

**Metals and pH TMDLs  
for the Tygart Valley River Watershed, West Virginia**

**U.S. Environmental Protection Agency  
Region 3  
1650 Arch Street  
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## 1.0 Problem Understanding

The Tygart Valley River is located in northeastern West Virginia. Its approximately 1,362 square mile (871,933 acre) drainage area is represented by the Tygart Valley River watershed (Figure 1-1). The source of the main stem of the Tygart Valley River is on Cheat Mountain near Spruce in Pocahontas County. The river flows north for approximately 207 miles. The two major tributaries to the main stem are the Middle Fork River and the Buckhannon River.

The watershed is dominated by forest and agricultural lands and common practices include coal mining, timber harvesting, recreational development, and agricultural activities (WVDEP, 1982). Many of the 12 counties in the watershed contain active surface and deep mining operations. Virtually all of the coal fields in the watershed contain abandoned coal mines. The watershed's population is widely distributed throughout small towns and rural unincorporated communities. The largest towns in the watershed include Elkins, Philippi, Grafton, and Fairmont (where the Tygart Valley River joins the West Fork River to form the Monogahela River).

Fifty-four waterbodies in the Tygart watershed have been included on West Virginia's 1996 and 1998 303(d) list due to metals and/or pH impairments (Table 1-1). These listed waterbodies include the main stem of the Tygart Valley River and 53 additional stream segments in the watershed. The pH and metals impairments, which include total iron, aluminum, and manganese, have been attributed to acid mine drainage (AMD).

AMD occurs when surface and subsurface water percolates through coal bearing minerals containing high concentrations of pyrite and marcasite, which are crystalline forms of iron sulfide ( $\text{FeS}_2$ ). It is these chemical reactions of the pyrite which generate acidity in water. A synopsis of these reaction are as follows: Exposure of pyrite to air and water causes the oxidation of pyrite. The sulfur component of pyrite is oxidized releasing dissolved ferrous ( $\text{Fe}^{2+}$ ) ions and also hydrogen ( $\text{H}^+$ ) ions. It is these  $\text{H}^+$  ions which cause the acidity. The intermediate reaction with the dissolved  $\text{Fe}^{2+}$  ions generates a precipitate, ferric hydroxide [ $\text{Fe}(\text{OH})_3$ ], and also releases more  $\text{H}^+$  ions, thereby causing more acidity. Another reaction is one between the pyrite and generated ferric ( $\text{Fe}^{3+}$ ) ions, in which more acidity ( $\text{H}^+$ ) is released as well as  $\text{Fe}^{2+}$  ions, which then can enter the reaction cycle (Stumm and Morgan, 1996).

The EPA's *Water Quality Planning and Management Regulations* (40 CFR 130) require states to develop Total Maximum Daily Loads (TMDLs) for waters which are exceeding water quality standards. The objective of this study was to develop TMDLs for the impaired waterbodies in the Tygart Valley River watershed.

This report presents TMDLs for each of the 54 listed segments in the Tygart watershed. In order to develop the TMDLs and other pertinent watershed and waterbody information, the watershed was divided into 21 regions (Figure 1-2). These regions represent hydrologic units. Each region was further divided into subwatersheds (1,007 total for the entire Tygart Valley River watershed) for modeling purposes. The 21 regions and their respective subwatersheds provide a good basis for georeferencing pertinent source information, monitoring data, and presenting TMDLs. This information is presented in Appendices A-1 through A-21 of this report. Numeric designation

for each Appendix A section corresponds to the same numerically-identified region of the Tygart watershed (e.g., A-3 corresponds to region 3 of the Tygart watershed).

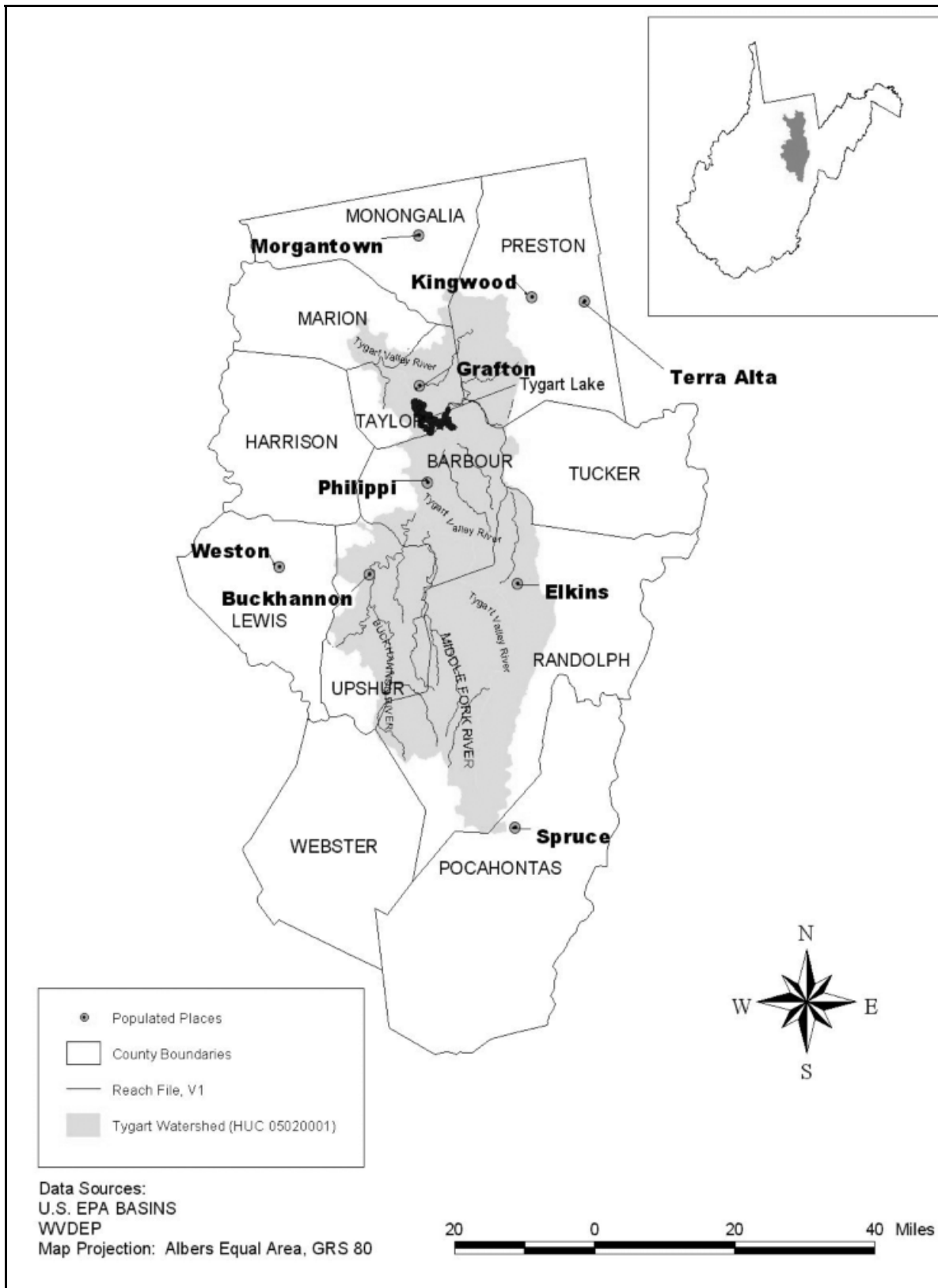


Figure 1-1. Location of the Tygart Valley River watershed



**Table 1-1.** Section 303(d) listed waterbodies and corresponding impairments

Listed Segment ID	Stream Name	Length (mi)	Trout Waters	Al	Fe	Mn	Metals *	pH
WV_M-27(a)_1998	TYGART RIVER	36					x	x
WV_M-27(b)_1998	TYGART RIVER	23	x	x				
WV_MT-11-A_1998	SHELBY RN	3.6	x				x	x
WV_MT-11-B-1_1998	BERRY RN	1.5	x				x	x
WV_MT-11-B_1998	LONG RN / BERKELEY RN	3.6	x				x	x
WV_MT-11_1998	BERKELY RN	7.2	x				x	x
WV_MT-12-C-2_1998	LITTLE RACCOON RN	2.6					x	
WV_MT-12-C_1998	RACCOON CK/THREEFORK CK	8.8					x	x
WV_MT-12-H_1998	BIRDS CK	5.5					x	x
WV_MT-12-I_1998	SQUIRES CK	4.5					x	x
WV_MT-12-G2_1998	BRAINS CK/FIELDS CK	4.9					x	x
WV_MT-12_1998	THREEFORK CK	19					x	x
WV_MT-18-C_1998	GLADE RN / SANDY CK	2.9					x	x
WV_MT-18-E-1_1998	MAPLE RN	4.8					x	x
WV_MT-18-E-3_1998	LEFT FK / LL SANDY CK	5.4					x	x
WV_MT-18-E_1998	LITTLE SANDY CK	10.6					x	x
WV_MT-18-G_1998	LEFT FORK / SANDY CK	8					x	
WV_MT-18_1998	SANDY CK	16.4					x	x
WV_MT-24-A_1998	FROST RN	2.2					x	x
WV_MT-26-B_1998	FOXGRAPE RN	3.4		x				
WV_MT-26-C_1998	LITTLE HACKERS CK	1.6		x				
WV_MT-27_1998	FORD RN	2.7					x	x
WV_MT-29_1998	ANGLINS RN	2.6					x	x
WV_MT-31_1998	BUCKHANNON RIVER	5.55			x			
WV_MT-33(a)_1998	MIDDLE FORK RIVER	4.7	x					x
WV_MT-33(b)_1998	MIDDLE FORK RIVER	4.7	x	x				
WV_MT-36_1998	ISLAND RN	1.2					x	x
WV_MT-37_1998	BEAVER CK	4.6	x				x	x
WV_MT-39_1998	LAUREL RN	3.4	x				x	x
WV_MT-4_1998	GOOSE CK	2.6	x				x	x
WV_MT-40.?_1998 <sup>a</sup>	U.T /TYGART RIVER (HARDING)	0					x	x
WV_MT-41_1998	GRASSY RN	2.8					x	x
WV_MT-42_1998	ROARING CK	15	x				x	x
WV_MT-5_1998	LOST RN	8.6	x				x	x
WV_MTB-5-.8A	UT / PECKS RUN	.69					x	x
WV_MTB-10-A_1998	SUGAR RN	1.73					x	
WV_MTB-10_1998	TURKEY RN	7.04					x	x
WV_MTB-11-B_1998	MUD LICK OF FINK RN	1.9			x	x		
WV-MTB-11-B.7	BRIDGE RN / FINK RN	2.47					x	x
WV_MTB-11_1998	FINK RN	8.17					x	x
WV_MTB-18	FRENCH CREEK	18.47					x	
WV_MTB-18-A	CROOKED RUN	1.38					x	
WV_MTB-18-B-3	MUDLICK RN	1.14			x			
WV_MTB-18-B-2_1998	BLACKLICK RN	2.09			x			
WV_MTB-18-B_1998	BULL RN	3.9			x			
WV_MTB-25_1998	TEN MILE CREEK	3.2	x	x	x			
WV_MTB-27_1998	PANTHER FK	6.4	x					x
WV_MTB-29_1998	SWAMP RN	1.68	x				x	x
WV_MTB-30_1998	HERODS RN	2.62	x					x

## Metals and pH TMDLs for the Tygart Valley River Watershed

Listed Segment ID	Stream Name	Length (mi)	Trout Waters	Al	Fe	Mn	Metals <sup>*</sup>	pH
WV_MTB-32(a)_1998	LEFT FK / BUCKHANNON RV	17.9			x			x
WV_MTB-8	BIG RUN	1.89					x	x
WV_MTB-5-B_1998	LITTLE PECKS RN	2.49			x	x		
WV_MTB-5-C_1998	MUD RN/PECKS RN	1.18					x	
WV_MTB-5_1998	PECKS RN	8.2					x	x
WV_MTB-3	BIG RUN	6.01					x	x
WV_MTM-16 (TBL_B)_1998	CASSITY CK	6.4	x				x	x
WV_MTM-16-A_1998	PANTHER RN	5.8	x				x	x
WV_MTM-4_1998	DEVIL RN	2.33	x				x	x
WV_MTM-6_1998	HELL RN	3.23	x				x	x
WV_MTM-8_1998	WHITEOAK RN	1.92	x				x	x

\*Official WV stream code, exact location unknown (see Appendix A-19.)

\* Metals includes Al, Fe and Mn

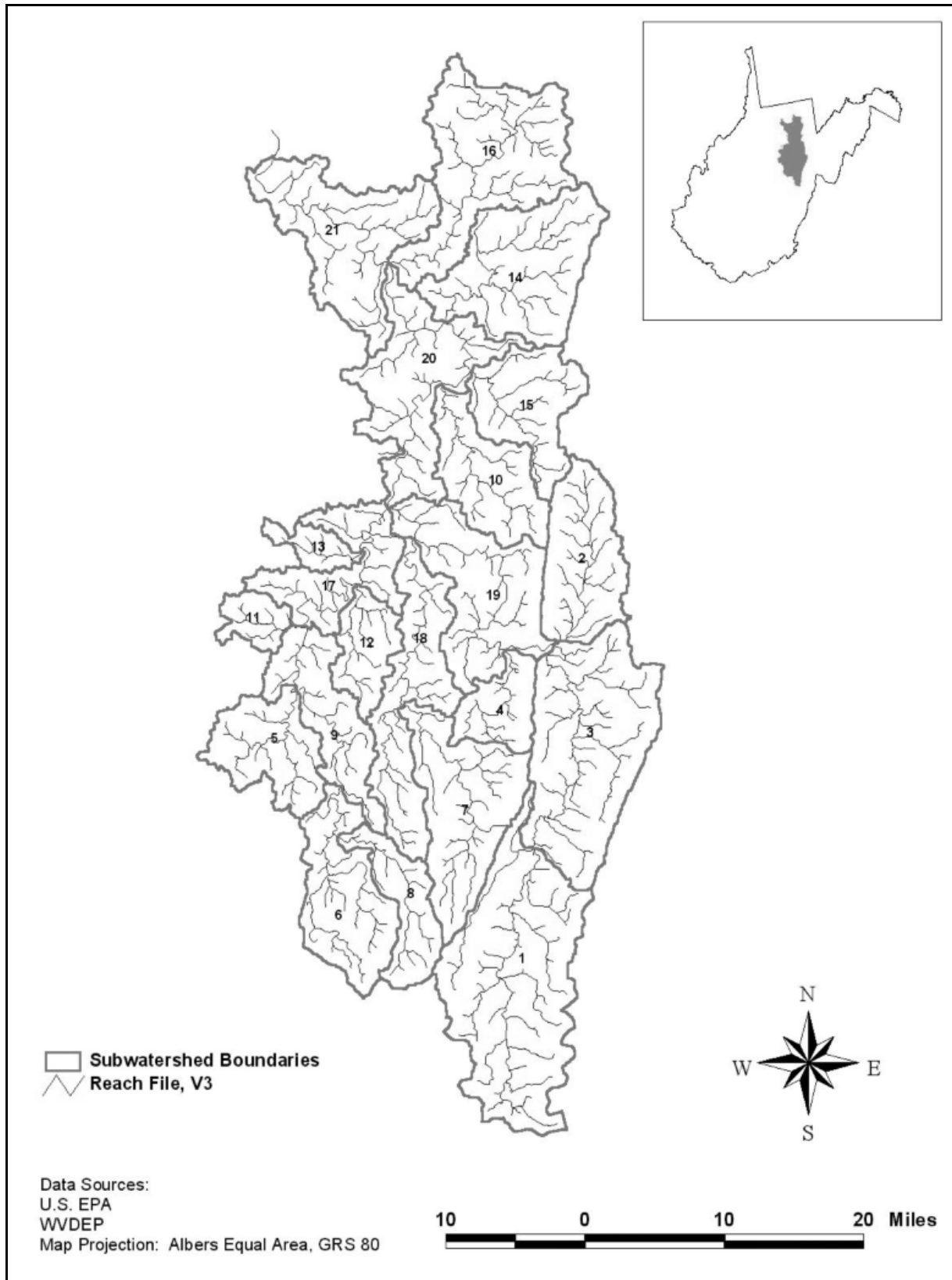


Figure 1-2. Tygart Valley River watershed and its 21 regions





## 2.0 Water Quality Standards

West Virginia's *Requirements Governing Water Quality Standards* (WVSOS, 2000) have defined water quality criteria for surface waters as a numeric constituent concentration or a narrative statement representing a quality of water that supports a designated use or uses of the waterbody. Total aluminum, iron, and manganese, and pH are given numeric criteria under the aquatic life and the human health use designation categories (Table 2-1). All listed waterbodies in the Tygart watershed have been designated as having an aquatic life and human health use. A number of waterbodies have also been identified as trout waters (Table 1-1). These waterbodies must meet the aquatic life B2 criteria.

**Table 2-1.** Applicable West Virginia water quality criteria

Parameter	Use Designation				
	Aquatic Life				Human Health
	B1, B4		B2		A
	Acute	Chronic	Acute	Chronic	
Aluminum, Total ( $\mu\text{g/L}$ )	750 <sup>a</sup>	-	750 <sup>a</sup>	-	-
Iron, Total (mg/L)	-	1.5 <sup>b</sup>	-	0.5 <sup>b</sup>	1.5 <sup>c</sup>
Manganese, Total (mg/L)	-	-	-	-	1.0 <sup>c</sup>
pH	No values below 6.0 or above 9.0	No values below 6.0 or above 9.0	No values below 6.0 or above 9.0	No values below 6.0 or above 9.0	No values below 6.0 or above 9.0

Source: WVSOS, 2000; B1 = Warm water fishery streams, B4 = Wetlands, B2 = Trout waters, A = Water supply, public;

<sup>a</sup> One hour average concentration not to be exceeded more than once every three years on the average,

<sup>b</sup> Four-day average concentration not to be exceeded more than once every three years on the average,

<sup>c</sup> Not to exceed

There are approximately 280 existing water quality stations in the Tygart watershed. Examination of the data for the listed segments confirms that water quality criteria were exceeded. Tables 3a, 3b, and 3c in each of Appendices A-1 through A-21 summarize applicable water quality data for monitoring stations throughout the watershed.

### 3.0 Source Assessment

This section examines and identifies the potential sources of aluminum, iron, and manganese in the Tygart watershed. A wide range of data were used to identify potential sources and to characterize the relationship between point and nonpoint source discharges and instream response at monitoring stations.

#### 3.1 Data Inventory

A wide range of data and information were used in the development of these TMDLs. The categories of data used include physiographic data that describe the physical conditions of the watershed and environmental monitoring data that identify potential pollutant sources and their contribution, and instream water quality monitoring data. Additional water quality monitoring data gathered by non-governmental groups were obtained through the WVDEP. Table 3-1 shows the various data types and data sources used in these TMDLs.

**Table 3-1.** Inventory of data and information used to develop the Tygart watershed TMDLs

Data Category	Description	Data Source(s)
Watershed Physiographic Data	Land Use (MRLC)	USGS
	Abandoned Mining Coverage	WVDEP
	Stream Reach Coverage	USGS, WVDEP
	Weather Information	National Climatic Data Center
Environmental Monitoring Data	NPDES Data	WVDEP OMR
	Discharge Monitoring Report Data	WVDEP
	Abandoned Mine Loading Data	WVDEP
	303(d) Listed Water	WVDEP
	Water Quality Monitoring Data for 280 Sampling Stations	EPA STORET
	Additional Water Quality Monitoring Data	Stream Restoration Group Special Reclamation Group Bond Forfeiture

#### 3.2 Stream Flow Data

There are 26 USGS flow gages in the Tygart watershed. Flow data from nine of these USGS gages were used to support flow analysis for the watershed. Table 3-2 shows the 9 flow gaging stations with frequent flow data and the corresponding period of record for each. These nine stations were used because they were the only stations with sufficient data to characterize the stream flow in the watershed.

**Table 3-2.** Flow analysis for the Tygart watershed

<b>Station</b>	<b>Stream Name</b>	<b>Start Date</b>	<b>End Date</b>	<b>Min (cfs)</b>	<b>Mean (cfs)</b>	<b>Max (cfs)</b>
3050000	Tygart Valley River	07/20/1988	09/30/1998	0	401.94	11700
3050500	Tygart Valley River	10/01/1979	09/30/1998	0	567.66	16000
3051000	Tygart Valley River	10/01/1979	09/30/1998	1	900.75	27400
3052000	Middle Fork River	05/28/1988	09/30/1998	0	377.50	9320
3052500	Sand Run near Buckhannon	10/01/1979	09/30/1998	0	30.41	1320
3053500	Buckhannon River	10/01/1979	09/30/1998	2	640.87	14500
3054500	Tygart Valley River	10/01/1979	09/30/1998	5	2056.29	50900
3056000	Tygart Valley River	10/01/1979	09/30/1991	170	2523.88	17700
3057000	Tygart Valley River	01/01/1980	09/30/1995	141	2722.68	24900

**3.3 Point Sources**

In order to characterize the contributing point sources in the Tygart watershed, the point sources were classified into two major categories: permitted non-mining point sources and permitted mining point sources.

*3.3.1 Permitted Non-mining Point Sources*

Data regarding non-mining point sources were retrieved from EPA’s Permit Compliance System (PCS). The non-mining point sources in the Tygart watershed typically do not discharge significant amounts of aluminum, iron, or manganese (e.g. wastewater treatment plants, non-metal producing industries, etc.) and hence do not have permit limits for these metals. Their discharge is also typically within an acceptable range for pH.

*3.3.2 Permitted Mining Point Sources*

Mining related point source discharges, from both deep, surface, and other mining related activities, typically contain low pH values and high concentrations of metals (iron, aluminum, and manganese). Consequently, mining related activities are commonly issued discharge permits for these parameters. A spatial coverage of the mining permit data was provided by West



Virginia Office of Mining and Reclamation (OMR). The coverage includes both active and inactive mining facilities, which are classified by type of mine and facility status. The mines are classified into eight different categories: coal surface mine, coal underground mine, haul road, coal preparation plant, coal reprocessing, prospective mine, quarry, and other. The haul road and prospective mine categories represent mining access roads and potential coal mining areas, respectively. The permits were also classified by mining status (7 categories) describing the status of each permitted discharge. OMR provided a brief description regarding classification and associated potential impact on water quality. Mining types and status descriptions are shown in Table 3-3.

**Table 3-3.** Classification of mining permit type and status

Type of Mining	Status Code	Description
Coal surface mine	Completely Released	Completely reclaimed, re-vegetated, should not be any associated water quality problems
Coal underground mine	Phase II Released	Sediment and ponding are gone, partially re-vegetated, very little water quality impact
Haul road	Phase I Released	Re-graded and re-seeded, initial phase of the reclamation process, could potentially impact water quality
Coal preparation plant	Renewed	Active mining facility, assumed to be discharging according to the permit limits
Coal reprocessing	New	Newly issued permit, could be currently active or inactive, assumed to be discharging according to permit limits
Prospective mine	Inactive	Currently inactive, could become active anytime, assumed to be discharging according to discharge limits
Quarry	Revoked	Bond forfeited, forfeiture may be caused by poor water quality, highest impact to water quality
Other		

Coal mining operations and sandstone quarries typically have permits for loading of total iron, total manganese, total nonfilterable residue, and pH. They are also required to list total aluminum discharges. However, limestone quarries don't have permits for loading of total iron, total manganese, total nonfilterable residue and aluminum discharges. There are a total of 410 active mining discharge permits in the Tygart watershed. A complete listing of mining permits in the Tygart watershed is located in Appendix B.

### 3.4 Nonpoint Sources

In addition to point sources, nonpoint sources may also contribute to water quality impairments in the Tygart watershed. Nonpoint sources represent contributions from diffuse, non-permitted sources. Based on the identification of a number of abandoned mining activities in the Tygart watershed, abandoned mine lands (AML) represent a critical nonpoint source. Abandoned mines can contribute significant amounts of acid mine drainage, which produces low pH and high metals concentrations in surface and subsurface water in areas where mining activities are or once were present. Because AML are present in the Tygart watershed in such abundance, nonpoint source contributions were grouped for assessment into two separate categories: AML

and other nonpoint sources. Figure 3-1 presents a schematic of potential sources in the Tygart watershed.

### *3.4.1 Abandoned Mine Lands (AML)*

There have been both surface and deep mining activities in the lower Tygart watershed and consequently numerous AML sites which produce AMD flows remain (WVDEP, 1982). Data regarding AML sites in the Tygart watershed were compiled from spatial coverages provided by OMR and the *Tygart Valley River Abandoned Mine Drainage Assessment* (WVDEP, 1982). The AML sites were classified into three categories:

- High walls
- Disturbed land
- Abandoned mines

Additional qualitative data were retrieved from OMR Problem Area Data Sheets (PADS). Information regarding the locations of the most critical sources, namely abandoned mines, are presented in Table 2 for each of Appendices A-1 through A-21.

### *3.4.2 Other Nonpoint Sources*

The predominant land uses in the Tygart watershed were identified based on the USGS's Multi-Resolution Land Characterization (MRLC) land use data (representative of the mid-1990's). According to the MRLC data, the major land uses in the watershed are forest land, which constitutes approximately 80% of the watershed area and agricultural land, which make up 15% of the watershed area. In addition to forest land and agricultural land uses, other landuses which may contribute nonpoint source metals loads to the receiving streams include barren and urban land. The land use distribution for the Tygart watershed is presented in Figure 3-2.

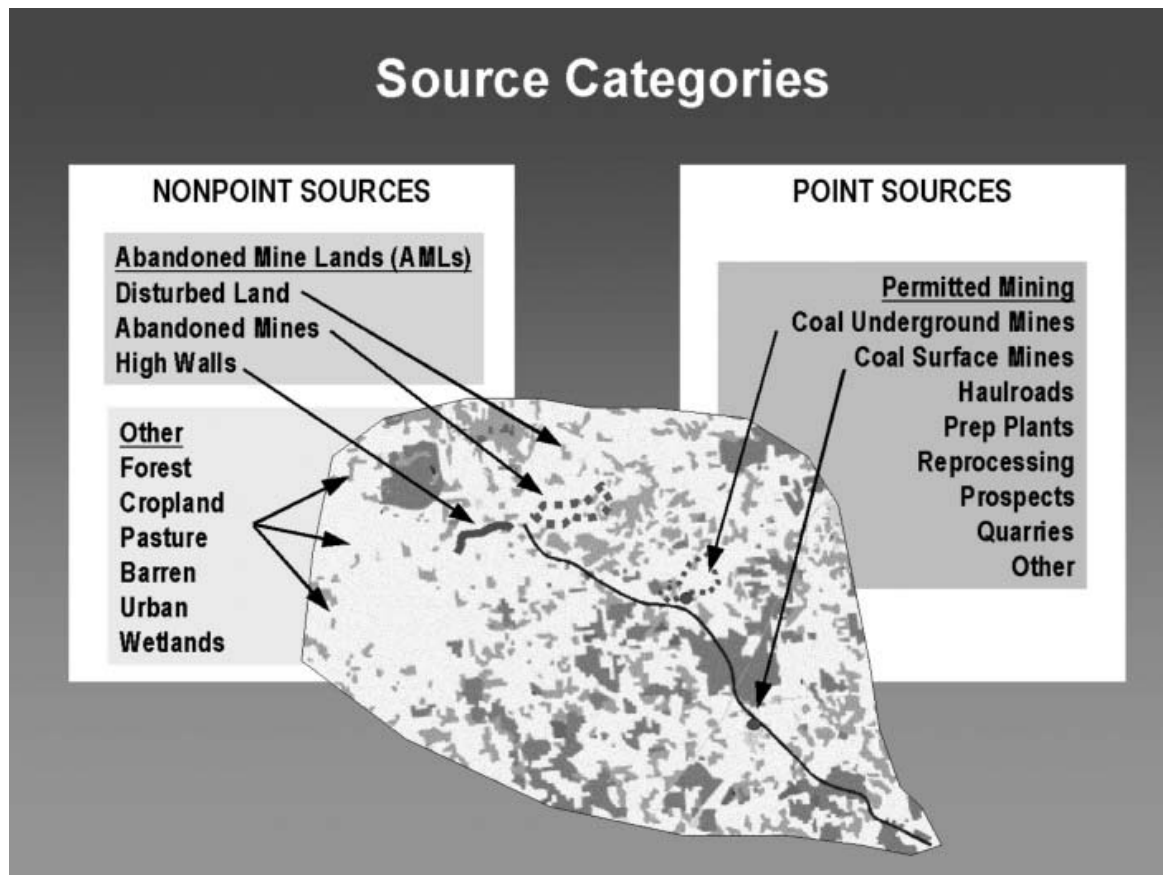


Figure 3-1. Potential sources contributing to impairments in the Tygart River watershed

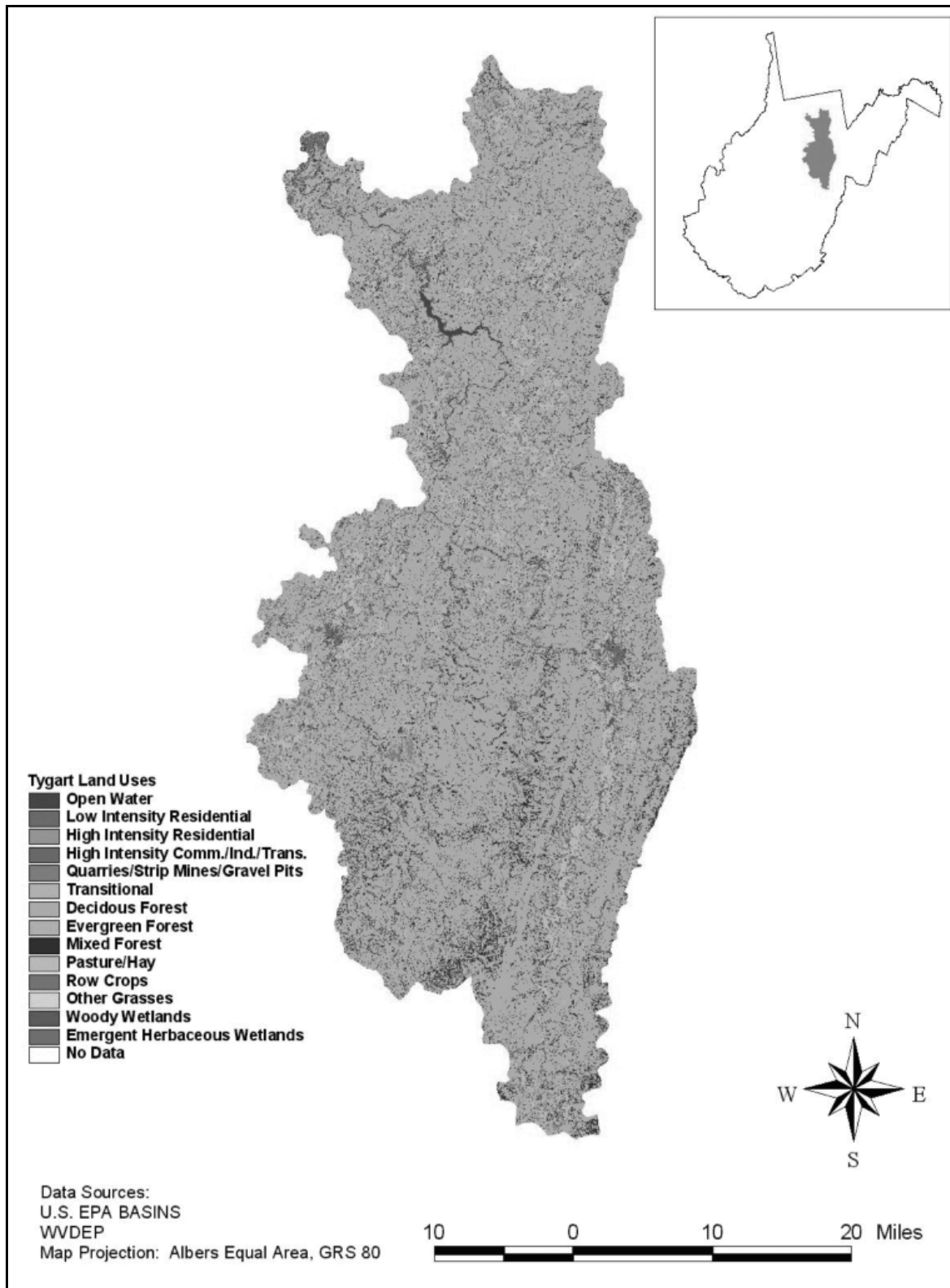


Figure 3-2. Land use distribution in the Tygart watershed

## 4.0 Technical Approach

Establishing the relationship between the instream water quality targets and source loadings is a critical component of TMDL development. It allows for evaluation of management options that will achieve the desired source load reductions. The link can be established through a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. Ideally, the linkage will be supported by monitoring data that allow the TMDL developer to associate certain waterbody responses to flow and loading conditions. The objective of this section is to present the approach taken to develop the linkage between sources and instream response for TMDL development in the Tygart watershed.

### 4.1 Model Framework Selection

Selection of the appropriate approach or modeling technique required consideration of the following:

- Expression of water quality criteria
- Dominant processes
- Scale of analysis

The relevant criteria for metals and pH were presented in Section 2. For metals, the West Virginia criteria are expressed as total metals. This dictates that the methodology predict the total metals concentration in the water column of the receiving water. Thresholds of a numeric measure are evaluated for frequency of exceedance (*e.g.*, not to exceed more than once every three years on average). Acute standards typically require evaluation over short time periods and violations may occur under variable flow conditions. Chronic criteria require the evaluation of the response over a four-day averaging period. The approach or modeling technique must permit representation of instream concentrations under a variety of flow conditions, in order to evaluate critical periods for comparison to chronic and acute criteria.

The approach must also consider the dominant processes regarding pollutant loadings and instream fate. For the Tygart watershed, primary sources contributing to metals and pH impairments include an array of nonpoint or diffuse sources as well as discrete point sources/permitted discharges. Loading processes for nonpoint sources or land-based activities are typically rainfall-driven and thus relate to surface runoff and subsurface discharge to a stream. Permitted discharges may or may not be dependent on rainfall, however, they are controlled by permit limits.

Key instream factors that must be considered include routing of flow, dilution, and transport of total metals. In the stream systems of the Tygart watershed, the primary physical driving process is the transport of total metals by diffusion and advection in the flow. Significant chemical processes are the speciation, precipitation of metals followed by sediment adsorption/desorption and redox reactions related to the precipitation reactions.

Scale of analysis and waterbody type must also be considered in the selection of the overall approach. The approach should have the capability to evaluate watersheds at multiple scales,

particularly those of a few hundred acres in size. The listed waters in the Tygart watershed range from small streams to the main stem of the river. Selection of scale should be sensitive to locations of key features, such as abandoned mines and point source discharges. At the larger watershed scale, land areas are lumped into subwatersheds for practical representation of the system, commensurate with the available data. Occasionally, there are site specific and localized acute problems which may require more detailed segmentation or definition of detailed modeling grids.

Based on the considerations described above, analysis of the monitoring data, review of the literature, and past pH and metals modeling experience, the Mining Data Analysis System (MDAS) was developed to represent the source-response linkage in the Tygart watershed. The MDAS is a comprehensive data management and modeling system that is capable of representing loading from nonpoint and point sources found in the Tygart watershed and simulating instream processes.

### 4.2 Mining Data Analysis System (MDAS) Overview

The MDAS is a system designed to support TMDL development for areas impacted by AMD. The system integrates the following:

- Graphical interface
- Data storage and management system
- Dynamic watershed model
- Data analysis/post-processing system

The graphical interface supports basic geographic information systems (GIS) functions, including electronic geographic data importation and manipulation. Key data sets include stream networks, landuse, flow and water quality monitoring station locations, weather station locations, and permitted facility locations. The data storage and management system functions as a database and supports storage of all data pertinent to TMDL development, including water quality observations, flow observations, permitted facility DMRs, as well as stream and watershed characteristics used for modeling. The system also includes functions for inventorying the data sets. The Dynamic Watershed Model, also referred to as the Hydrological Simulation Program - C++ (HSPC), simulates nonpoint source flow and pollutant loading as well as instream flow and pollutant transport, and it is capable of representing time-variable point source contributions. The data analysis/post-processing system conducts correlation and statistical analyses and enables the user to plot model results and observation data.

The most critical component of the MDAS to TMDL development is the HSPC model, because it provides the linkage between source contributions and instream response. The HSPC is a comprehensive watershed model used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. It is capable of simulating flow, sediment, metals, nutrients, pesticides, and other conventional pollutants, as well as temperature and pH for pervious and impervious lands and waterbodies. The HSPC is essentially a re-coded C++ version of selected Hydrologic Simulation Program-FORTRAN (HSPF) modules. HSPC's algorithms are identical to those in HSPF. Table 4-1 presents the modules from HSPF used in HSPC. Refer to the *Hydrologic Simulation Program FORTRAN User's Manual for Release 11*

for a more detailed discussion of simulated processes and model parameters (Bicknell et al., 1996).

**Table 4-1.** Modules from HSPF<sup>a</sup> converted to HSPC

<b>RCHRES Modules</b>	HYDR	Simulates hydraulic behavior
	CONS	Simulates conservative constituents
	HTRCH	Simulates heat exchange and water
	SEDTRN	Simulates behavior of inorganic sediment
	GQUAL	Simulates behavior of a generalized quality constituent
	PHCARB	Simulates pH, carbon dioxide, total inorganic carbon, and alkalinity
<b>PQUAL and IQUAL Modules</b>	PWATER	Simulates water budget for a pervious land segment
	SEDMNT	Simulates production and removal of sediment
	PWTGAS	Estimates water temperature and dissolved gas concentrations
	IQUAL	Uses simple relationships with solids and water yield
	PQUAL	Simple relationships with sediment and water yield

<sup>a</sup> Source: Bicknell et al., 1996

### 4.3 Model Configuration

The MDAS was configured for the Tygart watershed, and the HSPC model was used to simulate the watershed as a series of hydrologically connected subwatersheds. Configuration of the model involved subdivision of the Tygart watershed into modeling units and continuous simulation of flow and water quality for these units using meteorological, landuse, point source loading, and stream data. Specific pollutants that were simulated include total aluminum, total iron, and total manganese, and pH. This section describes the configuration process and key components of the model in greater detail.

#### 4.3.1 Watershed Subdivision

To represent watershed loadings and resulting concentrations of metals in the Tygart Valley River, the watershed was divided into 1,007 subwatersheds. These subwatersheds are presented in Figure 1 in each of Appendices A-1 through A-21, and they represent hydrologic boundaries. The division was based on elevation data (7.5 minute Digital Elevation Model [DEM] from USGS), stream connectivity (from EPA’s Reach File, Version 3 [RF3] stream coverage), and locations of monitoring stations.

### *4.3.2 Meteorological Data*

Meteorological data are a critical component of the watershed model. Appropriate representation of precipitation, wind speed, potential evapotranspiration, cloud cover, temperature, and dewpoint are required to develop a valid model. Meteorological data were accessed from a number of sources in an effort to develop the most representative dataset for the Tygart watershed.

In general, hourly precipitation data are recommended for nonpoint source modeling. Therefore, only weather stations with hourly-recorded data were considered in development of a representative dataset. Long-term hourly precipitation data available from four National Climatic Data Center (NCDC) weather stations located near the watershed were used (Figure 4-1):

- Terra Alta No 1
- Tygart Dam
- Elkins WSO Airport
- Valley Head

Meteorological data for the remaining required parameters were available from the Elkins WSO Airport station. These data were applied to all subwatersheds in the Tygart watershed.



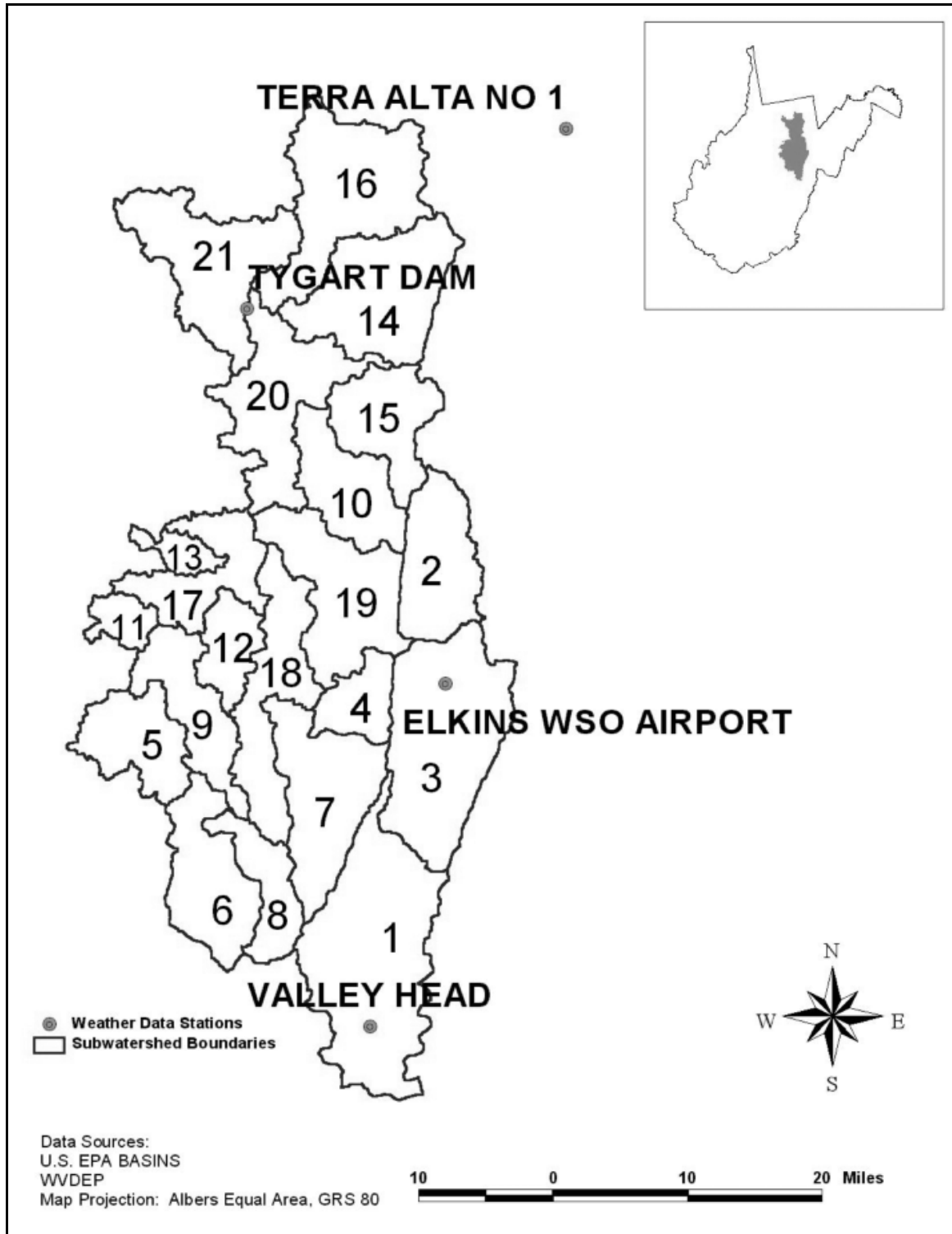


Figure 4-1. Weather stations used in modeling

4.3.3 Nonpoint Source Representation

Abandoned Mine Lands (AML)

In order to represent AMLs as nonpoint sources, the AML categories were represented as three unique land use categories: high walls, disturbed land, and abandoned mines. The abandoned mines represent either discharge from abandoned deep mines or seeping and leaching from other abandoned mine sites. The forested area land use (described below in the Other Nonpoint Sources section) was reduced to account for the three additional land uses.

Other Nonpoint Sources

The MRLC land use categories were reclassified into eight land use categories that best describe the watershed conditions and dominant source categories. The eight land uses represent nonpoint sources, which include barren land, crop land, forest, pasture, strip mining/quarries/gravel pits, urban impervious, urban pervious, and wetlands. The land use reclassification is shown in Table 4-2.

**Table 4-2.** Model land use reclassification

Model Category	MRLC Category
Barren	Bare Rock/Sand/Clay
	Transitional Barren
	Bare Soil
Crop land	Row Crops
	Small Grains
Forest	Deciduous Forest
	Evergreen Forest
	Mixed Forest
	Deciduous Shrub land
	Evergreen Shrub land
	Mixed Shrub land
Pasture	Non-Natural Woody (Orchards/Groves/etc)
	Grasslands/Herbaceous (Natural/Semi Natural Herbaceous)
	Pasture/Hay
Strip Mining	Other Grasses/(Urban Grasses)
	Quarries/Strip Mines/Gravel Pits
Urban Impervious	Low Intensity Residential
	High Intensity residential
	High Intensity Commercial/Industrial/Transportation
Urban Pervious	Low Intensity Residential
	High Intensity residential
	High Intensity Commercial/Industrial/Transportation
Wetlands	Woody Wetlands
	Emergent Herbaceous Wetlands

This land use coverage was used to estimate total aluminum, iron, and manganese loadings associated with conventional land uses. The assumed pervious and impervious percentage for each land use, which affects the hydrology and water quality of the Tygart watershed, is listed in Table 4-3. These percentages are based on the average percent impervious area of different land use types found in the Soil Conservation Service’s *TR-55, Urban Hydrology for Small Watersheds* manual (USDA-SCS, 1986).

**Table 4-3.** Average percent perviousness and imperviousness for different land use types

Landuse	Pervious (%)	Impervious (%)
Pasture	100	0
Crop	100	0
Forest	100	0
Barren	100	0
Strip mine	100	0
High density commercial/industrial/transportation (urban impervious)	15	85
Lower density residential (urban pervious)	88	12
Wetlands	100	0

*4.3.4 Point Sources Representation*

Permitted Non-mining Point Sources

Non-mining point source permits in the Tygart watershed were not permitted for iron, aluminum, or manganese discharges. Therefore, the non-mining facilities were not considered in the modeling effort.

Permitted Mining Point Sources

The permitted mining point sources were introduced as six unique land use categories based on the type of mine and the current status of the mine. Phase II and Completely Released permitted facilities were not modeled since reclamation of these mines is either completed or nearly complete, and they are assumed to have little potential water quality impact (WVDEP, 2000a). Table 4-4 shows the land uses representing current active mines that were modeled.

**Table 4-4.** Model nonpoint source representation of different permitted mines

Type and status of active mine	Land use representation
Active deep mine	ADM
New/inactive deep mine	IADM
Phase I released deep mine	PIDM
Revoked deep mines	RDM
Active/inactive/revoked surface mines	ASM
Other mines (other, haulroad, prospect, quarry)	Other

To account for the additional deep mine land use categories (ADM, IADM, RDM and PIDM), the area of each permitted deep mine was subtracted from the forested land use area. The remaining additional land use categories (ASM and Other) were subtracted from the strip mine

land use areas. The size of each mine was assumed to be equivalent to the surface disturbed area. A summary of the land use distribution is shown in Tables 4-5 and 4-6.

**Table 4-5. Modeled land use distribution in acres for regions 1 through 11 (in acres)**

Land Use Name	1	2	3	4	5	6	7	8	9	10	11
ADM	0	0	0	0	33	0	0	27	173	0	0
AML	0	0	0	30	20	50	308	0	40	0	21
ASM	3	0	0	361	0	109	0	160	818	37	0
Barren	427	22	126	144	45	161	218	140	158	47	297
Cropland	2652	1527	1994	2	2320	510	399	80	1377	2769	1081
Disturbed land	0	0	0	16	42	5	170	0	24	23	84
Forest	89878	30895	57829	16372	18336	37984	49447	21623	26766	24315	5848
Highwall	0	0	11	98	37	8	28	83	15	68	29
IADM	0	0	0	0	0	0	10	33	0	0	0
Other mines	71	0	130	0	106	6	0	219	146	0	1
Pasture	8163	5717	9696	385	4465	1256	367	189	4350	7136	2188
PIDM	0	0	0	0	0	0	37	32	0	0	0
RDM	22	0	0	35	0	8	2	18	0	9	5
Strip mining	59	0	52	896	3	324	117	307	938	44	1
Urban Impervious	91	485	17	41	12	18	12	121	5	383	0
Urban Pervious	262	824	19	62	30	8	14	460	20	352	0
Water	201	73	507	11	38	43	9	15	326	31	31
Wetlands	308	223	761	29	38	24	22	10	40	20	15
<b>Total</b>	<b>101902</b>	<b>38811</b>	<b>72415</b>	<b>18415</b>	<b>25586</b>	<b>40530</b>	<b>51159</b>	<b>22962</b>	<b>35752</b>	<b>34524</b>	<b>10335</b>

**Table 4-6. Modeled land use distribution in acres for regions 12 through 21 (in acres)**

Land Use Name	12	13	14	15	16	17	18	19	20	21
ADM	0	0	235	0	131	37	0	0	136	0
AML	0	10	72	0	52	75	102	370	34	25
ASM	88	55	381	0	1309	220	874	364	87	48
Barren	109	11	101	80	350	133	265	268	854	316
Cropland	755	842	2423	1743	1897	2518	883	1780	2203	2535
Disturbed land	67	10	16	0	142	132	57	239	107	60
Forest	15833	4538	42959	27242	52665	20827	41292	41099	38481	40357
Highwall	1	47	10	3	151	102	15	184	72	72
IADM	0	0	0	0	7	0	0	85	35	133
Other mines	0	17	28	139	348	187	8	605	300	368
Pasture	2102	2195	9711	4879	6498	6694	2070	6378	8020	9406
PIDM	0	0	0	0	0	0	0	0	36	0
RDM	0	0	144	0	4	14	20	0	0	0
Strip mining	112	30	147	58	493	207	231	914	367	106
Urban Impervious	8	4	3	62	109	7	96	266	664	0
Urban Pervious	20	26	16	269	106	21	288	197	1527	0
Water	34	16	50	60	96	489	276	648	2288	953

Land Use Name	12	13	14	15	16	17	18	19	20	21
Wetlands	17	5	67	56	55	109	22	103	408	62
<b>Total</b>	<b>19179</b>	<b>7803</b>	<b>56375</b>	<b>34280</b>	<b>64528</b>	<b>31959</b>	<b>46143</b>	<b>53422</b>	<b>53890</b>	<b>56633</b>

Point sources were represented differently, depending on the stage of modeling for TMDL development. The two major stages, which are described in more detail later in this section and in Section 5, are the calibration condition and the allocation conditions.

#### Calibration Condition

For matching model results to historical data, which is described in more detail in the Model Calibration section, it was necessary to represent the existing point sources using available historical data. Permitted discharges that were issued after the calibration period were not considered during the calibration process. If Discharge Monitoring Report data (DMRs) were available, permitted mines were represented in the model using average flows and pollutant loads. The DMR data includes monthly averages and maximums for flow, pH, total aluminum, total iron, and manganese. The monthly average metals concentrations were multiplied by the discharge flows to estimate average loadings for these point sources.

In most cases, DMRs were insufficient to support representation in the model. For these situations, permitted point sources were represented by the following approach. When DMR data were available for point sources within a region, the average flow and monthly average concentrations were distributed throughout that particular region. In cases where there were no available DMR data within a region, the average point source flow from the entire Tygart watershed and the permitted average concentrations were used to estimate the loadings for the point sources. Parameters affecting pollutant concentrations from these mines were adjusted to be consistent with typical discharge characteristics from similar mining activities or to match site-specific instream monitoring data.

#### Allocation Conditions

Modeling for allocation conditions required running multiple scenarios, including a baseline scenario and multiple allocation scenarios. This process is further explained in Section 5. For the allocation conditions, all permitted mining facilities were represented using precipitation-driven nonpoint source processes in the model. Under this nonpoint source representation, flow was estimated in a manner similar to other nonpoint sources in the watershed (*i.e.*, based on precipitation and hydrologic properties). This is consistent with OMR’s estimation that discharges from most surface mines and some deep mines are precipitation-driven (WVDEP, 2000b). Flow was typically present at all times, and it increased during storm events. The metals concentrations were assigned based on permit limits for the baseline condition modeling and based on required reductions to achieve instream TMDL endpoints for the allocation scenarios.

Traditionally, mining discharge permits have had either technology-based or water quality-based effluent limitations. For existing technology-based permits, effluent limitations and self-monitoring requirements represent wasteload allocations of 3.2 (mg/l) and 2.0 (mg/l) for iron and manganese, respectively. Aluminum has not been not limited in existing permits, but regular

self-monitoring has been required. Based upon a review of self-monitoring results, a wasteload allocation of 4.3 (mg/l) was chosen to represent the aluminum baseline condition. Existing water quality-based permits require compliance with instream water quality criteria end-of-pipe. In the allocation process, existing point sources were assigned wasteload allocation values that range from those representing water quality criteria end-of-pipe to those representing existing technology-based requirements.

### *4.3.5 Stream Representation*

Modeling subwatersheds and calibrating hydrologic and water quality model components required routing flow and pollutants through streams. Each subwatershed was represented with a single stream. Stream segments were identified using EPA's RF3 stream coverage.

In order to route flow and pollutants, development of rating curves was required. Rating curves were developed for each stream using Manning's equation and representative stream data. Required stream data includes slope, Manning's roughness coefficient, and stream dimensions including mean and channel widths and depths. Manning's roughness was assumed to be 0.05 for all streams (representative of natural streams). Slopes were calculated based on digital elevation model (DEM) data and stream lengths measured from the RF3 stream coverage. Stream dimensions were estimated using regression curves that relate upstream drainage area to stream dimensions (Rosgen, 1996).

### *4.3.6 Hydrologic Representation*

Hydrologic processes were represented in the HSPC using algorithms from the PWATER (water budget simulation for pervious land segments) and IWATER (water budget simulation for impervious land segments) modules of HSPF (Bicknell et al., 1996). Parameters associated with infiltration, groundwater flow, and overland flow were designated during model calibration.

### *4.3.7 Pollutant Representation*

In addition to flow, three pollutants were modeled with the HSPC:

- Total aluminum
- Total iron
- Total manganese
- pH

The loading contributions of these pollutants from different nonpoint sources was represented in the HSPC using the PQUAL (simulation of quality constituents for pervious land segments) and IQUAL (simulation of quality constituents for impervious land segments) modules in HSPF (Bicknell et al., 1996). Pollutant transport was represented in the streams using the GQUAL (simulation of behavior of a generalized quality constituent) and SEDMNT (simulation of sediment and its associated quality constituents) modules. Values for the pollutant representation were refined through the water quality calibration process.

## 4.4 Model Calibration

After the model was configured, calibration was performed at multiple locations throughout the Tygart watershed. Calibration refers to the adjustment or fine-tuning of modeling parameters to reproduce observations. Model calibration focused on two main areas: hydrology and water quality. Upon completion of the calibration at selected locations, a calibrated dataset containing parameter values for modeled sources and pollutants was developed. This dataset was applied to areas where calibration data were not available.

A significant amount of time-varying monitoring data were necessary to calibrate the model. Available monitoring data in the watershed were identified and assessed for application to calibration (Tables 3a, 3b, and 3c in each of Appendices A-1 through A-21). Only monitoring stations with data representing a range of hydrologic conditions, source types, and pollutants were selected. The locations selected for calibration are presented in Figure 4-2.

### *4.4.1 Hydrology Calibration*

Hydrology was the first model component calibrated. The hydrology calibration involved a comparison of model results to in-stream flow observations at selected locations and the subsequent adjustment of hydrologic parameters. Key considerations included the overall water balance, the high-flow low-flow distribution, storm flows, and seasonal variation.

To best represent hydrologic variability throughout the watershed, three locations with daily flow monitoring data were selected for calibration. The stations were USGS #03053500 on the Buckhannon River, USGS #03050500 on the Tygart Valley River, and USGS # 03052500 on Sand Run. The model was calibrated for the year 1986, because it represented a range of hydrologic conditions. Flow-frequency curves, temporal comparisons (daily and monthly), and comparisons of high flows and low flows were developed to support calibration. The calibration involved adjustment of infiltration, subsurface storage, evapotranspiration, surface runoff, and interception storage parameters.

After adjusting the appropriate parameters within acceptable ranges, good correlations were found between model results and observed data for the comparisons made. Flow-frequency curves and temporal analyses are presented in Appendix C.

Parameter values were validated for an independent, extended time period (usually between 1980 and 1992) after calibrating parameters at the stations. Validation involved comparison of model results and flow observations without further adjustment of parameters. The validation comparisons also showed a good correlation between modeled and observed data. Refer to Appendix C for validation results.

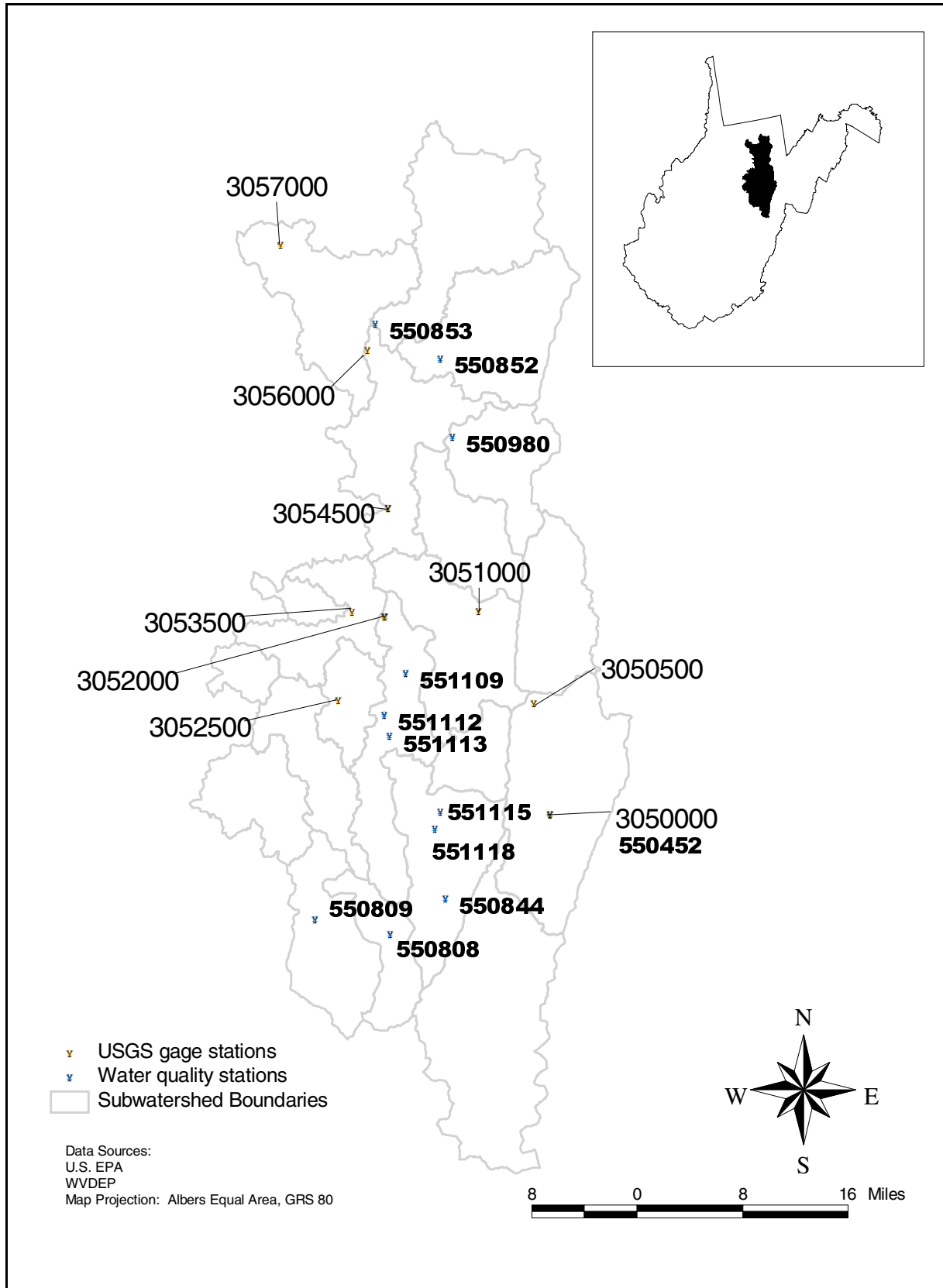


Figure 4-2. Calibration locations used in modeling



#### *4.4.2 Water Quality Calibration*

After hydrology had been sufficiently calibrated, water quality calibration was performed. Modeled versus observed in-stream concentrations were directly compared during model calibration. The water quality calibration consisted of executing the watershed model, comparing water quality time series output to available water quality observation data, and adjusting water quality parameters within a reasonable range.

The approach taken to calibrate water quality focused on matching trends identified during the water quality analysis. Daily average instream concentration from the model was compared directly to observed data. Observed data were obtained from EPA's STORET database as well as from three additional groups collecting water quality data in the Tygart watershed. - the Stream Restoration Group, the Special Reclamation Group, and Bond Forfeiture. Each group's data were obtained through WVDEP. The objective was to best simulate low flow, mean flow, and storm peaks at representative water quality monitoring stations. Representative stations were selected based on both location (distributed throughout the Tygart watershed) and source type. These stations were typically West Virginia DEP monitoring stations. Results of the water quality calibration are presented in Appendix C.

## 5.0 Allocation Analysis

A TMDL is the total amount of a pollutant that can be assimilated by the receiving water while still achieving water quality standards. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving water body. Conceptually, this definition is denoted by the equation:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

In order to develop aluminum, iron, manganese, and pH TMDLs for each of the waterbodies in the Tygart watershed listed on the West Virginia 303(d) list, the following approach was taken:

- Define TMDL endpoints
- Simulate baseline conditions
- Assess source loading alternatives
- Determine the TMDL and source allocations

### 5.1 TMDL Endpoints

TMDL endpoints represent the instream water quality targets used in quantifying TMDLs and their individual components. Different TMDL endpoints are necessary for each impairment type (*i.e.*, aluminum, iron, manganese, and pH). West Virginia's numeric water quality criteria for aluminum, iron, manganese, and pH (identified in Section 2) and an explicit margin of safety (MOS) were used to identify endpoints for TMDL development.

#### 5.1.1 Aluminum, Iron, and Manganese

The TMDL, with the MOS, endpoint for aluminum was selected as 712.5 ug/L (based on the 750 ug/L criteria for aquatic life minus a 5% MOS). The endpoint, with the MOS, for iron was selected either as 0.475 mg/L (based on the 0.5 mg/L criteria for aquatic life-trout waters minus a 5% MOS) or 1.425 mg/L (based on the 1.5 mg/L criteria for aquatic life minus a 5% MOS). The endpoint, with the MOS, for manganese was selected as 0.95 mg/L (based on the 1.0 mg/L criteria for human health minus a 5% MOS).

Components of the TMDLs for aluminum, iron, and manganese are presented in terms of mass per time in this report.

#### 5.1.2 pH

The water quality criteria for pH requires it to be above 6 and below 9. In the case of acid mine drainage, pH, is not a good indicator of the acidity in a waterbody and can be a misleading characteristic. Water with near neutral pH (~7) but containing elevated concentrations of dissolved ferrous (Fe<sup>2+</sup>) ions can become acidic after oxidation and precipitation of the iron

(PADEP, 2000). Therefore, a more practical approach to meeting the water standards of pH is to use the concentration of metal ions as a surrogate for pH. Through reducing instream metals, namely aluminum and iron, to meet water quality criteria (or TMDL endpoints), it is assumed that the pH will result in meeting the WQS. This assumption is based on the application of MINTEQA2, a geochemical equilibrium speciation model, to aqueous systems representative of waterbodies in the Tygart watershed. By inputting into the model the dissolved concentrations of metals, a pH value can be predicted. Refer to Appendix D for a more detailed description of the modeling.

*5.1.3 Margin of Safety*

An implicit MOS was included in TMDL development through application of a dynamic model for simulating daily loading over a wide range of hydrologic and environmental conditions, and through the use of conservative assumptions in model calibration and scenario development. In addition to this implicit margin of safety, a 5% explicit MOS was used to account for the differences between modeled and monitored data. Long term water quality monitoring data were used for model calibration. While these data represented actual conditions, they were not continuous time series and may not have captured the full range of instream conditions that occurred during the simulation period. The explicit 5% MOS also accounts for those cases where monitoring data may not have captured the full range of instream conditions.

**5.2 Baseline Conditions**

The calibrated model provided the basis for performing the allocation analysis. The first step in this analysis involved simulation of baseline conditions. Baseline conditions represent existing nonpoint source loading conditions and permitted point source discharge conditions. The baseline conditions allow for an evaluation of instream water quality under the “worst currently allowable” scenario.

The model was run for baseline conditions for the period January 1, 1987 through December 31, 1992. Predicted instream concentrations of aluminum, iron, and manganese for the impaired waterbodies in the Tygart watershed were compared directly to the TMDL endpoints. This comparison allowed evaluation of the expected magnitude and frequency of exceedances under a range of hydrologic and environmental conditions, including dry periods, wet periods, and average periods.

Permitted conditions for mines were represented using precipitation-driven flow estimations and the metals concentrations presented in Table 5-1.

**Table 5-1.** Metals concentrations used in representing permitted conditions for mines

<b>Pollutant</b>	<b>Technology-based Permits</b>	<b>Water Quality-based Permits</b>
Aluminum, total	4.3 mg/L (assumed for “report only”)	0.75 mg/L
Iron, total	3.2 mg/L	1.5 mg/L, 0.5 mg/L (trout waters)
Manganese, total	2.0 mg/L	1.0 mg/L

### 5.3 Source Loading Alternatives

Simulation of baseline conditions provided the basis for evaluating each stream's response to variations in source contributions under virtually all conditions. This sensitivity analysis gave insight into the dominant sources and how potential decreases in loads would affect instream metals concentrations. For example, loading contributions from abandoned mines, permitted facilities, and other nonpoint sources were individually adjusted and instream concentrations were observed.

Multiple scenarios were run for the impaired waterbodies. Successful scenarios were those that achieved the TMDL endpoints under all conditions for aluminum, iron, and manganese (through comparison of model results for the 1987-1992 modeling period). Exceedances for aluminum and iron were allowed once every three years. The averaging period was taken into consideration during these assessments (*e.g.*, a four-day average was used for iron). In general, loads contributed by abandoned mines and revoked mines were reduced first, because they generally had the greatest impact on instream concentrations. If additional load reductions were required to meet the TMDL endpoints, then reductions were made in point source (permitted) contributions.

### 5.4 TMDLs and Source Allocations

A top-down methodology was followed to develop the TMDLs and allocate loads to sources. Headwaters were analyzed first, because their impact frequently had a profound effect on downstream water quality. In impaired subwatersheds, loading contributions were reduced to the extent necessary to ensure compliance with instream criteria, and the loading associated with that condition was transferred to downstream subwatersheds. Conversely, where MDAS indicated that the baseline condition was compliant with water quality criteria, the loading associated with the baseline condition was transferred to downstream subwatersheds. The required headwater reductions often led to downstream water quality improvements, effectively decreasing necessary loading reductions from downstream sources.

In some situations, reductions in sources contributing to unlisted stream segments have been determined necessary to ensure universal compliance with water quality criteria in the watershed. Recent water quality data is not available for all streams in the watershed and MDAS is the best technical tool available to determine if a particular permit is protective of water quality criteria. Other situations have been encountered where recent water quality data indicates that a particular stream segment is not impaired, yet the TMDL imposes point source wasteload allocations that represent a reduction of existing permit limitations. Certain permittees that are currently achieving discharge quality that is better than required by their permit may need to maintain such improved performance in order for the receiving water to consistently meet standards.

The general allocation philosophy used in this TMDL is further described as follows:

- Pollutant reductions were not required of non-mining point or nonpoint sources. Non-mining point sources in this watershed do not discharge significant amounts of aluminum, iron and manganese. The model predicts that, in the absence of other sources, the

pollutants contributed by non-mining nonpoint sources (forest, agriculture, urban) do not cause water quality criteria violation.

- Pollutant reductions of mining nonpoint sources (AML and revoked permits) were required first, to the extent necessary to achieve instream compliance or to the extent expected to be reasonably achievable.
- Pollutant reductions from mining point sources were required only if mining nonpoint sources are not present in the subwatershed, or if the reduction of existing mining nonpoint sources was inadequate to achieve instream compliance.

This methodology ensures water quality criteria compliance in all streams in the watershed, targets pollutant reductions from the primary causative sources of impairment, and minimizes the impact to existing point sources in the watershed.

The TMDLs for the Tygart watershed were determined on a subwatershed basis (for each of the 21 defined regions with the exception of Region 8). The TMDLs for Region 8 were completed in 1998 as a part of *Metals TMDL for Buckhannon River, West Virginia* (1998).

### 5.4.1 Wasteload Allocations (WLAs)

The WLAs for aluminum, iron, and manganese (for each permit) are presented in Tables 4a, 4b, and 4c for each of Appendices A-1 through A-21. The WLAs are presented as annual loads, in terms of pounds per year and as discharge concentrations. They are presented on an annual basis (as an average annual load), because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The concentration values represent a range of concentrations that achieve instream water quality criteria (under the same range of conditions). Each parameter was assigned a WLA (as a concentration) within a range of discharge concentrations, the minimum reflecting the instream water quality criteria, the maximum having been derived from the EPA's *Technical Support Document for Water Quality-based Toxics Control* (USEPA, 1991) to find the monthly average discharge concentration. The ranges are as follows: Al: 0.75-4.3mg/L, Fe: 0.5 or 1.5 -3.2mg/L, Mn: 1.0-2.0 mg/L.

### 5.4.2 Load Allocations (LAs)

Load allocations (LAs) were made for the dominant source categories, as follows:

- Abandoned mine lands (including abandoned mines (deep), high walls, and disturbed areas), strip mines (areas represented in the land use coverage, but not accounted for by permits or AMLs)
- Other nonpoint sources (urban, agricultural, and forested land contributions)
- Revoked permits - (loading from revoked permitted facilities)

The LAs for aluminum, iron, and manganese are presented in Tables 5a, 5b, and 5c for each of Appendices A-1 through A-21. The LAs are presented as annual loads, in terms of pounds per

year. They are presented on an annual basis (as an average annual load), because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. Tables 5-2, 5-3, and 5-4 present the  $\sum$  LAs and  $\sum$  WLAs for aluminum, iron, and manganese, respectively, for each of the 303(d) listed segments.

5.4.3 pH Modeling Results

As described in section 5.1.2, aluminum, iron, and manganese concentrations were input into MINTEQA2 to simulate various scenarios including conditions with metals concentrations meeting water quality standards and conditions in proximity to mining activities. MINTEQA2 was run twice using the two different iron standards for aquatic life and trout waters. Based on the inputs (described in more detail in Appendix D), pH was estimated to be 7.74 for the aquatic life iron standard of 1.5 mg/L and 7.76 for the trout waters standard of 0.5 mg/L. For the scenario representative of mining areas, typical instream metals concentrations were used, and pH was estimated to be 4.38. Results from MINTEQA2 imply that pH will meet the West Virginia pH criteria of above 6 and below 9 if metals concentrations meet water quality criteria.

5.4.4 Seasonal Variation

A TMDL must consider seasonal variation in the derivation of the allocation. For the Tygart Valley River watershed metals TMDLs, seasonal variation was considered in the formulation of the modeling analysis. By using continuous simulation (modeling over a period of several years), seasonal hydrologic and source loading variability was inherently considered. The metals concentrations simulated on a daily time step by the model were compared to TMDL endpoints. An allocation which meets these endpoints throughout the year was developed.

**Table 5-2.** TMDLs and load and waste load allocations for aluminum

Region	Stream Name	List ID <sup>A</sup>	TMDLs (lbs Al/yr)	$\sum$ LAs (lbs Al/yr)	$\sum$ WLAs (lbs Al/yr)
10	Frost RN	MT-24-A	2,411	2,411	0
11	Bridge RN	MTB-11-B.7	3,247	3,247	0
11	Fink RN	MTB-11-B	21,037	21,013	24
11	Mud lick	MTB-11-B	3,759	3,759	0
13	Little Pecks R	MTB-5-B	1,921	1,921	0
13	Mud RN/Pecks R	MTB-5-C	4,835	4,835	0
13	Pecks RN	MTB-5	16,338	14,605	1,733
13	U.T./Pecks RN	MTB-5-.8A	1,523	1,523	0
14	Glade RN/Sandy	MT-18-C	3,625	3,625	0
14	Left Fork/ LL	MT-18-E-3	8,446	7,234	1,212
14	Left Fork/ San	MT-18-G	12,147	12,147	0
14	Little Sandy C	MT-18-E	36,858	33,957	2,901
14	Maple RN	MT-18-E-1	4,828	3,166	1,662
14	Sandy CK	MT-18	74,736	71,835	2,901
16	Birds CK	MT-12-H	12,966	9,816	3,150
16	Brains CK	MT-12-G-2	4,996	3,056	1,940
16	Little Raccoon	MT-12-C-2	2,559	1,719	840
16	Raccoon CR	MT-12-C	17,927	13,933	3,994
16	Squires CK	MT-12-I	8,097	3,561	4,536
16	Threefork CK	MT-12	88,934	73,689	15,245
17	Big RN1	MTB-8	2,463	2,463	0
17	Big RN2	MTB-3	7,449	6,505	944
17	Buckhanno	MT-31	59,499	55,693	3,806
17	Sugar RN	MTB-10-A	2,370	2,370	0

# Metals and pH TMDLs for the Tygart Valley River Watershed

Region	Stream Name	List ID <sup>A</sup>	TMDLs (lbs Al/yr)	$\sum$ LAs (lbs Al/yr)	$\sum$ WLAs (lbs Al/yr)
17	Turkey RN	MTB-11	6,011	4,580	1,431
18	Devil RN	MTM-4	2,760	2,760	0
18	Hell RN	MTM-6	2,624	2,624	0
18	Whiteoak RN	MTM-8	1,396	1,396	0
19	Beaver CK	MT-37	10,890	9,349	1,541
19	Grassy RN	MT-41	4,386	4,386	0
19	Island RN	MT-36	2,531	2,531	0
19	Laurel RN	MT-39	4,343	4,343	0
20	Anglins RN	MT-29	5,085	5,085	0
20	Ford RN	MT-27	3,465	3,450	15
20	Foxgrape RN	MT-26-B	4,057	2,969	1,088
20	Little Hackers	MT-26-C	1,658	686	972
21	Berkely RN	MT-11	12,164	12,164	0
21	Berry RN	MT-11B-1	1,081	1,081	0
21	Goose CK	MT-4	3,644	1,342	2,302
21	Long RN	MT-11-B	3,907	3,907	0
21	Lost RN	MT-5	10,176	10,176	0
21	Shelby RN	MT-11-A	3,841	3,841	0
21	Tygart River	M-27	72,430	65,679	6,751
4	Roaring CK	MT-42	45,553	40,989	4,564
5	Mudlick RN	MTB-18-B-2	1,592	1,216	376
5	Blacklick RN	MTB-18-B	7,251	6,875	376
5	Bull RN	MTB-18-A	1,308	1,308	0
5	Crooked	MTB-18	39,051	38,675	376
5	Franch CK	MTB-18-B-3	932	932	0
6	Herods RN	MTB-30	1,980	1,980	0
6	Swamp RN	MTB-29	1,340	1,340	0
7	Cassity CK	MTM-16	19,803	19,803	0
7	Middle Fork Ri	MT-33	52,975	52,971	4
7	Panther RN	MTM-16-A	11,445	11,445	0
9	Panther FK	MTB-27	13,546	13,546	0

<sup>A</sup> These IDs are the same as Table 1-1 except for WV\_MTB\_11-B.7

**Table 5-3. TMDLs and load and waste load allocations for iron**

Region	Stream Name	List ID	TMDLs (lbs Fe/yr)	$\sum$ LAs (lbs Fe/yr)	$\sum$ WLAs (lbs Fe/yr)
10	Frost RN	MT-24-A	3,405	3,405	0
11	Bridge RN	MTB-11-B.7	4,016	4,016	0
11	Fink RN	MTB-11-B	24,620	24,602	18
11	Mud lick	MTB-11-B	5,193	5,193	0
13	Little Pecks R	MTB-5-B	2,404	2,404	0
13	Mud RN/Pecks R	MTB-5-C	6,268	6,268	0
13	Pecks RN	MTB-5	20,854	19,520	1,334
13	U.T./Pecks RN	MTB-5-.8A	2,450	2,450	0
14	Glade RN/Sandy	MT-18-C	4,213	4,213	0
14	Left Fork/ LL	MT-18-E-3	12,971	10,153	2,818
14	Left Fork/ San	MT-18-G	16,251	16,251	0
14	Little Sandy C	MT-18-E	40,379	35,899	4,480
14	Maple RN	MT-18-E-1	4,883	3,241	1,642
14	Sandy CK	MT-18	81,369	76,889	4,480
16	Birds CK	MT-12-H	20,970	16,761	4,209
16	Brains CK	MT-12-G-2	4,613	2,763	1,850
16	Little Raccoon	MT-12-C-2	2,270	1,645	625
16	Raccoon CR	MT-12-C	23,569	17,808	5,761
16	Squires CK	MT-12-I	13,010	4,756	8,254
16	Threefork CK	MT-12	106,350	83,196	23,154
17	Big RN1	MTB-8	2,403	2,403	0
17	Big RN2	MTB-3	8,883	6,068	2,815
17	Buckhanno	MT-31	56,292	48,772	7,520
17	Sugar RN	MTB-10-A	1,947	1,947	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

Region	Stream Name	List ID	TMDLs (lbs Fe/yr)	$\sum$ LAs (lbs Fe/yr)	$\sum$ WLAs (lbs Fe/yr)
17	Turkey RN	MTB-11	7,991	5,361	2,630
18	Devil RN	MTM-4	2,122	2,122	0
18	Hell RN	MTM-6	2,003	2,003	0
18	Whiteoak RN	MTM-8	1,434	1,434	0
19	Beaver CK	MT-37	8,856	7,709	1,147
19	Grassy RN	MT-41	4,094	4,094	0
19	Island RN	MT-36	3,550	3,550	0
19	Laurel RN	MT-39	4,551	4,551	0
20	Anglins RN	MT-29	4,268	4,268	0
20	Ford RN	MT-27	3,380	3,366	14
20	Foxgrape RN	MT-26-B	4,903	2,994	1,909
20	Little Hackers	MT-26-C	1,540	548	992
21	Berkely RN	MT-11	12,619	12,619	0
21	Berry RN	MT-11B-1	947	947	0
21	Goose CK	MT-4	2,898	1,238	1,660
21	Long RN	MT-11-B	4,275	4,275	0
21	Lost RN	MT-5	9,435	9,435	0
21	Shelby RN	MT-11-A	4,208	4,208	0
21	Tygart River	M-27	68,360	63,390	4,970
4	Roaring CK	MT-42	43,045	38,874	4,171
5	Mudlick RN	MTB-18-B-3	2,591	1,107	1,484
5	Blacklick RN	MTB-18-B-2	7,239	5,755	1,484
5	Bull RN	MTB-18-B	1,379	1,379	0
5	Crooked	MTB-18-A	37,812	36,328	1,484
5	Franch CK	MTB-18	743	743	0
6	Herods RN	MTB-30	2,060	2,060	0
6	Swamp RN	MTB-29	1,315	1,315	0
7	Cassity CK	MTM-16	17,156	17,156	0
7	Middle Fork Ri	MT-33	48,954	48,944	10
7	Panther RN	MTM-16-A	9,838	9,838	0
9	Panther FK	MTB-27	8,093	8,093	0

**Table 5-4.** TMDLs and load and waste load allocations for manganese

Region	Stream Name	List ID	TMDLs (lbs Mn/yr)	$\sum$ LAs (lbs Mn/yr)	$\sum$ WLAs (lbs Mn/yr)
10	Frost RN	MT-24-A	2,376	2,376	0
11	Bridge RN	MTB-11-B.7	2,442	2,442	0
11	Fink RN	MTB-11-B	14,787	14,776	11
11	Mud lick	MTB-11-B	2,690	2,690	0
13	Little Pecks R	MTB-5-B	1,887	1,887	0
13	Mud RN/Pecks R	MTB-5-C	4,400	4,400	0
13	Pecks RN	MTB-5	13,453	12,599	854
13	U.T./Pecks RN	MTB-5-.8A	1,274	1,274	0
14	Glade RN/Sandy	MT-18-C	2,622	2,622	0
14	Left Fork/ LL	MT-18-E-3	6,237	4,616	1,621
14	Left Fork/ San	MT-18-G	9,288	9,288	0
14	Little Sandy C	MT-18-E	24,135	21,622	2,513
14	Maple RN	MT-18-E-1	2,737	1,856	881
14	Sandy CK	MT-18	48,823	46,310	2,513
16	Birds CK	MT-12-H	12,361	9,333	3,028
16	Brains CK	MT-12-G-2	4,192	3,190	1,002
16	Little Racoon	MT-12-C-2	1,296	960	336
16	Racoon CR	MT-12-C	12,450	9,383	3,067
16	Squires CK	MT-12-I	7,854	2,577	5,277
16	Threefork CK	MT-12	63,366	49,083	14,283
17	Big RN1	MTB-8	1,160	1,160	0
17	Big RN2	MTB-3	6,109	4,042	2,067
17	Buckhanno	MT-31	32,708	27,680	5,028
17	Sugar RN	MTB-10-A	1,236	1,236	0
17	Turkey RN	MTB-11	5,237	3,579	1,658



## Metals and pH TMDLs for the Tygart Valley River Watershed

Region	Stream Name	List ID	TMDLs (lbs Mn/yr)	$\sum$ LAs (lbs Mn/yr)	$\sum$ WLAs (lbs Mn/yr)
18	Devil RN	MTM-4	2,400	2,400	0
18	Hell RN	MTM-6	2,321	2,321	0
18	Whiteoak RN	MTM-8	1,331	1,331	0
19	Beaver CK	MT-37	9,069	8,350	719
19	Grassy RN	MT-41	2,375	2,375	0
19	Island RN	MT-36	1,984	1,984	0
19	Laurel RN	MT-39	1,870	1,870	0
20	Anglins RN	MT-29	3,065	3,065	0
20	Ford RN	MT-27	2,106	2,103	3
20	Foxgrape RN	MT-26-B	3,163	1,969	1,194
20	Little Hackers	MT-26-C	962	363	599
21	Berkely RN	MT-11	8,511	8,511	0
21	Berry RN	MT-11B-1	1,003	1,003	0
21	Goose CK	MT-4	3,995	842	3,153
21	Long RN	MT-11-B	3,059	3,059	0
21	Lost RN	MT-5	5,926	5,926	0
21	Shelby RN	MT-11-A	2,886	2,886	0
21	Tygart River	M-27	44,853	39,930	4,923
4	Roaring CK	MT-42	32,942	27,270	5,672
5	Mudlick RN	MTB-18-B-3	1,043	717	326
5	Blacklick RN	MTB-18-B-2	3,878	3,552	326
5	Bull RN	MTB-18-B	781	781	0
5	Crooked	MTB-18-A	19,460	19,134	326
5	Franch CK	MTB-18	411	411	0
6	Herods RN	MTB-30	1,238	1,238	0
6	Swamp RN	MTB-29	807	807	0
7	Cassity CK	MTM-16	15,053	15,053	0
7	Middle Fork Ri	MT-33	28,116	28,114	2
7	Panther RN	MTM-16-A	8,657	8,657	0
9	Panther FK	MTB-27	7,806	7,806	0

### 5.4.5 Future Growth

This TMDL does not include specific future growth allocations to each subwatershed. Because of the general allocation philosophy used in this TMDL, such allocations would be made at the expense of active mining point sources in the watershed. However, the absence of specific future growth allocations does not prohibit new mining in the watershed. Future growth could occur in the watershed under the following scenarios:

1. A new facility could be permitted anywhere in the watershed, provided that effluent limitations are based upon the achievement of water quality standards end-of-pipe for the pollutants of concern in the TMDL.
2. Remining could occur without a specific allocation to the new permittee, provided that the requirements of existing State remining regulations are achieved. Remining activities are viewed as a partial nonpoint source load reduction from Abandoned Mine Lands.
3. Reclamation and release of existing permits could provide an opportunity for future growth provided that permit release is conditioned upon achieving discharge quality better than the wasteload allocation prescribed by the TMDL.

It is also possible that the TMDL may be refined in the future through remodeling. Such refinement may incorporate new information and/or to the redistribute pollutant loads. Trading may provide

an additional opportunity for future growth, contingent upon the State's development of a statewide or watershed-based trading program.

### *5.4.6 Water Quality Trading*

This TMDL neither prohibits nor authorizes trading in the Tygart River watershed. Both the WVDEP and EPA generally endorse the concept of trading, and recognize that it may become an effective tool for TMDL implementation. However, significant regulatory framework development is necessary before large-scale trading in West Virginia may be realized. EPA will cooperate with the West Virginia Division of Environmental Protection in their development of a statewide or watershed-based trading program. Further, EPA supports program development assisted by a consensus-based stakeholder process.

Prior to the development of a formal trading program, it is conceivable that the regulation of specific point source to point source trades may be feasible under the framework of the NPDES program. EPA commits to cooperate with the WVDEP to facilitate such trades if opportunities arise and are proven to be environmentally beneficial.

## 6.0 Reasonable Assurance

Two primary programs are in effect which provide reasonable assurance for maintenance and improvement of water quality in the watershed. The WVDEP's efforts to reclaim abandoned mine lands, coupled with its duties and responsibilities for issuance of NPDES permits, will be the focal points in water quality improvement.

Additional opportunities for water quality improvement are both ongoing and anticipated. Historically, a great deal of research into mine drainage has been conducted by scientists at West Virginia University, the West Virginia Division of Natural Resources, the United States Office of Surface Mining, the National Mine Land Reclamation Center, the National Environmental Training Laboratory and many other agencies and individuals. Funding from EPA's 319 Grant program has been used extensively to remedy mine drainage impacts. This myriad of activity is expected to continue and result in water quality improvement.

## 6.1 Reclamation

Two distinct units of WVDEP reclaim land and water resources impacted by abandoned mines. The Office of Abandoned Mine Lands and Reclamation remedies eligible sites under Title IV of the Surface Mining Control and Reclamation Act of 1977. The Office of Mining and Reclamation's Special Reclamation Program remedies sites where operating permits and bonds have been revoked. Funding of the Office of Abandoned Mine Lands and Reclamation is derived from a federal tax on coal producers. The Special Reclamation Program is funded by the Special Reclamation Fund, which has primary sources of income from civil penalties, forfeited bonds, and a three-cent per ton fee on all coal produced.

A description of the operating procedures and accomplishments of each program follows.

### 6.1.1 Office of Abandoned Mine Lands and Reclamation

Title IV of the Surface Mining Control and Reclamation Act (Public Law 95-87) is designed to help reclaim and restore coal mine areas abandoned prior to August 3, 1977, throughout the country. The AML Program supplements existing state programs and allows the State of West Virginia to correct many abandoned mine related problems that would otherwise not be addressed.

The major purpose of the AML Program is to reclaim and restore abandoned mine areas so as to protect the health, safety, and general welfare of the public and the environment.

The AML Program corrects abandoned mine-related problems in accordance with the prioritization process specified in Public Law 95-87, Section 403 (a), 1-3.

Priorities:

- Priority 1 – The protection of public health, safety, general welfare, and property from extreme danger of adverse effects related to coal mining practices;

- Priority 2 – The protection of public health, safety, and general welfare from adverse effects related to coal mining practices; and
- Priority 3 – The restoration of the environment, including the land and water resources, that were degraded by adverse effects related to coal mining practices. This involves the conservation and development of soil, water (not channelization), woodland, fish and wildlife, recreational resources, and agricultural productivity.

Priority 1 and 2 problem areas include unsafe refuse piles, treacherous highwalls, pollution of domestic water supplies from mine drainage, mine fires, subsidence and other abandoned mine-related problems.

The AML Program is now also focused on Priority 3 problem areas and on treating and abating water quality problems associated with abandoned mine lands but is not required by law or any statutory authority to do so. By recognizing the need to protect, and in many cases, improve the quality of the state's water resources from the impacts of mine drainage pollution from abandoned coal mines, coordinated efforts are now being employed to deal with this nonpoint source pollution problem.

Although OAML&R has been actively involved in the successful remediation of mine drainage pollution, inadequate funding and the lack of cost-effective mine drainage pollution treatment and abatement technologies have limited water quality improvement efforts. In 1990, the Surface Mining Control and Reclamation Act was amended to include a provision allowing states and tribes to establish an Acid Mine Drainage Treatment and Abatement Program and Fund. States and tribes may set-aside up to 10% of their annual grant to begin to address abandoned polluted coal mine drainage problems. Money from the Acid Mine Drainage Treatment and Abatement Fund can be utilized to clean-up mine drainage pollution at sites where mining ceased prior to August 3, 1977, and where no continuing reclamation responsibility can be determined. In order to qualify and be eligible, qualified hydrologic units or watersheds must be identified and water quality must adversely impact biological resources. A plan must be prepared and presented to the Natural Resources Conservation Service for review and the Office of Surface Mining for approval. Plans that include the most cost-effective treatment and abatement alternatives, the greatest down-stream benefits to the ecosystem, and diverse cooperators and stakeholders, will be the highest priority for approval.

AML&R has created an Acid Mine Drainage Abatement Policy to guide efforts in treating and abating mine drainage pollution. The Policy acts to guide the expenditure of funds in order to achieve the maximum amount of mine drainage pollution treatment within the boundaries imposed by budgetary and statutory constraints. The goal is to utilize existing technologies and practical economic considerations to maximize the amount of treatment for dollars expended.

The policy includes a holistic watershed characterization and remediation procedure known as the Holistic Watershed Approach Protocol. The Protocol involves diverse stakeholders in the establishment of various sampling networks and subsequent water quality data generation that focus remediation efforts. The Protocol is first used to subdivide the watershed into focus areas. More specific data is then generated to allow identification of the most feasible pollution sources

to address and the best available pollution abatement technology to apply. The Protocol also includes the establishment of post-construction sampling networks to assess the impacts of remediation efforts. The Protocol is iteratively implemented until all focus areas have been addressed and all feasible pollution abatement technologies have been applied. A detailed description of the Protocol is provided in Appendix E.

### 6.1.2 Special Reclamation Group

When notice of permit revocation is received from the Director, a liability estimate is completed within 60 days of the revocation. The liability estimate notes any special health and safety characteristics of the site and calculates the cost to complete reclamation according to the permit reclamation plan. At sites where acid mine drainage is present, the permit is flagged for water quality characterization and a priority index assigned.

The reclamation plan at all sites includes the application of the best professional judgment to address the site specific problems including acid mine drainage. Any change or modification to the permit reclamation plan is done by or under the supervision of a Registered Professional Engineer. All construction requires application of best management practices to insure quality work and protect the environment.

Prioritization of bond forfeiture sites is consistent with the criteria used in the Abandoned Mine Land and Reclamation (AML&R) program. The criteria, as described below, have been used successfully for many years on abandoned mine areas with similar characteristics to bond forfeiture sites.

#### Priority

#### Description

1. The highest priority sites are those that entail protection of public health, safety, general welfare, and property from extreme danger. There are relatively few of these types of bond forfeiture sites; however, they are unquestionably first order priorities and receive a ranking of 1.
2. Second order priority sites are those where public health, safety, welfare, and property values are judged to be threatened. Examples include sites with a high potential for landslides or flooding or the presence of dangerous highwalls, derelict buildings or other structures..
- 3a. Third order priorities comprise the bulk of bond forfeiture sites. Therefore, this ranking level is sub-divided into smaller groupings. The first sub-group is sites that are causing or have a high potential for causing off-site environmental damage to the land and water resources. Such off-site damage would most likely be from heavy erosion, or high loadings of acid mine drainage.
- 3b. The second sub-group would include sites that are of a lower priority, but are in close geographic proximity to first or second priority sites. It is more efficient and cost effective to "cluster"

projects where possible.

- 3c. The third sub-group includes sites near high-use public recreation areas and major thoroughfares.
- 3d. The fourth sub-group includes sites that are nearly fully reclaimed by the operator and only require monitoring of vegetative growth or other parameters. Sites which have a real potential for re-permitting by another operator or reclamation by a third party, will also be placed in this sub-group.

Reclamation construction contracts occur by submittal of a detailed Project Requisition to the State Purchasing Division. All state purchasing policies and procedures are applicable and the contract is awarded to the lowest qualified bidder. Special Reclamation personnel perform inspection and contract management activities through the life of the contract. When all reclamation work is satisfactorily completed, a one-year contract warranty period begins to insure adequate vegetative growth and drainage system operation. Upon completion of the contract warranty period and recommendation of the Regional Supervisor, the permit status is classified as “completed.” A completed status removes the liability of the forfeited site and terminates WVDEP jurisdiction and responsibility as a Phase III bond release.

At the sites with significant and high priority AMD, treatment operations are conducted to the extent of available funding, pursuant to the authority granted in 22-3-11 (g) of the West Virginia Surface Coal Mining and Reclamation Act. That regulation limits the annual expenditure of funds for designing, constructing and maintaining water treatment systems to 25 % of the annual amount of the fees collected.

## **6.2 Permitting**

NPDES permits in the watershed will be issued, reissued or modified by the Office of Water Resources in close cooperation with the Office of Mining and Reclamation. Both offices have adjusted permitting schedules to accommodate the State’s Watershed Management Framework, thus implementation of TMDL requirements at existing facilities will generally occur at the time of scheduled permit reissuance. Permits for existing facilities in the Tygart Valley watershed are scheduled to be reissued in 2002.

## 7.0 Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each state must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements. As a result, it is the intent of the West Virginia DEP to solicit public input by providing opportunities for public comment and review of the draft TMDLs. The public meetings pertaining to the Tygart Valley River watershed occurred as follows:

January 26, 1999	Public meeting presenting an introduction to the TMDL process, together with the requirements of the consent decree.
July 28, 1999	Public meeting presented by WVDEP, EPA and Tetra Tech.
May 9, 2000	Public meeting presented by WVDEP, EPA and Tetra Tech.
October 11, 2000	Public meeting presented by WVDEP, EPA and Tetra Tech.
January 15, 2001	Public meeting presented by WVDEP, EPA and Tetra Tech.

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## **Appendix A**

### **Tygart Valley River Watershed Data and TMDLs**

Appendix A is divided into 21 separate sections. Each section provides information for a different region of the Tygart watershed. The map on the following page presents the watershed's 21 regions (Figure A). Numeric designation for each Appendix A section corresponds to the same numerically identified region of the Tygart watershed (e.g., Appendix A-3 corresponds to region 3 of the Tygart watershed).

The structure and content of the appendices are as follows:

- **Figure 1**—presents a map of the region, including impaired waterbodies, RF3 stream segments, and subwatersheds used in the model. The subwatershed IDs provide a basis for presenting information in the subsequent tables.
- **Table 1**—lists each impaired waterbody, its corresponding impairment and use designation, all subwatersheds in the region that drain into the impaired waterbody (contributing SWS), and any other regions that drain into the impaired waterbody (contributing regions). Use designations are presented in Section 2 of the main report.
- **Table 2**—lists the subwatersheds in the region that are assumed to contain abandoned mines. These abandoned mines refer to seeps, deep mines, and leaching. They do not include highwall locations or disturbed areas.
- **Tables 3a, 3b, and 3c**—summarize water quality data for water quality monitoring stations in the region. Each table summarizes data for a different metal (aluminum, iron, and manganese). Data are summarized by subwatershed (SWS) and the summary includes averages, minimum, and maximum observed values, as well as the total number of observations (count) and the start and end date of sampling.
- **Tables 4a, 4b, and 4c**—present baseline and allocation information for permitted mine point sources in the region and future growth allocations. Tables a through c present information for different metals. The information is presented by mine permit for each subwatershed. Baseline loads (in lbs/yr) are presented for each mine. The baseline load represents the load estimated under baseline conditions, assuming a constant permitted concentration. This load represents the monthly average permitted discharge (based on existing permit limits), and does not necessarily represent current conditions. This load is presented for comparative purposes. Allocation loads (in lbs/yr) and allocation concentrations (in mg/L) are also presented for each mine. The allocation load represents the WLA. The allocation concentration represents the maximum allowable concentration that will meet the water quality criteria for all conditions. These concentrations were derived from the EPA's *Technical Support Document for Water Quality-based Toxics Control* (USEPA, 1991).

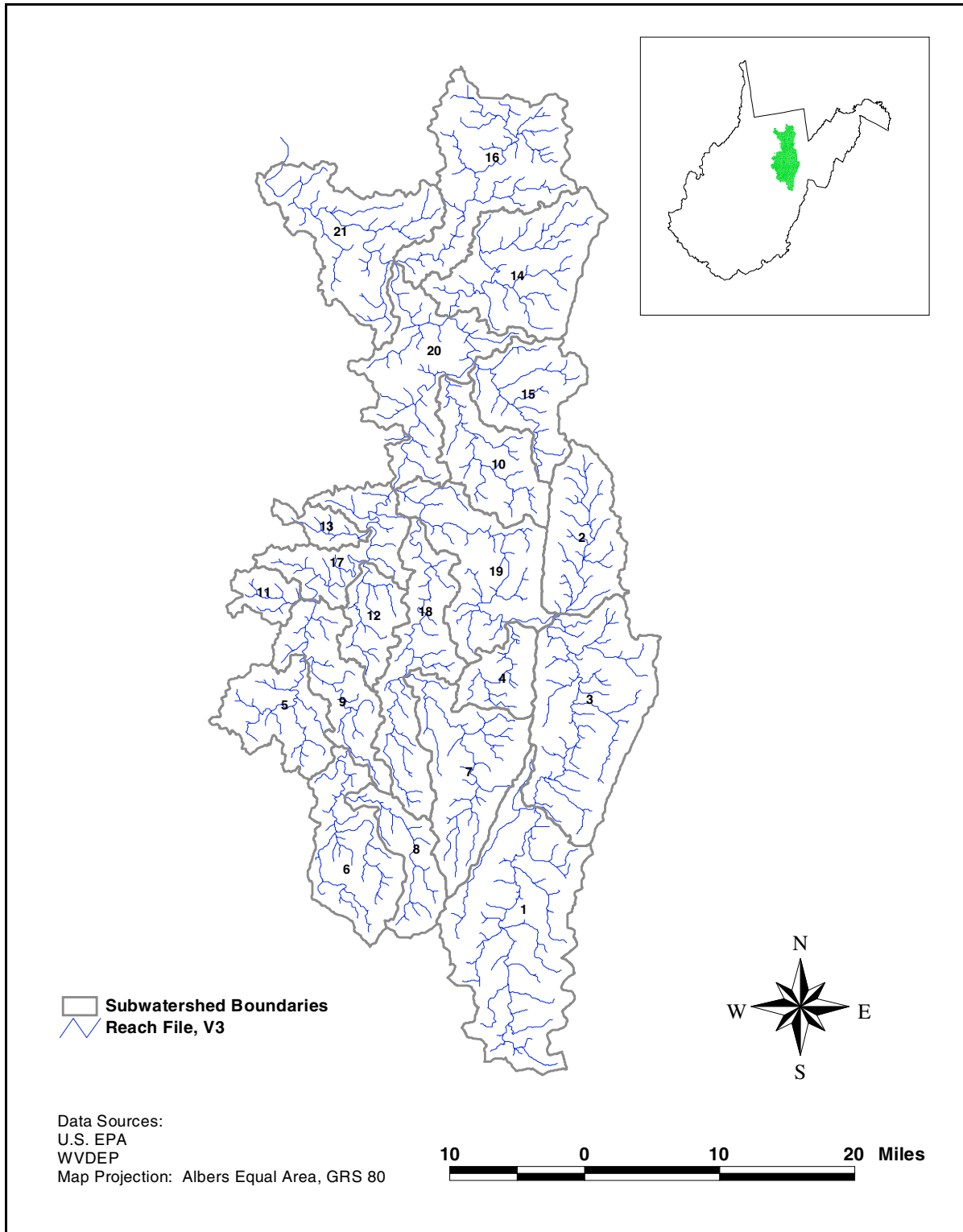


Figure A. Tygart watershed and its 21 regions

- **Tables 5a, 5b, and 5c**—present baseline and allocation information for nonpoint sources in the region. Each table presents information for a different metal. Baseline and allocation loads (in lbs/yr) are presented by subwatershed for the following nonpoint source categories: AML, other nonpoint sources, and revoked mines. The AML category represents highwalls, disturbed land, strip mines, and abandoned mines. The other nonpoint sources category represents contributions from forest, pasture, cropland, urban (impervious and pervious), wetlands, and barren land. The revoked mines category represents the loading contribution from revoked mines. The baseline loads presented represent nonpoint source contributions under existing conditions. The allocation loads represent the LAs for individual categories. A column entitled “Requires Reduction” is also included to conveniently identify subwatersheds requiring nonpoint source load reductions to meet water quality criteria.

A number of the appendices do not include all of the above listed tables. Appendices A-1, A-2, A-3, A-12, and A-15 represent regions containing no impaired waterbodies. Only Tables 5a, 5b, and 5c and in some cases 4a, 4b, 4c, and are presented for these sections. Appendix A-8 represents the Buckhannon River. Because TMDLs were previously developed for this area, only a summary of the TMDL results are presented. Refer to the 1998 document *Metals TMDL for Buckhannon River, West Virginia*.

# Appendix A-1

## Region 1

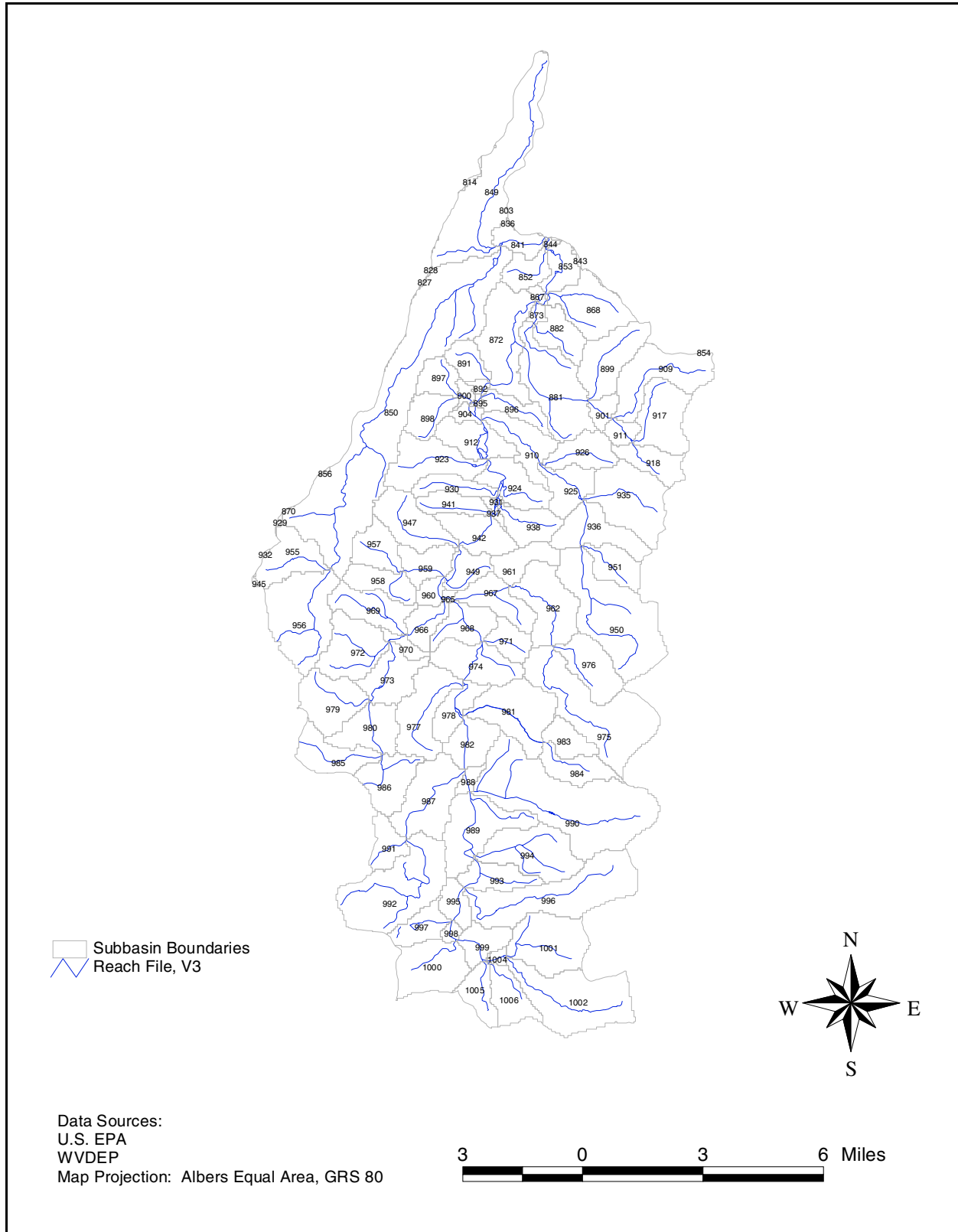


Figure 1. Region 1 - Upstream of the Tygart Valley River, Randolph County

**Table 1.** Impaired waterbodies in Region 1  
(not applicable in this region)

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)  
(not applicable in this region)

**Table 3a.** Water quality data for aluminum  
(not applicable in this region)

**Table 3b.** Water quality data for iron  
(not applicable in this region)

**Table 3c.** Water quality data for manganese  
(not applicable in this region)

**Table 4a.** Aluminum baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4b.** Iron baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4c.** Manganese baseline conditions for permitted mining point sources  
(not applicable in this region)



**Table 5a.** Aluminum baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
1000	0	1089	0
1001	0	1151	0
1002	0	1404	0
1003	0	12	0
1004	0	68	0
1005	0	587	0
1006	0	581	0
803	0	3964	0
836	0	250	0
837	0	661	0
841	0	824	0
842	0	3	0
843	0	1040	0
844	0	94	0
849	0	2401	0
850	0	8446	0
852	0	1149	0
853	0	986	0
867	0	193	0
868	0	777	0
872	0	3088	0
873	0	311	0
881	0	3151	0
882	0	569	0
891	0	300	0
892	0	154	0
895	0	89	0
896	0	418	0
897	0	295	0
898	0	370	0
899	0	746	0
900	0	94	0
901	0	365	0
904	0	302	0
909	0	927	0
910	0	1704	0
911	0	171	0
912	0	679	0
917	0	701	0
918	0	396	0
923	0	752	0
924	0	729	0
925	0	995	0
926	0	498	0
930	0	326	0
931	0	74	0
935	15	1042	0
936	4	661	0
937	0	106	0
938	0	446	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
941	0	312	0
942	0	662	0
947	0	668	0
949	0	333	0
950	8	1696	0
951	0	382	0
955	0	1087	0
956	0	2336	0
957	0	426	0
958	0	404	0
959	0	416	0
960	0	165	0
961	0	366	0
962	0	837	0
965	0	68	0
966	0	333	0
967	0	504	0
968	0	598	0
969	0	561	0
970	0	132	0
971	0	325	0
972	0	737	0
973	0	571	0
974	0	702	0
975	0	1651	0
976	0	584	0
977	0	826	0
978	0	422	0
979	3	705	0
980	0	592	0
981	0	1162	0
982	0	998	0
983	0	358	0
984	0	438	0
985	35	632	0
986	0	733	0
987	0	920	0
988	0	120	0
989	0	958	0
990	5	2665	0
991	0	425	0
992	12	1814	0
993	0	445	0
994	0	1130	0
995	0	314	0
996	0	1604	0
997	0	553	0
998	0	104	0
999	0	429	0
<b>Total</b>	<b>82</b>	<b>81340</b>	<b>0</b>

**Table 5b.** Iron baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
1000	0	2328	0
1001	0	2558	0
1002	0	3271	0
1003	0	17	0
1004	0	146	0
1005	0	1173	0
1006	0	1129	0
803	0	5311	0
836	0	303	0
837	0	1407	0
841	0	1128	0
842	0	4	0
843	0	2404	0
844	0	116	0
849	0	5578	0
850	0	8060	0
852	0	1348	0
853	0	1215	0
867	0	233	0
868	0	1819	0
872	0	3876	0
873	0	329	0
881	0	4334	0
882	0	1163	0
891	0	692	0
892	0	197	0
895	0	112	0
896	0	854	0
897	0	695	0
898	0	876	0
899	0	1774	0
900	0	198	0
901	0	586	0
904	0	424	0
909	0	2184	0
910	0	2169	0
911	0	402	0
912	0	1493	0
917	0	1645	0
918	0	909	0
923	0	1766	0
924	0	1577	0
925	0	1554	0
926	0	1139	0
930	0	760	0
931	0	99	0
935	32	2433	0
936	8	1545	0
937	0	210	0
938	0	1028	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
941	0	734	0
942	0	1467	0
947	0	1578	0
949	0	756	0
950	17	3976	0
951	0	901	0
955	0	1035	0
956	0	2213	0
957	0	1008	0
958	0	956	0
959	0	936	0
960	0	380	0
961	0	860	0
962	0	1987	0
965	0	103	0
966	0	763	0
967	0	1197	0
968	0	1315	0
969	0	1335	0
970	0	309	0
971	0	752	0
972	0	1752	0
973	0	1317	0
974	0	1606	0
975	0	3875	0
976	0	1391	0
977	0	1941	0
978	0	938	0
979	8	1627	0
980	0	1370	0
981	0	2623	0
982	0	1549	0
983	0	825	0
984	1	1028	0
985	78	1454	0
986	0	1445	0
987	0	2118	0
988	0	271	0
989	0	2212	0
990	10	6179	0
991	0	917	0
992	27	3866	0
993	0	1004	0
994	0	2572	0
995	0	681	0
996	0	3705	0
997	0	1068	0
998	0	216	0
999	0	932	0
<b>Total</b>	<b>181</b>	<b>151619</b>	<b>0</b>

Table 5c. Manganese baseline conditions for nonpoint sources

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
1000	0	429	0
1001	0	452	0
1002	0	578	0
1003	0	6	0
1004	0	27	0
1005	0	227	0
1006	0	233	0
803	0	2098	0
836	0	130	0
837	0	263	0
841	0	444	0
842	0	2	0
843	0	424	0
844	0	52	0
849	0	996	0
850	0	3100	0
852	0	602	0
853	0	509	0
867	0	103	0
868	0	323	0
872	0	1610	0
873	0	162	0
881	0	1670	0
882	0	225	0
891	0	124	0
892	0	79	0
895	0	47	0
896	0	165	0
897	0	124	0
898	0	155	0
899	0	312	0
900	0	39	0
901	0	192	0
904	0	161	0
909	0	387	0
910	0	897	0
911	0	71	0
912	0	265	0
917	0	293	0
918	0	165	0
923	0	311	0
924	0	282	0
925	0	524	0
926	0	203	0
930	0	134	0
931	0	40	0
935	14	431	0
936	4	275	0
937	0	40	0
938	0	182	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
941	0	129	0
942	0	261	0
947	0	278	0
949	0	138	0
950	8	707	0
951	0	159	0
955	0	394	0
956	0	848	0
957	0	180	0
958	0	173	0
959	0	170	0
960	0	68	0
961	0	153	0
962	0	351	0
965	0	36	0
966	0	136	0
967	0	211	0
968	0	233	0
969	0	235	0
970	0	55	0
971	0	139	0
972	0	308	0
973	0	238	0
974	0	290	0
975	0	721	0
976	0	245	0
977	0	344	0
978	0	170	0
979	3	292	0
980	0	245	0
981	0	572	0
982	0	523	0
983	0	160	0
984	0	194	0
985	34	260	0
986	0	293	0
987	0	380	0
988	0	49	0
989	0	404	0
990	5	1201	0
991	0	168	0
992	12	730	0
993	0	182	0
994	0	540	0
995	0	126	0
996	0	675	0
997	0	214	0
998	0	41	0
999	0	170	0
<b>Total</b>	<b>79</b>	<b>35350</b>	<b>0</b>

# **Appendix A-2**

## **Region 2**

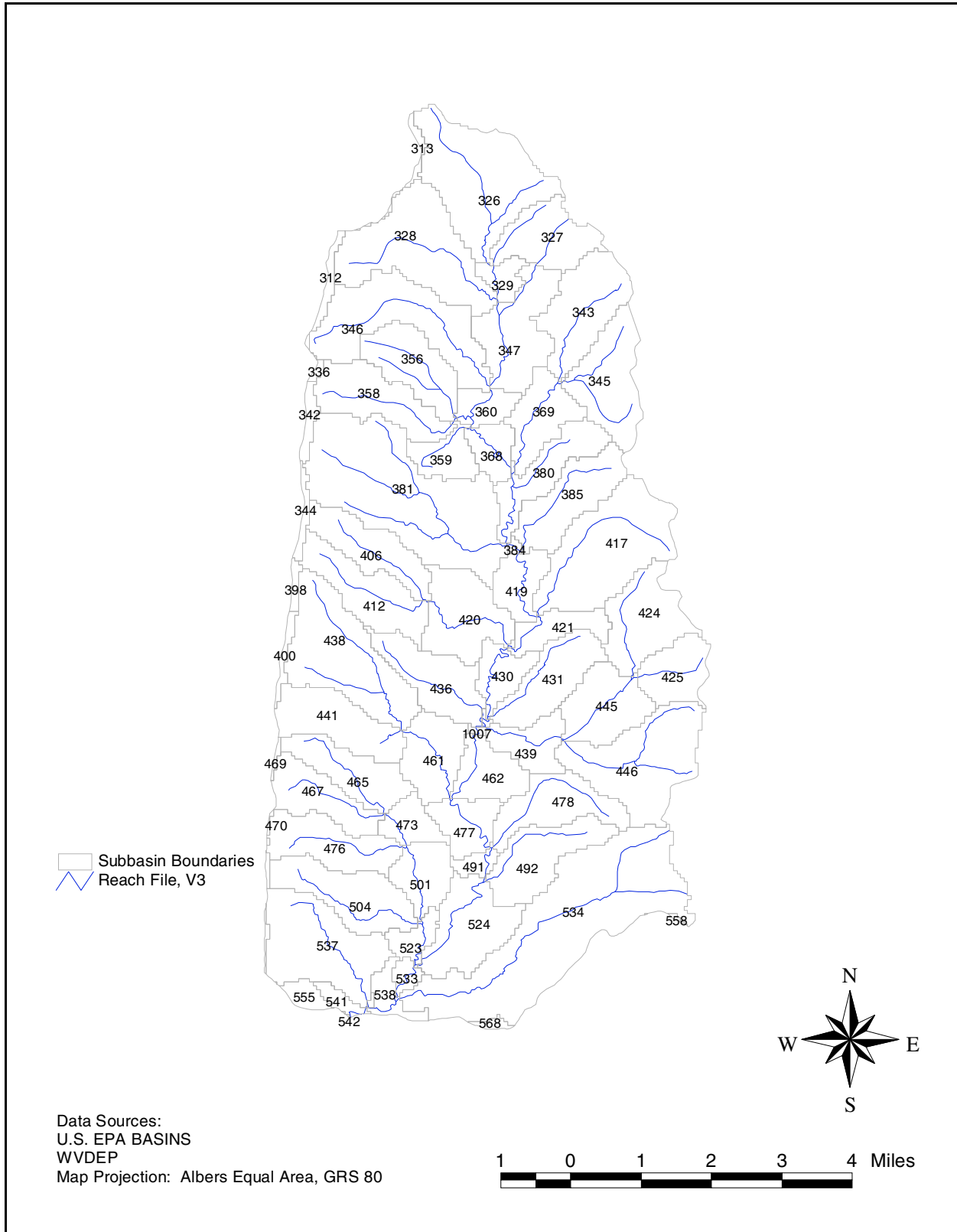


Figure 1. Region 2 - Leading Creek, Randolph County



**Table 1.** Impaired waterbodies in Region 2  
(not applicable in this region)

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)  
(not applicable in this region)

**Table 3a.** Water quality data for aluminum  
(not applicable in this region)

**Table 3b.** Water quality data for iron  
(not applicable in this region)

**Table 3c.** Water quality data for manganese  
(not applicable in this region)

**Table 4a.** Aluminum baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4b.** Iron baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4c.** Manganese baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 5a.** Aluminum baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
1007	0	27	0
326	0	1062	0
327	0	449	0
328	0	937	0
329	0	361	0
343	0	584	0
345	0	571	0
346	0	934	0
347	0	1352	0
356	0	553	0
358	0	539	0
359	0	232	0
360	0	464	0
368	0	445	0
369	0	451	0
380	0	444	0
381	0	1764	0
384	0	59	0
385	0	522	0
406	0	414	0
412	0	484	0
417	0	1115	0
419	0	724	0
420	0	806	0
421	0	242	0
424	0	505	0
425	0	336	0
430	0	559	0
431	0	497	0
436	0	607	0
437	0	22	0
438	0	836	0
439	0	385	0
441	0	439	0
445	0	417	0
446	0	754	0
461	0	905	0
462	0	758	0
465	0	404	0
467	0	353	0
473	0	190	0
476	0	432	0
477	0	705	0
478	0	459	0
491	0	227	0
492	0	491	0
501	0	310	0
504	0	517	0
523	0	310	0
524	0	1354	0

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
533	0	175	0
534	0	1990	0
537	0	759	0
538	0	498	0
541	0	100	0
Total	0	31824	0

**Table 5b.** Iron baseline conditions for nonpoint sources

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
1007	0	42	0
326	0	2334	0
327	0	976	0
328	0	2110	0
329	0	431	0
343	0	1290	0
345	0	1308	0
346	0	2015	0
347	0	1869	0
356	0	1121	0
358	0	1191	0
359	0	495	0
360	0	606	0
368	0	624	0
369	0	915	0
380	0	982	0
381	0	3907	0
384	0	72	0
385	0	1137	0
406	0	945	0
412	0	1116	0
417	0	2429	0
419	0	905	0
420	0	1658	0
421	0	536	0
424	0	1182	0
425	0	772	0
430	0	764	0
431	0	1106	0
436	0	1281	0
437	0	32	0
438	0	1934	0
439	0	742	0
441	0	1031	0
445	0	964	0
446	0	1767	0
461	0	1242	0
462	0	993	0
465	0	911	0
467	0	811	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
473	0	406	0
476	0	991	0
477	0	892	0
478	0	1007	0
491	0	274	0
492	0	1094	0
501	0	668	0
504	0	1140	0
523	0	417	0
524	0	1830	0
533	0	237	0
534	0	4481	0
537	0	1717	0
538	0	714	0
541	0	212	0
Total	0	62627	0

**Table 5c.** Manganese baseline conditions for nonpoint sources

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
1007	0	14	0
326	0	425	0
327	0	182	0
328	0	378	0
329	0	186	0
343	0	236	0
345	0	237	0
346	0	373	0
347	0	714	0
356	0	217	0
358	0	216	0
359	0	94	0
360	0	249	0
368	0	238	0
369	0	176	0
380	0	174	0
381	0	691	0
384	0	33	0
385	0	210	0
406	0	168	0
412	0	197	0
417	0	438	0
419	0	386	0
420	0	298	0
421	0	96	0
424	0	213	0
425	0	152	0
430	0	298	0
431	0	196	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
436	0	232	0
437	0	12	0
438	0	342	0
439	0	146	0
441	0	183	0
445	0	171	0
446	0	314	0
461	0	470	0
462	0	394	0
465	0	165	0
467	0	146	0
473	0	77	0
476	0	178	0
477	0	369	0
478	0	187	0
491	0	118	0
492	0	199	0
501	0	124	0
504	0	213	0
523	0	159	0
524	0	717	0
533	0	95	0
534	0	808	0
537	0	310	0
538	0	266	0
541	0	39	0
<b>Total</b>	<b>0</b>	<b>13920</b>	<b>0</b>

# Appendix A-3

## Region 3

# Metals and pH TMDLs for the Tygart Valley River Watershed

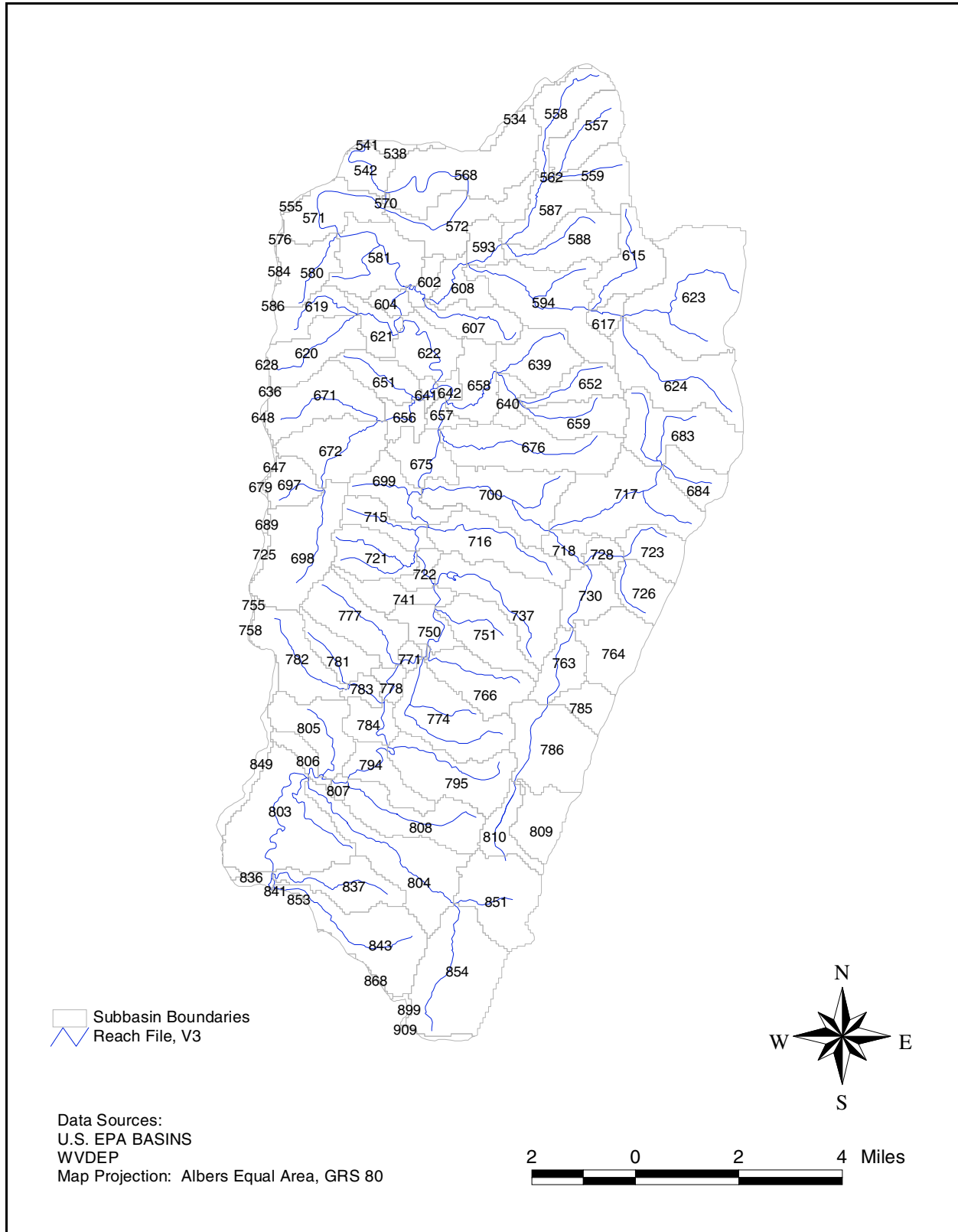


Figure 1. Region 3 - Tygart Valley River, Randolph County

**Table 1.** Impaired waterbodies in Region 3  
(not applicable in this region)

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)  
(not applicable in this region)

**Table 3a.** Water quality data for aluminum  
(not applicable in this region)

**Table 3b.** Water quality data for iron  
(not applicable in this region)

**Table 3c.** Water quality data for manganese  
(not applicable in this region)

**Table 4a.** Aluminum baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4b.** Iron baseline conditions for permitted mining point sources  
(not applicable in this region)

**Table 4c.** Manganese baseline conditions for permitted mining point sources  
(not applicable in this region)



# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5a.** Aluminum baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
542	0	847	0
557	0	479	0
558	0	533	0
559	0	371	0
562	0	23	0
568	0	2699	0
570	0	29	0
571	116	1266	0
572	0	1591	0
580	0	474	0
581	0	2246	0
587	0	580	0
588	0	671	0
593	0	485	0
594	0	1368	0
602	0	374	0
604	0	411	0
607	0	1040	0
608	0	892	0
615	0	579	0
617	0	151	0
619	5	336	0
620	7	561	0
621	0	366	0
622	0	1476	0
623	0	1619	0
624	0	1068	0
639	0	725	0
640	0	295	0
641	0	222	0
642	0	217	0
651	0	955	0
652	0	379	0
656	0	530	0
657	0	327	0
658	0	1124	0
659	0	514	0
671	30	725	0
672	0	721	0
675	0	1256	0
676	0	1110	0
683	0	901	0
684	0	314	0
697	6	297	0
698	0	982	0
699	0	1299	0
700	0	2897	0
715	0	849	0
716	0	1965	0
717	0	1171	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
718	0	419	0
721	0	508	0
722	0	512	0
723	0	371	0
726	0	342	0
728	0	280	0
730	0	426	0
737	0	1051	0
741	0	918	0
750	0	1033	0
751	0	661	0
763	0	365	0
764	0	623	0
765	0	38	0
766	0	603	0
771	0	250	0
774	0	1213	0
777	0	780	0
778	0	413	0
781	0	350	0
782	0	762	0
783	0	308	0
784	0	905	0
785	0	294	0
786	0	920	0
794	0	1123	0
795	0	910	0
804	0	1327	0
805	0	1500	0
806	0	447	0
807	0	109	0
808	0	812	0
809	0	423	0
810	0	287	0
851	0	782	0
854	0	1194	0
<b>Total</b>	<b>164</b>	<b>65562</b>	<b>0</b>

**Table 5b.** Iron baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
542	0	1075	0
557	0	1122	0
558	0	1210	0
559	0	880	0
562	0	40	0
568	0	4087	0
570	0	37	0
571	233	1949	0
572	0	2441	0
580	0	1125	0
581	0	3012	0
587	0	1307	0
588	0	1528	0
593	0	773	0
594	0	2970	0
602	0	537	0
604	0	518	0
607	0	1491	0
608	0	1208	0
615	0	1334	0
617	0	342	0
619	9	798	0
620	14	1331	0
621	0	777	0
622	0	1786	0
623	0	3693	0
624	0	2521	0
639	0	1447	0
640	0	564	0
641	0	281	0
642	0	286	0
651	0	1292	0
652	0	852	0
656	0	737	0
657	0	435	0
658	0	1579	0
659	0	1167	0
671	63	1714	0
672	0	1693	0
675	0	1617	0
676	0	2485	0
683	0	2117	0
684	0	748	0
697	10	705	0
698	0	2337	0
699	0	1809	0
700	0	3814	0
715	0	1232	0
716	0	2656	0
717	0	2744	0

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
718	0	659	0
721	0	1176	0
722	0	619	0
723	0	883	0
726	0	814	0
728	0	464	0
730	0	956	0
737	0	2318	0
741	0	1259	0
750	0	1226	0
751	0	1473	0
763	0	863	0
764	0	1482	0
765	0	50	0
766	0	1392	0
771	0	313	0
774	0	2696	0
777	0	1738	0
778	0	508	0
781	0	814	0
782	0	1713	0
783	0	434	0
784	0	1127	0
785	0	700	0
786	0	2158	0
794	0	1446	0
795	0	2066	0
804	0	2911	0
805	0	2113	0
806	0	615	0
807	0	160	0
808	0	1855	0
809	0	1007	0
810	0	681	0
851	0	1855	0
854	0	2837	0
Total	328	119580	0

**Table 5c.** Manganese baseline conditions for nonpoint sources

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
542	0	446	0
557	0	199	0
558	0	219	0
559	0	153	0
562	0	12	0
568	0	1408	0
570	0	15	0
571	133	682	0
572	0	835	0
580	0	199	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
581	0	1208	0
587	0	231	0
588	0	272	0
593	0	257	0
594	0	532	0
602	0	200	0
604	0	219	0
607	0	544	0
608	0	484	0
615	0	239	0
617	0	62	0
619	3	141	0
620	5	237	0
621	0	139	0
622	0	775	0
623	0	714	0
624	0	445	0
639	0	288	0
640	0	113	0
641	0	121	0
642	0	118	0
651	0	491	0
652	0	154	0
656	0	288	0
657	0	174	0
658	0	588	0
659	0	209	0
671	27	305	0
672	0	303	0
675	0	681	0
676	0	448	0
683	0	376	0
684	0	131	0
697	3	125	0
698	0	413	0
699	0	699	0
700	0	1546	0
715	0	456	0
716	0	1036	0
717	0	489	0
718	0	221	0
721	0	210	0
722	0	278	0
723	0	155	0
726	0	143	0
728	0	147	0
730	0	173	0
737	0	425	0
741	0	490	0
750	0	557	0
751	0	267	0

## Metals and pH TMDLs for the Tygart Valley River Watershed

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
763	0	152	0
764	0	260	0
765	0	21	0
766	0	246	0
771	0	138	0
774	0	471	0
777	0	313	0
778	0	221	0
781	0	145	0
782	0	311	0
783	0	161	0
784	0	485	0
785	0	123	0
786	0	384	0
794	0	594	0
795	0	385	0
804	0	523	0
805	0	788	0
806	0	236	0
807	0	59	0
808	0	334	0
809	0	177	0
810	0	120	0
851	0	328	0
854	0	500	0
<b>Total</b>	170	30960	0

# **Appendix A-4**

## **Region 4**

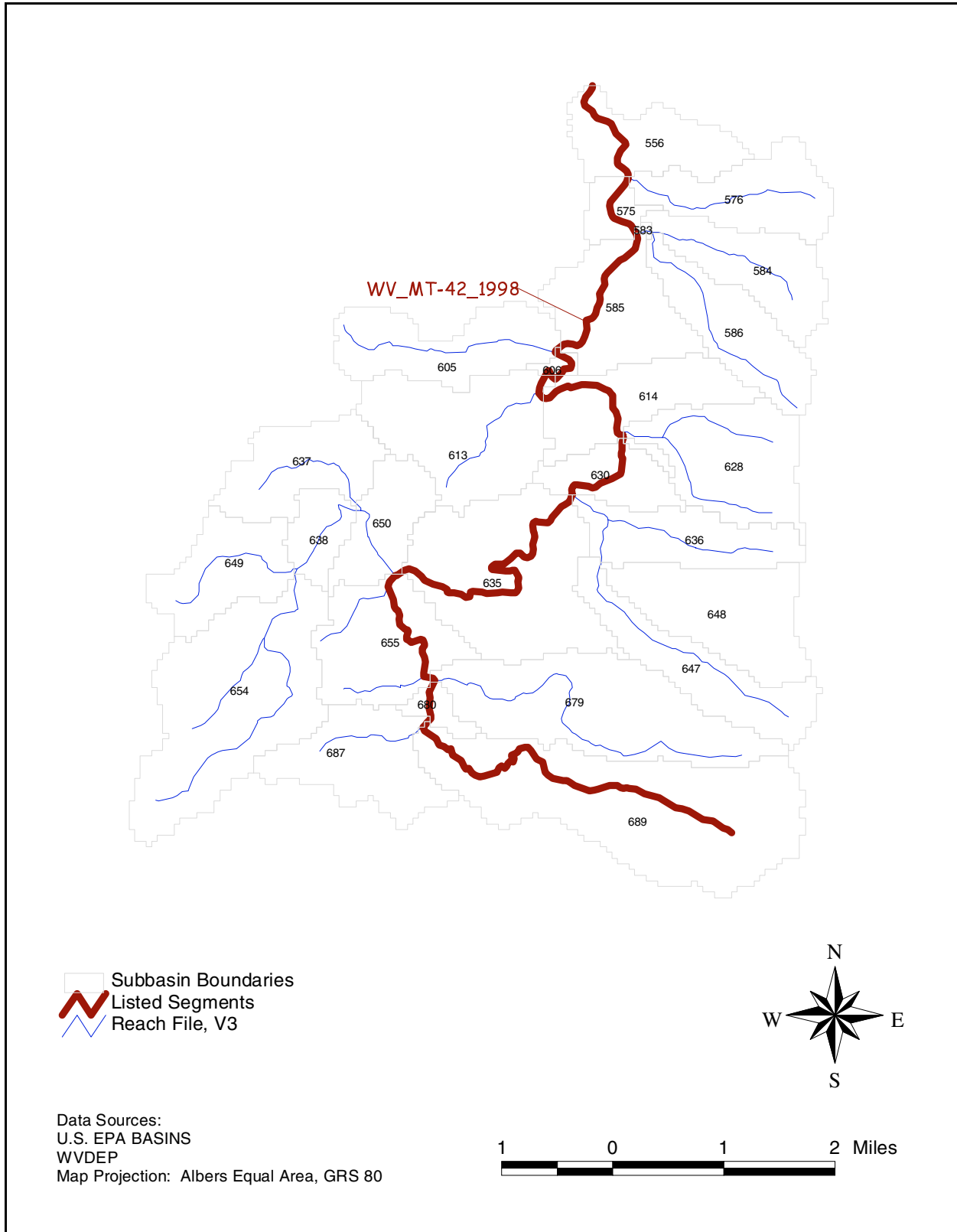


Figure 1. Region 4- Roaring Creek, Northwest of Randolph County



**Table 1.** Impaired waterbodies in Region 4

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Roaring CK	MT-42	pH, Metals	556, 583, 575, 576, 584, 606, 585, 605, 586, 614, 630, 613, 637, 628, 636, 638, 650, 649, 635, 648, 655, 680, 647, 679, 687, 654, 689	none	B-2

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
614

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
635	MT-42-{07.7}	1800	1800	1800	1	16-Sep-97	16-Sep-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
556	385605079570039	1430	590	2300	3	27-Mar-80	22-Jul-81
614	385341079575401	13333	12000	15000	3	01-Jun-84	08-Apr-85
635	MT-42-{07.7}	480	480	480	1	16-Sep-97	16-Sep-97

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
556	385605079570039	747	530	1100	3	27-Mar-80	22-Jul-81
614	385341079575401	343	330	360	3	01-Jun-84	08-Apr-85
635	MT-42-{07.7}	2500	2500	2500	1	16-Sep-97	16-Sep-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/l)
638	s201787	3148	1472	2.0
650	s202086	6323	3092	2.1

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/l)
638	s201787	2068	1241	1.9
650	s202086	4153	2930	2.3

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/l)
638	s201787	1885	1257	2.0
650	s202086	3787	2524	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
556	75	75	597	597	0	0	
575	103	62	188	188	0	0	x
576	0	0	669	669	0	0	
583	0	0	10	10	0	0	
584	0	0	633	633	0	0	
585	1267	642	645	645	0	0	x
586	0	0	656	656	0	0	
605	655	271	741	741	0	0	x
606	228	109	50	50	0	0	x
613	3376	1533	1035	1035	0	0	x
614	26292	7962	696	696	0	0	x
628	77	52	872	872	256	256	x
630	96	60	387	387	0	0	x
635	5638	2297	1698	1698	0	0	x
636	324	169	599	599	1025	1025	x
637	3932	1684	544	544	0	0	x
638	216	107	264	264	0	0	x
647	520	266	765	765	0	0	x
648	689	354	868	868	0	0	x
649	552	279	665	665	0	0	x
650	1409	254	168	168	0	0	x
654	1413	535	1688	1688	0	0	x
655	2208	1068	748	748	0	0	x
679	1315	568	1354	1354	0	0	x
680	465	199	106	106	0	0	x
687	2115	824	669	669	0	0	x
689	2477	1031	1992	1992	0	0	x
Total	55441	20828	19303	19303	1281	140	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
556	88	88	571	571	0	0	
575	103	68	180	180	0	0	x
576	0	0	638	638	0	0	
583	0	0	9	9	0	0	
584	0	0	603	603	0	0	
585	1214	671	623	623	0	0	x
586	0	0	625	625	0	0	
605	600	266	714	714	0	0	x
606	215	113	52	52	0	0	x
613	3152	1552	1024	1024	0	0	x
614	21263	6466	674	674	0	0	x
628	79	58	830	830	256	256	x
630	97	65	378	378	0	0	x
635	5128	2228	1745	1745	0	0	x
636	313	178	571	571	1026	1026	x
637	3602	1651	533	533	0	0	x
638	240	131	252	252	0	0	x
647	499	279	741	741	0	0	x
648	661	371	830	830	0	0	x
649	528	291	661	661	0	0	x
650	1288	232	164	164	0	0	x
654	1271	508	1629	1629	0	0	x
655	2091	1101	716	716	0	0	x
679	1214	565	1294	1294	0	0	x
680	428	198	102	102	0	0	x
687	1912	791	641	641	0	0	x
689	2269	1014	1907	1907	0	0	x
Total	48255	19322	18707	18707	1282	249	

**Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources**

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
556	46	46	218	218	0	0	
575	75	53	69	69	0	0	x
576	0	0	243	243	0	0	
583	0	0	3	3	0	0	
584	0	0	229	229	0	0	
585	964	631	237	237	0	0	x
586	0	0	238	238	0	0	
605	517	313	271	271	0	0	x
606	175	112	19	19	0	0	x
613	2621	1641	389	389	0	0	x
614	15836	4847	256	256	0	0	x
628	54	41	316	316	147	147	x
630	70	50	144	144	0	0	x
635	4472	2695	663	663	0	0	x
636	245	163	217	217	587	587	x
637	3104	1909	201	201	0	0	x
638	145	145	96	96	0	0	x
647	394	259	282	282	0	0	x
648	522	344	316	316	0	0	x
649	420	275	251	251	0	0	x
650	1113	1113	62	62	0	0	x
654	1130	663	619	619	0	0	x
655	1694	1088	272	272	0	0	x
679	1030	633	492	492	0	0	x
680	364	223	39	39	0	0	x
687	1684	997	244	244	0	0	x
689	1952	1183	726	726	0	0	x
Total	38629	18980	7111	7111	734	734	

# Appendix A-5

## Region 5

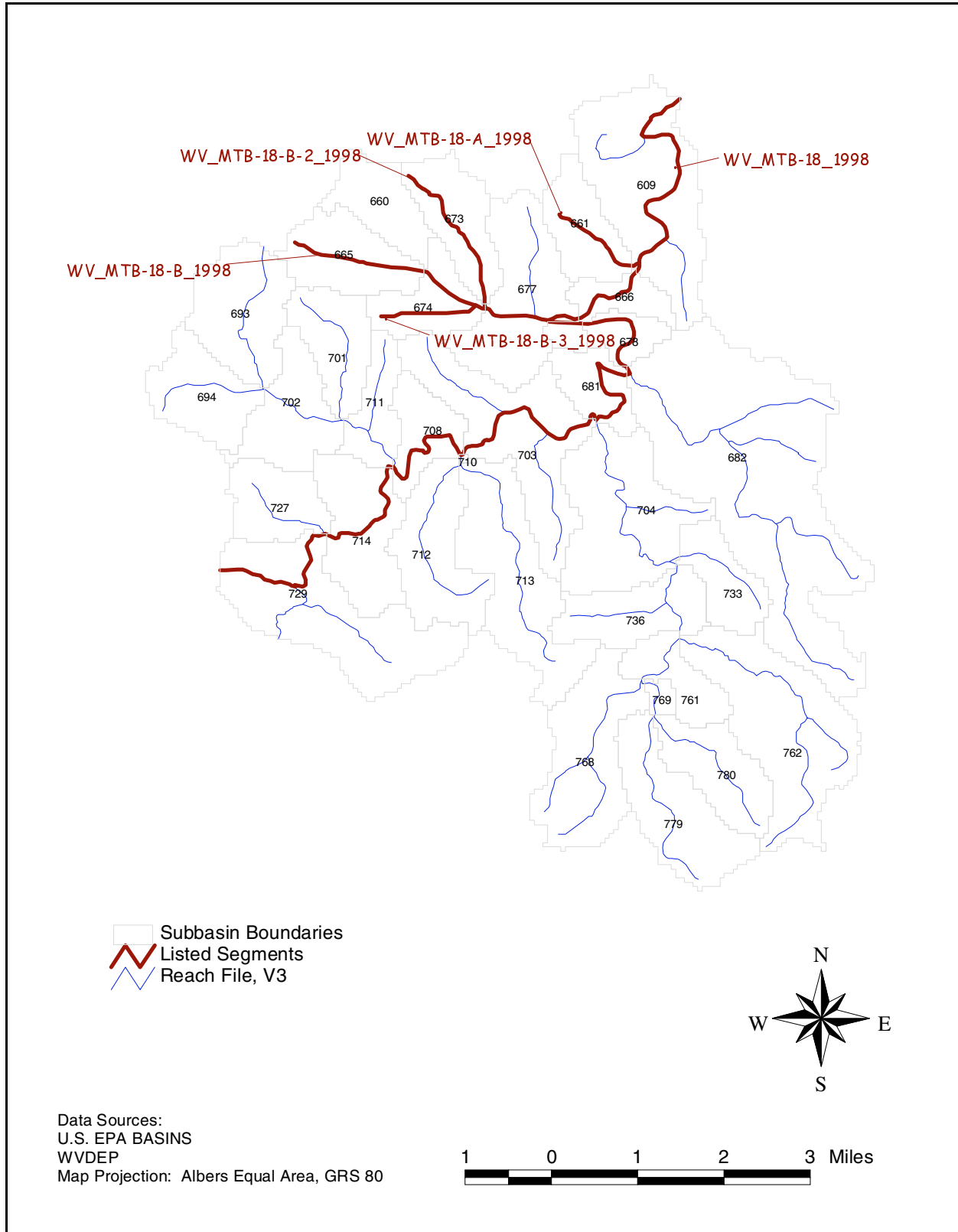


Figure 1. Region 5-French Creek, Upshur County

**Table 1.** Impaired waterbodies in region 5

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Mudlick RN	MTB-18-B-3	Iron	674	None	B-1
Blacklick RN	MTB-18-B-2	Iron	673	None	B-1
Bull RN	MTB-18-B	Iron	665,660,673,674,677, 418	None	B-1
French CK	MTB-18	Metals	660 661 665 673 609 674 666 678 693 677 701 681 694 710 711 702 708 727 703 704 714 712 733 736 729 713 769 761 780 768 762 779 555 535 552 536 566 565 333 338 341 357 361 349 348 415 426 464 432 469 463 470 493 433 494 499 503 502 519 500 521 511 498 579 582	None	B-1
Crooked RN	MTB18-A	Metals	661	None	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, and /or leaching)

SWS
673, 661

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
609	MTB-18-A	170	170	170	1	26-Jun-98	26-Jun-98
674	MTB-18-B-3	170	170	170	1	03-Sep-97	03-Sep-97
677	MTB-18-B	170	170	170	1	03-Sep-97	03-Sep-97
677	MTB-18-B-2	130	130	130	1	03-Sep-97	03-Sep-97
708	MTB-18-{11.2}	150	150	150	1	03-Sep-97	03-Sep-97
736	MTB-18-D-{03.9}	55	55	55	1	10-Sep-97	10-Sep-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
609	MTB-18-A	240	240	240	1	26-Jun-98	26-Jun-98
661	385453080154001	7700	7700	7700	1	02-Sep-80	02-Sep-80
661	385505080155201	3400	3400	3400	1	03-Sep-80	03-Sep-80
674	MTB-18-B-3	1200	1200	1200	1	03-Sep-97	03-Sep-97
677	MTB-18-B	2400	2400	2400	1	03-Sep-97	03-Sep-97
677	MTB-18-B-2	3600	3600	3600	1	03-Sep-97	03-Sep-97
704	385232080155239	1220	240	2200	2	22-Mar-80	22-Aug-80
708	385307080175339	1157	870	1300	3	22-Mar-80	22-Jul-81
708	MTB-18-{11.2}	1200	1200	1200	1	03-Sep-97	03-Sep-97
736	MTB-18-D-{03.9}	240	240	240	1	10-Sep-97	10-Sep-97

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
609	MTB-18-A	80	80	80	1	26-Jun-98	26-Jun-98
661	385453080154001	390	390	390	1	02-Sep-80	02-Sep-80
661	385505080155201	280	280	280	1	03-Sep-80	03-Sep-80
674	MTB-18-B-3	130	130	130	1	03-Sep-97	03-Sep-97
677	MTB-18-B	270	270	270	1	03-Sep-97	03-Sep-97
677	MTB-18-B-2	1000	1000	1000	1	03-Sep-97	03-Sep-97
704	385232080155239	40	30	50	2	22-Mar-80	22-Aug-80
708	385307080175339	197	70	380	3	22-Mar-80	22-Jul-81
708	MTB-18-{11.2}	510	510	510	1	03-Sep-97	03-Sep-97
736	MTB-18-D-{03.9}	20	20	20	1	10-Sep-97	10-Sep-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
673	o000484	275	275	4.3
673	u006083	100	100	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
673	o000484	1488	1060	2.3
673	u006083	595	424	2.3

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
673	o000484	233	233	2.0
673	u006083	93	93	2.0



**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
609	53	53	2726	2726	0	0	
660	1	1	1058	1058	0	0	
661	402	261	1047	1047	0	0	x
665	1	1	1209	1209	0	0	
666	36	36	620	620	0	0	
673	89	89	1127	1127	0	0	
674	0	0	932	932	0	0	
677	259	259	1893	1893	306	306	x
678	0	0	367	367	0	0	
681	0	0	582	582	0	0	
693	0	0	1364	1364	0	0	
694	0	0	1037	1037	0	0	
701	0	0	900	900	0	0	
702	0	0	1151	1151	0	0	
703	53	53	2107	2107	0	0	
704	1	1	1851	1851	0	0	
708	1	1	752	752	0	0	
710	0	0	12	12	0	0	
711	0	0	721	721	0	0	
712	0	0	1290	1290	0	0	
713	1	1	1898	1898	0	0	
714	0	0	1283	1283	0	0	
727	0	0	900	900	0	0	
729	0	0	2219	2219	0	0	
733	0	0	643	643	0	0	
736	0	0	910	910	0	0	
761	0	0	531	531	510	510	
762	0	0	2116	2116	0	0	
768	1	1	1666	1666	0	0	
769	0	0	103	103	0	0	
779	0	0	1235	1235	0	0	
780	0	0	852	852	0	0	
Total	898	758	37103	37103	319	319	

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
609	49	49	2263	2263	0	0	
660	2	2	792	792	0	0	
661	1649	561	818	818	0	0	x
665	2	2	989	989	0	0	
666	33	33	539	539	0	0	
673	4852	171	936	936	0	0	x
674	0	0	743	743	0	0	
677	239	239	1575	1575	306	306	
678	0	0	362	362	0	0	
681	0	0	566	566	0	0	
693	0	0	1322	1322	0	0	
694	0	0	990	990	0	0	
701	0	0	874	874	0	0	
702	0	0	1093	1093	0	0	
703	49	49	2027	2027	0	0	
704	2	2	1822	1822	0	0	
708	2	2	709	709	0	0	
710	0	0	12	12	0	0	
711	0	0	672	672	0	0	
712	0	0	1239	1239	0	0	
713	2	2	1834	1834	0	0	
714	0	0	1244	1244	0	0	
727	0	0	853	853	0	0	
729	0	0	2166	2166	0	0	
733	0	0	635	635	0	0	
736	0	0	901	901	0	0	
761	0	0	528	528	510	510	
762	0	0	2104	2104	0	0	
768	2	2	1610	1610	0	0	
769	0	0	102	102	0	0	
779	0	0	1229	1229	0	0	
780	0	0	849	849	0	0	
Total	6881	1111	34396	34396	330	330	

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
609	78	78	1140	1140	0	0	
660	1	1	486	486	0	0	
661	314	314	467	467	0	0	
665	1	1	522	522	0	0	
666	53	53	255	255	0	0	
673	112	112	605	605	0	0	
674	0	0	411	411	0	0	
677	385	385	828	828	201	201	
678	0	0	170	170	0	0	
681	0	0	279	279	0	0	
693	0	0	759	759	0	0	
694	0	0	565	565	0	0	
701	0	0	477	477	0	0	
702	0	0	689	689	0	0	
703	78	78	1092	1092	0	0	
704	1	1	796	796	0	0	
708	1	1	464	464	0	0	
710	0	0	7	7	0	0	
711	0	0	455	455	0	0	
712	0	0	638	638	0	0	
713	1	1	932	932	0	0	
714	0	0	644	644	0	0	
727	0	0	570	570	0	0	
729	0	0	1055	1055	0	0	
733	0	0	253	253	0	0	
736	0	0	358	358	0	0	
761	0	0	200	200	335	335	
762	0	0	800	800	0	0	
768	1	1	847	847	0	0	
769	0	0	38	38	0	0	
779	0	0	458	458	0	0	
780	0	0	312	312	0	0	
Total	1026	1026	17573	17573	205	205	

# **Appendix A-6**

## **Region 6**

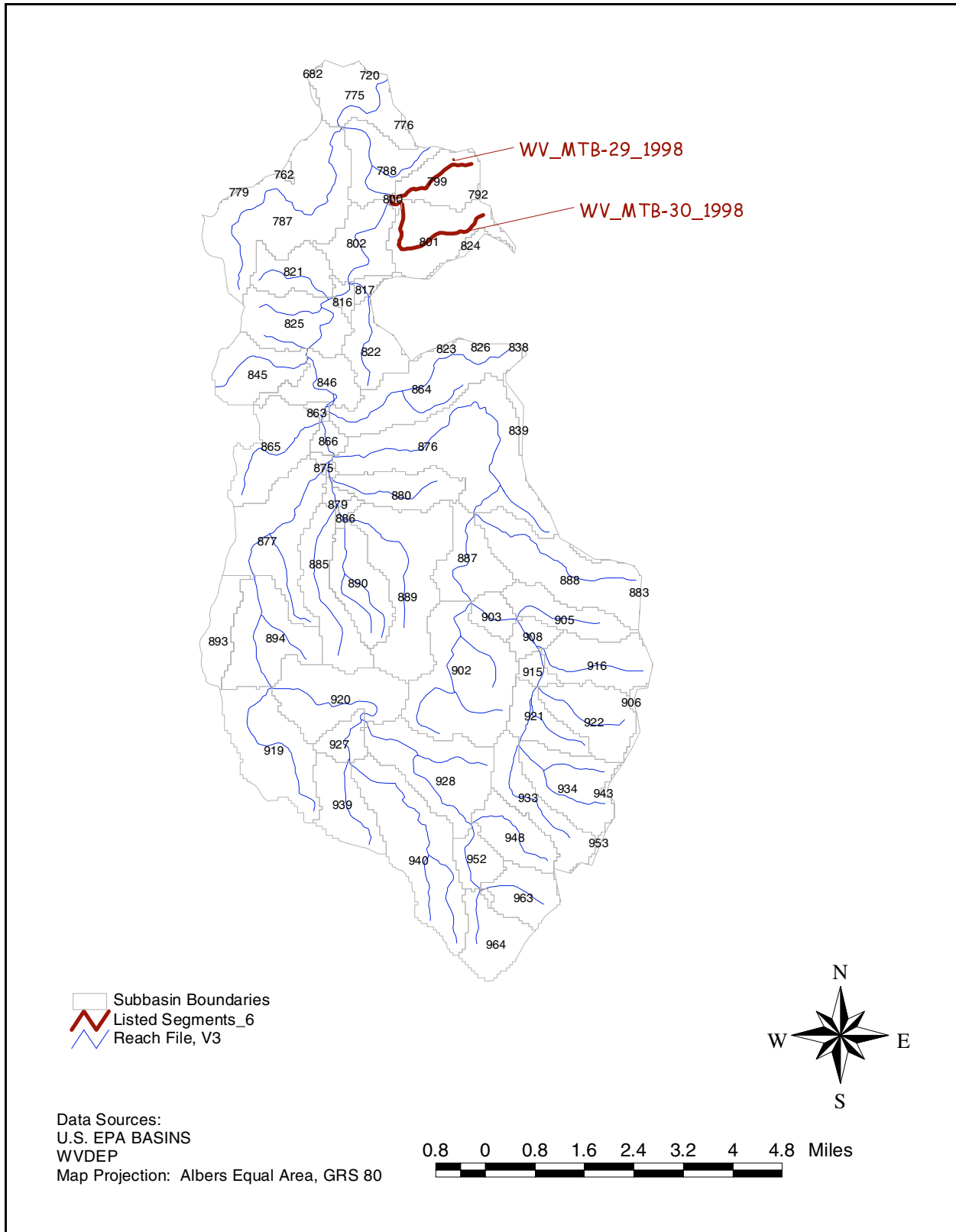


Figure 1. Region 6 - Buckhannon River, Right FK, Randolph County

**Table 1.** Impaired waterbodies in Region 6

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Region	Aquatic Life
Swamp RN	MTB-29	pH, Metals	799	None	B-2
Herods RN	MTB-30	pH	801	None	B-2

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
799 and 801

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
775	MTB-27	67	67	67	1	16-Sep-97	16-Sep-97
787	MTB-28-{01.33}	121	121	121	1	28-Apr-98	28-Apr-98
801	MTB-29	7500	7500	7500	1	09-Sep-97	09-Sep-97
817	MTB-32-{00.40}	50	50	50	1	16-Sep-97	16-Sep-97
866	550809	243	20	1500	61	20-Mar-86	14-Jun-88
888	MTB-31-F-1	54	54	54	1	08-Sep-97	08-Sep-97
902	MTB-31-F-2-{1}	56	56	56	1	08-Sep-97	08-Sep-97
922	MTB-31-F-5	57	57	57	1	08-Sep-97	08-Sep-97
928	MTB-31-{59.57}	60	60	60	1	28-Apr-98	28-Apr-98
940	MTB-31-J-{02.1}	73	73	73	1	28-Apr-98	28-Apr-98
964	MTB-31-{61.58}	107	107	107	1	28-Apr-98	28-Apr-98

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
775	MTB-27	98	98	98	1	16-Sep-97	16-Sep-97
787	MTB-28-{01.33}	284	284	284	1	28-Apr-98	28-Apr-98
801	MTB-29	300	300	300	1	09-Sep-97	09-Sep-97
817	MTB-32-{00.40}	140	140	140	1	16-Sep-97	16-Sep-97
866	550809	245	20	2900	61	20-Mar-86	14-Jun-88
875	384440080140939	383	260	590	3	22-Mar-80	21-Jul-81
888	MTB-31-F-1	93	93	93	1	08-Sep-97	08-Sep-97
902	MTB-31-F-2-{1}	170	170	170	1	08-Sep-97	08-Sep-97
922	MTB-31-F-5	69	69	69	1	08-Sep-97	08-Sep-97
928	MTB-31-{59.57}	212	212	212	1	28-Apr-98	28-Apr-98
940	MTB-31-J-{02.1}	136	136	136	1	28-Apr-98	28-Apr-98
964	MTB-31-{61.58}	172	172	172	1	28-Apr-98	28-Apr-98

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
775	MTB-27	66	66	66	1	16-Sep-97	16-Sep-97
787	MTB-28-{01.33}	54	53.8	53.8	1	28-Apr-98	28-Apr-98
801	MTB-29	5300	5300	5300	1	09-Sep-97	09-Sep-97
817	MTB-32-{00.40}	20	20	20	1	16-Sep-97	16-Sep-97
866	550809	48	0	380	61	20-Mar-86	14-Jun-88
875	384440080140939	30	10	50	3	22-Mar-80	21-Jul-81
888	MTB-31-F-1	7	7	7	1	08-Sep-97	08-Sep-97
902	MTB-31-F-2-{1}	20	20	20	1	08-Sep-97	08-Sep-97
922	MTB-31-F-5	5	5	5	1	08-Sep-97	08-Sep-97
928	MTB-31-{59.57}	27	26.8	26.8	1	28-Apr-98	28-Apr-98
940	MTB-31-J-{02.1}	37	37.1	37.1	1	28-Apr-98	28-Apr-98
964	MTB-31-{61.58}	15	15.1	15.1	1	28-Apr-98	28-Apr-98

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
775	108	108	1171	1171	674	674	
787	241	241	3333	3333	0	0	
788	297	297	938	938	1245	1245	
799	1122	237	753	753	405	350	x
800	0	0	4	4	0	0	
801	787	787	1193	1193	0	0	
802	259	259	933	933	1044	1044	
816	6	6	155	155	0	0	
817	2	2	130	130	0	0	
821	87	87	926	926	0	0	
822	0	0	843	843	741	741	
825	0	0	1398	1398	0	0	
845	0	0	1158	1158	0	0	
846	0	0	785	785	0	0	
863	0	0	99	99	0	0	
864	0	0	2046	2046	0	0	
865	0	0	1353	1353	0	0	
866	0	0	276	276	0	0	
875	0	0	76	76	0	0	
876	0	0	3380	3380	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
877	0	0	1959	1959	0	0	
878	0	8	27	27	0	0	
879	0	0	127	127	0	0	
880	0	0	890	890	0	0	
885	0	0	1285	1285	0	0	
886	0	0	100	100	0	0	
887	0	0	1047	1047	0	0	
888	0	0	2102	2102	0	0	
889	0	0	2487	2487	0	0	
890	0	0	1110	1110	0	0	
893	0	0	734	734	0	0	
894	0	0	1542	1542	0	0	
902	0	0	2866	2866	0	0	
903	0	0	368	368	0	0	
905	0	0	843	843	0	0	
908	0	0	367	367	0	0	
915	7	7	241	241	0	0	
916	22	22	1144	1144	0	0	
919	0	0	1796	1796	0	0	
920	0	0	1669	1669	0	0	
921	0	0	733	733	0	0	
922	144	144	1094	1094	0	0	
927	0	0	381	381	0	0	
928	33	33	1882	1882	0	0	
933	15	15	1088	1088	0	0	
934	87	87	1255	1255	0	0	
939	0	0	998	998	0	0	
940	26	26	2439	2439	0	0	
948	9	9	903	903	0	0	
952	2	2	601	601	0	0	
963	0	0	783	783	0	0	
964	53	53	899	899	0	0	
Total	3309	2403	56711	56711	4110	4055	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
775	149	149	1144	1144	674	674	
787	332	332	3201	3201	0	0	
788	410	410	935	935	1245	1245	
799	1596	220	750	750	405	345	x
800	0	0	4	4	0	0	
801	870	870	1190	1190	0	0	
802	358	358	913	913	1045	1045	
816	8	8	149	149	0	0	
817	3	3	128	128	0	0	
821	120	120	864	864	0	0	



# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
822	0	0	803	803	741	741	
825	0	0	1344	1344	0	0	
845	0	0	1114	1114	0	0	
846	0	0	766	766	0	0	
863	0	0	87	87	0	0	
864	0	0	2002	2002	0	0	
865	0	0	1331	1331	0	0	
866	0	0	262	262	0	0	
875	0	0	71	71	0	0	
876	0	0	3339	3339	0	0	
877	0	0	1940	1940	0	0	
878	0	0	26	26	0	0	
879	0	0	123	123	0	0	
880	0	0	885	885	0	0	
885	0	0	1276	1276	0	0	
886	0	0	99	99	0	0	
887	0	0	1034	1034	0	0	
888	0	0	2067	2067	0	0	
889	0	0	2460	2460	0	0	
890	0	0	1107	1107	0	0	
893	0	0	730	730	0	0	
894	0	0	1540	1540	0	0	
902	0	0	2782	2782	0	0	
903	0	0	364	364	0	0	
905	0	0	833	833	0	0	
908	0	0	353	353	0	0	
915	7	7	230	230	0	0	
916	24	24	1129	1129	0	0	
919	0	0	1795	1795	0	0	
920	0	0	1662	1662	0	0	
921	0	0	720	720	0	0	
922	195	195	1092	1092	0	0	
927	0	0	380	380	0	0	
928	30	30	1895	1895	0	0	
933	20	20	1093	1093	0	0	
934	117	117	1255	1255	0	0	
939	0	0	1014	1014	0	0	
940	36	36	2489	2489	0	0	
948	12	12	916	916	0	0	
952	3	3	621	621	0	0	
963	0	0	775	775	0	0	
964	73	73	911	911	0	0	
Total	4364	2988	55996	55996	4110	4050	

Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
775	83	83	441	441	453	453	
787	184	184	1304	1304	0	0	
788	228	228	343	343	838	838	
799	1370	296	275	275	271	236	x
800	0	0	2	2	0	0	
801	810	810	428	428	0	0	
802	198	198	355	355	707	707	x
816	5	5	60	60	0	0	
817	2	2	48	48	0	0	
821	67	67	388	388	0	0	
822	0	0	331	331	502	502	
825	0	0	536	536	0	0	
845	0	0	456	456	0	0	
846	0	0	296	296	0	0	
863	0	0	44	44	0	0	
864	0	0	764	764	0	0	
865	0	0	501	501	0	0	
866	0	0	119	119	0	0	
875	0	0	31	31	0	0	
876	0	0	1240	1240	0	0	
877	0	0	713	713	0	0	
878	0	0	11	11	0	0	
879	0	0	50	50	0	0	
880	0	0	321	321	0	0	
885	0	0	466	466	0	0	
886	0	0	36	36	0	0	
887	0	0	389	389	0	0	
888	0	0	786	786	0	0	
889	0	0	914	914	0	0	
890	0	0	399	399	0	0	
893	0	0	264	264	0	0	
894	0	0	551	551	0	0	
902	0	0	1114	1114	0	0	
903	0	0	136	136	0	0	
905	0	0	310	310	0	0	
908	0	0	145	145	0	0	
915	11	11	95	95	0	0	
916	28	28	425	425	0	0	
919	0	0	645	645	0	0	
920	0	0	603	603	0	0	
921	0	0	278	278	0	0	
922	115	115	393	393	0	0	
927	0	0	137	137	0	0	
928	49	49	714	714	0	0	
933	11	11	409	409	0	0	
934	72	72	452	452	0	0	
939	0	0	393	393	0	0	
940	20	20	988	988	0	0	
948	7	7	363	363	0	0	
952	2	2	269	269	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
963	0	0	295	295	0	0	
964	40	40	351	351	0	0	
Total	3301	2228	21374	21374	2771	2736	

# **Appendix A-7**

## **Region 7**

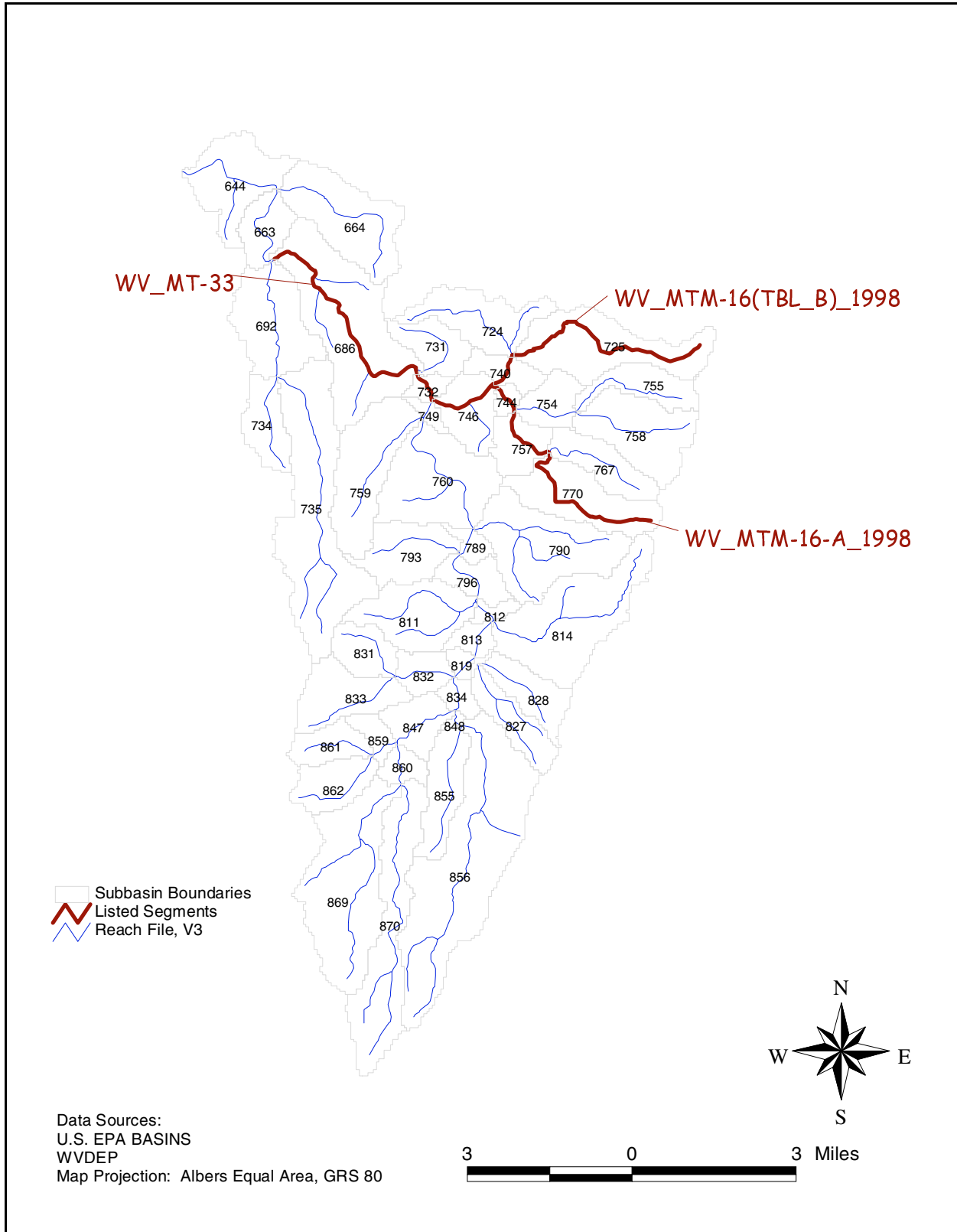


Figure 1. Region 7- Middle Fork River, Randolph County

**Table 1.** Impaired waterbodies in Region 7

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Cassity CK	MTM-16	pH, Metals	724,725,740,746,755,744,754,757,758,767,770	None	B-2
Panther RN	MTM-16-A	pH, Metals	755,744,754,757,758,767,770	None	B-2
Middle Fork River	MT-33	pH, Aluminum	749,760,759,789,793,790,796,812,811,813,831,819,814,832,834,848,833,828,847,861,859,827,860,862,855,869,856,870,724,725,740,746,755,744,754,757,758,767,770	None	B-2

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
725, 740, 754 and 757

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
663	551114	1733	200	7200	35	18-Jun-91	26-Oct-94
692	MTM-13-{00.80}	53	53	53	1	08-Sep-97	08-Sep-97
725	551117	274	50	1000	40	27-Jun-91	25-Oct-94
732	551115	2486	530	11000	39	18-Jun-91	25-Oct-94
732	551116	7338	1100	30200	40	27-Jun-91	25-Oct-94
760	551118	338	50	1400	38	18-Jun-91	25-Oct-94
848	550844	364	50	5430	48	06-May-80	25-Oct-94

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
663	551114	334	70	3380	35	18-Jun-91	26-Oct-94
692	MTM-13-{00.80}	192	192	192	1	08-Sep-97	08-Sep-97
725	551117	253	15	1400	40	27-Jun-91	25-Oct-94
732	551115	740	20	5200	39	18-Jun-91	25-Oct-94
732	551116	1550	100	3820	40	27-Jun-91	25-Oct-94
746	384933080020639	2447	740	4400	3	23-Mar-80	22-Jul-81
760	384905080024139	823	110	1600	3	23-Mar-80	22-Jul-81
760	551118	280	15	3000	38	18-Jun-91	25-Oct-94
848	550844	199	15	1200	58	06-Feb-80	25-Oct-94

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
663	551114	705	40	2000	35	18-Jun-91	26-Oct-94
692	MTM-13-{00.80}	11	11	11	1	08-Sep-97	08-Sep-97
725	551117	175	5	2550	40	27-Jun-91	25-Oct-94
732	551115	833	20	3660	39	18-Jun-91	25-Oct-94
732	551116	2697	160	9600	38	27-Jun-91	25-Oct-94
746	384933080020639	2057	710	4500	3	23-Mar-80	22-Jul-81
760	384905080024139	40	20	70	3	23-Mar-80	22-Jul-81
760	551118	167	5	1200	38	18-Jun-91	25-Oct-94
848	550844	131	5	2010	58	06-Feb-80	25-Oct-94

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
734	u104391	261	261	4.3
735	u202588	707	707	4.3
861	u100791	4	4	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
734	u104391	195	195	3.2
735	u202588	528	528	3.2
861	u100791	18	10	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
734	u104391	104	104	2.0
735	u202588	282	282	2.0
861	u100791	4	2	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
644	0	0	1482	1482	0	0	
663	0	0	688	688	0	0	
664	58	58	1842	1842	0	0	
686	176	176	3271	3271	0	0	
692	1	1	1630	1630	0	0	
724	219	219	1246	1246	0	0	
725	65315	1959	1951	1951	0	0	x
731	3	3	784	784	0	0	
732	0	0	214	214	0	0	
734	36	36	811	811	0	0	
735	112	112	3811	3811	73	73	
740	38173	1145	408	408	0	0	x
744	7	7	157	157	0	0	
746	561	561	869	869	0	0	
749	1356	1356	158	158	0	0	
754	68992	2070	517	517	0	0	x
755	1	1	779	779	0	0	
757	69868	2096	548	548	0	0	x
758	27	27	1624	1624	0	0	
759	181	181	1834	1834	0	0	
760	622	622	2172	2172	0	0	
767	1	1	918	918	0	0	
770	1154	1154	1546	1546	0	0	
789	0	0	251	251	0	0	
790	0	0	2206	2206	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
793	2	2	1133	1133	0	0	
796	0	0	549	549	0	0	
811	1	1	1457	1457	0	0	
812	0	0	181	181	0	0	
813	75	75	300	300	0	0	
814	112	112	2566	2566	0	0	
819	0	0	159	159	0	0	
820	0	0	37	37	0	0	
827	0	0	796	796	0	0	
828	0	0	793	793	0	0	
831	1	1	682	682	0	0	
832	0	0	475	475	0	0	
833	1	1	1160	1160	0	0	
834	0	0	265	265	0	0	
847	0	0	692	692	0	0	
848	0	0	72	72	0	0	
855	0	0	998	998	0	0	
856	0	0	4450	4450	0	0	
859	0	0	305	305	0	0	
860	1	0	331	331	0	0	
861	11	0	599	599	0	0	
862	1	0	840	840	0	0	
869	149	0	3028	3028	0	0	
870	0	15	2350	2350	0	0	
Total	247213	11988	55935	55935	73	73	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
644	0	0	1411	1411	0	0	
663	0	0	658	658	0	0	
664	85	85	1761	1761	0	0	
686	228	228	3151	3151	0	0	
692	2	2	1556	1556	0	0	
724	365	365	1197	1197	0	0	
725	21829	1310	1861	1861	0	0	x
731	5	5	773	773	0	0	
732	0	0	206	206	0	0	
734	69	69	779	779	0	0	
735	132	132	3638	3638	73	73	
740	12758	765	390	390	0	0	x
744	14	13	151	151	0	0	
746	589	589	841	841	0	0	
749	1425	1425	152	152	0	0	
754	23059	1383	497	497	0	0	x
755	2	2	742	742	0	0	
757	23351	1401	520	520	0	0	x
758	52	52	1556	1556	0	0	
759	195	195	1734	1734	0	0	



# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
760	654	654	2054	2054	0	0	
767	1	1	871	871	0	0	
770	1213	1213	1436	1436	0	0	
789	0	0	233	233	0	0	
790	0	0	2090	2090	0	0	
793	3	3	1049	1049	0	0	
796	0	0	521	521	0	0	
811	2	2	1373	1373	0	0	
812	0	0	172	172	0	0	
813	88	88	283	283	0	0	
814	132	132	2430	2430	0	0	
819	0	0	149	149	0	0	
820	0	0	35	35	0	0	
827	0	0	758	758	0	0	
828	0	0	755	755	0	0	
831	2	2	633	633	0	0	
832	0	0	448	448	0	0	
833	1	1	1091	1091	0	0	
834	0	0	249	249	0	0	
847	0	0	644	644	0	0	
848	0	0	65	65	0	0	
855	0	0	939	939	0	0	
856	0	0	4220	4220	0	0	
859	0	0	282	282	0	0	
860	1	1	310	310	0	0	
861	21	21	558	558	0	0	
862	2	2	814	814	0	0	
869	177	177	2846	2846	0	0	
870	0	0	2233	2233	0	0	
Total	86457	10320	53115	53115	73	73	

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
644	0	0	544	544	0	0	
663	0	0	250	250	0	0	
664	46	46	670	670	0	0	
686	121	121	1198	1198	0	0	
692	1	1	592	592	0	0	
724	207	207	459	459	0	0	
725	23858	2611	714	714	0	0	x
731	3	3	294	294	0	0	
732	0	0	79	79	0	0	
734	40	40	310	310	0	0	
735	68	68	1422	1422	42	42	
740	13944	1526	148	148	0	0	x

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
744	8	8	57	57	0	0	
746	410	410	321	321	0	0	
749	992	992	59	59	0	0	
754	25201	2758	190	190	0	0	x
755	1	1	282	282	0	0	
757	25523	2793	199	199	0	0	x
758	30	30	593	593	0	0	
759	128	128	673	673	0	0	
760	455	455	798	798	0	0	
767	1	1	333	333	0	0	
770	845	845	567	567	0	0	
789	0	0	93	93	0	0	
790	0	0	801	801	0	0	
793	2	2	415	415	0	0	
796	0	0	199	199	0	0	
811	1	1	530	530	0	0	
812	0	0	67	67	0	0	
813	46	46	111	111	0	0	
814	68	68	941	941	0	0	
819	0	0	58	58	0	0	
820	0	0	14	14	0	0	
827	0	0	291	291	0	0	
828	0	0	288	288	0	0	
831	1	1	250	250	0	0	
832	0	0	173	173	0	0	
833	1	1	422	422	0	0	
834	0	0	98	98	0	0	
847	0	0	255	255	0	0	
848	0	0	30	30	0	0	
855	0	0	364	364	0	0	
856	0	0	1618	1618	0	0	
859	0	0	112	112	0	0	
860	1	1	121	121	0	0	
861	12	12	219	219	0	0	
862	1	1	312	312	0	0	
869	91	91	1111	1111	0	0	
870	0	0	853	853	0	0	
Total	165066	13270	20503	20503	42	42	

# Appendix A-8

## Region 8

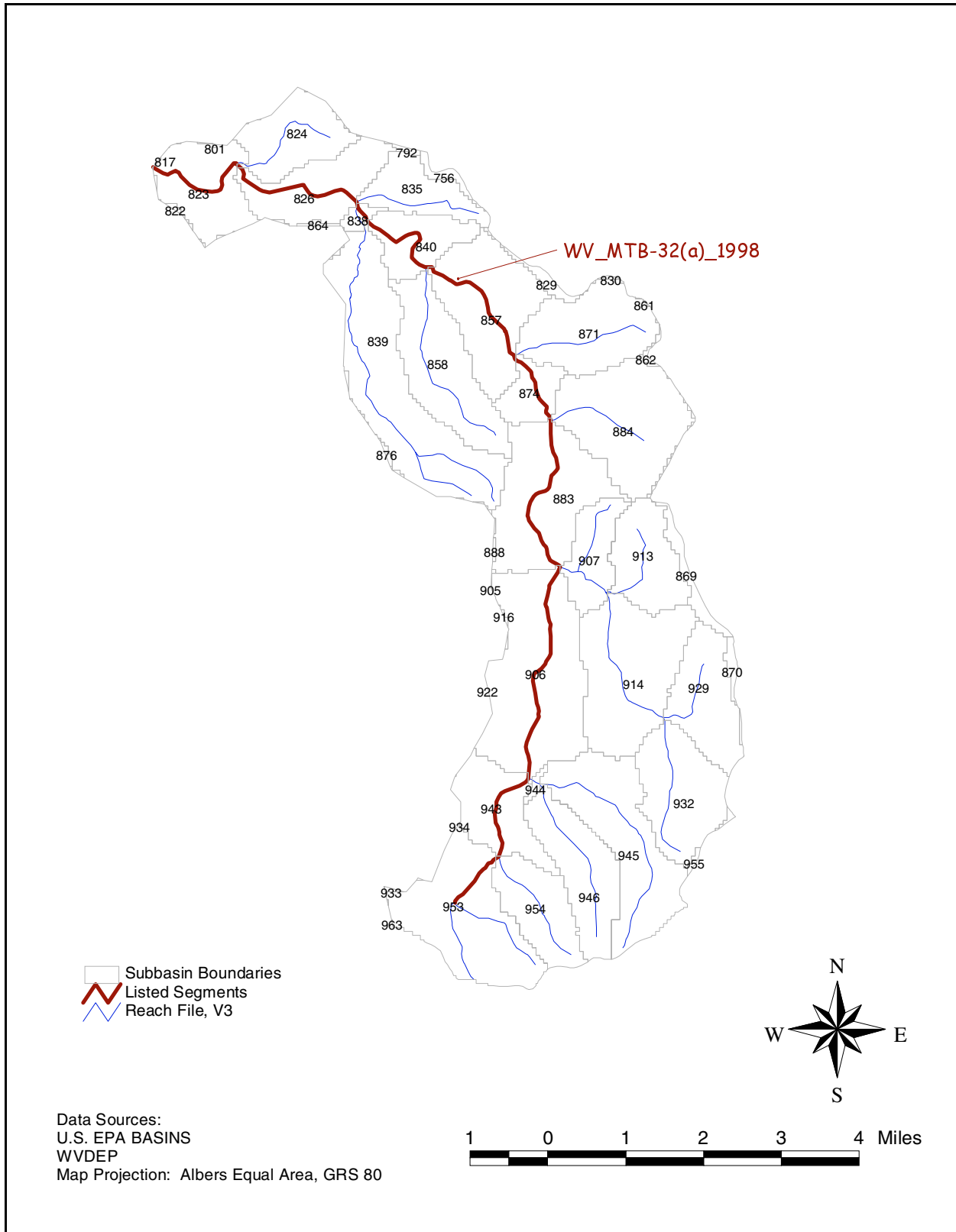


Figure 1. Region 8-Buckhannon River, Left Fork, Randolph County

TMDLs for Region 8 were developed in 1998, *Metals TMDL for Buckhannon River, West Virginia*. The allocation results from this report are summarized in Tables 5a-5c. Refer to the report for a more detailed description of the TMDL development methodology and TMDL allocation. Note that the watershed column refers to the watersheds in the Buckhannon TMDL. 5020001018 represents the following SWS used in development of the Tygart watershed TMDLs: 902, 883, 896, 898, 897, 911, 936, 946, 951, 938, 931, 949, and 960. 5020001020 represents 969, 970, 1001, 1005, and 1018. 502001021 represents 1004, 1007, 1019, 1036, 1035, 1037, and 1040.

**Table 5a.** Aluminum existing and allocation loadings (lbs/yr)

Aluminum		
Watershed	Existing(lbs/yr)	Allocation(lbs/yr)
5020001018	17901	14101
5020001020	12941	6037
5020001021	12337	9233
All Subwatersheds	483065	445501

**Table 5b.** Iron existing and allocation loadings (lbs/yr)

Iron		
Watershed	Existing(lbs/yr)	Allocation(lbs/yr)
5020001018	23312	18044
5020001020	17974	8020
5020001021	15291	11365
All Subwatersheds	623687	575492

**Table 5c.** Manganese existing and alloaction loadings (lbs/yr)

Management		
Watershed	Existing(lbs/yr)	Allocation(lbs/yr)
5020001018	4827	4287
5020001020	2632	1541
5020001021	2506	2173
All Subwatersheds	152839	148616

# Appendix A-9

## Region 9

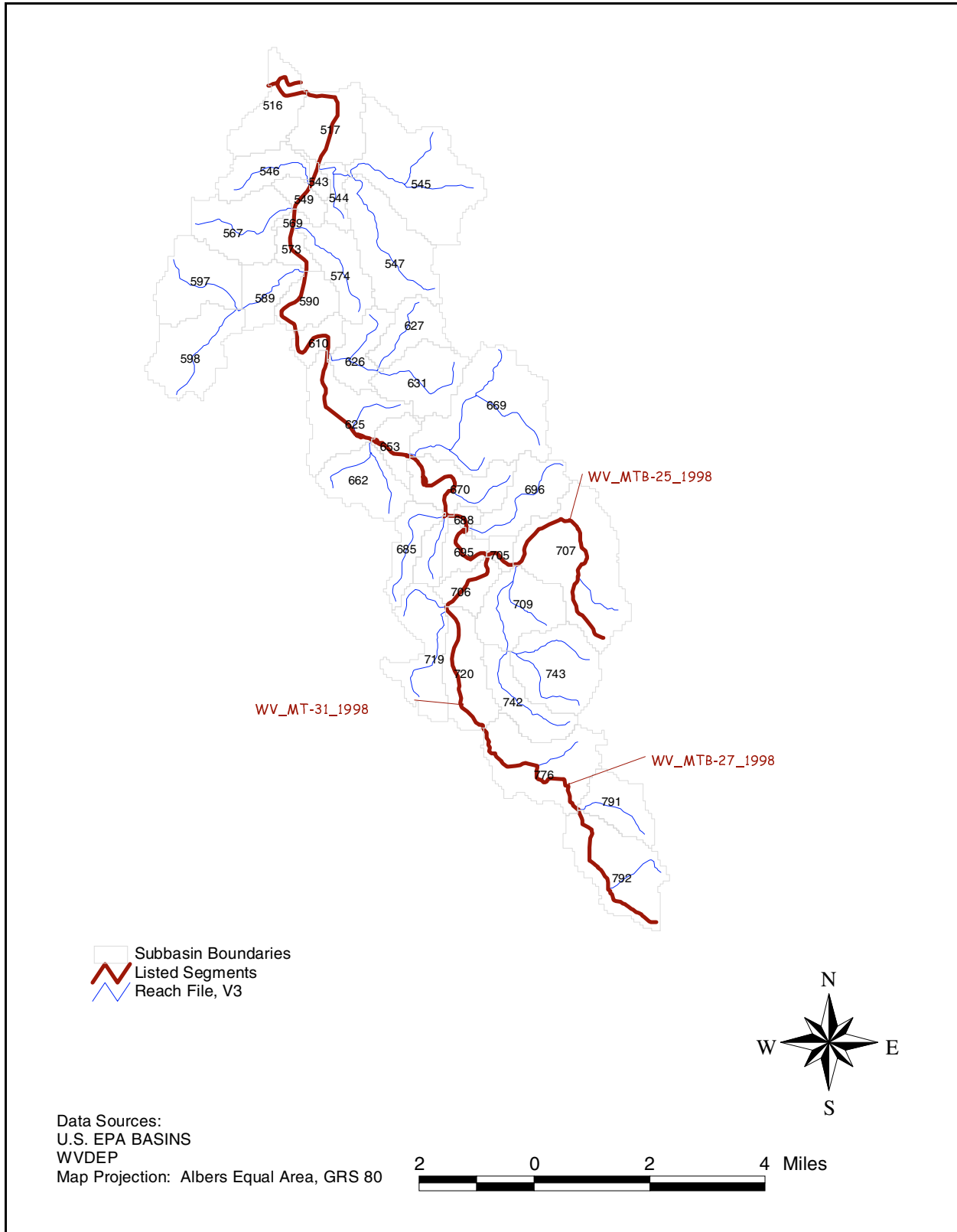


Figure 1. Region 9- Buckhannon River, Upshur County

**Table 1.** Impaired waterbodies in Region 9

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Ten mile CK	MTB-25	Aluminum, Iron	705,707,709,742,743	None	B-1
Buckhannon River	MT-31	Iron	516,517,543,546,549,569,544,545,567,573,547,574,597,589,590,610,627,626,598,631,625,669,653,662,688,696,695,670,685,706,719,720,705,707,709,742,743,776,791,792	8,6,5	B-1
Panther FK	MTB-27	pH	776,791,792	None	B-2

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
776

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
544	MTB-13-{00.80}	160	160	160	1	29-Apr-98	29-Apr-98
598	MTB-17-{01.67}	239	239	239	1	29-Apr-98	29-Apr-98
625	550807	311	60	1500	70	06-May-80	14-Jun-88
625	MTB-20	57	57	57	1	04-Sep-97	04-Sep-97
626	MTB-19-{0.9}	260	260	260	1	04-Sep-97	04-Sep-97
705	MTB-25	240	240	240	1	17-Sep-97	17-Sep-97
705	MTB-25-{00.57}	439	439	439	1	29-Apr-98	29-Apr-98
707	385111080093301	500	500	500	1	30-Oct-84	30-Oct-84
707	MTB-25-A	114	114	114	1	17-Sep-97	17-Sep-97
709	MTB-25-A-{01.7}	152	152	152	1	29-Apr-98	29-Apr-98

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
544	MTB-13-{00.80}	292	292	292	1	29-Apr-98	29-Apr-98
598	MTB-17-{01.67}	404	404	404	1	29-Apr-98	29-Apr-98
625	550807	300	0	1450	82	06-Feb-80	14-Jun-88
625	MTB-20	370	370	370	1	04-Sep-97	04-Sep-97
626	MTB-19-{0.9}	490	490	490	1	04-Sep-97	04-Sep-97
705	MTB-25	780	780	780	1	17-Sep-97	17-Sep-97
705	MTB-25-{00.57}	524	524	524	1	29-Apr-98	29-Apr-98
707	385111080093301	910	910	910	1	30-Oct-84	30-Oct-84
707	MTB-25-A	186	186	186	1	17-Sep-97	17-Sep-97
709	MTB-25-A-{01.7}	55	55	55	1	29-Apr-98	29-Apr-98



**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
544	MTB-13-{00.80}	36	35.8	35.8	1	29-Apr-98	29-Apr-98
598	MTB-17-{01.67}	26	26.3	26.3	1	29-Apr-98	29-Apr-98
625	550807	208	0	1320	81	06-Feb-80	14-Jun-88
625	MTB-20	150	150	150	1	04-Sep-97	04-Sep-97
626	MTB-19-{0.9}	200	200	200	1	04-Sep-97	04-Sep-97
705	MTB-25	1300	1300	1300	1	17-Sep-97	17-Sep-97
705	MTB-25-{00.57}	257	257	257	1	29-Apr-98	29-Apr-98
707	385111080093301	210	210	210	1	30-Oct-84	30-Oct-84
707	MTB-25-A	111	111	111	1	17-Sep-97	17-Sep-97
709	MTB-25-A-{01.7}	48	48.2	48.2	1	29-Apr-98	29-Apr-98

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
589	u002883	1449	455	1.4
590	p201497	1	1	4.3
598	d003582	386	121	1.3
598	p201597	1	1	4.3
625	u201698	459	459	4.3
631	s016376	2271	1089	2.1
653	d018400	2246	2246	4.3
662	o003983	2515	1075	1.8

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
589	u002883	809	809	3.2
590	p201497	2	1	3.2
598	d003582	216	216	3.2
598	p201597	1	1	3.2
625	u201698	341	341	3.2
631	s016376	1689	1689	3.2
653	d018400	1671	1671	3.2
662	o003983	1871	1871	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
589	u002883	506	506	2.0
590	p201497	0	0	2.0
598	d003582	135	135	2.0
598	p201597	0	0	2.0
625	u201698	213	213	2.0
631	s016376	1071	1071	2.0
653	d018400	1045	1045	2.0
662	o003983	1150	1150	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
517	0	0	1665	1665	0	0	
543	0	0	273	273	0	0	
544	0	0	584	584	0	0	
545	30	30	3607	3607	0	0	
546	0	0	959	959	0	0	
547	0	0	2501	2501	0	0	
549	0	0	525	525	0	0	
567	0	0	2069	2069	0	0	
569	49	49	141	141	0	0	
573	67	67	383	383	0	0	
574	7	7	1380	1380	0	0	
589	0	0	1018	1018	0	0	
590	0	0	766	766	0	0	
597	0	0	2031	2031	0	0	
598	7	7	2238	2238	0	0	
610	0	0	600	600	0	0	
625	26	26	1831	1831	0	0	
626	30	30	924	924	0	0	
627	1	1	926	926	0	0	
631	0	0	1405	1405	0	0	
653	33	33	374	374	0	0	
662	355	155	1098	1098	0	0	x
669	0	0	3413	3413	0	0	
670	2	2	1573	1573	0	0	
682	1	1	5638	5638	0	0	
685	0	0	787	787	0	0	
688	0	0	151	151	0	0	
695	0	0	426	426	0	0	
696	37	37	1334	1334	0	0	
705	0	0	219	219	0	0	
706	0	0	537	537	0	0	
707	2918	2918	1163	1163	0	0	
709	1334	1334	1041	1041	0	0	
719	0	0	1480	1480	0	0	
720	93	93	1211	1211	0	0	
742	73	73	968	968	0	0	
743	86	86	1595	1595	0	0	
776	395	395	1864	1864	8558	8558	
791	0	0	865	865	0	0	
792	23	23	1841	1841	0	0	
Total	5567	5567	53405	53405	8558	8558	

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
517	0	0	1637	1637	0	0	
543	0	0	240	240	0	0	
544	0	0	522	522	0	0	
545	28	28	3343	3343	0	0	
546	0	0	919	919	0	0	
547	0	0	2322	2322	0	0	
549	0	0	500	500	0	0	
567	0	0	1887	1887	0	0	
569	45	45	131	131	0	0	
573	61	61	348	348	0	0	
574	7	7	1280	1280	0	0	
589	0	0	905	905	0	0	
590	0	0	737	737	0	0	
597	0	0	1872	1872	0	0	
598	6	6	1889	1889	0	0	
610	0	0	539	539	0	0	
625	26	26	1731	1731	0	0	
626	28	28	870	870	0	0	
627	2	2	883	883	0	0	
631	0	0	1343	1343	0	0	
653	46	46	365	365	0	0	
662	490	490	1100	1100	0	0	
669	0	0	3291	3291	0	0	
670	3	3	1550	1550	0	0	
682	2	2	5447	5447	0	0	
685	0	0	752	752	0	0	
688	0	0	151	151	0	0	
695	0	0	432	432	0	0	
696	51	51	1328	1328	0	0	
705	0	0	218	218	0	0	
706	0	0	539	539	0	0	
707	4025	4025	1189	1189	0	0	
709	1840	1840	1046	1046	0	0	
719	0	0	1445	1445	0	0	
720	129	129	1207	1207	0	0	
742	100	100	964	964	0	0	
743	119	119	1588	1588	0	0	
776	424	424	1853	1853	8558	3080	x
791	0	0	865	865	0	0	
792	32	32	1839	1839	0	0	
Total	7462	7462	51063	51063	8558	3080	

Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
517	0	0	820	820	0	0	
543	0	0	136	136	0	0	
544	0	0	277	277	0	0	
545	44	44	1551	1551	0	0	
546	0	0	417	417	0	0	
547	0	0	1065	1065	0	0	
549	0	0	249	249	0	0	
567	0	0	964	964	0	0	
569	73	73	65	65	0	0	
573	99	99	161	161	0	0	
574	11	11	604	604	0	0	
589	0	0	481	481	0	0	
590	0	0	301	301	0	0	
597	0	0	909	909	0	0	
598	10	10	1056	1056	0	0	
610	0	0	264	264	0	0	
625	36	36	747	747	0	0	
626	44	44	375	375	0	0	
627	1	1	371	371	0	0	
631	0	0	557	557	0	0	
653	25	25	143	143	0	0	
662	272	272	498	498	0	0	
669	0	0	1390	1390	0	0	
670	2	2	591	591	0	0	
682	1	1	2193	2193	0	0	
685	0	0	307	307	0	0	
688	0	0	54	54	0	0	
695	0	0	166	166	0	0	
696	28	28	569	569	0	0	
705	0	0	89	89	0	0	
706	0	0	197	197	0	0	
707	2233	2233	505	505	0	0	
709	1021	1021	401	401	0	0	
719	0	0	563	563	0	0	
720	71	71	447	447	0	0	
742	55	55	353	353	0	0	
743	66	66	582	582	0	0	
776	398	398	674	674	5748	5748	
791	0	0	309	309	0	0	
792	18	18	659	659	0	0	
Total	4508	4508	22059	22059	5748	5748	

# **Appendix A-10**

## **Region 10**

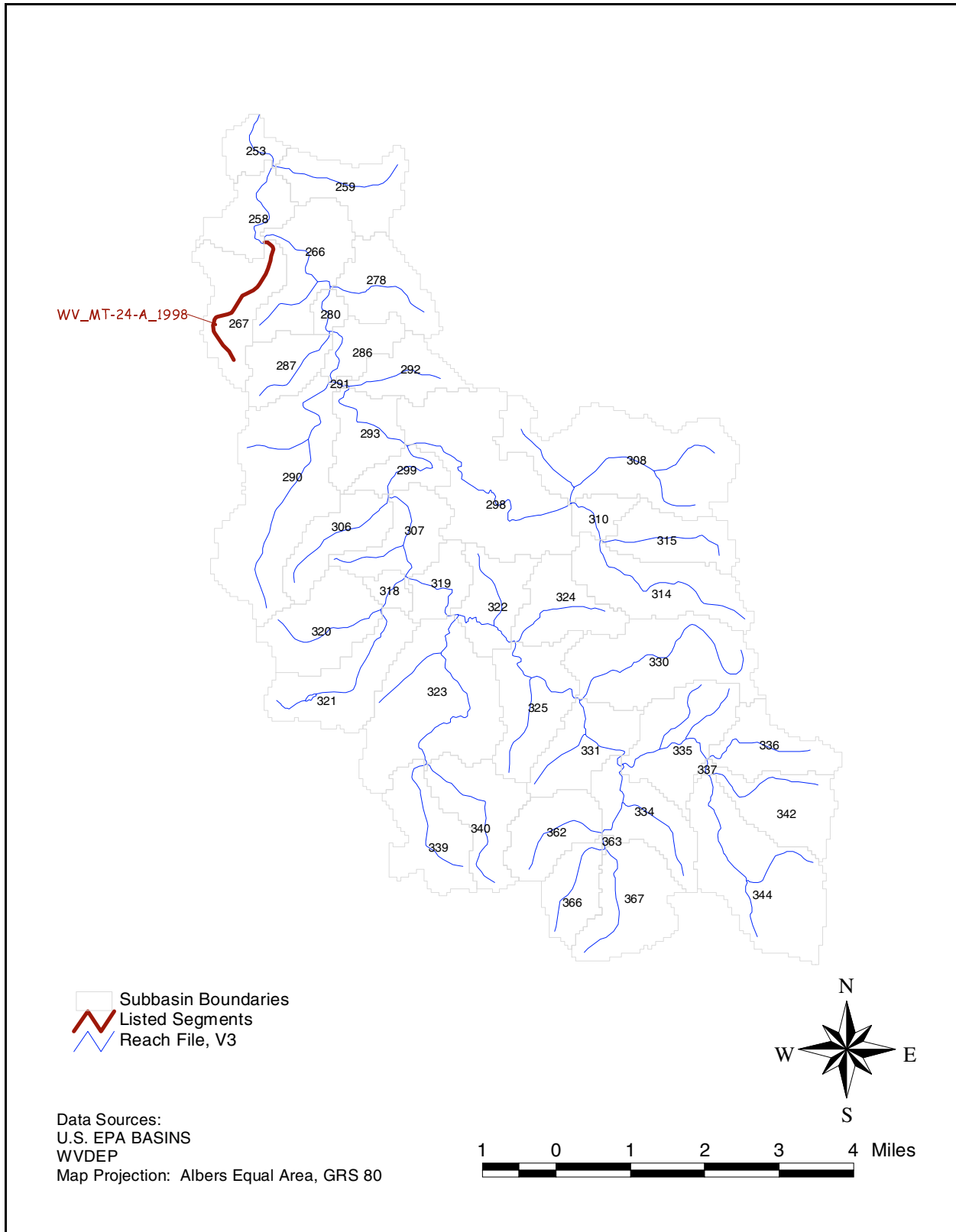


Figure 1. Region 10- Laurel Creek, Barbour County

**Table 1.** Impaired waterbodies in Region 10

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Frost RN	MT-24-A	pH, Metals	267	None	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, leaching)

SWS
none

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
258	550981	167	60	250	10	25-Oct-89	19-Sep-90
267	MT-24-A	71	71	71	1	10-Sep-97	10-Sep-97
323	MT-24-C-2	104	104	104	1	10-Sep-97	10-Sep-97
335	MT-24-C-3.5	394	394	394	1	10-Sep-97	10-Sep-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
258	550981	350	84	700	11	25-Oct-89	19-Sep-90
266	391100079583139	605	380	830	2	27-Mar-80	23-Aug-80
267	MT-24-A	850	850	850	1	10-Sep-97	10-Sep-97
323	MT-24-C-2	876	876	876	1	10-Sep-97	10-Sep-97
335	MT-24-C-3.5	727	727	727	1	10-Sep-97	10-Sep-97

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
258	550981	72.1	40	108	10	25-Oct-89	19-Sep-90
266	391100079583139	70	60	80	2	27-Mar-80	23-Aug-80
267	MT-24-A	1100	1100	1100	1	10-Sep-97	10-Sep-97
323	MT-24-C-2	197	197	197	1	10-Sep-97	10-Sep-97
335	MT-24-C-3.5	80	80	80	1	10-Sep-97	10-Sep-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources  
(not applicable in this region)

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
253	0	0	406	406	325	325	
258	112	112	843	843	0	0	
259	0	0	1277	1277	0	0	
266	47	47	1677	1677	0	0	
267	1034	1034	1377	1377	0	0	
278	0	0	1471	1471	0	0	
280	0	0	218	218	0	0	
286	0	0	655	655	0	0	
287	0	0	848	848	0	0	
290	16	16	4047	4047	0	0	
291	0	0	34	34	0	0	
292	0	0	1177	1177	0	0	
293	63	63	1105	1105	0	0	
298	74	74	3928	3928	0	0	
299	7	7	601	601	0	0	
306	22	22	1295	1295	0	0	
307	7	7	1206	1206	0	0	
308	0	0	4092	4092	0	0	
310	0	0	440	440	0	0	
314	30	30	1982	1982	0	0	
315	0	0	1321	1321	0	0	
318	0	0	307	307	0	0	
319	0	0	697	697	0	0	
320	0	0	1889	1889	0	0	
321	0	0	1956	1956	0	0	
322	15	15	1174	1174	0	0	
323	7	7	3882	3882	0	0	
324	37	37	1286	1286	0	0	
325	0	0	1917	1917	0	0	
330	0	0	2424	2424	0	0	
331	22	22	1228	1228	1405	1405	
334	0	0	1395	1395	0	0	
335	7	7	1704	1704	0	0	
336	0	0	927	927	0	0	
337	0	0	34	34	0	0	
339	0	0	1452	1452	0	0	
340	45	45	1347	1347	0	0	
342	0	0	1062	1062	0	0	
344	0	0	2359	2359	0	0	
362	22	22	1206	1206	0	0	
363	0	0	43	43	0	0	
366	0	0	841	841	0	0	
367	0	0	1622	1622	0	0	
Total	1570	1570	60750	60750	1731	1731	



**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
253	0	0	404	404	325	325	
258	130	130	819	819	0	0	
259	0	0	1188	1188	0	0	
266	58	58	1517	1517	0	0	
267	2131	2131	1274	1274	0	0	
278	0	0	1321	1321	0	0	
280	0	0	211	211	0	0	
286	0	0	613	613	0	0	
287	0	0	801	801	0	0	
290	15	15	3649	3649	0	0	
291	0	0	31	31	0	0	
292	0	0	1040	1040	0	0	
293	58	58	993	993	0	0	
298	68	68	3483	3483	0	0	
299	7	7	564	564	0	0	
306	21	21	1172	1172	0	0	
307	7	7	1081	1081	0	0	
308	0	0	3686	3686	0	0	
310	0	0	398	398	0	0	
314	28	28	1838	1838	0	0	
315	0	0	1204	1204	0	0	
318	0	0	264	264	0	0	
319	0	0	618	618	0	0	
320	0	0	1698	1698	0	0	
321	0	0	1772	1772	0	0	
322	14	14	1028	1028	0	0	
323	7	7	3442	3442	0	0	
324	34	34	1198	1198	0	0	
325	0	0	1690	1690	0	0	
330	0	0	2293	2293	0	0	
331	21	21	1145	1145	1405	1405	
334	0	0	1311	1311	0	0	
335	7	7	1603	1603	0	0	
336	0	0	915	915	0	0	
337	0	0	34	34	0	0	
339	0	0	1344	1344	0	0	
340	41	41	1292	1292	0	0	
342	0	0	1093	1093	0	0	
344	0	0	2325	2325	0	0	
362	21	21	1111	1111	0	0	
363	0	0	30	30	0	0	
366	0	0	809	809	0	0	
367	0	0	1531	1531	0	0	
Total	2667	2667	55834	55834	1730	1730	

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
253	0	0	147	147	279	279	
258	125	125	322	322	0	0	
259	0	0	529	529	0	0	
266	47	47	727	727	0	0	
267	2488	1806	570	570	0	0	x
278	0	0	664	664	0	0	
280	0	0	83	83	0	0	
286	0	0	274	274	0	0	
287	0	0	344	344	0	0	
290	23	23	1809	1809	0	0	
291	0	0	15	15	0	0	
292	0	0	555	555	0	0	
293	94	94	485	485	0	0	
298	109	109	1804	1804	0	0	
299	11	11	253	253	0	0	
306	33	33	575	575	0	0	
307	11	11	525	525	0	0	
308	0	0	1858	1858	0	0	
310	0	0	193	193	0	0	
314	44	44	863	863	0	0	
315	0	0	594	594	0	0	
318	0	0	141	141	0	0	
319	0	0	303	303	0	0	
320	0	0	860	860	0	0	
321	0	0	887	887	0	0	
322	22	22	522	522	0	0	
323	11	11	1796	1796	0	0	
324	55	55	608	608	0	0	
325	0	0	872	872	0	0	
330	0	0	985	985	0	0	
331	33	33	517	517	1209	1209	
334	0	0	591	591	0	0	
335	11	11	707	707	0	0	
336	0	0	341	341	0	0	
337	0	0	12	12	0	0	
339	0	0	614	614	0	0	
340	66	66	535	535	0	0	
342	0	0	464	464	0	0	
344	0	0	870	870	0	0	
362	33	33	514	514	0	0	
363	0	0	19	19	0	0	
366	0	0	338	338	0	0	
367	0	0	666	666	0	0	
Total	3219	2536	26349	26349	1488	1488	

# Appendix A-11

## Region 11

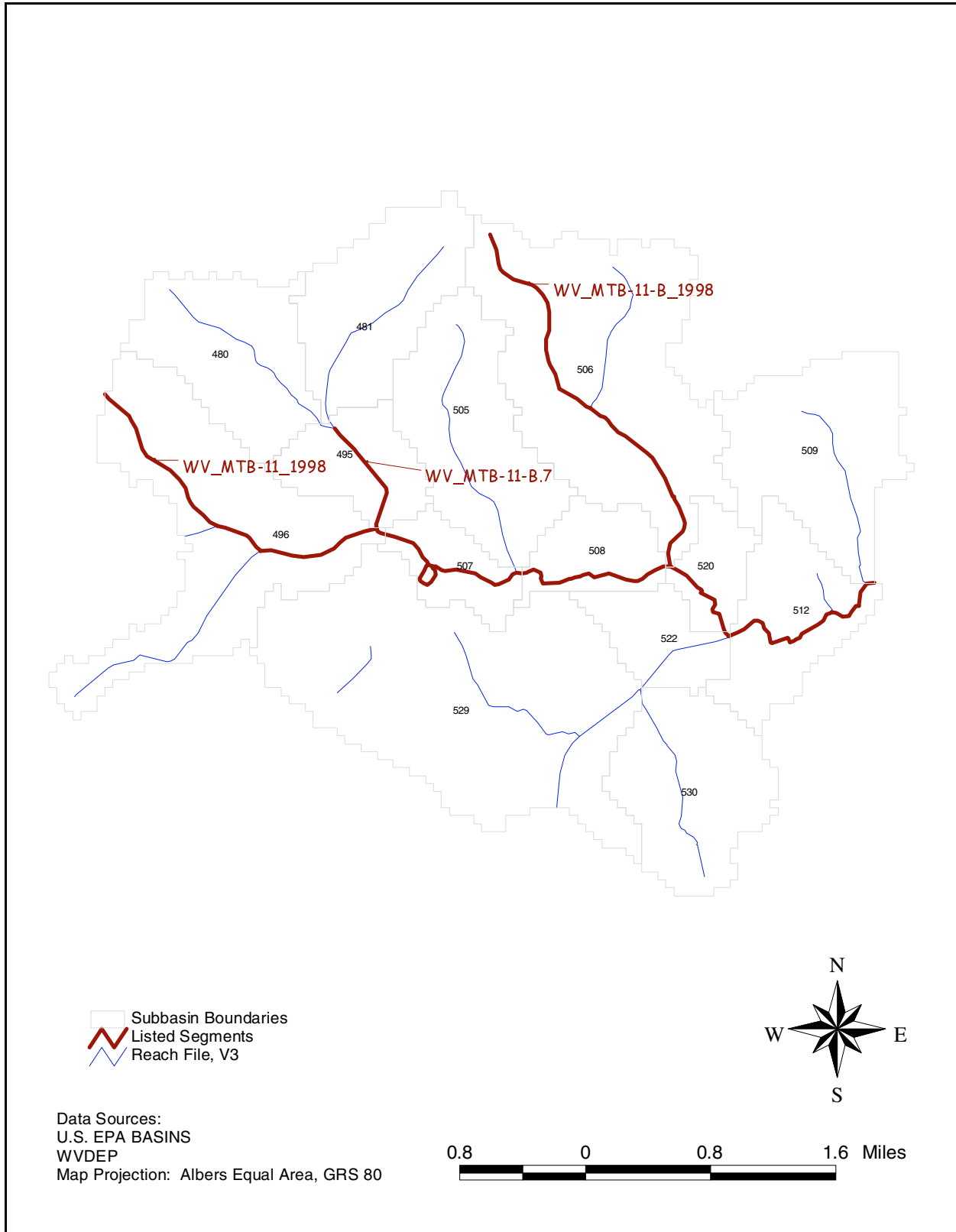


Figure 1. Region 11-Fink Run, Upshur County

**Table 1.** Impaired waterbodies in Region 11

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Mud lick	MTB-11-B	Iron, Manganese	506	None	B-1
Fink RN	MTB-11	pH, Metals	481,480,495,505,506,509,508,507,520,522,496,512,529,530	None	B-1
Bridge RN	MTB-11-B.7	pH, Metals	495,480,481	None	B-1

**Table 2.** Locations of Abandoned Mines (seep, deep mine, and/or leaching)

SWS
506 and 495

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
495	MTB-11-B.7	2600	2600	2600	1	2-Sep-97	2-Sep-97
506	MTB-11-B	150	150	150	1	2-Sep-97	2-Sep-97
516	MTB-11	120	120	120	1	2-Sep-97	2-Sep-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
495	MTB-11-B.7	17000	17000	17000	1	2-Sep-97	2-Sep-97
506	MTB-11-B	1000	1000	1000	1	2-Sep-97	2-Sep-97
512	385946080142139	6667	3500	10000	3	26-Mar-80	22-Jul-81
516	MTB-11	1000	1000	1000	1	2-Sep-97	2-Sep-97

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	count	Start Date	End Date
495	MTB-11-B.7	2300	2300	2300	1	2-Sep-97	2-Sep-97
506	MTB-11-B	610	610	610	1	2-Sep-97	2-Sep-97
512	385946080142139	1070	540	2100	3	26-Mar-80	22-Jul-81
516	MTB-11	250	250	250	1	2-Sep-97	2-Sep-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
530	p200699	24	24	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
530	p200699	18	18	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
530	p200699	11	11	2.0

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
480	0	0	1363	1363	0	0	
481	0	0	1218	1218	0	0	
495	1603	160	506	506	0	0	x
496	0	0	2388	2388	0	0	
505	49	49	1410	1410	0	0	
506	1229	1229	2530	2530	0	0	
507	4	4	422	422	0	0	
508	1	1	615	615	0	0	
509	87	87	1468	1468	0	0	
512	16	16	805	805	0	0	
516	1	1	1214	1214	0	0	
520	522	418	355	355	0	0	x
522	0	0	558	558	0	0	
529	55	55	3768	3768	170	170	
530	0	0	1418	1418	0	0	
Total	3568	2020	20037	20037	170	170	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
480	0	0	1267	1267	0	0	
481	0	0	1213	1213	0	0	
495	3969	992	544	544	0	0	x
496	0	0	2325	2325	0	0	
505	74	74	1455	1455	0	0	
506	2935	2495	2698	2698	0	0	x
507	7	7	494	494	0	0	
508	2	2	742	742	0	0	
509	131	131	1477	1477	0	0	
512	24	24	945	945	0	0	
516	2	2	1494	1494	0	0	
520	1512	1286	405	405	0	0	x
522	0	0	610	610	0	0	
529	83	83	3886	3886	170	170	
530	0	0	1277	1277	0	0	
Total	8739	5096	20831	20831	170	170	

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
480	0	0	855	855	0	0	
481	0	0	701	701	0	0	
495	1600	576	310	310	0	0	x
496	0	0	1494	1494	0	0	
505	37	37	848	848	0	0	
506	1316	1316	1374	1374	0	0	
507	4	4	245	245	0	0	
508	1	1	362	362	0	0	
509	66	66	866	866	0	0	
512	12	12	473	473	0	0	
516	1	1	755	755	0	0	
520	1425	1211	188	188	0	0	x
522	0	0	360	360	0	0	
529	42	42	2535	2535	113	113	
530	0	0	787	787	0	0	
Total	4504	3267	12151	12151	113	113	

# Appendix A-12

## Region 12



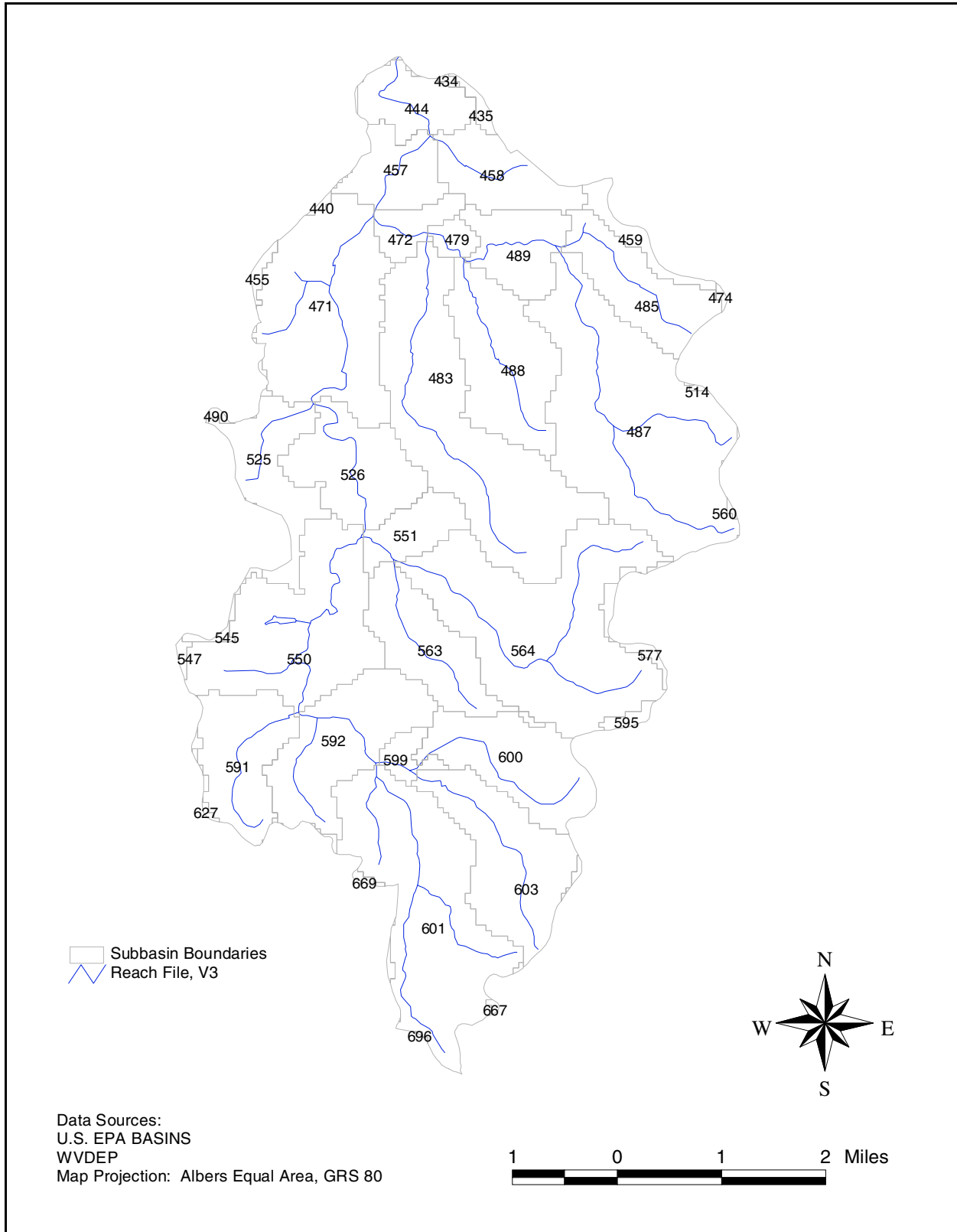


Figure 1. Region 12 - Sand Run, Upshur County

**Table 1.** Impaired waterbodies in Region 12  
(not applicable in this region)

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)  
(not applicable in this region)

**Table 3a.** Water quality data for aluminum  
(not applicable in this region)

**Table 3b.** Water quality data for iron  
(not applicable in this region)

**Table 3c.** Water quality data for manganese  
(not applicable in this region)

**Table 4a.** Aluminum baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation (lbs/yr)	Allocation (mg/L)
487	s020477	1126	1501	4.3

**Table 4b.** Iron baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation (lbs/yr)	Allocation (mg/L)
487	s020477	1126	1068	3.2

**Table 4c.** Manganese baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation (lbs/yr)	Allocation (mg/L)
487	s020477	646	554	2.0

**Table 5a.** Aluminum baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
444	0	544	0
457	0	738	0
458	0	823	0
471	0	2382	0
472	0	272	0
479	4	136	0
483	63	2434	980
485	2	1027	0
487	269	3021	1089
488	80	1121	0
489	0	644	0
525	0	1313	0
526	0	962	0
550	0	1993	0
551	0	417	0
563	0	872	0
564	253	2825	0
591	0	1319	0
592	17	1529	0
599	0	172	0
600	17	1179	0
601	263	2624	0
603	17	1460	0
Total	985	29808	2070

**Table 5b.** Iron baseline conditions for nonpoint sources

<b>SWS</b>	<b>AML Baseline (lbs/yr)</b>	<b>Nonpoint Baseline (lbs/yr)</b>	<b>Revoked Mine Baseline (lbs/yr)</b>
444	0	530	0
457	0	684	0
458	0	792	0
471	0	2205	0
472	0	266	0
479	5	129	0
483	86	2391	980
485	3	986	0
487	345	2996	1089
488	110	1113	0
489	0	614	0
525	0	1156	0
526	0	933	0
550	0	1884	0
551	0	407	0
563	0	855	0
564	338	2691	0
591	0	1177	0
592	24	1396	0
599	0	169	0

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
600	16	1133	0
601	243	2615	0
603	20	1403	0
Total	1191	28525	2070

**Table 5c.** Manganese baseline conditions for nonpoint sources

SWS	AML Baseline (lbs/yr)	Nonpoint Baseline (lbs/yr)	Revoked Mine Baseline (lbs/yr)
444	0	207	0
457	0	306	0
458	0	323	0
471	0	1021	0
472	0	101	0
479	3	54	0
483	48	912	563
485	2	440	0
487	246	1214	625
488	61	406	0
489	0	255	0
525	0	621	0
526	0	368	0
550	0	802	0
551	0	160	0
563	0	324	0
564	209	1129	0
591	0	607	0
592	13	669	0
599	0	65	0
600	25	464	0
601	391	1124	0
603	19	579	0
Total	1017	12153	1187

# **Appendix A-13**

## **Region 13**

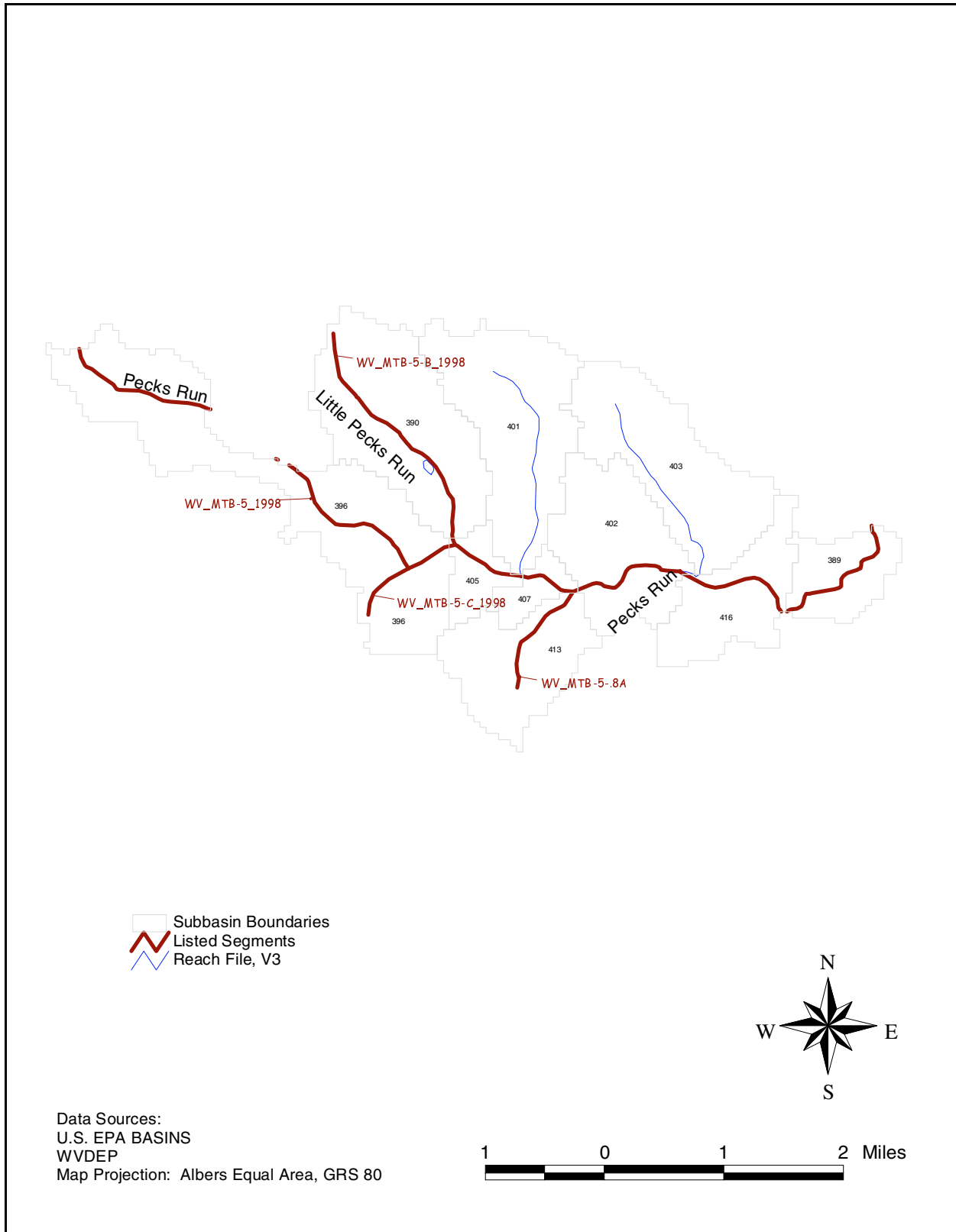


Figure 1. Region 13-Pecks Run, Upshur County

**Table 1.** Impaired waterbodies in Region 13

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Pecks RN	MTB-5	pH, Metals	390,401,403,389,405,407,402,396,416,413, 418	None	B-1
Little Pecks Run	MTB-5-B	Mn, Fe	390	None	B-1
Mud RN/Pecks RN	MTB-5-C	Metals	396, 390	None	B-1
U.T./Pecks RN	MTB-5-.8A	pH, Metals	413	None	B-1

**Table 2.** Location of abandoned mines (seep, deep mine, and/or leaching)

SWS
413 and 390

**Table 3a.** Water quality for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
389	MTB-05	50	50	50	1	16-Sep-97	16-Sep-97
390	MTB-05-B	140	140	140	1	17-Sep-97	17-Sep-97

**Table 3b.** Water quality for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
389	MTB-05	67	67	67	1	16-Sep-97	16-Sep-97
390	MTB-05-B	780	780	780	1	17-Sep-97	17-Sep-97
402	390334080091839	1750	1300	2200	2	26-Mar-80	22-Jul-81

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
389	MTB-05	23	23	23	1	16-Sep-97	16-Sep-97
390	MTB-05-B	1580	1580	1580	1	17-Sep-97	17-Sep-97
402	390334080091839	783	320	1500	3	26-Mar-80	22-Jul-81

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
401	s201087	525	440	3.6
402	o202586	417	417	4.3
402	s200996	875	875	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
401	s201087	384	384	3.2
402	o202586	311	311	3.2
402	s200996	639	639	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
401	s201087	246	246	2.0
402	o202586	197	197	2.0
402	s200996	411	411	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
389	19	19	586	586	0	0	
390	42	42	1879	1879	0	0	
396	99	99	2815	2815	0	0	
401	69	69	1710	1710	0	0	
402	186	186	1225	1225	0	0	
403	69	69	1681	1681	0	0	
405	41	41	358	358	0	0	
407	31	31	287	287	0	0	
413	466	369	1154	1154	0	0	x
416	30	30	960	960	0	0	
418	28	28	967	967	0	0	
Total	1080	983	13622	13622	0	0	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
389	29	29	727	727	0	0	
390	79	79	2325	2325	0	0	
396	165	165	3699	3699	0	0	
401	104	104	2149	2149	0	0	
402	312	312	1559	1559	0	0	
403	104	104	2148	2148	0	0	
405	62	62	504	504	0	0	
407	49	49	444	444	0	0	
413	1283	930	1520	1520	0	0	x
416	46	46	1203	1203	0	0	
418	42	42	1320	1320	0	0	
Total	2274	1921	17598	17598	0	0	



**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked Mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
389	14	14	370	370	0	0	
390	743	598	1289	1289	0	0	x
396	324	324	2189	2189	0	0	
401	52	52	1199	1199	0	0	
402	637	637	947	947	0	0	
403	52	52	1336	1336	0	0	
405	31	31	320	320	0	0	
407	43	43	314	314	0	0	
413	904	392	882	882	0	0	x
416	35	35	714	714	0	0	
418	21	21	840	840	0	0	
Total	2857	2199	10400	10400	0	0	

# Appendix A-14

## Region 14

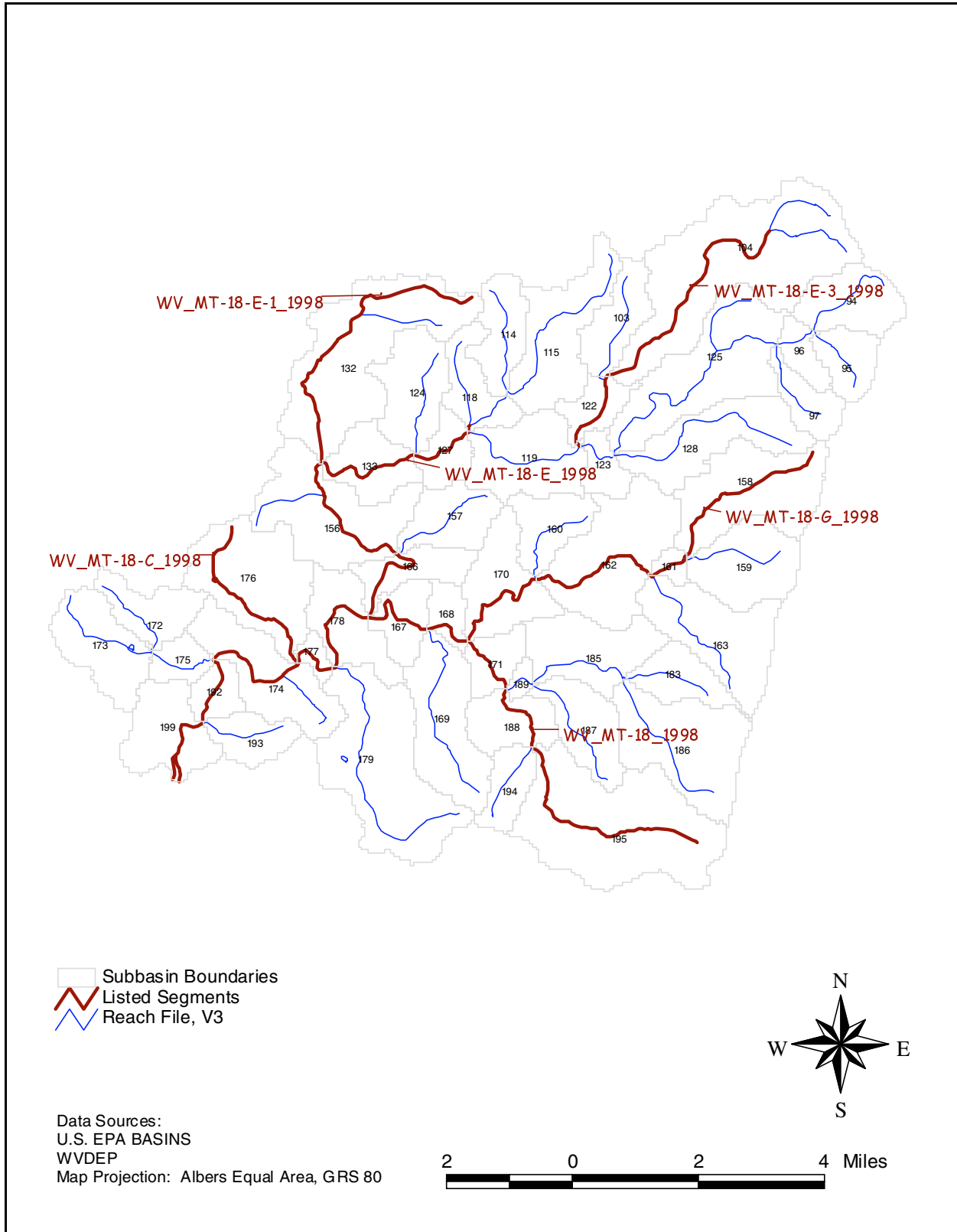


Figure 1. Region 14-Sandy Creek, Preston County

**Table 1.** Impaired waterbodies in Region 14

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Glade RN/Sandy CK	MT-18-C	pH, Metals	176	None	B-1
Left Fork/Sandy CK	MT-18-G	Metals	170,160,162,161,163,159,158	None	B-1
Maple RN	MT-18-E-1	pH, Metals	132	None	B-1
Sandy CK	MT-18	pH, Metals	94,103,104,96,114,95,115,118,97,122,124,125,132,127,128,123,133,119,157,158,156,160,161,159,166,162,170,172,168,176,167,175,177,178,171,189,185,173,183,163,192,174,188,193,199,187,169,186,194,179,195	None	B-1
Little Sandy CK	MT-18-E	pH, Metals	166,156,157,133,132,127,124,118,119,123,122,115,114,128,103,125,97,96,95,94,104, 125	None	B-1
Left Fork/ LL Sandy CK	MT-18-E-3	pH, Metals	103, 104, 122	None	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
104, 132 and 158

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
103	MT-18-E-3-A-{1}	300	300	300	1	03-Sep-97	03-Sep-97
166	MT-18-E-{00.40}	10000	10000	10000	1	04-Sep-97	04-Sep-97
171	MT-18-{09.60}	210	210	210	1	03-Sep-97	03-Sep-97
174	550852	2585	700	7000	12	04-Jun-80	14-Jun-84
199	4TYG12112	5667	1440	12760	10	11-May-83	18-Oct-83

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
103	MT-18-E-3-A-{1}	670	670	670	1	03-Sep-97	03-Sep-97
127	391958079520739	4733	3200	6700	3	27-Mar-80	23-Jul-81
166	MT-18-E-{00.40}	1700	1700	1700	1	04-Sep-97	04-Sep-97
171	MT-18-{09.60}	340	340	340	1	03-Sep-97	03-Sep-97
174	550852	1058	260	2300	19	20-Feb-80	12-Sep-84
177	391722079543439	1467	1300	1700	3	27-Mar-80	23-Jul-81
199	4TYG12112	582	100	1700	11	27-Apr-83	18-Oct-83

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
103	MT-18-E-3-A-{1}	50	50	50	1	03-Sep-97	03-Sep-97
127	391958079520739	310	140	530	3	27-Mar-80	23-Jul-81
166	MT-18-E-{00.40}	1000	1000	1000	1	04-Sep-97	04-Sep-97
171	MT-18-{09.60}	47	47	47	1	03-Sep-97	03-Sep-97
174	550852	395	126	1060	19	20-Feb-80	12-Sep-84
177	391722079543439	473	200	900	3	27-Mar-80	23-Jul-81
199	4TYG12112	849	140	1910	11	27-Apr-83	18-Oct-83

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
103	u100798	5729	1135	0.9
103	u101492	391	77	0.8
118	p101199	27	27	4.3
132	s006183	2206	1662	3.2

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
103	u100798	4264	2638	2.0
103	u101492	291	180	2.0
118	p101199	20	20	3.2
132	s006183	1642	1642	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
103	u100798	2285	1517	2.0
103	u101492	156	103	2.0
118	p101199	11	11	2.0
132	s006183	881	881	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
103	0	0	577	577	0	0	
104	8703	784	3606	3606	1790	1790	x
114	0	0	773	773	0	0	
115	0	0	1754	1754	0	0	
118	83	0	717	717	0	0	x
119	0	83	1468	1468	843	843	
122	0	0	477	477	0	0	
123	0	0	446	446	0	0	
124	7	7	1372	1372	0	0	
125	0	0	2195	2195	0	0	
127	0	0	661	661	0	0	
128	99	99	1400	1400	0	0	x
132	7081	185	2981	2981	0	0	x
133	0	0	996	996	0	0	
156	0	0	2287	2287	733	733	
157	0	0	1198	1198	0	0	
158	3841	35	1405	1405	7577	1742	x
159	414	414	937	937	2785	1070	x
160	0	0	981	981	0	0	
161	0	0	173	173	0	0	
162	0	0	2298	2298	0	0	
163	0	0	1386	1386	0	0	
166	0	0	1008	1008	0	0	
167	0	0	658	658	0	0	
168	0	0	504	504	0	0	
169	0	0	1801	1801	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
170	0	0	1706	1706	0	0	
171	0	0	507	507	0	0	
172	0	0	955	955	0	0	
173	0	0	1718	1718	0	0	
174	0	0	1540	1540	0	0	
175	0	5	486	486	0	0	
176	0	0	2328	2328	2162	1297	x
177	0	0	201	201	0	0	
178	0	0	1086	1086	0	0	
179	0	0	3243	3243	0	0	
183	0	0	625	625	0	0	
185	0	0	1731	1731	0	0	
186	0	0	1618	1618	0	0	
187	0	0	935	935	0	0	
188	0	0	752	752	0	0	
189	0	0	168	168	0	0	
192	0	0	397	397	0	0	
193	0	0	720	720	0	0	
194	0	0	597	597	0	0	
195	0	0	2971	2971	0	0	
199	0	0	1083	1083	0	0	
94	0	0	884	884	1083	1083	
95	0	0	485	485	0	0	
96	0	0	375	375	0	0	
97	7	7	488	488	0	0	
Total	20236	1607	61660	61660	16972	8558	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
103	0	0	533	533	0	0	
104	130042	3984	3396	3396	1790	1790	x
114	0	0	730	730	0	0	
115	0	0	1643	1643	0	0	
118	77	77	684	684	0	0	
119	0	0	1360	1360	843	843	
122	0	0	450	450	0	0	
123	0	0	415	415	0	0	
124	7	7	1256	1256	0	0	
125	0	0	2079	2079	0	0	
127	0	0	607	607	0	0	
128	137	137	1353	1353	0	0	
132	21821	476	2765	2765	0	0	x
133	0	0	899	899	0	0	
156	0	0	2086	2086	733	733	
157	0	0	1074	1074	0	0	
158	3932	366	1369	1369	7577	5001	x
159	571	571	919	919	2785	2028	x
160	0	0	873	873	0	0	
161	0	0	162	162	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
162	0	0	2107	2107	0	0	
163	0	0	1359	1359	0	0	
166	0	0	856	856	0	0	
167	0	0	618	618	0	0	
168	0	0	448	448	0	0	
169	0	0	1644	1644	0	0	
170	0	0	1496	1496	0	0	
171	0	0	481	481	0	0	
172	0	0	864	864	0	0	
173	0	0	1506	1506	0	0	
174	0	0	1434	1434	0	0	
175	0	0	449	449	0	0	
176	0	0	2051	2051	2162	2162	
177	0	0	178	178	0	0	
178	0	0	994	994	0	0	
179	0	0	2966	2966	0	0	
183	0	0	610	610	0	0	
185	0	0	1550	1550	0	0	
186	0	0	1604	1604	0	0	
187	0	0	895	895	0	0	
188	0	0	718	718	0	0	
189	0	0	151	151	0	0	
192	0	0	379	379	0	0	
193	0	0	630	630	0	0	
194	0	0	552	552	0	0	
195	0	0	2870	2870	0	0	
199	0	0	1064	1064	0	0	
94	0	0	838	838	1448	1448	
95	0	0	475	475	0	0	
96	0	0	346	346	0	0	
97	10	10	470	470	0	0	
Total	156597	5628	57254	57254	17338	14004	

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
103	0	0	314	314	0	0	
104	8343	1048	1969	1969	1024	1024	x
114	0	0	418	418	0	0	
115	0	0	1017	1017	0	0	
118	124	124	395	395	0	0	
119	0	0	853	853	483	483	
122	0	0	261	261	0	0	
123	0	0	267	267	0	0	
124	11	11	838	838	0	0	
125	0	0	1188	1188	0	0	
127	0	0	420	420	0	0	
128	76	76	773	773	0	0	
132	4288	151	1705	1705	0	0	x

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
133	0	0	593	593	0	0	
156	0	0	1353	1353	420	420	
157	0	0	788	788	0	0	
158	4419	225	747	747	4335	2601	x
159	317	317	493	493	1595	1085	x
160	0	0	594	594	0	0	
161	0	0	96	96	0	0	
162	0	0	1331	1331	0	0	
163	0	0	709	709	0	0	
166	0	0	619	619	0	0	
167	0	0	393	393	0	0	
168	0	0	331	331	0	0	
169	0	0	1028	1028	0	0	
170	0	0	1090	1090	0	0	
171	0	0	288	288	0	0	
172	0	0	585	585	0	0	
173	0	0	1100	1100	0	0	
174	0	0	850	850	0	0	
175	0	0	305	305	0	0	
176	0	0	1384	1384	1238	1238	
177	0	0	108	108	0	0	
178	0	0	607	607	0	0	
179	0	0	1934	1934	0	0	
183	0	0	330	330	0	0	
185	0	0	1083	1083	0	0	
186	0	0	830	830	0	0	
187	0	0	520	520	0	0	
188	0	0	420	420	0	0	
189	0	0	107	107	0	0	
192	0	0	215	215	0	0	
193	0	0	411	411	0	0	
194	0	0	339	339	0	0	
195	0	0	1561	1561	0	0	
199	0	0	621	621	0	0	
94	0	0	471	471	2138	2138	
95	0	0	246	246	0	0	
96	0	0	202	202	0	0	
97	6	6	263	263	0	0	
Total	17583	1958	35362	35362	11232	8987	



# **Appendix A-15**

## **Region 15**

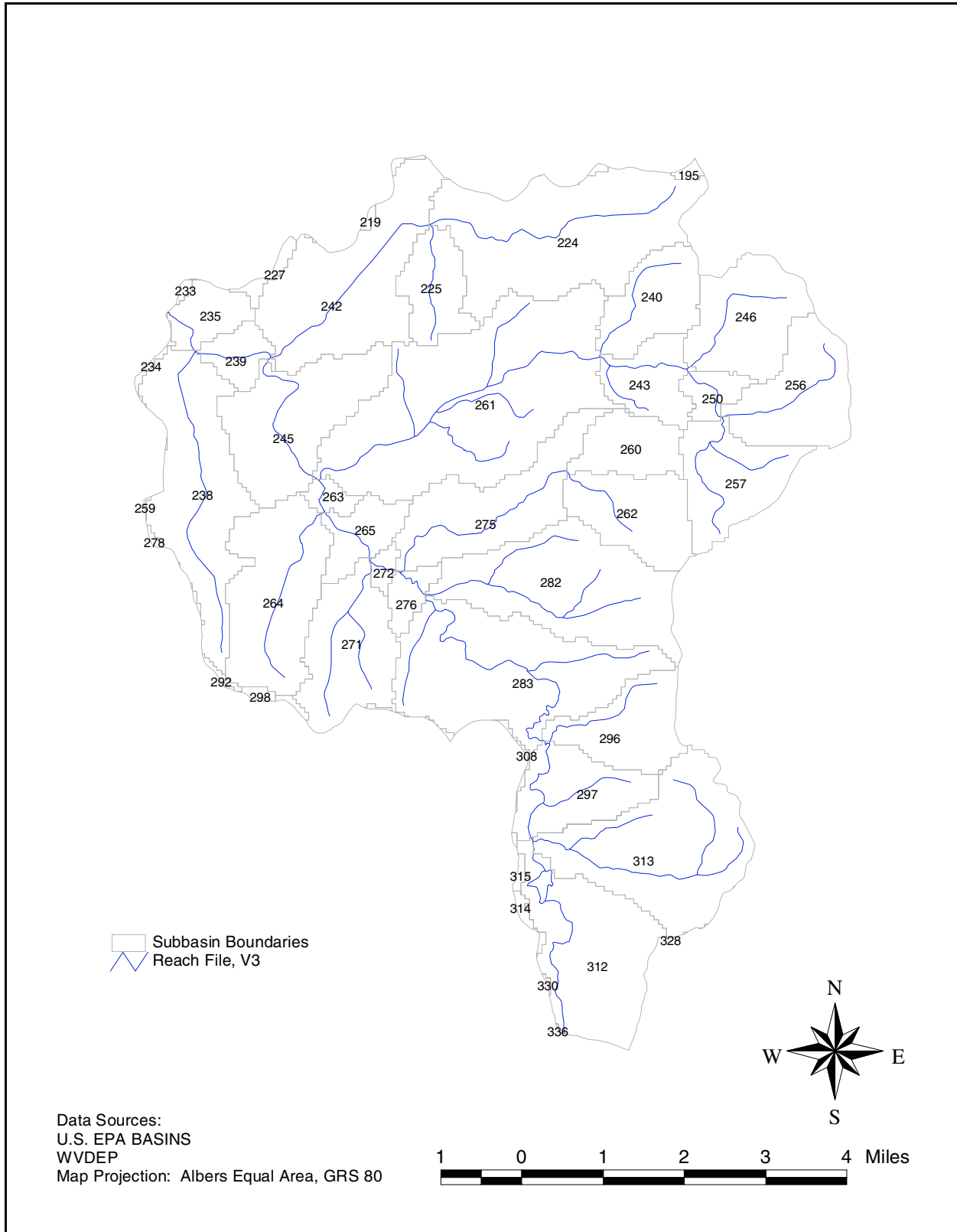


Figure 1. Region 15 - Teter Creek, Barbour County

**Table 1.** Impaired waterbodies in Region 15  
(not applicable in this region)

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)  
(not applicable in this region)

**Table 3a.** Water quality data for aluminum  
(not applicable in this region)

**Table 3b.** Water quality data for iron  
(not applicable in this region)

**Table 3c.** Water quality data for manganese  
(not applicable in this region)

**Table 4a.** Aluminum baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
243	q200495	157	NAA*	NAA
243	q201489	335	NAA	NAA

\* NAA - No allocation applied

**Table 4b.** Iron baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
243	q200495	192	NAA*	NAA
243	q201489	409	NAA	NAA

\* NAA - No allocation applied

**Table 4c.** Manganese baseline conditions for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
243	q200495	197	NAA*	NAA
243	q201489	419	NAA	NAA

\* NAA - No allocation applied

**Table 5a.** Aluminum baseline conditions for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
224	0	0	3800	3800	0	0	
225	0	0	1127	1127	0	0	
235	0	0	639	639	0	0	
238	0	0	3411	3411	0	0	
239	0	0	477	477	0	0	
240	0	0	1015	1015	0	0	
242	0	0	3284	3284	0	0	
243	0	0	633	633	0	0	
245	0	0	2413	2413	0	0	
246	0	0	1653	1653	0	0	
250	0	0	323	323	0	0	
256	0	0	1661	1661	0	0	
257	212	212	1303	1303	0	0	
260	0	0	771	771	0	0	
261	0	0	6950	6950	0	0	
262	8	11	1183	1183	83	83	
263	0	0	207	207	0	0	
264	15	15	2755	2755	0	0	
265	0	0	722	722	0	0	
271	0	0	2115	2115	0	0	
272	0	0	180	180	0	0	
275	0	0	2311	2311	0	0	
276	0	0	339	339	0	0	
282	0	0	2893	2893	0	0	
283	0	0	3470	3470	0	0	
296	0	0	1175	1175	0	0	
297	0	0	1396	1396	0	0	
312	0	0	2689	2689	0	0	
313	0	0	2914	2914	0	0	
Total	235	235	53807	53807	83	83	

**Table 5b.** Iron baseline conditions for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
224	0	0	3787	3787	0	0	
225	0	0	1112	1112	0	0	
235	0	0	635	635	0	0	
238	0	0	3375	3375	0	0	
239	0	0	477	477	0	0	
240	0	0	1045	1045	0	0	
242	0	0	3252	3252	0	0	
243	0	0	661	661	0	0	
245	0	0	2397	2397	0	0	
246	0	0	1722	1722	0	0	
250	0	0	336	336	0	0	
256	0	0	1693	1693	0	0	
257	383	383	1336	1336	0	0	
260	0	0	789	789	0	0	
261	0	0	6854	6854	0	0	
262	14	14	1206	1206	101	101	
263	0	0	206	206	0	0	
264	14	14	2724	2724	0	0	
265	0	0	715	715	0	0	
271	0	0	2092	2092	0	0	
272	0	0	177	177	0	0	
275	0	0	2285	2285	0	0	
276	0	0	340	340	0	0	
282	0	0	2883	2883	0	0	
283	0	0	3464	3464	0	0	
296	0	0	1200	1200	0	0	
297	0	0	1392	1392	0	0	
312	0	0	2687	2687	0	0	
313	0	0	2978	2978	0	0	
Total	410	410	53819	53819	101	101	

Table 5c. Manganese baseline conditions for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
224	0	0	1519	1519	0	0	
225	0	0	547	547	0	0	
235	0	0	276	276	0	0	
238	0	0	1576	1576	0	0	
239	0	0	201	201	0	0	
240	0	0	444	444	0	0	
242	0	0	1442	1442	0	0	
243	0	0	278	278	0	0	
245	0	0	1044	1044	0	0	
246	0	0	733	733	0	0	
250	0	0	142	142	0	0	
256	0	0	747	747	0	0	
257	233	233	573	573	0	0	
260	0	0	341	341	0	0	
261	0	0	3334	3334	0	0	
262	8	8	521	521	103	103	
263	0	0	86	86	0	0	
264	22	22	1289	1289	0	0	
265	0	0	321	321	0	0	
271	0	0	981	981	0	0	
272	0	0	94	94	0	0	
275	0	0	1070	1070	0	0	
276	0	0	147	147	0	0	
282	0	0	1120	1120	0	0	
283	0	0	1392	1392	0	0	
296	0	0	517	517	0	0	
297	0	0	590	590	0	0	
312	0	0	1007	1007	0	0	
313	0	0	1282	1282	0	0	
Total	263	263	23611	23611	103	103	

# Appendix A-16

## Region 16

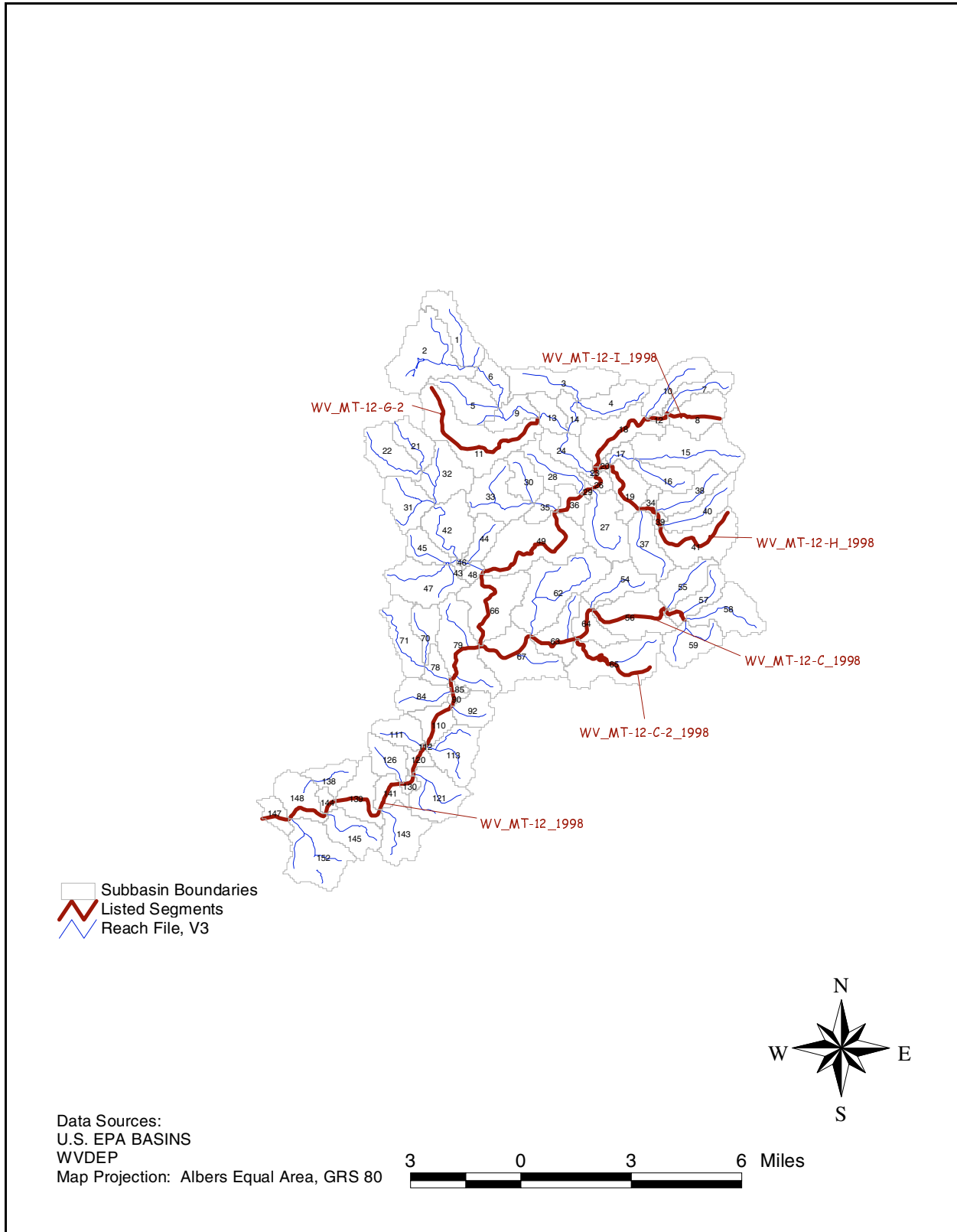


Figure 1. Region 16- Three Fork Creek, Preston County



**Table 1.** Impaired waterbodies in Region 16

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Threefork CK	MT-12	pH, Metals	1,2,3,6,7,10,4,5,12,9,13,14,8,18,17,21,20,15,11,24,22,28,26,16,29,30,32,38,34,35,19,33,36,39,40,31,42,44,45,27,41,46,49,43,37,48,47,54,55,57,62,58,56,66,64,70,63,59,71,78,65,85,67,79,90,84,92,110,111,120,126,113,130,138,141,144,148,121,139,147,145,143,152,23	None	B-1
Little Racoon CR	MT-12-C-2	Metals	65	None	B-1
Racoon CR	MT-12-C	pH, Metals	54,55,57,62,58,56,64,63,59,65,67	None	B-1
Squires CK	MT-12-I	pH, Metals	7,8,10,12,18	None	B-1
Birds CK	MT-12-H	pH, Metals	17,20,15,16,38,34,19,39,40,41,37	None	B-1
Brains CK	MT-12-G-2	pH, Metals	11	None	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
15,16,17,19,41,56,58,7, 8, and 18

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	6893	360	86110	14	09-May-83	17-May-84
376	551108	571	100	3600	35	18-Jun-91	26-Oct-94
428	MTM-00.5-{0.6}	280	280	280	1	25-Aug-97	25-Aug-97
475	551109	587	100	4900	40	18-Jun-91	26-Oct-94
514	MTM-03	230	230	230	1	25-Aug-97	25-Aug-97
540	551110	1360	1	3340	40	27-Jun-91	26-Oct-94
560	MTM-07	130	130	130	1	26-Aug-97	26-Aug-97
561	551111	2193	450	9130	40	27-Jun-91	26-Oct-94
577	551112	7631	400	27000	40	27-Jun-91	26-Oct-94
596	551113	852	100	6370	40	18-Jun-91	26-Oct-94
643	MTM-11-{0.3}	50	50	50	1	26-Aug-97	26-Aug-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	8964	100	120600	14	30445	30819
376	551108	876	80	21600	35	33407	34633
428	MTM-00.5-{0.6}	740	740	740	1	35667	35667
475	551109	256	15	900	40	33407	34633
514	MTM-03	3800	3800	3800	1	35667	35667
540	551110	198	15	2500	40	33416	34633
560	MTM-07	430	430	430	1	35668	35668
561	551111	162	60	400	40	33416	34633
577	551112	739	35	1760	40	33416	34633
596	551113	316	15	2900	40	33407	34633
643	385346080065239	675	150	1200	2	29302	29455
643	MTM-11-{0.3}	310	310	310	1	35668	35668

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	1782	170	16370	14	09-May-83	17-May-84
376	551108	534	15	8400	35	18-Jun-91	26-Oct-94
428	MTM-00.5-{0.6}	62	62	62	1	25-Aug-97	25-Aug-97
475	551109	359	5	900	40	18-Jun-91	26-Oct-94
514	MTM-03	4100	4100	4100	1	25-Aug-97	25-Aug-97
540	551110	657	45	1420	40	27-Jun-91	26-Oct-94
560	MTM-07	130	130	130	1	26-Aug-97	26-Aug-97
561	551111	607	20	2550	40	27-Jun-91	26-Oct-94
577	551112	7297	130	21000	40	27-Jun-91	26-Oct-94
596	551113	555	5	4670	40	18-Jun-91	26-Oct-94
643	385346080065239	50	40	60	2	22-Mar-80	22-Aug-80
643	MTM-11-{0.3}	42	42	42	1	26-Aug-97	26-Aug-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
10	o002384	1050	168	0.8
10	s003684	3618	578	0.8
10	s011982*	4029	749	0.8
11	s005284	919	717	3.4
11	s100293	1568	1223	3.4
12	u108086	283	283	4.3
15	u008784	1332	946	3.1
16	u100494	425	243	2.5
18	o101286	1816	1240	2.6
18	s011982*	1331	798	2.6
18	u104186	397	271	2.6
27	p101200	27	27	4.3
27	p102897	27	27	4.3
4	u101186	283	108	2.0
4	s011982*	1449	666	2.0
40	s102288	2033	1095	1.6
41	d011382	183	183	4.3
41	s100298	683	683	4.3
5	s101488	3361	797	1.0
55	u100893	1016	475	2.0
59	o100898	4519	1312	1.2
62	p100700	27	27	4.3
62	s102587	683	683	4.3
65	s103691	840	840	4.3
67	s005378	657	657	4.3
7	s105886	2678	448	0.8

\* Permit s011982 discharges to three subwatersheds. The load allocations are designated to each specific subwatershed.

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
10	o002384	781	350	1.7
10	s003684	2692	1201	1.7
10	s011982*	3004	1559	17
11	s005284	684	684	3.2
11	s100293	1166	1166	3.2
12	u108086	211	211	3.2
15	u008784	992	992	3.2
16	u100494	316	316	3.2
18	o101286	2067	2067	3.2
18	s011982*	1331	1331	3.2
18	u104186	452	452	3.2
27	p101200	20	20	3.2
27	p102897	20	20	3.2
4	u101186	175	175	3.2
4	s011982*	1083	1083	3.2
40	s102288	2257	2257	3.2
41	d011382	136	136	3.2
41	s100298	508	508	3.2
5	s101488	2501	1782	2.3
55	u100893	756	756	3.2
59	o100898	3363	3363	3.2
62	p100700	20	20	3.2
62	s102587	508	508	3.2
65	s103691	625	625	3.2
67	s005378	489	489	3.2
7	s105886	1712	1083	2.0

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
10	o002384	415	219	1.0
10	s003684	1444	752	1.0
10	s011982*	1877	976	1.0
11	s005284	370	370	2.0
11	s100293	632	632	2.0
12	u108086	113	113	2.0
15	u008784	531	531	2.0
16	u100494	170	170	2.0
18	o101286	1371	1371	2.0
18	s011982*	883	883	2.0
18	u104186	300	300	2.0
27	p101200	11	11	2.0
27	p102897	11	11	2.0
4	u101186	111	111	2.0
4	s011982*	685	685	2.0
40	s102288	1418	1418	2.0
41	d011382	73	73	2.0
41	s100298	836	836	2.0
5	s101488	1342	1092	1.6
55	u100893	405	405	2.0
59	o100898	1783	1780	2.0
62	p100700	11	11	2.0
62	s102587	273	273	2.0
65	s103691	336	336	2.0
67	s005378	262	262	2.0
7	s105886	1069	663	1.2

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
1	0	0	844	844	0	0	
10	0	0	621	621	0	0	
11	15	15	2628	2628	3384	413	x
110	0	0	464	464	0	0	
111	0	0	581	581	0	0	
112	0	0	5	5	0	0	
113	0	0	931	931	0	0	
12	9	9	82	82	0	0	
120	0	0	237	237	0	0	
121	0	0	992	992	0	0	
126	0	0	593	593	0	0	
13	0	0	531	531	0	0	
130	0	0	116	116	0	0	
138	0	0	581	581	0	0	
139	0	0	844	844	0	0	
14	0	0	437	437	0	0	
141	0	0	395	395	0	0	
143	84	84	990	990	1686	1686	
144	0	0	165	165	0	0	
145	0	0	791	791	0	0	
147	0	0	340	340	0	0	
148	0	0	1071	1071	0	0	
15	222	144	1527	1527	1391	140	x
152	0	0	1679	1679	0	0	
16	292	41	517	517	0	0	x
17	87	36	203	203	0	0	x
18	47	47	1026	1026	0	0	
19	6013	1372	735	735	404	404	
2	35	35	1881	1881	277	277	
20	43	43	43	43	0	0	
21	158	158	655	655	0	0	
22	0	0	1107	1107	0	0	
23	0	0	22	22	0	0	
24	0	0	679	679	0	0	
26	0	0	204	204	0	0	
27	18	18	1058	1058	0	0	
28	0	0	741	741	0	0	
29	0	0	62	62	0	0	
3	0	0	1906	1906	0	0	
30	0	0	627	627	0	0	
31	0	0	1074	1074	0	0	
32	0	0	1236	1236	0	0	
33	0	0	1148	1148	0	0	
34	15	15	158	158	0	0	
35	0	0	334	334	0	0	
36	0	0	394	394	0	0	
37	226	226	874	874	0	0	
38	88	88	698	698	0	0	
39	8	8	52	52	0	0	
4	27	27	847	847	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
40	846	106	500	500	1866	378	x
41	1447	234	1005	1005	2466	269	x
42	0	0	1049	1049	0	0	
43	0	0	59	59	0	0	
44	0	0	520	520	0	0	
45	0	0	446	446	0	0	
46	0	0	48	48	0	0	
47	0	0	1430	1430	0	0	
48	0	0	137	137	0	0	
49	5	5	1982	1982	0	0	
5	75	75	1093	1093	0	0	
54	116	116	804	804	0	0	
55	22	22	693	693	1759	192	x
56	2659	196	1077	1077	770	770	x
57	61	61	508	508	2567	606	x
58	3806	678	1044	1044	0	0	x
59	0	0	645	645	0	0	
6	0	0	596	596	0	0	
62	22	22	1927	1927	0	0	
63	11	11	750	750	0	0	
64	0	0	514	514	0	0	
65	38	38	1681	1681	0	0	
66	95	95	1484	1484	0	0	
67	85	85	1493	1493	0	0	
7	4429	72	493	493	0	0	x
70	0	0	472	472	0	0	
71	0	0	1009	1009	0	0	
78	37	37	286	286	0	0	
79	8	8	1635	1635	0	0	
8	2316	487	724	724	0	0	x
84	0	0	632	632	0	0	
85	0	0	56	56	0	0	
9	0	0	700	700	0	0	
90	0	0	78	78	0	0	
92	0	0	498	498	0	0	
Total	23466	4720	63794	63794	17070	5101	

Table 5b. Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
1	0	0	824	824	0	0	
10	0	0	621	621	0	0	
11	14	14	2336	2336	3384	413	x
110	0	0	462	462	0	0	
111	0	0	555	555	0	0	
112	0	0	5	5	0	0	
113	0	0	904	904	0	0	
12	12	12	81	81	0	0	
120	0	0	231	231	0	0	
121	0	0	976	976	0	0	
126	0	0	572	572	0	0	
13	0	0	498	498	0	0	
130	0	0	117	117	0	0	
138	0	0	540	540	0	0	
139	0	0	815	815	0	0	
14	0	0	390	390	0	0	
141	0	0	384	384	0	0	
143	77	77	956	956	1686	1686	
144	0	0	159	159	0	0	
145	0	0	759	759	0	0	
147	0	0	369	369	0	0	
148	0	0	1031	1031	0	0	
15	205	195	1469	1469	1391	1246	x
152	0	0	1578	1578	0	0	
16	383	355	497	497	0	0	x
17	81	74	196	196	0	0	x
18	65	65	995	995	0	0	
19	18311	4219	688	688	404	404	x
2	32	32	1765	1765	277	277	
20	39	39	43	43	0	0	
21	204	204	600	600	0	0	
22	0	0	1019	1019	0	0	
23	0	0	23	23	0	0	
24	0	0	653	653	0	0	
26	0	0	191	191	0	0	
27	22	22	1043	1043	0	0	
28	0	0	692	692	0	0	
29	0	0	58	58	0	0	
3	0	0	1688	1688	0	0	
30	0	0	586	586	0	0	
31	0	0	951	951	0	0	
32	0	0	1102	1102	0	0	
33	0	0	1091	1091	0	0	
34	21	21	154	154	0	0	
35	0	0	321	321	0	0	
36	0	0	383	383	0	0	
37	252	252	865	865	0	0	
38	92	92	678	678	0	0	
39	11	11	52	52	0	0	
4	38	38	777	777	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
40	1160	530	484	484	1866	857	x
41	6330	220	996	996	2466	2124	x
42	0	0	1014	1014	0	0	
43	0	0	55	55	0	0	
44	0	0	492	492	0	0	
45	0	0	436	436	0	0	
46	0	0	47	47	0	0	
47	0	0	1299	1299	0	0	
48	0	0	137	137	0	0	
49	7	7	1905	1905	0	0	
5	69	69	1001	1001	0	0	
54	138	138	797	797	0	0	
55	21	21	692	692	1759	962	x
56	8105	1763	1074	1074	769	769	x
57	70	70	503	503	2567	1311	x
58	11699	1784	1011	1011	0	0	x
59	0	0	639	639	0	0	
6	0	0	552	552	0	0	
62	21	21	1859	1859	0	0	
63	15	15	730	730	0	0	
64	0	0	511	511	0	0	
65	35	35	1610	1610	0	0	
66	88	88	1419	1419	0	0	
67	79	79	1414	1414	0	0	
7	14209	221	490	490	0	0	x
70	0	0	456	456	0	0	
71	0	0	936	936	0	0	
78	34	34	286	286	0	0	
79	7	7	1558	1558	0	0	
8	7500	1549	722	722	0	0	x
84	0	0	609	609	0	0	
85	0	0	56	56	0	0	
9	0	0	629	629	0	0	
90	0	0	78	78	0	0	
92	0	0	490	490	0	0	
Total	69446	12373	60730	60730	12394	17060	



Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
1	0	0	441	441	0	0	
10	0	0	411	411	0	0	
11	22	22	1597	1597	2245	1571	x
110	0	0	236	236	0	0	
111	0	0	314	314	0	0	
112	0	0	2	2	0	0	
113	0	0	485	485	0	0	
12	7	7	45	45	0	0	
120	0	0	126	126	0	0	
121	0	0	520	520	0	0	
126	0	0	321	321	0	0	
13	0	0	311	311	0	0	
130	0	0	61	61	0	0	
138	0	0	332	332	0	0	
139	0	0	457	457	0	0	
14	0	0	255	255	0	0	
141	0	0	213	213	0	0	
143	125	125	561	561	965	965	
144	0	0	88	88	0	0	
145	0	0	415	415	0	0	
147	0	0	190	190	0	0	
148	0	0	649	649	0	0	
15	330	299	802	802	796	630	x
152	0	0	976	976	0	0	
16	257	224	278	278	0	0	x
17	130	109	105	105	0	0	x
18	36	36	549	549	0	0	
19	3730	2285	403	403	231	231	x
2	52	52	1026	1026	157	157	
20	63	63	22	22	0	0	
21	142	142	374	374	0	0	
22	0	0	660	660	0	0	
23	0	0	12	12	0	0	
24	0	0	382	382	0	0	
26	0	0	111	111	0	0	
27	20	20	544	544	0	0	
28	0	0	410	410	0	0	
29	0	0	35	35	0	0	
3	0	0	1211	1211	0	0	
30	0	0	339	339	0	0	
31	0	0	608	608	0	0	
32	0	0	721	721	0	0	
33	0	0	638	638	0	0	
34	11	11	82	82	0	0	
35	0	0	180	180	0	0	
36	0	0	208	208	0	0	
37	267	267	495	495	0	0	
38	120	120	561	561	0	0	
39	9	9	43	43	0	0	
4	21	21	516	516	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
40	659	245	263	263	1230	307	x
41	5298	330	825	825	4185	324	x
42	0	0	553	553	0	0	
43	0	0	30	30	0	0	
44	0	0	289	289	0	0	
45	0	0	229	229	0	0	
46	0	0	24	24	0	0	
47	0	0	808	808	0	0	
48	0	0	69	69	0	0	
49	4	4	1075	1075	0	0	
5	112	112	642	642	0	0	
54	124	124	455	455	0	0	
55	33	33	410	410	1007	504	x
56	1628	290	553	553	441	441	x
57	68	68	270	270	1469	770	x
58	2317	938	572	572	0	0	x
59	0	0	328	328	0	0	
6	0	0	357	357	0	0	
62	33	33	1038	1038	0	0	
63	9	9	399	399	0	0	
64	0	0	260	260	0	0	
65	57	57	903	903	0	0	
66	142	142	800	800	0	0	
67	127	127	801	801	0	0	
7	2695	81	324	324	0	0	x
70	0	0	244	244	0	0	
71	0	0	567	567	0	0	
78	54	54	145	145	0	0	
79	12	12	904	904	0	0	
8	1426	748	376	376	0	0	x
84	0	0	338	338	0	0	
85	0	0	28	28	0	0	
9	0	0	440	440	0	0	
90	0	0	39	39	0	0	
92	0	0	262	262	0	0	
Total	20140	7219	35941	35941	12726	5902	

# **Appendix A-17**

## **Region 17**

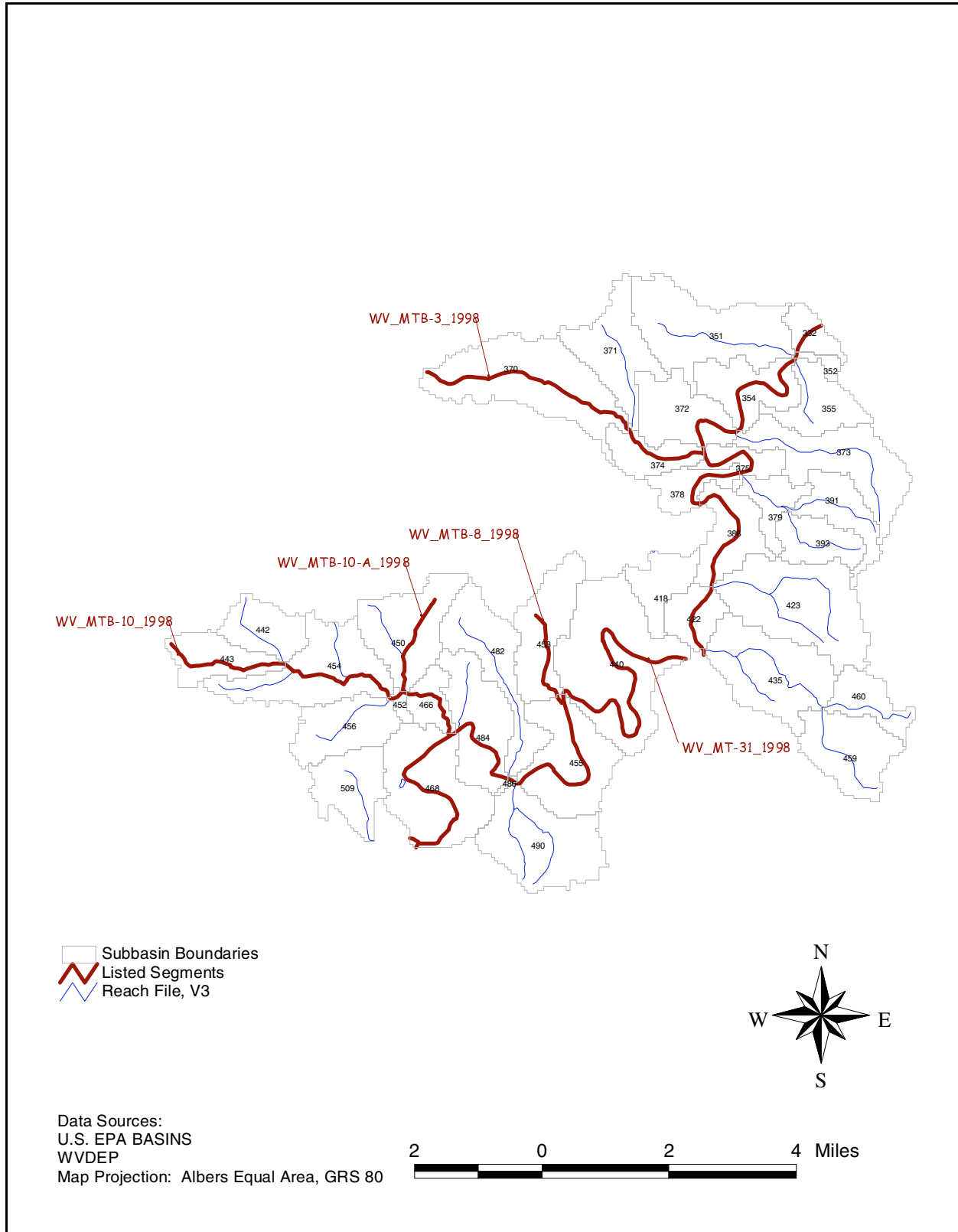


Figure 1. Region 17-Buckhannon River, Upshur County (Northern portion)

**Table 1.** Impaired waterbodies in Region 17

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Turkey RN	MTB-10	pH, Metals	454,442,443	None	B-1
Sugar RN	MTB-10-A	Metals	450	None	B-1
Buckhannon River	MT-31	Iron	370 374 375 378 373 379 393 388 391 422 442 423 434 443 490 332 352 351 371 354 355 372 450 453 454 452 466 435 460 440 456 482 484 486 459 455 468	11,13,9,12, 6, 8	B-1
Big RN1	MTB-8	Metals	453	None	B-1
Big RN2	MTB-3	Metals	371 370 374	None	B-1

**Table 2.** Locations of abandoned mines

SWS
442, 443, 450, 374, and 454

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
351	MTB-03	100	100	100	1	17-Sep-97	17-Sep-97
378	MTB-00-{06.6}	50	50	50	1	16-Sep-97	16-Sep-97
379	2C040006L	107	71	142	2	24-Apr-86	12-May-86
388	4TYG12217	266	100	860	14	09-May-83	17-May-84
388	550796	267	20	2400	72	11-Mar-80	08-Jul-88
391	2C040006U	201	141	260	2	24-Apr-86	12-May-86
450	MTB-10-A	64	64	64	1	02-Sep-97	02-Sep-97
468	550583	368	20	2600	61	18-Mar-86	14-Jun-88

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
351	MTB-03	310	310	310	1	17-Sep-97	17-Sep-97
378	MTB-00-{06.6}	160	160	160	1	16-Sep-97	16-Sep-97
388	4TYG12217	369	100	1100	13	09-May-83	17-May-84
388	550796	1055	50	51000	80	11-Mar-80	08-Jul-88
450	MTB-10-A	320	320	320	1	02-Sep-97	02-Sep-97
468	550583	1921	100	70000	61	18-Mar-86	14-Jun-88

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
351	MTB-03	22	22	22	1	17-Sep-97	17-Sep-97
378	MTB-00-{06.6}	71	71	71	1	16-Sep-97	16-Sep-97
388	4TYG12217	154	50	280	14	09-May-83	17-May-84
388	550796	166	0	400	76	11-Mar-80	08-Jul-88
450	MTB-10-A	460	460	460	1	02-Sep-97	02-Sep-97
468	550583	258	100	700	61	18-Mar-86	14-Jun-88

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
370	o002684	2266	474	0.9
370	o004483	1712	358	0.9
370	u007483	533	112	0.9
378	o001183	509	509	4.3
452	s200799	1214	491	1.7
454	s201593	3171	1283	1.7
454	u200597	194	79	1.7
454	u201295	170	69	1.7
456	s201095	1065	431	1.7

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
370	o002684	1378	1378	3.2
370	o004483	1041	1041	3.2
370	u007483	397	397	3.2
378	o001183	378	378	3.2
452	s200799	903	903	3.2
454	s201593	2354	2359	3.2
454	u200597	145	145	3.2
454	u201295	127	127	3.2
456	s201095	793	793	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
370	o002684	1036	1036	2.0
370	o004483	783	783	2.0
370	u007483	248	248	2.0
378	o001183	234	234	2.0
452	s200799	570	570	2.0
454	s201593	1488	1488	2.0
454	u200597	90	90	2.0
454	u201295	79	79	2.0
456	s201095	500	500	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
332	0	0	391	391	0	0	
351	9	9	2769	2769	0	0	
352	0	0	162	162	0	0	
354	7	7	988	988	0	0	
355	0	0	948	948	0	0	
370	276	276	3036	3036	0	0	
371	363	363	1402	1402	0	0	
372	0	0	1297	1297	0	0	
373	0	0	2150	2150	0	0	
374	953	634	794	794	0	0	x
375	12	12	486	486	0	0	
378	0	0	589	589	0	0	
379	7	7	574	574	583	583	
388	0	0	1111	1111	0	0	
391	22	22	955	955	0	0	
393	0	0	815	815	0	0	
422	0	0	605	605	0	0	
423	1	1	2357	2357	0	0	
434	0	0	100	100	0	0	
435	0	0	1894	1894	0	0	
440	161	161	3451	3451	0	0	
442	874	49	821	821	0	0	x
443	3680	381	960	960	0	0	x
450	5978	264	2106	2106	0	0	x
452	7	7	115	115	0	0	
453	631	631	1832	1832	0	0	
454	1812	180	2189	2189	0	0	x
455	14	14	2030	2030	0	0	
456	120	120	1217	1217	0	0	
459	0	0	1406	1406	0	0	
460	0	0	816	816	0	0	
466	11	11	723	723	0	0	
468	250	250	3088	3088	0	0	
482	58	58	2414	2414	0	0	
484	143	143	2443	2443	0	0	
486	4	4	47	47	0	0	
490	17	17	2408	2408	0	0	
Total	15414	3624	51491	51491	583	583	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
332	0	0	366	366	0	0	
351	12	12	2215	2215	0	0	
352	0	0	131	131	0	0	
354	10	10	931	931	0	0	
355	0	0	836	836	0	0	
370	296	296	2304	2304	0	0	
371	500	500	1206	1206	0	0	
372	0	0	1110	1110	0	0	
373	0	0	1919	1919	0	0	
374	1107	1107	655	655	0	0	
375	11	11	431	431	0	0	
378	0	0	472	472	0	0	
379	7	7	503	503	438	438	
388	0	0	937	937	0	0	
391	21	21	808	808	0	0	
393	0	0	729	729	0	0	
422	0	0	557	557	0	0	
423	2	2	2213	2213	0	0	
434	0	0	86	86	0	0	
435	0	0	1777	1777	0	0	
440	215	215	2850	2850	0	0	
442	1642	54	759	759	0	0	x
443	6739	385	803	803	0	0	x
450	11367	360	1587	1587	0	0	x
452	7	7	103	103	0	0	
453	1058	1058	1345	1345	0	0	
454	3344	1613	1747	1747	0	0	x
455	13	13	1665	1665	0	0	
456	111	111	1082	1082	0	0	
459	0	0	1255	1255	0	0	
460	0	0	675	675	0	0	
466	12	12	513	513	0	0	
468	328	328	2197	2197	0	0	
482	54	54	1638	1638	0	0	
484	174	174	1627	1627	0	0	
486	5	5	34	34	0	0	
490	17	17	1896	1896	0	0	
Total	27054	4960	41963	41963	438	438	



Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
332	0	0	147	147	0	0	
351	7	7	1198	1198	0	0	
352	0	0	71	71	0	0	
354	6	6	365	365	0	0	
355	0	0	377	377	0	0	
370	346	346	1396	1396	0	0	
371	278	278	570	570	0	0	
372	0	0	527	527	0	0	
373	0	0	1000	1000	0	0	
374	1269	1119	333	333	0	0	x
375	18	18	191	191	0	0	
378	0	0	252	252	0	0	
379	11	11	242	242	292	292	
388	0	0	462	462	0	0	
391	33	33	397	397	0	0	
393	0	0	318	318	0	0	
422	0	0	229	229	0	0	
423	1	1	881	881	0	0	
434	0	0	40	40	0	0	
435	0	0	703	703	0	0	
440	134	134	1456	1456	0	0	
442	586	66	317	317	0	0	x
443	2615	538	406	406	0	0	x
450	3891	292	944	944	0	0	x
452	11	11	49	49	0	0	
453	305	305	855	855	0	0	
454	1267	1267	985	985	0	0	x
455	21	21	863	863	0	0	
456	179	179	482	482	0	0	
459	0	0	550	550	0	0	
460	0	0	348	348	0	0	
466	14	14	343	343	0	0	
468	219	219	1537	1537	0	0	
482	87	87	1152	1152	0	0	
484	146	146	1194	1194	0	0	
486	3	3	22	22	0	0	
490	24	24	1061	1061	0	0	
Total	11470	4097	22262	22262	292	292	

# Appendix A-18

## Region 18

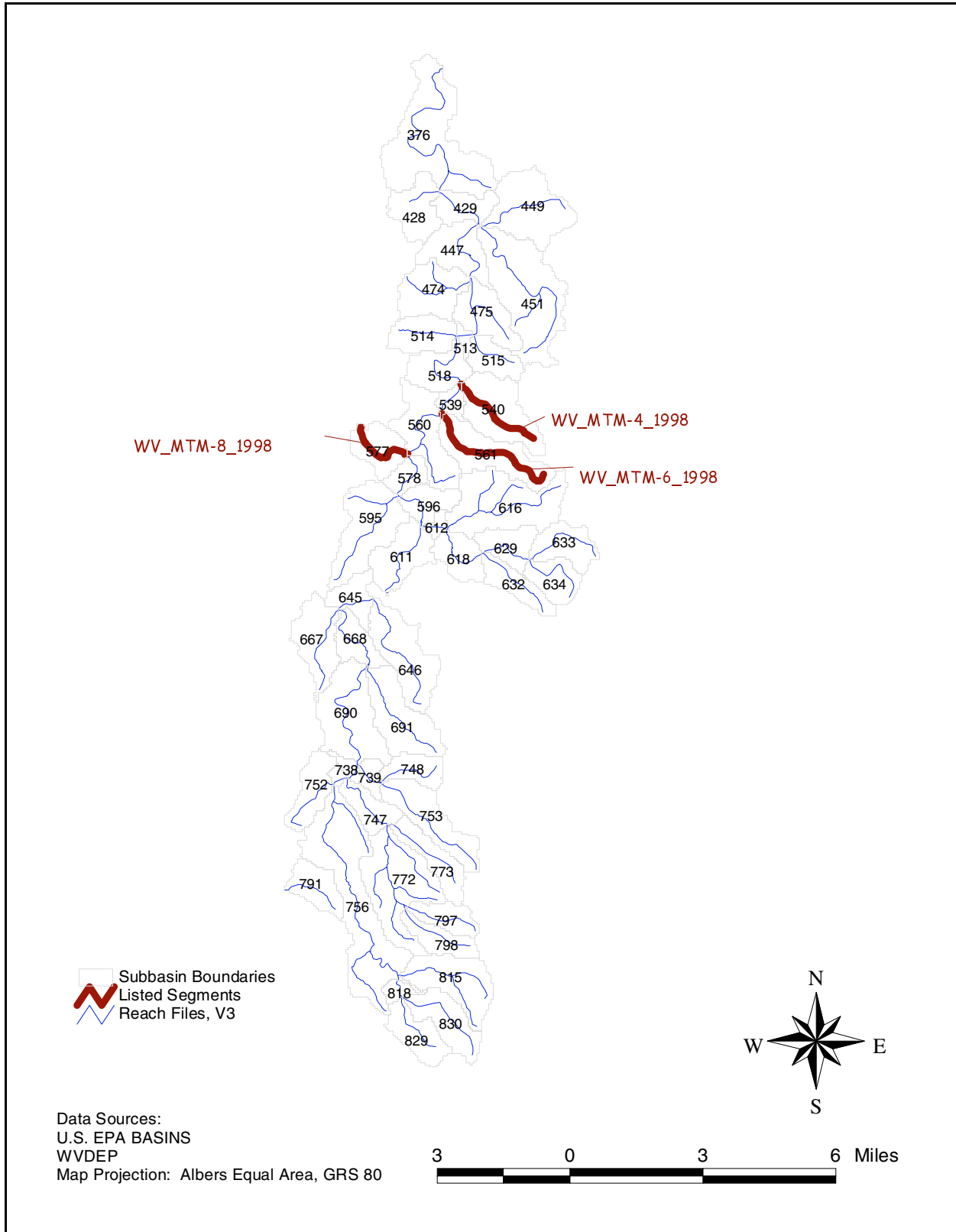


Figure 1. Region 18-Middle Fork River, Upshur County

**Table 1.** Impaired waterbodies in Region 18

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Whiteoak RN	MTM-8	pH, Metals	577	None	B-2
Hell RN	MTM-6	pH, Metals	561	None	B-2
Devil RN	MTM-4	pH, Metals	540	None	B-2

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
540, 561, and 577

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	6893	360	86110	14	09-May-83	17-May-84
376	551108	571	100	3600	35	18-Jun-91	26-Oct-94
428	MTM-00.5-{0.6}	280	280	280	1	25-Aug-97	25-Aug-97
475	551109	587	100	4900	40	18-Jun-91	26-Oct-94
514	MTM-03	230	230	230	1	25-Aug-97	25-Aug-97
540	551110	1360	1	3340	40	27-Jun-91	26-Oct-94
560	MTM-07	130	130	130	1	26-Aug-97	26-Aug-97
561	551111	2193	450	9130	40	27-Jun-91	26-Oct-94
577	551112	7631	400	27000	40	27-Jun-91	26-Oct-94
596	551113	852	100	6370	40	18-Jun-91	26-Oct-94
643	MTM-11-{0.3}	50	50	50	1	26-Aug-97	26-Aug-97

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	8964	100	120600	14	30445	30819
376	551108	876	80	21600	35	33407	34633
428	MTM-00.5-{0.6}	740	740	740	1	35667	35667
475	551109	256	15	900	40	33407	34633
514	MTM-03	3800	3800	3800	1	35667	35667
540	551110	198	15	2500	40	33416	34633
560	MTM-07	430	430	430	1	35668	35668
561	551111	162	60	400	40	33416	34633
577	551112	739	35	1760	40	33416	34633
596	551113	316	15	2900	40	33407	34633
643	385346080065239	675	150	1200	2	29302	29455
643	MTM-11-{0.3}	310	310	310	1	35668	35668

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
376	4TYG12218	1782	170	16370	14	09-May-83	17-May-84
376	551108	534	15	8400	35	18-Jun-91	26-Oct-94
428	MTM-00.5-{0.6}	62	62	62	1	25-Aug-97	25-Aug-97
475	551109	359	5	900	40	18-Jun-91	26-Oct-94
514	MTM-03	4100	4100	4100	1	25-Aug-97	25-Aug-97
540	551110	657	45	1420	40	27-Jun-91	26-Oct-94
560	MTM-07	130	130	130	1	26-Aug-97	26-Aug-97
561	551111	607	20	2550	40	27-Jun-91	26-Oct-94
577	551112	7297	130	21000	40	27-Jun-91	26-Oct-94
596	551113	555	5	4670	40	18-Jun-91	26-Oct-94
643	385346080065239	50	40	60	2	22-Mar-80	22-Aug-80
643	MTM-11-{0.3}	42	42	42	1	26-Aug-97	26-Aug-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
595	p202398	24	24	4.3
595	p202898	24	24	4.3
667	p200900	73	73	4.3
667	s005780	802	802	4.3
690	s001282	259	259	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
595	p202398	18	18	3.2
595	p202898	18	18	3.2
667	p200900	54	54	3.2
667	s005780	796	796	3.2
690	s001282	257	257	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
595	p202398	11	11	2.0
595	p202898	11	11	2.0
667	p200900	34	34	2.0
667	s005780	173	173	2.0
690	s001282	56	56	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
376	0	0	3612	3612	0	0	
428	5	5	1251	1251	0	0	
429	0	0	813	813	0	0	
447	0	0	1256	1256	0	0	
448	0	0	3	3	0	0	
449	3	3	2395	2395	0	0	
451	1	1	3329	3329	0	0	
474	0	0	1633	1633	0	0	
475	1	1	1249	1249	0	0	
513	28	28	160	160	0	0	
514	91	91	1063	1063	0	0	
515	135	135	889	889	0	0	
518	1	1	989	989	0	0	
539	741	741	307	307	0	0	
540	8247	961	1799	1799	0	0	x
560	2205	5131	1616	1616	102	102	
561	8199	913	1711	1711	0	0	x
577	15133	157	676	676	4327	563	x
578	0	0	472	472	0	0	
595	416	416	2203	2203	0	0	
596	1	1	767	767	0	0	
611	0	0	1422	1422	0	0	
612	0	0	180	180	0	0	
616	1	1	2515	2515	0	0	
618	0	0	865	865	0	0	
629	29	29	794	794	0	0	
632	122	122	800	800	0	0	
633	152	152	962	962	0	0	
634	3	3	821	821	0	0	
643	0	0	168	168	0	0	
645	0	0	688	688	0	0	
646	0	0	1774	1774	0	0	
667	103	103	1463	1463	0	0	
668	29	29	778	778	0	0	
690	236	236	2219	2219	0	0	
691	0	0	1719	1719	0	0	
738	44	44	200	200	0	0	
739	0	0	311	311	0	0	
745	4	4	112	112	0	0	
747	1	1	759	759	0	0	
748	0	0	706	706	0	0	
752	19	19	1046	1046	0	0	
753	52	52	1551	1551	0	0	
756	1	1	4221	4221	0	0	
772	3	3	2573	2573	0	0	
773	0	0	991	991	0	0	
797	1	1	689	689	0	0	
798	3	3	761	761	0	0	
815	2	2	1622	1622	0	0	
818	0	0	233	233	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
829	0	0	997	997	0	0	
830	7	7	1187	1187	0	0	
Total	36017	9395	63321	63321	4428	665	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
376	0	0	3654	3654	0	0	
428	10	10	1166	1166	0	0	
429	0	0	792	792	0	0	
447	0	0	1241	1241	0	0	
448	0	0	3	3	0	0	
449	5	5	2301	2301	0	0	
451	2	2	3306	3306	0	0	
474	0	0	1563	1563	0	0	
475	2	2	1252	1252	0	0	
513	52	52	175	175	0	0	
514	168	168	1108	1108	0	0	
515	249	249	953	953	0	0	
518	2	2	1015	1015	0	0	
539	799	799	303	303	0	0	
540	314	314	1808	1808	0	0	
560	205	462	1637	1637	102	102	
561	269	269	1734	1734	0	0	
577	1658	264	694	694	4327	476	x
578	0	0	480	480	0	0	
595	448	448	2147	2147	0	0	
596	2	2	734	734	0	0	
611	0	0	1401	1401	0	0	
612	0	0	184	184	0	0	
616	2	2	2573	2573	0	0	
618	0	0	874	874	0	0	
629	32	32	817	817	0	0	
632	134	134	827	827	0	0	
633	167	167	991	991	0	0	
634	5	5	854	854	0	0	
643	0	0	171	171	0	0	
645	0	0	699	699	0	0	
646	0	0	1829	1829	0	0	
667	191	191	1544	1544	0	0	
668	32	32	817	817	0	0	
690	435	435	2311	2311	0	0	
691	0	0	1773	1773	0	0	
738	81	81	209	209	0	0	
739	0	0	322	322	0	0	
745	8	8	116	116	0	0	
747	2	2	772	772	0	0	
748	0	0	732	732	0	0	
752	36	36	1063	1063	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
753	95	95	1581	1581	0	0	
756	2	2	4187	4187	0	0	
772	5	5	2581	2581	0	0	
773	0	0	1014	1014	0	0	
797	2	2	707	707	0	0	
798	5	5	781	781	0	0	
815	3	3	1669	1669	0	0	
818	0	0	224	224	0	0	
829	0	0	993	993	0	0	
830	13	13	1210	1210	0	0	
Total	5429	4293	63890	63890	4428	578	

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
376	0	0	1597	1597	0	0	
428	6	6	567	567	0	0	
429	0	0	370	370	0	0	
447	0	0	551	551	0	0	
448	0	0	1	1	0	0	
449	3	3	1120	1120	0	0	
451	1	1	1487	1487	0	0	
474	0	0	763	763	0	0	
475	1	1	558	558	0	0	
513	30	30	70	70	0	0	
514	99	99	478	478	0	0	
515	146	146	411	411	0	0	
518	1	1	439	439	0	0	
539	537	537	135	135	0	0	
540	2649	1608	792	792	0	0	x
560	2725	6647	705	705	67	67	
561	2618	1576	745	745	0	0	x
577	18677	173	294	294	2880	864	x
578	0	0	205	205	0	0	
595	301	301	993	993	0	0	
596	1	1	340	340	0	0	
611	0	0	660	660	0	0	
612	0	0	79	79	0	0	
616	1	1	1095	1095	0	0	
618	0	0	377	377	0	0	
629	21	21	344	344	0	0	
632	89	89	347	347	0	0	
633	112	112	417	417	0	0	
634	3	3	356	356	0	0	
643	0	0	76	76	0	0	
645	0	0	300	300	0	0	
646	0	0	769	769	0	0	
667	112	112	653	653	0	0	
668	21	21	340	340	0	0	
690	255	255	984	984	0	0	



# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
691	0	0	745	745	0	0	
738	47	47	90	90	0	0	
739	0	0	136	136	0	0	
745	5	5	50	50	0	0	
747	1	1	334	334	0	0	
748	0	0	306	306	0	0	
752	21	21	464	464	0	0	
753	56	56	688	688	0	0	
756	1	1	1857	1857	0	0	
772	3	3	1132	1132	0	0	
773	0	0	430	430	0	0	
797	1	1	298	298	0	0	
798	3	3	330	330	0	0	
815	2	2	703	703	0	0	
818	0	0	102	102	0	0	
829	0	0	440	440	0	0	
830	8	8	515	515	0	0	
Total	28556	11890	28039	28039	2947	931	

# **Appendix A-19**

## **Region 19**

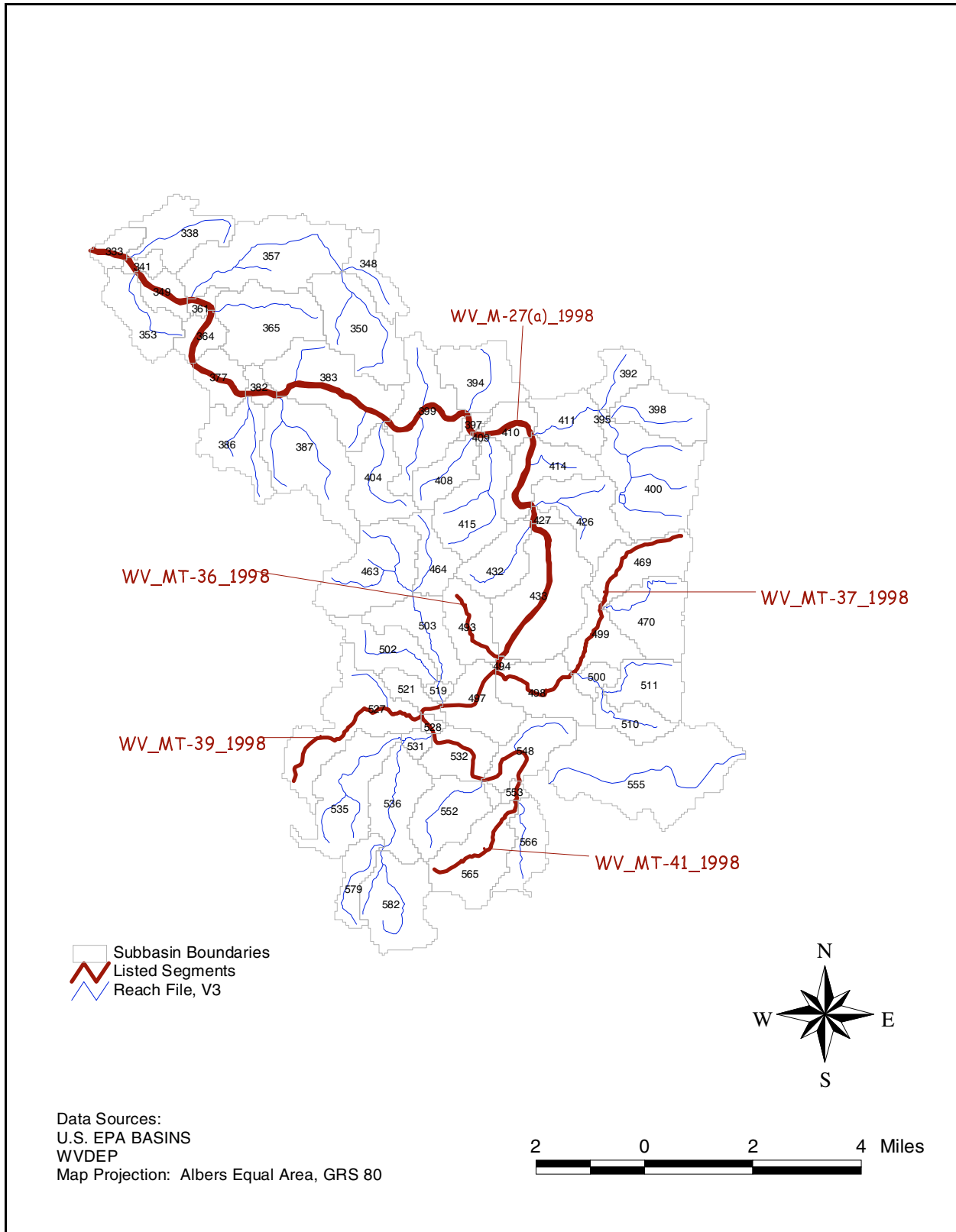


Figure 1. Region 19 - Tygart Valley River, Barbour County (Southern portion)

**Table 1.** Impaired waterbodies in Region 19

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Tygart R	M-27	pH, Metals	353 364 365 350 382 394 392 377 395 397 409 398 383 411 410 399 386 408 414 427 404 387 400 528 497 510 531 532 548 554 553 527 555 535 552 536 566 565 333 338 341 357 361 349 348 415 426 464 432 469 463 470 493 433 494 499 503 502 519 500 521 511 498 579 582	1, 3, 2, 4	B-2
Island RN	MT-36	pH, Metals	493		B-1
Beaver CK	MT-37	pH, Metals	469, 470, 499, 500, 511, 498, 510		B-2
Laurel RN	MT-39	pH, Metals	536, 579, 582		B-2
Grassy RN	MT-41	pH, Metals	553,566,565		B-1
U.T.	MT-40.*	pH, Metals			B-1

\*Due to uncertainty regarding its exact location, the TMDL for impaired stream segment MT-40? was not calculated. This does not affect the allocations of the other segments in the subwatershed because each segment allocation has been calculated separately (WVDEP, 2000c).

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
498, 499 and 565

**Table 3a.** Water quality data for aluminum (ug/L).

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
399	550578	567	0.4	2850	69	18-Mar-86	15-Sep-88
414	4TYG11119	534	50	2030	14	09-May-83	17-May-84
433	MT-36	250	250	250	1	15-Sep-97	15-Sep-97
433	MT-37-{0.0}	8200	8200	8200	1	15-Sep-97	15-Sep-97
499	MT-37-{2.9}	440	440	440	1	15-Sep-97	15-Sep-97
555	550792	297	20	2240	57	18-Mar-86	14-Jun-88

**Table 3b.** Water quality data for iron (ug/L).

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
399	550578	688	100	2250	69	18-Mar-86	15-Sep-88
414	4TYG11119	557	100	1900	14	09-May-83	17-May-84
433	MT-36	1000	1000	1000	1	15-Sep-97	15-Sep-97
433	MT-37-{0.0}	1300	1300	1300	1	15-Sep-97	15-Sep-97
499	MT-37-{2.9}	1000	1000	1000	1	15-Sep-97	15-Sep-97
555	550792	715	150	8000	57	18-Mar-86	14-Jun-88

**Table 3c.** Water quality for manganese (ug/L).

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
399	550578	181	0	2490	69	18-Mar-86	15-Sep-88
414	4TYG11119	138	10	370	14	09-May-83	17-May-84
433	MT-36	850	850	850	1	15-Sep-97	15-Sep-97
433	MT-37-{0.0}	1500	1500	1500	1	15-Sep-97	15-Sep-97
499	MT-37-{2.9}	890	890	890	1	15-Sep-97	15-Sep-97
555	550792	43	0	140	57	18-Mar-86	14-Jun-88

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources.

<b>SWS</b>	<b>Permit ID</b>	<b>Baseline (lbs/yr)</b>	<b>Allocation(lbs/yr)</b>	<b>Allocation (mg/L)</b>
387	u202687	422	422	4.3
469	p202598	23	23	4.3
499	s200596	1518	1518	4.3
548	o202388	551	551	4.3
552	l009900	92	92	4.3
552	u200988	1063	1063	4.3
555	q200197	8890	NAA*	NAA

\* NAA - No allocation required

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

<b>SWS</b>	<b>Permit ID</b>	<b>Baseline (lbs/yr)</b>	<b>Allocation(lbs/yr)</b>	<b>Allocation (mg/L)</b>
387	u202687	314	314	3.2
469	p202598	17	17	3.2
499	s200596	1130	1130	3.2
548	o202388	410	410	3.2
552	l009900	88	88	3.2
552	u200988	594	594	3.2
555	q200197	6626	NAA*	NAA

\* NAA - No allocation required

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

<b>SWS</b>	<b>Permit ID</b>	<b>Baseline (lbs/yr)</b>	<b>Allocation (lbs/yr)</b>	<b>Allocation (mg/L)</b>
387	u202687	196	196	2.0
469	p202598	11	11	2.0
499	s200596	708	708	2.0
548	o202388	253	253	2.0
552	l009900	20	20	2.0
552	u200988	372	372	2.0
555	q200197	4092	NAA*	NAA

\* NAA - No allocation required

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
333	0	0	403	403	0	0	
338	11	11	1761	1761	0	0	
341	4	4	216	216	0	0	
348	0	0	1178	1178	0	0	
349	4	4	472	472	0	0	
350	0	0	2924	2924	0	0	
353	0	0	1175	1175	0	0	
357	1	1	3932	3932	0	0	
361	4	4	178	178	0	0	
364	20	20	470	470	0	0	
365	0	0	2493	2493	0	0	
377	1	1	689	689	0	0	
382	11	11	239	239	0	0	
383	58	58	2505	2505	1745	1745	
386	25	25	1252	1252	3396	849	x
387	835	768	2344	2344	2617	893	x
392	0	0	830	830	0	0	
394	11	11	1612	1612	0	0	
395	0	0	86	86	0	0	
397	0	0	195	195	0	0	
398	0	0	1239	1239	0	0	
399	15	15	2426	2426	0	0	
400	0	0	2969	2969	0	0	
404	65	65	1339	1339	0	0	
408	0	0	1091	1091	0	0	
409	0	0	66	66	0	0	
410	0	0	671	671	0	0	
411	9	9	1518	1518	0	0	
414	5	5	1481	1481	0	0	
415	0	0	2188	2188	0	0	
426	36	36	1955	1955	0	0	
427	2	2	153	153	0	0	
432	1	1	1272	1272	0	0	
433	176	176	3135	3135	0	0	
463	0	0	2308	2308	0	0	
464	0	0	1112	1112	0	0	
469	231	231	1324	1324	0	0	
470	11	11	1475	1475	0	0	
493	2337	1428	1103	1103	0	0	x
494	10	10	64	64	0	0	
497	557	557	1117	1117	0	0	
498	8654	471	1180	1180	0	0	x
499	4666	1581	892	892	0	0	x
500	35	35	336	336	0	0	
502	0	0	1227	1227	0	0	
503	32	32	1538	1538	0	0	
510	33	33	715	715	0	0	
511	41	41	1024	1024	0	0	
519	50	50	136	136	0	0	
521	58	58	546	546	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
527	12	12	2614	2614	1557	1557	
528	11	11	100	100	0	0	
531	18	18	188	188	0	0	
532	357	357	947	947	0	0	
535	0	0	1943	1943	0	0	
536	120	120	1371	1371	0	0	
548	439	439	984	984	0	0	
552	843	843	1005	1005	0	0	
553	106	106	119	119	0	0	
554	20	20	167	167	0	0	
555	1175	1175	2964	2964	4868	4868	
565	82894	1518	1637	1637	0	0	x
566	155	155	851	851	0	0	
579	4	4	689	689	0	0	
582	464	464	1695	1695	0	0	
Total	104630	9070	79827	79827	14183	9912	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
333	0	0	396	396	0	0	
338	14	14	1632	1632	0	0	
341	5	5	214	214	0	0	
348	0	0	1036	1036	0	0	
349	5	5	467	467	0	0	
350	0	0	2626	2626	0	0	
353	0	0	1151	1151	0	0	
357	2	2	3535	3535	0	0	
361	5	5	174	174	0	0	
364	27	27	468	468	0	0	
365	0	0	2343	2343	0	0	
377	2	2	682	682	0	0	
382	14	14	231	231	0	0	
383	76	76	2356	2356	1745	1745	x
386	34	34	1213	1213	3396	747	x
387	1151	430	2262	2262	2617	872	x
392	0	0	793	793	0	0	
394	14	14	1492	1492	0	0	
395	0	0	77	77	0	0	
397	0	0	171	171	0	0	
398	0	0	1223	1223	0	0	
399	14	14	2272	2272	0	0	
400	0	0	2882	2882	0	0	
404	90	90	1297	1297	0	0	
408	0	0	1013	1013	0	0	
409	0	0	60	60	0	0	
410	0	0	637	637	0	0	
411	10	10	1390	1390	0	0	
414	7	7	1409	1409	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
415	0	0	1986	1986	0	0	
426	49	49	1785	1785	0	0	
427	3	3	142	142	0	0	
432	2	2	1177	1177	0	0	
433	166	166	3025	3025	0	0	
463	0	0	2186	2186	0	0	
464	0	0	1007	1007	0	0	
469	231	231	1305	1305	0	0	
470	14	14	1467	1467	0	0	
493	2487	2487	1063	1063	0	0	
494	14	14	65	65	0	0	
497	751	751	1142	1142	0	0	
498	16917	414	1192	1192	0	0	x
499	9313	30	880	880	0	0	x
500	36	36	334	334	0	0	
502	0	0	1173	1173	0	0	
503	42	42	1423	1423	0	0	
510	35	35	708	708	0	0	
511	40	40	1023	1023	0	0	
519	68	68	135	135	0	0	
521	78	78	524	524	0	0	
527	17	17	2516	2516	1550	1550	
528	15	15	100	100	0	0	
531	25	25	188	188	0	0	
532	485	485	954	954	0	0	
535	0	0	1925	1925	0	0	
536	159	159	1368	1368	0	0	
548	424	424	996	996	0	0	
552	1153	1153	1001	1001	0	0	
553	100	100	123	123	0	0	
554	27	27	175	175	0	0	
555	4606	4606	12648	12648	4875	4875	
565	112937	1187	1648	1648	0	0	x
566	186	186	850	850	0	0	
579	5	5	694	694	0	0	
582	632	632	1693	1693	0	0	
Total	152484	14226	86123	86123	14183	9789	



# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
333	0	0	150	150	0	0	
338	8	8	776	776	0	0	
341	3	3	79	79	0	0	
348	0	0	557	557	0	0	
349	3	3	171	171	0	0	
350	0	0	1350	1350	0	0	
353	0	0	457	457	0	0	
357	1	1	1758	1758	0	0	
361	3	3	67	67	0	0	
364	15	15	169	169	0	0	
365	0	0	1060	1060	0	0	
377	1	1	257	257	0	0	
382	8	8	90	90	0	0	
383	43	43	1014	1014	1167	1167	
386	19	19	481	481	2271	1067	x
387	639	639	922	922	1750	1453	x
392	0	0	337	337	0	0	
394	8	8	673	673	0	0	
395	0	0	42	42	0	0	
397	0	0	91	91	0	0	
398	0	0	463	463	0	0	
399	23	23	1015	1015	0	0	
400	0	0	1169	1169	0	0	
404	50	50	519	519	0	0	
408	0	0	471	471	0	0	
409	0	0	30	30	0	0	
410	0	0	295	295	0	0	
411	10	10	702	702	0	0	
414	4	4	650	650	0	0	
415	0	0	953	953	0	0	
426	27	27	870	870	0	0	
427	2	2	64	64	0	0	
432	1	1	539	539	0	0	
433	253	253	1264	1264	0	0	
463	0	0	929	929	0	0	
464	0	0	499	499	0	0	
469	230	230	499	499	0	0	
470	8	8	534	534	0	0	
493	1507	1507	477	477	0	0	
494	8	8	26	26	0	0	
497	431	431	466	466	0	0	
498	5342	3160	486	486	0	0	x
499	2801	2208	343	343	0	0	x
500	44	44	122	122	0	0	
502	0	0	482	482	0	0	
503	24	24	683	683	0	0	
510	30	30	263	263	0	0	
511	57	57	366	366	0	0	
519	38	38	55	55	0	0	
521	44	44	240	240	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
527	9	9	1070	1070	1346	1346	
528	8	8	36	36	0	0	
531	14	14	67	67	0	0	
532	271	271	381	381	0	0	
535	0	0	708	708	0	0	
536	99	99	500	500	0	0	
548	606	606	397	397	0	0	
552	642	642	385	385	0	0	
553	153	153	49	49	0	0	
554	15	15	84	84	0	0	
555	898	898	1226	1226	3212	3212	
565	1060	1060	645	645	0	0	
566	158	158	310	310	0	0	
579	3	3	257	257	0	0	
582	353	353	658	658	0	0	
Total	15973	12456	32750	32750	9745	8244	

# **Appendix A-20**

## **Region 20**

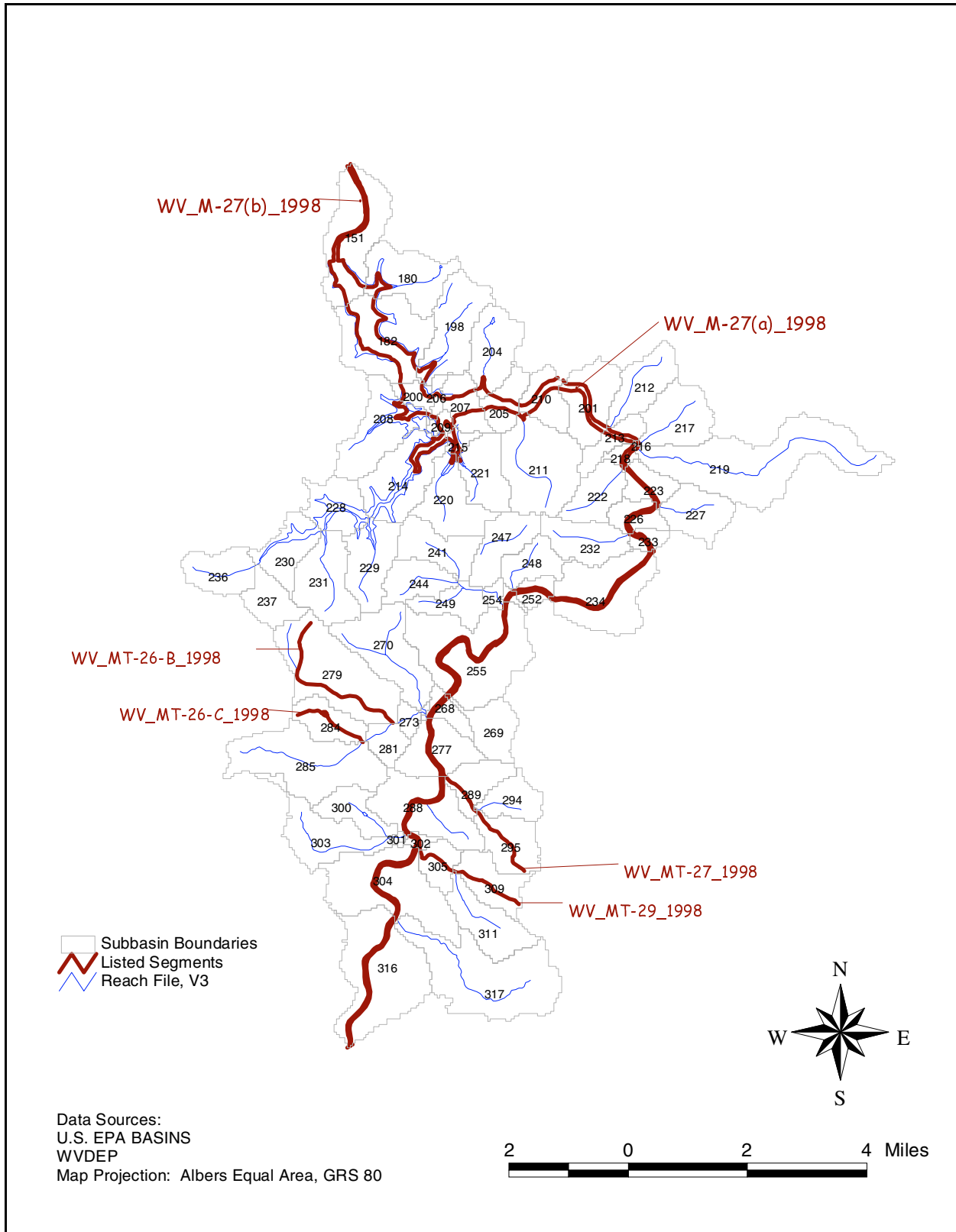


Figure 1. Region 20-Tygart Valley River, Barbour County

**Table 1.** Impaired waterbodies in Region 20

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Region	Aquatic Life
Tygart River	M-27	pH, Metals	151,180,182,198,204,206,200,212,207,205,210,209,216,217,201,215,218,213,208,223,221,219,211,214,222,226,228,220,227,233,232,241,247,248,236,230,244,254,252,229,251,231,237,249,234,270,255,274,279,273,268,284,269,281,277,285,289,294,300,301,302,288,303,295,305,309,304,311,317,316	14,20,15,10,13,17,11,12,5,9,6,8,19,4,18,7,2,3,1	B-1
Foxgrape RN	MT-26-B	Aluminum	279	None	B-1
Little Hackers CK	MT-26-C	Aluminum	284	None	B-1
Ford RN	MT-27	pH, Metals	289,294,295	None	B-1
Anglins RN	MT-29	pH, Metals	305,309,311	None	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
289,305, and 309

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
151	4TYG20201	668	50	9600	24	08-Apr-81	07-Aug-87
151	4TYG21002	386	50	8500	38	26-Apr-83	07-Aug-87
151	550575	1105	200	3500	8	18-Mar-86	10-Apr-86
182	4TYG21004	374	50	1870	32	26-Apr-83	18-Oct-83
201	4TYG21008	135	100	170	2	31-Aug-83	31-Aug-83
207	4TYG21006	319	50	1870	33	27-Apr-83	18-Oct-83
209	4TYG22006	70	70	70	1	15-Sep-83	15-Sep-83
213	4TYG21009	346	90	2020	34	10-Sep-81	18-Oct-83
220	4TYG22007	100	100	100	1	15-Sep-83	15-Sep-83
232	MT-22	95	95	95	1	09-Sep-97	09-Sep-97
234	4TYGW0111	557	50	2823	37	28-Apr-86	14-Mar-88
234	4TYGW1111	790	50	7040	22	08-Apr-81	07-Aug-87
255	4TYG11112	900	620	1180	2	21-Feb-86	24-Mar-86
255	550576	395	0.1	2060	36	18-Mar-86	02-Jul-87
273	MT-26-{00.4}	50	50	50	1	27-Aug-97	27-Aug-97
279	MT-26-B	180	180	180	1	16-Sep-97	16-Sep-97
279	MT-26-C	50	50	50	1	27-Aug-97	27-Aug-97
288	4TYG11115	592	50	5940	59	08-Apr-81	14-Mar-88
289	4TYG12215	31478	50	118770	53	08-Apr-81	14-Mar-88
302	550577	387	100	1440	64	18-Mar-86	11-Jul-88
302	550822	318	120	600	8	11-Mar-80	10-Sep-84
305	MT-29	90	90	90	1	11-Sep-97	11-Sep-97

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
151	4TYG20201	641	100	6400	24	08-Apr-81	07-Aug-87
151	4TYG21002	513	100	8100	38	26-Apr-83	07-Aug-87
151	550575	803	200	1400	8	18-Mar-86	10-Apr-86
182	4TYG21004	608	100	2900	36	26-Apr-83	18-Oct-83
201	4TYG21008	667	100	1700	3	31-Aug-83	31-Aug-83
207	4TYG21006	415	100	2500	34	27-Apr-83	18-Oct-83
209	4TYG22006	100	100	100	1	15-Sep-83	15-Sep-83
213	4TYG21009	426	100	1800	34	10-Sep-81	18-Oct-83
220	4TYG22007	100	100	100	1	15-Sep-83	15-Sep-83
232	MT-22	122	122	122	1	09-Sep-97	09-Sep-97
234	4TYGW0111	834	100	3900	37	28-Apr-86	14-Mar-88
234	4TYGW1111	1300	100	8500	23	08-Apr-81	07-Aug-87
255	4TYG11112	1100	1100	1100	1	21-Feb-86	21-Feb-86
255	550576	535	0.2	3220	36	18-Mar-86	02-Jul-87
273	MT-26-{00.4}	50	50	50	1	27-Aug-97	27-Aug-97
279	MT-26-B	180	180	180	1	16-Sep-97	16-Sep-97
279	MT-26-C	180	180	180	1	27-Aug-97	27-Aug-97
288	4TYG11115	876	100	7400	58	08-Apr-81	14-Mar-88
289	4TYG12215	61132	100	256400	52	08-Apr-81	14-Mar-88
302	390900080022539	942	180	1700	10	29-Jan-80	02-Sep-80
302	550577	465	100	2520	64	18-Mar-86	11-Jul-88
302	550822	689	180	2600	15	10-Jun-80	10-Sep-84
305	MT-29	500	500	500	1	11-Sep-97	11-Sep-97
317	390723080023139	530	360	700	2	27-Mar-80	23-Aug-80

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
151	4TYG20201	211	10	450	23	08-Apr-81	07-Aug-87
151	4TYG21002	429	10	2600	37	26-Apr-83	07-Aug-87
151	550575	208	106	318	8	18-Mar-86	10-Apr-86
182	4TYG21004	245	10	1240	37	26-Apr-83	18-Oct-83
201	4TYG21008	160	60	350	3	31-Aug-83	31-Aug-83
207	4TYG21006	125	10	450	34	27-Apr-83	18-Oct-83
209	4TYG22006	20	20	20	1	15-Sep-83	15-Sep-83
213	4TYG21009	194	30	1260	34	10-Sep-81	18-Oct-83
220	4TYG22007	10	10	10	1	15-Sep-83	15-Sep-83
232	MT-22	8	8	8	1	09-Sep-97	09-Sep-97
234	4TYGW0111	147	10	380	37	28-Apr-86	14-Mar-88
234	4TYGW1111	164	10	580	21	08-Apr-81	07-Aug-87
255	4TYG11112	220	170	270	2	21-Feb-86	24-Mar-86
255	550576	94	0	500	36	18-Mar-86	02-Jul-87
273	MT-26-{00.4}	60	60	60	1	27-Aug-97	27-Aug-97
279	MT-26-B	140	140	140	1	16-Sep-97	16-Sep-97
279	MT-26-C	78	78	78	1	27-Aug-97	27-Aug-97
288	4TYG11115	247	10	4499	59	08-Apr-81	14-Mar-88
289	4TYG12215	7499	10	31620	51	08-Apr-81	14-Mar-88
302	390900080022539	147	70	210	10	29-Jan-80	02-Sep-80
302	550577	150	0	400	64	18-Mar-86	11-Jul-88
302	550822	143	78	248	14	11-Mar-80	10-Sep-84
305	MT-29	290	290	290	1	11-Sep-97	11-Sep-97
317	390723080023139	70	60	80	2	27-Mar-80	23-Aug-80

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
219	u103790	938	938	4.3
255	p200300	27	27	4.3
277	e011000	445	445	4.3
277	r064900	2502	2502	4.3
279	u001583	2565	1088	2.4
284	o011383	4776	906	0.8
284	s200594	345	66	0.8
285	s200592	1917	1917	4.3
288	e010300	781	781	4.3
288	p071300	0	0	0.0
289	o010283	15	15	4.3
304	d016300	235	235	4.3
304	u001985	235	235	4.3

**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
219	u103790	698	698	3.2
255	p200300	20	20	3.2
277	e011000	331	331	3.2
277	r064900	1862	1862	3.2
279	u001583	1909	1909	3.2
284	o011383	926	926	3.2
284	s200594	66	66	3.2
285	s200592	1427	1427	3.2
288	e010300	581	581	3.2
288	p071300	0	0	0.0
289	o010283	14	14	3.2
304	d016300	175	175	3.2
304	u001985	175	175	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
219	u103790	374	374	2.0
255	p200300	11	11	2.0
277	e011000	177	177	2.0
277	r064900	987	987	2.0
279	u001583	1194	1194	2.0
284	o011383	557	557	2.0
284	s200594	42	42	2.0
285	s200592	766	766	2.0
288	e010300	312	312	2.0
288	p071300	0	0	0.0
289	o010283	3	3	2.0
304	d016300	94	94	2.0
304	u001985	94	94	2.0

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
151	0	0	1186	1186	0	0	
180	0	0	1032	1032	0	0	
182	0	0	1148	1148	0	0	
198	0	0	1096	1096	0	0	
200	0	0	98	98	0	0	
201	0	0	683	683	0	0	
204	0	0	898	898	0	0	
205	7	7	335	335	0	0	
206	0	0	72	72	0	0	
207	0	0	296	296	0	0	
208	0	0	1203	1203	0	0	
209	0	0	68	68	0	0	
210	7	7	369	369	0	0	
211	0	0	1524	1524	0	0	
212	0	0	870	870	0	0	
213	0	0	326	326	0	0	
214	0	0	1110	1110	0	0	
215	0	0	114	114	0	0	
216	0	0	3	3	0	0	
217	0	0	1093	1093	0	0	
218	0	0	98	98	0	0	
219	0	0	3333	3333	0	0	
220	7	7	883	883	0	0	
221	0	0	685	685	0	0	
222	0	0	593	593	0	0	
223	0	0	322	322	0	0	
226	0	0	322	322	0	0	
227	0	0	986	986	0	0	
228	0	0	721	721	0	0	
229	0	0	922	922	0	0	
230	7	7	1045	1045	0	0	
231	15	15	970	970	0	0	
232	7	7	804	804	0	0	
233	0	0	161	161	0	0	
234	7	7	1411	1411	0	0	
236	69	69	701	701	0	0	
237	118	118	567	567	0	0	
241	0	0	1002	1002	0	0	
244	0	0	863	863	0	0	
247	0	0	851	851	0	0	
248	0	0	489	489	0	0	
249	0	0	606	606	0	0	
251	0	0	59	59	0	0	
252	45	45	177	177	0	0	
254	0	0	177	177	0	0	
255	218	218	2301	2301	0	0	
268	161	161	231	231	0	0	
269	11	11	631	631	0	0	
270	17	17	1807	1807	0	0	



## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
273	0	0	144	144	0	0	
274	41	41	21	21	0	0	
277	282	282	601	601	0	0	
279	467	120	2849	2849	0	0	x
281	1	1	434	434	0	0	
284	22	22	664	664	0	0	
285	162	162	2261	2261	0	0	
288	35	35	1404	1404	0	0	
289	105230	737	798	798	0	0	x
294	7	7	817	817	0	0	
295	37	37	1054	1054	0	0	
300	1	1	636	636	0	0	
301	6	6	38	38	0	0	
302	30	30	74	74	0	0	
303	71	71	1516	1516	0	0	
304	120	120	2146	2146	0	0	
305	1252	1003	522	522	0	0	x
309	1680	1344	976	976	0	0	x
311	0	0	1240	1240	0	0	
316	245	245	2091	2091	0	0	
317	0	0	2741	2741	0	0	
Total	110389	5310	60269	60269	0	0	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
151	0	0	1205	1205	0	0	
180	0	0	1000	1000	0	0	
182	0	0	1175	1175	0	0	
198	0	0	1068	1068	0	0	
200	0	0	111	111	0	0	
201	0	0	675	675	0	0	
204	0	0	846	846	0	0	
205	7	7	332	332	0	0	
206	0	0	76	76	0	0	
207	0	0	296	296	0	0	
208	0	0	1160	1160	0	0	
209	0	0	77	77	0	0	
210	7	7	363	363	0	0	
211	0	0	1452	1452	0	0	
212	0	0	790	790	0	0	
213	0	0	320	320	0	0	
214	0	0	1108	1108	0	0	
215	0	0	121	121	0	0	
216	0	0	3	3	0	0	
217	0	0	1004	1004	0	0	
218	0	0	99	99	0	0	
219	0	0	3019	3019	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
220	7	7	846	846	0	0	
221	0	0	660	660	0	0	
222	0	0	570	570	0	0	
223	0	0	323	323	0	0	
226	0	0	317	317	0	0	
227	0	0	870	870	0	0	
228	0	0	714	714	0	0	
229	0	0	865	865	0	0	
230	7	7	895	895	0	0	
231	14	14	945	945	0	0	
232	7	7	745	745	0	0	
233	0	0	156	156	0	0	
234	7	7	1339	1339	0	0	
236	64	64	656	656	0	0	
237	146	146	515	515	0	0	
241	0	0	852	852	0	0	
244	0	0	744	744	0	0	
247	0	0	759	759	0	0	
248	0	0	470	470	0	0	
249	0	0	549	549	0	0	
251	0	0	57	57	0	0	
252	42	42	177	177	0	0	
254	0	0	143	143	0	0	
255	201	201	2089	2089	0	0	
268	149	149	223	223	0	0	
269	15	15	591	591	0	0	
270	15	15	1619	1619	0	0	
273	0	0	143	143	0	0	
274	38	38	25	25	0	0	
277	389	389	580	580	0	0	
279	419	419	2575	2575	0	0	
281	2	2	399	399	0	0	
284	27	27	521	521	0	0	
285	196	196	2073	2073	0	0	
288	32	32	1381	1381	0	0	
289	236075	708	822	822	0	0	x
294	7	7	771	771	0	0	
295	34	34	1024	1024	0	0	
300	2	2	592	592	0	0	
301	9	9	40	40	0	0	
302	41	41	79	79	0	0	
303	94	94	1345	1345	0	0	
304	155	155	1958	1958	0	0	
305	1668	672	537	537	0	0	x
309	2237	895	973	973	0	0	x
311	0	0	1191	1191	0	0	
316	293	293	1997	1997	0	0	
317	0	0	2496	2496	0	0	
Total	242406	4701	56513	56513	0	0	

Table 5c. Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Strip mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
151	0	0	640	640	0	0	
180	0	0	582	582	0	0	
182	0	0	647	647	0	0	
198	0	0	620	620	0	0	
200	0	0	58	58	0	0	
201	0	0	358	358	0	0	
204	0	0	527	527	0	0	
205	11	11	183	183	0	0	
206	0	0	41	41	0	0	
207	0	0	159	159	0	0	
208	0	0	703	703	0	0	
209	0	0	41	41	0	0	
210	11	11	191	191	0	0	
211	0	0	831	831	0	0	
212	0	0	507	507	0	0	
213	0	0	173	173	0	0	
214	0	0	609	609	0	0	
215	0	0	64	64	0	0	
216	0	0	1	1	0	0	
217	0	0	664	664	0	0	
218	0	0	53	53	0	0	
219	0	0	2029	2029	0	0	
220	11	11	481	481	0	0	
221	0	0	370	370	0	0	
222	0	0	316	316	0	0	
223	0	0	167	167	0	0	
226	0	0	175	175	0	0	
227	0	0	616	616	0	0	
228	0	0	417	417	0	0	
229	0	0	503	503	0	0	
230	11	11	659	659	0	0	
231	22	22	525	525	0	0	
232	11	11	450	450	0	0	
233	0	0	89	89	0	0	
234	11	11	750	750	0	0	
236	101	101	381	381	0	0	
237	117	117	317	317	0	0	
241	0	0	584	584	0	0	
244	0	0	541	541	0	0	
247	0	0	486	486	0	0	
248	0	0	258	258	0	0	
249	0	0	359	359	0	0	
251	0	0	35	35	0	0	
252	68	68	90	90	0	0	
254	0	0	104	104	0	0	
255	324	324	1283	1283	0	0	
268	240	240	120	120	0	0	
269	9	9	354	354	0	0	
270	25	25	1143	1143	0	0	
273	0	0	80	80	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Strip mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
274	61	61	11	11	0	0	
277	216	216	336	336	0	0	
279	383	383	1586	1586	0	0	
281	1	1	272	272	0	0	
284	23	23	340	340	0	0	
285	167	167	1374	1374	0	0	
288	52	52	876	876	0	0	
289	36862	922	371	371	0	0	x
294	11	11	335	335	0	0	
295	55	55	409	409	0	0	
300	1	1	380	380	0	0	
301	5	5	25	25	0	0	
302	23	23	40	40	0	0	
303	59	59	987	987	0	0	
304	108	108	1311	1311	0	0	
305	835	835	212	212	0	0	
309	1119	1119	414	414	0	0	
311	0	0	485	485	0	0	
316	258	258	1232	1232	0	0	
317	0	0	1656	1656	0	0	
Total	41211	5271	33983	33983	0	0	

# **Appendix A-21**

## **Region 21**

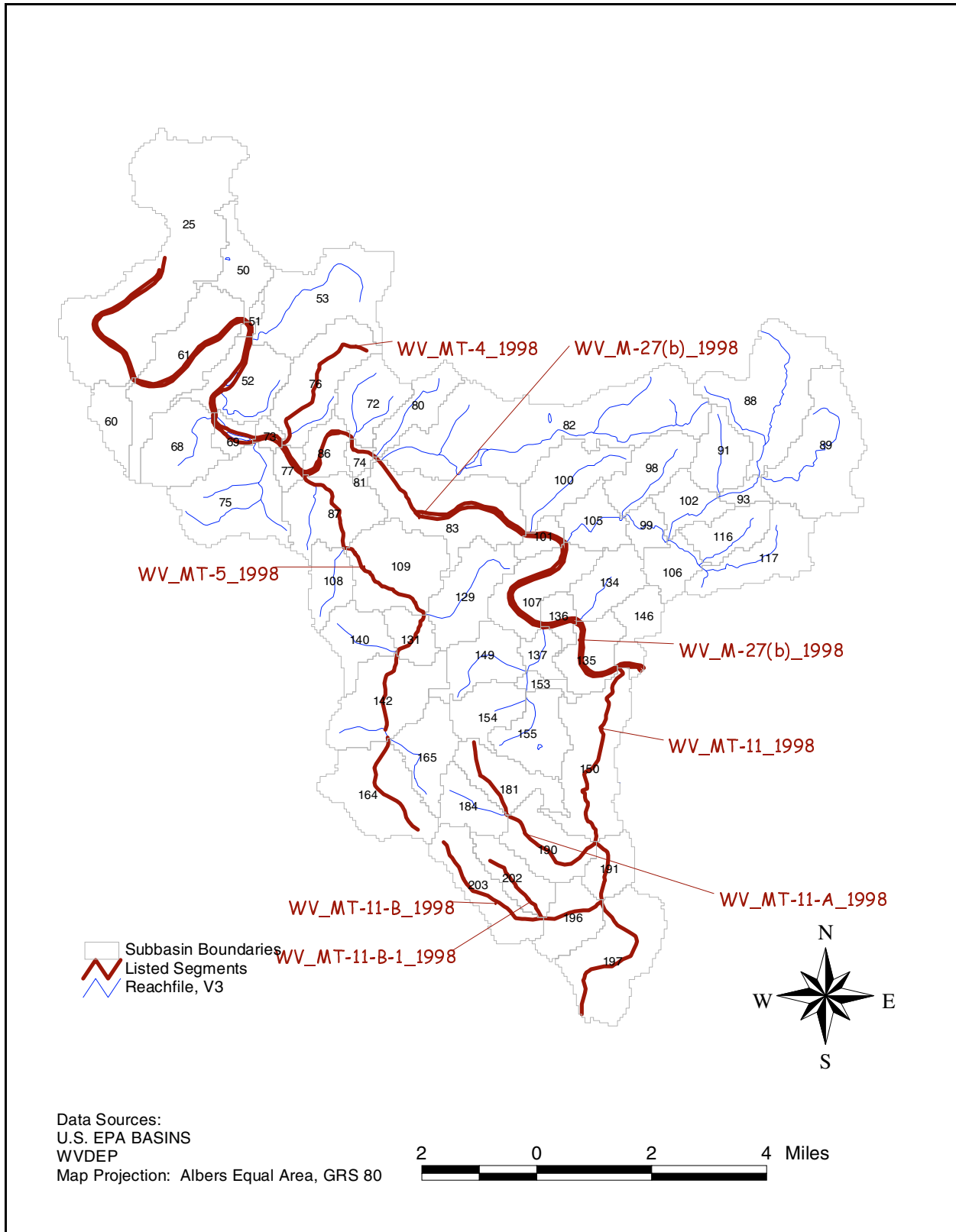


Figure 1. Region 21-The most downstream portion of the Tygart Valley River, Taylor County

**Table 1.** Impaired waterbodies in Region 21

Stream Name	Stream Code	Pollutant	Contributing SWS	Contributing Regions	Aquatic Life
Berkely RN	MT-11	pH, Metals	150,191,197,196, 203, 202,190, 184, 181		B-1
Berry RN	MT-11B-1	pH , Metals	202		B-1
Long RN	MT-11-B	pH , Metals	196,203,202		B-1
Shelby RN	MT-11-A	pH, Metals	190,184,181		B-1
Goose CK	MT-4	pH, Metals	76		B-1
Lost RN	MT-5	pH, Metals	87,108,109,129,131,140,142,164,165		B-1
Tygart River	M-27-(b)	pH, Metals	50,51,53,25,52,76,72,73,80,69,60,86,74, 88,61,81,82,68,77,91,93,98,89,100,102,75,105,101,99,87,116,83,117,106,109,134,108,107,129,136,131,137,146,135,140,149,153,142,154,155,165,181,184,150,164,190,191,202,203,196,197	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	B-1

**Table 2.** Locations of abandoned mines (seep, deep mine, and/or leaching)

SWS
181, 202, and 203

**Table 3a.** Water quality data for aluminum

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
100	MT-07	50	50	50	1	26-Aug-97	26-Aug-97
105	MT-08	50	50	50	1	26-Aug-97	26-Aug-97
135	4TYG13019	314	80	650	17	08-Apr-81	02-Feb-84
146	550451	290	80	760	10	11-Mar-80	12-Sep-84
190	MT-11-A	50	50	50	1	26-Aug-97	26-Aug-97
196	MT-11-B	360	360	360	1	26-Aug-97	26-Aug-97
197	MT-11-{06.63}	130	130	130	1	27-Aug-97	27-Aug-97
202	MT-11-B-1	130	130	130	1	26-Aug-97	26-Aug-97
25	4OPW12010	152	50	320	8	22-Aug-83	24-Aug-92
25	4OPW12011	150	150	150	1	26-Aug-85	26-Aug-85
52	4TYG13006	286	50	1280	18	08-Apr-81	15-May-86
52	550574	358	20	1940	143	11-Mar-80	14-Jun-95
52	WA96-M03	523	50	1200	12	12-Mar-96	03-Dec-98
76	MT-04	1200	1200	1200	1	25-Feb-97	25-Feb-97
91	MT-12-{10.20}	7300	7300	7300	1	02-Sep-97	02-Sep-97

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 3b.** Water quality data for iron

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
100	MT-07	87	87	87	1	26-Aug-97	26-Aug-97
105	MT-08	220	220	220	1	26-Aug-97	26-Aug-97
135	4TYG13019	315	100	800	17	08-Apr-81	02-Feb-84
146	550451	463	130	1240	20	11-Mar-80	12-Sep-84
190	MT-11-A	180	180	180	1	26-Aug-97	26-Aug-97
196	MT-11-B	1100	1100	1100	1	26-Aug-97	26-Aug-97
197	MT-11-{06.63}	370	370	370	1	27-Aug-97	27-Aug-97
202	MT-11-B-1	500	500	500	1	26-Aug-97	26-Aug-97
25	4OPW12010	168	100	400	7	04-Aug-86	24-Aug-92
25	4OPW12011	100	100	100	1	26-Aug-85	26-Aug-85
51	392615080075539	1719	150	6900	9	17-Jan-80	18-Sep-80
52	4TYG13006	289	100	1200	18	08-Apr-81	15-May-86
52	550574	497	20	8400	150	11-Mar-80	14-Jun-95
52	WA96-M03	607	65	1340	12	12-Mar-96	03-Dec-98
76	MT-04	430	430	430	1	25-Feb-97	25-Feb-97
91	MT-12-{10.20}	170	170	170	1	02-Sep-97	02-Sep-97

**Table 3c.** Water quality data for manganese

SWS	WQ station	Avg (ug/L)	Min (ug/L)	Max (ug/L)	Count	Start Date	End Date
100	MT-07	20	20	20	1	26-Aug-97	26-Aug-97
105	MT-08	20	20	20	1	26-Aug-97	26-Aug-97
135	4TYG13019	224	20	500	17	08-Apr-81	02-Feb-84
146	550451	195	60	434	18	11-Mar-80	14-Jun-84
190	MT-11-A	91	91	91	1	26-Aug-97	26-Aug-97
196	MT-11-B	420	420	420	1	26-Aug-97	26-Aug-97
197	MT-11-{06.63}	87	87	87	1	27-Aug-97	27-Aug-97
202	MT-11-B-1	450	450	450	1	26-Aug-97	26-Aug-97
25	4OPW12010	76	50	134	8	22-Aug-83	24-Aug-92
25	4OPW12011	60	60	60	1	26-Aug-85	26-Aug-85
51	392615080075539	176	80	310	8	17-Jan-80	18-Sep-80
52	4TYG13006	115	10	250	18	08-Apr-81	15-May-86
52	550574	177	20	800	152	11-Mar-80	14-Jun-95
52	WA96-M03	120	10.2	190	12	12-Mar-96	03-Dec-98
76	MT-04	630	630	630	1	25-Feb-97	25-Feb-97
91	MT-12-{10.20}	2100	2100	2100	1	02-Sep-97	02-Sep-97

**Table 4a.** Aluminum baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
76	o100187	5302	1539	1.2
76	r074600	2627	763	1.2
77	e012500	3480	3480	4.3
77	r074700	968	968	4.3



**Table 4b.** Iron baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
76	o100187	3946	1110	0.9
76	r074600	1955	550	0.9
77	e012500	2590	2590	3.2
77	r074700	721	721	3.2

**Table 4c.** Manganese baseline conditions and allocations (WLAs) for permitted mining point sources

SWS	Permit ID	Baseline (lbs/yr)	Allocation(lbs/yr)	Allocation (mg/L)
76	o100187	2423	2108	1.7
76	r074600	1201	1045	1.7
77	e012500	1388	1388	2.0
77	r074700	866	382	2.0

**Table 5a.** Aluminum baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
100	0	0	1235	1235	0	0	
101	0	0	212	212	0	0	
102	0	0	601	601	0	0	
105	0	0	626	626	0	0	
106	0	0	622	622	0	0	
107	0	0	952	952	0	0	
108	0	0	512	512	0	0	
109	0	0	1475	1475	0	0	
116	0	0	753	753	0	0	
117	0	0	1307	1307	0	0	
129	0	0	1192	1192	0	0	
131	0	0	470	470	0	0	
134	0	0	736	736	0	0	
135	0	0	687	687	0	0	
136	0	15	271	271	0	0	
137	0	4	324	324	0	0	
140	0	0	790	790	0	0	
142	0	0	1715	1715	0	0	
146	0	0	706	706	0	0	
149	18	18	1027	1027	0	0	x
150	22	22	1893	1893	0	0	x
153	0	0	174	174	0	0	
154	7	7	933	933	0	0	x
155	0	0	1252	1252	0	0	
164	38	38	1659	1659	0	0	
165	30	30	1229	1229	0	0	
181	964	33	1071	1071	2619	916	x
184	83	83	673	673	0	0	
190	16	16	1049	1049	0	0	
191	17	17	503	503	0	0	
196	5	5	674	674	0	0	
197	1	1	1980	1980	0	0	

# Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
202	695	399	682	682	0	0	x
203	763	88	1081	1081	978	978	
25	213	213	4456	4456	0	0	
50	0	0	639	639	0	0	
51	0	0	75	75	0	0	
52	312	312	1124	1124	0	0	
53	0	0	2095	2095	0	0	
60	7	7	616	616	0	0	
61	7	7	1784	1784	0	0	
68	7	7	1382	1382	0	0	
69	71	71	238	238	0	0	
72	34	34	848	848	0	0	
73	97	97	143	143	0	0	
74	11	11	104	104	0	0	
75	0	0	1785	1785	0	0	
76	40	40	1302	1302	0	0	
77	12	12	9	9	0	0	
80	22	22	608	608	0	0	
81	0	0	36	36	0	0	
82	0	0	4520	4520	0	0	
83	51	51	1547	1547	0	0	
86	0	0	383	383	0	0	
87	0	0	1066	1066	0	0	
88	0	0	2120	2120	0	0	
89	0	0	2253	2253	0	0	
91	0	0	646	646	0	0	
93	0	0	181	181	0	0	
98	0	0	774	774	0	0	
99	0	0	325	325	0	0	
Total	3595	1693	62127	62127	3597	1894	

**Table 5b.** Iron baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
100	0	0	1111	1111	0	0	
101	0	0	204	204	0	0	
102	0	0	548	548	0	0	
105	0	0	600	600	0	0	
106	0	0	553	553	0	0	
107	0	0	914	914	0	0	
108	0	0	499	499	0	0	
109	0	0	1397	1397	0	0	
116	0	0	698	698	0	0	
117	0	0	1187	1187	0	0	
129	0	0	1111	1111	0	0	
131	0	0	440	440	0	0	
134	0	0	691	691	0	0	
135	0	0	713	713	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
136	0	0	264	264	0	0	
137	0	0	298	298	0	0	
140	0	0	717	717	0	0	
142	0	0	1565	1565	0	0	
146	0	0	669	669	0	0	
149	17	17	916	916	0	0	
150	20	20	1801	1801	0	0	
153	0	0	159	159	0	0	
154	7	7	848	848	0	0	
155	0	0	1109	1109	0	0	
164	35	35	1526	1526	0	0	
165	28	28	1075	1075	0	0	
181	1055	34	926	926	2618	1570	x
184	76	76	625	625	0	0	
190	14	14	963	963	0	0	
191	15	15	496	496	0	0	
196	7	7	650	650	0	0	
197	2	2	1802	1802	0	0	
202	865	309	638	638	0	0	x
203	965	694	999	999	978	978	
25	196	196	4855	4855	0	0	
50	0	0	614	614	0	0	
51	0	0	76	76	0	0	
52	430	430	1083	1083	0	0	
53	0	0	1961	1961	0	0	
60	7	7	598	598	0	0	
61	7	7	1721	1721	0	0	
68	6	6	1248	1248	0	0	
69	97	97	243	243	0	0	
72	31	31	799	799	0	0	
73	133	133	143	143	0	0	
74	11	11	104	104	0	0	
75	0	0	1641	1641	0	0	
76	55	55	1183	1183	0	0	
77	17	17	14	14	0	0	
80	21	21	582	582	0	0	
81	0	0	36	36	0	0	
82	0	0	4071	4071	0	0	
83	47	47	1516	1516	0	0	
86	72	72	368	368	0	0	
87	0	0	1042	1042	0	0	
88	0	0	1972	1972	0	0	
89	0	0	2017	2017	0	0	
91	0	0	626	626	0	0	
93	0	0	176	176	0	0	
98	0	0	744	744	0	0	
99	0	0	309	309	0	0	
Total	4237	2389	58455	58455	3596	2549	

# Metals and pH TMDLs for the Tygart Valley River Watershed

**Table 5c.** Manganese baseline conditions and allocations (LAs) for nonpoint sources

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
100	0	0	713	713	0	0	
101	0	0	112	112	0	0	
102	0	0	333	333	0	0	
105	0	0	349	349	0	0	
106	0	0	365	365	0	0	
107	0	0	503	503	0	0	
108	0	0	265	265	0	0	
109	0	0	821	821	0	0	
116	0	0	448	448	0	0	
117	0	0	778	778	0	0	
129	0	0	689	689	0	0	
131	0	0	267	267	0	0	
134	0	0	401	401	0	0	
135	0	0	380	380	0	0	
136	0	0	149	149	0	0	
137	0	0	175	175	0	0	
140	0	0	449	449	0	0	
142	0	0	1028	1028	0	0	
146	0	0	439	439	0	0	
149	27	27	600	600	0	0	
150	33	33	1071	1071	0	0	
153	0	0	97	97	0	0	
154	11	11	593	593	0	0	
155	0	0	798	798	0	0	
164	56	56	966	966	0	0	
165	45	45	783	783	0	0	
181	512	47	661	661	1761	1039	x
184	123	123	393	393	0	0	
190	23	23	600	600	0	0	
191	25	25	269	269	0	0	
196	4	4	355	355	0	0	
197	1	1	1167	1167	0	0	
202	1024	608	395	395	0	0	x
203	1084	424	616	616	657	657	x
25	316	316	2602	2602	0	0	
50	0	0	352	352	0	0	
51	0	0	38	38	0	0	
52	239	239	689	689	0	0	
53	0	0	1217	1217	0	0	
60	11	11	391	391	0	0	
61	11	11	1058	1058	0	0	
68	10	10	855	855	0	0	
69	54	54	147	147	0	0	
72	51	51	465	465	0	0	
73	74	74	97	97	0	0	
74	17	17	53	53	0	0	
75	0	0	1021	1021	0	0	
76	30	30	812	812	0	0	
77	9	9	4	4	0	0	
80	33	33	330	330	0	0	

## Metals and pH TMDLs for the Tygart Valley River Watershed

SWS	AML		Nonpoint		Revoked mine		Requires Reduction
	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	Baseline (lbs/yr)	Allocation (lbs/yr)	
81	0	0	18	18	0	0	
82	0	0	2561	2561	0	0	
83	76	76	810	810	0	0	
86	40	40	206	206	0	0	
87	0	0	557	557	0	0	
88	0	0	1160	1160	0	0	
89	0	0	1341	1341	0	0	
91	0	0	336	336	0	0	
93	0	0	97	97	0	0	
98	0	0	412	412	0	0	
99	0	0	179	179	0	0	
Total	3938	2398	35837	35837	2418	1696	

# **Appendix B**

## **Mining Permits in the Tygart Watershed**

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
d002782	WV0047988	Coal Underground	Completely Released	0	8	Rauer Coal Corp.	NPDES Permittee is Gauley Eagle Holdings, Inc. - Expired 7/05/00	Upshur	Coit
d003582	WV0027031	Coal Underground	Renewed	12	5	*Bass Energy, Inc.	Expired 3/01/02	Upshur	Altieri
d005581	WV1007254	Coal Underground	Revoked	0	4	Statue Mining Co., Inc	Expired 10/13/93	Preston	
d005582	WV0061689	Coal Underground	Renewed	4	4	Upshur Property, Inc.	Expired 8/03/00	Upshur	Altieri
d011382	WV0060259	Coal Underground	Inactive	7	7	Dana Mining Company, Inc.	Expired 12/04/02	Preston	
d016300	WV0004421	Coal Underground	Inactive	9	9	Dante Coal Company	Expired 9/01/02	Barbour	Richard
d018400	WV0039471	Coal Underground	Renewed	93	80	Hawthorne Coal Company, Inc.	Expired 10/15/02	Upshur	Altieri
d043500		Coal Underground	Revoked	0	19	* Phoenix Resources, Inc.		Randolph	Meade
d045500		Coal Underground	Completely Released	0	101	S.S. "Joe" Burford, Inc		Randolph	
e008500		Coal Underground	Completely Released	0	8	Enoxy Coal Inc		Upshur	
e010300	WV0004421	Coal Underground	Renewed	30	21	Dante Coal Company	Expired 9/01/02	Barbour	Richard
e010800	WV0062910 WV0091901	Coal Underground	Inactive	12	12	Action Holding Inc.	(WV0062910) Expired 5/05/02 (WV0091901) Expired 3/23/02	Randolph	Dickinson
e011000	WV0004421	Coal Underground	Inactive	17	3	Dante Coal Company	Expired 9/01/02	Barbour	Richard
e011800	WV0035998	Coal Underground	Revoked	14	13	Blondy Mining Inc	Expired 6/29/98	Barbour	Richard
e012500	WV0062766	Coal Underground	Inactive	133	28	Martinka Coal Company	Expired 7/14/02	Marion	
h007800		Haulroad	Completely Released	0	2	*Barbour Mining Co.		Barbour	
h021900		Haulroad	Completely Released	0	18	Marla Ann Coals, Inc		Randolph	
h023200	WV0042056	Haulroad	Revoked	0	29	Dlm Coal Corp	NPDES Permittee is WVDEP - Expired 9/12/02	Upshur	Shreve
H027900		Haulroad	Completely Released	36	18	Fairfax Trucking Company		Randolph	Dickinson
h031900		Haulroad	Completely Released	0	2	Phoenix Resources, Inc.		Randolph	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
h034300		Haulroad	Completely Released	0	5	*Belington Mining Co.		Barbour / Randolph	
h042200		Haulroad	Completely Released	0	2	*Universal Coal Corp.		Upshur	
h046500		Haulroad	Completely Released	0	4	Gator Mining, Inc		Barbour	
h053600	WV0050717	Haulroad	Inactive	8	8	Upshur Property, Inc.	Expired 12/03/00	Upshur	Altieri
h058000		Haulroad	Completely Released	0	4	Barbour Coal Co.		Barbour	
h061300	WV0050717	Haulroad	Inactive	9	9	Upshur Property, Inc.	Expired 12/03/00	Upshur	Altieri
i055600		Coal Surface Mine	Completely Released	0	0	Demotto-peerless Coal Co Inc		Randolph	
i060800	WV1003232	Coal Surface Mine	Phase 2 Released	2	2	Marson Coal Company	Expired 5/25/98	Randolph	Dickinson
i064000		Coal Surface Mine	Completely Released	3	4	Carter-Roag Coal Co Inc		Randolph	
i069900	WV0094901	Coal Surface Mine	Completely Released	10	10	Upshur Property, Inc.	Expired 9/13/02	Upshur	Altieri
i073900	WV0042056	Coal Surface Mine	Revoked	0	22	Dlm Coal Corp	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	Shreve
I001900		Other	Completely Released	0	10	City of Buckhannon		Upshur	Altieri
I009900		Other	New	62	62	City of Elkins		Randolph	Dickinson
o000385	WV0067946	Other	Completely Released	0	12	*Interstate Lumber Co., Inc.	Expired 10/27/88	Preston	
o000484	WV0027031	Other	Renewed	82	80	*Bass Energy, Inc.	Expired 03/01/02	Upshur	Meade
o001182	WV0053929	Other	Completely Released	13	13	Carter-Roag Coal Co Inc	Expired 6/05/02	Randolph	
o001183	WV0051781	Other	Renewed	22	19	Cheyenne Sales Company, Inc	Released 7/02/98	Upshur	Altieri
o001283		Other	Completely Released	0	16	Island Creek Mining co		Upshur	Dickinson
o001884	WV0063363, WV0063371	Other	Completely Released	0	2	Mccoy Bros, Inc	(WV0063371) Dickinson Job (WV0063363) Beaver Creek -- Both terminated 4/15/94	Barbour	Richard



## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
o002384	WV0066885	Other	Renewed	37	37	Patriot Mining Company, Inc.	Expired 7/01/02	Preston	Hooton
o002683	WV1003305	Other	Completely Released	4	4	Larosa Fuel Company, Inc.	Expired 2/18/03	Randolph	Dickinson
o002684	WV0064955	Other	Inactive	94	94	Energy Marketing Co., Inc.	Expired 6/04/02	Barbour	Dickinson
o002884		Other	Completely Released	0	18	Patriot Mining Company, Inc.		Preston	
o002983	WV1003399	Other	Completely Released	0	6	Larosa Fuel Company, Inc.	Released 5/26/92	Upshur	
o003185	WV0090344	Other	Renewed	91	86	Action Holding Inc.	Expired 12/18/02	Randolph	Dickinson
o003983	WV0039471	Other	Renewed	105	105	Hawthorne Coal Co., Inc.	Expired 10/15/02	Upshur	Altieri
o004385	WV0056171	Other	Revoked	0	12	Preston Energy Inc	Released 7/27/98	Preston	Hooton
o004483	WV0064955	Other	Inactive	71	60	Energy Marketing Company, Inc.	Expired 6/04/02	Barbour	Dickinson
o006182	WV0067601	Other	Inactive	10	7	Upshur Property, Inc.	Expired 8/03/00	Upshur	Altieri
o007683		Other	Completely Released	0	10	Enviro Energy Inc		Randolph	
o010283	WV0033073	Other	Inactive	10	10	Dante Coal Company	Expired 3/08/02	Barbour	Richard
o011383	WV0043273	Other	Renewed	196	167	Anker West Virginia Mining Company, Inc.	Expired 4/03/02	Barbour	Hooton
o012683	WV0063851	Other	Completely Released	3	3	Fairfax Trucking Company	Released 5/05/98	Randolph	
o015483	WV1003372	Other	Completely Released	9	9	Larosa Fuel Company, Inc.	Released 10/05/99	Upshur	
o100187	WV0062766	Other	Inactive	222	222	Martinka Coal Company	Expired 7/14/02	Marion	
o100898	WV1017403	Other	New	168	168	Coastal Coal-west Virginia, Llc	Expired 4/30/04	Preston	
o101286	WV0066885, WV0098892	Other	Renewed	64	56	Patriot Mining Company, Inc.	(WV0066885) Expired 7/01/02 (WV0098892) Released 7/01/94	Preston	
o103587	WV0056171	Other	Revoked	0	54	Preston Energy Inc	Expired 12/30/92	Preston	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
o104791	WV1011243	Other	Inactive	83	83	Action Holding Inc.	Expired 10/30/01	Randolph	Dickinson
o202288	WV0095036	Other	Completely Released	9	9	C. & W. Coal Company	Expired 12/20/05	Barbour	
o202388	WV0094790	Other	Renewed	24	21	Action Holding Inc.	Expired 5/07/02	Randolph / Upshur	Dickinson
o202586	WV0051781	Other	Renewed	17	14	Cheyenne Sales Company, Inc	Expired 12/09/02	Upshur	Altieri
o203186	WV0053929	Other	Inactive	23	22	Action Holding Inc.	Expired 6/05/02	Randolph	Dickinson
o203788		Other	Completely Released	0	24	Bright Coal Corp		Randolph	Meade
o204086		Other	Completely Released	0	3	Bentley Coal Company		Randolph	
o204488	WV1003526	Other	Revoked	22	18	Marson Coal Company	Revoked 9/11/00	Randolph	
o205486	WV1003356	Other	Completely Released	0	21	*Bright Coal Corp.	Expired 6/14/02	Randolph	
p003679		Prospect	Revoked	0	3	H & A Coal Co of Lost Creek w	N/A		
p042600	WV0042056	Prep Plant	Revoked	5	6	Dlm Coal Corp	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	Shreve
p069800	WV0051110	Prep Plant	Inactive	320	242	Upshur Property, Inc.	Expired 12/03/00	Upshur	Altieri
p071100	WV0053929	Prep Plant	Completely Released	0	6	Carter-Roag Coal Co Inc	Expired 6/05/02	Randolph	
p071300	WV0033073	Prep Plant	Inactive	31	21	Dante Coal Company	Expired 3/08/02	Barbour	
p100194		Prospect	Completely Released	0	2	Patriot Mining Company, Inc.	N/A		
p100294		Prospect	Completely Released	0	1	Patriot Mining Company, Inc.	N/A		
p100296		Prospect	Completely Released	0	1	Kingwood Coal Company	N/A		
p100398		Prospect	Completely Released	0	0	Anr Coal-west Virginia, Llc	N/A		
p100494		Prospect	Completely Released	0	1	Bronco Mining Company, Inc.	N/A		
p100496		Prospect	Completely Released	1	1	Mepco, Inc.	N/A		
p100497		Prospect	Completely Released	1	1	Anr Coal Company, Llc	N/A		

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
p100498		Prospect	Completely Released	1	1	Anr Coal-west Virginia, Llc	N/A		
p100595		Prospect	Completely Released	0	0	Kingwood Coal Company	N/A		
p100697		Prospect	Completely Released	0	0	Mepco, Inc.	N/A		
p100700		Prospect	New	1	1	Dana Mining Company, Inc.	N/A		
p100795		Prospect	Completely Released	0	1	Kingwood Coal Company	N/A		
p100894		Prospect	Completely Released	0	1	Kingwood Coal Company	N/A		
p100895		Prospect	Completely Released	7	7	Martinka Coal Company	N/A		
p100994		Prospect	Completely Released	0	1	Patriot Mining Company, Inc.	N/A		
p101095		Prospect	Completely Released	0	1	Kingwood Coal Company	N/A		
p101096		Prospect	Completely Released	0	1	Kingwood Coal Company	N/A		
p101199		Prospect	New	1	1	Coastal Coal-west Virginia, Llc	N/A		
p101200		Prospect	New	1	1	Roger Street	N/A		
p101597		Prospect	Completely Released	1	1	Jeffery S. Sisler	N/A		
p101695		Prospect	Completely Released	3	3	Martinka Coal Company	N/A		
p101894		Prospect	Completely Released	0	0	Mepco, Inc.	N/A		
p102098		Prospect	Completely Released	2	2	Bronco Mining Company, Inc.	N/A		
p102195		Prospect	Completely Released	4	4	Martinka Coal Company	N/A		
p102295		Prospect	Completely Released	3	1	Patriot Mining Company, Inc.	N/A		
p102697		Prospect	Completely Released	2	2	Patriot Mining Company, Inc.	N/A		
p102786		Prospect	Revoked	0	2	Beefsteak Mining, co	N/A		
p102789		Prospect	Revoked	0	1	George Phillips	N/A		

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
p102897		Prospect	New	1	1	Mepco, Inc.	N/A		
p104889		Prospect	Revoked	0	2	William W. Street	N/A		
p200296		Prospect	Completely Released	10	10	Oiltanking Houston Inc Dbc Carter-Roag Coal Co.	N/A		
p200299		Prospect	Completely Released	0	0	Dante Coal Company	N/A		
p200300		Prospect	New	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p200397		Prospect	Completely Released	10	10	Oiltanking Houston Inc Dbc Carter-Roag Coal Co.	N/A		
p200399		Prospect	Completely Released	3	3	Bell Mining Company	N/A		
p200494		Prospect	Completely Released	0	1	Philippi Development Inc	N/A		
p200595		Prospect	Completely Released	1	1	Philippi Development Inc	N/A		
p200697		Prospect	Completely Released	1	1	Spruce Fork Coal Company, Inc.	N/A		
p200699		Prospect	New	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p200795		Prospect	Completely Released	1	1	Philippi Development Inc	N/A		
p200896		Prospect	Completely Released	1	1	Genesis Mining co	N/A		
p200899		Prospect	Completely Released	1	1	Jerry Stalnaker Coal Company, Inc.	N/A		
p200900		Prospect	New	3	3	Patriot Mining Company, Inc.	N/A		
p200994		Prospect	Completely Released	1	1	Regal Coal Company, Inc.	N/A		
p200996		Prospect	Completely Released	0	1	C. J. Coal Corporation	N/A		
p200998		Prospect	Completely Released	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p201097		Prospect	Completely Released	6	6	Deerfield Resources Inc	N/A		

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
p201195		Prospect	Completely Released	0	0	Nesco, Inc.	N/A		
p201196		Prospect	Completely Released	1	1	Patriot Mining Company, Inc.	N/A		
p201197		Prospect	Completely Released	1	1	Spruce Fork Coal Company, Inc.	N/A		
p201297		Prospect	Completely Released	1	1	Taylor, John s.	N/A		
p201298		Prospect	Completely Released	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p201497		Prospect	New	1	1	Spruce Fork Coal Company, Inc.	N/A		
p201498		Prospect	Completely Released	2	2	Anker West Virginia Mining Company, Inc.	N/A		
p201597		Prospect	New	1	1	Fairmont Energy, Inc.	N/A		
p201698		Prospect	Completely Released	2	2	Anker West Virginia Mining Company, Inc.	N/A		
p201798		Prospect	Completely Released	2	2	Anker West Virginia Mining Company, Inc.	N/A		
p202098		Prospect	Completely Released	2	2	Energy Marketing Company, Inc.	N/A		
p202398		Prospect	New	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p202598		Prospect	New	1	1	Nesco, Inc.	N/A		
p202698		Prospect	Completely Released	2	2	Anker West Virginia Mining Company, Inc.	N/A		
p202797		Prospect	Completely Released	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p202897		Prospect	Completely Released	1	1	Anker West Virginia Mining Company, Inc.	N/A		
p202898		Prospect	New	1	1	Anker West Virginia Mining Company, Inc.	N/A		

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
q000285	WV0071749	Quarry	Completely Released	18	18	J. F. Allen Company	Released 8/06/97		
q000385	WVG022504	Quarry	Revoked	71	71	Century Limestone, Inc.			
q000683		Quarry	Revoked	0	20	Weiss Brothers Construction	NONE	Tucker	
q000784	WVG022504	Quarry	Revoked	75	75	Century Limestone, Inc.	Revoked 6/15/00	Tucker	
q001083		Quarry	Completely Released	0	66	* R & R Coal Contracting, Inc.		Upshur	
q001279		Quarry	Completely Released	0	13	Hawthorne Industries, Inc		Randolph	
q002581		Quarry	Completely Released	0	15	North American Energy Systems		Preston	
q006474		Quarry	Revoked	0	7	Deerfield Sand Corp		Monongalia	
q006779	WV0071749	Quarry	Completely Released	100	100	J. F. Allen Company	Released 6/06/97	Randolph	
q007573		Quarry	Completely Released	0	125	Black Rock Contracting, Inc		Randolph	
q013775		Quarry	Completely Released	0	14	Hawthorne Industries, Inc		Randolph	
q014575	WV0071749	Quarry	Completely Released	21	21	J. F. Allen Company	Released 6/06/97	Randolph	
q018173		Quarry	Completely Released	0	24	Elkins Limestone co		Randolph	
q200197	WVG022518 WVG022522	Quarry	Renewed	372	372	J. F. Allen Company	(WVG022518) Rel. 3/10/00 (WVG042522) Expired 9/17/00	Randolph	Meade
q200495	WVG022515	Quarry	Inactive	38	38	Stanley Industries, Inc.	Expired 9/17/00	Tucker	Deem
q200587	WVG022514	Quarry	Renewed	125	125	R. H. Armstrong, Inc.	Expired 9/17/00	Randolph	Meade

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
q200795	WV0092266	Quarry	Renewed	71	71	Meadows Stone & Paving, Inc.	Expired 9/22/99	Randolph	Meade
q201292	WV0071749	Quarry	Completely Released	61	61	J. F. Allen Company	Released 6/06/97	Randolph	
q201399	WVG022514	Quarry	New	5	5	R. H. Armstrong, Inc.	Expired 9/17/00	Randolph	Meade
q201489	WVG022506	Quarry	Renewed	81	81	Martin Marietta Materials, Inc.	Expired 9/17/00	Tucker	Deem
q203586	WV0092266	Quarry	Completely Released	27	27	Meadows Stone & Paving, Inc.	Expired 9/02/99	Randolph	
r000482		Reprocessing	Completely Released	0	2	Heater, Junior m.		Upshur	
r000784	WV1010158	Reprocessing	Revoked	9	4	D. A. Lambert	Released 2/07/96	Upshur	
r042300	WV0042056	Other	Revoked	6	23	Dlm Coal Corp	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	Shreve
r063900	WV0056171	Other	Completely Released	0	5	Preston Energy Inc	Expired 12/30/92	Preston	
r064900	WV0033073	Other	Inactive	93	89	Dante Coal Company	Expired 3/08/02	Barbour	
r074600	WV0062766	Other	Inactive	110	96	Martinka Coal Company	Expired 7/14/02	Marion	
r074700	WV0062766	Other	Inactive	36	36	Martinka Coal Company	Expired 7/14/02	Marion	
r203988		Reprocessing	Revoked	0	15	Elk River Sewell Coal co		Webster	Gilkeson
s000178	WV0042056	Coal Surface Mine	Revoked	13	74	Dlm Coal Corp	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	Shreve
s000280	WV0042056	Coal Surface Mine	Revoked	19	116	DLM Coal Corp.	NPDES Permittee is WVDEP - Expired 9/12/02	Upshur	Shreve
s000485	WV0098043	Coal Surface Mine	Completely Released	0	35	*LaRosa Fuel Co., Inc.	Released 3/03/93	Upshur	Lehmann
s001081	WV1006851	Coal Surface Mine	Revoked	89	64	*Ed-E Development	Released 1/26/93	Monongalia	Isabell
s001084	WV0067857, WV1003348	Coal Surface Mine	Completely Released	19	49	Stanley Industries, Inc.	(WV0067857) Released 4/27/94 (WV1003348) Released 4/29/03)	Marion	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s001676		Coal Surface Mine	Completely Released	0	22	M & V Fuel Corp		Preston	
s001774		Coal Surface Mine	Completely Released	20	77	Fairfax Trucking Company		Randolph	Lehmann
s002278		Coal Surface Mine	Completely Released	0	49	Harman Construction, Inc.		<b>Barbour</b>	
s002283		Coal Surface Mine	Completely Released	0	58	Fairfax Trucking Company		Randolph	
s002383	WV0067199	Coal Surface Mine	Revoked	0	13	Dalton, Raymond	NPDES Permittee is Larew Lumber Co. Expired 8/12/88	Preston	
s002479	WV1003348	Coal Surface Mine	Completely Released	10	75	Stanley Industries, Inc.	Expired 7/07/98	Barbour	Coit
s002577	WV1011618	Coal Surface Mine	Completely Released	0	125	Mary Ruth Corporation	Released 1/10/00	Preston	Dixon
s002784	WV0068012	Coal Surface Mine	Completely Released	0	10	92 Coal Corp.	Expired 6/08/89	Barbour	Coit
s002877		Coal Surface Mine	Completely Released	0	110	Mountain Top Fuel Co, Inc		Randolph	
s002881	WV0098981	Coal Surface Mine	Revoked	0	30	Preston Energy Inc	Expired 7/06/93	Preston	
s002885	WV0053588	Coal Surface Mine	Completely Released	0	10	C W Bentley Inc	Released 9/04/95	Randolph	Dickinson
s002984	WV0067687	Coal Surface Mine	Completely Released	174	184	Mower Resources Inc.	Released 8/01/95	Randolph	Meade
s003385	WV0095494	Coal Surface Mine	Completely Released	2	12	* Sharon Coal	Released 9/15/99	Preston	
s003679		Coal Surface Mine	Revoked	0	107	Pierce Coal & Construct Inc		Upshur	
s003680		Coal Surface Mine	Completely Released	0	75	Cheyenne Sales Company, Inc		Upshur	Altieri
s003684	WV0066885, WV0068128	Coal Surface Mine	Phase 1 Released	127	127	Patriot Mining Company, Inc.	Expired 7/01/02 (WV0066885) Rel. 7/1/94 (WV0068128)	Preston	
s003685	WV0068292	Coal Surface Mine	Revoked	21	41	J & R Coal co	Expired 10/3/90	Preston	



## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s003777		Coal Surface Mine	Completely Released	0	10	Capitol Coal, Inc		Taylor	
s003982	WV0058777	Coal Surface Mine	Revoked	0	31	Interstate Lumber Co Inc	Released 10/9/95	Preston	
s003984	WVG012000	Coal Surface Mine	Phase 2 Released	117	117	Larosa Fuel Company, Inc.	Expired 10/31/04	Upshur	Altieri
s004481		Coal Surface Mine	Completely Released	0	17	P & B Fuels		Preston	
s004483		Coal Surface Mine	Revoked	20	19	Falco Coal co		Taylor	
s004575		Coal Surface Mine	Completely Released	0	38	Ten-a-coal Company		Upshur	
s004775		Coal Surface Mine	Completely Released	0	33	Badger Coal co		Barbour	
s004881	WV1003453	Coal Surface Mine	Completely Released	17	29	J. R. Coal co	Released 2/20/94	Monongalia	Isabell
s005179		Coal Surface Mine	Completely Released	0	23	Hallelujah Mining		Preston	
s005283	WV0067563	Coal Surface Mine	Revoked	0	48	* Interstate Lumber Co., Inc.	Released 10/9/95	Preston	
s005284	WV0068250, WV1007378	Coal Surface Mine	Phase 3 Released	34	74	Sharon Coal Co	(WV0068250) Rel. 5/25/94 (WV1007378) Expired 9/07/98	Preston	
s005378	WV0067709	Coal Surface Mine	Phase 1 Released	25	65	Maurice Jennings	Expired 8/05/02	Preston	
s005476		Coal Surface Mine	Completely Released	0	85	Badger Coal co		Barbour	
s005480	WV1002660	Coal Surface Mine	Completely Released	0	23	Maurice Jennings	Expires 1/10/02	Preston	Kromer
s005583	WV1007700	Coal Surface Mine	Completely Released	27	27	Allegheny Dev Corp Inc (The)	Terminated 8/11/99	Monongalia	Moore
s005780	WV0050717	Coal Surface Mine	Renewed	580	580	Upshur Property, Inc.	Expired 12/03/00	Upshur	Altieri
s005784	WV0068446	Coal Surface Mine	Revoked	92	95	F & M Coal Co Ip	Expired 8/09/89	Preston	
s005877	WV0042056	Coal Surface Mine	Revoked	12	48	*WVDEP	NPDES Permittee is WVDEP - Expired 9/12/02	Upshur	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s005885	WV0098221	Coal Surface Mine	Completely Released	0	25	92 Coal Corp.	Released 10/03/95	Taylor	
s006183	WV0067709	Coal Surface Mine	Renewed	52	52	Maurice Jennings	Expired 8/05/02	Preston	
s006377		Coal Surface Mine	Completely Released	46	46	Cheyenne Sales co		Upshur	
s006477		Coal Surface Mine	Completely Released	0	15	Laurita Trucking & Excavating		Barbour	
s006876		Coal Surface Mine	Completely Released	0	108	S.s. "Joe" Burford, Inc		Randolph	
s006984	WV0068390	Coal Surface Mine	Completely Released	24	60	Stanley Industries, Inc.	Released 2/24/79	Barbour	
s007082		Coal Surface Mine	Completely Released	7	7	Ten-a-coal Company		Barbour	
s007178		Coal Surface Mine	Revoked	0	37	Greenbrier Energy Corp		Barbour	
s007780		Coal Surface Mine	Completely Released	0	237	Mountain Top Fuel Co, Inc		Randolph	
s008185		Coal Surface Mine	Revoked	0	10	Mary Lou Coal co		Preston	
s008576		Coal Surface Mine	Completely Released	0	116	Casella Construction Co Inc		Upshur	
s008675		Coal Surface Mine	Completely Released	0	35	Universal Coal Corp		Upshur	
s008679		Coal Surface Mine	Completely Released	10	14	Pitcarin Properties, Inc		Upshur	
s008879		Coal Surface Mine	Completely Released	6	27	Coaltrain Corporation		Preston	
s008982		Coal Surface Mine	Completely Released	62	83	92 Coal Corp.	NONE	Barbour	Dickinson
s009080		Coal Surface Mine	Completely Released	0	53	Larosa Fuel Company, Inc.		Upshur	
s009183	WV0067881	Coal Surface Mine	Renewed	443	443	Upshur Property, Inc.	Expired 8/03/00	Upshur	
s009383	WV0067474	Coal Surface Mine	Completely Released	0	22	Red Rock Coal co	Released 8/31/92	Upshur	
s009680		Coal Surface Mine	Completely Released	4	14	Patriot Mining Company, Inc.		Preston	
s009682	WV0067041	Coal Surface Mine	Revoked	0	25	Interstate Lumber Co Inc	Released 10/9/95	Preston	Deem

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s009783	WV0067938	Coal Surface Mine	Revoked	20	25	B & D Coal co	Released 8/17/98	Taylor	Washburn
s010078		Coal Surface Mine	Revoked	0	47	Pierce Coal & Construct Inc		Upshur	
s010175		Coal Surface Mine	Completely Released	59	100	Roaring Creek Coal Co Inc		Randolph	
s010280	WV1003437	Coal Surface Mine	Completely Released	0	62	Mccoy Bros, Inc	Released 11/22/93	Barbour	Richard
s010377		Coal Surface Mine	Completely Released	0	23	Lewis Coal And Coke co		Preston	
s010882	WV0067601, WV0067881	Coal Surface Mine	Renewed	271	271	Upshur Property, Inc.	WV0067601 (Expired 8/3/00) NPDES to be combined into WV0067881	Upshur	Altieri
s010975		Coal Surface Mine	Completely Released	0	13	C.m.t. Enterprises, Inc.		Monongalia	
s010979	WV0050717	Coal Surface Mine	Completely Released	280	140	Island Creek Mining co	Expired 12/03/00	Upshur	
s010980		Coal Surface Mine	Revoked	23	61	Pontorero & Sons Coal Co Inc		Preston	Dixon
s011176	WV1003445	Coal Surface Mine	Completely Released	0	12	Mccoy Bros, Inc	Released 12/09/98	Barbour	Richard
s011277		Coal Surface Mine	Completely Released	9	37	Maurice Jennings		Preston	
s011278	WV0050717	Coal Surface Mine	Completely Released	0	207	Island Creek Mining co	Expired 12/03/00	Upshur	
s011577		Coal Surface Mine	Revoked	0	27	R & a Coal co		Upshur	
s011679		Coal Surface Mine	Completely Released	0	18	Capitol Coal, Inc		Upshur	
s011879		Coal Surface Mine	Revoked	0	82	Keister Coal Co., Inc		Barbour	
s011982	WV0066885	Coal Surface Mine	Phase 1 Released	268	267	Patriot Mining Company, Inc.	NPDES Expires 7/01/02	Preston	Hooton
s012274		Coal Surface Mine	Completely Released	0	47	Maurice Jennings		Preston	
s012675		Coal Surface Mine	Completely Released	25	160	Ed-e Development Co Inc		Monongalia	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s012776		Coal Surface Mine	Completely Released	0	17	M & J Coal Company, Inc.		Preston	
s012975		Coal Surface Mine	Completely Released	5	11	Scott Coal co		Barbour	
s012976		Coal Surface Mine	Completely Released	0	9	Larew Coal Co.		Preston	
s012977		Coal Surface Mine	Completely Released	0	65	Fairfax Trucking Company		Randolph	
s012979		Coal Surface Mine	Completely Released	11	53	Badger Coal co		Barbour	
s013578	WV0042056	Coal Surface Mine	Revoked	10	66	DLM Coal Corp.	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	
s013674	WV0067415	Coal Surface Mine	Completely Released	20	132	Fairfax Trucking Company	Expired 6/13/88	Randolph	Lehmann
s013874		Coal Surface Mine	Revoked	0	227	Dlm Coal Corp		Upshur	
s014276		Coal Surface Mine	Completely Released	39	39	Cheyenne Sales co		Randolph	Gilkeson
s014776		Coal Surface Mine	Completely Released	0	19	Cheyenne Sales Company, Inc		Upshur	
s016075		Coal Surface Mine	Revoked	0	55	West Virginia Fuels, Inc		Taylor	
s016376	WV0094901	Coal Surface Mine	Renewed	94	94	Upshur Property, Inc.	Expired 9/13/02	Upshur	Altieri
s016477	WV0042056	Coal Surface Mine	Revoked	0	44	DLM Coal Corp.	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	
s016878		Coal Surface Mine	Revoked	0	14	Pontorero & Sons Coal Co Inc		Monongalia	
s016973	WV1003445	Coal Surface Mine	Completely Released	0	26	Mccoys Bros, Inc	Terminated 12/09/98	Barbour	Richard
s017777		Coal Surface Mine	Completely Released	17	46	Coaltrain Corporation		Preston	
s017976		Coal Surface Mine	Completely Released	0	32	Lewis Coal And Coke co		Preston	
s018477		Coal Surface Mine	Revoked	0	27	Keister Coal Co., Inc		Barbour	
s018777	WV0042056	Coal Surface Mine	Revoked	12	64	DLM Coal Corp.	NPDES Permittee is WVDEP — Expired 9/12/02	Upshur	
s019878		Coal Surface Mine	Revoked	0	56	Gator Mining, Inc		Barbour	
s020477		Coal Surface Mine	Completely Released	0	31	Asco Coal		Upshur	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s020877		Coal Surface Mine	Revoked	0	30	Christie Mining Co Inc		Upshur	
s022474		Coal Surface Mine	Completely Released	0	10	Ten-a-coal Company		Barbour	
s022476		Coal Surface Mine	Completely Released	15	17	Interstate Lumber Co Inc		Preston	Deem
s022675		Coal Surface Mine	Completely Released	20	42	Fairfax Trucking Company		Randolph	Lehmann
s022676		Coal Surface Mine	Completely Released	0	82	Stanley Industries, Inc.		Barbour	
s023272		Coal Surface Mine	Completely Released	0	125	Badger Coal co		Barbour	
s023976		Coal Surface Mine	Completely Released	0	95	Petitto Brothers Inc		Upshur	
s024372		Coal Surface Mine	Completely Released	2	45	Keeley Construction co		Randolph	
s026976		Coal Surface Mine	Completely Released	0	130	Island Creek Mining co		Upshur	Dickinson
s027371		Coal Surface Mine	Completely Released	0	30	Carbona Mining Corp		Barbour	
s031571		Coal Surface Mine	Completely Released	0	13	Larew Coal Co.		Preston	
s035370		Coal Surface Mine	Completely Released	0	100	Carbona Mining Corp		Barbour	
s041900		Coal Surface Mine	Revoked	0	3	Premium Sewell, Inc		Randolph	Meade
s100293	WV1011405	Coal Surface Mine	Phase 1 Released	58	58	Colby Coal Company	Expired 2/09/02	Preston	
s100298	WV1017331	Coal Surface Mine	New	26	26	Ali Co.	Expired 4/04/02	Preston	
s100386	WV0098701	Coal Surface Mine	Completely Released	0	100	Coaltrain Corporation	Expired 2/10/91	Taylor	
s100387	WV1002945	Coal Surface Mine	Completely Released	145	149	Coaltrain Corporation	Released 4/21/99	Taylor	
s101090	WV0095486	Coal Surface Mine	Completely Released	25	14	Williams Dozer Service, Inc	Released 8/4/97	Taylor	
s101390	WV1010123	Coal Surface Mine	Completely Released	52	60	Colby Coal Company	Expired 1/16/01	Barbour	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s101488	WV1007378	Coal Surface Mine	Renewed	118	118	Sharon Coal co	Expired 9/07/98	Preston / Monongalia	
s101691	WV1010476	Coal Surface Mine	Completely Released	0	47	Kristie Corp	Terminated 12/19/95	Preston	Dixon
s101693	WV1007807	Coal Surface Mine	Completely Released	44	44	Patriot Mining Company, Inc.	Expired 10/19/02	Taylor	
s101888	WV1007416	Coal Surface Mine	Revoked	27	28	Amanda Nicole Fuels Inc	Released 10/14/93	Preston	
s101990	WV1003445	Coal Surface Mine	Completely Released	37	37	Mccoys Bros, Inc	Released 12/09/98	Barbour	
s102288	WV1007459	Coal Surface Mine	Renewed	129	129	Patriot Mining Company, Inc.	Released 7/01/94	Preston	
s102388	WV1007467	Coal Surface Mine	Revoked	35	35	*K.C. & M. Coal	Expired 11/10/02	Preston	
s102587	WV1006886	Coal Surface Mine	Phase 1 Released	26	26	Rebekah Coal Company, Inc.	Expired 7/02/03	Preston	
s102790	WV1010239	Coal Surface Mine	Completely Released	66	76	Colby Coal Company	Released 2/07/00	Barbour	
s103286	WV0098841	Coal Surface Mine	Revoked	96	50	K-c & M Coal Company, Inc.	Released 7/07/93	Preston	
s103290	WV1006789	Coal Surface Mine	Completely Released	15	48	Patriot Mining Company, Inc.	Expired 06/02/03 (Discharges to trib. Monongahela River)	Monongalia (DNR Stream Code M-3)	Ball
s103387	WV1007025	Coal Surface Mine	Revoked	0	28	Tom Patterson Coal co	Released 1/03/95	Taylor	
s103591	WV1003348	Coal Surface Mine	Completely Released	45	45	*Stanley Industries	Expired 4/29/03	Barbour	
s103691	WV0067709	Coal Surface Mine	Renewed	32	32	Mangus Coal, Inc.	Expired 8/05/02	Preston	
s103886		Coal Surface Mine	Revoked	59	58	B & D Coal co	NONE	Taylor	
s103889	WV0095249	Coal Surface Mine	Completely Released	30	10	Coaltrain Corporation	Terminated 1/27/00	Preston	Dixon
s104090	WV1010387	Coal Surface Mine	Completely Released	222	24	Coaltrain Corporation	Terminated 2/24/99	Preston	Dixon
s104487	WV1007157	Coal Surface Mine	Revoked	76	86	F & M Coal Co lp	Expired 03/29/93	Preston	Deem

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s104587	WV1007181	Coal Surface Mine	Revoked	391	162	Vms, Ltd	Released 12/26/95	Monongalia	Kromer
s104786		Coal Surface Mine	Completely Released	0	50	Eastern Mountain Mining Co in		Preston	
s105886	WV1002660	Coal Surface Mine	Phase 1 Released	94	122	Maurice Jennings	Expired 1/10/02	Preston	Kromer
s106986	WV0098019	Coal Surface Mine	Revoked	0	46	*A & A Coal Co.	Releaed 1/28/92	Taylor	Moore
s108786		Coal Surface Mine	Revoked	0	37	*Beefsteak Mining		Preston	Park
s200190	WV1010085	Coal Surface Mine	Completely Released	10	28	Amerikohl Mining, Inc.	Terminated 9/08/99	Barbour	Deem
s200287	WV1003348	Coal Surface Mine	Completely Released	120	120	Stanley Industries, Inc.	Expired 4/29/03	Barbour	Deem
s200289	WV1003488	Coal Surface Mine	Completely Released	22	48	Stanley Industries, Inc.	Expired 4/29/03	Barbour	Deem
s200293	WV1003348	Coal Surface Mine	Phase 2 Released	97	97	*Stanley Industries, Inc.	Expired 4/29/03	Barbour	Kromer
s200386	WV0098779	Coal Surface Mine	Revoked	0	43	*Werner Mining Co.	Released 7/05/93	Barbour	Meade
s200486	WV0098736	Coal Surface Mine	Revoked	21	54	National Construction co	Expired 6/09/03	Barbour	Richard
s200592	WV1013645	Coal Surface Mine	Completely Released	73	73	Alan Coal, Inc.	Expired 3/23/03	Barbour	Richard
s200594	WV1013912	Coal Surface Mine	Phase 1 Released	14	23	*Flo Ann Mayle	Expired 6/23/02	Barbour	Hooton
s200596	WV1014099	Coal Surface Mine	Renewed	68	68	Nesco, Inc.	Expired 9/10/01	Barbour	Richard
s200693	WV1013807	Coal Surface Mine	Revoked	0	66	Ralph Kniceley Dba Ralph Kniceley Coal Co.	Expired 7/26/98	Randolph	Meade

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s200799	WV1014021	Coal Surface Mine	New	49	49	Jerry Stalnaker Coal Company, Inc.	Expired 5/16/01	Upshur	Altieri
s200887	WV1003402	Coal Surface Mine	Completely Released	0	26	B & B Coal Co, Inc	Expired 4/26/95	Upshur	Altieri
s200996	WV1014153	Coal Surface Mine	New	35	33	*Cheyenne Sales Co., Inc.	Expired 12/26/01	Upshur	Altieri
s201087	WV1003411	Coal Surface Mine	Phase 1 Released	20	21	Upco Coal, Inc.	Expired 9/03/01	Upshur	Altieri
s201095	WV1003411	Coal Surface Mine	New	43	28	Jerry Stalnaker Coal Company, Inc.	Expired 9/03/01	Upshur	Altieri
s201286	WV0098621	Coal Surface Mine	Completely Released	0	26	Larosa Fuel Company, Inc.	Released 4/26/95	Upshur	Altieri
s201287	WV1003461	Coal Surface Mine	Renewed	64	52	Ten-a-coal Company	Expired 6/06/03	Barbour	Kromer
s201289	WV0095133	Coal Surface Mine	Revoked	254	270	* Hope Coal Co.	Terminated 11/16/94	Upshur	Shreve
s201386	WV0098779	Coal Surface Mine	Revoked	40	90	*Werner Mining Co., Inc.	Terminated 6/04/93	Barbour	Meade
s201387	WV0098388	Coal Surface Mine	Completely Released	11	61	92 Coal Corp.	Expired 12/17/01	Barbour	Coit
s201593	WV1013858	Coal Surface Mine	Phase 1 Released	128	122	*Three-C Mining, Inc.	Expired 9/25/05	Upshur	Altieri
s201687	WV1003445	Coal Surface Mine	Completely Released	15	62	Mccoys Bros, Inc	Expired 12/09/98	Barbour	Richard
s201787	WV1003500	Coal Surface Mine	Renewed	120	160	*Bentley Coal Co.	Expired 5/14/02	Randolph	Dickinson
s201889	WV0098388	Coal Surface Mine	Phase 1 Released	87	87	92 Coal Corp.	Expired 12/17/01	Barbour	Richard
s201989	WV1010018	Coal Surface Mine	Completely Released	0	34	Amerikohl Mining, Inc.	Terminated 9/08/99	Barbour	Richard
s202086	WV1003038	Coal Surface Mine	Phase 1 Released	241	241	Bentley Coal Company	Expired 6/14/02	Randolph	Dickinson



## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
s202088	WV1003445	Coal Surface Mine	Completely Released	0	38	Mccoys Bros, Inc	Expired 12/09/98	Barbour	Richard
s202186	WV0098621	Coal Surface Mine	Completely Released	0	506	Enoxy Coal Inc	Released 2/26/91	Upshur	Altieri
s202187	WV1003526	Coal Surface Mine	Revoked	35	35	Marson Coal Company, Inc.	Terminated 9/11/00	Randolph	Dickinson
s202289	WV1010042	Coal Surface Mine	Completely Released	10	52	Amerikohl Mining, Inc.	Terminated 10/05/99	Barbour	Deem
s202587	WV1003593	Coal Surface Mine	Completely Released	46	46	Philippi Development Inc	Terminated 6/10/99	Barbour	Richard
s202887	WV1003607	Coal Surface Mine	Completely Released	49	59	Larosa Fuel Company, Inc.	Terminated 8/15/95	Upshur	Altieri
s202888	WV0094919	Coal Surface Mine	Completely Released	59	121	Nesco, Inc.	Terminated 1/27/00	Barbour	Richard
s203287	WV0094731	Coal Surface Mine	Completely Released	37	56	Mangus Coal, Inc.	Terminated 03/23/98	Barbour	Kromer
s203886	WV1003135	Coal Surface Mine	Completely Released	19	29	B & B Coal Co, Inc	Terminated 10/26/98	Upshur	Meade
s203986	WV0098388	Coal Surface Mine	Completely Released	1	11	92 Coal Corp.	Expired 12/17/01	Barbour	Coit
s204186	WVG012001	Coal Surface Mine	Completely Released	158	138	Bentley Coal Company	Terminated 7/26/96	Randolph	Dickinson
s204188	WV0094986	Coal Surface Mine	Completely Released	27	46	Amerikohl Mining, Inc.	Terminated 12/06/95	Barbour	Richard
s205286	WV1003275	Coal Surface Mine	Revoked	15	15	Marson Coal Company, Inc.	Expired 6/16/03	Randolph	Dickinson
s205386	WV1003291	Coal Surface Mine	Completely Released	0	5	Larosa Fuel Company, Inc.	Terminated 1/28/94	Upshur	Altieri
s205586	WV1003356	Coal Surface Mine	Phase 2 Released	187	197	*Bright Coal Corp.	WV100 3356 Expired 6/14/02 (WV1003321 terminated 10/13/00)	Randolph	Dickinson
u001583	WV0043273	Coal Underground	Renewed	106	86	*Anker WV Mining Co., Inc.	Expired 4/03/02	Barbour	Hooton
u001985	WV0091189	Coal Underground	Inactive	9	6	*Stanley Industries, Inc.	Expired 6/19/02	Barbour	Kromer

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
u002883	WV1014188	Coal Underground	Renewed	45	15	*Anker WV Mining Co., Inc.	Expired 5/02/02	Upshur	Altieri
u004384	WV0060887	Coal Underground	Revoked	0	10	Preston Energy Inc	Terminated 2/24/99	Preston	Hooton
u004785	WV0066486	Coal Underground	Completely Released	0	12	Carter-Roag Coal Co Inc	Terminated 6/12/95	Randolph	Meade
u006083	WV0027031	Coal Underground	Renewed	33	24	*Bass Energy, Inc.	Expired 3/01/02	Upshur	Altieri
u007483	WV0024619	Coal Underground	Renewed	22	20	*Energy Marketing Co., Inc.	Expired 11/20/01	Barbour	Dickinson
u007485	WV0098531	Coal Underground	Completely Released	2	7	Bentley Coal Company	Terminated 2/24/99	Barbour	Richard
u008784	WV0066885	Coal Underground	Phase I Released	47	47	* Patriot Mining Co., Inc.	(WV0065897) Released 7/01/94 (WV0066885) Expired 7/01/02	Preston	Dixon
u010383	WV0060887	Coal Underground	Revoked	0	10	Preston Energy Inc	Released 2/24/99	Preston	Hooton
u011183	WV0062910	Coal Underground	Inactive	21	9	Action Holding Inc.	Expired 5/05/02	Randolph	Dickinson
u011783	WV0024627	Coal Underground	Completely Released	41	41	*Energy Marketing Co., Inc.	Expired 6/25/03	Upshur	Kromer
u013683	WV0094854	Coal Underground	Completely Released	21	10	Demotto-peerless Coal Co Inc	Terminated 1/04/93	Randolph	
u013783	WV1003526	Coal Underground	Completely Released	0	3	Demotto-peerless Coal Co Inc	Terminated 9/11/00	Randolph	Dickinson
u014582		Coal Underground	Completely Released	0	6	Viking Coal Company		Preston	Hooton
u023100		Coal Underground	Revoked	0	8	Dlm Coal Corp		Upshur	
u029900	WV0092002	Coal Underground	Revoked	0	3	Premium Sewell, Inc	Released 7/31/95	Randolph	Meade
u030000		Coal Underground	Revoked	0	7	Mett, Inc		Randolph	
u034100		Coal Underground	Completely Released	0	2	*S.S. Joe Burford, Inc.		Randolph	Guthrie
u034700		Coal Underground	Revoked	0	2	Energy Resources Mining Co, i		Randolph	
u036700	WV1003585	Coal Underground	Completely Released	9	9	Helvetia Coal Mining Co, Inc	Released 11/11/99	Randolph	Meade
u037100	WV0024619	Coal Underground	Renewed	7	6	Ten -a-coal Company	Expired 8/19/00	Barbour	Kromer
u039300		Coal Underground	Revoked	9	13	Balar Coal Co., Inc		Barbour	
u047000		Coal Underground	Revoked	0	0	Mogasco Mining, Inc		Barbour	
u056500	WV0063045	Coal Underground	Completely Released	0	5	Vic -mar Coal co	Released 8/14/98	Preston	
u058800		Coal Underground	Revoked	0	0	International Coal Company		Randolph	

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
u070800		Coal Underground	Revoked	0	2	International Coal Company		Randolph	
u071000		Coal Underground	Revoked	0	5	Mogasco Mining, Inc		Upshur	
u071400	WV0053503	Coal Underground	Revoked	28	29	*Prestwood Co., Inc.	Expired 7/31/95	Randolph	Meade
u100289	WV1002520	Coal Underground	Revoked	0	8	Eastern Mountain Mining Co in	Released 10/14/92	Preston	
u100494	WV1011502	Coal Underground	New	11	9	Double H Mining Co., Inc.	Expired 5/05/01	Preston	Dixon
u100791	WV1010395	Coal Underground	Phase 1 Released	10	10	Action Holding Inc.	Expired 7/15/01	Randolph	Dickinson
u100798	WV0095583	Coal Underground	New	220	206	Coastal Coal-west Virginia, Llc	Expired 12/11/02	Preston	Hooton
u100893	WV1011464	Coal Underground	Renewed	39	39	Dana Mining Company, Inc.	Expired 9/30/02	Preston	Kromer
u101186	WV0066885, WV0099112	Coal Underground	Renewed	10	10	Patriot Mining Company, Inc.	(WV0066885) Expired 7/1/02 (WV0099112) Rel. 2/07/96	Preston	Hooton
u101492	WV0095583	Coal Underground	Renewed	15	15	Coastal Coal-west Virginia, Llc	Expired 12/11/02	Preston	Hooton
u102090	WV0098531	Coal Underground	Completely Released	15	7	Bentley Coal Company	Expired 2/24/99	Barbour	Richard
u102688	WV1002741	Coal Underground	Revoked	116	58	F & M Coal Co Ip	Expired 10/10/91	Preston	Deem
u103790	WV1003348	Coal Underground	Phase 1 Released	36	25	*Stanley Industries, Inc.	Expired 4/29/03	Barbour	Kromer
u104089	WV1007866	Coal Underground	Completely Released	0	45	Preston Energy Inc	Released 6/05/95	Preston	Hooton
u104186	WV0066885, WV1002465	Coal Underground	Renewed	14	16	Squires Creek Coal Co., Inc	(WV0066885) Expired 7/01/02 (WV1002465) no record	Preston	Hooton
u104391	WVG012002	Coal Underground	Inactive	10	10	Action Holding Inc.	Expired 10/31/04	Randolph	Dickinson
u108086	WV1002775	Coal Underground	Renewed	10	13	Decondor Coal Company, Inc.	Expired 6/05/02	Preston	Dixon
u200290	WV1010093	Coal Underground	Completely Released	0	12	Bright Coal Corp	Expired 1/01/95	Randolph	Meade
u200387	WV1003356	Coal Underground	Phase 1 Released	32	32	Bohica, Inc	Expired 6/14/02	Randolph	Dickinson

## Metals and pH TMDLs for the Tygart Valley River Watershed

Permit ID	NPDES ID	Mine Type	Status	Current Area <sup>A</sup> (ac)	Original Area <sup>B</sup> (AC)	Facility Name	NPDES Status	County	Inspector
u200588	WV1003526	Coal Underground	Revoked	16	11	*Marson Coal Co., Inc.	Terminated 9/11/00	Randolph	Dickinson
u200597	WV1013858	Coal Underground	New	8	8	Burn Coal, Inc.	Expired 9/25/05	Upshur	Altieri
u200988	WV0094790	Coal Underground	Inactive	66	24	Action Holding Inc.	Expired 5/07/02	Randolph	Dickinson
u200997	WV1017896	Coal Underground	New	12	12	Action Holding Inc.	Expired 2/23/03	Randolph	Dickinson
u201295	WV1013858	Coal Underground	New	7	7	*Three-C Mining, Inc.	Expired 9/25/05	Upshur	Altieri
u201297	WV1017896	Coal Underground	New	15	15	Action Holding Inc.	Expired 2/23/03	Randolph	Dickinson
u201698	WV1017985	Coal Underground	New	19	19	*Anker WV Mining Co., Inc.	Expired 6/02/02	Upshur	Altieri
u202487	WV1003569	Coal Underground	Revoked	20	10	*Delta Mining Co.	Released 6/22/93	Upshur	Dickinson
u202588	WV1003151, WV1014129, WVG012001	Coal Underground	Phase 1 Released	27	10	*Bentley Coal Company	(WV1003151) Rel. 10/26/92 (WV1014129) Expired 7/26/01 (WVG012001) Terminated 7/26/96	Randolph	Dickinson
u202687	WV1003623	Coal Underground	Inactive	19	19	Roblee Coal Company	Expired 4/02/03	Barbour	Kromer
u202988	WV1003038	Coal Underground	Completely Released	2	10	Bentley Coal Company	Expired 6/14/02	Randolph	Dickinson
z002381		Coal Surface Mine	Completely Released	3	24	Capitol Coal, Inc	NONE	Upshur	Altieri
z004881	WV1003453	Coal Surface Mine	Completely Released	0	125	Larosa Fuel Company, Inc.	Expired 1/28/94	Upshur	Altieri
z005081		Coal Surface Mine	Completely Released	0	71	Grafton Coal Company		Lewis	
z005781	WV0050717	Coal Surface Mine	Completely Released	0	63	Island Creek Mining co	Expired 12/03/00	Upshur	Altieri
z007581		Coal Surface Mine	Completely Released	0	71	C W Bentley Inc	NONE	Randolph	Dickinson

<sup>A</sup> Current Area - Surface disturbed area of permitted mines(October 2000)

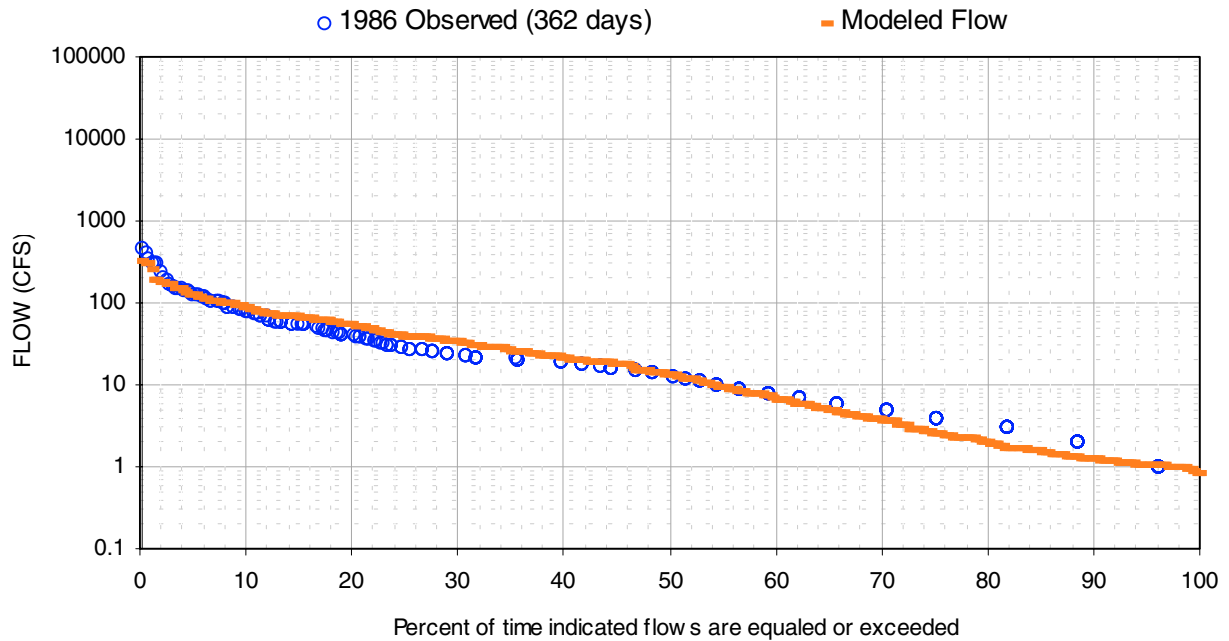
<sup>B</sup> Original Area - Surface disturbed area when mining permit was originally issued

\*Note: Facility name has been changed to reflect the permittee rather than the operator

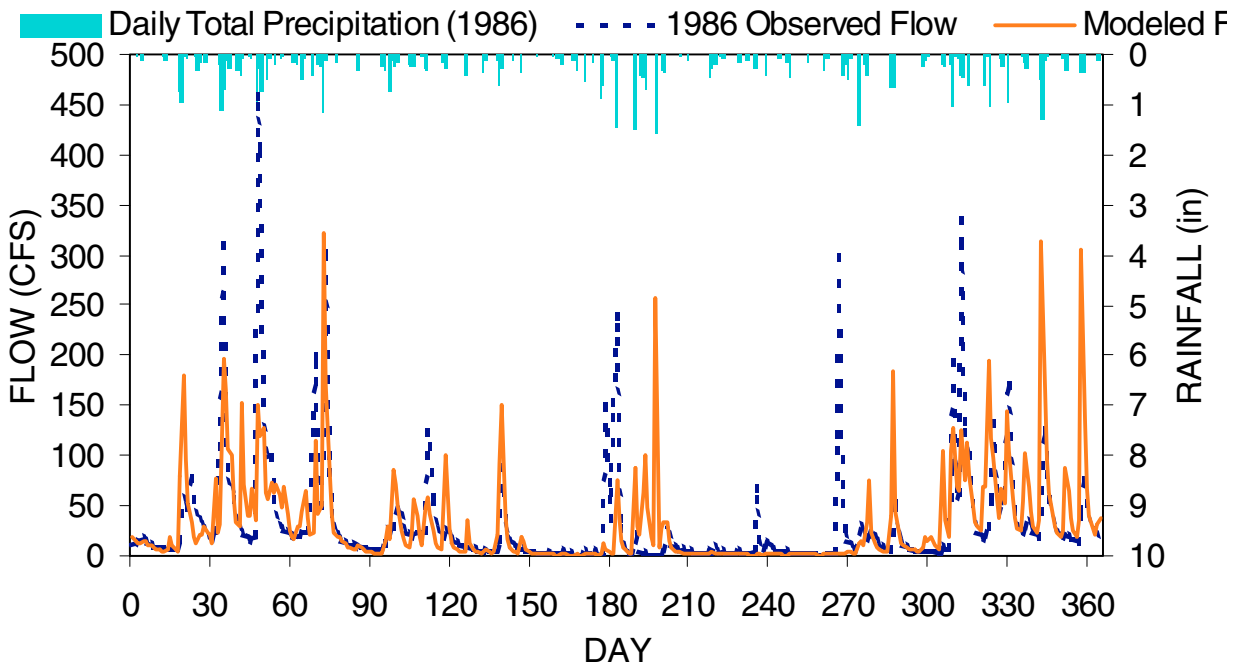
## **Appendix C**

# **Hydrology and Water Quality Calibration and Validation Results**

## Hydrology Calibration



**Figure C-1.** Sand Run (USGS 3052500) flow-frequency curve for year 1986



**Figure C-2.** Temporal calibration results for Sand Run (USGS 3052500) for year 1986

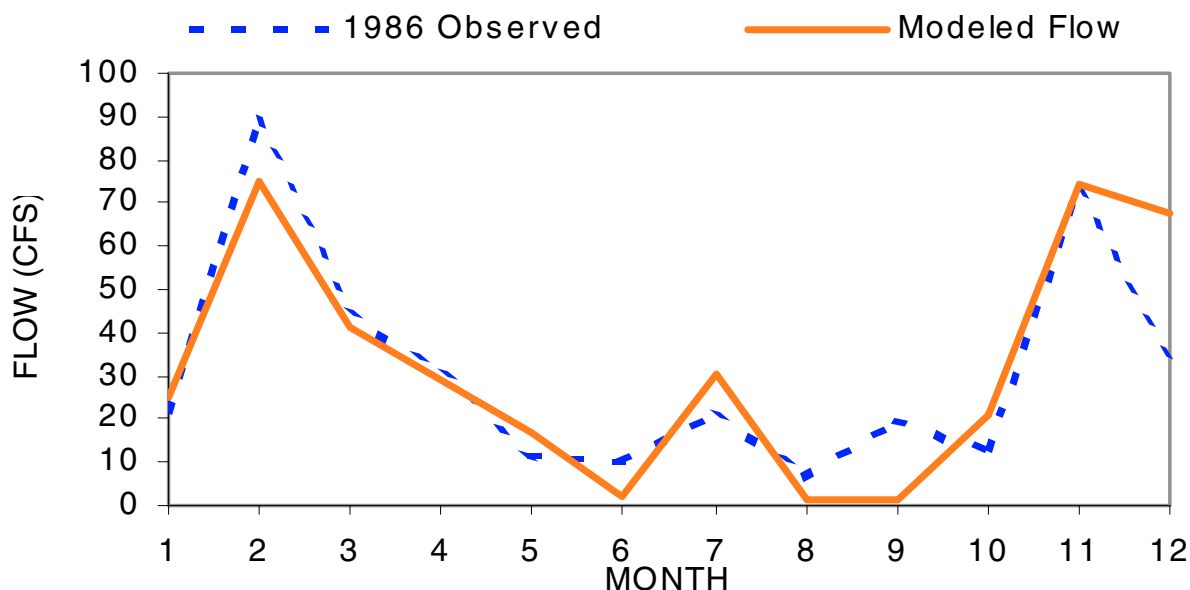


Figure C-3. Temporal calibration results for Sand Run (USGS 3052500) for year 1986

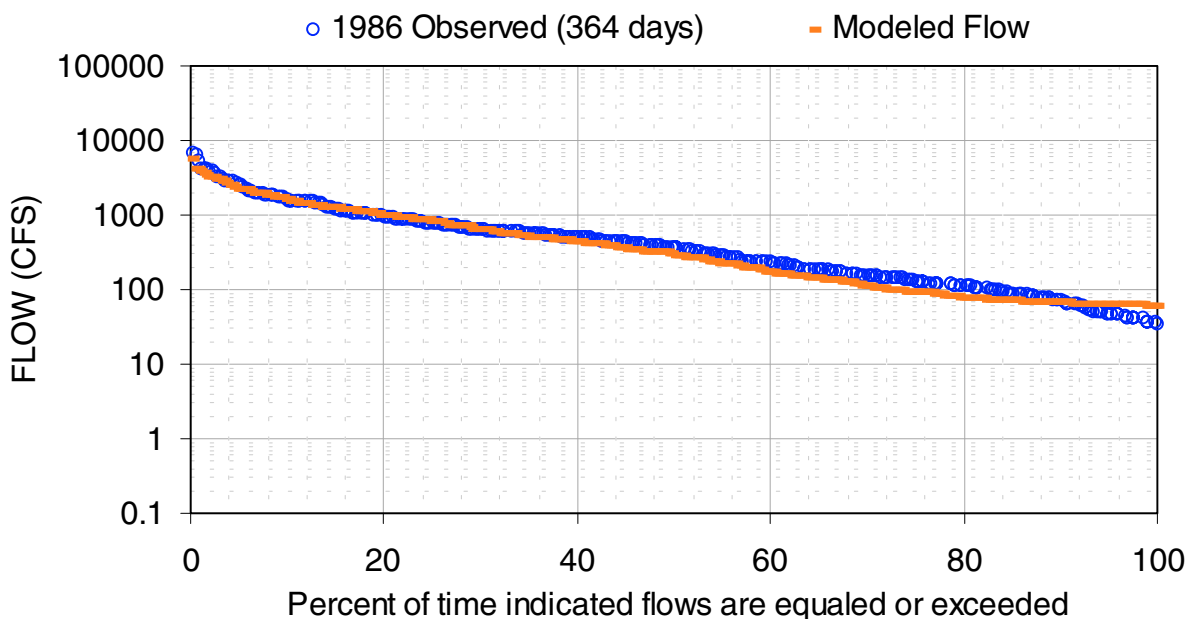


Figure C-4. Buckhannon River (USGS 3053500) flow-frequency curve for year 1986



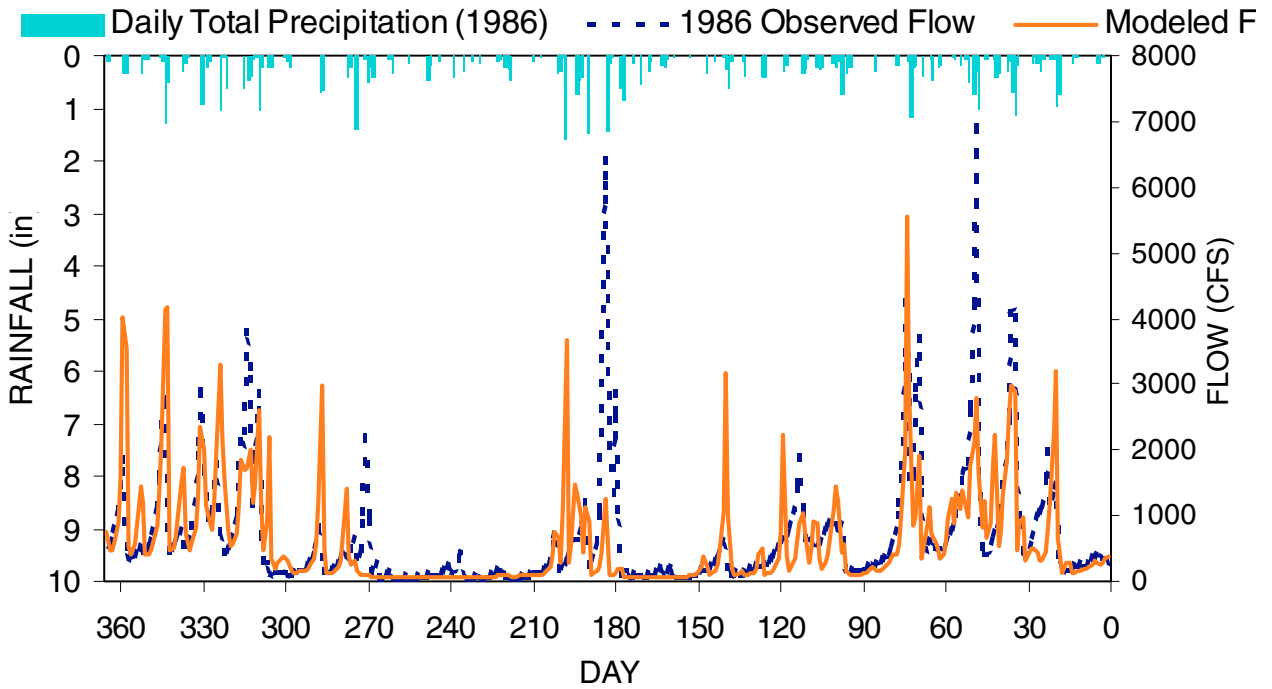


Figure C-5. Temporal calibration results for Buckhannon River (USGS 3053500) for year 1986

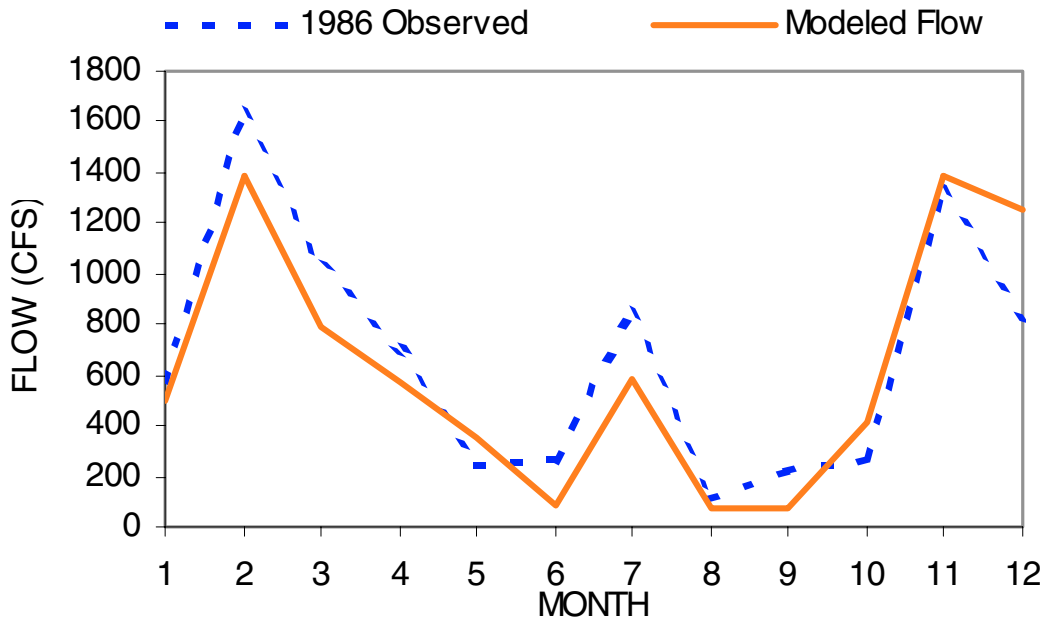


Figure C-6. Temporal calibration results for Buckhannon River (USGS 3053500) for year 1986

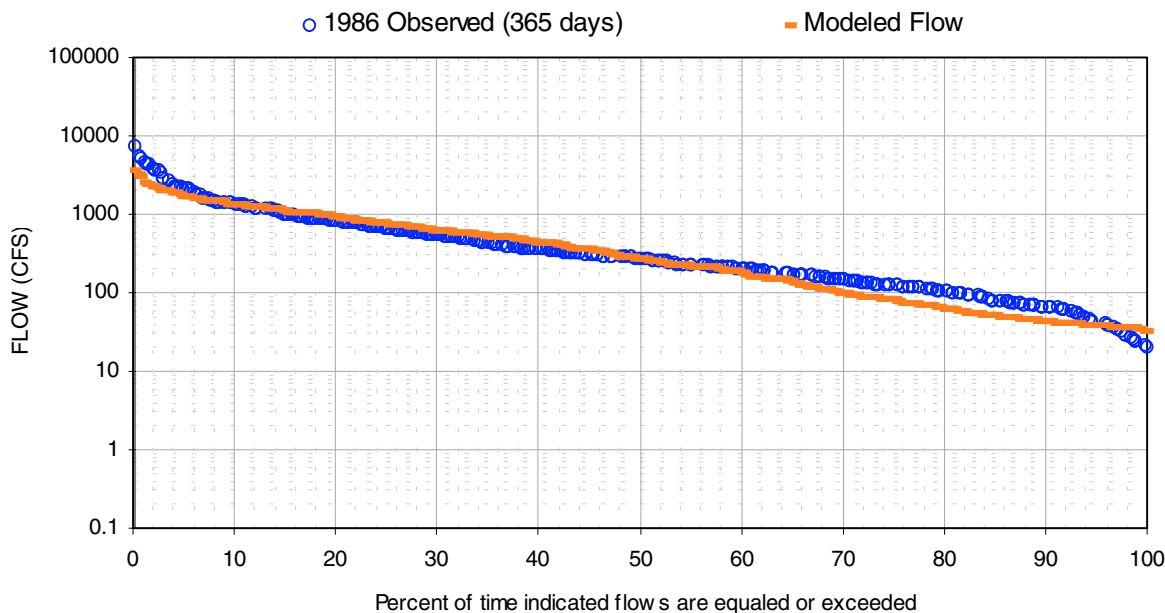


Figure C-7. Tygart Valley River (USGS 3050500) flow-frequency curve for year 1986

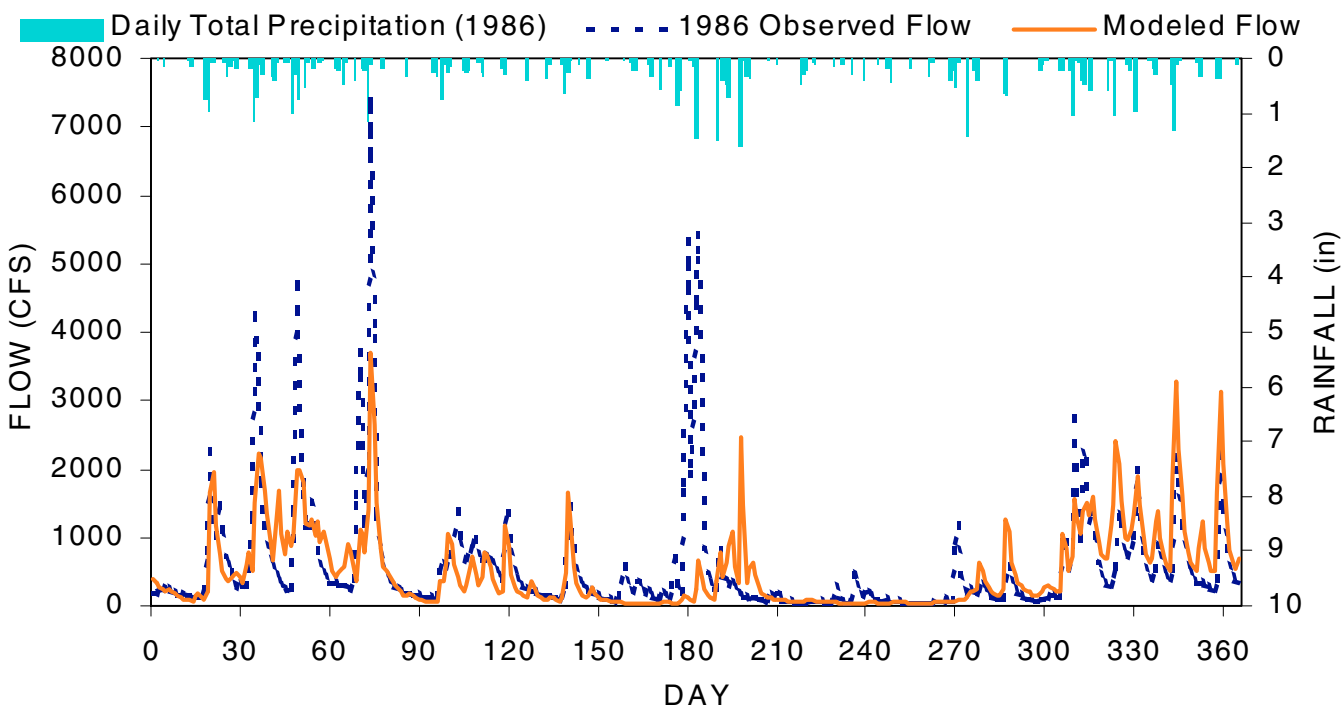
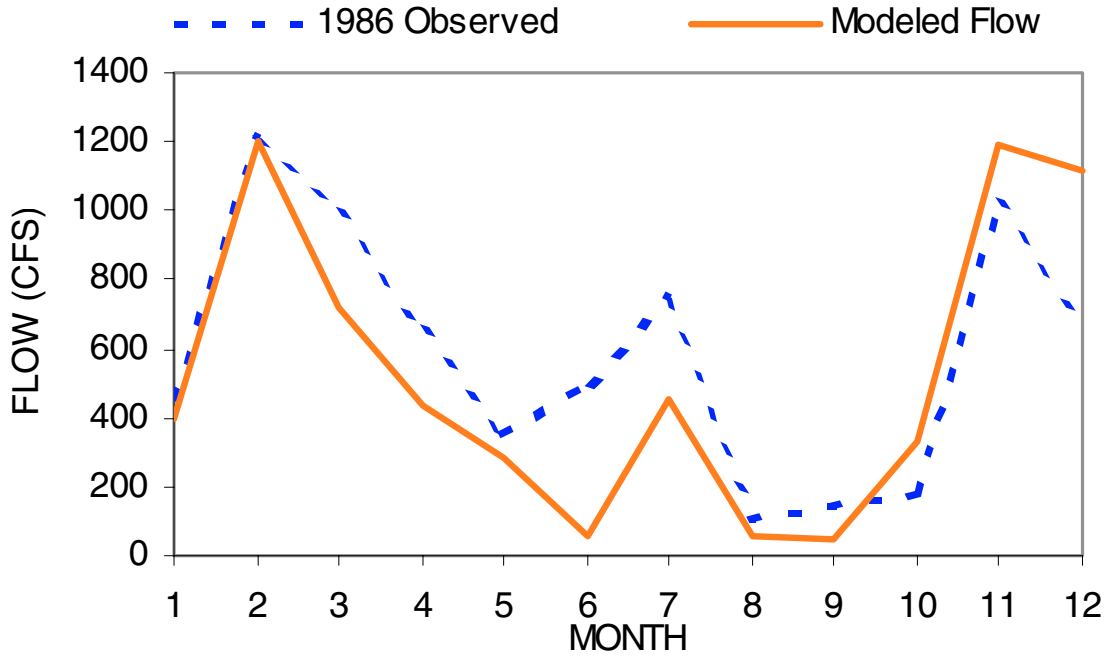
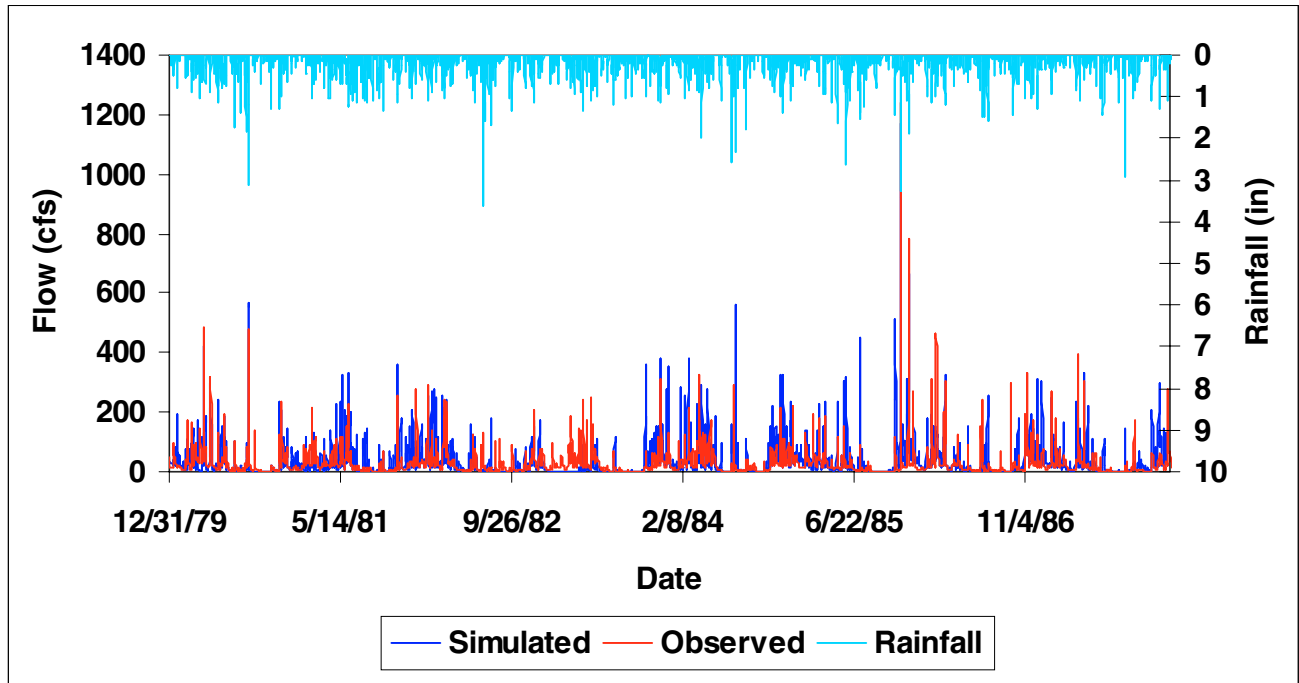


Figure C-8. Temporal calibration results for the Tygart Valley River (USGS 3050500) for year 1986



**Figure C-9.** Temporal calibration results for the Tygart Valley River (USGS 3050500) for year 1986



**Figure C-10.** Sand Run (USGS 3052500) validation

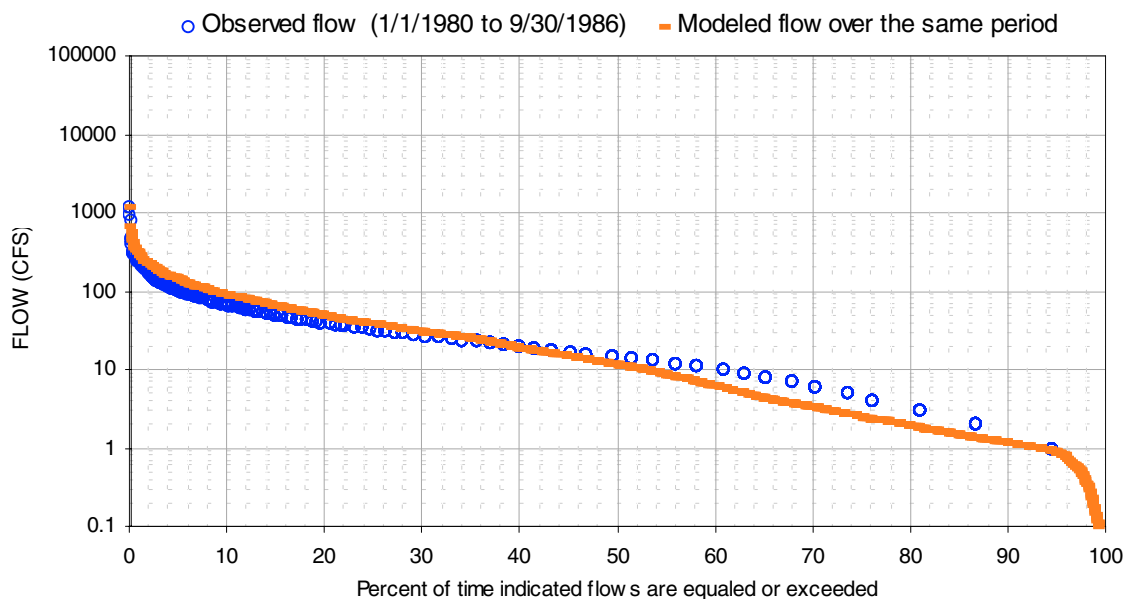


Figure C-11. Sand Run (USGS 3052500) flow-frequency validation

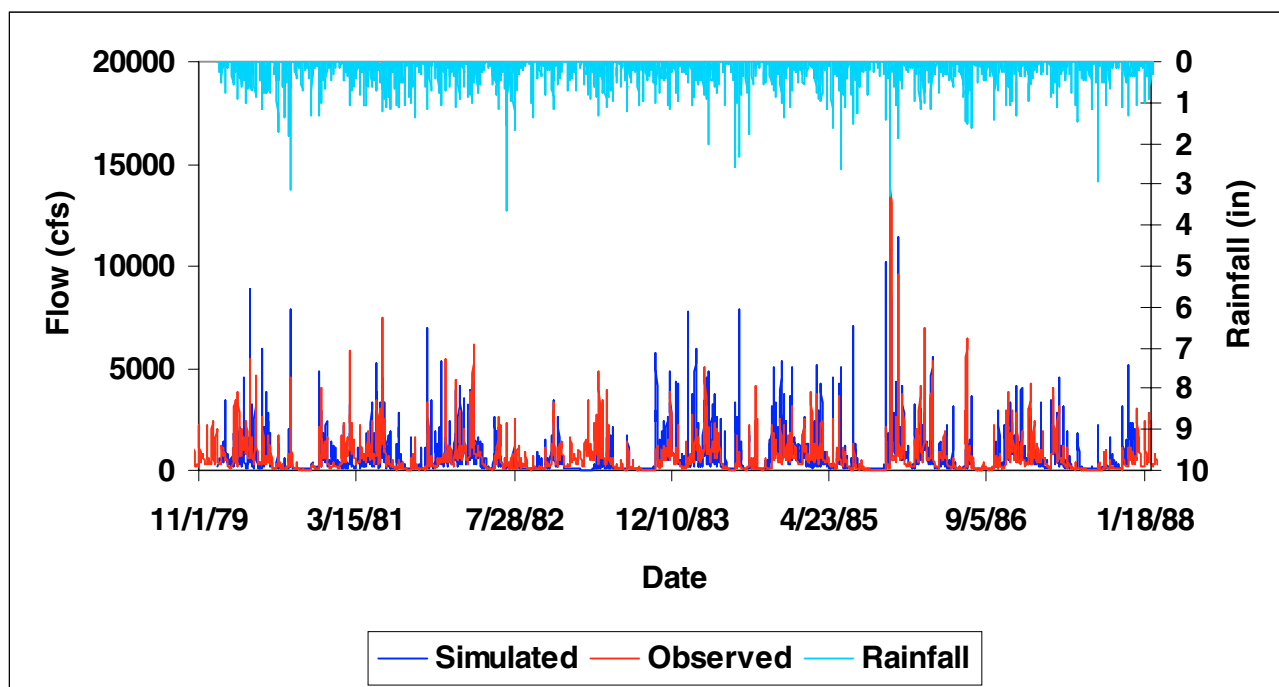


Figure C-12. Buckhannon River (USGS 3053500) validation

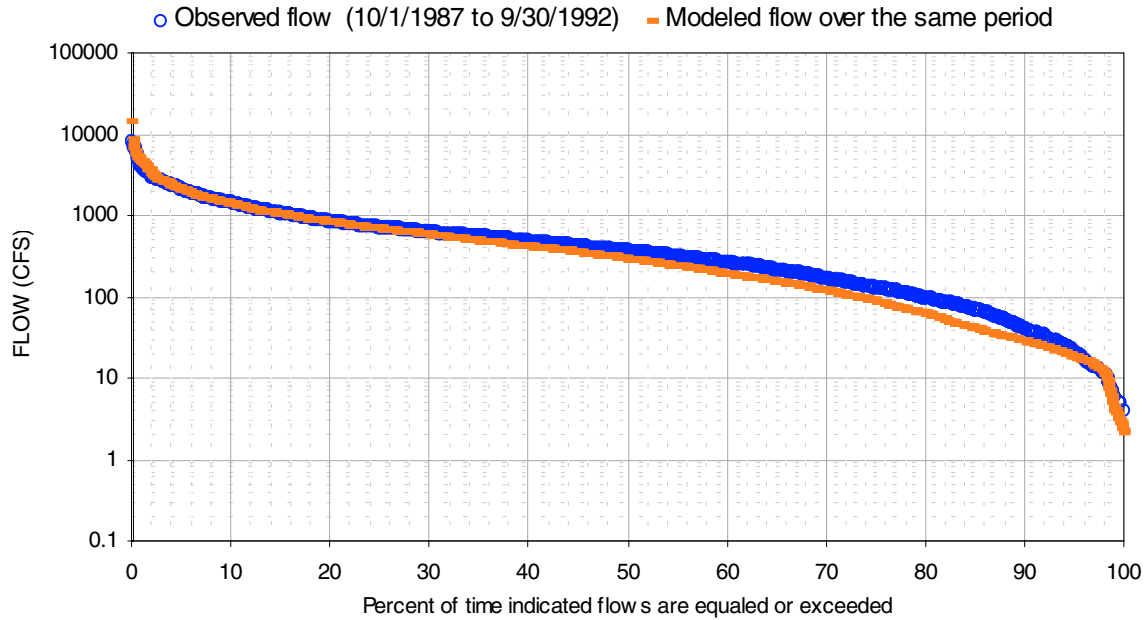


Figure C-13. Buckhannon River (USGS 3053500) flow-frequency validation

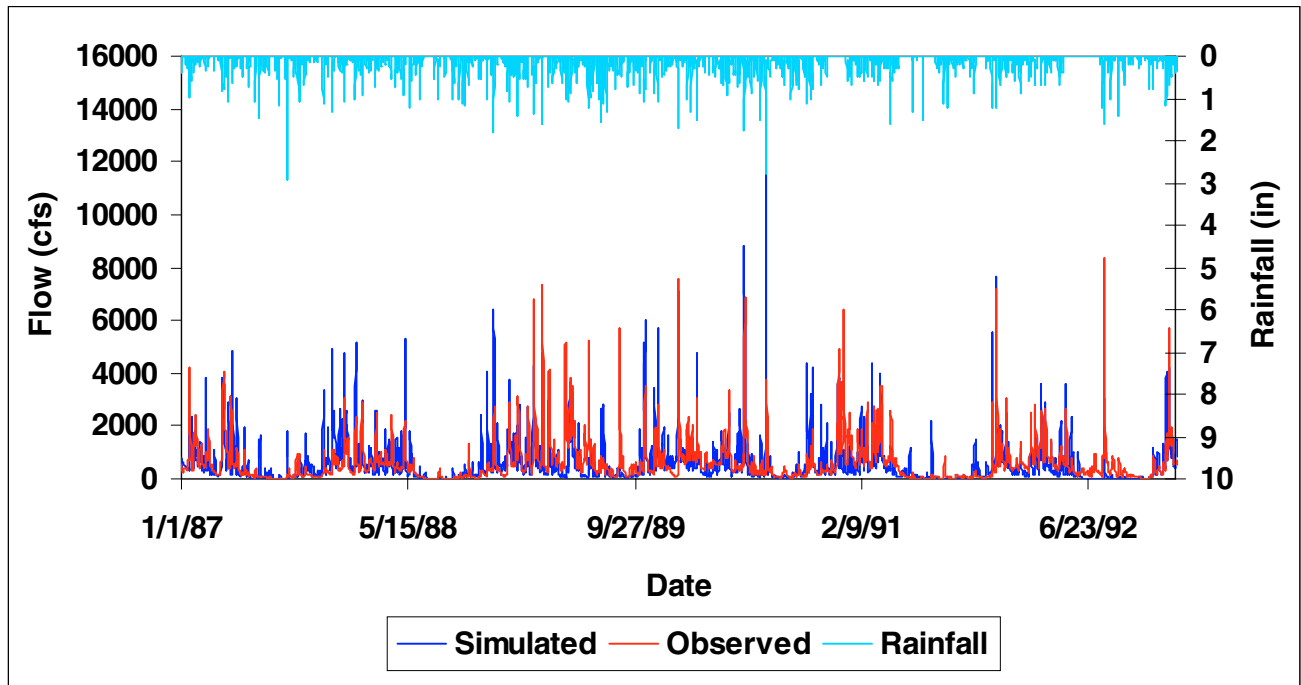


Figure C-14. Tygart Valley River (USGS 3050500) validation

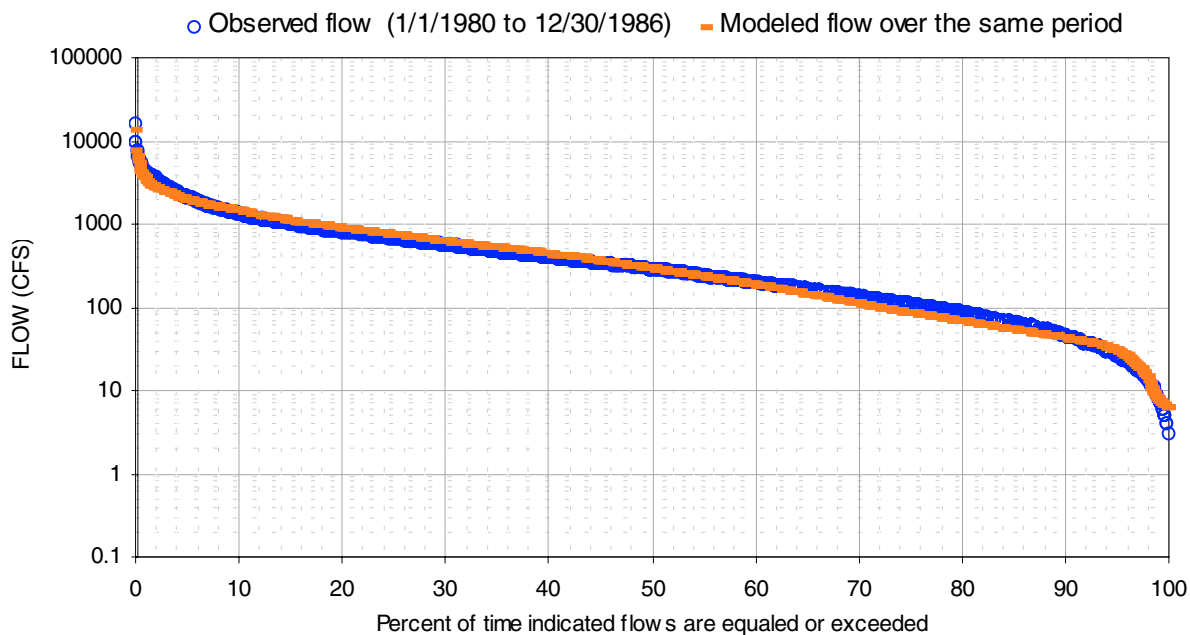


Figure C-15. Tygart Valley River (USGS 3050500) flow-frequency validation

## Water Quality Calibration

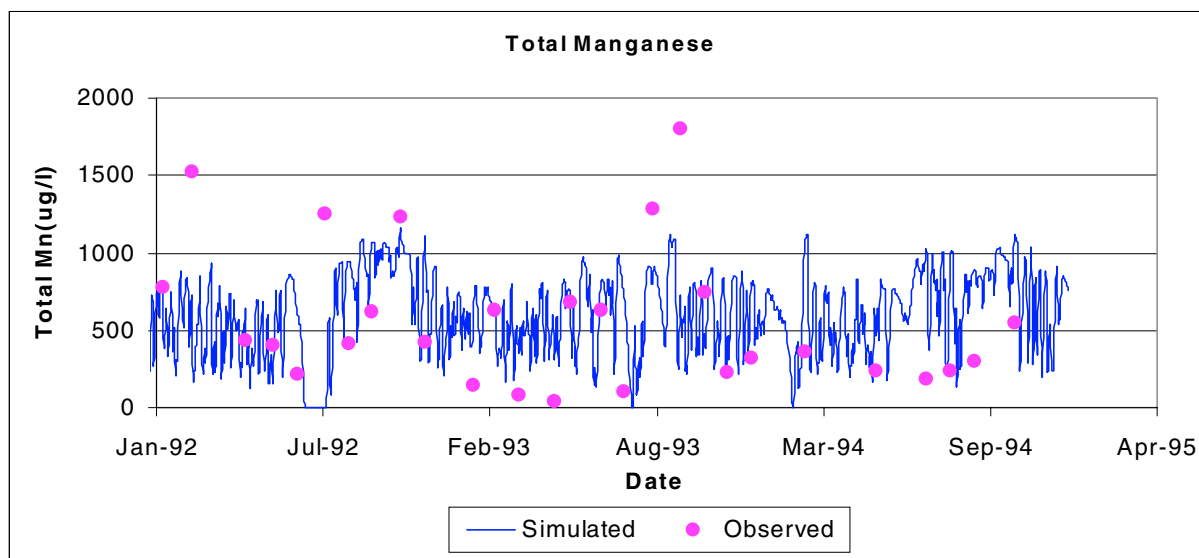
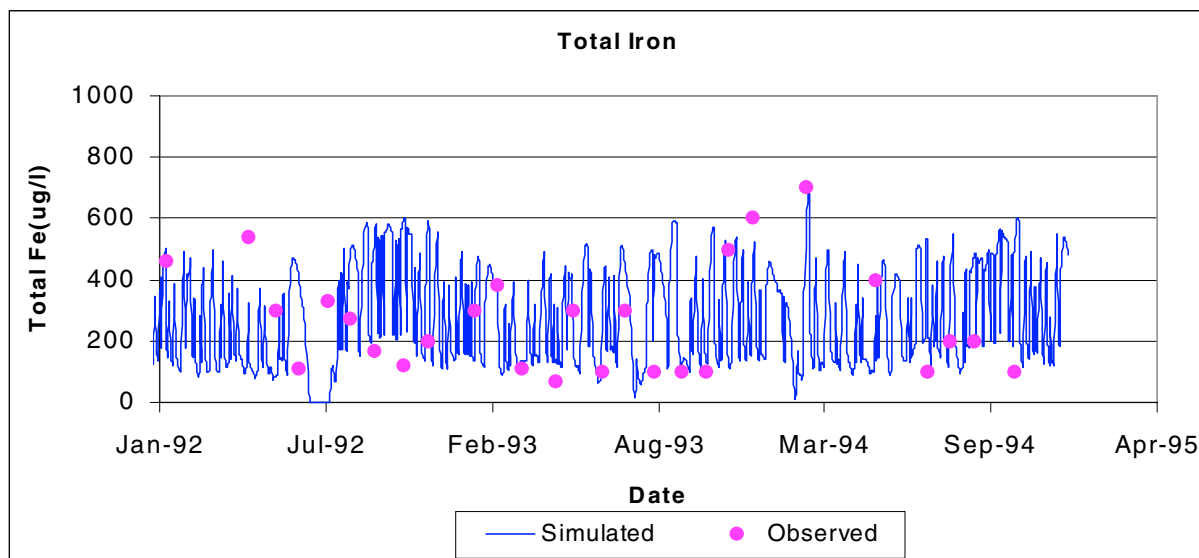
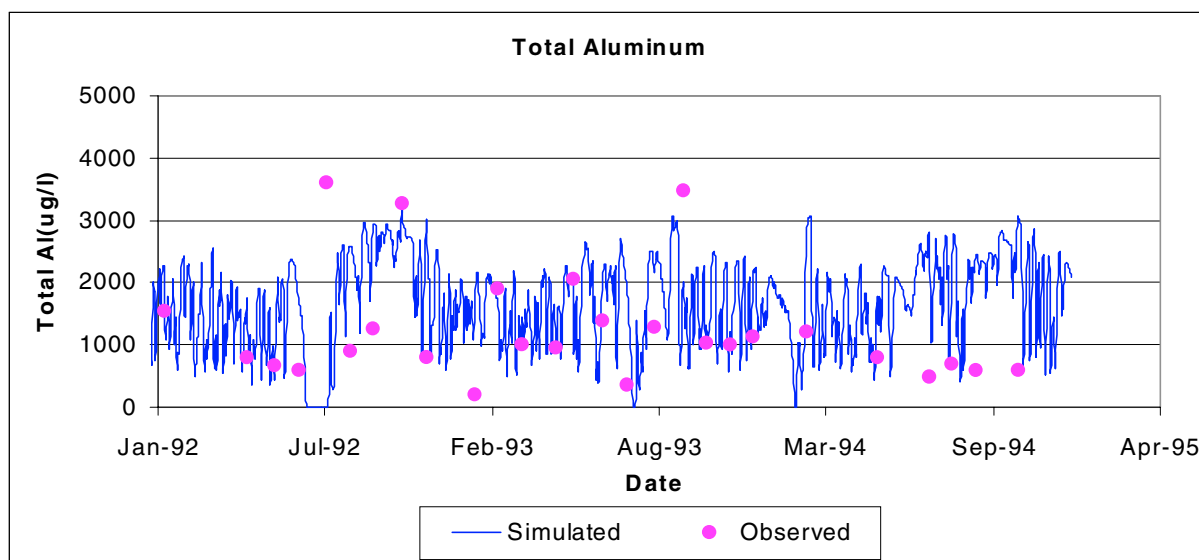
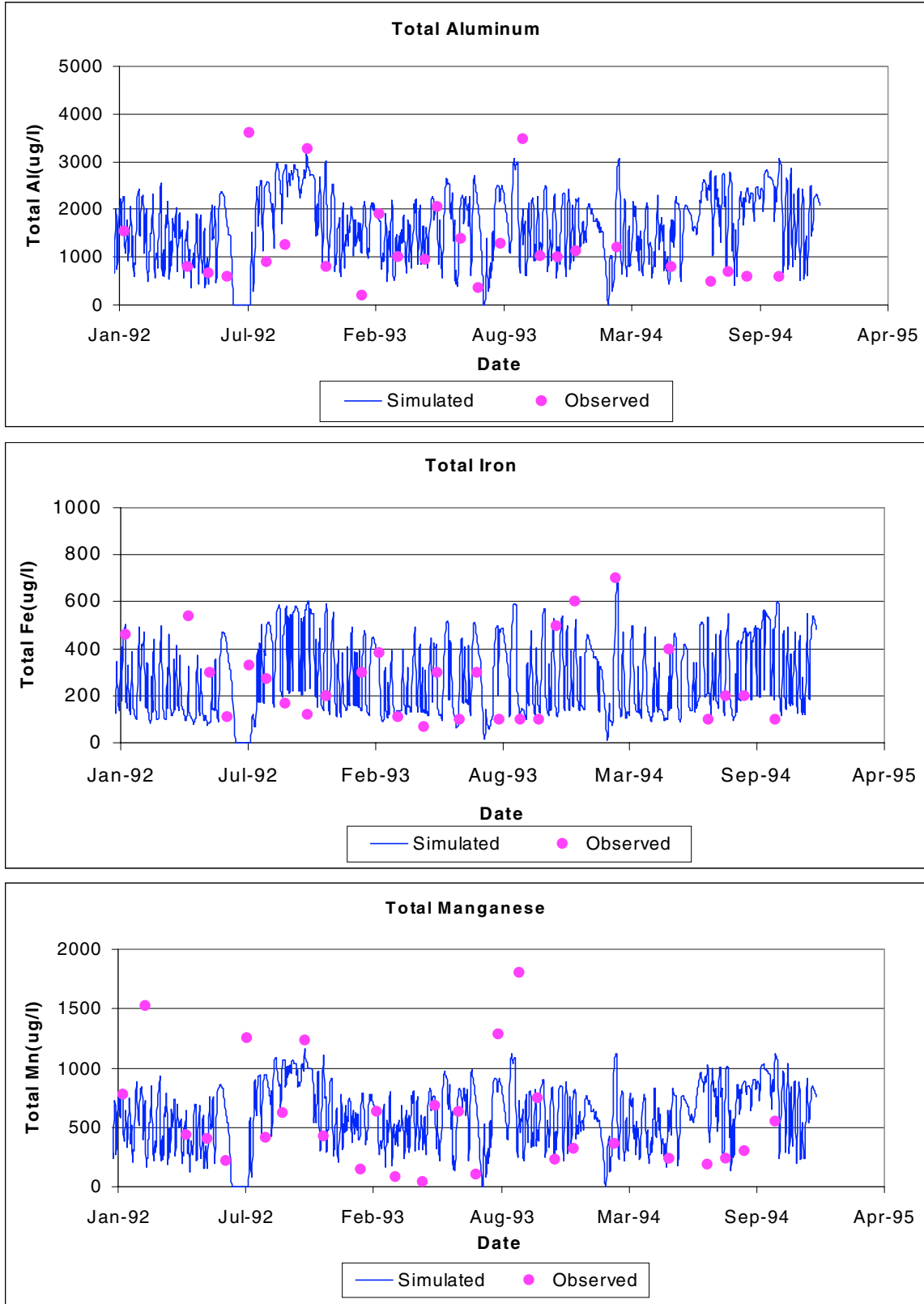


Figure C-16. Water quality calibration at Middle Fork River below Cassity (551115)





**Figure C-17.** Water quality calibration at the Middle Fork River above Long Run (551114)

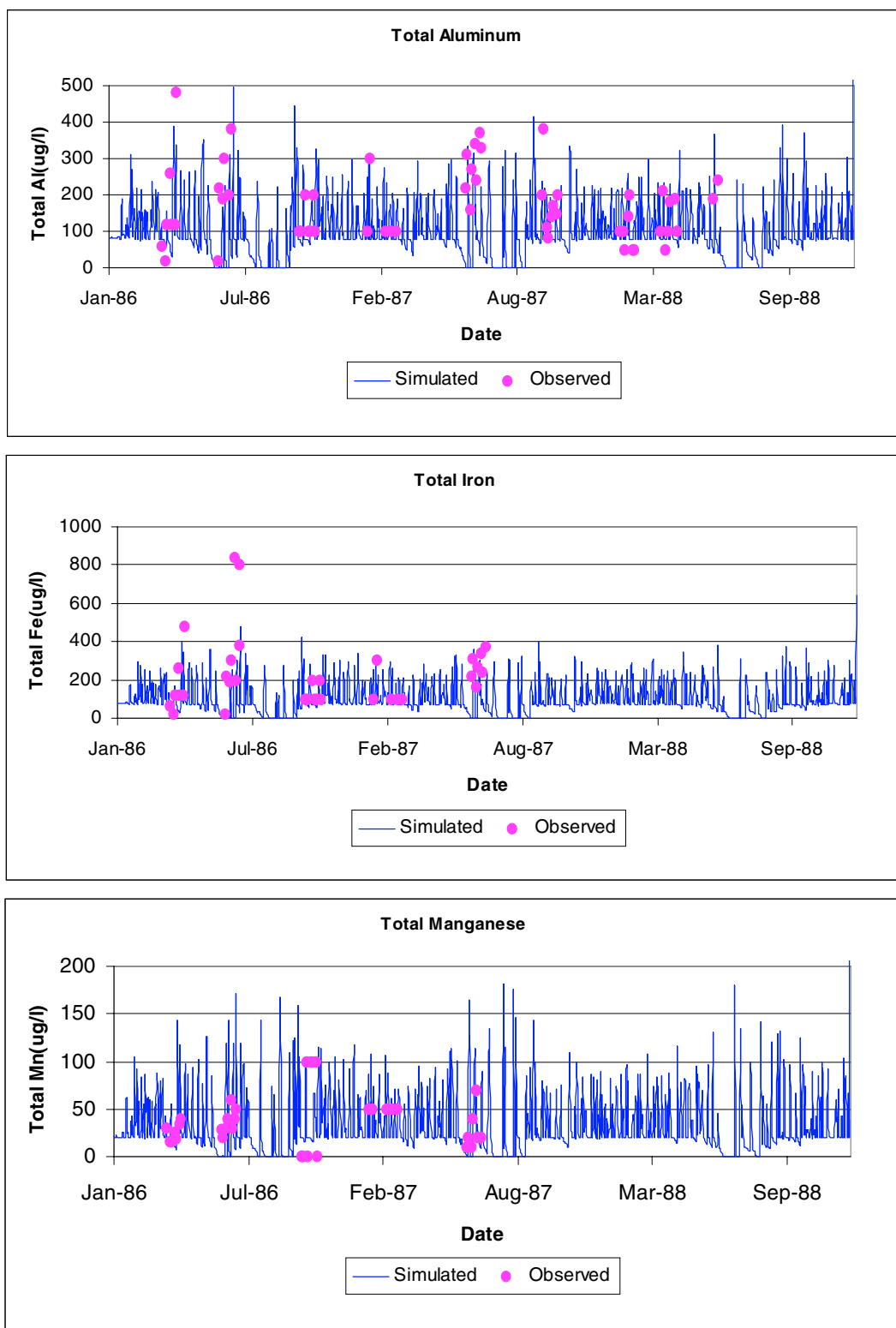


Figure C-18. Water quality calibration at Left Fork of Buckhannon River (550808)

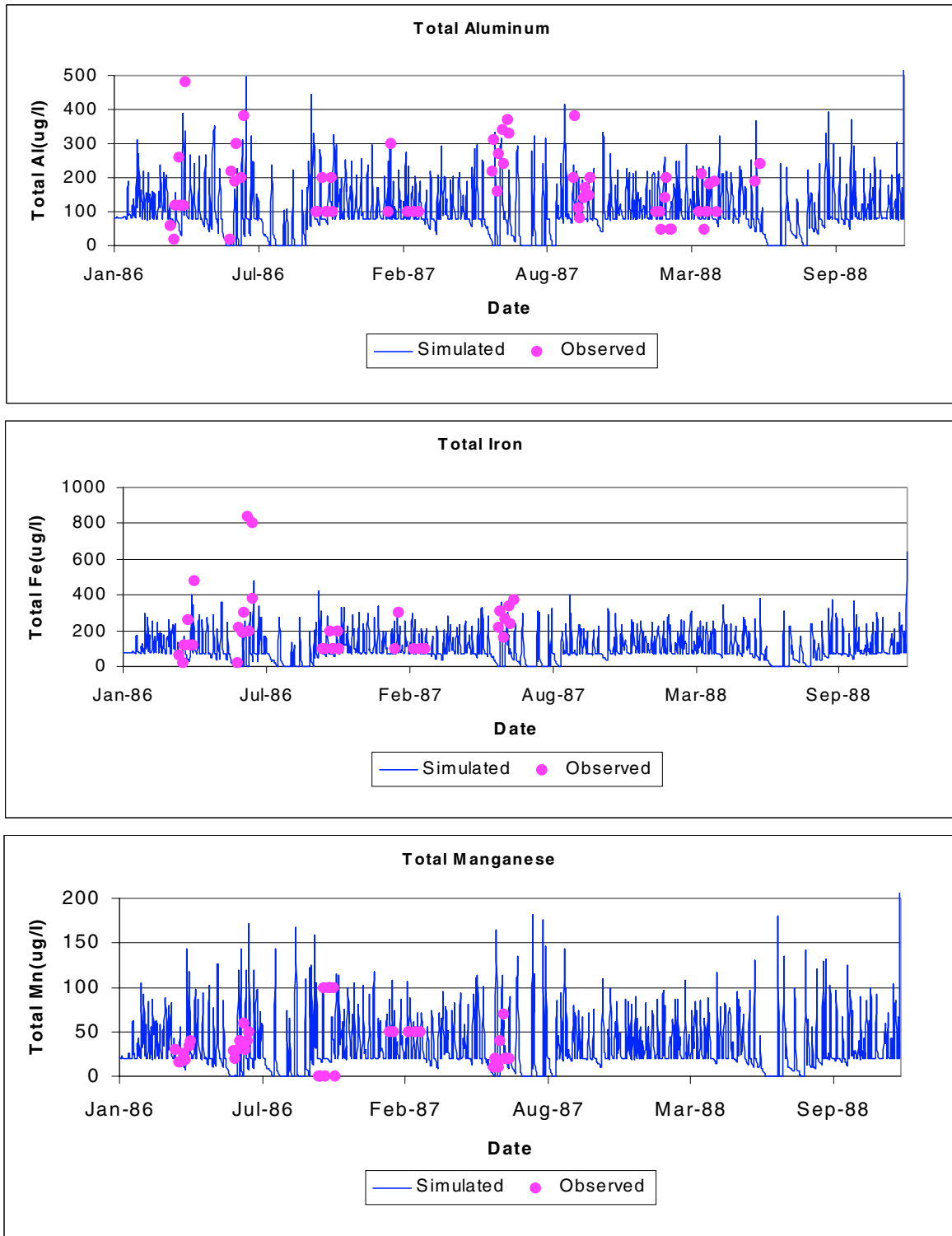


Figure C-19. Water quality calibration at Right Fork of the Buckhannon River (550809)

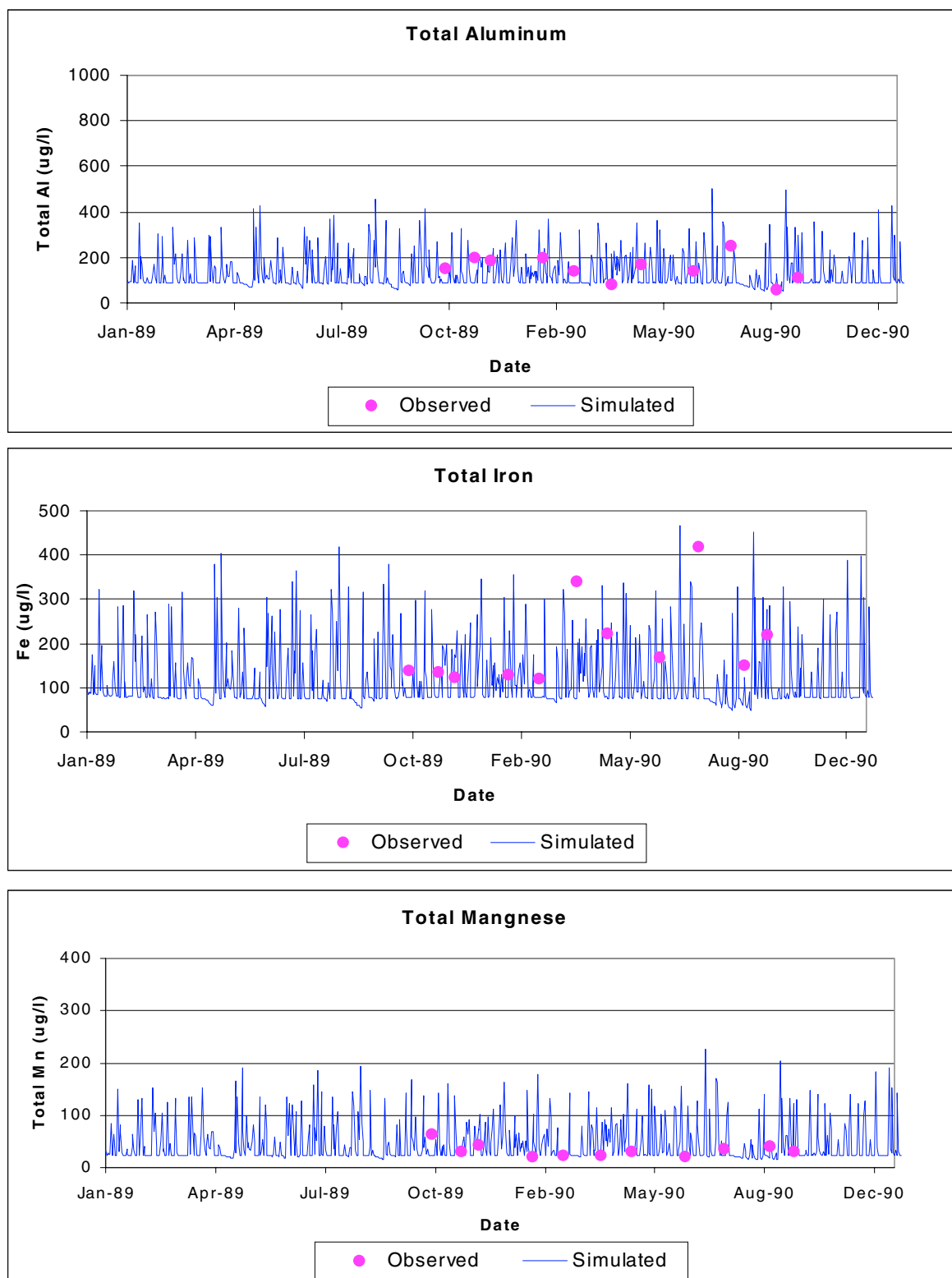


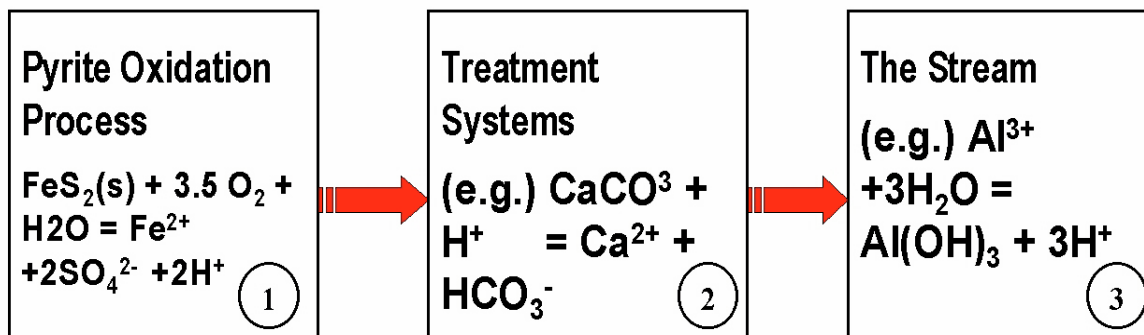
Figure C-20. Water quality calibration at Teter Creek (550980)

# **Appendix D**

## **Modeling pH for TMDL Development**

## Overview

Streams affected by acid mine drainage often exhibit high metals concentrations (specifically for iron [Fe], aluminum [Al], and manganese [Mn]) along with low pH. The relationship between these metals and pH provides justification for using metals TMDLs as a surrogate for a separate pH TMDL calculation. The following figure shows three representative physical components that are critical to establishing this relationship.



Note: Several major ions comprise the water chemistry of a stream. The cations are usually  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{H}^+$ , and the anions consist of  $\text{HCO}_3^-$ ,  $\text{CO}_3^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ , and  $\text{OH}^-$  (Stumm and Morgan, 1996).

Component 1 describes the beginning oxidation process of pyrite ( $\text{FeS}_2$ ) resulting from its exposure to  $\text{H}_2\text{O}$  and  $\text{O}_2$ . This process is common in mining areas. The kinetics of pyrite oxidation processes are also affected by bacteria (*Thiobacillus ferrooxidans*), pH, pyrite surface area, crystallinity, and temperature (PADEP, 2000). The overall stoichiometric reaction of the pyrite oxidation process is as follows:



Lower pH and higher metals concentrations from Component 1 should be treated effectively with applicable systems.

Component 2 presents an example chemical reaction occurring within a mining treatment system. Examples of treatment systems include wetlands, successive alkalinity producing systems, and open limestone channels. Carbonate and other bases (e.g., hydroxide) created in treatment systems consume hydrogen ions produced by pyrite oxidation and hydrolysis of metals, thereby increasing pH. The increased pH of the solution will precipitate metals as metal hydroxides. Treatment systems may not necessarily work properly, however, because the removal rate of metals, and attenuation of pH depends on chemical constituents of the inflow, the age of the systems, and physical characteristics of the systems (e.g., flow rate, detention rate) (West Virginia University Extension Service, 2000).

It is assumed that implementation of TMDLs in the Tygart watershed for aluminum, iron, and manganese will result in in-stream metals concentrations meeting the water quality criteria. This

assumes that treatment systems are implemented properly and effectively increase pH, in order to precipitate and thus lower metals concentrations.

After treatment, the focus shifts to Component 3 and the relationship between metals concentrations and pH in the stream. The chemical process that needs to be considered is the hydrolysis reaction of metals in the stream. Component 3 presents an example of this reaction. In order to estimate pH resulting from chemical reactions occurring in the stream, MINTEQA2 (a geochemical equilibrium speciation model for dilute aqueous systems) was used.

### MINTEQA2 Application

MINTEQA2 is an EPA geochemical equilibrium speciation model capable of computing equilibrium aqueous speciation, adsorption, gas phase partitioning, solid phase saturation states, and precipitation-dissolution of metals in an environmental or lab setting. The model includes an extensive database of reliable thermodynamic data. The MINTEQA2 model was run using the following inputs:

Species	Input Values (mg/L)
Ca	43.2
Mg	14.5
Na <sup>(a)</sup>	6.3
K <sup>(a)</sup>	2.3
Cl <sup>(a)</sup>	7.8
SO <sub>4</sub>	86.6
Fe <sup>(b)</sup>	1.5 and 0.5
Al <sup>(b)</sup>	0.75
Mn <sup>(b)</sup>	1.0
Alkalinity	18.0 (as CaCO <sub>3</sub> )

<sup>(a)</sup> source: Livingstone (1963)

<sup>(b)</sup> allowable maximum concentrations (TMDL endpoints)

Input values for Fe, Al, and Mn were based on TMDL endpoints (maximum allowable limits). The alkalinity value was based on average in-stream concentrations for rivers relatively unimpacted by mining activities in the Tygart Valley River watershed. Mean observation values were used for the remaining ions requiring input for MINTEQA2. Where observation data were not available, literature values were used for the chemical species. The model was additionally set to equilibrium with atmospheric CO<sub>2</sub>. Based on the inputs presented, the resultant equilibrium pH was estimated to be 7.74 using the aquatic life standard (1.5 mg/L total Fe) and 7.76 using the trout waters standard (0.5 mg/L total Fe).

The model was also run using typical in-stream metals concentrations found in the vicinity of mining activities (10 mg/L for total Fe, 10 mg/L for Al, 5 mg/L for Mn, and 3 mg/L as CaCO<sub>3</sub> for alkalinity). These inputs resulted in an equilibrium pH of 4.38.

Results from MINTEQA2 imply that pH will be within the West Virginia criteria of above 6 and below 9, provided that in-stream metals concentrations simultaneously meet applicable water quality criteria.

### Assumptions

The conclusions presented above assume that TMDLs are implemented properly, so that metals concentrations from point and nonpoint sources result in the stream meeting metals criteria (implying that pH from these sources has already been increased, in order to decrease metals). Additional assumptions (and facts) that were considered in this process are as follows:

#### *Iron (Fe)*

Ferric iron was selected as total iron based on the assumption that the stream will be in equilibrium with the atmospheric oxygen. Since iron exhibits oxidized and reduced states, the redox part of the iron reactions may additionally need to be considered. The reduced state of iron, ferrous iron, can be oxidized to ferric iron through abiotic and biotic oxidation processes in the stream. The first process refers to oxidation by increasing the dissolved oxygen because of the mixing of flow. The other process is oxidation by microbial activity in acidic conditions on bedrock (Mcknight and Bencala, 1990). Photoreduction of hydrous oxides also can increase the dissolved ferrous form. This reaction could increase pH of the stream followed by oxidation and hydrolysis reactions of ferrous iron (Mcknight, Kimball and Bencala, 1988). Since water quality data are limited, the concentration of total Fe was assumed to be constant at 1.5 mg/L, and it was assumed that total Fe increase by photoreduction would be negligible. (This assumption could ignore pH changes during daytime.)

#### *Sodium (Na), Potassium (K), and Chloride (Cl)*

The concentration of Na, K, and Cl can be higher in streams affected by acid mine drainage. These ions are conservative and are not reactive in natural water, however, so it is likely that the pH of the stream would not be affected.

#### *Calcium (Ca), Magnesium (Mg)*

These ions may have higher concentrations than the values used for the modeling in this study due to the dissolution of minerals under acidic conditions and the reactions within treatment systems. Increasing the concentrations of these ions in the stream, however, could result in more complex forms with sulfate in the treatment system and in the river. This should not affect pH.

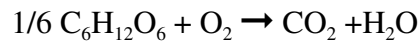
#### *Manganese (Mn)*

Manganese oxide ( $MnO_2$ ) can have a redox reaction with ferrous iron and produce ferric iron (Evangelou, 1998). This ferric iron can go through a hydrolysis reaction and produce hydrogen ions, thereby decreasing pH.



### *Biological Activities*

Biological activities such as photosynthesis, respiration, and aerobic decay can influence the pH of localized areas in the stream. Biological reactions such as the one below:



will assimilate  $\text{CO}_2$  during photosynthesis and produce  $\text{CO}_2$  during respiration or aerobic decay. Reducing  $\text{CO}_2$  levels will increase the pH and increasing  $\text{CO}_2$  levels will lower the pH of the water (Langmuir, 1997). It is possible that as a result of these biological activities, the pH standards may be violated even though metals concentrations are below in-stream water quality standards.

### *Kinetic Considerations*

The kinetic aspect of metal reactions in the stream is an important factor that also needs to be considered. For example, Fe and Mn can be oxidized very rapidly if the pH of the solution is 7.5 to 8.5; otherwise the oxidization process is much slower (Evangelou, 1995). Having a violation of metals concentrations, but no pH violation might be a result of the kinetic aspect of the reactions.

## **Appendix E**

### **Holistic Watershed Approach Protocol for Integrated Watershed Characterization**

## **Background**

Integrated watershed characterizations produce better environmental data and information to make more informed decisions about where and how we invest our resources toward watershed management of mine drainage pollution and associated Total Maximum Daily Load (TMDL) implementation. Involving local, state, and federal agencies; industry; academia; and the public in planning and sampling for watershed characterizations, has led to effective protection, restoration, and enhancement of the ecological integrity of water quality and quantity. Time, costs, knowledge, skills, and abilities are some of the limiting factors when attempting to perform these tasks separately for the desired ecological integrity. Inconsistencies in planning, sampling, and data collection methodologies create quality assurance and quality control concerns. A standard operating procedure, or protocol, eliminates these inconsistencies. Implementation of a protocol, in an integrated fashion, reduces limitations and promotes outreach, education, and training, as well as improves knowledge, skills, and abilities. The West Virginia Division of Environmental Protection's Stream Restoration Group currently implements a Holistic Watershed Approach Protocol involving diverse stakeholders in planning and sampling for integrated watershed characterizations in six of West Virginia's thirty-two hydrologic regions. The Protocol is a dynamic document continually evolving to accommodate multiple applications and satisfy specific needs of diverse stakeholders.

## **Methodology**

When a watershed is designated for watershed characterization to determine impairment from mine drainage pollution discharges, the *study area* watershed boundaries are determined and stakeholders are notified. Watersheds are defined based on the USGS-developed hydrologic unit cataloging (HUC) system. Stakeholder involvement, spearheaded by watershed organizations, is incorporated into all aspects of watershed characterizations, including: restoration, protection, and enhancement.

With the assistance of the stakeholders, a *comprehensive sampling network* is established, mapped, and staked. This *network* includes sampling locations that divide the mainstem into segments representing changes in water quality from upstream to downstream. Sampling locations at the mouth of all mainstem tributaries along with extensive sampling locations throughout the tributary stream reach are also included. Water quality and quantity measurements are obtained three to six times, spanning a range of hydrologic and climatologic conditions. Benthic macroinvertebrate surveys and fish surveys at selected locations are also collected during this time period.

If the watershed is large and dendritic, additional sampling of a *streamlined sampling network* is conducted. This consists of sampling locations of the mainstem and all the mainstem tributaries at the mouth locations only.

The environmental data and information is reviewed and mainstem tributaries are prioritized according to degree of impairment. A *focus area sampling network* of a selected mainstem tributary is then established and mapped. The *network* consists of

sampling locations at the pollution sources as well as at various locations throughout the mainstem tributary reach. Sampling locations are determined by researching existing data and field reviewing the area for all sources of mine drainage pollution discharges. As with the *comprehensive sampling network*, water quality and quantity measurements are obtained three to six times, spanning a range of hydrologic and climatologic conditions. Benthic macroinvertebrate surveys are also collected during this time period.

The data is reviewed and utilized for: establishing the impact of the mine drainage pollution sources to the *focus area* tributaries, selecting the most feasible pollution sources within the *focus area* to address, and identifying the best available technology for the abatement or treatment of the pollution sources.

Following mine drainage pollution remediation of selected project sites within the *focus area*, a *post construction sampling network* is established. It consists of the same *focus area* locations sampled prior to construction, in addition to the treated discharges resulting from the installation of any mine drainage pollution abatement technologies. All new sampling site coordinates are obtained and mapped. Three to six water quality and quantity sampling sweeps are conducted spanning a range of hydrologic and climatologic conditions. Benthic macroinvertebrate surveys are also collected during this time period.

This process continues until all *focus areas* in the initial *study area* have been addressed, and all feasible treatment or abatement technologies applied. At that time, three to six water quality and quantity sampling sweeps of the initial *comprehensive sampling network* are conducted spanning a range of hydrologic and climatologic conditions. Benthic macroinvertebrate surveys and fish surveys are also collected during this time period.

Results are analyzed and a report prepared evaluating the effect of the abatement or treatment technologies on the mine drainage pollution sources and their receiving streams.

Once implemented, the Protocol is a perpetual cycle with many overlapping process steps. The Protocol outline and a process flowchart is presented below:

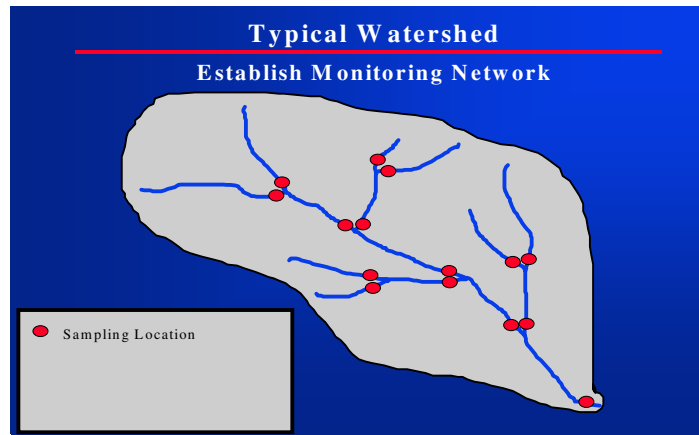
## **Holistic Watershed Approach Protocol**

### **I. Define the *study area* and stakeholders.**

- Select mainstem stream.
- Delineate watershed boundary.
- Foster Stakeholders.

**II. Establish *comprehensive sampling network* within the study area.**

- Select and number stream sampling stations utilizing USGS 7.5 Minute Topographic Quadrangle Maps and field reconnaissance.
  - Select mainstem stream sampling stations representing mainstem stream segments.
  - Select all mainstem tributary sampling stations at the mouth locations and at extensive locations throughout the mainstem tributary stream reach.



**III. Geo-reference *comprehensive sampling network* for input into Geographical Information Systems (GIS).**

**IV. Implement sampling sweeps of the *comprehensive sampling network*.**

- Conduct *Water Quality Study* sweeps three to six times spanning a range of hydrologic and climatologic conditions.
  - Perform water sample collection.
    - Collect stream water sample for laboratory analysis employing “grab” sample method.
  - Perform field measurements.
    - Obtain insitu water quality measurements at all sampling stations.
    - Obtain stream flow.
- Conduct *Biological and Physical Study* one time between April and November.
  - Perform stream habitat assessments and qualitative benthic macroinvertebrate surveys at all stream sampling stations.
  - Perform fish survey at selective stream sampling stations only.

**V. Review all data collected. (If watershed is large and dendritic, continue or otherwise skip to IX.)**

- Analyze changes in tributary and mainstem stream segments and compare tributaries.

- Represent *Water Quality Study* data graphically.
- Compare *Biological and Physical Study* data.

**VI. Establish *streamlined sampling network* within the *comprehensive sampling network*.**

- Select and number stream sampling stations.
  - Select mainstem stream sampling stations representing mainstem stream segments.
  - Select all mainstem tributary sampling stations at the mouth locations only.

**VII. Implement sampling sweeps of *streamlined sampling network*.**

- Conduct *Water Quality Study* sweeps three to six times spanning a range of hydrologic and climatologic conditions.
  - Perform water sample collection.
    - Collect stream water sample for laboratory analysis employing “grab” sample method.
  - Perform field measurements.
    - Obtain insitu water quality measurements at all sampling stations.
    - Obtain stream flow.

**VIII. Review all data collected.**

- Analyze changes in tributary and mainstem stream segments and compare tributaries.
  - Represent *Water Quality Study* data graphically.
  - Compare *Biological and Physical Study* data.
  - Compare mainstem tributaries with respect to degree of impairment.

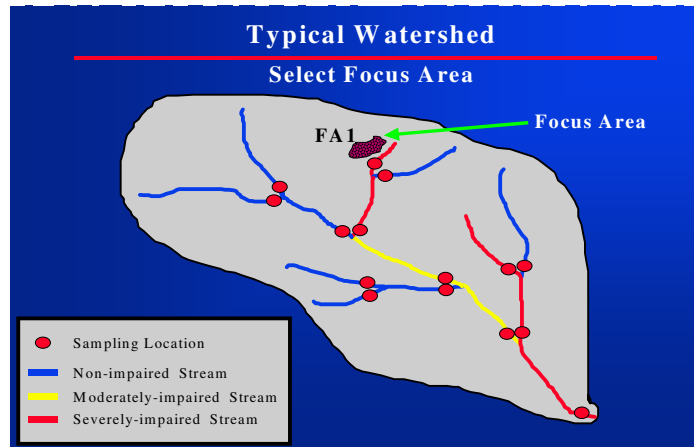
**IX. Define *focus study area*.**

- Select impaired tributary within *comprehensive sampling network* and determine watershed boundary.

**X. Establish *focus area sampling network* within the *focus study area*.**

- Locate mine drainage pollution discharge sampling stations within impaired tributary watershed.
  - Research existing data.
  - Field review entire impaired tributary watershed.
- Select impaired tributary sampling stations at mouth location and at extensive locations throughout the tributary stream reach, including stations upstream and downstream of mine drainage pollution discharge influx.

- Select receiving stream sampling stations upstream and downstream of the confluence with the impaired tributary.



**XI. Geo-reference *focus area sampling network* for input into Geographical Information Systems (GIS).**

**XII. Implement sampling sweeps of *focus area sampling network*.**

- Conduct *Water Quality Study* sweeps two to three times spanning a range of hydrologic and climatologic conditions.
  - Perform water sample collection.
    - Collect stream water sample for laboratory analysis employing “grab” sample method.
    - Collect pollution source water sample at origin. (When several sources co-mingle, it is necessary to collect a sample of the combined discharge.)
  - Perform field measurements.
    - Obtain insitu water quality measurements at all sampling stations.
    - Obtain stream flow.
- Conduct *Biological and Physical Study* one time between April and November.
  - Perform stream habitat assessments and qualitative benthic macroinvertebrate surveys upstream and downstream of mine drainage pollution discharge project areas.

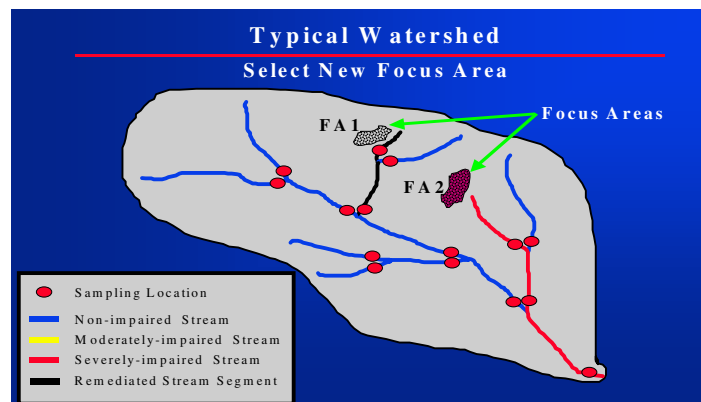
**XIII. Review all data collected.**

- Analyze *focus area sampling network* data.
  - Determine extent of impairment mine drainage pollution discharge contributes to the *focus area* impaired tributaries.
  - Determine site-specific mine drainage pollution discharge treatment technology for the sources at each project area.

- Evaluate chemical suitability of selected mine drainage pollution discharge treatment technology.
- Evaluate physical suitability of selected mine drainage pollution discharge treatment technology.
- Determine in-stream mine drainage pollution discharge treatment technology for stream benefits in addition to, or in lieu of site-specific pollution discharge treatment.

**XIV. Modify *focus area sampling network*. [If additional data is or may be required to support pre construction design(s), repeat XII through XIII.]**

- Cease sampling of any portion of project for which polluted water abatement appears infeasible.
- Incorporate sampling of any additional *focus area(s)* mine drainage pollution discharges found following completion of **XII**.



**XV. Report findings.**

- Prepare preliminary pre-design *Water Quality Study* report.

**Implementation**

**XVI. Establish *post construction focus area sampling network* when mine drainage pollution discharge treatment is complete in the *focus study area*. (If initial *study area* contains other *focus study area(s)* that have not been addressed, repeat IX through XV, otherwise continue.)**

- Locate constructed mine drainage pollution discharge treatment systems within treatment project boundaries.
  - Field review mine drainage pollution discharge treatment project site.
- Select and number stream sampling stations throughout *focus study area*.
  - Select the previously impaired tributary sampling stations at mouth location and at extensive locations throughout the tributary stream reach,



including stations upstream and downstream of mine drainage pollution discharge treatment project influx.

- Select receiving stream sampling stations upstream and downstream of the confluence with the previously impaired tributary.

**XVII. Geo-reference *post construction focus area sampling network* for input into Geographical Information Systems (GIS).**

**XVIII. Implement sampling sweeps of *post construction focus area sampling network*.**

- Conduct *Water Quality Study* sweeps monthly during the first year period; quarterly during the second year period; and semiannually during the third and every subsequent year period spanning a range of hydrologic and climatologic conditions.
  - Perform water sample collection.
    - Collect stream water sample for laboratory analysis employing “grab” sample method.
    - Collect untreated source water sample at origin if possible.
    - Collect treated source water sample at mine drainage pollution discharge treatment system outflow.
  - Perform field measurements.
    - Obtain insitu water quality measurements at all sampling stations.
    - Obtain stream flow.
- Conduct *Biological and Physical Study* one time between April and November, at least one year after completion of project construction.
  - Perform stream habitat assessments and qualitative benthic macroinvertebrate surveys upstream and downstream of mine drainage pollution discharge treatment project influx.

**XIX. Implement sampling sweeps of the *comprehensive sampling network*. (If mine drainage pollution discharge treatment is complete throughout initial *study area* continue.)**

- Conduct *Water Quality Study* sweeps three to six times spanning a range of hydrologic and climatologic conditions.
  - Perform water sample collection.
    - Collect stream water sample for laboratory analysis employing “grab” sample method.
  - Perform field measurements.
    - Obtain insitu water quality measurements at all sampling stations.
    - Obtain stream flow.
- Conduct *Biological and Physical Study* one time between April and November.
  - Perform stream habitat assessments and qualitative benthic macroinvertebrate surveys at all stream sampling stations.

- Perform fish survey at selective stream sampling stations only.

**XX. Review all data collected.**

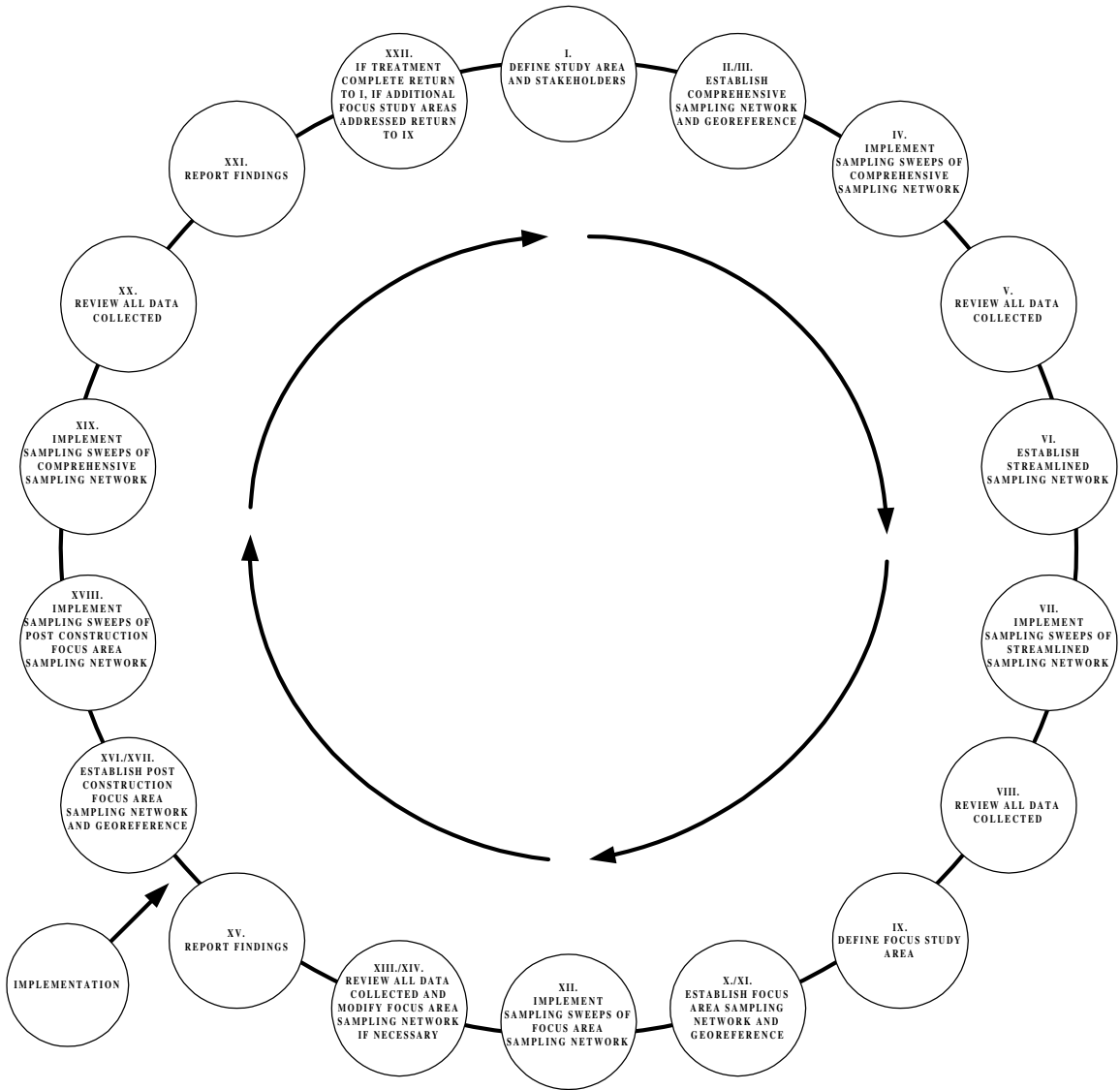
- Analyze changes in stream water quality.
- Analyze effectiveness and efficiency of constructed mine drainage pollution discharge treatment systems.
- Determine the effect of constructed mine drainage pollution discharge treatment systems on the mine drainage pollution discharges, *focus area sampling networks*, and *comprehensive sampling network*.

**XXI. Report findings**

- Prepare final post construction *Water Quality Study* report.

**XXII. If mine drainage pollution discharge treatment is complete throughout the study area, return to I. If additional *focus study areas* will be addressed within the study area, return to IX.**

## Holistic Watershed Approach Protocol



## Holistic Watershed Approach Protocol

**Appendix F**  
**Abatement Projects in the**  
**Tygart Valley River Watershed**

**Tygart Valley River Watershed Abandoned Mine Land and Mine Drainage Pollution Treatment and Abatement Projects in Planning, Mapping, Design, Completed and/or Ongoing Phase**

<u>Project</u>	<u>County</u>	<u>Status</u>	<u>Costs/Estimated Costs</u>
Austen Highwall, Refuse, & Portals (Raccoon Run)	Preston	Mapping	\$ 952,380.00
Beaver Creek Highwall	Barbour	Completed	\$1,124,845.00
Camp Mahonegan Surface Mines (Middle Fork)	Randolph	Completed	\$ 910,000.00
Coalton School Portals (Roaring Creek)	Randolph	Completed	\$ 47,184.00
Fords Run Refuse & Mining Facility	Barbour	Planning	\$ 631,400.00
Kittle Flats - Phase II (Middle Fork)	Randolph	Design	\$1,738,000.00
Kittle Flats – Phase I	Upshur	Completed	\$1,042,281.00
Left Fork of Little Sandy Creek	Preston	Completed	\$1,450,900.00
Mabie Highwall (Roaring Creek)	Randolph	Planning	\$ 593,120.00
Maple Run Portals	Preston	Mapping	\$ 654,390.00
Upshur Rt 10/15 Portals	Upshur	Completed	\$ 267,942.00
Whitman Flats	Upshur	Completed	\$1,174,839.00

The Special Reclamation Group has completed reclamation of the following bond forfeiture sites in the Tygart Valley River watershed:

<u>Permit No.</u>	<u>Permit Name</u>	<u>Forfeiture Date</u>	<u>County</u>	<u>Receiving Stream</u>
U039300				Moats Hollow of Laurel Cr
P102786	BALAR COAL CO.	11/01/88	BARBOUR	UT Raccoon Ck.
S108786	BEEFSTEAK MINING CO.	06/01/90	PRESTON	UT Raccoon Creek
R000784	BEEFSTEAK MINING CO.	10/13/89	PRESTON	New Found Run of French Ck
U202487	D. A. LAMBERT	12/28/92	UPSHUR	White Oak Run of Middle Fork River
U100289	DELTA MINING, INC.	03/18/93	UPSHUR	Frog Run of L.Sandy Cr
U034700	EASTERN MT. MINING CO.	05/19/92	PRESTON	Phillips Camp Run
S104487	ENERGY RESOURCES MINING CO.	01/29/81	RANDOLPH	UT Left Fk. Sandy Ck.
S005784	F & M COAL CO.	04/30/92	PRESTON	UT Left Fk. of Sandy Cr.
U102688	F & M COAL CO.	03/13/92	PRESTON	UT Left Fk of Sandy Cr.
S019878	F & M COAL CO.	02/18/93	PRESTON	UT of Tygart Valley River
P102789	GATOR MINING, INC.	06/13/85	BARBOUR	Tygart Valley River
S007178	GEORGE PHILLIPS	08/01/90	PRESTON	
P003679	GREENBRIER ENERGY	08/29/80	BARBOUR	
S201289	H & A COAL CO.	12/22/80	UPSHUR	UT of French Ck.
U058800	HOPE COAL CO.	12/03/91	UPSHUR	Long Run
U070800	INTERNATIONAL COAL CO.	05/07/85	RANDOLPH	Long Run of Middle Fork River
	INTERNATIONAL COAL CO.	05/07/85	RANDOLPH	

## Metals and pH TMDLs for the Tygart Valley River Watershed

S003982				UT Racoon Ck
S005283	INTER-STATE LUMBER CO.	07/31/95	PRESTON	UT Racoon Ck
S009682	INTER-STATE LUMBER CO.	07/31/95	PRESTON	UT Birds Ck.
S003685	INTER-STATE LUMBER CO.	07/31/95	PRESTON	Racoon Ck
S011879	J & R COAL CO.	03/29/93	PRESTON	UT of Tygart River
S018477	KEISTER COAL	06/01/83	BARBOUR	Gower Run
S008185	KEISTER COAL	09/01/83	BARBOUR	Bird Ck
U030000	MARY LOU COAL CO.	02/26/88	PRESTON	UT Laurel Run, Roaring Creek
U071000	METT, INC. #1	01/01/81	RANDOLPH	
S200486	MOGASCO'S	07/01/84	UPSHUR	Gower Run
D043500	NATIONAL CONSTRUCTION COMPANY, INC.	12/07/98	Barbour	
S041900	PHOENIX RESOURCES, INC.	09/22/94	RANDOLPH	
U029900	PHOENIX RESOURCES, INC.	08/03/94	RANDOLPH	
S010078	PHOENIX RESOURCES, INC.	08/03/94	RANDOLPH	L.Fk. of Sand Run
S003679	PIERCE COAL & CONSTR. CO.	12/01/82	UPSHUR	White Oak Run & Sand Run
S010980	PIERCE COAL & CONSTR. CO.	12/01/82	UPSHUR	UT Lt Sandy Ck & L Fk of Lt Sandy Ck
O103587	PONTORERO & SONS COAL	07/17/91	PRESTON	UT of Birds Ck
O004385	PRESTON ENERGY, INC.	05/05/94	PRESTON	Birds Ck
S002881	PRESTON ENERGY, INC.	05/24/94	PRESTON	UT Birds Ck
U071400	PRESTON ENERGY, INC.	05/25/94	PRESTON	UT Laurel Run of Roaring Ck
S011577	PRESTWOOD CO., INC.	11/02/94	RANDOLPH	Little Laurel Fork of Buckhannon River
D005581	R & A COAL CO.	01/24/83	UPSHUR	UT of Bird's Ck
S200386	STATUE MINING CO., INC.	05/24/94	PRESTON	Left Fk. of Gower Run
S201386	WERNER MINING CO., INC.	05/20/92	BARBOUR	Tallman's Run
	WERNER MINING CO., INC.	05/20/92	BARBOUR	

Reclamation activities are initiated, but not yet completed at the following sites:

Permit No.	Permit Name	Forfeiture Date	County	Receiving Stream
S101888				Left Fk of Little Sandy Cr
E011800	AMANDA NICOLE FUELS, INC.	06/12/92	PRESTON	
S001278	BLONDY MINING, INC.	05/04/99	BARBOUR	Buckhannon River
S013578	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
S013874	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
S016477	DLM COAL CO.	09/03/85	UPSHUR	Buckhannon River
	DLM COAL CO.	09/16/85	UPSHUR	

## Metals and pH TMDLs for the Tygart Valley River Watershed

S018777				Buckhannon River
S000280	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
S005877	DLM COAL CO.	09/13/85	UPSHUR	Buckhannon River
H023200	DLM COAL CO.	09/16/85	UPSHUR	
I073900	DLM COAL CO.	10/01/85	UPSHUR	Buckhannon River
I078000	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
P042600	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
R042300	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
U023100	DLM COAL CO.	09/16/85	UPSHUR	Buckhannon River
	DLM COAL CO.	09/16/85	UPSHUR	

Reclamation has yet to be initiated at the following sites:

Permit No.	Permit Name	Forfeiture Date	County	Receiving Stream
S103286				Kanes Ck. & UT of Squires Ck
S102388	ED-E DEVELOPMENT CO., INC.	03/29/93	PRESTON	
O204488	K. C. & M. COAL COMPANY	03/08/00	PRESTON	Left Fork Buckhannon River
S205286	MARSON COAL COMPANY	04/13/00	Randolph	
U200588	MARSON COAL COMPANY	10/12/99	RANDOLPH	
S202187	MARSON COAL COMPANY	10/12/99	RANDOLPH	Left Fork of Buckhannon River
U010383	MARSON COAL COMPANY INC.	09/11/00	Randolph	Left Fk. of Little Sandy Creek
U004384	PRESTON ENERGY, INC.	09/29/94	PRESTON	Left Fk. of Little Sandy Creek
S200693	PRESTON ENERGY, INC.	09/29/94	PRESTON	Doe Run & Lick Run
	RALPH KNICELEY CONSTR.	04/03/96	RANDOLPH	

The Special Reclamation Group is currently applying active chemical treatment at two sites in the Tygart Valley River watershed. The first site is the DLM Mine Complex in Upshur County. Treatment to NPDES technology-based effluent limitations is required through litigation by the West Virginia Highlands Conservancy in 1985. Drainage from the Complex flows into several small tributaries of the Buckhannon River. The second site is the F&M Mine Complex in Preston County. Treatment at this site is a result of litigation by the Laurel Mountain/Fellowsville Area Clean Watershed Association. Treatment to technology-based effluent limitations requirements is the goal but not the requirement at F&M. Drainage from the site flows into the Left Fork of Sandy Creek, Sandy Creek, and then into the Tygart Lake.