Executive Summary

For the past forty-five years, the Scrubgrass Creek watershed has undergone a transition of land use that effected the economics of its residents in both a positive and negative manner. The major economic activity in the watershed between World War II and the mid-1980's has been mining and oil production. Since the 1980's economic viability has become dependant on improved use of the natural resources. Specifically the development of sustainable timber and recreation industries now leads the economy in the watershed and surrounding area. Interviews with residents and community leaders reflect the concern that water quality in Scrubgrass Creek has declined to the point that its total recreational value has declined significantly, especially the cold water fishery. This concern comes at a time when the enactment of the Allegheny Wild and Scenic River designation and the development of recreational facilities in the watershed have increased recreational demands throughout the watershed. (One community leader reminisced about the good times he had brook trout fishing back in the 1950's.).

The current watershed planning process began with a review of historical documents, principally the Operation Scarlift study completed by Pantech Engineers for the Department of Environmental Resources on May 29, 1973. The study entailed a comprehensive survey of water quality and an effort to identify sites and factors that contributed to the watershed's degradation. This study was used as a basis to identify sampling areas that needed attention as well as any problem sites. It should be noted that the change in land use and the extent of new mining significantly changed the watershed in the twenty-seven years since the Scarlift study was completed. Re-mining, natural recovery, and the 1977 Surface Mining Control and Reclamation Act environmental controls produced a slight improvement in water quality in the lower section of Scrubgrass Creek.

Three public meetings over the past two years have sparked an interest in the project by major landowners and most of the municipalities. A watershed group was formed and is now making an effort to be formally organized. The watershed group will take the lead in an education effort and in coordinating any watershed implementation work that takes place. The goal of the watershed group will be to treat any negative resource impacts that have occurred as well as to promote proper resource management for the future.

During the public meetings mentioned above, water quality was indicated as the primary concern. Government intervention or regulations regarding land use/control were mentioned as a major concern. It is the latter concern that the watershed group can influence the most. Municipal leaders and landowners working together will exert more self-control in resource management implementation.

Pennsylvania Rivers Conservation Plan

The Keystone Recreational, Park and Conservation Fund Act (Act 50 of July 2, 1993, PL 359) authorizes the Pennsylvania Department of Conservation and Natural Resources to award grants to municipalities and qualified organizations for the purpose of river protection and conservation. The Penn Soil Resource Conservation and Development Council received a planning grant through the Pennsylvania Rivers Conservation Plan. This grant was equally matched with a local cash donation and in-kind services. The purpose of this grant is to develop a detailed assessment of currently available information for the Scrubgrass Creek watershed. Significant resource issues relating to the environmental, recreational, cultural, and economic use of the watershed will be identified. The study's goal will be the implementation of the recommendations listed in this document by a local watershed group and its partners that will result in an improved watershed.

Relationship to Other Plans or Studies

The plan development process involved gathering information from other studies and resource information. The three primary sources of information that were utilized were public input, the 1973 Operation Scarlift study and the Pennsylvania Department of Environmental Resources information for permitting of mines and wells and their water quality data. The public input was the most important information resource since it gave the planners a feel for the issues, concerns and goals of the local residents. There was a good mix of expected and unexpected public response.

The finished plan will be submitted to the Pennsylvania Department of Conservation and Natural Resources for approval and inclusion in the Pennsylvania Rivers Conservation Registry. The purpose of the registry is to officially recognize plans for conserving watershed-related resources. Once the watershed is accepted on the registry, the Scrubgrass Creek watershed will be recognized by the Pennsylvania Department of Conservation and Natural Resources as a watershed that is eligible for grant funding made available for implementation of the watershed plan.

Study Methodology

With the awarding of the grant to the Penn Soil Resource Conservation and Development Council, a local study team was set up to begin the process of evaluating the watershed. The team consisted of representatives from the Pennsylvania Department of Environmental Resources, Bureau of Mines and Bureau of Oil and Gas Management, the Venango Conservation District, the Venango Planning Commission, Confluence Ecological and the United States Department of Agriculture Natural Resources Conservation Service. Confluence Ecological serves as the resource information coordinator. USDA Natural Resources Conservation Service Franklin Field Office serves as the public liaison coordinator. The first phase of the planning process consisted of a series of public meetings at the Clinton Township municipal building where an overview of the project and timeline was presented. The study team was introduced. Principal investigators Neal Parker of the Natural Resources Conservation Service and Dr. Bruce Dickson of Confluence Ecological gave a presentation of current natural resource information and major issues. The majority of the time of the first two meetings was devoted to a discussion of local issues and concerns. Mail-in forms as a method for expressing concerns were provided to the municipal representatives to be handed out upon request.

The second phase of the planning included gathering and compiling the resource data and information that was available and mapping the appropriate information using ESRI's ArcInfo Geographic Information System Software. Spatial information came from the Operation Scarlift study, Pennsylvania Department of Environmental Resources, United States Geologic Survey, USDA Natural Resources Conservation Service, municipal records, water treatment and municipal waste treatment facilities and others.

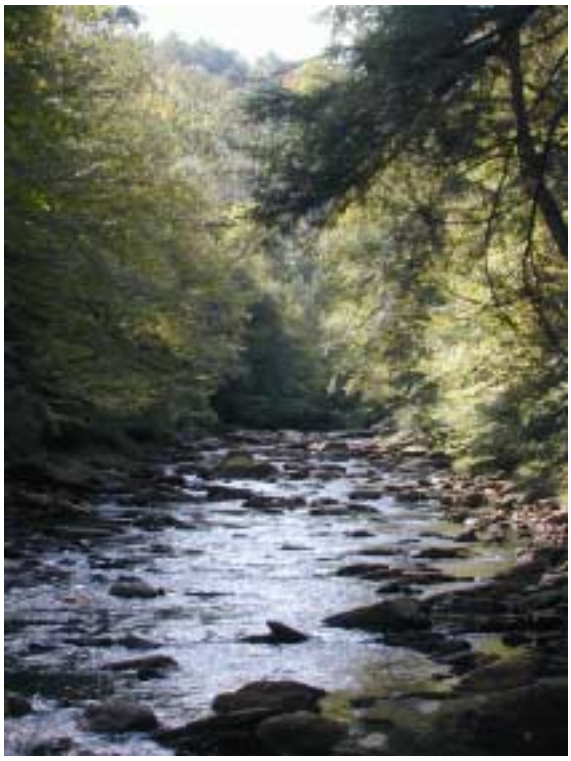
A preliminary finding report was developed and presented at a public meeting held at the Clinton Township municipal building on November 23, 1998. The study team presented resource data and local issues and concerns compiled from previous meetings.

A preliminary draft copy was sent to the Pennsylvania Department of Conservation and Natural Resources for review and comment. The Pennsylvania Department of Conservation and Natural Resources comments on the plan, along with an opportunity for an increased amount of data and the availability for improved mapping abilities using ESRI's ArcView with 1995 USDA Natural Resources Conservation Service aerial photos and other data layers caused an intentional delay in the development of this report. The additional products include:

The results of three sets of water samples at set sampling stations taken every four weeks between July and September 2000.

An in-stream habitat quality survey using Ohio EPA's Qualitative Habitat Evaluation Index (QHEI) at 23 sampling stations on Scrubgrass Creek and its tributaries. These sites are 150 and 300-meter sections of the streams totaling about 8 percent of the total watershed stream length.
Improved land-use and resource mapping using ArcView data bases with mapping scales between 1: 3,000 and 1: 6,000 rather than 1: 24,000 topographic scale.
Additional input about resource issues from landowners during the latter fieldwork. These landowners contacted during the fieldwork are more directly impacted by the project than most other landowners.
An opportunity to report the improvement in the Clintonville Sewage Treatment Plant issue and to get the new plant operator's input on this issue.
The identification of additional problem acid mine drainage locations and wells and the opportunity to plot onto a global positioning system, problem sites.
An improved analysis of the current condition of the watershed and an improved opportunity to know how to utilize the best cost/benefit rated practices.
The final copy of the plan and executive summary was presented to the residents of the watershed at a meeting held at the Clinton Township building. Each municipal representative received a copy of the plan.

Elements of the Plan



The Middle Section of Scrubgrass Creek

Unlike the Operation Scarlift study, which dealt only with pollution from coal mining and oil production, this plan is a comprehensive evaluation of the watershed. Its field and mapping methodology is the most up-to-date for 2000. All data compilation, mapping, photos, and text were produced digitally.

Chapter I contains a description of the watershed including its size, topography, a description of the stream corridor and tributaries, the social and economic conditions, and outstanding features. Chapter II contains a discussion of the resource issues and concerns as well as the use constraints and opportunities. Chapters III through VI contain information about land, water, biological and cultural resources of the watershed. This information has been collected, compiled and analyzed. This data adds a quantitative aspect to the local issues and concerns as well as identifies possible other issues that cannot be ignored in a management plan.

Chapter VII is an examination of the management options related to the water quality and stream corridor management for Scrubgrass Creek and its tributaries. The management option chart discusses alternative solutions to the problems and is the foundation for future implementation projects and a guide for the Scrubgrass Creek Watershed Association's activities. Chapter VIII is a listing of the maps, charts and figures. Supplemental photos are included in this section. This assessment has shown that the water quality improved since the 1973 Operation Scarlift study due to a major shift in land use from mining to other uses. The Quality Habitat Evaluation Index produced relatively good scores. Adequate water volume during low-flow periods, well-developed riparian areas and moderate yet variable gradient combine to produce fish habitat that is exceptional in some areas.

Sample stations with depressed QHEI scores generally suffer from excessive flocculent deposition and acid mine drainage induced substrate embeddedness. Areas of need are concentrated in the upper reaches of Scrubgrass Creek and three of its northwest tributaries.

The interest in the watershed appears to be growing. The study team has not had any negative contact with landowners while sampling. The study has been well publicized with only one negative comment related to timing. The residents of the watershed wish to see an improvement in the watershed without the burden of dealing with government regulations and want to participate in the effort to make this come about.

Introduction

The Scrubgrass Creek Watershed is located in the southwestern part of Venango County and northern Butler County, Pennsylvania. It encompasses 25,400 acres (39.7 square miles) with 560 acres of this in Butler County. The watershed had been continuously mined since World War II. Its land-use is dominantly woodland and wildlife land. Nineteen percent of the watershed area has been surface-mined. It also has a major oil field running through it with approximately 1640 wells concentrated in the center and southern portions of the watershed. The Pennsylvania Fish and Boat Commission have historically considered Scrubgrass Creek a cold-water fishery.

As reported in the Operation Scarlift study in 1973, by Mr. Robert B. Hesser of the Pennsylvania Fish Commission, the streams in the watershed had been stocked with trout for 30 years prior to 1956. That is the earliest period for which water quality data existed. At that time the main channel had declined to the point that the Pennsylvania Fish Commission had stopped stocking it and ceased keeping water quality records for the creek and its tributaries. A 1958 study did reveal that the stream "was void of insect life and the appearance was turbid with evidence of heavy iron precipitation and oil slicks on the stream bottom"[1]. The pH data indicated that there had been some recovery and the stream was placed on the 1959-stocking list. This was followed by a decline in water quality the following spring and an experimental stocking of only 400 trout was planned and then cancelled. The 1973 Operation Scarlift study gave a complete set of water quality data. Since then water quality data collected has been primarily by the Department of Environmental Protection inspectors regulating mine drainage and oil activities.

The purpose of this study is to address local issues and concerns, gather data, and recommend management options for protection of the watershed. Water quality has been one of the primary concerns in this watershed. Other major concerns include stream corridor management, municipal waste management, and recreational use enhancement. The steps for the plan procedure follow the planning procedures recommended by the Pennsylvania Department of Conservation and Natural Resources Rivers Conservation Program. The planning process for this study involved a six-step process. These steps and the sequence are required to secure acceptance into the Pennsylvania Rivers Registry. It is also the goal of the Penn Soil Resource Conservation and Development Council to have this plan serve as a basis for planning under other programs. Some of these are the USDA Natural Resources Conservation Service's PL85-566 program, the federal 319 program or other state and federal programs that become available for the implementation phase of this project.

Upper Scrubgrass Creek

The first step was to conduct a public meeting to inform the public about the study, recruit local members for the study team, gather information about problems, discuss local resource issues and concerns, and listen to suggestions for remedies. A meeting was held on September 30, 1997 at the Clinton Township municipal building. A

[1] From the Operation Scarlift Study , Pantech Engineers, 1973

second public meeting was held on October 14, 1997 to follow up on the local issues and concerns. During this phase, a scope of work and a timeline were developed. The steering committee also contacted local leaders to form a watershed group.

The second step was to identify and collect as much available data as could be found. The Operation Scarlift study provided some historical water quality data and a good reference for mapping the coal reserves. The Pennsylvania Department of Environmental Resources Bureau of Mines and Bureau of Oil and Gas Management provided more recent data. Aerial photos from 1956, 1981, and 1989 also yielded information. The Venango County Planning Commission provided data on economic conditions and other issues such as illegal dumps. This data would later be supplemented with water quality and biological studies started in July of 2000. This new process was facilitated by additional funding and allowed for more field time to identify and quantify all the stream related problem sites.

The third step involved an analysis of the data and mapping of the information. This data was used to support the local resource issues and concerns, as well as identify new concerns that were brought up for local discussion with members of the local group and municipal leaders. The mapping during this phase was a time consuming task using PC ArcInfo software with a CalComp digitizing board and 1: 24,000 topographic maps. This mapping was later supplemented using ArcView and 1995 digital photos, and many new resource layers provided by the USDA Natural Resources Conservation Service. The watershed was thoroughly remapped in the fall of 2000 using ArcView and mapping scales between 1: 3,000 and 1: 6,000. This allowed for a more accurate mapping of the existing resource information as well as adding the new data.

The fourth step was to prepare a Preliminary Findings Report. This was completed and presented at a public meeting on November 23, 1998. Additional public comments were taken and the members of the watershed group were asked to comment. The report was supplemented with a PowerPoint presentation.

The fifth step was to prepare a Draft Rivers Conservation Plan. Development of this document was delayed to take advantage of additional technology and resource information. It encompasses the information in the Preliminary Findings Report revised to reflect the additional comments and new resource information. A public meeting was scheduled for December 2000.

The sixth step will be to prepare the Final Rivers Conservation Plan. This will be a revision of the Draft Conservation Plan to include the record of the public meeting on the Draft Plan and the resolution of substantial comments made about the Draft Plan. It will also include the letters or resolutions of support by the affected municipalities.

The final step will be to submit the Final Rivers Conservation Plan to the Pennsylvania Department of Conservation and Natural Resources for adoption into the Rivers Registry.

I. Project Area Characteristics

Location

The Scrubgrass Creek watershed is located for the most part in southwest Venango County and a very small portion of northern Butler County. It is traversed by Interstate Route 80 about thirty six miles east of the Ohio line. It is approximately 60 miles north of Pittsburgh and 60 miles southeast of Erie. Butler, Mercer, Grove City and Franklin are the major communities that are located within thirty miles of the watershed. It is positioned to the southwest of the Allegheny River.

Size

It encompasses 25,400 acres (39.7 square miles) with 560 acres of this in Venango and Marion Townships, and Butler County. The Townships of Clinton, Irwin, Scrubgrass and Victory as well as Clintonville Borough represent the local municipalities in Venango County. The main channel of Scrubgrass Creek is 10.96 miles long and it flows in a northeasterly direction to the Allegheny River directly across the river from the eastern end of Kennerdell. It has 9 tributaries that total 27.45 miles. Clintonville is the only municipality with a concentrated population. Interstate 80 traverses the southern part of the watershed in an east-west direction. Route 8 between Barkeyville and Franklin dissects the watershed's western boundary.

Topography

The Scrubgrass Creek watershed is found on the Appalachian Plateau with characteristic deep V-shaped stream valleys dropping from the surrounding uplands. The highest point in the watershed is found in the upper reaches of the Bullion Run sub-watershed at approximately 1,600 feet. Historically, this may not have been the highest point in the watershed as surface mining has altered topography significantly. The lowest point of the watershed is found at the mouth of the main channel of Scrubgrass Creek where the elevation is 920 feet. The difference in elevation of roughly 700 feet is typical of watersheds in this region. The lower third of the Scrubgrass Creek, Bullion Run and Trout Run stream valleys are about 400 feet deep and have slopes greater than 25 percent. The upper parts of the watershed have wider and shallower valleys. According to the Venango County Soil Survey, the geology of the watershed is typical of the rest of Venango County. Like the county, the watershed is transected by glacial till from the northeast to the southwest. The glacial till is from the Wisconsin glacial period. The till covers about one-third of the watershed. (See the General Soils Map in Appendix A.). The geographic formations are sedimentary rocks that include sandstone, shale and siltstone. The lower lying shale formations are frequently covered by sandstone talus. The surface rocks were formed either in the Mississippian or the Pennsylvanian period. Along with the sandstone is approximately 15 feet of Vanport Limestone. The coal seams found in association with the limestone include the Middle Kittanning (80-90 feet above the top of the limestone), the Lower Kittanning (40-50 feet above the top of the limestone), the Upper Clarion (15-30 feet below the top of the limestone), the Lower Clarion (30-45 feet below the top of the limestone), and the Brookville seam (55-65 feet below the top of the limestone).[1]

The total area underlain by the coal was mapped at 13,176 acres. This is 51 percent of the watershed area. The area of the watershed that was mined from the 1950's through 1993 was mapped at 5054.8 acres. The coal and mined areas are shown on the Coal and Mined Areas Map in Appendix A. This data helps characterize the watershed and provides a window on the amount of coal mining activity

[1] From the Operation Scarlift Study , Pantech Engineers, 1973

that has occurred throughout the drainage. Mined-lands calculations were generated from digital topographic maps and aerial photography using 1993 Natural Resources Conservation Service supplied digital orthographic quadrangles.

The stream lengths do not show a typical characteristic of normal stream networks. The intermittent streams total a length of 34.57 miles and the perennial streams have a length of 38.41 miles. It should be noted that the stream network length is based on United States Geologic Survey blue lines and includes intermittent streams.

Forty two percent of the watershed is in slope classifications that are conducive to active development for economic purposes (classes 0% - 4 % and 4% - 8%). Slopes in the 0% - 12% range are conducive to agricultural activity of some form but may require approved soil conservation practices to avoid resource damage. Much of the remainder of the watershed has slopes that are relatively steep and therefore remain in forested land uses.

Major Tributaries

The two lower sections make Scrubgrass Creek a third-order stream (Horton-Stahler) originating north of Wesley and flowing north and east to its confluence with the Allegheny River at Kennerdell. The watershed is small with 73 miles of perennial and intermittent stream channels draining approximately 25,500 acres. Scrubgrass Creek forms a J-shape, flowing southeast then turning northeast toward the Allegheny River. The three main tributaries that make up most of the western part of the watershed reflect names as found on United States Geologic Survey topographic maps and include Gilmore Run, Trout Run, and Bullion Run. Other tributaries remain unnamed on the topographic maps but were referred to as East Tributary 1, East Tributary 2, East Tributary 3, South Branch and Center Tributary for identification purposes in this study. These are all second-order streams on their lower channels. The main channel in the watershed was divided into Upper Scrubgrass Creek, Middle Scrubgrass Creek and Lower Scrubgrass Creek. Other smaller tributaries were identified and were given reference names.

Table 1: Stream Orders and Lengths (including perennial tributaries)

NAME	Stream Order	Length (Miles)
Lower Scrubgrass	3	2.34
Middle Scrubgrass	3	6.21
Upper Scrubgrass	2	2.41
Bullion Run	2	3.78
Upper Bullion	1	1.40
Bullion Trib.1	1	0.69
Bullion Trib. 2	1	0.87
Bullion Trib 3	1	0.42
Trout Run	1	1.97
Center Tributary	1	0.56
Gilmore Run	2	2.59
Gilmore Trib. 1	1	0.26
Scrub. Trib. 1	1	0.62

NAME	Stream Order	Length (Miles)
Scrub. Trib. 2	1	0.38
Scrub.Trib.2A	1	0.13
Scrub.Trib. 3	1	0.56
Scrub. Trib. 4	1	1.22
Scrub. Trib. 4a	1	0.96
South Branch	2	3.24
South Br. Trib 1	1	0.68
South Br. Trib 2	1	0.69
South Br. Trib 3	1	0.41
East Tributary 3	2	3.21
East 3 Trib.1	1	0.34
East Tributary 2	1	0.97
East Tributary 1	1	0.54

A stream map is included in Appendix A. This shows all the identified perennial streams in the list above. A further description of the main streams is covered in Section IV. Water Resources.

Corridor

The main stream corridor is approximately eighty percent wooded with the exception of the campground at the mouth of the main channel and some cottages within a mile upstream of the campground. The balance of the corridor cover is wildlife land and roads. There also three isolated recreational use areas along the lower section. Camping throughout the summer season has degraded these. The swimming hole is the least degraded area although garbage is left but usually cleaned up during the heaviest use periods.

No zoning exists in the watershed. It should be noted here that the pressure on the municipalities to commit to zoning as a result of this study was one of the local issues discussed in the public meetings that were conducted. As there is little developmental pressure and only the issue of aesthetics that can be addressed through volunteer clean-up or landowner controls this was considered a non-issue.

Corridor Management
The swimming hole on the lower section of Scrubgrass Creek

lower halve of Bullion Run is primarily hemlock. These stream channels have some north facing aspect and deeper ravines. This growth pattern seams to correspond to the Hazleton soils mapped in those areas.

Social / Economic Profile

Bituminous coal mining has been an ongoing economic activity in the watershed since the 1930's. Large portions of the watershed have been mined where overburden thickness permitted coal recovery to be economically viable. In the last six years only one surface mine has operated in the watershed. It was located in the Bullion Run sub-watershed. It was less than 40 acres and appears to not have impacted any area that was not previously mined. Mining in the watershed has dropped off greatly since the mid-1980's.

The transportation routes in the watershed include Interstate 80 and state routes 208 and 308. Route 208 parallels Interstate 80 and Route 308 runs north and south close to the middle of the watershed. These have the potential of supporting economic growth in the watershed. This growth has possibly been suppressed by the development of transportation facilities in the Barkeyville area as well as facilities historically located in the Franklin-Oil City area. Some commercial development has occurred in recent years around the Clintonville exit of Interstate 80. Development includes a truck dealership. There is the American Folkways Festival facility. In recent years, with the improvement of the water quality in some of the tributaries and the lower part of Scrubgrass Creek, recreation opportunities have arisen. Marlow's Campground has developed an increase in camping opportunities. Most of its business may relate to its proximity to the river, but the quality of the watershed has and will affect the commercial recreational opportunities in the watershed.

The watershed also supports several lumber mills that utilize timber logged locally in addition to trees from outside sources. Some of these mills ship as far as Quebec as we found out while attempting to give directions to a lost French Canadian truck driver. Other small commercial businesses such as a camper dealership, Whitherup's steel erection company, garages, and other small businesses exist in the watershed. Ten of these are outside of the Clintonville area. (That includes a one-mile distance along 208 from the center of Clintonville.) It is noted in the demographic data below that the average commute is between 19 and 25 minutes. This may indicate that many of the watershed's residents may be working in the Franklin, Grove City or Mercer areas. Agriculture is not a dominant economic factor within the watershed. There are only two full time dairy operations and about fifteen other farms either farmed part time or rented. Cropland only makes up 4.34 percent of the watershed acres and the combination of hay and pasture about equals that acreage combined.

Township roads comprise about eighty percent of the transportation system in the watershed. These are generally dirt and gravel and are kept in good condition. They are maintained each spring by grading and ditch repair. The roads are shown on the land use maps in Appendix A.
Clintonville is the only community in the watershed that has a concentrated population. It lies in the southern section of the watershed and is in close proximity to the South Branch. The figures below show it has ten times the population density of the surrounding area. The 2000 census figures give the population of Clintonville as approximately 520. The approximate number of families is 238.

Summer cottage on the upland area of Bullion Run

The amount of land area in Clintonville is 2.95 square kilometers and the amount of surface water is 0.006 square kilometers. The 1990 Kennerdell zip-code demographic information above reflects the watershed as a whole with this area covering about 60 percent of the watershed. The 2000 census population data for the Kennerdell zip-code area was not available. The 1990 census data [1] shows the following information.

[1] from Delorme Street Atlas 4.0 demographic data for Zip Code 16372 – Clintonville, PA and 16374 – Kennerdell, PA

Table 2: 1990 Demographics for Clintonville and Kennerdell zip code areas

Demographics for Clintonville		Demographics for Kennerdell, PA	
Population	527	Population	4,098
Population Density	402/square mile	Population	42/suare mile
Families	137	Density	40/square mile
Households	216	Families	886
Median Home Value	$36,300	Households	1138
Median Rent	$217	Median Home Value	$35,500
Owner Occupied Housing	56%	Median Rent	$293
Renter Occupied Housing	33%	Owner Occupied Housing	53%
Housing Units	254	Renter Occupied Housing	15%
Median Year Built	1971	Housing Units	1681
Median Household Income	$20,526	Median Year Built	1950
Per Capita Income	$9,207	Median Household Income	$21,791
Average Age	38	Per Capita Income	$9,967
Average Commute	19 min.	Average Age	38
		Average Commute	25 min.

It should be noted that the population trend for Clintonville was a population loss of 7 but an increase of household/families of 22 between 1990 and 2000. This reflects the total trend of Venango County and most of northwestern Pennsylvania.

Outstanding or Unique Features

An outstanding feature in the area is the Stone Mill below East Tributary 2 on Scrubgrass Creek Main channel. The history of this is unknown and it does not appear on the National Register of Historic Places. Several old bridges that were constructed in 1908 are found in the watershed. There are also two bridges that have been listed on the National Register of Historic Places. These are described in the Cultural Resources section. The riparian area of the lower section has an outstanding aesthetic quality in the areas where heavy use has not impacted the stream bank. The rock strata and free stone characteristic of the channel along with the riparian forest cover are what make the Scrubgrass Creek quality what it is.

Scrubgrass Creek Riparian Scene

II. Issues, Concerns, Constraints, and Opportunities

Public Meetings

Resource concerns, issues, and problems were identified by the study team through two public meetings held at the Clintonville Township Municipal Building in the fall of 1997 and the spring of 1998. At both meetings an overview of the project was given and the floor was opened to the public for their input regarding concerns that they thought were relevant in the watershed. Following the two meetings the results were compiled and are presented below as the major watershed issues. Each issue area was assigned a priority ranking (e.g., primary, secondary, moderate, minimal, non-issue, unknown). Background information and data sources were provided and an action outcome describing data development and information was produced relative to each issue.

Water Resources Fieldwork

In addition to the public meetings, the issues that relate to water resources are a result of field research over a two-year period. The fieldwork involved identifying point source pollution areas: acid mine drainage, well seeps, and naturally occurring seeps. The locations of the impairments were compared to any information that was contained in the historical water quality data particularly the Operation Scarlift Study. The water resources were mapped using ArcView and an examination of the main channel corridor was conducted.

All the identified issues, concerns, constraints, and opportunities are discussed as follows.

Issues relating to Water Quality

Water Quality Degradation from Acid Mine Drainage

Priority: This is a primary resource issue for the watershed.
Background: Historical data exists from Operation Scarlift as developed in 1973 and ongoing monitoring and assessment activities at active and abandoned mine sites by Department of Environmental Protection Bureau of Mines and Bureau of Abandoned Mine Reclamation Program. Department of Environmental Protection provides identification and characterization of source sites from data at selected locations. Historical impact is well-described and current impact partially determined through field assessments. Coal reserves and mined areas were digitized from United States Geologic Survey maps and air photos. Maps in Appendix A depict coal reserves, mined lands, and unmined areas for the watershed.
Goal: The seeps identified in the Operation Scarlift Study will be reexamined and other seeps need to be identified. An engineering assessment of any potential treatment system should be completed in the next phase. Funding should be sought through state and federal programs. These funds should be managed locally either through a non-profit watershed association or the individual municipalities.

Water Quality Degradation from Well Seeps

Priority: This is a primary resource issue for the watershed.
Background: Historical data on wells exists from the Pennsylvania Department of Environmental Resources Bureau of Oil and Gas Management. These were digitized from United States Geologic Survey maps and air photos. A map in Appendix A shows the location of oil wells as a general pattern and indicates the proximity of the wells in the watershed. The majority of these wells are producing

alkaline discharges that contain significant quantities of iron and manganese. These metals originate from buried mine spoils that are leached and transported laterally underground where they eventually contact shallow oil wells. Many wells have failed casings that allow mine drainage to enter the wells and flow to the surface. The Bureau of Oil and Gas Management locates the wells by using a Global Positioning System. If these wells are determined by the Pennsylvania Department of Environmental Resources Bureau of Oil and Gas Management not to be the responsibility of the landowners, or the operators, then they are eligible for the orphaned well program. It should be noted that this program has limited funds and does not guarantee that the well will be plugged. Wells that are causing problems generally are ranked as a higher priority. Approximately fifteen of these wells have been identified.
***Goal**:* An engineering assessment of any potential treatment system or well plugging should be completed in the next phase. Due to the complexity of any treatment system, plugging should be the preferred method. In some cases plugging may not be feasible due to location or re-emergence of the water in another location. Funding should be sought through state and federal programs. These funds should be managed locally either through a non-profit watershed association or the individual municipalities.

Water Quality Degradation from Active Oil Production

***Priority**:* This is a secondary resource issue for the watershed.
Background: The Pennsylvania Department of Environmental Resources Bureau of Oil and Gas Management regulates the oil produced in the watershed. The producers with a few exceptions make an effort to keep well sites contained and environmentally sound. The main concern for the watershed is the wells that are in the riparian zone and have a potential for seepage into the streams. The general location of Department of Environmental Protection registered wells is public information and was digitized from information provided by them. A map in Appendix A shows the location of oil wells.
***Goal**:* The Department of Environmental Protection Bureau of Oil and Gas Management must still regulate the oil well producers. The Bureau desires to work through the regulatory process in cooperation with a local watershed group. Compliance to the regulations may be worked out in a non-hostile working relationship. There is a need for attitude changes that can be facilitated by the watershed group. The Bureau of Oil and Gas Management is working on the development of a new permit for wetland treatment of brine water. This will be for discharges of less then 1,000 gallons per day. There is a demonstration project involving the construction of several wetland treatment systems. Natural Resources Conservation Service is designing these for the Bureau of Oil and Gas Management. These will be funded through a grant.

An active oil well along a tributary of Scrubgrass Creek.

Water Quality Degradation from Natural Seeps

Natural seep on Bullion Run– not related to production or mining.

Priority: This is a primary resource issue for the watershed.
Background: Several natural seeps with concentrations of iron are found within the Scrubgrass drainage. These seeps are low discharge and produce localized effects that may be considered significant pollution sources. These seeps need to be tested to determine if the iron is associated with an acid or alkaline discharge. No regulatory agency has control over this type of discharge.
Goal: Water chemistry and flow rates need to be conducted to determine if treatment of these seeps is feasible. If treatment is needed and feasible an engineering assessment should be completed.

Water Quality Degradation from Agricultural Sedimentation

Priority: This is a minimal resource issue for the watershed.
Background: The Natural Resources Conservation Service oversees Sediment discharge/controls from agricultural activities. Specific farm conservation assessments and estimates are available from the Natural Resources Conservation Service Field Office at Franklin although these are confidential. The Natural Resources Conservation Service measures relative impacts as part of the conservation planning process. Because of the type of farming operations (primarily beef), ongoing technical assistance by the Soil Conservation Service/Natural Resources Conservation Service and the requirements of the Food Security Act of 1985 and the PA Clean Streams Law section 102, Natural Resources Conservation Service has determined erosion from cropland is currently minimized.
Goal: Agricultural land use covers change annually with crop rotations and therefore the numbers presented in this report will vary. Agricultural land use is limited in the watershed with approximately 4.34 percent (1103 acres) in active row-crop production. Production acres vary depending on grain prices. Hayland and pastureland uses comprise approximately 4.44 percent (973.1 and 155.2 acres respectively) of the watershed. Agricultural land use poses little threat to the stream network unless stocking rates are excessive and severe overgrazing occurs on pastures. See the Agricultural Land Use Map Appendix A**.**

Water Quality Degradation from Construction and Logging

Priority: This is a primary resource issue for the watershed.
Background: Sedimentation prevention for these and similar activities are regulated through permits approved by the Venango County Conservation District. Because land use in the watershed is dominated by woodland (59.6%), potential sedimentation from logging operations is a concern.
Goal: There is a high potential for impact on the aquatic reproduction that is at a critical point in some sections of the main channel and several tributaries. Timber management and erosion control workshops sponsored by the Venango Conservation District and the Pennsylvania Department of Conservation and

Natural Resources Bureau of Forestry should be considered. The conservation district should maintain a pro-active working relationship with the woodland managers in the watershed.

Water Quality Degradation from Dirt and Gravel Road Sedimentation

***Priority**:* This is a secondary resource issue for the watershed.
Background: The total length of unimproved dirt and gravel roads in the watershed is approximately 43.4 miles. Townships own most of the dirt and gravel roads, but the PA Department of Conservation and Natural Resources and PA Game Commission also maintain some roads in the watershed. Municipalities have moderate resources including the liquid fuels tax. The PA State Conservation Commission's Dirt and Gravel Road Program also address this issue. The Venango Conservation District administers this program and has conducted an environmental impact ranking of sediment-related improvement needs using the ArcView geographic information system. Sediment delivery from gravel roads and sources adjacent to roads is known. The Conservation District through its Quality Assurance Board reviews road improvement projects applications, and provides grants as budget resources allows.
Goal: The Conservation District's Dirt and Gravel Roads program is open to municipalities that want to participate in it. Attendance at a two-day training program is the only prerequisite. This program has been effective in providing direct financial and technical assistance to townships for protecting streams from heavy sediment load discharges, as well as resulting in a more maintenance-free road. The municipalities should develop a working relationship with the Conservation District.

Water Quality Degradation from Sewage Septic Systems

Priority: The level of concern for this resource issue is unknown.
Background: The townships and township sewage enforcement officers are the lead for regulating on-lot septic systems. PA Department of Environmental Protection has the ultimate enforcement responsibility. Contribution of pollutants to Scrubgrass Creek from these sources is largely unknown. Housing was mapped from United States Geologic Survey 1:24,000 maps to generate potential on-lot and sewage system information. Digitized data show that there are approximately 282 dwellings outside the Clintonville sewage system and 156 connected to the Clintonville sewage system.
Goal: The watershed group through the technical assistance of the appropriate agencies needs to develop stream water quality data that will help identify stream reaches and other locations where sources of sewage pollution exist. This should result in voluntary compliance with the existing sewage enforcement laws rather then penalties. The sewage enforcement officers should be involved in the watershed groups.

Water Quality Degradation from the Clintonville Treatment Plant

Clintonville sewage treatment plant.

Priority: This appears to be a secondary resource issue.
Background: The issue comes primarily from Clintonville and other municipal officials. Differences of opinion had existed as to the extent and magnitude of this potential problem. Contribution of pollutants to Scrubgrass Creek from these sources was largely unknown. Water quality and biological data are needed to assess the current level of impact (if any) from sewage and/or storm-water on Scrubgrass Creek. The sewage treatment plant has recently come under a different manager. The plant operation has been improved and concerns about the overflows are being addressed. The plant now works with the Pennsylvania Department of Environmental resources outreach program and is looking into the goal of reducing the storm-water input of the system.
Goal: The watershed project can provide some resource information, and mapping assistance to the borough for engineering of the sewage (and water) treatment system if requested. The sewage plant manager is in the process of upgrading the operation of the system and is monitoring the problems. He now controls the discharge overflows so that the potential problems should be eliminated. Additional water quality data is needed and sampling stations can be integrated into the monitoring network

Water Quality Degradation relating to a Cold Water Fishery

Priority: This is a primary resource issue for the watershed.
Background: The trout fishery was eliminated in much of the watershed where the acid mine drainage is evident. Several reaches still support limited Brook Trout fisheries. The level of impact is very high yet poorly quantified. Historical data from Pennsylvania Fish and Boat Commission is limited to what is stated in the Operation Scarlift Study. There were some word-of-mouth indications that trout had been caught in the lower sections of Scrubgrass Creek for several years. Sampling verified this, as well as trout production in Bullion Run. These populations would not however support any

heavy fishing pressure. The middle and upper sections of Scrubgrass Creek as well as most of the tributaries are not suited to supporting any trout populations due to the precipitates of iron and aluminum coating the free stone bottoms of the channels. Even though the water quality has improved in the lower sections over the years, aquatic invertebrate production has not reached a level to support a stocking or in-stream reproduction. All the other factors such as the stream gradients, riparian forest cover, water temperatures and free stone bottoms meet the needs of a cold water fishery. It is speculated that the Brown Trout found in the watershed are transient fish that have moved into the Scrubgrass Creek watershed from the Allegheny River.

A detailed aquatic study needs to be completed by the watershed work group in cooperation with the Pennsylvania Fish and Boat Commission, the Natural Resources Conservation Service, Trout Unlimited and the Venango County Conservation District. This data is needed to rank and prioritize impacted stream reaches and sub-watersheds and to weigh the cost-benefit of acid mine drainage treatment locations. An aquatic inventory is recommended and should be used with water quality data from discharges to determine the needs for treatment systems.

Goal: With the historic natural improvements made since 1973, it appears that future improvements in the watershed can make a cold water fishery an obtainable goal. An inventory of the treatment needs, engineering requirements and corresponding costs should be completed and funding through state and federal agencies needs to be obtained.

Water Quality Degradation relating to the Aquatic Biodiversity

Priority: This is a primary resource issue for the watershed.

Background: The impact from acid mine discharge is very high throughout the watershed on its biodiversity. The issues are more complex than that of trout production. The iron and aluminum precipitates coat the stream bottom in the upper reaches of the watershed. No information is available from the Pennsylvania Fish and Boat Commission.

Goal: An aquatic biodiversity study needs to be completed to determine the effect of the acid mine discharge on aquatic biota. Application of the Ohio Environmental Protection Agency Index of Biological Integrity methodology to assess impacts on the fish community is recommended. The results need to be applied to the treatment recommendations.

Water Quality Degradation relating to the Riparian Biodiversity

Priority: This is a moderate resource concern.

Background: The biodiversity of the terrestrial riparian zone correlates to the land use and cover types found in the corridor of the channels. The main channel is dominantly woodland (80+ %). The dominant tree species are Oak and Hemlock based on the location and slope aspect. Scrubgrass Creek and its upper reaches and upper tributaries are more diverse. The wildlife cover is primarily reclaimed mined land cover that consists of grasses: tall fescue, bromegrass, as well as volunteer warm season grasses, switchgrass and big bluestem, forbs: goldenrod, milkweed, St. John's wort, cinquefoil and wild strawberry. Some legumes such as birdsfoot trefoil can also be found in the mix of the above plants. This cover is less then 10 % of the riparian zone. The availability of shade in the riparian areas is more of a factor in the establishment of a cold water fishery than the diversity. Additional shade in the upper reaches of the first order streams may be needed for the proper water temperature to support the cold water fishery.

Goals: The biodiversity needs to be inventoried. This needs to be weighed against other factors in the quality analysis of the riparian areas. Additional forested riparian buffers should be a priority. The

Natural Resources Conservation Service and the Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry should take the lead in providing technical assistance in this area.

Issues relating to Land Use

Land use in the Scrubgrass Creek Watershed is quite varied. Woodland and wildlife lands are the dominant land use. Agriculture (cropland, hayland, and pasture) is a less dominant land use in the watershed. The remaining watershed land use is a mix of residential areas, community, transportation or commercial uses. Bodies of water constitute less than 1 percent of the watershed area.

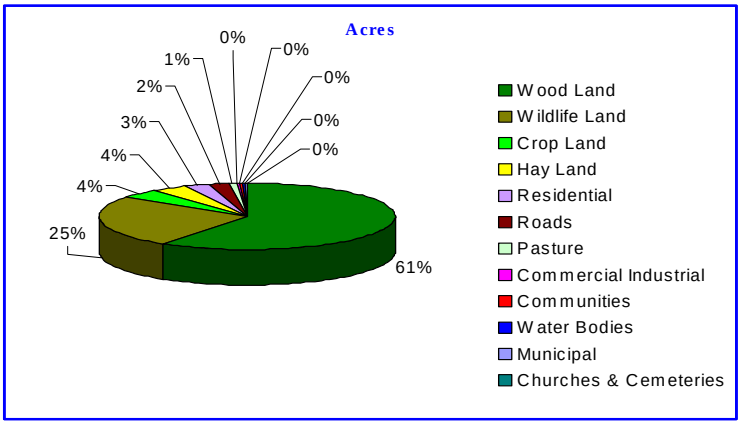


Chart 1: Land Use Graph

A comparison of land use shows that the current land uses have not changed significantly over the past 25 years. The Operation Scarlift report showed forest lands at 60 percent and agriculture at 15 percent during 1973. Based on the land use acreage, timber stand management and re-growth are the primary concern. Compared to ten to thirty years ago, mining has become a minor issue. There are several land use maps in Appendix A.

Zoning

Priority: This is a minimal resource issue.
Background: Some municipalities are concerned that they will be forced to implement zoning. One has studied it but the initiative was dropped before completion due to public concerns. Zoning was also identified by the Department of Environmental Protection's 21st Century Commission as a statewide concern.
Goal: Zoning will not be addressed in this watershed study since it is not a tool that fits into the overall goals of the watershed group nor can it be used to solve existing problems. If a municipality desires to pursue zoning, the work team can provide resource data as requested.

Land Value

Priority: This is a non-issue for the watershed.
Background: Land value and assessment have been identified as issues by some residents but will not be addressed in this document. It is realized that there are conflicts with the results of the recent countywide reassessment. These issues are individual issues that should be resolved through the process set up as part of the reassessment efforts. It is a short-term matter.
Goal: No inventory of this is needed.

Government Land Acquisition

Priority: This is a moderate resource issue.
Background: Local residents have a concern that the Allegheny Scenic Rivers Management Plan will facilitate more government land acquisition. At this time no government purchases are anticipated. The other public land ownership is the Clear Creek (Allegheny) State Forest - 580.4 acres in the watershed and State Game Lands 39 – 608.47 acres in the watershed. There has been no indication that either the Pennsylvania Department of Conservation and Natural Resources or the Pennsylvania Game Commission has any plans to expand their respective land ownership in the watershed.
Goal: Time has provided a window on the expected direction of the Allegheny River Wild and Scenic River Plan. The Allegheny River Support Group has the only river plan related activities. These ongoing actions are advocacy related. A few individuals overstate the concerns about public ownership. More education and interaction is needed. The creation of a watershed organization will allow more local input and buffer some opinions.

Illegal Dumping

Priority: This is a minimal resource issue for the watershed.
Background: The Venango County Planning Commission has established an illegal dump clean-up program and has identified only one location in the watershed. The major concern for the watershed is the debris that is related to the isolated heavy use of the riparian areas.
Goal: There is a need to develop a program to assist landowners in controlling the small amounts of debris and garbage left in some spots. This situation may fit into the riparian conservation easement situation discussed in the Riparian Lands section. There is also a PA Greenways group in Venango County that may be willing to assist in this.

Issues relating to Recreational Opportunities

Trout Fishery Development

Priority: This is a primary resource issue for the watershed.
Background: Fishery restoration is the main goal of the water resources related activities in the watershed. Trout Unlimited is an active member of the watershed work group and has specific goals in this area. See **Water Quality Degradation relating to a Cold Water Fishery**.
Goal: Inventorying water quality and aquatic biodiversity will be useful to determine the streams' abilities to support a stocked or native trout population once restoration is achieved. This goal is not an immediate one since the aquatic bio-diversity needs to be greatly improved to support the fishery development. The Pennsylvania Fish and Boat Commission has no immediate plans to stock Scrubgrass Creek. This may be an obtainable goal in eight to ten years.

Camping Opportunities

Priority: This is a moderate resource issue for the watershed.
Background: Currently one private campground exists at the mouth of Scrubgrass Creek. Other public camping opportunities exist within Clear Creek (Kittanning) State Forest along the Allegheny River. Discussions and an initiative took place many years ago to convert sections of the riparian corridor into a local park. The concentrated and sometimes unauthorized use of private ownership makes this a moderate issue. The heavy use of the riparian zones may have a negative impact.
Goal: No inventory of this is needed. However, support to the landowners with problems should be a priority.

Trail Erosion

Priority: This is a moderate resource issue for the watershed.
Background: The Pennsylvania Game Commission and the Department of Conservation and Natural Resources Bureau of Forestry have some trails on their land. Most private landowners are controlling heavy use access to their properties. The Venango County Conservation District and the Natural Resources Conservation Service provide technical assistance to landowners related to trail erosion control.

Goal: Inventory could be completed at least for those trails within the riparian zones of each stream. Field inventories and landowner surveys will be the main sources of information if conducted. Landowner support and education of the potential trail users may be a goal for the watershed group.

Cultural Events

Priority: This is a non-resource issue for the watershed.
Background: Cultural events have a minimal impact on most resources. They are limited activities both in resource utilization and time.
Goal: This has no major impact on land-use issues or other resource concerns.

Cultural Features and History

Priority: This is a moderate resource issue for the watershed.
Background: There appears to be a minimum number of features with known historical significance in the watershed. There may be a need for a cultural resource inventory using some Pennsylvania Historical and Museum Commission recommended parameters. A basic mapping of potential prehistoric and historic sites (Phase I type archeological study) would be of value for future commercial and industrial development projects and publicly funded infrastructure projects.
Goal: Potential cultural resource sites based on soils, topography, stream or water proximity could be projected based on current digital resource layers. If any potential impact would occur from any watershed-related activity, wetland treatment systems, etc., the Pennsylvania State Historical Preservation Officer would review the activity. Historical sites that landowners may want to have registered may be coordinated through the watershed group.

Issues relating to Economics

Economic Promotion

Priority: This is a moderate resource issue for the watershed.
Background: The watershed study has taken into account the current economic conditions of the watershed. Timber management is currently the driving economic factor in the watershed. One goal of the watershed project is to restore Scrubgrass Creek to a sustaining trout fishery. This will have a positive economic impact due to short-term construction activities (site restoration) and long-term tourism associated with the fishery.
Goal: Proper woodland management will sustain the bio-diversity as well as the heath of the timber industry. The Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry and private foresters working together can provide the guidance to landowners for sustainable forestry practices. The tourism increases that result from a cold water fishery will occur if promoted through a watershed group working with others such as the Venango County Tourism Agency, Marlow's Campground.

Small lumber operation on a previously mined area.

Economic Impact of Timber Management/Forest Sustainability

Priority: This is not an issue for the watershed as indicated by public response. However, the authors feel that while this may not be a public issue, it is an important economic issue for the watershed.
Background: Raised as an issue by the study team but identified as a non-issue at public meeting. Emphasis was on proper forest management techniques and aesthetic considerations. The sustainability of the woodland is needed to provide not just a long-term production of timber but a positive impact on stream water quality, aesthetics and aquatic and terrestrial habitats. Stream nutrient loading and sedimentation are directly effected by forestry practices.
Goal: Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry and private foresters need to work through a watershed group to provide information about forest related programs such as the Stewardship Incentive Program and the Forest Incentive Program.

Economic Impact of Community Development

Priority: This is not an issue for the watershed as indicated by public response.
Background: As with zoning, the issue of community development did not fly well in the public's eye. The demographics show that there is a status quo in the population and economic levels of Clintonville and the surrounding area. Clintonville does well managing the community aspects of its area and appears to be well balanced in community support facilities such as the fire department and water authority. Civic activities include church and other social gatherings that are held throughout the seasons.

A view of a Clintonville street on a late August day.

Goal: Any watershed related activities that can be coordinated with the appropriate municipal authorities should be. The economic benefits of these activities to the municipalities could be monitored through the watershed group with the assistance of an appropriate agency such as tourist promotion.

Economic Impact of Industrial Development

Priority: This is a primary resource issue for the watershed.
Background: Currently, the only industrial development that has occurred in the watershed has been development of sawmills. The Clintonville exit of I-80 provides the watershed with a high potential for industrial development. Some tracts in this area have been partially developed by private individuals to sell as industrial/commercial sites. Scrubgrass Generating Company operates a power plant within 2 miles of the watershed. The Venango Economic Development Corporation has been trying to work with the local municipalities on development of the southern part of the county. Due to the negative population trends in the watershed, the watershed plan and watershed group should support industrial development. It is noted that there are many open area sites left from the mining era that are marginal for cropland, wildlife land or future woodland but that could support industry. This recommendation does

not include mining as recommended industrial development. This is due to recognition of the potential for conflict with any planned treatment of past water quality problems.
Goal: Industrial development should be supported by an inventory of wetlands, cultural features, prime farmland, and soil characteristics. Such a scientific approach to industrial site selection and development will lead to minimal impacts. Data development and siting models could be conducted on a site by site basis if necessary.

Economic Impact of Rural Fire Protection

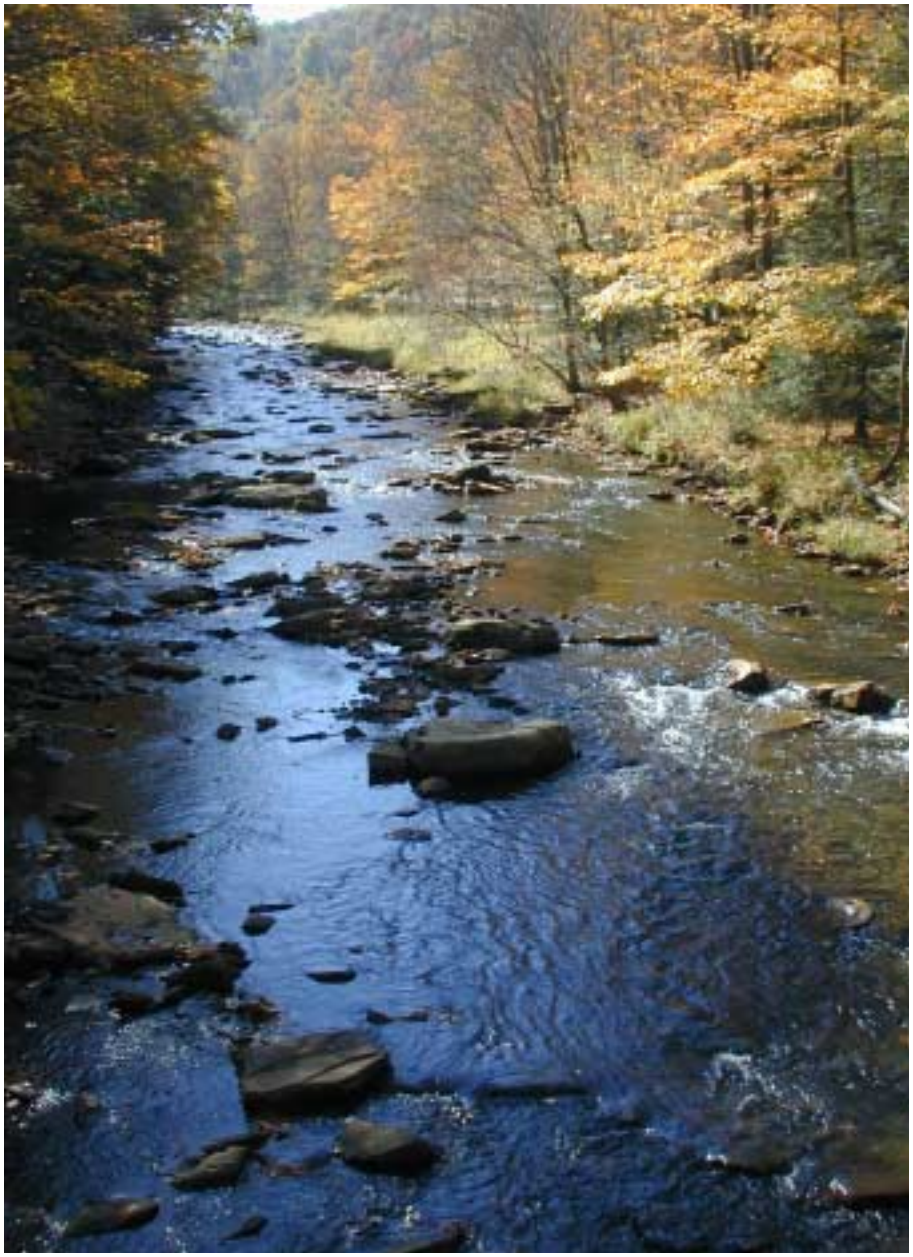
Priority: This is a moderate resource issue for the watershed.
Background: There is a dry fire hydrant program administered by the Penn Soil Resource Conservation and Development Council. This program is in cooperation with Central Rural Electric Cooperative. The Natural resources Conservation Service Field Office has been working with the Penn Soil Trust and local municipalities and fire companies to implement the program. It may be possible to gain an area wide insurance reduction from the program if enough hydrants are installed for the coverage needed. Currently 241 of the 282 mapped residential areas are located within three road miles of a fire hydrant. This would reduce the fire insurance expense for each resident by approximately ninety dollars annually. The insurance savings could be a potential 25,000 dollars annually to the residents of the watershed.
Goal: The program should continue to be promoted and supported by the agencies.

Issues relating to Natural Conditions

Biodiversity

Priority: This is a moderate resource issue for the watershed.
Background: Diversity data has been collected from various sources. These include the Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry and the US Fish and Wildlife Service. The data is to identify at-risk, threatened, and endangered species in the watershed. It is shown in the Pennsylvania Natural Diversity Index (PNDI) data in Section III of this study. A map is included in Appendix A showing the PNDI coverage areas. The state-inventoried species are not available to the public as the Federally Listed Species of Concern are. The state only designates the number of species. These lists are used as references in both the state and federal permitting process.
Goal: It is recognized that the biodiversity of the Scrubgrass Creek watershed goes beyond the lists of threatened species. The general diversity of plants enhances the wildlife, timber, and aesthetic value of the watershed.

Riparian Lands



Priority: This is a primary resource issue for the watershed.
Background: This issue was identified as an important component to cold water fishery development and restoration by the study team. Riparian systems are important for stream bank stabilization and channel protection. Research has also shown that a well-maintained riparian zone will serve as a filter for nutrients and other pollutants. A riparian area should have trees as it primary cover, but have some open areas to provide sunlight that is needed for both terrestrial and aquatic invertebrates. The combination of shade areas to cool the water and sunlight for development of invertebrates as a food source is critical for a cold water fishery. The riparian lands in the lower and middle section of Scrubgrass Creek and its tributaries appear to be well balanced and managed. Timber removal has been minimal and relatively well managed. The upper sections need to be inventoried as to the effect of mining on the streams. Some impact from stream bank erosion and heavy use in spots has had a negative impact. Riparian land protection in the upper reaches of the watershed is more critical for trout production then in the lower sections of the steams. An inventory of the intermittent and first order streams indicated that there were some areas that can be improved.
Goal: The riparian zones of the first order streams should be assessed for degradation caused by sources including livestock, motorized vehicles, and non-motorized vehicles. The possibility of using programs such as the Pennsylvania Stream Relief or other grants to support owners of the riparian lands should be a priority. The support can be financial through easements to offset timber production and help to control heavy use degradation. The watershed group should make this one of the top priorities. Technical assistance for riparian planning is available through the Natural Resources Conservation Service.

Wetlands

Priority: This is a primary resource issue for the watershed.
Background: Wetlands provide watershed-wide hydrologic stability and are an important source of wildlife habitat. They also serve as a natural filter for pollutants. United States Army Corps of Engineers and Pennsylvania Department of Environmental Protection regulate impacts on wetlands.
Goal: Any developmental activity that impacts wetlands will be enforced through the United States Army Corps of Engineers and Pennsylvania Department of Environmental Protection. The Venango Conservation District serves as the local contact for wetland encroachment permits. The watershed group should work with developers and the Venango Conservation District to provide information on wetland regulations. The Natural Resources Conservation Service will be developing digital soils information that will allow a better indicator of the hydric soils in the watershed.

Timber Stand Management

Priority: This is a primary resource issue for the watershed.
Background: Given the acreage of woodland in the watershed, timber management will be a factor that will dominate the watershed's condition. This issue addresses the non-economic impact of timber management. The factors that are involved here are erosion control, regeneration, wildlife cover and biodiversity. Goals are the same as the economic impacts of timber management: sustainability and minimal negative impact on the watershed.
Goal: Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry and private foresters need to work through a watershed group to provide information about forest related programs such as the Stewardship Incentive Program and the Forest Incentive Program.

Issues relating to Soils

Proper watershed planning involves making land use decisions based on many factors. Soils information relates to nearly all biological or construction activities and binds the uses together. The impact of any earth disturbance or land cover effects the areas below it through increased runoff, sedimentation, and nutrient loading. Realizing the limitations of what any given soil can support will reduce negative impacts both on site and off when land use changes are being considered.

Soils Interpretations

Priority: This is a primary resource issue for the watershed.
Background: Soil classification and capability are important for siting and development considerations and for other natural resource management projects and/or concerns.
Goal: The Natural Resources Conservation Service is responsible for producing the soil surveys for each county. These surveys will be reproduced in digital format over the next two years. This information needs to be incorporated into the watershed database maintained at the Natural Resources Conservation Service Franklin field office and it needs to also be available to planners as needed.

Erosion Control

Priority: This is a moderate resource issue for the watershed.
Background: Natural Resources Conservation Service oversees erosion from agricultural activities while the Venango County Conservation District oversee other activities that can cause erosion. Specific farm conservation assessments and estimates are available from the Natural Resources Conservation Service field office in Franklin.
Goal: Sites can be identified and mapped with assistance from the USDA Natural Resources Conservation Service in if needed.

Prime Farmland

Priority: This is a minimal resource issue for the watershed.
Background: Prime farmland is associated with soil type and with soil classification and capability information. This issue is most often connected to development pressure.
Goal: Soils data available from the Natural Resources Conservation Service Franklin field office can be used to identify specific areas that could be classified as prime farmland. All development and infrastructure (sewer and water) activities supported financially through the federal government agencies are regulated by the Federal Prime Farmland Protection Act (FPPA). The study has determined that developmental impact on prime farmland at this point in time would be minimal due to the degree of previous mining and also to population trends.

III. Land Resources

Land use in the Scrubgrass Creek Watershed is quite varied as shown below. Forested ecosystems dominate land use accounting for 59.63 percent of the watershed. Agriculture (hayland, cropland and pasture) constitutes approximately 8.78 percent of watershed land use. The remaining 31.59 percent of the watershed are a mix of wildlife habitat (25.21%), residential areas (2.73%), urban areas (0.89%), transportation corridors (2.44%), and churches and cemeteries (0.06%).

It is evident from these numbers that a large portion of the watershed's land use is devoted to natural resource based activities. Forestry, agriculture, and wildlife habitat account for more than 93 percent of the land uses in the watershed making this a truly rural watershed. The current land uses have not changed significantly over the past 25 years. The Operation Scarlift report showed forest lands at 60 percent and agriculture at 15 percent during 1973.

Table 3: Watershed Land Use

Land Use	Acres	Percent
Woodland	15144.89	59.63
Wildlife Land	6402.85	25.21
Crop Land	1102.31	4.34
Hay Land	973.12	3.83
Pasture	155.21	.61
Residential	694.04	2.73
Communities	79.71	.32
Churches & Cemeteries	15.67	.06
Commercial Industrial	114.42	.45
Municipal	30.81	.12
Transportation	618.61	2.44
Water Bodies	68.04	.27
TOTAL ACRES	25399.68	100.00

Land use was classified and mapped according to the following criteria. (See the consolidated Land Use Map in Appendix A). The following are definitions of the land use classifications.

- Woodland: Classified as productive woodland by the State Service Forester.
- Wildlife Land: Areas with the following covers: grass/forb, grass/legume/forb, forbs, or brush smaller then pole timber size.
- Cropland: Fields with crops in rotation. The expected soil pH ranges from 5.8-7.0
- Hayland: These areas have hay stands that are not rotated with crops and are at least six years old. The expected soil pH ranges from 5.0-7.0.
- Pasture: Pastures managed as exercise lots and grazing areas. The expected soil pH ranges from 5.0-7.0.
- Residential: Single dwelling areas isolated from other dwellings by more then 200 feet.
- Commercial Industrial: Areas that are developed for industrial or commercial enterprises.
- Communities: Clintonville or areas of residential buildup greater then one acre and having multi-dwellings.
- Churches and Cemeteries: Churches and cemeteries found both within and not within a designated urban or residential area.
- Municipal: Municipal buildings and public support facilities such as water treatment of sewage treatment plants.
- Transportation: All roads including I-80, state routes, township roads.
- Water Bodies: Ponds and lakes not included in the stream system.

Soil Characteristics

The Scrubgrass Creek Watershed contains four of the six major soil associations found in Venango County including the Cavode-Wharton association, the Cookport-Hazelton-Gilpin association, Hazelton-Gilpin association, and the Hanover-Alvira association. The Cavode-Wharton association is found primarily on uplands with nearly level and gently sloping, deep, and somewhat poorly drained and moderately well drained soils underlain by shale and siltstone. This association has a seasonally high water table that restricts agricultural activity. The Cookport-Hazelton-Gilpin association is found on uplands. It is gently sloping to moderately steep, deep and moderately deep, and is moderately well drained and well drained soils underlain by sandstone, siltstone, and shale. Many areas were once cultivated but due to excess water and drainage requirements for successful agricultural production many areas are idle or have reverted to woodland. The Hazelton-Gilpin association is restricted mostly to valley sides on steep and very steep, deep and moderately deep, stony, well-drained soils underlain by shale, siltstone, and sandstone. This association is found along most streams and is typically wooded. The Hanover-Alvira association is found on uplands that are gently sloping and sloping, deep, well drained to somewhat poorly drained soils underlain by glacial till. Many areas were previously cultivated but are or have reverted to woodlands or are idle. (See the General Soils Map in Appendix A).

The occurrence and distribution of hydric soils is an important component in watershed analysis and management. Scrubgrass Creek has 41 different soil units with 7 classified as hydric. These include Armagh silt loam, Atkins silt loam, Brinkerton (A; B) silt loam, Brinkerton-Frenchtown stony silt loam, and Frenchtown (A; B) silt loam. These soils are poorly drained, indicate potential wetland condition, and have severely limited development capacity.

Land Ownership

Public land ownership consists of only 7.25 % of the total land area in the watershed. The public land use totals 1842.28 acres. At 623.02 acres, transportation facilities and roads are the primary public land ownership. This is primarily due to Interstate 80, which has two rest stops. The total length of unimproved dirt and gravel roads in the watershed is approximately 43.4 miles. Township roads make up the entire dirt and gravel roads mapped in this acreage, but the Pennsylvania Department of Conservation and Natural Resources and the Pennsylvania Game Commission also maintain some roads in the watershed. The Pennsylvania Game Commission owns 608.47 acres in the watershed. This acreage is part of the 684-acre tract of Game Lands 39. The Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry owns 580.71 acres in the watershed. This is the southern portion of the Clear Creek or Kittanning State Forest. This tract totals 932.26 acres and lies on the west side of the Allegheny River across from the village of Brandon on the north end, to Kennerdell on the south end. The game land tract and the state forest tract are adjacent to each other with the game lands on the west. A map showing the public land ownership is included in Appendix A. The private ownership in the watershed is 23, 571.7 acres or 92.75 % of the watershed. The land uses have been mapped and are shown in a chart in the above section as well as in the maps in Appendix A.

Municipal Jurisdictions

The Scrubgrass Creek Watershed contains 7 distinct political jurisdictions (see table below). Five are located in Venango County including Victory Township, Clinton Township, Irwin Township, Scrubgrass Township, and the Borough of Clintonville. Two townships, Venango and Marion, are located in Butler County. Clinton Township and Irwin Township comprise 92.1 percent of the watershed.

Table 4: Scrubgrass Creek Watershed Municipal Jurisdictions.

Jurisdiction	County	Total Area (acres)	Percent of Total Watershed
Irwin Township	Venango	8,571.1	33.6
Clinton Township	Venango	14,940.0	58.5
Victory Township	Venango	371.3	1.4
Scrubgrass Township	Venango	381.9	1.5
Clintonville Borough	Venango	697.1	2.7
Venango Township	Butler	331.3	1.3
Marion Township	Butler	231.3	0.9

Critical Areas

Less then 40 acres of the watershed is either critically eroded or has a heavy use impact. The majority of this comes from some old mine areas. The aluminum associated with these shallow mining activities has presented a plant toxicity problem in some areas. Due to the amount of limestone in the area, mining since 1977 for the most part has not had a major effect on soil erosion. Some riparian areas in the middle and lower sections of Scrubgrass Creek are suffering from stream bank erosion due to the heavy recreational use. These areas consist of less then five acres. Field inventories of seeps along the streams have shown that these have caused little increase in erosion rates.

Land Fills

There are no landfills in the watershed.

Mine and Hazard Areas

As indicated above most of the Scrubgrass Creek Watershed is forested. However, that land use and the others defined in this study do not offer a complete representation of the watershed. Mine lands are not listed as a land use because many of the land use classifications occur on areas distributed throughout the watershed that were once surface-mined which masks the extent to which the watershed has been subjected to coal extraction. Nearly one quarter of the land area of the Scrubgrass Creek Watershed has been surface-mined over the past 60 years. The total extent of mining in the watershed is calculated to be approximately 6,011 acres or 23.6 percent. Much of the mining in the watershed occurred before 1980 (2,753 acres)[1]. These areas are believed to present the greatest challenge to restoration as mining would have occurred in that period when regulatory controls were less stringent than those imposed by the Federal Government in 1977 following passage of the Surface Mining Control and Reclamation Act. Surface mining continued over the next decade through 1991 adding another 3,257.5 acres. For all practical purposes surface mining ceased around 1991.

A spatial assessment of the watershed shows that most surface mining historically occurred in the upland areas of the Scrubgrass Creek watershed and along the divides of its sub-watersheds. This is not surprising because this is precisely where the majority of the coalfields (Brookville and Middle Kittanning) are located in the watershed. These two coal reserves originally occupied 53.4 percent of the watershed leaving 46.6 percent of the watershed without reserves (mostly those steep areas in the center

[1] It should be noted that at the conclusion of the Operation Scarlift Study in 1973 it was calculated that 2,200 acres of non reclaimed strip mines remained in the Scrubgrass Watershed.

of the watershed). A considerable reserve, approximately 7,600 acres of land over the Brookville and Middle Kittanning coalfields, still remains in the watershed. This is an important consideration for future watershed restoration and management initiatives.

Many of the problems from acid mine drainage in Scrubgrass Creek may originate in those sub-watersheds that were most extensively mined in the past. Included here are the South Branch and the Scrubgrass Creek main channel in its upper reaches. Both of these tributaries have had more than twenty percent of their land areas mined in the past (24.7 and 30.9 percent respectively). Due to their location in the upper reaches of the watershed these tributaries may exert a profound influence on habitat suitability and water quality in the downstream reaches of Scrubgrass Creek main channel. The combination of polluted discharges from these two tributaries may be difficult to overcome by flow contributions from the remaining, smaller tributaries.

Bullion Run was also heavily mined (13.2 percent); Gilmore Run and East Tributary 2 both have had less than ten percent of their land areas mined (8.7 and 7.8 percent respectively). The remaining sub-watersheds (East Tributaries 1 and 3, Center Tributary, Trout Run, and the Scrubgrass Creek main channel) have a relatively low incidence of previous mining activity, all below 4 percent.

According to the Operation Scarlift Study four sub-watershed areas contributed nearly 73 percent of the acid discharge into Scrubgrass Creek. These included the Center Tributary, Scrubgrass Creek Main channel, Gilmore Run, and Trout Run. However, these four areas only accounted for 22.6 percent of the land area of the watershed. Specific stream reaches and tributaries were also designated according to their acid contributions during average flows. Several, including Trout Run, Gilmore Run, Scrubgrass Creek main channel (upper reaches) and the Center Tributary were classified as being predominantly acid (acidity > alkalinity) during average flow conditions (i.e., discharge). Water quality data were developed for the Operation Scarlift study from 70 sampling stations distributed throughout the watershed.

There have been many open shafts left from old mining activities and identified in the Operation Scarlift Study. The study shows the sub-watersheds having the following number of open deep mine shafts. It is not known how many of these have been eliminated due to re-mining. The mine shaft locations are shown on the Mine Shaft Location Map in Appendix A.

Table 5: Number of mine shafts

Sub-watershed	Number of shafts
Middle Scrubgrass Creek	2
Bullion Run	5
Trout Run	1
Gilmore Run	4
Upper Scrubgrass Creek	18
South Branch	13
East Tributary 2	1

Only three open high-walls have been located in the watershed. Two have lengths of less then four hundred feet each and heights of less then twenty-five feet. The third has a length of 5070 feet and a high-wall ranging from fifteen to thirty feet. This last area has 4.7 acres of water at the base of the high-walls.

There are no other sink holes in the watershed.

IV. Water Resources

Major Tributaries

The following section incorporates information from field studies conducted during the early phases of the Department of Environmental Protection funded Growing Greener Project initiated in 2000. Sample stations were located in all the sub-watersheds to assess impacts from acid mine drainage and other pollutants. Water quality, fish diversity and abundance, and habitat assessments were conducted at most locations.

Species richness (number of species), species abundance (percent community composition), and Shannon-Weiner Diversity are reported. Shannon-Weiner Diversity (H) is a function of both the number of species in a sample and the distribution of individuals among those species. Low H is often a result of poor species richness, dominance by one or more species, or a combination of both.

Also listed are the watershed acres for the specific stream, its length in feet and miles as well as the overall gradient on the perennial length as shown on the United States Geologic Survey topographic maps.

Scrubgrass Creek Main Channel
Length: 57,850 feet (10.956 miles)
Gradient: 0. 74%
Watershed area: 25,414 acres

The Scrubgrass Creek main channel was subdivided into three sections to better summarize water quality. Four sampling locations were combined in the upper reaches of the Scrubgrass Creek main channel to describe water quality in that section behind the Victory Joint School. Two stations, one above and one below PA Route 308 were combined in order to characterize water quality in that area where conditions begin to improve. The last group of stations includes that portion of the Scrubgrass main channel between East Tributary 2 and the confluence of Scrubgrass Creek and the Allegheny River.

Upper Scrubgrass Main Channel
Length: 12,730 feet (2.411 miles)
Gradient: 0.55%
Watershed area: 4,755.93 acres

This section of Scrubgrass Creek is the most polluted waterway in the watershed suffering from various sources of acid mine drainage. Beginning on the east side of PA Route 8 and continuing downstream to the mouth of Gilmore Run the Scrubgrass Creek main channel is typified by very low pH (range: 3.10 to 4.35), high acidity (avg. 29.6 mg/l), and significant levels of sulfate (388 mg/l) and metals: aluminum 2.0 mg/l, iron 1.71 mg/l, and manganese 13.7 mg/l. These average concentrations are highly toxic and/or produce severely limiting in-stream habitat modifications due to extensive precipitation and substrate embeddedness. No fish were captured in this reach and no crayfish were observed. Additional downstream sampling showed that no fish are present above the mouth of Gilmore Run on the Scrubgrass main channel.

Mid Scrubgrass Main Channel
Length: 32,787 feet (6.210 miles)
Gradient: 0.79%
Watershed area: 19,937.43 acres

This portion of the Scrubgrass main channel shows substantial recovery but still suffers from significant mine-drainage impacts. Two stations were sampled on the Scrubgrass main channel with one

below and one above PA Route 308. A return to alkaline conditions (average alkalinity 28.2 mg/l), improved pH (range: 6.29 to 7.58) and aluminum concentrations below detection limits reduces toxicity. However, sulfates (274.5 mg/l), iron (0.42 mg/l) and manganese (4.4 mg/l) continue to degrade water quality and negatively impact in-stream habitat through continued precipitation. Six fish species were collected between the two sites (total 600 meters) with Blacknose Dace *(Rhinichthys atratulus)* dominating at both sites (~ 70 % species composition). Shannon-Weiner Diversity was calculated at 0.792.

Lower Scrubgrass Main Channel
Length: 12,333 feet (2.336 miles)
Gradient: 0.81%
Watershed area: 25,414 acres

The Lower Scrubgrass main channel includes four stations between East Tributary 2 and the Allegheny River. This three-mile section shows a remarkable improvement in water quality. All stations within this reach were alkaline (average concentration 28.4 mg/l) and maintained an acceptable pH (range: 6.53 – 7.75). Sulfates were still relatively high (average 223 mg/l) but aluminum was below detectable limits. Iron concentrations were diminished but still present and averaging 0.2 mg/l. Manganese remained troublesome averaging 1.23 mg/l. A total of twenty-eight fish species were collected at these four stations. Shannon-Weiner Diversity was calculated at 2.496 for the four stations combined (H range: 2.209 to 2.590). Central Stoneroller *(Campostoma anomalum)* dominated the lower three stations (15.3%, 33.6%, and 38.0%) while Blacknose Dace *(Rhinichthys atratulus)* dominated at the other station (40.4%).

This portion of Scrubgrass Creek has shown significant recovery and has the potential to become an important trout fishery. Although trout are not reproducing in this section of the Scrubgrass main channel adults utilize selected reaches where suitable habitat is available.

Bullion Run
Length: 27319 feet (5.174 miles)
Gradient: 1.757 %
Watershed area: 4751.55 acres

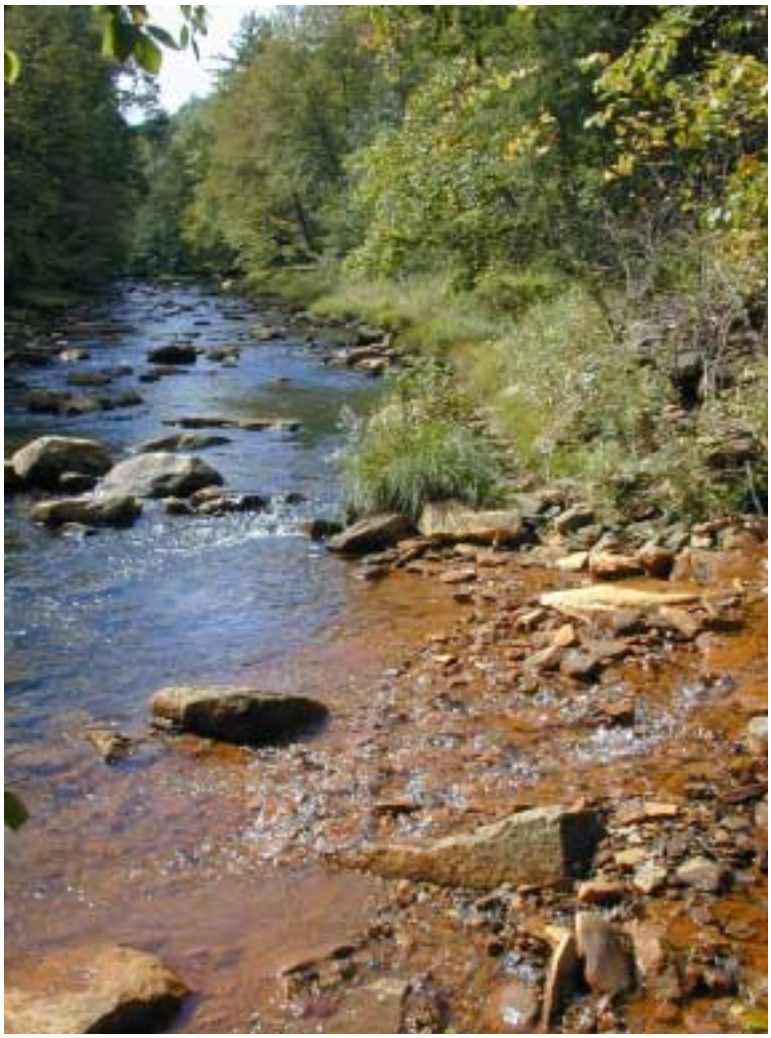
This is one of three Bullion Run discharges. They are on the upper section and appear not to be effecting the biological integrity of the stream as a whole.

Bullion Run was sampled at its mouth, in mid-reach, and near its source close to PA Route 308. The uppermost sampling station is located downstream from a low discharge abandoned well. Although pH is acceptable (range: 7.12 – 7.52) and the stream is alkaline (alkalinity: 56 mg/l) sulfates averaged 235 mg/l, iron averaged 0.58 mg/l and manganese 0.82 mg/l. The latter readily deposit in the stream bottom for some distance from the well site and impact the stream substrate downstream. At the two lower sampling stations on Bullion Run little to no effect of the mine effluent from the upper site is noticeable. Water quality at these sites shows that the stream is alkaline (~ 31.6 mg/l) and maintains a pH between 7.07 and

7.63. Sulfates averaged 156 mg/l and aluminum, iron, and manganese were all relatively low or below detection limits.

Fishery surveys were also conducted on Bullion Run at the same sample locations totaling 900 meters in length. Thirteen fish species were collected with Blacknose Dace *(Rhinichthys atratulus)* dominating (percent composition) at the upper and middle stations (53.8% and 41.3% respectively) and Mottled Sculpin *(Cottus bairdi)* dominant at the lower station (30.7%). Shannon-Weiner Diversity (H) averaged 1.660 increasing as one moved downstream into areas with less acid mine drainage influence. Metal deposition at the upper station limits in-stream benthic production and fish reproduction. Habitat conditions improve downstream of the upper sampling location with natural reproduction of Brook Trout *(Salvelinus fontinalis)* and Brown Trout *(Salmo trutta)***.**

Trout Run
Length: 10426 feet (1.97miles)
Gradient: 3.36 %
Watershed area: 884.14 acres.



This scene shows the mouth of Trout Run. Precipitates are diluted by Scrubgrass Creek enough to support some fish species.

Trout Run is a small tributary that enters Scrubgrass Creek above the Pump Station Bridge (Scrubgrass Creek RM 2.5). Trout Run is affected by acid mine drainage from numerous sources that emerge from formations along its lower reaches. Trout Run is marginally alkaline (4.3 mg/l) and maintains a pH between 6.28 and 6.49. Sulfates averaged 100 mg/l, aluminum was below detection limits, iron averaged 0.06 mg/l and manganese concentrations averaged 0.82 mg/l. Trout Run was electrofished for 150 meters near its mouth but yielded no fish. Severe substrate embeddedness appears to inhibit fish reproduction or any benthic production.

Center Tributary
Length: 2956 feet (0.56 miles)
Gradient: 3.72 %
Watershed area: 1025.54 acres

Center Tributary enters Scrubgrass Creek approximately 1 mile downstream of Pennsylvania Route 308. It is the most impacted small stream entering Scrubgrass Creek. This stream is acidic (average acidity 3.8 mg/l) with a pH ranging from 4.24 to 5.23 and an average sulfate concentration of 228 mg/l. Metals are elevated with aluminum averaging 0.324 mg/l, manganese 4.05 mg/l, and iron 1.34 mg/l. Center Tributary was electrofished for 150 meters at its mouth but yielded no fish. Low pH, acidic conditions, and toxic metal concentrations in addition to severe substrate embeddedness, prevent benthic and fish colonization.

Center Tributary iron precipitate

Gilmore Run
Length: 13,661 feet (2.59 miles)
Gradient: 0.92%
Watershed area: 2058.16 acres

Gilmore Run Substrate containing tar. This was found forming part of the stream bottom.

Two sampling stations were located on Gilmore Run. The stream was alkaline (69.5 mg/l) with a pH range of 6.64 to 7.93. Average sulfate concentration was elevated (294 mg/l) but aluminum was below detection limits. Average concentrations of manganese (1.48 mg/l) and iron (0.71) impact the stream due to the heavy precipitate deposited on the substrate. Gilmore Run was electrofished at one location 300 meters long approximately one mile upstream from its mouth. Seven species were collected with Shannon-Diversity calculated at 1.273. Creek Chub *(Semotilus atromaculatus)* dominated this reach comprising 45.1% of the total fish captured. Severe substrate embeddedness from the recurring iron/manganese flocculent deposition inhibits benthic production and limits fish diversity.

East Tributary 1
Length: 2844 feet (0.54 miles)
Gradient: 9.49%
Watershed area: 725.02 acres

East Tributary 1 is a small, first order stream that enters Scrubgrass Creek above Bullion Run on the east side of the Scrubgrass Creek Watershed. This tributary shows no effect from mine drainage and represents a non-impacted condition. The pH ranged from 6.86 to 7.24, alkalinity averaged 17.6 mg/l, and sulfates averaged 13 mg/l. Iron, manganese, and aluminum were all very low or below detection limits. This site yielded eight species of fish and had a Shannon-Weiner Diversity of 1.170. Mottled Sculpins *(Cottus bairdi)* were dominant in this 150-meter reach comprising 64.4 percent of fish numbers. This stream is quite small, developing isolated pools during periods of low flow, but supports the type of fish fauna that are expected in a low-productivity Appalachian Plateau stream.

East Tributary 2
Length 5144 feet (0.97miles)
Gradient: 5.44 %
Watershed area: 1295.31 acres

East Tributary 2 enters Scrubgrass Creek upstream from the mouth of Trout Run. This stream has a very high gradient and is influenced by several seeps that emanate from formations above the Phipps Road Bridge. The pH ranged from 7.24 – 7.80 and alkalinity averaged 44.7 mg/l. Sulfates are elevated averaging 171 mg/l but aluminum, manganese, and iron was relatively low or below detection limits.

Seven fish species were collected from the 150-meter reach sampled on East Tributary 2. Blacknose Dace *(Rhinichthys atratulus)* dominated (40.4% composition) this high gradient reach located just above the confluence with Scrubgrass Creek. Shannon-Weiner Diversity was calculated at 15.01.

East Tributary 3
Length 16952 feet (3.21 miles)
Gradient: 1.18 %
Watershed area: 1789.79 acres

East Tributary 3 originates near Interstate 80 and enters Scrubgrass Creek downstream from Center Tributary. Two sampling locations were established: one along Phipps Road and a second at its confluence with Scrubgrass Creek. This tributary maintained good buffering capacity (alkalinity averaging 54 mg/l) and a pH ranging from 7.19 to 7.97. Aluminum, manganese, and iron were relatively low or below detection limits and sulfates averaged 83.5 mg/l indicating that acid mine drainage is not a problem in this sub-watershed.

East Tributary 3 was sampled for fish at two locations, each location being 150 meters long. A total of seven species were collected and Shannon-Diversity was relatively low at 0.973. Blacknose Dace (Rhinichthys atratulus) dominated the lower station (42.4%) while Creek Chub (Semotilus atromaculatus) were dominant at the upper station (55.6%). The fish community at this location appears to be experiencing some form of environmental stress as greater diversity and numbers were expected. Two impoundments may contribute to altering the temperature regime during summer months in this way possibly excluding several cold-water species, notably brook trout.

South Branch
Length: 17,129 feet (3.24 miles)
Gradient: 0.93 %
Watershed area: 3992.86 acres

Five sample stations were located in this sub-watershed (located south of Clintonville) that enters the Scrubgrass main channel 1500 ft. above Pennsylvania Route 308. Influences from mining activities are evident in all sampled locations. Four of the five locations were grouped together and were primarily alkaline. Moderate alkalinity averaged 161.7 mg/l and aluminum was below detection limits. Iron and manganese had average concentrations of 0.33 mg/l and 0.54 mg/l respectively.

One sampling location in this sub-watershed near the Venango/Butler county line showed greater evidence of mine drainage impact than the other sites with an alkalinity of 3.6 mg/l and a pH range of 4.84 to 5.79. Sulfate was relatively low (59 mg/l) but aluminum (1.09 mg/l), manganese (1.932 mg/l), and iron levels (0.572 mg/l) were elevated.

Fishery samples in this sub-watershed were conducted in three locations totaling 450 meters. Two reaches were sampled in that portion of the watershed south of Clintonville and one reach was sampled near the confluence with Scrubgrass Creek. Eight species were collected from these reaches with Blacknose (Rhinichthys *atratulus)* dominating at the uppermost station (52.9%) and the lower reach (60.0%) and with Creek Chub (Semotilus atromaculatus) dominant in the mid-reach (53.4%). Shannon-Weiner Diversity was relatively low at 1.160.

Wetlands

The wetlands in the watershed are associated with Frenchtown and Atkins soils in the glacial till on the western side of the watershed and with Brinkerton, Armagh and Atkins soils in the residual soils on the east and west sides of the watershed. All these soils are hydric and except for Armagh are found along the streams. Mining has disturbed some of the wetland areas in the upper reaches of the streams, especially on Bullion Run, Gilmore Run and the upper section of Scrubgrass Creek. Beaver dams are numerous along the middle and upper sections of Scrubgrass Creek and have increased surface water and saturated areas along these sections. Upland wetland areas are found in situations and with soils that are listed in Table A1 as having inclusion of hydric soils. These wetlands are generally upland locations in uncultivated areas having depressions or small channels. The biggest areas of hydric soils are found surrounding Clintonville. These generally are associated with wider alluvial plains. The Hydric Soils Map in Appendix A shows these areas. The northwestern part of the watershed is much more dissected by the stream channels and the slopes are the major factor in the absence of the hydric conditions as shown on the map.

Floodplains

Because of the stream gradient in the main channel of Scrubgrass Creek, the 100-year flood levels remain in the channel. An exception to this is at the mouth of Scrubgrass Creek. Here the stream gradient levels and the area is also susceptible to back flows from the Allegheny River. The hydric conditions and wider alluvial areas associated with the Frenchtown and Brinkerton soils in the upper sections of streams restricts the stream encroachment activities. These are lower gradient stream channels and can be susceptible to out-of-bank flooding.

Lakes and Ponds

There are 106 lakes, ponds or other bodies of water located in the watershed. These total a surface area of 68.04 acres as mapped using the ArcView Geographic Information Program. The average size of these is 0.64 acres. The largest is 6.14 acres and the smallest is 0.02 acres. The distribution of the water bodies in the watershed can be seen on the Water Bodies Map in Appendix A.

Water Quality

Water quality in the upper reaches of the Scrubgrass Creek main channel prohibits fish colonization. Acidic conditions, low pH levels, and toxic levels of metals all contribute to exclude fish downstream to the mouth of Gilmore Run. Below Gilmore Run to just above the confluence of the South Tributary of Scrubgrass Creek with the Scrubgrass main channel only Creek Chubs and Blacknose Dace were collected. Both of these species are highly tolerant to pollutants and are dominant in those locations suffering major acid mine impacts throughout the watershed.

Species richness, Shannon-Weiner diversity, and total biomass increase on the Scrubgrass main channel as it approaches the Allegheny River. Much of the Scrubgrass Creek main channel below Pennsylvania Route 308 contains exceptional in-stream habitat that is well protected by mature riparian communities. Improvements in water quality, especially the reduction of metal flocs originating upstream that are periodically redeposited downstream, will stimulate greater benthic production, improve fish reproduction, and contribute to the development of an exceptional cold-water fishery.

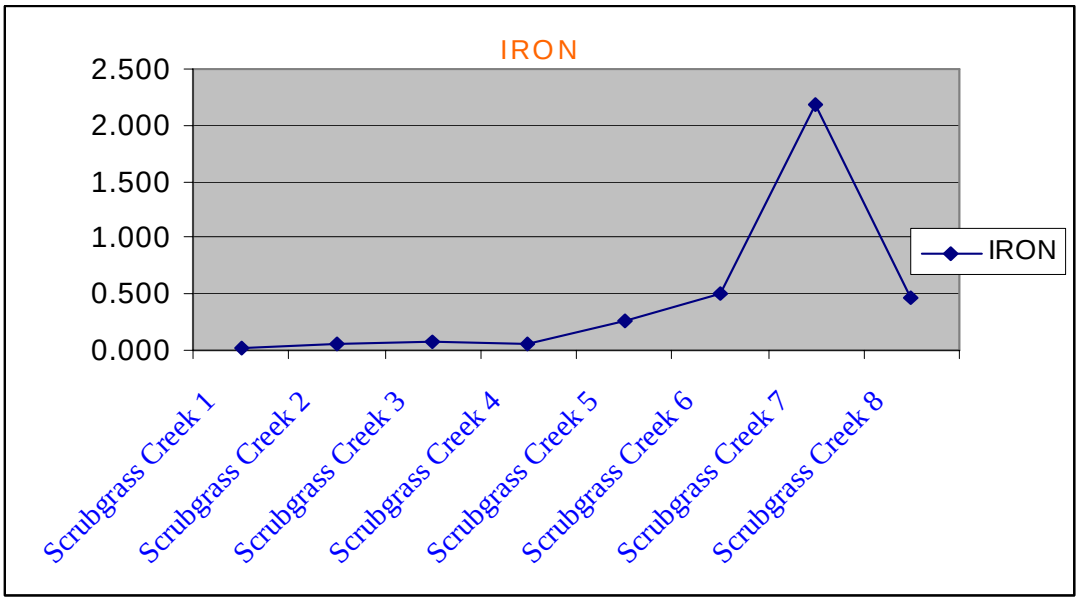
According to historical records water quality in the Scrubgrass Creek watershed began to deteriorate during the 1950's. Following several investigations of the main stem by the Pennsylvania Fish Commission between 1956 and into the early 1960's that consistently yielded low pH values, Scrubgrass Creek was removed from the Commission's trout stocking program.

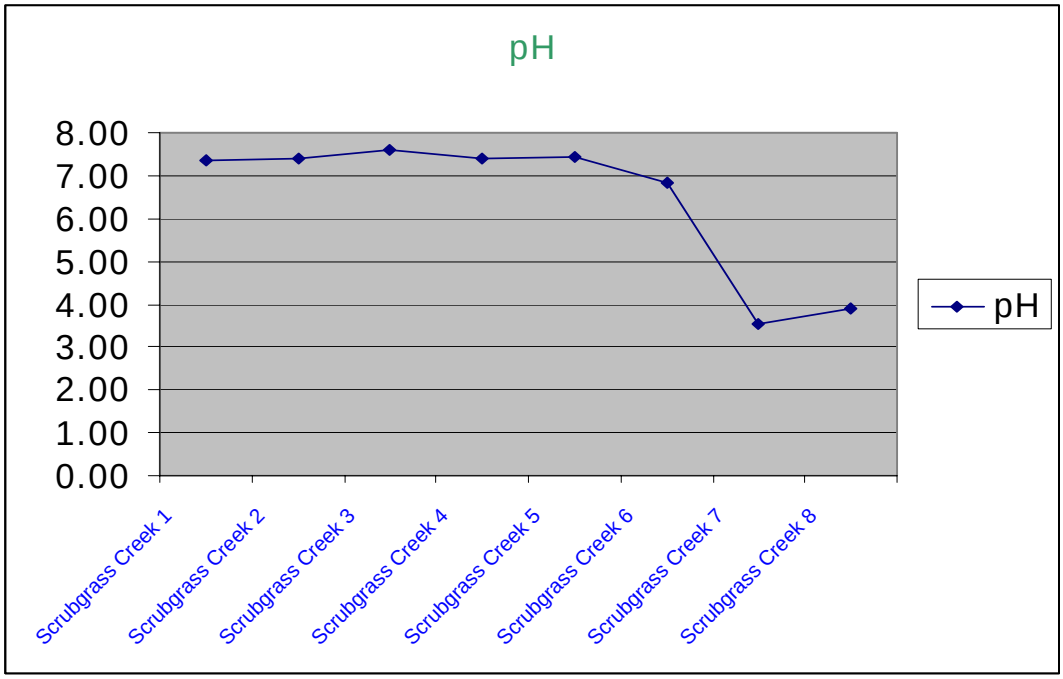
Summary water quality and fish community data presented in this section of the report were developed following the award of a Department of Environmental Protection Growing Greener grant for a comprehensive watershed assessment in the Scrubgrass Creek Watershed. Water quality and fishery data were collected from July through November 2000 and are briefly summarized to augment this report. Water quality and fish community samples were collected from a network of stations throughout the watershed. Selected information is broken down by sub-watershed or by combining sampling reaches where appropriate. A brief summary of important water quality indicators of acid mine drainage are presented.

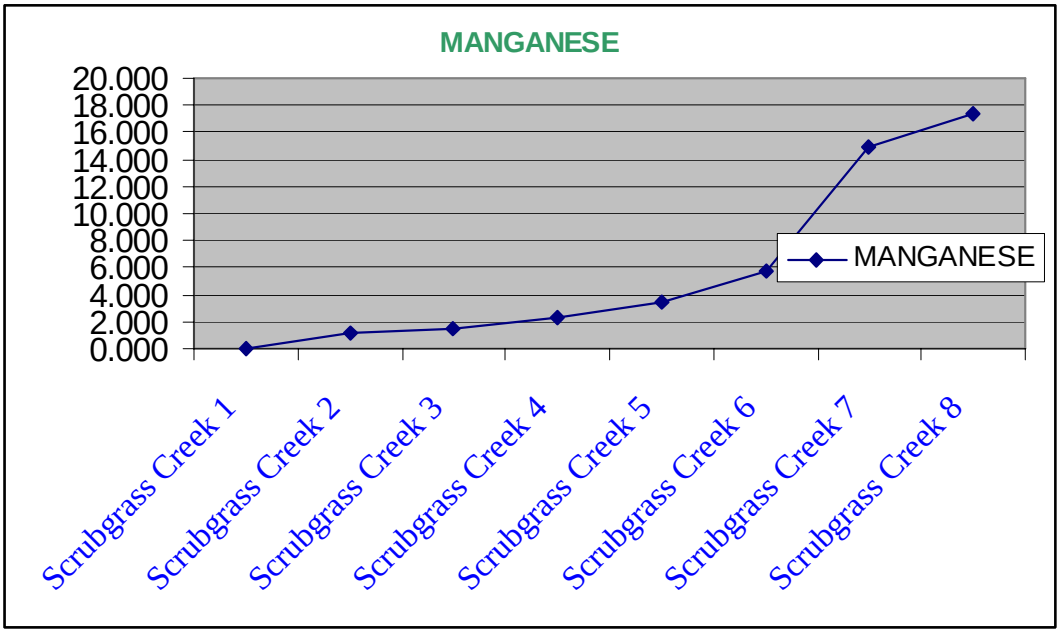
Fishery community sampling was conducted at many of the stations where water sampling occurred. Fish were collected over 150 or 300-meter reaches with a Smith-Root Direct Current backpack electrofisher. All fish were identified as to species, were weighed, assessed for anomalies, and released. Species richness and Shannon-Weiner Diversity (H) are presented for each sub-watershed or group of sampling locations as presented in the water quality summary. Over 6,000 meters of stream channel was electrofished from July to November 2000.

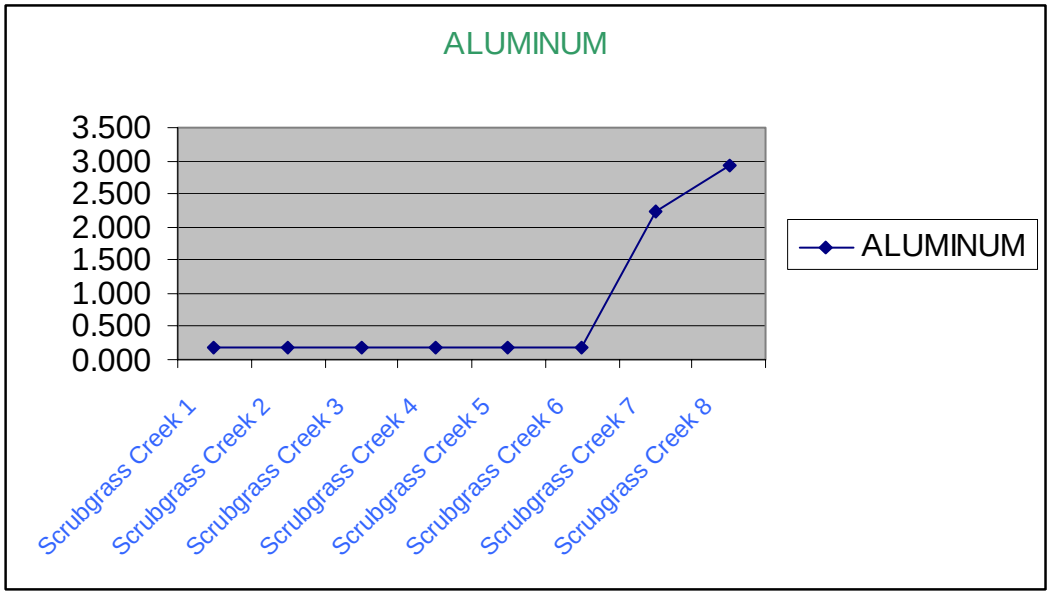
Map 1: Locations of Sample Points on Scrubgrass Creek for Data shown in the following Charts

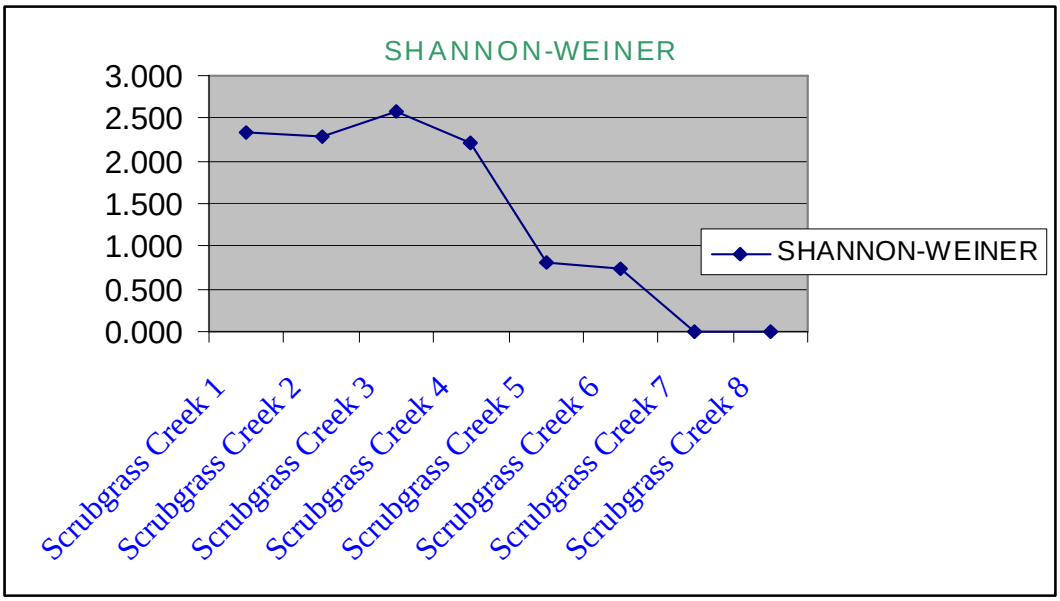
Figures 2-6: Charts showing water quality changes on the main section of Scrubgrass Creek

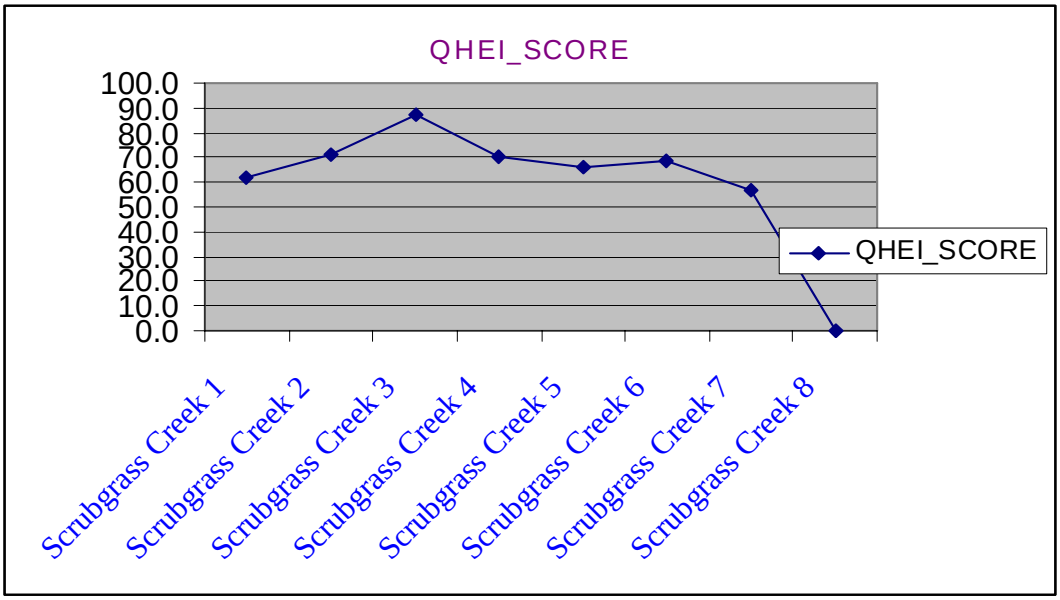





MANGANESE
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
MANGANESE
Scrubgrass Creek 1
Scrubgrass Creek 2
Scrubgrass Creek 3
Scrubgrass Creek 4
Scrubgrass Creek 5
Scrubgrass Creek 6
Scrubgrass Creek 7
Scrubgrass Creek 8


ALUMINUM
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
ALUMINUM
Scrubgrass Creek 1
Scrubgrass Creek 2
Scrubgrass Creek 3
Scrubgrass Creek 4
Scrubgrass Creek 5
Scrubgrass Creek 6
Scrubgrass Creek 7
Scrubgrass Creek 8


SHANNON-WEINER
3.000
2.500
2.000
1.500
1.000
0.500
0.000
SHANNON-WEINER
Scrubgrass Creek 1
Scrubgrass Creek 2
Scrubgrass Creek 3
Scrubgrass Creek 4
Scrubgrass Creek 5
Scrubgrass Creek 6
Scrubgrass Creek 7
Scrubgrass Creek 8


QHEI_SCORE
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
QHEI_SCORE
Scrubgrass Creek 1
Scrubgrass Creek 2
Scrubgrass Creek 3
Scrubgrass Creek 4
Scrubgrass Creek 5
Scrubgrass Creek 6
Scrubgrass Creek 7
Scrubgrass Creek 8

Water Supply

Clintonville has the only municipal water system in the watershed. It serves about 257 households with 520 people. It also supplies water for borough fire hydrants. It is serviced by two wells located east of the borough on the south side of State Route 208. The rest of the water supply in the watershed is from private wells. These wells service about 345 residential lots and about eight small businesses including Marlow's Campground. One rest stop on Interstate 80 is serviced by a well located at within its area. Eight wells including the two Clintonville municipal wells and two PennDOT wells are covered by the Pennsylvania Well Head Protection Program. These buffer areas have a one half-mile radius. They are shown on the Well Head Protection Map in Appendix A. The well numbers are the state registration codes.

Water supply for rural fire protection is a concern of the Clintonville Volunteer Fire Company and the municipalities it serves. The fire company has participated in the Pennsoil Resource Conservation and Development's dry hydrant program. This program allows the municipalities and fire companies to install hydrants in ponds and streams that have the proper depths. Hydrant components are provided free of charge through the rural electric cooperatives servicing a particular area. The Central Electric Cooperative has provided five hydrants to service the watershed's rural residences. Technical assistance and engineering for these projects is coordinated through the Natural Resources Conservation Service Franklin Field Office. A common goal among fire companies participating in the program as well as Pennsoil is to have a dry hydrant to service three road miles from its location. A map of the existing rural fire hydrants is included in Appendix A. The coverage area are shown on this map is three linear road miles by one quarter of a mile on each side of the road. Currently about 90 percent of the rural buildings are within this three-mile area.

V. Biological Resources

Wildlife

Wildlife resources in the Scrubgrass watershed are typical for an Allegheny Plateau watershed with a predominantly forested land use. Although no formal surveys for wildlife species were conducted many important species were observed during stream sampling and other reconnaissance activities.

Mammals[1] include-

Game Species: White-tailed Deer (*Odocoileus virginianus*), Grey, red and fox squirrels, and are commonly encountered and appear to have robust populations. These two game species attract recreational users from a wide area during hunting season. Black bears (*Ursus americanus*) are the largest mammal found in the watershed. Bear bedding was observed along Scrubgrass Creek in a dense stand of small Spruce/Hemlock on a bench fifty feet above the channel. Rabbits are easily found in the open areas with grass/legume and forb cover.

Non-game woodland mammal species include porcupine (*Erethizon dorsatum*), opossum (*Didelphis virginiana*), bats (*Myotis*), grey fox, raccoon (*Procyon lotor*), shrews, striped skunk (*Mephitis mephitis*) and the eastern chipmunk (*Tamias striatus*).

Non game non-wooded mammal species include cottontail rabbits, shrews, woodchuck, and red fox.

Mammal species associated with the Allegheny River include weasels (*Mustela erminea*), mink (*Mustela vison mink*), and river otter (*Lutra canadensis*).

Mammals associated with wetlands include mink, beaver (*Castor canadensis*) and muskrat(*Ondatra zibethica*).

Bird species[1] include –

Woodland bird species include the ruffed grouse (, eastern wild turkey (Meleagris *gallopavo*), crows (*Covus brachyrhynchos*), owls of various species, Woodpeckers of various species, Hawks, primarily the Red-tailed and the Red-shouldered as well as migratory songbirds. Woodcock are found in the middle sections in the areas associated with the hydric soils – see Hydric Soils Map in Appendix A. Wood ducks (*Aix sponsa*) are the dominant duck specie in the lower and middle section of the of the watershed. Their nesting areas are associated with both streams and wetland open water.

Bird species associated with the Allegheny River include mergansers, bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*) mallard (*Anas platyrhynchos*), canada geese (*Branta canadensis*) and other duck species. These species can be found on Scrubgrass Creek near its mouth.

Open area bird species include numerous bird species, many which are migratory. There is not a significant amount of pheasants in these areas due to the low survival rate. Dove are numerous in the reclaimed mine areas.

[1] Habitat and Latin names from Pa game Commission Wildlife Notes – NRCS PA Technical Guide Reference # 54

Reptiles and amphibians[1] may include -

Salamanders
Eastern Hellbender
Common Mudpuppy
Red-spotted Newt
Jefferson Salamander
Spotted Salamander
Northern Dusky Salamander
Allegheny Dusky Salamander
Northern Two-lined Salamander
Longtail Salamander
Northern Spring Salamander
Four-toed Salamander
Northern Redback Salamander
Northern Slimy Salamander
Northern Red Salamander

Frogs
Eastern American Toad
Fowler's Toad
Pickerel Frog
Northern Leopard Frog
Bullfrog
Green Frog
Wood Frog
Western Chorus Frog
Northern Spring Peeper
Gray Treefrog Complex

Turtles
Common Snapping Turtle
Common Musk Turtle
Spotted Turtle
Wood Turtle
Eastern Box Turtle
Painted Turtle
Eastern Spiny Softshell

Lizards
Northern Coal Skink
Five-lined Skink

Snakes
Northern Black Racer
Northern Ringneck Snake
Black Rat Snake
Eastern Milk Snake
Northern Water Snake
Smooth Green Snake
Queen Snake
Northern Brown Snake
Northern Redbelly Snake
Shorthead Garter Snake
Ribbon Snake
Eastern Garter Snake
Mountain Earth Snake
Northern Copperhead
Timber Rattlesnake

Aquatic species are discussed in Section IV. Water Resources. The fish species are discussed for each stream section. Aquatic habitat ratings are also found in this section.

Vegetation

The Scrubgrass Watershed lies within the Western Allegheny Plateau ecoregion. Most of the Western Allegheny Plateau Ecoregion is forested with timber production remaining an important economic activity.

The Western Allegheny Plateau is an ecoregion of mixed mesophytic forest with canopy dominance shared by multiple species. Forest composition changes spatially with moisture availability and soil type. Oak/hickory communities with pines occur on drier ridges and southwest facing slopes. Dominant hemlocks stands are found along stream margins and on steep areas. Sycamores are primarily found in riparian areas within the active floodplain. Below is a list of tree species found in the watershed.

[1] Pennsylvania Herpetological Atlas Project – Venango County Inventory

Tree/shrub species found in the Scrubgrass Watershed:[1]

Eastern White Pine	*Pinus strobus*	Cucumber Tree	*Magnolia acuminata*
Scots Pine	*Pinus sylvestris*	Tulip Poplar	*Liriodendron tulipifera*
Red Pine	*Pinus resinosa*	Sweet Birch	*Betula lenta*
Eastern Hemlock	*Tsuga canadensis*	Sassafras	*Sassafras albidum*
Norway Spruce	*Picea abies*	Witch Hazel	*Hamamelis virginiana*
Red Oak	*Quercus rubra*	Serviceberry	*Amelanchier*
Black Oak	*Quercus velutina*	American Hornbeam	*Carpinus caroliniana*
Scarlet Oak	*Quercus coccinea*	Hop-hornbeam	*Ostrya virginiana*
White Oak	*Quercus a*lba	Common Elderberry	*Sambucus canadensis*
White Ash	*Fraxinus americana*	Flowering Dogwood	*Cornus florida*
Shagbark Hickory	*Carya ovata*	Silky Dogwood	*Cornus amomum*
Bitternut Hickory	*Carya cordiformis*	Hawthorn	*Crataegus spp*.
Butternut	*Juglans cinerea*	Alder	*Alnus spp*.
Black Cherry	*Prunus serotina*	Black Raspberry	*Rubus occidentalis*
Red Maple	*Acer rubrum*	Allegheny Blackberry	*Rubus allegheniensis*
Blackgum	*Nyssa sylvatica*	Grape	*Vitis spp*.
Quaking Aspen	*Populus grandidentata*	Virginia Creeper	*Parthenocissus quinquefolia*
Bigtooth Aspen	*Populus tremuloides*	Poison Ivy	*Toxicodendron radicans*
Willow	*Salix spp*.	Partridgeberry	*Mitchella repens*
Slippery Elm	*Ulmus rubra*	Greenbriar	*Smilax rotundifolia*
American Elm	*Ulmus americana*		

Mine areas reclaimed since 1977 is the major type of open area. Open areas have mixed vegetation of planted grasses such Orchard Grass and Timothy along with legumes dominated by Birdsfoot Trefoil. These areas are generally maintained and have moderate fertility. Some of these areas are managed to permit nesting of open area wildlife species such as birds, fox and rabbits These areas also serve to take the deer browsing pressure off of the forest understory by providing forage for deer. Mine spoil acid tolerant plantings of white pine dominate the poorly early-reclaimed areas. There is a minimal ground cover in these areas.

Several species of warm season grasses have been observed through the watershed along access roads and in fields including Indian Grass, Big Bluestem.

The dominant species in small wooded openings is Deertongue and forbs such as Wild Raspberry, and Blackberry.

Wetland areas are dominated by rushes rather then sedges or cattails. Arrowhead was found in one wetland. It was not determined if it was planted or volunteered.

Vegetative Cover distribution is shown on the General Land Use Map shown in Appendix A.

[1] Pennsylvania DCNR Bureau of Forestry

The Pennsylvania Natural Diversity Index (PNDI)

There are 7 searches with a 5000 acre coverage (See map in Appendix.). Marc Rickard of Venango Conservation District performed the searches. The following are summaries of the searches. The search areas have a radius of 8326 feet and cover a 5,000-acre circular area. A map of the coverage areas is located in Appendix A.

It should be noted that some of the "conflicts" on searches 1 and 3 may be related to the species in the Allegheny River.

Search Area 1 is PNDI Search Number N70783. Search parameters are:
Quad 417938; North Offset – 2.05; West Offset – 3.3;
Center Point Latitude: 41.26125, Longitude: 79.89902
There are 5 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 2 is PNDI Search Number N70784. Search parameters are:
Quad 417928; North Offset – 14.30; West Offset – 8.00;
Center Point Latitude: 41.20351, Longitude: 79.93308
There are 7 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 3 is PNDI Search Number N70785. Search parameters are:
Quad 417927; North Offset – 21.00; West Offset – 13.50;
Center Point Latitude: 41.24029, Longitude: 79.84801
There is 1 potential Bird locate for the Pennsylvania list: Osprey (*Pandion haliatus*) and 1 potential Plant conflict: SMALL WOOD SUNFLOWER (*Helianthus microcephalus*).
There are 5 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 4 is PNDI Search Number N70786. Search parameters are:
Quad 417928; North Offset – 10.50; West Offset – 1.25;
Center Point Latitude: 41.18265, Longitude: 79.88407
There are 6 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 5 is PNDI Search Number N70787. Search parameters are:
Quad 417928; North Offset – 17.50; West Offset – 3.15;
Latitude: 41.22108, Longitude: 79.89787
There are 6 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 6 is PNDI Search Number N78854. Search parameters are:
Quad 417928; North Offset 20.0; West Offset 9.5;
Center Point Latitude: 41.23480, Longitude: 79.94397
There are 6 potential conflicts relating to Federally Listed Species of Special Concern.

Search Area 7 is PNDI Search Number N70789. Search parameters are:
Quad 417927; North Offset – 16.25; West Offset – 15.95;
Center Point Latitude: 41.21421, Longitude: 79.86580
There are 6 potential conflicts relating to Federally Listed Species of Special Concern.

Longhead Darter collected from Scrubgrass Creek

No Federally Listed species of fish were recorded in the Scrubgrass watershed. However, one fish species was collected from Scrubgrass Creek, the Longhead Darter *(Percina macrocephala)*, that is listed as a candidate species in Pennsylvania (58 PA Code Chapter 75).

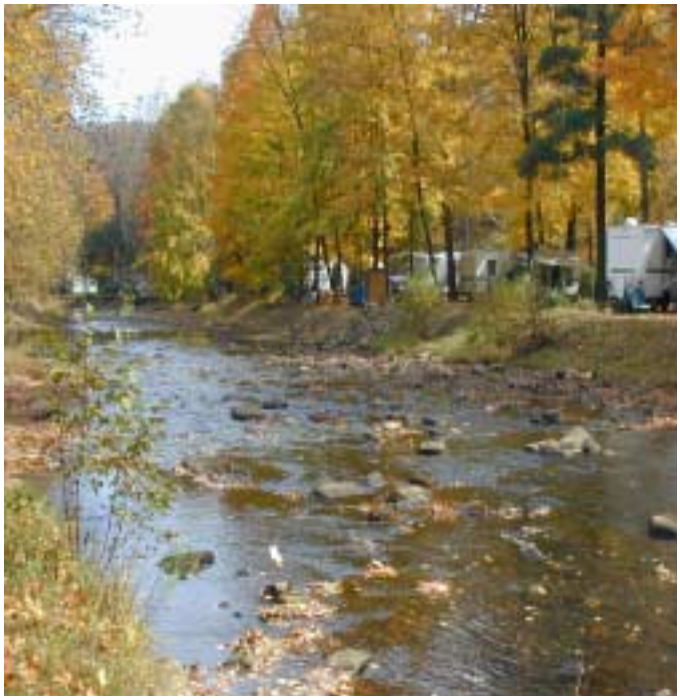
The Longhead Darter is one of the largest darters in Pennsylvania reaching a total length of up to 4.5 inches. The Longhead Darter is distinguished from other darters by its size, body form, and markings. A long head and very slender snout characterizes this species. It is bright olive above crossed with 12 black saddle bands and has a small black caudal spot with a vertical bar beneath. It is most like the Blackside Darter and Slenderhead Darter. The Longhead Darter has a very limited distribution in Pennsylvania. Historical occurrences are recorded from French Creek near the New York/Pennsylvania border, the upper Allegheny River, and the Youghiogheny River. There are no previous records of this species being collected in the Scrubgrass Creek drainage or Venango County. This may be in part due to the habitat requirements of the Longhead Darter. It prefers clear, moderate to large sized streams with fast flowing pools and riffles to gravel and cobble that are difficult to sample, especially with seines. The lack of extensive fish surveys in Pennsylvania also contributes to the lack of distribution data for this species.

Important Habitats

The most significant habitat is Scrubgrass Creek itself. There are no other important habitats inventoried. There will be some habitat importance related to the Species of Concern relation to the Pennsylvania Natural Diversity Index (PNDI). The federal species are not listed, so the habitats are not available for inventory. At this time, we feel it is important to dress these habitats, but only when relating to direct impacts resulting from the watershed restoration activities.

VI. Cultural Features

Recreational



Scrubgrass Creek was known as an excellent cold water fishery prior to the degradation caused by widespread surface mining. Lack of proper reclamation and subsequent acid mine drainage discharges to Scrubgrass Creek destroyed the trout fishery. The recent addition of the portion of the Allegheny River from Franklin to Emlenton to the national list of Scenic Rivers has begun to attract visitors and has also resulted in projects like the River Otter Reintroduction Program. State Game Lands # 39 and the Kittanning State Forest also attract visitors to the area for hunting and other outdoor based recreational activities.

Archaeological /Historical

There are numerous historical features located in the watershed. They are all located on private lands. Three of the more unique historical features are the bridge at the mouth of Trout Run, an abandoned bridge over the middle section of Scrubgrass Creek and remnants of an old mill located upstream from the mouth of Trout Run. Two bridges are listed on the on the National Register of Historic Places. The Witherup Bridge was replaced in the late 1990's.

No pre-historic sites are inventoried for this study due to the susceptibility of intrusions on the sites if their locations are disclosed.

Abandoned 1908 Bridge over Bullion Run. Note trees growing on bridge.

Scrubgrass Creek Watershed related data from National Register of Historic Places as of December 2000

RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
Bridge in Clinton Township	LR 60010 over Scrubgrass Creek	Kennerdell	1988-06-22	Highway Bridges Owned by the Commonwealth of Pennsylvania, Department of Transportation TR
Witherup Bridge	LR 60007 over Scrubgrass Creek	Kennerdell	1988-06-22	Highway Bridges Owned by the Commonwealth of Pennsylvania, Department of Transportation TR

Old Scrubgrass Mill
located near the mouth of Trout Run

VII. Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Water Quality Phase 1		**2000-2002**
Completed the one-year stream monitoring for water quality.	Confluence Ecological	On-Going Venango County through a PA Growing Greener Grant
Tabulate and review the Stream water quality sampling and fish collection data.	Confluence Ecological	
Inventory and evaluate seeps and problem areas. Set up flow weirs. Take flow rates and sample discharges. List alternative actions for treatment of each site.	USDA Natural Resources Conservation Service	
Prioritize treatment sites based on the stream quality data and the water flow/quality data from seeps and problem areas.	USDA Natural Resources Conservation Service	
Conduct a preliminary engineering on sites to be treated including treatment system type and size recommendations, cost, and timetable. Have two sites designed and ready for contracting the construction of treatment system.	USDA Natural Resources Conservation Service	
Complete plan with engineering and watershed assessment data included.	USDA Natural Resources Conservation Service	

Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Water Quality Phase 2		**2002-2010**
Implement watershed restoration plan – Construct treatment systems: well plugging, passive treatment systems and coal refuse utilization and abandoned mine reclamation.	Scrubgrass Creek Watershed Association USDA Natural Resources Conservation Service PA Department of Environmental Resources	PA Rivers Conservation Program PA Growing Greener Program PA-DEP Orphan Well Plugging Program PA DEP Bureau of Abandoned Mines Reclamation Program

Recommended Actions	Responsibility	Time Table Possible Funding
Water Quality Phase 3		**2002-2012**
Develop and maintain public input and coordinate the maintenance of the treatment systems	Scrubgrass Creek Watershed Association	PA Growing Greener Program
Develop a water quality-monitoring program.	Venango Conservation District Trout Unlimited	TU Embrace-A-Stream Program
Inventory the stream sections for trout production, stocking and harvest potentials	PA Fish and Boat Commission Trout Unlimited	PA Fish and Boat Commission Trout Unlimited
Secure funds for the operation and maintenance of any treatment systems.	Scrubgrass Creek Watershed Association	PA Rivers Conservation Program PA Growing Greener Program

Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Stream Corridor Management Phase 1		**2001-2006**
Develop a stream corridor management program to provide: • Public education about corridor use • Provide landowner assistance to maintain and stabilize heavy uses areas. • Provide financial assistance to landowners through conservation easements.	Scrubgrass Creek Watershed Association Venango Conservation District USDA-Natural Resources Conservation Service PA-DCNR Bureau of Forestry	PA Rivers Conservation Program PA Growing Greener Program Canaan Valley Institute TU Embrace-A-Stream Program League of Women Voter's Water Resources Education Network
Identify stream sections that riparian forest buffers will benefit the stream quality.	USDA-Natural Resources Conservation Service PA-DCNR Bureau of Forestry	Continuous Conservation Reserve Program Stream Releaf
Provide information to landowners about riparian buffer assistance programs.	USDA-Natural Resources Conservation Service PA-DCNR Bureau of Forestry	Continuous Conservation Reserve Program Stream Releaf PA DCNR Forest Stewardship Program

Recommended Actions	Responsibility	Time Table Possible Funding
Forest Stewardship Phase 1		**2002-2012**
Provide technical and financial assistance for developing forest stewardship plans for landowners throughout the watershed	Scrubgrass Creek Watershed Association PA-DCNR Bureau of Forestry USDA-NRCS & FSA	PA Rivers Grant Forest Stewardship Program
Provide public education about forest management practices.	PA-DCNR Bureau of Forestry Venango Conservation District	PA Rivers Conservation Program PA Growing Greener Program

Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Recreational/Tourism Phase 1		**2002-2006**
Determine the capacity of the watershed to handle: • Fishing days • Hunting days • Camping pressure in the corridor • Cultural resources related tourism	Scrubgrass Creek Watershed Association PA Fish and Boat Commission PA Game Commission Oil Heritage, Inc & Venango County Tourist Promotion	Community Development Grants Trout Unlimited PA DCNR -Heritage Parks Program PA Rivers Conservation Program
Provide technical assistance to individuals and communities providing community recreational facilities within the watershed: grant application assistance, permit assistance, and design assistance.	Penn Soil Resource Conservation and Development USDA Natural Resources Conservation Service Venango Conservation District	PA DCNR Community Recreation Grants Penn Soil Resource Conservation and Development Other Private Grant Sources Local In-Kind Contributions

Recommended Actions	Responsibility	Time Table Possible Funding
Economics Phase 1		**2001-2010**
Work with oil and gas producers to improve markets and develop an educational program about the industry.	Scrubgrass Creek Watershed Association Venango Economic Development Corporation Oil Heritage, Inc	Economic Development Grants
Assist timber operators with marketing strategies	Scrubgrass Creek Watershed Association	Economic Development Grants

Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Mineral Resource Extraction Phase 1		**2001-2007**
Inventory the existing and potential mine areas and oil/gas wells.	PA DEP Bureau of Mines PA DEP Bureau of Oil and Gas Development USDA Natural Resources Conservation Service	PA DEP Bureau of Mines PA DEP Bureau of Oil and Gas Development PA Growing Greener
Work with oil and gas producers to develop and implement site treatment and controls for producing wells. Secure permit assistance for landowners to implement alternative treatment systems	Scrubgrass Creek Watershed Association Venango Conservation District Scrubgrass Creek Watershed Association	PA Rivers Conservation Program PA Growing Greener Program 319 Grants

Recommended Actions	Responsibility	Time Table Possible Funding
Cultural Resources Phase 1		**2001-2010**
Inventory historic sites and potential archeological sites in the watershed	Scrubgrass Creek Watershed Association USDA Natural Resources Conservation Service	PA Rivers Conservation Grant Penn Soil Resource Conservation and Development
Provide a clearinghouse and technical assistance for any earth disturbing activity that may effect a cultural resource site in the watershed	Scrubgrass Creek Watershed Association	PA Rivers Conservation Grant Pennsylvania Historical and Museum Commission

Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Soils and Land Use Phase 1		**2001-2010**
Provide soils information using the digital mapping and data for land use issues such as development, wetlands, and others	USDA Natural Resources Conservation Service	Conservation Technical Assistance
Secure funding to provide the watershed association and municipalities with GIS technology.	Scrubgrass Creek Watershed Association Venango County Commissioners	319 Grant PA Rivers Conservation Grant Penn Soil Resource Conservation and Development
Provide assistance to municipalities for any comprehensive planning they desire.	Venango County Planning Commission Venango Conservation District USDA Natural Resources Conservation Service	State Planning Assistance Grants
Provide technical and financial Assistance to farm operations in developing and applying conservation systems on the agricultural land the watershed.	USDA Natural Resources Conservation Service USDA Farm Service Agency Venango Conservation District PA DCNR Bureau of Forestry PA Game Commission	Current Federal and State Farm Programs. PGC Farm Game Program

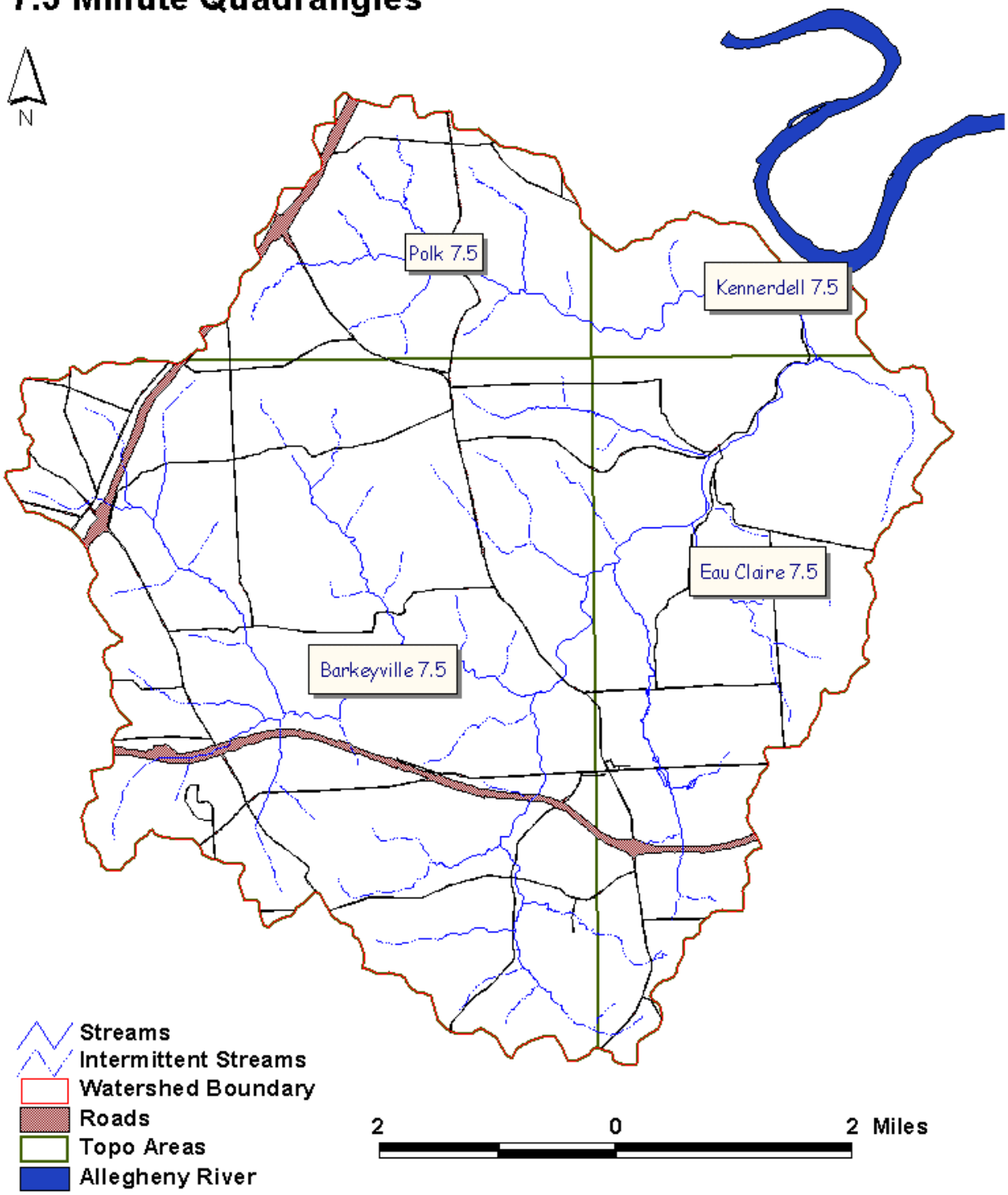
Management Options

Recommended Actions	Responsibility	Time Table Possible Funding
Roads Phase 1		**2001-2005**
Inventory all roads in the watershed and assess their condition and contribution to the sediment load	Venango Conservation District USDA Natural Resources Conservation Service PennDOT PA DCNR Bureau of Forestry PA Game Commission Municipalities	On-Going: Dirt and Gravel Roads Program Penn Soil Resource Conservation and Development PennDOT PA DCNR Bureau of Forestry PA Game Commission
Provide workshops for alternative road maintenance programs.	Venango Conservation District Municipalities	Dirt and Gravel Roads Program
Reduce sediment from dirt roads where it is factoring into stream water quality	Venango Conservation District USDA Natural Resources Conservation Service	Dirt and Gravel Roads Program Penn Soil Resource Conservation and Development

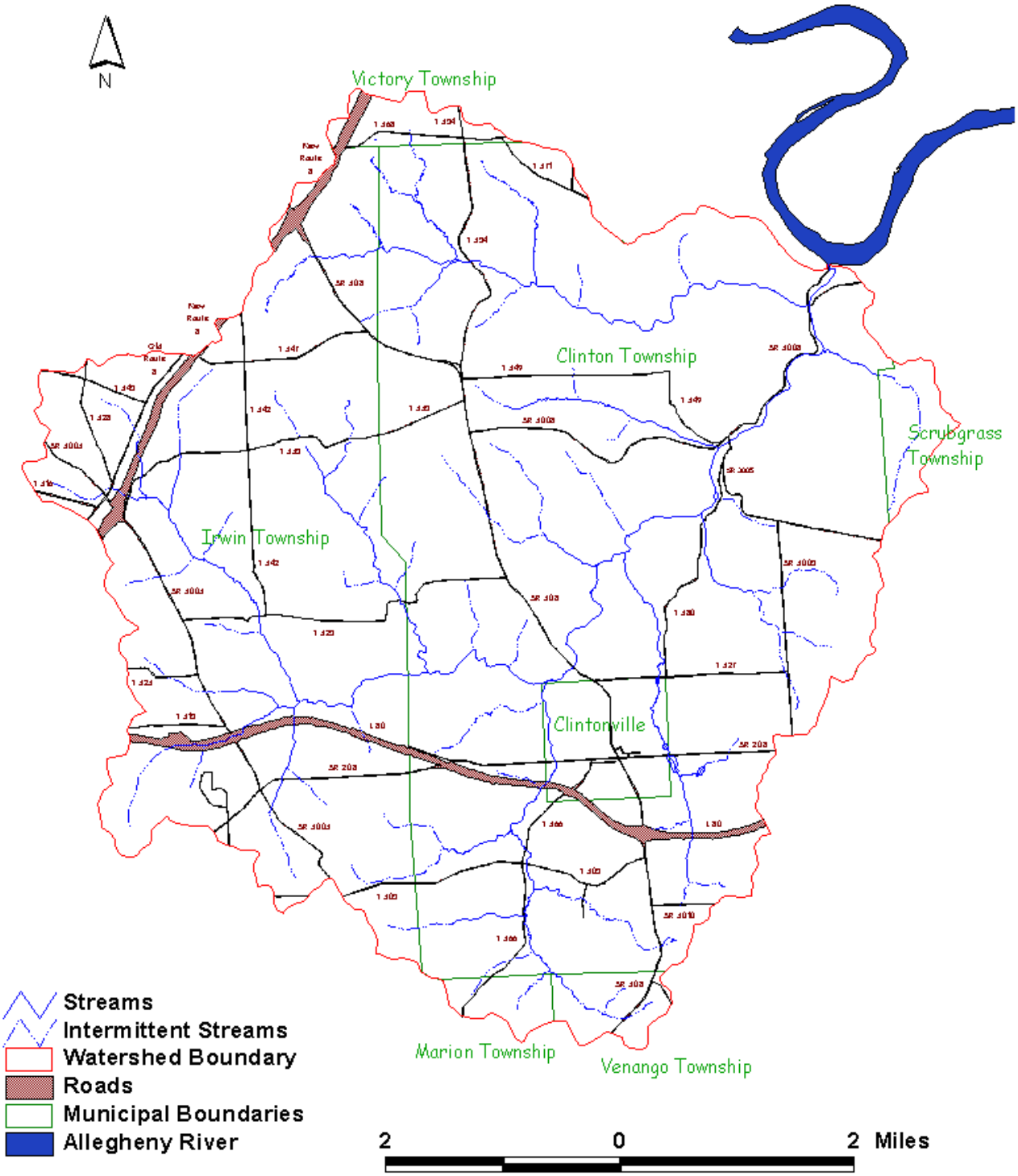
VIII. Appendices and Figures

Map 1:	Watershed Location
Map 2:	Topographic Map Coverage
Map 3:	Municipal Boundaries and Roads
Map 4:	Public Lands
Map 5:	PA Well Protection Areas
Map 6:	Streams and Subwatersheds
Map 7:	Water Quality and Fish Inventory Stations
Map 8:	Stream pH
Map 9:	Stream Iron
Map 10:	Stream Manganese
Map 11:	Stream Aluminum
Map 12:	Shannon-Weiner Diversity
Map 13:	Quality Habitat Evaluation Index
Map 14:	General Soils Map
Map 15:	Hydric Soils
Map 16:	PNDI Coverage
Map 17:	Problem Areas Identified
Map 18:	Oil Wells
Map 19:	Coal Resources and Mined Lands
Map 20:	General Land Use
Map 21:	Woodland and Wildlife Land Uses
Map 22:	Agricultural Land Uses
Map 23:	Social-Economic Land Uses
Map 24:	Water Resources
Map 25:	Rural Fire Protection
Table A1:	Venango County Hydric Soils List
Table A2:	Venango County Prime Farmland Soils List
Table A3:	Venango County Soils of Statewide Importance List

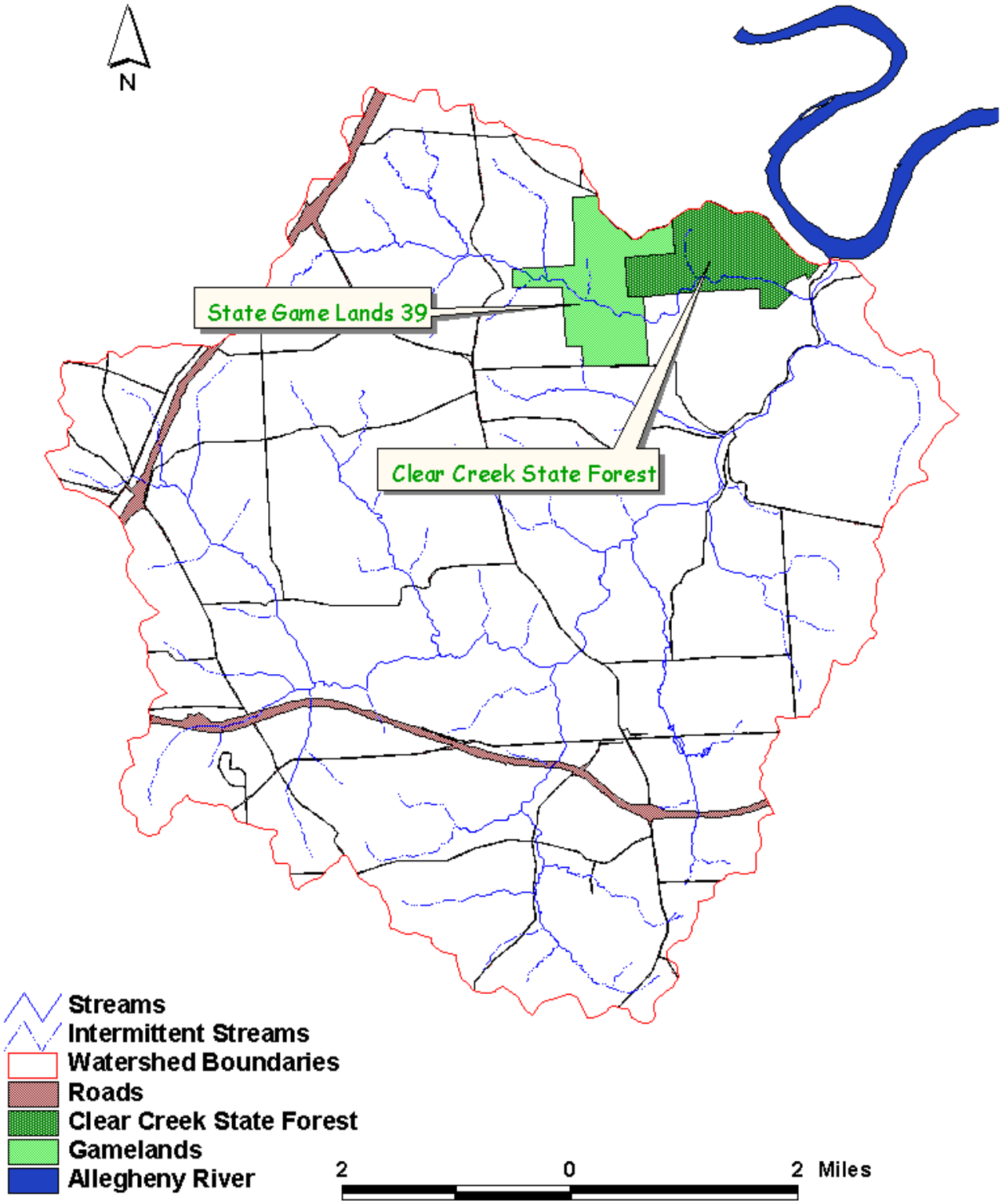
USGS Topographic Map Coverage
7.5 Minute Quadrangles

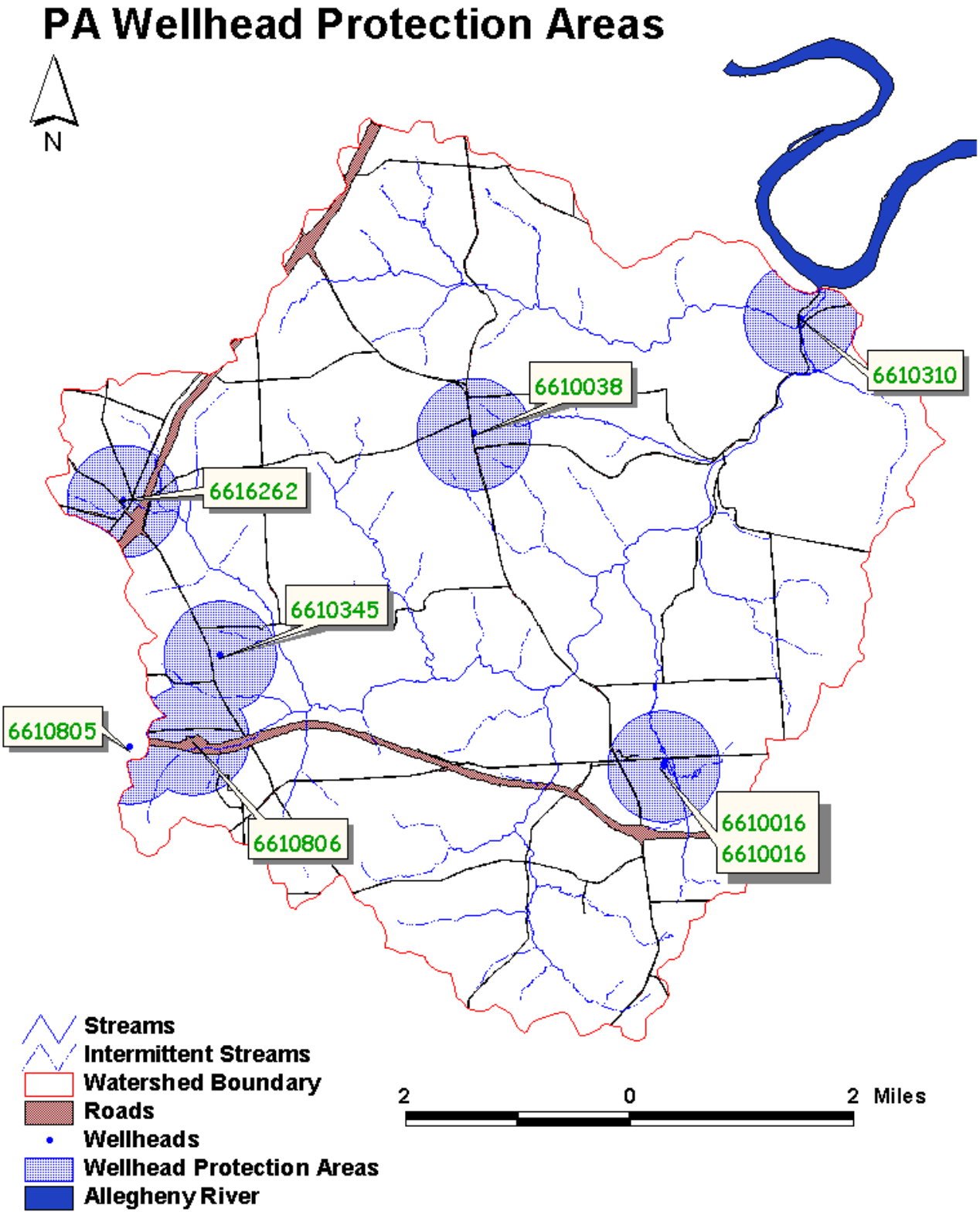


Municipal Boundaries and Roads

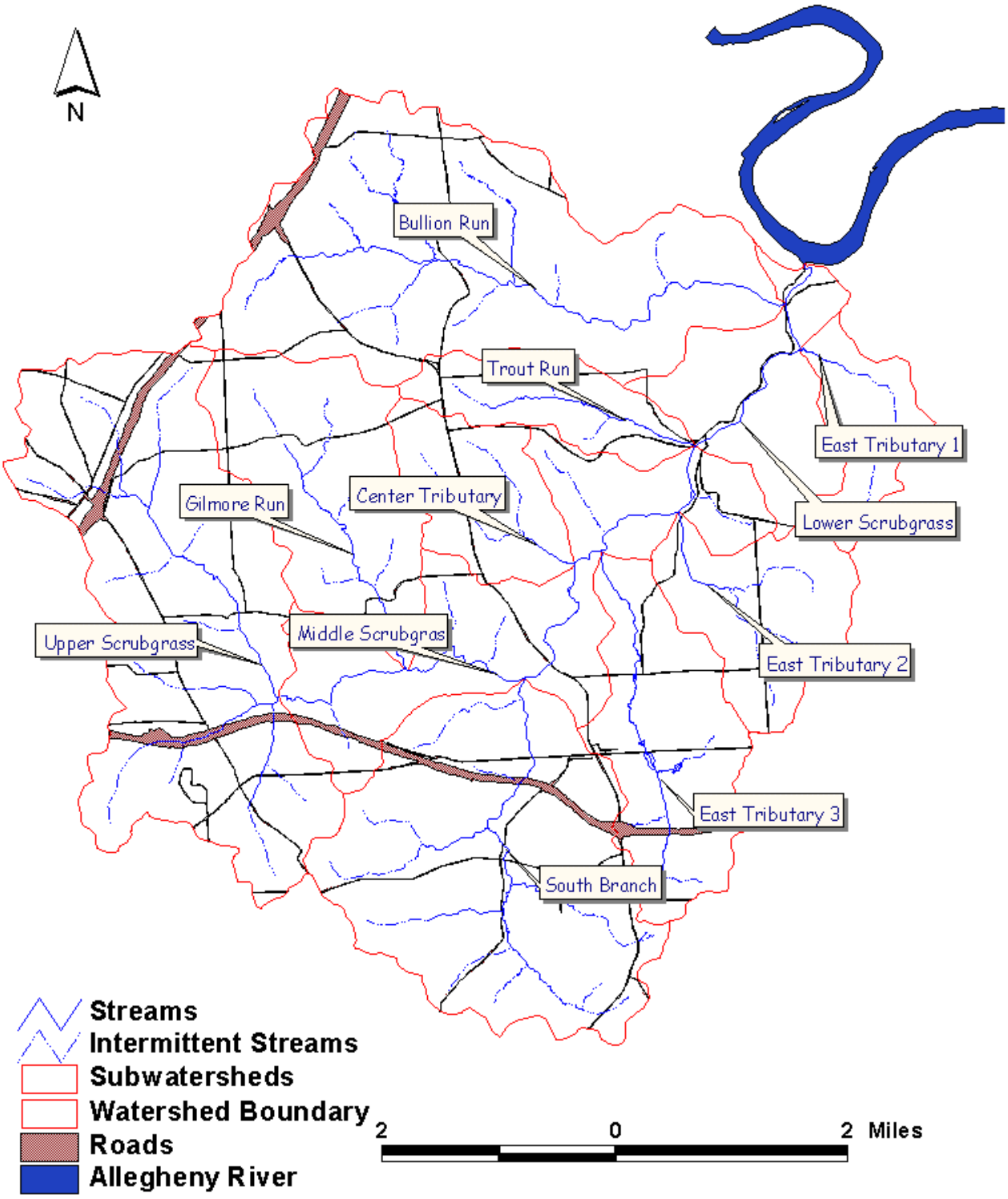


Public Lands

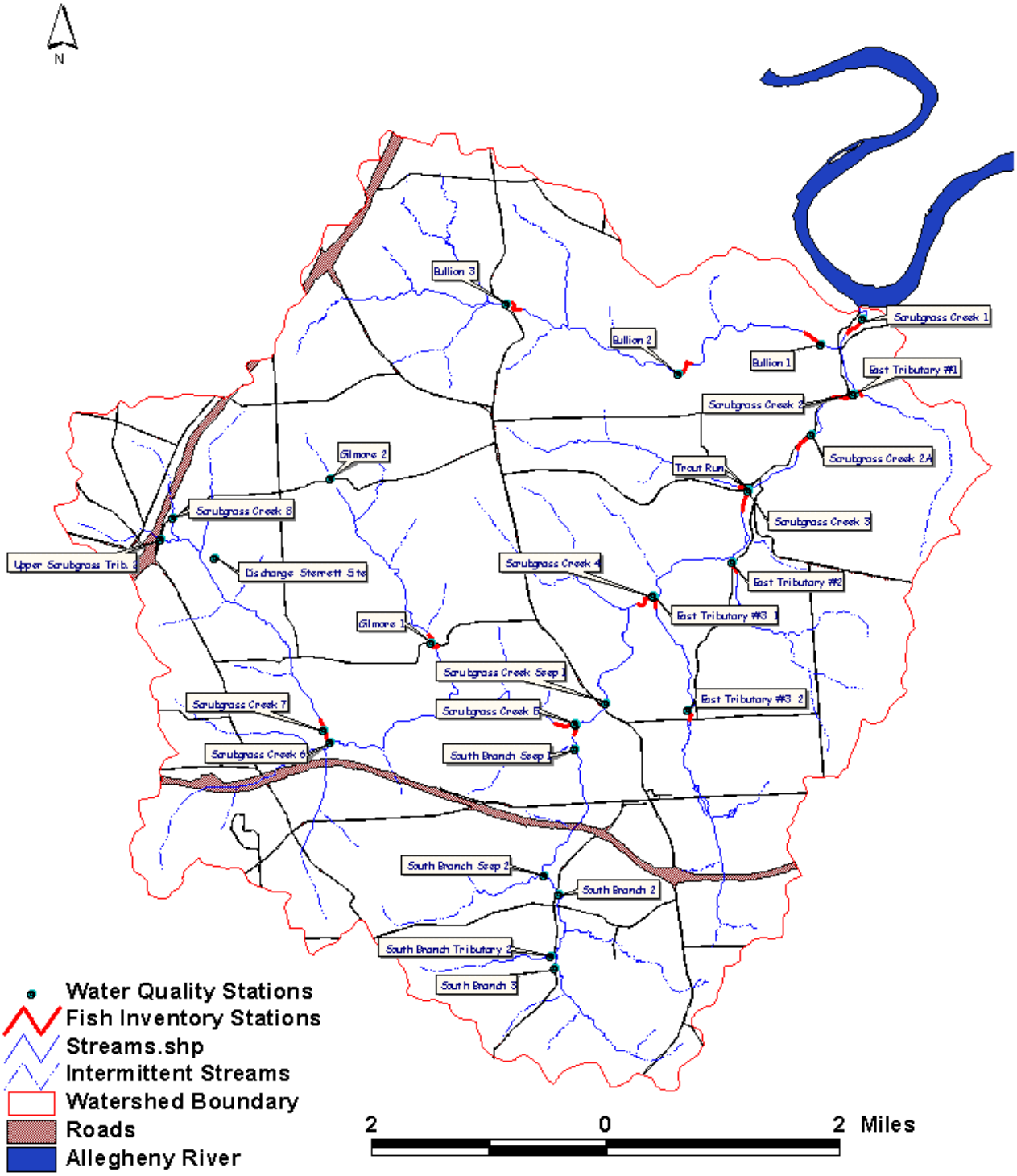


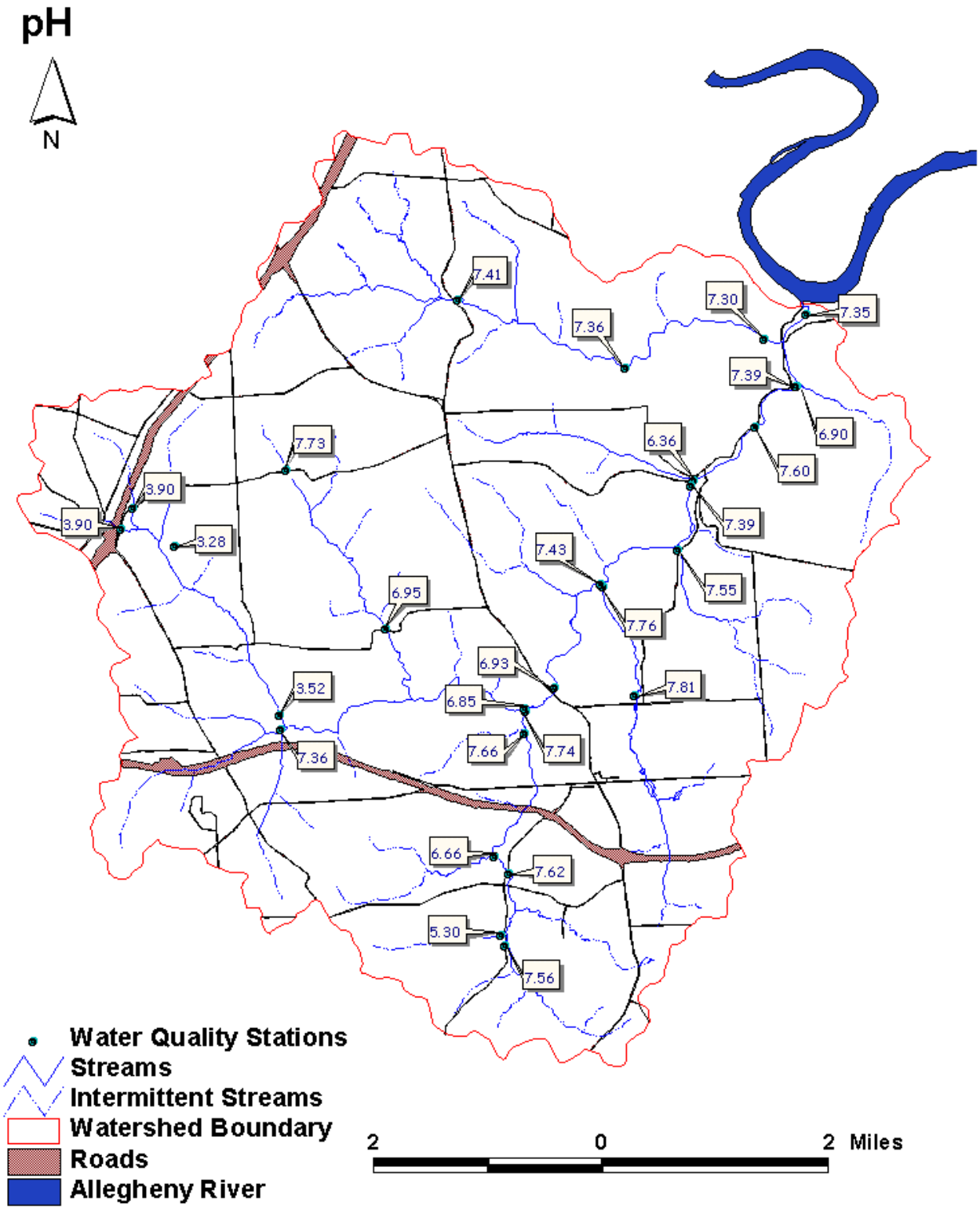

PA Wellhead Protection Areas
N
6610310
6610038
6616262
6610345
6610805
6610806
6610016
6610016
Streams
Intermittent Streams
Watershed Boundary
Roads
Wellheads
Wellhead Protection Areas
Allegheny River
2
0
2 Miles

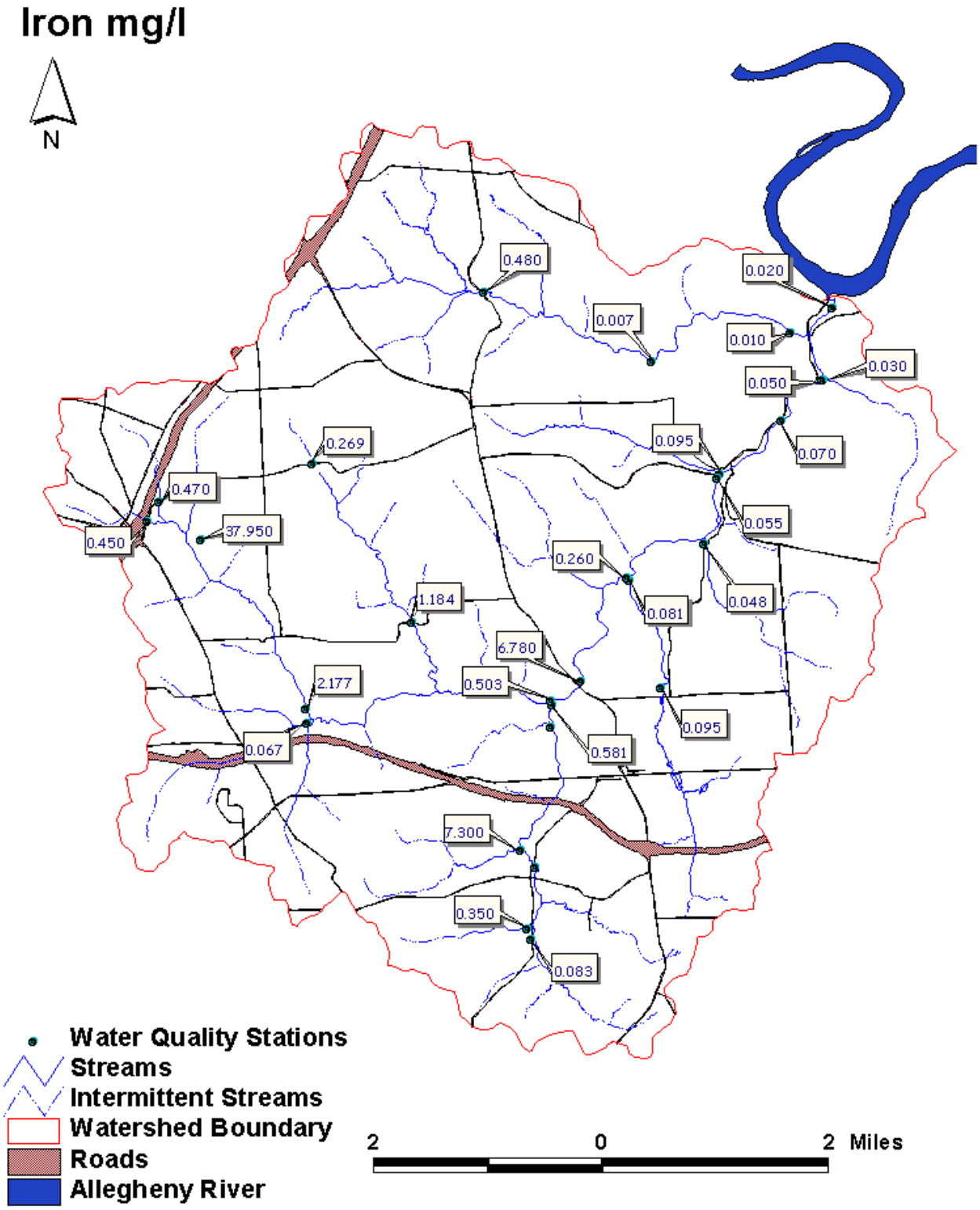
Streams and Subwatersheds

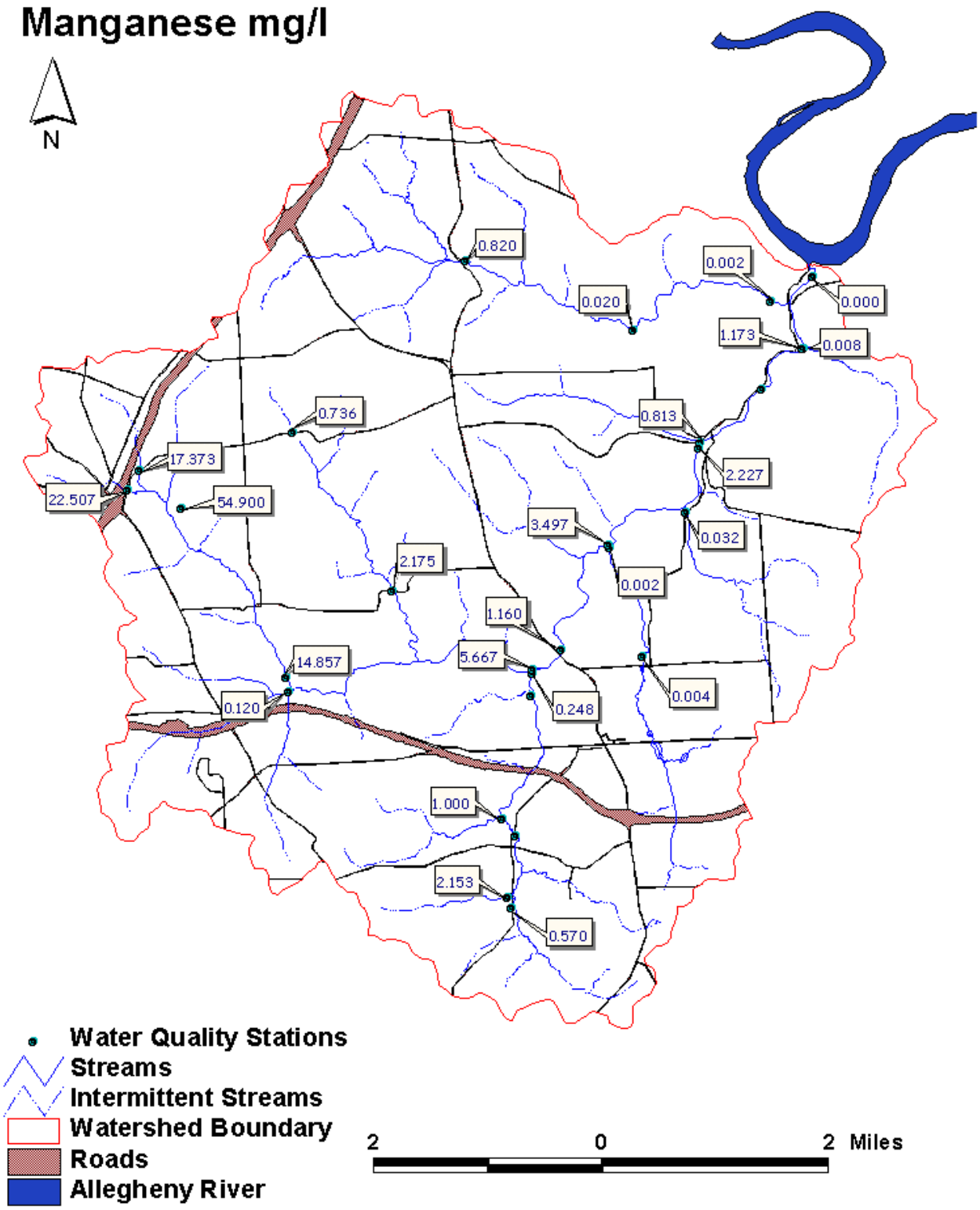


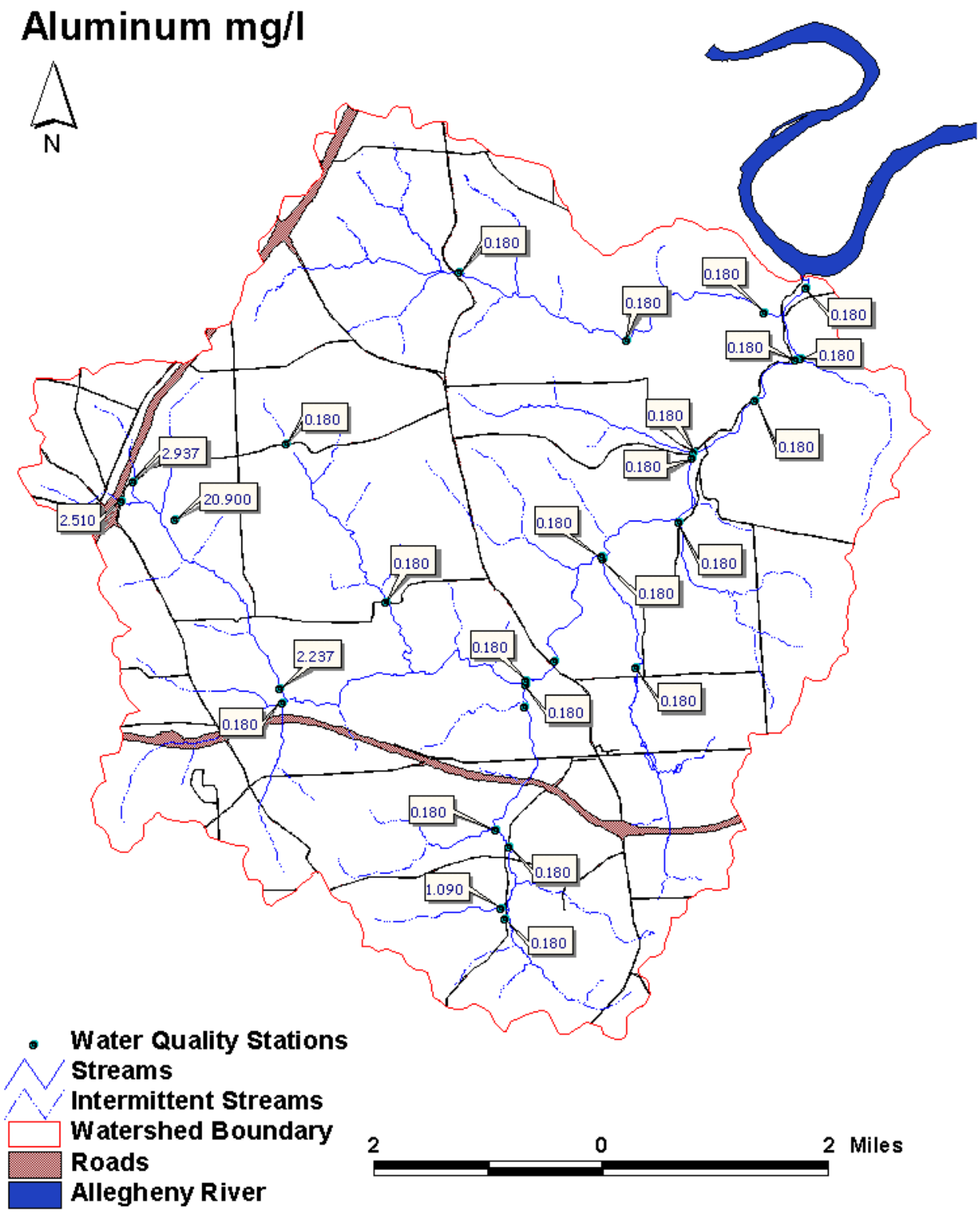
Water Quality and Fish Inventory Stations



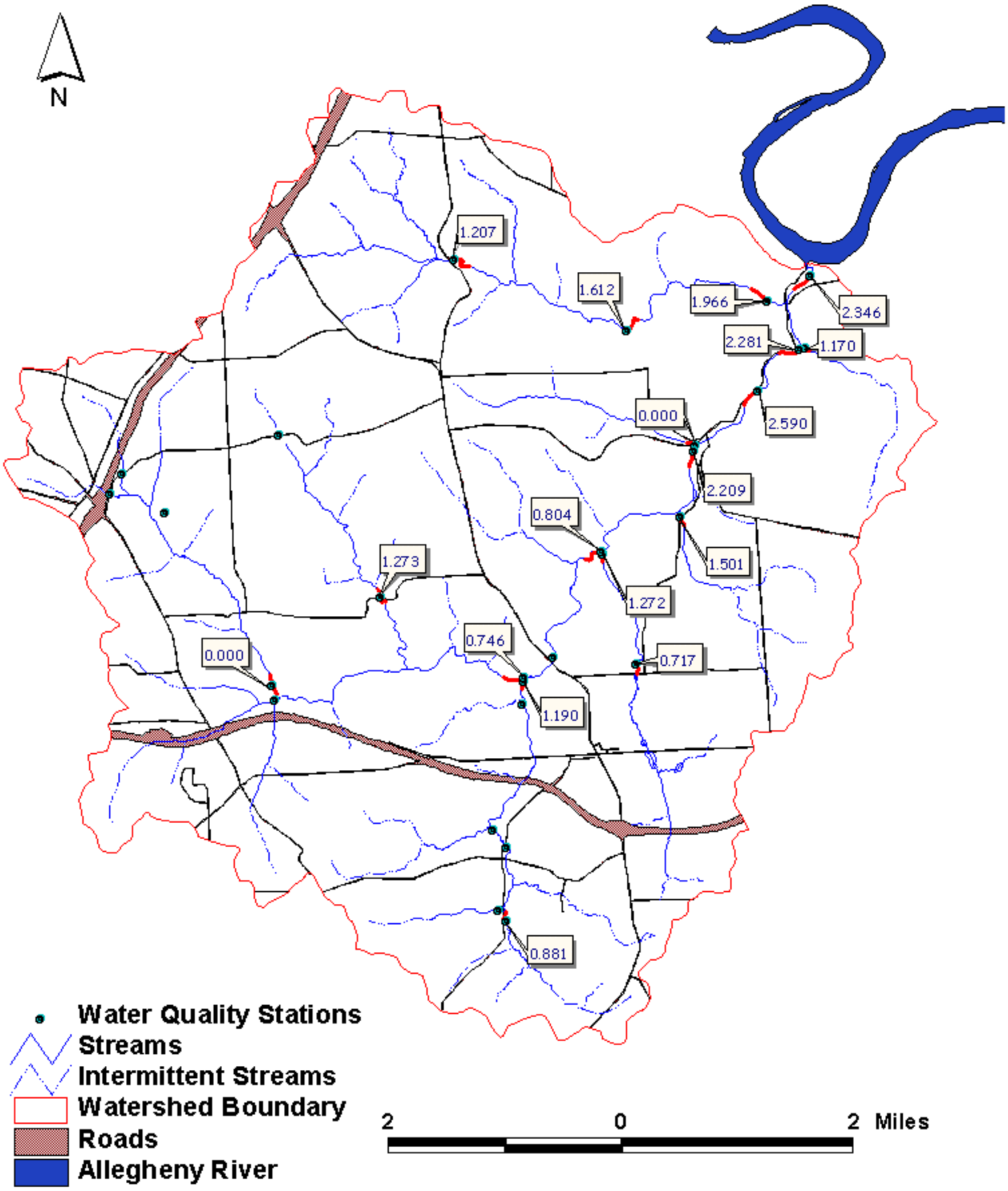

pH
N
7.41
7.30
7.35
7.36
7.39
6.90
7.73
6.36
7.60
3.90
3.90
3.28
7.39
7.43
7.55
6.95
7.76
6.93
3.52
7.81
6.85
7.36
7.66
7.74
6.66
7.62
5.30
7.56
Water Quality Stations
Streams
Intermittent Streams
Watershed Boundary
Roads
Allegheny River
2
0
2 Miles


Iron mg/l
N
0.480
0.020
0.007
0.010
0.030
0.050
0.269
0.095
0.070
0.470
0.055
37.950
0.450
0.260
1.184
0.081
0.048
6.780
2.177
0.503
0.095
0.067
0.581
7.300
0.350
0.083
Water Quality Stations
Streams
Intermittent Streams
Watershed Boundary
Roads
Allegheny River
2
0
2 Miles

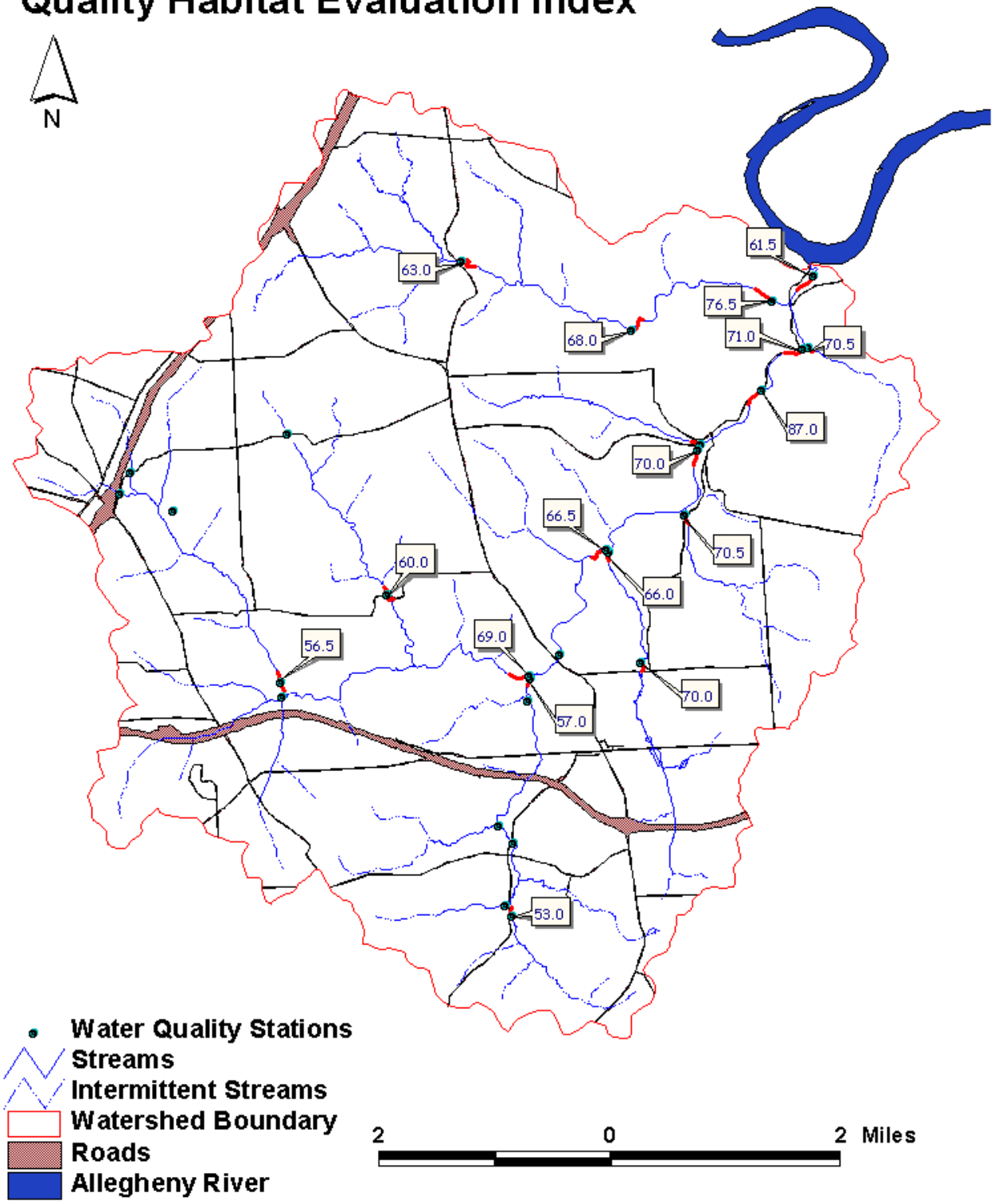

Manganese mg/l
N
0.820
0.002
0.020
0.000
1.173
0.008
0.736
0.813
17.373
2.227
22.507
54.900
3.497
0.032
2.175
0.002
1.160
14.857
5.667
0.004
0.120
0.248
1.000
2.153
0.570
Water Quality Stations
Streams
Intermittent Streams
Watershed Boundary
Roads
Allegheny River
2
0
2 Miles

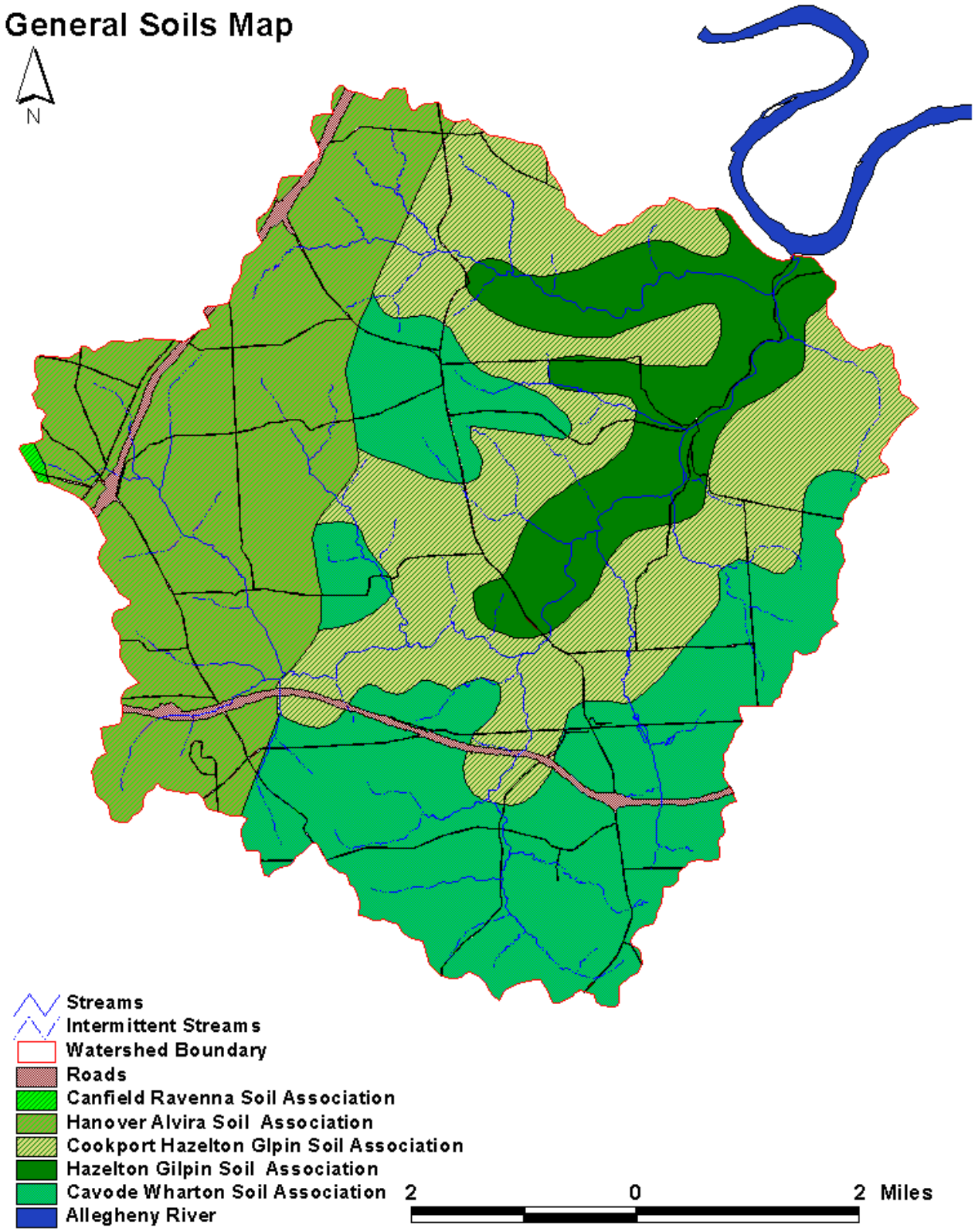

Aluminum mg/l
N
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
0.180
2.937
2.510
20.900
2.237
1.090
Water Quality Stations
Streams
Intermittent Streams
Watershed Boundary
Roads
Allegheny River
2
0
2 Miles

Shannon Weiner Diversity

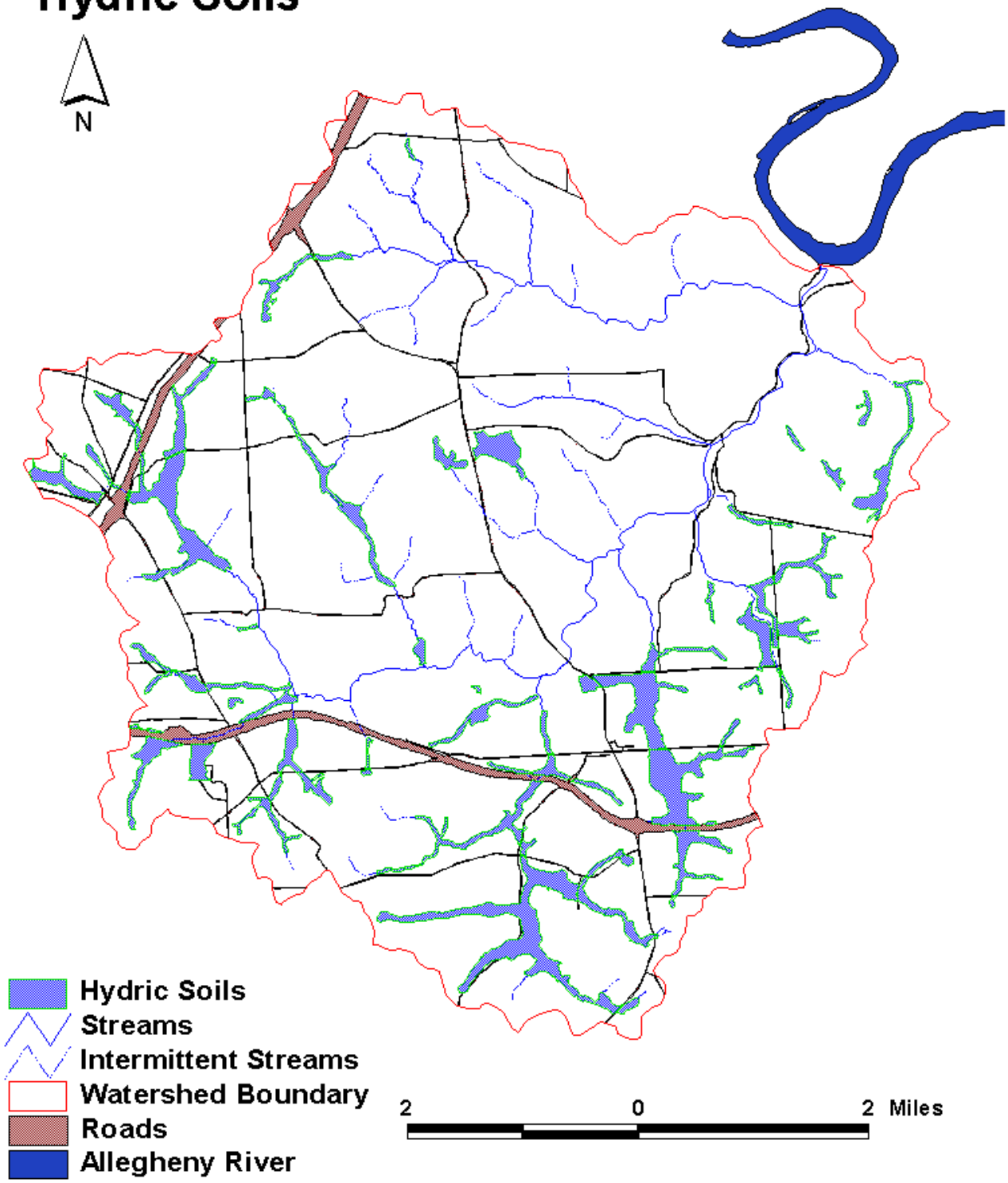


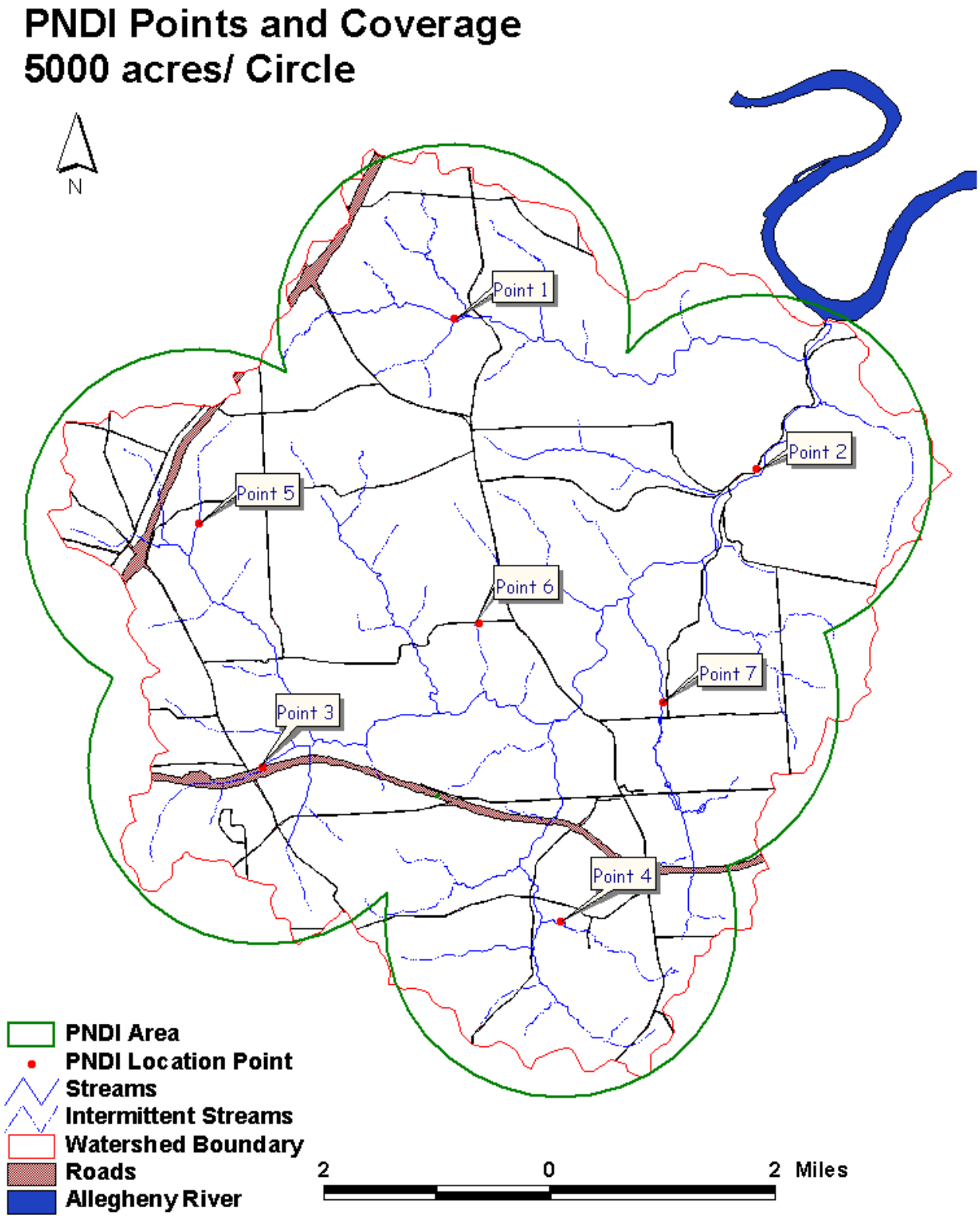
Quality Habitat Evaluation Index



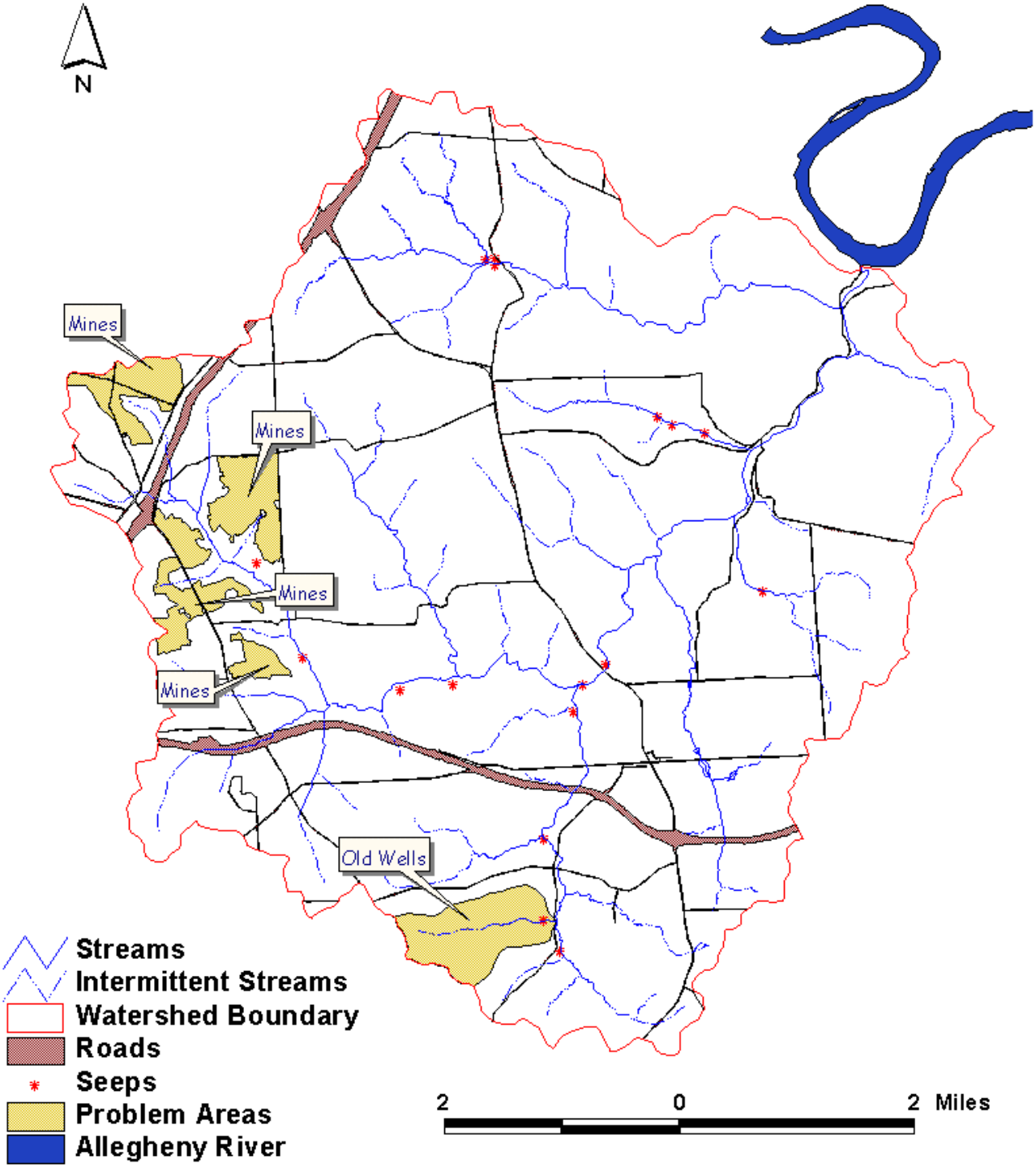

General Soils Map
N
Streams
Intermittent Streams
Watershed Boundary
Roads
Canfield Ravenna Soil Association
Hanover Alvira Soil Association
Cookport Hazelton Glpin Soil Association
Hazelton Gilpin Soil Association
Cavode Wharton Soil Association
Allegheny River
2
0
2 Miles

Hydric Soils

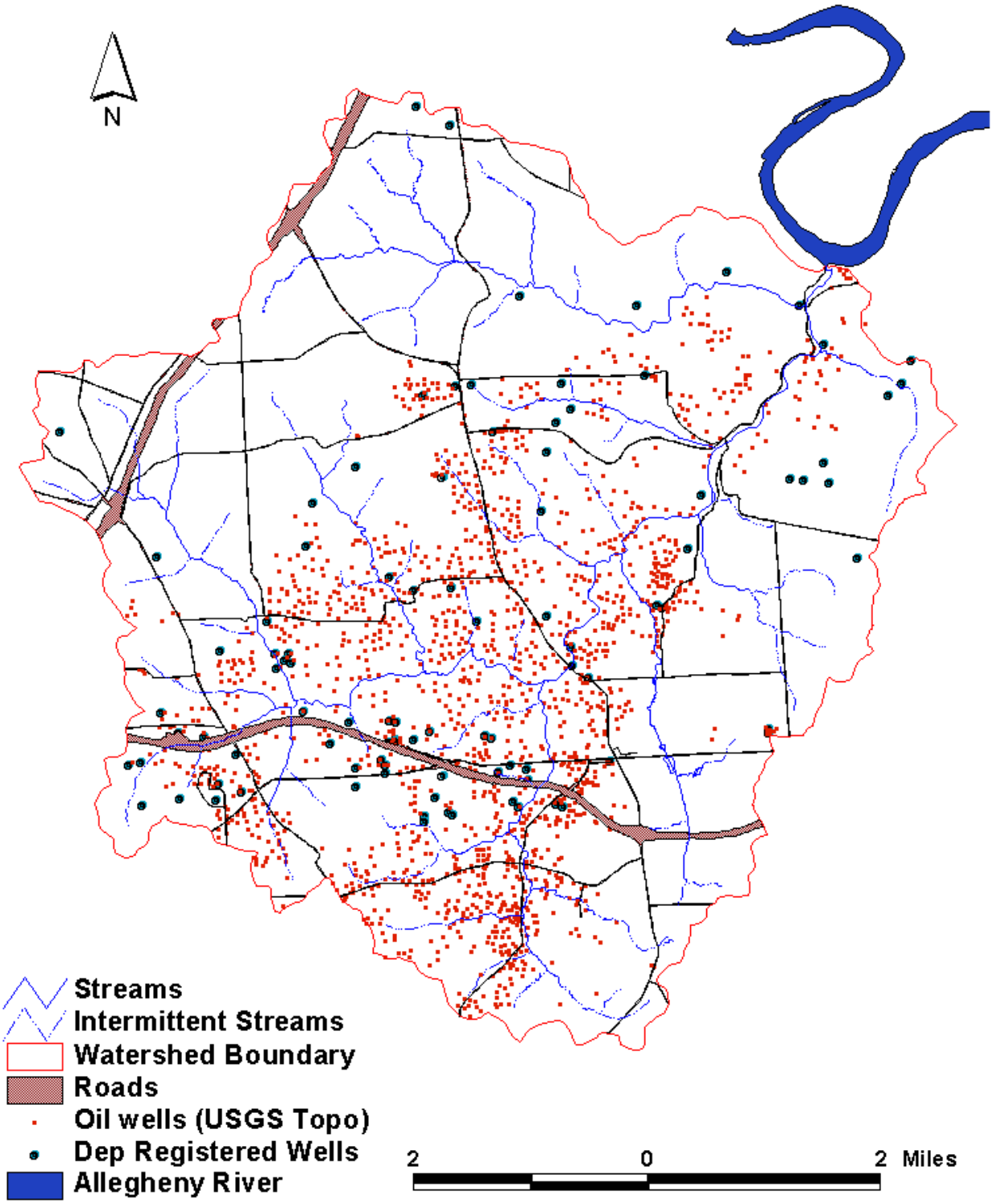



PNDI Points and Coverage
5000 acres/ Circle
N
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Point 7
PNDI Area
PNDI Location Point
Streams
Intermittent Streams
Watershed Boundary
Roads
Allegheny River
2
0
2 Miles

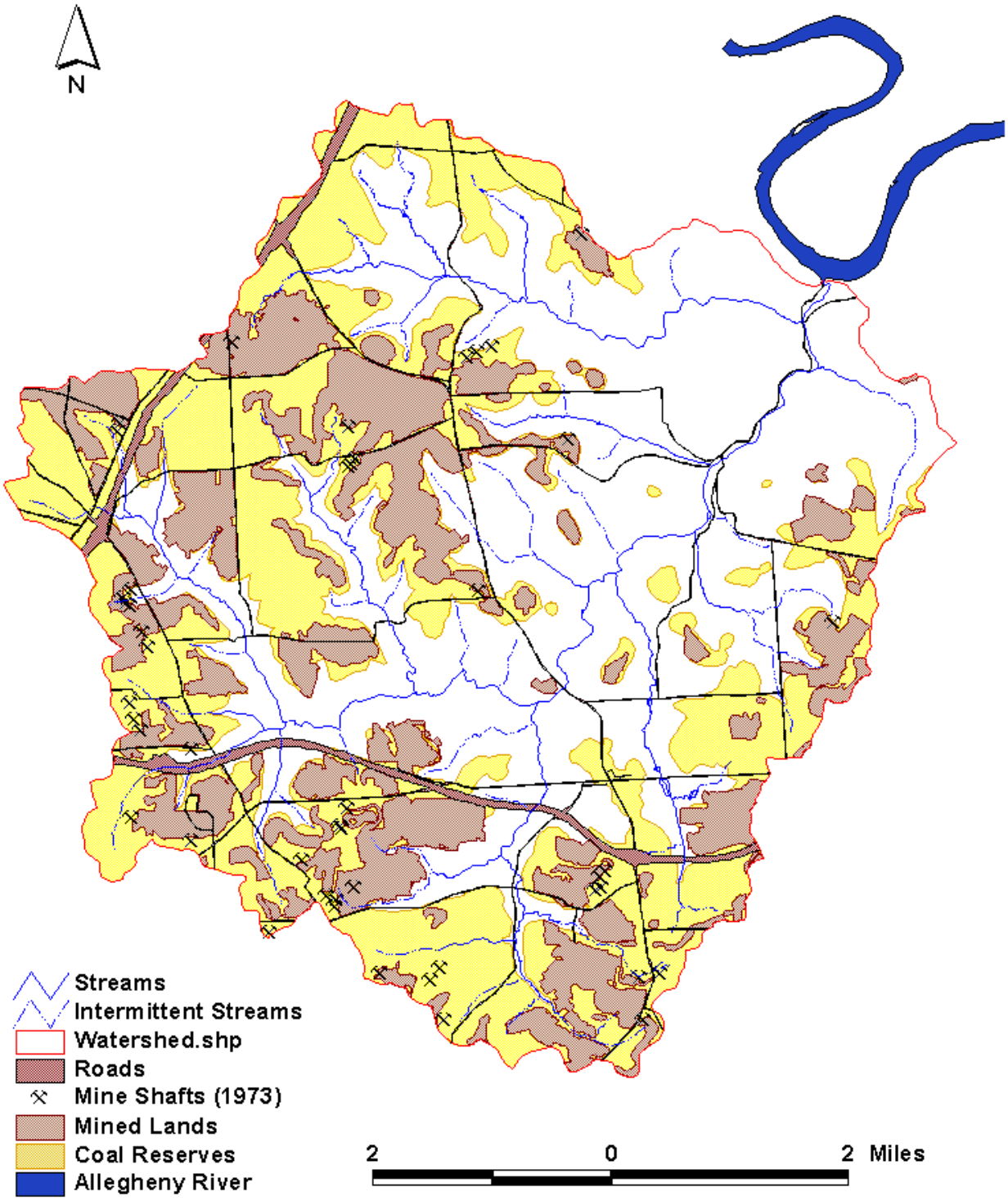
Problem Areas Indentified



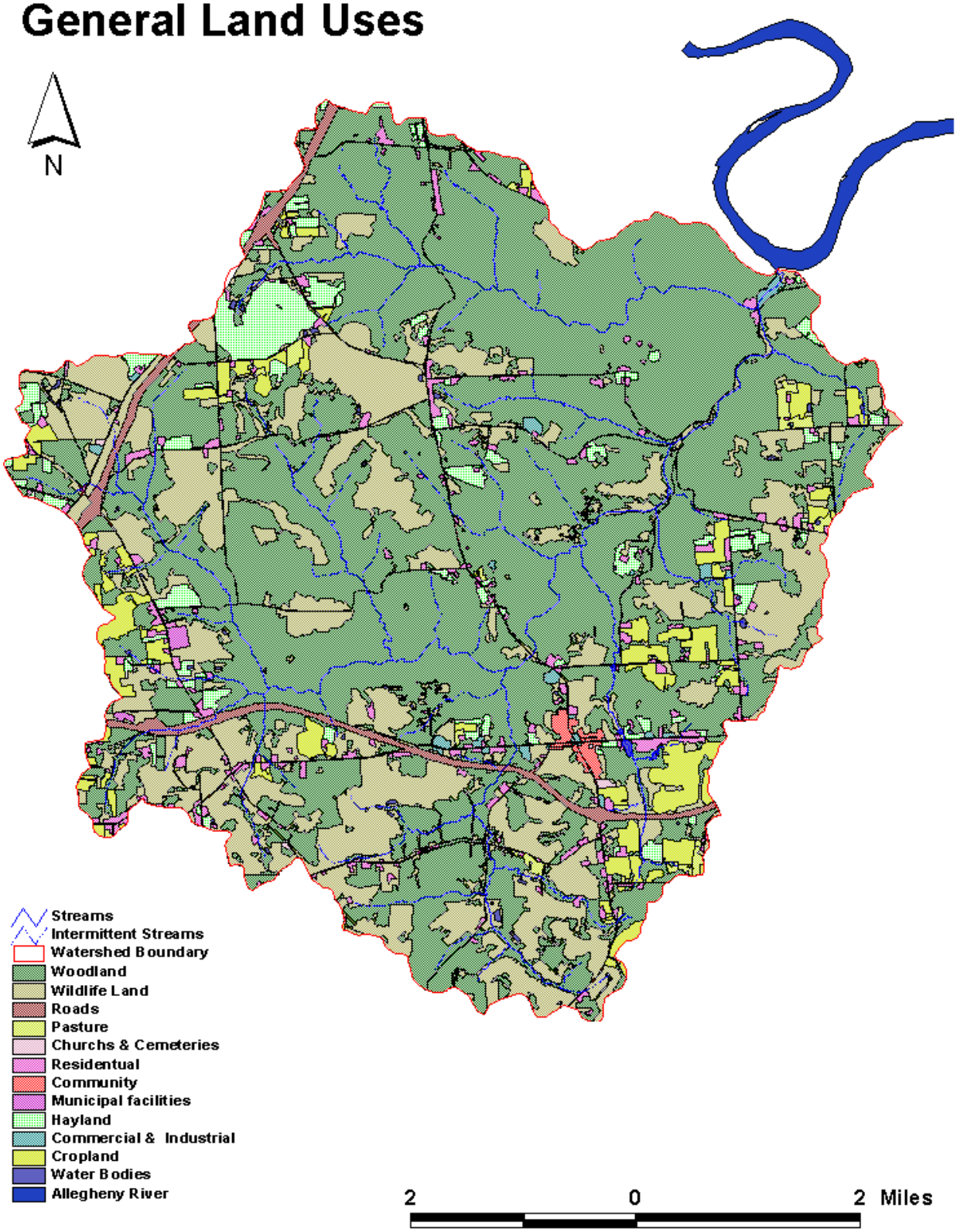
Oil Wells - Historic and Registered



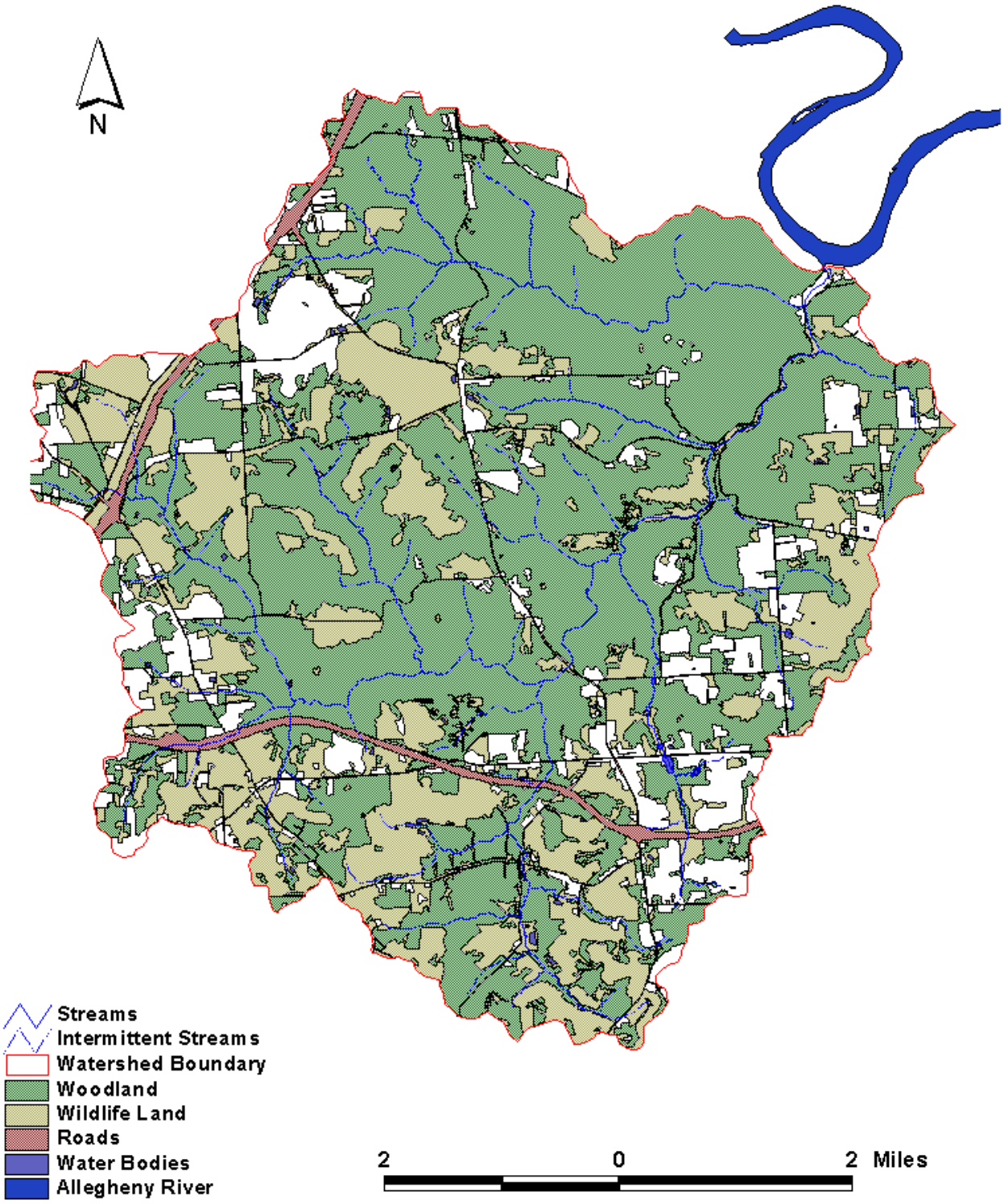
Coal Resources and Mine Lands



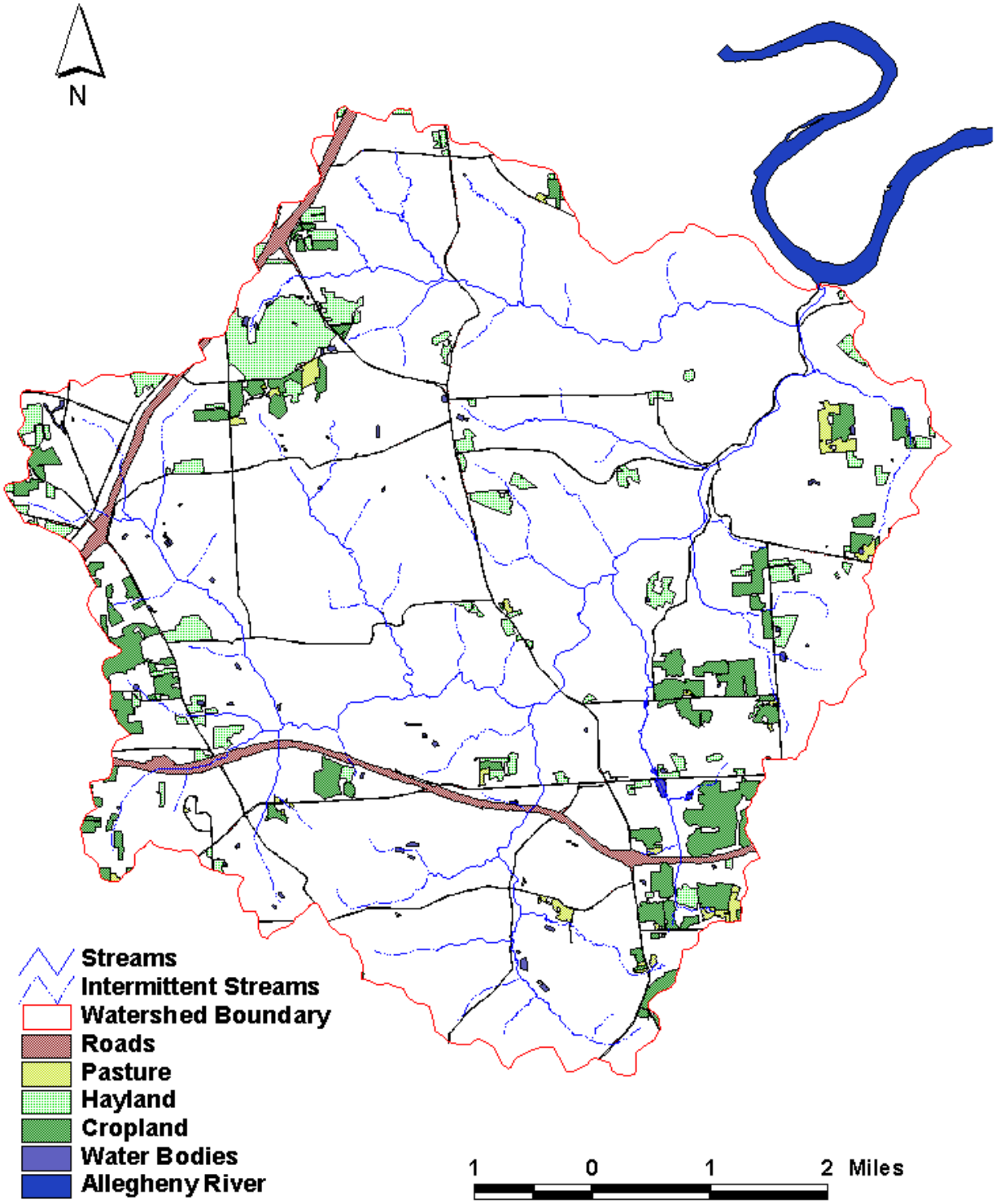
General Land Uses



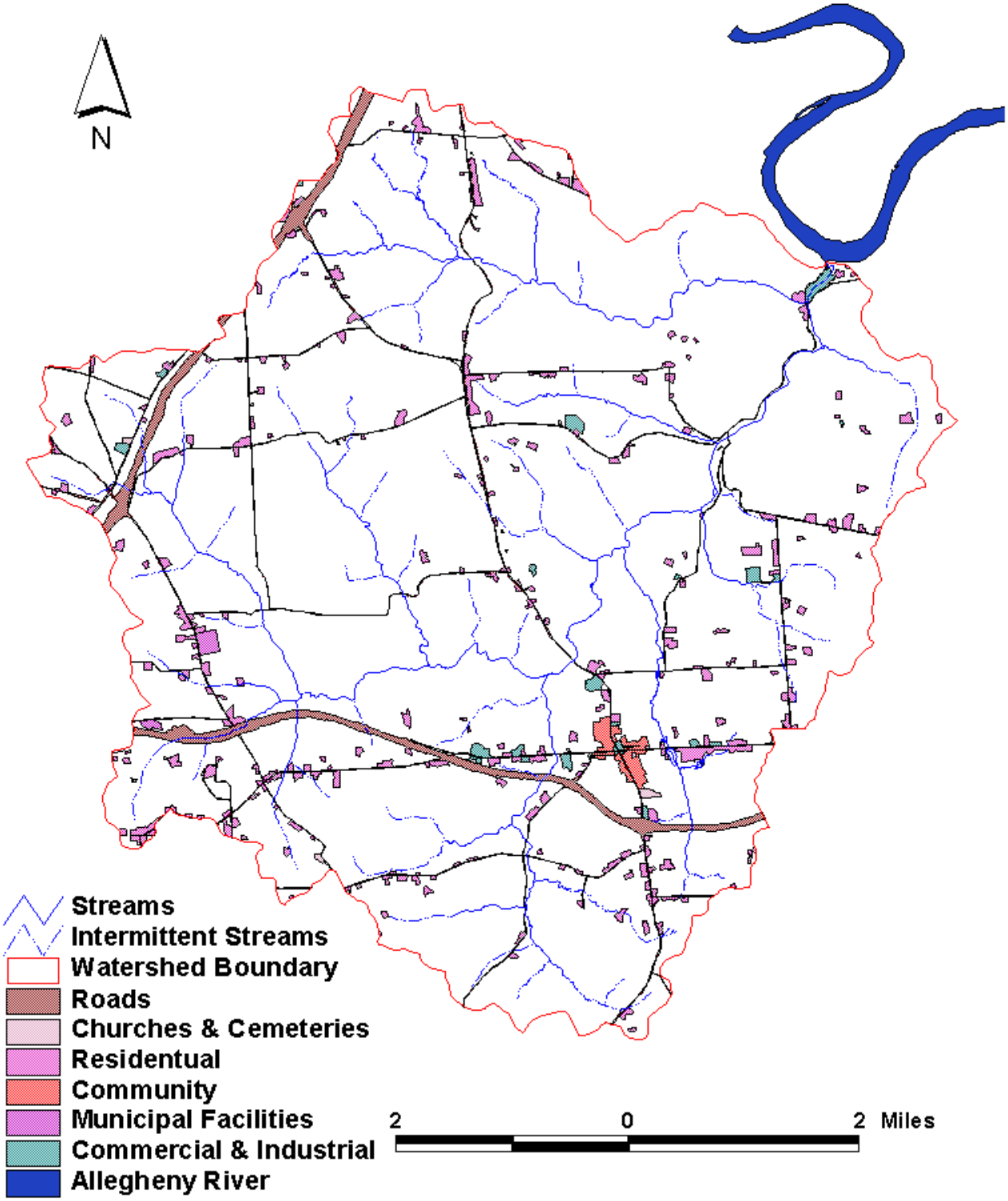
Woodland and Wildlife Land Use



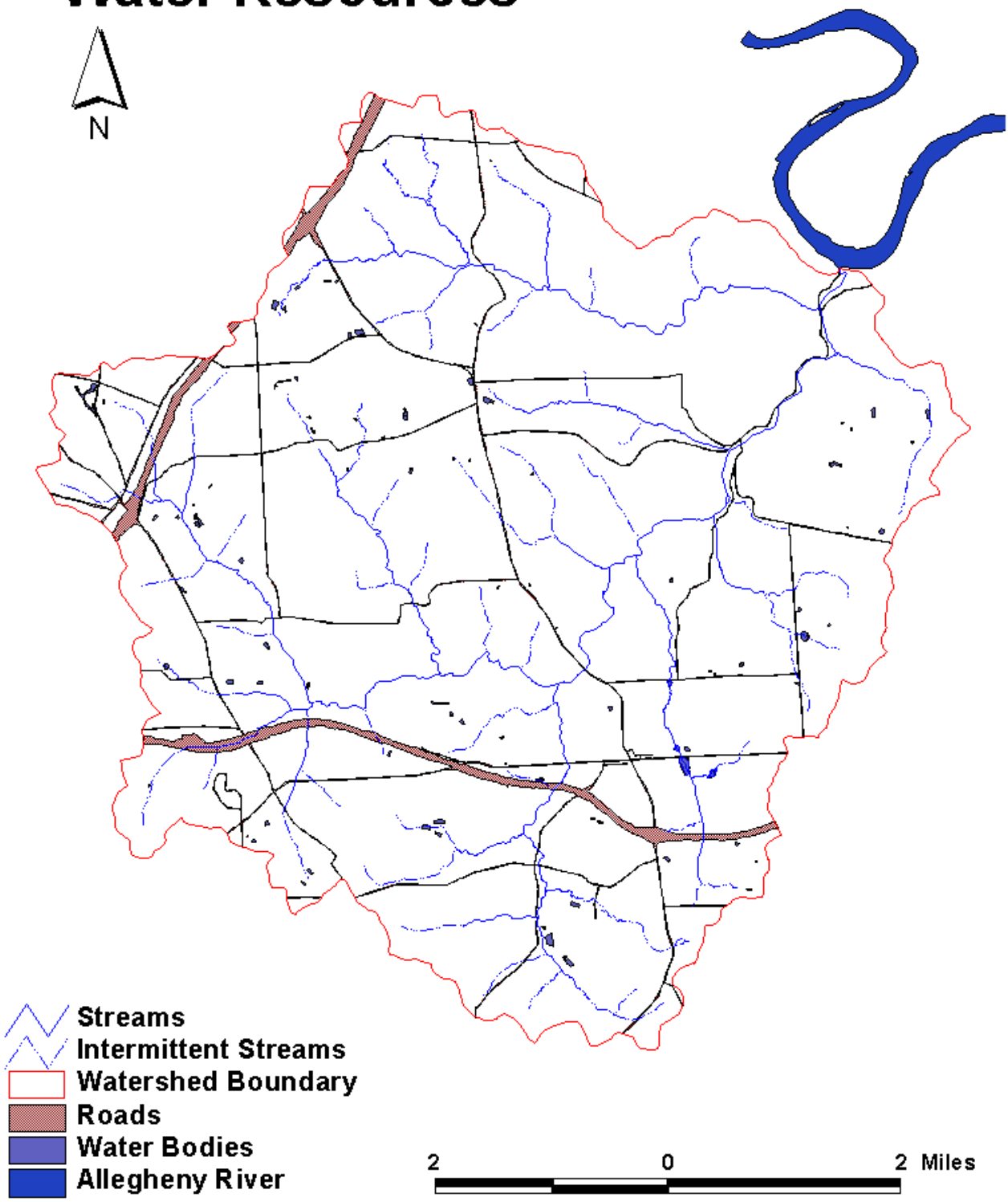
Agricultural Land Uses



Social and Economic Land Uses



Water Resources



Economic - Rural Fire Protection

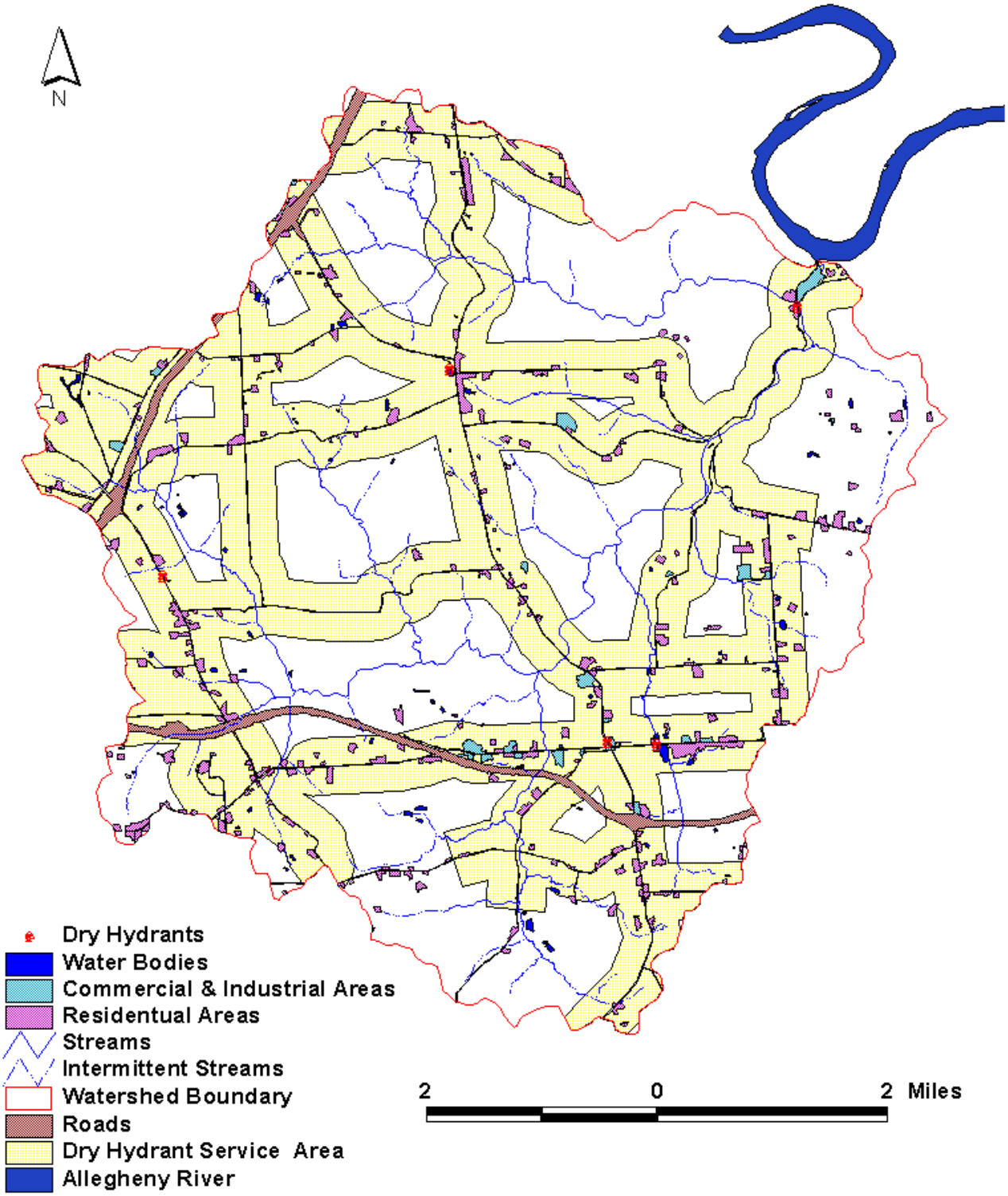


Table A1

HYDRIC SOILS

Venango County

Symbol	Map Name	Hydric Component	Location Notes
Map units with major hydric components:			
As	Armagh silt loam	Armagh (Pa0094)	
At	Atkins silt loam	Atkins (WV0008)	
BrA	Brinkerton silt loam, 0 to 3 percent slopes	Brinkerton (PA0090)	
BrB	Brinkerton silt loam, 3 to 8 percent slopes	Brinkerton (PA0090)	
Bt	Brinkerton and Frenchtown very stony silt loam	Brinkerton (PA0091) Frenchtown (OH0085)	
FeA	Frenchtown silt loam, 0 to 3 percent slopes	Frenchtown (OH0085)	
FeB	Frenchtown silt loam, 3 to 8 percent slopes	Frenchtown (OH0085)	
Re	Rexford silt loam	Rexford (PA0017)	
Map units with inclusions of hydric components:			
AlA	Alvira silt loam, 0 to 3 percent slopes	Frenchtown	depressions, drainageways, potholes
AlB	Alvira silt loam, 3 to 8 percent slopes	Frenchtown	depressions, drainageways, potholes
AlC	Alvira silt loam, 8 to 15 percent slopes	Frenchtown	depressions, drainageways, potholes
ArB	Alvira and Ravenna very stony silt loams, 0 to 8 percent slopes	Frenchtown	depressions, drainageways, potholes
CdB	Canfield gravelly silt loam, 3 to 8 percent slopes	Frenchtown	depressions, drainageways, potholes
CdC	Canfield gravelly silt loam, 8 to 15 percent slopes	Frenchtown	depressions, drainageways, potholes
CeB	Canfield very stony silt loam, 0 to 8 percent slopes	Frenchtown	depressions, drainageways, potholes
CeC	Canfield very stony silt loam, 8 to 15 percent slopes	Frenchtown	depressions, drainageways, potholes
ClA	Cavode silt loam, 0 to 3 percent slopes	Armagh	low flats, drainageways
ClB	Cavode silt loam, 3 to 8 percent slopes	Armagh	low flats, drainageways
ClC	Cavode silt loam, 8 to 15 percent slopes	Armagh	low flats, drainageways
CoA	Cookport loam, 0 to 3 percent slopes	Wet spots	depressions
CoB	Cookport loam, 3 to 8 percent slopes	Wet spots	depressions
CoC	Cookport loam, 8 to 15 percent slopes	Wet spots	depressions
CpB	Cookport very stony loam, 0 to 8 percent slopes	Wet spots	depressions
CpC	Cookport very stony loam, 8 to 15 percent slopes	Wet spots	depressions
ErB	Ernest silt loam, 3 to 8 percent slopes	Brinkerton	depressions, drainageways
EsB	Ernest very stony silt loam, 0 to 8 percent slopes	Brinkerton	depressions, drainageways
EsC	Ernest very stony silt loam, 8 to 15 percent slopes	Brinkerton	depressions, drainageways
MoA	Monongahela silt loam, 0 to 3 percent slopes	Rexford	potholes, drainageways
MoB	Monongahela silt loam, 3 to 8 percent slopes	Rexford	potholes, drainageways
Ph	Philo silt loam	Atkins	bottom lands
Po	Pope loam	Atkins	bottom lands
RaA	Ravenna silt loam, 0 to 3 percent slopes	Frenchtown	potholes, drainageways
RaB	Ravenna silt loam, 3 to 8 percent slopes	Frenchtown	potholes, drainageways
RaC	Ravenna silt loam, 8 to 15 percent slopes	Frenchtown	potholes, drainageways
SM	Strip mines	Wet spots[1]	potholes, drainageways
Ty	Tyler silt loam	Rexford	potholes, drainageways
UM	Urban land- Monongahela complex	Wet spots	potholes, drainageways
WhB	Wharton silt loam, 3 to 8 percent slopes	Armagh	depressions, drainageways
WhC	Wharton silt loam, 8 to 15 percent slopes	Armagh	depressions, drainageways

[1] may need soil scientist's verification

Table A2

LIST OF MAPPING UNITS THAT QUALIFY AS PRIME FARMLAND

Venango County

Manuscript Symbol	Mapping Unit Name
AgA	Allegheny silt loam, 0 to 3 percent slopes
AgB	Allegheny silt loam, 3 to 8 percent slopes
AhA	Alton gravelly loam, 0 to 3 percent slopes
AhB	Alton gravelly loam, 3 to 8 percent slopes
CdB [1]	Canfield gravelly silt loam, 0 to 3 percent slopes
CoA	Cookport loam, 0 to 3 percent slopes
CoB	Cookport loam, 3 to 8 percent slopes
GlB	Gilpin silt loam, 3 to 8 percent slopes
HaA	Hanover silt loam, 0 to 3 percent slopes
HaB[1]	Hanover silt loam, 3 to 8 percent slopes
HeB	Hazleton channery loam, 3 to 8 percent slopes
MoA	Monongahela silt loam, 0 to 3 percent slopes
Ph	Philo silt loam
Po	Pope loam
RaA	Ravenna silt loam, 0 to 3 percent slopes
RaB	Ravenna silt loam, 3 to 8 percent slopes
WhB	Wharton silt loam, 3 to 8 percent slopes
WoB	Wooster gravelly silt loam, 3 to 8 percent slopes

1 Some nonprime farmland areas are included in this mapping unit; however, it is our best judgement that in this county, over 50 percent of this unit have slopes of less than 5.4 percent and this soil qualifies for prime farmland.

Revised 6/83
By GHL

Table A3

LIST OF SOIL MAPPING UNITS THAT QUALIFY AS ADDITIONAL FARMLAND OF STATEWIDE IMPORTANCE

Venango County

Manuscript Symbol	Mapping Unit Name
AlA	Alvira silt loam, 0 to 3 percent slopes
AlB	Alvira silt loam, 3 to 8 percent slopes
AlC	Alvira silt loam, 8 to 15 percent slopes
At	Atkins silt loam
CdC	Canfield gravelly silt loam, 8 to 15 percent slopes
ClA	Cavode silt loam, 0 to 3 percent slopes
ClB	Cavode silt loam, 3 to 8 percent slopes
ClC	Cavode silt loam, 8 to 15 percent slopes
CoC	Cookport loam, 8 to 15 percent slopes
ErB	Ernest silt loam, 3 to 8 percent slopes
FeA	Frenchtown silt loam, 0 to 3 percent slopes
FeB	Frenchtown silt loam, 3 to 8 percent slopes
GlC	Gilpin silt loam, 8 to 15 percent slopes
HaC	Hanover silt loam, 8 to 15 percent slopes
Hec	Hazleton channery loam, 8 to 15 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
RaC	Ravenna silt loam, 8 to 15 percent slopes
Re	Rexford silt loam
Ty	Tyler silt loam
WhC	Wharton silt loam, 8 to 15 percent slopes
WoC	Wooster gravelly silt loam, 8 to 15 percent slopes

Revised 6/83
By GHL