment	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	Impaired	

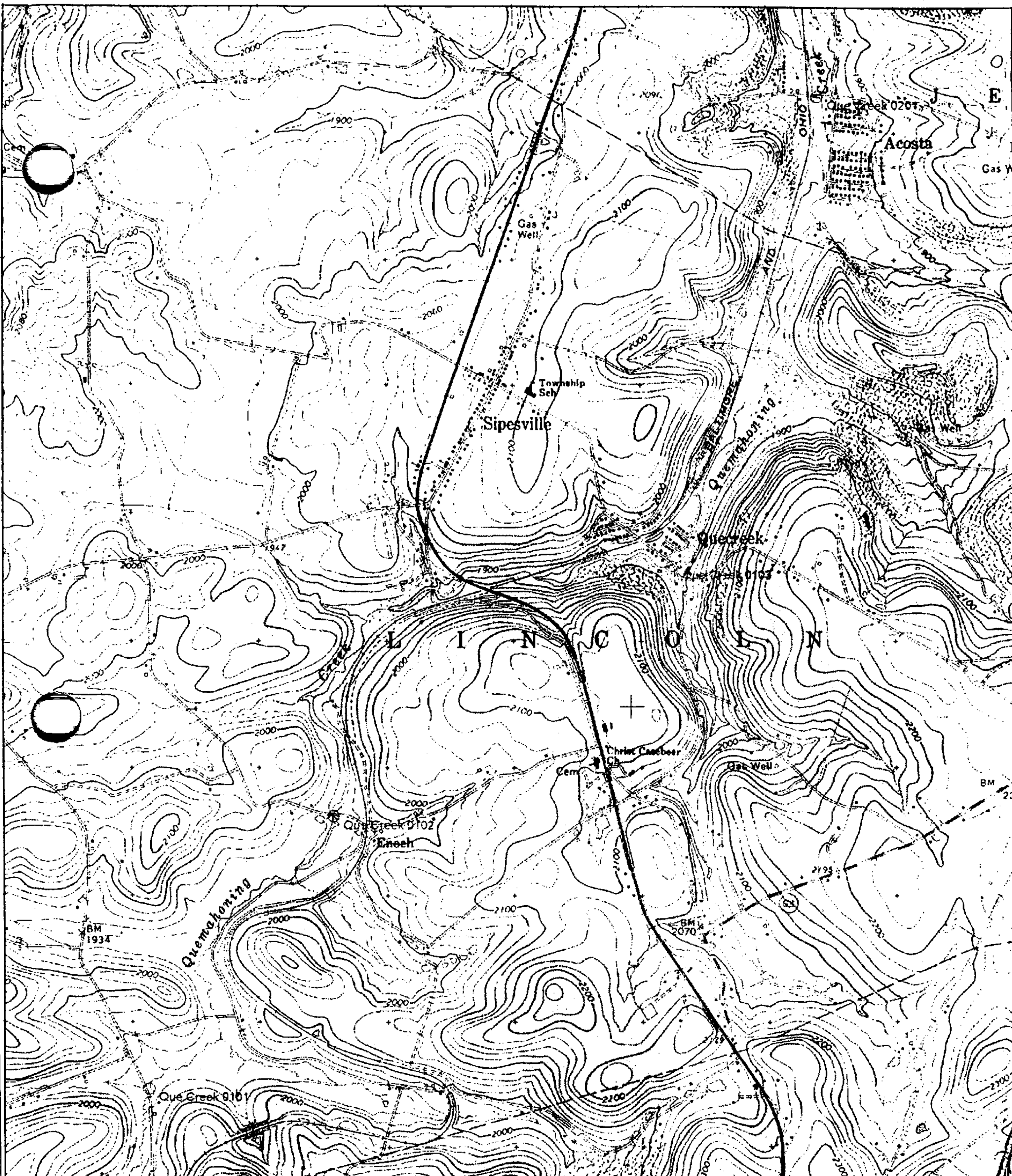
* All Quem[illegible]ng Creek stations were compared to Wills Creek, which was used as a r[illegible]ce station.

Attachment D: Fish collected on Quemahoning Creek on July 22-24, 1997 by the Pennsylvania Fish and Boat Commission

Species	Que Creek 0101	Que Creek 0102	Que Creek 0103	Que Creek 0201	Que Creek 0202	Que Creek 0301	Que Creek 0302	Que Creek 0303	Que Creek 0401
Brown Trout		1	1						1
Bluntnose Minnow	7	19		1				16	39
Blacknose Dace	62		151			12	4	100	
Redside Dace	1	8							
Creek Chub	186	54	125	12	10	35	1	22	2
Golden Shiner		3		1					
White Sucker	76	183	192	79	18	9	5	117	4
Northern Hog Susker									50
Brown Bullhead					1				5
Yellow Bullhead								53	1
Rock Bass		1				1		7	40
Pumpkinseed	7	3		3		4	1		10
Bluegill	7	7				2		9	18
Green Sunfish	1	4							
Largemouth Bass	12	1				1		2	
Smallmouth Bass									2
Yellow Perch								10	1
Blackside Darter						1		1	11
Greenside Darter									16
Fantail Darter						3		24	10
Johnny Darter	3	8	2		7	12			
Mottled Sculpin	20	37	5					4	
Species Total	11	13	6	5	4	10	4	12	15
Site Length	118 m	200 m	209 m	200 m	200 m	200 m	100 m	200 m	200 m
Efforts (minutes)	24	45	50	45	34	33	17	60	40

Attachment E Index of Biotic Integrity (IBI) metric rankings for the eight sites upstream of Quemahoning Reservoir in Quemahoning Creek (818E), Somerset County; July 1997. (Ranking: 1 = best - 8 = worst)

IBI Metrics	0101	0102	0103	0201	0202	0301	0302	0303
# of species	3	1	5	6	7	4	7	2
# of salmonid sp	3	1	1	3	3	3	3	3
# of sculpin sp	1	1	1	5	5	5	5	1
# of salmonids & sculpins sp	3	1	1	5	5	5	5	3
# of cyprinid sp	1	1	5	3	8	5	5	3
# of darter sp	3	3	3	7	3	1	7	2
# of sucker sp	1	1	1	1	1	1	1	1
# of sunfish sp	2	1	7	5	7	2	5	4
# of intolerant sp	2	1	4	6	6	4	6	2
% of individuals that are tolerant sp	5	2	8	7	3	1	6	4
% of individuals that are stenothermal coolwater & coldwater	2	1	3	5	5	5	5	3
% of individuals that are generalists	8	2	6	1	3	7	5	4
% of individuals that are omnivores	2	7	4	8	6	1	5	3
% of individuals that are generalists/omnivores	5	4	8	7	3	1	6	1
% of individuals that are insectivores	5	4	8	7	3	1	6	1
% of individuals that are top carnivore or piscivore	2	4	5	6	6	2	6	1
% of individuals that are simple lithophilous sp	7	5	3	1	6	8	1	4
Catch-per-unit-effort (CPUE) (#/hr)	1	3	2	6	7	5	8	4
CPUE (#/hr), excluding tolerant sp	1	2	6	7	5	4	7	3
Total score	57	45	81	96	92	65	99	49
Final ranking	3	1	5	7	6	4	8	2



<Default> - 4 Markers, Length = 4 miles, 680 feet

Que Creek 0103 - 040° 05' 24.6" N, 079° 04' 51.0" W

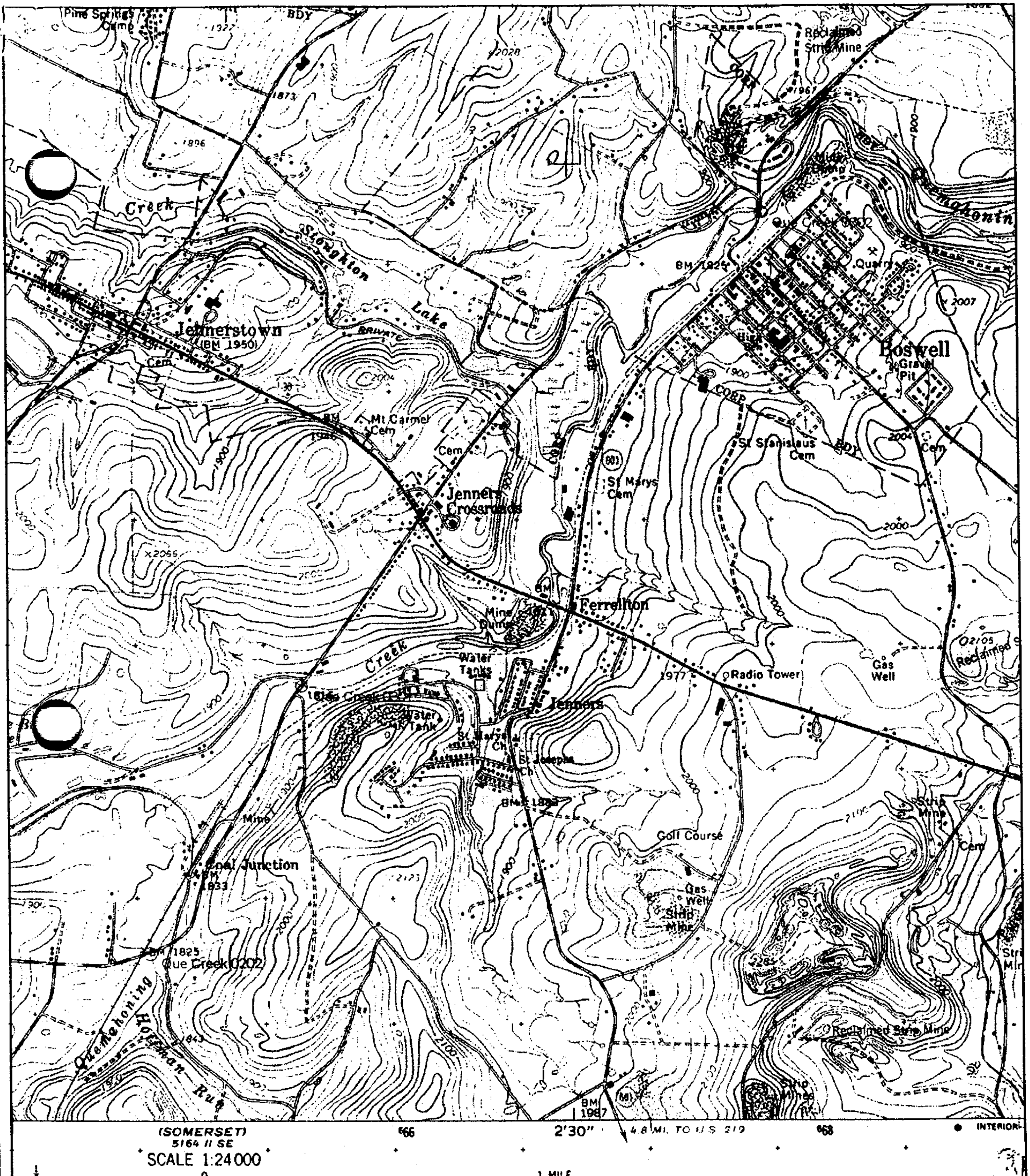
Que Creek 0101 - 040° 03' 53.9" N, 079° 06' 48.7" W

Que Creek 0201 - 040° 06' 46.1" N, 079° 04' 17.8" W

Que Creek 0102 - 040° 04' 41.2" N, 079° 06' 07.2" W

[illegible] SOMERSET
D[illegible]/16/98
Scale: 1 inch equals 2222 feet

Location: 040° 05' 19.4" N 079° 05' 27.3" W
Caption: Attachment F



<Default> - 3 Markers, Length = 2 miles, 4750 feet

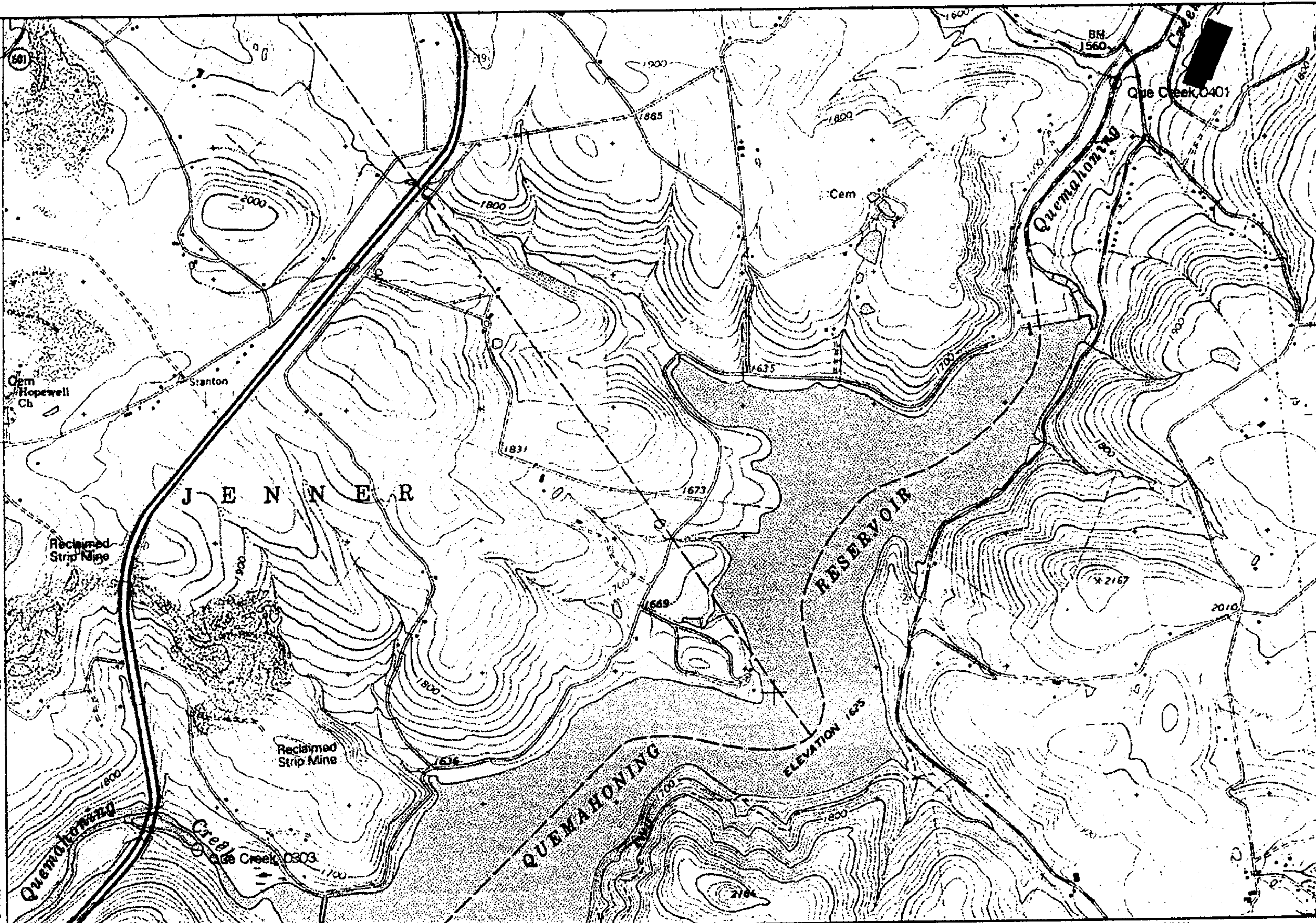
Que Creek 0302 - 040° 09' 52.5" N, 079° 01' 50.8" W

Que Creek 0301 - 040° 08' 38.2" N, 079° 03' 24.6" W

Que Creek 0202 - 040° 07' 56.5" N, 079° 03' 55.5" W

BOSWELL
7/16/98
Scale: 1 inch equals 2000 feet

Location: 040° 08' 52.0" N 079° 02' 41.5" W
Caption: Attachment F



<Default> - 2 Markers, Length = 3 miles, 2282 feet — Que Creek 0401 - 040° 11' 31.1" N, 078° 56' 21.9" W — Que Creek 0303 - 040° 09' 37.7" N, 078° 59' 22.9" W

Name: HOOVERSVILLE
Date: 7/16/98
Scale: 1 inch equals 2000 feet

Location: 040° 10' 34.1" N 078° 57' 56.1" W
Caption: Attachment F

APPENDIX B

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
March 25, 1998

3-26-98

WATER: Quemahoning Creek (818E) Section 01 - 04 Somerset County

EXAMINED: July 1997

BY: Gary Smith and Rick Lorson

Bureau Director Action: ______________________ Date: ____________

Division Chief Action: ______________________ Date: ____________

WW Unit Leader Action: ______________________ Date: ____________

CW Unit Leader Action: ______________________ Date: ____________

AREA COMMENTS:

Quemahoning Creek (818E) originates in westcentral Somerset County and flows northeastward for 33 km to its confluence with Stonycreek River south of Benson, PA. Quemahoning Reservoir, a 364-ha private impoundment, is located on the stream approximately 2.1 km upstream from the mouth. The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Quemahoning Creek's fish populations, 2) to compare the 1997 survey results to those of 1983, 3) use data to update the fish management strategies for Quemahoning Creek, and 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics to monitor future water quality improvements in Quemahoning Creek.

Water chemistry and fish communities in Quemahoning Creek have improved since 1983. The pH level at the nine sites were similar to or greater than the levels in 1983. Total alkalinity at all sites had increased at least three times the levels observed in 1983. Total number of fish species increased in Sections 01, 03, and 04 from 1983 to 1997. In Section 02, total number of fish species in 1997 was similar to the number in 1983. In spite of these positives, there remain significant point source and non-point source pollution problems in the watershed. The 1997 survey from headwaters to the mouth provides evidence of some specific areas and problems within the watershed yet to be addressed.

Section 01 had the highest IBI ranking of the three sections upstream of the reservoir. The habitat and fish community in Section 01 indicated that this portion of Quemahoning Creek was impaired primarily by agriculture. Section 02 was the most degraded section of Quemahoning Creek due to mine drainage and sewage. Section 03 had the second worst ranking of the three sections upstream of the reservoir due primarily to mine drainage. Section 04 had adequate water quality and physical habitat to support the best fish community of the nine survey sites in 1997. The aquatic community of Section 04 of Quemahoning Creek and Stonycreek River downstream to the mouth can be improved substantially by requiring a conservation release from Quemahoning Reservoir.

Mine drainage, siltation, and sewage affect Quemahoning Creek's aquatic life throughout Section 01-03. Conditions in Section 04 are impaired due to water quantity during time periods when conservation releases from Quemahoning Reservoir are reduced to near zero due to the existing water allocati permit. These factors need to be addressed if aquatic communities Quemahoning Creek are going to improve.

AREA RECOMMENDATIONS:

1) Continue to manage Section 01-04 of Quemahoning Creek under the Natural Yield Option. A severely limited recreational fishery currently exists in Quemahoning Creek.

2) Consider introducing smallmouth bass and/or fingerling trout in Section 03 to provide a recreational fishery in Quemahoning Creek after water quality improvements are made.

3) A follow-up survey should be conducted on Quemahoning Creek at the same locations as the nine sites sampled in 1997 when water quality improvements are made. The same sampling protocol as in 1997 should be followed, so that IBI metric values can be compared to the 1997 values.

4) Bank erosion, sedimentation, and mine drainage are problems in Quemahoning Creek. A copy of this report should be sent to Dave Steele, Manager, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501 and Pam Milavek, Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation, 122 South Center Avenue, P.O. Box 149, Ebensburg, PA 15931.

5) Provide a copy of this report to Leroy Young, Pennsylvania Fish and Bo Commission, Division of Environmental Services to assist in his effor to require a conservation release from Quemahoning Reservoir to improve the fish community in Section 04.

6) Efforts need to be made to identify and eliminate sources of sewage entering Quemahoning Creek. A copy of this report should be sent to Tom Proch, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

7) Provide a copy of this report to Len Lichvar, Chairman, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907-0153.

8) Provide a copy of this report to Cliff Guindon, Pennsylvania Game Commission, Land Manager, P.O. Box A, Ligonier, PA 15658, for consideration of a Pheasants Forever riparian area project on Quemahoning Creek Section 01.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Quemahoning Creek (818E) Management Report Section 01 - 04

Prepared by
Gary Smith and Rick Lorson

Date Sampled: July 1997 Date Prepared: March 1998

Introduction

Quemahoning Creek (818E) originates just south of Zimmerman, PA in westcentral Somerset County. It flows northeastward for 33 km to its confluence with Stonycreek River south of Benson, PA. Quemahoning Reservoir, a 364-ha private impoundment, is located on the stream approximately 2.1 km upstream from the mouth. Land uses in the 254 km^2 watershed consist of agriculture and mining. Agriculture, acid mine drainage, and sewage affect most of Quemahoning Creek. The Department of Environmental Protection Chapter 93 designation for Quemahoning Creek is Cold Water Fishes (CWF) (Pennsylvania Department of Environmental Resources 1993). The Pennsylvania Fish and Boat Commission (PFBC) surveyed Section 01-04 of Quemahoning Creek in 1983 to assess its potential as a trout and/or warmwater fishery (Boyer et al. 1983). Prior to 1983, no PFBC surveys had been conducted on the stream. Quemahoning Creek is divided into four management sections (Table 1).

A joint U.S. Geological Survey and Somerset County Conservation District study was conducted from 1992 - 1994 to locate and sample abandoned coal-mine discharges in the Stonycreek River Basin, to prioritize the mine discharges for remediation, and to determine the effects of the mine discharges on water quality of the Stonycreek River and its major tributaries (Williams et al. 1996). Williams et al. (1996) located, sampled, and prioritized 20 coal-mine discharges in the Quemahoning Creek Basin (Table 2, Figure 1). The prioritization was based only on the 1992 samples. The top three discharges were (1) a discharge (USGS#208) to an unnamed tributary above SR 4015 bridge in Quecreek, PA, (2) a discharge (USGS#176) to an unnamed tributary near Jenners, PA, and (3) a discharge (USGS#172) on Twomile Run, which enters Quemahoning Reservoir. The discharge at Quecreek, PA (USGS#208) was ranked as the tenth worst discharge of the 270 discharges identified and sampled in the Stonycreek River Basin. This same discharge had the highest dissolved aluminum loading of the 270 discharges.

A treatment system was constructed near Jenners, PA to treat the mine discharge from USGS#176 (number 2 on priority list). The plant came on-line in August/September 1997. No official monitoring has been conducted on the treatment system as of January 1998.

Section 01 of Quemahoning Creek begins at the headwaters (River Mile [RM] 20.63) and extends 8.4 km to 60 m upstream of the SR 4015 bridge in Quecreek, PA (RM 15.39) (Figure 2). At the downstream boundary, the first large source of mine drainage (USGS#208) enters Quemahoning Creek. Seventy-one percent of Section 01 is within 100 m of a road and 100% of the section is privately owned and open to fishing (Table 3). It is accessible from SR 4009, SR 4015, T-448, and other township roads. This section of Quemahoning Creek is low gradient and meanders through primarily agricultural land.

Quemahoning Creek Section 02 starts 60 m upstream of the SR 4015 bridge (RM 15.39) and extends 6.8 km to the confluence with the North Branch of Quemahoning Creek (RM 11.17). Seventy-six percent of Section 02 is within 100 m of a road and 100% of the section is privately owned and open to fishing (Table 4). It is accessible from SR 4015, which follows along the creek from Quecreek to 2 km north of Acosta. Section 02 had little potential as a recreational fishery under the conditions in 1983 (Boyer et al. 1983). Siltation had degraded the habitat and the effect of acid mine drainage was eminent. Hoffman Run, which receives acid mine drainage, enters Quemahoning Creek in Section 02. The Jenner Community Sportsmen's Club stocks trout upstream of Acosta and in the vicinity of Quecreek.

Section 03 of Quemahoning Creek begins at the confluence with the North Branch of Quemahoning Creek (RM 11.17) and extends 10.5 km to the Quemahoning Reservoir (RM 4.64). Section 03 is less accessible than Section 01 and 02 with 59% of the section within 100 m of a road (Table 5). One hundred percent of the section is privately owned and open to fishing. The gradient and habitat quality of Section 03 increases as it approaches Quemahoning Reservoir.

Quemahoning Creek Section 04 starts at the outflow of the Quemahoning Reservoir (RM 1.33) and extends 2.1 km to the mouth on Stony Creek (RM 0.00) (Figure 3). Good access is available to Section 04 with 76% of the section within 100 m of a road (Table 6). During low flows, Section 04 may not receive water from Quemahoning Reservoir, because a conservation release is not required from the privately owned impoundment.

The purpose of this survey was to: 1) assess water quality and the occurrence and abundance of Quemahoning Creek's fish populations, 2) to compare the 1997 survey results to those of 1983, 3) use data to update the fish management strategies for Quemahoning Creek, and 4) collect and enumerate all fish species for Index of Biotic Integrity (IBI) metrics to monitor future water quality improvements in Quemahoning Creek. Somerset County Conservation District, Department of Environmental Protection - Bureau of

Abandoned Mine Reclamation (Ebensburg Office), Stonycreek-Conemaugh River Improvement Project (SCRIP), and Southern Alleghenies Resource Conservation & Development assisted with the Quemahoning Creek survey.

Methods

Two sites in Section 01 were surveyed in 1997 to characterize the section. Site 0101 was located approximately 240 m downstream of SR 4009 bridge at RM 18.62 (Figure 2). Site 0102 was located at the T-436 bridge in Enoch, PA at RM 17.21. Both sites were at the same location as Boyer et al. (1983) sites.

Three sites in Section 02 were sampled in 1997 to represent the section. Site 0103 was located 209 m downstream of the SR 4015 bridge in Quecreek, PA at RM 15.22, which placed it below the first mine discharge (USGS#208). Site 0103 in 1997 differed from site 0103 in 1983. Site 0103 in 1983 started at the SR 4015 bridge and extended 240 m upstream of the first major source of mine drainage (USGS#208). Site 0201 was located at the SR 4006 bridge in Acosta, PA at RM 13.45. Site 0202 was located at the SR 4023 bridge below the confluence with Hoffman Run but above the confluence with the North Branch of Quemahoning Creek at RM 11.85. Site 0201 and Site 0202 were at the same location as Boyer et al. (1983).

Three sites in Section 03 were surveyed in 1997 to characterize the section. Site 0301 was located at the SR 4023 bridge south of Jenners Crossroads at RM 10.53. Site 0302 was located at the Route 601 bridge in Boswell, PA at RM 7.87. Site 0303 was located 200 m downstream of the Route 219 bridge at RM 4.94. All three sites were at the same location as Boyer et al. (1983) sites.

One site in Section 04 was sampled in 1997 to characterize the section. Site 0401 was located at the SR 4019 bridge below Quemahoning Reservoir at RM 0.46 (Figure 3). This site was at the same location as Boyer et al. (1983) site.

Data from Section 01-04 were collected for physical, chemical, fish occurrence and abundance. Water quality analysis, aquatic marcoinvertebrates analysis, and habitat assessment were conducted by the Department of Environmental Protection (DEP), Bureau of Abandoned Mine Reclamation. Fish sampling was accomplished with a Coffelt model BP-1C backpack electrofisher operated at 100-150 volts AC and 150 watts. Three netters were used at each site to collect all fish. The assessment was conducted from July 22-24, 1997 according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

All fish species were collected and enumerated because the data were used to calculate Index of Biotic Integrity (IBI) metrics. The IBI is a composite index based on an array of ecological attributes of fish communities in regards to: species richness, indicator taxa, trophic guilds, fish abundance, and the incidence of hybridization, disease, and anomalies. The original IBI contained 12 metrics and was developed by Karr (1981) for small, warmwater streams in the Midwest. Each metric received a score of five points if it had a value similar to that expected for a fish community characteristic of a system with little human influence; a score of one point if it had a value similar to that expected for a fish community that deviates strongly from the reference condition; and a score of three points if it deviated somewhat from reference expectations. An IBI score is computed by summing each metric score. An IBI score reflects the overall integrity of a stream compared to a non-impaired stream. Since Karr's original version was developed, others have built on the original's fundamentals, modifying it for other regions and different ecosystems (Leonard and Orth 1986; Lyons 1992, Lyons et al. 1996). The new versions still had the multimetric structure, but differed from the original in the quantity, scoring, and in the use of new metrics.

Currently, Pennsylvania does not have a version of the IBI to evaluate streams in the state. However, a one year project by the PFBC initiated the process to develop IBI metrics that would be used for Pennsylvania streams (Smith et al. 1997). Metric testing determines which metric discriminates between the non-impaired sites and the severely impaired sites. Smith et al. (1997) tested only species richness metrics because the historical PFBC database contained only presence/absence data on non-game fish. Fish abundance data for all fish species from potential reference sites are needed to further test IBI metrics. The PFBC's Fisheries Management Division started collecting IBI data for potential reference sites in 1997 for coldwater streams.

Given the status of the undeveloped Pennsylvania IBI, IBI metrics for this study were extracted from Karr (1981), Lyons (1992), Lyons et al. (1996), Ohio Environmental Protection Agency (1987), and Smith et al. (1997). Life history and pollution tolerance designations for fish species collected in Quemahoning Creek were taken from Smith et al. (1997) (Table 7). Each metric was computed from the data, but a score was not assigned to each metric because reference conditions from Pennsylvania streams and scoring criteria are not available. Therefore, an IBI score was not computed for the survey sites. Each metric was ranked from 1 to 8 based upon the metric value at the eight survey sites upstream of Quemahoning Reservoir. Section 04 was not ranked because it has different environmental variables from being downstream of the reservoir. A rank of 1 was assigned to the metric if the metric value represented the best stream condition among the eight sites. Lower rankings were given to metrics as the metric value represented worse stream condition among the eight sites. Metric rankings were summed to provide a total ranking for the eight sites upstream of Quemahoning Reservoir.

The IBI rankings will provide: (1) comparisons among the eight sites upstream of Quemahoning Reservoir surveyed in 1997 and (2) a tool to measure the degree of change for future improvements to Quemahoning Creek.

Results

SECTION 01

Site 0101 (RM 18.62)

Land use types at Site 0101 consisted of row crops, pasture, and grass fields. The canopy was open and consisted of agricultural row crops, pasture, and tag alders along the bank. The streambanks were moderately eroded. Silt was the dominant substrate at the site. Site 0101 was low gradient, which resulted in low velocity flows. Elodea *Elodea canadensis* was very abundant. The pH level increased from 6.9 standard units (SU) in 1983 to 7.2 SU in 1997 (Table 3). Total alkalinity increased from 17 mg/l in 1983 to 64 mg/l in 1997.

Eleven species of fish were collected in 1997 compared to 7 species in 1983 (Table 8). Redside dace *Clinostomus elongatus*, blacknose dace *Rhinichthys atratulus*, bluegill *Lepomis macrochirus*, mottled sculpin *Cottus bairdi*, and green sunfish *Lepomis cyanellus* were present in 1997 but not in 1983. Northern hog sucker *Hypentelium nigricans* was collected in 1983 but not in 1997. Creek chub *Semotilus atromaculatus* was the most abundant species at Site 0101 with 186 collected (Table 9). White sucker *Catostomus commersoni* and blacknose dace were the second and third most abundant species, respectively. Total catch-per-unit-effort (CPUE) at Site 0101 was the highest from the nine sites in 1997 (Table 10). Two intolerant species (redside dace and mottled sculpin) were collected at this site. Eighty-seven percent of the individuals were tolerant species. The trophic composition of the fish community was primarily generalists and omnivores.

Site 0102 (RM 17.21)

Flow at Site 0102 was slow due to the low gradient. Partial shading was present from trees and shrubs along the streambanks. The bank vegetation did not provide much stability because the banks were heavily eroded. Silt covered the streambed and was deep in several pools. Total alkalinity and pH at Site 0102 were similar to the levels at Site 0101 (Table 3). The pH level increased slightly from 7.1 SU in 1983 to 7.3 SU in 1997. Alkalinity increased from 18 mg/l in 1983 to 58 mg/l in 1997.

The total number of fish species at Site 0102 increased from 8 species in 1983 to 13 species in 1997 (Table 11). Seven species were collected in 1997 but not in 1983. Blacknose dace and northern hog sucker were sampled in 1983 but not in 1997. A 182-mm brown trout, which appeared to be wild, was collected in 1997. White sucker was the dominant species at Site 0102 with 183 individuals collected (Table 9). Mottled sculpin, a coldwater species, were common at Site 0102. Three intolerant species (redside dace, rock bass *Ambloplites rupestris*, and mottled sculpin) were present at this site (Table 10). Fourteen percent of the individuals at Site 0102 were stenothermal coldwater and coolwater species, which was the highest percentage of the nine sites surveyed in 1997. The trophic composition of the fish community was primarily generalists and omnivores.

SECTION 02

Site 0103 (RM 15.22)

Site 0103 in Section 02 was different from site 0101 and 0102 in habitat, chemical parameters, and fish occurrence. The stream gradient was higher than in Section 01, and rubble and boulders were present on the streambed. However, "yellow boy" covered the substrate. The pH of 6.6 SU in 1997 was higher than the pH of 6.3 SU in 1983 (Table 4). Total alkalinity increased from 8 mg/l in 1983 to 56 mg/l in 1997. Iron loading at Site 0103 was 22.78 lbs/day, which was five times greater than the level at Site 0102.

Along with the mine drainage source, sewage is a problem at Site 0103. Two sewage discharges from residential homes were entering Quemahoning Creek. The discharges were located 80 m and 200 m below the SR 4015 bridge.

Six species of fish were collected in 1997 compared to 12 species in 1983 (Table 12). This is not a good comparison, because Site 0103 in 1983 started at the SR 4015 bridge and extended approximately 240 m upstream of the first major source of mine drainage. Bluntnose minnow *Pimephales notatus*, redside dace, and all centrarchid species collected in Section 01 in 1997 were not present at Site 0103. White sucker, blacknose dace, and creek chub comprised of 98% of the individuals collected at the site (Table 10). All three species are considered tolerant of pollution. A 265-mm brown trout was collected and appeared to be of hatchery origin.

Site 0201 (RM 13.45)

Stream gradient at Site 0201 was low. Habitat consisted of slow velocity pools with dense spatterdock *Nuphar advena* that choked the stream channel. Electrofishing efficiency was reduced due to obstructed vision from the spatterdock and water turbidity. No riffles were present in the 200 m site. Trees and shrubs provided partial shading. Streambanks were moderately eroded, and silt covered the streambed. Two sewage discharges were coming into Quemahoning Creek at this site. Similar to the sites upstream, pH and alkalinity increased since the 1983 survey. The pH level was 6.9 SU, and alkalinity was 56 mg/l in 1997 (Table 4).

Number of fish species at Site 0201 was reduced from the number of species in Section 01. Five species were collected in 1997 compared to six species in 1983 (Table 13). Creek chub and pumpkinseed *Lepomis gibbosus* were collected in 1997 but not in 1983. Blacknose dace, johnny darter *Etheostoma nigrum*, and mottled sculpin were present in 1983 but not in 1997. White sucker dominated the total catch with some large individuals (Table 9). Ninety-seven percent of the individuals collected were tolerant species (Table 10). The trophic composition of the fish community at Site 0201 is predominantly generalists/omnivores.

Site 0202 (RM 11.85)

Similar to the survey sites upstream, excluding Site 0103, Site 0202 had no riffles, unstable streambanks, and a silt-covered streambed. The pH level increased slightly from 6.5 SU in 1983 to 6.7 SU in 1997 (Table 4). Alkalinity increased from 10 mg/l in 1983 to 32 mg/l in 1997.

Site 0202 had the lowest species total of the nine sites surveyed in 1997. Four fish species were collected in 1997, which was an increase of one species from 1983 (Table 14). Brown bullhead *Ameiurus nebulosus* was collected in 1997 but not in 1983. Thirty-six individuals from the four species were collected at Site 0202, which was the second lowest total CPUE from the nine survey sites (Table 9 and 10).

SECTION 03

Site 0301 (RM 10.53)

Quemahoning Creek at Site 0301 was noticeable larger than the upstream sites due to the North Branch of Quemahoning Creek entering Quemahoning Creek. Deep pools were present with some of them unwadeable. Streambanks were moderately eroded. Substrate consisted of rubble and silt. Some woody debris was present underneath the water surface, which provided fish cover. The site ended in the middle of a deep pool. The pH level of 6.4 SU in 1997 was similar to the pH in 1983 (Table 5). Total alkalinity increased from 8 mg/l in 1983 to 22 mg/l in 1997.

Fish species occurrence increased dramatically from the previous survey. Ten species were collected in 1997 compared to one species in 1983 (Table 15). Site 0301 was the upstream-most site in 1997 that blackside darter *Percina maculata* and fantail darter *Etheostoma flabellare* were collected. Seventy percent of the individuals were tolerant species, which was the second lowest percentage of the nine sites (Table 10).

Site 0302 (RM 7.87)

The first 50 m of Site 0302 contained a pool/riffle mix, and the next 50 m consisted of deep pools with some portions too deep to wade. Silt and "yellow boy" covered the substrate. Streambanks were heavily eroded. The pH level of 6.5 SU in 1997 increased from the pH level of 6.2 SU in 1983; however, it was lower than the pH level at Site 0301 in 1997 (Table 5). Alkalinity increased from 12 mg/l in 1983 to 46 mg/l in 1997. Water was turbid, which reduced the electrofishing efficiency.

Site 0302 had the lowest total number of fish species along with Site 0202. The number of species at Site 0302 increased from two in 1983 to four in 1997 (Table 16). Pumpkinseed and blacknose dace were found in 1997 but not in 1983. Site 0302 had the lowest total CPUE than any of the nine survey sites (Table 10). Ninety-one percent of the individuals were tolerant species. Generalists/omnivores were the predominant trophic group at Site 0302.

Site 0303 (RM 4.94)

Habitat at Site 0303 was better than most sites upstream. Stream gradient was higher and water velocity was fast; hence, several riffles and runs were present. This was the first site where the water was not turbid. Boulder, rubble, and silt were the main substrate types at this site. The substrate was still iron stained, but not to the degree that other sites were. Streambanks were stable, and trees were present along the banks. Total alkalinity and pH increased from the last survey in 1983, which was the trend at the upstream sites (Table 5). The pH level increased from 6.7 SU in 1983 to 7.0 SU in 1997. Alkalinity increased from 11 mg/l in 1983 to 38 mg/l in 1997.

Twelve fish species were collected in 1997 compared to nine species in 1983 (Table 17). Blacknose dace, largemouth bass *Micropterus salmoides*, fantail darter, mottled sculpin, bluntnose minnow, and blackside darter were sampled in 1997 but not in 1983. Common shiner *Luxilus cornutus*, brown bullhead, black crappie *Pomoxis nigromaculatus* were present in 1983 but not in 1997. White sucker and blacknose dace were the first and second most abundant fish at Site 0303, respectively (Table 9). Eighty-four percent of the individuals collected were tolerant species (Table 10). The trophic composition of the fish community was predominantly generalists/omnivores.

SECTION 04

Site 0401 (RM 0.46)

Site 0401 is the only survey site below the Quemahoning Reservoir. Substrate types consisted of rubble, gravel, and silt. Trees along the bank provided partial shading to the stream channel. Streambanks were moderately eroded. The pH level of 7.0 SU in 1997 was similar to the level in 1983 (Table 6). Total alkalinity increased from 9 mg/l in 1983 to 26 mg/l in 1997. A sewage odor was present at this site.

Site 0401 had the highest number of fish species. Fifteen species were collected in 1997 compared to nine species in 1983 (Table 18). Eight species, including brown trout and smallmouth bass *Micropterus dolomieui*, were collected in 1997 but not in 1983. The one brown trout collected was 265 mm. Blacknose dace and largemouth bass were present in 1983 but not in 1997. Site 0401 was the only survey site in 1997 where northern hog sucker was collected. Site 0401 had the lowest percentage of individuals that are tolerant species at 24% and generalists/omnivores at 21% (Table 10). Site 0401 had the highest percentage of individuals that are insectivores at 78% and the highest CPUE of all individuals excluding tolerant species.

Discussion

Water chemistry and fish communities in Quemahoning Creek have improved since 1983. The pH level at the nine sites were similar to or greater than the levels in 1983. Total alkalinity at all sites had increased at least three times the levels observed in 1983. Total number of fish species increased in Sections 01, 03, and 04 from 1983 to 1997. In Section 02, total number of fish species in 1997 was similar to the number in 1983. In spite of these positives, there remain significant point source and non-point source pollution problems in the watershed. The 1997 survey from headwaters to the mouth provides evidence of some specific areas and problems within the watershed yet to be addressed.

To assess the overall health of the fish community throughout Quemahoning Creek, IBI metrics were computed for each site and ranked relative to other sites in Quemahoning Creek. Most applications of the IBI have been used on warmwater streams. Quemahoning Creek can be characterized as a coldwater stream at least in Section 01 and 02. Some of the metrics, such as number of sunfish species, used in this study may not be suitable. However, until further testing of IBI metrics for Pennsylvania streams, these metrics will be used to examine the fish communities in Quemahoning Creek during 1997.

In warmwater streams, the number of fish species (or species richness) decrease with most types of degradation. Environmental degradation often will increase the number of species in coldwater streams, but the severest types of degradation can cause a decline in number of species. Number of fish species ranking for Quemahoning Creek sites was based on the idea of a higher number of species, the better the stream condition. Section 01 had a high number of species. The number of species decreased in Section 02, which is below USGS#208 discharge at Quecreek, PA. Species richness increased at Site 0301, but declined at Site 0302. Site 0302 is below Beaver Dam Creek, which receives mine drainage from USGS#173 and a newly-discovered discharge below Stoughton Lake. The number of species increased at Site 0303 and Site 0401.

The number of intolerant species ranged between 2 and 3 at Site 0101, 0102, 0303, and 0401. Zero or one intolerant species was found from Site 0103, 0201, 0202, 0301, and 0302.

The percent of individuals that were stenothermal (narrow preference) coldwater and coolwater species was highest at Site 0102 (14%). Site 0101 had the second highest percentage at 5%. These two highest percentages also occurred above the USGS#208 discharge at Quecreek, PA. A high-quality coldwater stream in Wisconsin has 86-100% of the fish community as stenothermal coldwater and coolwater individuals (Lyons et al., 1996).

The percent of individuals that were generalists/omnivores and the percent of individuals that were insectivores were inversely related in Quemahoning Creek. When one metric value was high, the other metric value was low. Sites from 0101 to 0303 had greater than 70% of the fish community comprised of generalists/omnivores. Generalists/omnivores can feed on a variety of food items. A high percentage of non-specialized trophic species usually indicates a degraded system. Top carnivores such as trout or black bass made up a very small percentage of the population.

The abundance metrics indicate that Site 0401, 0303, 0101, and 0102 contained higher number of fish than the other five sites. Catch-per-unit-effort, excluding tolerant species, was highest at Site 0401. Site 0101 had the highest CPUE for all species and second highest CPUE, excluding tolerant species.

Final metric ranking of the sites upstream of Quemahoning Reservoir indicates that Site 0102 was the best site followed by Site 0303, and Site 0101. Site 0302 and 0201 were the most degraded and second-most degraded sites surveyed in 1997 based on IBI fish community metrics, respectively. These rankings correspond well to the chemical and physical characteristic observed at the survey sites.

Section 01 had the highest ranking of the three sections upstream of the reservoir with a mean ranking of 2. The habitat and fish community in Section 01 indicated that this portion of Quemahoning Creek was impaired primarily by agriculture. Silt covered the streambed, which did not allow availability to coarse substrate, and water was turbid. Suspended solids can increase downstream drifting of invertebrates, and deposited sediment decreases the habitat of invertebrates that inhabit the interstitial spaces with the streambed (Waters 1995). These factors drastically reduce the fish food source for insectivores. Streambanks were moderately to heavily eroded from runoff of agricultural fields and unstable banks from livestock pasturing through the stream. Fish community in Section 01 was predominantly tolerant species, which are generalists/omnivores. Pollution from agriculture needs to be addressed to improve conditions in Section 01. Riparian vegetated buffer strips along the creek would help stabilize the banks and reduce nutrient loading entering Quemahoning Creek. A Pheasants Forever riparian area project, similar to the project on Pike Run, Washington County, would be beneficial to Section 01 of Quemahoning

Creek. A copy of this report will be provided to Cliff Guindon, Pennsylvania Game Commission, for consideration of a Pheasants Forever riparian area project on Quemahoning Creek Section 01. Improved riparian agricultural practices would likely improve the aquatic community and habitat (aquatic and terrestrial).

Section 02 was the most degraded section of Quemahoning Creek with a mean ranking of 6. The USGS#208 mine discharge and sewage affect the aquatic communities at Site 0103 and 0201. Greater than 97% of the fish community at Site 0103 and 0201 were comprised of tolerant species, which are generalist/omnivore feeders. The fish community at Site 0202 was further impaired by acid mine drainage coming from Hoffman Run. On July 21, 1997, Hoffman Run had a pH of 4.4, total alkalinity of 0 mg/l, and total iron loading of 89 lb/d. The three sites in Section 02 had only one intolerant species present and fish abundance was greatly reduced. The USGS#208 mine discharge had a recorded dissolved aluminum concentration of 120 mg/l in August 1992. The high aluminum concentration measured in 1992 contributed to USGS#208 discharge receiving the highest prioritization for remediation in the watershed (Williams et al. 1996). Aluminum concentration for USGS#208 discharge in 1993 and 1994 was 0.4 mg/l. It is possible that the 1992 aluminum concentration was incorrect. The USGS#208 discharge may no longer be considered as the first priority for remediation (D. Steele, Somerset County Conservation District, personal communication), but it is still contributing the largest manganese loading, sulfate loading, total heated acidity loading, and fourth largest iron loading of the mine discharges entering Quemahoning Creek. Therefore, USGS#208 should still be one of the mine discharges considered for remediation.

Section 03 had the second worst ranking of the three sections upstream of the reservoir with a mean ranking of 5. Stream conditions improved from Site 0202 to Site 0301. Number of species increased from 4 at Site 0202 to 10 at Site 0301. The percent of individuals that are tolerant species and generalists/omnivores decreased from Site 0202 to Site 0301. Fish abundance also increased from Site 0202 to Site 0301. However, acid mine drainage was still present at Site 0301. Water quality declined from Site 0301 to Site 0302. The USGS#176 and USGS#173 discharges, and a newly-discovered mine discharge enters Quemahoning Creek between Site 0301 and 0302. As of September 1997, USGS#176 discharge is being treated near Jenners, PA. In July 1997, DEP Bureau of Abandoned Mine Reclamation discovered a mine discharge coming up in a wetland below Stoughton Lake on Beaver Dam Creek. Discharge rates from the seepage have been recorded up to 4,000 gallons per minute. Total iron loading has been measured at approximately 500 lb/d. It is suspect that the newly-discovered discharge is the largest contributor of iron to Quemahoning Creek. The USGS#173 discharge is located close to the newly-discovered discharge. Efforts should be made to remediate these two discharges. The fish community at Site 0303 is influenced by fish moving upstream 0.3 miles from Quemahoning Reservoir. Yellow bullhead, bluegill, yellow perch, and largemouth bass have moved up to Site 0303 from the reservoir. Conditions were better at Site 0303 than at Site 0302, but the substrate was still covered by "yellow boy". Habitat in Section 03 is suitable for smallmouth bass. If water quality improves, smallmouth bass may be considered for reintroduction. Fingerling trout stocking may be another consideration. We have already documented brown trout moving from Quemahoning Reservoir to Higgins Run to spawn (Lorson and Miko 1994). Currently, brown trout from the reservoir may be avoiding moving into Section 03 of Quemahoning Creek due to degraded water quality.

Section 04 had adequate water quality and physical habitat to support the best fish community of the nine survey sites in 1997. Several habitat types (riffle, run, and pool) and gravel and rubble were present at this site. Quemahoning Reservoir traps much of the sediment and metals before they reach Section 04. Site 0401 fish composition is influenced by the impoundment and Stonycreek River. Bluegill, pumpkinseed, yellow perch, brown bullhead, and yellow bullhead probably moved from the reservoir into Section 04. However, Section 04 has been plagued by a water quantity problem (Arway-PFBC to Martino-DEP correspondence 1998). On July 23, 1997, DEP measured a flow of 9,309 gallons per minute upstream of the reservoir compared to only 485 gallons per minute downstream of the dam. The aquatic community of Section 04 of Quemahoning Creek and Stonycreek River downstream to the mouth can be improved substantially by requiring a conservation release from Quemahoning Reservoir.

Mine drainage, siltation, and sewage affect Quemahoning Creek's aquatic life throughout Section 01-03. Conditions in Section 04 are impaired due to water quantity during time periods when conservation releases from Quemahoning Reservoir are reduced to near zero due to the existing water allocation permit. These factors need to be addressed if aquatic communities in Quemahoning Creek are going to improve.

A follow-up survey should be conducted on Quemahoning Creek at the same locations as the nine sites sampled in 1997 when improvements to the water quality are made. The same sampling protocol as in 1997 should be followed, so that IBI metric values can be compared to the 1997 values.

Management Recommendations

1) Continue to manage Section 01-04 of Quemahoning Creek under the Natural Yield Option. A severely limited recreational fishery currently exists in Quemahoning Creek.

2) Consider introducing smallmouth bass and/or fingerling trout in Section 03 to provide a recreational fishery in Quemahoning Creek after water quality improvements are made.

3) A follow-up survey should be conducted on Quemahoning Creek at the same locations as the nine sites sampled in 1997 when water quality improvements are made. The same sampling protocol as in 1997 should be followed, so that IBI metric values can be compared to the 1997 values.

4) Bank erosion, sedimentation, and mine drainage are problems in Quemahoning Creek. A copy of this report should be sent to Dave Steele, Manager, Somerset County Conservation District, 1590 North Center Avenue, Suite 103, Somerset, PA 15501 and Pam Milavek, Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation, 122 South Center Avenue, P.O. Box 149, Ebensburg, PA 15931.

5) Provide a copy of this report to Leroy Young, Pennsylvania Fish and Boat Commission, Division of Environmental Services to assist in his efforts to require a conservation release from Quemahoning Reservoir to improve the fish community in Section 04.

6) Efforts need to be made to identify and eliminate sources of sewage entering Quemahoning Creek. A copy of this report should be sent to Tom Proch, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222.

7) Provide a copy of this report to Len Lichvar, Chairman, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907-0153.

8) Provide a copy of this report to Cliff Guindon, Pennsylvania Game Commission, Land Manager, P.O. Box A, Ligonier, PA 15658, for consideration of a Pheasants Forever riparian area project on Quemahoning Creek Section 01.

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Table 1. Section catalog for Quemahoning Creek (818E), Somerset County; 1998.

Section No.	Section length (km)	Boundary limits	Management designation
01	8.4	UPS: Headwaters (RM 20.63) DNS: 60 m upstream of SR 4015 bridge at Quecreek (confluence with unnamed tributary)(RM 15.39)	Natural Yield
02	6.8	UPS: 60 m upstream of SR 4015 bridge at Quecreek (confluence with unnamed tributary)(RM 15.39) DNS: Confluence with the North Branch of Quemahoning Creek (RM 11.17)	Natural Yield
03	10.5	UPS: Confluence with the North Branch of Quemahoning Creek (RM 11.17) DNS: Quemahoning Reservoir (RM 4.64)	Natural Yield
04	2.1	UPS: Outflow at the Quemahoning Reservoir (RM 1.33) DNS: Mouth on Stonycreek River (RM 0.00)	Natural Yield

Table 2. Prioritization index (PI) for coal-mine discharges in the Quemahoning Creek Basin, Somerset County; 1992. Taken from Williams et al. (1996).

Site no.	pH (SU)	Iron, total (lb/d as Fe)	Acidity, total heated (lb/d as CaCO3)	Sulfate, total (lb/d as SO4)	Aluminum, dissolved (lb/d as Al)	Manganese, toal (lb/d as Mn)	Discharge (gal/min)	PI
208	6.2	16.60	3,050.00	5,830.0	539.00	58.30	374.0	1
176	5.9	436.00	642.00	1,780.0	0.40	24.20	330.0	2
172	2.8	2.38	93.60	342.0	8.64	5.04	30.0	3
173	6.2	192.00	<0.01	4,570.0	1.13	24.80	470.0	4
259	6.3	1.87	<0.01	4,580.0	1.35	1.98	867.0	5
174	5.0	16.20	30.60	83.7	0.07	1.17	7.5	6
175	3.2	2.22	7.20	28.8	0.32	0.66	5.0	7
209	3.5	6.68	<0.01	230.0	0.15	0.92	64.0	8
48	4.5	0.61	4.80	53.8	0.27	0.87	8.0	9
258	3.8	1.51	6.42	38.4	0.21	0.33	3.3	10
54	6.7	10.50	<0.01	129.0	0.19	0.84	111.0	11
53	3.6	0.07	3.97	28.2	0.43	0.04	4.6	12
171	6.6	0.79	<0.01	124.0	0.11	0.42	69.0	13
47	3.2	0.73	3.69	14.8	0.17	0.27	1.6	14
183	4.2	0.05	1.44	7.6	0.14	0.10	3.0	15
92	5.8	0.02	0.24	22.4	<0.01	0.02	1.7	16
182	5.2	0.18	0.20	1.4	<0.01	0.03	1.0	17
52	3.8	0.02	0.12	1.3	<0.01	<0.01	0.2	18
256	5.8	<0.01	0.05	0.3	<0.01	<0.01	0.8	19
257	6.9	<0.01	<0.01	4.1	<0.01	<0.01	1.1	20

Table 3. Social, physical, and chemical characteristics of Section 01 of Quemahoning Creek (818E), Somerset County; 1983 and 1997.

Characteristics	Description
USGS Quadrangle	R13 (Somerset)
Social:	
Ownership	
Date Assessed	4/83
% Public	0
% Private (open)	100
% Private (closed)	0
Road Accessibility	
Date Assessed	4/83
% within 100 m	71
% within 300 m	100
% within 500 m	100
Parking	
Date Assessed	
Spaces (#/km)	
Human Population	
Census Year	1980
Density (#/sq km)	44
Physical:	
Length (km)	8.4
Mean width (m)	5.4
Substrate	Site 0101 - Silt Site 0102 - Silt

Chemical	Site 0101		Site 0102	
	5/83	7/97	5/83	7/97
Air Temperature (°C)	16.0	NA	15.0	NA
Water Temperature (°C)	11.6	19.5	7.0	20.0
pH (standard units)	6.9	7.2	7.1	7.3
Specific Conductance (umhos)	NA	460	220	360
Total Alkalinity (mg/l)	17	64	18	58
Total Hardness (mg/l)	56	114	45	90
Dissolved Oxygen (mg/l)	9.4	NA	10.4	NA

Table 4. Social, physical, and chemical characteristics of Section 02 of Quemahoning Creek (818E), Somerset County; 1983 and 1997.

Characteristics	Description
USGS Quadrangle	R13 (Somerset) Q13 (Boswell)
Social:	
Ownership	
Date Assessed	4/83
% Public	0
% Private (open)	100
% Private (closed)	0
Road Accessibility	
Date Assessed	4/83
% within 100 m	76
% within 300 m	100
% within 500 m	100
Parking	
Date Assessed	
Spaces (#/km)	
Human Population	
Census Year	1980
Density (#/sq km)	26
Physical:	
Length (km)	6.8
Mean width (m)	6.2
Substrate	Site 0103 - Boulder, Rubble, Silt Site 0201 - Silt Site 0202 - Silt

Chemical	Site 0103		Site 0201		Site 0202	
	5/83	7/97	6/83	7/97	6/83	7/97
Air Temp. (°C)	16.0	NA	21.0	NA	19.0	NA
Water Temp. (°C)	11.7	16.0	14.5	19.0	12.0	18.5
pH	6.3	6.6	6.7	6.9	6.5	6.7
Spec. Cond. (umhos)	230	480	210	440	360	520
Alkalinity (mg/l)	8	56	16	56	10	32
Hardness (mg/l)	800	182	80	161	232	240
Dis. Oxygen (mg/l)	12.4	NA	8.2	NA	9.0	NA

Table 5. Social, physical, and chemical characteristics of Section 03 of Quemahoning Creek (818E), Somerset County; 1983 and 1997.

Characteristics	Description
USGS Quadrangle	Q13 (Boswell) Q14 (Hooversville)
Social:	
Ownership	
Date Assessed	4/83
% Public	0
% Private (open)	100
% Private (closed)	0
Road Accessibility	
Date Assessed	4/83
% within 100 m	59
% within 300 m	100
% within 500 m	100
Parking	
Date Assessed	
Spaces (#/km)	
Human Population	
Census Year	1990
Density (#/sq km)	33
Physical:	
Length (km)	10.5
Mean width (m)	15.2
Substrate	Site 0301 - Rubble, Silt Site 0302 - Rubble, Silt Site 0303 - Boulder, Rubble, Silt

Chemical	Site 0301		Site 0302		Site 0303	
	6/83	7/97	6/83	7/97	6/83	7/97
Air Temp. (°C)	22.0	NA	22.0	NA	26.0	NA
Water Temp. (°C)	16.0	20.0	11.0	19.0	19.0	19.5
pH	6.3	6.4	6.2	6.5	6.7	7.0
Spec. Cond. (umhos)	195	390	210	410	310	550
Alkalinity (mg/l)	8	22	12	46	11	38
Hardness (mg/l)	80	175	144	245	120	254
Dis. Oxygen (mg/l)	8.0	NA	8.0	NA	9.9	NA

Table 6. Social, physical, and chemical characteristics of Section 04 of Quemahoning Creek (818E), Somerset County; 1983 and 1997.

Characteristics	Description
USGS Quadrangle	Q14 (Hooversville)
Social:	
Ownership	
Date Assessed	4/83
% Public	0
% Private (open)	100
% Private (closed)	0
Road Accessibility	
Date Assessed	4/83
% within 100 m	76
% within 300 m	100
% within 500 m	100
Parking	
Date Assessed	
Spaces (#/km)	
Human Population	
Census Year	1980
Density (#/sq km)	53
Physical:	
Length (km)	2.1
Mean width (m)	13.6
Substrate	Rubble, Gravel, Silt

Chemical	Site 0401	
	6/83	7/97
Air Temperature (°C)	23.0	NA
Water Temperature (°C)	19.5	19.0
pH (standard units)	7.1	7.0
Specific Conductance (umhos)	250	230
Total Alkalinity (mg/l)	9	26
Total Hardness (mg/l)	80	78
Dissolved Oxygen (mg/l)	8.3	NA

Table 7. Index of Biotic Integrity designations for fish species collected in Quemahoning Creek (818E), Somerset County; July 1997. I = insectivore, P = piscivore, O = omnivore, G = generalist feeder; t = tolerant, i = intolerant

	IBI group	Trophic group	Tolerance designation	Simple lithophilic spawners	Stenothermal coolwater & coldwater
Brown trout	salmonid	I/P			X
Bluntnose minnow	cyprinid	O	t		
Blacknose dace	cyprinid	G	t	X	
Redside dace	cyprinid	I	i	X	X
Creek chub	cyprinid	G	t		
Golden shiner	cyprinid	O	t		
White sucker	sucker	O	t	X	
Northern hog sucker	sucker	I	i	X	
Brown bullhead	--	I	t		
Yellow bullhead	--	I	t		
Rock bass	sunfish	I/P	i		
Pumpkinseed	sunfish	I			
Bluegill	sunfish	I			
Green sunfish	sunfish	I	t		
Largemouth bass	--	I/P			
Smallmouth bass	--	I/P			
Yellow perch	--	I/P			
Blackside darter	darter	I		X	
Greenside darter	darter	I	i	X	
Fantail darter	darter	I			
Johnny darter	darter	I			
tled sculpin	sculpin		i		X

Table 8. Species occurrence at Site 0101 (River Mile 18.62) for Section 01 of Quemahoning Creek (818E), Somerset County; May 1983 and July 1997.

Common Name	Scientific Name	05/83	07/97
Redside dace	*Clinostomus elongatus*		X
Bluntnose minnow	*Pimephales notatus*	X	X
Blacknose dace	*Rhinichthys atratulus*		X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*	X	
Pumpkinseed	*Lepomis gibbosus*	X	X
Largemouth bass	*Micropterus salmoides*	X	X
Johnny darter	*Etheostoma nigrum*	X	X
Bluegill	*Lepomis macrochirus*		X
Mottled sculpin	*Cottus bairdi*		X
Green sunfish	*Lepomis cyanellus*		X
Species Total		7	11

Table 9. Fish abundance at nine sites in Quemahoning Creek (818E), Somerset County; July 1997.

	0101	0102	0103	0201	0202	0301	0302	0303	0401
Brown trout		1	1						1
Bluntnose minnow	7	19		1				16	39
Blacknose dace	62		151			12	4	100	
Redside dace	1	8							
Creek chub	186	54	125	12	10	35	1	22	2
Golden shiner		3		1					
White sucker	76	183	192	79	18	9	5	117	4
Northern hog sucker									50
Brown bullhead					1				5
Yellow bullhead								53	1
Rock bass		1				1		7	40
Pumpkinseed	7	3		3		4	1		10
Bluegill	7	7				2		9	18
Green sunfish	1	4							
Largemouth bass	12	1				1		2	
Smallmouth bass									2
Yellow perch								10	1
Blackside darter						1		1	11
Greenside darter									16
Fantail darter						3		24	10
Johnny darter	3	8	2		7	12			
Mottled sculpin	20	37	5					4	
Species total	11	13	6	5	4	10	4	12	15
Site length	118 m	200 m	209 m	200 m	200 m	200 m	100 m	200 m	200 m
[illegible]ort (minutes)	24	45	[illegible]	45	34	33	17	60	40

Table 10. Index of Biotic Integrity (IBI) metrics for the nine sites in Quemahoning Creek (818E), Somerset County; July 1997.

IBI Metrics	0101	0102	0103	0201	0202	0301	0302	0303	0401
Species Richness Metrics									
# of species	11	13	6	5	4	10	4	12	15
# of salmonid sp	0	1	1	0	0	0	0	0	1
# of sculpin sp	1	1	1	0	0	0	0	1	0
# of salmonids & sculpins sp	1	2	2	0	0	0	0	1	1
# of cyprinid sp	4	4	2	3	1	2	2	3	2
# of darter sp	1	1	1	0	1	3	0	2	3
# of sucker sp	1	1	1	1	1	1	1	1	2
# of sunfish sp	3	4	0	1	0	3	1	2	3
# of intolerant sp	2	3	1	0	0	1	0	2	3
Trophic Composition Metrics									
% of individuals that are tolerant sp	87	80	98	97	81	70	91	84	24
% of individuals that are stenothermal coolwater & coldwater	5	14	1	0	0	0	0	1	0.5
% of individuals that are generalists	65	16	58	13	28	59	45	33	1
% of individuals that are omnivores	22	62	40	84	50	11	45	36	20
% of individuals that are generalists/omnivores	87	79	98	97	78	70	91	70	21
% of individuals that are insectivores	10	21	1	3	22	30	9	30	78
% of individuals that are top carnivore or piscivore	3	1	0.2	0	0	3	0	5	21
% of individuals that are simple lithophilous sp	36	58	72	82	50	28	82	60	39
Abundance Metrics									
Catch-per-unit-effort (CPUE) (#/hr)	955	439	571	128	64	145	39	365	315
CPUE (#/hr), excluding tolerant sp	125	88	10	4	12	44	4	57	239

Table 11. Species occurrence at Site 0102 (River Mile 17.21) for Section 01 of Quemahoning Creek (818E), Somerset County; May 1983 and July 1997.

Common Name	Scientific Name	05/83	07/97
Brown trout	*Salmo trutta*	X	X
Redside dace	*Clinostomus elongatus*		X
Bluntnose minnow	*Pimephales notatus*		X
Blacknose dace	*Rhinichthys atratulus*	X	
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*	X	
Green sunfish	*Lepomis cyanellus*		X
Pumpkinseed	*Lepomis gibbosus*	X	X
Bluegill	*Lepomis macrochirus*	X	X
Mottled sculpin	*Cottus bairdi*	X	X
Johnny darter	*Etheostoma nigrum*		X
Rock bass	*Ambloplites rupestris*		X
Largemouth bass	*Micropterus salmoides*		X
Golden shiner	*Notemigonus crysoleucas*		X
Species Total		8	13

Table 12. Species occurrence at Site 0103 (River Mile 15.35 in 1983 and River Mile 15.22 in 1997) for Section 02 of Quemahoning Creek (818E), Somerset County; May 1983 and July 1997.

Common Name	Scientific Name	05/83	07/97
Brown trout	*Salmo trutta*	X	X
Brook trout	*Salvelinus fontinalis*	X	
Bluntnose minnow	*Pimephales notatus*	X	
Blacknose dace	*Rhinichthys atratulus*	X	X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*	X	
Brown bullhead	*Ameiurus nebulosus*	X	
Pumpkinseed	*Lepomis gibbosus*	X	
Bluegill	*Lepomis macrochirus*	X	
Johnny darter	*Etheostoma nigrum*	X	X
Mottled sculpin	*Cottus bairdi*	X	X
Species Total		12	6

Table 13. Species occurrence at Site 0201 (River Mile 13.45) for Section 02 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Golden shiner	*Notemigonus crysoleucas*	X	X
Bluntnose minnow	*Pimephales notatus*	X	X
Blacknose dace	*Rhinichthys atratulus*	X	
Creek chub	*Semotilus atromaculatus*		X
White sucker	*Catostomus commersoni*	X	X
Johnny darter	*Etheostoma nigrum*	X	
Mottled sculpin	*Cottus bairdi*	X	
Pumpkinseed	*Lepomis gibbosus*		X
Species Total		6	5

Table 14. Species occurrence at Site 0202 (River Mile 11.85) for Section 02 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Johnny darter	*Etheostoma nigrum*	X	X
Brown bullhead	*Ameiurus nebulosus*		X
Species Total		3	4

Table 15. Species occurrence at Site 0301 (River Mile 10.53) for Section 03 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Blacknose dace	*Rhinichthys atratulus*		X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*		X
Rock bass	*Ambloplites rupestris*		X
Bluegill	*Lepomis macrochirus*		X
Blackside darter	*Percina maculata*		X
Johnny darter	*Etheostoma nigrum*		X
Pumpkinseed	*Lepomis gibbosus*		X
Fantail darter	*Etheostoma flabellare*		X
Largemouth bass	*Micropterus salmoides*		X
Species Total		1	10

Table 16. Species occurrence at Site 0302 (River Mile 7.87) for Section 03 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Pumpkinseed	*Lepomis gibbosus*		X
Blacknose dace	*Rhinichthys atratulus*		X
Species Total		2	4

Table 17. Species occurrence at Site 0303 (River Mile 4.94) for Section 03 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Common shiner	*Luxilus cornutus*	X	
Blacknose dace	*Rhinichthys atratulus*		X
Creek chub	*Semotilus atromaculatus*	X	X
White sucker	*Catostomus commersoni*	X	X
Yellow bullhead	*Ameiurus natalis*	X	X
Brown bullhead	*Ameiurus nebulosus*	X	
Rock bass	*Ambloplites rupestris*	X	X
Bluegill	*Lepomis macrochirus*	X	X
Largemouth bass	*Micropterus salmoides*		X
Black crappie	*Pomoxis nigromaculatus*	X	
Fantail darter	*Etheostoma flabellare*		X
Yellow perch	*Perca flavescens*	X	X
Mottled sculpin	*Cottus bairdi*		X
Bluntnose minnow	*Pimephales notatus*		X
Blackside darter	*Percina maculata*		X
Species Total		9	12

Table 18. Species occurrence at Site 0401 (River Mile 0.46) for Section 04 of Quemahoning Creek (818E), Somerset County; June 1983 and July 1997.

Common Name	Scientific Name	06/83	07/97
Brown trout	*Salmo trutta*		X
Bluntnose minnow	*Pimephales notatus*	X	X
Blacknose dace	*Rhinichthys atratulus*	X	
Creek chub	*Semotilus atromaculatus*		X
White sucker	*Catostomus commersoni*	X	X
Northern hog sucker	*Hypentelium nigricans*		X
Yellow bullhead	*Ameiurus natalis*		X
Brown bullhead	*Ameiurus nebulosus*	X	X
Rock bass	*Ambloplites rupestris*	X	X
Pumpkinseed	*Lepomis gibbosus*	X	X
Bluegill	*Lepomis macrochirus*	X	X
Largemouth bass	*Micropterus salmoides*	X	
Yellow perch	*Perca flavescens*	X	X
Blackside darter	*Percina maculata*		X
Smallmouth bass	*Micropterus dolomieui*		X
Greenside darter	*Etheostoma blennoides*		X
Fantail darter	*Etheostoma flabellare*		X
Species Total		9	15

Table 19. Index of Biotic Integrity (IBI) metric rankings for the eight sites upstream of Quemahoning Reservoir in Quemahoning Creek (818E), Somerset County; July 1997. (Ranking: 1 = best - 8 = worst)

IBI Metrics	0101	0102	0103	0201	0202	0301	0302	0303
# of species	3	1	5	6	7	4	7	2
# of salmonid sp	3	1	1	3	3	3	3	3
# of sculpin sp	1	1	1	5	5	5	5	1
# of salmonids & sculpins sp	3	1	1	5	5	5	5	3
# of cyprinid sp	1	1	5	3	8	5	5	3
# of darter sp	3	3	3	7	3	1	7	2
# of sucker sp	1	1	1	1	1	1	1	1
# of sunfish sp	2	1	7	5	7	2	5	4
# of intolerant sp	2	1	4	6	6	4	6	2
% of individuals that are tolerant sp	5	2	8	7	3	1	6	4
% of individuals that are stenothermal coolwater & coldwater	2	1	3	5	5	5	5	3
% of individuals that are generalists	8	2	6	1	3	7	5	4
% of individuals that are omnivores	2	7	4	8	6	1	5	3
% of individuals that are generalists/omnivores	5	4	8	7	3	1	6	1
% of individuals that are insectivores	5	4	8	7	3	1	6	1
% of individuals that are top carnivore or piscivore	2	4	5	6	6	2	6	1
% of individuals that are simple lithophilous sp	7	5	3	1	6	8	1	4
Catch-per-unit-effort (CPUE) (#/hr)	1	3	2	6	7	5	8	4
CPUE (#/hr), excluding tolerant sp	1	2	6	7	5	4	7	3
Total score	57	45	81	96	92	65	99	49
[illegible]al Ranking	3	1	5	7	6	4	8	[illegible]

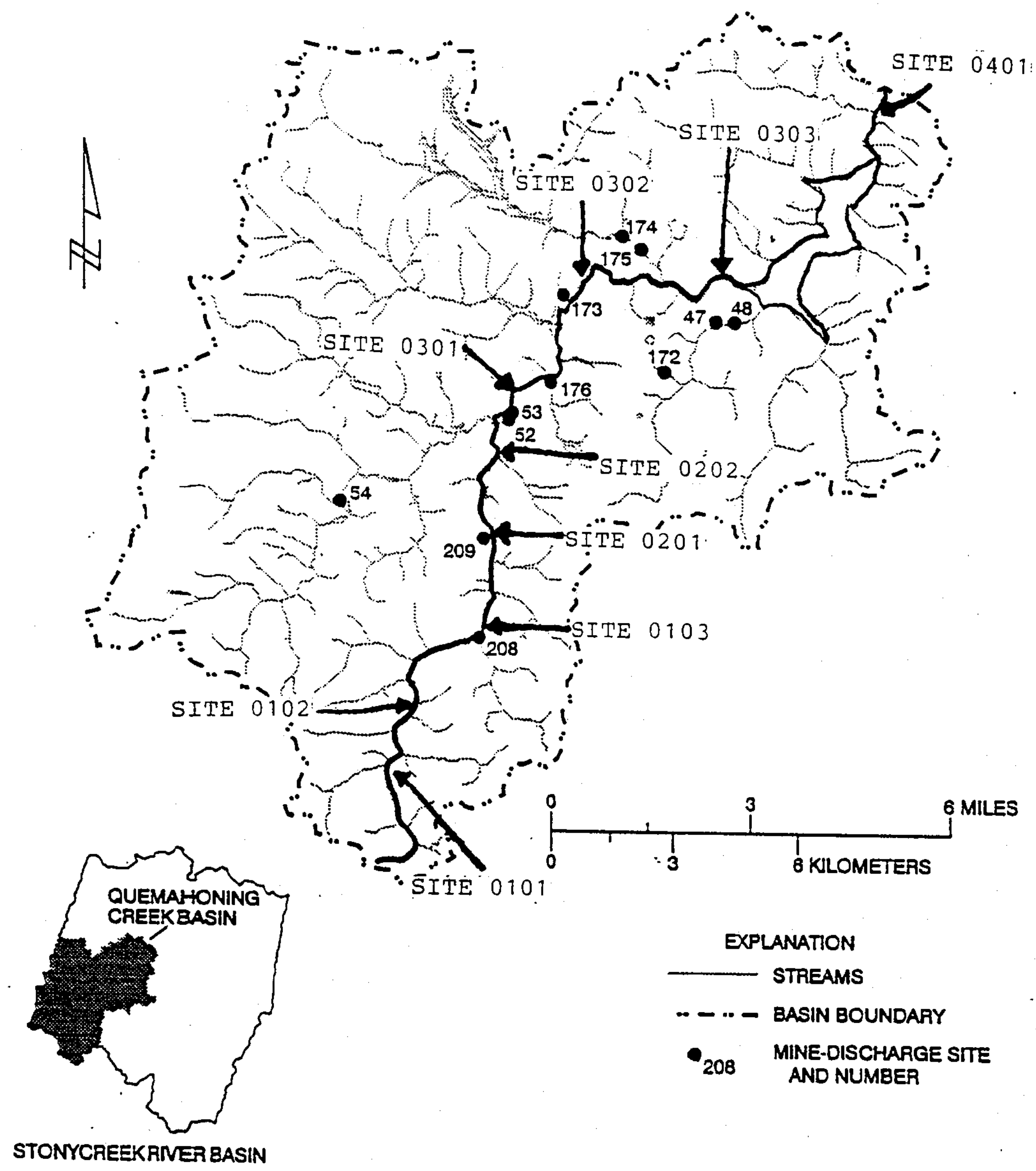


Figure 1. Location of the coal-mine discharge sites in the Quemahoning Creek Basin, Somerset County. Taken from Williams et al. (1996).

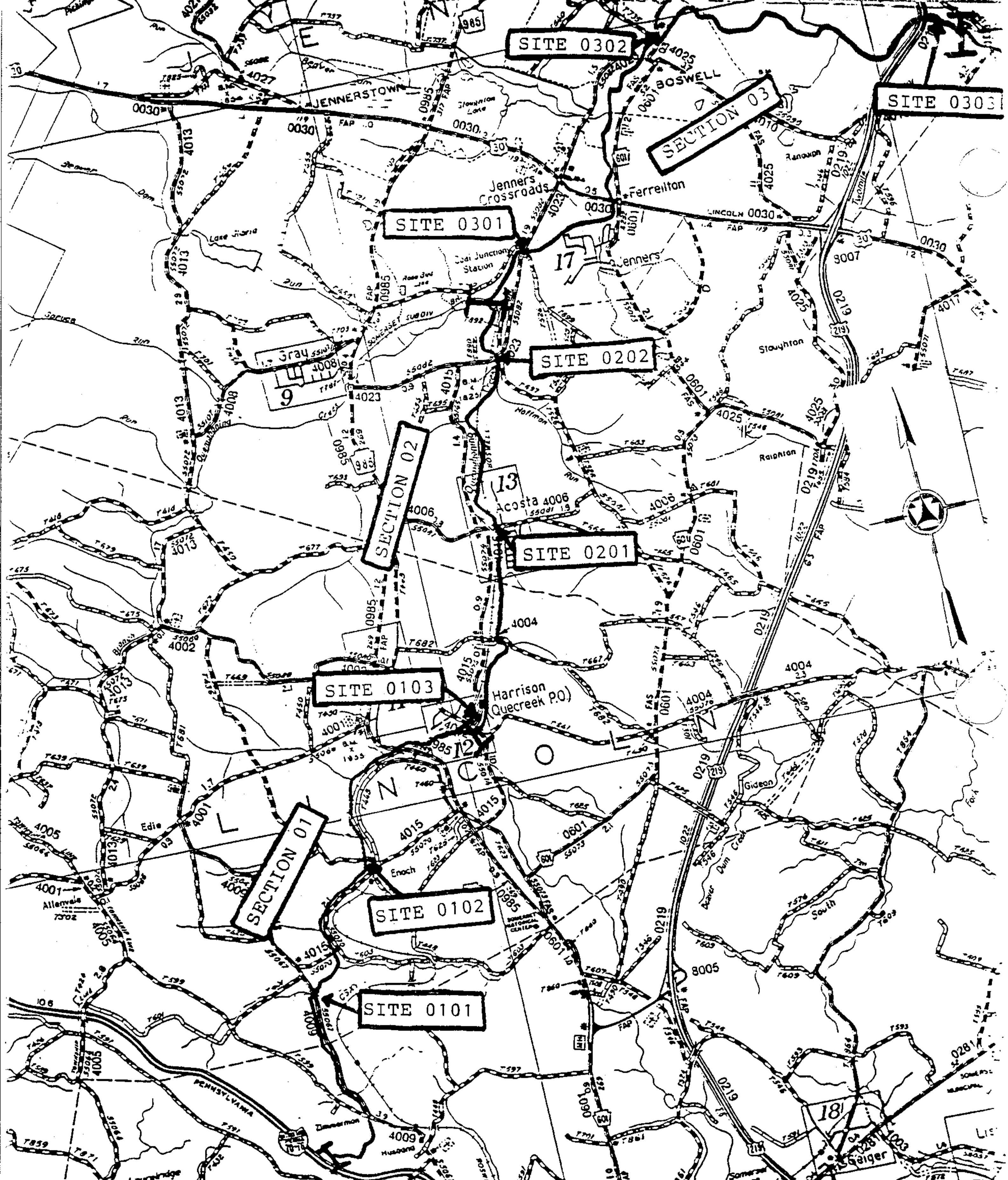
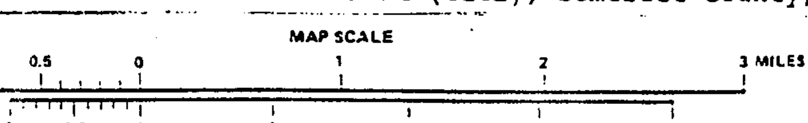


Figure 2. Site locations and section limits for Section 01-03 of Quemahoning Creek (818E), Somerset County; July 1997.



I = Section limit

Appendix C

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
January 29, 2002

ER: Coal Run (818E) Somerset County

EXAMINED: June 2000

BY: Jason Wisniewski, Rick Lorson, and Gary Smith

Acting Bureau Director Action: Martin Marcinko Date: 02-01-02

Division Chief Action: Richard A Snyder Date: 1-30-02

WW Unit Leader Action: ______ Date: ______

CW Unit Leader Action: R. Thomas Greene Date: 1/29/02

CWU COMMENTS:

Coal Run (818E), Section 01, was initially examined during June 2000 to document the status of the fishery and to collect baseline data on the resource.

Section 01 can be characterized as a small, coldwater stream. A total of five fish species were captured during the 2000 survey, including 30 y-o-y wild brown trout (3.77 kg/ha) and one adult wild brook trout (3.07 kg/ha).

RECOMMENDATIONS:

1. Coal Run (818E), Section 01, should be managed as a biomass Class D wild trout fishery under the Natural Yield option. Statewide regulations should apply with no stocking.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Coal Run (818E) Management Report (Abstract)

Prepared by
Jason Wisniewski, Rick Lorson, and Gary Smith

Fisheries Management Database Name: Coal Rn
Lat/Lon: 400927790625

Date Sampled: June 2000 Date Prepared: May 2001

Coal Run is a 2.2 km long stream that flows through Jenner Township in western Somerset County. It is a tributary to Beaverdam Run, which empties into Lake Gloria before its confluence with the North Branch of Quemahoning Creek. Section 01 of Coal Run begins at the headwaters (River Mile (RM) 1.39) and extends 2.2 km to its mouth (RM 0.00) (Figure 1). The Department of Environmental Protection (DEP) Chapter 93 designation for Coal Run is Cold Water Fishes (CWF) (Pennsylvania Department of Environmental Protection 1999). The Pennsylvania Fish and Boat Commission (PFBC) Fisheries Management Area 8 had never surveyed Coal Run, and the purpose of the 2000 survey was to document the aquatic resource.

Data from Section 01 of Coal Run included physical, chemical, fish occurrence, and relative fish abundance. Fish sampling was accomplished with a Coffelt model BP-1C backpack electrofisher operated at 200 volts AC and 125 watts for 104 m at Site 0101. Total electrofishing effort at Site 0101 was 18 minutes. The assessment was conducted on June 20, 2000, according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°09'36", longitude 79°06'25" (RM 0.21). Trees dominated the bank vegetation and provided dense shade, and the substrate was composed of sand and gravel. Flow was normal, and the mean width was 3.2 meters. Erosion was rated as light.

The pH at Site 0101 was 6.9 standard units (SU), total alkalinity was 16 mg/l, and total hardness was 41 mg/l (Table 1). Conductivity was 233 umhos and total dissolved solids were 157 mg/l.
Five fish species were collected, including one wild brook trout

Salvelinus fontinalis in the 200 mm length group and 30 young of the year brown trout *Salmo trutta*, ranging from a length groups 25 mm to 75 mm (Table 2). A one pass catch estimate utilizing statewide mean weights for brown trout, estimated brown trout biomass to be 3.77 kg/ha (Table 3). Other species included mottled sculpin *Cottus bairdi*, creek chub *Semotilus atromaculatus*, and blacknose dace *Rhinichthys atratulus*. Blacknose dace were abundant at Site 0101. The absence of adult brown trout and young of the year brook trout may be the effect of drought years in 1998 and 1999 on this small headwater stream. Adult brook trout were sampled in Beaverdam Run below the confluence of Coal Run during the same week of sampling.

Coal Run positively influences water quality in Beaverdam Run, an acid sensitive stream. The pH and total alkalinity of Beaverdam Run upstream of the confluence of Coal Run was 5.6 and 2 mg/l, respectively (Smith and Lorson 2001). The pH and total alkalinity of Beaverdam Run downstream of Coal Run was 6.7 and 5 mg/l, respectively.

Management Recommendations

1. Coal Run should continue to be managed as a biomass Class D fishery under the Natural Yield option.

2. Coal Run should be added to the PFBC's listing of surveyed streams having verified trout reproduction.

3. A copy of this report should be sent to a) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222, b) Dave Steele, Manager, Somerset County Conservation District, 1509 North Center Avenue, Suite 103, Somerset, PA 15501, and c) Len Lichvar, Chairman, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907.

Literature Cited

Marcinko, M.T., R.D. Lorson, and R. Hoopes. 1986. Procedures for stream and river inventory information input. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Pennsylvania Department of Environmental Protection. 1999. Department of Environmental Protection Chapter 93. Water quality standards. Bureau of Watershed Conservation. Division of Water Quality Assessment and Standards. Harrisburg, Pennsylvania.

Smith, G.A., and R.D. Lorson. 2001. Beaverdam Run Management Report. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Table 1. Water quality characteristics at Site 0101 (River Mile 0.21) for Section 01 of Coal Run (818E), Somerset County; June 2000. Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°09′36″, longitude 79°06′25″.

Characteristic	6/20/00
Water Temperature (°C)	15
pH (standard units)	6.9
Total Alkalinity (mg/l)	16
Total Hardness (mg/l)	41
Specific Conductance (umhos)	233
Total Dissolved Solids (mg/l)	157

Table 2. Species occurrence at Site 0101 (River Mile 0.21) for Section 01 of Coal Run (818E), Somerset County; June 2000. Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°09′36″, longitude 79°06′25″.

Common name	Scientific name
Mottled sculpin	*Cottus bairdi*
Blacknose dace	*Rhinichthys atratulus*
Creek chub	*Semotilus atromaculatus*
Brook trout	*Salvelinus fontinalis*
Brown trout	*Salmo trutta*
Species Total: 5	

Table 3. Estimated biomass of brown trout at Site 0101 (River Mile 0.21) for Section 01 of Coal Run (818E), Somerset County; June 2000. Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°09'36'', longitude 79°06'25''.

Length Group (mm)	Length Frequency	#/ha	Kg/ha
25	2	67	0.06
50	19	633	1.90
75	9	300	1.80
TOTALS	30	1000	3.77

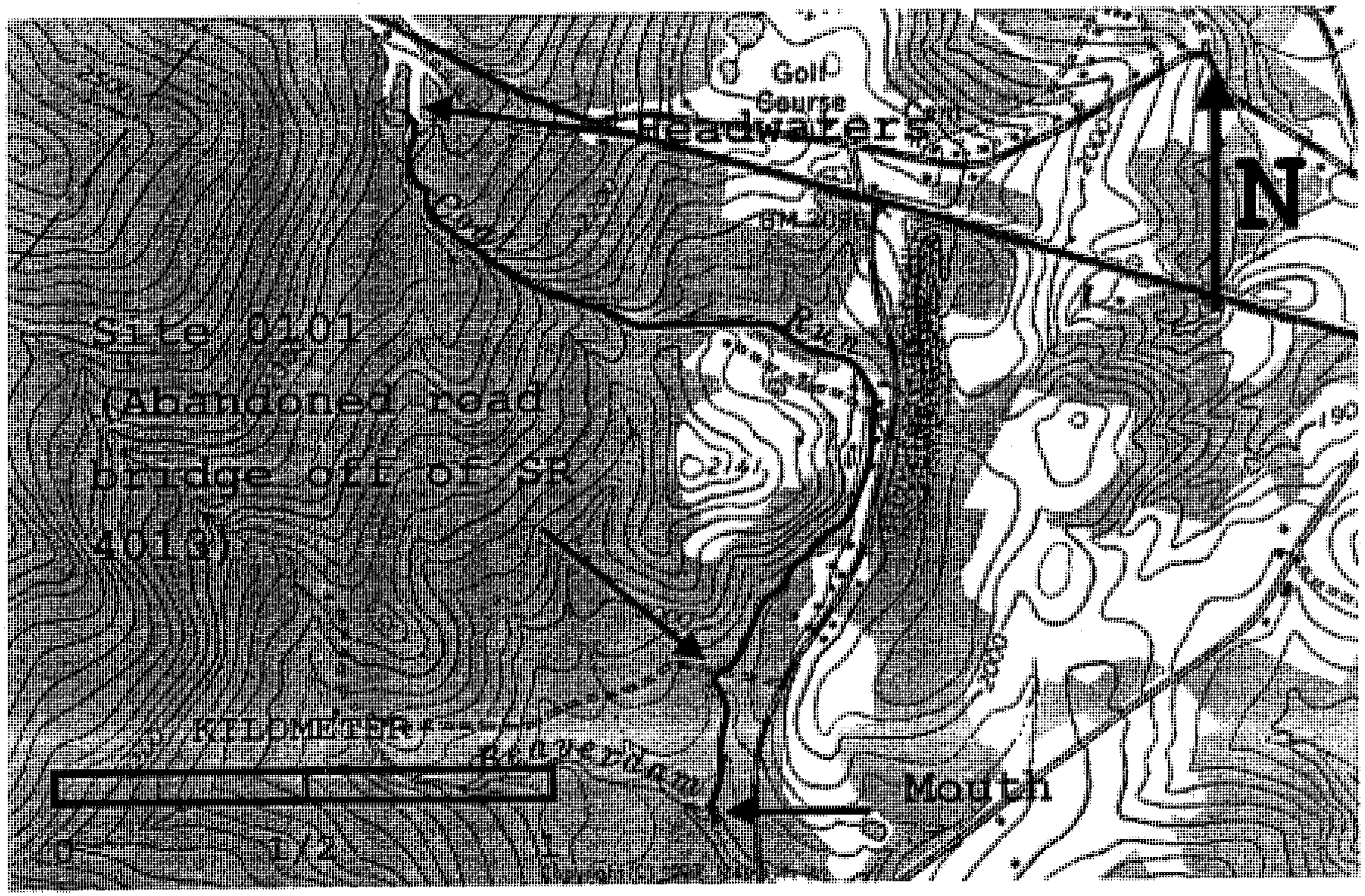


Figure 1. Site location for Section 01 of Coal Run (818E), Somerset County; June 2000.

APPENDIX D

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
January 29, 2002

ER: Beaverdam Run (818E) Somerset County

EXAMINED: June 2000

BY: Gary Smith and Rick Lorson

Bureau Director Action: Martin Marcinko Date: 01-30-02

Division Chief Action: Richard A. Snyder - concur Date: 1-29-02

WW Unit Leader Action: ______ Date: ______

CW Unit Leader Action: R. Thomas Greene Date: 1/29/02

CWU COMMENTS:

Beaverdam Run (818E), Section 01, was initially inventoried during June 2000 to document the status of the fishery and to collect baseline data on the resource.

Section 01 can be characterized as a small, infertile, coldwater stream. A total of four fish species were captured during the 2000 examination, including a biomass Class C wild brook trout fishery estimated at 12.00 ha.

CWU RECOMMENDATIONS:

1. Beaverdam Run (818E), Section 01, should be managed as a biomass Class C wild trout fishery under the Natural Yield option. Statewide regulations should apply with no stocking.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Beaverdam Run (818E) Management Report
Section 01
Abstract

Prepared by
Gary Smith and Rick Lorson

Fisheries Management Database Name: Beaverdam Rn
Lat/Lon: 400812790430

Date Sampled: June 2000 Date Prepared: March 2001

Beaverdam Run (818E) is a small freestone stream in northwestern Somerset County near Gray, PA. It originates on the eastern slope of Laurel Mountain and flows 5 km to its mouth on the North Branch of Quemahoning Creek at River Mile [RM] 0.78. Laurel Mountain receives the highest annual precipitation in the state and the highest wet deposition of sulfates and hydrogen ions in the Northeast leading to very low pH precipitation (Sharpe et al. 1984). Beaverdam Run is susceptible to the effects of acid precipitation due to the infertile soils in the watershed and location on Laurel Mountain. Lake Gloria is a privately owned 13 ha (33 acre) impoundment that is located on Beaverdam Run. The only named tributary to Beaverdam Run is Coal Run, which enters Beaverdam Run at RM 2.58. The Pennsylvania Department of Environmental Protection (DEP) Chapter 93 designation for Beaverdam Run is Cold Water Fishes (CWF) (DEP 1999). The Pennsylvania Fish and Boat Commission (PFBC) Fisheries Management Area 8 had never surveyed Beaverdam Run, and the purpose of the 2000 survey was to document the aquatic resource.

Section 01 of Beaverdam Run begins at its headwaters (RM 3.06) and extends 1.3 km to the backwater of Lake Gloria (RM 2.24) (Figure 1). Two sites in Section 01 were surveyed in 2000. Site 0101 was located 20 m upstream of Coal Run mouth at latitude 40°09′26″, longitude 79°06′26″ (RM 2.59). Site 0102 was located 230 m downstream of Coal Run mouth at latitude 40°09′20″, longitude 79°06′21″ (RM 2.45).

Physical, chemical, fish occurrence, and relative fish abundance data were collected at Site 0102. At Site 0101, only water quality sampling was conducted. Fish sampling was accomplished with a Coffelt model BP-1C backpack electrofisher operated at 250 volts AC

and 125 watts for 209 m at Site 0102. Trout abundance and biomass were estimated using the Petersen Mark-Recapture method at Site 0102. Total electrofishing effort was 34 minutes for the marking run and 33 minutes for the recapture run at Site 0102. The assessment was conducted on June 20 and 21, 2000 according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

Water quality between Site 0101 and Site 0102 was different due to the influence of Coal Run (Table 1). Site 0101, which is upstream of Coal Run, had a pH of 5.6, alkalinity of 2 mg/l, hardness of 11 mg/l, and conductivity of 40 umhos. Site 0102, which is downstream of Coal Run, had a pH of 6.7, alkalinity of 5 mg/l, hardness of 17 mg/l, and conductivity of 103 umhos.

Habitat at Site 0102 was good with a good pool to riffle ratio. Trees along the stream banks provided dense shading, but the stream banks were moderately eroded. Rubble, gravel, and sand were the major substrate types. Flow was normal and the mean width of the site was 4.0 meters.

Four fish species were collected at Site 0102 in 2000 (Table 2). Wild brook trout *Salvelinus fontinalis* ranged from length groups 25 mm to 225 mm. Total wild brook trout biomass was estimated at 12.00 kg/ha in 2000 (Table 3). Wild brown trout *Salmo trutta* ranged from length groups 50 mm to 75 mm and had an estimated biomass of 0.17 kg/ha in 2000. Total trout biomass was estimated at a Class C level of 12.17 kg/ha in Beaverdam Run, Section 01, in 2000. The 1998 and 1999 droughts probably reduced the abundance of trout in this small freestone stream. Mottled sculpin *Cottus bairdi* and blacknose dace *Rhinichthys atratulus* were classed as common at this site.

Coal Run, which empties into Beaverdam Run 230 m upstream of Site 0102, had 30 brown trout from length groups 25 mm to 75 mm in a 104 m long site in 2000. In 2000 Coal Run had a higher pH (6.9) and alkalinity (16 mg/l) than Beaverdam Run, Section 01. Unlike Coal Run, Beaverdam Run was dominated by brook trout, which are more tolerant of lower pH and drought conditions. The pH and alkalinity levels in Beaverdam Run, Section 01, would be reduced in the spring due to acid precipitation. It is also interesting to note that our survey did not produce any adult brown trout in either Coal Run or Beaverdam Run. Drought conditions coupled with low alkalinity may severely limit the brown trout population in this watershed. Therefore, brook trout will probably be more abundant than brown trout in Section 01 of Beaverdam Run unless water quality conditions improve.

Management Recommendations

Total trout biomass was estimated at a Class C level of 12.17 kg/ha (brook trout 12 kg/ha, brown trout 0.17 kg/ha) in Beaverdam Run, Section 01, in 2000. Section 01 will be managed as a trout biomass Class C fishery under the Natural Yield option.

2. Beaverdam Run, Section 01, should be added to the PFBC's listing of surveyed streams having verified trout reproduction.

3. This acid-sensitive stream would benefit from alkaline addition via limestone sand if a sponsor becomes available. The total standing stock of brook trout would probably increase to a "quality level" with this approach.

4. A copy of this report should be sent to a) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222, b) Dave Steele, Manager, Somerset County Conservation District, 1509 North Center Avenue, Suite 103, Somerset, PA 15501, c) Len Lichvar, Chairman, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907, and d) Randy Buchanan, President, Mountain Laurel Chapter Trout Unlimited, 1745 Regal Drive, Johnstown, PA 15904.

Literature Cited

Marcinko, M.T., R.D. Lorson, and R. Hoopes. 1986. Procedures for stream and river inventory information input. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Pennsylvania Department of Environmental Protection. 1999. Department of Environmental Protection Chapter 93. Water quality standards. Bureau of Watershed Conservation. Division of Water Quality Assessment and Standards. Harrisburg, Pennsylvania.

Sharpe, W.E., D.R. DeWalle, R.T. Leibfried, R.S. Dinicola, W.G. Kimmel, and L.S. Sherwin. 1984. Causes of acidification of four streams on Laurel Hill in southwestern Pennsylvania. Journal of Environmental Quality 13(4):619-631.

Table 1. Chemical characteristics of Site 0101 (RM 2.59) and Site 0102 (RM 2.45) in Section 01 of Beaverdam Run (818E), Somerset County; June 2000. Site 0101 was located 20 m upstream of Coal Run mouth at latitude 40°09'26", longitude 79°06'26". Site 0102 was located 230 m downstream of Coal Run mouth at latitude 40°09'20", longitude 79°06'21".

	Site 0101 6/21/00	Site 0102 6/20/00
Water temperature (°C)	15.0	15.5
pH (standard units)	5.6	6.7
Total Alkalinity (mg/l)	2	5
Total Hardness (mg/l)	11	17
Specific Conductance (umhos)	40	103
Total Dissolved Solids (mg/l)	24	70

Table 2. Species occurrence at Site 0102 (River Mile 2.45) in Section 01 of Beaverdam Run (818E), Somerset County; June 2000. Site 0102 was located 230 m downstream of Coal Run mouth at latitude 40°09'20", longitude 79°06'21".

Common name	Scientific name
Brook trout	*Salvelinus fontinalis*
Brown trout	*Salmo trutta*
Blacknose dace	*Rhinichthys atratulus*
Mottled sculpin	*Cottus bairdi*
Species Total: 4	

Table 3. Estimated abundance and biomass using the Petersen Mark-Recapture estimate for brook trout and brown trout at Site 0102 (River Mile 2.45) in Section 01 of Beaverdam Run (818E), Somerset County; June 2000. Site 0102 was located 230 m downstream of Coal Run mouth at latitude 40°09′20″, longitude 79°06′21″.

Length group (mm)	Brook Trout		Brown Trout	
	Population estimate	kg/ha	Population estimate	kg/ha
25	1	0.01	--	---
50	41	1.02	2	0.08
75	--	---	1	0.09
100	--	---	--	---
125	7	2.54	--	---
150	7	3.76	--	---
175	2	1.58	--	---
200	1	1.15	--	---
225	1	1.94	--	---
Totals	60	12.00	3	0.17

Figure 1. Site locations and section limits for Section 01 of Beaverdam Run (818E), Somerset County; June 2000. Site 0101 was located 20 m upstream of Coal Run mouth at latitude 40°09′26″, longitude 79°06′26″. Site 0102 was located 230 m downstream of Coal Run mouth at latitude 40°09′20″, longitude 79°06′21″.

APPENDIX E

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
February 5, 2002

TER: Beam Run (818E) Somerset County

EXAMINED: June 2000

BY: Jason Wisniewski, Rick Lorson and Gary Smith

Acting Bureau Director Action: Martin Marcinko Date: 02-05-02

Division Chief Action: Richard A Snyder - concur Date: 2-5-02

WW Unit Leader Action: ________ Date: ________

CW Unit Leader Action: R. Thomas Greene Date: 2/05/02

CWU COMMENTS AND RECOMMENDATIONS:

Beam Run (818E), Section 01, was initially examined during June 2000 to collect baseline data on the resource.

Section 01 can be characterized as a small, infertile, coldwater stream that is extremely sensitive to acid precipitation. The acid sensitive nature of this stream was evidenced by the chemical characteristics of the stream and the fact that no fish were captured during the 2000 inventory. ue to the lack of a sport fishery no further management actions are commended for Beam Run at this time.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION
Fisheries Management Area 8

Beam Run (818E) Management Report (**Abstract**)

Prepared by
Jason Wisniewski, Rick Lorson, and Gary Smith

Fisheries Management Database Name: Beam Rn
Lat/Lon: 400730790643

Date Sampled: June 2000 Date Prepared: August 2001

Introduction

Beam Run (18E) is a small stream located in northwestern Somerset County near Gray, PA. The stream originates on the eastern slope of Laurel Mountain and flows 2.1 km to its mouth on the North Branch of Quemahoning Creek at River Mile (RM) 3.62. Laurel Mountain receives the highest annual precipitation in the state and the highest wet deposition of sulfates and hydrogen ions in the Northeast, thus producing low pH precipitation (Sharpe et al. 1984). Poor soil fertility and underlying geology near Beam Run makes it extremely sensitive to the effects of acid precipitation.

In June 1998, 90.5 tons of 83.8% CCE limestone sand added to Beam Run resulted in immediate increases in the pH and alkalinity levels of the stream (Memo from David Creamer to Len Lichvar 8/14/1998). Liming occurred only during 1998 as part of project by the Somerset County Conservation District. Section 01 of Beam Run begins at the headwaters (RM 1.29) and extends to its mouth (RM 0.00) (Figure 1).

The Pennsylvania Department of Environmental Protection (DEP) Chapter 93 designation for Beam Run is Cold Water Fishes (CWF) (PA-DEP 1999). The Pennsylvania Fish and Boat Commission (PFBC) Fisheries Management Area 8 had never surveyed Beam Run, and the purpose of the 2000 survey was to document the aquatic resource.

Data from Section 01 of Beam Run included physical, chemical, and fish occurrence. Fish sampling was accomplished with a Coffelt model BP-1C backpack electrofisher operated at 350 volts AC and 125 watts for 109 m at Site 0101. Total electrofishing effort at Site 0101 was 8 minutes. The assessment was conducted on June 20, 2000, according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°07′41″, longitude 79°07′02″ (RM 0.36). Trees dominated the bank vegetation and provided dense shade, and the substrate was composed of sand and silt. Flow was normal, and the mean width was 4.0 meters. Erosion was rated as moderate. Woody debris provided ample fish habitat.

The pH at Site 0101 was 4.7 standard units (SU), total alkalinity was 0 mg/l, and total hardness was 9 mg/l (Table 1). Specific conductance was 41 umhos and total dissolved solids were 28 mg/l. No fish were captured during the electrofishing run.

The absence of fish is indicative of the low pH associated with acid precipitation on Laurel Mountain. Heavy precipitation along with annual snowmelt runoff could further depress the pH and alkalinity levels of Beam Run.

Similar observations were documented in 2000 on other streams located on the eastern slope of Laurel Mountain. Spruce Run, Beaverdam Run, and Coal Run, all originate in Jenner Township near Beam Run. Spruce Run had a pH of 4.3 and a total alkalinity of 0 mg/l during 2000 (PFBC Files 2000) (Table 2). Beaverdam Run had a pH and total alkalinity of 5.6 and 2 mg/l at Site 0101, and 6.7 and 5 mg/l at Site 0102, respectively in 2000 (Smith and Lorson 2001). Coal Run had a pH of 6.9 and a total alkalinity of 16 mg/l in 2000 (Wisniewski et al. 2001).

Management Recommendations

1. Beam Run should continue to be managed under the Natural Yield option.

2. A copy of this report should be sent to a) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222, b) Dave Steele, Manager, Somerset County Conservation District, 1509 North Center Avenue, Suite 103, Somerset, PA 15501, and c) Len Lichvar, Chairman, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907.

Literature Cited

Marcinko, M.T., R.D. Lorson, and R. Hoopes. 1986. Procedures for stream and river inventory information input. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Pennsylvania Department of Environmental Protection. 1999. Department of Environmental Protection Chapter 93. Water quality standards. Bureau of Watershed Conservation. Division of Water Quality Assessment and Standards. Harrisburg, Pennsylvania.

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Sharpe, W.E., D.R. DeWalle, R.T. Leibfried, R.S. Dinicola, W.G. Kimmel, and L.S. Sherwin. 1984. Causes of acidification of four streams on Laurel Hill in southwestern Pennsylvania. Journal of Environmental Quality 13(4):619-631

Smith, G.A., and R.D. Lorson. 2001. Beaverdam Run Management Report. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Wisniewski, J.M., R.D. Lorson, and G.A. Smith. 2001. Coal Run Management Report. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Table 1. Water quality characteristics at Site 0101 (River Mile 0.36) for Section 01 of Beam Run (818E), Somerset County; June 2000. Site 0101 was located at the abandoned road bridge off of SR 4013 at latitude 40°07'41", longitude 79°07'02".

Characteristic	6/20/00
Water Temperature (°C)	14
pH (standard units)	4.7
Total Alkalinity (mg/l)	0
Total Hardness (mg/l)	9
Specific Conductance (umhos)	41
Total Dissolved Solids (mg/l)	28

Table 2. Comparison of chemical characteristics of Beam Run, Spruce Run, Coal Run, and Beaverdam Run (Sites 0102 and 0201), Somerset County; June 2000.

Chemical characteristic	Beam Run	Spruce Run	Coal Run	Beaverdam Run Site	
				0101	0102
Water Temperature (°C)	14.0	13.0	15.0	15.0	15.5
pH (standard units)	4.7	4.3	6.9	5.6	6.7
Total Alkalinity (mg/l)	0	0	16	2	5
Total Hardness (mg/l)	9	6	41	11	17
Specific Conductance (umhos)	41	43	233	40	103
Total Dissolved Solids (mg/l)	28	29	157	24	70

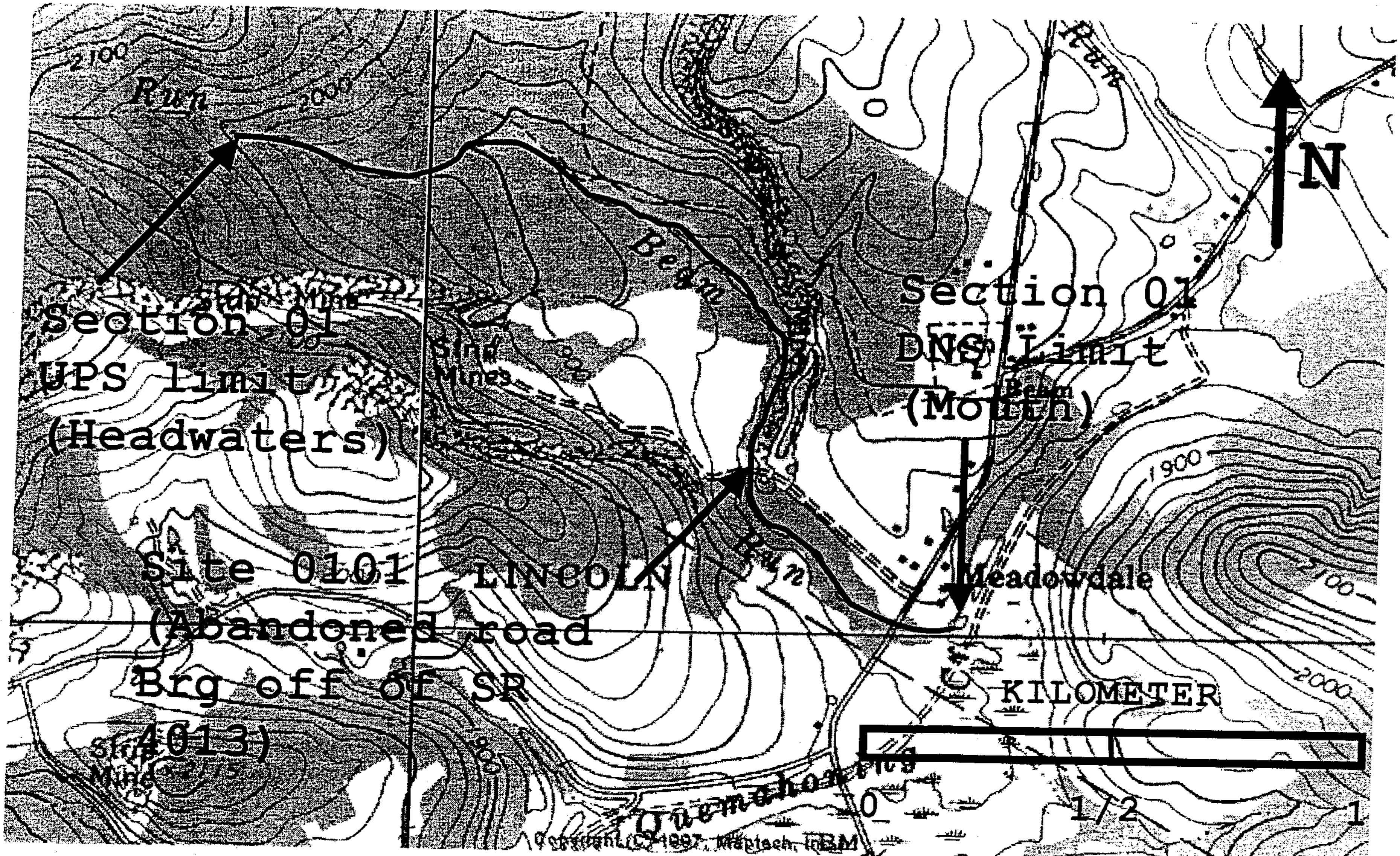

Figure 1. Site location and section limits for Section 01 of Beam Run (818E), Somerset County; June 2000.

Appendix F

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION

Higgins Run (818E) Management Report
Sections 01 and 02

Prepared by
Gary Smith and Rick Lorson

Fisheries Management Database Name: Higgins Rn
Lat/Lon: 400837785754

Date Sampled: July 2001 Date Prepared: May 2002

Introduction

Higgins Run is a 5.0-km coldwater stream located near Stoystown, PA in northcentral Somerset County and is a tributary to Quemahoning Reservoir. The Pennsylvania Department of Environmental Protection (DEP) Chapter 93 designation for Higgins Run, Section 01 (headwaters to the Solar #7 mine coal tipple) is Cold Water Fishes (CWF) (Pennsylvania Department of Environmental Protection 1999). Higgins Run, Section 02 (Solar #7 mine coal tipple to the mouth) is recognized as High Quality - Cold Water Fishes (HQ-CWF) because it contains a Class A wild brown trout population.

Genesis, Inc. Solar #7 mine is located along Higgins Run and was started in 1976. On average, 300 to 400 gallons per minute of mine water was pumped from the mine pool, treated, and released into Higgins Run near their coal tipple (River Mile [RM] 1.37) (P. Parsons, Genesis, Inc., personal communication). The raw mine water is alkaline but has a high level of iron. Genesis, Inc. used lime to treat the mine water up until a few years ago and then switched to caustic soda and a conglomerate. The treated mine discharge had a pH around 8.0, total alkalinity of 130 mg/l, total iron of 2 mg/l, total sulfate of 444 mg/l, and low levels of manganese and aluminum based on July, August, and September 2001 and February 2002 monitoring reports provided by DEP. The Solar #7 mine discharge increased Higgins Run pH by 0.6 units, total alkalinity by 6 mg/l, total iron by 0.3 mg/l, total manganese by 0.1 mg/l, and total sulfate by 78 mg/l based on five sampling dates from 1997 to 2002. Mining at the Solar #7 mine ceased on January 31, 2002. Pumping and treating of the mine water continued until February 27, 2002. By the end of April 2002, hydraulic seals will be used to seal the mine entrances. The coal stockyard will be cleaned up and seeded.

Genesis, Inc. started a new mine, Genesis #17 mine, in the fall of

2001, which is projected to last about 15 to 20 years. The Genesis #17 mine is located in the Beaverdam Run watershed, but the Genesis #17 mine water is being treated and discharged into an old deep mine complex (Quemahoning mine pool). The mine water is currently being treated due to a high level of suspended solids with caustic soda and a conglomerate (P. Parsons, Genesis, Inc., personal communication). Water in the Quemahoning mine pool comes out at the Stone Bridge borehole along Higgins Run just downstream of SR 0030 (RM 1.81). According to DEP, mine water from the Genesis #17 mine would account for a very small percentage (~1%) of the total amount of water in the Quemahoning mine pool (J. Winter, DEP - McMurray District Office, personal communication). The DEP claims that the Genesis #17 mine would have no effect on the quality or quantity of the water coming out of the Stone Bridge borehole. Water quality at the Stone Bridge borehole is stable based on eight samples between 1996 and 2002 provided by DEP. The borehole has a pH around 6.4, total alkalinity of 105 mg/l, total iron less than 0.3 mg/l, total manganese less than 0.2 mg/l, total aluminum less than 0.5 mg/l, and total sulfate of 326 mg/l.

Section 01 of Higgins Run begins at an unnamed pond in the headwaters (RM 3.07) and extends 2.7 km to the Solar #7 mine coal tipple (RM 1.37). The last survey of Higgins Run, Section 01 by the Pennsylvania Fish and Boat Commission (PFBC) was conducted in 1993 (Lorson and Miko 1994).

Section 02 of Higgins Run begins at the Solar #7 mine coal tipple (RM 1.37) and extends 2.2 km to the mouth at Quemahoning Reservoir (RM 0.00) (Figure 1). The last survey of Higgins Run, Section 02 by the PFBC was conducted in 2000 (Smith and Lorson 2000). Total brown trout *Salmo trutta* biomass was estimated at a Class A level of 56.00 kg/ha for Section 02 in 2000. The July 2001 survey of Higgins Run, Section 02 was part of a five-year (1998-2002) statewide study to evaluate Class A wild trout waters. One site in Section 02 will be sampled on an annual basis through 2002. Additional sites were surveyed in Section 01 to update our management data and provide background data for a change in mining operations in the watershed.

Methods

Two sites in Section 01 and one site in Section 02 were surveyed in 2001 to characterize the sections (Figure 1). Site 0101 was located 111 meters downstream of SR 0030 bridge (upstream of the Stone Bridge borehole) at latitude 40°07′27″, longitude 78°59′08″ (RM 1.96) and was sampled for the first time in 2001. Site 0102 was located 976 meters upstream from T-707 bridge (downstream of the Stone Bridge borehole) at latitude 40°07′49″, longitude 78°59′07″ (RM 1.61) and was at the same location as in 1993. Site 0201 was located 200 meters downstream from SR 4021 bridge (downstream of the Solar#7 discharge) at latitude 40°08′31″, longitude 78°57′59″ (RM 0.13) and was at the same location as in 1993, 1998, 1999, and 2000.

Physical, chemical, fish occurrence, relative fish abundance, and trout abundance data were collected for Higgins Run, Sections 01 and 02. Brown trout abundance and biomass at Site 0102 and Site 0201 were estimated using the Petersen Mark-Recapture method. Fish sampling was accomplished with a Coffelt model BP-1C backpack electrofisher operated at 100-200 volts AC and 125-150 watts for 101 m at Site 0101, 200 m at Site 0102, and 210 m at Site 0201. Total electrofishing effort was 19 minutes at Site 0101, 39 minutes for the marking run and 47 minutes for the recapture run at Site 0102, and 49 minutes for the marking run and 48 minutes for the recapture run at Site 0201. The assessment was conducted on July 11 and 12, 2001 according to *Procedures for Stream and River Inventory Information Input* (Marcinko et al. 1986).

Results/Discussion

Section 01

<u>Site 0101 (RM 1.96)</u>

Site 0101 was located just downstream of the SR 0030 bridge and upstream of the Stone Bridge borehole. Trees were the dominant bank vegetation and provided dense shading. Stream banks at Site 0101 were moderately eroded. Silt and rubble were the dominant substrate types. Flow was low, and the mean stream width was 2.5 meters.

At Site 0101, pH was 7.7, total alkalinity was 41 mg/l, total hardness was 100 mg/l, and conductivity was 283 umhos in 2001 (Table 1). The Pennsylvania Department of Environmental Resources (DER) sampled just downstream of SR 0030 in June 1981 (Hughey 1982). Water quality testing was conducted just after a heavy rain and the stream was very turbid from coal dust that had washed off SR 0030. In June 1981, pH was 6.5, total alkalinity was 38 mg/l, and total hardness was 48 mg/l.

The DER fish survey in June 1981 yielded four species: blacknose dace *Rhinichthys atratulus*, creek chub *Semotilus atromaculatus*, white sucker *Catostomus commersoni*, and mottled sculpin *Cottus bairdi* (Hughey 1982). Seven fish species were collected at Site 0101 in 2001 (Table 2). In 2001, 10 wild brown trout in the 50-mm to 175-mm length groups, seven pumpkinseeds *Lepomis gibbosus*, three bluegills *Lepomis macrochirus*, and one yellow perch *Perca flavescens* were captured at the 101 m long site (Table 3). Overall, 69 total wild brown trout were captured in 290 meters of electrofishing at Site 0201 in 2001. Of the 10 total wild brown trout, 2 were legal size (≥ 175 mm) trout. Total wild brown trout biomass using a one-pass catch estimate was 6.70 kg/ha in 2001. Biomass of wild brown trout less than 150 mm was estimated at 0.80 kg/ha at Site 0101 in 2001.

<u>Site 0102 (RM 1.61)</u>

Site 0102 was located in the lower portion of Section 01, downstream of the Stone Bridge borehole. Trees were the dominant bank vegetation and provided dense shading. Stream banks were heavily eroded. Silt, gravel, and rubble were the major substrate types. Flow was normal, and the mean stream width was 3.2 meters. Water quality at Site 0102 remained relatively the same from 1993 to 2001 (Table 4). The pH level at Site 0102 was 6.9 in 2001 compared to 7.3 in 1993. Total alkalinity and total hardness were 80 mg/l and 388 mg/l in 2001, respectively, and were very similar to 1993 levels. Specific conductance in 2001 was high at 487 umhos. All water quality parameter values, except for pH, increased from Site 0101 in 2001 to Site 0102 in 2001.

Wild brown trout and mottled sculpin were captured at Site 0102 in 2001 compared to only wild brown trout in 1993 (Table 5). Total wild brown trout biomass was estimated at a Class A level of 91.05 kg/ha in 2001 (Table 6). Overall, 185 total wild brown trout from length groups 25 mm to 300 mm were captured in 200 meters of electrofishing at Site 0102 in 2001. Of the 185 total wild brown trout, 17 were legal size (≥ 175 mm) trout, including one fish ≥ 300 mm (Table 7). In 1993, a total of five wild brown trout from length groups 200 mm to 275 mm were collected at Site 0102. Total wild brown trout biomass using a one-pass catch estimate was 9.81 kg/ha in 1993. In 2001, 5% of the estimated wild brown trout abundance (N/km) and 44% of the estimated wild brown trout biomass (kg/ha) were composed of legal size (≥ 175 mm) trout.

Section 02

Site 0201 (RM 0.13)

The water quality at Site 0201 in 2001 remained relatively the same from previous surveys (Table 8). The pH of 7.9 and total alkalinity of 97 mg/l were slightly higher than previous years and were the highest recorded. Total hardness, specific conductance, and total dissolved solids in 2001 were within the ranges observed in previous surveys. Flow was normal at the time of the survey. Site 0201 historical mean stream width of 4.9 m was used for the 2001 survey to calculate the site area for trout abundance and biomass estimates.

Nine fish species were collected in 2001, which was comparable to previous surveys (Table 9). Wild brown trout, blacknose dace, and white sucker were captured during all PFBC surveys at Site 0201. Hatchery rainbow trout *Oncorhynchus mykiss* were collected for the second year in a row after fingerling rainbow trout were stocked in Quemahoning Reservoir in the summer of 2000 by the PFBC. Johnny darter *Etheostoma nigrum* was present for the first time in 2001.

Total wild brown trout biomass at Site 0201 in 2001 increased from the level in 2000 and was estimated at a Class A level of 79.31 kg/ha (Table 10 and Figure 2). The estimated wild brown trout abundance (N/km) of 1,672/km in 2001 was the highest on record for

Site 0201. The strong year class in 2000 resulted in 179% increase from 2000 to 2001 in biomass of brown trout from 100-174 mm. Overall, 238 total wild brown trout were captured in 210 meters of electrofishing at Site 0201 in 2001 (Table 11). Of the 238 total wild brown trout, 29 were legal size (≥ 175 mm) trout, including four fish ≥ 300 mm. In 2001, 9% of the estimated wild brown trout abundance (N/km) and 55% of the estimated wild brown trout biomass (kg/ha) were composed of legal size (≥ 175 mm) trout. Total hatchery rainbow trout biomass at Site 0201 was estimated at 4.84 kg/ha in 2001. Fingerling hatchery rainbow trout were stocked in Quemahoning Reservoir on a one-time basis in the summer of 2000 by the PFBC.

The sectioning strategy of Higgins Run will be changed due to the closing of the Solar #7 mine and the Class A wild brown trout population at Site 0102. Starting in 2002, Section 01 of Higgins Run will begin at an unnamed pond in the headwaters (River Mile [RM] 3.07) and extend 2.0 km to the Stone Bridge borehole (RM 1.81) (Figure 1). Section 02 of Higgins Run will begin at the Stone Bridge borehole (RM 1.81) and extend 2.9 km to the mouth at Quemahoning Reservoir (RM 0.00). The resectioning of Higgins Run will increase the length of Section 02, which has Class A wild brown trout population, from 2.2 km to 2.9 km.

The closing of the Solar #7 mine should not change the water quality in Higgins Run, Section 02 to the point of negatively affecting the wild brown trout population. The Solar #7 mine discharge increased Higgins Run pH by 0.6 units and total alkalinity by 6 mg/l based on five sampling dates from 1997 to 2002 provided by DEP. Based on our sampling, pH increased from 7.3 at Site 0102 (upstream of the Solar mine discharge) to 7.7 at Site 0201 (downstream of the Solar mine discharge) in 1993. Total alkalinity was higher at Site 0102 (89 mg/l) than at Site 0201 (83 mg/l) in 1993. During our 2001 sampling, pH and total alkalinity were higher at Site 0201 (7.9 and 97 mg/l) than at Site 0102 (6.9 and 80 mg/l). The water quality upstream of the Solar #7 mine was good enough to support a Class A wild brown trout population at Site 0102 in 2001. The wild brown trout population at Site 0201 was not the result of the treated mine discharge from Solar #7 mine; therefore, the Class A wild brown trout population at Site 0201 should be maintained at a high density after termination of treated mine discharge into the stream.

Several potential problems with the closing of the Solar #7 mine are water quantity during drought years and the possibility of the mine water not being contained in the mine pool. The raw mine water is alkaline, but has a high level of iron that may impair aquatic life in Higgins Run if the mine water entered Higgins Run.

The new Genesis #17 discharges treated mine water into the Quemahoning mine pool that comes out at the Stone Bridge borehole along Higgins Run just downstream of SR 0030. According to DEP, mine water from the Genesis #17 mine would account for a very small percentage (~1%) of the total amount of water in the Quemahoning mine pool and would have no effect on the quality or quantity of the water coming out of the Stone Bridge borehole. The borehole water quality should be monitored by DEP to ensure that water quality is not degraded and does not negatively affect one of the few Class A wild brown trout waters in southwestern PA.

Management Recommendations

1) Total wild brown trout biomass at Site 0201 increased from the level in 2000 and was estimated at a Class A level of 79.31 kg/ha in 2001. Continue to manage Higgins Run Section 02 as a Class A Wild Brown Trout water. Toward this end, rainbow trout will not be stocked in Quemahoning Reservoir.

2) Total wild brown trout biomass at Site 0102 was estimated at a Class A level of 91.05 kg/ha in 2001. Total wild brown trout biomass using a one-pass catch estimate was 9.81 kg/ha in 1993.

3) The sectioning strategy of Higgins Run will be changed due to the closing of the Solar #7 mine and the Class A wild brown trout population movement upstream to Site 0102. Starting in 2002, the Section 01 downstream limit / Section 02 upstream limit will be the Stone Bridge borehole. The resectioning of Higgins Run will increase the length of Section 02, which has Class A wild brown trout population, from 2.2 km to 2.9 km. This change should be made to DEP Chapter 93. A copy of this report should be provided to John Arway, PFBC, Environmental Services Division.

4) Ten wild brown trout, including seven young-of-the-year, were collected at Site 0101 in Higgins Run, Section 01 (headwaters to Stone Bridge borehole). Total wild brown trout biomass using a one-pass catch estimate was 6.70 kg/ha in 2001. Biomass of wild brown trout less than 150 mm was estimated at 0.80 kg/ha at Site 0101 in 2001. Higgins Run, Section 01 should be added to the PFBC's listing of surveyed streams having verified trout reproduction.

5) Resurvey Higgins Run, Section 02 in 2002 as part of a five-year (1998-2002) statewide study to evaluate Class A wild trout waters.

6) The closing of the Genesis, Inc. Solar #7 mine and opening of Genesis, Inc. Genesis #17 mine should be monitored to ensure that water quality is not degraded and does not negatively affect one of the few Class A wild brown trout waters in southwestern PA. A copy of this report should be sent to a) Tom Proch, Aquatic Biologist, Pennsylvania Department of Environmental Protection, 400 Water Front Drive, Pittsburgh, PA 15222, b) Department of Environmental Protection, District Mining Operations - Cambria Office, 286 Industrial Park Road, Ebensburg, PA 15931, c) Len Lichvar, Stonycreek Conemaugh River Improvement Project (SCRIP), P.O. Box 153, Johnstown, PA 15907 and d) James Grecco, Cambria Somerset Authority, 1001 Broad Street, Johnstown, PA 15906.

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Pennsylvania Department of Environmental Protection. 1999. Department of Environmental Protection Chapter 93. Water quality standards. Bureau of Watershed Conservation. Division of Water Quality Assessment and Standards. Harrisburg, Pennsylvania.

Smith, G., and R. Lorson. 2000. Higgins Run (818E) management report, Section 02. Pennsylvania Fish and Boat Commission files. Division of Fisheries Management. Fisheries Management Area 8. Somerset, Pennsylvania.

Table 1. Chemical characteristics of Site 0101 in Section 01 of Higgins Run (818E), Somerset County; July 2001. Site 0101 was located 111 meters downstream of SR 0030 bridge at latitude 40°07′27″, longitude 78°59′08″ (River Mile 1.96).

	7/11/01
Water temperature (°C)	19.0
pH (standard units)	7.7
Total Alkalinity (mg/l)	41
Total Hardness (mg/l)	100
Specific Conductance (umhos)	283
Total Dissolved Solids (mg/l)	190

Table 2. Species occurrence at Site 0101 in Section 01 of Higgins Run (818E), Somerset County; July 2001. Site 0101 was located 111 meters downstream of SR 0030 bridge at latitude 40°07′27″, longitude 78°59′08″ (River Mile 1.96).

Common name	Scientific name
Brown trout	*Salmo trutta*
Blacknose dace	*Rhinichthys atratulus*
Pumpkinseed	*Lepomis gibbosus*
Bluegill	*Lepomis macrochirus*
Yellow perch	*Perca flavescens*
Goldfish	*Carassius auratus*
Mottled sculpin	*Cottus bairdi*
Species Total: 7	

Table 3. Length frequency distribution for wild brown trout at Site 0101 in Section 01 of Higgins Run (818E), Somerset County; July 2001. Site 0101 was located 111 meters downstream of SR 0030 bridge at latitude 40°07′27″, longitude 78°59′08″ (River Mile 1.96).

Length group (mm)	Brown trout
50	6
75	1
100	--
125	--
150	1
175	2
Total	10

Table 4. Chemical characteristics of Site 0102 in Section 01 of Higgins Run (818E), Somerset County; September 1993 and July 2001. Site 0102 was located 976 meters upstream from T-707 bridge at latitude 40°07′49″, longitude 78°59′07″ (River Mile 1.61).

	9/16/93	7/11/01
Water temperature (°C)	16.0	13.0
pH (standard units)	7.3	6.9
Total Alkalinity (mg/l)	89	80
Total Hardness (mg/l)	392	388
Specific Conductance (umhos)	906	781
Total Dissolved Solids (mg/l)	613	525

Table 5. Species occurrence at Site 0102 in Section 01 of Higgins Run (818E), Somerset County; September 1993 and July 2001. Site 0102 was located 976 meters upstream from T-707 bridge at latitude 40°07′49″, longitude 78°59′07″ (River Mile 1.61).

Common name	Scientific name	9/16/93	7/11/01
Brown trout	*Salmo trutta*	X	X
Mottled sculpin	*Cottus bairdi*		X
	Species Total:	1	2

Table 6. Estimated abundance and biomass using the Petersen Mark-Recapture estimate for wild brown trout at Site 0102 in Section 01 of Higgins Run (818E), Somerset County; July 2001. Site 0102 was located 976 meters upstream from T-707 bridge at latitude 40°07′49″, longitude 78°59′07″ (River Mile 1.61).

Length group (mm)	Population estimate	N/ha	kg/ha	N/km
25	1	17	0.02	5
50	260	4,333	13.00	1,300
75	5	83	0.33	25
100	1	17	0.32	5
125	14	238	7.39	72
150	41	675	29.70	203
175	7	117	8.52	35
200	4	67	6.53	20
225	2	33	4.53	10
250	2	33	6.60	10
275	2	33	8.43	10
300	1	17	5.68	5
Totals	340	5,663	91.05	1,699

Table 7. Summary information for wild brown trout collected at Site 0102 in Section 01 of Higgins Run (818E), Somerset County; July 2001.

Stream	Higgins Run
Site Number	Site 0102
Site Description	1,067 yards upstream from T-707 bridge at latitude 40°07′49″, longitude 78°59′07″
Site River Mile (RM)	RM 1.61
Site Length	219 yards
Site Width	3.5 yards
Site Area	0.16 acre
Month/Year Sampled	July 2001
Total number of wild brown trout captured at the site	185
Total number of legal size (≥ 7 inches) wild brown trout captured at the site	17
Total number of wild brown trout ≥ 12 inches captured at the site	1
Total number of wild brown trout ≥ 14 inches captured at the site	0
Estimated number of wild brown trout from 100 yards of stream	30
Estimated number of legal size (≥ 7 inches) wild brown trout from 100 yards of stream	8
Estimated number of wild brown trout ≥ 12 inches from 100 yards of stream	0
Estimated number of wild brown trout ≥ 14 inches from 100 yards of stream	0

Table 8. Water quality characteristics for Site 0201 in Section 02 of Higgins Run (818E), Somerset County; September 1993, June 1998, June 1999, July 2000, and July 2001. Site 0201 was located 200 meters downstream from SR 4021 bridge at latitude 40°08′31″, longitude 78°57′59″ (River Mile 0.13).

Characteristic	9/16/93	6/29/98	6/22/99	7/06/00	7/11/01
Water Temperature (°C)	16.0	14.5	12.0	13.5	14.0
pH (standard units)	7.7	7.7	7.8	7.7	7.9
Total Alkalinity (mg/l)	83	67	74	80	97
Total Hardness (mg/l)	444	324	396	356	408
Specific Conductance (umhos)	1,057	690	925	805	880
Total Dissolved Solids (mg/l)	790	464	622	536	591

Table 9. Fish species occurrence at Site 0201 in Section 02 of Higgins Run (818E), Somerset County; September 1993, June 1998, June 1999, July 2000, and July 2001. Site 0201 was located 200 meters downstream from SR 4021 bridge at latitude 40°08′31″, longitude 78°57′59″ (River Mile 0.13).

Common name	Scientific name	9/93	6/98	6/99	7/00	7/01
Brown trout	*Salmo trutta*	X	X	X	X	X
Rainbow trout - hatchery	*Oncorhynchus mykiss*				X	X
Bluntnose minnow	*Pimephales notatus*	X		X		
Blacknose dace	*Rhinichthys atratulus*	X	X	X	X	X
Creek chub	*Semotilus atromaculatus*	X	X	X		
White sucker	*Catostomus commersoni*	X	X	X	X	X
Northern hog sucker	*Hypentelium nigricans*	X				
Yellow bullhead	*Ameiurus natalis*		X	X	X	X
Brown bullhead	*Ameiurus nebulosus*	X				
Pumpkinseed	*Lepomis gibbosus*	X				X
Bluegill	*Lepomis macrochirus*				X	X
Yellow perch	*Perca flavescens*	X				
Greenside darter	*Etheostoma blennioides*				X	
Johnny darter	*Etheostoma nigrum*					X
Mottled sculpin	*Cottus bairdi*		X	X	X	X
Species Total		9	6	7	8	9

Table 10. Estimated abundance and biomass using the Zippin three-pass removal estimate in 1993 and the Petersen Mark-Recapture estimate in 1998, 1999, 2000, and 2001 for wild brown trout at Site 0201 in Section 02 of Higgins Run (818E), Somerset County; September 1993, June 1998, June 1999, July 2000, and July 2001. Site 0201 was located 200 meters downstream from SR 4021 bridge at latitude 40°08′31″, longitude 78°57′59″ (River Mile 0.13).

Length group (mm)	Sept 16, 1993		June 29, 1998		June 22, 1999		July 06, 2000		July 11, 2001	
	N/km	kg/ha	N/km	kg/ha	N/km	kg/ha	N/km	kg/ha	N/km	kg/ha
25	--	--	5	0.01	14	0.03	10	0.02	19	0.04
50	--	--	607	3.82	343	1.44	959	6.04	1,032	6.50
75	161	2.51	38	0.40	--	--	181	2.66	77	1.30
100	26	0.76	33	1.19	10	0.36	57	2.04	61	1.93
125	--	--	134	7.87	122	6.94	14	0.99	166	9.05
150	27	2.98	198	20.35	91	8.06	71	7.05	174	17.17
175	19	3.10	114	16.56	24	3.20	36	4.80	67	9.24
200	14	3.08	14	3.51	82	17.49	24	5.30	14	3.06
225	20	7.29	24	6.25	54	14.63	38	11.76	19	5.00
250	40	18.13	30	13.06	19	6.44	5	1.97	24	10.60
275	16	10.03	29	17.34	5	2.38	10	5.88	--	--
300	--	--	5	3.03	10	6.66	5	3.60	10	6.66
325	5	4.91	10	8.76	10	6.90	5	3.89	5	3.88
350	--	--	--	--	5	4.70	--	--	5	4.88
Total	329	52.79	1,240	102.15	788	79.23	1,413	56.00	1,672	79.31

Table 11. Summary information for wild brown trout collected at Site 0201 in Section 02 of Higgins Run (818E), Somerset County; June 1998, June 1999, July 2000, and July 2001.

Stream	Higgins Run	Higgins Run	Higgins Run	Higgins Run
Site Number	Site 0201	Site 0201	Site 0201	Site 0201
Site Description	219 yards downstream from SR 4021 bridge	219 yards downstream from SR 4021 bridge	219 yards downstream from SR 4021 bridge	219 yards downstream from SR 4021 bridge
Site River Mile (RM)	RM 0.13	RM 0.13	RM 0.13	RM 0.13
Site Length	230 yards	230 yards	230 yards	230 yards
Site Width	5.4 yards	5.4 yards	5.4 yards	5.4 yards
Site Area	0.26 acre	0.26 acre	0.26 acre	0.26 acre
Month/Year Sampled	June 1998	June 1999	July 2000	July 2001
Total number of wild brown trout captured at the site	183	117	178	238
Total number of legal size (≥ 7 inches) wild brown trout captured at the site	43	38	22	29
Total number of wild brown trout ≥ 12 inches captured at the site	3	5	2	4
Total number of wild brown trout ≥ 14 inches captured at the site	0	1	0	1
Estimated number of wild brown trout from 100 yards of stream	113	72	129	153
Estimated number of legal size (≥ 7 inches) wild brown trout from 100 yards of stream	21	19	11	13
Estimated number of wild brown trout ≥ 12 inches from 100 yards of stream	1	2	1	2
Estimated number of wild brown trout ≥ 14 inches from 100 yards of stream	0	0	0	0

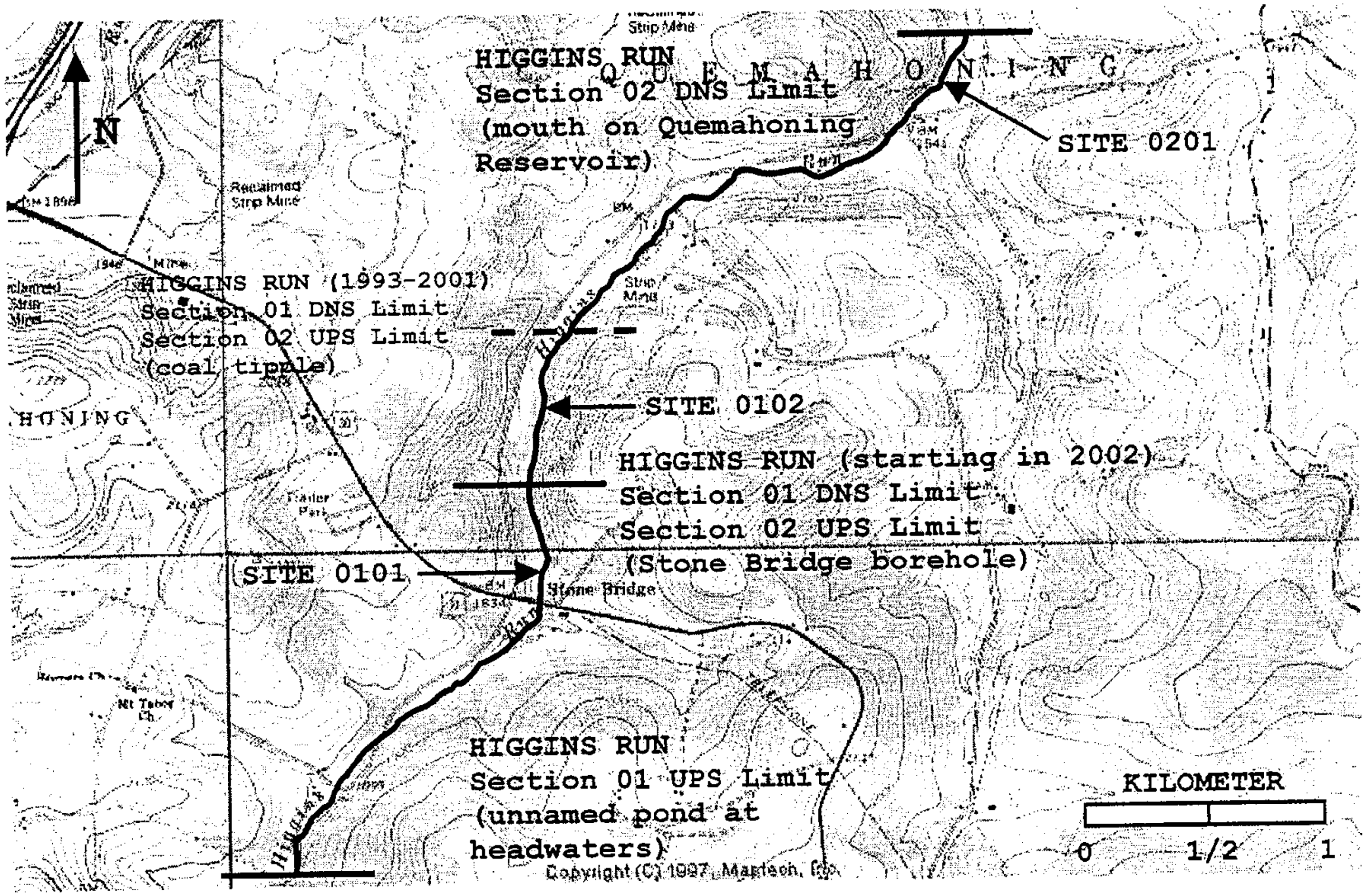

Figure 1. Site locations and section limits for Sections 01 and 02 of Higgins Run (818E), Somerset County; June 2001. Site 0101 was located 111 meters downstream of SR 0030 bridge at latitude 40°07'27", longitude 78°59'08" (RM 1.96). Site 0102 was located 976 meters upstream from T-707 bridge at latitude 40°07'49", longitude 78°59'07" (RM 1.61). Site 0201 was located 200 meters downstream from SR 4021 bridge at latitude 40°08'31", longitude 78°57'59" (RM 0.13).

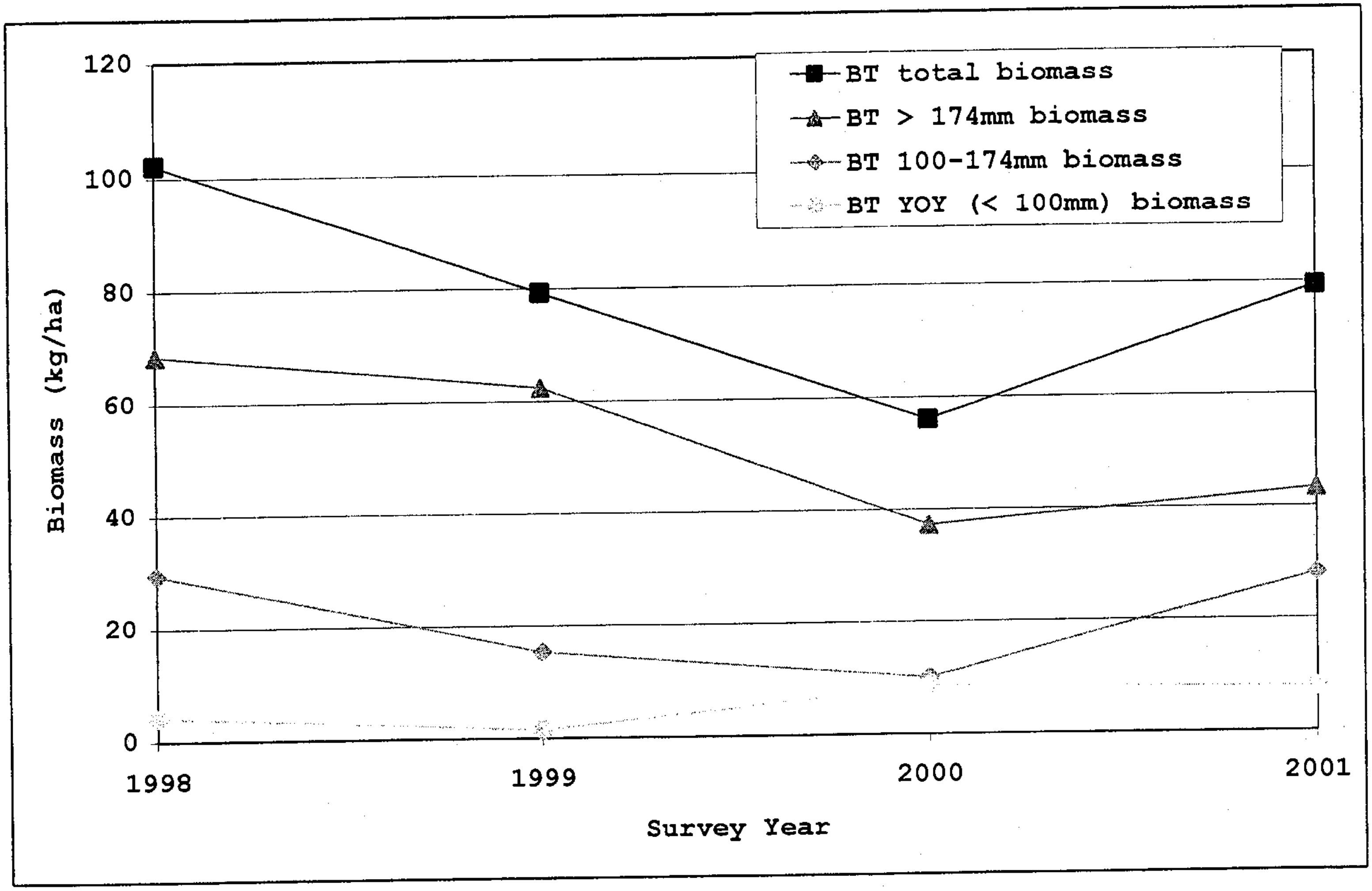

Figure 2. Estimated biomass of wild brown trout at Site 0201 in Section 02 of Higgins Run (818E), Somerset County; June 1998, June 1999, July 2000, and July 2001. Site 0201 was located 200 meters downstream from SR 4021 bridge at latitude 40°08′31″, longitude 78°57′59″ (River Mile 0.13).

APPENDIX 6

PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
December 10, 1999

DEC 15 1999

WATER: Quemahoning Reservoir (818E) Somerset County

EXAMINED: April, May, August 1999

BY: Rick Lorson and Gary Smith

Bureau Director Action: Delano R. Graff Date: 12-15-99

Division Chief Action: Richard A. Snyder Date: 12-10-99

WW Unit Leader Action: Robert M Lorantas Date: 12/10/99

CW Unit Leader Action: R. Thomas Greene Date: 12/10/99

AREA COMMENTS:

The Quemahoning Reservoir fish populations can be characterized as low in density overall, with several potentially impacted by historical shoreline angling pressure. Low lake productivity (mean alkalinity of 16 mg/l) has also served to keep fish populations at a low density. The primary limiting factor to the fish populations at this point is very infertile water quality brought on by acid mine drainage in the watershed.

The opening of Quemahoning Reservoir for recreational angling has been a highly anticipated occurrence for area anglers for a number of years now. The shoreline angling and associated harvest, which has occurred here historically, may have reduced the size quality of some of the fish populations. It is anticipated that when the lake opens formally to the public, heavy fishing pressure will occur. Fish management strategies will be necessary to maintain a quality fishing experience at Quemahoning Reservoir.

The highest density fish populations were largemouth bass, northern pike, and brown bullhead in 1999. The highest quality fish population in terms of numbers and sizes was largemouth bass. Low-density was recorded for walleye, brown trout, channel catfish, black crappie, bluegill, yellow perch, and white sucker. Forage fishes available included bluntnose minnow, common carp, golden shiner, and white sucker that were also of a low density. Overall growth was good for largemouth bass, walleye, and brown trout. Growth was slow for northern pike and younger age classes of bluegill and yellow perch. Quality size bluegill, black crappie, and yellow perch grew well.

It is imperative that efforts to improve water quality of tributary streams to the lake be pursued. Intensive fish management can only partially improve or maintain this fishery resource. The productive potential of the lake can improve with each water quality improvement, whether it is mine drainage, sewage, or agriculture related. Also, a conservation release from Quemahoning Reservoir must be implemented as soon as possible for improvement of the aquatic resources of Quemahoning Creek downstream.

AREA RECOMMENDATIONS:

1. Water quality issues in the Quemahoning Reservoir watershed will have a major affect on the future improvements to the fishery.

2. The high quality largemouth bass population at Quemahoning Reservoir should be managed with Big Bass Regulations.

3. Walleye are present in low numbers as a naturally reproducing population. Small walleye fingerlings should be stocked at 20/acre for the next five years to improve recruitment to the walleye fishery.

4. An adequate forage base is not present at Quemahoning Reservoir. Emerald shiners and spotfin shiners should be stocked in 2000 and 2001 to improve the forage base.

5. Panfish Enhancement Regulations should be applied to bluegill, crappie, and perch at Quemahoning Reservoir. The quality of the panfish fishery can be maintained and improved through this approach.

6. A higher density two-story brown trout fishery should be developed through stocking brown trout fingerlings annually at 63 per acre. Any stocking in the watershed, including sportsman stocking in Quemahoning Creek should be brown trout only.

7. Shoreline access is fair and could be enhanced through additional parking facilities. Boat access should be provided through opening the boat launch already constructed. A second boat launch area should b considered in the future. The size of Quemahoning Reservoir would permit consideration of a 10 horsepower boating limit on the lake. Yellow Creek Lake, Indiana County, is comparable in size and is managed with a 10 horsepower limit.

8. A copy of this report should be provided to the Cambria-Somerset Authority, 1001 Broad Street, Johnstown, PA. 15906; Stonycreek-Conemaugh River Improvement Project, PO Box 153, Johnstown, PA. 15907-0153; Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite 4, Bedford, PA. 15522; Western Pennsylvania Coalition for Abandoned Mine Reclamation, RD 12 Box 202B, Greensburg, PA. 15601.

WWU COMMENTS:

Quemahoning Reservoir is a large (899 ac), unproductive (mean total alkalinity 16 mg/l) water supply reservoir impounded in 1912. Private ownership of the reservoir restricted fishing activity, however, recent transfer to public ownership (Cambria and Somerset Counties) will accommodate increased public recreation including free fishing access. Area personnel recently completed the first Fish and Boat Commission survey of the Reservoir. Initial observations revealed that three tributaries to Quemahoning Reservoir, Quemahoning Creek, Higgins Run, and Twomile Run; suffer from acid mine drainage (AMD) which diminish reservoir water quality. In terms of fish species, Quemahoning Reservoir contains warmwater, coolwater and coldwater species. Dominant warmwater predators include largemouth bass collected at rate of 46 per hour total, 32 per hour ≥ 300 mm and 18 per hour ≥ 375 mm. All of these values exceed Big Bass guidelines and Area personnel recommend application of Big Bass regulations to maintain size structure following opening to full public access. Dominant coolwater predators include walleye and northern pike. Walleye currently sustain themselves as a low density naturally reproducing population. All catch rate values fall below walleye plan guidelines. Walleye mean lengths at age generally exceed state means for walleye ≥ 352 mm and the mean relative weight was 87. Area personnel recommend stocking fingerlings at a rate of 20 per acre for the next 5 years in conjunction with stocking shiner species to enhance forage fish density. Northern pike also occur as a low density self-sustaining population, however, mean lengths at age are all below average. Warmwater panfish include bluegill and black crappie. Trapnet catch rates of bluegill fall below Panfish Enhancement Regulation guideline values (mean total CUE = 0.07) in Quemahoning Reservoir. Similarly, trapnet catch rates of black crappie fall below Panfish Enhancement Regulation guideline values (mean total CUE = 0.03). Coolwater panfish include yellow perch which also fall below Panfish Enhancement Regulation guideline values (mean total CUE = 0.12). Area personnel recommend application of panfish enhancement regulations to bluegill (sunfish), black crappie (crappie), and yellow perch.

WWU RECOMMENDATIONS:

1. I concur with Area concerns related to water quality degredation due to AMD, and affect upon fish production at Quemahoning Reservoir. Good fishing opportunities will depend upon improvements in water quality.

2. I concur with the recommendation to apply Big Bass regulations to Quemahoning Reservoir to maintain size structure of the bass population.

3. I concur with the Area recommendation to enhance walleye populations through stocking and addition of pelagic forage. Obtaining emerald and spotfin shiners may require some Area involvement. Area personnel may have to consider trapping of these cyprininds with transfer assistance from Warmwater/Coolwater Production personnel. These species are typically not available as a cultured fish and concerns relative to introduction of exotics limit availability from other sources. Great care will have to be exercised in any transfer such that exotics are not introduced into Quemahoning Dam.

4. I concur with the recommendation to apply Panfish Enhancement Regulations to black crappie, white crappie, bluegill, pumpkinseed, and yellow perch. With limited harvest while under private ownership these species all fall below Panfish Enhancement Regulations guidelines, however, as harvest increases under public ownership additional protections will be necessary to maintain these small populations. Excessive or extremely high levels of harvest and erosion of size structure and density of newly exploited or virgin populations is legendary in the fisheries literature.

CWU COMMENTS AND RECOMMENDATIONS:

Quemahoning Reservoir (818E), was initially inventoried during the 1999 field season to collect baseline data on the resource and document the status of the fishery. Quemahoning Reservoir can be characterized as a large, infertile impoundment with water quality, hampered by acid mine drainage.

The 1999 evaluation recorded the presence of 16 fish species including, a low density brown trout fishery. I concur with the recommendation to plant brown trout fingerling in the reservoir to take advantage of the two story potential and add variety to the multispecies fishery. However, when considering the lack of a well established forage base and the fact that brown trout have already established a population in the reservoir and at least one tributary, I would recommend that the Area staff initiate fingerling brown trout stocking at lower rates than prescribed in the narrative. I certainly concur with the recommendations to improve water quality in the drainage and to establish boating and parking facilities to enhance angler use at Quemahoning Reservoir.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION

Quemahoning Reservoir (818E) Management Report

Prepared by
Rick Lorson and Gary Smith, Fisheries Management Area 8

Date Sampled: April, May, and August 1999

Date Prepared: November 1999

Introduction

Quemahoning Reservoir is located just east of State Route 219 near Jerome, PA in northern Somerset County. This impoundment has a surface area of 364 ha (899 ac) and 18.5 km (11.5 mi) of shoreline, with primary uses being a water supply for industry and human consumption. Quemahoning Reservoir was impounded in 1912 and has historically been "closed to fishing," which actually meant that shoreline angling was tolerated and a private club was permitted to fish using boats. The Pennsylvania Fish and Boat Commission (PFBC) has not been directly involved in managing the fishery due to these access restrictions. Partial lake surveys of Quemahoning Reservoir took place in 1975 (Weirich et al. 1975) and 1980 (Weirich 1981) with the expectation or hope that the impoundment would be open to the general public. Greater Johnstown Water Authority considered purchasing the impoundment in 1989 from Manufacturers Water Company, but later dropped the agreement due to concerns of instream flow requirements (Young 1990).

Manufacturers Water Company placed Quemahoning Reservoir and four other water supply reservoirs up for sale in 1996. A great deal of interest was generated through the possibility of having these properties in public ownership. Many public officials, groups, and individuals initiated a "feasibility for public purchase" study for the properties (Rizzo Associates 1998). Ultimately, a plan to accomplish the purchase was developed. The Cambria-Somerset Authority was formed to direct the purchase of these reservoirs formerly owned by Manufacturers Water Company (Southern Alleghenies Conservancy 1999). The property transfer to public ownership should occur in Winter 1999 with a major emphasis being public recreation and conservation for the land and water resources involved. The Pennsylvania Fish and Boat Commission will manage the fishing and boating resources of the properties following transfer to public ownership. The anticipated opening to the public will be on or after January 1, 2000.

Quemahoning Reservoir is a very infertile impoundment (surface alkalinity 14 mg/l) that limits the production potential of the fish populations. Tributaries entering the lake have a history of mine drainage pollution problems. The major culprit is Quemahoning Creek, with additional problems in the Higgins Run and Twomile Run watersheds. Water quality degradation in Quemahoning Creek above the reservoir was addressed through a 1997 survey (Smith and Lorson 1998). Increased production of the fish populations in Quemahoning Reservoir hinges on water quality improvements upstream in the watershed.

The ensuing public acquisition created a need for the PFBC to conduct a complete lake inventory to develop a fishery management plan for Quemahoning Reservoir. The lake resource inventory was subsequently scheduled for 1999 field season by Fisheries Management Area 8. The purpose of this report was to: 1) analyze all lake resource data collected, 2) develop a fish management strategy for the lake, and 3) provide the fish management approach to the Cambria-Somerset Authority, the public, and other interested parties.

Methods

Pennsylvania style trap nets, gill nets, and night flatbottom boat electrofishing were the gear types used to sample the fish populations at Quemahoning Reservoir. All gill nets were 46 m (150 ft) long, sinking, and included 2.5 in., 5 in., and 6 panel experimental stretch monofilament mesh. Pennsylvania style trap nets utilized a 26 m (85 ft) lead. The electrofishing boat was equipped with a 3,500-watt Honda generator and Coffelt model VVP-2C-2000 as the power source for pulsed DC output at 2-3 amps. The boat had a two fixed-boom electrode set up with eight dropper-style anodes in two electrode arrays. The sampling crew consisted of one boat operator and two netters. Night electrofishing efforts targeted black bass and walleye.

Fish occurrence, relative abundance, and age and growth were collected in accordance to methods prescribed for lake sampling (Hoopes 1989a). The size structure indices of proportional stock density (PSD) and relative stock density (RSD) utilize the stock and quality sizes of Anderson (1980). Relative weight (W_r) of walleye were determined using the methods of Murphy et al. (1990). Descriptive statistics for fish population data were generated, in part, through the Pennsylvania Fish and Boat Commission-Electronic Data Processing system. All reported fish lengths are total lengths (TL). Lateral scales, viewed under a microprojector, were used for age and growth determination.

A summer lake chemical profile and aquatic macrophyte survey was also conducted according to prescribed methods.

Results

Fish population sampling with trap nets and gill nets took place from April 19 to 23, 1999. A total of 12 trap net sets and 12 gill net sets were utilized over as many differing habitats as possible (Figure 1). Night electrofishing took place on May 25 and 26, 1999 using eight runs covering different shoreline habitats across the lake.

Gamefish collected during our survey included brown trout, channel catfish, largemouth bass, walleye, and northern pike (Table 1). Panfish collected included black crappie, bluegill, brown bullhead, pumpkinseed, rock bass, yellow bullhead, and yellow perch. Bluntnose minnow, common carp, golden shiner, and white sucker made up the forage species collected. A total of 16 species were sampled during 1999.

Largemouth bass were collected from length group 100 mm to 575 mm (Table 2). Total largemouth bass CUE (Catch per Unit Effort) was 46.06/hr, CUE for 300 mm and above was 32.07/hr, and CUE for 375 mm and above was 18.29/hr. Standard PSD and RSD values were 74 and 42, respectively. Big Bass Guidelines of CUE (Hoopes 1989b) were exceeded by largemouth bass at Quemahoning Reservoir. These CUE quality indices for largemouth bass were higher than Youghiogheny River Lake and Yellow Creek Lake, and lower than those at Cross Creek Lake. Largemouth bass were aged with scales from Age 1 to 10 (Table 3). The majority of the catch was distributed among ages 2 to 8 (n = 98), with frequencies of those ages ranging from 9 to 21. Largemouth bass mean backcalculated lengths at age were at or above the state average for ages 2 to 6 and were below the state average for ages 1, 7, and 8.

Northern pike collected from trap nets ranged from length group 325 mm to 650 mm (Table 4). Trap net total CUE was 0.13/hr, with CUE for 600 mm and above at 0.01/hr. Trap net CUE indices for northern pike at Quemahoning Reservoir were comparable to those at Yellow Creek Lake in 1996 (Miko et al. 1997), and High Point Lake in 1996 and 1998 (Lorson and Smith 1997). Standard PSD and RSD for northern pike from trap nets in 1999 was 11 and 0, respectively. Northern pike collected from gill nets ranged from length group 325 mm to 650 mm (Table 5). Total pike CUE for gill nets was 0.20/hr and CUE for 600 mm and above was 0.03/hr. Gill net PSD and RSD were 13 and 0, respectively. Northern pike aged with scales ranged from Age 1 to 8, with high frequency of age 1, 5, and 6 (Table 6). Pike mean backcalculated length at age was below the state average for all age classes.

Total night electrofishing catch of walleye was 35 ranging from length group 175 mm to 525 mm (Table 7). Total electrofishing CUE was 10.28/hr and CUE for 375 mm and above was 0.89/hr. CUE for 375 mm and above was below the Pennsylvania Walleye Plan guideline of

5/hr (Hoopes and Young 1988) and also less than the cue measured at Youghiogheny River Lake in 1998 and 1990. Thirteen walleye were collected in trap nets from length group 225 mm to 650 mm (Table 8). Total CUE was 0.05/hr and CUE for 375 mm and above was 0.04/hr. The CUE for 375 mm and above was well below that of 0.15 in the Walleye Plan and also below that of Yough Lake in 1995 and 1998. Combined gill net walleye catch was 8 fish for a total CUE of 0.03/hr and a CUE for above 375 mm of 0.03 (Table 9). The Quemahoning Reservoir gill net CUE above 375 mm was below the Walleye Plan and the 1990 and 1998 values at Youghiogheny River Lake (Lorson and Smith 1999). Walleye aged from scales at Quemahoning Reservoir ranged from Age 1 to 8, with Age 1 making up half of the total (Table 10). Walleye mean backcalculated length at age was above the state average for ages 2 and older.

A total of 9 black crappies were caught in trap nets for a CUE of 0.03/hr (Table 11). Selected size ranges of black crappie were below the Panfish Enhancement Guidelines. The PSD and RSD for black crappie were 88 and 75, respectively. Age of black crappies from scales provided age classes from 1 to 5 (Table 12). Mean backcalculated length at age was below the state average for age 1, equal at age 2, and above the state average for ages 3, 4, and 5.

Trap net catch of bluegills was 20 fish for a total CUE of 0.07/hr (Table 13). Bluegill trap net catch was below the Panfish Enhancement Guidelines. Bluegill ages from scales ranged from 1 to 6 (Table 14). Mean backcalculated lengths at age were below the state average through age 4, equal at age 5, and above the state average at age 6. Yellow perch trap net catch was 33 for a total CUE of 0.12/hr (Table 15). Trap net catch of yellow perch was below the Panfish Enhancement Guidelines for selected length groupings. Yellow perch age from scales ranged from 1 to 6 (Table 16). Comparing mean backcalculated lengths at age to the state average yielded below average values for ages 1 through 4, and above average values for age 5 and 6.

Brown trout were collected only from gill net sampling in 1999 and ranged from length group 425 mm to 625 mm (Table 17). Eight brown trout were sampled for a gill net CUE of 0.03/hr. Brown trout were aged from 4 to 6 years, with the majority being 4 and 5 year olds (Table 18). Brown bullhead from trap net sampling ranged from 225 mm to 375 mm length groups (Table 19). The majority of brown bullheads were at or above the 300 mm length group. Brown bullhead PSD and RSD were 100 and 99, respectively. One channel catfish in the 550 mm length group was collected from all sampling. White suckers (total of 21) collected from trap nets ranged from length group 450 mm to 575 mm (Table 20).

Surface water quality was collected on April 19, 1999. PH and alkalinity were 6.8 and 14 mg/l, respectively. This compares to 5.95 for pH and 9 mg/l for alkalinity at the surface on March 31,

1975. A lake chemical profile was completed on August 12, 1999. The secchi disc reading was 9.5 m and the thermocline limits were at 6.5 and 11.0 m (Table 21). Dissolved oxygen was above 6.0 mg/l down to 19.5 m. PH from surface to bottom ranged from 6.3 to 7.3. Alkalinity ranged from 14 to 18 mg/l.

Aquatic macrophytes were sparse when sampled in the lake on August 12, 1999. This was partially affected by the lake being approximately 1.5 m below normal water level due to drought conditions the summer of 1999. For this reason, a surface area coverage estimate was not obtained. Limited beds of watermilfoil (*Myriophyllum spp.*), pondweed (*Potamageton natans*), and naiad (*Najas spp.*) were identified.

Discussion

The Quemahoning Reservoir fish populations can be characterized as being of low density, with several populations potentially impacted by historical shoreline angling pressure. Low lake productivity (alkalinity of 16 mg/l) has also served to keep fish populations at a low density. The primary limiting factor to the fish populations at this point is very infertile water quality brought on by acid mine drainage in the watershed.

The opening of Quemahoning Reservoir for recreational angling has been a highly anticipated occurrence for area anglers for a number of years now. The shoreline angling and associated harvest, which has occurred here historically, may have reduced the quality aspect of some of the fish populations. It is anticipated that when the lake opens formally to the public, heavy fishing pressure will occur. Fish management strategies will be necessary to sustain a quality fishing experience at Quemahoning Reservoir.

The highest density fish populations were largemouth bass, northern pike, and brown bullhead in 1999. The highest quality fish population in terms of numbers and sizes was largemouth bass. Low-density abundance was recorded for walleye, brown trout, channel catfish, black crappie, bluegill, yellow perch, and white sucker. Forage fishes available included bluntnose minnow, common carp, golden shiner, and white sucker that were also of a low density. Overall growth was good for largemouth bass, walleye, and brown trout. Growth was slow for northern pike, and younger age classes of bluegill and yellow perch. Quality size bluegill, black crappie, and yellow perch grew well.

A high quality largemouth bass population currently exists at Quemahoning Reservoir despite its clear water, low fertility, and steep-sided banks. Bass growth was good even though the forage base was of low density. Quality indices were well above the Big Bass Guidelines. In fact, these indices were higher than those at Youghiogheny River Lake and Yellow Creek Lake, waters with comparable fertility and lake size. Only the very fertile Cross Creek Lake registered a higher abundance of quality size fish (those over 300 mm and 375 mm). We must bear in mind however, that the three lakes used for comparison would have a much higher black bass angling pressure. Black bass angler effort will likely be much higher when Quemahoning Reservoir opens to the public. Limited boat angling for black bass has occurred by a private club, but they have practiced catch and release only. The largemouth bass population at Quemahoning Reservoir should be managed with Big Bass Regulations to sustain a quality bass fishery over the long term.

The northern pike population was of high density, had low abundance of legal-size fish, and was growing slowly. These are characteristics of Southwest Pennsylvania and statewide northern pike populations (Lee et al. 1998). High catchability of pike and large numbers of intermediate-size pike (450 mm to 600 mm) appears to be producing a "bottle neck" to higher numbers of legal-size pike. Trap net and gill net abundance of pike over 500 mm, 600 mm, and 700 mm were comparable between Quemahoning Reservoir, High Point Lake, and Yellow Creek Lake. Total angling effort at High Point and Yellow Creek is believed to be higher than at Quemahoning Reservoir, but the shoreline angling may still be responsible for considerable harvest of pike.

We learned from creel surveys in 1996 at High Point Lake and Yellow Creek Lake that high pike catch rates and high directed effort occurred even though harvest and availability of legal-size fish were low (Lorson and Smith 1997; Miko et al. 1997). These two lakes had pike in the top four species in terms of directed effort and total catch during the creel surveys of 1996. Pike are definitely an important aspect of the overall fishery where they occur. The quality of the pike fishing may be able to be improved by harvesting some of the smaller fish (up to 20 inches) to reduce interspecific competition, and protecting more large fish (24 to 28 inches) from harvest. This could ultimately improve the catch and release aspect by having more large pike available, and provide a more trophy-oriented harvest of pike. The infertile water quality may still be the major limiting factor to the pike population, however.

A dense bass population over 375 mm exhibited good growth, and walleye over 352 mm also grew fast, while pike growth was found to be slow in 1999. Also, the dense largemouth bass population does not appear to be substantially reducing the number of small northern pike. A 20 to 28 inch protected slot length limit could be considered to manage northern pike at Quemahoning Reservoir. The creel limit would remain at 2, with harvest allowed of pike less than 20 inches and over 28 inches. Protected slot length limits (20 to 30 inches or 22 to 30 inches) were applied to five Minnesota lakes (Pierce and Tomko 1997). In the short term (3 or 4 years), the regulation reduced exploitation of pike over 20 inches considerably compared to pre-regulation and other reference lakes. Their research over a longer term will be used to determine if natural mortality "overwhelms" the attempt to enhance numbers of larger northern pike. We may consider this approach at Quemahoning Reservoir if growth rates improve with addition of forage and improved water quality. Another consideration will be if pike angler effort is high at Quemahoning Reservoir in the future. Pike angler opinions could then be garnered to determine whether numbers or sizes of pike carry more importance.

A low density naturally reproducing walleye population was sampled at Quemahoning Reservoir in 1999. Abundance of legal length walleye was also low as night electrofishing, trap net, and gill net catch were all below the guidelines in the PA Walleye Plan (Hoopes and Young 1988). Low lake fertility and a missing link in the forage base are considered to be contributors to reduced recruitment at Quemahoning Reservoir. Mean backcalculated lengths were all above the state average.

Youghiogheny River Lake will be used for walleye population comparison purposes, since it is also of low fertility and has a quality naturally reproducing walleye population (Lorson and Smith 1999). Trap net and gill net catch of walleye was comparable between Yough in 1982 and Quemahoning Reservoir in 1999. Forage base limitations were considered at Youghiogheny River Lake and a forage base was developed (primarily alewife and emerald shiners) through stocking at Youghiogheny River Lake by the late 1980s. The forage base developed at Youghiogheny River Lake was considered a primary factor in higher densities of walleye in 1990 through 1998. Mean relative weight of walleye (Murphy et al. 1990) in 1999 at Quemahoning Reservoir was 84. Mean relative weight of walleye at Youghiogheny River Lake was 87 in 1998. Researchers list a mean population relative weight of 93 for the 50^{th} percentile of 114 walleye lakes (Murphy et al. 1990). Care must be exercised in interpretation of the Quemahoning Reservoir relative weight, as mean length at age were all above the state average. Anderson and Neuman (1996) suggested that season of year may provide considerable variability in relative weight. There have been instances in our sampling where males dominate the walleye sample and/or spent females, each of which could yield a lower mean relative weight.

An improved forage base should be developed at Quemahoning Reservoir to benefit walleye and all other piscivores, including panfish. Alewife will not be considered due to their potential negative impacts to recruitment of several species. Emerald shiners and spotfin shiners should be stocked in 2000 and 2001 to develop a much needed forage base. Walleye should be supplementally stocked for the next five years to improve the walleye standing stock and fishery until recruitment from walleye natural reproduction is higher.

Numbers of bluegill, black crappie, and yellow perch were of low density, but some quality size fish of each species were present (bluegill over 175 mm and perch and crappie over 225 mm). Lake fertility and shore angling harvest combine to provide this scenario. The quality size fish of each species also exhibited good growth using mean backcalculated length at age. Recruitment appeared consistent for all three species, as numbers were comparable for the age classes present (1 to 6 years). Abundance data for all three were below the Panfish Enhancement Guidelines. Heavier fishing pressure expected when the lake formally opens to the public will likely further depress the quality of these populations. Panfish Enhancement Regulations should be applied to bluegill, crappie, and yellow perch at Quemahoning Reservoir to improve the quality of the panfish fishery.

Several large brown trout (length groups 425 mm to 625 mm) were sampled at Quemahoning Reservoir in 1999. These brown trout most likely recruit from Higgins Run, a Class A brown trout stream tributary to the reservoir (Lorson and Miko 1994). We also have evidence that these large brown trout move into Higgins Run to spawn. The 1999 lake chemical profile indicated ample habitat available for a two-story fishery. The brown trout sampled in 1999 grew rapidly, with a mean length of 521 mm reached at Age 4. An opportunity exists at Quemahoning Reservoir, whereby supplemental stocking of a fast growing trout species feeding at a lower trophic level (than existing warmwater/coolwater species) should result in trout of a higher quality in the creel (PFBC 1997). Brown trout fingerlings should be stocked at Quemahoning Reservoir to supplement the population.

Guidelines in the PFBC Trout Plan were used to determine number of brown trout to be stocked. The Morphoedaphic Index calculated at 5.5 suggests a stocking rate of 63 trout per acre per year (56,700 brown trout fingerlings per year). Brown trout only will be stocked to protect the integrity of the wild brown trout population in Higgins Run. It is also recommended that any stocking in the watershed, including sportsman stocking in Quemahoning Creek should be brown trout only.

Anglers interested in fishing for brown bullhead and white suckers at Quemahoning Reservoir will find good populations of each. There was a large number of brown bullhead sampled above 300 mm and a good number above 350 mm in 1999. White suckers sampled were all over 450 mm and in addition to being available in the lake, should provide a spawning run fishery in the tributaries.

It is imperative that efforts to improve water quality of tributary streams to the lake are pursued. Intensive fish management can only improve a portion of this fishery resource. The productive potential of the lake can improve with each water quality improvement, whether it is mine drainage, sewage, or agriculture related. Mine drainage impact on water quality was also mentioned as a major problem in a 1980 survey (Weirich 1981). Also, a conservation release from Quemahoning Reservoir must be implemented as soon as possible for improvement of the aquatic resources of Quemahoning Creek downstream. This item has been discussed in detail previously (Young 1990; Smith and Lorson 1998).

Management Recommendations

1. Water quality issues in the Quemahoning Reservoir watershed will have a major affect on the future improvements to the fishery.

2. The high quality largemouth bass population at Quemahoning Reservoir should be managed with Big Bass Regulations.

3. Walleye are present in low numbers as a naturally reproducing population. Small walleye fingerlings should be stocked at 20/acre for the next five years to improve recruitment to the walleye fishery.

4. An adequate forage base is not present at Quemahoning Reservoir. Emerald shiners and spotfin shiners should be stocked in 2000 and 2001 to improve the forage base.

5. Panfish Enhancement Regulations should be applied to bluegill, crappie, and perch at Quemahoning Reservoir. The quality of the panfish fishery can be maintained and improved through this approach.

6. A higher density two-story brown trout fishery should be developed through stocking brown trout fingerlings annually at 63 per acre. Any stocking in the watershed, including sportsman stocking in Quemahoning Creek should be brown trout only.

7. Shoreline access is fair and could be enhanced through additional parking facilities. Boat access should be provided through opening the boat launch already constructed. A second boat launch area should be considered in the future. The size of Quemahoning Reservoir would permit consideration of a 10 horsepower boating limit on the lake. Yellow Creek Lake, Indiana County, is comparable in size and is managed with a 10 horsepower limit.

8. A copy of this report should be provided to the Cambria-Somerset Authority, 1001 Broad Street, Johnstown, PA. 15906; Stonycreek-Conemaugh River Improvement Project, PO Box 153, Johnstown, PA. 15907-0153; Southern Alleghenies Conservancy, 702 West Pitt Street, Fairlawn Court, Suite 4, Bedford, PA. 15522; Western Pennsylvania Coalition for Abandoned Mine Reclamation, RD 12 Box 202B, Greensburg, PA.15601.

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TABLE 1. Fish species occurrence in Quemahoning Reservoir (818E), Somerset County, from sampling in 1999.

Common Name	Scientific Name
black crappie	*Pomoxis nigromaculatus*
bluegill	*Lepomis macrochirus*
bluntnose minnow	*Pimephales notatus*
brown bullhead	*Ameiurus nebulosus*
brown trout	*Salmo trutta*
channel catfish	*Ictalurus punctatus*
common carp	*Cyprinus carpio*
golden shiner	*Notemigonus crysoleucas*
largemouth bass	*Micropterus salmoides*
northern pike	*Esox lucius*
pumpkinseed	*Lepomis gibbosus*
rock bass	*Ambloplites rupestris*
walleye	*S. vitreum vitreum*
white sucker	*Catostomus commersoni*
yellow bullhead	*Ameiurus natalis*
yellow perch	*Perca flavescens*

Species total: 16

TABLE 2. Total Catch(Catch), Mean Catch per Unit Effort(CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for largemouth bass from night electrofishing in Quemahoning Reservoir(18E) in 1999.

Length Group (mm)	CATCH	C.U.E. (number/hour)
100	1	0.25
125	2	0.55
150	3	0.80
175	6	1.55
200	7	1.85
225	19	4.74
250	3	0.80
275	13	3.47
300	11	2.74
325	8	2.17
350	33	8.87
375	33	8.88
400	24	6.46
425	9	2.44
450	1	0.25
575	1	0.25

Total Catch for all 8 sites: 174
Total Effort for all 8 sites: 3.83 hours
Mean Total C.U.E.: 46.06 (total C.U.E. / # of sites)
Standard PSD: 74.07 (stock size = 200 mm, quality size = 300 mm)
Standard RSD: 41.98 (stock size = 200 mm, desired size = 375 mm)

CUE for specified size ranges Water, Sampling Year	Total CUE	CUE Above 300 mm	CUE Above 375 mm
Quemahoning Reservoir, 1999	46.06	32.07	18.29
Youghiogheny River Lake, 1998	26.27	17.35	4.24
Yellow Creek Lake, 3-year mean[a]	28.20	18.71	4.69
Cross Creek Lake, 1994[a]	201.00	102.00	27.00
Big Bass Guidelines- Statewide	35.00	7.00	2.00

[a] Big Bass Regulations

Table 3. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for largemouth bass collected from Quemahoning Reservoir (18E) in 1999.

			Weighted mean at capture		Mean length (mm) at annulus (Int=20)							
Age	Number aged	Year class	length (mm)	weight (g)	1	2	3	4	5	6	7	8
1	4	1998	151	50	149							
2	17	1997	226	153	76	225						
3	21	1996	275	285	83	189	275					
4	9	1995	309	424	85	188	245	309				
5	13	1994	362	679	93	212	296	332	362			
6	9	1993	383	785	84	210	297	338	361	383		
7	13	1992	401	961	90	208	306	347	368	384	401	
8	9	1991	421	1089	90	225	311	353	374	391	404	421
Mean backcalc lengths to last annulus:					149	225	275	309	362	383	401	421
Grand mean backcalculated lengths:					88	209	293	339	365	385	402	421
Minimum backcalculated lengths:					42	126	158	199	287	344	370	393
Maximum backcalculated lengths:					165	261	352	393	420	443	439	465
Annual length increments:					88	121	84	46	27	20	17	18

GM Regression: log(weight) = u + v*log(length), u=-5.28, v= 3.17, r=0.99, n=98

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=1.37

Statewide mean backcalculated lengths:	108	186	246	299	345	388	430	465

TABLE 4. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for northern pike from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group(mm)	CATCH	CUE (number/hour)
325	1	< .01
425	2	0.01
450	4	0.01
475	3	0.01
500	5	0.02
525	12	0.05
550	4	0.02
575	1	< .01
600	3	0.01
650	1	< .01

Total Catch for all 12 sites: 36
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.13 (total C.U.E. / # of sites)
Standard PSD: 11.43 (stock size = 350 mm, quality size = 600 mm)
Standard RSD: 0.00 (stock size = 350 mm, desired size = 700 mm)

CUE for specified size ranges Water, Sampling Year	CUE Above 500 mm	CUE Above 600 mm	CUE Above 700 mm
Quemahoning Reservoir, 1999	0.10	0.01	0.00
High Point Lake, 1998	0.04	0.01	0.00
High Point Lake, 1996	0.09	0.02	0.01
Yellow Creek Lake, 1996	0.08	0.01	0.00

TABLE 5. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for northern pike from gill nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	Catch	CUE (number/hour)
325	1	< 0.01
350	2	0.01
375	1	< 0.01
400	1	< 0.01
425	3	0.01
450	3	0.01
475	6	0.02
500	9	0.03
525	8	0.03
550	9	0.03
575	3	0.01
600	3	0.01
625	5	0.02
650	1	< 0.01

Total Catch for all 12 Sites = 55
Total Effort for all 12 Sites = 272.75 hours
Mean Total CUE: 0.20 (total CUE / # of sites)
Standard PSD: 17.00 (stock size = 350 mm, quality size = 600 mm)
Standard RSD: 0.00 (stock size = 350 mm, desired size = 700 mm)

CUE for specified size ranges Water, Sampling Year	CUE Above 500 mm	CUE Above 600 mm	CUE Above 700 mm
Quemahoning Reservoir, 1999	0.14	0.03	0.00
High Point Lake, 1996	0.10	0.02	<0.01
Yellow Creek Lake, 1996	0.05	<0.01	<0.01

Table 6. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Northern pike collected from Quemahoning Reservoir (18E) in 1999.

			Weighted mean at capture		Mean length (mm) at annulus (Int=55)							
Age	Number aged	Year class	length(mm)	weight(g)	1	2	3	4	5	6	7	8
1	25	1998	336	228	327							
2	6	1997	437	504	385	437						
3	10	1996	470	598	271	416	468					
4	8	1995	525	865	275	427	496	523				
5	23	1994	553	955	295	420	494	528	553			
6	19	1993	545	901	258	398	475	510	529	545		
7	7	1992	572	1074	301	409	486	518	538	556	572	
8	1	1991	611	1200	190	326	380	487	507	555	597	611
Mean backcalc lengths to last annulus:					327	437	468	523	553	545	572	611
Grand mean backcalculated lengths:					295	413	483	519	540	548	574	611
Minimum backcalculated lengths:					118	251	380	437	468	498	530	611
Maximum backcalculated lengths:					438	588	637	673	672	639	653	611
Annual length increments:					295	118	70	36	21	8	26	37

GM Regression: log(weight) = u + v*log(length), u=-5.14, v= 2.96, r=0.99, n=99

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=0.56

Statewide mean backcalculated lengths:	290	421	524	592	673	747	793

TABLE 7. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for walleye from night electrofishing in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	CATCH	CUE (number/hour)
175	2	0.60
200	8	2.38
225	13	3.87
250	6	1.72
325	2	0.60
350	1	0.23
475	1	0.30
500	1	0.30
525	1	0.30

Total Catch for all 8 sites: 35
Total Effort for all 8 sites: 3.83 hours
Mean Total C.U.E.: 10.28 (total CUE / # of sites)
Standard PSD: 25.00 (stock size = 250 mm, quality size = 375 mm)
Standard RSD: 16.67 (stock size = 250 mm, desired size = 500 mm)

CUE for specified size ranges

Water, Sampling Year	Total CUE	CUE Above 375 mm
Quemahoning Reservoir, 1999	10.28	0.89
Youghiogheny River Lake, 1998	40.88	17.37
Youghiogheny River Lake, 1990	64.67	32.00
Youghiogheny River Lake, 1982	33.25	18.15
Pa. Walleye Plan	--	5.00

TABLE 8. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for walleye from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	CATCH	CUE (number/hour)
225	1	< .01
375	1	< .01
500	2	0.01
525	2	0.01
550	4	0.01
575	1	< .01
600	1	< .01
650	1	< .01

Total Catch for all 12 sites: 13
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.05 (total C.U.E. / # of sites)
Standard PSD: 100.00 (stock size = 250 mm, quality size = 375 mm)
Standard RSD: 91.67 (stock size = 250 mm, desired size = 500 mm)

CUE for specified size ranges

Water, Sampling Year	Total CUE	CUE Above 375 mm
Quemahoning Reservoir, 1999	0.05	0.04
Youghiogheny River Lake, 1998	0.58	0.43
Youghiogheny River Lake, 1995	0.53	0.49
Youghiogheny River Lake, 1990	0.46	0.33
Youghiogheny River Lake, 1982	0.09	0.07
Pa. Walleye Plan	--	0.15

TABLE 9. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for walleye from gill nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	Catch	CUE (number/hour)
350	1	< 0.01
375	1	< 0.01
450	4	0.02
475	1	< 0.01
650	1	< 0.01

CUE for specified size ranges

Water, Sampling Year	Total CUE	CUE Above 375 mm
Quemahoning Reservoir, 1999	0.03	0.03
Youghiogheny River Lake, 1998	0.28	0.19
Youghiogheny River Lake, 1990	0.21	0.10
Youghiogheny River Lake, 1982	0.04	0.03
Pa. Walleye Plan	--	0.50

Table 10. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Walleye collected from Quemahoning Reservoir in 1999.

Age	Number aged	Year class	Weighted mean at capture length (mm)	Weighted mean at capture weight (g)	Mean length (mm) at annulus (Int=55) 1	2	3	4	5	6	7	8
1	26	1998	233	103	228							
2	5	1997	355	395	198	352						
3	7	1996	460	911	221	370	460					
4	7	1995	527	1259	239	404	483	527				
5	3	1994	564	1565	257	432	491	528	564			
6	2	1993	563	1500	261	423	497	535	550	561		
8	2	1991	671	2563	245	367	506	583	621	641	659	671

	1	2	3	4	5	6	7	8
Mean backcalc lengths to last annulus:	228	352	460	527	564	561		671
Grand mean backcalculated lengths:	230	388	480	535	576	601	659	671
Minimum backcalculated lengths:	183	291	381	450	497	511	656	670
Maximum backcalculated lengths:	282	443	550	594	622	642	661	672
Annual length increments:	230	158	93	55	40	25	58	12

GM Regression: log(weight) = u + v*log(length), u=-5.30, v= 3.09, r=1.00, n=52

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=0.84

	1	2	3	4	5	6	7	8
Statewide mean backcalculated lengths:	231	324	395	461	513	549	579	624

TABLE 11. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for black crappie from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group(mm)	CATCH	CUE (number/hour)
100	1	< .01
150	1	< .01
225	1	< .01
250	2	0.01
275	3	0.01
300	1	< .01

Total Catch for all 12 sites: 9
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.03 (total CUE / # of sites)
Standard PSD: 87.50 (stock size = 125 mm, quality size = 200 mm)
Standard RSD: 75.00 (stock size = 125 mm, desired size = 250 mm)

CUE for specified size ranges	Panfish Enhancement Guidelines
0.03 for range 200 and above	0.63
0.03 for range 225 and above	0.25
0.02 for range 250 and above	0.09

Table 12. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Black crappie collected from Quemahoning Reservoir in 1999.

			Weighted mean at capture		Mean length (mm) at annulus (Int=35)							
Age	Number aged	Year class	length (mm)	weight (g)	1	2	3	4	5	6	7	8
1	1	1998	85	2	85							
2	2	1997	137	32	57	137						
3	4	1996	255	273	68	157	255					
4	1	1995	307	488	68	173	261	307				
5	3	1994	282	421	62	148	186	230	282			

	1	2	3	4	5	6
Mean backcalc lengths to last annulus:	85	137	255	307	282	
Grand mean backcalculated lengths:	66	152	230	249	282	
Minimum backcalculated lengths:	53	121	169	222	276	
Maximum backcalculated lengths:	85	178	268	307	287	
Annual length increments:	66	86	78	20	33	

GM Regression: log(weight) = u + v*log(length), u=-7.49, v= 4.13, r=0.99, n=11

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=1.51

	1	2	3	4	5	6
Statewide mean backcalculated lengths:	86	149	192	223	249	269

TABLE 13. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indicies for bluegill from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group(mm)	CATCH	CUE (number/hour)
50	2	0.01
75	1	< .01
100	4	0.01
125	2	0.01
150	2	0.01
175	4	0.02
200	4	0.01
250	1	< .01

Total Catch for all 12 sites: 20
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.07 (total C.U.E. / # of sites)
Standard PSD: 61.11 (stock size = 75 mm, quality size = 150 mm)
Standard RSD: 27.78 (stock size = 75 mm, desired size = 200 mm)

CUE for specified size ranges	Panfish Enhancement Guidelines
0.04 for range 150 and above	1.15
0.03 for range 175 and above	0.51
0.02 for range 200 and above	0.08

Table 14. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Bluegill collected from Quemahoning Reservoir (18E) in 1999.

Age	Number aged	Year class	Weighted mean at capture: length (mm)	Weighted mean at capture: weight (g)	Mean length (mm) at annulus (Int=20): 1	2	3	4	5	6	7	8
1	1	1998	50	2	50							
2	1	1997	74	5	37	74						
3	4	1996	113	24	36	62	113					
4	3	1995	131	43	37	65	99	131				
5	5	1994	183	137	38	65	102	142	183			
6	5	1993	202	212	36	63	102	149	176	202		
Mean backcalc lengths to last annulus:					50	74	113	131	183	202		
Grand mean backcalculated lengths:					37	64	104	142	179	202		
Minimum backcalculated lengths:					30	55	73	108	146	158		
Maximum backcalculated lengths:					50	74	124	170	206	222		
Annual length increments:					37	27	40	38	37	23		

GM Regression: log(weight) = u + v*log(length), u=-5.88, v= 3.54, r=0.99, n=20

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=2.00

Statewide mean backcalculated lengths:	1	2	3	4	5	6	7	8
	60	99	134	159	178	189	202	214

TABLE 15. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for yellow perch from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	CATCH	CUE (number/hour)
75	1	< .01
100	15	0.06
125	3	0.01
150	5	0.02
175	4	0.02
200	1	< .01
225	1	< .01
300	2	0.01
325	1	< .01

Total Catch for all 12 sites: 33
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.12 (total C.U.E. / # of sites)
Standard PSD: 29.41 (stock size - 125 mm, quality size - 200 mm)
Standard RSD: 17.65 (stock size - 125 mm, desired size - 250 mm)

CUE for specified size ranges	Panfish Enhancement Guidelines
0.02 for range 200 and above	0.43
0.01 for range 225 and above	0.19
0.01 for range 250 and above	0.07

Table 16. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Yellow perch collected from Quemahoning Reservoir (18E) in 1999.

Age	Number aged	Year class	Weighted mean at capture length(mm)	Weighted mean at capture weight(g)	Mean length (mm) at annulus (Int=30) 1	2	3	4	5	6	7	8
1	2	1998	100	15	100							
2	9	1997	119	19	73	118						
3	7	1996	141	31	71	107	141					
4	6	1995	181	62	77	118	155	180				
5	2	1994	220	110	79	133	167	195	220			
6	1	1993	302	295	65	119	165	206	238	302		
Mean backcalc lengths to last annulus:					100	118	141	180	220	302		
Grand mean backcalculated lengths:					75	116	151	188	229	302		
Minimum backcalculated lengths:					48	80	122	170	207	302		
Maximum backcalculated lengths:					106	134	177	212	238	302		
Annual length increments:					75	41	35	37	40	73		
GM Regression: log(weight) = u + v*log(length), u=-4.90, v= 2.97, r=0.98, n=29												
Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=1.13												
Statewide mean backcalculated lengths:					85	125	161	187	213	237	259	268

TABLE 17. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for brown trout from gill nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	Catch	CUE (number/hour)
425	1	< 0.01
475	1	< 0.01
550	3	0.01
600	2	0.01
625	1	< 0.01

Total Catch for all 12 sites: 8
Total Effort for all 12 sites: 272.75 hours
Mean Total CUE: 0.03 (total C.U.E. / # of sites)
Standard PSD: 100 (stock size - 225 mm, quality size - 300 mm)
Standard RSD: 100 (stock size - 225 mm, desired size - 350 mm)

Table 18. Weighted mean length at capture, weighted mean weight at capture, and mean backcalculated lengths at annulus by year class. Additional statistics, descriptive of growth and condition, are also listed for Brown trout collected from Quemahoning Reservoir (18E) in 1999.

Age	Number aged	Year class	Weighted mean at capture length(mm)	Weighted mean at capture weight(g)	Mean length (mm) at annulus (Int=35) 1	2	3	4	5	6	7	8
4	4	1995	521	1475	121	226	470	521				
5	3	1994	604	2308	125	220	484	545	601			
6	1	1993	606	2400	132	243	491	545	584	606		
Mean backcalc lengths to last annulus:								521	601	606		
Grand mean backcalculated lengths:					124	226	478	533	597	606		
Minimum backcalculated lengths:					97	196	395	447	558	606		
Maximum backcalculated lengths:					155	296	544	574	649	606		
Annual length increments:					124	102	251	55	64	9		

GM Regression: log(weight) = u + v*log(length), u=-4.01, v= 2.65, r=0.95, n=8

Mean condition factor: K = (weight/length^3)*X, X=100,000 ,K=1.05

Statewide mean backcalculated lengths: (not available for this species)

TABLE 19. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for brown bullhead from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	CATCH	CUE (number/hour)
225	1	< .01
275	9	0.03
300	28	0.10
325	45	0.17
350	21	0.08
375	2	0.01

Total Catch for all 12 sites: 106
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.39 (total C.U.E. / # of sites)
Standard PSD: 100.00 (stock size - 125 mm, quality size - 200 mm)
Standard RSD: 99.06 (stock size - 125 mm, desired size - 250 mm)

TABLE 20. Total Catch(Catch), Mean Catch per Unit Effort (CUE Unit = hour), Proportional and Relative Stock Densities, and Selected Indices for white sucker from trap nets in Quemahoning Reservoir (18 E) in 1999.

Length Group (mm)	CATCH	CUE (number/hour)
450	3	0.01
475	4	0.02
500	6	0.02
525	4	0.02
550	2	0.01
575	2	0.01

Total Catch for all 12 sites: 21
Total Effort for all 12 sites: 270.25 hours
Mean Total C.U.E.: 0.08 (total C.U.E. / # of sites)

TABLE 21. Lake chemical profile report for Quemahoning Reservoir (18 E) in 1999.

Site Latitude/Longitude: 401050 / 785640
Date: 08/12/1999 Time: 1100
Air Temperature (°C): 21 Thermocline Limit - Upper (m): 6.5
Secchi Disk (m): 9.5 - Lower (m): 11.0

Depth (m)	Temp. (øC)	D.O. (mg/l)	Alk. (mg/l)	Hard. (mg/l)	Sp.Cond. (umhos)	pH (su)	D.O. (Winkler) (mg/l)	Total Dissolved Solids (mg/l)
0.0	24.6	7.7	16	131	349	7.2	7.8	231
0.5	24.6	7.8						
1.0	24.5	7.7	17	131	369	7.3	7.9	246
1.5	24.5	7.7						
2.0	24.5	7.6						
2.5	24.4	7.8						
3.0	24.4	7.7						
3.5	24.4	7.8						
4.0	24.4	7.7						
4.5	24.4	7.7						
5.0	24.4	7.7						
5.5	24.2	7.8						
6.0	23.9	7.8						
6.5	21.9	8.9	18	133	371	7.1	9.0	249
7.0	20.0	9.0						
7.5	18.6	9.3						
8.0	17.2	9.4						
8.5	15.9	9.5						
9.0	14.9	9.6						
9.5	13.7	9.6						
10.0	12.6	9.6						
10.5	11.6	9.6						
11.0	10.7	9.4	14	295	270	6.7	10.0	182

TABLE 21. Continued.

Depth (m)	Temp. (øC)	D.O. (mg/l)	Alk. (mg/l)	Hard. (mg/l)	Sp.Cond. (umhos)	pH (su)	D.O. (Winkler) (mg/l)	Total Dissolved Solids (mg/l)
11.5	9.1	10.0						
12.0	9.5	9.0						
12.5	8.6	8.9						
13.0	8.6	8.6						
13.5	8.3	8.6						
14.0	8.1	8.5						
14.5	8.1	7.9						
15.0	7.8	8.2						
15.5	7.7	7.6						
16.0	7.5	7.9						
16.5	7.5	7.7						
17.0	7.3	7.1						
17.5	7.3	6.9						
18.0	7.2	6.9						
18.5	7.2	6.9						
19.0	7.1	6.7						
19.5	7.1	6.6						
20.0	7.0	5.5						
20.5	7.0	5.4						
21.0	7.0	5.5						
21.5	6.8	4.7						
22.0	6.8	4.4						
22.5	6.7	3.8						
23.0	6.6	3.4						
23.5	6.6	3.0						
24.0	6.5	2.8						
24.5	6.5	2.7						
25.0	6.5	2.5	16	320	284	6.3	3.6	201
25.5	6.5	1.3						
26.0	6.4	0.9						

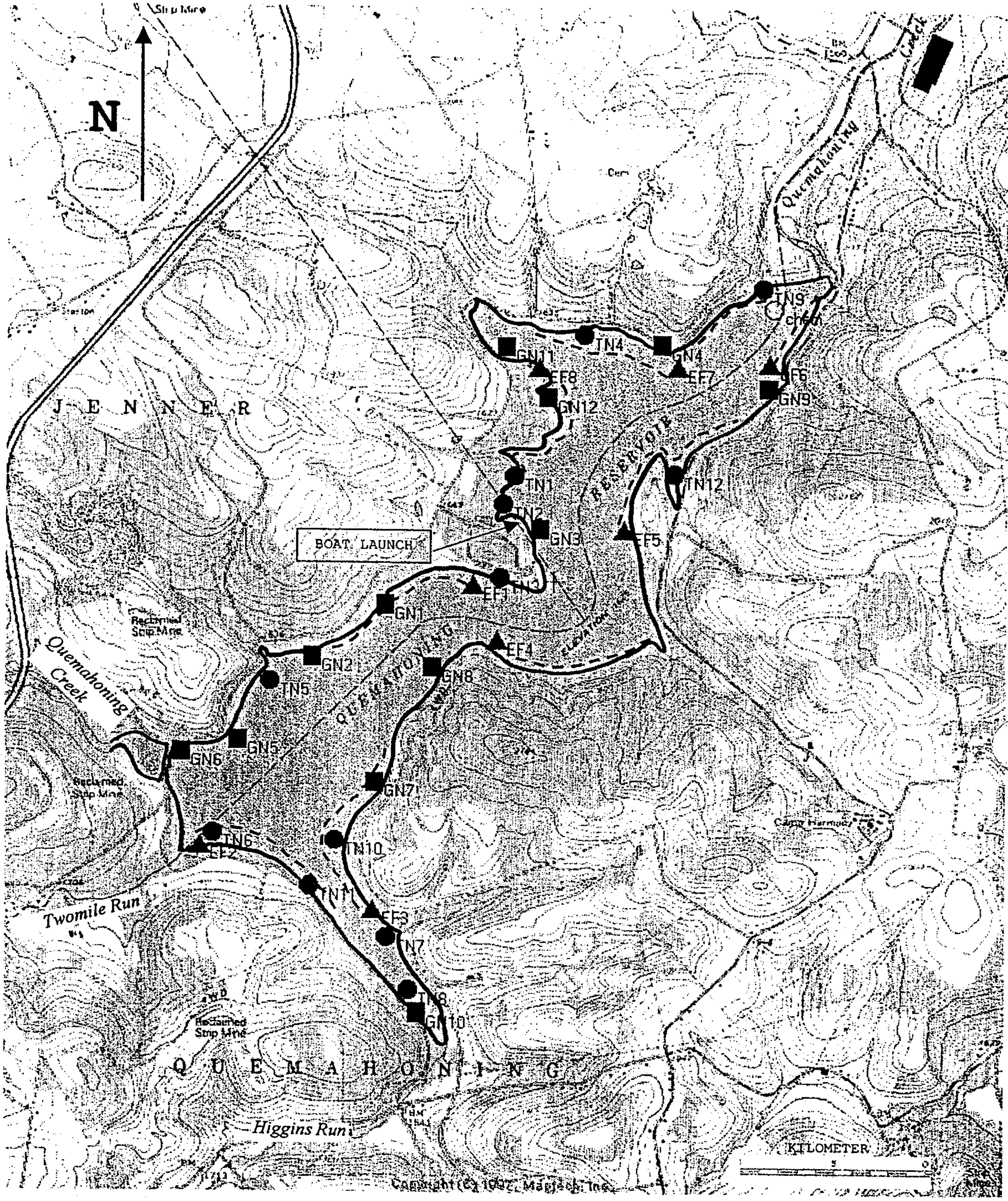

Figure 1. Night electrofishing, gill net and trap net sites at Quemahoning Reservoir (818E), Cambria County; April and May 1999.

APPENDIX H

Table 10. Prioritization index (PI) for mine discharge sites in the Quemahoning Creek Basin.

[UG/L, micrograms per liter; MG/L, milligrams per liter; <, less than]

SITE NUMBER	pH (UNITS)	IRON, TOTAL (UG/L AS FE)	ALUMINUM, DISOLVED (UG/L AS AL)	ACIDITY TOTAL HEATED (MG/L AS $CACO_3$)	SULFATE, TOTAL (MG/L AS SO_4)	MANGANESE, TOTAL (UG/L AS MN)	DISCHARGE, INST. (GALLONS PER MINUTE)	FINAL SCORE	PI
208	6.20	3700	120000	680	1300.00	13000	374.00	414.00	1
172	2.8	6600	24000	260	950	14000	30	371.00	2
173	6.2	34000	200	0	810	4400	470	330.00	3
176	5.90	110000	<100	162	450.00	6100	330.00	315.00	4
174	5	180000	800	340	930	13000	7.5	294.00	5
48	4.5	6400	2800	50	560	9100	8	234.00	6
175	3.20	37000	5300	120	480	11000	5.00	230.00	7
258	3.80	38000	5300	162	970.00	8300	3.30	196.00	8
209	3.50	8700	200	0	300.00	1200	64.00	189.00	9
53	3.6	1200	7700	72	510	680	4.6	180.00	10
47	3.20	38000	8900	192	770	14000	1.6	159.00	11
259	6.30	180	<130	0	440.00	190	867.00	140.00	12
54	6.70	7900	140	0	97	630	111	136.00	13
183	4.20	1400	3900	40	210.00	2700	3.00	128.00	14
171	6.6	950	<130	0	150	510	69	104.00	15
92	5.80	1000	240	12	1100	1200	1.7	93.00	16
82	5.20	15000	<130	17	120.00	2200	1.00	52.00	17
52	3.8	9500	800	50	550	2600	0.2	37.00	18
257	6.90	570	<130	0	310.00	33	1.10	22.00	19
256	5.80	540	<130	5.4	31.00	240	0.80	13.00	20

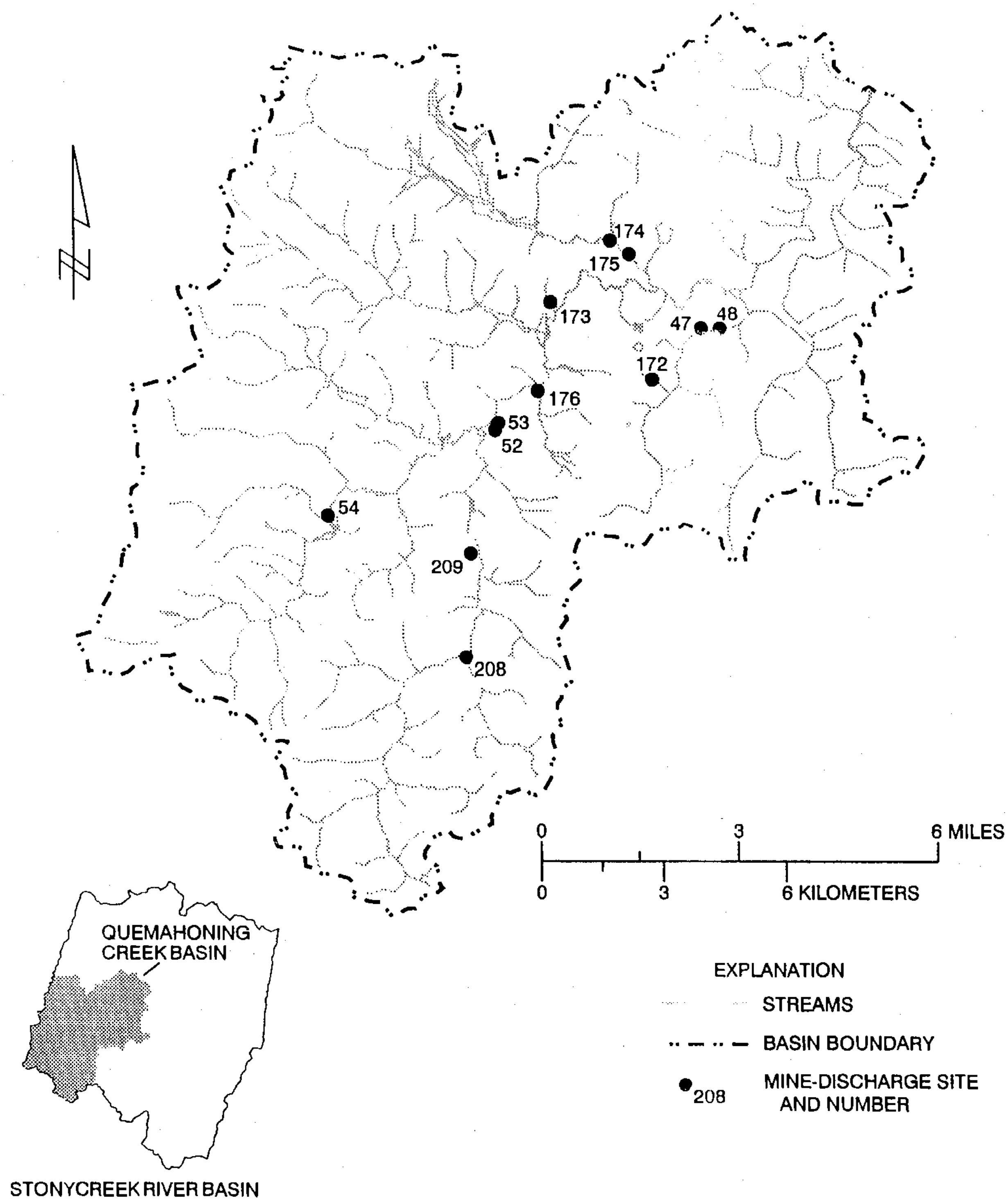

Figure 9. Location of the coal-mine-discharge sites in the Quemahoning Creek Basin.

APPENDIX I

Quemahoning Creek Non-Point Source Pollution Data Sheet

DATE	pH	D.O. (ppm)	NITRATE (ppm)	PHOSPHATE (ppm)	WATER TEMPERATURE	LATITUDE	LONGITUDE
NPS #61						40.0824	79.045
7/15/97	7.75	7.1	1	<1.0	68		
10/12/97	6.2	6.5	<0.25	<1.0	67.5		
1/6/98	6.04	11	1.5	<1.0	59.7		
7/19/98	6.23	6.8	0.5	<1.0	82.5		
10/27/98	6.24	7.1	0.25	1	50.4		
11/23/98	6.44	6.8	<0.25	<1.0	52.3		
12/22/98	6.21	7	0.25	1	40.7		
1/28/99	5.82	9.5	0.25	<1.0	52.2		
NPS #62						40.0821	79.0419
7/15/97	6.25	6.1	0.5	<1.0	72		
10/12/97	6.16	6.3	<0.25	<1.0	66.1		
1/6/98	6.27	10.8	1.75	<1.0	54.7		
5/13/98	6.52		0.4	<1.0	72.6		
7/19/98	6.5	7.2	0.5	<1.0	84.8		
10/27/98	6.74	6.8	<0.25	<1.0	53.6		
11/23/98	6.86	7.2	<0.25	<1.0	55.8		
12/22/98	6.68	6.9	<0.25	<1.0	42.5		
1/28/99	6.36	7.4	<0.25	<1.0	51.5		
NPS #63						40.0931	79.0635
7/14/97	6.75	9.1	0.25	<1.0	64		
9/20/97	6.12	7.6	<0.25	<1.0	65.7		
1/6/98	6.56	11.4	0.4	<1.0	52.3		
7/26/98	5.8	9	0.2	<1.0	73.9		
10/28/98	6.13	7.4	<0.25	<1.0	48.4		
11/24/98	5.85	8.6	<0.25	<1.0	49.4		
12/23/98	6.02	7.2	<0.25	<1.0	45.6		
1/28/99	5.94	8.9	<0.25	<1.0	54.2		
NPS #64						40.0776	79.0531
7/11/97	6.5	5.3	0.5	<1.0	74		
10/12/97	6.37	5.4	<0.25	<1.0	73.2		
3/22/98	6.37	10.8	0.75	<1.0	39.1		
5/13/98	6.47		1.5	<1.0	75.1		
10/28/98	6.34	7.2	<0.25	<1.0	51.2		
11/24/98	6.47	7.9	<0.25	<1.0	53.6		
12/22/98	6.58	6.8	<0.25	<1.0	43.9		
1/28/99	6	7.3	<0.25	<1.0	52.4		
NPS #65						40.0721	79.054
7/11/97	7.25	7	4	<1.0	62		
10/19/97	6.22	1.1	<0.25	<1.0	57.8		
3/22/98	6.41	11.8	3.5	<1.0	40.8		
5/15/98	6.65		4	<1.0	70.75		
10/27/98	no	water	in	channel			
11/24/98	no	water	in	channel			
12/23/98	4.67	4.2	3.5	3	40.7		
1/28/99	6.6	5.6	4.5	5	53.2		

Quemahoning Creek Non-Point Source Pollution Data Sheet

DATE	pH	D.O. (ppm)	NITRATE (ppm)	PHOSPHATE (ppm)	WATER TEMPERATURE	LATITUDE	LONGITUDE
NPS #66						40.0801	79.0631
7/17/97	7.5	5.2	0.25	<1.0	68		
10/12/97	6.35	9.6	<0.25	<1.0	70.2		
12/14/97	5.41	11.6	0.75	<1.0	36.9		
5/15/98	5.56		0.25	<1.0	75.8		
8/16/98	6.5	8.6	0.4	<1.0	79.6		
10/30/98	6.72	7.4	<0.25	<1.0	48.7		
11/24/98	6.74	7.3	<0.25	<1.0	50.3		
12/23/98	6.78	9.1	<0.25	<1.0	40.8		
1/29/99	6.34	8.4	<0.25	<1.0	51.6		
NPS #67						40.0761	79.0686
7/11/97	6	8.4	0.25	<1.0	60		
9/20/97	6.13	7.8	<0.25	<1.0	67.4		
12/14/97	6.37	11.4	<0.25	<1.0	40.8		
5/15/98	6.03		<0.25	<1.0	77.7		
8/16/98	6.27	8.2	0.2	<1.0	76.8		
10/30/98	6.23	8.6	<0.25	<1.0	43.8		
11/24/98	6.28	8	<0.25	<1.0	45.5		
12/23/98	6.45	8.8	<0.25	<1.0	42.2		
1/29/99	6.36	8.5	<0.25	<1.0	50.5		
NPS #68						40.0619	79.089
7/16/97	5.52	8	0.25	<1.0	69		
11/30/97	5.4	10.1	0.4	<1.0	54.3		
2/10/98	6.2	11.2	<0.25	<1.0	48.7		
7/26/98	7.1	8.6	<0.25	<1.0	70.6		
10/30/98	5.83	7.5	0.25	<1.0	46.1		
11/24/98	6.14	8.4	<0.25	<1.0	47.9		
12/23/98	5.78	7.8	0.25	<1.0	41.8		
1/29/99	6.25	9.8	0.25	<1.0	51.6		
NPS #69						40.0519	79.0812
7/16/97	7.25	6.2	1	<1.0	68		
11/30/97	5.46	9.6	3.5	<1.0	52.4		
4/18/98	6.44	8.2	0.25	<1.0	60.1		
7/26/98	6.65	8.2	3	<1.0	78.4		
10/30/98	6.74	7.4	<0.25	<1.0	44.7		
11/24/98	6.45	7.8	<0.25	<1.0	46.9		
12/23/98	7.1	8.1	<0.25	<1.0	43.8		
1/28/99	6.88	8.4	0.25	<1.0	50		
NPS #70						40.0838	79.0387
7/15/97	6.75	7.2	0.5	<1.0	73		
10/12/97	6.25	7.3	<0.25	<1.0	67.7		
1/6/98	5.9	10	1	<1.0	54.8		
7/19/98	6.38	8	0.75	<1.0	78.4		
10/28/98	6.26	6.9	<0.25	<1.0	54.4		
11/24/98	6.88	7.4	<0.25	<1.0	56.2		
12/22/98	5.89	9	<0.25	<1.0	43.9		
1/28/99	6.28	8.3	<0.25	<1.0	52.7		

Quemahoning Creek Non-Point Source Pollution Data Sheet

DATE	pH	D.O. (ppm)	NITRATE (ppm)	PHOSPHATE (ppm)	WATER TEMPERATURE	LATITUDE	LONGITUDE
NPS #71						40.0568	79.0471
7/11/97	6.75	9.1	1	<1.0	59		
10/29/97	6.12	10	3	<1.0	52.2		
3/22/98	6.21	11	3	<1.0	43.4		
5/15/98	6.45		3	<1.0	75.9		
10/27/98	7.21	8.7	0.25	<1.0	47.5		
11/23/98	6.81	6.8	<0.25	<1.0	52.5		
12/24/98	6.76	7.9	0.25	<1.0	44.2		
1/28/99	6.65	8.6	0.25	<1.0	52.1		
NPS #72						40.0607	79.0539
7/11/97	6.75	7.4	1	<1.0	57		
10/29/97	6.53	10.3	1	<1.0	53.8		
2/15/98	6.08	12.8	1.5	<1.0	42.3		
5/15/98	6.64		2	<1.0	73.8		
10/27/98	6.04	7	<0.25	<1.0	46.4		
11/23/98	5.72	8.1	<0.25	<1.0	48.6		
12/24/98	6.52	8.4	<0.25	<1.0	42.6		
1/28/99	6.87	8	1	<1.0	49.8		
NPS #73						40.0545	79.056
7/11/97	7.25	7.1	2	<1.0	63		
10/19/97	6.48	10	<0.25	<1.0	55.6		
2/8/98	6.16	11.2	4	<1.0	45.3		
5/15/98	6.39		3	<1.0	75.4		
10/27/98	6.63	7.5	<0.25	<1.0	46.4		
11/23/98	7.52	7.9	0.25	1	50.2		
12/24/98	6.83	7.6	<0.25	<1.0	41.4		
1/28/99	6.88	9.5	2	<1.0	52.3		
NPS #74						40.0603	79.0577
7/11/97	7	9	6	<1.0	59		
10/19/97	6	1.3	<0.25	>10	50.2		
2/10/98	6.38	9.2	4	3.75	48.5		
7/26/98	6.63	7.9	0.75	1	77.1		
10/27/98	7.24	8.1	<0.25	1	50.1		
11/23/98	7.67	6.9	<0.25	1.5	48.9		
12/24/98	6.84	8.4	<0.25	<1.0	43.7		
1/28/99	6.74	9	<0.25	1	51.6		
NPS #75						40.058	79.0579
7/11/97	6.75	7.2	4	<1.0	58		
10/19/97	6.4	10.1	2.5	<1.0	57.6		
2/8/98	6.14	9.6	5	<1.0	45.9		
5/15/98	6.57		5	<1.0	74.3		
10/27/98	6.61	7.9	2	<1.0	55.1		
11/23/98	7.62	7	1.5	<1.0	48.9		
12/24/98	6.54	9.1	2.5	<1.0	42.8		
1/28/99	6.86	8.2	2	<1.0	52.4		

Quemahoning Creek Non-Point Source Pollution Data Sheet

DATE	pH	D.O. (ppm)	NITRATE (ppm)	PHOSPHATE (ppm)	WATER TEMPERATURE	LATITUDE	LONGITUDE
NPS #76						40.037	79.0783
7/11/97	7.5	6.5	0.25	<1.0	72		
11/30/97	7.6	10.2	2	<1.0	55.2		
4/18/98	6.56	10	0.35	<1.0	54.1		
7/26/98	6.62	8.2	<0.25	<1.0	74.4		
10/28/98	6.86	6.8	<0.25	<1.0	55		
11/24/98	7.4	6.5	<0.25	<1.0	47.7		
12/23/98	7.24	7.8	<0.25	<1.0	43.2		
1/28/99	6.9	8	0.25	<1.0	51.8		

APPENDIX J

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
																		40-09.81N, 79-02.12W		
OC17 Quemahong Creek downstream of Genders discharge																				
7/2/96	020		6.49	6.10	381.00		8.12	0.00	26.00	131.70	3.26	2.40	0.18	0.69	107.00					
2/3/97	066		6.29	6.40	133.00		7.33	1.40	22.00	79.00	2.29	1.50	0.43	0.46	60.00	16				
4/7/97	103		6.28	6.30	163.00		5.80	0.00	16.60	93.00	2.07	1.38	0.23	0.44	52.00	4				
4/29/97	109		6.64	6.30	217.00		7.62	0.00	22.00	88.00	2.65	1.40	0.34	0.48	10.00	8				
5/27/97	129		6.04	6.50	209.00		13.02	0.00	20.00	68.00	2.67	0.46	1.43	0.26	39.00	10				
6/22/97	149		6.28	6.40	574.00			8.00	40.00	379.00	12.80	0.22	<0.135	1.42	231.00	20				
8/4/97	177		6.34	6.40	718.00		10.80	0.00	56.00	320.00	3.92	1.44	0.20	1.47	256.00	38				
8/26/97	193		6.40	6.40	425.00		10.38	0.00	42.00	182.00	4.06	2.22	0.20	1.10	132.00	<2.00				
10/6/97	215		6.50	6.40	427.00			0.00	42.00	266.00	3.96	2.94	<0.2	0.92	131.00	10				
10/29/97	240		6.64	6.50	363.00			0.00	40.00	107.00	3.91	2.64	<0.2	0.63	99.00	2				
12/7/97	259		6.60	6.20	182.00		6.79	4.00	17.20	73.00	2.06	1.74	0.42	0.42	42.00	<2.00				
1/4/98	281		6.14	6.00	193.00		6.97	0.00	19.00	55.00	1.65	0.46	0.62	0.29	39.00	12				
2/8/98	300		6.20	6.40	314.00		6.68	0.00	24.00	74.00	2.29	1.44	0.30	0.50	43.00	<2.00				
3/15/98	323		6.20	6.30	193.00		7.71	0.00	16.80	15.00	2.30	1.56	0.49	0.47	63.00	6				
4/13/98	342		6.34	6.20	133.00		8.20	0.00	11.80	47.00	1.70	0.78	0.82	0.32	41.00	6				
5/3/98	363		6.33	6.40	181.00		7.45	0.00	17.80	38.00	1.98	0.88	0.56	0.43	70.00	8				
5/31/98	382		6.26	6.50	431.00			0.00	34.00	160.00	3.45	1.80	<.2	0.89	103.00	2				
6/28/98	406		6.39	6.50	264.00		8.77	0.00	26.00	84.00	2.78	1.08	0.48	0.62	90.00	4				
8/9/98	418		6.27	6.60	538.00		20.32	0.00	50.00	316.60	9.30 •	1.92	0.26	1.24	236.00	4				
9/13/98	446		6.55	6.50	420.00			0.00	44.00	259.60	4.02	2.40	<.2	1.18	205.00	154				
10/11/98	462		6.30	6.50	294.00			0.00	34.00	130.86	3.26	1.68	<.2	0.72	90.00	14				
11/8/98	480		6.70	6.50	588.00			0.00	58.00	323.41	7.22	5.17	<.2	1.23	198.00	174				
11/29/98	500			6.50				0.00	64.00	270.58	6.09	4.96	<.2	1.18	228.00	12				
1/17/99	524		6.49	6.30	280.00		7.89	0.00	15.20	72.70	2.18	0.78	0.60	0.36	40.00	28				
3/28/99	555		6.14	6.20	329.00		11.19	0.00	19.00	112.76	3.99		0.55	0.53	90.00	20				
4/25/99	579		6.31	6.40	294.00		11.37	0.00	15.40	81.36	2.89	0.10	0.98	0.41	61.00	14				
6/3/99	600		6.36	6.30	423.00			0.00	32.00	157.15	4.16	1.50	<0.2	0.87	140.00	24				
OC17A																				
2/3/97	056		5.89	6.00	250.00			10.40	13.80	201.00	1.41	0.62	<0.135	2.64	114.00	2				
OC18 Quemahoning Creek after Boswell																		40-10.13N, 79-01.52W		
7/1/96	021		6.52	6.10	363.00		7.14	0.00	24.00	119.50	2.61	1.26	0.24	0.61	90.00					
3/18/97	069		6.25	6.20	158.00		6.71	3.80	17.00	84.00	2.04	1.56	0.40	0.45	57.00	2				
USGS 54Discharge in Grey, below Meadowdale																		40-07.67N, 79-06.77W		
6/10/96	006		6.26	6.30	209.00		6.83	0.00	34.00	119.40	2.90	0.04	0.22	0.22	60.00					
8/1/96	046		3.20	3.40	930.00		124.00		0.00		8.41	1.32	7.09	10.30	382.00					
8/1/96	047		5.80	5.40	930.00		42.00		7.00		0.89	0.70	13.10	12.40	482.00					
3/18/97	064		6.46	6.30	163.00		5.60	0.00	36.00	97.00	2.49	0.75	0.11	0.23	71.00	2				
5/11/97	113		5.90	6.50	248.00			0.00	50.00	88.00	4.61	2.76	<0.14	0.47	65.00	4				
5/27/97	131		5.51	6.40	187.00			0.00	40.00	71.00	2.13	1.62	<0.135	0.24	60.00	<2.00				
6/30/97	155	111.00	5.40	6.40	222.00		19.57	0.00	48.00	106.00	9.91	2.46	0.16	0.53	72.00	30		13.22	7.07	2.13
11/3/97	247		5.90	6.80	354.00			0.00	84.00	123.00	9.18	8.14	<0.2	0.84	99.00	16				
12/14/97	273		5.10	6.30	220.00			0.00	44.00	98.00	3.21	2.28	<0.2	0.26	76.00	6				
1/19/98	288		5.90	6.50	236.00			0.00	46.00	89.00	3.58	2.10	<0.2	0.28	92.00	<2.00				
2/15/98	311		5.91	6.40	219.00			0.00	36.00	84.00	2.77	1.68	<0.2	0.21	58.00	2				
3/8/98	324		6.20	6.40	184.00			0.00	32.00	56.00	2.10	0.56	<0.2	0.18	32.00	<2.00				
4/19/98	356		6.00	6.20	273.00			0.00	42.00	66.00	2.96	1.98	<0.2	0.26	76.00	52				
5/10/98	377		5.89	6.30	187.00			0.00	34.00	91.00	2.12	1.20	<0.2	0.19	71.00	18				
6/14/98	393		6.30	6.40	187.00			0.00	38.00	74.00	2.66	0.50	<0.2	0.26	71.00	12				
8/16/98	426		6.03	6.50	256.00			0.00	54.00	152.34	5.15	3.90	<0.2	0.48	103.00	10				
9/13/98	451		6.40	6.50	248.00			0.00	60.00	144.59	7.56	5.61	<0.2	0.54	94.00	6				
10/11/98	466		6.50	6.30	207.00			0.00	58.00	131.04	5.76	5.10	<0.2	0.42	88.00	24				
11/15/98	481		6.80	6.50	289.00			0.00	68.00	151.12	6.12	5.17	<0.2	0.58	79.00	6				
12/13/98	510		6.67	6.60	202.00			0.00	64.00	128.51	6.70	4.95	<0.2	0.46	82.00	14				
1/31/99	534		6.04	6.30	158.00			0.00	32.00	81.77	1.94	1.08		0.19	126.00	<2.0				
4/24/99	563		5.99	6.40	228.00			0.00	34.00	90.96	2.05	0.68	<0.2	0.17	50.00	<2.0				
5/1/99	585		6.10	6.40	233.00			0.00	38.00	119.01	1.97	0.15	<0.2	0.26	67.00	14				
6/14/99	606		5.30	6.40	210.00			0.00	40.00	110.81	2.06	0.80	<0.2	0.27	58.00	<2.0				
USGS 164 Discharge into Stonycreek, off SR 403 in South Hooversville, north of Oven Run																		40-08.94N, 78-55.43W		
6/13/96	015		2.90	2.90	1160.00		247.37	304.00	0.00	464.20	34.40	1.44	20.50	5.01	468.00					
7/24/96	043		2.70	2.90	1620.00		233.36	308.00	0.00	1794.00	32.30	1.44	19.00	3.96	496.00					

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
QC3 Unnamed tributary upstream from branch, flows underneath SR 985																		40-08.02N, 79-05.11W		
6/10/96	004		6.95	6.70	190.00		9.35	0.00	56.00	59.10	3.30	0.31	0.14	1.47	10.00					
7/16/96	030		6.72	6.70	267.00		26.58	0.00	64.00	82.70	6.80	0.96	1.92	2.07	36.00					
2/11/97	066		5.27	6.10	56.00		3.99	4.60	7.20	35.00	0.65	0.42	0.41	0.28	26.00					
4/7/97	105		6.60	6.70	92.00			0.00	26.00	37.00	0.90	0.19	<0.14	0.07	13.00	<2.00				
5/11/97	114		6.50	6.70	113.00		4.39	0.00	24.00	30.00	0.97	0.12	0.43	0.14	<10	<2.00				
6/9/97	139		6.49	6.60	187.00			0.00	30.00	68.00	1.18	0.87	<0.135	0.36	89.00	52				
6/30/97	157		6.47	6.70	161.00		44.85	0.00	48.00	69.00	9.72	1.20	4.83	0.36	12.00	130				
8/4/97	174		6.79	6.30	177.00		4.28	0.00	26.00	217.00	1.24	0.28	0.24	0.39	63.00	4				
9/7/97	211		6.40	6.30	154.00		3.90	0.00	24.00	51.00	1.24	0.18	0.21	0.27	33.00	8				
10/12/97	223		6.37	6.50	476.00			0.00	19.40	41.00	1.15	0.46	<0.2	0.32	27.00	6				
11/2/97	248		6.44	5.90	85.00		7.56	6.90	7.60	32.00	0.79	0.73	1.01	0.26	15.00	14				
12/14/97	274		6.00	6.00	74.00		3.79	0.20	6.60	34.00	0.38	0.18	0.47	0.25	21.00	<2.00				
1/19/98	289		6.20	6.10	73.00		4.66	0.00	6.60	34.00	0.54	0.20	0.58	0.24	44.00	2				
2/15/98	310		6.33	6.50	104.00		3.18	0.00	15.20	31.00	0.58	0.04	0.37	0.04	<10	20				
3/8/98	323		6.43	6.40	91.00		17.86	0.00	15.20	26.00	2.79	0.43	2.27	0.13	21.00	286				
4/19/98	364		6.31	6.50	93.00		9.99	0.00	32.00	36.00	2.31	0.59	1.00	0.16	103.00	120				
5/10/98	379		6.15	6.40	142.00		5.70	0.00	24.00	31.00	0.71	0.14	0.47	0.99	27.00	30				
6/14/98	400		6.30	6.90	226.00		8.86	0.00	32.00	40.00	1.56	0.20	1.06	0.13	22.00	42				
8/16/98	435		6.12	6.60	454.00		42.12	0.00	62.00	78.00	3.07	1.26	1.16	16.60	123.00	4				
9/13/98	452		6.93	6.90	148.00		10.80	0.00	66.00	88.41	2.27	2.04	1.17	0.13	<20	214				
10/11/98	467		6.70	6.40	119.00		8.42	0.00	36.00	69.45	1.69	0.49	0.93	0.12	<20	244				
11/15/98	492		7.10	6.70	160.00		39.06	0.00	58.00	90.66	6.61	0.60	4.78	0.38	<20	752				
12/13/98	511		6.70	6.40	152.00		178.30	28.00	30.00	90.82	39.70	1.44	18.80	1.62	37.60	1464				
3/17/99	545		6.74	6.30	99.00			0.00	11.00	46.40	0.56	0.38	0.36	0.32	28.00	24				
4/24/99	562		6.21	6.20	200.00			0.00	7.60	31.42	0.37		0.63	0.21	<.02	<2.0				
6/1/99	584		6.34	6.40	126.00			0.00	11.20	46.17	0.37	0.23	0.21	0.29	29.00	20				
8/14/99	606		6.12	6.40	141.00			0.00	16.80	55.00	0.64	0.14	<0.2	4.49	27.00	<2.0				
QC4 North branch tributary upstream of Quemahoning, off of Fetterolf Road																		40-07.52N, 79-06.79W		
7/16/96	032		6.37	6.40	642.00		3.58	0.00	14.60	42.60	1.66	0.35	0.00	0.33	17.00					
3/16/97	085		6.32	6.10	60.00		7.98	1.20	7.00	41.00	0.45	0.15	1.20	0.26	20.00	14				
6/9/97	146		6.33	6.20	86.00		1.29	0.00	7.40	38.00	0.45	0.17	0.00	0.26	32.00	14				
8/11/97	186		6.46	6.40	165.00		3.14	0.00	30.00	66.00	1.36	0.02	0.00	0.38	34.00	48				
10/12/97	221		6.20	6.60	128.00		3.33	0.00	24.00	38.00	1.51	0.81	0.00	0.34	26.00	12				
1/8/98	298		6.04	6.00	96.00		11.18	1.80	6.80	26.00	0.45	0.13	1.80	0.18	12.00	18				
2/15/98	309		6.30	6.20	111.00		1.15	0.00	7.20	28.00	0.42	0.11	0.00	0.20	12.00	6				
6/14/98	395		6.18	6.60	121.00		7.11	0.00	17.20	33.00	1.48	0.44	0.70	0.31	16.00	26				
7/19/98	413		6.32	6.50	138.00		3.91	0.00	20.00	43.00	1.10	0.23	0.25	0.30	<20	10				
10/18/98	471				140.00			0.00	24.00	60.29	1.19	0.60	<0.2	0.35	33.00	8				
3/28/99	550		5.80	5.90	111.00			0.00	5.40	55.19	2.56		1.62	0.34	30.00	6				
4/24/99	565		5.36	6.30	120.00			0.00	7.20	32.26	0.42	0.15	0.66	0.16	<20.00	4				
6/1/99	591		6.22	6.40	148.00			0.00	11.60	49.01	0.65	0.29	0.21	0.27	21.00	16				
6/14/99	611		6.24	6.40	161.00			0.00	18.20	60.07	1.14	0.37	0.28	0.35	30.00	<2.0				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
USGS 173 GONDERS DISCHARGE																		40-09.88N, 79-02.26W		
7/1/96	018	381.48	6.04	5.90	1336.00		69.45	24.00	96.00	710.20	34.90	42.33	0.14	3.46	642.00			160.030087	158.6544802	6.42
2/3/97	064	344.00	6.15	6.20	987.00			48.00	104.00	754.00	40.10	41.82	<0.14	3.51	589.00	20		165.81	145.13	
3/6/97	075	561.00	6.40	6.20				106.20	102.00	316.00	40.30	38.76	<0.135	3.09	625.00	114		271.75	208.37	
4/7/97	101	477.00	5.93	6.20	905.00			80.00	96.00	714.00	40.60	38.76	<0.135	0.16	560.00	<2.00		232.78	9.17	
4/29/97	107	449.00	5.94	6.20	829.00		83.41	19.20	100.00	735.00	43.00	44.00	0.14	3.20	674.00	20		232.07	172.70	7.56
5/27/97	127	O.W.	5.73	6.20	1058.00			20.00	98.00	669.00	36.90	36.72	<0.135	2.86	603.00	8				
6/22/97	148	294.00	6.16	6.20	1358.00			66.00	98.00	629.00	49.30	0.82	<0.135	3.54	595.00	2		174.22	125.10	
8/4/97	176	222.00	6.09	6.10	1253.00		87.44	74.00	112.00	728.00	44.70	43.86	0.20	3.56	699.00	14		119.28	95.00	5.34
8/26/97	191	200.00	5.94	6.20	1172.00		96.00	100.00	116.00	601.00	48.60	46.92	0.20	3.89	706.00	6		116.83	93.52	4.81
10/6/97	213	245.00	6.08	6.20	1387.00			0.20	110.00	724.00	52.00	55.50	<0.2	4.04	520.00	26		153.13	118.97	
10/29/97	239	157.00	6.01	6.20	1504.00			72.00	122.00	792.00	54.30	51.00	<0.2	3.97	699.00	38		102.47	74.92	
12/7/97	256	477.00	6.31	6.20	1033.00			62.00	98.00	153.00	26.80	17.85	<0.2	2.91	502.00	8		147.93	166.85	
1/4/98	279	318.00	5.60	6.10	1208.00			40.00	102.00	560.00	36.30	35.70	<0.2	2.90	504.00	14		134.93	110.85	
2/8/98	298	422.00	5.70	6.20	1318.00		76.35	0.00	90.00	531.00	39.10	32.13	0.22	2.90	428.00	38		198.33	147.10	11.16
3/16/98	331	O.W.	5.71	6.20	843.00			0.00	88.00	498.00	33.50	28.06	<0.2	2.76	493.00	4				
4/13/98	340	O.W.	6.20	6.30	782.00		30.14	13.40	92.00	490.00	5.34	26.50	3.58	0.38	484.00	36				
5/3/98	361	O.W.	5.73	6.20	1053.00			0.00	90.00	477.00	35.10	31.62	<0.2	2.97	503.00	8				
5/31/98	383	398.00	5.86	6.00	981.00		62.79	2.80	70.00	565.00	28.90	35.70	0.99	3.10	492.00	572		137.56	147.56	47.12
6/28/98	402	449.00	6.12	6.20	864.00			0.00	92.00	552.00	31.30	31.11	<0.2	2.83	427.00	50		168.93	152.73	
8/9/98	416	178.00	5.81	6.30	1010.00			0.00	98.00	768.31	47.70	35.19	<0.2	3.24	524.00	6		102.06	69.32	
9/13/98	445	157.00	6.02	6.20	989.00			0.00	110.00	807.40	49.80	39.78	<0.2	3.64	561.00	10		93.98	68.69	
10/11/98	463	178.00	6.10	6.20	1062.00			0.00	108.00	846.93	43.30	41.82	<0.2	3.72	695.00	36		92.64	79.59	
11/8/98	478	136.00	6.08	6.30	1264.00			0.00	120.00	821.22	43.30	39.80	<0.2	3.76	670.00	<2		70.78	61.47	
11/29/98	488	136.00		6.20				0.00	120.00	830.92	52.60	44.37	<0.2	3.60	873.00	14		85.90	58.85	
1/17/99	622	294.00	5.88	6.20	1377.00			0.00	100.00	822.40	67.70	43.35	<0.2	3.70	647.00	80		239.24	130.75	
1/24/99	528	916.40	6.04	6.20	1176.00			0.00	106.00	738.26	40.30	37.23	<0.2	3.00	634.00	44		443.91	330.45	
3/26/99	556		5.90	6.10	1067.00			0.00	96.00	523.17	29.20		<0.2	2.28	411.00	18				
4/26/99	578	964.00	5.94	6.30	159.00			0.00	82.00	613.20	27.10	0.88	<0.2	2.42	600.00	26		310.76	277.50	
6/3/99	601	245.00	5.90	6.20	1121.00			0.00	88.00	564.78	28.60	30.60	<0.2	2.64	539.00	18		84.22	77.75	

Is the same as in [illegible]?

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
USGS 176 Water plant discharge from well in Ferralton																		40-05.68N, 79-02.82W		
7/1/96	023	51.60	5.77	5.90	1212.00			268.00	36.00	634.80	160.00	160.00	0.14	9.59	421.00			93.03	59.48	0.87
7/23/96	040	47.12		6.10				340.00	34.00	653.00	170.00	181.90	0.14	10.20	608.00			96.29	57.77	0.79
2/3/97	058		5.99	5.90	845.00			300.00	28.00	665.00	173.00	175.00	<0.14	13.00	470.00	46		-	-	
3/6/97	076		6.20	6.00				312.00	36.00	700.00	159.00	163.62	<0.14	11.40	594.00	28		-	-	
3/31/97	095		5.80	6.00	817.00			298.00	32.00	676.00	158.00	160.00	<0.14	9.09	651.00	28				
4/29/97	112		5.94	5.90	1127.00			306.00	26.00	123.00	160.00	168.00	0.14	10.90	38.00	78		-	-	-
5/27/97	130		5.52	5.90	999.00			298.00	28.00	627.00	163.00	164.00	<0.14	11.80	542.00	90				
6/22/97	150		5.98	6.00	1312.00			302.00	30.00	884.00	191.00	169.80	<0.14	14.00	653.00	66				
8/4/97	178		6.04	5.90	1062.00			322.00	38.00	650.00	176.00	82.82	0.20	12.60	572.00	156		-	-	-
9/1/97	196		5.73	5.70	1079.00			274.00	22.00	631.00	179.00	174.00	<0.2	13.40	416.00	16				
10/5/97	217	26.00	6.08	5.70	910.00			336.00	17.20	596.00	170.00	178.00	<0.2	11.90	623.00	80		53.13	36.88	
10/29/97	235	22.00	5.79	6.00	1158.00			326.00	38.00	326.00	199.00	174.00	<0.2	10.90	456.00	42		52.62	28.56	
11/16/97	250	38.00	5.80	6.00	975.00			288.00	38.00	640.00	170.00	178.00	<0.2	11.90	485.00	34		77.65	54.36	
12/7/97	264	32.00	5.68	5.90	1073.00			290.00	28.00	591.00	111.00	170.00	<0.2	9.84	345.00	100		42.70	37.85	
1/4/98	283	31.00	5.70	5.90	1206.00			228.00	36.00	494.00	150.00	156.00	<0.2	9.97	510.00	26		55.89	37.16	
2/8/98	303	32.00	5.80	6.00	1315.00			248.00	38.00	535.00	172.00	166.00	<0.2	12.10	367.00	22		66.16	46.54	
3/8/98	319	54.00	5.73	6.00	1178.00			268.00	36.00	431.00	179.00	152.00	<0.2	13.00	514.00	34		116.19	84.38	
4/13/98	344	31.00	6.03	6.00	1008.00			274.00	40.00	606.00	168.00	15.60	<0.2	12.20	604.00	38		62.60	45.46	
5/3/98	366	38.00	5.85	6.00	1137.00			298.00	34.00	626.00	187.00	180.00	<0.2	11.70	588.00	8		85.41	53.44	
5/31/98	387	32.00	6.04	6.00	1032.00		351.42	282.00	28.00	573.00	175.50	180.00	<0.2	11.40	594.00	30		67.50	43.85	
6/28/98	408	105.00	6.02	5.90	1045.00			280.00	32.00	593.00	181.00	166.00	1.04	12.30	595.00	18		228.44	165.24	13.13
8/9/98	421	25.00	6.16	5.90				262.00	34.00	462.01	176.00	172.00	<0.2	13.30	585.00	18		52.89	39.97	
8/30/98	439	26.00	6.02	5.90	1089.00			298.00	28.00	537.63	188.00	176.00	<0.2	14.10	519.00	<2		58.75	44.07	
9/27/98	458	28.00	5.64	6.00	929.00			264.00	32.00	454.61	175.00	170.00	<0.2	10.90	604.00	34		58.90	36.69	
11/8/98	482	22.00	5.85	6.00	1039.00			262.00	36.00	507.40	181.00	165.00	<0.2	13.60	584.00	12		47.96	35.70	
11/29/98	501	16.00		5.90				274.00	32.00	450.14	174.00	170.00	<0.2	12.20	688.70	12		33.46	23.46	
1/17/99	515	25.00	5.80	5.90	1128.00			250.00	36.00	435.51	153.00	172.00	<0.2	10.90	555.00	42		46.96	32.75	
1/24/99	525	52.00	5.82	5.90	1115.00			256.00	26.00	470.81	217.00	162.00	<0.2	12.80	621.00	70		136.63	80.01	
3/17/99	551	34.00	4.75	6.00	1275.00			274.00	36.00	459.39	171.00	178.00	<0.2	12.20	604.00	34		69.88	49.86	
4/24/99	569	32.00	5.85	6.00	1206.00			274.00	30.00	418.14	166.00	180.00	<0.2	11.20	358.00	28		63.95	43.08	
6/3/99	594	30.00	5.84	5.90	1225.00			264.00	34.00	453.26	160.00	168.00	<0.2	12.20	563.00	44		57.70	43.99	
USGS 176X																				
8/4/97	179		6.19	6.20	332.00		3.20	3.20	10.80	87.00	0.73	0.04	0.63	1.36	71.00	<2.00				
9/1/97	197		6.93	7.40	1313.00			0.00	182.00	561.00	4.92	1.74	0.23	5.39	466.00	22				
10/5/97	218	26.00	6.71	7.10	1224.00			0.00	82.00	538.00	2.30	0.32	<0.2	8.80	571.00	36		0.72	27.50	
10/29/97	237	22.00	6.26	6.90	1060.00			0.00	70.00	610.00	2.33	0.19	0.31	9.21	503.00	14		0.62	24.36	0.82
11/16/97	251	38.00	6.02	6.50	768.00			0.00	48.00	481.00	5.81	0.50	<0.2	8.60	461.00	36		2.65	39.28	
12/7/97	255	32.00	6.20	6.00	788.00			30.00	14.60	468.00	6.12	0.50	<0.2	10.00	418.00	20		2.35	38.46	
1/4/98	284	31.00	5.40	3.90	963.00			32.00	0.00	438.00	18.00	8.03	<0.2	10.40	467.00	22		6.71	38.75	
2/8/98	304	32.00	6.00	4.00	1064.00			42.00	0.00	473.00	26.70	16.80	<0.2	12.10	436.00	38		10.27	46.54	
3/8/98	320	54.00	5.80	5.10	936.00			30.00	3.00	458.00		2.10	<0.2	11.60	456.00	16			75.29	
4/13/98	345	34.00	6.09	6.00	983.00			18.80	12.00	518.00	5.09	0.99	<0.2	9.59	513.00	46		2.08	39.19	
5/3/98	368	38.00	5.78	6.20	1137.00			13.80	19.40	504.00	3.04	0.28	<0.2	9.34	451.00	14		1.39	42.66	
5/31/98	388	32.00	6.20	5.90	1075.00			28.00	8.20	528.00	5.36	3.19	<0.2	11.60	559.00	14		2.06	44.82	
8/9/98	423	25.00	6.13	7.20	1113.00			0.00	62.00	718.10	2.61	1.14	<0.2	9.46	490.00	28		0.78	28.43	
8/30/98	440	26.00	6.11	7.00	1288.00			0.00	72.00	826.83	5.68	2.22	<0.2	10.60	524.00	68		1.78	33.13	
9/27/98	459	28.00	6.84	7.00	876.00			0.00	72.00	740.00	6.66	0.84	<0.2	10.30	547.00	48		2.24	34.67	
11/8/98	484	22.00	6.67	6.60	1036.00			0.00	46.00	759.17	24.10	0.88	<0.2	13.20	571.00	10		6.37	34.91	
11/29/98	503	16.00		6.30				0.00	28.00	716.12	7.03	0.21	<0.2	12.80	716.20	16		1.36	24.62	
1/17/99	517	25.00	5.56	5.80	836.00			0.00	16.20	647.80	4.93	0.13	<0.2	12.50	537.00	12		1.48	37.56	
1/24/99	526	52.00	5.38		758.00			1.20	8.40	445.64	7.99	1.38	<0.2	7.79	400.00	32		4.99	48.69	
3/17/99	562	34.00	4.80	5.00	1012.00			24.00	3.20	593.26	5.03	0.49	<0.2	10.70	568.00	12		2.06	43.73	
4/24/99	571	32.00	6.31	6.50	1126.00			0.00	28.00	539.82	5.51	0.17	<0.2	9.38	479.00	18		2.12	36.00	
6/3/99	596	30.00	6.32	6.30	1344.00			0.00	38.00	652.47	6.03	0.96	<0.2	10.30	606.00	34		2.17	37.14	

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Loading (lbs/day)
																		40-05.36N, 79-04.7W		
USGS 208 Discharge into Quemahoning behind Quecreek Post Office																				
6/10/96	001		5.92	6.10	508.00		26.76	9.40	48.00	245.80	6.57	2.76	2.18	1.03	252.00					
7/16/97	027		5.85	6.10	493.00		26.79	0.00	50.00	271.50	6.25	2.58	2.46	1.06	219.00					
2/18/97	070		5.96	6.20	432.00		30.57	28.00	54.00	189.00	6.96	3.18	2.93	1.01	214.00	< 2.00				
3/16/97	086		5.70	5.90	346.00		23.15	18.20	38.00	222.00	5.22	2.40	2.17	0.94	184.00	2				
5/12/97	124		5.57	6.10	385.00		23.43	28.00	50.00	203.00	5.43	2.22	2.16	0.93	230.00	10				
5/27/97	132		6.38	5.90	375.00		33.70	2.60	30.00	193.00	7.69	1.68	3.34	0.74	195.00	30				
6/30/97	153	366.90	5.56	6.10	551.00		23.06	48.00	50.00	246.00	5.07	1.92	2.20	0.96	198.00	26		22.36	42.34	97.02
8/11/97	180	270.00	5.80	6.10	585.00		27.20	0.00	66.00	283.00	6.43	2.88	2.44	1.17	204.00	42		20.87	37.97	79.19
9/7/97	206		6.14	6.20	548.00		37.73	0.00	72.00	< 10.00	9.30	3.54	3.40	1.21	242.00	54				
10/12/97	231		6.00	6.30	421.00		29.14	0.00	72.00	286.00	6.95	3.42	2.62	1.18	213.00	28				
11/16/97	253		5.80	6.20	434.00		36.24	7.00	64.00	208.00	8.11	2.70	3.59	0.98	211.00	40				
12/7/97	280		5.88	6.20	623.00		53.73	0.00	56.00	311.00	10.30	3.18	6.04	0.96	197.00	52				
1/19/98	294		5.56	6.00	585.00		26.59	0.00	46.00	213.00	6.21	3.00	2.44	1.04	201.00	10				
2/15/98	315		5.92	6.10	513.00		23.38	0.00	42.00	198.00	5.62	2.34	2.07	0.99	200.00	18				
3/15/98	336		5.18	6.00	527.00		25.11	0.00	42.00	197.00	5.85	2.16	2.30	1.01	212.00	10				
4/19/98	359	364.29	5.78	6.00	560.00		21.34	0.00	46.00	229.00	5.23	2.16	1.87	0.86	163.00	76		22.90	37.86	81.88
5/10/98	380	364.29	5.86	6.00	464.00		20.00	0.00	42.00	172.00	4.82	2.04	1.77	0.83	190.00	24		21.11	36.34	77.50
6/14/98	401	278.30	6.08	6.10	531.00		22.83	0.00	62.00	183.00	5.19	2.10	2.14	0.90	181.00	22		17.36	30.11	71.59
8/16/98	433	200.00	6.06	6.30	556.00		25.82	0.00	68.00	310.16	6.17	3.00	2.29	1.13	226.00	22		14.83	27.17	55.06
9/13/98	453	159.00	5.96	6.20	507.00		29.24	0.00	70.00	329.78	6.84	3.00	2.66	1.22	223.00	26		13.07	23.32	50.84
10/11/98	469		6.30	6.30	474.00		25.50	0.00	66.00	323.19	5.95	2.88	2.31	1.11	217.00	20				
11/15/98	496		5.99	6.30	626.00		12.46	0.00	6.60	332.75	2.84	1.14	1.12	0.63	107.00	4				
12/13/98	514		6.15	6.30	648.00		29.22	0.00	84.00	329.97	7.05	3.54	2.59	1.22	291.40	36				
1/31/99	535	200.00	5.91	6.10	451.00		24.11	0.00	48.00	260.46	5.06	2.46	2.37	1.03	210.00	< 2.0		12.16	24.76	
3/17/99	542		5.80	6.10	577.00		24.82	0.00	58.00	283.55	5.62	2.64	2.30	1.08	226.00	68				
4/25/99	573	364.00	5.50	5.90	579.00		19.46	0.00	32.00	217.11	3.90	0.10	1.92	0.97	179.00	4		17.06	42.44	
6/1/99	581	200.00	5.82	6.00	652.00			0.00	56.00	316.15	4.03	0.20	0.92	1.01	302.00	14		9.69	24.28	22.12
6/14/99	602	131.00	5.32	6.00	592.00			0.00	64.00	293.67	4.49	3.12	1.01	1.14	216.00	< 2.0				
BQC Beaver Run																				
6/9/97	140		4.20	4.60	53.00		9.80	9.80	1.00	50.00	0.10	0.06	0.69	0.23	< 10	4				
6/30/97	154	962.00	4.22	4.70	70.00		6.00	6.00	1.40	15.00	0.16	0.07	0.53	0.28	10.00	14		1.6677984	29.011472	54.914572
9/7/97	206		4.45	4.80	45.00		7.40	7.40	1.80	17.00	0.20	0.10	0.35	0.42	16.00	< 2.00				
CTO1 SHADE CREEK Cottagetown RAMP Site (input)																		40-07.07N, 78-50.66W		
6/20/98	016		3.56	3.50	540.00		134.00	134.00	0.00	258.60	36.40	3.78	5.16	2.36	242.00					
7/22/98	038	30.00	3.80	3.30	954.00		144.00	144.00	0.00	315.00	12.00	5.04	9.03	3.04	273.00			4.3272	10.96224	32.58218
2/11/99	538	60.00	3.07	4.00	956.00			38.00	0.00	202.09	6.20	0.20	2.25	26.60	194.00	< 2.0				
CTO2 SHADE CREEK Cottagetown RAMP Site (output)																		40-07.07N, 78-50.66W		
6/20/98	017		3.56	3.60	565.00		56.00	56.00	0.00	224.00	1.62	1.26	3.23	2.16	223.00					
7/22/98	039	30.00	3.96	3.40	801.00		86.00	86.00	0.00	314.00	3.90	2.10	6.35	3.09	294.00					
2/11/99	539	60.00	7.19	7.50	541.00			0.00	96.00	292.78	0.83	0.73	<0.2	1.08	217.00	< 2.0				
SC1																				
7/30/97	168		6.40	6.20	1062.00		7.40	7.40	8.40	529.00	0.37	0.06	0.20	0.54	452.00	10				
SC2																				
7/30/97	167		6.05	6.20	996.00		12.60	12.60	16.60	448.00	0.78	0.26	1.88	2.14	401.00	22				
SQC Spruce Run																				
6/9/97	141		4.32	4.70	45.00		9.00	9.00	1.40	53.00	0.16	0.05	0.83	0.17	< 10	2				
6/30/97	156	457.80	5.30	5.10	35.00		7.60	7.60	2.60	15.00	0.13	0.04	0.48	0.19	< 10	10		0.71536828	10.4552364	26.4132288
9/7/97	207		6.10	5.90	29.00		5.20	5.20	4.40	< 10.00	0.21	0.04	0.23	0.07	12.00	< 2.00				

WATER QUALITY DATA SUMMARY

Quemahoning Creek Watershed

Somerset, Lincoln, & Jenner Twps. , Somerset Co.

File Created: 10/12/97

Last Revised: 06/30/99

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
																		40-06.4N, 79-04.87W		
QC 1 Quemahoning Creek upstream of tributary at Quecreek strip mine area																				
6/10/96	002		7.12	6.70	332.00		6.08	0.00	32.00	97.40	1.38	0.26	0.55	0.30	37.00	1				
7/16/96	028		7.27	6.90	323.00		6.22	0.00	42.00	85.00	1.21	0.18	0.68	0.15	21.00					
2/18/97	071		6.18	6.70	406.00		4.46	0.00	38.00	126.00	0.79	0.12	0.45	0.29	13.00	<2.00				
3/18/97	087		6.32	6.70	166.00		2.68	0.00	30.00	61.00	0.46	0.06	0.28	0.16	18.00	16				
8/11/97	181		6.22	6.80	348.00		3.21	0.00	58.00	103.00	0.70	0.17	0.28	0.22	19.00	34				
9/7/97	208		6.42	6.80	436.00		3.94	0.00	60.00	113.00	0.85	0.10	0.34	0.29	74.00	4				
10/12/97	230		6.28	7.40	343.00		2.66	0.00	64.00	105.00	0.65	0.34	0.27		36.00	4				
12/7/97	262		6.20	6.30	206.00		3.14	0.00	22.00	78.00	0.48	0.16	0.35	0.17	23.00	<2.00				
1/19/98	295		6.30	6.00	261.00		2.84	0.00	26.00	51.00	0.51	0.11	0.28	0.18	24.00	<2.00				
2/15/98	316		6.32	6.50	228.00		2.10	0.00	24.00	47.00	0.41	0.10	0.20	0.13	16.00	6				
3/15/98	337		6.40	6.50	192.00		2.94	0.00	24.00	34.00	0.53	0.14	0.29	0.20	20.00	4				
4/19/98	357		6.31	6.50	190.00		37.96	0.00	32.00	50.00	5.18	0.88	5.10	0.20	18.00	184				
5/10/98	378		6.25	6.50	161.00		4.96	0.00	22.00	<10.00	0.74	0.18	0.60	0.16	22.00	28				
6/14/98	399		6.31	6.90	234.00		20.47	0.00	34.00	47.00	3.26	0.20	2.55	0.26	20.00	64				
8/16/98	434		6.14	7.00	329.00		3.04	0.00	60.00	108.70	0.68	0.26	0.25	0.24	26.00	10				
9/13/98	454		7.43	7.10	312.00		3.59	0.00	64.00	132.35	0.82	0.25	0.28	0.31	21.00	<2				
10/11/98	468		6.80	6.60	306.00		2.90	0.00	54.00	115.29	0.72	0.28	0.22	0.21	<20	18				
11/15/98	494		7.30	7.00	380.00		3.06	0.00	58.00	135.70	0.67	0.24	0.23	0.32	<20					
12/13/98	512		6.95	6.90	392.00		3.79	0.00	56.00	130.29	0.82	0.39	0.29	0.39	25.60	<2				
1/31/99	536		6.45	6.40	229.00			0.00	15.20	70.97	0.71	0.32	0.59	0.29	33.00	<2.0				
3/17/99	544		6.79	6.60	188.00			0.00	14.40	58.30	0.07	0.03	<0.2	0.02	21.00	16				
4/25/99	574		6.90	6.60	230.00			0.00	16.80	49.25	0.46	0.16	0.41	0.12	<20.00	4				
6/1/99	582		6.97	6.80	394.00			0.00	40.00	104.99	0.89	0.47	0.45	0.35	28.00	14				
6/14/99	603		6.78	6.80	392.00			0.00	56.00	111.51	1.11	0.43	0.43	0.41	<20.00	<2.0				
QC 2 Quemahoning Creek, downstream from tributary discharge																		40-06.18N, 79-04.80W		
6/10/96	003		6.81	6.60	341.00		5.02	0.00	34.00	93.10	1.16	0.35	0.46	0.21	38.00					
7/16/96	029		6.77	6.60	340.00		8.92	0.00	44.00	110.40	1.83	0.40	0.93	0.26	61.00					
2/18/97	072		6.15	6.60	361.00		4.33	0.00	36.00	70.00	0.91	0.12	0.41	0.23	32.00	20				
3/18/97	088		6.17	6.60	157.00		2.92	0.00	28.00	69.00	0.56	0.08	0.30	0.14	25.00	2				
5/12/97	126		5.96	6.50	163.00		4.99	0.00	26.00	49.00	0.87	0.16	0.57	0.14	31.00	12				
8/11/97	182		6.19	6.40	483.00		14.95	0.00	62.00	210.00	3.52	1.44	1.30	0.78	133.00	42				
9/7/97	210		6.30	6.40	488.00		15.69	0.00	58.00	180.00	3.77	1.50	1.38	0.76	142.00	12				
10/12/97	232		6.15	6.90	430.00		11.09	0.00	68.00	142.00	2.60	1.14	0.98	0.56	93.00	14				
12/7/97	261		6.33	6.30	191.00		3.29	0.00	24.00	78.00	0.63	0.25	0.34	0.14	38.00	<2.00				
1/19/98	296		6.28	6.50	275.00		3.68	0.00	26.00	62.00	0.74	0.16	0.37	0.16	30.00	4				
2/15/98	317		6.30	6.50	226.00		2.08	0.00	24.00	50.00	0.44	0.08	0.20	0.09	21.00	14				
3/15/98	338		6.40	6.50	241.00		3.06	0.00	24.00	47.00	0.65	0.18	0.29	0.15	36.00	4				
4/19/98	358		6.30	6.60	211.00		35.56	0.00	32.00	52.00	4.89	0.54	4.76	0.20	19.00	138				
5/10/98	379		6.20	6.40	142.00		5.70	0.00	24.00	51.00	0.71	0.14	0.47	0.99	27.00	16				
6/14/98	400		6.30	6.90	226.00		8.86	0.00	32.00	56.00	1.56	0.20	1.06	0.13	22.00	42				
8/16/98	436		6.12	6.60	454.00		13.07	0.00	62.00	210.39	3.07	1.26	1.16	0.62	123.00					
9/13/98	456		6.69	6.60	493.00		15.68	0.00	66.00	243.04	3.58	1.44	1.41	0.78	141.00	18				
10/11/98	470		6.70	6.50	348.00		11.56	0.00	58.00	181.59	2.56	0.88	1.12	0.42	69.00	22				
11/15/98	496		5.99	6.60	626.00		12.45	0.00	64.00	238.00	2.84	1.14	1.12	0.63	107.00					
12/13/98	513		6.80	6.60	523.00		13.74	0.00	68.00	218.48	3.26	1.50	1.20	0.68	141.80	14				
1/31/99	537		6.47	6.50	217.00			0.00	17.40	73.78	0.65	0.04	0.45	0.16	27.00	<2.0				
3/17/99	543		6.74	6.70	466.00			0.00	34.00	104.04	0.63	0.02	0.38	0.18	28.00	24				
4/25/99	576		6.63	6.50	230.00			0.00	18.00	51.65	0.41	0.17	0.32	0.09	22.00	<2.0				
6/1/99	583		6.52	6.60	457.00			0.00	42.00	161.49	1.46	0.76	0.44	0.39	101.00	18				
6/14/99	604		6.10	6.50	481.00			0.00	58.00	193.81	2.30	1.26	0.61	0.65	118.00	<2.0				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
																		40-09.20N, 79-04.69W		
QC6 Quemahoning Creek downstream of Hoffman Run, below bridge																				
7/17/96	036			6.60	665.00		11.93	0.00	34.00	152.50	3.68	1.44	0.52	1.35	127.00					
2/18/97	069		6.31	6.40	395.00		9.86	0.00	28.00	107.00	2.61	1.32	0.56	1.06	73.00	14				
3/16/97	081'		6.65	6.30	164.00		5.36	0.00	18.80	83.00	0.91	0.50	0.52	0.45	42.00	12				
5/11/97	119		6.40	6.50	232.00		8.31	0.00	26.00	71.00	1.72	0.31	0.80	0.43	31.00	6				
6/30/97	160		6.45	6.40	458.00		26.08	0.00	32.00	159.00	6.78	1.68	1.92	1.81	100.00	36				
8/3/97	173		6.32	6.30	653.00		20.60	7.00	26.00	298.00	6.64	5.50	0.25	4.03	270.00	8				
10/12/97	224		6.63	6.70	476.00			0.00	42.00	211.00	3.34	1.74	<0.2	2.42	160.00	14				
11/3/97	242		6.69	6.40	270.00		6.48	0.00	28.00	80.00	1.24	0.27	0.64	0.38	41.00	6				
12/14/97	272		5.40	6.40	218.00		5.15	0.00	22.00	66.00	0.93	0.50	0.50	0.38	61.00	14				
1/19/98	293		6.31	6.50	254.00		6.74	0.00	22.00	77.00	1.11	0.48	0.48	0.59	64.00	4				
4/19/98	352		6.43	6.40	270.00		21.64	0.00	22.00	59.00	3.89	0.64	4.30	0.43	46.00	110				
5/10/98	376		6.36	6.40	194.00		7.36	0.00	22.00	60.00	1.12	0.35	0.86	0.34	57.00	46				
6/14/98	398		6.13	6.90	243.00		13.74	0.00	30.00	52.00	2.41	0.16	1.57	0.39	36.00	784				
8/16/98	429		6.20	6.50	494.00		153.60	0.00	36.00	247.97	45.30	2.82	12.10	3.01	143.00	576				
10/18/98	474			6.60	433.00		15.57	0.00	48.00	259.20	4.92	2.84	0.21	3.08	182.00	10				
11/15/98	493		6.67	6.60	435.00			0.00	50.00	244.07	1.39	0.30	<.2	2.29	20.00	<2				
1/31/99	531		6.10	6.20	292.00			0.00	10.20	97.76	1.09	0.65	1.29	0.56	61.00	<2				
3/17/99	546		6.29	6.70	375.00			0.00	30.00	117.25	1.21	0.73	0.51	0.67	53.00	8				
4/24/99	564		6.28	6.40	262.00			0.00	15.00	66.63	0.88	0.29	1.30	0.29	38.00	4				
6/1/99	586		6.59	6.60	492.00			0.00	32.00	195.42	2.14	1.08	0.37	1.34	129.00	40				
6/14/99	607		5.93	6.60	504.00			0.00	46.00	193.24	1.25	0.35	<0.2	1.33	112.00	<2.0				
QC7 Mine Drainage #2, at Coal Junction (Solar Fuel), behind large tin shed																		40-08.24N, 79-03.95W		
8/20/96	061		3.20	3.60			80.31	112.00	0.00	724.00	4.10	1.14	10.40	1.46	610.00					
3/6/97	077		3.60	3.60			62.81	82.00	0.00	123.00	2.58	0.53	7.63	1.79	348.00	16				
5/12/97	122		3.77	4.10	657.00		42.28	66.00	0.00	518.00	1.85	0.96	5.99	0.96	466.00	<2.00				
6/3/97	136		3.97	3.80	630.00		56.13	70.00	0.00	430.00	2.65	0.78	7.21	1.88	345.00	<2.00				
7/13/97	163		3.47	3.60	1170.00		72.99	88.00	0.00	558.00	4.38	0.82	8.94	1.62	664.00	10				
9/7/97	204		4.80	4.50	1123.00		56.63	44.00	0.00	678.00	7.65	2.94	7.13	0.98	619.00	146				
10/19/97	234		5.78	5.90	446.00		25.60	18.40	11.00	429.00	4.51	2.52	2.88	0.76	431.00	58				
11/2/97	243		5.87	6.10	568.00		12.96	10.60	22.00	343.00	3.31	2.28	1.07	0.58	273.00	<2.00				
1/4/98	276		3.60	3.90	928.00		44.86	0.00	0.00	384.00	1.99	0.78	5.91	1.20	356.00	8				
5/10/98	372		3.61	3.60	900.00		57.14	72.00	0.00	406.00	2.09	0.54	6.77	1.78	455.00	18				
8/16/98	431		4.84	4.60	898.00		43.51	44.00	1.80	586.38	2.39	1.68	6.34	1.62	514.00	18				
9/13/98	447		4.44	4.70	976.00		33.29	26.00	1.60	706.36	1.63	0.82	4.84	1.37	517.00	30				
11/15/98	489		5.10	5.00	1048.00		20.72	28.00	3.20	622.96	2.57	1.44	2.46	1.08	468.00	74				
1/31/99	532		3.28	3.40	784.00			92.00	0.00	377.89	2.80	0.78	8.96	1.98	360.00	8				
3/28/99	557		2.89	3.40	765.00			80.00	0.00	332.13	1.90		6.33	1.45	239.00	4				
6/1/99	587		3.56	3.70	917.00			6.40	0.00	492.35	1.47	0.43	6.56	1.02	400.00	14				
6/14/99	609		3.20	3.70	856.00			8.60	0.00	461.83	1.67	0.43	7.60	0.98	396.00	<2.0				
QC7A Discharge at Coal Junction, upperside (large flow)																		40-08.15N, 79-03.22W		
7/17/96	036			3.90			28.67	48.00	0.00	281.30	0.00	0.66	3.93	0.30	301.00					
2/18/97	073		4.93	5.20	349.00		19.99	28.00	4.20	236.00	4.20	0.29	2.13	0.19	220.00	<2.00				
3/16/97	082		4.95	6.50	277.00		20.70	1.80	8.00	196.00	8.00	0.12	1.08	0.14	165.00	6				
5/11/97	115		4.90	5.10	445.00		30.63	19.00	3.40	268.00	3.40	0.43	4.22	0.34	188.00	2				
6/3/97	137		5.34	5.60	350.00		19.77	22.00	7.60	312.00	7.60	0.12	1.04	0.16	176.00	2				
7/13/97	166		5.62		680.00															
9/7/97	203		5.00	4.50	628.00		24.00	40.00	0.00	356.00	0.00	0.46	3.93	0.32	349.00	56				
10/19/97	233		3.84	4.20	603.00		26.18	48.00	0.00	338.00	0.00	0.56	4.02	0.38	284.00	120				
1/4/98	277		5.40	6.00	465.00		16.67	15.00	4.60	220.00	4.60	0.20	1.37	0.19	195.00	6				
2/15/98	313		4.72	5.00	498.00		16.69	8.40	3.00	200.00	3.00	0.12	1.90	0.15	174.00	58				
3/15/98	334		5.90	6.00	443.00		54.83	1.40	13.00	203.00	13.00	0.19	5.64	0.13	182.00	4				
4/19/98	353		6.16	6.00	438.00		5.93	0.00	16.00	209.00	0.36	0.13	0.89	0.16	173.00	58				
8/16/98	432		5.00	4.90	550.00		30.77	36.00	2.80	361.70	2.64	0.39	4.53	0.24	263.00	208				
9/13/98	448		4.78	4.80	533.00		112.10	28.00	2.20	394.07	12.90	0.21	15.80	0.27	311.00	192				
10/18/98	473			4.70	538.00		222.84	38.00	2.20	397.75	34.00	0.96	28.80	0.62	337.00	144				
1/31/99	533		4.26	4.50	355.00			15.00	46.00	187.58	0.33	0.24	1.88	0.18	164.00	<2.0				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
OC5 Hoffman Run in Quemahoning, various seeps behind the church																		40-07.01N, 79-02.26W		
7/17/96	034		4.34	4.70	656.00		33.66	42.00	1.80	352.60	6.47	5.28	2.13	5.10	329.00					
2/18/97	068		4.87	4.90	350.00		31.64	32.00	2.60	245.00	4.38	2.28	3.17	3.07	217.00	16				
3/18/97	080		4.22	4.60	385.00		29.67	34.00	0.00	264.00	2.37	1.86	3.23	3.26	201.00	10				
5/11/97	118		5.07	5.10	387.00		30.25	34.00	4.80	210.00	5.17	3.18	2.39	4.04	94.00	2				
6/3/97	134		5.80	5.20	239.00		13.19	24.00	3.00	147.00	1.78	1.20	1.12	1.91	137.00	2				
6/30/97	158		4.64	4.90	701.00		31.48	46.00	3.00	341.00	4.24	3.06	2.54	5.04	287.00	4				
8/3/97	172		4.94	4.70	659.00		36.50	54.00	2.00	364.00	9.22	5.28	1.66	5.40	305.00	20				
9/1/97	202		4.88	4.90	638.00		38.23	62.00	4.00	336.00	9.00	7.59	1.78	6.40	343.00	<2.00				
10/12/97	227		4.32	4.20	660.00		43.40	60.00	0.00	372.00	9.56	5.04	1.88	7.01	335.00	40				
11/3/97	246		5.12	4.90	446.00		21.82	30.00	3.40	204.00	2.93	2.64	1.78	3.34	173.00	6				
12/14/97	269		4.00	4.30	480.00		37.60	44.00	0.00	241.00	2.06	1.02	4.46	3.65	210.00	8				
1/19/98	292		4.12	4.10	529.00		41.40	48.00	0.00	280.00	4.25	1.86	4.19	3.61	286.00	<2.00				
2/8/98	308		5.00	4.60	514.00		26.36	26.00	1.00	220.00	1.74	1.01	2.96	2.81	183.00	4				
3/8/98	327		5.80	4.60	445.00		34.80	24.00	1.20	188.00	2.69	0.64	4.47	2.15	163.00	24				
4/19/98	360		5.78	4.90	399.00		16.30	19.20	2.60	168.00	1.63	0.75	1.81	1.49	161.00	80				
5/10/98	374		5.40	5.00	437.00		20.73	18.80	2.80	178.00	2.08	1.50	2.03	2.88	199.00	20				
6/14/98	396		5.96	5.20	388.00		16.97	13.40	3.20	146.00	2.44	1.56	1.33	2.70	180.00	18				
8/16/98	428		5.71	5.00	561.00		93.57	22.00	3.00	317.78	7.89	4.02	2.14	36.90	276.00					
9/13/98	450		5.26	5.40	560.00		96.21	13.00	8.00	349.11	8.67	2.76	1.06	40.50	271.00	22				
10/18/98	475			5.50	504.00		79.99	18.80	9.60	317.05	7.08	6.27	0.77	34.60	294.00	10				
11/15/98	490		5.49	5.60	564.00		28.61	19.60	13.60	285.86	9.54	0.78	0.69	4.19	173.00	122				
12/13/98	508		5.59	5.90	487.00		39.91	5.20	26.00	271.90	16.40	10.92	0.37	4.68	265.00					
1/31/99	530		4.53	4.60	531.00			44.00	1.40	310.63	3.67	2.64	4.44	4.45	310.00	12				
3/26/99	560		3.90	4.20	618.00			34.00	0.00	257.23	2.96		4.04	3.47	219.00	<2.0				
OC5A Seep into Hoffman Run, on field above cemetary																		40-07.83N, 79-04.99W		
7/17/96	033		2.82	3.40	920.00		97.79	122.00	0.00	446.00	33.00	21.93	0.83	7.89	418.00					
2/18/97	067		5.49	6.00	462.00		16.05	36.00	2.80	238.00	5.34	2.34	0.52	1.72	288.00	<2.00				
3/16/97	079		5.68	6.60	413.00		124.80	13.00	6.40		58.00	0.98	3.20	1.83	357.00					
5/11/97	117		5.50	5.30	688.00		30.72	22.00	3.60	415.00	11.10	1.86	1.36	1.70	355.00	104				
6/3/97	133		6.40	6.10	471.00		75.36	24.00	20.00	333.00	32.20	2.54	2.72	1.49	186.00	26				
6/30/97	159		5.61	6.30	989.00		216.99	66.00	54.00	484.00	108.00	21.42	1.81	7.73	404.00	216				
8/3/97	171		5.44	4.70	1193.00		589.17	238.00	2.40	921.00	306.00	92.90	4.36	9.67	648.00	856				
12/14/97	268		4.09	4.10	735.00		126.70	38.00	0.00	437.00	62.70	0.27	3.96	3.58	413.00	676				
3/8/98	326		6.18	6.10	453.00		30.43	0.40	8.40	247.00	3.46	0.17	4.21	0.45	229.00	230				
4/19/98	351		6.06	6.00	623.00		15.77	18.40	12.60	351.00	8.04	0.62	0.21	0.11	266.00	226				
OC5B																				
8/18/97	189		5.39	5.90	667.00			70.00	14.00	411.00	18.70	19.96	<0.2	7.57	326.00	70				
10/12/97	225		5.98	5.90	981.00		133.84	150.00	17.00	621.00	59.30	56.56	0.34	14.30	499.00	12				
11/3/97	244		5.96	6.00	633.00		68.79	64.00	18.80	309.00	25.90	22.96	0.21	6.23	286.00	<2.00				
12/14/97	270		4.80	5.80	551.00		45.10	32.00	11.00	305.00	16.10	15.12	1.24	5.16	229.00	16				
3/8/98	328		6.02	5.90	438.00		60.07	12.40	7.20	157.00	10.50	3.30	6.47	2.92	218.00	98				
1/19/98	290		5.68	5.40	519.00		53.59	36.00	5.60	308.00	16.80	12.18	2.57	5.01	353.00	22				
6/4/98	396		5.96	6.20	388.00			12.20	16.80	196.00	12.90	11.56	0.20	4.54	160.00	18				
8/16/98	430		5.64	6.00	838.00			64.00	17.40	477.51	38.60	33.15	<0.20	9.40	379.00					
10/18/98	476			6.00	836.00			88.00	24.00	611.14	56.20	47.43	0.22	12.90	552.00	14				
12/13/98	509		6.85	6.00	833.00			80.00	24.00	631.80	56.10	54.64	0.21	11.80	635.70	16				
OC5C																				
8/18/97	188		3.30	3.60	3.30		43.11	64.00	0.00	408.00	1.44	0.47	0.65	13.40	342.00	28				
10/12/97	226		5.61	5.30	5.61			42.00	3.40	466.00	2.33	0.96	<0.2	18.40	446.00	18				
11/3/97	245		4.54	4.40	4.54		11.99	15.60	0.00	127.00	1.92	1.26	0.26	2.82	142.00	<2.00				
12/14/97	271		3.53	3.80	3.53		32.22	40.00	0.00	355.00	4.56	1.98	0.66	6.87	332.00	16				
1/19/98	291		3.67	3.70	3.67		36.07	50.00	0.00	361.00	5.40	2.40	0.60	7.52	381.00	2				
3/8/98	329		5.18	4.10	5.18		24.60	28.00	0.00	276.00	4.85	3.78	0.22	5.91	315.00	2				
OC5D																				
8/18/97	187		3.38	3.70	737.00		46.09	64.00	0.00	383.00	4.62	2.88	0.86	12.70	354.00	38				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
QC7B Discharge at Coal Junction, upper side (small flow)																		40-08.15N, 79-03.22W		
7/17/96	037			2.30			100.46	154.00	0.00	828.50	8.13	1.14	10.70	0.79	696.00					
2/18/97	074		3.21	2.30	911.00		81.78	120.00	0.00	671.00	6.11	0.83	8.04	0.63	368.00	<2.00				
3/16/97	083		3.38	3.80	742.00		42.58	82.00	0.00	542.00	2.76	0.45	4.37	0.46	406.00	18				
5/11/97	116		3.20	3.40	1022.00		90.09	114.00	0.00	608.00	7.86	1.14	9.78	1.00	402.00	10				
6/3/97	138		3.45	3.50	816.00		46.24	78.00	0.00	444.00	3.06	0.40	4.28	0.65	365.00	<2.00				
7/13/97	166		3.11		1249.00															
2/15/98	314		3.80	3.40	1134.00		53.56	64.00	0.00	439.00	3.25	0.73	4.84	0.53	548.00	18				
3/15/98	335		3.29	3.50	1163.00		200.73	74.00	0.00	579.00	77.60	0.72	8.14	0.62	552.00	20				
4/19/98	354		3.73	3.80	935.00		39.71	60.00	0.00	487.00	2.13	0.35	4.00	0.62	716.00	84				
QC8 Mine Drainage #1 at Coal Junction (Solar Fuel), behind small gravel pitt																		40-08.30N, 79-03.85W		
8/20/96	062		5.86	6.10			953.17	16.40	82.00	291.00	418.80	51.61	34.70	6.87	262.00					
2/6/97	078		5.80	6.00			1.89	5.80	17.80	122.00	0.22	0.03	0.24	0.06	110.00	<2.00				
6/12/97	123		4.00	3.90	1038.00		1146.60	410.00	0.00	801.00	597.00	134.00	9.73	11.10	849.00	656				
6/3/97	136		5.52	5.90	261.00		18.68	19.00	6.60	91.00	4.43	2.04	1.26	2.03	93.00	12				
7/13/97	164		5.83	5.80	1284.00		513.59	1026.00	166.00	612.00		304.00	87.00	16.60	387.00	35750				
8/7/97	206		5.70	6.10	709.00		456.00	134.00	96.00	256.00	197.00	80.80	14.30	13.60	237.00	912				
1/4/98	276		5.30	6.10	618.00		441.85	122.00	118.00	230.00	233.00	22.40	3.40	3.77	206.00	2160				
6/10/98	373		3.57	3.50	1218.00		277.93	334.00	0.00	674.00	84.90	64.00	9.55	31.60	723.00	112				
3/26/99	558		5.02	5.30	468.00			2.00	3.20	191.45	0.15		0.59	0.23	166.00	<2.0				
6/1/99	589		4.66	4.70	718.00			15.40	1.40	407.66	1.29	0.55	2.07	0.44	345.00	10				
6/14/99	608		3.76	4.60	680.00			26.00	0.00	383.63	3.67	0.58	3.55	0.50	336.00	<2.0				
QC9 Quemahoning downstream of branch tributary, along railroad, behind Fetterolf Mining building																		40-08.61N, 79-03.94W		
7/16/96	031		6.41	6.40	172.00		8.93	0.00	15.80	70.00	1.79	0.35	0.90	0.39	47.00					
3/16/97	084		6.59	6.00	109.00		9.78	9.00	7.20	72.00	3.36	2.88	0.56	0.34	32.00	12				
8/11/97	195		6.08	6.40	167.00		5.84	0.00	26.00	67.00	1.68	0.37	0.36	0.45	40.00	36				
10/12/97	222		6.31	6.60	104.00		16.97	0.00	24.00	50.00	4.06	0.67	1.62	0.39	32.00	20				
1/6/98	285		5.90	5.30	248.00		26.57	22.00	3.40	67.00	10.40	7.35	1.27	0.38	44.00	28				
5/10/98	371		6.26	6.10	118.00		10.31	0.00	11.40	39.00	1.71	0.30	1.20	0.30	32.00	48				
7/19/98	414		6.38	6.50	240.00		6.76	0.00	22.00	35.00	2.19	0.96	0.27	0.73	73.00	10				
10/18/98	472			6.40	201.00		10.09	0.00	24.00	106.43	3.16	1.26	0.49	0.94	80.00	4				
3/26/99	556		5.72	6.00	192.00			2.00	6.60	56.83	1.31		1.36	0.35	37.00	12				
6/1/99	590		6.22	6.30	278.00			0.00	14.80	88.49	1.43	0.92	0.22	0.56	49.00	4				
6/14/99	610		5.65	6.40	298.00			0.00	22.00	108.81	1.73	0.89	0.23	0.84	76.00	<2.0				
QC10 Left fork of tributaries in Jenner, upstream of water plant																		40-08.61N, 79-02.79W		
7/1/96	025		6.79	6.30	870.00			0.00	38.00	366.40	0.36	0.08	0.64	3.79	287.00					
8/7/96	048		6.80	6.70	620.00			0.00	30.00	321.00										
2/11/97	060		5.26	6.30	220.00		8.76	1.60	18.60	188.00	0.30	0.08	0.85	1.91	116.00					
3/18/97	092		6.33	6.40	247.00		17.82	3.20	22.00	151.00	1.01	0.10	2.08	2.44	101.00	32				
5/12/97	120		6.20	6.40	400.00		10.94	6.80	20.00	150.00	0.40	0.08	0.97	2.65	171.00	8				
6/9/97	144		6.05	6.50	439.00		19.00	0.00	28.00	168.00	1.31	0.10	2.46	1.64	148.00	50				
6/22/97	151		6.40	6.90	664.00		10.67	0.00	50.00	285.00	0.50	0.08	0.83	2.84	232.00	8				
8/3/97	169		6.40	7.00	1384.00		5.13	0.00	70.00	663.00	0.33	0.07	0.23	1.79	564.00	14				
9/1/97	199		6.53	6.80	808.00		5.11	0.00	34.00	296.00	0.86	0.06	0.06	1.98	372.00	2				
10/5/97	220		7.00	6.50	690.00		4.28	0.00	32.00	253.00	0.36	0.06	0.21	1.35	223.00	10				
11/16/97	249		6.01	6.40	206.00		9.86	1.00	16.00	86.00	0.86	0.16	1.17	1.00	58.00	24				
12/14/97	296		5.70	6.40	242.00		12.77	0.00	17.80	127.00	0.73	0.10	1.55	1.56	108.00	26				
2/8/98	306		6.30	6.40	392.00		12.39	0.00	20.00	141.00	0.39	0.08	1.24	2.63	112.00	16				
3/8/98	322		6.12	6.40	312.00		72.49	2.60	13.40	96.00	9.54	0.58	8.94	3.17	88.00	270				
4/13/98	346		6.11	6.40	449.00		24.32	0.00	15.80	169.00	1.81	0.10	2.80	3.03	118.00	26				
5/3/98	369		6.07	6.40	485.00		19.14	5.20	14.80	223.00	0.58	0.12	1.91	4.11	186.00	20				
5/31/98	390		6.30	6.50	626.00		14.12	0.00	26.00	309.00	0.26	0.09	0.77	5.15	288.00	12				
6/28/98	411		6.27	6.70	379.00		28.47	0.00	32.00	198.00	2.30	0.30	3.45	2.85	147.00	62				
8/9/98	424		6.33	6.80	618.00		11.98	0.00	38.00	371.44	1.06	0.04	1.19	1.91	263.00	120				
8/30/98	442		6.26	6.70	632.00			0.00	40.00	344.62	0.21	0.06	<.2	1.79	234.00	8				
9/27/98	461		6.61	6.70	602.00			0.00	46.00	389.18	0.22	0.07	<.2	0.96	289.00	28				
11/8/98	485		6.80	6.60	2080.00			0.00	40.00	769.48	0.47	0.26	<.2	3.27	331.00	<2				
12/13/98	504		7.00	6.70	971.00			0.00	48.00	461.76	0.26	0.13	<.2	0.81	379.00	10				
1/17/99	518		6.86	6.40	421.00			0.00	18.20	105.62	0.39	0.08	0.63	0.82	58.00	16				
1/24/99	527		6.47	6.80	196.00			0.00	17.80	70.64	1.37	0.20	0.92	0.50	40.00	42				
3/17/99	560		6.48	6.70	519.00			0.00	24.00	197.40	1.12	0.33	2.06	1.71	149.00	56				
4/24/99	568		6.71	6.60	13.00			0.00	22.00	116.27	1.01	0.20	1.64	1.17	69.00	26				
6/3/99	582		7.06	6.60	882.00			0.00	34.00	360.34	0.19		0.50	3.26	294.00					
6/14/99	619		7.10	6.70	739.00			0.00	52.00	511.94	0.17	0.06	0.22	2.00	396.00	12				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
QC11 Tributary from golf pond in Jenner, right fork of tributary, above St Joseph's Church, under SR 601																		40-08.35N, 79-02.66W		
7/1/96	026		3.90	4.50	509.00		19.31	24.00	0.00	0.00	0.41	0.35	1.24	5.56	197.00					
8/7/96	049		4.90	5.00	340.00		41.10	20.00	2.60	189.00	4.29	0.18	4.40	4.67	175.00					
2/3/97	058		6.76	6.20	133.00		7.79	11.00	7.00	12.00	0.50	0.14	0.87	1.12	57.00	16				
3/18/97	093		5.92	5.90	146.00		11.32	9.60	5.20	106.00	0.53	0.11	1.26	1.85	68.00	2				
5/12/97	121		4.94	5.10	287.00		10.06	14.80	3.60	120.00	0.42	0.09	0.92	2.09	115.00	6				
6/9/97	145		5.99	6.00	203.00		8.80	3.60	5.40	119.00	0.66	0.18	0.98	1.17	85.00	12				
6/22/97	152		5.70	5.70	310.00		12.53	8.60	3.60	3000.00	1.15	0.13	1.24	1.92	148.00	<2.00				
8/3/97	170		4.56	4.60	704.00		43.03	48.00	1.20	452.00	0.44	0.25	2.60	14.60	288.00	<2.00				
9/1/97	201		4.64	4.70	335.00		19.88	15.20	1.60	169.00	0.76	0.22	1.58	4.81	127.00	<2.00				
10/12/97	228		4.83	4.90	359.00		21.13	24.00	2.60	182.00	0.36	0.19	1.43	6.55	171.00	12				
11/16/97	252		6.30	6.30	132.00		6.37	2.20	11.00	72.00	0.51	0.24	0.68	0.91	49.00	14				
12/14/97	267		5.90	6.30	162.00		7.86	1.20	11.40	64.00	0.49	0.15	0.87	1.17	67.00	10				
2/8/98	307		6.30	6.10	237.00		6.27	1.40	7.20	91.00	0.13	0.06	0.48	1.83	81.00	<2.00				
3/8/98	325		6.23	6.20	196.00		38.20	6.60	7.40	57.00	4.36	0.42	4.68	2.41	35.00	102				
4/13/98	347		6.46	5.90	198.00		8.79	4.20	3.80	71.00	0.60	0.09	0.97	1.24	75.00	28				
5/3/98	370		5.16	5.90	203.00		16.67	8.40	3.80	81.00	1.29	0.18	1.94	1.94	94.00	22				
5/31/98	391		5.97	5.20	361.00		13.96	14.20	3.00	108.00	0.86	0.16	1.12	3.24	125.00	56				
6/28/98	412		5.67	4.90	406.00		19.00	28.00	2.40	224.00	0.35	0.24	1.26	5.91	218.00	28				
8/9/98	425		6.04	5.10	429.00		22.29	8.60	3.00	269.75	1.21	0.05	1.85	5.20	249.00	2				
8/30/98	443		5.99	5.30	341.00		15.00	5.80	3.20	196.21	1.04	0.04	1.31	3.09	165.00	32				
11/8/98	486		4.93	4.80	386.00		21.67	16.40	2.20	209.18	1.03	0.14	2.01	4.33	191.00	12				
12/13/98	507		4.78	5.00	338.00		48.84	16.20	3.00	188.84	3.99	0.15	5.94	4.52	190.20	144				
3/17/99	549		6.13	6.20	166.00			2.00	7.60	109.00	0.62	0.23	1.21	1.34	84.00	62				
4/24/99	567		4.45	7.80	248.00			0.00	13.60	68.16	0.75	0.18	1.07	0.90	47.00	14				
6/14/99	614		4.40	4.80	496.00			30.00	2.20	308.50	0.33	0.08	2.11	13.60	647.00	28				
QC12 Quemahoning Creek before Jenner discharge																		40-08.79N, 79-02.73W		
6/13/96	012		6.51	6.20	265.00		5.79	0.00	15.60	79.70	1.68	0.84	0.27	0.69	60.00					
7/23/96	041			6.40			8.68	4.80	14.80	64.00	3.01	1.80	0.35	0.74	57.00					
2/11/97	061		6.20	6.20	135.00		4.90	2.00	12.80	77.00	1.19	0.81	0.38	0.41	61.00	<2.00				
3/31/97	098		6.13	6.30	98.00		4.30	0.00	10.80	43.00	0.73	0.32	0.46	0.23	34.00	4				
8/11/97	183		6.16	6.20	366.00		5.87	0.00	19.00	167.00	1.18	0.24	0.20	1.44	99.00	34				
9/1/97	200		6.54	6.50	302.00		7.36	0.00	32.00	117.00	2.26	0.18	0.21	1.18	87.00	10				
10/12/97	229		6.06	6.70	245.00		7.02	0.00	28.00	100.00	2.19	0.65	0.26	0.91	89.00	12				
10/29/97	236		6.51	6.50	308.00		4.42	0.00	22.00	74.00	1.18	0.28	0.28	0.41	59.00	<2.00				
12/14/97	265		5.90	6.30	145.00		4.73	3.80	12.40	48.00	0.98	0.61	0.43	0.31	46.00	14				
2/8/98	305		6.18	6.40	230.00		5.18	0.00	16.20	42.00	1.33	0.76	0.37	0.40	41.00	16				
3/8/98	321		6.19		157.00															
4/19/98	349		6.38	6.10	207.00		9.39	3.40	12.60	52.00	1.69	0.48	0.98	0.49	51.00	56				
5/3/98	367		6.15	6.40	160.00		21.38	0.00	11.80	571.00	3.98	0.45	2.48	0.38	60.00	8				
5/31/98	389		6.18	6.40	242.00		12.41	0.00	18.20	63.00	3.41	0.99	0.86	0.84	60.00	536				
6/28/98	410		6.22	6.40	204.00		6.71	0.00	19.80	71.00	1.64	0.51	0.50	0.54	45.00	<2.00				
8/9/98	422		6.20	6.40	276.00		17.17	0.00	22.00	173.11	5.53	0.90	0.88	1.31	133.00	6				
8/30/98	441		6.22	6.50	267.00		13.96	0.00	26.00	158.83	4.87	0.54	0.51	1.32	106.00	<2				
9/27/98	460		6.70	6.50	360.00			0.00	30.00	139.17	1.83	0.31	<.2	1.01	73.00	14				
11/8/98	483		6.68	6.50	311.00			0.00	30.00	166.88	1.92	0.85	<.2	1.09	112.00	<2				
11/29/98	502			6.40			7.75	0.00	28.00	138.45	2.25	0.59	0.37	0.91	101.60	6				
1/17/99	516		6.56	6.20	264.00		4.84	0.00	11.20	61.67	1.01	0.22	0.45	0.28	<20	22				
4/24/99	570		6.12	6.30	155.00		8.70	0.00	9.20	45.96	1.09	0.51	1.14	0.22	30.00	18				
6/3/99	596		6.26	6.30	242.00		5.09	0.00	16.80	76.99	1.24	480.00	0.35	0.49	60.00	10				
6/14/99	618		6.32	6.30	258.00			0.00	20.00	126.83	2.64	1.08	0.31	0.95	107.00	20				
QC12A																				
2/11/97	063		3.58	3.70	587.00			212.00	0.00	636.00	109.00	121.00	<0.135	12.00	484.00	10				
3/31/97	096		3.14	3.20	501.00			148.00	0.00	326.00	38.80	24.48	<.014	6.84	314.00	6				
QC12B																				
7/2/96	024		6.28	6.20	1034.00		121.19	0.00	88.00	506.30	55.60	16.12	1.22	8.30	453.00					

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
																		40-08.57N, 79-01.98W		
QC13 Quemahoning Creek, downstream of Jenner discharge																				
3/13/96	013		6.55	6.20	292.00		9.00	0.00	15.60	63.30	2.68	1.74	0.33	1.29	94.00					
7/23/96	042			6.50			5.21	0.00	15.60	60.00	1.33	0.44	0.38	0.39	34.00					
2/11/97	062		5.58	6.20	126.00		6.32	4.40	13.80	71.00	1.57	1.14	0.45	0.54	60.00	<2.00				
3/31/97	067		6.11	6.30	87.00		5.10	1.20	11.20	51.00	0.93	0.44	0.51	0.32	38.00	2				
4/29/97	111		6.80	6.20	169.00		6.14	0.00	13.40	14.00	1.53	0.70	0.44	0.51	27.00	6				
6/9/97	143		6.26	6.30	206.00		5.79	2.80	11.20	71.00	1.27	0.83	0.42	0.64	69.00	18				
713/97	161		5.92	6.30	437.00		7.87	11.20	15.60	141.00	2.47	1.62	0.16	1.40	126.00	12				
8/11/97	184		6.02	6.30	408.00		16.31	0.00	22.00	188.00	4.60	1.08	0.70	1.86	142.00	42				
9/1/97	198		6.46	6.50	415.00		9.06	0.00	32.00	157.00	2.61	0.48	0.32	1.43	108.00	<2.00				
10/6/97	218		6.30	6.20	244.00		6.52	0.00	18.00	63.00	1.98	0.76	0.21	0.98	12.00	10				
10/28/97	238		6.70	6.50	209.00		5.19	0.00	22.00	71.00	1.53	0.58	0.26	0.56	51.00	8				
12/7/97	284		5.96	6.10	141.00		6.76	7.00	10.60	31.00	1.32	0.96	0.65	0.41	26.00	4				
2/8/98	302		6.12	6.40	216.00		5.86	0.00	17.00	47.00	1.46	0.83	0.42	0.49	38.00	6				
4/19/98	348		6.19	6.10	213.00		18.73	3.60	13.40	60.00	3.20	0.62	2.13	0.63	67.00	76				
5/3/98	365		6.26	6.40	124.00		5.90	0.00	12.40	38.00	1.16	0.44	0.53	0.42	61.00	2				
5/31/98	381		6.18	6.30	300.00			0.00	17.80	102.00	1.91	0.91	<.2	1.17	80.00	<2.00				
6/28/98	407		6.08	6.50	182.00		6.50	0.00	19.40	65.00	1.57	0.48	0.48	0.56	64.00	8				
8/9/98	420		6.39	6.50	364.00			0.00	22.00	193.17	1.80	1.02	<.2	1.44	157.00	2				
8/30/98	438		6.27	6.50	337.00		8.15	0.00	24.00	168.60	2.22	1.02	0.22	1.62	126.00	<2				
9/27/98	456		6.65	6.60	406.00				28.00	170.37	2.01	1.02	<.2	1.37	85.00	18				
11/8/98	487		6.42	6.40	418.00			0.00	28.00	188.99	3.24	1.87	<.2	1.58	150.00					
12/13/98	506		6.48	6.50	207.00		6.97	0.00	26.00	101.53	2.31	1.38	0.24	0.82	88.70	10				
1/17/99	520		6.27	6.20	233.00		4.97	0.00	11.20	64.36	1.00	0.26	0.46	0.33	22.00	16				
4/24/99	572		6.10	6.20	203.00		6.66	0.00	9.20	44.29	0.83	0.19	0.85	0.23	29.00	4				
6/3/99	597		6.50	6.30	260.00		5.02	0.00	17.80	88.07	1.24	0.55	0.30	0.62	59.00	18				
6/14/99	617		6.66	6.30	295.00			0.00	19.20	156.43	2.23	1.26	<0.2	1.21	139.00	22				
QC13A																				
3/31/97	099		6.70	5.70	249.00		23.93	26.00	5.20	207.00	6.93	8.03	1.44	2.88	124.00	10				
QC14 Tributary downstream of Jenner discharge, under 601																		40-08.70N, 79-02.12W		
6/12/96	014		5.92	6.00	190.00		79.85	19.80	18.00	103.90	28.40	10.56	4.84	1.21	76.00					
8/7/96	050		6.20	6.00	100.00		25.40	20.00	9.20	61.00	10.30	5.83	1.00	0.77	53.00					
2/11/97	064		5.45	6.30	136.00		6.48	0.00	19.20	38.00	1.42	0.83	0.46	0.20	38.00	10				
3/18/97	090		5.95	6.00	71.00		3.84	1.40	6.80	27.00	0.90	0.76	0.33	0.19	23.00	2				
4/7/97	104		5.96	6.00	101.00		6.51	7.20	5.60	37.00	2.35	1.92	0.30	0.33	28.00	8				
4/29/97	110		6.42	5.90	169.00		8.59	9.20	6.00	43.00	2.97	2.46	0.46	0.37	56.00	16				
6/9/97	142		6.16	6.00	147.00		14.76	12.80	7.40	87.00	5.82	3.72	0.62	0.48	40.00	16				
7/13/97	162		4.60	4.10	419.00		46.69	58.00	0.00	120.00	19.60	16.38	0.42	2.96	112.00	42				
8/26/97	195		6.28	5.90	283.00		62.43	32.00	11.60	107.00	29.80	13.86	0.93	2.19	106.00	26				
10/5/97	216		5.80	5.70	324.00		37.67	44.00	7.80	118.00	17.80	16.33	0.24	2.45	67.00	12				
12/7/97	263		6.30	5.90	91.00			9.20	6.80	30.00	1.38	1.38	<.2	0.24	26.00	<2.00				
1/4/98	282		6.06	6.60	93.00		3.30	0.00	7.20	30.00	0.61	0.17	0.36	0.14	13.00	<2.00				
2/8/98	301		6.14	6.10	152.00		3.71	1.60	7.20	42.00	1.22	1.02	0.20	0.21	28.00	<2.00				
3/8/98	318		6.40	6.20	137.00		9.36	4.80	7.80	26.00	1.98	0.51	0.98	0.19	12.00	26				
5/3/98	384		6.43	6.20	87.00		4.31	2.60	7.40	20.00	1.06	0.57	0.37	0.18	26.00	10				
6/28/98	406		6.60	6.20	103.00		12.67	17.80	7.40	26.00	3.71	1.68	0.96	0.32	15.00					
8/9/98	419		6.34	6.40	493.00		32.92	0.00	58.00	184.68	16.10	12.81	0.21	1.64	116.00	24				
8/30/98	437		6.14	6.00	263.00		49.03	14.20	12.40	97.41	20.70	14.70	1.58	1.78	71.00	4				
9/27/98	457		6.28	6.50	421.00			0.00	42.00	143.71	16.60	16.59	<.2	1.66	73.00	20				
11/8/98	481		5.66	5.80	246.00			20.00	7.20	102.40	9.95	8.20	<.2	1.40	76.00	<2				
12/13/98	505		6.72	5.60	229.00		21.71	13.40	6.40	74.60	10.10	8.36	0.22	1.28	79.00	30				
1/17/99	519		6.13	6.00	141.00		2.84	0.20	6.00	38.74	0.57	0.35	0.26	0.21	<20	<2				
3/17/99	548		6.15	6.20	588.00		5.09	2.60	8.60	63.57	1.56	1.02	0.33	0.24	143.00	8				
4/24/99	566		6.10		266.00			0.00	24.00	45.04	0.44	0.21	0.36	0.11	20.00	<2.0				
6/3/99	598		5.85	6.00	151.00		9.34	4.40	7.40	43.27	3.69	2.88	0.30	0.56	32.00	24				
6/14/99	616		4.40	4.10	404.00			32.00	0.00	129.87	17.40	16.17	0.37	2.73	106.00	16				
QC14A																				
2/11/97	065		5.06	6.30	155.00			0.00	48.00	109.00	0.87	0.69	<0.135	0.15	50.00					

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	T Acidity HT (lab) (mg/l)	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
QC15 Tributary from Stoughton Lake, Lake Road																		40-08.43N, 79-02.63W		
7/1/96	022		7.34	6.30	154.00		2.11	0.00	22.00	47.70	0.50	0.04	0.14	0.23	23.00					
7/29/96	044		6.90	6.90	100.00		1.99	0.00	28.00	47.00	0.38	0.04	0.14	0.29	16.00					
2/3/97	057		7.20	6.50	76.00		2.10	0.00	20.00	48.00	0.33	0.04	0.21	0.18	26.00	6				
3/18/97	091		6.64	6.40	67.00		2.47	0.00	17.20	32.00	0.37	0.06	0.28	0.13	24.00	2				
4/7/97	100		6.56	6.50	129.00		1.88	0.00	17.80	638.00	0.27	0.08	0.18	0.21	11.00	6				
4/29/97	106		8.40	7.40	127.00		2.03	0.00	22.00	56.00	0.31	0.02	0.21	0.17	133.00	4				
5/27/97	126		6.10	6.40	72.00		2.96	0.00	11.20	12.00	0.52	0.12	0.30	0.19	< 10	40				
6/22/97	147		6.10	6.80	133.00			0.00	32.00	196.00	0.62	0.07	< 0.14	0.23	34.00	2				
8/4/97	175		6.69	6.50	171.00		2.91	0.00	38.00	58.00	0.50	0.09	0.20	0.49	31.00	6				
8/29/97	190		6.06	6.70	165.00		2.16	0.00	38.00	49.00	0.42	0.06	0.20	0.16	26.00	2				
10/6/97	212		6.03	6.60	208.00			0.00	36.00	70.00	0.42	0.04	< 0.2	0.11	48.00	10				
11/3/97	241		6.39	6.70	178.00			0.00	42.00	56.00	0.35	0.07	< 0.2	0.06	31.00	< 2.00				
12/7/97	257		7.00	6.40	93.00			0.00	17.20	38.00	0.22	0.06	< 0.2	0.05	35.00	< 2.00				
1/4/98	278		5.96	6.00	119.00			0.00	22.00	32.00	0.13	0.02	< 0.2	0.13	25.00	6				
2/8/98	297		6.40	6.50	178.00		2.57	0.00	20.00	30.00	0.25	0.03	0.33	0.15	44.00	< 2.00				
3/15/98	330		6.26	6.40	77.00			0.00	11.80	26.00	0.16	0.03	< 0.2	0.06	15.00	< 2.00				
4/13/98	339		6.25	6.40	86.00		14.46	0.00	14.80	24.00	0.35	0.30	2.46	0.08	< 10	38				
5/3/98	360		6.15	6.60	141.00			0.00	19.40	33.00	0.38	0.05	< .2	0.15	21.00	2				
5/31/98	385		6.91	6.50	129.00			0.00	28.00	34.00	0.36	0.05	< .2	0.18	16.00	< 2.00				
6/28/98	402		6.02	6.70	90.00		5.63	0.00	22.00	33.00	1.03	0.07	0.54	0.43	< 10	< 2.00				
8/9/98	415		5.89	6.70	174.00			0.00	40.00	64.47	0.25	0.03	< .2	0.41	< 20	< 2				
8/30/98	436		6.06	6.90	195.00			0.00	46.00	72.53	0.35	0.04	< .2	0.06	< 20	4				
10/11/98	465		6.60	6.90	149.00		4.04	0.00	44.00	74.01	0.76	0.09	0.38	0.31	< 20	14				
11/8/98	477		7.18	6.90	170.00			0.00	44.00	76.26	0.70	0.12	< .2	0.32	20.00	< 2				
11/29/98	497			6.80				0.00	46.00	81.68	0.80	0.16	< .2	0.28	20.60	24				
1/17/99	521		6.64	6.40	136.00			0.00	17.20	46.60	0.27	0.05	< 0.2	0.15	< 20	6				
3/17/99	547		6.52	6.60	154.00			0.00	24.00	55.19	0.28	0.12	< 0.2	0.17	23.00	4				
4/25/99	577		6.60	6.40	108.00			0.00	16.00	33.36	0.67	0.18	0.82	0.10	< 20.00	14				
6/3/99	593		7.24	6.60	156.00			0.00	26.00	47.50	0.19	0.07	< .2	0.16	< 20.00	16				
6/14/99	612		7.74	6.90	141.00			0.00	28.00	48.05	0.12	< 0.02	< 0.2	0.09	193.00	< 2.0				
QC16 Quemahoning Creek before Genders discharge																		40-09.68N, 79-02.19W		
7/1/96	019		6.49	6.10	389.00		5.81	0.00	24.00	107.30	2.06	1.08	0.19	0.67	82.00					
2/3/97	053		6.31	6.30	131.00		7.16	4.60	20.00	91.00	1.93	1.14	0.53	0.41	56.00	6				
4/7/97	102		6.22	6.30	156.00		10.54	0.40	15.00	121.00	2.90	1.20	0.82	0.43	48.00	10				
4/29/97	108		6.40	6.30	205.00		6.04	0.00	22.00	78.00	2.00	1.40	0.29	0.46	41.00	8				
5/27/97	128		6.23	6.30	119.00		8.91	1.00	9.40	41.00	1.38	0.30	1.07	0.26	21.00	4				
8/26/97	192		6.29	6.40	275.00		9.16	0.00	42.00	176.00	3.52	1.98	0.20	0.96	121.00	4				
10/6/97	214		6.39	6.40	395.00		8.01	0.00	40.00	125.00	3.06	1.98	0.20	0.78	106.00	14				
12/7/97	258		6.60	6.20	153.00		5.93	3.40	16.00	77.00	1.66	1.38	0.40	0.39	40.00	14				
1/4/98	280		6.16	5.90	171.00		6.70	0.00	18.20	40.00	1.48	0.63	0.63	0.27	34.00	6				
2/8/98	299		6.10	6.40	313.00		6.13	0.00	22.00	56.00	1.96	1.32	0.32	0.46	70.00	< 2.00				
3/15/98	332		6.22	6.40	200.00		6.34	0.00	15.20	184.00	1.86	1.26	0.39	0.46	57.00	8				
4/13/98	341		6.51	6.10	143.00			0.00	10.20	23.00	27.20	4.60	< .2	2.43	43.00	42				
5/3/98	362		6.22	6.40	162.00		6.56	0.00	17.40	30.00	1.76	0.73	0.48	0.40	54.00	14				
5/31/98	381		6.22	6.30	267.00			0.00	32.00	35.00	3.65	1.50	< .2	0.87	113.00	16				
6/28/98	404		6.34	6.50	264.00		8.77	0.00	28.00	76.00	2.60	0.84	0.56	0.56	72.00	14				
8/9/98	417		6.10	6.60	504.00			0.00	50.00	295.03	4.00	2.16	< .2	1.20	190.00	2				
9/13/98	444		6.59	6.40	439.00		10.91	0.00	48.00	229.50	4.17	1.62	0.26	1.10	159.00	< 2				
10/11/98	464		6.35	6.50	245.00		9.32	0.00	34.00	133.19	3.08	1.50	0.45	0.72	83.00	6				
11/8/98	479		6.67	6.50	566.00			0.00	64.00	322.34	6.39	2.31	< .2	1.19	188.00	6				
11/29/98	499			6.40			42.88	0.00	52.00	263.21	18.80	3.96	1.26	1.26	198.70	14				
1/17/99	523		6.64	6.20	294.00		7.35	0.00	14.80	72.96	1.95	0.58	0.58	0.34	41.00	14				
3/26/99	554		6.29	6.20	321.00		6.94	0.00	11.20	62.02	1.21		0.76	0.30	46.00	16				
4/25/99	580		6.06	6.40	410.00		7.31	0.00	11.60	56.45	1.30	0.03	0.80	0.29	42.00	16				
6/3/99	599		6.37	6.30	350.00		7.89	0.00	28.00	130.45	2.74	1.44	0.29	0.75	100.00	26				
6/14/99	613		6.28	6.50	509.00			0.00	46.00	221.37	4.29	3.30	< 0.2	1.01	182.00	< 2.0				

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. F)	Total Acidity (calculated) (mg/l)	Net Acidity (lab) (mg/l)	Total Alkalinity (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)
Discharge Near Center Of Wetlands (Flow and loading determined by subtracting upstream from downstream parameters)																			
8/26/1997		1954.3														0.00	323.86	29.09	<4.71
11/24/1997		2055														0.00	392.65	24.04	<4.94
12/16/1997		3293														0.00	479.14	31.11	<7.91
1/7/1998		3910														0.00	376.09	22.58	<7.92
2/9/1998		2271														0.00	533.27	33.37	0.94
3/25/1998		3075														0.00	524.05	30.47	20.77
4/21/1998		2818														0.00	751.34	39.92	-22.37
5/28/1998		2391														0.00	413.82	31.51	5.75
7/1/1998		3445														0.00	276.53	22.58	8.28
7/29/1998		2250														0.00	337.49	28.41	5.41
9/1/1998		2300														0.00	288.76	45.84	4.55
10/19/1998		1834														0.00	289.54	26.19	4.41
11/18/1998		1563														0.00	273.73	19.05	3.76
1/12/1999		2099														0.00	547.30	26.35	15.84
Discharge Near Center Of Wetlands (Flow determined by subtracting upstream from downstream parameters, sample obtained from upwelling)																			
11/24/1997	7485392	2055	7.0	6.5	480	na	16.8	0	52.0	8.8	6.7	<.2	0.598	122	nd	0.00	217.37	14.77	<4.94
12/16/1997	7485397	3293	7.3	6.4	950	na	45.5	0	134.0	24.2	22.4	<.2	1.25	444	12	0.00	957.88	49.48	<7.91
1/7/1998	7485411	3910	6.3	6.3	880	na	48.2	16.0	132.0	25.8	23.4	<.2	1.15	323	nd	0.00	1212.55	54.05	<9.39
2/9/1998	7485425	2271	6.7	6.4	830	na	43.1	0	130.0	22.9	20.4	0.252	1.19	642	4	0.00	625.11	32.48	6.88
3/25/1998	7485446	3075	5.8	6.3	970	na	44.9	0	132.0	23.9	23.9	<.2	1.21	26	4	0.00	883.38	44.72	<7.39
4/21/1998	7485472	2818	6.4	6.3	810	na	44.1	0	128.0	23.5	22.4	<.2	1.14	322	24	0.00	796.00	38.61	<6.77
5/28/1998	7485481	2391	na	6.3	770	na	46.3	0	124.0	24.7	21.9	0.2	1.17	348	6	0.00	709.87	33.63	5.75
7/1/1998	7485488	3445	6.4	6.4	790	na	46.5	0	126.0	24.7	21.2	0.2	1.28	309	16	0.00	1022.80	53.00	8.28
7/29/1998	7485506	2250	6.2	6.3	750	na	46.0	0	124.0	24.6	21.0	0.2	1.14	355	na	0.00	665.31	30.83	5.41
9/1/1998	7485531	2300	7.3	6.4	730	57	43.7	0	124.0	23.2	19.9	0.2	1.25	353	4	0.00	641.39	34.56	5.53

DEP Laboratory Sample Submission Sheet

LAB USE ONLY
Date Received:

Bureau of Abandoned Mine Reclamation
Ebensburg District Office
122 S. Center St.
Ebensburg, PA 15931

Telephone: 814-472-1800

Program: 0 0 1 5

Funding Link: 0 3 8

Reason: 0 1

Collector ID: 7 4 9 3

Date Collected: (MM-DD-YY) 0 5 2 1 0 2

SAC: 0 7 1 1

Routine Monitoring Form QCRGI

Project (Name/Number): QUEMAHONING CREEK REGIONAL GEOGRAPHIC INITIATIVE

Seq. #: (001-999)	Time: (HH MM)	Monitoring Point ID Alias:	Point Description: *	pH c/m	Cond. (umho/cm)	D.O. (mg/l)	Flow (cfs)	E/M	Lab Number
009		QC12	UPSTREAM OF JENNER PASSIVE TREATMENT	6.5	175				
010		QC13	DOWNSTREAM OF JENNER PTS	6.7	180				
011		USGS 176X	OUTFLOW OF JENNER PTS	6.8	475				
012		QCHRA	QC ABOVE HOFFMAN RUN	6.9	225				
013		QC5	HOFFMAN RUN @ CONFL. w/ QC	5.6	650				
014		QC6	QC BELOW HOFFMAN RUN	6.0	285				
015		QC1	QC ABOVE USGS 208	6.5	205				
016		USGS 208		6.5	206				
017		QC2	QC BELOW USGS 208	6.6	224				

Weather Conditions: PARTLY CLOUDY

Comments: QCHRA – 40°07'51.37" 79°03'55.02"

Collector Name (Please PRINT): Leonard Lichvar Signature: [signature]

* For non-established monitoring points, include latitude/longitude. Indicate datum and method in comments.

DEP Laboratory Sample Submission Sheet

LAB USE ONLY
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Bureau of Abandoned Mine Reclamation
Ebensburg District Office
122 S. Center St.
Ebensburg PA 15931
Telephone: 814-472-1800

Program: 0 0 1 5

Funding Link: 0 3 8

Reason: 0 1

Collector ID: 7 4 9 3

Date Collected: (MM-DD-YY) 0 5 2 2 0 2

SAC: 0 7 1 1

Routine Monitoring Form QCRGI

Project (Name/Number): QUEMAHONING CREEK REGIONAL GEOGRAPHIC INITIATIVE

Seq. #: (001-999)	Time: (HH MM)	Monitoring Point ID Alias:	Point Description:	pH s/m	Cond. (umho/cm)	D.O. (mg/l)	Flow (cfs)	E/M	Lab Number
018		QCSR	SPRUCE RUN TRIB.	5.7	80				
019		QCSRD	QC DOWNSTREAM OF SPRUCE RUN	5.8	110				
020		QCSRU	QC UPSTREAM OF SPRUCE RUN	5.6	88				
021		QCBRU	QC UPSTREAM OF BEAMS RUN	5.8	158				
022		QCBR	BEAMS RUN	5.1	036				
023		QCBRD	QC DOWNSTREAM OF BEAM'S RUN	5.5	074				
024		QCTM	TWO MILE RUN	6.2	348				
025		QCRU	QC ABOVE RESERVOIR	6.6	202				
026		QCRD	QC BELOW RESERVOIR	6.6	206				
027		QCRR	ROARING RUN	6.7	160				

Weather Conditions: SUNNY MILD MID 60's

Comments:
QCSR - 40°08'2.08"N 79°06'21.35"W
QCSRD - 40°07'52.16"N 79°06'19.56"W
QCSRU - 40°07'52.16"N 79°06'26.16"W
QCBRU - 40°07'28.83"N 79°06'43.20"W
QCBR - 40°07'31.94"N 79°06'50.13"W

* SEE PAGE 2 FOR ADDITIONAL LAT/LONG'S FOR SITES

Collector Name (Please PRINT): Leonard Lichvar Signature: [signature]

* For non-established monitoring points, include latitude/longitude. Indicate datum and method in comments.

DEP Laboratory Sample Submission Sheet

LAB USE ONLY
Date Received:

Bureau of Abandoned Mine Reclamation
Ebensburg District Office
122 S. Center St.
Ebens[illegible] PA 15931

Telephone: 814-472-1800

Program: 0015

Funding Link: 038

Reason: 01

Collector ID: 7493

Date Collected: (MM-DD-YY) 052202

SAC: 0711

Routine Monitoring Form QCRGI

Project (Name/Number): Quemahoning Creek Regional Geographic Initiative

Seq. #: (001-999)	Time: (HH MM)	Monitoring Point ID Alias:	Point Description: *	Field Measurements: pH c/m	Cond. (umho/cm)	D.O. (mg/l)	Flow (cfs)	E/M	Lab Number
028		QCRRU	QC upstream of Roaring Run	6.8	212				

Weather Conditions: Sunny, Mild mid 60's

Comments: QCBRD - 40°07'59.09" N 79°05'11.09" W
QCTM - 40°09' 9.51" N 78°~~58~~ 58.26" W
QCRU - 40°09' 37.09" N 78°59' 20.03" W
QCRD - 40°11' 35.36" N 78°56' 18.60" W
QCRR - 40°09' 46.89" N 79°00' 29.94" W
QCRRU - 40°09' 41.80" N 79°00' 26.55" W

Collector Name (Please PRINT): Leonard Lichvar Signature: [signature]

* For non-established monitoring points, include latitude/longitude. Indicate datum and method in comments.

Printed: 11/5/2002

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.0	pH units
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00410	ALK	COMPLET	A	10.6	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00530	TSS	COMPLET	A	6	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00900	HARD	COMPLET	A	68	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	18.000	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	5.540	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	48.6	MG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	1700.000	UG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	720.00	UG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	485.000	UG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R01105A	Al	COMPLET	A	1190.000	UG/L
2002 I 027055	Unknown	05/24/02 8:25 am	711	7493	009	05/21/02 12:00 am	R70508	ACID	COMPLET	A	38.60	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.1	pH units
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00410	ALK	COMPLET	A	11.0	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00530	TSS	COMPLET	A	6	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00900	HARD	COMPLET	A	75	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	19.500	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	6.370	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	50.9	MG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	1490.000	UG/L

Printed: 11/5/2002

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	900.00	UG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	500.000	UG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R01105A	Al	COMPLET	A	781.000	UG/L
2002 I 027056	Unknown	05/24/02 8:25 am	711	7493	010	05/21/02 12:00 am	R70508	ACID	COMPLET	A	35.60	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.4	pH units
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00410	ALK	COMPLET	A	28.0	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00900	HARD	COMPLET	A	220	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	52.600	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	21.600	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	184.0	MG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	681.000	UG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	280.00	UG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	1650.000	UG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R01105A	Al	COMPLET	A	223.000	UG/L
2002 I 027057	Unknown	05/24/02 8:25 am	711	7493	011	05/21/02 12:00 am	R70508	ACID	COMPLET	A	10.80	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.3	pH units
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00410	ALK	COMPLET	A	19.0	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00530	TSS	COMPLET	A	10	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00900	HARD	COMPLET	A	86	MG/L

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	22.900	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	6.960	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	50.3	MG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	379.000	UG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	90.00	UG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	241.000	UG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R01105A	Al	COMPLET	A	1070.000	UG/L
2002 I 027058	Unknown	05/24/02 8:25 am	711	7493	012	05/21/02 12:00 am	R70508	ACID	COMPLET	A	17.40	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00403	pH	COMPLET	A	4.7	pH units
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00410	ALK	COMPLET	A	1.8	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00900	HARD	COMPLET	A	348	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	72.100	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	40.600	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	378.0	MG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	7000.000	UG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	6530.00	UG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	5230.000	UG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R01105A	Al	COMPLET	A	3000.000	UG/L
2002 I 027059	Unknown	05/24/02 8:25 am	711	7493	013	05/21/02 12:00 am	R70508	ACID	COMPLET	A	64.80	MG/L

Printed: 11/5/2002

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM_ID	Sample Status	Stat	Results	Units
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.2	pH units
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00410	ALK	COMPLET	A	16.8	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00530	TSS	COMPLET	A	4	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00900	HARD	COMPLET	A	110	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	27.700	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	10.000	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	70.9	MG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	984.000	UG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	600.00	UG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	718.000	UG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R01105A	Al	COMPLET	A	1220.000	UG/L
2002 I 027060	Unknown	05/24/02 8:25 am	711	7493	014	05/21/02 12:00 am	R70508	ACID	COMPLET	A	24.40	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.5	pH units
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00410	ALK	COMPLET	A	24.0	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00900	HARD	COMPLET	A	74	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	20.800	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	5.240	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	25.4	MG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	304.000	UG/L

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Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	104.000	UG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R01105A	Al	COMPLET	A	242.000	UG/L
2002 I 027061	Unknown	05/24/02 8:25 am	711	7493	015	05/21/02 12:00 am	R70508	ACID	COMPLET	A	0.00	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.2	pH units
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00410	ALK	COMPLET	A	22.0	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00900	HARD	COMPLET	A	82	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	22.100	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	6.460	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	47.2	MG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	935.000	UG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	370.00	UG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	272.000	UG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R01105A	Al	COMPLET	A	509.000	UG/L
2002 I 027062	Unknown	05/24/02 8:25 am	711	7493	016	05/21/02 12:00 am	R70508	ACID	COMPLET	A	21.20	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00403	pH	COMPLET	A	6.6	pH units
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00410	ALK	COMPLET	A	32.0	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00530	TSS	COMPLET	A	4	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00900	HARD	COMPLET	A	74	MG/L

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Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00916A	Ca	COMPLET	A	20.600	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00927A	Mg	COMPLET	A	5.470	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R00945A	SO4	COMPLET	A	28.3	MG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R01045A	Fe	COMPLET	A	403.000	UG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R01047A	Fe+2	COMPLET	A	70.00	UG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R01055A	Mn	COMPLET	A	102.000	UG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R01105A	Al	COMPLET	A	226.000	UG/L
2002 I 027063	Unknown	05/24/02 8:25 am	711	7493	017	05/21/02 12:00 am	R70508	ACID	COMPLET	A	0.00	MG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00403	pH	COMPLET	A	4.8	pH units
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00410	ALK	COMPLET	A	1.8	MG/L
~~2002 I 027064~~	~~Unknown~~	~~05/24/02 8:26 am~~	~~711~~	~~7493~~	~~018~~	~~05/22/02 12:00 am~~	~~R00530~~	~~TSS~~	~~COMPLET~~	~~A~~	~~12~~	~~MG/L~~
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00900	HARD	COMPLET	A	15	MG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	3.750	MG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	1.410	MG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	~~<20.0~~	~~MG/L~~
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	130.000	UG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	276.000	UG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R01105A	Al	COMPLET	A	1190.000	UG/L
2002 I 027064	Unknown	05/24/02 8:26 am	711	7493	018	05/22/02 12:00 am	R70508	ACID	COMPLET	A	27.20	MG/L

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Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00403	pH	COMPLET	A	5.5	pH units
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00410	ALK	COMPLET	A	3.0	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00900	HARD	COMPLET	A	36	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	8.850	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	3.460	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	28.4	MG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	205.000	UG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	398.000	UG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R01105A	Al	COMPLET	A	825.000	UG/L
2002 I 027065	Unknown	05/24/02 8:26 am	711	7493	019	05/22/02 12:00 am	R70508	ACID	COMPLET	A	25.80	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00403	pH	COMPLET	A	5.9	pH units
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00410	ALK	COMPLET	A	4.6	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00900	HARD	COMPLET	A	52	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	12.500	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	5.100	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	36.1	MG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	582.000	UG/L

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Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	20.00	UG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	523.000	UG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R01105A	Al	COMPLET	A	1050.000	UG/L
2002 I 027066	Unknown	05/24/02 8:26 am	711	7493	020	05/22/02 12:00 am	R70508	ACID	COMPLET	A	27.00	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00403	pH	COMPLET	A	5.9	pH units
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00410	ALK	COMPLET	A	4.8	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00530	TSS	COMPLET	A	6	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00900	HARD	COMPLET	A	73	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	17 400	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	7.160	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	71.2	MG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	285.000	UG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	685.000	UG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R01105A	Al	COMPLET	A	745.000	UG/L
2002 I 027067	Unknown	05/24/02 8:26 am	711	7493	021	05/22/02 12:00 am	R70508	ACID	COMPLET	A	25.00	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00403	pH	COMPLET	A	4.9	pH units
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00410	ALK	COMPLET	A	1.6	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00900	HARD	COMPLET	A	12	MG/L

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Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	2.810	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	1.090	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	<20.0	MG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	492.000	UG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	20.00	UG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	259.000	UG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R01105A	Al	COMPLET	A	1100.000	UG/L
2002 I 027068	Unknown	05/24/02 8:26 am	711	7493	022	05/22/02 12:00 am	R70508	ACID	COMPLET	A	29.40	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00403	pH	COMPLET	A	5.6	pH units
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00410	ALK	COMPLET	A	3.6	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00900	HARD	COMPLET	A	35	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	8.390	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	3.310	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	27.6	MG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	253.000	UG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	371.000	UG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R01105A	Al	COMPLET	A	746.000	UG/L
2002 I 027069	Unknown	05/24/02 8:26 am	711	7493	023	05/22/02 12:00 am	R70508	ACID	COMPLET	A	27.20	MG/L

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Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coli #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00403	pH	COMPLET	A	6.2	pH units
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00410	ALK	COMPLET	A	9.8	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00900	HARD	COMPLET	A	164	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	38.700	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	16.400	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	131.0	MG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	255.000	UG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	1100.000	UG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R01105A	Al	COMPLET	A	1030.000	UG/L
2002 I 027070	Unknown	05/24/02 8:27 am	711	7493	024	05/22/02 12:00 am	R70508	ACID	COMPLET	A	27.60	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00403	pH	COMPLET	A	6.3	pH units
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00410	ALK	COMPLET	A	28.0	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00530	TSS	COMPLET	A	6	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00900	HARD	COMPLET	A	83	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	21.100	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	7.420	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	56.2	MG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	1350.000	UG/L

Printed: 11/5/2002

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	450.00	UG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	524.000	UG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R01105A	Al	COMPLET	A	469.000	UG/L
2002 I 027071	Unknown	05/24/02 8:27 am	711	7493	025	05/22/02 12:00 am	R70508	ACID	COMPLET	A	41.20	MG/L
2002 I 027072	Unknown	05/24/02 8.27 am	711	7493	026	05/22/02 12:00 am	R00403	pH	COMPLET	A	6.6	pH units
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00410	ALK	COMPLET	A	19.2	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00900	HARD	COMPLET	A	81	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	21.700	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	6.550	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	48.1	MG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	237.000	UG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	<20.0	UG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	200.000	UG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R01105A	Al	COMPLET	A	<200	UG/L
2002 I 027072	Unknown	05/24/02 8:27 am	711	7493	026	05/22/02 12:00 am	R70508	ACID	COMPLET	A	0.00	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00403	pH	COMPLET	A	6.4	pH units
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00410	ALK	COMPLET	A	13.6	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00530	TSS	COMPLET	A	<2	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00900	HARD	COMPLET	A	68	MG/L

Printed: 11/5/2002

Sample Inquiry Report for I

Lab # 027055 to 027074

Lab Number	QC	Sample Logged	SAC	Coll #	Seq#	Date Collected	Testcode	CHEM ID	Sample Status	Stat	Results	Units
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	16.000	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	6.800	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	50.7	MG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	847.000	UG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	230.00	UG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	856.000	UG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R01105A	Al	COMPLET	A	<200	UG/L
2002 I 027073	Unknown	05/24/02 8:27 am	711	7493	027	05/22/02 12:00 am	R70508	ACID	COMPLET	A	35.40	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00403	pH	COMPLET	A	6.3	pH units
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00410	ALK	COMPLET	A	13.4	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00530	TSS	COMPLET	A	4	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00900	HARD	COMPLET	A	86	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00916A	Ca	COMPLET	A	22.200	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00927A	Mg	COMPLET	A	7.400	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R00945A	SO4	COMPLET	A	57.6	MG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R01045A	Fe	COMPLET	A	1580.000	UG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R01047A	Fe+2	COMPLET	A	810.00	UG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R01055A	Mn	COMPLET	A	503.000	UG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R01105A	Al	COMPLET	A	539.000	UG/L
2002 I 027074	Unknown	05/24/02 8:27 am	711	7493	028	05/22/02 12:00 am	R70508	ACID	COMPLET	A	31.40	MG/L

...MONITORING WAT... - POLLUTIONAL DISCHARGES (PART 1 OF 2)

H & I Sandi Coal Inc.
J - Carlton Barron.

MAP KEY	SAMPLE NUMBER	DATE	FLOW* (G/m)	ACIDITY (MG/L)	ALK (MG/L)	IRON (MG/L)	MANG. (MG/L)	AL. (MG/L)	ACID LOADING (LBS/DAY)	IRON LOADING (LBS/DAY)	AL LOADING (LBS/DAY)	MANG. LOADING (LBS/DAY)	LANDMARKS
(A)	4304538	11/1/00	2 (E)	428	0	146	230	.7	10.3	3.5	—	5.5	Boswell Quarry
(B)	4304246	4/3/95	35 (E)	126	0	35	12.5	<.5	53	14.7	—	5.3	Hoffman Run Ankney Farm Road
(C)	4304433	9/7/00	270 (m)	0	128	34	3	<.5	0	110	—	—	Gonder Discharge
(D)	4304040	2/8/00	2 (E)	186	22	83	19	<.5	4.5	2	—	—	Corner of Ankney Pasture Seep
(E)	4304273	3/25/99	25 (E)	17	10	5.29	2.3	1.14	5	2	—	—	Hoffman Church
(F)	4304274	3/25/99	65 (E)	128	0	2.74	8.2	13.1	100	2	10	6.4	Hoffman Church
(G)	4304262	5/6/96	150 (E)	60	0	<.3	.35	3.89	108	.5	.7	—	Old Consol - Belltown
(H)	4304236	4/26/00	123 (m)	856	0	40	6	115	1265	59	170	8.9	Acosta Refuse Pile
(I)	4304166	3/31/00	60 (E)	52	12	<.3	4.4	9.7	38	.2	7	3	RR Culvert - Acosta
(J)	4304416	4/22/98	300 (E)	0	48	4.4	.8	1.7	0	16	6	3	Quecreek
(K)	4304599	6/29/98	30 (E)	3.6	30	3.4	8.4	<.5	1.3	1.2	—	3	Jenners Bog System
(L)	4304258	5/10/00	15 (E)	348	22	164	13.5	.6	62.7	29.6	—	2.4	Bridge - Boswell Quarry
(n)			1800 (E)	0		25				540			Old Stoughton Lake II
(U)	4304191	4/12/00	22 (m)	102	0	4.7	.341	5	27	1.24	1.3	3.5	Bell Town Area Across Weiman Drive Fur.
(O)	4304429	9/6/00	10 (E)	60	26	9.46	36.3	<.5	7.2	1.1	—	4.36	Godin Bog
(P)	4304078	3/1/00	20 (E)	38	0	.6	.3	2.6	9.1	—	—	—	Across Road From Coal Junction Tipple
(Q)	4304849	10/7/98	6	148	0	5.3	1.6	13.8	10.7	—	.9	—	Also Directly Across From Coal Junction Shop

* (E) = ESTIMATED, (m) = MEASURED > FLOWS CAN FLUCTUATE SIGNIFICANTLY AT VARIOUS TIMES OF THE YEAR (WEEKLY/DAILY SAMPLING WOULD BE NEEDED TO GET AN IDEA OF YEARLY LOADING)

Quemahoning Watershed - Polutional Discharges (Page 2 of 2)

QL 12

Map Key	Sample Number	Date	(G/m)* Flow	mg/L Acidity	Alk.	Iron		Mang.	Al.		LBS/DAY Acid Loading	Iron Loading	Al Loading	Mang. Loading	Landmarks
R															Road Culvert near New BJ Maurer Ford
S															Road Culvert on Rt 601 near Ferrellton
T															In Jenners - last row of houses - pipe
U															Old Fetterolf Discharge (Barnes)
V															Old Stufft Deep Mine Discharge
W															Old Fetterolf Boswell Seeps
X	4304346	7/13/00	35 (E)	0	78	15.2		8.6	<.5		—	6.4	—	3.6	MF Land Refuse Pile Drainage
Y															Old Goodin Seep near Boswell Quarry Rd
Z	4304334	3/28/86	25 (E)	38	11	.46		3.1	1.6		11.4	—	—	—	Combination of seeps etc. Bridge above Hoffman Church
AA															Old King Coal Discharge (near Beckners)
BB															Old Fetterolf Refuse Pit Flow
CC															Old Deep Mine Discharge - East of Pilltown
DD															Old Gray Refuse Pile Seeps
EE															Old Mine Seep - West of Lake Gloria
FF															Wralynton Road Seep - at Y
GG															Wralynton Road Seep - near Hemmingers
HH															Old Dixon Seep

* (E) = Estimated
(m) = Measured

Flows can fluctuate significantly at various times of the year. (Weekly/Daily sampling would be needed to get an idea of yearly loading)

WATER QUALITY DATA SUMMARY | File Created: 08/01/02 | Dan Seibert

Jenner Passive Treatment System

Jenner Twp., Somerset County

SAMPLE DATE	SOURCE	FLOW (gpm)	pH (field)	pH (lab)	Specific Conduct. (umhos/cm)	Temp. (field) (deg. C)	Total Acidity (calculated) (mg/l)	Net Acidity (lab) (mg/l)	Total Alkalinity (mg/l)	Total Fe (mg/l)	Ferrous Fe (mg/l)	Total Al (mg/l)	Total Mn (mg/l)	Total Sulfates (mg/l)	Susp. Solids (mg/l)	Acid Loading (lbs/day)	Fe Loading (lbs/day)	Mn Loading (lbs/day)	Al Loading (lbs/day)	Alkalinity Loading (lbs/day)	Acid Loading tons/year	Fe Loading tons/year	Mn Loading tons/year	Al Loading tons/year
6/11/200	inflow	35	nd	4.66	nd	nd	276.09	252.00	34.00	143.00	150.00	0.00	10.80	546.00		106.02	60.16	4.54	0.00	14.30	19.34799	10.97922	0.8292	0
6/11/00	outflow	35	nd	6.41	nd	nd	26.72	0.00	158.00	4.87	4.02	0.00	9.90	608.00		0.00	2.05	4.16	0.00	86.47	0	0.373908	0.7601	0
														difference		106.02	58.11	0.38	0.00	-52.17	19.35	10.61	0.07	0.00
														%efficiency		100.00	96.97	99.08	0.00	NA	100.00	96.97	99.08	#DIV/0!

Appendix K

ABANDONED MINE RECLAMATION PROJECT
AMD 56(3077) 101.1
HOFFMAN ZION CHURCH (HOFFMAN RUN)
JENNER TOWNSHIP
SOMERSET COUNTY, PENNSYLVANIA

JOB DESCRIPTION

Ankney Family Revocable Trust
Robert K. & Johnette J. Ankney Trustees
(Surface and Minerals)

The proposed project involves the collection and treatment of AMD discharges from an abandoned surface mine, located in Jenner Township, Somerset County. The project area exhibits pollutional discharges that adversely impact the lower reaches of Hoffman Run and Quemahoning Creek.

The subject property is shown within the red lines on the attached map. The property is also described on Tax Assessment Maps No.12 &13, Somerset County, Pennsylvania listed as Parcel No. 91 containing 319.75 acres, and being the same property described in the deed contained in Deed Book 1365 Pages1080 to 1089.

The proposed project will provide passive treatment of the discharges and will consist of a series of vertical flow wetlands, settling ponds and aerobic wetlands. Major work required for the project includes; the construction of a permanent access road to the site, erosion and sedimentation control, clearing and grubbing, unclassified excavation of the wetland treatment cells, external embankment construction, internal dike construction, construction of flow control structures, placement of wetland substrate, slope protection, diversion and care of surface water, and revegetation of all areas disturbed during construction of the project.

It will be necessary to use ingress, egress and regress for the mobilization of personnel, equipment and materials onto the subject property to complete the work.

Upon completion of the project and the removal of all equipment from the work site, all disturbed areas will be revegetated and restored to a condition at least as good as existed prior to construction.

Hoffman Run AMD 56(3077)101.1 Preliminary Cost Estimate

Passive System:

Flow = 75 gpm
Acidity = 120 Mg/l

Iron load= 75*120*.01202*365/2000 = 19.7 Tons/year

Cost= 19.7 Tons/year * 25 years* $402.00 = $197,985.00

Diversion Channel:

700L.F. * $15.00/L.F = $10,500.00

Mine portal sealing:

3 portals@ $4000.00 each = $12,000.00

Surface Mine Restoration:

L=2500 ft
H=50 ft

312,500 cubic yards * $1.00 = $312,500.00

Total Cost = $532,985.00

APPENDIX L

To: Len Lichvar
From: David Creamer
Subject: Limestone Dosing Project
Date: 8/14/98

I have inculded my original summary of the project and some graphs I printed up this afternoon. Basicly, SR1 and BR1 are the sample points above the dosing points for the respective streams. SR2 and BR2 are the sample points below the dosing sites. The sample date of July 21 maybe unreliable due to the extrem value the lab gave me for the alkalinity for the down stream sample. Other than that I think the data is pretty accurate.

Summary of Spruce Run and Beam Run Limestone Dosing Project.

Spruce and Beam Runs, tributaries to the North Branch of the Quemahoning River, are located approximately two miles east of the town of Gray. Both of these streams have high acidity levels (greater than 60) and low pH. These streams were evaluated as potential sights for a limestone doseing project. This process will hopefully decrease the acidity and raise the pH in both streams. The process works best when the sand application is doubled and is applied for five consecutive years. Follow up applications can be maid as necessary.

It was determined that both Spruce and Beam Run traverses the Grace Kesslar property at highly accessible points. At each of these points the streams flowed through a constricted area increasing there flow rate making these sights very good locations for limestone sand application. Spruce Run passed through a stretch of logging road that had been culverted and the Beam Run area had an unnamed tributary flowing into it that experienced a twenty foot drop to reach the main stream channel.

After obtaining permission from Zane Kesslar, Grace Kesslars son, we proceeded with the project by placing the required amount of sand (refer to folder) into the accessible points on the Kesslar property. Commonwealth Stone delivered 159.25 tons of 83.8% CCE limestone sand to the sight on June 6, 1998 (Spruce Run received 68.75 tons and Beam Run Received 90.5 tons respectively). The following Monday, June 8, 1998, Berkey Excavating provided the pay loader to place the sand in and around the streams. The sand was spread out over several access points in both streams to improve the overall coverage area. Water samples were taken the day after the dosing, June 9, 1998, and the following Monday, June 15, 1998. John Landis will continue taking weekly samples during the rest of the summer.

Summary of Cost

Commonwealth Stone, 159.25 tons limestone sand at $9.70/ton : $1,544.75

Berkey Excavating, pay loader use 9hr : $450.00

Determination of Limestone Sand

Surface Area x 0.65231 x Precipitation = Flow
Flow x Acidity = Pounds of Acidity that Needs Treated.
Pounds of Acidity/80% = Amount of Limestone Sand Needed for One Year of Treatment
Multiplied by two gives you enough buffer for two years.

Beam Run :

(80568576 sqft) (0.65231) (3.52 ft) = 184996021.1 cuft of flow

(184996021.1 cuft of flow) (.000374617 #/cuft of acidity) = 69302.65 # of acidity

(69302.65 # of acidity) (2) = 138605.31 #'s of buffer needed for two years

69.3 tons/80% = 83.16 tons

Spruce Run:

(56617110 sqft) (0.65231) (3.52 ft) = 130000312.7 cuft of flow

(130000312.7 cuft of flow) (0.000474502 #/cuft) = 61685.36 #'s of acidity

(61685.36 #'s of acidity) (2) = 123370.71 #'s of buffer needed for two years

61.69 tons/80% = 74.03 tons

LIMESTONE SAND DOSING DATA FOR SPRUCE AND BEAM RUNS

Data For SR1 (Spruce Run Upstream)

Date	Field pH	Lab pH	Alkalinity	Acidity
6/2/98	4.7	NA	NA	NA
6/9/98	5.15	4.81	2	64
6/15/98	4.72	4.51	1	70
6/23/98	4.45	4.36	0	56
7/1/98	4.6	4.41	0	60
7/10/98	4.75	4.67	4	40
7/14/98	5.7	5.67	6	30
7/21/98	6.22	5.78	8	38
8/10/98		6.18	8	44

Data for SR2(Spruce Run Downstream)

Date	Field pH	Lab pH	Alkalinity	Acidity
6/2/98	4.75	NA	NA	NA
6/9/98	8.15	6.06	16	40
6/15/98	6.7	5.88	10	54
6/23/98	6.14	5.18	4	36
7/1/98	5.2	5.59	6	42
7/10/98	6.8	5.61	8	16
7/14/98	7.45	6.14	10	25
7/21/98	6.4	5.93	12	42
8/10/98		6.04	20	56

Data for BR1(Beam Run Upstream)

Date	Field pH	Lab pH	Alkalinity	Acidity
6/2/98	4.47	NA	NA	NA
6/9/98	4.8	4.28	0	66

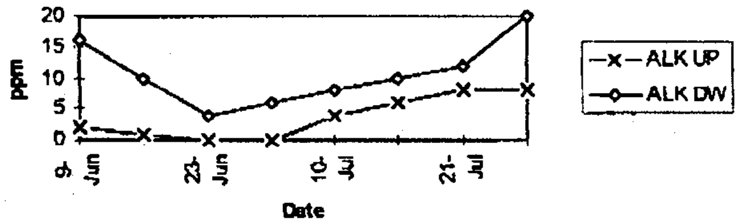
LIMESTONE SAND DOSING DATA FOR SPRUCE AND BEAM RUNS

6/15/98	4.28	4.36	0	82
6/23/98	4.06	4.28	0	36
7/1/98	4.08	4.07	0	58
7/10/98	4.2	4.71	2	42
7/14/98	4.35	4.18	0	36
7/21/98	3.4	4.44	0	50
8/10/98		4.34	0	66

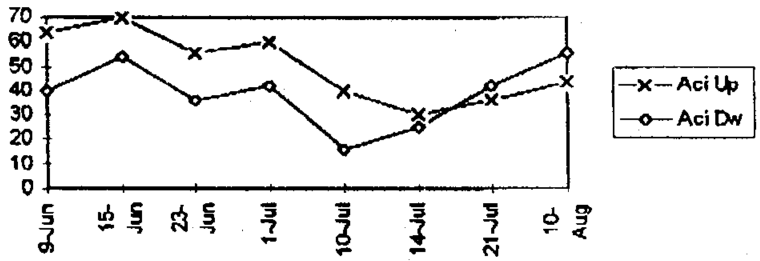
Data for BR2(Beam Run Downstream)

Date	FieldpH	Lab pH	Alkalinity	Acidity
6/2/98	4.42	NA	NA	NA
6/9/98	7.37	5.97	8	50
6/15/98	5.04	4.94	4	48
6/23/98	4.9	4.68	4	10
7/1/98	4.82	4.68	4	44
7/10	5.2	4.87	4	34
7/14/98	6.7	5.11	4	30
7/21/98	5.5	7.02	164	40
8/10/98		5.48	4	46

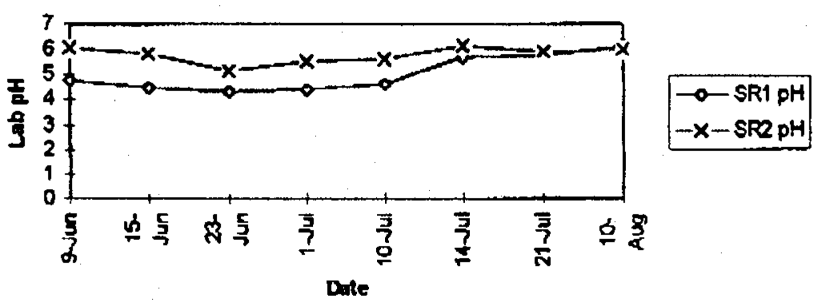
Comparison of Up Stream vs Down Stream Alkalinity for Spruce Run

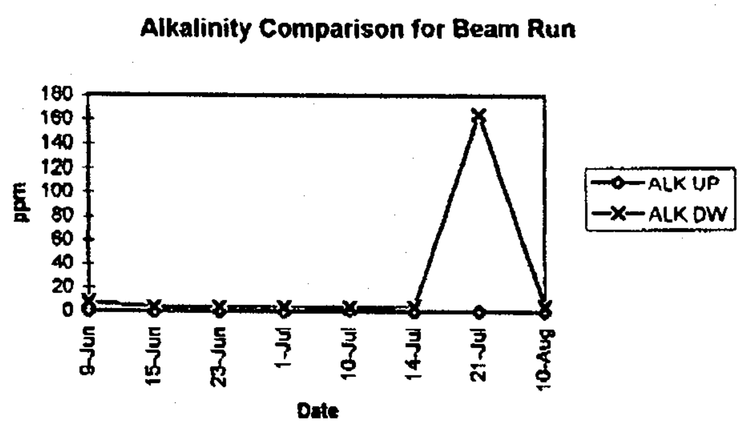


Comparison of Up Stream vs Down Stream Acidity for Spruce Run

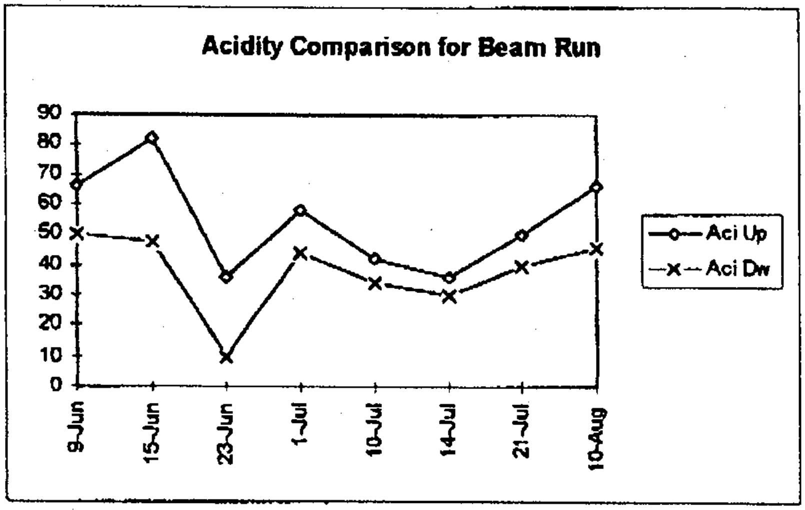


Comparison of Up Stream vs Down Stream pH on Spruce Run

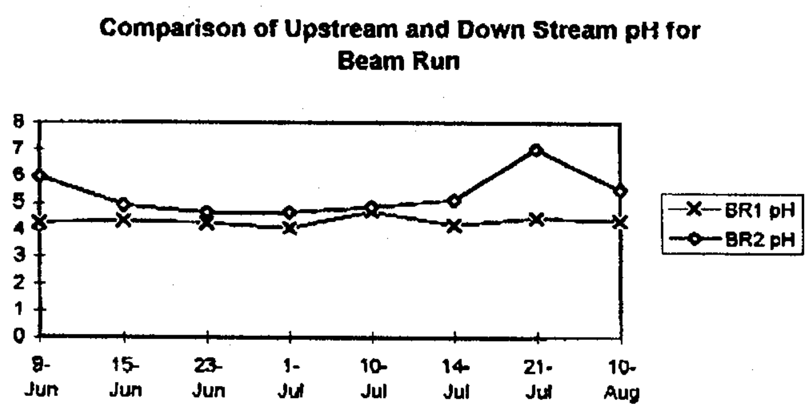




Alkalinity Comparison for Beam Run
ppm
180
160
140
120
100
80
60
40
20
0
9-Jun
15-Jun
23-Jun
1-Jul
10-Jul
14-Jul
21-Jul
10-Aug
Date
ALK UP
ALK DW



Acidity Comparison for Beam Run
90
80
70
60
50
40
30
20
10
0
9-Jun
15-Jun
23-Jun
1-Jul
10-Jul
14-Jul
21-Jul
10-Aug
Aci Up
Aci Dw

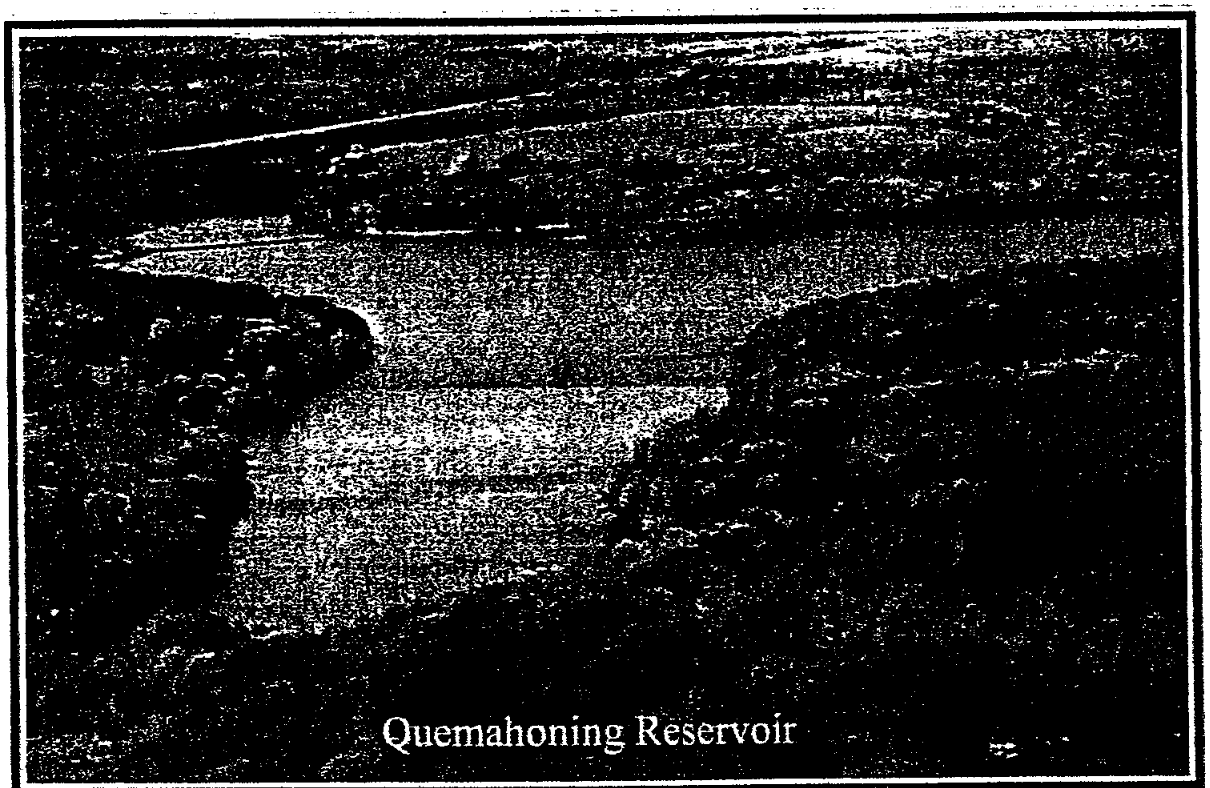


Comparison of Upstream and Down Stream pH for Beam Run
8
7
6
5
4
3
2
1
0
9-Jun
15-Jun
23-Jun
1-Jul
10-Jul
14-Jul
21-Jul
10-Aug
BR1 pH
BR2 pH

APPENDIX M

The Conemaugh River
Water Resource Conservation
And Management Plan

Concept Paper



Prepared by Southern Alleghenies Conservancy

in Cooperation with
The Stonycreek/ Conemaugh River Improvement Project

January 15, 1999

THE CONEMAUGH WATER AND RIVER

CONSERVATION AND MANAGEMENT PLAN

CONCEPT PAPER

Manufacturers Water Company formally accepted a $6,234,000 offer from the Commissioners of Cambria and Somerset Counties on November 19, 1998 to purchase approximately 5200 acres of land and water in both counties.

This acquisition creates the opportunity for the Commissioners, through a soon to be formed Authority, to accomplish the following objectives: I.) Meet the needs of existing industrial customers, and develop the integrated capacity to provide for reasonable industrial growth; II.) Provide sufficient water quantity and quality to provide for the needs of communities in the Little Conemaugh and Stonycreek Rivers watersheds; III.) Provide public outdoor recreational use of the land and water in partnership with the Southern Alleghenies Conservancy; IV.) Provide conservation releases to improve water quality and restore the integrity of flow to the Stonycreek and Little Conemaugh Rivers; and V.) Provide for scheduled releases from Quemahoning Reservoir to enable the creation of a whitewater recreational industry centered around the Stonycreek River Canyon north of Hollsopple and Benson Borough.

Objective I and II: Maximizing Capacity to Meet Industrial and Community Needs

Water allocation permits are in force for all 5 dams, but neither Border Dam or South Fork Dam have been on line for some time. Upon receipt of approval of the sale by the Public Utilities Commission, the Commissioners or their designee may apply to the Department of Environmental Protection for a transfer of water rights from the Manufacturers Water Company. The existing allocations are as follows:

Quemahoning Reservoir	up to 101 mgd (million gallons /day)
Border Dam	-- 26 --
Hinckston Run Reservoir	-- 10 --
Wilmore Reservoir	-- 11 --
South Fork Dam	-- 27 --

Without Border and South Fork Dams, system capacity is 122 mgd. If Border Dam is brought back on line, system capacity (the amount of water available for sale or conservation purposes) is expanded 21%. If both dams are brought back on line, system capacity is expanded 43%. Water quality in these dams is a serious concern, even for the industrial customers, especially in South Fork Dam on the Little Conemaugh. Both dams also need to be evaluated to determine what repairs are necessary to ensure another century of service. Sediment deposition behind the aging structures must also be removed if their usefulness is to be restored, and the pipelines that carry water from the dams must be examined and upgraded where necessary. On the plus side, the Department of Environmental Protection will expedite the transfer of water rights, and will allow the clean-out of sediments to proceed via a simple letter of request and an approved erosion and sediment control plan. DEP and the Cambria and Somerset Conservation Districts will assist the new Authority in securing required General and Stream Encroachment permits for any work that might be needed along the streambanks. These upgrades are essential if an integrated approach to water and river conservation and management is to be realized. Bringing the existing Border and South Fork Dams back on line is much more feasible economically, and from a regulatory standpoint, than any attempt to construct new dams.

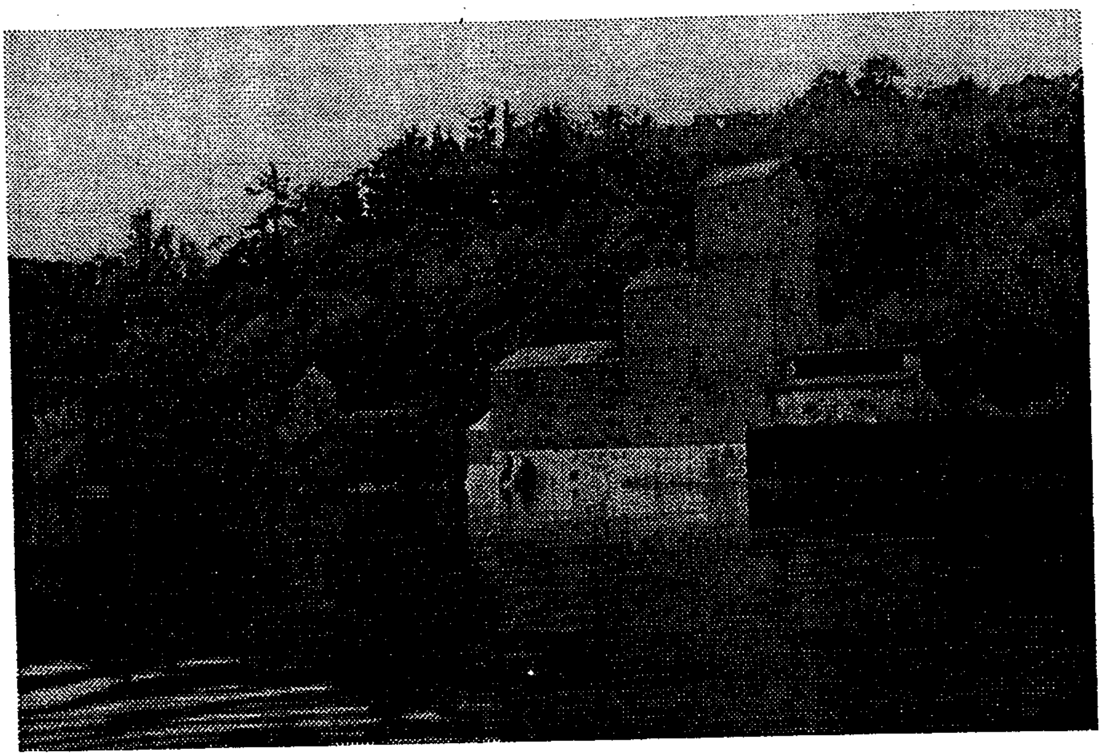


Figure 1 : Border Dam on Stonycreek River

In the case of Border Dam on the Stonycreek River (See Figure 1), the major pollution sources from Oven Run and Pokeytown Run will be abated in 2 years via the US Department of Agriculture's Small Watershed Program (PL-566). If high quality industrial water is to be delivered from Border Dam, then additional abandoned mine drainage sources in the Shade Creek watershed must be abated or treated. The Central City AMD (site16) produces approximately 60% of the AMD contaminants polluting Shade Creek, and is the worst discharge in the Stonycreek Basin. The next 2 priority Shade Creek sites contribute an additional 30% of the load to Shade Creek. Elimination of these major sources should enable Shade Creek and the Stonycreek River to assimilate the remaining lesser AMD sources upstream of Border Dam. Recent breakthroughs in resource recovery technologies by Hedin Environmental, Damariscotta, and other companies may create additional opportunities to recover and sell metals from the AMD to at least cover the cost of operation and maintenance. The provision of passive or active treatment of these 3 Shade Creek discharges coupled with the improvements at Oven and Pokeytown Runs should render the waters of Border Dam of sufficient quality to satisfy the demands of existing and future industrial customers. The Stonycreek and Conemaugh Rivers

Improvement Project (SCRIP) has requested that the DEP Bureau of Abandoned Mine Reclamation provide an assessment (or funding for an assessment) to confirm this or determine which additional AMD sources need to be removed in order to provide industrial grade water in Border Dam. The requests from the Greater Johnstown Water Authority for high quality water can continue to be met with water derived from Quemahoning Reservoir.

The impact of putting Border Dam back on-line will be huge environmentally and economically. Much more water will be available in the Quemahoning Reservoir to serve the glaring needs of communities in Northern Somerset County as well as for expansion by the GJWA. The ability to provide conservation releases will be strengthened, flows will be restored to Quemahoning Creek creating a premier tailrace sport fishery, and the additional clean water will revitalize the Stonycreek River. The capacity to provide scheduled releases will also foster the development of a major whitewater recreational industry in the beautiful Stonycreek Canyon giving the Hollsopple - Benson Borough area a major economic opportunity.

In the case of South Fork Dam on the Little Conemaugh River, water quality is much worse. This dam was constructed to provide cooling water to the old Franklin Mill, which is now home to Bar Technologies Inc. BarTech also needs water for cooling steel, and currently derives approximately 22 mgd from Quemahoning Reservoir. This amounts to roughly 60% of all water sold from the Que. It is extremely important to determine what the water quality requirements for this industrial use are, and equally important to meet them consistently.

Restoring water quality in South Fork Dam will be challenging because nine (9) large discharges upstream of this dam produce nearly 94% of the Little Conemaugh's AMD pollution load. The dam is located on the Little Conemaugh River just below the mouth of the South Fork of the Little Conemaugh River near South Fork Borough. Although the South Fork is far more badly polluted than the main stem Little Conemaugh, the Topper Run discharge contributes approximately 60% of the South Fork load; and the Sulfur Creek borehole contributes another 22% of the load. The Cambria County Conservation & Recreation Authority is working on a proposal to develop a pump-storage electricity generating facility using the Topper Run discharge that would also eliminate the pollution problem. The Pa. Department of Environmental Protection has recently constructed a pilot treatment project on the Sulfur Creek borehole. If successful, these efforts will provide remediation to 82% of the South Fork AMD pollution load. The main stem Little Conemaugh River is improved by the good quality water from the North Branch of the Little Conemaugh River and a few smaller streams. Three large discharges near Portage and Ehrenfeld will be difficult to treat passively because of limited available land. However, plans are being developed to treat the Hughes borehole, which contributes approximately 20% of the pollution load of the main stem Little Conemaugh above South Fork Dam. An assessment is needed to determine whether treating the Topper Run, Sulfur Creek, and Hughes discharges will be sufficient to assure industrial grade water in South Fork Dam; and, if not, to determine how much additional treatment or buffering is needed in the Little Conemaugh River. As with Border Dam, a structural assessment of the dam and removal of the sediments behind it will also be necessary.

Restoring the ability to use 27 mgd capacity of South Fork Dam will dramatically increase the potential uses for Quemahoning Reservoir water. Using an integrated water and river conservation and management plan, we will have the option of releasing additional water from Wilmore Reservoir (if available) to supplement South Fork Dam's supply; or turn back to the Quemahoning and/or Border Dam during critically dry periods.

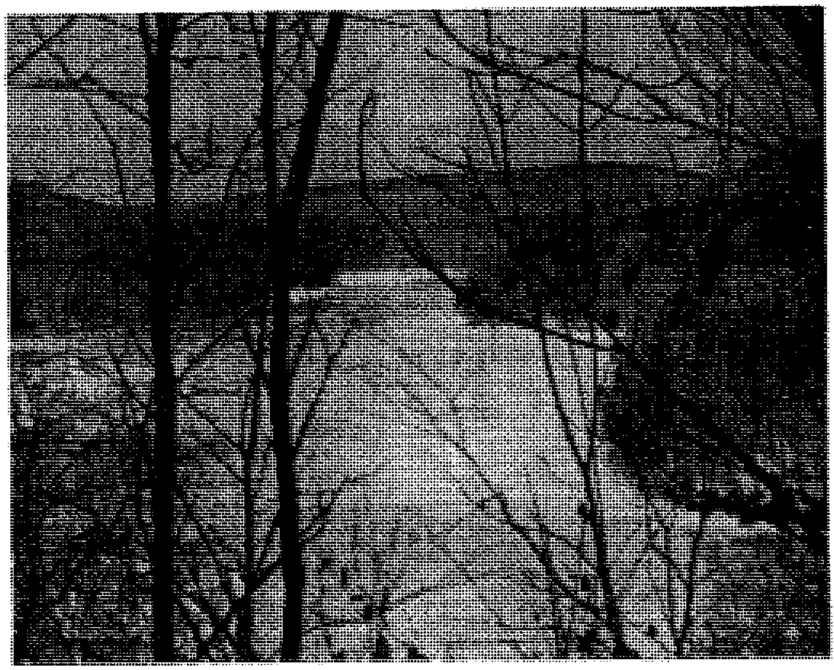


Figure 2: Wilmore Dam

Objective III: Develop a Plan for Public Recreation that Does Not Jeopardize Water Quality needed by Customers

A key goal is to provide outdoor recreational opportunities on the reservoirs and adjacent land. This goal must be considered in the context of the water quality needs of the customers, and extreme care must be taken to avoid a decline in water quality that would create any substantial burden on the system customers or jeopardize customer operations.

The provision of public recreation, to the maximum extent feasible, is important because it would improve the quality of life for residents, make the region more attractive to companies seeking new locations, and enhance the regional effort to create jobs through tourism.

Quality of life is well documented as a key factor in attracting new companies with jobs to an area; companies generally start a location search with a long list of locations with suitable access to key markets or raw materials, including sometimes access to water or energy. They may narrow the list based on labor factors, such as availability of skilled labor or wage rates. But when a company has narrowed the choice of locations to a short list of three or four communities, quality of life is often a deciding factor.

Tourism will soon be the biggest industry in the world, and is already the second-biggest industry in Pennsylvania. A concerted effort to develop new tourism attractions and more tourism spending in the region has been under way for over a decade. Most of the emphasis has been placed on historic and cultural sites. However, a study by Pennsylvania State University for the Southwestern Pennsylvania Heritage Preservation Commission in 1993, found that, of the 9.8 million days that visitors spend in the nine-county region, 54% of the activities were outdoors activities. People inside the region spent

794,384 days fishing and/or boating, while people from outside the region spent 563,772 days fishing and/or boating in the region. The study showed that the average spending per day exceeded $26 for each regional and non-regional fisherman and boater, producing direct expenditures of $35.6 million, including $14.7 million spent by people from outside the nine counties. Another seven million visitor days were spent on other outdoor activities, which despite average daily spending of less than $10 per day, resulted in $75.7 million of expenditures in the region.

Several other studies suggest the kind of impact that might be generated by recreation on reservoirs and whitewater rafting downstream of Quemahoning Dam. The Pennsylvania Fish & Boat Commission calculates that fisherman spend on average $28 to $42 per day of fishing. Boaters who typically stay overnight at Raystown lake spend on average $76 per day, according to a study for the Army Corps of Engineers. Rivers that attract large numbers of whitewater rafters for guided excursions, such as the Gauley River in West Virginia, produce economic impacts ranging from $60 to $133 per person per day, according to another study. A study of canoeing on the Saint Croix River in Maine showed average daily spending of $15.

The primary objective is to make water available to industry and communities, so the goal of maintaining the required water quality must remain paramount. To assure attainment of this goal, the efforts of Southern Alleghenies Conservancy, the county Conservation Districts and various other partners to clean up mine drainage, agricultural and other pollution in the watersheds of the reservoirs should be supported, especially the clean-up efforts in the Quemahoning watershed that provides water for public use. However, it is believed that certain kinds of recreational uses can be allowed without jeopardizing the water quality requirements. Because of the benefits to area residents, the help with economic development and the direct economic impact of recreation, recreational opportunities should be allowed to the maximum extent feasible. A study of various recreational alternatives and their environmental impacts should be undertaken.

Objective IV: Restoring Historic River Flows

Conservation releases are required by federal and state law in order to protect aquatic habitat below dams. The provision of a 10.8 mgd conservation release from Quemahoning Reservoir will at least partially restore flows, which have been interrupted for nearly a century. The Stonycreek River's ability to buffer remaining AMD and other pollution will be enhanced and water quality will be restored to a level that should have been present all along. The release will also create a tailwater fishery in Quemahoning Creek below Quemahoning Dam.

Figure 3: Discharge Point of Water Release

The combination of completed AMD abatement projects and restored flows will further promote the developing fishery on the middle Stonycreek by providing more consistent flows necessary for the establishment and proliferation of aquatic life forms. In addition, restored flows will provide additional water to enable canoe and float trips through the Stonycreek Canyon. These restored flows will open up an entire new section of water to river users for the first time. Along with increased aquatic and recreational opportunities the restoration of the flows will provide improved water quality into Border Dam and other downstream points that will create significant additional supplies of industrial grade water for use by current and future industrial users

The need for a conservation release from Wilmore Reservoir should also be evaluated by the DEP in consultation with the Pa. Fish and Boat Commission. The restoration of the historic flows in combination with current and future water quality improvements; will accelerate both rivers' ability to support aquatic resources, create new recreational endeavors, provide for additional industrial uses and make the Stonycreek and Little Conemaugh Rivers assets to everyone and everything that depends on them for survival.

Figure 4: Water Release at Quemahoning Dam

Jennings-Randolph and Savage Dams loosen river bottom sediments and AMD induced armoring on rocks, thus helping to flush out the impacts of prior damage.

Additional technical information is needed to get an accurate picture of the recreational release potential of the Quemahoning Dam, the impacts it will have on the Stonycreek River, and whether it would adversely affect the provision of community and industrial water. Putting Border and South Fork Dams back on line, with their additional 53 mgd capacity, may well be pivotal to unleashing the positive economic and environmental impacts of recreational releases.

Appendix N

Profile of USGS 171

Map: Boswell Lower Right
Data produced by: Don Williams **Date:** 5-11-94
Watershed: Two Mile Run
Description of slope: 1-2%
Describe the seep: Numerous lateral discharges
Availability of passive system treatment: Yes **Acres:** 4 acres
Available land in proximity to site for treatment: N/A **Estimated acres:** N/A
Accessibility of proposed wetlands: N/A
Current landuse: Idle
Cover type: Trees and grasses
Wetlands present: Yes
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Minimal
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e sewerage outflows): N/A
Site notes: This site is at a road culvert and represents a culmination of many seeps from wetlands. The area is about 4 acres of land available and then the flow goes into a stream. Additional treatment could exist in the area of creek bottom, however water quality is fairly good.

Profile of USGS 172

Map: Boswell Lower Right
Data Produced by: M Schuster, J Bowman **Date:** 8-5-92
Watershed: Quemahoning Creek
Landowner: Selko
Predominant soil: UDF, BrB
Description of slope: 0-5%
Describe the seep: Diffuse seeps
Availability of passive system treatment: Yes **Acres:** 2
Available land in proximity to site for treatment: Yes 40' beside site in reclaimed area
Estimated acres: 4 acres
Total possible construction land: 6 acres
Accessibility of proposed wetlands: Good
Current landuse: Forest, Housing and Idle
Cover type: Trees and grasses
Wetlands present: No
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Yes
To what extent: Coal spoil piles opposite of reclaimed area on property
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e sewerage outflows): No
Site notes: One sample taken in the wooded area at the top of site (representative). Seeps exist along the access road and crosses driveway. Property owner has tried to divert the flow, and are experiencing well contamination. They would like to see remediation occur.

Profile of USGS 175

Map: Boswell Lower Right
Data produced by: M Schuster J Bowman **Date:** 8-5-92
Watershed: Quemahoning Creek
Landowner: Donald Fetteroff
Predominant soil: Po
Description of slope: 0-5% mixed drainage but flows over mainly flat ground
Describe the seep: Diffuse seep
Availability of passive system treatment: Yes **Acres:** 2-4
Available land in proximity to site for treatment: No **Acre available:** N/A
Total treatment: 2-4 acres
Accessibility of proposed wetlands: Fair
Current landuse: Forest
Cover type: Trees
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: Potentially
Site hazards: None
Coal refuse present: None
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Seep is to the left of an old logging access road and runs through a trench, no measurable flow.

Profile of USGS 174

Map: Boswell Lower Right
Data produced by: M Schuster **Date:** 8-5-92
Watershed: Roaring Run
Predominant soil: At
Description of slope: flat ground
Describe the seep: Diffuse
Availability of passive system treatment: Yes **Acres:** <1
Available land in proximity to site for treatment: No **Acres available:** N/A
Total treatment: 1 acre
Accessibility of proposed wetlands: Good
Current landuse: Idle
Cover type: Grasses
Wetlands present: Yes
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: Yes
Site hazards: None
Coal refuse present: Yes
Macroinvertibrates present: Yes-frogs
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Seep emanates from a borehole.

Profile of USGS 176
Jenners Passive Treatment System

Map: Boswell Lower Right
Data produced by: M Schuster J Bowman **Date:** 8-5-92
Watershed: Trib North Branch
Landowner: Dupont Energy
Predominant soil: VoA
Description of slope: Steep 0-5% mixed drainage but flows over mainly flat ground
Describe the seep: Upwelling
Availability of passive system treatment: Yes **Acres:** 2-3
Available land in proximity to site for treatment: No
Total treatment: 2-3 acres
Accessibility of proposed wetlands: Fair
Current landuse: Forest and idle
Cover type: Trees and grasses
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: Likely
Site hazards: None
Coal refuse present: Yes
To what extent: several piles of refuse and old mining structures
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Flows from a pipe in a brick covered square ventilation shaft. Below the discharge there is a 2 acre dead area. Sample taken about 7 foot below old RR bridge crossing (sample possibly diluted by good water) data may be skewed.

Profile of USGS 182 & 183

Map: Ligioner Quad in Lower Right
Data produced by: M Schulster **Date:** 7-14-93
Description of slope: Steep 2%
Describe the seep: Diffuse seepage
Availability of passive system treatment: Yes **Acres:** 1 acre
Available land in proximity to site for treatment: Yes within 100 feet
Acres available: 1 acre
Total treatment: 2 acres
Accessibility of proposed wetlands: Good
Current landuse: Forest and housing
Cover type: Trees and grasses
Wetlands present: Yes
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Yes
    To what extent: 1acre of spoils above site
Macroinvertibrates present: Yes- frogs
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Discharge 181 seeping on the right side of drive. Several additional seeps are present in the area. Sample representative discharge 182 from left side of drive at the inflow to pool, measure the pool below on the left side of the drive entry.

Profile of USGS 208

Map: Somerset Quad in the Upper Left
Data produced by: L Fekula **Date:** 8-5-92
Watershed: Quemahoning Creek
Predominant soil: EsB, VOE
Description of slope: Steep 20-30%
Describe the seep: Lateral Discharge
Availability of passive system treatment: Yes **Acres:** <1acre
Available land in proximity to site for treatment: 1 acre
Accessibility of proposed wetlands: Good
Current landuse: Forest and housing
Cover type: Trees
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: Yes
Site hazards: None
Coal refuse present: Nearby
To what extent: 2 acres of refuse
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Discharge from a 2-foot diameter pipe form the east under road above clean stream that has Sp. Condition 210. Yellow Boy is present in creek most likely an abandoned mine to the east of site. Site near the town of Quemahoning, mine dump, a garage and the post office. Located at the edge of town.

Profile of USGS 209 & USGS 256

Map: Somerset Quad in the Upper Left
Data produce by: L Fekula **Date:** 8-5-92
Watershed: Quemahoning Creek Tributary
Predominant soil: CaC, VOE
Description of slope: Flat
Describe the seep: Diffuse Seep
Availability of passive system treatment: Yes **Acres:** 5 acres
Available land in proximity to site for treatment: 10 Acres
Accessibility of proposed wetlands: Good
Current landuse: Idle
Cover type: None
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Yes
To what extent: Acres of refuse
Macroinvertibrates present: Frogs
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Some frogs present.

Site:256
Map: Somerset Quad in the Upper Left
Data produced by: D Williams **Date:** 9-26-94
Description of slope: 1-3%
Describe the seep: Lateral discharge
Availability of passive system treatment: Yes **Acres:** 3-4 acres
Available land in proximity to site for treatment: No
Accessibility of proposed wetlands: Good
Current landuse: Idle
Cover type: Shrubs, trees, and grasses
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Yes
To what extent: Minimal chunks of coal present
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Flow emanates from mine workings from the Griffie-Acosta Mine. Coal chunks are present at the site and some iron staining is present of rocks contacting the discharge water. Mr Ernie Shaulis, a nearby resident says that the discharge flows all the time. The discharge is not acidic pH 5.8 and SC of 133. Some area below the discharge may be treating it- need for additional treatment is not of top priority. Contact Ernie Shaulis of additional information 814-629-9151.

Profile of 259

Data produced by: D Williams **Date:** 9-26-94
Watershed: Higgins Run
Description of slope: 1%
Describe the seep: Upwelling and lateral discharge
Availability of passive system treatment: N/A **Acres:** N/A
Current landuse: Idle
Cover type: Trees and grasses
Wetlands present: Yes
Accessibility of wetlands: N/A
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: Yes
Site hazards: None
Coal refuse present: None
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e sewerage outflows): No
Site notes: This is a very large flow coming out of an old Ralphton Mine and actually emanates from a concrete house. It is being treated and flows only about 100 feet before discharging into Higgins Run. This discharge comprises most of the flow in Higgins Run at the point of discharge. **As previously referenced in this report and pictured in this section, Wild Brown Trout live in proximity to this discharge.**

Profile of USGS 47 & USGS 257

Map: Boswell Lower Right
Data produced by: Don Williams, J Bowman **Date:** 8-13-92
Predominant soil: BtB, CaB
Description of slope: N/A
Describe the seep: Diffuse seepage
Availability of passive system treatment: No **Acres:** N/A
Available land in proximity to site for treatment: N/A
Accessibility of proposed wetlands: N/A
Current landuse: Forest
Cover type: Trees
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: No
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e sewerage outflows): N/A
Site notes: Discharge flows into Two Mile Run 30-40 ft below road. There are several small immeasurable seeps visible below SR 4010 with one flow accounting for majority of flow. It is flowing parallel to the road until it crosses under it in a culvert (sample taken in ditch, flow measured at culvert outflow).

Site: 257
Map: Somerset Quad in the Upper Left
Data produced by: D Williams **Date:** 9-26-94
Description of slope: 1-2%
Describe the seep: Diffuse seep
Availability of passive system treatment: Yes **Acres:** 3-4 acres
Available land in proximity to site for treatment: Potentially
Accessibility of proposed wetlands: Good
Current landuse: Idle
Cover type: Shrubs, trees, and grasses
Wetlands present: Yes
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Some
    To what extent: Minimal
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e. sewerage outflows): No
Site notes: Flow emanates from an old strip mined area that has not been completely reclaimed and the water flows through a mine induced wetland. The water quality is not bad and area exists for possible wetland remediation. Contact Ernie Shaulis of additional information 814-629-9151.

Profile of USGS 48 & USGS 53

Site: 48
Map: Stonersville Lower Left
Data produced by: Don Williams, J Bowman **Date:** 8-13-92
Watershed: Two Mile Run
Predominant soil: BgC, Ar, BtB
Availability of passive system treatment: Yes **Acres:** 1/2
Available land in proximity to site for treatment: N/A
Accessibility of proposed wetlands: Good
Current landuse: Forest and housing
Cover type: Trees and grasses
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: No
Macroinvertibrates present: Yes-frogs
Are other sources of pollution impacting site (i.e sewerage outflows): N/A
Site notes: 2 seeps converge at culvert above road. Sample and flow measurements taken below the road at culvert outflow.

Site: 53
Map: Boswell Lower Right
Data produced by: Don Williams **Date:** 9-14-92
Describe the seep: Lateral discharge
Availability of passive system treatment: Yes **Acres:** 8 acres
Available land in proximity to site for treatment: None
Accessibility of proposed wetlands: Good
Current landuse: Idle
Cover type: Shrubs, none
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: Yes
To what extent: Extensive refuse present, however it is concealed by vegetation
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e sewerage outflows): No
Site notes: The discharge is located in proximity to Coal Junction. Large flow for this time of year. The discharge is piped underneath the road and drains into an 8 acre area that could become a treatment area. The site is about 500 ft north of a road leading to a coal prep plant.

Profile of USGS 52

Map: Boswell Lower Right
Data produced by: Don Williams **Date:** 9-14-92
Describe the seep: Diffuse seepage
Availability of passive system treatment: No **Acres:** N/A
Available land in proximity to site for treatment: 100 ft from discharge
Estimated acres: 2
Accessibility of proposed wetlands: Good
Current landuse: Proximal to road
Cover type: None
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: No
Macroinvertibrates present: No
Are other sources of pollution impacting site (i.e sewerage outflows): N/A

Site notes: Currently small flow is present, but most likely exhibits seasonal variation with higher flows in the winter and spring- during water recharge periods. A treatment area exists and is directly across from a road that leads to a coal preparation plant.

Profile of USGS 54

Map: Boswell Lower Left
Data produced by: Don Williams **Date:** 9-14-92
Landowner: David Penrod
Description of slope: Residential yard relatively flat
Describe the seep: Upwelling
Coal seam: Kittanning E
Availability of passive system treatment: Yes **Acres:** 3 acres
Available land in proximity to site for treatment: None **Estimated acres:** N/A
Accessibility of proposed wetlands: Good
Current landuse: Thick brush
Cover type: Shrubs and Grasses
Wetlands present: Potentially
Hydric soils or hydrophytic vegetation present: Yes
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: None
Macroinvertibrates present: N/A
Are other sources of pollution impacting site (i.e sewerage outflows): N/A
Site notes: The discharge upwells in a residential yard and is conveyed via 5-inch square, terracotta pipe. (Since the survey the discharge has been piped with plastic pipe) It is discharged directly into adjacent stream. Area exists for wetland development and there is some evidence of an existing wetland. Resident indicated winter and spring flows are much higher than other seasons.

Profile of USGS 92

Map: Hooversville Lower Right
Data produced by: Don Williams **Date:** 9-22-93
Watershed: Quemahoning Lake
Description of slope: 5-7%
Describe the seep: Lateral discharge
Availability of passive system treatment: No
Available land in proximity to site for treatment: None
Accessibility of proposed wetlands: N/A
Current landuse: Forest and Idle
Cover type: Trees
Wetlands present: No
Hydric soils or hydrophytic vegetation present: No
Is the site in a floodplain: No
Site hazards: None
Coal refuse present: None
Macroinvertibrates present: None
Are other sources of pollution impacting site (i.e sewerage outflows): No
Site notes: The discharge comes out of a hillside and flows under the road, then travels approximately 150 ft directly into Quemahoning Lake. There is no area for treatment. The pH is not bad, but does have a high conductivity and is exhibiting some discoloring of the rocks in streambed.

Restoration Projects in the Watershed

Stream bank restoration project

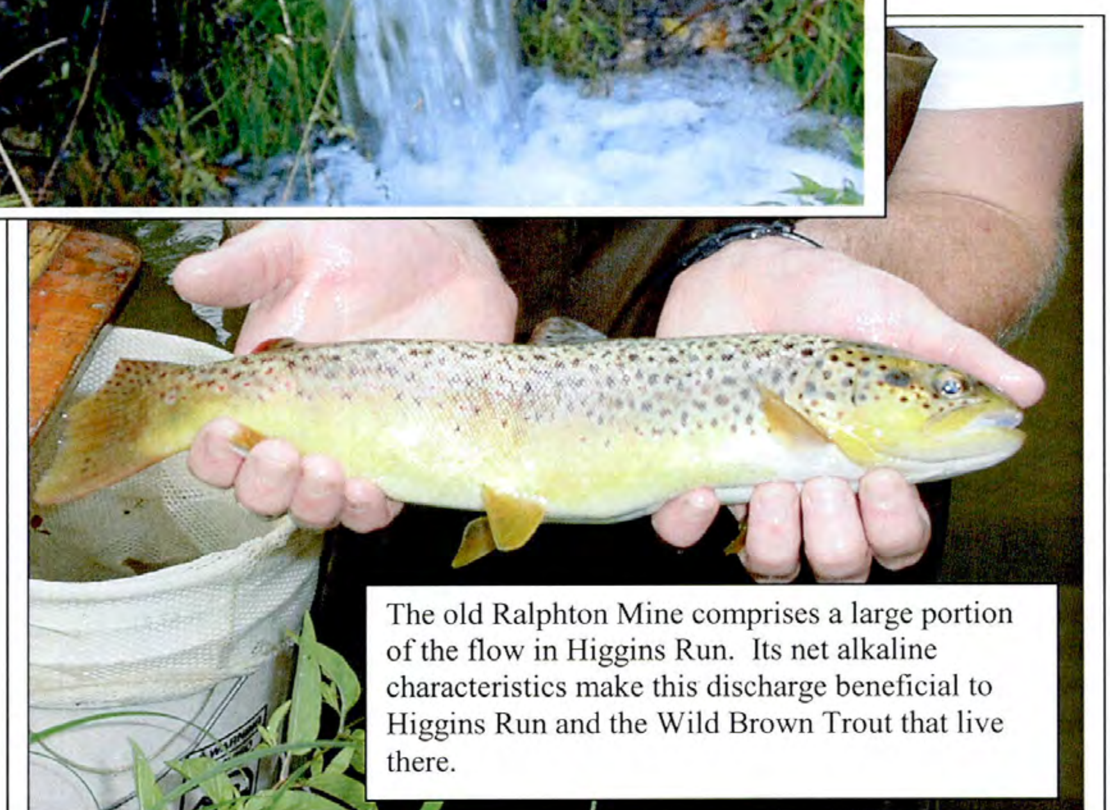
Stream restoration projects in the watershed have reduced sediment loading, erosion and created stable areas for trails. This project is on Quemahoning Creek between the Village of Ferrelton and the Borough of Boswell.

Jenners Passive Treatment System

Passive treatment systems like the one at Jenners are proliferating through the watershed. They are systems that utilize time, space, and alkaline materials to mitigate the damage that AMD discharges cause. These systems can range in price from tens of thousands of dollars to millions of dollars. The restoration of Quemahoning Creek is attributed to mitigation projects like Jenners.

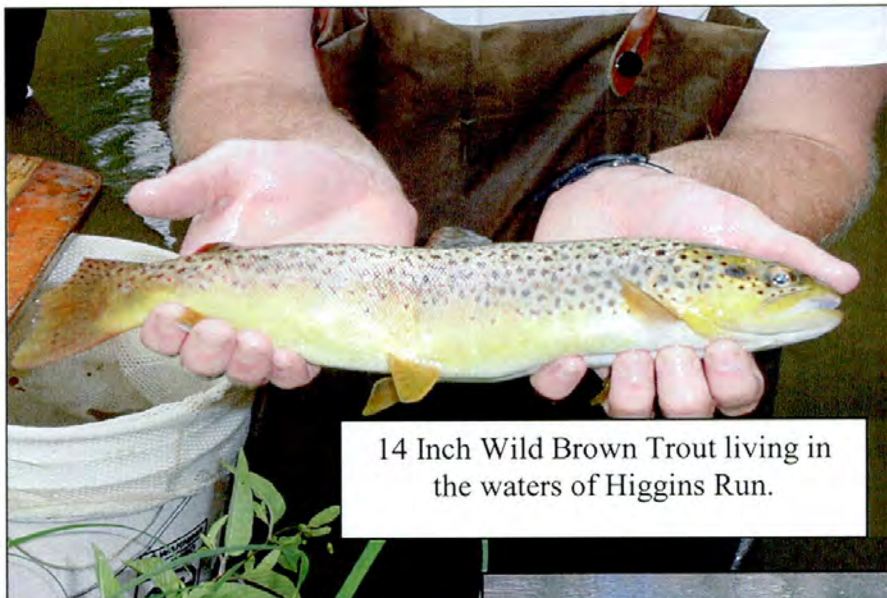
Phase I construction is finally underway at the Boswell Passive Treatment System.

A Positive Impact by a Borehole?

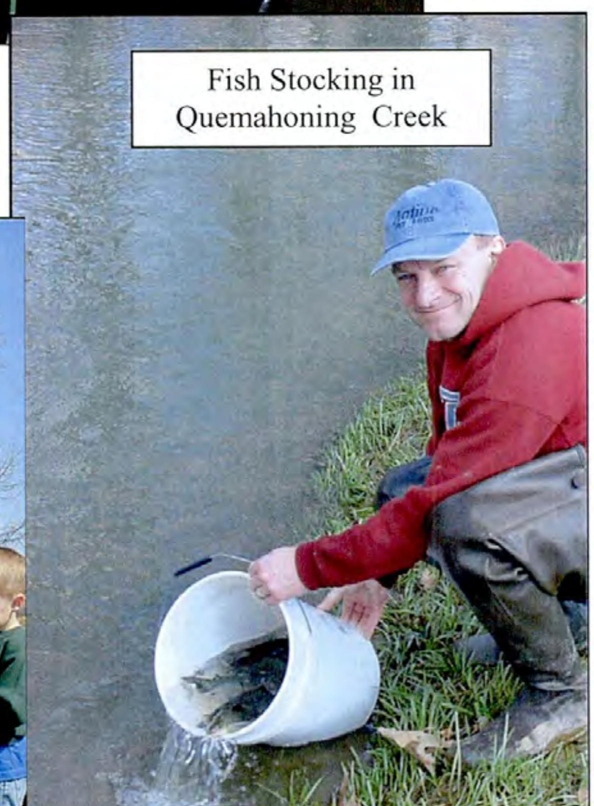


The old Ralphton Mine comprises a large portion of the flow in Higgins Run. Its net alkaline characteristics make this discharge beneficial to Higgins Run and the Wild Brown Trout that live there.

Fish Are Making a Comeback & so is the Watershed.



14 Inch Wild Brown Trout living in the waters of Higgins Run.



Fish Stocking in Quemahoning Creek

Children now fish where their dads and grandfathers couldn't.

Hoffman Run Discharge

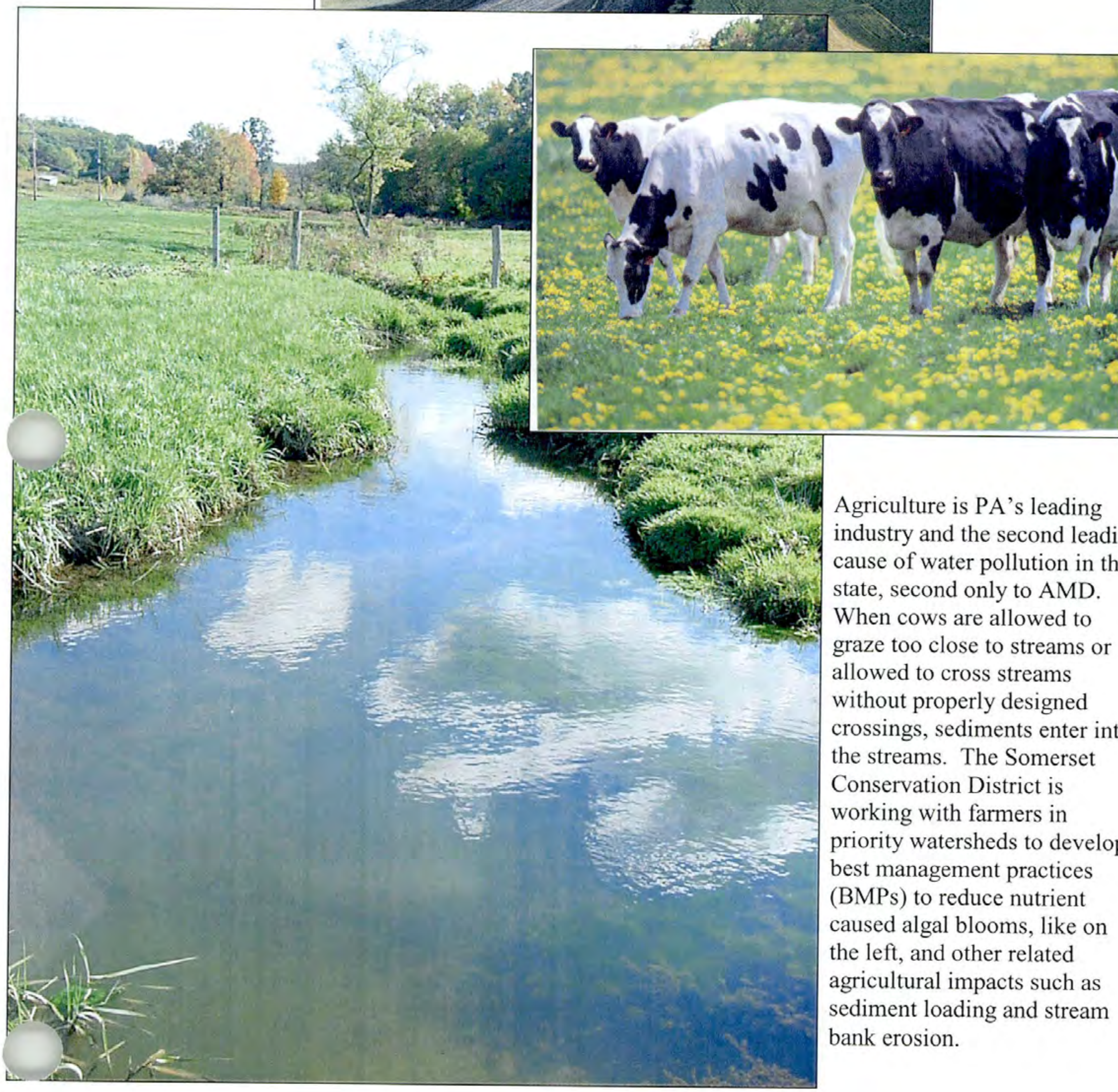
The numerous discharges of Hoffman Run are of interest to the PA DEP. Extensive studying and monitoring of these discharges have taken place. Consideration is underway for a passive treatment system to mitigate these discharges.

Monitoring Quemahoning Creek

In the aftermath of the Quecreek mining rescue, that captivated the nation's attention and put Somerset County in the national spotlight, a stream assessment was conducted to determine the rescue's impacts on the stream. The information obtained during this assessment on October 7 and 8, 2002 was not available at the time of this publication. At left Scott Alexander and Rich Beam of the PA DEP conduct their tests.

Carl Jones, watershed specialist for the Somerset Conservation District, joins the assessment and assists Rich and Scott. The assessment revisited the same sites that were evaluated in a 1997 DEP assessment.

Nonpoint Source Pollution



Agriculture is PA's leading industry and the second leading cause of water pollution in the state, second only to AMD. When cows are allowed to graze too close to streams or allowed to cross streams without properly designed crossings, sediments enter into the streams. The Somerset Conservation District is working with farmers in priority watersheds to develop best management practices (BMPs) to reduce nutrient caused algal blooms, like on the left, and other related agricultural impacts such as sediment loading and stream bank erosion.

PARTNERS In WATERSHED RESTORATION

Illegal dump along Quemahoning Creek

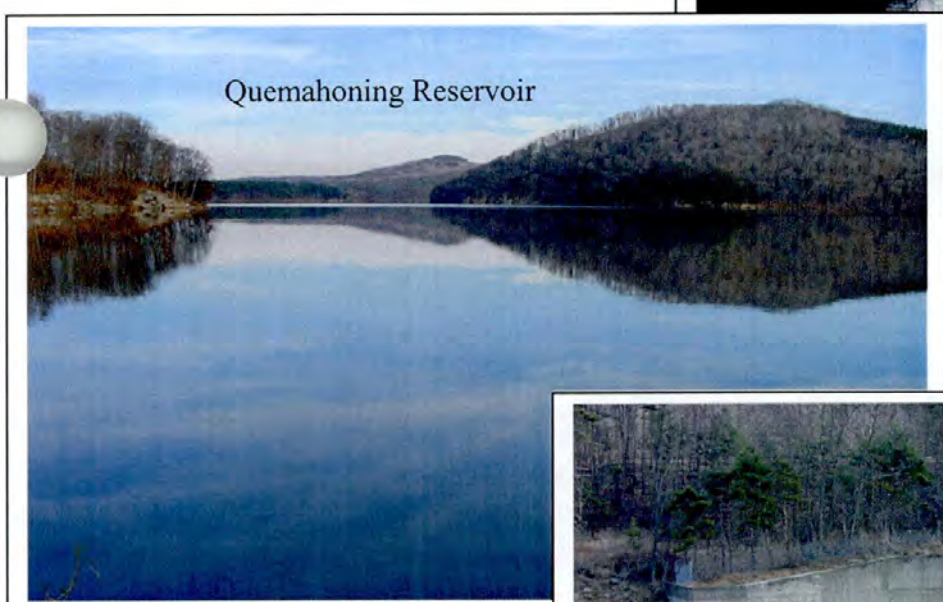
PA Cleanways, an organization that targets illegal dump clean-ups, and the students of North Star High School have played invaluable roles in the restoration efforts of Quemahoning Creek. Partnerships like these epitomize the synergistic relationships that have been developed through years of volunteer efforts, from the grassroots, to bring Quemahoning Creek back to a pre-mining status.

North Star High School students sample macroinvertebrate life in Quemahoning Creek.

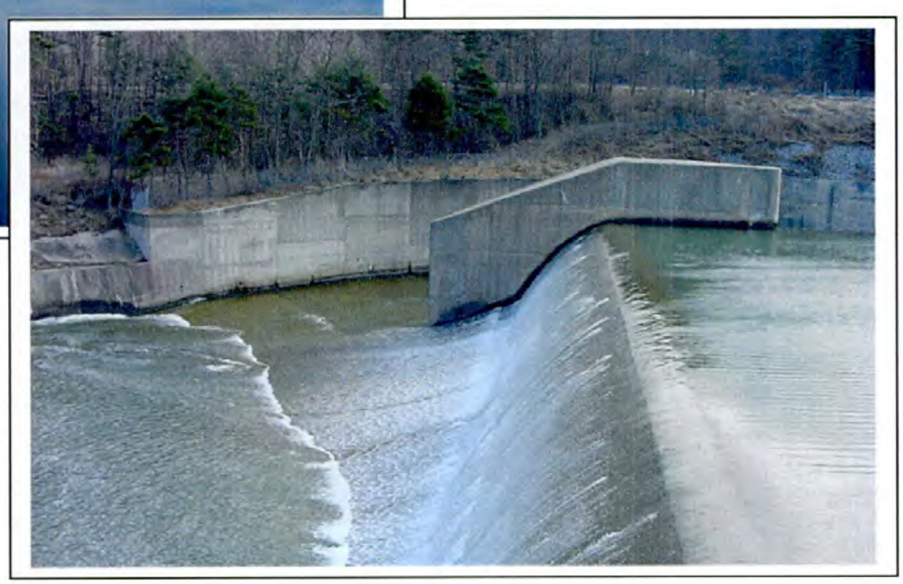
Recreational Use Areas

Areas downstream of Boswell teem with kayakers and canoers throughout the spring months. Not only do they have the opportunity to navigate some serious rapids, but they also have the opportunity to view some picturesque scenery.

Lower Quemahoning Creek



Quemahoning Reservoir



Kayakers, canoers, and fishermen alike all flock to the Quemahoning Reservoir to take advantage of this now public asset to the area. Negotiations between the CSA and outdoor enthusiasts continue to enhance recreational opportunities at the reservoir. Soon a 10.8 million gallon a [illegible] release will augment current releases [illegible]he spillway.

Coal Refuse Piles Account for Pollution

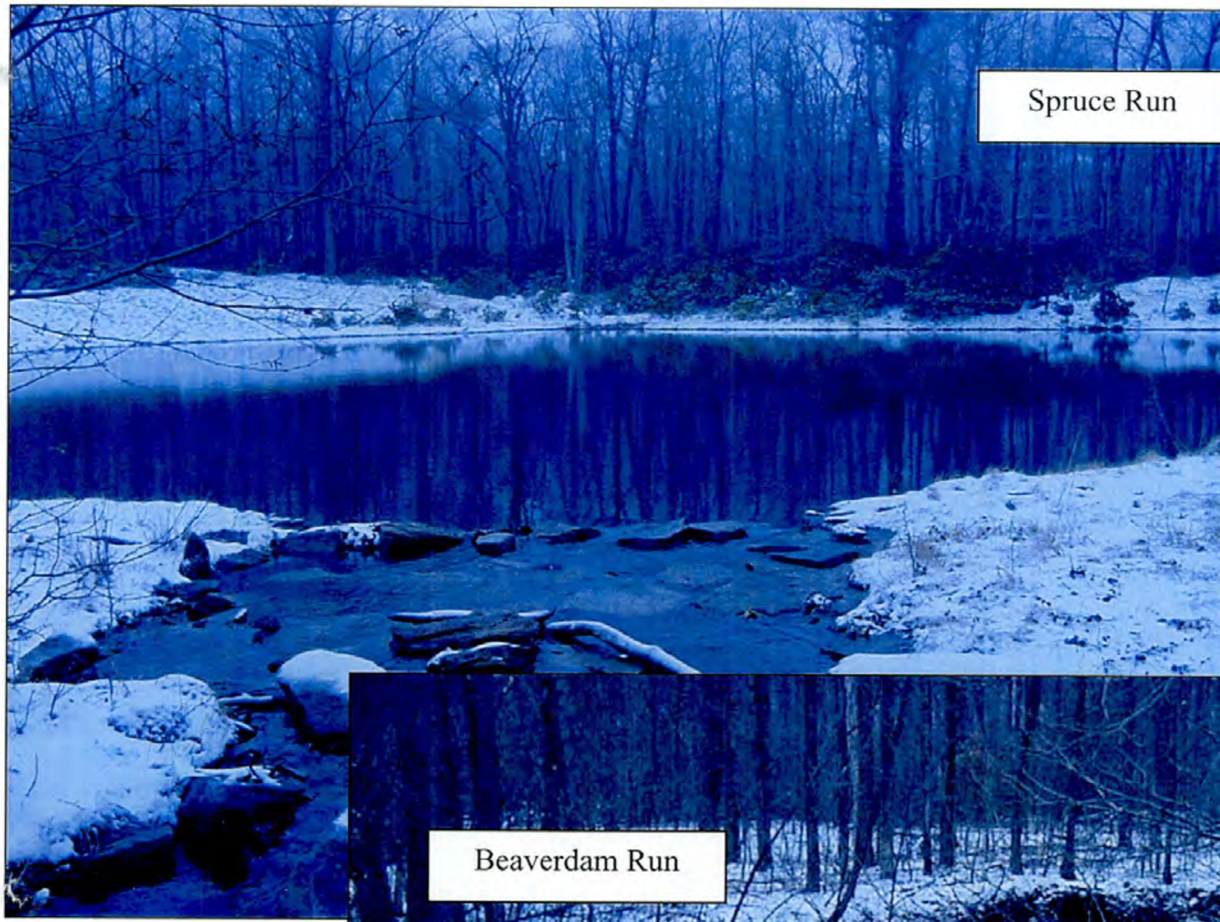
The Dixon Refuse Pile, adjacent to the intersection of Rt 601 and Rt 30 in Jenner Twp., is just one of many sources of pollution caused by refuse piles. Refuse piles such as this one not only create acidic waters, but also create unpleasant and unsafe landscapes.

The picture to the left shows the high erosion potential of these refuse piles. Sights like this are common after storm events.

Roaring Run Discharges

At left, a discharge near the bridge leading to New Enterprise Stone and Lime's quarry. Below is a view of the impacts on the stream caused by this discharge.

Potential Waters for Alkaline Addition



Appendix O

The Southern Alleghenies Conservancy in partnership with the PA DEP, U. S. Congressman John Murtha and the Western Pennsylvania Watershed Program have been promoting and identifying innovative AMD abatement technologies that may be applicable to the concept of resource recovery, abatement of large flow discharges and mine pool treatment of AMD.

Since 1999 SAC and its partners have conducted two AMD abatement Symposiums at the University of Pittsburgh at Johnstown. The following companies have either participated or have been identified and are pursuing innovative technologies that may be applicable to discharges in the Quemahoning Creek Watershed.

This is a representative list:

Hedin Environmental
Iron Oxide Recovery Inc.
195 Castle Shannon Blvd.
Pittsburgh, PA 15228-2268
412-571-2204
A pioneer in iron oxide recovery processes

****

The EADS Group
1126 Eighth Ave.
Altoona, PA 16602
814-944-5035
Utilizing SBR technology and other state of the art abatement technologies

****

Skelly and Loy Inc.
2601 N. Front St.
Harrisburg, PA 17110
717-232-0593
Passive treatment and alternate powered aeration processes

****

Fraunhofer
University of Pittsburgh
B-63C Benedum Hall
Pittsburgh, PA 15261
412-624-7272
Provides research and engineering services

****

Process Plants Corporation
P.O. Box 1966
Cranberry Twp., PA 16066
800-569-5827
Creating simple solutions to complex AMD abatement problems

****

Knight Piesold and Co.
1050 17 St.
Suite 500
Denver, CO 80265-0500
303-629-8788
Pioneering innovative passive treatment technology

****

Reliant Energy
1001 Broad St.
Johnstown, PA 15907
814-533-8951
Utilization of alkaline ash for AMD abatement

****

Sub-Technical Inc.
P.O. Box 1178
Mars, PA 16046
724-625-0008
Utilization of chemical grout to decrease AMD outflows

****

IBC Advanced Technologies Inc.
856 East Utah Valley Dr.
American Fork, UT 84003
801-763-8400

****

Virotec
46 Reservoir St. #1
Cambridge, MA 02138
617-491-5161
Using bauxsol technology that prevents leaching of metals

****

Department of Earth Sciences of the University of Waterloo
Waterloo, Ontario N2L3G1
519-888-4567 Ext. 2899

****

Charles Cravatta III, Ph.D. P.G.
U.S. Geological Survey
Water Resources Discipline
215 Lime Kiln Road
New Cumberland, PA 17070

****

Terry Ackman
U.S. Department of Energy
NETL
626 Cochrans Mill Road
P. O. Box 10940
Pittsburgh, PA 15236-0940
412-386-6566

****

Commercial System Inc.
31 36-35 New Germany Road
Ebensburg, PA 15931
814-472-5664

****

Don Budeit Environmental Solutions
80 Eicher Road
Pittsburgh, PA 15237
412-734-2880
Utilizing enhanced oxidation processes to precipitate metals

****

GAI Consultants Inc.
570 Beatty Road
Monroeville, PA 15146
Utilizing grout injection to fill mine voids

****

Kentucky Chemical & Analysis Inc.
P. O. Box 21756
Lexington, KY 40522-1756
859-257-9881
Utilizing Novel Mutidentate Remediation Ligands

****

Damariscotta
1650 Merle St., Suite C
Clarion, PA 16214
814-266-5792
Passive treatment solutions and aluminum recovery

****

Appendix P

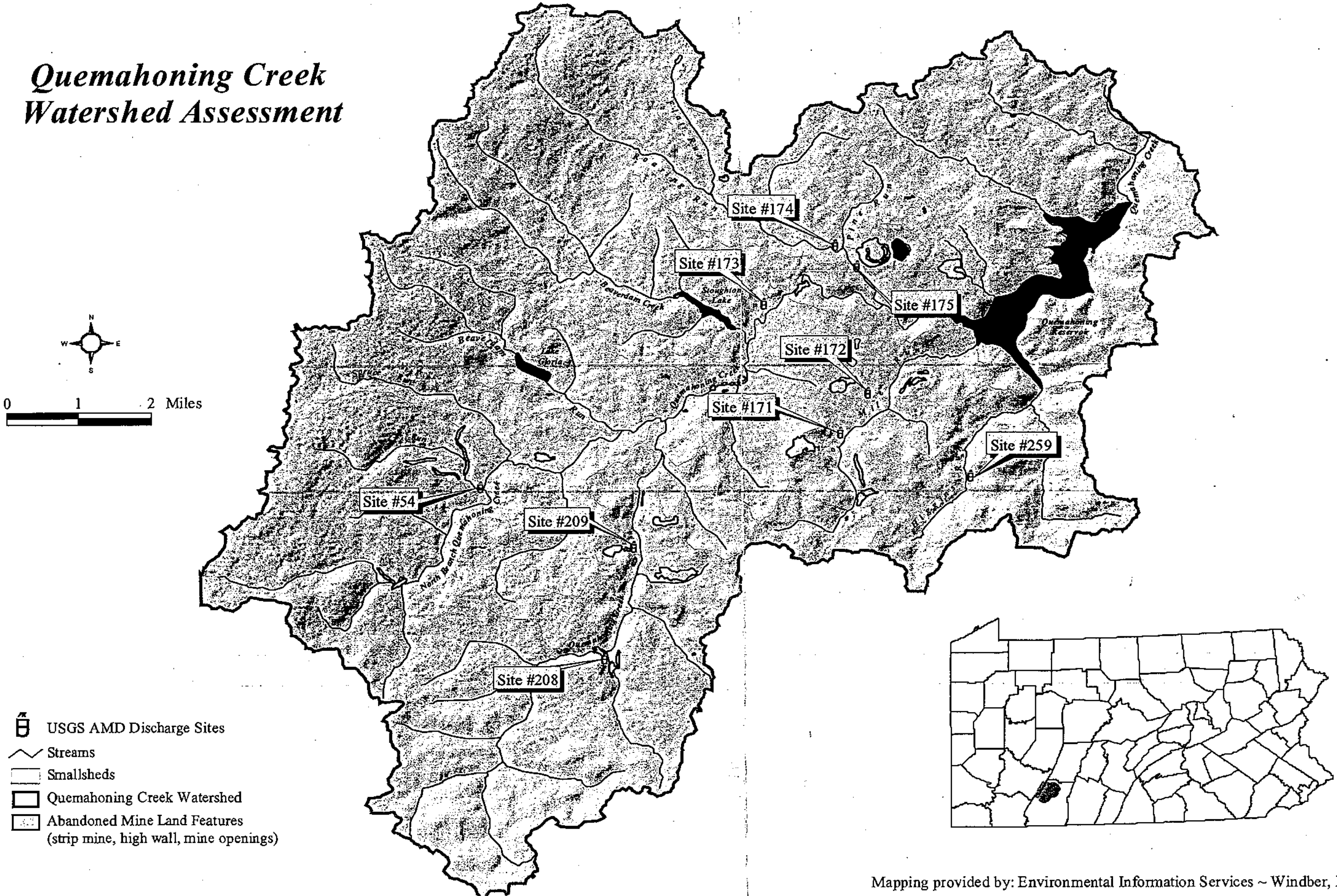
Acronyms-Contact List

ACSI	Appalachian Clean Streams Initiative Office of Surface Mining 1951 Constitution Ave. Washington, DC 20240 202-208-2782
CSA	Cambria-Somerset Authority 244 Walnut St. Johnstown, PA 15901 814-532-8942
EPA	U. S. Environmental Protection Agency Region III 1650 Arch St. Philadelphia, PA 19103-2029 215-814-2900
KCRBA	Kiski-Conemaugh River Basin Alliance 501 15th St. P.O. Box 115 Windber, PA 15963 814-467-6816
Macri International	Macri International Box 877 Waynesboro, PA 17268 717-762-9750
MLTU	Mountain Laurel Chapter Trout Unlimited 1745 Regal Drive Johnstown, PA 15904 814-467-4034
OSM	Office of Surface Mining 1951 Constitution Ave. Washington, DC 20240 202-208-2782

PA DEP	PA Department of Environmental Protection P. O. Box 2063 Harrisburg, PA 17105-2063 717-783-2300
PA DEP BAMR	PA Department of Environmental Protection Bureau of Abandoned Mine Reclamation 286 Industrial Park Road Ebensburg, PA 15931 814-472-1900
PA DCNR	PA Department of Conservation and Natural Resources Rachel Carson Office Building 6th Floor P. O. Box 8475 Harrisburg, PA 17105 717-787-7672
PFBC	PA Fish and Boat Commission Southwest Region 236 Lake Road Somerset, PA 15501 814-445-8974
SAC	Southern Alleghenies Conservancy 702 West Pitt St. Suite 8 Bedford, PA 15522 814-623-7900 Ext. 5
SA RC&D	Southern Alleghenies Resource Conservation and Development 702 West Pitt St. Suite 7 Bedford, PA 15522 814-623-7900 Ext. 5
SCRIP	Stonycreek-Conemaugh River Improvement Project P.O. Box 153 Johnstown, PA 15907
Somerset Conservation District	Somerset Conservation District 1590 North Center Ave. North Ridge Building

	Somerset, PA 15501 814-445-4652
Somerset County Conservancy	Somerset County Conservancy P. O. Box 241 Somerset, PA 15501
USDA NRCS	United States Department of Agriculture Natural Resources Conservation Service Somerset Technical Field Office 1590 North Center Ave. North Ridge Building Somerset, PA 15501 814-445-8979
USGS	United States Geological Survey 840 Market St. Lemoyne, PA 17043-1586 717-901-5399
WPWP	Western Pennsylvania Watershed Program R. D. # 1 P. O. Box 152 Alexandria, PA 16111 814-669-4847

Quemahoning Creek Watershed Assessment



Mapping provided by: Environmental Information Services ~ Windber, PA