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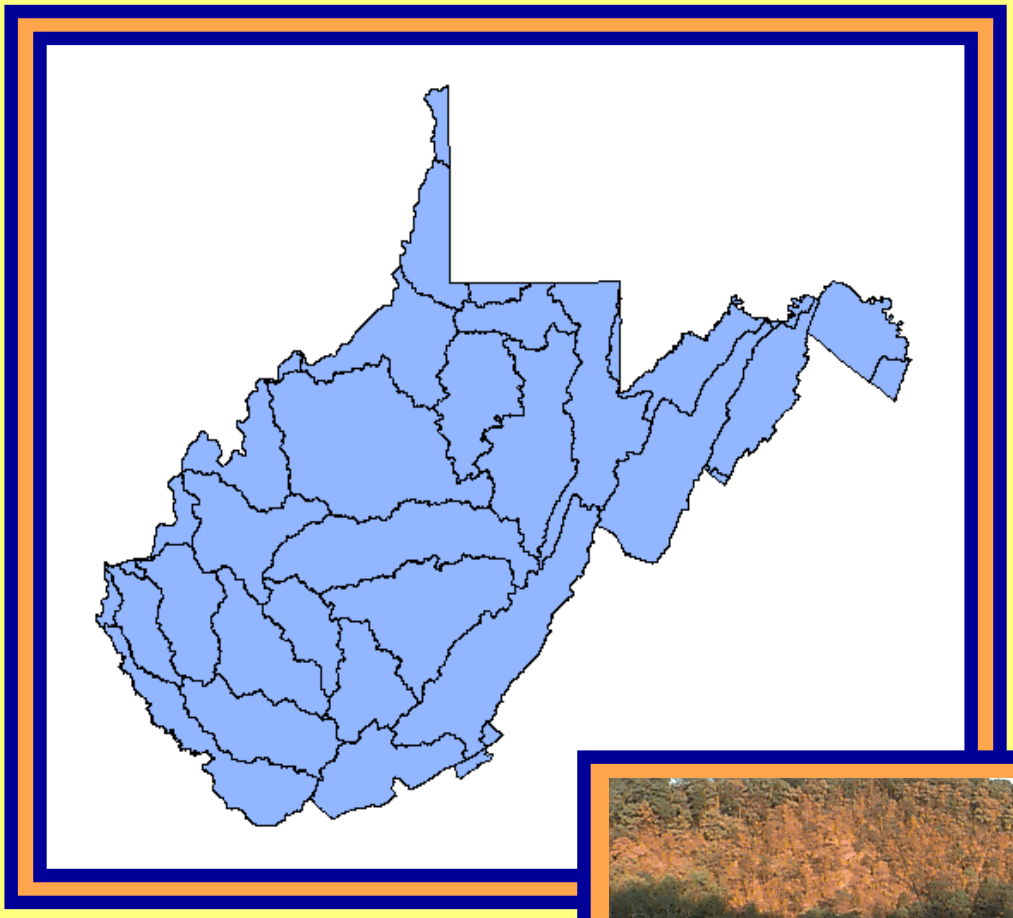
Version 12/08/98

West Virginia's Water Quality Assessment



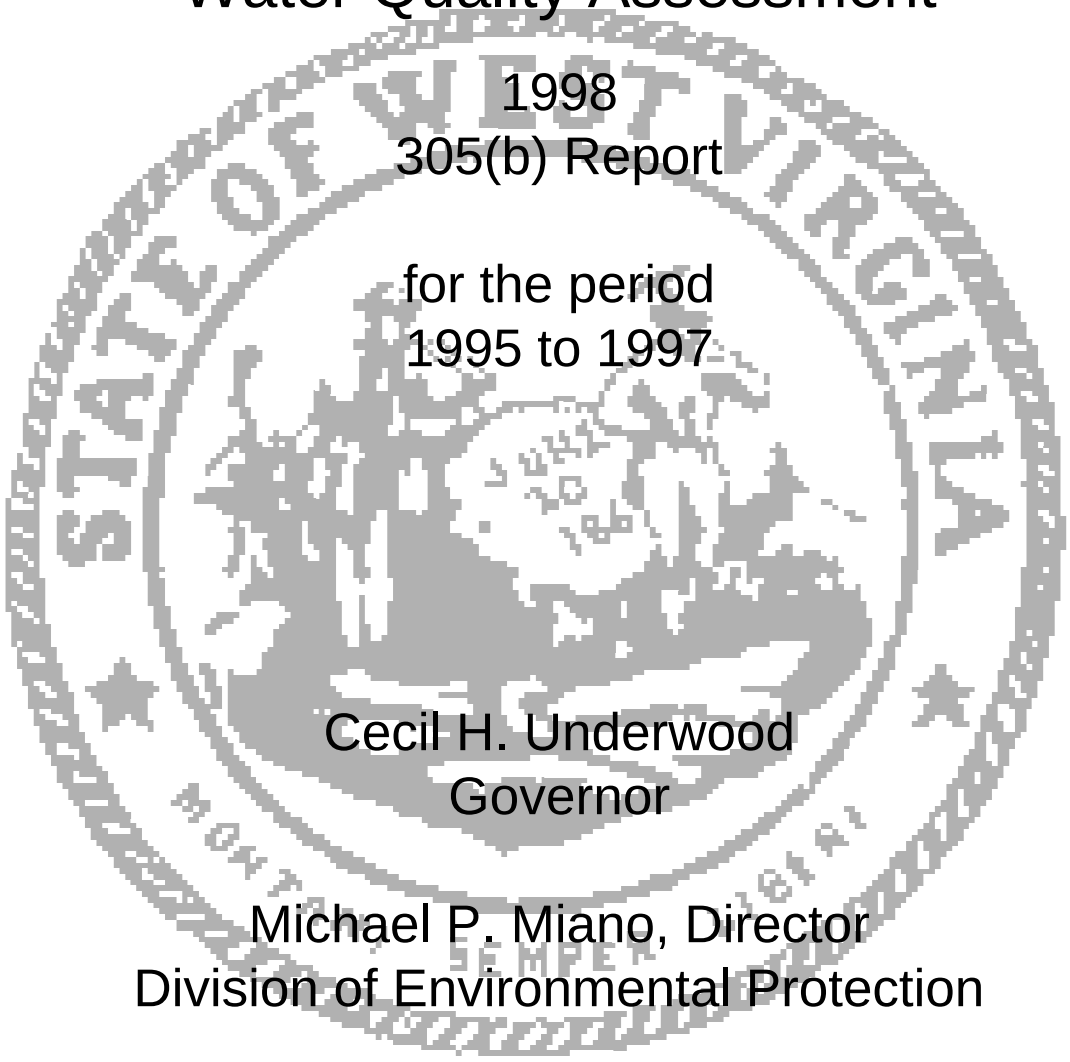
305(b) Report 1998

West Virginia

Water Quality Assessment

1998
305(b) Report

for the period
1995 to 1997



Cecil H. Underwood
Governor

Michael P. Miano, Director
Division of Environmental Protection

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Office of Water Resources

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PART I: EXECUTIVE SUMMARY/OVERVIEW

This report has been prepared to meet the requirements of section 305(b) of the federal Clean Water Act (CWA). It was compiled from data collected by a number of state, interstate, and federal agencies, including the WV Division of Environmental Protection, WV Division of Natural Resources, WV Bureau for Public Health, Ohio River Valley Water Sanitation Commission, U.S. Geological Survey, U.S. Forest Service and U.S. Army Corps of Engineers. It provides a general assessment of the quality of the state's surface and groundwater resources.

The report addresses public health/aquatic life concerns and provides updated assessments of West Virginia's lakes, wetlands, and nonpoint source programs. It also discusses special state concerns and describes existing programs for the monitoring and control of water pollution. In addition, the report provides recommendations for the improvement of water quality management in West Virginia.

There are more than 9,000 streams in West Virginia, comprising a total length of more than 32,000 miles (over 21,000 miles of perennial streams and over 11,000 miles of intermittent streams). Any assessment of this type can only be a broad overview. More specific information on individual streams can be found in the various watershed assessment reports being published by the West Virginia Division of Environmental Protection (DEP). A brief inventory of West Virginia’s water resources is provided in Table 1.

The format of this 305(b) report represents a significant departure from previous reports. In the past, DEP has reported on water quality in the state as a whole without discussing individual watersheds. In this report, the discussion focuses on a subset of the state’s 32 major watersheds, or Hydrologic Units. The watersheds in this report are the Upper Ohio River North, Upper Kanawha River, Youghiogheny River, Cheat River, Shenandoah River, and South Branch Potomac River. These watersheds are in Group A (Figure 1) and were assessed in 1996.

Most of the data used in this report was collected by theOffice of Water Resources’ Watershed Assessment Program (WAP) as part of its rotating basin assessment strategy established in 1996. For five years beginning in 1996, WAP will be responsible for collecting water quality data in six to seven of the state’s 32 major watersheds (8-digit

U.S.G.S. Hydrologic Units). Then the process will begin again. In this manner, DEP can achieve comprehensive coverage of the state's waters every five years.

Advantages of this pre-set timetable include: a) synchronizing study dates with permit cycles, b) facilitating the addition of stakeholders to the information gathering process, c) insuring assessment of all watersheds, d) improving the OWR's ability to plan and e) buffering the assessment process against domination by special interests.

TABLE 1
WATER RESOURCES ATLAS

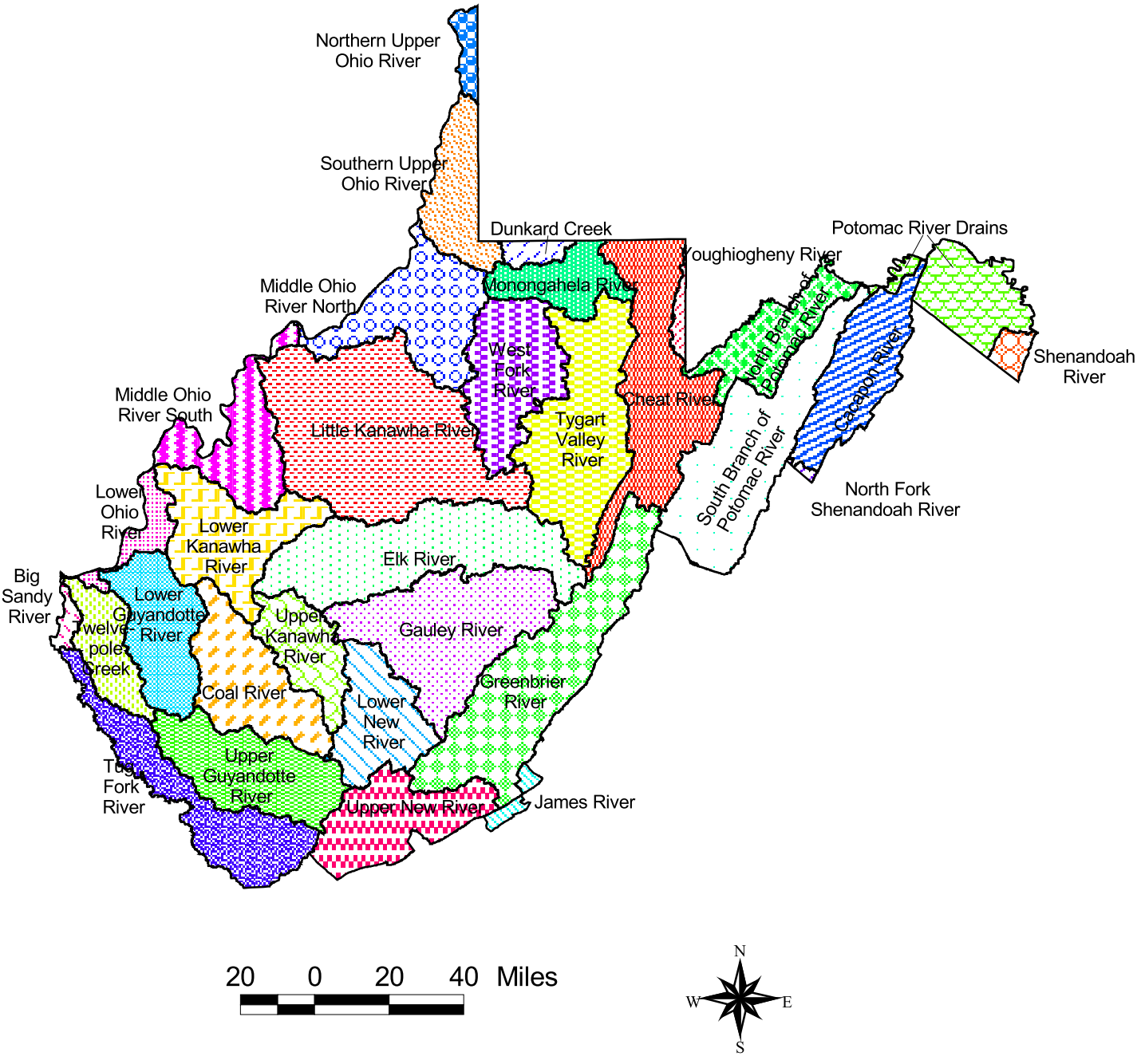
State Population (1990)	1,793,477
State Surface Area (in square miles)	24,282
Number of Water Basins (according to state subdivisions)	32
Total Number of River and Stream Miles	32,278
Number of Perennial River Miles (subset)	21,114
Number of Intermittent Stream Miles (subset)	11,164
Number of Ditches and Canals in Miles (subset)	18
Number of Border Miles (subset)	619
Number of Lakes/Reservoirs/Ponds (publicly-owned)	108
Acres of Lakes/Reservoirs/Ponds (publicly-owned)	22,373
Square Miles of Estuaries/Harbors/Bays	0
Number of Ocean Coastal Miles	0
Number of Great Lake Shore Miles	0
Acres of Freshwater Wetlands	102,000
Acres of Tidal Wetlands	0

In addition to data collected by WAP and those agencies mentioned in paragraph one, citizens monitoring data was used in this 305(b) report. However, only data that pertains to the watersheds in this report were considered. Restated a different way, keeping with the rotating basin assessment strategy, only the Group A hydrologic regions (Figure 1) were assessed in this 305(b) report. Data from other watersheds will be kept on file and reported on when the process moves in to Groups B, C, D, and E. Watersheds

visited by WAP in 1997 and 1998 (Figure 1, Groups B and C, respectively) will be included in the 305(b) Report for the year 2000. (Note: data from watersheds monitored in 1997 and 1998 were not available when this report was initiated).

West Virginia Hydrologic Unit Groupings

Figure 1



The majority of data used in this report is less than five years old. The only exceptions are data from mine drainage and acid rain impacted streams, in which cases water quality is not likely to change unless treatment has been initiated. Thus, this report is a current and accurate account of the quality of the states assessed waters.

It is important to note that many streams selected for monitoring during this reporting period were not selected in random fashion, but were sampled because of known or suspected pollution problems. Because sampling of streams in West Virginia traditionally has not been performed in random fashion, it is prudent not to make general inferences about the quality of West Virginia streams based solely upon the data used in this report.

In order to provide a more accurate picture regarding general water quality conditions in the state, WAP established a random monitoring program in 1997 to complement its targeted stream program. Random monitoring will enable DEP to make general inferences regarding the state's water quality in a statistically valid manner. This new assessment characterization tool will be applied to Group B and Group C Hydrologic Units in the 305(b) report for the year 2000. A general discussion regarding the targeted and random monitoring protocols WAP utilizes is contained in OWR's Quality Assurance Project Plan for the Watershed Assessment Program (OWR, 1997).

During this reporting period, 15 of West Virginia's public lakes were evaluated. They were monitored in 1996 and were the last lakes to be monitored under the state's Clean Lakes Program. The program has since been phased out due to lack of funding. EPA also phased out its Clean Lakes Program during this reporting period due to lack of funding from Congress. The federal program was the state's primary funding source for lake monitoring and assessment.

West Virginia's wetlands (102,000 acres) comprise less than 1 percent of the state's total acreage. The state takes great interest in the management of these areas. Such management efforts are mainly geared toward protection of wetlands either by regulatory proceedings or acquisition. West Virginia has an active Section 401 certification program. However, permitting authority for activities impacting wetlands (Section 404) lies with the U.S. Army Corps of Engineers.

The Wildlife Resources Section of the Division of Natural Resources updated its wetlands inventory in 1996. Current wetland information is described in a booklet entitled

"West Virginia's Wetlands...Uncommon, Valuable Wildlands" (Tiner, 1996). This publication is available from the West Virginia Wildlife Resources Section, Technical Support Unit, P. O. Box 67, Elkins, WV 26241.

The state's groundwater resources are regulated by OWR's Groundwater Program. Passage of the Groundwater Protection Act in 1991 has had a significant positive impact on the way the resource is managed. The Groundwater Protection Act requires that DEP provide a biennial report to the Legislature on the status of the state's groundwater and groundwater management program. Current information on the state's groundwater programs and activities can be found in the biennial report to the West Virginia 1998 Legislature (OWR, 1998).

Control of water pollution in the state is primarily achieved through the National Pollutant Discharge Elimination System (NPDES) permitting system. These permits emphasize the use of either the best available technology approach to point source control, or, particularly on smaller streams, water quality based requirements. Control of water pollution encompasses facility inspections, complaint investigations, compliance monitoring, biological monitoring and chemical monitoring. Inspections of activities under the nonpoint source program are intended to reduce pollution from these sources. The vast majority of these inspections have been directed toward silviculture and construction activities.

West Virginia's surface water monitoring program is comprised of compliance inspections, intensive biological and/or chemical surveys on a site-specific basis, ambient chemical monitoring, rotating watershed surveys, total maximum daily load support studies, and citizens monitoring.

Site-specific fish tissue evaluation is carried out to respond to human health concerns. When necessary, fish consumption advisories are issued. A list of current fish consumption advisories is contained in Table 7 of this report.

A cost/benefit assessment is included, not only to provide an idea of some of the costs involved in maintaining acceptable water quality, but also to provide information relating to the benefits resulting from clean water.

Finally, the increasing importance of total maximum daily loads (TMDL), and the relationships between 305(b) reporting and 303(d) listing, deserves discussion. During this

reporting period the requirements and principles in these areas have changed dramatically from something poorly understood to the focal point of agency activity.

This change was brought about by a lawsuit filed in federal court relating to the state's failure to develop TMDL's for impaired waters. A settlement between EPA and the plaintiffs was approved on July 09, 1997. Subsequently DEP and EPA activities and funding have been concentrated on efforts to comply with the agreement.

As TMDL's become more common, and their regulatory implications are better understood, accurate determination of whether or not streams support their designated uses becomes even more critical. In the simplest terms, if a waterbody is less than fully supporting its designated uses, it is subject to TMDL development. However, listing exceptions, data quantity, and data quality issues provide for differences between a classification of less than fully supporting a designated use in a 305(b) report and an appearance on the 303(d) list. Further information on this subject can be found in West Virginia's 1998 303(d) list and its supporting information.

PART II: SURFACE WATER ASSESSMENT

Northern Upper Ohio River Watershed

Background

Located in the northern tip of West Virginia's northern panhandle, The Northern Upper Ohio River watershed (hydrologic unit #05030101) is a circumscribed cluster of tributaries flowing through Hancock and Brooke counties directly into the Ohio River. The headwaters of many of these streams lie in Pennsylvania. Within West Virginia , this watershed is about 20 miles long (north-to-south) by 4.5 miles wide (east-to-west). A portion of the Ohio River (31.40 miles) forms the northern and western border from the Pennsylvania line southward to the mouth of Cross Creek in Brooke County. A total of 37 streams comprise the 149.70 miles contained within the watershed. A generalized map of the watershed with monitoring stations is provided in Figure 2. Table 2 is a list of these stations.

One of West Virginia's most industrialized areas, the watershed includes chemical and steel production, as well as coal mining. Historically, many of the streams have been polluted by both domestic sewage and industrial discharges.

Water Quality Summary

During this reporting period, all 37 streams in the Northern Upper Ohio River watershed were monitored. A summary of overall designated use support is provided in Table 2 while a use support matrix summary of all designated uses is given in Table 3.

Of the 139.10 stream miles assessed, 9.49 (6.8%) were fully supporting their overall designated uses, 24.20 (17.4%) were fully supporting but threatened, 95.32 (68.5%) were partially supporting, and 10.09 (7.3%) were not supporting.

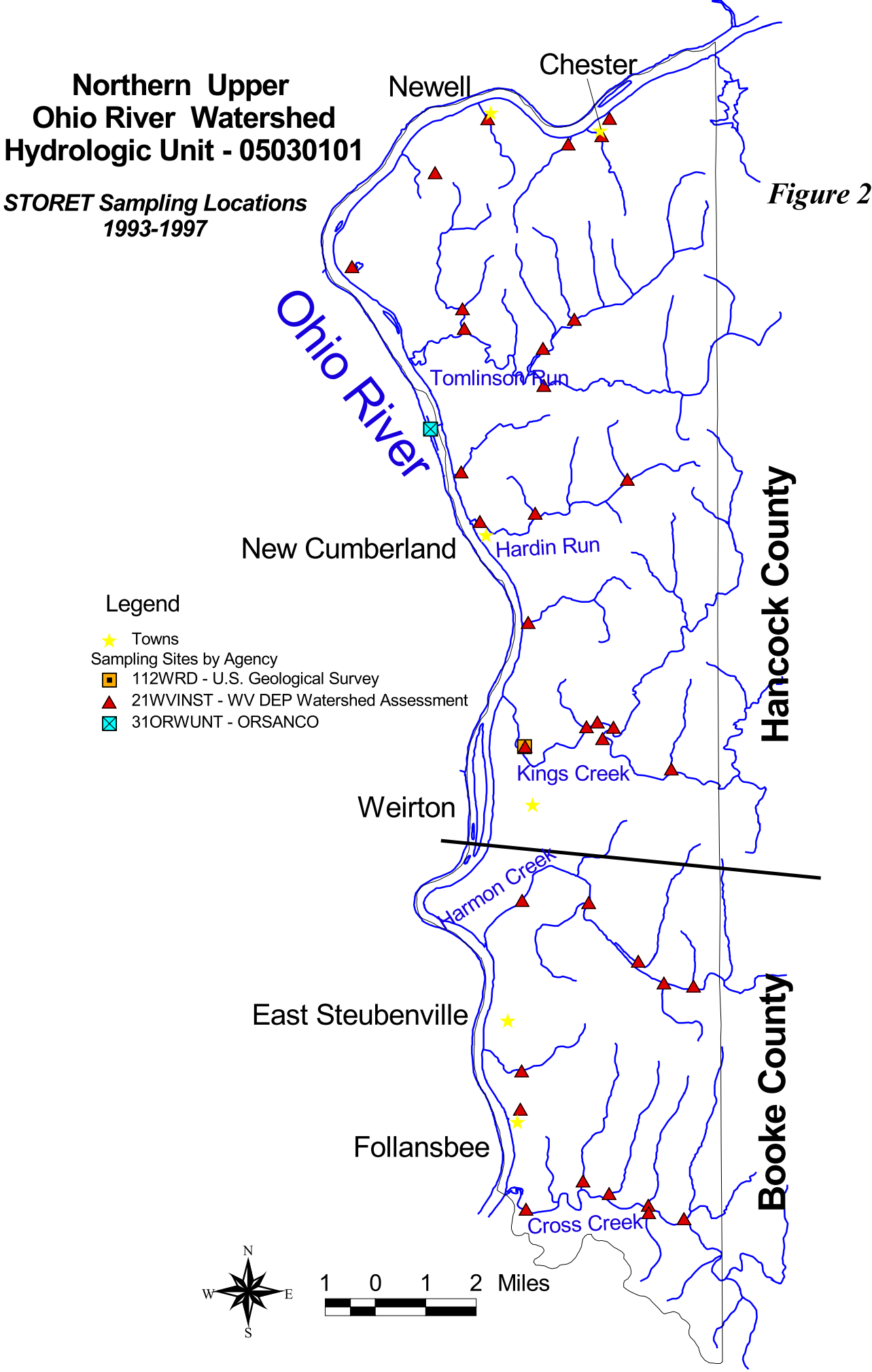
The fishable goal of the Clean Water Act (CWA) essentially is assessed in two parts: Aquatic Life Support use and Fish Consumption use. Of the 141.10 miles assessed for Aquatic Life Support use, 11.38 (8.1%) were fully supporting, 28.53 (20.2%) were fully supporting but threatened, 91.10 (64.5%) were partially supporting, and 10.09 (7.2%) were not supporting. For the Fish Consumption use, all 31.40 miles assessed were partially supporting. This mileage corresponds to the Ohio River mainstem segment which has a fish consumption advisory in effect due to PCB and chlordane contamination.

The swimmable goal of the CWA, like the fishable goal, is assessed in two parts: Primary Contact Recreation use and Secondary Contact Recreation use. The Secondary

Northern Upper Ohio River Watershed Hydrologic Unit - 05030101

STORET Sampling Locations 1993-1997

Figure 2



Contact Recreation use is not recognized in the state's water quality standards, therefore it is not assessed. Of the 133.55 miles assessed for Primary Contact Recreation use, 34.45 (25.8%) were fully supporting, 54.29 (40.7%) were fully supporting but threatened, and 44.81 (33.5%) were partially supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Northern Upper Ohio River watershed is provided in Table 4.

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are fecal coliform (44.81 miles), metals (41.56 miles), siltation (31.40 miles), and total toxics (31.40 miles). A large portion of the stream mileage (31.40 miles) contributing to these totals is the Ohio River mainstem.

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Northern Upper Ohio River watershed is provided in Table 5.

Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are unknown source (74.47 miles), abandoned mining (40.76 miles), and land disposal (34.92 miles).

Table 2
STORET Sampling Locations for
Northern Upper Ohio River Watershed
Hydrologic Unit Code -05030101
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
112WRD	03110830	KINGS CREEK AT WEIRTON WV - HANCOCK
21WVINST	O-095	Cross Creek near Wellsburg WV - BROOKE
21WVINST	O-095.5	Allegheny Steel Run at Follansbee WV - BROOKE
21WVINST	O-095-A	Bosley Run near Rockdale WV - BROOKE
21WVINST	O-095-B	Ebenezer Run at Louise WV - BROOKE
21WVINST	O-095-C	North Potrock Run near Louise WV - BROOKE
21WVINST	O-095-D	Potrock Run near Louise WV - BROOKE
21WVINST	O-095-E	Scott Run near Virginville WV - BROOKE
21WVINST	O-095-E-1	Parmar Run near Virginville WV - BROOKE
21WVINST	O-096	Mahan Run above Coketown WV - BROOKE
21WVINST	O-097	Harmon Creek at Weirton WV - BROOKE
21WVINST	O-097-A	Sappington Run at Weirton WV - BROOKE
21WVINST	O-097-B	Alexanders Run at Weirton WV - BROOKE
21WVINST	O-097-C	Mechling Run at Weirton WV- BROOKE
21WVINST	O-097-D	Brown Hollow at Weirton WV- BROOKE
21WVINST	O-098	Kings Creek at Weirton WV -HANCOCK
21WVINST	O-098-.5A	Turkey Foot Run at Weirton WV - HANCOCK
21WVINST	O-098-.7A	Rush Run at Weirton WV- HANCOCK
21WVINST	O-098-A	North Fork at Weirton WV- HANCOCK
21WVINST	O-098-A.5	Marrow Run at Weirton WV - HANCOCK
21WVINST	O-098-B	Lick Run at Weirton WV - HANCOCK
21WVINST	O-099	Holbert Run near Zalia WV - HANCOCK
21WVINST	O-100	Hardin Run at New Cumberland WV - HANCOCK
21WVINST	O-100-A	Herron Run near New Cumberland WV - HANCOCK
21WVINST	O-100-B	Longfill Run near New Cumberland WV - HANCOCK
21WVINST	O-101	Deep Gut Run near New Cumberland WV- HANCOCK

Table 2 STORET Sampling Locations for Northern Upper Ohio River Watershed Hydrologic Unit Code -05030101 for 1993-1997		
Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	O-102	Tomlinson Run/ Tomlinson State Park WV-HANCOCK
21WVINST	O-102-A	Whiteoak Run/ Tomlinson State Park WV - HANCOCK
21WVINST	O-102-B	South Fork/ Tomlinson Run State Park WV - HANCOCK
21WVINST	O-102-C	North Fork/ Tomlinson Run State Park WV - HANCOCK
21WVINST	O-102-C-1	Mercer Run near Tomlinson Run State Park - HANCOCK
21WVINST	O-103	Dry Run above Arroyo WV - HANCOCK
21WVINST	O-104	Congo Run above Congo WV - HANCOCK
21WVINST	O-105	Laurel Hollow above Newell WV- HANCOCK
21WVINST	O-106	Cunningham Run in Chester WV- HANCOCK
21WVINST	O-107	Middle Run at Chester WV - HANCOCK
21WVINST	O-108	Marks Run at Chester WV - HANCOCK
31ORWUNT	OR926.6M	Ohio River at New Cumberland Locks & Dam - JEFFERSON, OH

Note:

Agency Identifier Code	Name of Agency
112WRD	U.S. Geological Survey
21WVINST	West Virginia DEP Watershed Assessment Program
31ORWUNT	Ohio River Valley Water Sanitation Commission (ORSANCO)

Size of Waters Affected by Toxics

For purposes of this report, toxics monitoring refers only to streams sampled for priority pollutants listed in Section 307 of the Clean Water Act.

During this reporting cycle, 31.40 stream miles in the Northern Upper Ohio River

watershed were monitored for toxics and all 31.40 had elevated levels of toxics. The 31.40 stream miles monitored for toxics corresponded to the Ohio River mainstem segment within the watershed. No other streams were monitored for toxics. Elevated levels of toxics include

Table 3
USE SUMMARY REPORT: OVERALL USE SUPPORT
NORTHERN UPPER OHIO RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	37
Total Number of River/Streams Monitored:	37
Total Number of River/Streams Evaluated:	0

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	9.49	9.49
SUPPORTING BUT THREATENED	0.00	24.20	24.2
PARTIALLY SUPPORTING	0.00	95.32	95.32
NOT SUPPORTING	0.00	10.09	10.09
NOT ATTAINABLE	0.00	0.00	0
TOTAL SIZE ASSESSED	0.00	139.10	139.1

PCB's and chlordane in fish tissue and copper in the water column. The source of these contaminants is unknown

Public Health/Aquatic life Impacts

All fish consumption advisories and/or revisions are based on extensive data collection by state, interstate, and federal agencies. Risk assessment information and FDA action levels are taken into consideration when developing advisories. Details of all current fish consumption advisories are contained in Table 7.

Within the Northern Upper Ohio River watershed, only the Ohio River mainstem segment is under a fish consumption advisory. This risk based advisory was issued in May, 1996 and is due to contamination by pcb's and chlordane. The advisory remains in affect for the entire Ohio River mainstem. A commercial fishing ban on the Ohio River mainstem coincides with the fish consumption advisory.

Information on public drinking water supply/bathing beach closures was obtained from the state Bureau for Public Health (BPH). During this reporting period, no bathing beach or public water supply closures were documented in the watershed.

Information pertaining to pollution-caused fish kills is maintained by the Division of Natural Resources' (DNR) Wildlife Resources Section. During this reporting period, no fish kills were reported in the watershed.

TABLE 4
USE SUPPORT MATRIX SUMMARY
NORTHERN UPPER OHIO RIVER WATERSHED
WATERBODY TYPE: RIVER
UNITS IN MILES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	9.49	24.20	95.32	10.09	
Aquatic Life	11.38	28.53	91.10	10.09	
Fish Consumption			31.40		
Cold Water Fishery - Trout					
Shell fishing					
Warm Water Fishery	4.68	10.38	54.00		
Bait Minnow Fishery	6.70	18.15	37.10	14.93	
Primary Contact Recreation	34.45	54.29	44.81		
Secondary Contact Recreation					
Drinking Water Supply	17.20		14.20		
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial	31.40				
Navigation					
Wildlife					
Livestock Watering					

Section 303(d) Waters

Table 8 includes streams from the Northern Upper Ohio River watershed that are on the current 303(d) list. Sixteen streams from the watershed are on the list, including one (Ohio River mainstem) on the Primary Waterbody List, three on the Mine Drainage Impaired sublist, and 12 on the Biologically Impaired sublist.

Table 5
Complete Summary of Causes, Including User-Defined
Northern Upper Ohio River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	3.13	25.40
0200	PESTICIDES	31.40	0.00
0410	PCBs	31.40	0.00
0500	METALS	5.07	36.49
1000	pH	5.07	5.09
1100	SILTATION	0.00	31.40
1500	FLOW ALTERATIONS	9.50	3.72
1600	HABITAT ALTERATION (non-flow)	9.50	9.44
1700	PATHOGENS	31.40	13.41
1710	FECAL COLIFORM BACTERIA	31.40	13.41
2400	TOTAL TOXICS	31.40	0.00

Generally speaking, streams on the Primary Waterbody List are high priority for TMDL (total maximum daily load) development, streams on the Mine Drainage sublist are medium priority, and streams on the Biologically Impaired sublist are low priority. Very little is known about streams on the Biologically Impaired sublist, other than the fact that a single sample at the stream mouth revealed a rating of 50% or less when compared to the watershed reference site. Further study will be necessary to document the causes, sources, and spacial extent of the impairment.

Currently, no 303(d) listed streams in the Northern Upper Ohio River watershed have had TMDL's completed.

Table 6
Complete Summary of Sources, Including User-Defined
Northern Upper Ohio River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0100	INDUSTRIAL POINT SOURCES	0.80	0.00
0110	Major Industrial Point Source	0.80	0.00
0400	COMBINED SEWER OVERFLOW	31.40	0.00
1000	AGRICULTURE	0.00	31.40
1350	GRAZING RELATED SOURCES	0.00	5.08
1400	Pasture Grazing-Riparian and/or Upland	0.00	5.08
2000	SILVICULTURE	0.00	31.40
3000	CONSTRUCTION	0.00	31.40
4000	URBAN RUNOFF/STORM SEWERS	31.40	0.00
5000	RESOURCE EXTRACTION	4.27	36.49
5900	Abandoned Mining	4.27	36.49
6000	LAND DISPOSAL	0.00	34.92
6200	Wastewater	0.00	1.70
6800	Raw Sewage	0.00	1.82
7000	HYDRO MODIFICATION	9.50	5.42
7100	Channelization	9.50	5.42
7550	HABITAT MODIFICATION-Other Than HYDRO MODIFICATION	9.50	14.59
7600	Removal of Riparian Vegetation	9.50	14.59
7700	Stream bank Modification/Destabilization	7.61	6.46
9000	SOURCE UNKNOWN	34.53	39.94

Table 7
WEST VIRGINIA FISH CONSUMPTION ADVISORIES

				Species Affected Under Current Advisories and Consumption Categories			
Name of Waterbody	**Pollutant(s) of Concern**	**Source(s) of Pollutant**	**Affected Area (Miles)**	**One meal/week[1]**	**One meal/month[1]**	**Six meals/year[1]**	**Do not eat**
Kanawha River (O-20)	Dioxin	Unknown	From mouth of Coal River to Point. Pleasant (46.0)				Bottom Feeders
Pocatalico River (K-29)	Dioxin	Unknown	Lower two miles (2.0)				Bottom Feeders
Armour Creek (K-30)	Dioxin	Unknown	Lower two miles (2.0)				Bottom Feeders
Ohio River (O)	PCBs, Chlordane, Dioxin	Unknown	Entire length bordering West Virginia (227)	Largemouth & Smallmouth Bass, Sauger	White Bass, Hybrid Striped Bass, Fresh water Drum	Flathead & Channel Catfish less than 17" long	Carp, Channel Catfish more than 17" long
Shenandoah River (S)	PCBs	Avtex, Front Royal, VA	Entire length in WV (20)				Carp, Suckers, Channel Catfish
North Branch of Potomac River (P-20)	Dioxin	Westvaco Pulp Mill, Luke, MD	Lower 50 miles (50.0)				Non-Sport fish species
Potomac River (P)	Dioxin	Westvaco Pulp Mill, Luke, MD	From Piedmont to Cacapon R. (38)				Non-Sport fish species
Flat Fork Creek (KP-33)	PCBs	Spencer Transformer, Harmony, WV	Entire Length (5)				Carp, Suckers, Channel Catfish

[1] Advisories are based on a meal size of ½ pound of fish.

TABLE 8
West Virginia
1998 303(d) List
Northern Upper Ohio River Watershed

Primary Waterbody List

Stream Name	Stream Code	Use Affected	Pollutant	Primary Source	Size Affected in Miles	Reach Description	TMDL Priority	HUC
Ohio River	O	Human Health*	PCBs	Undetermined	277	Entire Length	High	Multiple
Ohio River	O	Human Health*	Chlordane	Undetermined	277	Entire Length	High	Multiple
Ohio River	O	Human Health#	Dioxin	Undetermined	79.5	MP 237.5 to MP 317	High	Multiple
Ohio River	O	Aquatic Life	Copper	Undetermined	72	MP-54.5 to MP 126.4	Low	Multiple
Ohio River	O	Aquatic Life	Aluminum	Undetermined	277	Entire Length	Low	Multiple
Ohio River	O	Aquatic Life, Human Health	Iron	Undetermined	117	East Liverpool to New Cumberland	Low	Multiple

Table 8 (continued)
Northern Upper Ohio River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Alexanders Run	O-97-B	3.35	Aquatic Life	Metals	Mine Drainage	Medium
Mechling Run	O-97-C	1.74	Aquatic Life	pH, Metals	Mine Drainage	Medium
Deep Gut Run	O-101	4.27	Aquatic Life	Metals	Mine Drainage	Medium

Table 8 (continued)
Northern Upper Ohio River Watershed
Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority
Potrock Run	O-95-D	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Scott Run	O-95-E	undetermined	Aquatic Life	Unknown	Unknown	36.0	Low
Allegheny Steel Run	O-95.5	undetermined	Aquatic Life	Unknown	Unknown	14.0	Low
Mahan Run	O-96	undetermined	Aquatic Life	Unknown	Unknown	43.0	Low
Brown Hollow	O-97-D	undetermined	Aquatic Life	Unknown	Unknown	29.0	Low
Marrow Run	O-98-A.5	undetermined	Aquatic Life	Unknown	Unknown	43.0	Low
Turkey Foot Run	O-98.5A	undetermined	Aquatic Life	Unknown	Unknown	43.0	Low
South Fork Tomlinson Run	O-102-B	undetermined	Aquatic Life	Unknown	Unknown	43.0	Low
North Fork Tomlinson Run	O-102-C	undetermined	Aquatic Life	Unknown	Unknown	43.0	Low
Mercer Run	O-102-C-1	undetermined	Aquatic Life	Unknown	Unknown	36.0	Low
Middle Run	O-107	undetermined	Aquatic Life	Unknown	Unknown	36.0	Low
Marks Run	O-108	undetermined	Aquatic Life	Unknown	Unknown	36.0	Low

* Contaminant found in fish tissue
# Contaminant found in fish tissue and water column

TMDL - Total Maximum Daily Load
HUC - Hydrologic Unit Code
MP - Mile Point

Upper Kanawha River Watershed

Background

The watershed area draining into Great Kanawha River, and lying between the confluence of Gauley and New Rivers on the upstream end and the confluence of Elk and Kanawha Rivers on the downstream end, is identified as the Upper Kanawha River watershed (hydrologic unit # 05050006). The watershed encompasses parts of Kanawha and Fayette Counties and is located roughly in the south-central part of the state. Approximately 38.5 miles of the Kanawha River mainstem lie within the watershed. The watershed contains 286 streams totaling approximately 631 miles. A generalized map of the watershed with monitoring stations is provided in Figure 3. Table 9 is a list of these locations.

This watershed lies within the Allegheny Plateau physiographic province. Its geological structure is characterized by cyclical sequences of sandstone, shale, and coal. The topography consists of steep-sided hills incised by very narrow valleys, with the notable exception of the broad Kanawha Valley.

In the 19th century, coal began to be extracted from seams located in the watershed. The establishment of rail lines up the tributaries of the Great Kanawha River further expanded mining opportunities. One outcome of this early mining was the destruction or impairment of hundreds of miles of streams within the watershed by acid and metals-laden mine drainage. The advent of surface mining also increased sediment loading to streams. As a result, significant damage was done to the watershed's aquatic resources.

Prior to mining, the salt industry was king in the Kanawha Valley. In addition, agriculture was common in the bottom lands and hillside benches. Much of the forest covering the watershed was gone by the latter part of the 19th century. It is likely that sediment negatively impacted streams during this great logging and agricultural era, but once farms were abandoned and the forest grew back, sediment from such activities became less. From World War I until now, coal mine drainage has played an increasingly larger role in hindering the recovery of fisheries and other aquatic resources. In addition, the densely populated hollows with a lack of adequate sewage treatment has resulted in impacts from sewage.

Water Quality Summary

During this reporting period, 121 (41%) of the streams in the Upper Kanawha River watershed were monitored. A summary of overall designated use support is provided in

Table 10 while a use support matrix summary of all designated uses is given in Table 11.

Upper Kanawha River Watershed
Hydrologic Unit Code 05050006

Figure 3

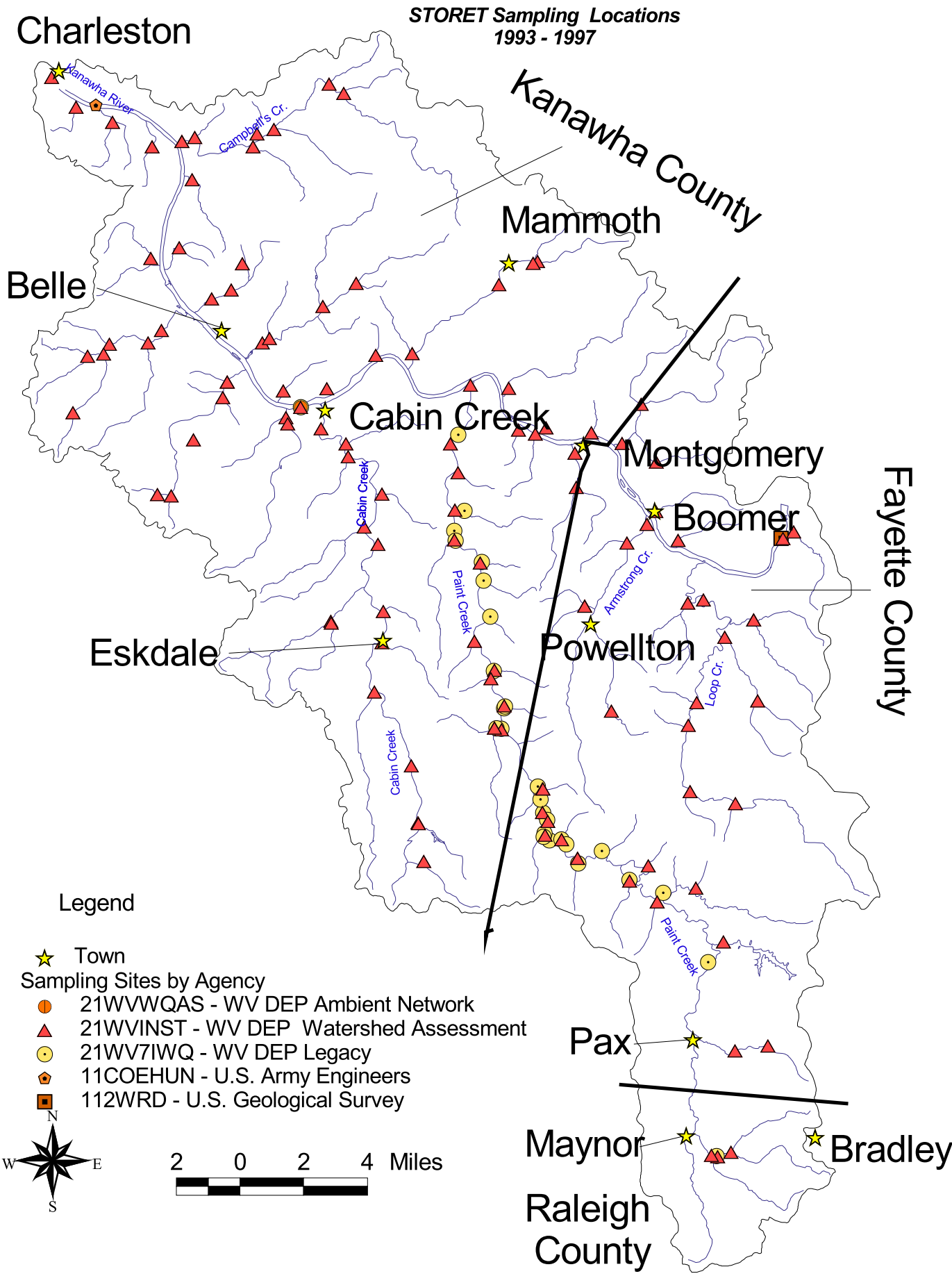


Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
11COEHUN	1KR0W6005	Kanawha River Mile 60 - KANAWHA
21WV7IWQ	550474	Kanawha River at Chelyan WV - KANAWHA
21WVWQAS	WA96-K02	Kanawha River at Chelyan WV - KANAWHA
21WV7IWQ	551083	Paint Creek above Holly Grove WV - KANAWHA
21WV7IWQ	551084	Paint Creek at Standard WV - KANAWHA
21WV7IWQ	551086	Paint Creek at Burnwell WV - KANAWHA
21WV7IWQ	551087	Paint Creek at Greencastle WV - KANAWHA
21WV7IWQ	551088	Banner Hollow near Livingston WV - KANAWHA
21WV7IWQ	551089	Fourmile Fork at Standard WV - KANAWHA
21WV7IWQ	551093	Tenmile Fork at Burnwell WV - KANAWHA
21WV7IWQ	551103	Collins Branch near Standard WV - KANAWHA
21WV7IWQ	551104	Buzzard Branch near Standard WV - KANAWHA
21WV7IWQ	551106	Toms Branch at Whittaker WV - KANAWHA
21WV7IWQ	551107	Sycamore Branch near Burnwell WV - KANAWHA
21WV7IWQ	551105	Ash Branch near Standard WV - KANAWHA
112WRD	03193000	Kanawha River at Kanawha Falls WV - FAYETTE
21WV7IWQ	551085	Paint Creek at Westerly WV FAYETTE
21WV7IWQ	551090	Mossy Creek at Mossy WV - FAYETTE
21WV7IWQ	551091	Milburn Creek below Kingston WV - FAYETTE
21WV7IWQ	551092	Paint Creek below Milburn WV - FAYETTE
21WV7IWQ	551094	Hickory Camp Branch at Mahan WV - FAYETTE
21WV7IWQ	551095	Unnamed Creek #1 Paint Creek near Coalfield WV - FAYETTE
21WV7IWQ	551096	Unnamed Creek #2 Paint Creek near Coalfield WV - FAYETTE
21WV7IWQ	551097	Fifteenmile Creek near Milburn WV - FAYETTE
21WV7IWQ	551098	Spring Branch at Milburn WV - FAYETTE
21WV7IWQ	551099	Unnamed tributary of Paint Creek above Milburn WV - FAYETTE

Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WV7IWQ	551100	Skitter Creek near Milburn WV - FAYETTE
21WV7IWQ	551102	Paint Creek above Coalfield WV - FAYETTE
21WV7IWQ	551120	Paint Creek below Lively WV - FAYETTE
21WV7IWQ	551125	Cedar Creek near Mahan WV - FAYETTE
21WV7IWQ	551132	North Sand Branch below Bradley WV - RALEIGH
21WVINST	K-45	Lick Branch in Charleston WV - KANAWHA
21WVINST	K-46-A	Mission Hollow in Charleston WV - KANAWHA
21WVINST	K-48	Lower Donnally Branch in Charleston WV - KANAWHA
21WVINST	K-49-{00.3)	Campbells Creek in Charleston WV - KANAWHA
21WVINST	K-49-{00.3}	Campbells Creek in Charleston WV - KANAWHA
21WVINST	K-49-A	Dry Branch at Charleston WV - KANAWHA
21WVINST	K-49-D	Coal Fork above Coal Fork WV - KANAWHA
21WVINST	K-49-E	Clover Hollow at Coal Fork WV - KANAWHA
21WVINST	K-49-F	Point Lick Fork at Point Lick WV - KANAWHA
21WVINST	K-49-H	Five Mile Hollow at Five Mile WV - KANAWHA
21WVINST	K-49-I	Rattlesnake Hollow at Cinco WV - KANAWHA
21WVINST	K-50	Georges Creek above Malden WV - KANAWHA
21WVINST	K-51	Rush Creek at Marmet WV - KANAWHA
21WVINST	K-51-A	Right Fork Rush Creek at Marmet WV - KANAWHA
21WVINST	K-52	Burning Spring Branch at Dupont City WV - KANAWHA
21WVINST	K-53-{00.3}	Lens Creek above Marmet WV - KANAWHA
21WVINST	K-53-A	Left Fork Lens Creek above Marmet WV - KANAWHA
21WVINST	K-53-B	Ring Hollow at Hernshaw WV - KANAWHA
21WVINST	K-53-C	Four Mile Creek near Hernshaw WV - KANAWHA
21WVINST	K-53-C-1	Spruce Fork near Hernshaw WV - KANAWHA
21WVINST	K-53-D	Six Mile Branch near Hernshaw WV - KANAWHA

Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	K-54	Simmons Creek at Belle WV - KANAWHA
21WVINST	K-54-A	Kelly Branch near Belle WV - KANAWHA
21WVINST	K-57	Witcher Creek at Belle WV - KANAWHA
21WVINST	K-57-A	Dry Branch near Belle WV - KANAWHA
21WVINST	K-57-C	Left Fork of Witcher Creek near Belle WV - KANAWHA
21WVINST	K-57-D	Counterfeit Branch near Belle WV - KANAWHA
21WVINST	K-58	Fields Creek near Chesapeake WV - KANAWHA
21WVINST	K-58-A	Mill Branch near Chesapeake WV - KANAWHA
21WVINST	K-58-B.1	Wolfpen Hollow near Chesapeake WV - KANAWHA
21WVINST	K-58-B.8-1	New West Hollow near Winfrede WV - KANAWHA
21WVINST	K-58-B.8-2	Old West Hollow near Winifrede WV - KANAWHA
21WVINST	K-59	Carroll Branch at Quincy WV - KANAWHA
21WVINST	K-60	Slaughter Creek near Chelyan WV - KANAWHA
21WVINST	K-60-A	Little Creek near Chelyan WV - KANAWHA
21WVINST	K-61.5	Hicks Hollow at Shrewsbury WV - KANAWHA
21WVINST	K-61-{00.8}	Cabin Creek at Cabin Creek WV - KANAWHA
21WVINST	K-61-B	Dry Branch at Dry Branch WV - KANAWHA
21WVINST	K-61-C	Wet Branch near Ronda WV - KANAWHA
21WVINST	K-61-E	Paint Branch near Sharon WV - KANAWHA
21WVINST	K-61-F	Longbottom Creek at Dawes WV - KANAWHA
21WVINST	K-61-G	Greens Branch near Giles WV - KANAWHA
21WVINST	K-61-H	Coal Fork near Ohley WV - KANAWHA
21WVINST	K-61-H-1	Laurel Fork near Ohley WV - KANAWHA
21WVINST	K-61-I	Bear Hollow at Ohley WV - KANAWHA
21WVINST	K-61-J	Cane Fork at Eskdale WV - KANAWHA
21WVINST	K-61-L	Ten Mile Fork at Leewood WV - KANAWHA

Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	K-61-O	Fifteen Mile Fork at Decota WV - KANAWHA
21WVINST	K-61-O-1	Abbott Creek near Decota WV - KANAWHA
21WVINST	K-61-O-2	Long Branch at United WV - KANAWHA
21WVINST	K-62	Watson Branch at Shrewsbury WV - KANAWHA
21WVINST	K-63	Mile Branch near Cedar Grove WV - KANAWHA
21WVINST	K-64-{00.4}	Kellys Creek at Cedar Grove WV - KANAWHA
21WVINST	K-64-A	Horsemill Branch at Cedar Grove WV - KANAWHA
21WVINST	K-64-I	Fivemile Fork near Mammoth WV - KANAWHA
21WVINST	K-64-J	Hurricane Fork near Mammoth WV - KANAWHA
21WVINST	K-64-K	Left Fork of Kellys Creek at Mammoth WV - KANAWHA
21WVINST	K-65-{00.5}	Paint Creek at Pratt WV - KANAWHA
21WVINST	K-65-{06.9}	Paint Creek above Standard WV - KANAWHA
21WVINST	K-65-{12.8}	Paint Creek below Burnwell WV - KANAWHA
21WVINST	K-65-{20.1}	Paint Creek above Milburn WV - FAYETTE
21WVINST	K-65-A	Milburn Branch near Holly Grove WV - KANAWHA
21WVINST	K-65-B	Sugar Camp Branch near Holly Grove WV - KANAWHA
21WVINST	K-65-C	Jones Branch near Gallagher WV - KANAWHA
21WVINST	K-65-D	Banner Hollow near Livingston WV - KANAWHA
21WVINST	K-65-DD	Packs Branch above Pax WV - FAYETTE
21WVINST	K-65-DD-2	Big Fork near Pax WV - FAYETTE
21WVINST	K-65-E	Fourmile Fork near Standard WV - KANAWHA
21WVINST	K-65-HH-1	North Fork of Sand Branch near Maynor WV - RALEIGH
21WVINST	K-65-HH-1-A	Maple Fork near Maynor WV - FAYETTE
21WVINST	K-65-HH-2	South Fork of Sand Branch near Maynor WV RALEIGH
21WVINST	K-65-I	Hurricane Branch near Whittaker WV - KANAWHA
21WVINST	K-65-J	Toms Branch at Whittaker WV - KANAWHA

Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	K-65-K	Brushy Branch near Whittaker WV - KANAWHA
21WVINST	K-65-L	Sycamore Branch near Burnwell WV - KANAWHA
21WVINST	K-65-M	Tenmile Fork at Burnwell WV - KANAWHA
21WVINST	K-65-M-1	Long Branch at Burnwell WV - KANAWHA
21WVINST	K-65-P	Hickory Camp Branch at Mahan WV - FAYETTE
21WVINST	K-65-Q	Cedar Creek near Mahan WV - FAYETTE
21WVINST	K-65-Q.3	Unnamed Tributary #1 above Cedar Creek near Mahan WV FAYETTE
21WVINST	K-65-Q.5	Unnamed Tributary #2 above Cedar Creek near Mahan WV - FAYETTE
21WVINST	K-65-R	Fifteen Mile Creek near Milburn WV - FAYETTE
21WVINST	K-65-S	Spring (Lick) Branch at Milburn WV - FAYETTE
21WVINST	K-65-T	Skitter Creek near Milburn WV - FAYETTE
21WVINST	K-65-V	Milburn Creek near Mossy WV - FAYETTE
21WVINST	K-65-W	Lykins Creek near Mossy WV - FAYETTE
21WVINST	K-65-X	Bishop Branch at Mossy WV - FAYETTE
21WVINST	K-65-Y-2	Long Branch near Mossy WV - FAYETTE
21WVINST	K-65-Z	Plum Orchard Creek near Lively WV - FAYETTE
21WVINST	K-66-{00.3}	Hughes Creek at Hugheston WV - KANAWHA
21WVINST	K-67	Lower Creek at Handley WV - KANAWHA
21WVINST	K-68	Upper Creek at Handley WV - KANAWHA
21WVINST	K-68.5	West Hollow near London WV - KANAWHA
21WVINST	K-70-{00.4}	Morris Creek in Montgomery WV - KANAWHA
21WVINST	K-70-A	Schuyler Fork in Montgomery WV - KANAWHA
21WVINST	K-71	Staten Run near Montgomery WV - KANAWHA
21WVINST	K-72-{00.5}	Smithers Creek in Smithers WV - FAYETTE
21WVINST	K-72-A-1	Fishhook Fork near Smithers WV - FAYETTE

Table 9
STORET Sampling Locations for
Upper Kanawha River Watershed
Hydrologic Unit Code -05050006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	K-72-B	Bullpush Run at Cannelton WV - FAYETTE
21WVINST	K-73-{00.4}	Armstrong Creek at Mt. Carbon WV - FAYETTE
21WVINST	K-73-A	Tucker Hollow at Kimberly WV - FAYETTE
21WVINST	K-73-D	Jenkins Fork near Columbia WV - FAYETTE
21WVINST	K-73-E	Powellton Fork below Powellton WV - FAYETTE
21WVINST	K-73-E-1	Laurel Creek near Powellton WV - FAYETTE
21WVINST	K-74	Boomer Branch in Boomer WV - FAYETTE
21WVINST	K-75	Jarrett Branch in Alloy WV - FAYETTE
21WVINST	K-76-{00.3}	Loop Creek above Deep Water WV - FAYETTE
21WVINST	K-76-B	Big Righthand Fork near Deep Water WV FAYETTE
21WVINST	K-76-C	Mulberry Fork near Robson WV - FAYETTE
21WVINST	K-76-C-1	Dempsey Branch near Robson WV - FAYETTE
21WVINST	K-76-D	Beards Fork near Robson WV - FAYETTE
21WVINST	K-76-D-1	Right Fork Beards Fork at Beards Fork WV FAYETTE
21WVINST	K-76-E	Robinson Branch near Page WV - FAYETTE
21WVINST	K-76-G	Molly Kincaid Branch at Page WV - FAYETTE
21WVINST	K-76-J	Camp Branch near Hamilton WV - FAYETTE
21WVINST	K-76-K	Ingram Branch at Ingram Branch WV - FAYETTE
21WVINST	K-80	Falls Creek at Kanawha Falls WV - FAYETTE
21WVINST	O-20-{58.5}	Kanawha River at Southside Bridge Charleston WV - KANAWHA
21WVINST	O-20-{73.6}	Kanawha River at Chelyan WV - KANAWHA
21WVINST	O-20-{94.4}	Kanawha River at Kanawha Falls WV - FAYETTE

Note:

Agency Identifier Code	Name of Agency
112WRD	U.S. Geological Survey
11COEHUN	U.S. Army Corps of Engineers
21WV7IWQ	West Virginia DEP Legacy
21WVWQAS	West Virginia DEP Ambient Network
21WVINST	West Virginia DEP Watershed Assessment Program

Table 10
USE SUMMARY REPORT: OVERALL USE SUPPORT
UPPER KANAWHA RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	121
Total Number of River/Streams Monitored:	117
Total Number of River/Streams Evaluated:	4

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	49.94	49.94
SUPPORTING BUT THREATENED	2.87	127.58	130.45
PARTIALLY SUPPORTING	0.00	94.05	94.05
NOT SUPPORTING	5.40	124.15	129.55
NOT ATTAINABLE	1.14	0.00	1.14
TOTAL SIZE ASSESSED	9.41	395.72	405.13

Of the 405.13 stream miles assessed, 49.94 (12.3%) were fully supporting their overall designated uses, 130.45 (32.2%) were fully supporting but threatened, 94.05 (23.2%) were partially supporting, and 129.55 (32.0%) were not supporting.

The fishable goal of the Clean Water Act (CWA) was assessed solely by means of the Aquatic Life Support use, since the Fish Consumption use was not assessed during this reporting period. Of the 419.20 miles assessed for Aquatic Life Support use, 123 (29.3%) were fully supporting, 85.27 (20.3%) were fully supporting but threatened, 96.31 (23.0%) were partially supporting, and 114.20 (27.2%) were not supporting.

TABLE 11
USE SUPPORT MATRIX SUMMARY
UPPER KANAWHA RIVER WATERSHED
WATERBODY TYPE: RIVER
UNITS IN MILES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	49.94	130.45	94.05	129.55	1.14
Aquatic Life	123.00	85.27	96.31	114.20	1.14
Fish Consumption					
Cold Water Fishery - Trout	13			5.40	
Shell fishing					
Warm Water Fishery	37.50	25.30	42.13	45.87	
Bait Minnow Fishery	85.50	65.52	79.60	62.02	1.14
Primary Contact Recreation	130.76	194.97	8.23	88.88	1.14
Secondary Contact Recreation					
Drinking Water Supply					
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial					
Navigation					
Wildlife					
Livestock Watering					

The swimmable goal of the CWA was assessed by means of the Primary Contact Recreation use. Of the 423.98 miles assessed for Primary Contact Recreation use, 130.76 (30.8%) were fully supporting, 194.97 (46.0%) were fully supporting but threatened, 8.23 (1.9%) were partially supporting, and 88.88 (21.0%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Upper Kanawha River watershed is provided in Table 12.

Table 12
Complete Summary of Causes, Including User-Defined
Upper Kanawha River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	18.69	32.60
0500	METALS	65.41	22.68
0750	SULFATES	19.50	59.36
1000	pH	31.71	15.49
1100	SILTATION	23.29	69.25
1200	ORGANIC ENRICHMENT/LOW DO	3.48	0.00
1500	FLOW ALTERATIONS	1.14	38.96
1600	HABITAT ALTERATION (non-flow)	10.65	56.77
1700	PATHOGENS	23.63	24.03
1710	FECAL COLIFORM	22.48	24.03
1900	OIL AND GREASE	0.00	1.33
2000	TASTE AND ODOR	4.38	0.00
2100	SUSPENDED SOLIDS	0.00	3.48
2210	EXCESS ALGAL GROWTH/CHL-A	3.48	0.00
2300	FILLING AND DRAINING	0.00	4.77
2700	DISCOLORATION	0.90	6.02
2900	ODOR	3.48	3.57

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are siltation (92.54 miles), metals (88.09 miles), sulfates (78.86 miles), and habitat alterations (non-flow) (67.42 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Upper Kanawha River

watershed is provided in Table 13.

Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are abandoned mining (136.86 miles), channelization (128.32 miles), streambank modification/destabilization (106.81 miles), and urban runoff/storm sewers (80.39 miles).

Public Health/Aquatic life Impacts

Currently, no streams in the Upper Kanawha River watershed are under a fish consumption advisory. However, a ban on commercial fishing is in effect for the entire Kanawha River mainstem due to a fish consumption advisory for dioxin on the lower Kanawha River.

During this reporting period, no bathing beach closures were documented in the watershed. However, the BPH reported two public water supply closures occurred at the at the Town of Cedar Grove on the Kanawha River mainstem. The closures were due to oil spills from an unknown source.

During this reporting period, the DNR reported one fish kill in the watershed. This occurred on Georges Creek in Kanawha County in March, 1995 and was caused by green concrete. The total kill was 702 fish (all non-game) with an affected reach of 0.60 miles and a severity rating of moderate.

Section 303(d) Waters

Table 14 includes streams from the Upper Kanawha River watershed that are on the current 303(d) list. Seventy-three streams from the watershed are on the list, including one (Kanawha River mainstem) on the Primary Waterbody List, 53 on the Mine Drainage Impaired sublist, and 19 on the Biologically Impaired sublist. Twenty-three miles of the Kanawha River mainstem (Chelyan to New/Gauley River confluence) are listed for zinc impairment from an unknown source.

Currently, no 303(d) listed streams in the Upper Kanawha River watershed have had TMDL's completed.

Table 13
Complete Summary of Sources, Including User-Defined
Upper Kanawha River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0200	MUNICIPAL POINT SOURCES	3.48	0.00
0214	Major Municipal Point Source-Wet Weather Discharge	3.48	0.00
0400	COMBINED SEWER OVERFLOW	1.15	18.50
0500	COLLECTION SYSTEM FAILURE	1.15	0.00
2000	SILVICULTURE	0.00	5.29
2100	Harvesting, Restoration, Residue Management	0.00	1.16
3000	CONSTRUCTION	0.00	1.98
3100	Highway/Road/Bridge Construction	0.00	1.98
4000	URBAN RUNOFF/STORM SEWERS	4.57	75.82
4300	Other Urban Runoff	5.59	3.64
4400	Illicit Connections/Illegal Hookups/Dry Weather Flows	3.13	0.00
4500	Highway/Road/Bridge Runoff	9.80	54.01
4600	Erosion and Sedimentation	1.12	6.42
5000	RESOURCE EXTRACTION	79.48	72.02
5100	Surface Mining	2.93	3.22
5200	Subsurface Mining	7.09	0.00
5500	Petroleum Activities	1.12	5.29
5700	Mine Tailings	1.14	0.00
5900	Abandoned Mining	72.28	64.58
6000	LAND DISPOSAL	7.60	24.03
6300	Landfills	2.73	0.00
6500	Onsite Waste Water Systems-(Septic Tanks	9.30	42.53
6800	Raw Sewage	1.15	0.00
7000	HYDROMODIFICATION	52.07	76.25
7100	Channelization	69.04	55.92
7200	Dredging	0.00	31.42
7300	Dam Construction	1.14	0.00
7550	HABITAT MODIFICATION-Other Than Hydromodification	28.30	60.51
7600	Removal of Riparian Vegetation	26.97	46.08
7700	Streambank Modification/Destabilization	28.30	78.51
7800	Drainage/Filling of Wetlands	1.33	0.00
8300	HIGHWAY MAINTENANCE AND RUNOFF	3.04	10.14
9000	SOURCE UNKNOWN	34.85	44.36

TABLE 14
West Virginia
1998 303(d) List
Upper Kanawha River Watershed

Primary Waterbody List

Stream Name	Steam Code	Use Affected	Pollutant	Primary Source	Size Affected in Miles	Reach Description	TMDL Priority	HUC
Kanawha River (upper)	O-20	Aquatic Life	Zinc	Undetermined	23	Cheylan to New River at confluence with Gauley River	Medium	05050006

Table 14 (continued)
Upper Kanawha River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Left Fork / Lens Creek	K-53-A	2.13	Aquatic Life	Metals	Mine Drainage	Medium
Counterfeit Branch	K-57-D	0.75	Aquatic Life	Metals	Mine Drainage	Medium
Fields Creek	K-58	5.55	Aquatic Life	Metals	Mine Drainage	Medium
Mill Branch / Fields Creek	K-58-A	1.18	Aquatic Life	Metals	Mine Drainage	Medium
Wolfpen Hollow	K-58-B.1	0.98	Aquatic Life	pH, Metals	Mine Drainage	Medium
New West Hollow/ Mill Branch/ Fields Creek		1.14	Aquatic Life	Metals	Mine Drainage	Medium
Carroll Branch	K-59	2.76	Aquatic Life	pH, Metals	Mine Drainage	Medium

Table 14 (continued)
Upper Kanawha River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Slaughter Creek	K-60	6.02	Aquatic Life	Metals	Mine Drainage	Medium
Cabin Creek	K-61	21.41	Aquatic Life	pH, Metals	Mine Drainage	Medium
Hicks Hollow	K-61.5	0.95	Aquatic Life	pH, Metals	Mine Drainage	Medium
Greens Branch	K-61-G	1.98	Aquatic Life	pH, Metals	Mine Drainage	Medium
Laurel Fork	K-61-H-1	3.50	Aquatic Life	pH	Mine Drainage	Medium
Bear Hollow / Cabin Creek	K-61-I	1.63	Aquatic Life	pH, Metals	Mine Drainage	Medium
Cane Fork / Cabin Creek	K-61-J	2.57	Aquatic Life	pH, Metals	Mine Drainage	Medium
Tenmile Fork / Cabin Creek	K-61-L	6.02	Aquatic Life	Metals	Mine Drainage	Medium
Fifteenmile Fork / Cabin Creek	K-61-O	3.59	Aquatic Life	pH, Metals	Mine Drainage	Medium
Abbott Creek	K-61-O-1	2.25	Aquatic Life	pH, Metals	Mine Drainage	Medium
Long Branch / Fifteenmile Fork	K-61-O-2	2.85	Aquatic Life	pH, Metals	Mine Drainage	Medium
Watson Branch	K-62	1.24	Aquatic Life	pH, Metals	Mine Drainage	Medium
Mile Branch	K-63	1.31	Aquatic Life	pH	Mine Drainage	Medium
Jones Branch	K-65-C	1.43	Aquatic Life	Metals	Mine Drainage	Medium
Packs Branch / Paint Creek	K-65-DD	3.80	Aquatic Life	Metals	Mine Drainage	Medium

Table 14 (continued) Upper Kanawha River Watershed Waterbodies Impaired by Mine Drainage						
Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Big Fork / Packs Branch	K-65-DD-2	1.24	Aquatic Life	Metals	Mine Drainage	Medium
Tenmile Fork / Paint Creek	K-65-M	34.71	Aquatic Life	pH, Metals	Mine Drainage	Medium
Long Branch / Tenmile Fork	K-65-M-1	1.43	Aquatic Life	pH, Metals	Mine Drainage	Medium
Hickory Camp Branch	K-65-P	3.80	Aquatic Life	pH, Metals	Mine Drainage	Medium
Cedar Creek	K-65-Q	1.20	Aquatic Life	pH	Mine Drainage	Medium
Unnamed Tributary of Paint Creek #1	K-65-Q.3	0.36	Aquatic Life	pH, Metals	Mine Drainage	Medium
Unnamed Tributary of Paint Creek #2	K-65-Q.5	0.44	Aquatic Life	pH, Metals	Mine Drainage	Medium
Fifteenmile Creek / Paint Creek	K-65-R	1.24	Aquatic Life	Metals	Mine Drainage	Medium
Spring Branch	K-65-S	1.30	Aquatic Life	pH	Mine Drainage	Medium
Skitter Creek	K-65-T	1.48	Aquatic Life	Metals	Mine Drainage	Medium
Lykins Creek	K-65-W	4.62	Aquatic Life	pH, Metals	Mine Drainage	Medium
Long Branch / Mossy Creek	K-65-Y-2	2.43	Aquatic Life	Metals	Mine Drainage	Medium
West Hollow	K-68.5	4.05	Aquatic Life	Metals	Mine Drainage	Medium
Morris Creek	K-70	4.85	Aquatic Life	Metals	Mine Drainage	Medium

Table 14 (continued)
Upper Kanawha River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Staten Run	K-71	1.22	Aquatic Life	Metals	Mine Drainage	Medium
Smithers Creek	K-72	7.03	Aquatic Life	Metals	Mine Drainage	Medium
Fishhook Fork	K-72-A-1	1.52	Aquatic Life	Metals	Mine Drainage	Medium
Armstrong Creek	K-73	8.40	Aquatic Life	Metals	Mine Drainage	Medium
Jenkins Fork	K-73-D	2.13	Aquatic Life	pH, Metals	Mine Drainage	Medium
Powellton Fork	K-73-E	4.39	Aquatic Life	Metals	Mine Drainage	Medium
Laurel Fork / Powellton Fork	K-73-E-1	1.23	Aquatic Life	Metals	Mine Drainage	Medium
Right Fork / Armstrong Creek	K-73-F	2.51	Aquatic Life	Metals	Mine Drainage	Medium
Left Fork / Armstrong Creek	K-73-G	2.89	Aquatic Life	Metals	Mine Drainage	Medium
Boomer Branch	K-74	2.55	Aquatic Life	pH, Metals	Mine Drainage	Medium
Jarrett Branch	K-75	1.58	Aquatic Life	Metals	Mine Drainage	Medium
Beards Fork	K-76-D	4.28	Aquatic Life	Metals	Mine Drainage	Medium
Right Fork / Beards Fork	K-76-D-1	2.32	Aquatic Life	Metals	Mine Drainage	Medium
Robinson Branch	K-76-E	1.60	Aquatic Life	Metals	Mine Drainage	Medium
Molly Kincaid Branch	K-76-G	1.25	Aquatic Life	Metals	Mine Drainage	Medium
Camp Branch / Loop Creek	K-76-J	2.00	Aquatic Life	Metals	Mine Drainage	Medium

Table 14 (continued)
Upper Kanawha River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Ingram Branch	K-76-K	1.24	Aquatic Life	Metals	Mine Drainage	Medium

Table 14 (continued)
Upper Kanawha River Watershed
Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority
Mission Hollow	K-49-A	undetermined	Aquatic Life	Unknown	Unknown	21.4	Low
Coal Fork / Campbells Creek	K-49-D	undetermined	Aquatic Life	Unknown	Unknown	28.6	Low
Point Lick Fork	K-49-F	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Rattlesnake Hollow	K-49-I	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Lens Creek	K-53-{00.3}	undetermined	Aquatic Life	Unknown	Unknown	42.9	Low
Dry Branch / Witchers Creek	K-57-A	undetermined	Aquatic Life	Unknown	Unknown	42.9	Low
Wet Branch	K-61-C	undetermined	Aquatic Life	Unknown	Unknown	21.4	Low
Laurel Fork / Coal Fork	K-61-H-1	undetermined	Aquatic Life	Unknown	Unknown	42.9	Low
Horsemill Branch	K-64-A	undetermined	Aquatic Life	Unknown	Unknown	21.4	Low
Hurricane Fork / Kellys Creek	K-64-J	undetermined	Aquatic Life	Unknown	Unknown	42.9	Low
Sycamore Branch	K-65-L	undetermined	Aquatic Life	Unknown	Unknown	42.9	Low

Table 14 (continued) Upper Kanawha River Watershed Waterbodies with Biological Impairment							
Hickory Camp Branch	K-65-P	undetermined	Aquatic Life	Unknown	Unknown	35.7	Low
South Sand Branch	K-65-HH-2	undetermined	Aquatic Life	Unknown	Unknown	35.7	Low
Hughes Creek	K-66-{00.3}	undetermined	Aquatic Life	Unknown	Unknown	35.7	Low
Lower Creek	K-67	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Morris Creek	K-70-{00.4}	undetermined	Aquatic Life	Unknown	Unknown	14.3	Low
Smithers Creek	K-72-{00.5}	undetermined	Aquatic Life	Unknown	Unknown	21.4	Low
Bullpush Hollow	K-72-B	undetermined	Aquatic Life	Unknown	Unknown	28.6	Low
Boomer Branch	K-74	undetermined	Aquatic Life	Unknown	Unknown	14.3	Low

TMDL - Total Maximum Daily Load HUC - Hydrologic Unit Code

Youghiogheny River Watershed

Background

The portion of the Youghiogheny River watershed (hydrologic unit # 05020006) within West Virginia covers approximately 80 square miles in Preston County. Lying in the Appalachian Plateau Physiographic Province, the watershed is bounded to the east by the Eastern Continental Divide. Within West Virginia, the watershed is bounded to the north, west, and south by the Cheat River watershed and to the east by the Maryland border. The watershed contains 28 streams totaling approximately 74 miles in length. A generalized map of the watershed with monitoring stations is provided in Figure 4. Table 15 is a list of these stations.

Approximately the northern third of the watershed and a small fraction at the extreme southern end lies in the Central Appalachian ecoregion. The remainder lies in the Ridges and Valleys ecoregion. The watershed is punctuated by high, rounded mountains, but most second and higher order streams flow sluggishly through broad, low gradient valleys. The climate of both ecoregions is marked by cool summers, cold winters, and relatively high annual average precipitation.

A significant wetland, Cranesville Swamp, is located on the West Virginia-Maryland border within the basin. Called "Pine Swamp" locally and on USGS. topographic maps, this wetland hosts the southernmost stand of tamarack (Larix larcina) in the eastern United States (Mansueti, 1958). Several boreal insect species, including a few with aquatic life stages, have their southernmost known locations at the wetland. A rare fish, the "Cheat minnow" (Rhinicthys bowersi), has been found in North Branch of Snowy Creek (Goodfellow 1984).

A small amount of coal lies within the West Virginia portion of the watershed. Some of it has been mined, especially in the vicinity of Laurel Run of Snowy Creek. Most of the land is a patchwork of woodlots and pastures with some cropland, especially hay and buckwheat.

Water Quality Summary

During this reporting period, 24 (86%) of the streams in the West Virginia portion of the Youghiogheny river watershed were monitored. A summary of overall designated use support is provided in Table 16 while a use support matrix summary of all designated uses is given in Table 17.

Of the 85.69 stream miles assessed, 12.48 (14.6%) were fully supporting their

overall designated uses, 42.84 (50.0%) were fully supporting but threatened, 24.61 (28.7%) were partially supporting, and 5.76 (6.7%) were not supporting.

West Virginia Portion of Youghiogheny River Watershed Hydrologic Unit Code - 05020006 (Preston County)

STORET Sampling Locations 1993 - 1997

Figure 4

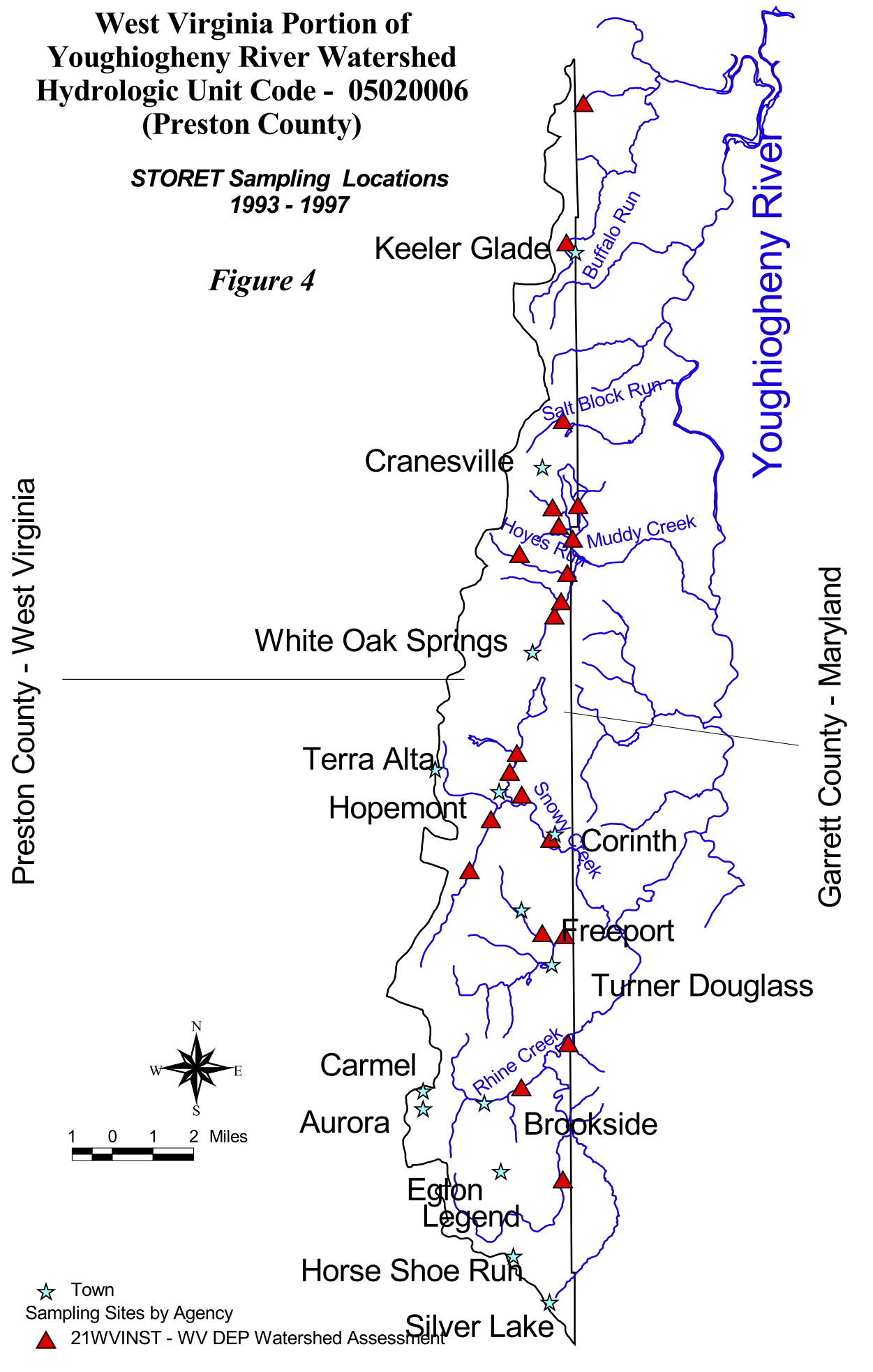


Table 15
STORET Sampling Locations for
Youghiogheny River Watershed
Hydrologic Unit Code -05020006
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MY	Youghiogheny River near WV-MD Stateline - PRESTON
21WVINST	MY-01-A	White Oak Spring Run White Oak Spring - PRESTON
21WVINST	MY-01-A-1	Cupp Run near White Oak Springs WV - PRESTON
21WVINST	MY-01-B	Hoyes Run near Lake Ford MD - PRESTON
21WVINST	MY-01-B.5	Noltken Run near Terra Alta WV - PRESTON
21WVINST	MY-01-B-5	Noltken Run near Cranesville WV - PRESTON
21WVINST	MY-01-C	Browning Run near Lake Ford MD - PRESTON
21WVINST	MY-01-D	Hayes Run near Lake Ford MD - PRESTON
21WVINST	MY-01-E	Tankiln Run near Cranesville WV - PRESTON
21WVINST	MY-01-F	Pine Swamp above Lake Ford MD -PRESTON
21WVINST	MY-02	Snowy Creek at Cornith WV - PRESTON
21WVINST	MY-02-.5A	Unnamed Trib Snowy Creek Hopemont WV- PRESTON
21WVINST	MY-02-A	North Br. Snowy Ck Hopemont WV - PRESTON
21WVINST	MY-02-A-1	Wardwell Run near Hopemont WV - PRESTON
21WVINST	MY-02-B	South Br. Snowy Ck. Hopemont WV - PRESTON
21WVINST	MY-02-B-1	Pine Run near Hopemont WV - PRESTON
21WVINST	MY-03	Laurel Run near Hopemont WV - PRESTON
21WVINST	MY-03-A	Little Laurel Run near Hopemont WV - PRESTON
21WVINST	MY-04	Rhine Creek below Brookside WV - PRESTON
21WVINST	MY-05	Maple Run near Eglon WV - PRESTON
21WVINST	MY-06	Salt Block Run near Cranesville WV - PRESTON
21WVINST	MY-09	Buffalo Run near Hazelton WV - PRESTON
21WVINST	MY-11	South Branch Laurel Run MD - GARRETT, MD

Note:

Agency Identifier Code	Name of Agency

Table 16
USE SUMMARY REPORT: OVERALL USE SUPPORT
YOUGHIOGHENY RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	24
Total Number of River/Streams Monitored:	22
Total Number of River/Streams Evaluated:	2

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	4.67	7.81	12.48
SUPPORTING BUT THREATENED	0.00	42.84	42.84
PARTIALLY SUPPORTING	1.56	223.05	224.61
NOT SUPPORTING	1.00	4.76	5.76
NOT ATTAINABLE	0.00	0.00	0
TOTAL SIZE ASSESSED	7.23	78.46	85.69

The fishable goal of the Clean Water Act (CWA) was assessed solely by means of the Aquatic Life Support use, since the Fish Consumption use was not evaluated during this reporting period. Of the 85.63 miles assessed for Aquatic Life Support use, 30.93 (36.1%) were fully supporting, 25.89 (30.3%) were fully supporting but threatened, 23.05 (26.9%) were partially supporting, and 5.76 (6.7%) were not supporting.

The swimmable goal of the CWA was assessed by means of the Primary Contact Recreation use. Of the 85.69 miles assessed for Primary Contact Recreation use, 42.74 (49.9%) were fully supporting, 37.17 (43.4%) were fully supporting but threatened, and 5.76 (6.7%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the West Virginia portion of the the Youghiogheny River watershed is provided in Table 12.

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are siltation (15.68 miles), cause unknown (13.86 miles), and habitat alterations (non-flow) (7.32 miles).

TABLE 17
USE SUPPORT MATRIX SUMMARY
YOUGHIOGHENY RIVER WATERSHED
WATERBODY TYPE: RIVER
UNITS IN MILES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	12.48	42.84	24.61	5.76	
Aquatic Life	30.93	25.89	23.05	5.76	
Fish Consumption					
Cold Water Fishery - Trout	4.79	6.23		20.46	
Shell fishing					
Warm Water Fishery	11.06	13.97	12.38		
Bait Minnow Fishery	8.81	5.69	10.67	5.76	
Primary Contact Recreation	42.74	37.19		5.76	
Secondary Contact Recreation					
Drinking Water Supply					
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial					
Navigation					
Wildlife					
Livestock Watering					

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the West Virginia portion of the the Youghiogheny River watershed is provided in Table 19. Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are source unknown (14.05 miles), agriculture (7.92 miles), silviculture (6.23 miles), and urban

runoff/storm sewers (6.23 miles).

Public Health/Aquatic life Impacts

No fish consumption advisories are currently in affect for the West Virginia portion of the Youghiogheny River watershed. In addition, no bathing beach or pubic water supply closures or pollution caused fish kills were documented in the watershed during this reporting period.

Section 303(d) Waters

Table 20 includes streams from the West Virginia portion of the Youghiogheny River watershed that are on the current 303(d) list. Six streams from the watershed are on the list, including one on the Mine Drainage Impaired sublist, and five on the Biologically Impaired sublist. Currently, no 303(d) listed streams in the West Virginia portion of the Youghiogheny River watershed have had TMDL's completed.

Table 18
Complete Summary of Causes, Including User-Defined
Youghiogheny River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	00.00	3.86
0500	METALS	4.76	0.00
0750	SULFATES	4.76	0.00
0800	OTHER ORGANICS	0.00	6.23
1000	pH	4.76	0.00
1100	SILTATION	4.76	10.92
1200	ORGANIC ENRICHMENT/LOW DO	0.00	1.12
1500	FLOW ALTERATIONS	1.00	0.00
1600	HABITAT ALTERATION (non-flow)	1.13	6.19
2000	TASTE AND ODOR	0.00	6.19
2300	FILLING AND DRAINING	1.00	0.00
2900	ODOR	0.00	1.69

Table 19
Complete Summary of Sources, Including User-Defined
Youghiogheny River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0400	COMBINED SEWER OVERFLOW	0.00	6.19
1000	AGRICULTURE	0.00	7.92
1350	GRAZING RELATED SOURCES	0.00	4.69
1410	Pasture Grazing-Riparian	0.00	1.69
2000	SILVICULTURE	0.00	6.23
3000	CONSTRUCTION	1.00	0.00
3100	Highway/Road/Bridge Construction	1.00	0.00
4000	URBAN RUNOFF/STORM SEWERS	0.00	6.23
5000	RESOURCE EXTRACTION	5.76	0.00
5100	Surface Mining	1.00	0.00
5200	Subsurface Mining	4.76	0.00
5700	Mine Tailings	4.76	0.00
5900	Abandoned Mining	4.76	0.00
5950	Inactive Mining	5.76	0.00
7800	Drainage/Filling of Wetlands	1.00	0.00
8600	NATURAL SOURCES	1.12	0.00
9000	SOURCE UNKNOWN	0.00	14.05

TABLE 20
West Virginia
1998 303(d) List
Youghiogheny River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Laurel Run	MY-3	4.76	Aquatic Life	pH, Metals	Mine Drainage	Medium

Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority
Tankiln Run	MY-1-E	undetermined	Aquatic Life	unknown	unknown	43.0	Low
Wardwell Run	MY-2-A-1	undetermined	Aquatic Life	unknown	unknown	46.0	Low
Snowy Creek	MY-2	undetermined	Aquatic Life	unknown	unknown	46.0	Low
Little Laurel Run	MY-3-A	undetermined	Aquatic Life	unknown	unknown	39.0	Low
Buffalo Run	MY-9	undetermined	Aquatic Life	unknown	unknown	39.0	Low

TMDL - Total Maximum Daily Load

Cheat River Watershed

Background

The Cheat River watershed (hydrologic unit # 05020004) within West Virginia covers approximately 1,420 square miles in Pocahontas, Randolph, Tucker, Preston, and Monongalia Counties. While the Cheat River watershed is roughly 95 miles from north to south, the Cheat River flows about 157 miles from its headwaters on the Shavers Fork to its mouth. The watershed contains 459 streams totaling approximately 1,475 miles in length. A generalized map of the watershed with monitoring stations is provided in Figure 5. Table 21 is a list of these stations.

The Cheat River and its many tributaries generally flow from south to north through the highest mountains of West Virginia. The Cheat River is formed by the confluence of the Black Fork and Shavers Fork at Parsons, West Virginia. Although most of the Cheat River is within West Virginia, a few tributaries to Big Sandy Creek, a major tributary of the Cheat, drain parts of Pennsylvania. In addition, the Cheat River does not join the Monongahela River until it enters Pennsylvania near the Lake Lynn Dam (Cheat Lake) north of Morgantown, WV.

The elevation in the Cheat watershed ranges from a high of 4,670 feet near the old logging town of Spruce in Randolph County to a low of 812 feet as it crosses the state line below the dam forming Lake Lynn. These extremes in elevation make it difficult to describe the area in generalities.

The Cheat River watershed includes parts of three ecoregions: the Ridge & Valleys, the Central Appalachians, and a small portion of the Western Allegheny ecoregion near Lake Lynn. The relatively higher peaks in the Ridge and Valley, and Central Appalachian ecoregions, as compared to the Western Allegheny ecoregion to the west, cause greater amounts of precipitation. Precipitation occurs on an average of 152 days each year in the watershed. The year of WAP's Cheat Basin survey, 1996, set the record as the wettest year for West Virginia in more than a century of keeping records.

Most of the Cheat River watershed consists of undeveloped rural land. South of Preston County, the Cheat River is adjacent to, or within, the Monongahela National Forest. This watershed includes all or parts of three wilderness areas: Dolly Sods, Otter Creek, and Laurel Fork. All of the watershed has been timbered at least once since the Civil War. Silviculture remains a valuable industry throughout the watershed.

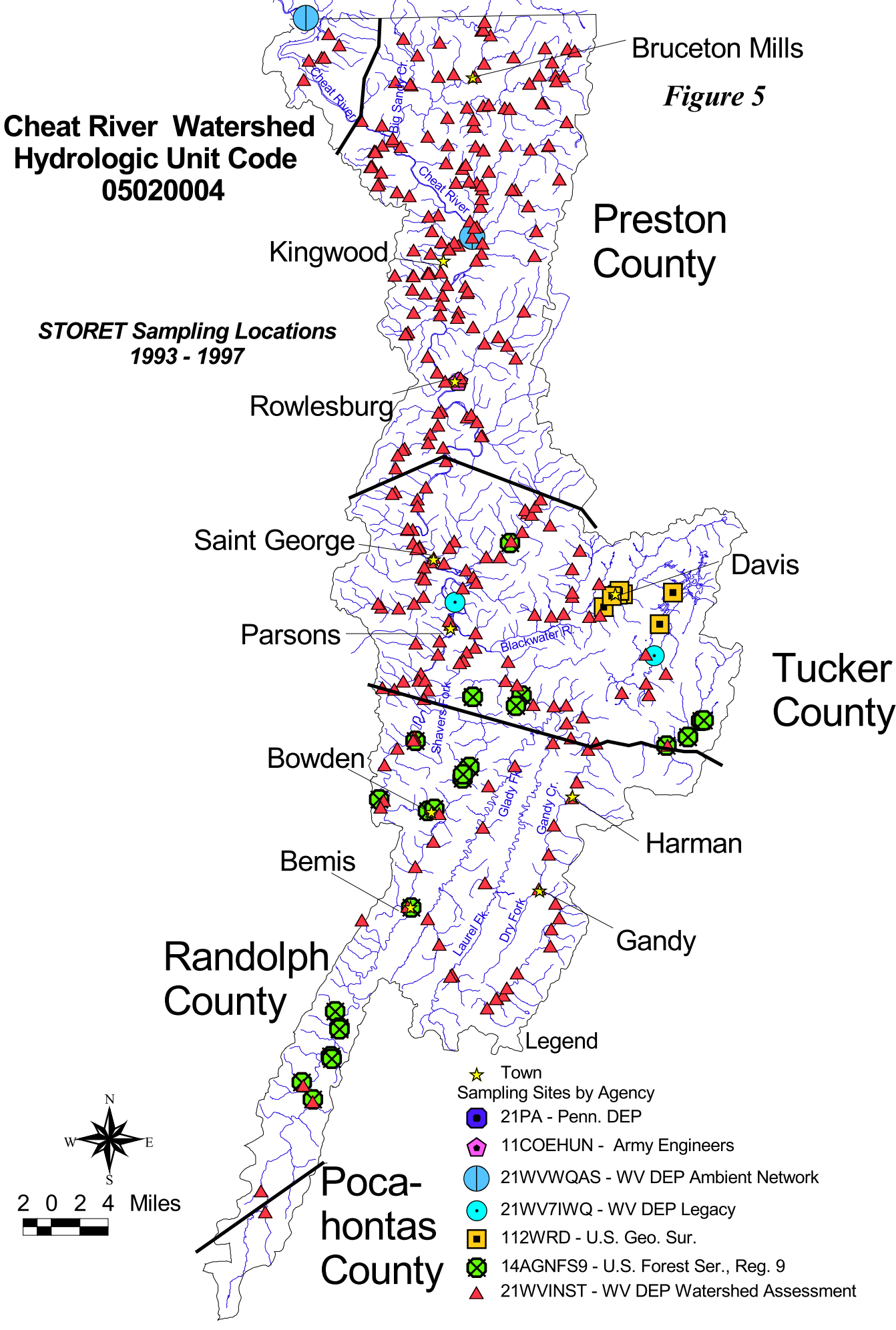

Cheat River Watershed
Hydrologic Unit Code
05020004
Figure 5
STORET Sampling Locations
1993 - 1997
Bruceton Mills
Kingwood
Preston
County
Rowlesburg
Saint George
Davis
Parsons
Tucker
County
Bowden
Harman
Bemis
Gandy
Randolph
County
Poca-
hontas
County
Cheat River
Big Sandy Cr.
Blackwater R.
Shavers Fork
Glady Fk.
Gandy Cr.
Laurel Fk.
Dry Fork
Legend
Town
Sampling Sites by Agency
21PA - Penn. DEP
11COEHUN - Army Engineers
21WVWQAS - WV DEP Ambient Network
21WV7IWQ - WV DEP Legacy
112WRD - U.S. Geo. Sur.
14AGNFS9 - U.S. Forest Ser., Reg. 9
21WVINST - WV DEP Watershed Assessment
N
W
E
S
2 0 2 4 Miles

Table 21 STORET Sampling Locations for Cheat River Watershed Hydrologic Unit Code - 05020004 for 1993-1997		
Agency Code Identifier	STORET Station Number	Location of Sampling Points
21PA	WQN0727	Cheat River-SR0119 BR at Pt. Marion PA - FAYETTE PA
21WVWQAS	WA96-M05	Cheat River below Lake Lynn Dam PA - FAYETTE PA
21WV7IWQ	550484	Cheat River at Albright WV - PRESTON
21WVWQAS	WA96-M06	Cheat River at Albright WV - PRESTON
11COEHUN	4CRR10201	Cheat River River Mile 43.7 - PRESTON
14AGNFS9	210324	Shavers Lick Run 6.5 Miles South-east of Parsons WV- TUCKER
14AGNFS9	210325	Shavers Lick Run 7 Miles South-east of Parsons WV- TUCKER
14AGNFS9	210326	Stonecoal Run 17.3 Miles South-east of Parsons WV - TUCKER
14AGNFS9	210327	Red Creek 17.3 Miles South-east of Parsons WV -TUCKER
14AGNFS9	210328	Turkey Run 5 Miles South-south-east Parsons WV - TUCKER
14AGNFS9	210329	Otter Creek Above Turkey Run 5 Mi South-south-east of Parsons WV
14AGNFS9	210330	Red Creek above Fisher Spring Run WV - TUCKER
14AGNFS9	210331	Fisher Spring Run 12 Miles West of Petersburg WV - TUCKER
112WRD	390548079242601	C20 North Branch at Mouth WV - TUCKER
112WRD	390744079232201	C22 Little Blackwater River at Mouth WV - TUCKER
112WRD	390655079284901	Blackwater River at Bridge Upstream from Blackwater Falls WV
112WRD	390740079271801	Blackwater River above Mouth Beaver Creek WV - TUCKER
112WRD	390740079274201	Blackwater River at Rt.32 Bridge Davis WV - TUCKER
112WRD	390754079273301	Beaver Creek near Mouth WV - TUCKER
14AGNFS9	210106	Horseshoe Run 7.4 Miles North-east of Parsons WV - TUCKER
21WV7IWQ	550892	Cheat River below Parsons WV - TUCKER

Table 21
STORET Sampling Locations for
Cheat River Watershed
Hydrologic Unit Code - 05020004
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WV7IWQ	551008	Blackwater River near Cortland WV - TUCKER
112WRD	03066000	Blackwater R at Davis WV - TUCKER
14AGNFS9	210512	Shavers Fork 4 Miles E Elkins WV - RANDOLPH
14AGNFS9	210332	Condon Run 9.5 Miles East Elkins WV - RANDOLPH
14AGNFS9	210552	Little Blackfork 7.5 Miles Ne of Elkins WV - RANDOLPH
14AGNFS9	219901	Bowden 7 Miles East of Elkins WV - RANDOLPH
14AGNFS9	210514	Shavers Fork 8 Mi East of Elkins WV - RANDOLPH
14AGNFS9	210517	Shavers Fork 9 Mi South-east of Elkins WV - RANDOLPH
14AGNFS9	210530	Shavers Fork 14.5 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210531	Yokum Run 16 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210532	Shavers Fork 16 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210539	Glade Run 18 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210548	Tributary of Glade Run 8.9 Miles North-west of Bartow WV - RAN.
14AGNFS9	210536	Shavers Fork 20 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210525	Shavers Fork 21 Miles South of Elkins WV - RANDOLPH
14AGNFS9	210318	Yellow Creek at Mouth 10 Miles North-east of Elkins WV - RANDOLPH
14AGNFS9	210320	Otter Creek below Dam 9.5 Miles East of Elkins WV - RANDOLPH
14AGNFS9	210313	Red Creek 24 Miles North-east Elkins WV - RANDOLPH
21WVINST	MC-0-{18.3}	Cheat River near Mt. Nebo WV - PRESTON
21WVINST	MC-0-{28.8}	Cheat River at Albright WV - PRESTON
21WVINST	MC-0-{43}	Cheat River at Rowlesburg WV - PRESTON
21WVINST	MC-0-{71.0}	Cheat River at St.George WV TUCKER
21WVINST	MC -2	Morgans Run near Cheat Neck WV - MONONGALIA
21WVINST	MC -2.5	Coles Run at Sunset Beach WV - MONONGALIA
21WVINST	MC -2.5-A	Birch Hollow near Cheat Neck WV - MONONGALIA

Table 21
STORET Sampling Locations for
Cheat River Watershed
Hydrologic Unit Code - 05020004
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC -2.7	Kelly Run at Sunset Beach WV - MONONGALIA
21WVINST	MC -2-A	Darnell Hollow at Coopers Rock State Forest WV - MONONGALIA
21WVINST	MC -4	Whites Run near Pierpont WV MONONGALIA
21WVINST	MC -7	Scott Run near Pisgah WV - PRESTON
21WVINST	MC-10	Big Run near Pisgah WV - PRESTON
21WVINST	MC-11-.1	Unnamed Trib No. 1 near Bull Run WV - PRESTON
21WVINST	MC-11-{00}	Bull Run below Bull Run WV - PRESTON
21WVINST	MC-11-{05}	Bull Run above Middle Run WV - PRESTON
21WVINST	MC-11-{07}	Bull Run above Bull Run WV - PRESTON
21WVINST	MC-11-A	Middle Run near Bull Run WV - PRESTON
21WVINST	MC-11-B	Mountain Run near Bull Run WV - PRESTON
21WVINST	MC-11-C	Lick Run near Bull Run WV - PRESTON
21WVINST	MC-11-C.1	Unnamed Tributary #2 near Bull Run WV - PRESTON
21WVINST	MC-11-D-{00}	Left Fork of Bull Run near Masontown WV - PRESTON
21WVINST	MC-11-D-{10}	Left Fork of Bull Run near Herring WV - PRESTON
21WVINST	MC-11-E	Right Fork of Bull Run near Masontwon WV - PRESTON
21WVINST	MC-12-.5-{00}	Sovern Run below Mt. Nebo WV - PRESTON
21WVINST	MC-12-.5-{02.5}	Sovern Run at Hudson WV - PRESTON
21WVINST	MC-12-.5-{04.5}	Sovern Run above Hudson WV - PRESTON
21WVINST	MC-12-.7	Parker Run near Mt. Nebo WV - PRESTON
21WVINST	MC-12-{00}	Big Sandy Creek near Mt. Nebo WV - PRESTON
21WVINST	MC-12-{10}	Big Sandy Creek at Bruceton Mills WV - PRESTON
21WVINST	MC-12-{14}	Big Sandy Creek above Clifton Mills WV - PRESTON
21WVINST	MC-12-A-{02.5}	Laurel Run at Laurel Run WV - PRESTON
21WVINST	MC-12-A-{03}	Laurel Run above Laurel Run WV - PRESTON
21WVINST	MC-12-A-1	Little Laurel Run near Laurel Run WV - PRESTON

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-12-A-1-A	Lick Run below Pisgah WV - PRESTON
21WVINST	MC-12-A-2	Patterson Run below Lake O'Woods WV - PRESTON
21WVINST	MC-12-B-.5-{00}	Webster Run below Sugar Valley WV - PRESTON
21WVINST	MC-12-B-.5-{02}	Webster Run above Sugar Valley WV - PRESTON
21WVINST	MC-12-B-.5-A	Unnamed Trib Webster Run near Sugar Valley WV - PRESTON
21WVINST	MC-12-B-{01}	Little Sandy Creek near Bruceton Mills WV - PRESTON
21WVINST	MC-12-B-{02}	Little Sandy Creek near Brandonville WV - PRESTON
21WVINST	MC-12-B-{06}	Little Sandy Creek near Hazelton WV - PRESTON
21WVINST	MC-12-B-{11}	Little Sandy Creek at Hazelton WV - PRESTON
21WVINST	MC-12-B-{12}	Little Sandy Creek above Hazelton WV - PRESTON
21WVINST	MC-12-B-1-.B	Unnamed Tributary Beaver Creek WV - PRESTON
21WVINST	MC-12-B-1-{01}	Beaver Creek near Brandonville WV - PRESTON
21WVINST	MC-12-B-1-{04}	Beaver Creek near Cuzzart WV - PRESTON
21WVINST	MC-12-B-1-B	Unnamed Tributary Beaver Creek - PRESTON
21WVINST	MC-12-B-2	Barnes Run near Brandonville WV - PRESTON
21WVINST	MC-12-B-3-{00}	Hog Run near Hazelton WV - PRESTON
21WVINST	MC-12-B-3-{02}	Hog Run North of Hazelton WV - PRESTON
21WVINST	MC-12-B-4.5	Piney Run near Hazelton WV - PRESTON
21WVINST	MC-12-B-4-{02}	Elk Run near Hazelton WV - PRESTON
21WVINST	MC-12-B-4-{03}	Elk Run South of Hazelton WV - PRESTON
21WVINST	MC-12-B-5-{03}	Cherry Run near Hazelton WV - PRESTON
21WVINST	MC-12-B-5-C	Unnamed Tributary Cherry Run near Hazelton WV - PRESTON
21WVINST	MC-12-B-6	Mill Run at Hazelton WV - PRESTON
21WVINST	MC-12-C-{01}	Hazel Run near Hopewell WV - PRESTON
21WVINST	MC-12-C-{04}	Hazel Run north of Hopewell WV - PRESTON
21WVINST	MC-12-D	Glade Run West of Bruceton Mills WV - PRESTON

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-12-E	Glade Run near Brandonville WV - PRESTON
21WVINST	MC-12-E.1	Unnamed Tributary near Clifton Mills WV - PRESTON
21WVINST	MC-12-F-{00.0}	Little Sandy Creek near Clifton Mills WV - PRESTON
21WVINST	MC-12-F-{01.0}	Little Sandy Creek near Clifton Mills WV - PRESTON
21WVINST	MC-13.5-{2.3}	Conner Run west of Valley Point WV - PRESTON
21WVINST	MC-13-{01}	Gibson Run near Mt. Nebo WV - PRESTON
21WVINST	MC-14-{02}	Hacklebarney Run near Herring WV - PRESTON
21WVINST	MC-15-{01}	Laurel Run near Pleasantdale WV - PRESTON
21WVINST	MC-15-A	Long Hollow above Pleasantdale WV - PRESTON
21WVINST	MC-16-{02}	Greens Run below Kingwood WV - PRESTON
21WVINST	MC-16-{04}	Greens Run below Pleasantdale WV - PRESTON
21WVINST	MC-16-A-.1	Unnamed Tributary South Fork Greens Run at Kingwood - PRESTON
21WVINST	MC-16-A-{0.2}	South Fork of Greens Run near Kingwood WV - PRESTON
21WVINST	MC-16-A-{0.8}	South Fork of Greens Run at Kingwood WV - PRESTON
21WVINST	MC-16-A-{2.5}	South Fork of Greens Run in Kingwood WV - PRESTON
21WVINST	MC-16-A-{3.9}	South Fork of Greens Run above Kingwood WV - PRESTON
21WVINST	MC-17-.6	Unnamed Tributary #3 Muddy Creek - PRESTON
21WVINST	MC-17-.7	Crab Orchard Creek north of Albright WV - PRESTON
21WVINST	MC-17-{00.0}	Muddy Creek near Albright WV - PRESTON
21WVINST	MC-17-{02.6}	Muddy Creek below Martin Creek WV - PRESTON
21WVINST	MC-17-{03.2}	Muddy Creek above Martin Creek WV - PRESTON
21WVINST	MC-17-{06.8}	Muddy Creek west of Cuzzart WV - PRESTON
21WVINST	MC-17-{10.2}	Muddy Creek east of Cuzzart WV - PRESTON
21WVINST	MC-17-{14.4}	Muddy Creek at Orr WV - PRESTON
21WVINST	MC-17-A.1	Unnamed Tributary #2 Muddy Creek WV - PRESTON

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-17-A-.5-{0}	Fickey Run south of Valley Point WV - PRESTON
21WVINST	MC-17-A-.5-{3}	Fickey Run west of Valley Point WV - PRESTON
21WVINST	MC-17-A-{0.0}	Martin Creek near Valley Point WV - PRESTON
21WVINST	MC-17-A-{2.1}	Martin Creek west of Valley Point WV - PRESTON
21WVINST	MC-17-A-1.1	Unnamed Tributary #1 Glade Run near Valley Point WV - PRESTON
21WVINST	MC-17-A-1.2	Unnamed Tributary #2 Glade Run at Valley Point WV - PRESTON
21WVINST	MC-17-A-1-{0.0}	Glade Run near Valley Point WV - PRESTON
21WVINST	MC-17-A-1-{3.2}	Glade Run at Valley Point WV - PRESTON
21WVINST	MC-17-B	Jump Rock Run near Cuzzart WV - PRESTON
21WVINST	MC-17-C	Sugarcamp Run near Cuzzart WV - PRESTON
21WVINST	MC-18-.1	Unnamed Tributary Roaring Creek north of Albright WV - PRESTON
21WVINST	MC-18-{0.0}	Roaring Creek north of Albright WV - PRESTON
21WVINST	MC-18-{6.0}	Roaring Creek near Albright WV - PRESTON
21WVINST	MC-18-A	Lick Run near Albright WV - PRESTON
21WVINST	MC-18-A-1	Little Lick Run near Albright WV - PRESTON
21WVINST	MC-19	Daugherty Run at Albright WV - PRESTON
21WVINST	MC-19-A	Dority Run at Dority WV - PRESTON
21WVINST	MC-20-{0.0}	Elsey Run south of Albright WV - PRESTON
21WVINST	MC-20-{6.0}	Elsey Run near Terra Alta WV - PRESTON
21WVINST	MC-21	Ashpole Run south of Albright WV - PRESTON
21WVINST	MC-22-{1.5}	Buffalo Run north of Camp Dawson WV - PRESTON
21WVINST	MC-22-{2.0}	Buffalo Run near Camp Dawson WV - PRESTON
21WVINST	MC-22-B	Unnamed Tributary #2 Buffalo Run near Camp Dawson - PRESTON
21WVINST	MC-23-.2	Unnamed Tributary #2 Morgan Run at Kingwood WV -PRESTON

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-23-{0.0}	Morgan Run south of Kingwood WV - PRESTON
21WVINST	MC-23-{1.8}	Morgan Run at Kingwood WV - PRESTON
21WVINST	MC-23-{2.0}	Morgan Run above Kingwood WV - PRESTON
21WVINST	MC-23-A-.1-A	Left Fork Unnamed Tributary Church Creek WV -PRESTON
21WVINST	MC-23-A-.1-B	Right Fork Unnamed Tributary Church Creek WV- PRESTON
21WVINST	MC-23-A-{0.0}	Church Creek at Kingwood WV - PRESTON
21WVINST	MC-23-A-{2.9}	Church Creek near St.Josephs WV - PRESTON
21WVINST	MC-24-{0.0}	Heather Run at Preston WV - PRESTON
21WVINST	MC-24-{2.7}	Heather Run near Irona WV - PRESTON
21WVINST	MC-24-A	Unnamed Tributary #1 Heather Run at Snider WV -PRESTON
21WVINST	MC-25-{0.0}	Lick Run south of Preston WV - PRESTON
21WVINST	MC-25-{2.3}	Lick Run south of Snider WV - PRESTON
21WVINST	MC-26-{0.0}	Joes Run south of Camp Dawson WV - PRESTON
21WVINST	MC-26-{1.5}	Joes Run at Camp Dawson Hunting Area WV - PRESTON
21WVINST	MC-27-{0.0}	Pringle Run south of Preston WV PRESTON
21WVINST	MC-27-{2.7}	Pringle Run below Tunnelton WV - PRESTON
21WVINST	MC-27-A	Left Fork of Pringle Run at Tunnelton WV - PRESTON
21WVINST	MC-27-B	Right Fork of Pringle Run at Tunnelton WV - PRESTON
21WVINST	MC-28	Stamping Ground Run near Rowlesburg WV - PRESTON
21WVINST	MC-31.5	Tray Run at Rowlesburg WV - PRESTON
21WVINST	MC-31.7	Fill Hollow at Rowlesburg WV - PRESTON
21WVINST	MC-31-{0.0}	Buckhorn Run north of Rowlesburg WV - PRESTON
21WVINST	MC-32	Saltlick Creek above Rowlesburg WV - PRESTON
21WVINST	MC-32-B	Spruce Run near Amblersburg WV - PRESTON
21WVINST	MC-32-C-1	Cabbage Run near Amblersburg WV - PRESTON
21WVINST	MC-32-D	Wolf Run near Amblersburg WV - PRESTON

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-32-E	Bucklick Run near Amblersburg WV - PRESTON
21WVINST	MC-32-F	Little Bucklick Run near Rodemer WV - PRESTON
21WVINST	MC-32-G	Irish Run near Rodemer WV - PRESTON
21WVINST	MC-33-{0.0}	Buffalo Creek at Macomber WV - PRESTON
21WVINST	MC-33-A	Flagg Run at Macomber WV - PRESTON
21WVINST	MC-33-A.5	Bell Hollow near Macomber WV - PRESTON
21WVINST	MC-33-B	Wildcat Run near Macomber WV - PRESTON
21WVINST	MC-33-B.5	Dog Run near Etam WV - PRESTON
21WVINST	MC-33-C	Birchroot Run near Etam WV - PRESTON
21WVINST	MC-33-D	Little Buffalo Creek near Etam WV - PRESTON
21WVINST	MC-33-E	Bucklick Run near Etam WV - PRESTON
21WVINST	MC-33-F	Sugarcamp Run near Etam WV - PRESTON
21WVINST	MC-34-{0.0}	Scott Run south of Macomber WV - PRESTON
21WVINST	MC-35	Madison Run near Macomber WV - PRESTON
21WVINST	MC-35.5-{0.0}	Keyser Run south of Macomber WV - PRESTON
21WVINST	MC-36-{0.0}	Wolf Creek at Erwin WV - PRESTON
21WVINST	MC-36-A	Little Wolf Creek near Erwin WV - PRESTON
21WVINST	MC-39	Muddy Run near Etam WV - PRESTON
21WVINST	MC-40	Ford Run near Hannansville WV - TUCKER
21WVINST	MC-42	Louse Camp Run at Hannansville WV - TUCKER
21WVINST	MC-43-{0.0}	Licking Creek south of Hannahsville WV - TUCKER
21WVINST	MC-43-A	Bearpen Hollow near Hannahsville WV - TUCKER
21WVINST	MC-43-B	Jacobs Run near Hannahsville WV - TUCKER
21WVINST	MC-44-{0.0}	Bearwallow Run south of Hannahsville WV - TUCKER
21WVINST	MC-46	Bull Run near Auvil WV - TUCKER
21WVINST	MC-46-A	Left Fork Bull Run north of Auvil WV - TUCKER

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-46-B	Right Fork Bull Run north of Auvil WV - TUCKER
21WVINST	MC-47	Johnathan Run at Auvil WV - TUCKER
21WVINST	MC-48	Laurel Run near St. George WV - TUCKER
21WVINST	MC-49	Clay Lick Run near St. George WV - TUCKER
21WVINST	MC-50	Upper Johanthan Run at Auvil WV - TUCKER
21WVINST	MC-51	Clover Run near St. George WV - TUCKER
21WVINST	MC-51-A	Right Fork Clover Run near St.George WV - TUCKER
21WVINST	MC-51-B	Left Fork Clover Run near St.George WV - TUCKER
21WVINST	MC-51-B-1	Johnson Run near St.George WV - TUCKER
21WVINST	MC-51-B-2	Mill Run near St. George WV - TUCKER
21WVINST	MC-51-B-3	Bear Run near Parsons WV - TUCKER
21WVINST	MC-51-B-4	Valley Fork near Parsons WV - TUCKER
21WVINST	MC-51-B-5	Indian Run near Parsons WV - TUCKER
21WVINST	MC-52	Minear Run in St. George WV - TUCKER
21WVINST	MC-52-.7A	Bridge Run near St. George WV - TUCKER
21WVINST	MC-52-A	Roaring Run near St. George WV - TUCKER
21WVINST	MC-52-.7	Bridge Run near St. George WV - TUCKER
21WVINST	MC-53	Dry Run near St. George WV - TUCKER
21WVINST	MC-54	Horseshoe Run near St. George WV - TUCKER
21WVINST	MC-54-A	Mike Run near St. George WV - TUCKER
21WVINST	MC-54-C	Maxwell Run near St. George WV - TUCKER
21WVINST	MC-54-D	Hile Run near Lead Mine WV - TUCKER
21WVINST	MC-54-F	Laurel Run in Lead Mine WV -TUCKER
21WVINST	MC-54-H	Thunderstruck Run near Lead Mine WV - TUCKER
21WVINST	MC-54-H-1	Walnut Hollow Run near Lead Mine WV - TUCKER
21WVINST	MC-54-I	Leadmine Run near Lead Mine WV - TUCKER

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-54-I-1	Lime Hollow Run near Lead Mine WV- TUCKER
21WVINST	MC-54-J	Wolf Run at Shafer WV - TUCKER
21WVINST	MC-54-K	Twelvemile Run near Shafer WV - TUCKER
21WVINST	MC-55	Dry Run near St. George WV - TUCKER
21WVINST	MC-56	Mill Run near Parsons WV - TUCKER
21WVINST	MC-57	Wolf Run north of Parsons WV - TUCKER
21WVINST	MC-59-{00.0}	Shavers Fork at Parsons WV - TUCKER
21WVINST	MC-59-{20.4}	Shavers Fork near Elkins WV - RANDOLPH
21WVINST	MC-60-{11.6}	Dry Fork near Red Creek WV - TUCKER
21WVINST	MC-60-{25.1}	Dry Fork above Job WV - RANDOLPH
21WVINST	MC-60-A	Roaring Creek near Parsons WV - TUCKER
21WVINST	MC-60-C	Elklick Run near Parsons WV - TUCKER
21WVINST	MC-60-C-3	John B. Hollow near Parsons WV - TUCKER
21WVINST	MC-60-C-4	Hickman Slide Hollow near Parsons WV - TUCKER
21WVINST	MC-60-C-5	Wilson Hollow near Parsons WV - TUCKER
21WVINST	MC-60-D-{25}	Blackwater River below Canaan State Park WV - TUCKER
21WVINST	MC-60-D-1	Big Run near Thomas WV - TUCKER
21WVINST	MC-60-D-11	Yoakum Run near Cortland WV - TUCKER
21WVINST	MC-60-D-12	Freeland Run near Canaan Valley State Park WV - TUCKER
21WVINST	MC-60-D-14	Mill Run at Canaan Valley State Park WV - TUCKER
21WVINST	MC-60-D-2	Tub Run near Davis WV - TUCKER
21WVINST	MC-60-D-2.7	Finley Run near Thomas WV - TUCKER
21WVINST	MC-60-D-3-A	Long Run in Douglas WV - TUCKER
21WVINST	MC-60-D-3-B	Middle Run near Thomas WV - TUCKER
21WVINST	MC-60-D-3-C	Snyder Run in Benbush WV - TUCKER
21WVINST	MC-60-D-3-E	Sand Run in Pierce WV - TUCKER

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-60-D-4	Pendleton Creek near Davis WV - TUCKER
21WVINST	MC-60-D-4.5	Shays Run in Blackwaters Falls State Park WV - TUCKER
21WVINST	MC-60-D-4.7	Engine Run in Blackwater Falls State Park WV - TUCKER
21WVINST	MC-60-D-9	North Branch Blackwater River Canaan Heights WV - TUCKER
21WVINST	MC-60-E	Laurel Run near Hendricks WV - TUCKER
21WVINST	MC-60-F	Otter Creek near Hendricks WV - TUCKER
21WVINST	MC-60-G	Red Run near Hendricks WV - TUCKER
21WVINST	MC-60-H.5	Cave Run near Gladwin WV - TUCKER
21WVINST	MC-60-I	Mill Run near Gladwin WV - TUCKER
21WVINST	MC-60-J	Elklick Run near Gladwin WV - TUCKER
21WVINST	MC-60-K-{00}	Glady Fork at Gladwin WV - TUCKER
21WVINST	MC-60-K-16	West Fork Glady Creek at Glady WV - RANDOLPH
21WVINST	MC-60-K-17	East Fork Glady Creek at Glady WV - RANDOLPH
21WVINST	MC-60-K-17-A	Louk Run near Glady WV - RANDOLPH
21WVINST	MC-60-K-2-A	Hog Run north of Alpena WV - RANDOLPH
21WVINST	MC-60-K-5	Woodford Run near Alpena WV - RANDOLPH
21WVINST	MC-60-K-8	Flannigan Run near Alpena WV - RANDOLPH
21WVINST	MC-60-L	Big Run near Red Creek WV - TUCKER
21WVINST	MC-60-N-{01}	Laurel Fork near Dryfork WV - RANDOLPH
21WVINST	MC-60-N-{20}	Laurel Fork near Glady WV - RANDOLPH
21WVINST	MC-60-N-4	Beaver Dam Run south of Wymer WV - RANDOLPH
21WVINST	MC-60-N-8	Five Lick Run near Glady WV - RANDOLPH
21WVINST	MC-60-N-8.5	Tingler Run near Glady WV - RANDOLPH
21WVINST	MC-60-O-{1.0}	Red Creek above DryFork WV - TUCKER
21WVINST	MC-60-O-{7.0}	Red Creek near Laneville WV - TUCKER
21WVINST	MC-60-O-1	Big Run near Dryfork WV - RANDOLPH

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MC-60-P	Spruce Run near Harman WV - RANDOLPH
21WVINST	MC-60-Q	Horsecamp Run at Harman WV - RANDOLPH
21WVINST	MC-60-R	Tory Camp Run south of Harman WV - RANDOLPH
21WVINST	MC-60-S	Stinking Run in Job WV - RANDOLPH
21WVINST	MC-60-T-{2.5}	Gandy Creek at Whitmer WV - RANDOLPH
21WVINST	MC-60-T-{13.0}	Gandy Creek near Sinks of Gandy WV - RANDOLPH
21WVINST	MC-60-T-1	Lower Two Spring Run south of Whitmer WV - RANDOLPH
21WVINST	MC-60-T-10	Narrow Ridge Run below Spruce Knob Lake WV - RANDOLPH
21WVINST	MC-60-T-11	Warner Run near Sinks of Gandy WV - RANDOLPH
21WVINST	MC-60-T-13	Big Run at Sinks of Gandy WV - RANDOLPH
21WVINST	MC-60-T-2	Upper Spring Run south of Whitmer WV - RANDOLPH
21WVINST	MC-60-T-3	Swallow Rock Run near Whitmer WV - RANDOLPH
21WVINST	MC-60-T-8	Big Run south of Whitmer WV - RANDOLPH
21WVINST	MC-60-T-9	Grants Branch near Sinks of Gandy WV - RANDOLPH
21WVINST	MCS -.5	Smoky Hollow at Parsons WV - TUCKER
21WVINST	MCS -2	Hawk Run near Parsons WV - TUCKER
21WVINST	MCS -3	Haddix Run near Porters Wood WV - TUCKER
21WVINST	MCS -3-A	South Branch of Haddix Run at Moore Station WV -TUCKER
21WVINST	MCS -5	Laurel Run near Porterwood WV - TUCKER
21WVINST	MCS -6	Pleasant Run at Pleasant Run WV - TUCKER
21WVINST	MCS -6-B	Aarons Run near Pleasant Run WV - TUCKER
21WVINST	MCS -6-C	Slab Camp Run near Pleasant Run WV - TUCKER
21WVINST	MCS -6-E	Choke Trap Run near Pleasant Run WV - TUCKER
21WVINST	MCS -7	Stonelick Run near Pleasant Run WV - TUCKER
21WVINST	MCS -7.5	Canoe Run near Pleasant Run WV - TUCKER
21WVINST	MCS -8	Laurel Run south of Pleasant Run WV - TUCKER

Table 21
STORET Sampling Locations for
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Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	MCS-12	Little Laurel Run north of Stuart Park WV - RANDOLPH
21WVINST	MCS-13	Little Black Fork north of Stuart Park WV - RANDOLPH
21WVINST	MCS-14	Clifton Run north of Stuart Park WV - RANDOLPH
21WVINST	MCS-15	Rattlesnake Run north of Stuart Park WV - RANDOLPH
21WVINST	MCS-16	Johns Run near Bowden WV - RANDOLPH
21WVINST	MCS-18	Wolf Run at Stuart Park WV - RANDOLPH
21WVINST	MCS-22	Taylor Run at Bowden WV - RANDOLPH
21WVINST	MCS-25	Collet Gap Run south of Bowden WV - RANDOLPH
21WVINST	MCS-28	Upper Pondlick Run north of Bemis WV - RANDOLPH
21WVINST	MCS-33	Fishing Hawk Creek at Bemis WV - RANDOLPH
21WVINST	MCS-46	Red Run north of Cheat Bridge WV - RANDOLPH
21WVINST	MCS-47	Blister Run at Cheat Bridge WV - RANDOLPH
21WVINST	MCS-53	Beaver Creek near Cheat Bridge WV - RANDOLPH
21WVINST	MCS-54	Second Fork near Durbin WV - POCAHONTAS

Note:

Agency Identifier Code	Name of Agency
1118ATL8	U.S. Forest Service, Region 8
112WRD	U.S. Geological Survey
21WV7IWQ	West Virginia DEP Legacy
21WVWQAS	West Virginia Ambient Network
21WVINST	West Virginia DEP Watershed Assessment Program

Water quality in the Cheat watershed is highly variable. The northern half of the watershed has been severely impacted by acid mine drainage (AMD). The continual discharge of AMD from abandoned surface and deep mines is the single largest water

quality problem within the watershed. The southern half of the watershed is a mixture of agriculture, coal mining, forestry, and recreation activities. As a whole, the southern half of the watershed is considered very healthy, although some tributaries are affected by sediment, fecal coliform bacteria, mine drainage, and acid precipitation.

Water Quality Summary

During this reporting period, 255 (56%) of the streams in the Cheat River watershed were monitored. A summary of overall designated use support is provided in Table 22 while a use support matrix summary of all designated uses is given in Table 23.

Table 22
USE SUMMARY REPORT: OVERALL USE SUPPORT
CHEAT RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	255
Total Number of River/Streams Monitored:	253
Total Number of River/Streams Evaluated:	2

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	608.83	608.83
SUPPORTING BUT THREATENED	0.00	159.34	159.34
PARTIALLY SUPPORTING	1.40	231.44	232.84
NOT SUPPORTING	2.00	140.50	142.5
NOT ATTAINABLE	0.00	0.00	0
TOTAL SIZE ASSESSED	3.40	1140.11	1143.51

Of the 1143.51 stream miles assessed, 608.83 (53.2%) were fully supporting their overall designated uses, 159.34 (13.9%) were fully supporting but threatened, 232.84 (20.4%) were partially supporting, and 142.50 (12.5%) were not supporting.

The fishable goal of the Clean Water Act (CWA) was assessed solely by means of the Aquatic Life Support use, since the Fish Consumption use was not evaluated during this reporting period. Of the 1172.14 miles assessed for Aquatic Life Support use, 630.44 (53.8%) were fully supporting, 142.50 (12.2%) were fully supporting but threatened, 253.50 (21.6%) were partially supporting, and 145.70 (12.4%) were not supporting.

The swimmable goal of the CWA was assessed by means of the Primary Contact Recreation use. Of the 1112.44 miles assessed for Primary Contact Recreation use, 867.74 (78.0%) were fully supporting, 167.40 (15.0%) were fully supporting but threatened, 21.70 (2.0%) were partially supporting, and 55.60 (5.0%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Cheat River watershed is provided in Table 24.

TABLE 23
USE SUPPORT MATRIX SUMMARY
CHEAT RIVER WATERSHED
WATERBODY TYPE: RIVER
UNITS IN MILES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	608.83	160.34	236.14	147.70	
Aquatic Life	630.44	142.50	253.50	145.70	
Fish Consumption					
Cold Water Fishery - Trout	365.34	96.80	138.50	39.70	
Shell fishing					
Warm Water Fishery	159.50	16.80	45.50	12.20	
Bait Minnow Fishery	135.50	28.90	60.70	121.70	
Primary Contact Recreation	867.74	167.40	21.70	55.60	
Secondary Contact Recreation					
Drinking Water Supply	172.80	11.00	20.90		
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial	57.10		20.90		

Navigation					
Wildlife					
Livestock Watering					

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are pH (241.60 miles), metals (167.50 miles), siltation (127.90 miles), and cause unknown (77.10 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Cheat River watershed is provided in Table 25.

Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are abandoned mining (155.20 miles), source unknown (105.40 miles), atmospheric deposition (92.10 miles), and construction (83.80 miles).

Public Health/Aquatic life Impacts

Currently, no streams in the Cheat River watershed are under a fish consumption advisory. In addition, no bathing beach or public water supply closures or pollution caused fish kills were documented in the watershed during this reporting cycle.

Section 303(d) Waters

Table 26 includes streams from the Cheat River watershed that are on the current 303(d) list. Ninety four streams from the watershed are on the list, including two on the Primary Waterbody List, 53 on the Mine Drainage Impaired sublist, 25 on the Biologically Impaired sublist, and 14 on the Acid Rain Impaired sublist.

Currently, the Upper Blackwater River is the only 303(d) listed stream in the Cheat River watershed that has had a TMDL completed (U.S. EPA, 1997). The TMDL, finalized in February of 1998, was for low dissolved oxygen due to municipal point sources.

A portion of the Cheat River mainstem, the Lower Blackwater River, and 53 AMD impacted tributaries in the watershed are scheduled for TMDL development in 1999. The pollutants involved are various heavy metals (including aluminum, iron, manganese, and zinc), and low pH.

Table 24
Complete Summary of Causes, Including User-Defined
Cheat River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	18.90	58.20
0500	METALS	125.60	41.90
0800	OTHER ORGANICS	8.90	14.00
0900	NUTRIENTS	4.00	1.70
1000	pH	190.10	51.50
1100	SILTATION	25.50	102.40
1200	ORGANIC ENRICHMENT/LOW DO	3.00	25.10
1500	FLOW ALTERATIONS	0.00	6.00
1600	HABITAT ALTERATION (non-flow)	4.30	42.40
1700	PATHOGENS	0.00	44.70
1710	FECAL COLIFORM	0.00	44.70

Table 25
Complete Summary of Sources, Including User-Defined
Cheat River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0100	INDUSTRIAL POINT SOURCES	2.50	1.30
0120	Minor Industrial Point Source	2.50	0.00
0200	MUNICIPAL POINT SOURCES	0.00	23.40
0230	Package Plants (Small Flows)	0.00	23.40
1000	AGRICULTURE	0.00	83.50
1350	GRAZING RELATED SOURCES	0.00	1.30
1400	Pasture Grazing- Riparian and/or Upland	0.00	79.30
2000	SILVICULTURE	0.00	10.30
3000	CONSTRUCTION	2.50	81.30
3100	Highway/Road/Bridge Construction	0.00	3.30
4000	URBAN RUNOFF/STORM SEWERS	0.00	2.80
5000	RESOURCE EXTRACTION	153.60	18.80
5100	Surface Mining	16.80	6.40
5200	Subsurface Mining	3.00	2.40
5900	Abandoned Mining	140.40	14.80
7000	HYDROMODIFICATION	0.00	9.00
7100	Channelization	0.00	9.00
7200	Dredging	0.00	1.00
7300	Dam Construction	0.00	2.00
7400	Flow Regulation/Modification	0.00	3.00
7550	HABITAT MODIFICATION- Other than Hydromodification	4.30	34.80
7600	Removal of Riparian Vegetation	4.30	31.80
7700	Streambank Modification/Destabilization	2.50	8.00
7800	Drainage/Filling of Wetlands	0.00	2.20
8100	ATMOSPHERIC DEPOSITION	44.30	47.80
9000	SOURCE UNKNOWN	15.50	89.90

TABLE 26
West Virginia
1998 303(d) List
Cheat River Watershed

Primary Waterbody List

Stream Name	Steam Code	Use Affected	Pollutant	Primary Source	Size Affected in Miles	Reach Description	TMDL Priority	HUC
Cheat River	MC	Aquatic Life, Human Health	Iron	Mine Drainage	12.59	Muddy Creek to Cheat Lake	High	05020004
Cheat River	MC	Aquatic Life	Aluminum, pH, Zinc	Mine Drainage	20.92	Pringle Run to Cheat Lake	High	05020004
Lower Blackwater River	MC-60-D	Aquatic Life	Iron, Aluminum	Mine Drainage	11	Davis to Mouth	High	05020004
Lower Blackwater River	MC-60-D	Human Health	Iron	Mine Drainage	11	Davis to Mouth	High	05020004
Lower Blackwater River	MC-60-D	Aquatic Life	Low Dissolved Oxygen	Municipal Point Sources	23.4	Headwaters to Mouth of Yellow Creek	Completed	05020004

Table 26 (continued)
Cheat River Watershed
Waterbodies Impaired by Mine Drainage

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Unnamed Tributary #1 Cheat Lake	MC ?	0.00	Aquatic Life	pH, Metals	Mine Drainage	High
Unnamed Tributary #2 Cheat Lake	MC ?	0.00	Aquatic Life	pH, Metals	Mine Drainage	High

Table 26 (continued) Cheat River Watershed Waterbodies Impaired by Mine Drainage						
Stream Name	**Steam Code**	**Miles Affected**	**Use Affected**	**Pollutant**	**Source**	**TMDL Priority**
Unnamed Tributary #3 Cheat Lake	MC ?	0.00	Aquatic Life	pH, Metals	Mine Drainage	High
Crammeys Run	MC-3	1.40	Aquatic Life	Metals	Mine Drainage	High
Bull Run	MC-11	6.20	Aquatic Life	pH, Metals	Mine Drainage	High
Middle Run / Bull Run	MC-11-A	1.70	Aquatic Life	pH, Metals	Mine Drainage	High
1st Unnamed Tributary / Bull Run	MC-11-.1A	1.44	Aquatic Life	pH, Aluminum	Mine Drainage	High
Mountain Run / Bull Run	MC-11-B	2.40	Aquatic Life	pH, Metals	Mine Drainage	High
Lick Run / Bull Run	MC-11-C	1.50	Aquatic Life	pH, Metals	Mine Drainage	High
2nd Unnamed Tributary / Bull Run	MC-11-C.1	1.40	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Right Fork Bull Run	MC-11-E	1.80	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Big Sandy Creek	MC-12	19.00	Aquatic Life	pH, Metals	Mine Drainage	High
Unnamed Tributary / Big Sandy Creek	MC-12?	0.00	Aquatic Life	pH, Metals	Mine Drainage	High
Little Sandy Creek	MC-12-B	14.00	Aquatic Life	pH, Metals	Mine Drainage	High
Webster Run / Little Sandy Creek	MC-12-B-0.5	3.00	Aquatic Life	pH, Metals	Mine Drainage	High
Beaver Creek / Little Sandy Creek	MC-12-B-1	7.40	Aquatic Life	pH, Metals	Mine Drainage	High

Table 26 (continued) Cheat River Watershed Waterbodies Impaired by Mine Drainage						
Stream Name	**Steam Code**	**Miles Affected**	**Use Affected**	**Pollutant**	**Source**	**TMDL Priority**
Glade Run / Beaver Creek / Little Sandy Creek	MC-12-B-1-A	2.80	Aquatic Life	pH, Metals	Mine Drainage	High
Unnamed Tributary #2 / Beaver Creek / little Sandy Creek	MC-12-B-1?	0.00	Aquatic Life	pH, Metals	Mine Drainage	High
Hog Run / Little Sandy Creek	MC-12-B-3	4.60	Aquatic Life	pH, Metals	Mine Drainage	High
Cherry Run	MC-12-B-5	3.00	Aquatic Life	pH, Metals	Mine Drainage	High
Hazel Run	MC-12-C	5.60	Aquatic Life	pH, Metals	Mine Drainage	High
Sovern Run/ Big Sandy Creek	MC-12-O.5	4.70	Aquatic Life	pH, Metals	Mine Drainage	High
Conner Run / Cheat River	MC-13.5	2.90	Aquatic Life	pH, Metals	Mine Drainage	High
Greens Run	MC-16	8.20	Aquatic Life	pH, Metals	Mine Drainage	High
South Fork / Green Run	MC-16-A	4.30	Aquatic Life	Metals	Mine Drainage	High
Middle Fork / Green Run	MC-16-A-.1	2.40	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Muddy Creek	MC-17	15.60	Aquatic Life	pH, Metals	Mine Drainage	High
Martin Creek	MC-17-A	2.60	Aquatic Life	pH, Metals	Mine Drainage	High
Fickey Run	MC-17-A-0.5	2.80	Aquatic Life	pH, Metals	Mine Drainage	High

Table 26 (continued) Cheat River Watershed Waterbodies Impaired by Mine Drainage						
Stream Name	**Steam Code**	**Miles Affected**	**Use Affected**	**Pollutant**	**Source**	**TMDL Priority**
Glade Run / Martin Creek	MC-17-A-1	3.60	Aquatic Life	pH, Metals	Mine Drainage	High
1st Unnamed tributary / Glade Run	MC-17-A-1.1	1.00	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
2nd Unnamed tributary / Glade Run	MC-17-A-1.2	1.20	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Roaring Creek	MC-18	9.20	Aquatic Life	pH, Metals	Mine Drainage	High
Morgan Run	MC-23	4.60	Aquatic Life	pH, Metals	Mine Drainage	High
1st Unnamed tributary / Morgan Run	MC-23-.2A	2.29	Aquatic Life	pH, Aluminum, Manganese	Mine Drainage	High
Church Creek / Morgan Run	MC-23-A	4.00	Aquatic Life	pH, Metals	Mine Drainage	High
Left Fork / Unnamed tributary / Church Creek	MC-23-A-.1-A	1.00	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Right Fork / Unnamed tributary/ Church Creek	MC-23-A-.1-B	1.80	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Heather Run	MC-24	3.40	Aquatic Life	pH, Metals	Mine Drainage	High
1st Unnamed tributary / Heather Run	MC-24-A	1.00	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Lick Run	MC-25	4.00	Aquatic Life	Metals	Mine Drainage	High

Table 26 (continued) Cheat River Watershed Waterbodies Impaired by Mine Drainage						
Stream Name	**Steam Code**	**Miles Affected**	**Use Affected**	**Pollutant**	**Source**	**TMDL Priority**
Joes Run	MC-26	2.80	Aquatic Life	pH, Metals	Mine Drainage	High
Pringle Run	MC-27	4.70	Aquatic Life	Metals	Mine Drainage	High
Left Fork / Pringle Run	MC-27-A	4.00	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Right Fork / Pringle Run	MC-27-B	3.00	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Tub Run	MC-60-D-2	2.80	Aquatic Life	pH, Metals	Mine Drainage	High
Finley Run	MC-60-D-2.7	0.73	Aquatic Life	pH, Metals	Mine Drainage	High
North Fork / Blackwater River	MC-60-D-3	4.00	Aquatic Life	pH, Metals	Mine Drainage	High
Long Run	MC-60-D-3-A	3.60	Aquatic Life	pH, Iron, Aluminum, Manganese	Mine Drainage	High
Middle Run / North Fork / Blackwater River	MC-60-D-3-B	1.80	Aquatic Life	pH, Metals	Mine Drainage	High
Snyder Run / North Fork / Blackwater River	MC-60-D-3-C	2.80	Aquatic Life	pH, Metals	Mine Drainage	High
Beaver Creek / Blackwater River	MC-60-D-5	13.80	Aquatic Life	pH, Metals	Mine Drainage	High
Hawkins Run	MC-60-D-5-C	2.00	Aquatic Life	pH, Metals	Mine Drainage	High

Table 26 (continued)
Cheat River Watershed
Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority
Coles Run	MC-2.5	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Kelly Run	MC-2.7	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Whites Run	MC-4	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Scott Run / Cheat River	MC-7	undetermined	Aquatic Life	Unknown	Unknown	17.0	Low
Left Fork Bull Run	MC-11-D-{0.0}	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Patterson Run	MC-12-A-2	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Unnamed tributary / Webster Run	MC-12-B-.5-A	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Elk Run	MC-12-B-4-{03}	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
3rd Unnamed tributary / Cherry Run	MC-12-B-5-C	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Glade Run	MC-12-E	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
2nd Unnamed tributary/Muddy Creek	MC-17-B.6A	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Crab Orchard Creek	MC-17-.7	undetermined	Aquatic Life	Unknown	Unknown	33.0	Low
Jump Rock Creek	MC-17-B	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
1st Unnamed tributary / Roaring Creek	MC-18-.1A	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low

Table 26 (continued) Cheat River Watershed Waterbodies with Biological Impairment							
Stream Name	**Steam Code**	**Miles Affected**	**Use Affected**	**Pollutant**	**Source**	**Biology Score**	**TMDL Priority**
2nd Unnamed tributary / Buffalo Run	MC-22-A	undetermined	Aquatic Life	Unknown	Unknown	33.0	Low
Buckhorn Run	MC-31-{0.0}	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Jacobs Run	MC-43-B	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Clay Lick Run	MC-49	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Wolf Run / Cheat River	MC-57	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Yokum Run	MC-60-D-11	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Freeland Run	MC-60-D-12	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Shays Run	MC-60-D-4.5	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Red Creek	MC-69-O-{07.0}	undetermined	Aquatic Life	Unknown	Unknown	33.0	Low
Smoky Hollow	MCS-.5	undetermined	Aquatic Life	Unknown	Unknown	42.0	Low
Red Run / Shavers FOrk	MCS-46	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low

Table 26 (continued)
Cheat River Watershed
Waterbodies Impaired by Acid Rain

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	TMDL Priority
Shavers Fork	MC-59	35	Aquatic Life	pH	Acid Rain	Low
Laurel Run / Dry Fork	MC-60-E	3.6	Aquatic Life	pH	Acid Rain	Low
Red Creek	MC-60-O	19.8	Aquatic Life	pH	Acid Rain	Low
Gandy Run / Red Creek	MC-60-O-3	2.3	Aquatic Life	pH	Acid Rain	Low
South Fork / Red Creek	MC-60-O-4	6	Aquatic Life	pH	Acid Rain	Low
Laurel Run	MCS-5	3.8	Aquatic Life	pH	Acid Rain	Low
McGee Run	MCS-39	2	Aquatic Life	pH	Acid Rain	Low
Yokum Run	MCS-41	1.6	Aquatic Life	pH	Acid Rain	Low
Crouch Run	MCS-41	1.8	Aquatic Life	pH	Acid Rain	Low
Whitmeadow Run	MCS-44	1.2	Aquatic Life	pH	Acid Rain	Low
Stonecoal Run	MCS-45	2.6	Aquatic Life	pH	Acid Rain	Low
Fish Hatchery Run	MCS-48	2.8	Aquatic Life	pH	Acid Rain	Low
First Fork	MCS-50	3.9	Aquatic Life	pH	Acid Rain	Low
Buck Run	MCS-52	1	Aquatic Life	pH	Acid Rain	Low

TMDL - Total Maximum Daily Load HUC - Hydrologic Unit Code

Shenandoah River Watershed

Background

The Shenandoah River watershed makes up the majority of the Great Valley Physiographic Province which also includes the Opequon, Conococheague, and Antietam Creek watersheds. It is the largest tributary to the main stem of the Potomac River and drains approximately 3085 square miles. It drains the eastern slopes of the Great North Mountain, the western slopes of the Blue Ridge Mountains, and the broad valleys in between. The West Virginia portion of the Shenandoah watershed actually consists of two very small hydrologic units: The Jefferson County unit (hydrologic unit # 02070007) and the Hardy County unit (02070006). Collectively, these units contain 17 streams totaling approximately 89 miles in length. A generalized map of the Jefferson County Unit (the larger of the two units) with monitoring stations delineated is provided in Figure 6. The sites located in Hardy County could not be mapped with current software. Table 27 is a list of these stations.

The Shenandoah River is formed by the confluence of the North and South Forks at the north end of Massanutten Mountain at Riverton, Virginia. From Riverton, it flows 34 miles to the southern boundary of Jefferson County, West Virginia. It then flows 19.45 miles near the eastern border of Jefferson County to its confluence with the Potomac River at Harpers Ferry, West Virginia. The drainage within this area includes a number of long tributaries flowing through the relatively flat agricultural land to the west of the river and several shorter streams which drain the forested slopes of the Blue Ridge Mountains to the east.

The Shenandoah River has largely recovered from widespread pollution that occurred during the 1940's in association with logging and the introduction of toxic chemicals and domestic sewage. The Shenandoah River, shown on the front cover of this report, is now an excellent fishing stream, especially for smallmouth bass, rock bass, sunfish, and channel catfish.

The small Hardy County portion of the watershed has no industries or municipal discharges. The area is primarily forest, with cropland in areas flat enough to allow it.

The Shenandoah watershed is predominantly in the Ridge and Valley Ecoregion, specifically in the Northern Limestone/Dolomite Valleys and low rolling hills sub-ecoregion. This area is lowland characterized by broad, level to undulating, fertile valleys that are extensively farmed. Sinkholes, underground streams, and other karst features have developed on the underlying limestone/dolomite, and as a result, the drainage density is

low. Where streams do occur, they tend to have gentle gradients and plentiful perennial flow.

West Virginia Portion of Shenandoah River Watershed Hydrologic Unit Code - 02070007 (Jefferson County)

Figure 6

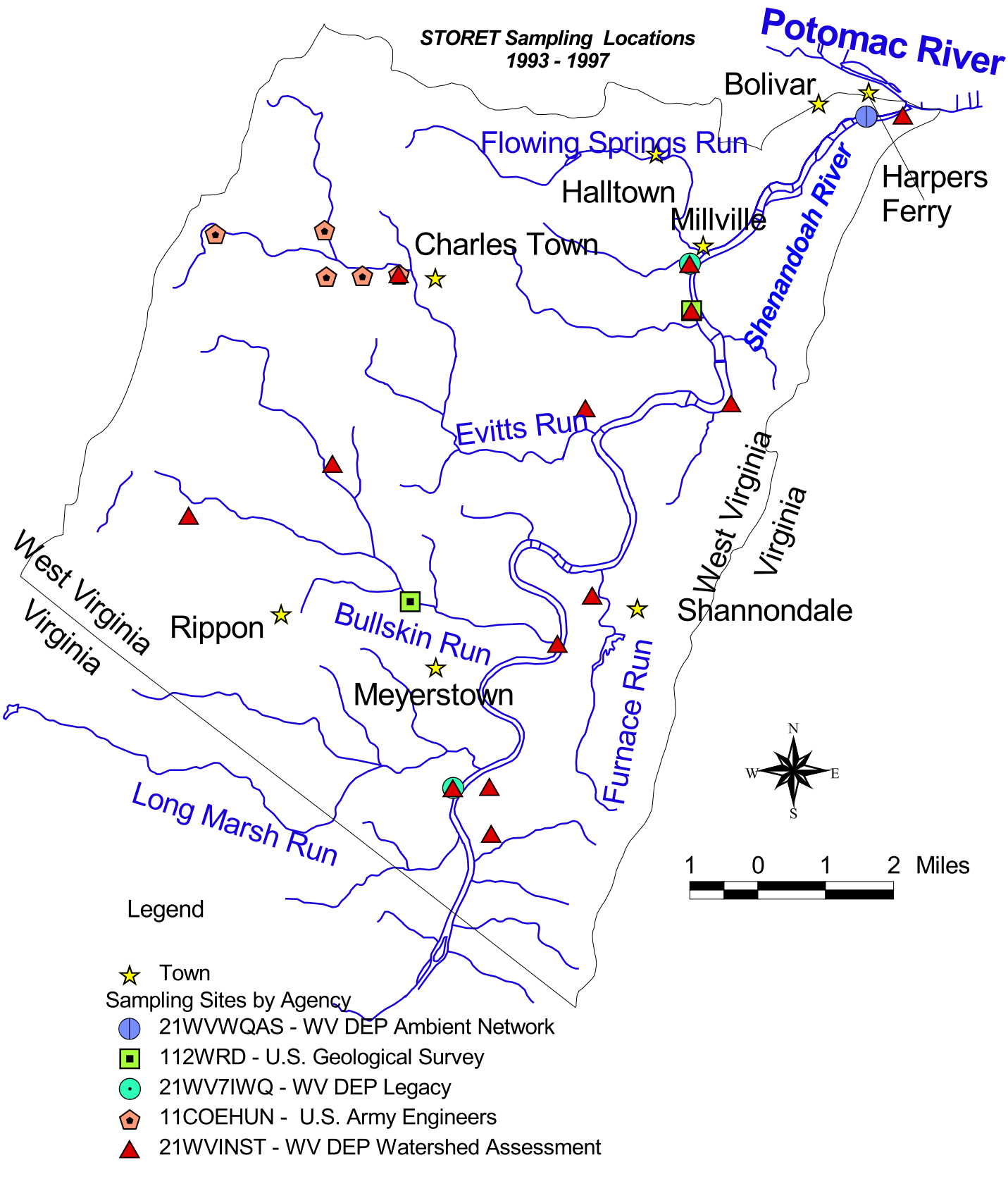

Table 27
STORET Sampling Locations for
Shenandoah River Watershed
Hydrologic Unit Code -02070007
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
112WRD	01636500	Shenandoah R at Millville WV - JEFFERSON
21WV7IWQ	550471	Shenandoah River at Harpers Ferry WV - JEFFERSON
21WV7IWQ	550472	Shenandoah River near Meyerstown W V - JEFFERSON
21WV7IWQ	550870	Shenandoah River at Millville WV - JEFFERSON
112WRD	01636460	Bullskin Run above Kabletown WV - JEFFERSON
11COEHUN	1AMEW0001	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0002	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0003	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0004	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0005	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0006	Evitts Run WV - JEFFERSON
11COEHUN	1AMEW0007	Evitts Run WV - JEFFERSON
21WVWQAS	WA96-S01	Shenandoah River at Harpers Ferry WV - JEFFERSON
21WVINST	S-00-{00.5}	Shenandoah River at Harpers Ferry WV - JEFFERSON
21WVINST	S-00-{17.0}	Shenandoah River near Meyerstown WV - JEFFERSON
21WVINST	S-01	Flowing Springs Run near Millville WV - JEFFERSON
21WVINST	S-02	Cattail Run near Millville WV - JEFFERSON
21WVINST	S-03	Forge Run near Mannings WV - JEFFERSON
21WVINST	S-04-{00.1}	Evitts Run at Bloomery WV - JEFFERSON
21WVINST	S-04-{06.0}	Evitts Run in Charles Town WV - JEFFERSON
21WVINST	S-05	Furnace Run at Shannondale WV - JEFFERSON
21WVINST	S-06-{00.1}	Bullskin Run below Kabletown WV - JEFFERSON
21WVINST	S-06-{06.0}	Bullskin Run above Wheatland WV - JEFFERSON
21WVINST	S-06-A	North Fork of Bullskin Run near Wheatland WV - JEFFERSON
21WVINST	S-07	Long Marsh Run near Meyerstown WV - JEFFERSON

Table 27 STORET Sampling Locations for Shenandoah River Watershed Hydrologic Unit Code -02070007 for 1993-1997		
Agency Code Identifier	**STORET Station Number**	**Location of Sampling Points**
21WVINST	S-08	Hog Run south of Shannondale WV - JEFFERSON
21WVINST	S-9-A	Capon Run - HARDY*
21WVINST	S-10	Crab Run - HARDY*

Note: * Shenandoah sites in Hardy County will not plot in STORET.

Agency Identifier Code	Name of Agency
11COEHUN	U.S. Army Corps of Engineers
112WRD	U.S. Geological Survey
21WV7IWQ	West Virginia DEP Legacy
21WVWQAS	West Virginia Ambient Network
21WVINST	West Virginia DEP Watershed Assessment Program

Leading industries in Jefferson County are cement and road materials, clothing, paper, boxboard, lumber, brass, lime marl, dolomite, and fertilizer. The main agricultural products for the county are fruit, livestock, hay and grain, and dairy.

Water Quality Summary

During this reporting period, 12 (70%) of the streams in the Shenandoah River watershed were monitored. A summary of overall designated use support is provided in Table 28 while a use support matrix summary of all designated uses is given in Table 29.

Of the 74.77 stream miles assessed, 24.41 (32.6%) were fully supporting their overall designated uses, 12.95 (17.4%) were fully supporting but threatened, and 37.41 (50.0%) were partially supporting.

Table 28
USE SUMMARY REPORT: OVERALL USE SUPPORT
SHENANDOAH RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	12
Total Number of River/Streams Monitored:	12
Total Number of River/Streams Evaluated:	0

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	24.41	24.41
SUPPORTING BUT THREATENED	0.00	12.95	12.95
PARTIALLY SUPPORTING	0.00	37.41	37.41
NOT SUPPORTING	0.00	0.00	0
NOT ATTAINABLE	0.00	0.00	0
TOTAL SIZE ASSESSED	0.00	74.77	74.77

The fishable goal of the Clean Water Act (CWA) was assessed solely by means of the Aquatic Life Support use, since the Fish Consumption use was not evaluated during this reporting period. Of the 74.77 miles assessed for Aquatic Life Support use, 43.86 (58.7%) were fully supporting, 12.95 (17.3%) were fully supporting but threatened, and 17.96 (24.0%) were partially supporting.

The swimmable goal of the CWA was assessed by means of the Primary Contact Recreation use. Of the 74.77 miles assessed for Primary Contact Recreation use, 23.09 (31.0%) were fully supporting, and 51.68 (69.0%) were fully supporting but threatened.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Shenandoah River watershed is provided in Table 30.

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are pcb's (19.45 miles), siltation (8.47 miles), and cause unknown (2.22 miles).

Relative Assessment of Sources

watershed is provided in Table 31.

Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are contaminated sediments (19.45 miles), source unknown (13.38 miles), and grazing-related sources (4.58 miles).

TABLE 29
USE SUPPORT MATRIX SUMMARY
SHENANDOAH RIVER WATERSHED
WATERBODY TYPE: RIVER
UNITS IN MILES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Support-ing	Not Attainable
Overall Use	24.41	12.95	37.41		
Aquatic Life	43.86	12.95	17.96		
Fish Consumption			19.45		
Cold Water Fishery - Trout	19.08		13.05		
Shell fishing					
Warm Water Fishery	19.45	10.30			
Bait Minnow Fishery	5.33	2.65	4.91		
Primary Contact Recreation	23.09	51.68			
Secondary Contact Recreation					
Drinking Water Supply	19.45				
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial					
Navigation					
Wildlife					
Livestock Watering					

Table 30
Complete Summary of Causes, Including User-Defined
Shenandoah River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	0.00	2.22
0410	PCBS	19.45	0.00
1100	SILTATION	0.00	8.47

Public Health/Aquatic life Impacts

A fish consumption advisory is currently in effect for the Shenandoah River mainstem. The advisory, which was re-issued in April 1994, is for Channel Catfish, Suckers, and Carp. It is recommended that these species not be consumed due to contamination with PCB's, which were historically discharged from Avtex Fibers in Front Royal, Virginia. The contaminants apparently are persisting in the stream sediments.

During this reporting period, there were no bathing beach or pubic water supply closures or pollution caused fish kills in the watershed.

Table 31
Complete Summary of Sources, Including User-Defined
Shenandoah River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
1350	GRAZING RELATED SOURCES	0.00	4.58
1400	Pasture Grazing-Riparian and/or Upland	0.00	4.58
8500	CONTAMINATED SEDIMENTS	19.45	0.00
9000	SOURCE UNKNOWN	0.00	13.38

Section 303(d) Waters

Table 32 includes streams from the Shenandoah River watershed that are on the

current 303(d) list. Three streams appear on the list, including one on the Primary Waterbody List (Shenandoah River mainstem) an two on the Biologically Impaired sublist. The Shenandoah River mainstem is on the list due to PCB contamination, as described in the previous section.

Currently, no 303(d) listed streams in the Shenandoah River watershed have had TMDL's completed.

TABLE 32
West Virginia
1998 303(d) List
Shenandoah River Watershed

Primary Waterbody List

Stream Name	Stream Code	Use Affected	Pollutant	Primary Source	Size Affected in Miles	Reach Description	TMDL Priority	HUC
Shenandoal River	S	Human Health*	PCBs	Avtex Fibers - Front Royal VA	19.45	Entire Length	Medium	02070007

Table 32 (continued)
Shenandoah River Watershed
Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority
Bullskin Run	S-6	6.0	Aquatic Life	Unknown	Unknown	46.0	Low
North Fork / Bullskin Run	S-6-A	undetermined	Aquatic Life	Unknown	Unknown	39.0	Low

* Contaminant found in fish tissue
TMDL - Total Maximum Daily Load HUC - Hydrologic Unit Code

South Branch Potomac River Watershed

Background

The north-east-ward-flowing Potomac River forms the Maryland-West Virginia boundary between Green Spring, Hampshire County, WV and Harpers Ferry, Jefferson County, WV. Upriver of Green Spring, the Potomac splits into two major tributaries, the North and South Branches.

The total length of the South Branch from headwaters to its confluence with the Potomac River is about 133 miles. The South Branch basin is a natural, hydrologically defined watershed of 1,493 square miles, all within Pendleton, Grant, Hardy, and Hampshire counties, West Virginia, and Highland County, Virginia. Located at the base of West Virginia's eastern panhandle, the South Branch Potomac Watershed (hydrologic unit # 02070001) is about 85 miles long (northeast to southwest) by 30 miles wide (northwest to southeast). The watershed contains 289 streams totaling approximately 1,055 miles in length. A generalized map of the watershed with monitoring stations is provided in Figure 7. Table 33 is a list of these stations.

The South Branch drains parts of two physiographic provinces. The Appalachian Plateau Province forms the watershed's extreme western edge. This province features narrow valleys, steep ridges, swift streams, low soil permeability, much coal (although none in the watershed), and horizontally bedded sedimentary rocks such as sandstone, shale, and limestone. The Ridge and Valley Province contains the majority of the watershed. Here, strata and topography are intensely folded and faulted. Parallel valleys are separated by long, steep ridges which reinforce a classic trellised drainage pattern.

Historically, water quality of the South Branch has been good to excellent. However, during 1994-95, Mathes (1996) evaluated the relationship between landuses and water quality in the watershed and concluded that there were positive correlations between a) the numbers of feedlots and poultry houses and b) the concentrations of nitrate and fecal coliform bacteria. These findings suggest that nonpoint source pollution was degrading some of the Watershed's streams.

One of West Virginia's most agricultural areas, the watershed includes concentrated cattle and poultry production, as well as field crops and pasture. Concentrated animal production (e.g., cattle feedlots, poultry houses) may be producing excess levels of fecal, sediment, and nutrient pollution.

South Branch of Potomac River Watershed
Hydrologic Unit Code - 02070001

Figure 7

STORET Sampling Locations
1993 - 1997

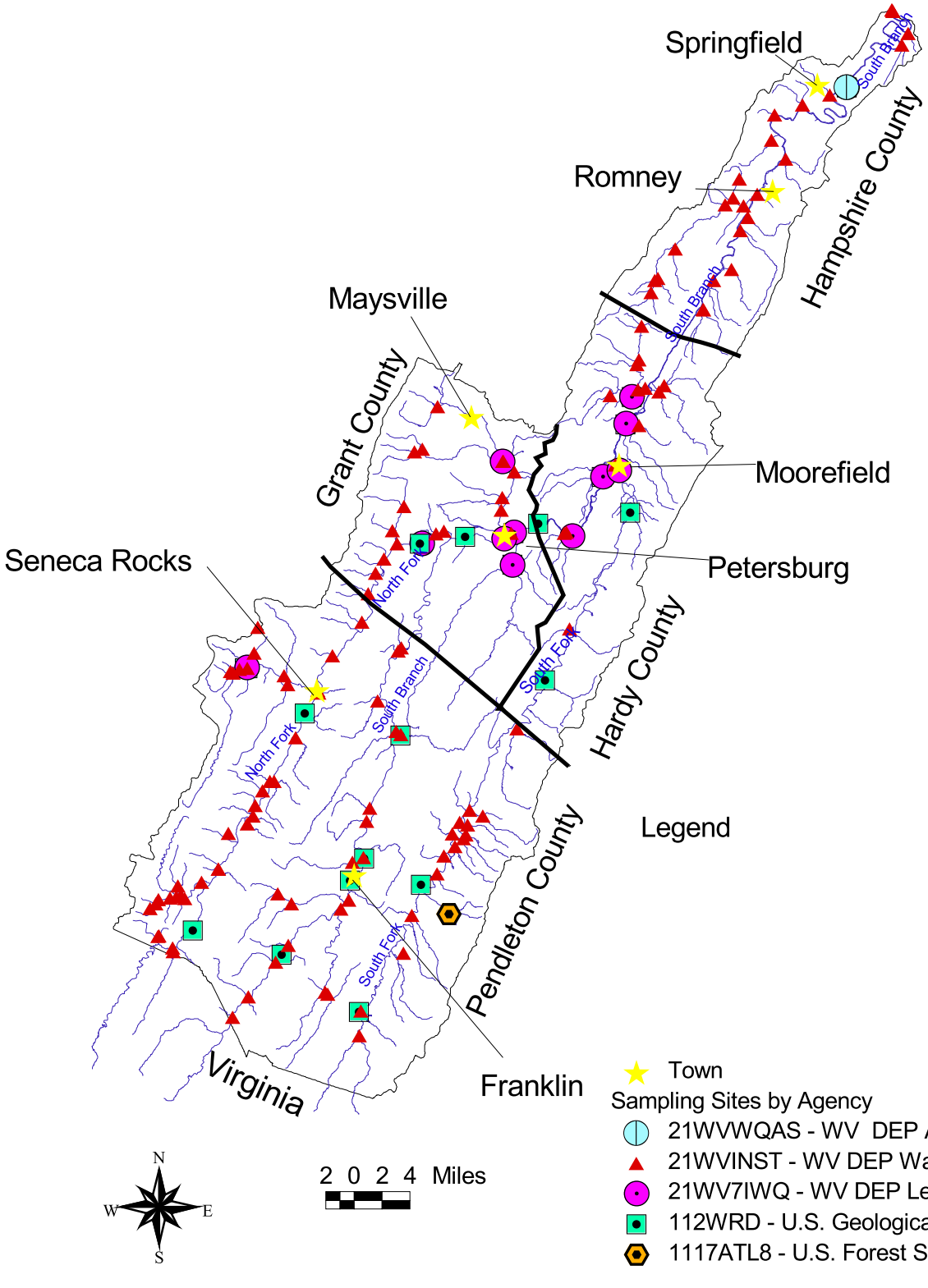

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
112WRD	01608500	South Branch Potomac River near Springfield WV - HAMPSHIRE
21WV7IWQ	550468	South Branch Potomac River near Springfield WV -HAMPSHIRE
21WVWQAS	WA96-P03	South Branch Potomac River near Springfield WV - HAMPSHIRE
112WRD	01608070	South Branch Potomac River near Moorefield WV - HARDY
112WRD	385026079042701	South Fork South Branch Potomac River at Peru WV - HARDY
112WRD	390011079044501	South Branch Potomac River at Petersburg Gap WV - HARDY
112WRD	390301078593501	South Branch Potomac River above Moorefield - HARDY
112WRD	390756078570401	Anderson Run at Old Fields WV - HARDY
21WV7IWQ	550843	South Branch of Potomac River below Moorefield WV- HARDY
21WV7IWQ	551070	Anderson Run in Old Fields WV - HARDY
21WV7IWQ	551071	South Branch of Potomac River above Moorefield WV- HARDY
21WV7IWQ	551069	Jenkins Run near Durgon WV - HARDY
21WV7IWQ	551066	South Fork South Branch Potomac in Moorefield WV - HARDY
112WRD	01608000	South Fork South Branch Potomac River near Moorefield WV - Hardy
112WRD	385740079065201	Mill Creek near Mouth - GRANT
112WRD	385938079064301	Lunice Creek at Petersburg WV - GRANT
112WRD	01606500	South Branch Potomac River near Petersburg WV - GRANT
21WV7IWQ	550920	Lunice Creek near Petersburg WV - GRANT
21WV7IWQ	551068	South Fork of Lunice Creek at Arthur WV - GRANT
21WV7IWQ	550917	South Branch Potomac River in Petersburg WV -GRANT
21WV7IWQ	550912	North Fork Soouth Branch Potomac River near Cabins WV - GRANT
112WRD	01606000	North Fork South Branch Potomac River at Cabins WV - GRANT
21WV7IWQ	550921	Mill Creek near Petersburg WV - GRANT
112WRD	383003079194201	South Fork South Branch Potomac River at Sugar Grove WV - PENDLETON

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
112WRD	383342079254601	South Branch Potomac River @ Moyer Gap WV - Pendleton
112WRD	383518079324601	North Fork South Branch Potomac River near State line WV
112WRD	383935079190501	South Branch Potomac River below Franklin WV - PENDLETON
112WRD	384712079160101	South Branch Potomac River at Upper Tract WV - PENDLETON
112WRD	384840079233501	North Fork South Branch Potomac River at Seneca Rocks WV
112WRD	385133079280501	Seneca Creek near Seneca Rocks WV - PENDLETON
112WRD	01605900	Seneca Creek near Onego WV - PENDLETON
1118ATL8	080201	Brandywine Lake - Hawes Run WV - PENDLETON
112WRD	01605500	South Branch Potomac River at Franklin WV - PENDLETON
21WV7IWQ	551067	Seneca Creek at Seneca Recreation Area WV - PENDLETON
112WRD	01607500	South Fork South Branch Potomac River at Brandywine WV
21WVINST	PSB-00.5	First Unnamed Tributary near Green Spring WV - HAMPSHIRE
21WVINST	PSB-00-{000.5}	South Branch of Potomac near Green Spring WV - HAMPSHIRE
21WVINST	PSB-00-{032.2}	South Branch of Potomac above Romney WV - HAMPSHIRE
21WVINST	PSB-00-{121.8}	South Branch of Potomac above Harper WV - PENDLETON
21WVINST	PSB-01	Stoney Run near Levels WV - HAMPSHIRE
21WVINST	PSB-01.5	Mine Hollow near Levels WV - HAMPSHIRE
21WVINST	PSB-01.8	Abernathy Run near Springfield WV - HAMPSHIRE
21WVINST	PSB-01.9	Second Unnamed Tributary near Grace WV - HAMPSHIRE
21WVINST	PSB-02	Johns Run at Grace WV - HAMPSHIRE
21WVINST	PSB-03	Broad Run at Springfield WMA WV - HAMPSHIRE
21WVINST	PSB-04	Fox Run near Wapocomo WV - HAMPSHIRE
21WVINST	PSB-05	Buffalo Creek north of Romney WV - HAMPSHIRE

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	PSB-09-{02.2}	Mill Creek at Mechanicsburg WV - HAMPSHIRE
21WVINST	PSB-09-{10.7}	Mill Creek near Purgitsville WV - HAMPSHIRE
21WVINST	PSB-09-B	Dumpling Run above Mechanicsburg WV - HAMPSHIRE
21WVINST	PSB-09-B-2	Mayhew Run near Mechanicsburg WV - HAMPSHIRE
21WVINST	PSB-09-D	Titus Run near Mechanicsburg WV - HAMPSHIRE
21WVINST	PSB-09-F	Camp Run south of Junction WV - HAMPSHIRE
21WVINST	PSB-09-F.5	Unnamed Trib. Mill Ck. near Purgitsville WV - HAMPSHIRE
21WVINST	PSB-09-G	Elmlick Run at Purgitsville WV - HAMPSHIRE
21WVINST	PSB-11	McDowell Run South of Romney WV - HAMPSHIRE
21WVINST	PSB-13	Mill Run South of Romney WV - HAMPSHIRE
21WVINST	PSB-14	Buffalo Run South of Romney WV - HAMPSHIRE
21WVINST	PSB-15	Stony Run near Glebe WV - HAMPSHIRE
21WVINST	PSB-16	Devil Hole Run at Glebe WV - HAMPSHIRE
21WVINST	PSB-16-A	Sawmill Run at Glebe WV - HAMPSHIRE
21WVINST	PSB-17-A	Clifford Hollow near McNeill WV - HARDY
21WVINST	PSB-18	Anderson Run at Old Fields WV - HARDY
21WVINST	PSB-18.2	Unnamed Tributary South Branch at McNeill WV - HARDY
21WVINST	PSB-18-A-{1.0}	Mudlick Run below Old Fields WV - HARDY
21WVINST	PSB-18-A-{6.7}	Mudlick Run above Old Fields WV - HARDY
21WVINST	PSB-18-A-0.5	Unnamed Tributary Mudlick Run North of Old Fields WV - HARDY
21WVINST	PSB-18-A-1	Turnmill Run North of Old Fields WV - HARDY
21WVINST	PSB-18-B	Walnut Bottom Run West of Old Fields WV - HARDY
21WVINST	PSB-19	Williams Hollow near Cummingham WV - HARDY
21WVINST	PSB-21-{01.0}	South Fork South Branch at Moorefield WV - HARDY
21WVINST	PSB-21-{33.7}	South Fork South Branch at Fort Seybert WV - PENDLETON
21WVINST	PSB-21-AA	Miller Run near Brandywine WV - PENDLETON

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	PSB-21-F	Dumpling Run at Brake WV - HARDY
21WVINST	PSB-21-GG	Little Fork North of Sugar Grove WV - PENDLETON
21WVINST	PSB-21-HH	Stony Run South of Sugar Grove WV - PENDLETON
21WVINST	PSB-21-I	Kettle Creek near Fame WV - PENDLETON
21WVINST	PSB-21-II	Brushy Fork South of Sugar Grove WV - PENDLETON
21WVINST	PSB-21-K	Rough Run near Fort Seybert WV - PENDLETON
21WVINST	PSB-21-K-1	Little Rough Run near Fort Seybert WV - PENDLETON
21WVINST	PSB-21-M	Fisher Run at Fort Seybert WV - PENDLETON
21WVINST	PSB-21-N	Dice Run near Fort Seybert WV - PENDLETON
21WVINST	PSB-21-O	Wagner Run near Fort Seybert WV - PENDLETON
21WVINST	PSB-21-Q	Dean Gap at Fort Seybert WV - PENDLETON
21WVINST	PSB-21-R	Stony Run near Fort Seybert WV - PENDLETON
21WVINST	PSB-21-T	Hirely Gap at Oak Flat WV - PENDLETON
21WVINST	PSB-21-U	Detimer Run near Brandywine WV - PENDLETON
21WVINST	PSB-23-A	Durgon Run at Durgon WV - HARDY
21WVINST	PSB-23-A-1	Mitchell Run at Durgon WV - HARDY
21WVINST	PSB-26	Lunice Creek at Petersburg WV - GRANT
21WVINST	PSB-26-A	Robinson Run near Petersburg WV - GRANT
21WVINST	PSB-26-B	Norman Run near Petersburg WV - GRANT
21WVINST	PSB-26-C	Brushy Run at Arthur WV - GRANT
21WVINST	PSB-26-D	South Fork Lunice Creek at Arthur WV - GRANT
21WVINST	PSB-26-D-2	Big Star Run at Streby WV - GRANT
21WVINST	PSB-26-D-3	Little Star Run at Streby WV - GRANT
21WVINST	PSB-26-E	North Fork Lunice Creek at Arthur WV - GRANT
21WVINST	PSB-26-E-2	Saltblock Run near Maysville WV - GRANT
21WVINST	PSB-28-.5-A	Powers Hollow at Cabins WV - GRANT

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	PSB-28-{00.5}	North Fork South Branch at Cabins WV - GRANT
21WVINST	PSB-28-{18.8}	North Fork South Branch at Seneca Rocks WV - PENDLETON
21WVINST	PSB-28-A	Jordan Run near Hopeville Gap WV - GRANT
21WVINST	PSB-28-A-1	Big Run near Hopeville Gap WV - GRANT
21WVINST	PSB-28-A-2	Laurel Run at Jordan Run WV - GRANT
21WVINST	PSB-28-B	Samuel Run at Hopeville WV - GRANT
21WVINST	PSB-28-BB	Pounding Mill Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-CC	Teeter Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-D	Moyer Run near Hopeville WV - GRANT
21WVINST	PSB-28-E	High Ridge Run near Hopeville WV - GRANT
21WVINST	PSB-28-EE	Big Run above Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-1	Cold Spring Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-2	Sawmill Branch near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-2-A	Back Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-3	Teeter Camp Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-3-A	Hemlock Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-3-B	Leonard Spring Hollow near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-3-C	Middle Ridge Hollow near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-EE-3-D	Bud Hollow west of Cherry Grove WV - PENDLETON
21WVINST	PSB-28-G	Zeke Run North of Seneca Rocks WV - PENDLETON
21WVINST	PSB-28-GG	Laurel Fork near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-GG-1	Vance Run near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-GG-2	Sams Run near Cherry Grove WV - PENDLETON

Table 33
STORET Sampling Locations for
South Branch Potomac River Watershed
Hydrologic Unit Code - 02070001
for 1993-1997

Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	PSB-28-HH	Straight Fork near Cherry Grove WV - PENDLETON
21WVINST	PSB-28-J.2	Shuckleford Run North of Seneca Rocks WV - PENDLETON
21WVINST	PSB-28-K	Seneca Creek at Seneca Rocks WV - PENDLETON
21WVINST	PSB-28-K-1	Brushy Run near Onego WV - PENDLETON
21WVINST	PSB-28-K-2	Roaring Creek above Onego WV - PENDLETON
21WVINST	PSB-28-K-3	Horsecamp Run West of Onego WV - PENDLETON
21WVINST	PSB-28-K-3-A	McIntosh Run West of Onego WV - PENDLETON
21WVINST	PSB-28-K-4	Strader Run West of Onego WV - PENDLETON
21WVINST	PSB-28-K-5	Gulf Run West of Onego WV - PENDLETON
21WVINST	PSB-28-K-6	Whites Run West of Onego WV - PENDLETON
21WVINST	PSB-28-K-6-A	Lower Gulf Run West of Onego WV - PENDLETON
21WVINST	PSB-28-M	Mill Creek near Macksville WV - PENDLETON
21WVINST	PSB-28-P	Root Run at Riverton WV - PENDLETON
21WVINST	PSB-28-Q	Dice Run at Riverton WV - PENDLETON
21WVINST	PSB-28-R	Blizzard Run at Harpers Mill WV - PENDLETON
21WVINST	PSB-28-S	Briery Gap Run near Judy Gap WV - PENDLETON
21WVINST	PSB-28-U	Judy Run at Judy Gap WV - PENDLETON
21WVINST	PSB-28-V	Nelson Run near Judy Gap WV - PENDLETON
21WVINST	PSB-28-Z	Bouses Run at Circleville WV - PENDLETON
21WVINST	PSB-30	Long Run North of Upper Tract WV - PENDLETON
21WVINST	PSB-30.5	Unnamed Tributary near Upper Tract WV - PENDLETON
21WVINST	PSB-32	Briggs Run near Upper Tract WV - PENDLETON
21WVINST	PSB-33	Reeds Creek at Upper Tract WV - PENDLETON
21WVINST	PSB-34	Mill Run near Upper Tract WV - PENDLETON
21WVINST	PSB-39	Hammer Run at Ruddle WV - PENDLETON
21WVINST	PSB-40	Peters Run North of Franklin WV - PENDLETON

Table 33 STORET Sampling Locations for South Branch Potomac River Watershed Hydrologic Unit Code - 02070001 for 1993-1997		
Agency Code Identifier	STORET Station Number	Location of Sampling Points
21WVINST	PSB-41	Trout Run at Franklin WV - PENDLETON
21WVINST	PSB-42	Friends Run at Franklin WV - PENDLETON
21WVINST	PSB-46	Smith Creek at Franklin WV - PENDLETON
21WVINST	PSB-46-A	Little Creek at Zigler WV PENDLETON
21WVINST	PSB-46-B	Twin Run near Zigler WV - PENDLETON
21WVINST	PSB-47	Thorn Creek South of Franklin WV - PENDLETON
21WVINST	PSB-47-B	Blackthorn Creek East of Moyers WV - PENDLETON
21WVINST	PSB-47-C	Whitethorn Creek at Moyers WV - PENDLETON
21WVINST	PSB-48	Moyer Run North of Cave WV - PENDLETON
21WVINST	PSB-50	Hammer Run North of Cave WV - PENDLETON
21WVINST	PSB-53	East Dry Run at Harper WV - PENDLETON

Note:

Agency Identifier Code	Name of Agency
1118aTL8	U.S. Forest Service, Region 8
112WRD	U.S. Geological Survey
21WV7IWQ	West Virginia DEP Legacy
21WVWQAS	West Virginia Ambient Network
21WVINST	West Virginia DEP Watershed Assessment Program

Water Quality Summary

During this reporting period, 106 (38%) of the streams in the South Branch Potomac River watershed were monitored. A summary of overall designated use support is provided in Table 34 while a use support matrix summary of all designated uses is given in Table 35.

Of the 657.36 stream miles assessed, 159.40 (24.2%) were fully supporting their overall designated uses, 344.32 (52.4%) were fully supporting but threatened, 130.60 (19.9%) were partially supporting, and 23.04 (3.5%) were not supporting.

Table 34
USE SUMMARY REPORT: OVERALL USE SUPPORT
SOUTH BRANCH POTOMAC RIVER WATERSHED
Waterbody Type: River

Total Number of River/Streams Assessed:	109
Total Number of River/Streams Monitored:	109
Total Number of River/Streams Evaluated:	0

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN MILES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	159.40	159.4
SUPPORTING BUT THREATENED	0.00	344.32	344.32
PARTIALLY SUPPORTING	0.00	130.60	130.6
NOT SUPPORTING	0.00	23.04	23.04
NOT ATTAINABLE	0.00	0.00	0.00
TOTAL SIZE ASSESSED	0.00	657.36	657.36

TABLE 35
USE SUPPORT MATRIX SUMMARY
SOUTH BRANCH POTOMAC RIVER WATERSHED
WATERBODY TYPE: RIVER

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	159.40	344.32	130.60	23.04	
Aquatic Life	270.15	249.88	123.63	23.04	
Fish Consumption					
Cold Water Fishery - Trout	74.76	148.04	24.88	14.60	
Shell fishing					
Warm Water Fishery	156.31	36.64	5.66	1.70	
Bait Minnow Fishery	36.81	65.20	95.86	13.47	

Primary Contact Recreation	333.83	279.17	48.44	2.36	
Secondary Contact Recreation					
Drinking Water Supply	157.99	36.00			
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial					
Navigation					
Wildlife					
Livestock Watering	5.24				

The fishable goal of the Clean Water Act (CWA) was assessed solely by means of the Aquatic Life Support use, since the Fish Consumption use was not evaluated during this reporting period. Of the 666.70 miles assessed for Aquatic Life Support use, 270.15 (40.5%) were fully supporting, 249.88 (37.5%) were fully supporting but threatened, 123.63 (18.5%) were partially supporting, and 23.04 (3.5%) were not supporting.

The swimmable goal of the CWA was assessed by means of the Primary Contact Recreation use. Of the 663.80 miles assessed for Primary Contact Recreation use, 333.83 (50.3%) were fully supporting, 279.17 (42.0%) were fully supporting but threatened, 48.44 (7.3%) were partially supporting, and 2.36 (0.4%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the watershed is provided in Table 36.

Considering both major and moderate/minor impacts, the principal causes of impairment in the watershed are habitat alteration (non-flow) (98.73 miles), cause unknown (79.69 miles), fecal coliform (53.19 miles), and nutrients (29.90 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the watershed is provided in Table 37.

Considering both major and moderate/minor impacts, the principal sources of pollution in the watershed are source unknown (104.93 miles), removal of riparian vegetation (79.85 miles), agriculture (63.46 miles), and construction (36.09 miles).

Public Health/Aquatic life Impacts

Currently, no fish consumption advisories are in affect for the South Branch Potomac River Watershed. In addition, there were no bathing beach or pubic water supply closures or
pollution caused fish kills documented during this reporting cycle.

Section 303(d) Waters

Table 38 includes streams from the Potomac River watershed that are on the current 303(d) list. Thirty-eight streams appear on the list, including six on the Primary Waterbody List, and 32 on the Biologically Impaired sublist.

All six streams on the Primary Waterbody List have had TMDL's completed. The TMDL's, finalized in February of 1998, were for fecal coliform from agricultural sources. Implementation of the TMDL's is currently ongoing, mainly in the form of Best Management Practices cost-sharing incentives to farmers and poultry growers that will help them manage their animal waste.

Table 36
Complete Summary of Causes, Including User-Defined
South Branch Potomac River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: River

Code	Cause Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0000	CAUSE UNKNOWN	10.74	68.95
0900	NUTRIENTS	27.51	2.39
0910	PHOSPHORUS	12.30	0.00
0920	NITROGEN	15.21	0.00
1000	pH	0.00	3.00
1100	SILTATION	0.00	13.83
1200	ORGANIC ENRICHMENT/LOW DO	0.00	2.39
1500	FLOW ALTERATIONS	0.00	19.41
1600	HABITAT ALTERATION (non-flow)	0.00	98.73
1700	PATHOGENS	14.80	38.39
1710	FECAL COLIFORM BACTERIA	14.80	38.39
1900	OIL AND GREASE	0.00	2.39

Table 37
Complete Summary of Sources, Including User-Defined
South Branch Potomac River Watershed
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Source Categories
Waterbody Type: River

Code	Source Category	Major Impact in Miles	Moderate/Minor Impact in Miles
0100	INDUSTRIAL POINT SOURCES	0.00	2.39
1000	AGRICULTURAL	25.07	38.39
1350	GRAZING RELATED SOURCES	0.00	21.41
1400	Pasture Grazing-Riparian and/or Upland	0.00	15.12
2000	SILVICULTURE	0.00	13.83
3000	CONSTRUCTION	0.00	36.09
3200	Land Development	0.00	33.70
6000	LAND DISPOSAL	0.00	2.39
6500	Onsite Waste Water Systems-(Septic Tanks	0.00	2.39
7000	HYDROMODIFICATION	0.00	16.03
7100	Channelization	0.00	13.90
7200	Dredging	0.00	11.83
7300	Dam Construction	0.00	2.13
7550	HABITAT MODIFICATION-Other Than Hydromodification	0.00	79.85
7600	Removal of Riparian Vegetation	0.00	79.85
7700	Streambank Modification/Destabilization	0.00	12.61
9000	SOURCE UNKNOWN	23.04	81.89

TABLE 38
West Virginia
1998 303(d) List
South Branch Potomac River Watershed

Primary Waterbody List

Stream Name	Steam Code	Use Affected	Pollutant	Primary Source	Size Affected in Miles	Reach Description	TMDL Priority	HUC
South Branch Potomac River	P-21	Human Health	Fecal Coliform	Agriculture	23	Between Moorefield and Upper Tract	Completed	02070001
Anderson Run	PSB-18	Human Health	Fecal Coliform	Agriculture	4.94	Entire Length	Completed	02070001
South Fork / South Branch Potomac River	PSB-21	Human Health	Fecal Coliform	Agriculture	73.99	Entire Length	Completed	02070001
Mill Creek	PSB-25	Human Health	Fecal Coliform	Agriculture	2.36	Entire Length	Completed	02070001
Lunice Creek	PSB-26	Human Health	Fecal Coliform	Agriculture	7.5	Entire Length	Completed	02070001
North Fork / South Branch Potomac River	PSB-28	Human Health	Fecal Coliform	Agriculture	45.77	Entire Length	Completed	02070001

Table 38 (continued)
South Branch Potomac River Watershed
Waterbodies with Biological Impairment

Stream Name	Steam Code	Miles Affected	Use Affected	Pollutant	Source	Biology Score	TMDL Priority

Table 38 (continued) South Branch Potomac River Watershed Waterbodies with Biological Impairment							
1st unnamed tributary / South Branch Potomac	PSB-0.5	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Johns Run	PSB-2	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Buffalo Creek	PSB-5	undetermined	Aquatic Life	Unknown	Unknown	33.3	Low
Dumpling Run / Mill Creek	PSB-9-B	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Mayhew Run	PSB-9-B-2	undetermined	Aquatic Life	Unknown	Unknown	33.3	Low
McDowell Run	PSB-11	undetermined	Aquatic Life	Unknown	Unknown	41.7	Low
Buffalo Run	PSB-14	undetermined	Aquatic Life	Unknown	Unknown	41.7	Low
Devil Hole Run	PSB-16	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Clifford Hollow	PSB-17-A	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Mudlick Run	PSB-18-A-{6.7}	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Unnamed Tributary / Mudlick Run	PSB-18-A-0.5	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Dumpling Run / South Fork	PSB-21-F	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Stony Run	PSB-21-R	undetermined	Aquatic Life	Unknown	Unknown	33.3	Low
Hively Gap	PSB-21-T	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Miller Run	PSB-21-AA	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Wagner Run	PSB-21-O	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Mitchell Run / Durgeon Run	PSB-23-A-1	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low

Table 38 (continued) South Branch Potomac River Watershed Waterbodies with Biological Impairment							
South Fork / Lunice Creek	PSB-26-D	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Powers Hollow	PSB-28-.5A	undetermined	Aquatic Life	Unknown	Unknown	41.7	Low
Brushy Run / Seneca Creek	PSB-28-K-1	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Mill Creek	PSB-28-M	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Root Run	PSB-28-P	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Judy Run	PSB-28-U	undetermined	Aquatic Life	Unknown	Unknown	33.3	Low
Nelson Run	PSB-28-V	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Bouses Run	PSB-28-Z	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Unnamed Tributary / South Branch Potomac River	PSB-30.5	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Briggs Run	PSB-32	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Reeds Creek	PSB-33	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
Mill Run / South Branch Potomac River	PSB-34	undetermined	Aquatic Life	Unknown	Unknown	41.7	Low
Smith Creek	PSB-46	undetermined	Aquatic Life	Unknown	Unknown	25.0	Low
Blackthorn Creek	PSB-47-B	undetermined	Aquatic Life	Unknown	Unknown	50.0	Low
East Dry Run	PSB-53	undetermined	Aquatic Life	Unknown	Unknown	33.3	Low

* Contaminant found in fish tissue
# Contaminant found in fish tissue and water column

TMDL - Total Maximum Daily Load
HUC - Hydrologic Unit Code
MP - Mile Point

PART III: LAKE WATER QUALITY ASSESSMENT

Background

Data for this reporting period was derived primarily from DEP's 1996 lake water quality assessment (LWQA). Although stream data in this report was broken down by individual watershed, lake data will be reported as an aggregate due to the fact that only 15 lakes were assessed during this reporting period.

This report on lake water quality will not include any information that was covered in the previous 305(b) report (1996). It is solely meant to be an update of information that has changed since the last reporting cycle. Any information that has not changed since the last cycle but is still relevant to 1998 will be referenced in the text.

The 15 public lakes assessed during this reporting period were each sampled twice in 1996, once in spring and once in summer. The 15 lakes sampled included 10 of the state's original 13 priority lakes along with 5 non-priority lakes with potential impairment. The three original priority lakes that were not sampled included Mountwood Park and Hurricane, which were undergoing Phase II studies, and Mt. Storm. Mt. Storm was removed from the priority list due to the fact that the lake is owned by a power company and is managed as a source of cooling water for a power plant. Therefore, this lake is not considered waters of the state.

In addition to monitoring within the lakes, sampling also was conducted on 19 tributary inflows in order to obtain a better understanding of tributary water quality.

A variety of chemical and physical parameters were evaluated in order to determine general water quality, use support status, and trophic condition (i.e., fertility) of each waterbody. Parameters were selected to help determine the impacts from sedimentation, nutrient enrichment, acid mine drainage, natural acidity, atmospheric deposition, and toxics. Physico-chemical characteristics of lakes and tributaries monitored in 1996 are given in Tables 39 through 42, with violations of state water quality criteria (West Virginia State Environmental Quality Board, 1998) footnoted. The 1996 305(b) report is referenced for a list of sample parameters (DEP, 1996).

By state definition, a significant publicly owned lake is any lake, reservoir, or pond that meets the definition of waters of the state, is owned by a government agency or public utility, and is managed as a recreational resource for the general public. Presently, there are 108 publicly owned lakes in West Virginia, totaling 22,373 surface acres. The 1996 305(b) report may be referenced for a list of publicly owned lakes.

TABLE 39
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SPRING 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Sampling date 1996		5-22	4-24	6-13	4-22	4-25	5-07	6-04	6-12	6-11	6-11	4-22	5-09	6-06	5-29	6-19
Temperature degrees Centigrade																
	Surface	16.0	15.2	24.6	19.2	15.3	17.5	20.5	23.6	25.5	24.8	11.8	23.8	19.4	15.7	22.9
	Bottom	11.0	11.2	13.8	8.5	8.9	12.3	12.6	NR	9.4	18.9	11.5	8.3	14.3	20.9	12.0
	Inflow	+	9.6	18.9	18.4	14.6	11.4	+	16.6	20.1	19.1	12.3	15.5	+	12.9	16.8
pH, (Standard Units)																
	Surface	7.6	7.6	7.5	8.1	7.3	6.4	7.0	8.3	8.5	8.6	6.7	7.0	6.4	6.1	6.5
	Bottom	7.3	7.3	6.8	7.2	7.1	5.7*	6.6	NR	7.1	7.6	6.5	6.5	6.0	6.5	5.9*
	Inflow	+	7.5	7.7	8.7	7.0	6.2	+	8.1	8.0	8.1	6.3	7.0	+	5.4*	5.9*
Conductivity umhos/cm																
	Surface	240	162	111	190	208	37	104	336	418	327	74	123	30	172	31
	Bottom	217	158	111	194	213	40	111	NR	566	346	81	142	30	179	48
	Inflow	+	182	136	216	194	55	+	392	669	370	76	114	+	162	22
Dissolved Oxygen, mg/l**																
	Surface	8.3	9.4	7.8	10.6	10.3	8.6	9.2	8.0	10.4	12.6	11.4	8.6	8.0	9.3	7.5
	Bottom	7.6	4.6*	0.4	5.5	9.8	3.4	8.5	NR	0.1*	6.2	10.3	3.2*	5.6*	8.6	0.7*
	Inflow	+	12.1	9.4	12.0	10.9	8.4	+	8.7	7.3	9.1	10.9	10.0	+	9.3	8.3

TABLE 39
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SPRING 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Hot Acidity, mg/l																
	Surface	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Bottom	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	5	<1
	Inflow	+	<1	<1	<1	<1	<1	+	<1	<1	<1	<1	<1	+	7	4
Total Alkalinity, mg/l																
	Surface	46	44	40	38	25	9	10	140	130	130	10	38	9	6	11
	Bottom	38	46	39	36	25	9	12	140	130	120	11	32	8	5	12
	Inflow	+	57	46	39	26	15	+	170	180	140	9	35	+	4	6
Suspended Solids, mg/l																
	Surface	20	30	5	9	5	7	1	8	11	12	5	33	<5	<5	<5
	Bottom	22	38	6	10	8	<5	<1	10	13	12	<5	140	<5	<5	7
	Inflow	+	14	<5	<5	<5	18	+	10	9	11	<5	12	+	<5	13
Total Phosphorus, mg/l																
	Surface	.07	.07	.02	.05	<.02	<.02	.17	.03	.03	.04	<.02	.07	<.02	.02	<.02
	Bottom	.07	.07	.03	.07	<.02	.16	.14	.04	.24	.04	<.02	.09	.03	.04	<.02
	Inflow	+	.03	.03	.04	<.02	.09	+	.03	.05	.04	<.02	.04	+	.02	<.02

TABLE 39
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SPRING 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Total Kjeldahl Nitrogen, mg/l																
	Surface	<.50	.80	1.00	<.5	,.5	.7	.15	1.40	.5	<.50	3.00	.60	<.50	<.50	<.50
	Bottom	<.50	.60	0.9	<.50	<.50	.70	<.10	1.40	1.20	<.50	<.50	.60	<.50	<.50	<.50
	Inflow	+	<.50	0.50	<.50	<.50	<.50	+	<.50	<.50	<.50	<.50	1	+	<.50	<.50
Ammonia Nitrogen mg/l																
	Surface	<.50	<.50	<.50	<.50	<.50	<.50	.12	<.50	<.50	<.50	<.50	<.50	<.50	<.50	<.50
	Bottom	<.50	<.50	<.50	<.50	<.50	<.50	<.10	<.50	<.50	<.50	<.50	<.50	<.50	<.50	<.50
	Inflow	+	<.50	<.50	<.50	<.50	<.50	+	<.50	<.50	<.50	<.50	<.50	+	<.50	<.50
Nitrate/Nitrite Nitrogen mg/l																
	Surface	.81	.1	.06	.38	.40	<.05	.32	.10	<.05	.11	.16	.16	.24	<.05	<.05
	Bottom	.96	.08	.05	.48	.44	<.05	.32	.15	<.05	<.05	.16	.22	.24	<.05	<.05
	Inflow	+	.11	.13	.27	.38	.06	+	.32	.31	.22	.13	.17	+	.09	.23
Total Iron mg/l																
	Surface	1.1	.95	.28	.52	.35	.52	.57	.45	.49	.49	.21	3.00*	.390	<.200	.410
	Bottom	1.5	3.20*	.45	.31	.41	.62	.70	.73	.50	.360	.340	7.40*	.340	<.200	.420
	Inflow	+	1.60*	.15	.53	.32	1.4	+	3.9*	.60	.420	<.200	1.20	+	<.200	.690*

TABLE 39
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SPRING 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Total Manganese mg/l																
	Surface	.390	.15	.27	.082	.081	.028	.14	.25	3.70	.062	.043	.067	.056	.021	.021
	Bottom	.280	.18	1.60*	.069	.10	.041	.12	.16	.32	.057	.064	.160	.055	.012	.077
	Inflow	+	.04	<.02	<.02	.046	.069	+	.38	.13	.083	<.02	.034	+	.017	.024
Total Aluminum mg/l																
	Surface	1.2*	.99*	.36*	.70*	.33*	.43*	.51*	.37*	.24*	.52*	.35*	4.6*	.19*	.18*	.2*
	Bottom	2.00*	3.6*	.42*	.52*	.36*	.28*	.55*	.39*	.27*	.41*	.29*	7.90*	.18*	.200*	.240*
	Inflow	+	2.10*	.27*	.53*	.28*	2.30*	+	.36*	.37*	.380*	.25*	1.6*	+	.36*	.34*
Chlorophyll A mg/m3		<6.0	20	9.3	<6.0	<6.0	<6.0	12.7	<6.0	27.0	14.0	<6.0	<6.0	<6.0	<6.0	<12.0
Secchi Depth. Feet		1.00	0.75	6.00	1.5	6.0	10.0	4.0	7.5	5.0	2.8	<7.0	0.83	9.0	8.5	7.0

* Violation of state water quality chronic criteria

** Violations of the minimum state water quality of 5.0 mg/l for dissolved oxygen occur routinely with samples collected from the bottom of reservoirs due to thermal stratification

*** Lake samples were collected from the deepest area near the dam.
Surface samples were collected approximately two feet below the surface.
Bottom samples were collected approximately two feet above the bottom.
Inflow samples were collected above the lake backwaters at the nearest access point.

+Water quality data for Tomlinson Run, Cheat, and Summit lake inflows are contained in Table

NR - No Result, Hydrolab Malfunction

TABLE 40
Physico - Chemical Characteristics of Summit, Cheat, and Tomlinson Run Lake Inflows, Spring 1996

Parameter*	Summit Lake Inflows		Cheat Lake Inflows			Tomlinson Run Lake Inflows	
	Coats Run	U.T. Coats Run	Cheat River	Morgan Run	Rubles Run	South Fork	North Fork
Sampling date 1996	6-06	6-06	6-04	6-03	6-03	5-22	
Temperature (Centigrade)	12.0	12.3	18.6	15.4	16.7	13.0	
pH (Standard Units)	7.3	4.4*	6.6	7.5	7.5	8.1	
Conductivity (umhos/cm)	70	24	134	134	331	245	N
Dissolved Oxygen, (mg/l)**	10.0	9.3	8.8	9.5	9.6	8.7	O
Hot Acidity (mg/l)	<1	11	<1	<1	<1	<1	T
Total Alkalinity (mg/l)	27	2	6	33	56	48	
Suspended Solids (mg/l)	<5	<5	8	<1	<1	8	S
Total Phosphorous (mg/l)	.20	<.02	.140	.160	.140	.050	A
Total Kjeldahl Nitrogen (mg/l)	<.50	<.50	.47	<.10	<.10	<.50	M
Ammonia Nitrogen (mg/l)	<.50	<.50	.38	<.06	.06	<.50	P
Nitrate-Nitrite Nitrogen (mg/l)	.21	.21	.32	.51	.31	.76	L
Total Iron (mg/l)	<.20	<.20	1.52*	.190	.080	.430	E
Total Manganese (mg/l)	<.02	.078	.18	.010	.010	.063	D
Total Aluminum (mg/l)	.23*	.37*	.90*	.200*	.170*	.560*	

TABLE 41
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SUMMER 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Sampling date 1996		8-28	7-02	9-05	6-27	7-01	9-13	9-12	8-28	8-28	8-29	8-08	8-16	9-04	8-24	7-27
Temperature degrees Centigrade																
	Surface	23.6	28.5	25.3	24.8	26.2	22.6	21.7	25.8	25.8	24.6	22.0	25.7	21.9	23.8	21.1
	Bottom	20.2	26.7	17.6	12.2	15.4	16.1	18.0	19.1	12.7	22.5	20.3	12.0	16.5	21.5	16.2
	Inflow	+	21.3	22.0	18.1	22.8	20.0	+	22.7	20.8	17.4	19.8	20.5	+	16.5	13.9
pH, (Standard Units)																
	Surface	8.4	7.5	7.7	7.5	7.5	7.2	6.6	8.4	8.8	7.8	6.8	7.4	7.2	6.9	6.1
	Bottom	7.2	7.2	6.4	6.7	6.8	7.1	6.2	7.1	6.7	7.2	6.0	6.8	6.4	6.3	6.1
	Inflow	+	7.5	7.1	7.3	7.8	6.4	+	8.0	7.9	7.8	7.7	7.2	+	6.9	5.8*
Conductivity umhos/cm																
	Surface	384	155	103	185	347	29	116	342	371	407	91	148	22	25	27
	Bottom	393	156	132	202	536	230	64	382	704	421	115	144	73	22	93
	Inflow	+	285	129	309	493	30	+	409	793	639	98	186	+	41	20
Dissolved Oxygen, mg/l**																
	Surface	10.6	6.0	9.2	7.3	7.1	7.3	6.6	9.8	11.5	5.9	7.4	6.6	7.7	7.4	8.5
	Bottom	0.2*	1.4*	0.2*	0.2*	4.3*	1.4*	6.2	0.1*	0.1*	0.1*	2.5*	1.8*	0.2*	3.7*	1.7*
	Inflow	+	5.0	8.0	8.8	7.9	4.4*	+	8.0	7.0	7.0	8.8	5.8	+	5.9	8.8

TABLE 41
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SUMMER 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Hot Acidity, mg/l																
	Surface	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	4	3	<1	2	2
	Bottom	<1	<1	<1	<1	<1	18	<1	<1	<1	<1	4	13	<1	3	9
	Inflow	+	++	<1	<1	<1	10	+	<1	<1	<1	3	3	+	3	3
Total Alkalinity, mg/l																
	Surface	104	58	41	69	39	11	16	126	87	144	29	50	12	5	10
	Bottom	109	59	41	70	55	20	12	139	164	143	28	63	18	5	12
	Inflow	+	110	49	92	68	16	+	151	196	220	22	69	+	4	3
Suspended Solids, mg/l																
	Surface	10	15	<5	17	<5	9	15	5	2	6	2	1	<5	1	2
	Bottom	17	12	18	56	6	19	120	22	18	8	7	62	6	1	5
	Inflow	+	6	<5	12	6	51	+	4	3	<1	7	3	+	16	6
Total Phosphorus, mg/l																
	Surface	.050	.040	<.020	.050	<.020	.011	.030	.040	.050	.050	.023	.021	<.020	.010	.024
	Bottom	.080	.30	.060	.070	<.020	.022	.200	.080	.430	.050	.029	.148	<.020	.012	.026
	Inflow	+	.020	<.020	.040	<.020	.045	+	.030	.060	.050	.031	.024	+	.012	.012

TABLE 41
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SUMMER 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Total Kjeldahl Nitrogen, mg/l																
	Surface	.65	<.50	<.50	<.50	<.50	.35	.41	.34	.31	.19	.32	.55	.50	++	.60
	Bottom	1.46	<.50	1.30	.80	<.50	.71	.50	.53	2.29	.28	.48	1.54	<.50	.31	.63
	Inflow	+	.70	<.50	1.50	<.50	1.60	+	.31	<.10	.16	<.10	.37	+	.14	.24
Ammonia Nitrogen mg/l																
	Surface	.09	<.50	<.50	<.50	<.50	.05	.15	<.06	<.06	<.06	.05	.04	<.50	++	.10
	Bottom	.84	<.50	<.50	<.50	<.50	.28	<.06	.31	1.21	.09	.10	1.04	<.50	.02	.07
	Inflow	+	<.50	<.50	<.50	<.50	.12	+	.06	.09	<.06	.04	.08	+	.01	.05
Nitrate/Nitrite Nitrogen mg/l																
	Surface	.116	<.05	<.05	.19	.41	.04	.27	<.05	<.05	<.05	<.0.1	.04	<.05	++	<.01
	Bottom	.056	.21	<.05	<.05	.50	<.01	.24	<.05	<.05	<.05	<.01	<.01	<.05	.05	<.01
	Inflow	+	.21	<.05	.47	.89	.02	+	.086	.126	.14	.22	.06	+	.07	.12
Total Iron mg/l																
	Surface	.680	.730	.420	2.100*	.250	.885	1.480	.340	.140	.540	.985	.195	.940*	.295	.945
	Bottom	.840	.780	.460	4.700*	.380	8.800*	19.200*	1.730*	.280	.220	1.100	7.800*	1.900*	.570	3.000*
	Inflow	+	.200	.160	.160	.360	4.200*	+	.160	.470	.240	.350	.365	+	.335	.590*

TABLE 41
PHYSICO-CHEMICAL CHARACTERISTICS OF SELECT WEST VIRGINIA PUBLIC LAKES, SUMMER 1996

Parameter		Tomlinson Run	Turkey Run	Saltlick Pond #9	Ridenour	Laurel	Moncove	Cheat	Castleman Run	Bear	Burches Run	Kanawha State Forest	O'Brien	Summit	Boley	Spruce Knob
Total Manganese mg/l																
	Surface	.250	.300	.100	.230	.550	.065	.330	.110	.130	.090	.240	.055	.048	.030	.130
	Bottom	2.620*	.310	.760	2.400*	.028	1.200*	.290	2.480*	10.900*	.870	.290	3.200*	.290	.070	.780
	Inflow	+	.036	.049	.160	.100	.270	+	.020	.380	.020	.025	.280	+	.035	.050
Total Aluminum mg/l																
	Surface	.520*	.540*	.280*	2.500*	.3900*	<.050	1.100*	.310*	<.100	.200*	<.050	.100	.460*	<.050	.095
	Bottom	.480*	.590*	.560*	4.900*	.560*	.050	11.60*	1.510*	.100*	.500*	.060	5.200*	.300*	.105	.085
	Inflow	+	.400*	.230*	.290*	.280*	.490	+	.190*	.440*	.140*	<.050	.210	+	.150	.360
Chlorophyll A mg/m3		164.0	73.70	58.60	32.20	41.40	4.76	9.50	67.00	67.40	79.90	8.63	2.48	6.60	0.99	23.71
Secchi Depth. Feet		2.00	1.50	6.2	1.17	2.8	5.5	1.10	2.90	4.0	2.80	4.0	7.50	7.20	8.75	6.0

* Violation of state water quality chronic criteria

** Violations of the minimum state water quality of 5.0 mg/l for dissolved oxygen occur routinely with samples collected from the bottom of reservoirs due to thermal stratification

*** Lake samples were collected from the deepest area near the dam.
Surface samples were collected approximately two feet below the surface.
Bottom samples were collected approximately two feet above the bottom.
Inflow samples were collected above the lake backwaters at the nearest access point.

+Water quality data for Tomlinson Run, Cheat, and Summit lake inflows are contained in Table
NR - No Result, Hydrolab Malfunction

TABLE 42
Physico - Chemical Characteristics of Summit, Cheat, and Tomlinson Run Lake Inflows, Summer 1996

Parameter*	Summit Lake Inflows		Cheat Lake Inflows			Tomlinson Run Lake Inflows	
	Coats Run	U.T. Coats Run	Cheat River	Morgan Run	Rubles Run	South Fork	North Fork
Sampling date 1996	9-4	9-4	9-11	9-11	9-11	8-28	8-28
Temperature (Centigrade)	15.7	16.1	23.2	19.2	22.0	17.6	17.6
pH (Standard Units)	7.2	4.8*	7.2	7.8	8.4	8.1	7.7
Conductivity (umhos/cm)	158	19	95	269	433	494	432
Dissolved Oxygen, (mg/l)**	7.6	7.4	8.2	8.5	9.5	8.9	8.2
Hot Acidity (mg/l)	<1	7	<1	<1	<1	<1	<1
Total Alkalinity (mg/l)	92	2	15	79	84	121	114
Suspended Solids (mg/l)	<5	<5	7	1	1	4	<1
Total Phosphorous (mg/l)	<.02	<.02	.010	.01	.01	.04	.03
Total Kjeldahl Nitrogen (mg/l)	<.50	<.50	.20	.38	<.10	.12	.12
Ammonia Nitrogen (mg/l)	<.50	<.50	<.06	<.06	<.06	.06	<.06
Nitrate-Nitrite Nitrogen (mg/l)	.16	.12	.27	1.56	.21	.941	.087
Total Iron (mg/l)	.081	.079	.52	.10	.13	.25	.16
Total Manganese (mg/l)	<.020	.140	.080	.03	.02	.06	.04
Total Aluminum (mg/l)	.250*	.320*	.40*	<.10	<.10	.62*	.22*

Trophic Status

Trophic state indices for public lakes assessed during this reporting period are given in Table 43. Of the 15 lakes assessed for trophic status, one was classified as oligotrophic (infertile), three were mesotrophic (moderately fertile), and the remaining 11 were eutrophic (fertile). The trophic state indices devised by Carlson (1977) were utilized to determine trophic status. This method was selected due to its relative ease of use and widespread acceptability.

Carlson's indices can be calculated from any of several parameters, including secchi depth, chlorophyll A, and total phosphorus. The calculated index values range on a scale of 0 to 100, with higher numbers indicating a degree of eutrophy (enrichment) and lower numbers indicating a degree of oligotrophy (sterility). For this assessment, the following

delineation was used: 0-39 = oligotrophic, 40-50 = mesotrophic, and 51-100 = eutrophic.

For lakes sampled during this reporting period, trophic state indices were determined utilizing summer chlorophyll A, total phosphorus, and secchi depth. The index values computed for these three parameters were then averaged to provide a final value which was compared against the scale in the previous paragraph.

Control Methods

Pollution control methods for state lakes have been previously summarized in the 1996 305(b) report. That report may be referenced for details. No additional controls have been implemented since the previous reporting period.

Restoration Methods

Lake restoration methods have been previously summarized in the 1996 305(b) report, which may be referenced for details. Restoration efforts that have been initiated since the last report was completed are summarized in the following paragraphs.

Summit Lake, a 43 acre impoundment in Greenbrier County, receives annual applications of agricultural limestone to offset a low pH condition. In September and October of 1995, the inlet to Summit Lake also was treated with limestone sand in an effort to increase lake pH and acid neutralizing capacity. This coldwater lake has historically been impacted by natural acidity and acid precipitation. The limestone treatment allows trout to survive year round and reduces the threat of low pH spikes in winter and early spring.

Mountwood Park Lake, a 41 acre impoundment in Wood County, had a Clean Lakes Phase II Project completed in September of 1997. The lake historically has been impacted by sedimentation from watershed development and streambank erosion.

In the Phase II Project, several BMP's were initiated to help restore lake water quality. These included 1) stabilization of a highly erodible 44 acre tract of denuded land, 2) relocation of a petting zoo away from the lake 3) stabilization of eroding streambanks, and 4) modification of the lake outlet to allow for drawdown to control macrophytes. The BMP's should ultimately result in lowered rates of erosion and improved water quality.

Hurricane Lake, a 12 acre impoundment in Putnam County, had a Clean Lakes Phase II Project completed in December of 1997. The lake historically has been impaired by severe watershed erosion and associated elevated levels of nutrients and metals.

TABLE 43

TROPHIC STATE INDICES (TSI) OF PRIORITY LAKES

SUMMER 1996

	SECCHI DISK		CHLOROPHYLL A		T. PHOSPHOROUS			
LAKE	**DEPTH (M)**	**TSI**	**CONC (MG/M3)**	**TSI**	**CONC (MG/M3)**	**TSI**	**MEAN TSI**	**TROPHIC STATE**
Tomlinson Run	0.61	67	164	81	50	61	70	Eutrophic
Turkey Run	0.46	71	73.7	73	40	57	67	Eutrophic
Saltlick Pond #9	1.89	51	58.6	70	20	47	56	Eutrophic
Ridenour	0.36	75	32.2	65	50	61	67	Eutrophic
Laurel	0.85	62	41.4	67	20	47	59	Eutrophic
Moncove	1.68	53	4.76	46	11	39	46	Mesotrophic
Cheat	0.33	76	9.5	53	30	53	61	Eutrophic
Castleman Run	0.88	62	67	72	40	57	64	Eutrophic
Bear	1.22	57	67.4	72	50	61	63	Eutrophic
Burches Run	0.85	62	79.9	74	50	61	66	Eutrophic
Kanawha State Forest	1.22	57	8.63	52	23	49	53	Eutrophic
O'Brien	2.29	486.6	2.48	39	21	48	45	Mesotrophic
Summit	2.19	49	6.6	49	20	47	48	Mesotrophic
Boley	2.67	46	0.99	30	10	37	38	Oligotrophic
Spruce Knob	1.83	51	23.71	62	24	50	54	Eutrophic

In the Phase II Project, watershed BMP's were implemented to decrease sedimentation and improve water quality. These included 1) stabilization of upper lake shoreline and inlet streambanks, and 2) installation of dump-rock check dams near the tributary inlets. These BMP's should help improve lake water quality. However, some or all of the nutrient-rich sediments that have built up in the lake will need to be removed in order to decrease turbidity and nutrient re-cycling.

Impaired and Threatened Lakes

The overall designated use support status for public lakes assessed during this reporting period is presented in Table 44. Of the 2,462 lake acres assessed, 144 (5.8 percent) fully supported their designated uses, 1,845 (74.9 percent) were fully supporting but threatened, and 473 (19.2 percent) were partially supporting.

Table 44
USE SUMMARY REPORT: OVERALL USE SUPPORT
Waterbody Type: Lake

Total Number of Lake/Reservoir Assesed:	15
Total Number of Lake/Reservoir Monitored:	15
Total Number of Lake/Reservoir Evaluated:	0

DEGREE OF USE SUPPORT	ASSESSMENT BASIS IN ACRES		
	EVALUATED	MONITORED	TOTAL
FULLY SUPPORTING	0.00	144	144
SUPPORTING BUT THREATENED	0.00	1845	1845
PARTIALLY SUPPORTING	0.00	473	473
NOT SUPPORTING	0.00	0	0
NOT ATTAINABLE	0.00	0	0
TOTAL SIZE ASSESSED	0.00	2462	2462

A summary of specific designated uses is provided in Table 45 . The fishable goal of the Clean Water Act (CWA) is typically reported in two parts (i.e., designated uses): aquatic life support and fish consumption. The swimmable goal of the CWA also is reported in two parts: swimming and secondary contact recreation. During this reporting period, the fish consumption use was not assessed. In addition, secondary contact recreation, because it is not a recognized use in West Virginia's water quality standards, was not assessed. Thus, in this report, the fishable goal of the CWA is equated to the aquatic life support use while the swimmable goal is equated to the primary contact recreation use.

TABLE 45
USE SUPPORT MATRIX SUMMARY
WATERBODY TYPE: LAKES
UNITS IN ACRES

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	144.00	1845.00	473.00		
Aquatic Life	144.00	1845.00	473.00		
Fish Consumption					
Cold Water Fishery - Trout		68.00			
Shell fishing					
Warm Water Fishery	144.00	1777.00	473.00		
Bait Minnow Fishery					
Primary Contact Recreation	732.00	1730.00			
Secondary Contact Recreation					
Drinking Water Supply		1730.00			
Aquifer Protection					
Non Degradation					
Aesthetics					
Multipurpose Use					
Agricultural					
Cultural/Ceremonial					
Industrial		1730.00			
Navigation					
Wildlife					

Livestock Watering					

For the aquatic life support use, 144 (5.8 percent) of the lake acres assessed were fully supporting, 1,845 (75 percent) were fully supporting but threatened, and 473 (19.2 percent) were partially supporting.

For the primary contact recreation use, 732 acres (29.7 percent) were fully supporting while 1,730 acres (70.3 percent) were fully supporting but threatened. (Cheat Lake, threatened by acid mine drainage, comprised the entire 1,730 acres of threatened waters).

Pollution cause categories for lakes classified as less than fully supporting are listed in Table 46. Considering both major and moderate/minor impacts, siltation was found to have the greatest impact on lakes, followed by metals, turbidity, and nutrients.

Table 46
Complete Summary of Causes, Including User-Defined
Sizes of Waterbodies Not Fully Supporting Uses
Affected by Various Cause Categories
Waterbody Type: Lake

Code	Cause Category	Major Impact in Acres	Moderate/Minor Impact in Acres
05000	METALS	27.00	232.00
0900	NUTRIENTS	8.00	80.00
1100	SILTATION	256.00	217.00
1200	ORGANIC ENRICHMENT/LOW DO	8.00	0.00
2200	NOXIOUS AQUATIC PLANTS (Native)	8.00	0.00
2500	TURBIDITY	0.00	217.00

Pollution source categories for lakes classified as less than fully supporting are provided in Table 47. Overall, petroleum activities, agriculture, silviculture, and construction affected the most lake acreage.

Table 47
Complete Summary of Sources, Including User-Defined Sizes of Waterbodies Not Fully Supporting Uses Affected by Various Source Categories
Waterbody Type: Lake

Code	Source Category	Major Impact in Acres	Moderate/Minor Impact in Acres
0230	Package Plants (Small Flows)	0.00	16.00
1000	AGRICULTURE	46.00	274.00
2000	SILVICULTURE	137.00	0.00
3000	CONSTRUCTION	65.00	0.00
4000	URBAN RUNOFF/STORM SEWERS	27.00	0.00
5000	RESOURCE EXTRACTION	153.00	217.00
5500	Petroleum Activities	153.00	217.00
6000	LAND DISPOSAL	0.00	16.00
6800	Raw Sewage	0.00	27.00

Water quality standards promulgated by the state Environmental Quality Board for streams also are applicable to lakes. Impaired or threatened status of lakes is determined by evaluating several factors, including violations of water quality criteria, physical alteration of habitat, and impairment of biological productivity.

Most violations of state water quality criteria noted during this assessment were for iron, manganese, and aluminum. These metals tend to accumulate in reservoirs and are frequently found in high concentrations, particularly in the hypolimnion (i.e., bottom waters). Accumulation of metals and other pollutants in reservoirs is not an unusual phenomenon, since reservoirs by their very nature act as sinks for pollution originating in the watershed. A few metals violations were noted in surface water samples, and these were primarily in lakes with a high level of turbidity.

Many of the lakes sampled during this assessment experienced hypolimnetic (bottom water) oxygen depletion in the summertime, with several also experiencing low hypolimnetic Dissolved Oxygen. in the spring. However, no violations of D.O. criteria occurred in any lake surface waters. It is important to realize that low bottom dissolved oxygen is a common phenomenon in many reservoirs due to thermal stratification. Although violations of state dissolved oxygen criteria were noted, special consideration must be given to lakes due to the phenomenon of stratification.

TABLE 48
West Virginia Lakes
1998 303(d) List

Primary Waterbody List

Lake Name	Steam Code	Use Affected	Pollutant	Primary Source	Size Affected in Acres	TMDL Priority	HUC
Hurricane Creek	K(L)-22-(1)	Aquatic Life	Nutrients, Siltation, Iron	Domestic Sewage, Construction, Urban Runoff	12	High	05050008
Hurricane Creek	K(L)-22-(1)	Human Health	Iron	Construction, Urban Runoff	12	High	05050008
Ridenour Lake	K(L)-30-A-(1)	Aquatic Life	Nutrients, Siltation, Iron, Aluminum	Domestic Sewage, Construction, Agriculture, Urban Runoff	27	High	05050008
Ridenour Lake	K(L)-30-A-(1)	Human Health	Iron	Construction, Urban Runoff	27	High	05050008
Mountwood Park Lake	LK(L)-10-(1)	Aquatic Life	Siltation	Construction, Streambank modification, highway maintenance	48	High	05030303
Saltlick Pond #9	LK(L)-95-(1)	Aquatic Life	Siltation	Undetermined	15	High	05030303
Tomlinson Run Lake	O(L)-102-(1)	Aquatic Life	Siltation	Agriculture, Construction	30	High	05030101
Turkey Run Lake	O(L)-37-(1)	Aquatic Life	Siltation, Iron, Aluminum, Nutrients	Petroleum Activities	15	High	05030202
Turkey Run Lake	O(L)-37-(1)	Human Health	Iron	Petroleum Activities	15	High	05030202
Burches Run Lake	O(L)-83-C-(1)	Aquatic Life	Nutrients, Siltation	Agriculture, Domestic Sewage	16	High	05030106
Bear Rocks Lake	O(L)-88-D-2-F-(1)	Aquatic Life	Nutrients, Siltation, Low Dissolved Oxygen	Agriculture, Construction	8	High	05030106
Castleman Run Lake	O(L)-92-L-(1)	Aquatic Life	Siltation, Nutrients	Agriculture	22	High	05030106

Acid Effects on Lakes

All 15 lakes monitored during this reporting period were assessed for high acidity. None were found to be impaired by high acidity. However, four lakes (Summit, Spruce Knob, Boley, and Cheat) are considered threatened. Summit, Spruce Knob, and Boley are threatened by acid precipitation while Cheat is threatened by acid mine drainage.

Many methods are being employed to mitigate the harmful effects of high acidity. In the Cheat Lake watershed, AMD effects are being reduced through reclamation of abandoned and inactive coal mines. Summit and Boley Lakes are routinely limed to neutralize a low pH condition. The soils of the Spruce Knob Lake watershed are limed periodically to help maintain a neutral pH.

Toxic Effects on Lakes

None of the 15 lakes sampled during this reporting period were monitored for toxics.

Trends in Lake Water Quality

Although no formal trend analysis has been conducted on lakes in West Virginia, a general comparison of historical water quality data and trophic status indicates that the majority of the 15 lakes monitored during this reporting cycle were stable (i.e., no apparent trend). The only lake that appears to be showing a trend is Cheat Lake, which is improving from the effects of acid mine drainage.

Literature Cited

Carlson, R. E. 1977. *A Trophic State Index for Lakes*. Limnol. Oceanogr. 22:362-369.

West Virginia Water Resources Board. 1990. Title 46, Emergency Legislative Rules: Requirements Governing Water Quality Standards, Series 1. West Virginia State Environmental Quality Board, Charleston, WV.

PART IV: GROUNDWATER

Under the Groundwater Protection Act, West Virginia code Chapter 22, Article 12, Section 6.a.3, the DEP is required to provide a biennial report to the state Legislature on the status of the state's groundwater and groundwater management program, including detailed reports from each agency which holds groundwater regulatory responsibility. The third Biennial Report to the legislature covering the period from 1 July 1995 through 30 June 1997 was submitted this past fall. The Office of Water Resources, within the DEP, is responsible for compiling and editing information submitted for the biennial report. The WV Division of Environmental Protection, the WV Department of Agriculture (WV DOA), and the WV Department of Health and Human Resources (WV DHHR) all have groundwater regulatory responsibility and have contributed to this report. Additionally, several boards and standing committees which currently share the responsibility of developing and implementing rules, policies, and procedures for the Ground Water Protection Act (1991) are: The Environmental Quality Board, The Groundwater Coordinating Committee, The Ground Water Protection Act Committee, The Groundwater Monitoring Well Drillers Advisory Board, The Well Head Protection Committee, and The Non-Point Source Coordinating Committee.

There is one recurring theme expressed by most, if not all, of the programs and offices of the reporting agencies. Most common is the need for an accessible central and statewide electronic data system. Currently all groundwater data, and other water data, are collected by individual programs and offices. There are some avenues of electronic data storage currently in place, but these are not available statewide. The DEP Office of Water Resources, Technical and Geographic Information System (TAGIS), and Information Technology Office (ITO) are currently working on the implementation of a statewide electronic data storage system through the Environmental Resources Information System (ERIS). Once this system is operational there will be a need for a technical committee of senior scientists to address the methods and needs for entering the state's data in the system to ensure consistency. Until this mechanism is in place it will be a monumental undertaking to assess and evaluate the status of the state's groundwater quality.

Another theme expressed is the need for a systematic approach to groundwater complaint investigations to involve all agencies with groundwater protection responsibilities. These is also the need for groundwater sampling guidelines to be developed by the Groundwater Program in cooperation with other programs to ensure consistency to all groundwater sampling efforts. Some effort to this effect has begun.

Programs and agencies have also identified the need for specific hydro geologic information on the state's groundwater such as regional and local potentiometric surfaces

(water levels), groundwater flow studies, and access to statewide dedicated groundwater monitoring data. Additional themes include greater outreach to the citizens of West Virginia on issues such as non-point source pollution, protecting individual groundwater and drinking water sources, toll free help lines, and the advantages and disadvantages of a consolidated groundwater protection program, at both the federal and the state levels, to enhance statewide consistency and unified implementation of groundwater rules.

While much remains to be done to provide protection and continued viability of the state's groundwater, great strides have been taken in that direction. The DEP, DOA, and DHHR continue to work closely at many levels to protect the groundwater of West Virginia and the health and safety of the citizens and visitors to the state.

Copies of the report "Groundwater Programs and Activities: Biennial Report to the West Virginia 1998 Legislature" may be obtained by contacting the Groundwater Program at the Office of Water Resources, 1201 Greenbrier Street, Charleston, WV 25311. Their telephone number is (304) 558-2108.

PART V: WETLANDS

While West Virginia's wetlands (102,000 acres) comprise less than 1 percent of the state's total acreage, the state still takes great interest in the management of these areas. Management efforts are mainly geared toward protection of wetlands by regulatory proceedings or acquisition. West Virginia has an active Section 401 certification program. However, permitting authority for activities impacting wetlands (Section 404) lies with the U.S. Army Corps of Engineers.

No significant changes have occured in the status of West Virginia's wetlands since submission of the 305(b) report for 1996. This publication is available from the Watershed Assessment Program, Office of Water Resources, 1201 Greenbrier Street, Charleston, WV 25311.

The Wildlife Resources Section of the Division of Natural Resources updated its wetlands inventory in 1996. Current wetland information is described in a booklet entitled "West Virginia's Wetlands...Uncommon, Valuable Wildlands" (Tiner, 1996). This publication is available from the West Virginia Wildlife Resources Section, Technical Support Unit, P. O. Box 67, Elkins, WV 26241.

PART VI: WATER POLLUTION CONTROL PROGRAM

Chapter One: Point Source Control Program

The objectives of the point source control program are the control and reduction of water pollution. These objectives are met by ensuring that discharges from facilities meet the applicable Clean Water Act effluent limitations and, further, that they do not violate water quality standards.

The Office of Water Resources' (OWR) primary mechanism for carrying out this program is the WV/NPDES permit. The permit includes effluent limits and requirements for facility operation and maintenance, discharge monitoring and reporting.

Due to these requirements and emphasis on issuing major industrial permits, the best available technology (BAT) approach to point source control has resulted in substantial pollution reduction in all state waters, particularly in the area of conventional pollutants. It also has provided states greater latitude in requiring additional reductions in effluent loadings of these pollutants. BAT limits are generally adequate to protect water quality since the majority of major dischargers are located on large rivers which have the capacity to assimilate wastewater. Water quality on the state's large rivers has shown a gradual improvement over the past few decades.

On smaller streams, the combination of BAT and water quality-based permit limits has generally provided the greatest degree of pollutant control, particularly in relation to toxic substances.

In addition to enabling OWR to correct problems, state regulations contain approval procedures for proposed industrial wastewater connections to publicly owned treatment works (POTWs). This allows OWR to evaluate proposals and require the installation of pretreatment facilities where necessary, or otherwise approve with conditions.

Each permitted facility is required to monitor its discharges and submit regular reports. These reports are reviewed and, where noncompliance exists, administrative actions are generally required. These may include warning letters, notices to comply, enforcement orders, or referrals for civil action.

OWR maintains a quality assurance/quality control (QA/QC) laboratory inspection program. This program provides a mechanism for reviewing the analytical testing procedures used by various laboratories serving WV/NPDES permittees across the State. The maintenance of acceptable QA/QC procedures is imperative to insure the analytical

information submitted to OWR is accurate. During this reporting period (July 1989-June 1991) about 146 laboratories (coal, commercial, industrial, and municipal) were inspected by personnel from OWR.

To address the discharge of toxic pollutants, the state Environmental Quality Board has adopted several additional numeric water quality criteria for organic constituents. These criteria supplement existing criteria for a variety of other organics and heavy metals.

Another major effort by OWR to address toxic discharges is an increase in the toxicity testing program. This effort serves to provide toxics information as it relates to a particular discharge. The results give the permitting engineer an indication of the presence or absence of toxicity in a discharge. The permit reissuance process and an increased use of toxicity testing has led to the reduction of toxic pollutants in discharges to West Virgnia streams.

To date, the point source permitting program has been effective in controlling the amount of toxic pollutants discharged into state waters. Section 304(l) of the Clean Water Act requires states to list all waters that do not meet standards due to point source toxics. Currently, no streams or lakes in the state qualify for listing under Section 304(l).

OWR supports a field inspection staff as part of the agency's Environmental Enforcement (EE) unit. This unit is responsible for a variety of pollution control tasks. The inspectors maintain close contact with permitted facilities and conduct activities that have an immediate and long-term effect on the state's water quality.

One of the inspectors' highest priorities is the investigation of fish kills and spills. Investigations must be thorough to determine the cause and, if necessary, to carry out enforcement procedures. Typical investigation procedures include location of a source, sampling, and contacting the responsible official or company. A quick assessment of downstream drinking water intakes is made by the inspector and steps are taken to notify and protect the users. Types of spill investigations include vehicle wrecks, chemical plant accidents, and train derailments.

Routine facility inspections occupy the largest portion of the inspector's time. Inspections of permitted facilities are conducted and include solid waste, municipal and industrial facilities. Most of these are reconnaissance inspections and are performed on a regular basis. The field staff also conducts more detailed compliance evaluation inspections (CEI) where facilities' sampling and reporting procedures are checked. Activities also include inspection of open dumps (solid waste) and the initiation of

enforcement actions necessary in the removal of such dumps.

When needed, enforcement action is initiated to correct problems. This may consist of a notice of violation, an administrative action, a notice to comply, or a criminal complaint. Inspectors may recommend the initiation of civil action for some pollution problems. In such cases, a recommendation is forwarded to DEP's Office of Legal Services. This type of enforcement action is very time consuming and is usually taken as a last resort.

Inspection of activities covered under the erosion control program is another important function of the field inspector. Activities related to construction and timbering sites and agricultural activities can potentially cause much soil disturbance. Unless proper erosion control measures are instituted on a site-by-site basis, soil erosion will occur causing excess sedimentation in streams and violation of water quality standards. Inspector activities in this area are closely coordinated with OWR's nonpoint source personnel.

Screening of complaints is conducted at the local level to determine if immediate response is needed. Complaints originate primarily from private citizens or emergency personnel such as fire departments, sheriff's departments, and state police. Serious complaints are investigated immediately and procedures are much the same as for spills.

Chapter Two: Nonpoint Source Control Program

The Water Quality Act of 1987 mandated that states develop and implement programs for the control of nonpoint sources of pollution. With the enactment of Section 319 of the Act, new direction and significant federal financial assistance for the implementation of state nonpoint source (NPS) programs was authorized. The Act required two major reports to be prepared by the states: (l) a State Assessment Report describing NPS water quality related problems, and (2) a State Management Program explaining how NPS problems will be addressed in the future.

The Nonpoint Source Assessment Report was completed and approved by EPA during 1989. In this report, nonpoint source impacts were identified in 1,673 streams. Further land use assessments identified 29 priority watersheds with agricultural or construction activities impacting water quality and 23 watersheds impacted due to a high incidence of repeat forest fire burns.

The most imposing water quality problem is abandoned coal mine drainage. Ninety six (96) out of 314 watersheds were found to be suffering from mine drainage impacts.

The NPS Management Program Plan also was completed and approved by EPA during 1989, thereby meeting the second part of Section 319 requirements of the Water Quality Act of 1987. The management plan is composed of several stand-alone documents prepared for the categories of silviculture, resource extraction, agriculture and construction. Each management program contains objectives designed to increase industry's understanding and awareness about protecting water quality during operations. The management program's purpose is to establish the mechanisms within the infrastructure of government that can be used to deal with the complex problem of nonpoint source pollution.

OWR, as the lead agency for the state's nonpoint source program, works with other cooperating state agencies to assess nonpoint source impacts, then develops and implements projects designed to reduce pollutant loads from agricultural, silvicultural, resource extraction, urban runoff, hydromodification, and construction activities. Program initiatives are based upon education, technical assistance, financial incentives, demonstration projects, and regulation.

OWR’s NPS program supports the overall administration and coordination of the nonpoint source activities in the participating state agencies: Office of Water Resources (lead agency), Office of Abandoned Mine Lands and Reclamation, Soil Conservation Committee, and Division of Forestry. There are specific activities funded under the non-

point source program. Following is a description of each program component:

Watershed Assessment Program

This project collects and interprets water quality and biological information on watersheds on a five-year cycle. It also identifies and ranks both hydrological regions and watersheds within hydrological regions, provides direction to the cooperating agencies water quality control efforts, and measures their effectiveness in managing and protecting the water quality of the state.

Middle Fork River Watershed National Pilot Project and DEP Stream Restoration Program

This project was established in 1991 when three state and three federal agencies signed a memorandum of agreement to jointly address the abatement of acid mine drainage (AMD) pollution. Tasks included design and installation of passive abatement technology to reduce AMD impacts, data analysis, and water quality monitoring.

During the period from 1995-1997 several abandoned mine drainage sources had limestone sand and passive abatement technologies installed. The results of this effort was the resurrection of the Middle Fork River. In February 1997 water quality was restored and trout were successfully restocked for the first time in over 25 years throughout the mainstem.

State NPS Silviculture Program

Managed through the Division of Forestry, the goal of this program is to maintain and strengthen the cooperative effort and involvement of state and federal agencies, environmental groups, forest industries, woodland owners, and the general populace toward preventing and correcting water quality problems associated with the harvesting and processing of forest products, along with problems created by forest fires and repeat fires which commonly occur within a ten county area in southern West Virginia.

NPS Resource Management Training Center at Cedar Lakes

This project supports the continuation of an environmental resources training center that provides information on water quality enhancement to all groups of land users. Specific training sessions are available for anyone whose profession involves land disturbance activities. The facility houses a modern technology transfer center including a library of pertinent publications, videos, and samples of modern erosion control materials. The center also includes on-site demonstration plots showing properly installed

erosion control materials and best management practices as well as a plant material demonstration.

Dunloup Creek Comprehensive Watershed Project

The Dunloup Creek watershed, within the demonstration area, was selected by the state NPS Technician for a watershed education, monitoring and restoration project. It evolved into a cooperative effort involving many citizen groups, schools, and government agencies. Educational forums on water quality, stream bank, and habitat restoration activities and monitoring by volunteers and government agencies were all incorporated into the project to educate landowners about the problem of sedimentation from eroding stream banks. Various biological and mechanical stream bank stabilization practices were explained and tested. This project concluded during 1995.

Southern Construction Demonstration Project (Piney Creek Comprehensive Watershed Project)

This project concentrates on the Piney Creek watershed. The water quality of Piney Creek has been monitored by the US Park Service and SOS volunteers and has been identified as having the poorest water quality of all watersheds draining into the New River Gorge National River. Piney Creek is impacted by sediments from construction and silviculture, urban runoff from the City of Beckley, heavy meals from mining impacts and untreated sewage. An NPS Technician is educating residents of the area, contractors, and engineers as well as the local planning commissions and the City of Beckley to attempt to incorporate storm water management and sediment and erosion control requirements and BMP's. Increased timber harvesting is expected due to the addition of a sawmill and Oriented Strand Board (OSB) plant in the area. The NPS Technician is coordinating with the local forester to determine where his NPS expertise and educational assistance are needed.

Kanawha River Direct Drainage Watershed Project

Agricultural producers and sediment sources in the demonstration watersheds are the primary target groups of this NPS project. The ultimate goal/objective is to reduce NPS impacts upon water quality from agricultural operations to acceptable levels. These parameters would include sediment, excess nutrients, and a variety of pesticides. Runoff reduction will be accomplished with regulatory and voluntary compliance from informed producers. The objectives, developed on a farm by farm basis, will actually be the development of a Best Management System that incorporates whatever BMP's are necessary to reduce NPS impacts on Water Quality. An NPS Technician assists in

preparing, reviewing and approving sediment control plans for two Soil Conservation Districts covering six counties.

Big Sandy Creek Comprehensive Watershed Project

This project focuses the efforts of an NPS technician on the nutrient management issues related to dairy farming within the watershed. The primary activities involve educational workshop training and nutrient management planning. Secondary activities include working with AMD issues as well as erosion and sediment control.

Wheeling Creek/Tomlinson Run Watershed Project

An NPS technician conducts workshops for contractors, developers, engineers, and landowners on the topic of erosion control. Presentations by the technician on volunteer stream monitoring have resulted in many streams being adopted by local citizens.

Teays Valley/Hurricane Creek Watershed Project

An NPS technician conducts workshops for contractors, developers, engineers, and landowners on the topic of erosion control. In addition, many local citizens have adopted and are monitoring streams as a result of training conducted by the technician.

Kittle Flats (AMD Abatement Project)

This project funded the assessment and design work needed to develop an anoxic limestone drain for the Kittle Flats site located within the Middle Fork River Watershed National Pilot Project study area. The goal is to neutralize acid mine drainage from the site. Successful installation of the drain was completed in 1996

Volunteer Citizens Water Quality Monitoring Program

This project provides a central contact program and entity for the mobilization, training, utilization, and coordination of citizen monitoring groups. Also fosters the creation of monitoring groups and supports data QA/QC objectives.

North & South Mill Creek Poultry & Resource Management

This project implements an information and education program for water quality

issues associated with plant nutrient and pesticide usage, with particular emphasis on potential impacts to agriculture and water quality. An environmental scientist is assisting in proper management of the vast amount of animal waste generated by the local agricultural community. The scientist will educate the public and provide technical assistance for erosion abatement throughout the watershed.

Lunice Creek-Poultry Production and Resource Management

Project responsibilities are same as Mill Creek Project above.

Kanawha State Forest - Watershed Resource Restoration Project

This project involves several participating agencies, industries, interest groups, and organizations that have committed to the watershed initiative through the signing of a Memorandum of Understanding (Attachment A.) This project is intended to provide for the overall coordination and implementation of BMPs to eliminate or minimize the various nonpoint sources contributing sediment and other pollutants to the Davis Creek watershed. Upon successful completion of this phase, project emphasis will be directed toward plan implementation of restoring the Kanawha State Forest lake to its designated usage. Accomplishment of the many components of the Kanawha State Forest Watershed Resource Restoration Project will involve the following tasks:

- Road stabilization,
- Reduction of sediment from recreation areas,
- Reduction of impact from the Stables drainage area, and
- Informing and educating state forest employees and visitors.

Tasks completed under this project, as of June 30, 1997, include:

- Design and installation of manure storage facility at the horse stable area,
- Design and installation of a low water bridge on Rattlesnake Hollow, and
- Improving roads by: regrading roads, widening roads, installing ditches and culverts along and under roads, applying gravel on road surfaces, and day lighting wet road areas.

Chapter Three: Cost/Benefit Assessment

The cleanup of wastewater from municipalities and public service districts in West Virginia has progressed at a moderate pace since 1972, when the Clean Water Act was passed. Between 1972 and 1995, 229 projects were constructed consisiting of 131 treatment plants and 98 separate sewage collection systems. The total cost for all projects was more than $1 billion. EPA grants and WV State Revolving Fund (SRF) loans provided more than $670 million of the total funding.

Since 1991, the EPA Construction Grants Program closeout has continued. Final closeout of all funded projects is expected to be completed by 1998. To replace the grants program, the new WV SRF low interest loan program has been established as the primary funding source for municipal wastewater projects. Since the first loan was made in November, 1991, the SRF has committed over $80 million to 42 projects.

Another indication of progress in water pollution control is the treatment status of the state's 39 major municipal facilities (one million gallons-per day (MGD) flow or more). In 1972, 76 percent of these major facilities were not in compliance with the federal Water Pollution Control Act. Now, 38 of the 39 facilities have constructed at least secondary treatment. The remaining facility has received a grant to upgrade to secondary standards. As a result of better sewage treatment, an increase in game fish populations and recreational use has been achieved on many streams.

During the 1993-1995 reporting period, 14 sewage treatment plants were either constructed or upgraded at a total cost of $35 million. In addition, 17 sewage collection sytems were either built or renovated at a total cost of $42 million. These 31 projects mentioned above were partially funded using $35 million in EPA grants and $42 million in State Revolving Fund loans. OWR's Construction Assistance Branch administers these two programs.

In West Virginia, the majority of water pollution control activities (permitting) are administered through various State agencies. DEP's Office of Water Resources oversees the administration and enforcement of water pollution control (NPDES) permits not related to coal mining. In addition, the office administers Section 401 (Water Quality Certification) permits, with comments provided by DNR's Wildlife Resources Section. The Office of Mining and Reclamation handles coal related NPDES permits. The Office of Waste Management issues NPDES permits associated with solid waste facilities. The state Health Department has input on municipal facilities and oversees all activities associated with home septic systems in cooperation with county sanitarians. The state Environmental Quality Board (EQB) (formerly the Water Resources Board) establishes water quality

standards and acts as an appellate board on some water pollution control activities. The Office of Water Resources also contributes to two interstate commissions dealing with water pollution: The Ohio River Valley Water Sanitation Commission (ORSANCO) and The Interstate Commission on the Potomac River Basin (ICPRB). Following is a breakdown of various state agency expenditures for FY-96-97:

Division of Environmental Protection	
Office of Administration	$ 3,609,789
Office of Information Services	1,525,794
Office of Water Resources (includes Revolving Loan Fund)	35,095,612
Office of Waste Management	14,191,559
Office of Mining and Reclamation	13,726,914
Office of Abandoned Mine Lands & Reclamation	34,707,012
Office of Oil & Gas	2,023,783
Division of Natural Resources	
Fish Kill Reimbursement	24,727
Acid Impacted Streams	75,959
Stream Restoration	13,050
Bureau of Public Health (includes County Sanitarians)	3,000,000
Environmental Quality Board	164,344
TOTAL	**$ 108,158,543**

Improvement in the water quality of state rivers and streams has had numerous benefits, particulary for the larger rivers such as the Ohio, Kanawha, and Monongahela. In these waterbodies, a recovery of the sport fishery has coincided with an increase in other water-based recreational activities such as boating, skiing, and swimming.

The Division of Natural Resources, Wildlife Resources Section maintains figures on the economic impact of hunting and fishing in West Virginia. According to a survey conducted by the U.S. Fish and Wildlife Service and the U.S. Bureau of the Census, state anglers spent $204,922,711 for fishing in 1996. According to a report released by the American Sportfishing Association, the total economic impact of these expenditures amounted to $308,804,127. The same report indicated that this impact maintained 4,450 jobs and generated wages amounting to $71,238,378. In addition, expenditures generated

$12,295,363 in state sales taxes and $2,048,445 in income taxes. The DNR Annual Report revealed that fishing (and related) licenses generated $5,953,610 in 1996. Excise tax apportionment was approximately $1,971,369. In summary:

WV Tax Income	$14,343,808
DNR Income	7,924,979
Impact on WV Government	$22,268,787

Obviously, these revenues are greatly dependent upon water quality supportive of the sport fishery.

Chapter Four: Surface Water Monitoring Program

General activities of the state's surface water monitoring program include conducting compliance inspections, performing intensive site-specific surveys, collecting ambient water quality data, monitoring contaminant levels in aquatic organisms, utilizing benthic and toxicity data to assess perturbations, and conducting special surveys and investigations.

The primary function of the monitoring program is to determine whether or not state waters support their designated uses. A secondary function of the program is to determine the degree of impairment of waters that do not fully support their uses. Monitoring data are used to support the agency's permitting, enforcement, and planning activities.

General monitoring activities (ambient and watershed assessments, fish tissue sampling, groundwater characterization, lake assessment, and intensive surveys) are coordinated by individual programs within the Office of Water Resources. DEP's Environmental Enforcement (EE) unit oversees all enforcement related water pollution control activities, including complaint investigation, spill response, and compliance monitoring of NPDES dischargers.

Following is a summary of monitoring activities conducted by the Office of Water Resources.

Watershed Assessment Program

Located within the OWR, the Watershed Assessment Program’s scientists are charged with evaluating the health of West Virginia's watersheds. The Program is guided, in part, by the Interagency Watershed Management Steering Committee consisting of representatives from each agency which participates in the Watershed Management Framework. Its function is to coordinate the operations of the existing water quality programs and activities within West Virginia to better achieve shared water resource management goals and objectives. The Watershed Basin Coordinator serves as the day to day contact for the committee. The responsibilities of this position are to organize and facilitate the Steering Committee meetings, maintain the watershed management schedule, assist with public outreach, and to be the primary contact for watershed management related issues.

WAP uses the U.S. Geological Survey's (USGS) scheme of hydrologic units to divide the state into 32 watersheds (see map, Figure 1).

WAP assesses the health of a watershed by evaluating as many of its streams as possible, as close to their mouths as possible. In addition WAP began evaluating random sites In each watershed beginning with group B watersheds in 1997. WAP's general sampling strategy can be broken into several steps:

- The names of streams within the watershed are retrieved from the U. S. Environmental Protection Agency's (EPA) Water Body System database.

- A list of streams is developed that includes several sub-lists. These sub-lists include:
  1. Severely impaired streams,
  2. Slightly or Moderately impaired streams,
  3. Unimpaired streams,
  4. Unassessed streams, and
  5. Streams of particular concern to citizens, public officials, and permit writers.

- Assessment teams visit as many streams listed as possible and sample as close to the streams' mouths as allowed by road access and sample site suitability. Longer streams may also be sampled at additional sites further upstream. If inaccessible or unsuitable sites are dropped from the list, they are replaced with previously determined alternate sites.

The Program has scheduled the study of each watershed for a specific year of a 5-year cycle. Advantages of this pre-set timetable include: a) synchronizing study dates with permit cycles, b) facilitating the addition of stakeholders to the information gathering process, c) insuring assessment of all watersheds, d) improving the OWR's ability to plan and e) buffering the assessment process against domination by special interests.

In broad terms, OWR evaluates the streams and the Interagency Watershed Management Steering Committee sets priorities in each watershed in 5 phases:

Phase 1 - For an initial cursory view assessment teams measure or estimate about 50 indicator parameters in as many of each watershed's streams as possible.

Phase 2 - Combining pre-existing information, new Phase 1 data and stakeholders' reports, the Program produces a list of streams of concern.

Phase 3 - From the list of streams of concern, the Interagency Watershed Management Steering Committee develops a smaller list of priority streams for more detailed study.

Phase 4 - Depending on the situation, Program teams or outside teams (e.g., USGS or consultants) intensively study the priority streams.

Phase 5 - The Office of Water Resources issues recommendations for improvement; develops total maximum daily loads and makes data available to any interested party such as local watershed associations, educators, consultants, and citizen monitoring teams.

The general sampling strategy is useful for comparing watersheds, but it was designed with other purposes in mind and will not pass the rigors of statistical tests that must be applied in a scientifically-sound, comparative study.

After the 1996 sampling season WAP developed a special sampling strategy for comparing watersheds. It can be highlighted in a few steps:

- 30-45 stream locations are selected randomly from an EPA database.
- Personnel from WAP, Environmental Enforcement and other groups reconnoiter the locations to secure landowner approval and suitability for sampling.
- Sampling teams visit the sites and sample in WAP's general assessment strategy.
- Special statistical analyses allow comparisons between watersheds. This special watershed assessment strategy will be applied to the Group A watersheds when they are revisited in 2001.

Fish Tissue Sampling

The fish tissue sampling program is used to measure substances not readily detected in the water column, to monitor spatial and temporal trends, determine the biological fate of specific chemicals, and when appropriate, to provide information to support human health risk assessment evaluations. This program underwent a short hiatus during this reporting period. An effort is being made to redefine advisory criteria in a cooperative effort with West Virginia University (WVU). This cooperative effort will allow the program to move from the Federal Food and Drug Administration (FDA) guidelines to the increasingly popular risk based approach (i.e., Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory). Fish Consumption Advisories can be found in Table 7.

Black Fly Control Program

The black fly control program was initiated in the mid-1980's to control nuisance populations of these biting flies. Black fly larvae are aquatic and reside in the rapids of streams and rivers. The adults are small gnats, which must have a blood meal to become reproductively mature. The black fly populations have the highest density in the Hinton

area of Summers County, where three large rivers (New, Greenbrier, and Bluestone) converge.

A bacterium called Bti (Bacillus thuringiensis isrealensis) is used to control the black flies in the aquatic larval stage. When Bti is consumed by an organism having an alkaline gut pH, a chemical reaction occurs, resulting in the destruction of the digestive tract. Few aquatic organisms beside black flies and mosquitoes have an alkaline gut pH.

Beginning in March of each year, biologists monitor streams in the Hinton area to evaluate the growth of the black fly larvae. Black flies are most active feeders during their fifth growth stage, or instar, and it is during the fifth instar that Bti application will have the greatest impact on the larvae. Biologists use such factors as larval size and stream temperature to estimate the best date for Bti application.

The Bti is applied via helicopter to fixed sites on the Greenbrier, New, and Bluestone Rivers. Water Resources biologists tell the pilot how much Bti to apply and which sites need to be treated. Since adult black flies from outlying areas can migrate into the treatment area and quickly repopulate the streams, Bti applications must be repeated throughout the summer. Typically, seventeen applications are performed between March and October.

Ambient Water Quality Monitoring

Ambient water quality has been changed to quarterly monitoring from monthly monitoring. In addition some sites have been adjusted to allow monitoring at the mouth of hydrologic regions. The information gathered is useful in assessing long-term trends and measuring differences between upstream and downstream stations on several rivers. The data is also of major importance in determining 303(d) listings for the states major rivers. Chemical constituents that are indicative of problems associated with sewage, mining, oil and gas drilling, agriculture, and several classes of industries are evaluated at each site.

A list of current sites monitored by representatives of the Office of Water resources and the Ohio River Valley Water Sanitation Commission (ORSANCO) can be found in Table 49. Eight Ohio River stations are contracted to ORSANCO. These are CORE stations and are spread throughout the West Virginia portion of this major waterway. These stations effectively bracket several target areas influenced by major industrial complexes, municipalities, and tributaries. All mile points on the Ohio River are measured from the confluence of the Allegheny River and the Monongalia River at Pittsburgh.

TABLE 49 1996- 1997 Watershed Assessment Ambient Water Quality Stations			
STORET STATION	STATE CODE NUMBER	LOCATION OF SAMPLING STATION	COUNTY
WA-96-B01	BST-001	Tug Fork at Fort Gay, WV	Wayne, WV
WA-96-G01	OG-003	Guyandotte River at Huntington, WV	Cabell, WV
WA-96-G02	0G-073	Guyandotte River at Pecks Mill, WV	Logan, WV
WA-96-K01	K-31	Kanawha River at Winfield Locks and Dam,	Putnam, WV
WA-96-K02	K-73	Kanawha River at Cheylan, WV	Kanawha, WV
WA-96-K03	KC-11	Coal River at Tornado, WV	Kanawha, WV
WA-96-K04	KE-004	Elk River at Cookskin Park, above CharlestonWV	Kanawha, WV
WA-96-K05	KG-008	Gauley River at Beech Glen, WV	Nicholas, WV
WA-96-K06	KN-001	New River above Gauley Bridge, WV	Fayette, WV
WA-96-K07	KN-064	New River at Hinton, WV	Summers, WV
WA-96-K08	KN-095	New River at Glen Lyn, VA	Giles, VA
WA-96-K09	KNG-006	Greenbrier River near Hinton, WV	Summers, WV
WA-96-L01	LK-028	Little Kanawha River at Elizabeth, WV	Wirt, WV
WA-96-L02	LKH-001	Hughes River below Freeport, WV	Wirt, WV
WA-96-MO1	M-07	Monongahela River below Morgantown, WV	Monongalia, WV
WA-96-M02	M-01-20	Dunkard Creek below Prentress, WV	Monongalia, WV
WA-96-M03	MT-006	Tygart Valley River at Colfax, WV	Marion, WV
WA-96-M04	MW-012	West Fork River at Enterprise, WV	Harrison, WV
WA-96-M05	MC-01	Cheat River below Lake Lynn Dam, PA	Fayette, PA
WA-96-M06	MC-32	Cheat River at Albright, WV	Preston, WV
WA-96-O01	OMI-010	Middle Island Creek at Arvilla, WV	Pleasants, WV
WA-96-O02	O-004-09	Twelvepole Creek below Shoals, WV	Wayne, WV
WA-96-P01	P-030-02	Opequon Creek near Bedington, WV	Berkeley, WV
WA-96-P02	PC-06	Cacapon River above Great Cacapon, WV	Morgan, WV
WA-96-P03	PSB-013	South Branch Potomac River near Springfield	Hampshire, WV
WA-96-S01	S-001	Shenandoah River at Harpers Ferry, WV	Jefferson, WV
Ohio River Sanitation Commission Water Qualtiy Sampling Stations All mile points on the Ohio River are measured from the confluence of the Allegheny River and the Monongalia River at Pittsburgh.			
OR-1	OR9408M	Ohio River at East Liverpool, OH, MP 40.2	Columbiana, OH
OR-2	OR896.8M	Ohio River at Pike Island Lock, WV	Ohio, WV
OR-3	OR8546M	Ohio River at Hanibal Lock, OH, MP 126.4	Monroe, OH
OR-4	OR8192M	Ohio River at Willow Island Lock, WV MP 161.8	Washington, OH
OR-5	OR7771M	Ohio River at Belleville Lock, OH, MP 203.9	Meigs, OH

OR-6	OR7210M	Ohio River near Addison, OH, MP 260.0	Gallia, OH
OR-7	OR7018M	Ohio River at Gallipolis Lock and Dam, MP 279.2	Mason, WV
OR-8	OR6741M	Ohio River near Huntington, WV, MP 306.9	Cabell, WV

Citizen Stream Monitoring Program

The citizen stream monitoring program had a successful year in 1997 and continues to grow and build its credibility. The totals for 1997 were 141 surveys submitted plus three surveys from an ORSANCO Riverwatchers monitoring team. There were 117 monitor surveys, 15 educational and 9 workshop surveys. Of those 141 surveys 40 rated "excellent", 42 rated "good", 27 rated "fair" and 32 rated "poor". One of the goals set for 1997 was to improve quality assurance and control. This involved the administering of QA/QC tests, 22 monitors passed their annual test. Increasing the number of trainers, especially volunteers, helped to reach more monitors for testing.

Another goal for 1997 had been to expand the educational outreach. There were 15 educational surveys sent to the coordinator. Some of these efforts actually contained multiple surveys by different teams of students but at the same station. In that case the highest score was chosen to represent the results. The educational efforts of the Lower Paint Creek Watershed Association (LPCWA) have been very successful. They have reached out to two high schools and one middle school teaching them how to monitor and including them in their watershed monitoring efforts. The Rural Net Workshop at Terra Alta has resulted in at least one pair of teachers combining with WVSOS volunteers from the Friends of Laurel Mountain to monitor a stream near Rowlesburg. Their results were registered on the Internet in the Rural Net database. One of the problems in gauging the impact of the program on education is that the surveys sent in to be recorded in the WVSOS database are only a fraction of the number of educational sessions. Many others are put on the internet or are never submitted. Contacts have been made with teachers active in the ORSANCO water monitoring program and one class' results have been submitted and are included in this report.

Improving the working relationship between DEP and volunteers is an ongoing role for the program. In 1997 the coordinator assisted the Blue Heron Environmental Network establish a reference station in Kates Run and document the conditions of the stream. Also assistance was given to the Davis Creek Watershed Association in monitoring a station to get a baseline survey to monitor the impact of expanding development in the watershed. Help was also given to the LPCWA and the Indian Creek Watershed Association in some of their educational workshops.

Spreading the program is also an ongoing goal. What is obvious when looking at the map of volunteer monitoring stations is that there is a large gap between the northern and southern parts of the state. However, in 1997 the program did spread further into the New and Gauley watersheds. Also the West Fork Watershed Association held a workshop and will hopefully begin monitoring the West Fork watershed in 1998. The WFWA is an example of the potential for cooperation between WVSOS and the Stream Partners Program because the association's grant from that program included support for monitoring. As new watershed associations form they have a need to know their water quality problem areas and gauge their success. This may offer the best opportunity to spread citizen monitoring into areas where it is absent now.

Chapter Five: Special State Concerns and Recommendations

Special State Concerns

In previous Section 305(b) reports the state has identified issues of concern to the effective management and protection of state waters. While the state has made some progress in developing programs and/or is taking advantage of special state and federal initiatives which will facilitate a more proactive approach to dealing with specific problems, those concerns are still valid. Briefly, the continuing issues are as follows:

Abandoned Mine Drainage - This is the most serious water quality problem facing the state affecting at least 484 streams totaling 2,852 miles.

Lack of domestic sewage treatment - In many rural areas of the state, collection and treatment of sewage from domestic sources is limited or nonexistent. The disposal of domestic sewage to state waters either through direct pipes or inadequate or failing septic tanks results in bacterial problems in many state streams.

Lack of land use policies - Uncontrolled land use continues to cause flooding and excessive pollutant runoff into adjacent streams. Unmanaged stormwater in developing areas is of particular concern.

Upper Ohio River hydropower licensing - Hydroelectric projects potentially impact water quality and reduce assimilative capacities in the state's major streams. The state continues to work closely with the Federal Energy Regulatory Commission (FERC) to insure that water quality considerations are factored into licensing agreements.

Monitoring programs - With the creation of the Watershed Assessment Program, the agency has initiated a long-term effort to effect comprehensive water quality data collection on a statewide scale. Resource constraints may undermine this program if funding is not available in future years.

Agricultural development in karst regions - The proliferation of the poultry industry and the concerns related to animal wastes in the eastern counties of the state (Potomac and Greenbrier River drainages) have resulted in greater focus by state and federal agricultural agencies in recent years. Continued financial and technical assistance to landowners should result in improvements in the future.

Additional challenges facing the state in the future are development of **Total Maximum Daily Loads** (TMDLs) on the state's list of impaired waters (303(d)),

antidegradation issues and state response to the federal **Endangered Species Act**.

Total Maximum Daily Loads - As a result of the resolution of an environmental suit in 1997, the state and the U.S. Environmental Protection Agency are tasked with the development of TMDLs on over 500 streams included on the state's 1996 303(d) list. By a court ordered consent decree, a schedule was established which included required completion dates of 2002 for the priority waters listed and 2006 for over 450 acid mine drainage affected streams. During 1997 and 1998, seven TMDLS were developed each year by EPA contractors with participation by OWR staff.

While the state recognizes its responsibility for development of TMDLs, OWR is hesitant to assume complete responsibility due to limited resources. Attempts are underway to solicit support for increased funding and to establish a stakeholder process which will result in broad-based representation in the development of TMDL implementation strategies at the watershed level.

Antidegradation - While the state has language in its water quality standards establishing an antidegradation policy, procedures for implementing that policy have been debated for many years. The West Virginia Environmental Quality Board has initiated a development process which includes representatives from several Division of Environmental Protection offices to create implementation procedures for the antidegradation policy. At issue in the deliberation process have been the categorization and establishment of appropriate levels of protection for individual streams and uncertainty in the implementation procedures relative to nonpoint source impacts.

Endangered Species Act - An initiative which has not received much attention at the state level but one which is looming on the horizon. The state must begin to consider how the ESA can be incorporated into future water resource management programs.

Recommendations for the improvement of water resource management:

In 1997, the Division of Environmental Protection along with 9 other state and federal agencies and the Governor of the State of West Virginia signed a Resolution of Mutual Intent for the development and implementation of a statewide Watershed Management Initiative. Designated as the Watershed Management Framework (WMF), the initiative is intended to provide a watershed focus for all participating agencies and to establish mutual priorities for remediation and protection projects. A copy of the document "West Virginia Watershed Management Framework" is available from the Office of Water Resources, 1201 Greenbrier Street, Charleston, West Virginia 25311.

Recognizing that the resolution of water quality and other environmental issues often requires the application of multi-agency authorities and resources, the WMF partners have committed to identifying watershed projects in which positive benefits can be achieved by the redirection of resources to common priorities. The basis for establishing priorities is the water quality and land use information generated by the Watershed Assessment Program (WAP) of the Office of Water Resources (OWR) and other information provided by the partner agencies.

Watershed management strategies and implementation plans are to be developed through a stakeholder process involving local input from potentially affected parties.

The WMF relationships and the continuing water quality assessments being conducted by WAP provide a logical vehicle for multi-agency involvement in water resource management for the state of West Virginia. Identification of water quality and other environmental problems and development of management strategies to address not only remediation but protection of the resource mesh well with the issues confronting the state in the next several years. TMDLs, antidegradation, endangered species and implementation of nonpoint strategies under the newly inaugurated Clean Water Action initiative must be coordinated at the state level through interaction by agencies with the authorities and responsibilities to achieve positive results.

The partnerships established through the WMF have already proven invaluable during the development of the state's Clean Water Action Plan. In response to this national initiative, the state chose to use the WMF as the forum for preparing the necessary documentation and reports which will ultimately result in access to significant federal funding support for nonpoint source remediation projects. Copies of the state's "Clean Water Action Plan" are available from the Office of Water Resources, 1201 Greenbrier Street, Charleston, West Virginia 25311.

In summary, the state has recognized that effective water resource (environmental) management cannot be achieved by a single entity. It requires the participation and cooperation of multiple interests and local input. The WMF provides the mechanism to address the challenges facing the state in the future.

STATEMENT OF POLICY REGARDING THE EQUAL OPPORTUNITY TO USE AND PARTICIPATE IN PROGRAMS

It is the policy of the West Virginia Division of Environmental Protection to provide its facilities, accommodations, services, and programs to all persons without regard to sex, race, color, age, religion, national origin, or handicap. Proper licenses/registration and compliance with official rules and regulations are the only sources of restrictions for facility use or program participation. Complaints should be directed to:

Director
WV Division of Environmental Protection
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