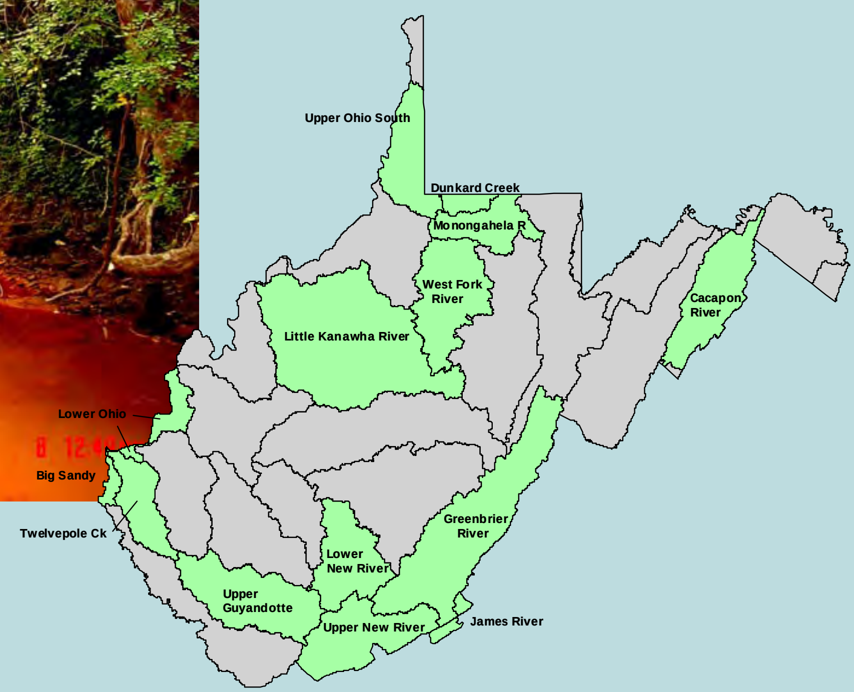
West Virginia's Water Quality Assessment

305(b) Report 2002



Focus on Watersheds Assessed in 1999 & 2000

DEP
WEST VIRGINIA
Department of Environmental Protection

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Acknowledgments

Without the assistance of numerous people within the Department of Environmental Protection, other state and federal agencies, private organizations, watershed associations, and individuals, compilation of this report would have not have been possible.

The Division of Water Resources would like to take this opportunity to thank the many individuals and agencies that volunteered data and dedicated time and resources toward the compilation of this report.

An electronic version of this report, as well as other reports prepared by the Division of Water Resources, are accessible through the Department of Environmental Protection's web page on the Internet at http://www.dep.state.wv.us.

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 is compiled from data collected by a number of state, interstate and federal agencies, including the West Virginia Department of Environmental Protection (DEP), West Virginia Division of Natural Resources (DNR), West Virginia Bureau for Public Health (BPH), United States Environmental Protection Agency (USEPA), Ohio River Valley Water Sanitation Commission (ORSANCO), United States Geological Survey (USGS), United States Forest Service (USFS), and United States Army Corps of Engineers (USCE). Also, data from a number of third party sources was used to prepare this report, including colleges and universities, public utilities, private consultants, and volunteer monitors. The report provides a general assessment of the quality of West Virginia's surface and ground water resources.

The report addresses public health and aquatic life concerns and provides updated assessments on 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 a list of 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. This includes approximately 21,000 miles of perennial streams and over 11,000 miles of intermittent streams. Only a broad overview can be included in an assessment of this type. More specific information on individual streams can be found in the various watershed assessment reports being published annually by DEP's Division of Water Resources (DWR). A brief inventory of West Virginia's water resources is provided in Table 1.

Table 1. Water Resource Atlas	
State population (2000)	1,808,344
State surface area (square miles)	24,282
Number of major watersheds (USGS 8-digit HUCs)	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 (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
Acres of freshwater wetlands	102,000

DWR's Watershed Assessment Section (WAS), as part of its rotating basin assessment strategy, collected the majority of data used in this report. In 1996, WAS established a five-year rotating basin approach to stream monitoring, called the West Virginia Watershed Management Framework. For five consecutive years beginning in 1996, WAS collected water quality data in each of the state's 32 major watersheds (eight-digit USGS hydrologic units). Each year, a group of five to eight watersheds was assessed. The first five-year cycle ended in 2000; the second cycle was initiated in 2001.

The format used in this 305(b) report is similar to that used in the 2000 report, which focused on 11 of the state's 32 major watersheds. This report will focus on 14 watersheds. The watersheds included in this report are the Greenbrier, James, Little Kanawha, Lower New, Monongahela, and Upper New (Figure 1, group D), and the Big Sandy, Cacapon, Dunkard, Lower Ohio, Twelvepole, Upper Guyandotte, Upper Ohio South, and West Fork (Figure 1, group E). WAS monitored the group D watersheds in 1999 and the group E watersheds in 2000.

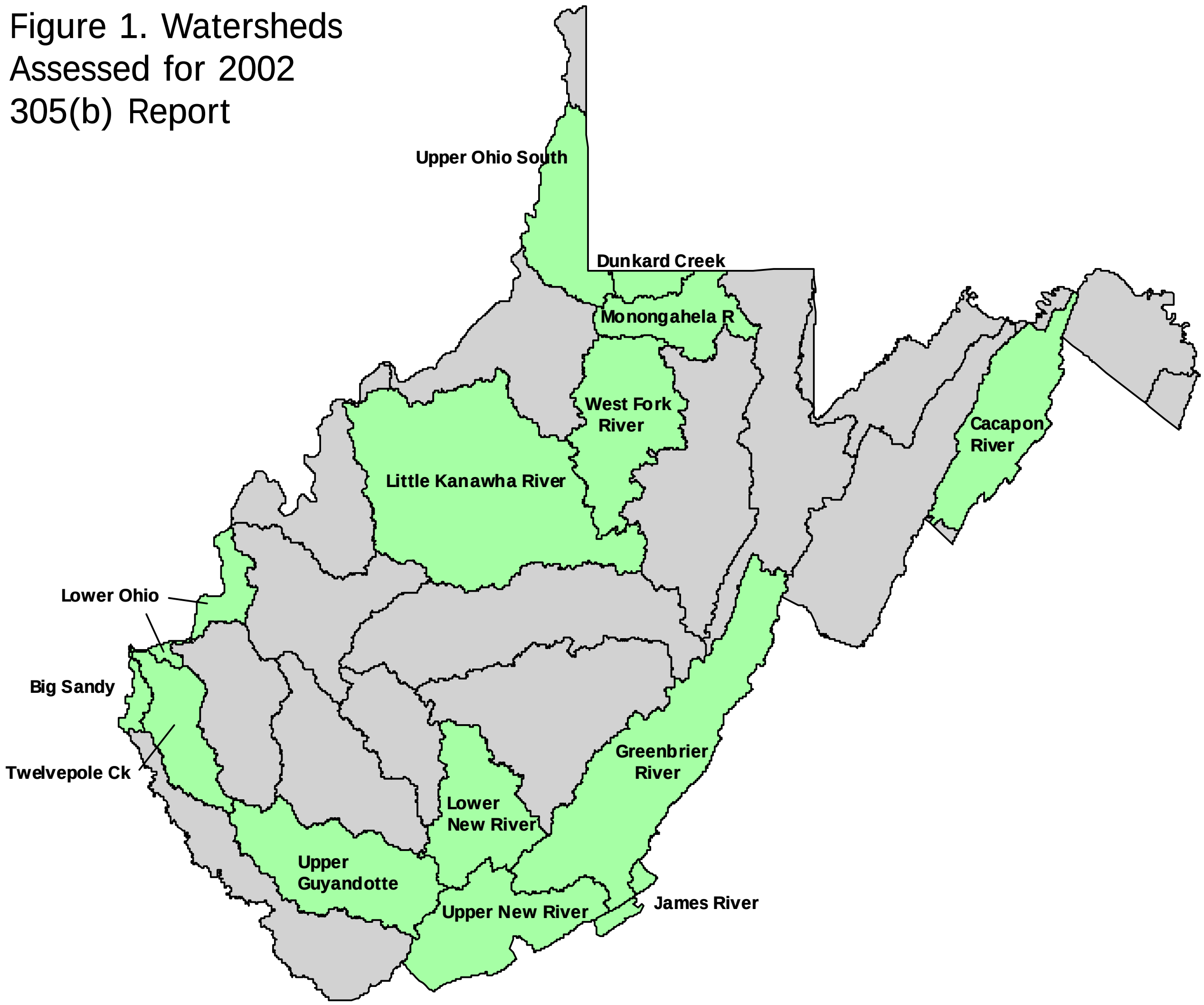
Data collected by WAS was not the only data used in this 305(b) assessment. Data collected from other sources, including those mentioned inWAS paragraph one of this section, were utilized. In addition to the group D and E watershed summaries, an overall statewide summary is provided in this report utilizing data collected from 1996-2001.

It is important to note that many of the 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 stream sampling in West Virginia traditionally has not been performed randomly, general inferences should not be made about the overall quality of West Virginia streams based solely upon the data used in this report.

However, in order to provide a more accurate picture regarding general water quality conditions in the state, WAS established a random monitoring program in 1997 to complement its targeted stream program. Random monitoring enables DEP to make general inferences regarding the state's overall water quality in a statistically valid manner. However, it will take at least one more reporting cycle before WAS fully develops the capabilities to analyze and interpret the data. A general discussion regarding the targeted and random monitoring protocols WAS follows is contained in DWR's Quality Assurance Project Plan for the Watershed Assessment Program (DWR, 1999).

During this reporting period, 15 public lakes were evaluated. These lakes were monitored in 1996 and were the last lakes to be monitored under the state's Clean Lakes Program. The program

Figure 1. Watersheds Assessed for 2002 305(b) Report



has since been phased out due to lack of targeted federal funding. The federal Clean Lakes Program originally was the state's primary funding source for lake monitoring and assessment.

WestVirginia's 102,000 acres of wetlands comprise less than one 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. Permitting authority for activities impacting wetlands (Section 404) lies with the U.S. Army Corps of Engineers. West Virginia insures protection through an active Section 401 certification program.

The Wildlife Resources Section of the DNR 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 DNR's Wildlife Resources Section, Technical Support Unit, P. O. Box 67, Elkins, WV 26241.

DWR's Groundwater Program regulates the state's groundwater resources. 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 resources and management program. Current information on the state's groundwater programs and activities can be found in the biennial report to the West Virginia 2000 Legislature (DWR, 2000).

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

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

Site-specific fish tissue evaluation is carried out on an annual basis in order to respond to human health concerns. Whenever necessary, fish consumption advisories are issued. A list of current fish consumption advisories is contained in this report.

In this report, a cost/benefit assessment is provided not only to give 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.

LITERATURE CITED

Tiner, R.W., 1996. West Virginia's Wetlands, Uncommon, Valuable Wildlands. U. S. Fish and Wildlife Service, Ecological Services, Northeast Region, Hadley, MA. 20 pp.

West Virginia Department of Environmental Protection. 1999. Quality Assurance Project Plan for the Watershed Assessment Program. 45pp.

West Virginia Department of Environmental Protection. 2000. Groundwater Programs and Activities, Biennial Report to the West Virginia 2000 Legislature. 161 pp.

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PART II: SURFACE WATER ASSESSMENT

Background

This section of the 305(b) report will provide a general overview of water quality conditions statewide. The remainder of Part II will deal with individual watersheds that were monitored during 1999 and 2000.

In 2000, the Watershed Assessment Section completed its first five-year cycle of watershed monitoring. The cycle began in 1996 with the goal of monitoring each of the state's 32 major watersheds within a five-year period. This section contains a summary of monitoring data collected by WAS in addition to data supplied by a variety of other sources during that five-year period.

In 2001, WAS began the five-year cycle over again. The second five-year cycle differs somewhat from the first in that more of an emphasis is being placed on pre-TMDL monitoring and less emphasis on general stream monitoring. Whereas general stream monitoring involves visiting sites only one time, pre-TMDL monitoring involves visiting sites monthly for a period of up to one year. Pre-TMDL monitoring also focuses on specific parameters that are known impairments, as opposed to a general suite of parameters.

Decision process for numeric water quality criteria

Many 305(b) assessment decisions are based on a comparison of water quality data to numeric criteria. The frequency of exceedence of a criterion is the primary factor for a listing decision. In general, if an ample dataset exists and the stream violates criteria more than 10% of the time, it is considered to be impaired. If lesser amounts of data are available, the listing threshold increases due to uncertainty. Table 2 describes criteria used to make 305(b) use support determinations and 303(d) impairment decisions relative to pollutants for which numeric water quality criteria are applicable. The agency uses certain guidelines for the minimum number of samples required to list or delist a waterbody. Ideally, a minimum of 20 samples would be used to make all listing decisions and typically, agency data from ambient stations will give 20 samples over a five-year period. However, data often includes less than 20 samples per site. If fewer than 20 samples per station or representative area were collected and violations were observed, listing decisions were made on a case-by-case basis, in accordance with the general guidance provided by the decision matrix. Consideration was given to other forms of information such as benthological surveys, fish community studies, and visual observations, among others. All of this information was considered when making decisions where less than the optimal number of samples was available. A

Table 2 - West Virginia Waterbody Assessment Matrix for Numeric Criteria

Number of Samples (last 5 years)	Frequency of Violation	305(b) Classification	303(d) Action
> 20	< 10%	Fully Supporting	No Listing
	11 - 25%	Partially Supporting	List
	> 25%	Non-Supporting	List
10 - 19	< 10%	Fully Supporting	No Listing
	11 - 50%	Threatened or Partially Supporting[1]	No Listing List
	> 50%	Non-Supporting	List
5 - 9	< 20%	Fully Supporting	No Listing
	21 - 75 %	Threatened or Partially Supporting[1]	No Listing List
	> 75%	Non-Supporting	List
< 5	< 20%	Fully Supporting or Not Assessed[2]	No Listing No Listing
	21 - 100%	Not Assessed (if no obvious impacts observed[3])	No Listing
		Non-Supporting (if obvious impacts observed)	List

[1] The waterbody may be classified as either threatened or partially supporting after consideration of additional factors, including but not limited to magnitude of violations, data trends, climatological data, and hydrologic conditions. For aquatic life use classifications, the results of available biological and habitat assessment data will be considered. Where available information is limited and uncertainty is high, assessments will tend toward a less-impaired classification.

[2] The waterbody may be classified as either fully supporting or not assessed after consideration of additional factors, including but not limited to number of samples collected, number of parameters evaluated, and the results of available biological / habitat data.

[3] Obvious impacts include acid mine drainage, raw sewage, or any other type of impairment that can be discerned by simple observation.

degree of professional judgment is unavoidable when less than optimal datasets exist. Use support and impairment decisions were made by comparing the instream values of various water quality parameters to the numeric criteria contained in the West Virginia water quality standards. For the Ohio River, both Ohio River Valley Water Sanitation Commission (ORSANCO) and West Virginia water quality criteria were considered as required by the ORSANCO compact. Where both ORSANCO and West Virginia standards contain a criterion for a particular parameter, instream values were compared against the more stringent criterion. The WVDEP supports ORSANCO's efforts to promote consistent decisions by the various jurisdictions with authority to develop 305(b) reports and 303(d) lists for the Ohio River.

Decision criteria for biological impairment

The narrative water quality criterion of 46 CSR 1 - 3.2.i. prohibits the presence of wastes in state waters that cause or contribute to significant adverse impact to the chemical, physical, hydrologic and biological components of aquatic ecosystems. Streams are listed as biologically impaired based on a survey of their benthic macroinvertebrate community. Benthic macroinvertebrate communities are rated using a multimetric index developed for use in wadeable streams of West Virginia. The West Virginia Stream Condition Index (WVSCI) is composed of six metrics that were selected to maximize discrimination between streams with known impairments and reference streams. In general, streams with WVSCI scores less than 60.6 points are considered to be biologically impaired and are included on the 303(d) list.

Streams with low biological scores are listed as having an unknown cause of impairment on the 303(d) list and most are listed by default for their entire length. In most cases, it is doubtful that the entire length of stream is impaired, but without further data, the exact length of impairment is unknown. Each listed stream will be revisited prior to TMDL development. The additional assessments performed in the pre-TMDL monitoring effort will better define the impaired length. The cause(s) of the impairment and the contributing sources of pollution will also be identified in the TMDL development process.

Table 3. Summary of Fully Supporting, Threatened, and Impaired Streams & Rivers Statewide in West Virginia (All Sizes in Miles)

Degree of Use Support	Evaluated	Monitored	Total
Size Fully Supporting All Assessed Uses:	12.6 (0.3%)	4069.4 (99.7%)	4082
Size Fully Supporting All Assessed Uses but Threatened for at Least One Use:	34.3 (0.9%)	3900.5 (99.1%)	3934.8
Size Impaired for One or More Uses:	233.4 (3.6%)	6240.4 (96.4%)	6473.8
Size Not Attainable for Any Use and Not Included in the Line Items Above :	0	0	0
Total Assessed:	280.2 (1.9%)	14210.2	14490.4

Table 4. Individual Use Support Summary for Streams & Rivers (in miles)					
Use	Assessed	Fully Supporting	Fully Supporting but Threatened	Partially Supporting	Not Supporting
Overall Use Support	14,485.60	4,356.87	3,715.56	5,601.18	811.99
Aquatic Life Support	14,407.86	5,986.36	2,393.21	4,145.46	1,881.70
Fish Consumption	341.85	0	0	341.85	0
Cold Water Fishery - Trout	2,696.28	1,428.45	620.74	476.15	170.94
Warm Water Fishery	6,768.53	2,447.09	1,166.91	2,423.47	731.06
Bait Minnow Fishery	5,187.11	2,252.19	621.35	1,386.39	926.05
Primary Contact (Recr)	14,458.92	6,091.68	4,707.92	2,514.19	1,145.13
Secondary Contact (Recr)	1	1	0	0	0
Drinking Water Supply	4,811.71	1,115.69	672.49	2,252.20	771.33
Industrial Use	540.2	429.7	0	110.5	0
Livestock Watering	5.24	5.24	0	0	0

Water Quality Summary

When assessing stream designated use support, the following categories are utilized.

1) fully supporting – the use is being fully met and no impairment exists.
2) fully supporting but threatened – the use is being fully met but a pollutant poses a potential threat to water quality.
3) partially supporting – the use is impaired by a pollutant that violates water quality criteria 11-25% of the time and/or the aquatic life is considered moderately impaired.
4) non-supporting – the use is impaired by a pollutant that violates water quality criteria >25% of the time, and/or the aquatic life is considered severely impaired.

During this reporting period, 3,127 stream segments totaling 14,490 miles were assessed statewide in West Virginia. An individual use support summary is given in Table 4.

Of the 14,490 stream miles assessed, 4,081 (28.2%) were fully supporting all assessed uses, 3,934 (27.2%) were fully supporting all uses but threatened for at least one, and 6,473 (44.7%) were impaired for one or more uses.

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 14,407 miles assessed for the aquatic life support use, 5,986 (41.5%) were fully supporting, 2,393 (16.6%) were fully supporting but threatened, 4,145

(28.8%) were partially supporting, and 1,881 (13.1%) were not supporting.

All 341 stream miles assessed for the fish consumption use during this reporting period were partially supporting.

The swimmable goal of the CWA, like the fishable goal, generally is assessed in two parts: primary contact recreation use and secondary contact recreation use. The secondary contact recreation use is not recognized in the state's water quality standards; therefore it is not assessed. Of the 14,458 miles assessed for the primary contact recreation use, 6,091 (42.1%) were fully supporting, 4,707 (32.6%) were fully supporting but threatened, 2,514 (17.4%) were partially supporting, and 1,145 (7.9%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution statewide is provided in Table 5. The principal causes of impairment are unknown cause (3,284 miles), metals (2,798 miles), siltation (2,067 miles), and fecal coliform (1,425 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution statewide is provided in Table 6. The principal sources of pollution are unknown source (3,915 miles), abandoned mining (1,602 miles), habitat modification (both hydro and non-hydro) (752 miles), agriculture (632 miles), and urban runoff/storm sewers (426 miles).

Public Health/Aquatic life Impacts

All fish consumption advisories and revisions are based on extensive data collection by state, interstate, and federal agencies. Risk assessment information and West Virginia Sportfish Advisory Guidelines (2000) are taken into consideration when developing advisories. Details of all current fish consumption advisories are contained in Table 96.

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

Information sources

Warnick, W. A and P. Mazik. West Virginia Sport Fish Consumption Advisory Guide. 2000. 173 p. Available from: West Virginia Division of Environmental Protection, Charleston, WV

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West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/nfs2.htm

Table 5. Summary of Causes Impairing West Virginia Streams & Rivers

Cause/Stressor Category	Total Size (Miles)
Cause Unknown	3284.78
Unknown toxicity	46.54
Pesticides	2.5
PCB's	277.65
Dioxins	267.6
Metals	2798.79
Mercury	245.6
Selenium	99.81
Zinc	39.62
Sulfates	98.25
Other inorganics	29.13
Nutrients	37.09
Phosphorus	9.17
Nitrogen	30.67
Nitrate	6.42
Other	1.48
pH	1278.5
Siltation	2067.47
Organic enrichment/Low DO	52.44
Salinity/TDS/chlorides	1.3
Flow alteration	76.4
Other habitat alterations	1369.81
Pathogens	1428.17
Fecal Coliform	1425.17
E. coli	3
Oil and grease	1.33
Taste and odor	10.13
Suspended solids	3.48
Algal Growth/Chlorophyll a	10.48
Total toxics	2.8
Turbidity	267.5
Discoloration	2.58
Sludge Deposits	5.13
Odor	10.13
Temperature	1.3
Caustic chemicals	20.78

Table 6. Summary of Sources Impairing West Virginia Streams & Rivers

Source Category	* Total Size (Miles)
Industrial Point Sources	67.26
Major Industrial Point Source	27.06
Minor Industrial Point Source	0.2
Municipal Point Sources	181.95
Major Municipal Point Sources - wet weather discharges	3.48
Package Plants (Small Flows)	31.8
Combined Sewer Overflow	150.2
Collection System Failure	1.4
Agriculture	632.78
Crop-related Sources	161.6
Nonirrigated Crop Production	124.2
Grazing related Sources	410.35
Pasture grazing - Riparian and/or Upland	274.57
Pasture grazing - Riparian	11.4
Pasture grazing - Upland	22.11
Range grazing - Riparian and/or Upland	4.47
Intensive Animal Feeding Operations	69.3
Confined Animal Feeding Operations (NPS)	67.1
Silviculture	204.04
Logging Road Construction/Maintenance	124.2
Construction	294.49
Highway/Road/Bridge Construction	18.79
Land Development	153
Urban Runoff/Storm Sewers	426.8
Other Urban Runoff	16.73
Highway/Road/Bridge Runoff	65.6
Erosion and Sedimentation	23.53
Resource Extraction	2532.9
Surface Mining	192.39
Subsurface Mining	74.41
Petroleum Activities	201.42
Mine Tailings	54.67
Acid Mine Drainage	763.08
Abandoned mining	1602.43
Active Mining	22.14
Inactive mining	35.23
Land Disposal	437.28
Sludge	0.7
Landfills	6.83
Inappropriate Waste Disposal/Wildcat Dumping	20.55
Onsite Wastewater Systems (Septic Tanks)	61.78
Raw sewage	358.2

Table 6. Summary of Sources Impairing West Virginia Streams & Rivers (continued)

Source Category	* Total Size (Miles)
Hydromodification	333.91
Channelization	287.97
Dredging	62.49
Dam Construction	2.6
Upstream Impoundment	5.4
Flow Regulation/Modification	10.1
Habitat Modification (other than Hydromodification)	418.5
Removal of Riparian Vegetation	341.61
Bank or Shoreline Modification/Destabilization	237.86
Drainage/Filling Of Wetlands	15.81
Atmospheric Deposition	215.77
Highway Maintenance and Runoff	35.88
Spills	23.85
Contaminated Sediments	19.45
Debris and bottom deposits	15.42
Natural Sources	19.37
Pesticide application	2.5

* These milages represent those stream segments where it was clear what the source of impairment was. These milages should not be assumed to represent the universe of impairments attributable to these sources.

SURFACE WATER ASSESSMENTS BY WATERSHED

DWR's Watershed Assessment Section (WAS), as part of its rotating basin assessment strategy, collected the majority of data used in this report. In 1996, WAS established a five-year rotating basin approach to stream monitoring, called the West Virginia Watershed Management Framework. For five consecutive years beginning in 1996, WAS collected water quality data in each of the state's 32 major watersheds (eight-digit USGS hydrologic units). Each year, a group of five to eight watersheds was assessed. The first five-year cycle ended in 2000; the second cycle was initiated in 2001.

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The Greenbrier River Watershed

Background

The Greenbrier River watershed (HUC # 05050003) extends from the northern border of Pocahontas County along the southeast border between Virginia and West Virginia to its confluence with the New River at the town of Bellepoint in Summers County. The watershed is located in the southeast portions of Pocahontas and Greenbrier counties as well as the northern part of Monroe County and the northeast corner of Summers County. The basin is bounded by the Potomac to the north, Gauley to the west, and the upper and lower New River basins to the southwest.

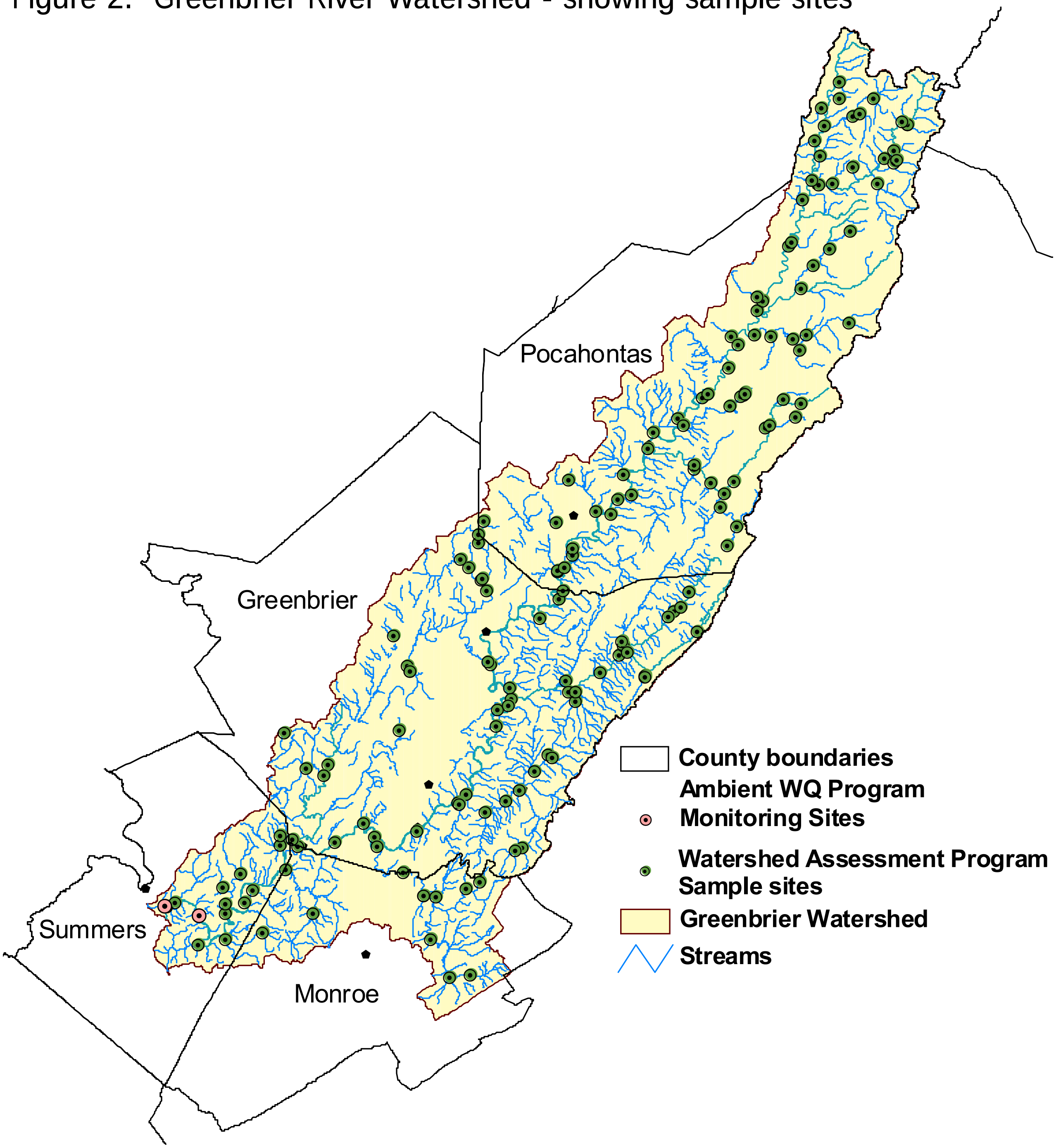
From its source in Pocahontas County to the mouth in Summers County, the Greenbrier River spans approximately 168 miles and drains an area of 1,646 square miles. The elevation ranges from 3,860 feet at its source on East Fork, to 1,360 feet at its mouth, an average rate of fall of 15 feet per mile.

The Greenbrier River watershed lies in two ecoregions, the Ridge and Valley (67) and the Central Appalachian (69). Long parallel ridges and valleys underlain by alternating layers of sandstone and shale characterize Ecoregion 67. Springs and caves are relatively numerous, with around 50 percent forested land cover. Ecoregion 69 is characterized by high mountains surrounding steep, narrow valleys with mostly high gradient streams. The rugged terrain, infertile soils, and cool climate limit agriculture and result in mostly forested land cover. Ecoregion 67 is significantly lower in elevation than Ecoregion 69 and therefore has less severe winters, warmer summers, and lower annual precipitation.

Each ecoregion is divided into two sub-ecoregions within the Greenbrier watershed. Ecoregion 67 is divided into 67b, the northern shale valleys in northern Pocahontas County and 67d the northern dissected ridges along the West Virginia, Virginia border. Ecoregion 67b is characterized by rolling valleys and low hills. Farming predominates with forestland on steeper slopes. Ecoregion 67d is composed of broken, dissected ridges underlain by sedimentary rocks.

Ecoregion 69 is divided into 69a, forested hills and mountains along the left descending bank of the Greenbrier River, and 69c, Greenbrier karst along the right descending bank of the Greenbrier River. Ecoregion 69a occupies the highest and most rugged portion of Ecoregion 69 and is extensively forested. Ecoregion 69c is rolling, agricultural lowland punctuated by isolated hills underlain by limestone.

Figure 2. Greenbrier River Watershed - showing sample sites



Most of the Greenbrier River watershed consists of undeveloped rural land. The Greenbrier River runs through the Monongahela National Forest from its headwaters to the town of Thorny Creek, at which point the river becomes the western boundary of the forest. The Greenbrier continues as the western boundary of the Monongahela National Forest south to the town of Anthony. The state's Natural Stream Preservation Act designates portions of the Greenbrier River as

Greenbrier River Watershed

Figure 3a. Summary of Individual Use Support

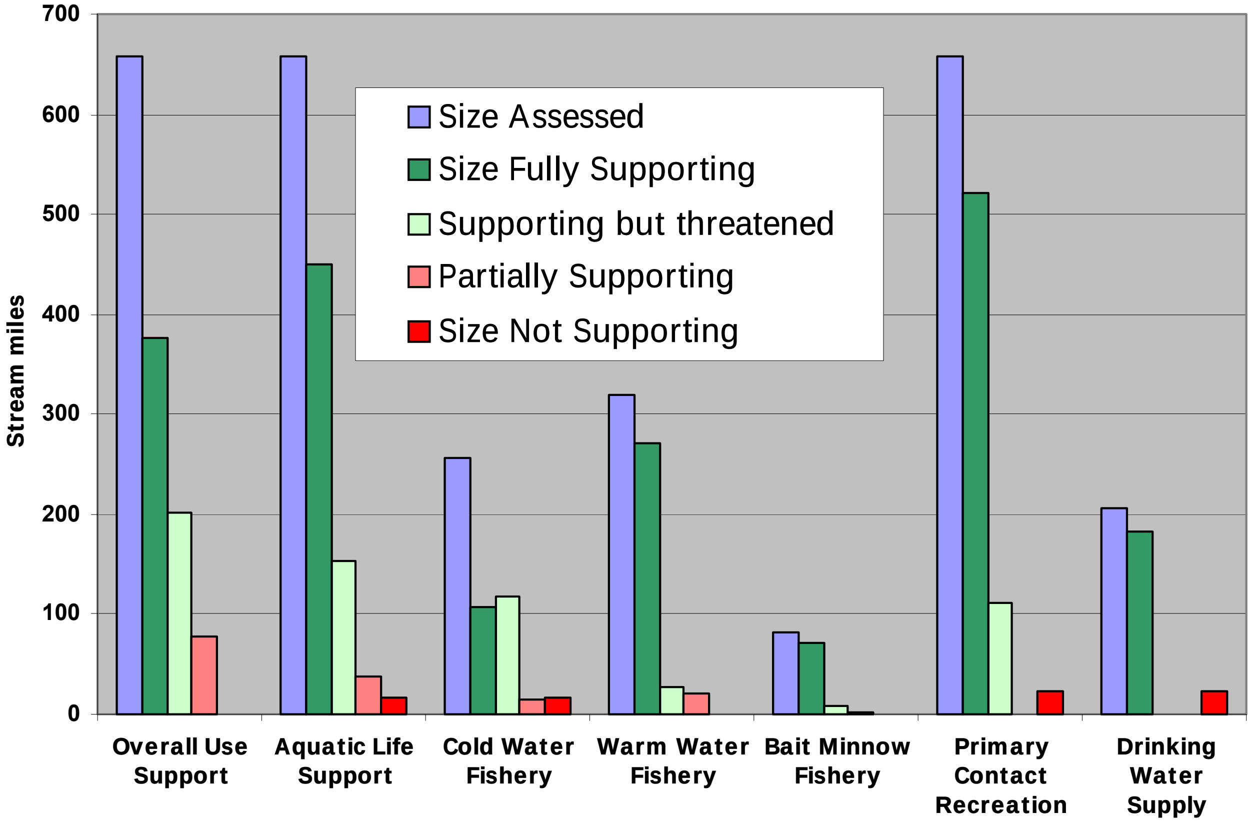


Figure 3b. Impairment Causes

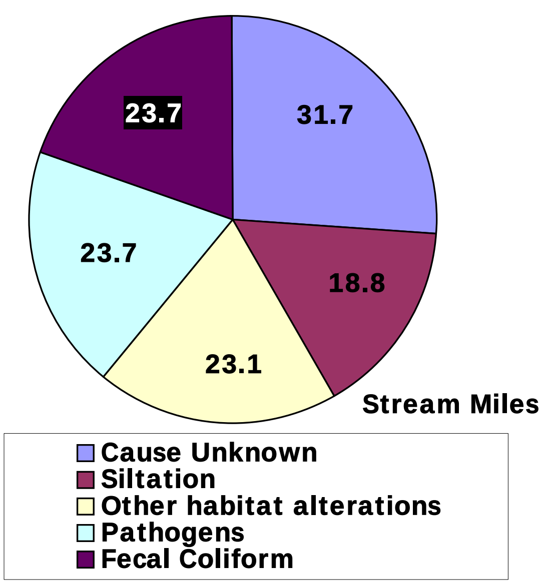


Figure 3c. Impairment Sources

protected streams. These sections include the Greenbrier River, from its confluence with Knapps Creek to its confluence with the New River, and the entire length of Anthony Creek. The Greenbrier River watershed has an abundance of rugged and remote forestland that is used recreationally. The scenery and wildlife provide a wide array of activities for nature lovers and sportsmen and are instrumental in fueling the local tourism industry.

Several plants and animals residing in the Greenbrier River watershed are on the federal endangered and threatened species lists. Endangered species include the Indiana Bat (*Myotis sodalis*), the Virginia Big-Eared Bat (*Corynorhinus townsendii virginianus*), and the West Virginia Northern Flying Squirrel (*Glaucomys sabrinus fuscus*). The Indiana Bat has been a reported denizen of caves in Pocahontas, Greenbrier, and Monroe counties. The Virginia Big-Eared Bat has more individuals present in West Virginia than in any other state. Their caves are present in the southern Appalachians from West Virginia to North Carolina. The West Virginia Northern Flying Squirrel has been reported to inhabit Pocahontas County. The Virginia Spirea (*Spiraea virginiana*), a threatened plant, inhabits the watershed. It is a colonial shrub that grows along the Greenbrier River. This plant inhabits only four other rivers statewide.

The main mineral extraction within the watershed consists of limestone operations in the Ronceverte and Fort Springs area in Greenbrier County. Very little coal is mined in the watershed, nor are significant quantities of oil or gas produced. The major agricultural product is livestock and related products. Silviculture and tourism are other major industries.

The Greenbrier River watershed has had past pollution problems associated with elevated fecal coliform levels from domestic sewage and agricultural runoff. Timbering and quarrying practices have also caused pollution in the form of sedimentation.

Water Quality Summary

During this reporting period, 78 stream segments totaling 657.2 miles were assessed in the Greenbrier River watershed. Figure 2 is a map depicting sampling sites in the watershed. Information on the individual sample sample sites can be found in Appendix A. Individual use support is summarized in Figure 3a.

Of the 657.2 stream miles assessed, 376.5 (57.3%) were fully supporting all assessed uses, 202.2 (30.8%) were fully supporting all uses but threatened for at least one, and 78.5 (11.9%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 657.2 miles assessed for the aquatic life support use, 449 (68.3%) were fully supporting, 153.4 (23.3%) were fully supporting but threatened, 38.8 (5.9%) were partially supporting, and 16 (2.5%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the CWA is determined by assessing the primary contact recreation use. Of the 657.2 miles assessed for the primary contact recreation use, 521.3 (79.3%) were fully supporting, 112.2 (17.1%) were fully supporting but threatened, and 23.7 (3.6%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Greenbrier River watershed is provided in Figure 3b. The principal causes of impairment are unknown cause (31.7 miles) and fecal coliform (23.7 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Greenbrier River watershed is provided in Figure 3c. The only principal source of pollution listed is unknown source (78.5 miles).

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 96. Currently, no streams within the Greenbrier River Watershed are under a fish consumption advisory.

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

Section 303(d) Waters

Streams from the Greenbrier River watershed that are on the current 303(d) list are included in Appendix B. Seven streams totaling 79 miles are on the list. Currently, no 303(d) listed streams in the Greenbrier River watershed have had TMDLs completed. TMDLs in the Greenbrier River watershed will be completed in either 2007, 2012, or 2017.

Information Sources

West Virginia Department of Natural Resources, Division of Water Resources. 1976. *Comprehensive Survey of the Greenbrier River Basin, Volume II Part 2: Economic Base Study*. Charleston, WV: (pp. 1-7)

West Virginia Department of Natural Resources, Division of Water Resources. 1983. *Greenbrier River Basin Plan*. Charleston, WV: (pp. 22-32)

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/myotis.htm

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/nfs2.htm

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/va%20bat.htm

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/va%20spirea.htm

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia*. Corvallis, OR. U.S. Environmental Protection Agency.

The James River Watershed

Background

The James River watershed (HUC # 02080201) is located along the eastern edge of Monroe County with a 0.8 square mile portion located on the southern tip of Pendleton County. This watershed consists of 78 square miles of sparsely populated mountains and forestland that serve as headwaters for the James River in the Commonwealth of Virginia.

Three streams and the extreme headwaters of a fourth stream are the extent of drainage to the James River from West Virginia. In Monroe County, Sweet Springs Creek and Back Creek, adjacent to the community of Sweet Springs, drain the northern part of the watershed. Potts Creek, within the Jefferson National Forest near Waiteville, drains the southern portion of the watershed. The drainage in Pendleton County consists of part of the eastern side of Jack Mountain and the western side of Brushy Hill, which produce wet weather streams flowing into Bullpasture Run and eventually to the James River.

The James River watershed is located entirely within the Ridge and Valley ecoregion (67). Long parallel ridges and valleys underlain by alternating layers of sandstones and shales characterize this ecoregion. No coals are present. Springs and caves are numerous in this relatively low-lying ecoregion.

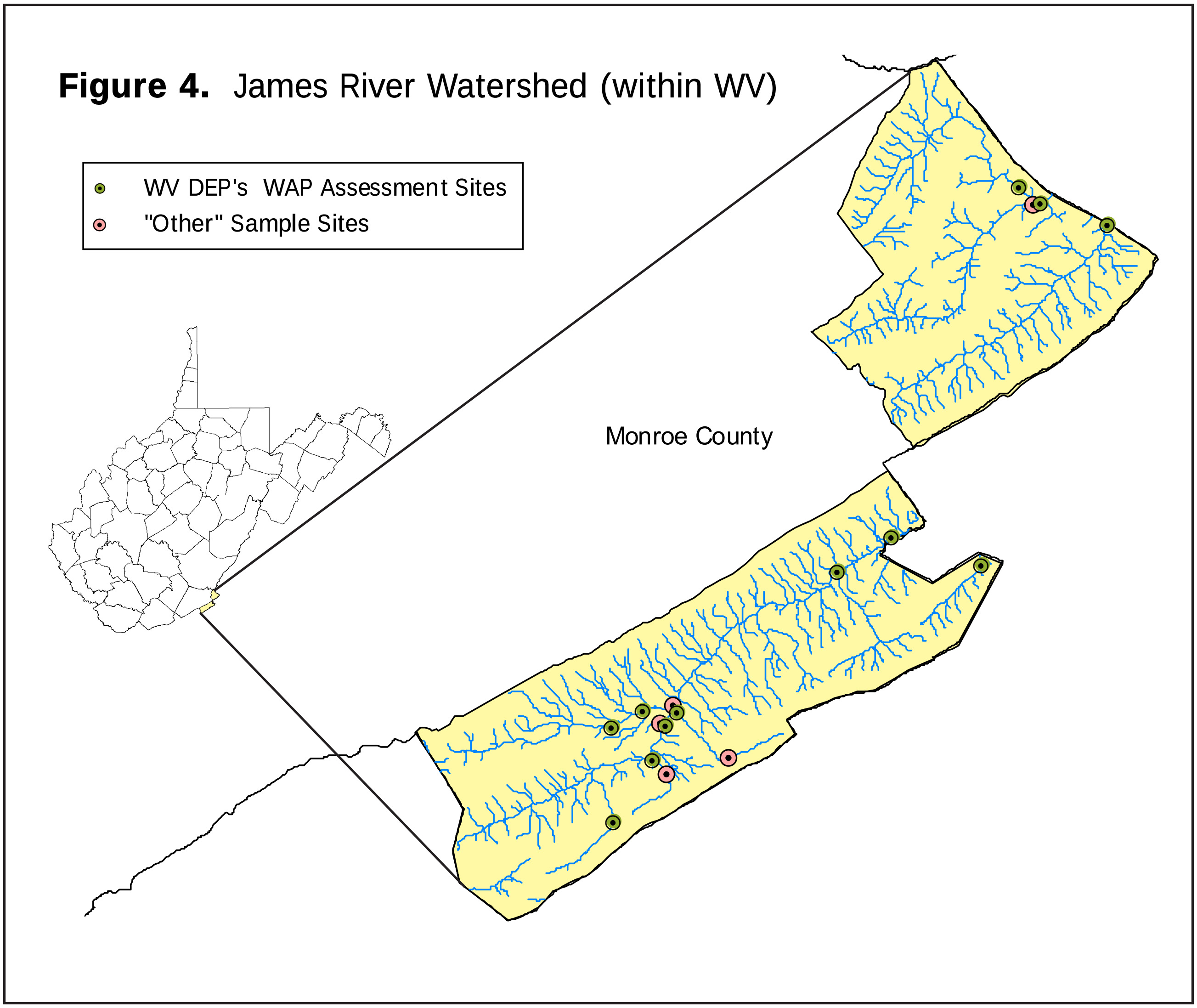
Four sub-ecoregions are present within the James River watershed. The portion of the watershed in Monroe County is divided into the Southern Limestone, Dolomite Valleys and Low Rolling Hills (67f), the Southern Shale Valleys (67g), and the Southern Sandstone Ridges (67h). The Southern Sandstone Ridges sub-ecoregion contains all of the watersheds ridges with the valleys to the north belonging to the Southern Limestone, Dolomite Valleys and those to the south belonging within the Southern Shale Valleys. The small area of the watershed within Pendleton County is part of sub-ecoregion 67c, Northern Sandstone Ridges.

Land use in this small, remote area is primarily forestland. Waiteville, Laurel Branch, and Sweet Springs, are the only communities inside the James River watershed.

Potts Creek is home to the only federally endangered slope mussel in West Virginia, the James Spinymussel (*Pleurobema collina*). This species inhabits the upper James River basin in Virginia and West Virginia.

Water Quality Summary

During this reporting period, 11 stream segments totaling 57.3 miles were assessed in the



James River watershed. Figure 4 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in Figure 5a.

Of the 57.3 stream miles assessed, 25.3 (44.2%) were fully supporting all assessed uses, 28.7 (50.1%) were fully supporting all uses but threatened for at least one, and 3.3 (5.7%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 57.3 miles assessed for the aquatic life support use, 27.1 (47.3%) were fully supporting, 26.9 (46.9%) were fully supporting but threatened, and 3.3 (5.8%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

James River Watershed

Figure 5a. Summary of Individual Use Support

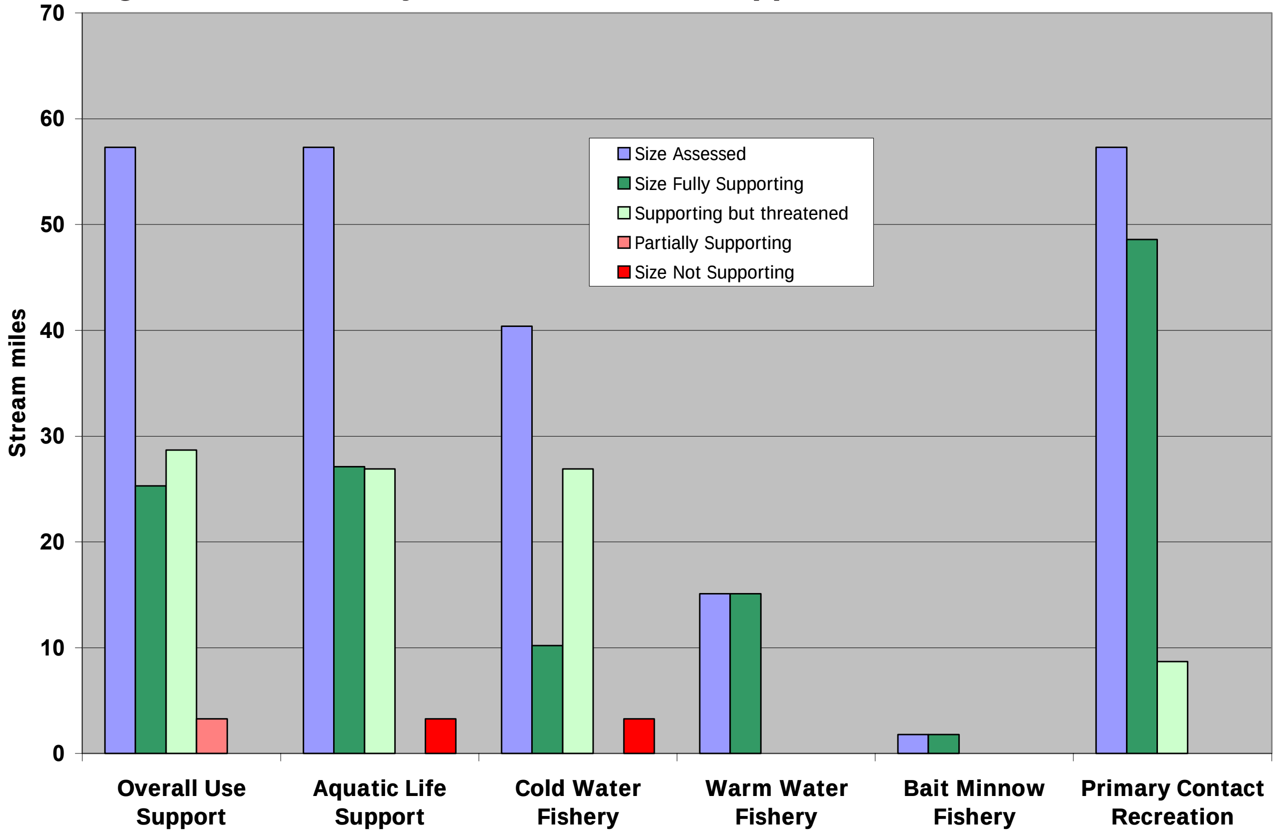


Figure 5b. Summary of Impairment Causes

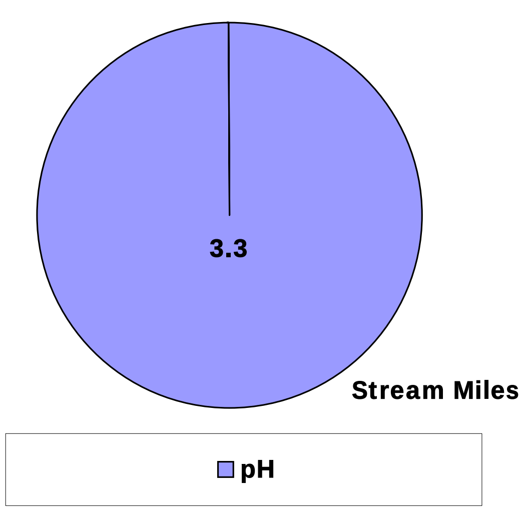
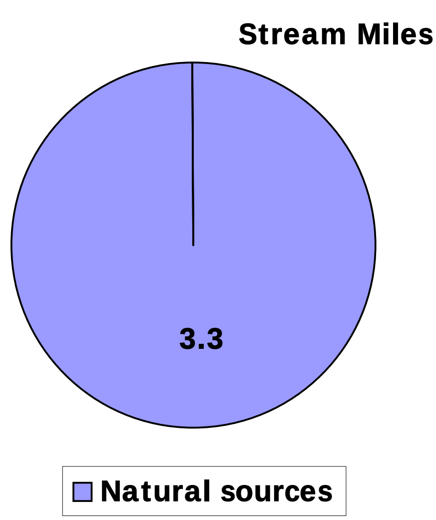


Figure 5c. Summary of Impairment Sources



Attainability of the swimmable goal of the CWA is determined by assessing the primary contact recreation use. Of the 57.3 miles assessed for the primary contact recreation use, 48.6 (84.8%) were fully supporting, and 8.7 (15.2%) were fully supporting but threatened.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the James River watershed is provided in figure 5b. The ony principal cause of impairment listed is pH (3.3 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the James River watershed is provided in figure 5c. The only known source of pollution listed is natural sources (3.3 miles).

Public Health/Aquatic Life Impacts

During this reporting period, no bathing beach or public water supply closures were documented in the watershed. In addition, no fish consumption advisories are in effect.

Section 303(d) Waters

There are no streams in the James River watershed on the 2002 303(d) list.The information used to complete this section was taken from the following sources:

Information Sources

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/mussel2.htm

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia*. Corvallis, OR. U.S. Environmental Protection Agency.

The Little Kanawha River Watershed

Background

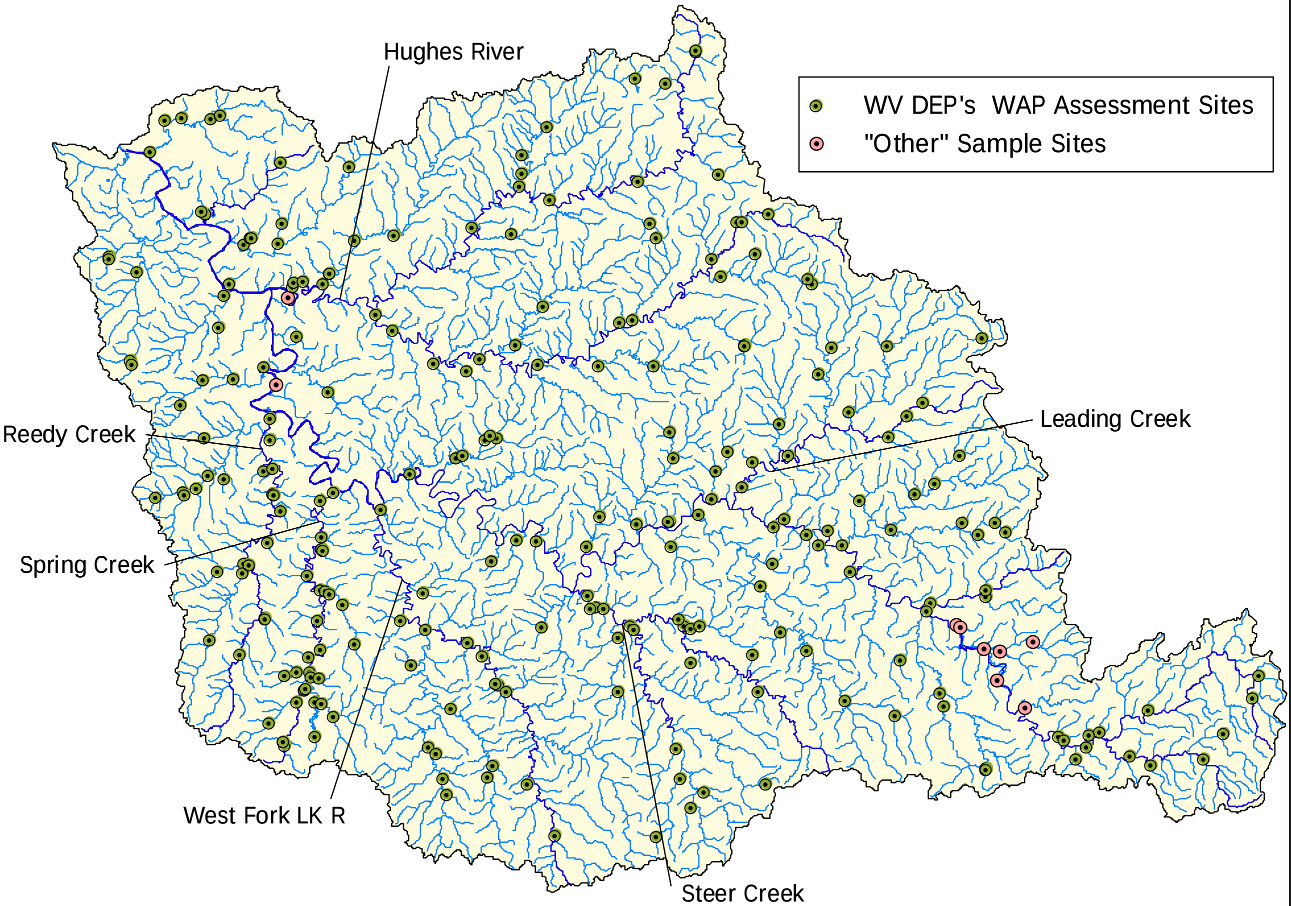
The Little Kanawha River watershed (HUC # 05030203) is located in the northern portion of central West Virginia between the Middle Ohio North and Middle Ohio South watersheds. The watershed drains 2,307 square miles in three entire counties and parts of nine others. The watershed includes all of Calhoun, Gilmer, and Ritchie counties and portions of Wirt (99%), Wood (54%), Braxton (53%), Roane (50%), Lewis (38%), Doddridge (20%), Upshur (17%), Webster (3%), and Clay (1%).

The Little Kanawha River flows generally northwest to its confluence with the Ohio River in Parkersburg, covering a distance of approximately 169 miles. A main tributary of the Little Kanawha, the Hughes River, enters at the town of Greencastle in Wirt County. The elevation of the Little Kanawha River ranges from 2,390 feet in the headwaters in Upshur County, to 624 feet at its mouth in Parkersburg. The average rate of fall from the river's source to Burnsville (120 miles upstream of Parkersburg, elevation 750 feet) is 33.8 feet per mile with the remaining 120 miles falling at 1.3 feet per mile. The upstream rugged headwaters meeting the terraces and lowlands characteristic of the lower reaches of the river is illustrated by the extreme differences in rates of fall.

Two ecoregions are represented in the Little Kanawha River watershed. Almost the entire area is Western Allegheny Plateau (70), with a small area in the southeastern tip of the watershed being in the Central Appalachian Ecoregion, (69). The Western Allegheny Plateau is typified by steep hills, narrow ravines and dissected ridges. Rail and vehicular roads follow the meandering streams on the level land of the narrow stream flood plains. The Central Appalachian ecoregion is a deeply dissected plateau terminated by a high escarpment to the east. The northwestern half of the watershed is located within the Permian Hills (70a) Sub-ecoregion. This region has few flat areas and is generally cooler, more forested and rugged than the Monongahela Transition Zone Sub-ecoregion (70b). Forests are common and most of the region is too steep for farming, though there are some farms on ridges and pastures on the hillsides. The Forested Hills and Mountains Sub-ecoregion (70b), covers the southeastern half of the Little Kanawha River watershed. This part of the watershed is locally predominated by urban and industrial activity crowded into the narrow river valleys that serve as transportation corridors. Bituminous coal mining is common and some oil production occurs as well as some general farming. Sub-ecoregion 69a, which is present only in the southeastern tip of the watershed, is composed of extensively forested, highly dissected, steep-sided hills, mountains, and ridges with narrow valleys.

Generally, alternating beds of sandstone and shale characterize the geology of the watershed. Extensive unconsolidated alluvial deposits occur along the lower part of the Little Kanawha River in

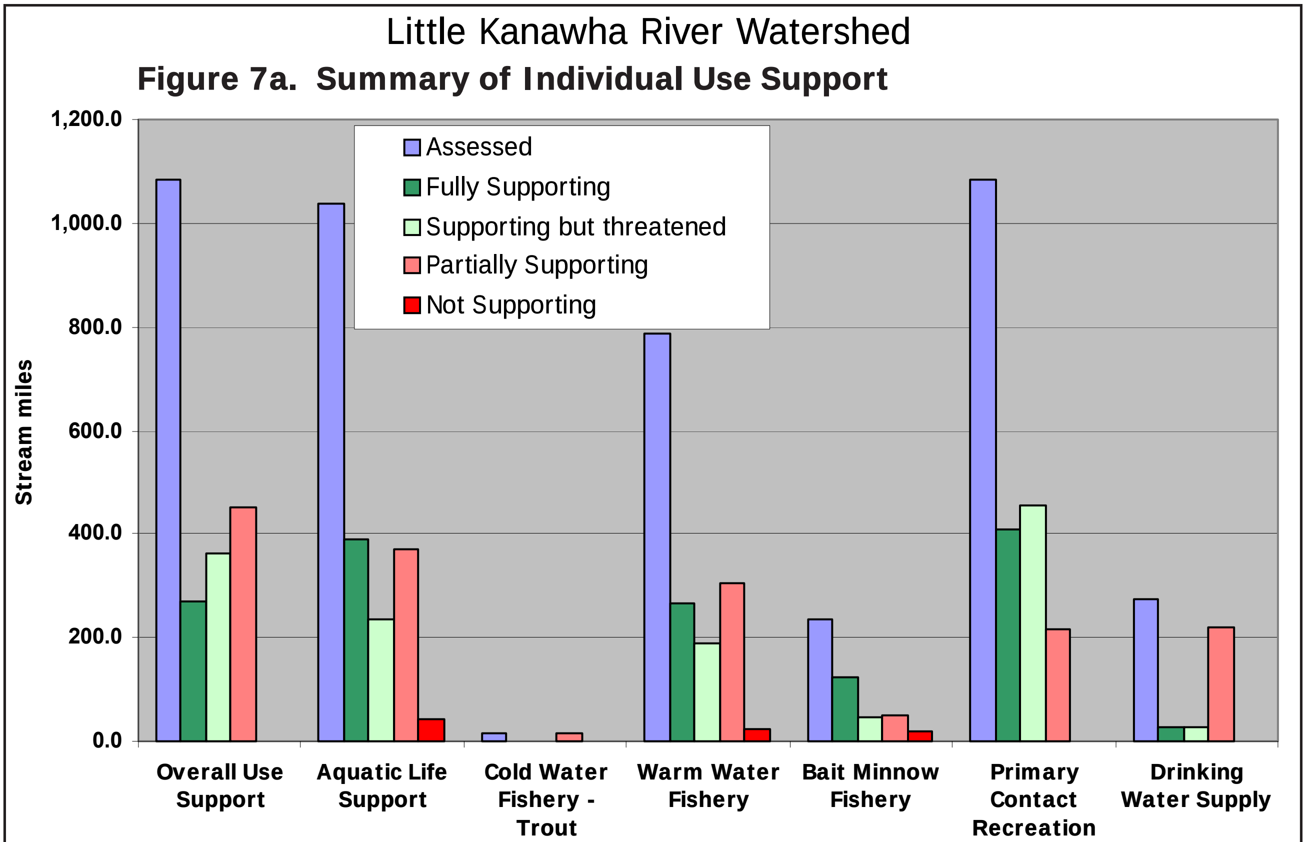
Figure 6. Little Kanawha River Watershed - Showing Sample Sites



Wood and Wirt counties and along the Ohio River. The western portion is underlain by clay shales giving a high portion of red clay soils. Steep slopes and clayey soil properties have severely limited land use in the upland areas of the watershed.

People were attracted to the Little Kanawha River area in the latter half of the 19^{th} Century by the rich deposits of oil and gas. Oil was first discovered in West Virginia in 1843 at Burning Springs, and there are claims that the first well was drilled there in 1860. Oil and gas are still important to the economy, mainly in the form of royalties. Coal underlies 60% of the watershed's area and is its most valuable mineral resource, although most of the increased economic activity of the mineral industry has been due to the expansion of oil and gas production. Coal is currently mined in Gilmer, Lewis, and Braxton counties, with the vast majority coming from underground operations in Braxton County. Difficulties associated with mining the coal seams has hindered maximum development of the coal reserves, however, it is probable that more seams will be mined as innovations in extraction occur.

The main pollution sources arise from lack of sewage treatment facilities and sewerage



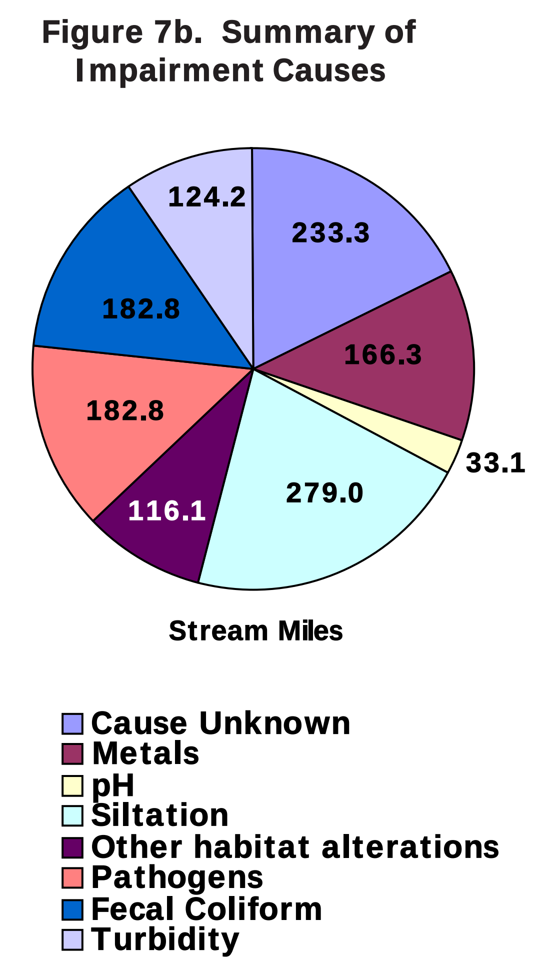


Figure 7c. Summary of Impairment Sources

Source Category	Stream Miles
Agriculture	155.63
Crop-related Sources	124.2
Nonirrigated Crop Production	124.2
Grazing related Sources	137.12
Pasture grazing - Riparian and/or Upland	137.12
Silviculture	124.2
Logging Road Construction/Maintenance	124.2
Construction	124.2
Land Development	124.2
Resource Extraction	131.37
Petroleum Activities	124.2
Acid Mine Drainage	3.69
Abandoned mining	3.48
Hydromodification	15.66
Channelization	10.17
Dredging	13.74
Atmospheric Deposition	6.92
Debris and bottom deposits	1.92
Source Unknown	307.77

systems associated with the small towns along the streams, and the discharge of mine water from various abandoned underground and surface mines. Sedimentation from agriculture, silviculture, oil and gas drilling and associated roads have been identified as the main cause of widespread water quality violations of the iron and aluminum criteria. A TMDL completed for the watershed called for a 99 percent reduction in sediment from these sources.

A federally endangered mussel, the Clubshell (*Pleurobema clava*) inhabits the Little Kanawha River in Calhoun County. Because mussels are sedentary filter feeders, they are very susceptible to changes in water quality. Dams, levies, channelization, and dredging have severely limited the habitat available for many species of freshwater mussels. Siltation from these practices, as well as construction and drilling, can harm food sources, host fish, or smother the mussels. Also, as long-lived filter feeders, mussels are vulnerable to toxins in the water, which accumulate in their system over time.

Water Quality Summary

During this reporting period, 221 stream segments totaling 1,082.99 miles were assessed in the Little Kanawha River watershed. Figure 6 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 7a.

Of the 1,082.99 stream miles assessed, 271.99 (25.1%) were fully supporting all assessed uses, 358.36 (33.1%) were fully supporting all uses but threatened for at least one, and 452.64 (41.8%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 1,037.29 miles assessed for the aquatic life support use, 390.15 (37.6%) were fully supporting, 234.80 (22.6%) were fully supporting but threatened, 371.16 (35.8%) were partially supporting, and 41.18 (4%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the CWA is determined by assessing the primary contact recreation use. Of the 1,037.29 miles assessed for the primary contact recreation use, 410.93 (37.9%) were fully supporting, 455.89 (42.1%) were fully supporting but threatened, and 216.17 (20%) were partially supporting.

Public Health/Aquatic life Impacts

During this reporting period, no bathing beach or public water supply closures were documented in the watershed, and no fish consumption advisories are currently in affect.

Section 303(d) Waters

Appendix B includes streams from the Little Kanawha River watershed that are on the current 303(d) list. Eleven streams are on the list totaling 251 miles. Nine waterbodies in the watershed have had TMDLs developed.

Information Sources

West Virginia Department of Natural Resources, Division of Water Resources. 1974. *Comprehensive Survey of the Little Kanawha River Basin, Volume I - Inventory*. Charleston, WV: (pp. 1-34)

West Virginia Department of Natural Resources, Division of Water Resources. 1982. *Little Kanawha River Basin Plan*. Charleston, WV: (pp. 31-40)

West Virginia Division of Natural Resources. Retrieved 22 October 2001. *West Virginia Wildlife-Endangered Species*. http://www.dnr.state.wv.us/wvwildlife/mussel2.htm

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia*. Corvallis, OR. U.S. Environmental Protection Agency.

The Lower New River Watershed

Background

The Lower New River watershed (HUC # 05050004) is located in southern West Virginia, bordered by the upper Guyandotte River, Coal River, and upper Kanawha River watersheds to the west, Gauley River watershed to the north and east, and the Greenbrier River and upper New River watersheds to the south. Its mouth is located at the town of Gauley Bridge where, after mixing with the Gauley River, the two form the Kanawha River. The New River originates in the Blue Ridge Mountains of North Carolina at an approximate elevation of 3,800 feet and travels 163 miles to West Virginia, where it enters near the common border of Mercer, Monroe, and Summers counties. The Lower New River watershed begins after the Greenbrier River and New River converge at the town of Hinton. Beckley, Oak Hill, and Fayetteville are the largest communities in the watershed.

The Lower New River watershed occupies 687 square miles in parts of Fayette, Raleigh and Summers counties. The river flows north approximately 67 miles from the beginning of the Lower New watershed near Hinton to its confluence with the Gauley at Gauley Bridge. The elevation varies from 1381 feet at Hinton to 672 feet at the junction with the Gauley, giving an average rate of fall of 11 feet per mile.

The Lower New River watershed is located in the Central Appalachian ecoregion (69). The Central Appalachian ecoregion consists of an elevated plateau of high hills, open valleys, and low mountains with sandstone, siltstone, shale geology, and coal deposits. Land use activities are generally forestry and recreation related, with areas of coal and gas extraction. Virtually the entire watershed is located within sub-ecoregion 69a, Forested Hills and Mountains. This sub-ecoregion includes the most rugged portion of ecoregion 69 and is extensively forested.

High quality coal is the most valuable mineral resource in the watershed. Extensive mineable coal beds are found in Fayette and Raleigh counties with small seams being present in Summers County. Coal mining in the watershed began in the 1880's and has been practiced extensively since the completion of the C&O and N&W Railroads. Natural gas is collected in Raleigh and Fayette counties. No significant oil drilling has occurred within the Lower New River watershed. Other minerals produced are limestone, sandstone, sand and gravel, clay and shale. The majority of the commercial quality forestland in the watershed is in Fayette County. Agricultural activity is primarily livestock and dairy production.

Several impoundments are present in the Lower New River watershed. The lakes range in purpose from recreation and water supply to flood control. A dam used for power production is present at Hawk's Nest.

The Lower New River Basin offers many recreational opportunities to the public. A notable recreational area within the basin is the New River Gorge. The Gorge reaches from Hinton to near Fayetteville and is designated a national river, which places it under management of the National Park Service.

Due to inadequate wastewater treatment and sewage facilities, stream fecal coliform counts have been high. Inadequate reclamation of underground and surface mining has caused acid mine drainage problems. Sedimentation from construction, mining, and farming practices has caused continuous pollution of the watershed.

Permanent settlement of the basin began in the early 1760s by Scotch-Irish pioneers. Much of the activity carried out by the settlers was done on small farms, although there was some trapping of valuable fur animals in the area. Some coal was mined, but on a small scale due to lack of good transportation.

In 1873, the coming of the Chesapeake and Ohio Railroad transformed the simple rural society of small farmers into a coal mining society. Huge deposits of bituminous coal were extracted on a large commercial scale to feed the steel mills and other large industries in other parts of the nation. More people came to the basin and many of the farmers inside the basin sold their lands to work in the mines. Today, the coal mining industry still dominates the New River Basin.

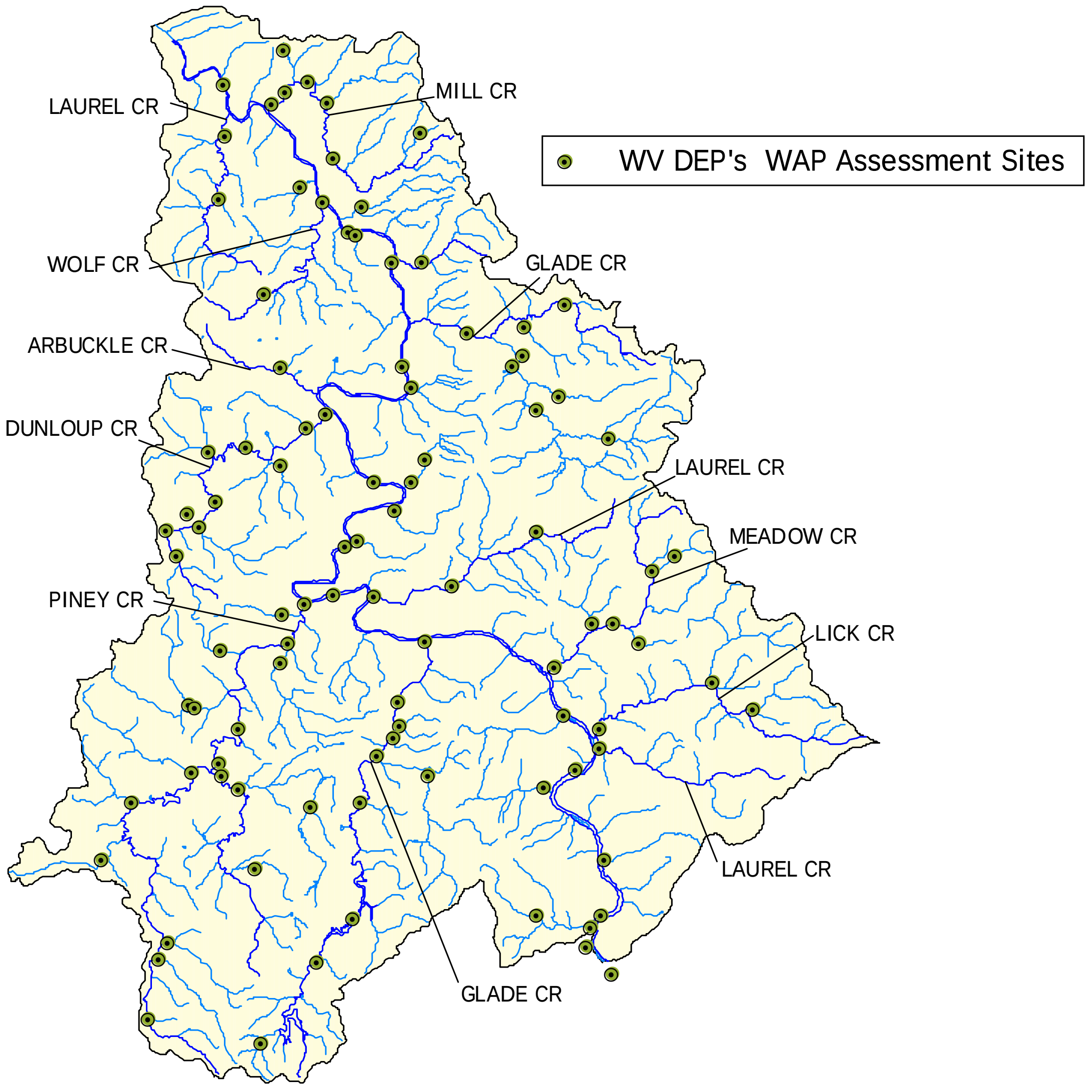
Water Quality Summary

During this reporting period, 67 stream segments totaling 406.02 miles were assessed in the Lower New River watershed. Figure 8 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. A n individual use support summary is given in Figure 9a.

Of the 406.02 stream miles assessed, 96.1 (23.7%) were fully supporting all assessed uses, 122.1 (30.1%) were fully supporting all uses but threatened for at least one, and 187.82 (46.2%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 402.62 miles assessed for the aquatic life support use, 146.7 (36.1%) were fully supporting, 140.9 (34.6%) were fully supporting but threatened, 75.72 (18.6%) were partially supporting, and 39.3 (9.7%) were not supporting. No streams in the watershed were assessed for the fish consumption during this reporting period.

Figure 8. Lower New River Watershed



Attainability of the swimmable goal of the CWA is determined by assessing the primary contact recreation use. Of the 406.02 miles assessed for the primary contact recreation use, 143.2 (35.3%) were fully supporting, 139 (34.2%) were fully supporting but threatened, 105.82 (26.1%) were partially supporting, and 18 (4.4%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Lower New River watershed is provided in figure 9b. The principal causes of impairment are fecal coliform (101.6 miles), unknown cause (81.1) miles, and metals (35.6 miles).

Lower New River Watershed

Figure 9a. Summary of Individual Use Support

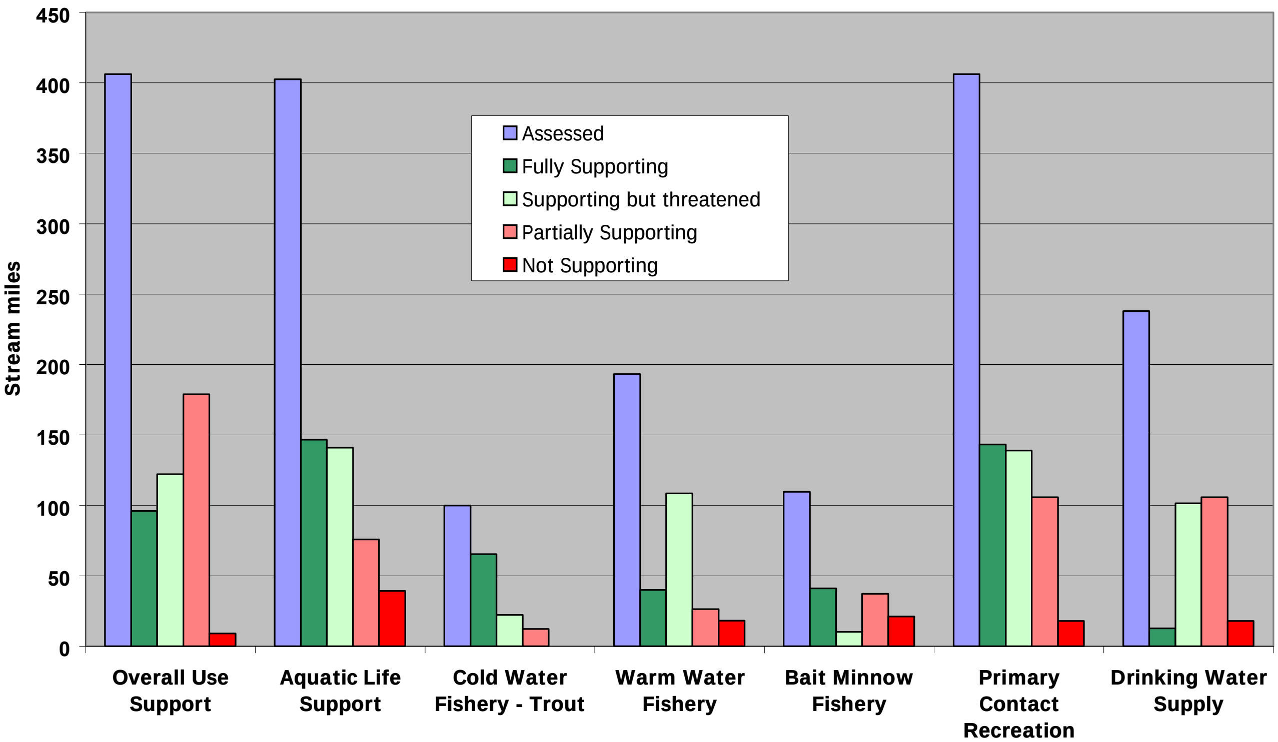


Figure 9b. Summary of Impairment Causes

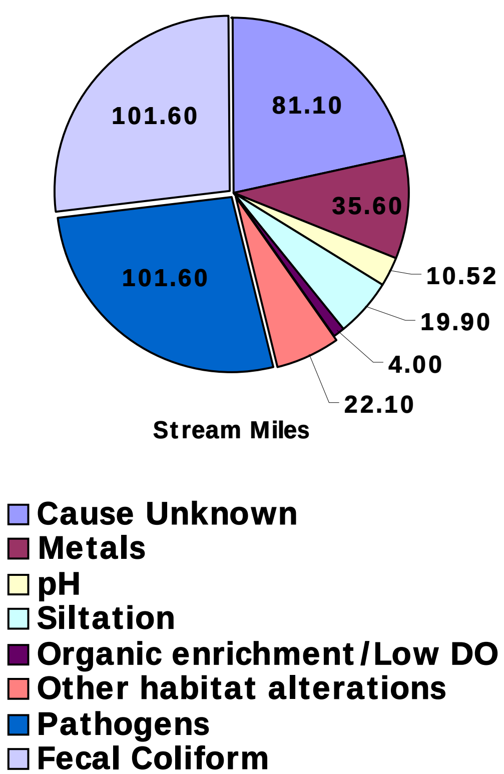


Figure 9c. Summary of Impairment Sources

Source Category	Stream Miles
Industrial Point Sources	6.20
Municipal Point Sources	9.00
Combined Sewer Overflow	10.20
Construction	6.20
Urban Runoff/Storm Sewers	10.20
Resource Extraction	36.90
Acid Mine Drainage	12.80
Abandoned mining	24.10
Land Disposal	10.80
Onsite Wastewater Systems (Septic Tanks)	6.20
Hydromodification	4.00
Source Unknown	160.12

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Lower New River watershed is provided in figure 9c . The principal sources of pollution are unknown source (160.12 miles), and abandoned mining (24.1 miles).

Public Health/Aquatic life Impacts

During this reporting period, no bathing beach or public water supply closures were documented in the watershed, and no fish consumption advisories are currently in effect.

Section 303(d) Waters

Appendix B includes streams from the Lower New River watershed that are on the current 303(d) list. Twenty-seven streams totaling 128 miles are on the list. Dunloup Creek and Mill Ck have had completed TMDLs in the last year.

Information Sources

West Virginia Department of Natural Resources, Division of Water Resources. 1976. *Comprehensive Survey of the New River Basin, Volume I - Inventory*. Charleston, WV: (pp. 1-21)

West Virginia Department of Natural Resources, Division of Water Resources. 1983. *New River Basin Plan*. Charleston, WV: (pp. 24-36)

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia*. Corvallis, OR. U.S. Environmental Protection Agency.

Background

The Monongahela River watershed (HUC 05020003) is located in north-central West Virginia and lies in the Appalachian Plateau physiogeographic province. The basin is quite large and drains over 400 square miles of mostly forested land. The low rolling mountains of the Appalachian Plateau serves as the hydrologic boundaries for the southern and eastern portions of the watershed; whereas, the relatively high topographic relief found in the Allegheny Mountains region provides the eastern hydrologic border. The Monongahela River watershed is bordered by six additional watersheds—the Cheat River watershed (east), the Tygart Valley River watershed (south), the West Fork River watershed (south), the Middle Ohio River North watershed (west), the Upper Ohio River South watershed (northwest), and the Dunkard Creek watershed (north).

The Monongahela River flows 128 miles from its source at Fairmont, West Virginia to the mouth at Pittsburgh, Pennsylvania. However, only 37 miles of its total length are located within West Virginia. The river drains Monongalia, Marion, Preston, Harrison, Taylor, Barbour, and Tucker counties and most of Upshur, Randolph, and Lewis counties and a small part of Pocahontas County. Yet, the majority of this drainage is contributed via the Cheat River, which occupies a separate watershed designation. It is estimated that 40% of the Monongahela's total flow at Point Marion, Pennsylvania actually originates from the Cheat River system. There are seven principal tributaries of the Monongahela, which have a drainage area of at least 200 square miles: the Tygart Valley River (1,366 mi^2), the West Fork River (759 mi^2), the Cheat River (1,380 mi^2), the Dry Fork River (345 mi^2), the Shavers Fork River (214 mi^2) the Buckhannon River (277 mi^2), and Big Sandy Creek (200 mi^2).

Land use within the watershed is almost evenly bifurcated—forested areas represent approximately one-half of total drainage area while a combination of agricultural, residential/urban, and industrial (including timber) land uses are found across the remaining landscape. Much of the land in this region is also occupied mining activities with Monongalia and Marion counties producing millions of net tons of bituminous coal each year. Although coal is the chief mineral product in the watershed, there is also an abundance of limestone and some oil and natural gas fields.

The soils in the watershed are largely varied with the topography; furthermore, the topography of the watershed ranges from nearly flat to rolling hills to gaps with a relief in excess of 1,300 feet. Generally, the soils consist of shale, siltstone, and sandstone of the Conemaugh Group. This includes soils that are frigid and mesic Ultisols and Inceptisols that are acidic, steep, often stony, and infertile. Other soils, prevailing in mostly low-lying areas with rolling hills, are Alfisols, Ultisols, and Inceptisols of varying base saturations. The soils in the watershed facilitate the growth of mixed mesophyitc and mixed oak forests; however, they are also conducive to agricultural development. Much of the forested area not disrupted by surface mining or residential/urban activities has been formerly grazed or cultivated. These areas are extremely susceptible to erosion, for the hillsides are often steep-sloped and the upland topsoil is thin or absent. The land's surface may also be impacted by oil and gas production/extraction; however, wells are relatively sporadic and quite dependent on underlying geological features.

The Monongahela River watershed is dissected into several EPA (Level III & IV) designated ecoregions, which includes sub-ecoregion classification. These ecoregions—69a, 69b, 70a, 70b, and 70c—are so designated as a result of the distinct ecological conditions that prevail within their coverage area. Ecoregion 69a, the Forested Hills, occupies the highest and most rugged parts of Ecoregion 69, the Central Appalachians. Its highly dissected hills, mountains, steep-sided ridges, and narrow valleys characterize the region. Ecoregion 69b, Uplands and Valleys of Mixed Land Use, is a dissected upland plateau characterized by a mosaic of woodland and agriculture. Ecoregion 70 is referred to as the Western Allegheny Plateau and is represented by hilly, wooded terrain; whereas, Ecoregion 70a, the Permian Hills, differs slightly in that the terrain is typically more rugged and cool with fewer flat areas. Ecoregion 70b, the Monongahela Transition Zone, is generally less dissected, less closed, more rounded, and less rugged than Ecoregion 70a. Lastly, Ecoregion 70c, the Pittsburgh Low Plateau, is unglaciated and has rounded hills, narrow valleys, fluvial terraces, entrenched rivers, general farming, landslides, and bituminous coal mining.

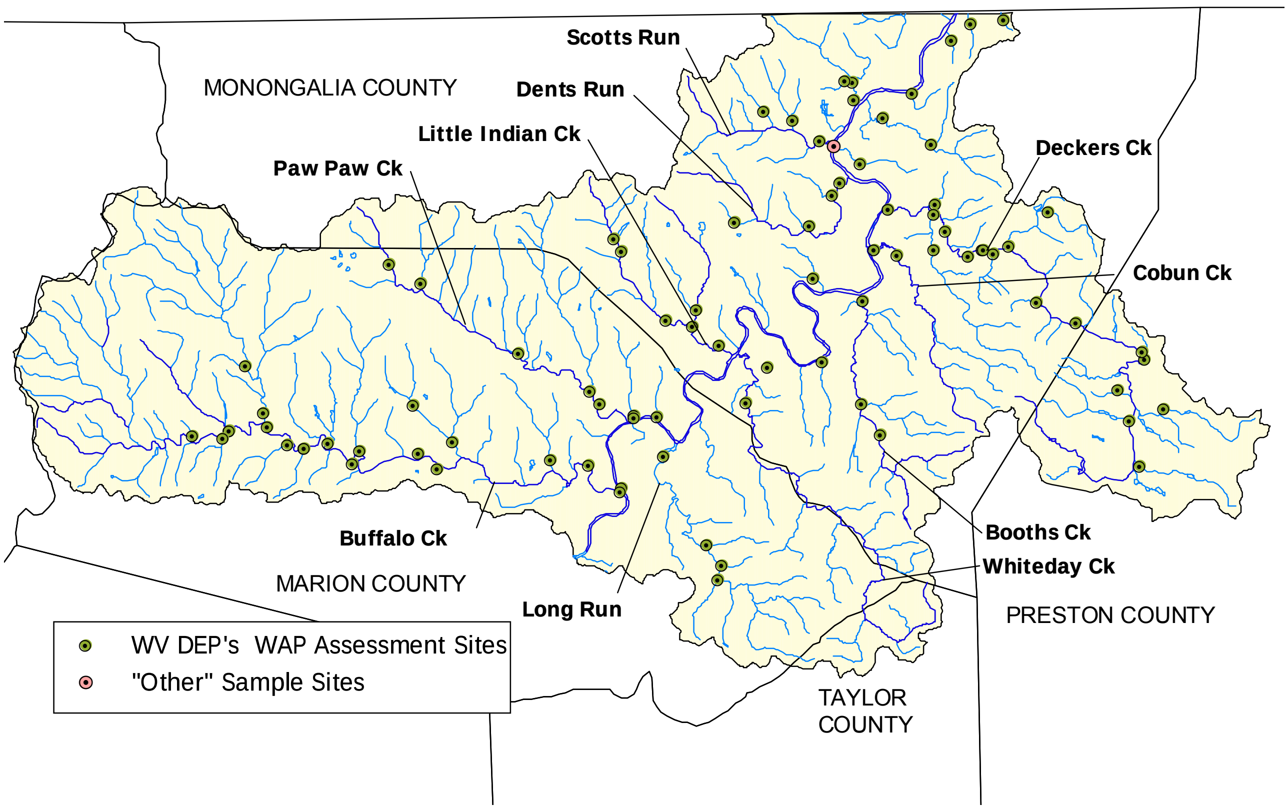
Pollution from varying sources also impacts the Monongahela River watershed. Although much of the water quality degradation is a result of coal mining and related activities, non-point pollution via agricultural and urban runoff is also a concern. The installation of new sewage treatment facilities and home septic systems as well as the repair of failed systems has aided in the reduction of residential pollution—primarily untreated sewage—but it is likely that this problem still persists.

Water Quality Summary

During this reporting period, 81 stream segments totaling 415.15 miles were assessed in the Monongahela River watershed. Figure 10 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 11a .

Of the 415.15 stream miles assessed, 35.6 (8.6%) were fully supporting all assessed uses, 22.63 (5.4%) were fully supporting all uses but threatened for at least one, and 356.92 (86%) were impaired for one or more uses.

Figure 10. Monongahela River Watershed



Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 415.15 miles assessed for the aquatic life support use, 44.3 (10.6%) were fully supporting, 13.93 (3.4%) were fully supporting but threatened, 221.6 (53.4%) were partially supporting, and 135.32 (32.6%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 415.15 miles assessed for the primary contact recreation use, 66.93 (16.1%) were fully supporting, 68.4 (16.5%) were fully supporting but threatened, 100.1 (24.1%) were partially supporting, and 179.72 (43.3%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Monongahela River watershed is provided in 11b The principal causes of impairment are metals (246.72 miles), unknown cause (219.7 miles), and fecal coliform (140.5 miles).

Monongahela River Watershed

Figure 11a. Summary of Individual Use Support

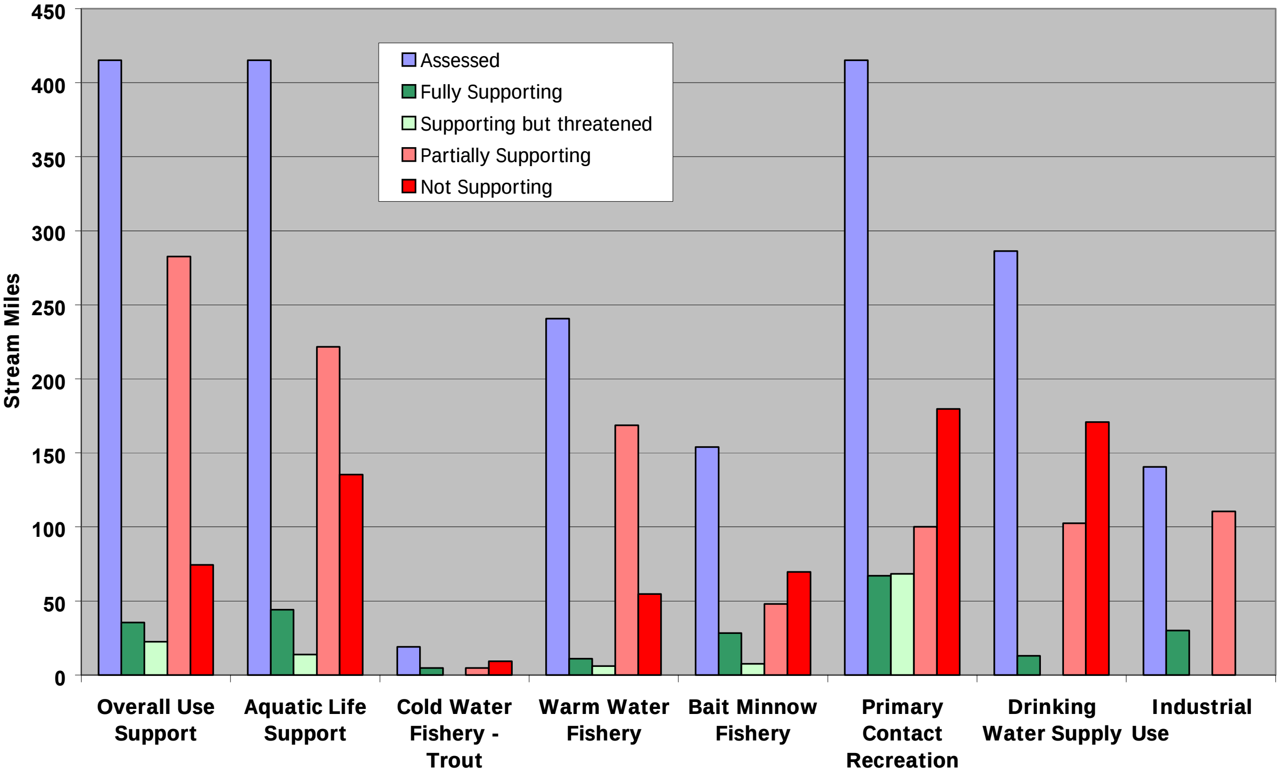


Figure 11b. Summary of Impairment Causes

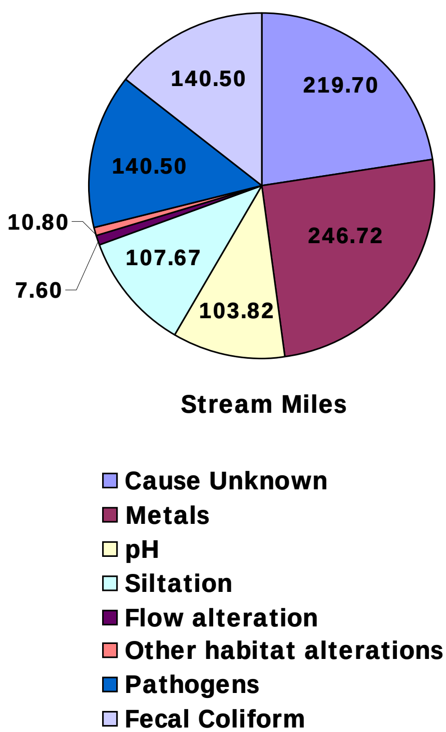


Figure 11c. Summary of Impairment Sources

Source Category	Stream Miles
Industrial Point Sources	29.8
Minor Industrial Point Source	0.2
Municipal Point Sources	74.6
Combined Sewer Overflow	121.5
Collection System Failure	1.4
Agriculture	8.9
Grazing related Sources	6.4
Pasture grazing - Riparian	6.4
Silviculture	73
Construction	11
Land Development	11
Urban Runoff/Storm Sewers	83.3
Other Urban Runoff	2.2
Highway/Road/Bridge Runoff	6
Resource Extraction	243.82
Surface Mining	4

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Monongahela River watershed is provided in figure 11c. The principal sources of pollution are abandoned mining (204.12 miles), unknown source (195.8 miles), combined sewer overflow (121.5 miles), and urban runoff/storm sewers (83.3 miles).

Public Health/Aquatic life Impacts

No fish consumption advisories are currently in effect for the Monongahela River watershed. During this reporting period, no bathing beach or public water supply closures were documented.

Section 303(d) Waters

Appendix B includes streams from the Monongahela River watershed that are on the current 303(d) list. Fifty streams totaling 254 miles are on the list. One stream in the watershed has had a TMDL completed.

Information Sources

Monongahela River Basin Plan. 1982. West Virginia Dept. of Natural Resources, Charleston, West Virginia.

Woods, A. J., J. M. Omernik, and D. D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia.* USEPA, Corvallis, Oregon.

The Upper New River Watershed

Background

The Upper New River watershed (HUC # 05050002) is located in southern West Virginia and is bordered by the Tug Fork and Upper Guyandotte River watersheds to the west, Lower New River watershed to the north, the Greenbrier and James River watersheds to the northeast and east, and the Commonwealth of Virginia to the south. Its downstream terminus is located at the town of Hinton after converging with the Greenbrier River, where the drainage basin becomes the Lower New River watershed. The New River originates in the Blue Ridge Mountains of North Carolina at an approximate elevation of 3,800 feet and travels 163 miles to West Virginia, where it enters near the common border of Mercer, Monroe, and Summers counties.

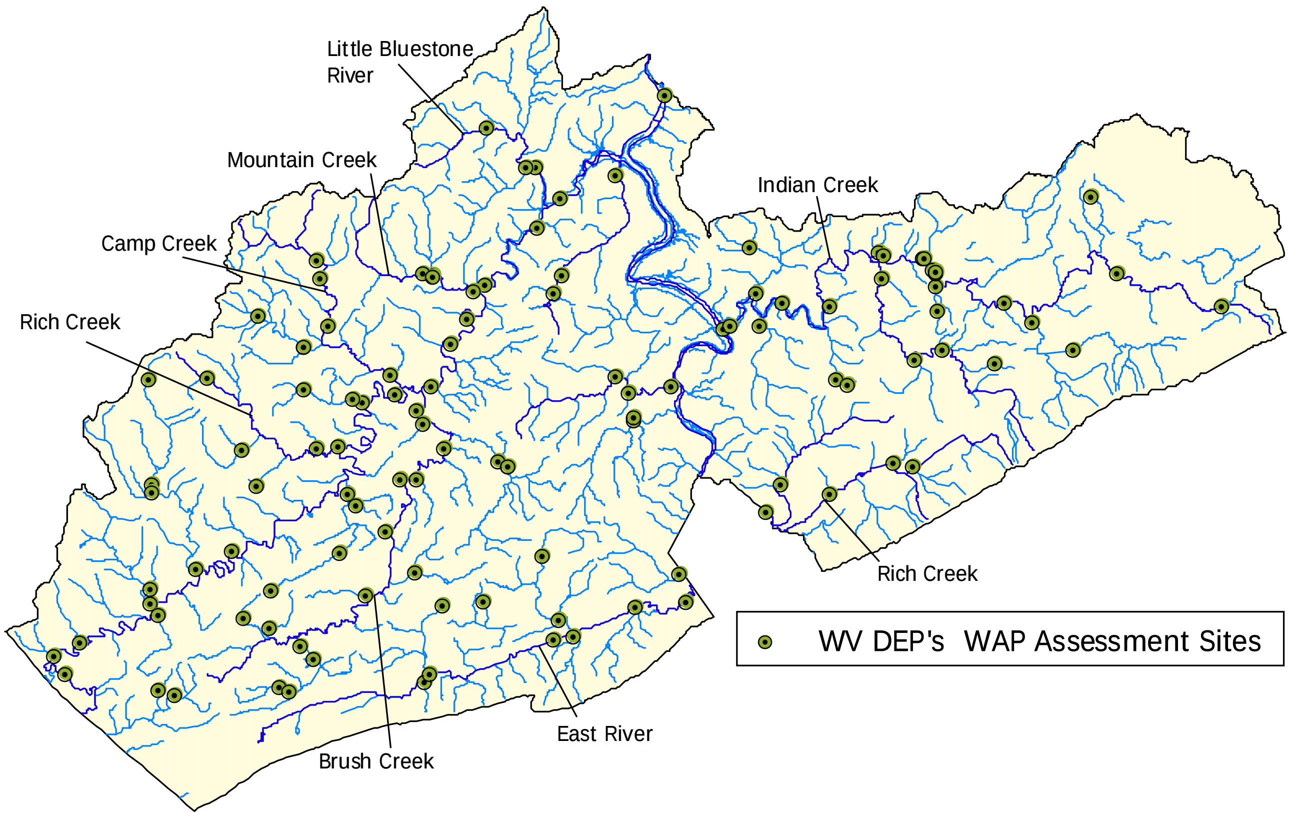
The Upper New River watershed occupies 799 square miles in Mercer County and parts of Monroe and Summers counties. The river flows north 26 miles from its entrance into West Virginia until meeting the Greenbrier River and entering the Lower New River watershed. The elevation varies from 1500 feet at the West Virginia/Virginia border to 1381 feet at the junction with the Lower New, giving an average rate of fall of five feet per mile. The largest subwatershed in the Upper New is that of the Bluestone River. This subwatershed drains 374 square miles in West Virginia as it extends northeast approximately 67 miles to join the New River at Bluestone State Park.

Two ecoregions make up the Upper New River watershed. Ecoregion 69, the Central Appalachian, makes up the majority with the southern edge of the watershed having a miniscule portion of the East River subwatershed in the Ridge and Valley Ecoregion (67). The Central Appalachian Ecoregion consists of an elevated plateau of high hills, open valleys, and low mountains with sandstone, siltstone, shale geology, and coal deposits. Land use activities are generally forestry and recreation related, with areas of coal and gas extraction.

Ecoregion 69 is divided into three sub-ecoregions within the Upper New River watershed. Most of the watershed lies within the Greenbrier Karst (69c) Sub-ecoregion. However, the northern tip is contained in the Forested Hills and Mountains (69a) and a small portion of northwestern Mercer County above Bluestone River lies within the Cumberland Mountains Sub-ecoregion (69d). Ecoregion 69a occupies the highest and most rugged portion of Ecoregion 69 and is extensively forested. Ecoregion 69c is rolling, agricultural lowland punctuated by isolated hills underlain by limestone. The Cumberland Mountains Sub-ecoregion (69d) is a strongly dissected region with narrow ridgetops, steep slopes, and extensive forests.

High quality coal is the most valuable mineral resource in the watershed. Extensive mineable coal beds are found in Mercer County, with small seams in Summers County. No known mineable beds exist in Monroe County. Coal mining in the watershed began in the 1880s and has been

Figure 12.
Upper New River Watershed



practiced extensively since the completion of the Chesapeake and Ohio and Norfolk and Western railroads. Small amounts of natural gas are collected in Mercer County, though no significant oil drilling has occurred within the Lower New River watershed. Other minerals produced are limestone, sandstone, sand and gravel, clay and shale. The majority of the agricultural activity in the watershed is in Monroe County, with the major products being livestock and dairy production. Rubber fabrication is a significant industry in Monroe County as well.

Eighteen impoundments are present in the Bluestone River subwatershed. The largest of these, the Bluestone Reservoir on the New River near Hinton, was created for flood control, recreation and low flow enhancement. The remaining lakes range in purpose from recreation and water supply to flood control. The largest recreational area in the Upper New River watershed is the Bluestone Public Hunting and Fishing Area, which surrounds Bluestone Lake. A 10 mile section of the Bluestone River is designated a National Scenic River and is under administration of the National Park Service. This preserved section flows through the Bluestone Gorge between Pipestem and Bluestone state parks.

Upper New River Watershed

Figure 13a. Summary of Individual Use Support

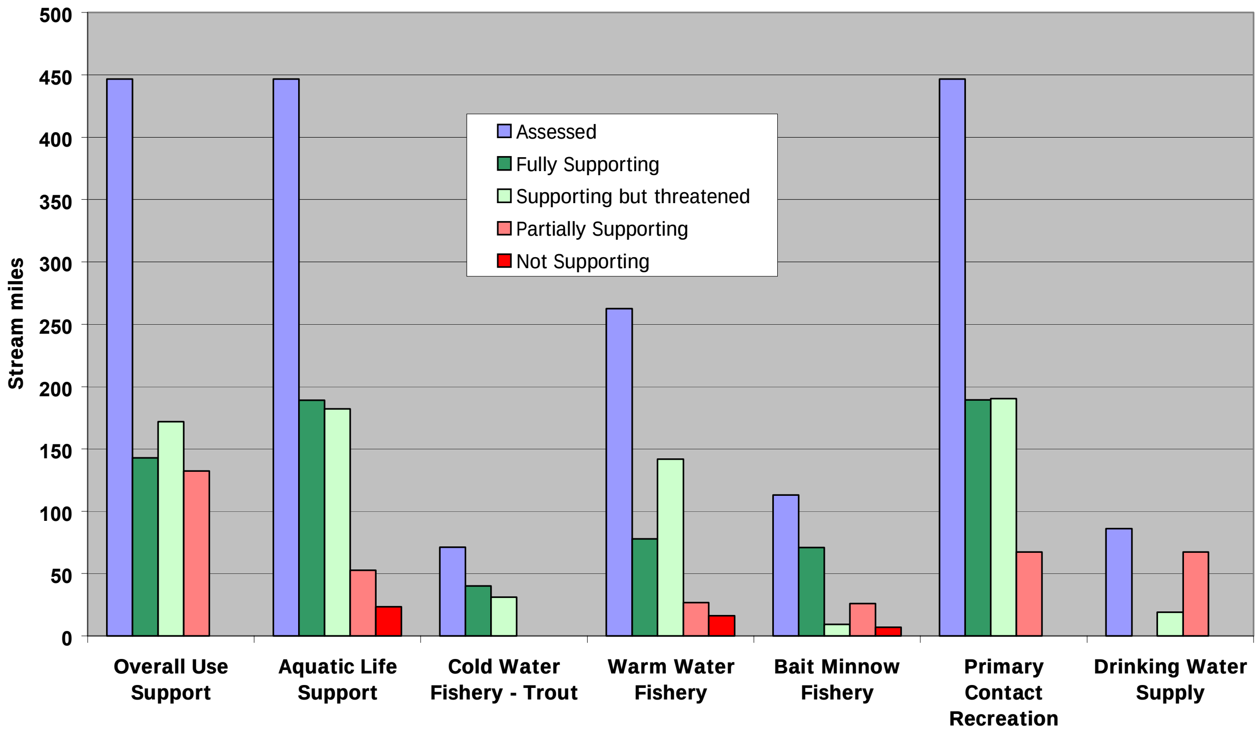


Figure 13b. Summary of Impairment Causes

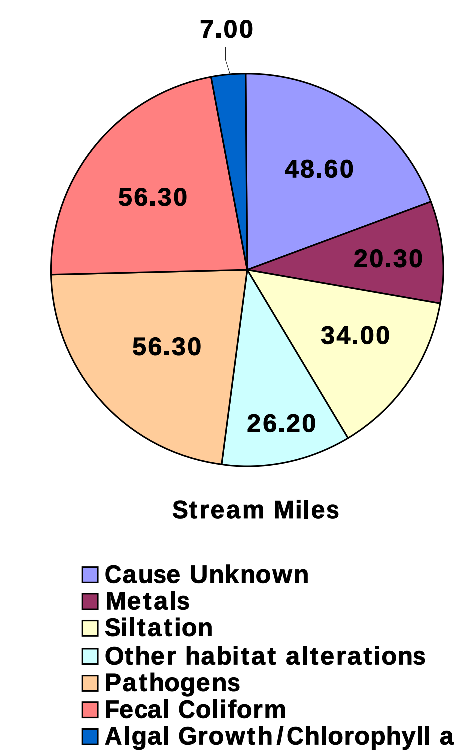


Figure 13c. Summary of Impairment Sources

Source Category	Stream Miles
Urban Runoff/Storm Sewers	7
Highway/Road/Bridge Runoff	7
Resource Extraction	28.5
Subsurface Mining	7.8
Mine Tailings	3
Abandoned mining	10.9
Land Disposal	6.8
Raw sewage	6.8
Hydromodification	10
Channelization	10
Dredging	7
Habitat Modification (other than Hydromodification)	10
Removal of Riparian Vegetation	7
Bank or Shoreline Modification/Destabilization	10
Highway Maintenance and Runoff	7

Due to inadequate wastewater treatment and sewage facilities, stream fecal coliform counts have been high. Inadequate reclamation of underground and surface mining has caused acid mine drainage problems. Sedimentation from construction, mining, and farming practices has caused continuous pollution of the watershed.

Permanent settlement of the basin began in the early 1760s by Scotch-Irish pioneers. Much of the activity carried out by the settlers was done on small farms, although there was some trapping of valuable fur animals in the area. Some coal was mined, but on a small scale due to lack of good transportation.

During the Civil War, the counties of Fayette, Mercer, Monroe, and Raleigh were separated from the Commonwealth of Virginia to form with other counties the new state of West Virginia. In 1873, the coming of the Chesapeake and Ohio Railroad transformed the simple rural society of small farmers into a coal mining society. Huge deposits of bituminous coal were extracted on a large commercial scale to feed the steel mills and other large industries in other parts of the nation. More people came to the basin and many of the farmers inside the basin sold their lands to work in the mines. Today, the coal mining industry still dominates the New River Basin.

Water Quality Summary

During this reporting period, 66 stream segments totaling 446.77 miles were assessed in the Upper New River watershed. Figure12 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 13a.

Of the 446.77 stream miles assessed, 142.80 (32.2%) were fully supporting all assessed uses, 171.77 (38.4%) were fully supporting all uses but threatened for at least one, and 132.2 (29.6%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 446.77 miles assessed for the aquatic life support use, 188.9 (42.3%) were fully supporting, 181.97 (40.7%) were fully supporting but threatened, 52.7 (11.8%) were partially supporting, and 23.2 (5.2%) were not supporting. No streams in the watershed were assessed for the fish consumption during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 446.77 miles assessed for the primary contact recreation use, 189.37 (42.4%) were fully supporting, 190.2 (42.6%) were fully supporting but threatened, and 67.2 (15%) were partially supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Upper New River watershed is provided in figure 13b. The principal causes of impairment are fecal coliform (56.3 miles), unknown cause (48.6 miles), and siltation (34 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Upper New River watershed is provided in figure 13c. The principal sources of pollution are unknown source (87.3 miles) and abandoned mining (10.9 miles).

Public Health/Aquatic life Impacts

No streams in the Upper New River watershed are currently under fish consumption advisory. In addition, no bathing beach or public water supply closures or fish kills were documented during this reporting period.

Section 303(d) Waters

Appendix B includes streams from the Upper New River watershed that are on the current 303(d) list. Ten streams totaling 132 miles are on the list. Currently, no 303(d) listed streams in the watershed have had TMDL's completed.

Information sources

Great Outdoors Recreation Page. Retrieved 12 November 2001. *Destinations-Bluestone National Scenic River*. http://www.gorp.com/gorp/resource/us_river/wv_blues.htm

West Virginia Department of Natural Resources, Division of Water Resources. 1976. *Comprehensive Survey of the New River Basin, Volume I - Inventory*. Charleston, WV: (pp. 1-21)

West Virginia Department of Natural Resources, Division of Water Resources. 1983. *New River Basin Plan*. Charleston, WV: (pp. 24-36)

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia*. Corvallis, OR. U.S. Environmental Protection Agency.

The Big Sandy River Watershed

Background

Arising from the confluence of the Tug Fork and Levisa Fork, the Big Sandy River originates in Fort Gay, in southwestern Wayne County, West Virginia. From here, the river flows 27 miles north forming the border between West Virginia and Kentucky before it empties into the Ohio River at Kenova, West Virginia. The Big Sandy basin (HUC # 05070204) drains 73 square miles in West Virginia; the elevation of the watershed decreases slightly from 597 feet at Fort Gay to 550 feet at Kenova.

Geologically, the Big Sandy River basin lies in the Cumberland Plateau, which consists mostly of sandstone. Less than half the area is made up of siltstone and shale with coal beds. The parent material, or underlying rocks that weather into soil, on steep slopes is mostly made up of coal-bearing sedimentary rocks, acid sandstone, siltstone and shale. In the valleys, limestone and dolomite form the majority of parent material along with pockets of sandstone and shale.

Kenova, with a population of approximately 3,485, is the largest city that lies in the Big Sandy basin. Other communities within the basin include the incorporated towns of Ceredo and Fort Gay, along with other unincorporated communities such as Prichard and Cyrus. According to the 1990 Census, the total population of Wayne County, which lies within the Big Sandy basin, is 11,658.

The majority of land within the basin is forested (95.6%). After that, croplands and pasture account for the second highest land use type at 3.54%. The remaining land use categories constitute less than 1% of the river basin. They are strip mines and reclaimed areas (0.77%), land for urban, industrial, and utility use (0.06%), and water (0.03%).

The West Virginia Department of Environmental Protection has 80 current permits issued in the Big Sandy River watershed. Five of these permits are for coal mining or coal mining related industries. The remaining 75 permits are NPDES or National Pollutant Discharge Elimination System permits, the majority of which are for individual home aeration units for septic systems. A few cover industrial discharges for such major companies as Ashland Chemical and Columbia Gas.

The Big Sandy River basin is rich in natural resources, including oil, natural gas, timber, water, and coal, which makes up the bulk of the economy in the Big Sandy basin. Coal has been mined in the region since the early 1800s and is known for its high Btu content and usefulness in metallurgy. Because of this, major steel companies invested heavily in the area from the early 1900s through the last 20 years. Currently, coal is primarily mined for energy production; the Kentucky Geologic Survey estimates that coal supplies in the area will last another 20-30 years. Coal production has obviously been a part of the Big Sandy basin for many years but the direct impact of coal on the Big Sandy River was reemphasized in October 2000 when a coal slurry impoundment breached and released 250 million gallons of water, mud, and coal waste into two tributaries of the Tug Fork. The slurry moved through the Tug and Big Sandy rivers, killing a large percentage of river life for more than 75 miles. Consequently, American Rivers named the Big Sandy River as the seventh most endangered river in the nation for 2001.

Water Quality Summary

During this reporting period, 38 stream segments totaling 90.4 miles were assessed in the Big Sandy River watershed. Figure 14 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 15a.

Of the 90.4 stream miles assessed, 20.45 (22.6%) were fully supporting all assessed uses, 54.6 (60.4%) were fully supporting all uses but threatened for at least one, and 15.35 (17%) were impaired for one or more uses.

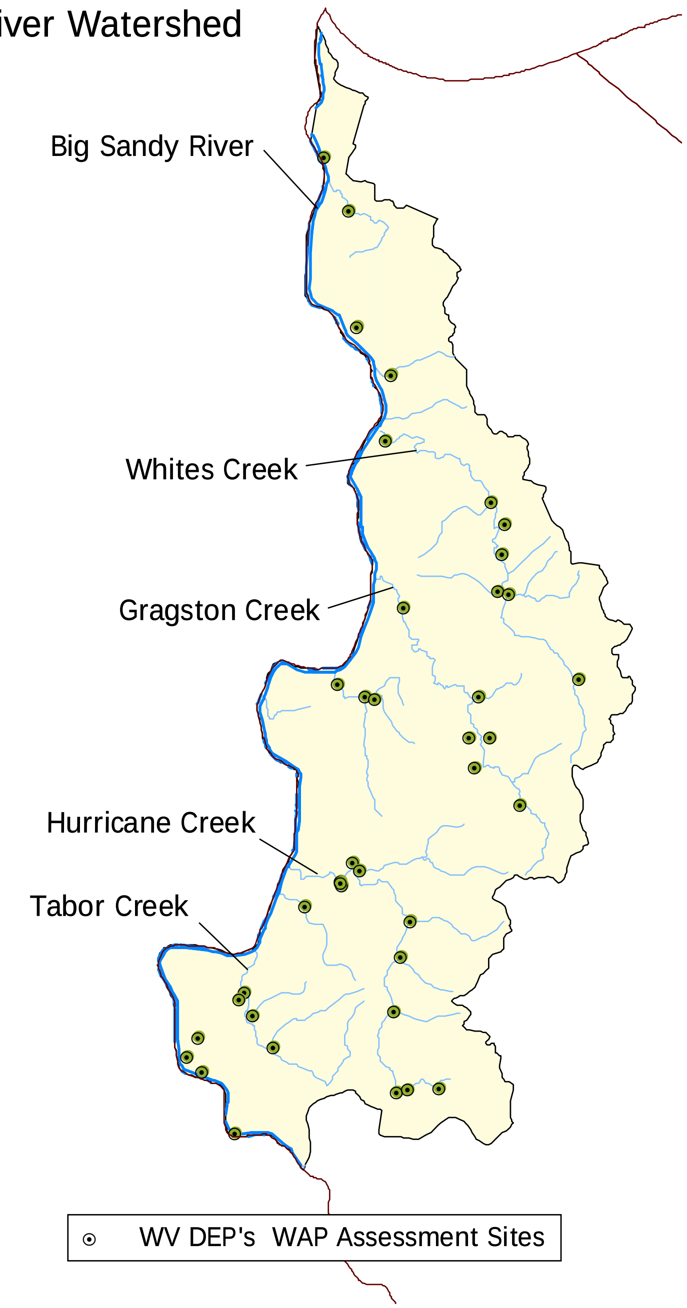
Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 90.4 miles assessed for the aquatic life support use, 41.3 (45.7%) were fully supporting, 33.75 (37.3%) were fully supporting but threatened, 2.65 (2.9%) were partially supporting, and 12.7 (14.1%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 90.4 miles assessed for the primary contact recreation use, 59.9 (66.3%) were fully supporting and 30.5 (33.7%) were fully supporting but threatened.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Big Sandy River watershed is provided in figure 15b. The principal causes of impairment in the watershed are unknown toxicity (8.8 miles) and siltation (8.15 miles).

Figure 14. Big Sandy River Watershed



Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Big Sandy River watershed is provided in figure 15c. The principal sources of pollution in the watershed are unknown source (15.35 miles) and hydromodification (1.6 miles).

Public Health/Aquatic life Impacts

No streams within the Big Sandy River watershed currently are under a fish consumption advisory. In addition, no bathing beach or water supply closures were documented during this reporting cycle.

Big Sandy Watershed

Figure 15a. Summary of Individual Use Support

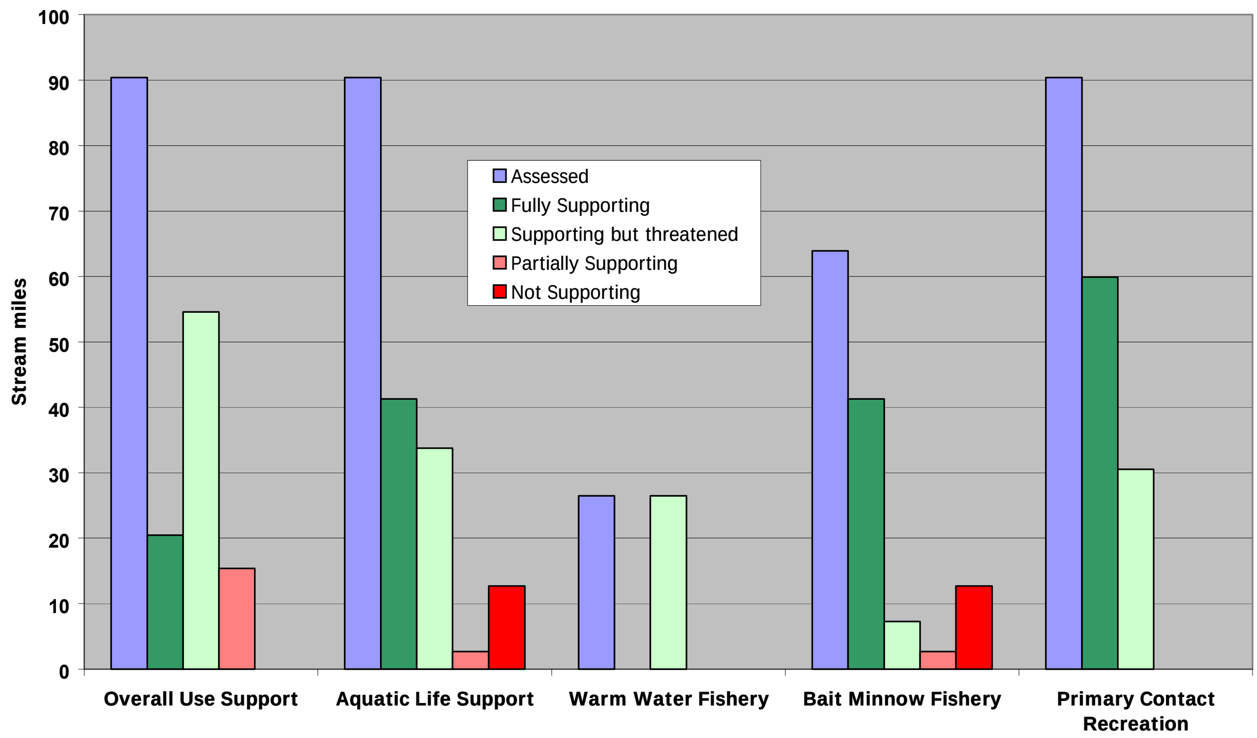


Figure 15b. Summary of Impairment Causes

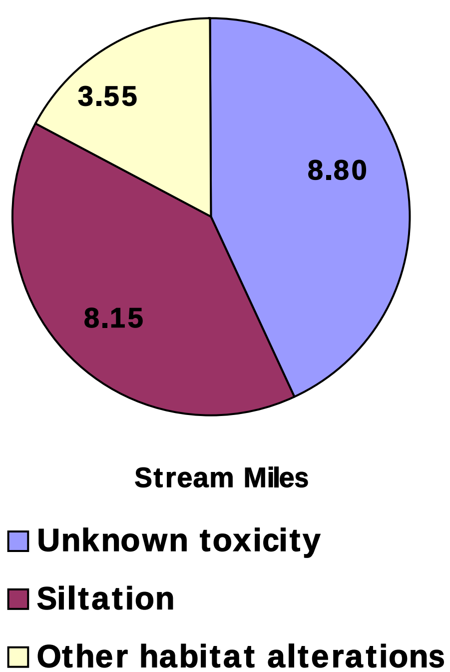
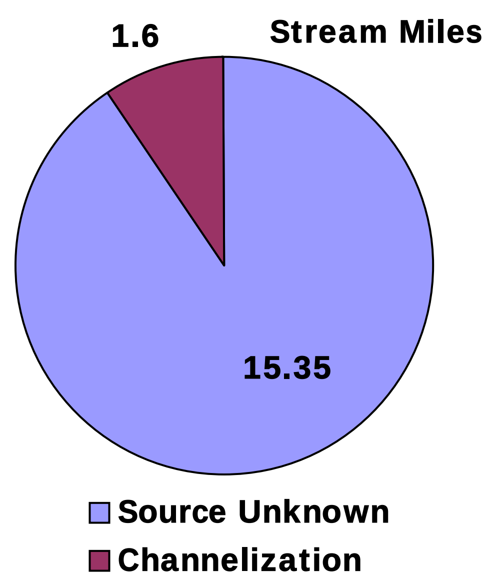


Figure 15c. Summary of Impairment Sources



Section 303(d) Waters

Appendix B includes streams from the Big Sandy River watershed that are on the current 303(d) list. Six streams totaling 15 miles are on the list. Currently, no 303(d) listed streams in the Big Sandy River watershed have had TMDLs completed.

Information sources:

About the District – Natural Resources. (n.d.). Big Sandy Area Development Council. Retrieved 22 October 2001. http://www.bigsandy.org/DATA_DIR/add_sum1.htm.

Big Sandy River Basin – Background and Summary Problem Statement. (n.d.). Kentucky Water Watch Information Server. Retrieved 22 October 2001. http://fluid.state.ky.us/bsr/BSR_REPORT.HTM.

Issued Mining Permits. (n.d.). West Virginia Department of Environmental Protection, Division of Mining and Reclamation. Retrieved 22 October 2001. http://129.71.240.41/webapp/_dep/search/Permits/PermitQuadQuery.cfm?office=OMR.

Issued DWR Permits. (n.d.). West Virginia Department of Environmental Protection, Division of Water Resources. Retrieved 22 October 2001. http://129.71.240.41/webapp/_dep/search/Permits/PermitQuadQuery.cfm?office=DWR.

Most Endangered Rivers of 2001 - #7 Big Sandy. 2001. Retrieved 22 October 2001. http://www.amrivers.org/mostendangered/2001bigsandyreport.htm.

West Virginia Department of Natural Resources, Division of Water Resources. 1986. *Big Sandy River Tug Fork Basin Plan*. Charleston, WV, 1986: (p. 64).

The Cacapon River Watershed

Background

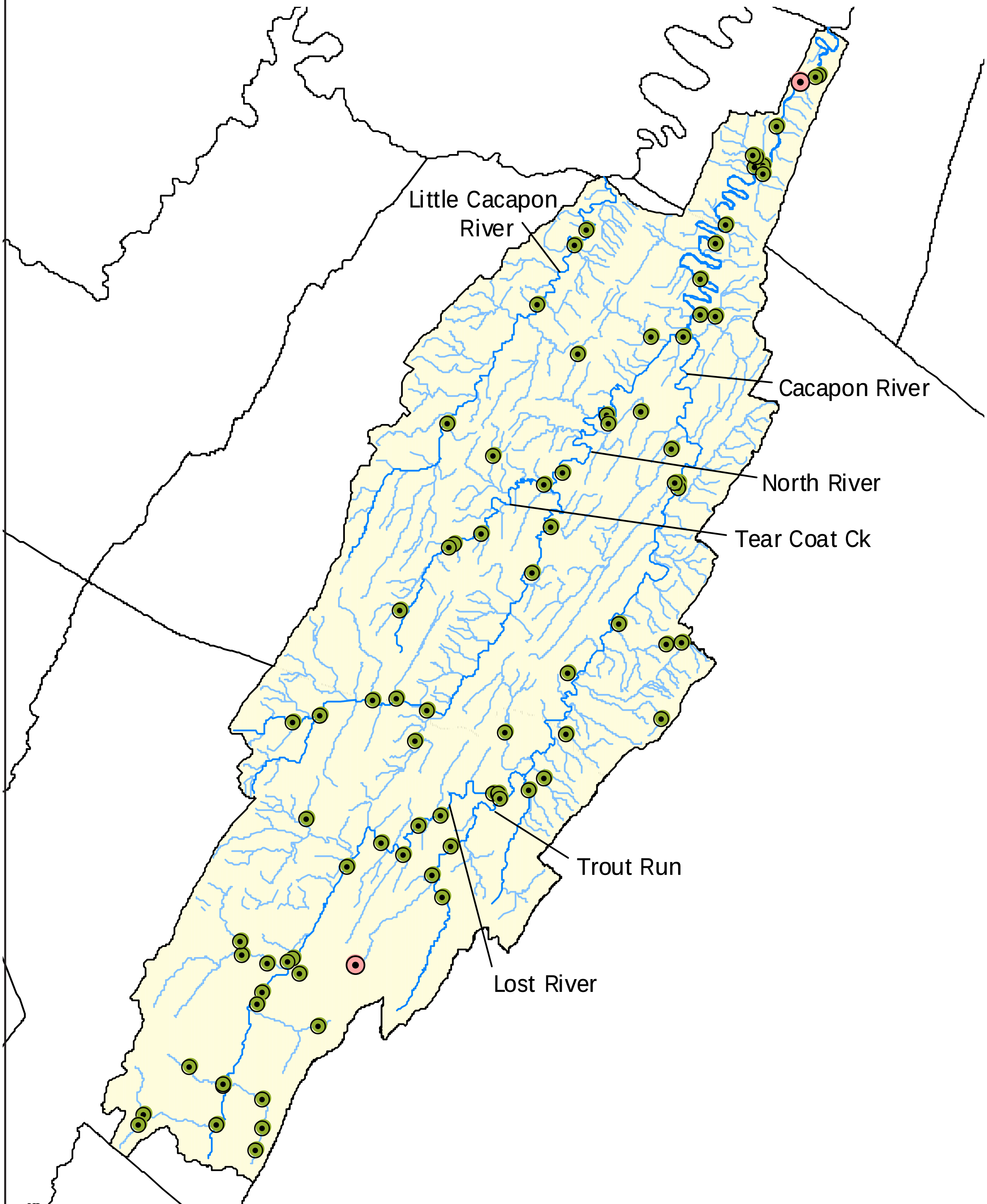
The Cacapon River watershed (HUC # 02070003) is located in West Virginia's eastern panhandle and drains 680 square miles of mostly forested land in Hampshire, Hardy, and Morgan counties. This area is described as the Ridge and Valley province of the Appalachian Highlands and is characterized by long northeast/southwest-trending ridges, which provide the hydrologic boundaries for the watershed. The watershed is bordered by the South Branch Potomac River watershed to the south and west, and by the Potomac River Direct Drains watershed to the north and east.

The Cacapon is the fourth largest tributary to the Potomac River, which drains the eastern slopes of the Appalachian Mountains. However, three major river segments and their tributaries comprise the Cacapon River watershed. Two of the major rivers are actually the same lotic system—the Lost and Cacapon rivers—but are separately identified following a "sink" or underground flow that occurs at Sandy Ridge in Hardy County. Collectively, the Lost/Cacapon river system drains 474 square miles. The other major tributary, North River, meets the Cacapon at the small community named Forks of Cacapon and drains 206 square miles.

The majority of the watershed is forested (84%) with mixed (coniferous and deciduous) canopy trees; however, land used primarily for agriculture occupies approximately 15 percent of the watershed area. Farming is particularly concentrated in the upper (headwater) portions of the watershed—in the wide valleys of the Lost and North rivers. The remaining one percent of land is associated with residential development and barren soils. This type of categorized land use has sharply increased due to the close proximity of the watershed to the major metropolitan areas of Washington, D.C., and Baltimore, Maryland.

The topography of the Cacapon River watershed ranges from predominantly mountainous, to gently rolling hills, to level land in floodplain areas. Elevation ranges from 500 to 3,000 feet above sea level among areas best characterized as long, narrow, parallel ridges and valleys that resulted from the erosion of tilted and folded Paleozoic sedimentary beds. Furthermore, the entire valley consists of one great syncline with numerous alternating anticlines and synclines dating from the Cambrian, Ordovician, Silurian, Devonian, and Mississippian ages. Resistant shale and sandstone form the ridges, while limestone, dolomite, and calcareous shale underlie the valleys. The surface rocks are sedimentary, forming under water, and consist of sandstones, shales, and limestones of great variety.

Figure 16. Cacapon River Watershed



Cacapon River Watershed

Figure 17a. Summary of Individual Use Support

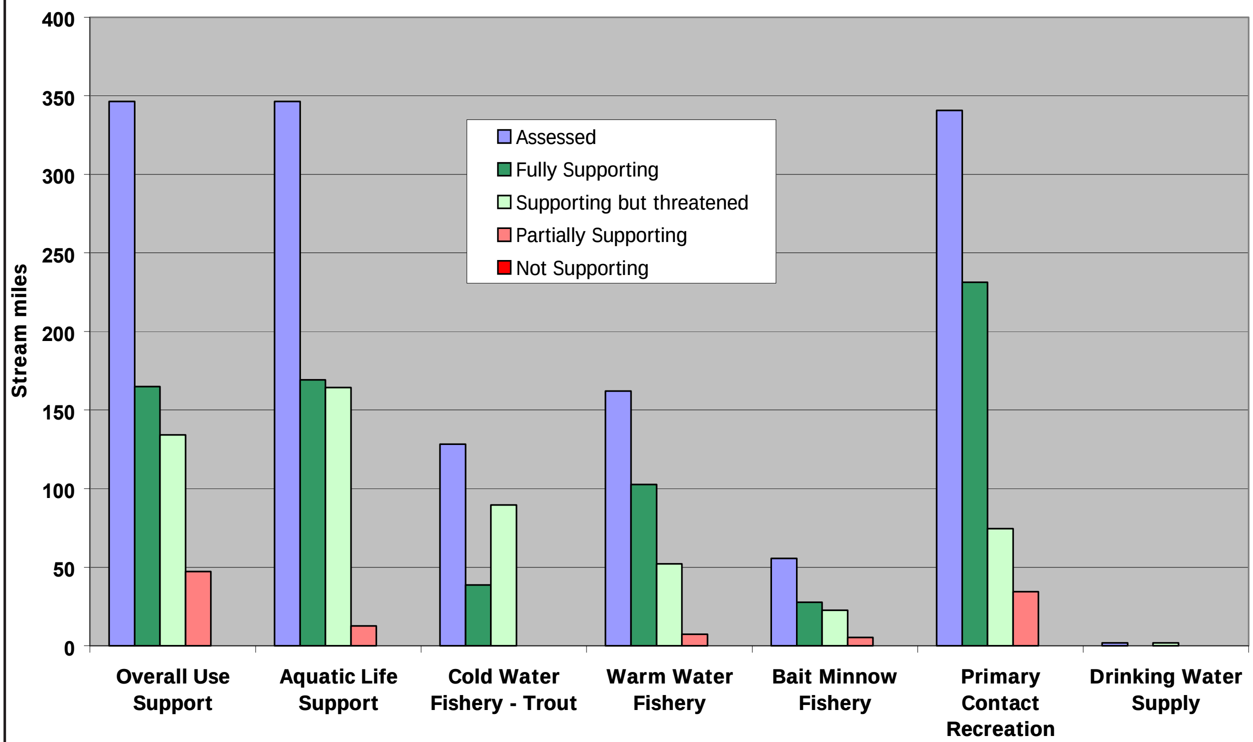


Figure 17b. Summary of Impairment Causes

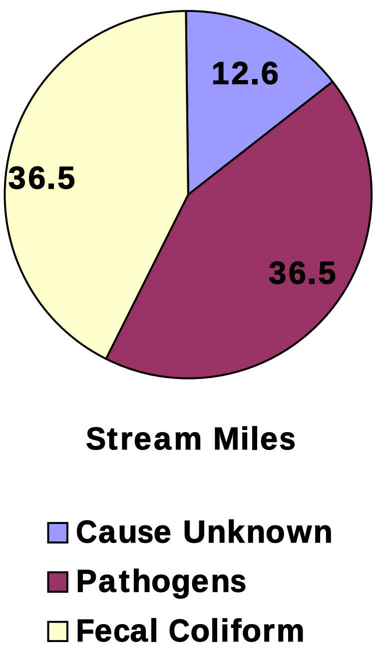


Figure 17c. Summary of Impairment Sources

Source Category	Stream Miles
Agriculture	25.3
Grazing-Related Sources	3.19
Pasture Grazing-Riparian and/or Upland	11.99
Pasture Grazing-Upland	8.8
Hydromodification	3.03
Dredging	3.03
Spills	0.2
Source Unknown	208.44

The soils found within the watershed are also closely associated with the topography and underlying geology. Therefore, the soils found in the river areas were typically formed by sandstone, siltstone, and shale—predominantly of Berles-Weikert-Laidig-Dekalb association. Soils of this type are generally deep, well drained, and moderately textured.

The Cacapon River watershed is divided into several EPA (Level III & IV) designated ecoregions, which includes sub-ecoregions, and are areas classified by the distinct ecological conditions that prevail. In general, Ecoregion 67 (Ridge and Valley), which comprises the entire watershed, is best described as northeast-southwest trending, relatively low-lying, physically and biologically diverse, and surrounded by rugged mountainous regions. More specifically, Ecoregion 67b (the Northern Shale Valleys) is characterized by rolling valleys and low hills and is underlain mostly by shale siltstone, and fine-grained limestone. Another Ecoregion, 67c (the Northern Sandstone Ridges), is marked by high, steep, forested ridges with narrow crests. Lastly, Ecoregion 67d, the Northern Dissected Ridges, is composed of broken, dissected ridges, and is underlain by interbedded sedimentary rocks.

Water Quality Summary

During this reporting period, 48 stream segments totaling 346.32 miles were assessed in the Cacapon River watershed. Figure 16 is a map depicting sampling stations in the watershed, while Apendix provides a list of these stations. An individual use support summary is given in figure 17a.

Of the 346.32 stream miles assessed, 164.93 (47.6%) were fully supporting all assessed uses, 134.19 (38.8%) were fully supporting all uses but threatened for at least one, and 47.2 (13.6%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 346.32 miles assessed for the aquatic life support use, 169.26 (48.9%) were fully supporting, 164.46 (47.5%) were fully supporting but threatened, and 12.6 (3.6%) were partially supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 340.62 miles assessed for the primary contact recreation use, 231.35 (67.9%) were fully supporting, 74.67 (21.9%) were fully supporting but threatened, and 34.6 (10.2%) were partially supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Cacapon watershed is provided in figure 17b. The principal causes of impairment in the watershed are fecal coliform (36.5 miles) metals and unknown cause (12.6 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Cacapon watershed is provided in figure 17c. The principal source of pollution in the watershed is unknown source (47.2 miles).

Public Health / Aquatic life Impacts

During this reporting period, no bathing beach or public water supply closures were documented in the watershed. In addition, no fish consumption advisories are in effect.

Section 303(d) Waters

Appendix B includes streams from the Cacapon River watershed that are on the current 303(d) list. Three streams totaling 13 miles are on the list. Currently, one stream in the watershed, the Lost River, has had a TMDL completed.

Information sources

Cacapon River: Wild and Scenic River Study. 1982. Draft. United States Department of the Interior, National Park Service, Denver, Colorado.

Constantz, G., N. Ailes, and D. Malakoff. 1995. *Portrait of a River: The Ecological Baseline of the Cacapon River.* Pine Cabin Run Eco. Lab., High View, WV.

Woods, A. J., J. M. Omernik, and D. D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia.* USEPA, Corvallis, Oregon.

The Dunkard Creek Watershed

Background

The Dunkard Creek watershed (HUC # 05020005) is located along the Pennsylvania-West Virginia border and drains 234.65 square miles of mostly forested land in Green County, Pa., and Monongalia County, Steep western, southern, and eastern ridges form the hydrologic boundary, while the northern watershed boundary follows along the Warrior Trail. The watershed is bordered by the Monongahela River watershed to the south and east, and the Upper Ohio South watershed to the west.

Dunkard Creek originates at the confluence of the Pennsylvania and West Virginia forks of Dunkard Creek, and is part of the Monongahela River subbasin, which drains into the Ohio River. The stream flows from west-to-east, extends for 36 miles, and drains 150,177 acres; 71,350 acres of which are located in Monongalia County, Although Dunkard Creek has 80 named tributaries, according to U.S. Geological Survey 7.5 minute quadrangle maps, only 12 are considered major and have drainage area of at least 5,000 acres. Five major tributaries are located within West Virginia and represent a total drainage area of nearly 55,500 acres.

Land use within the watershed consists largely of forested areas (63%) and pasture/hay production (18%); whereas, urban areas represent only a small portion (3%) of the distribution. Furthermore, the population within the watershed is estimated at 11,000 and 96.2% of the total acreage is privately owned—either by individuals or industry. The dominant employer in the Dunkard Creek watershed is the coal mining industry and related fields. The remaining 3.8% of the total watershed acreage is publicly owned, representing approximately 5,800 acres.

The topography of the watershed is rugged, marked with narrow valleys and ridge tops, and hillsides having slopes ranging from 15%-65%. However, such abrupt features are often contrasted by long benches that follow hillside contours. Many of the hillside areas are also slip-prone after saturation due to a soil composition with a high shrink-swell capacity. The upland soils forming these ridges, hillsides, and benches are mostly Dromont-Culleoka and Gilpin-Culleoka-Upshur associations. The remaining floodplain soils are typically of Library-Newark or Lobdell-Holly association, and are extremely vulnerable to flash flooding during heavy rainfall. Although these lowland soils have a high productivity potential for trees, few acres are wooded and not agriculturally used for cultivated crops, pasture, or hay. The dominant rock types found in the Dunkard Creek watershed include shales, siltstones, and shaly limestone of the Dunkard, Conemaugh, and Monongahela groups. The latter group yields most of the commercial coal, while all three contain aquifers in sandstone, limestone, and coal. Other significant features in the watershed include 203 wetlands documented by the National Wetland Inventory. They range in size from less than one acre to nearly 20 acres and are generally classified as Palustrine.

The Dunkard Creek watershed is transected by EPA (Level III and IV) designated sub-ecoregions 70a and 70b. These areas are so described as a result of the distinct ecological conditions that prevail within the ecoregion.   Ecoregion 70a is referred to as the Permian Hills and is generally more rugged, more forested, and cooler than Ecoregion 70b, the Monongahela Transition Zone. Ecoregion 70b, being less dissected and more rounded, facilitates greater urban, suburban, and industrial activities.   Therefore, pollution from various sources has degraded stream habitat, negatively affecting fish and invertebrates. Both point and nonpoint sources of water pollution are found throughout the Dunkard Creek watershed. The DEP has identified approximately 30-35 active NPDES permits in the watershed with 80% of those being mining related. Significant nonpoint sources of pollution include failed septic systems, runoff from mining and logging areas, livestock farming areas, and runoff from waste and construction sites.

Water Quality Summary

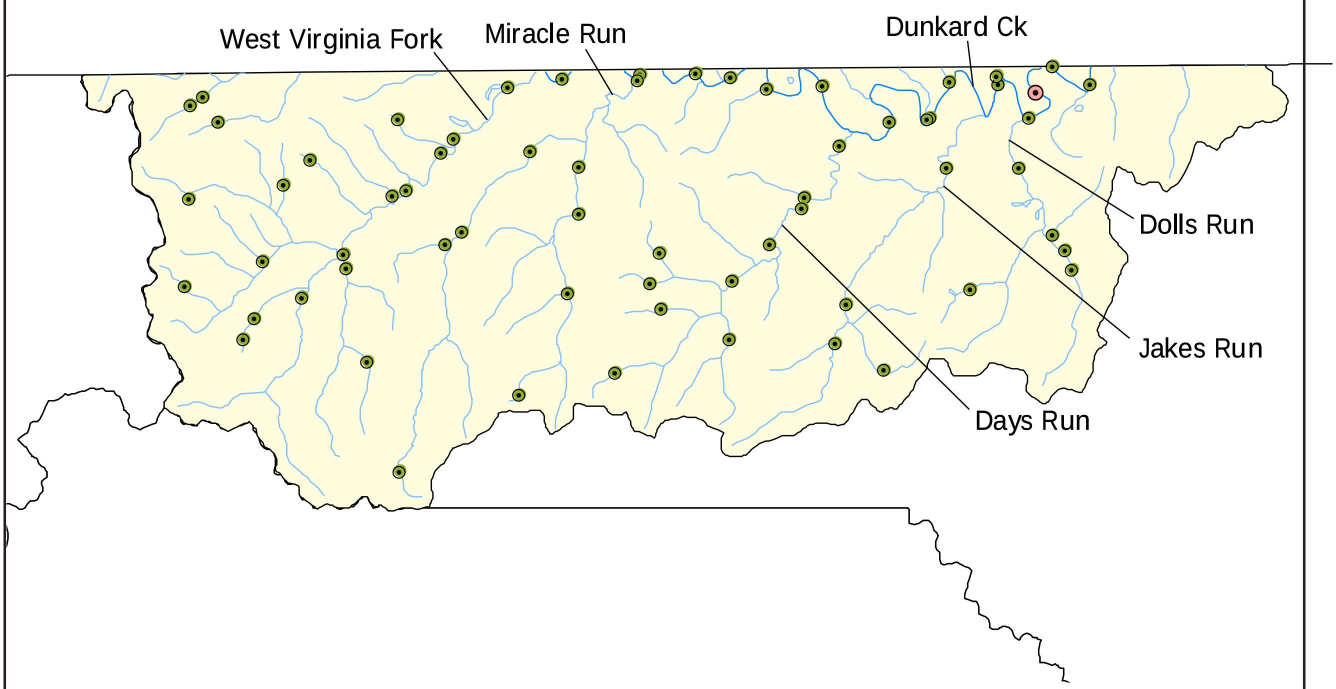
During this reporting period, 38 stream segments totaling 100.76 miles were assessed in the Dunkard Creek watershed. Figure 18 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 19a.

Of the 100.76 stream miles assessed, 25.86 (25.7%) were fully supporting all assessed uses, 9.05 (9%) were fully supporting all uses but threatened for at least one, and 65.85 (65.3%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 100.76 miles assessed for the aquatic life support use, 32.81 (32.6%) were fully supporting, 2.1 (2.1%) were fully supporting but threatened, 45.75 (45.4%) were partially supporting, and 20.1 (19.9%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 100.76 miles assessed for the primary contact recreation use, 43.26 (42.9%) were fully supporting, 41.50 (41.2%) were fully supporting but threatened, and 16 (15.9%) were partially supporting.

Figure 18. Dunkard Creek Watershed



Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Dunkard Creek watershed is provided in figure 19b. The principal causes of impairment in the watershed are unknown cause (56.55 miles), habitat alterations (18.45 miles), and fecal coliform (16 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Dunkard Creek watershed is provided in figure 19c. The principal sources of pollution in the watershed are unknown source (59.35 miles) and acid mine drainage (13.8 miles).

Public Health/Aquatic life Impacts

During this reporting period, no bathing beach or public water supply closures were documented in the watershed. In addition, no fish consumption advisories are currently in effect.

Section 303(d) Waters

Appendix B includes streams from the Dunkard River watershed that are on the current 303(d) list. Fourteen streams totaling 64 miles are on the list. To date, no streams in the watershed have had a TMDL completed.

Dunkard Creek Watershed

Figure 19a. Summary of Individual Use Support

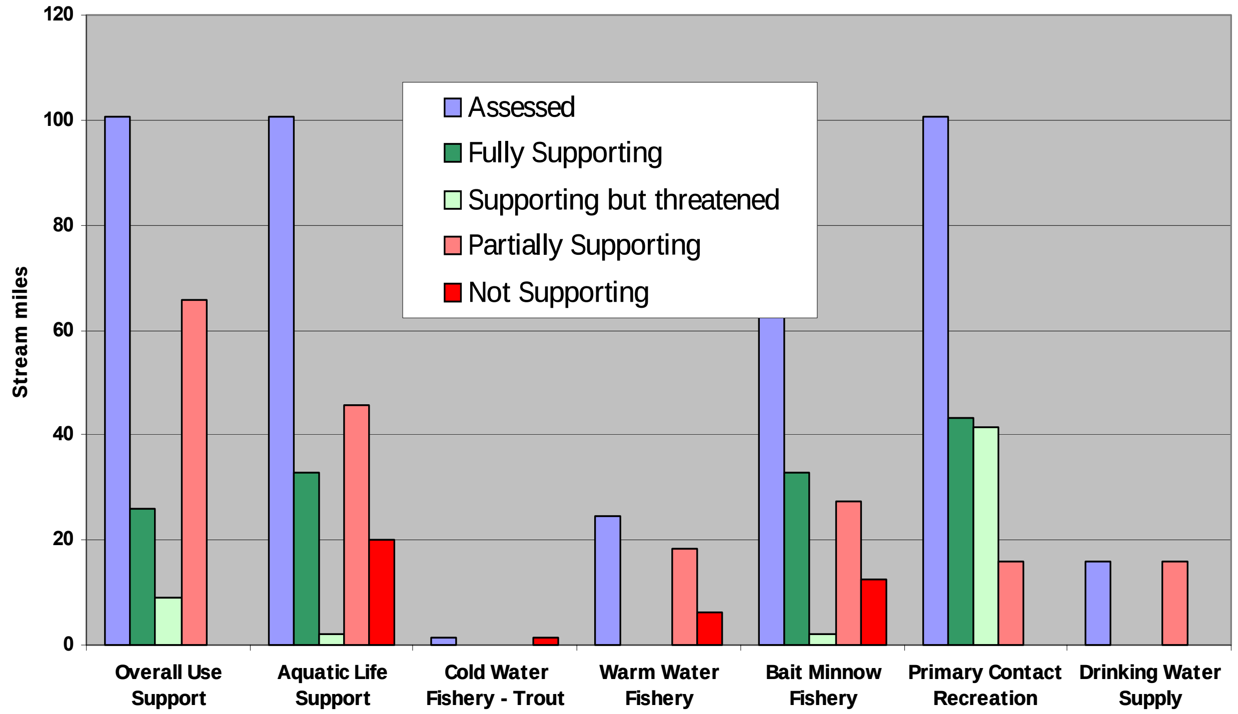


Figure 19 b. Summary of Impairment Causes

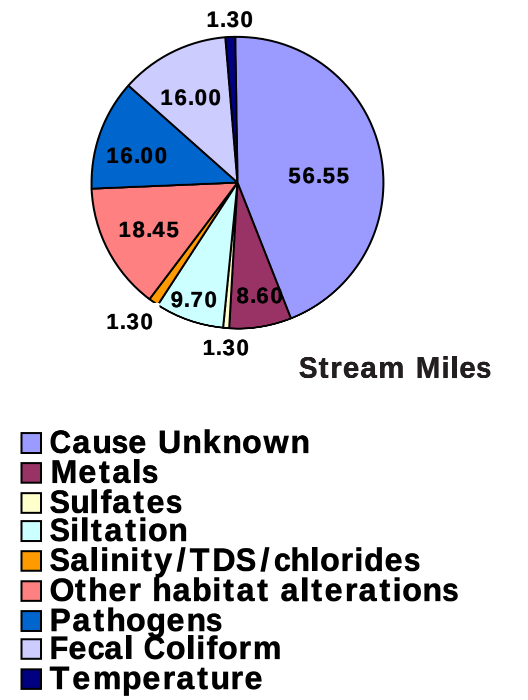
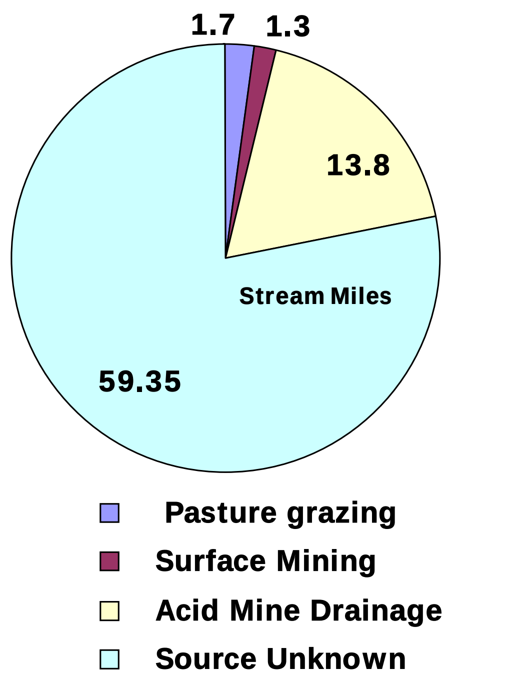


Figure 19c. Summary of Impairment Sources



Information sources

Rivers Conservation Plan for the Dunkard Creek Watershed. 2000. Green County Conservation District, Waynesburg, Pennsylvania.

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The Lower Ohio River Watershed

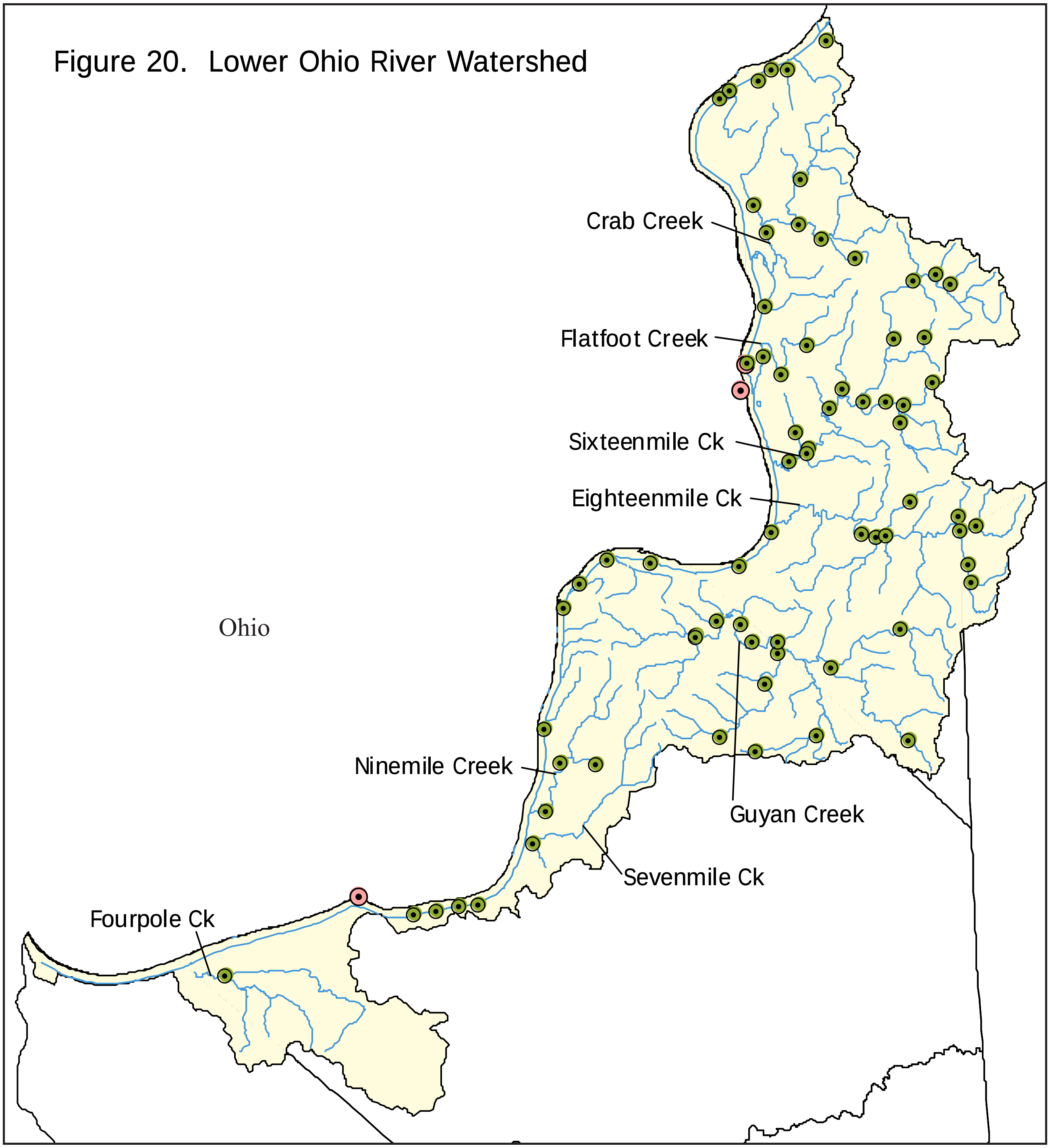
Background

The section of the Ohio River that flows 52.7 miles between the confluence of the Ohio and Kanawha rivers and the confluence of the Ohio and Big Sandy rivers forms the Lower Ohio River watershed (HUC # 05090101). This represents only a small portion of the Ohio River basin that lies in West Virginia; in fact, the Ohio River forms the western border of West Virginia until its confluence with the Big Sandy River in Wayne County. The entire Ohio River ultimately drains 75% or 18,217 square miles of the total land area of West Virginia. All major river systems in West Virginia except for the Potomac and James rivers eventually drain into the Ohio. The Lower Ohio portion of the basin and its tributaries drain 220 square miles in the state of West Virginia.

The Lower Ohio basin lies entirely in the Western Appalachian Plateau Ecoregion and occupies portions of Mason, Cabell, and Wayne counties; the two main municipalities in the basin are Point Pleasant and Huntington. The area is not as rugged, hilly, or densely forested as ecoregions to the east. The region was once covered with maple-beech-birch forests but much of the original forest has been cleared for farming practices. The geology of the basin is composed of shale, sandstone, siltstone, limestone, and coal. The topography is characterized by narrow flood plains and deeply indented stream valleys. Climatologically, the Lower Ohio basin is considered temperate with distinct seasonal changes. Flooding and dry periods do occur; high water has become less of a problem to communities situated along the river due to the construction of reservoirs and flood walls.

Business and industry is greatly varied in the Lower Ohio basin. Coal mining leads the natural resource extraction industry; gas and oil extraction along with timbering is also practiced. There is also a great deal of manufacturing in the basin; glass manufacturing, salt and brine production, alloy manufacturing, textile manufacturing, and chemical production all help support the local economy. Agriculture is still a major part of the economy in the area as well.

Figure 20. Lower Ohio River Watershed



Water Quality Summary

During this reporting period, 41 stream segments totaling 197.57 miles were assessed in the Lower Ohio River watershed. Figure 20 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 21a.

Lower Ohio River Watershed

Figure 21a. Summary of Individual Use Support

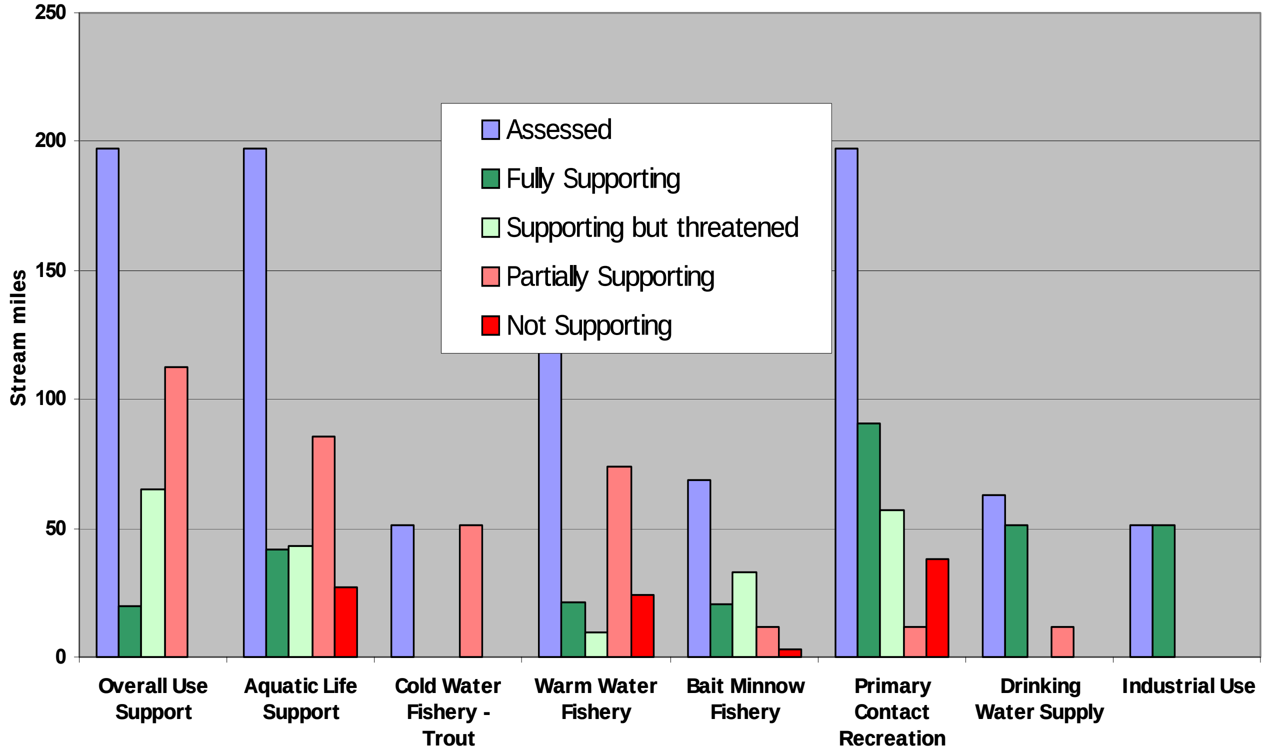


Figure 21b. Summary of Impairment Causes

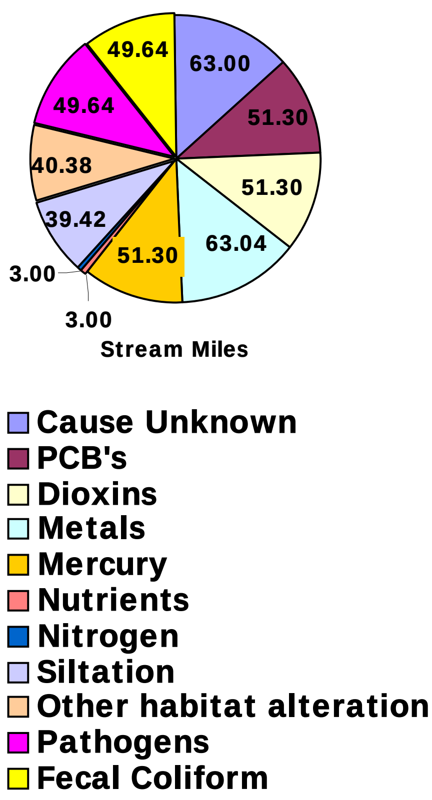


Figure 21c. Summary of Impairment Sources

Source Category	Stream Miles
Agriculture	12.88
Crop-related Sources	6.68
Grazing related Sources	6.2
Pasture grazing - Riparian and/or Upland	3.2
Pasture grazing - Riparian	3
Urban Runoff/Storm Sewers	5.9
Erosion and Sedimentation	5.9
Hydromodification	18.14
Channelization	14.94
Dredging	3.2
Habitat Modification (other than Hydromodification)	71.9
Removal of Riparian Vegetation	37.18
Bank or Shoreline Modification/Destabilization	34.72
Source Unknown	114.3

Of the 197.57 stream miles assessed, 19.99 (10.1%) were fully supporting all assessed uses, 64.8 (32.8%) were fully supporting all uses but threatened for at least one, and 112.78 (57.1%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 197.57 miles assessed for the aquatic life support use, 41.88 (21.2%) were fully supporting, 42.91 (21.7%) were fully supporting but threatened, 85.74 (43.4%) were partially supporting, and 27.04 (13.7%) were not supporting. All 51.3 stream miles assessed for the fish consumption use during this reporting period were partially supporting.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 197.57 miles assessed for the primary contact recreation use, 90.91 (46%) were fully supporting, 57.02 (28.9%) were fully supporting but threatened, 11.74 (5.9%) were partially supporting, and 37.9 (19.2%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Lower Ohio watershed is provided in figure 21b. The principal causes of impairment in the watershed are metals (63.04 miles) unknown cause (63 miles), and PCB's and dioxins (51.3 miles each).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Lower Ohio watershed is provided in figure 21c. The principal sources of pollution in the watershed are unknown source (114.3 miles), and habitat modification (including hydro) (90 miles).

Public Health/Aquatic life Impacts

A fish consumption advisory currently is in effect for the entire length of the Lower Ohio River mainstem (51.3 miles). The pollutants of concern are PCBs, dioxin, and mercury. A list of fish consumption advisories is provided in Table 95. During this reporting period, no bathing beach or public water supply closures were documented in the watershed.

Section 303(d) Waters

Appendix B contains streams that are currently on the 303(d) of impaired waters. Twelve streams totaling 126 miles are on the list. TMDLs have been completed for the Ohio River mainstem (dioxin & PCBs) and Fourpole Creek (Fecal Coiform & Aluminum).

Information sources

United States Environmental Protection Agency. Retrieved 5 November 2001. *1998 Section 303(d) Fact Sheet for Watershed RACCOOON-SYMMES.* http://OASPUB.EPA.GOV/waters/HUC_Rept.Control?P_Cycle=1996&P_HUC=05090101&P_HUC_DESC=RACCOON-SYMMES

West Virginia Department of Environmental Protection, Division of Water Resources. Retrieved 5 November 2001. *Lower Ohio River Watershed.* http://www.dep.state.wv.us/watershed/w5090101.html

West Virginia Department of Natural Resources, Division of Water Resources. 1988. *Ohio River Basin Plan*. Charleston, WV, 1988.

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. *Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia.* Corvallis, OR. U.S. Environmental Protection Agency.

The Twelvepole Creek Watershed

Background

Twelvepole Creek arises in Wayne County, West Virginia from the confluence of the East and West Fork rivers. The East and West forks both originate in northern Mingo County and have a rate of fall of 8.8 feet per mile before their confluence. Twelvepole flows in a northerly direction for 32 miles before it empties into the Ohio River at mile point 313.4. Over its course, Twelvepole falls approximately 1.5 feet per mile.

The Twelvepole watershed (HUC # 05090102) drains 460 square miles and encompasses 76 percent of the area of Wayne County. One incorporated town, Wayne (pop. 1,105), lies entirely in the Twelvepole watershed. The city of Huntington and the town of Ceredo have small sections that lie near the mouth of Twelvepole. Two major highways, U.S. Route 60 and U.S. Route 52, Tri-State airport and CSX and Norfolk and Southern Railroads serve the area's transportation needs. The watershed also drains several small, unincorporated towns including Lavalette and East Lynn. Beech Fork, the largest tributary of Twelvepole Creek, drains approximately 83 square miles. The Twelvepole watershed gets its name from the fact that the surveyors, when locating the savage land grant at its mouth in 1784, found its width to be twelve poles or rods. George Washington or the surveyors he hired were rumored to have named the stream.

Two dams have been constructed by the U.S. Army Corps of Engineers for the purpose of flood control; they are located on East Fork and Beech Fork. The East Fork impoundment controls a drainage area of 133 square miles, while the Beech Fork impoundment controls an area of 78 square miles. The resulting lakes, East Lynn Lake and Beech Fork Lake, have been developed as warm water fisheries and the surrounding areas have been upgraded with recreational facilities such as campgrounds, picnic shelters, and hiking/biking trails. The cold tailwaters of East Lynn Lake are also stocked with trout on a monthly basis between February and May. Twelvepole Creek at Wayne dam and West Fork of Twelvepole Creek are also stocked with trout.

The Twelvepole Creek watershed lies about half in the Western Appalachian Plateau Ecoregion and half in the North-Central Appalachian Ecoregion. The former ecoregion is not as rugged or hilly as ecoregions to the east and is known for its rich coal beds. The Western Appalachian Plateau ecoregion was once covered by maple-beech-birch forest but was cleared for farming practices. Farming and agriculture are still a major part of the economy in many areas of this ecoregion. The EPA has identified sedimentation as the primary stressor to streams in the Western Appalachian Plateau Ecoregion. Habitat degradation, acid mine drainage, and phosphorus runoff from farming activities have also been named as potential or real threats to the ecosystem. The North-Central Appalachians are composed of a vast elevated plateau of high hills, open valleys, and low mountains. The geological makeup of this region is a combination of sandstone, siltstone, and shale with numerous coal deposits. Large areas of the region have stands of oak and northern hardwood forest. Land use in the Central Appalachians revolves around forestry and recreation with some coal and gas extraction occurring in the western part of the ecoregion. The EPA has identified riparian habitat alteration, mine drainage, and acidic deposition as the most common stressors in the Central Appalachian Ecoregion.

Coal mining is the primary industry in the Twelvepole Creek watershed. The West Virginia Office of Miners' Health Safety and Training estimates that Wayne County produced 5,277,637 tons of coal and Mingo County produced 16,772,797 tons of coal from January to mid-September 2001. Their data show that the entire tonnage of coal produced in Wayne County has come from underground mining practices while 7,492,418 tons of the coal produced in Mingo County came from surface mining. According to data from the West Virginia Department of Environmental Protection, Division of Mining and Reclamation, there are 181 active mining and mining related industry permits issued in this watershed; 64 of these are for surface mining activities, some of which are located in Wayne County. Oil and natural gas exploration and production, timber production, recreation, and some agriculture also help support the local community.

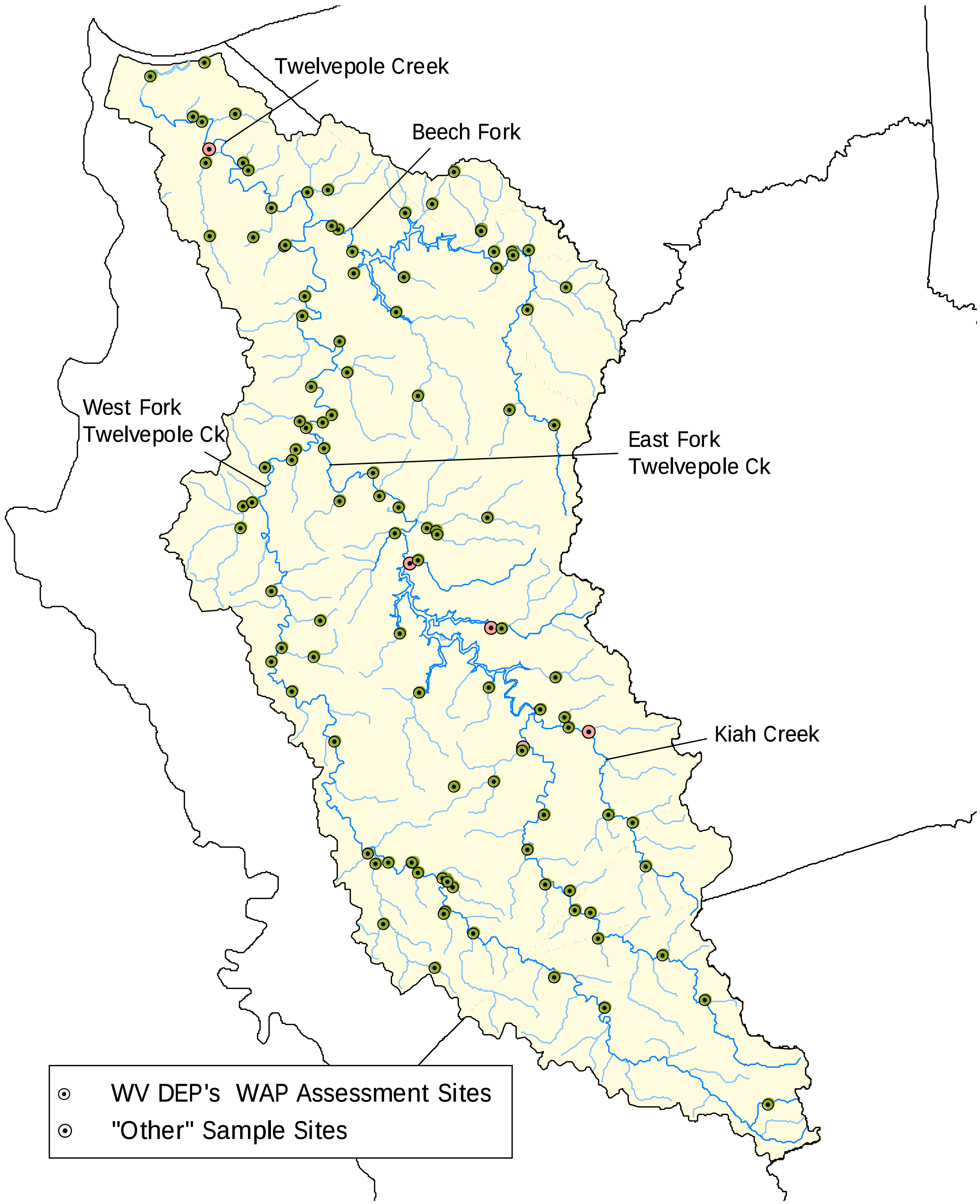
Water Quality Summary

During this reporting period, 77 stream segments totaling 352.03 miles were assessed in the Twelvepole Creek watershed. Figure 22 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 23a.

Of the 352.03 stream miles assessed, 83.19 (23.6%) were fully supporting all assessed uses, 10.92 (3.1%) were fully supporting all uses but threatened for at least one, and 257.92 (73.3%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 352.03 miles assessed for the aquatic life support use, 91.91 (26.1%) were fully supporting, 2.2 (0.6%) were fully supporting but threatened,

Figure 22. Twelvepole Creek Watershed



Twelvepole Creek Watershed

Figure 23a. Summary of Individual Use Support

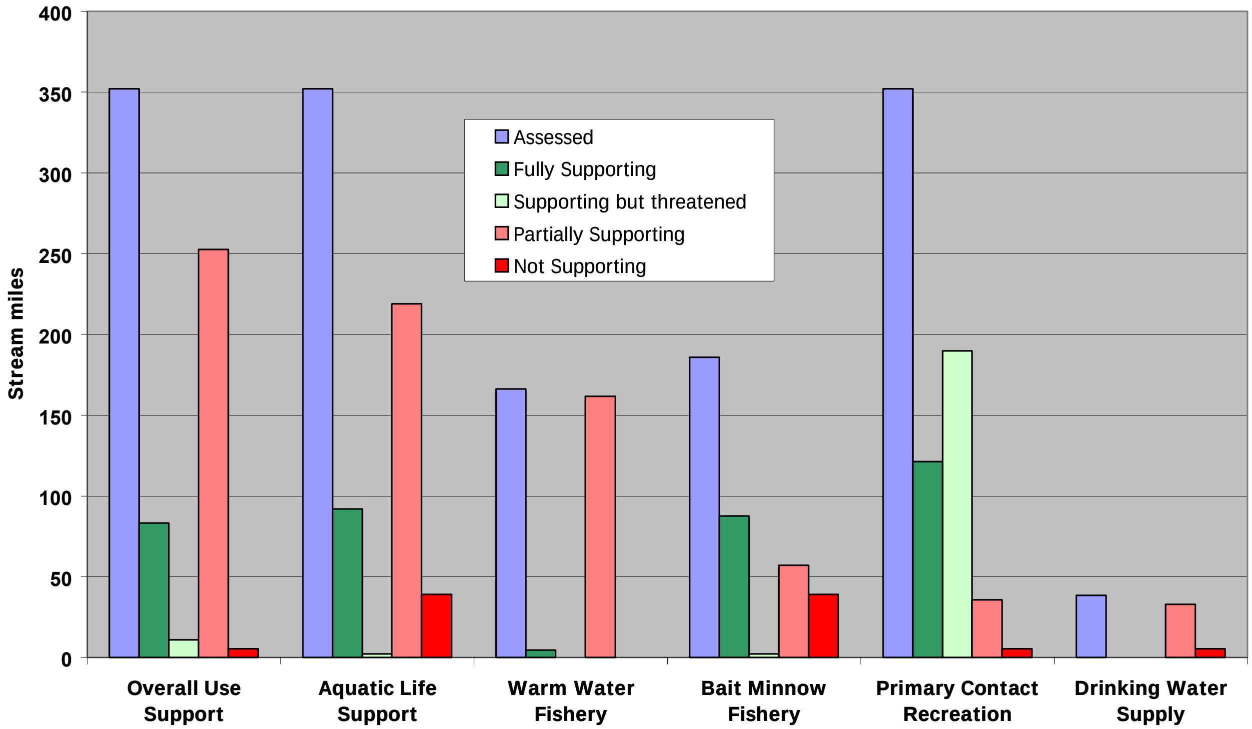


Figure 23b
Summary of Impairment Causes

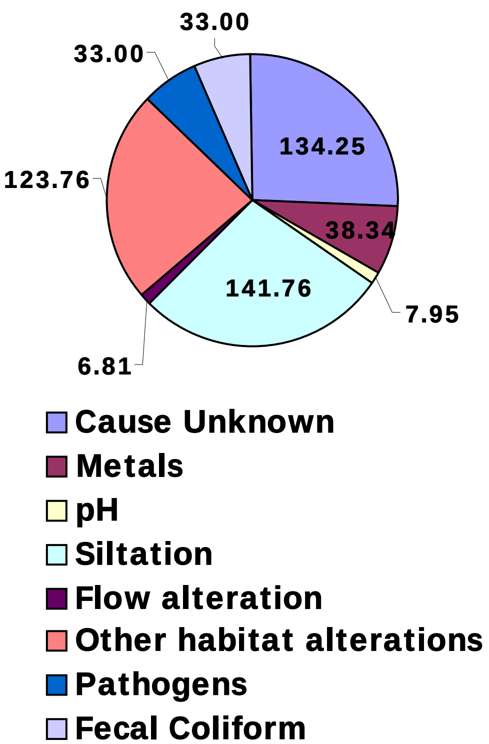


Figure 23c.
Summary of Impairment Sources

Source Category	Stream Miles
Industrial Point Sources	4.2
Agriculture	151.26
Grazing related Sources	13.89
Pasture grazing - Riparian and/or Upland	7.42
Pasture grazing - Riparian	2
Range grazing - Riparian and/or Upland	4.47
Intensive Animal Feeding Operations	69.3
Confined Animal Feeding Operations (NPS)	67.1
Construction	14.58
Highway/Road/Bridge Construction	1.55
Land Development	10
Urban Runoff/Storm Sewers	4.49
Other Urban Runoff	2.46
Highway/Road/Bridge Runoff	1.08
Erosion and Sedimentation	7.25
Resource Extraction	156.96
Surface Mining	53.53
Abandoned mining	19.42
Active Mining	2.08
Land Disposal	8.36
Raw sewage	1.7
Hydromodification	12.45
Channelization	9.84

218.91 (62.2%) were partially supporting, and 39.01 (11.1%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 352.03 miles assessed for the primary contact recreation use, 121.25 (34.5%) were fully supporting, 189.83 (53.9%) were fully supporting but threatened, 35.61 (10.1%) were partially supporting, and 5.34 (1.5%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Twelvepole Creek watershed is provided in figure 23b. The principal causes of impairment in the watershed are siltation (141.76 miles), unknown cause (134.25 miles), and habitat alterations (123.76 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Twelvepole Creek watershed is provided in figure 23c. The principal sources of pollution in the watershed are resource extraction (156.96 miles), agriculture (151.26 miles), and unknown source (69.52 miles).

Public Health/Aquatic life Impacts

No streams in the Twelvepole Creek watershed are currently under a fish consumption advisory. In addition, no bathing beach or public water supply closures were documented during this reporting period.

Section 303(d) Waters

Appendix B includes streams from the watershed that are on the current 303(d) list. Thirty – seven streams totaling 22 miles are on the list. Currently, no 303(d) listed streams in the Twelvepole Creek watershed have had TMDLs completed.

Information sources

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The Upper Guyandotte River Watershed

Background

The Guyandotte River is formed by the junction of Winding Gulf and Stonecoal Creek in southern Raleigh County and flows 167 miles to its confluence with the Ohio River in Huntington, West Virginia. The Upper Guyandotte watershed (HUC # 05070101) encompasses that part of the Guyandotte basin that occupies all of Wyoming County and a portion of Raleigh, Mingo, and Logan counties. The river basin lies entirely in the Appalachian Plateau physiographic province and is characterized by a narrow channel with rapid, shallow flow as it moves through steep valley walls in the upper part of the basin.

The geologic makeup of the Upper Guyandotte region allows for numerous coal beds as well as abundant natural gas production. Because it lies entirely in the Central Appalachian Ecoregion (69), the Upper Guyandotte watershed is geologically characterized by interbedded limestone, shale, sandstone, and coal. Extraction of coal has become common in this area; poor mining practices have lead to the degradation of stream quality in many places throughout the watershed. There are a few urban and suburban centers in the ecoregion, especially surrounding river corridors.

Abundant precipitation lends to the humid climate in the Upper Guyandotte basin. Annual precipitation averages 44 inches per year. Winters are relatively mild while summers tend to be hot and humid. Flooding in July 2001 caused extensive damage in several communities throughout the watershed, most notably Mullens, located in Wyoming County. Estimation of flood damages ranged in the millions of dollars.

There are several small communities spread out through the Upper Guyandotte basin. Logan is the largest community in the basin, although it has experienced a steady decline in population since the 1960s. According to the 2000 United States Census, Logan has a population of 1,630.

The coal industry, as it is in many regions throughout West Virginia, is vital to the economy in the Upper Guyandotte River basin. Poor mining practices have resulted in sedimentation, mine runoff, and metals deposition problems in some streams in the watershed. Logan, Mingo, Raleigh, and Wyoming counties are all major producers of coal. Other natural resources important to the area include clay, natural gas, timber, and oil. Farming is not as important as natural resource extraction due to the rough terrain in the basin. Of the small amount of farming and agriculture still practiced, the primary products are tobacco, grains, and livestock.

Water Quality Summary

During this reporting period, 129 stream segments totaling 576.31 miles were assessed in the Upper Guyandotte River watershed. Figure 24 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in figure 25a.

Of the 576.31 stream miles assessed, 50.96 (8.8%) were fully supporting all assessed uses, 44.41 (7.7%) were fully supporting all uses but threatened for at least one, and 480.94 (83.5%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 573.62 miles assessed for the aquatic life support use, 79.17 (13.8%) were fully supporting, 13.51 (2.4%) were fully supporting but threatened, 369.88 (64.5%) were partially supporting, and 111.06 (19.3%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 574.61 miles assessed for the primary contact recreation use, 134.26 (23.4%) were fully supporting, 138.43 (24.1%) were fully supporting but threatened, 276.27 (48.1%) were partially supporting, and 25.65 (4.4%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Upper Guyandotte River watershed is provided in figure 25b. The principal causes of impairment in the watershed are unknown cause (348.84 miles), metals (295.99 miles), and fecal coliform (95 miles).

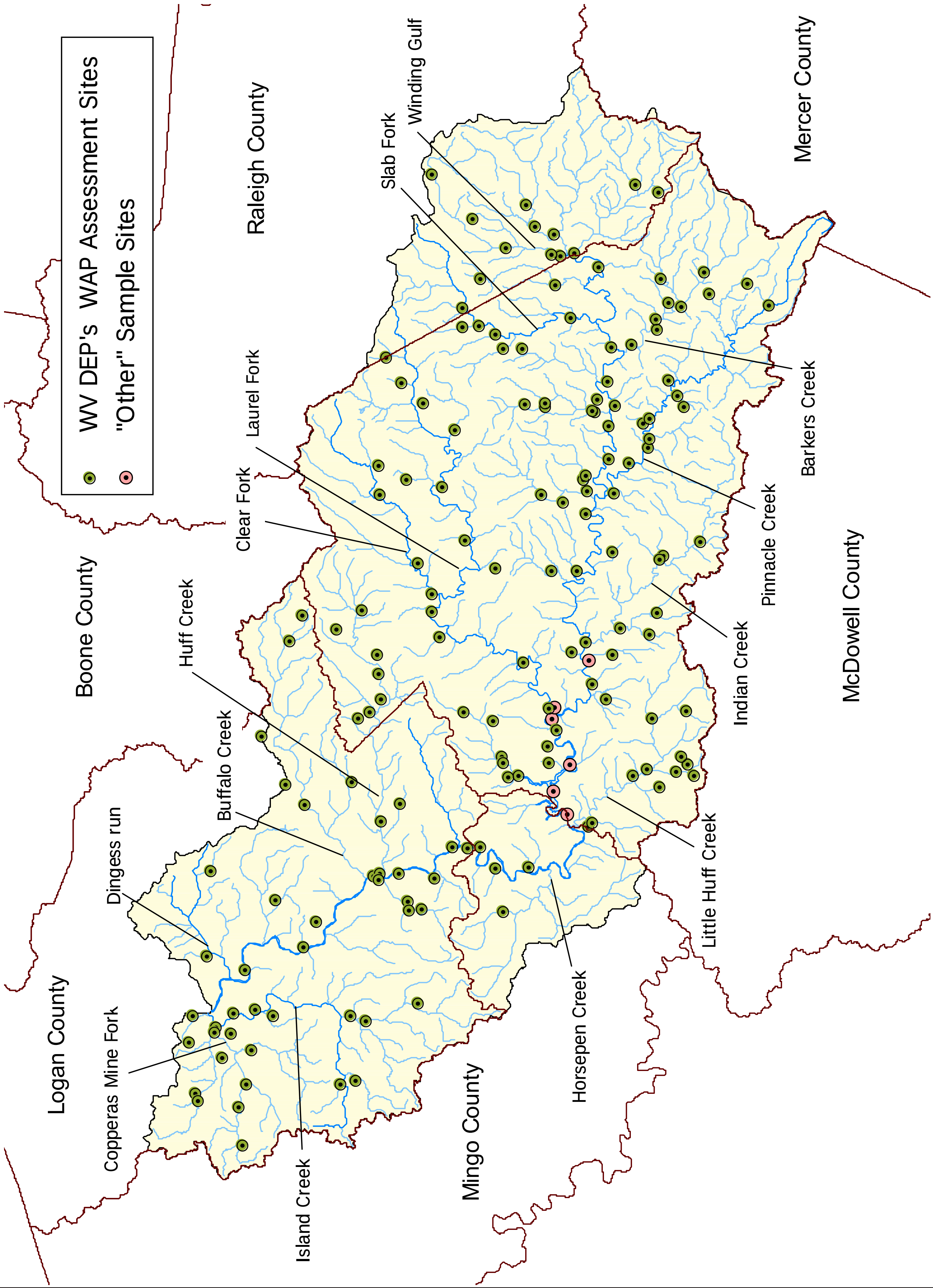
Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Upper Guyandotte watershed is provided in figure 25c. The principal sources of pollution in the watershed are unknown source (395.32 miles), urban runoff/storm sewers (97.84 miles), and abandoned mining (68.3 miles).

Public Health/Aquatic life Impacts

No streams in the Upper Guyandotte River watershed are currently under a fish consumption advisory. In addition, no bathing beach or public water supply closures were documented during this reporting period.

Figure 24. Upper Guyandotte River Watershed



Upper Guyandotte River Watershed

Figure 25a. Summary of Individual Use Support

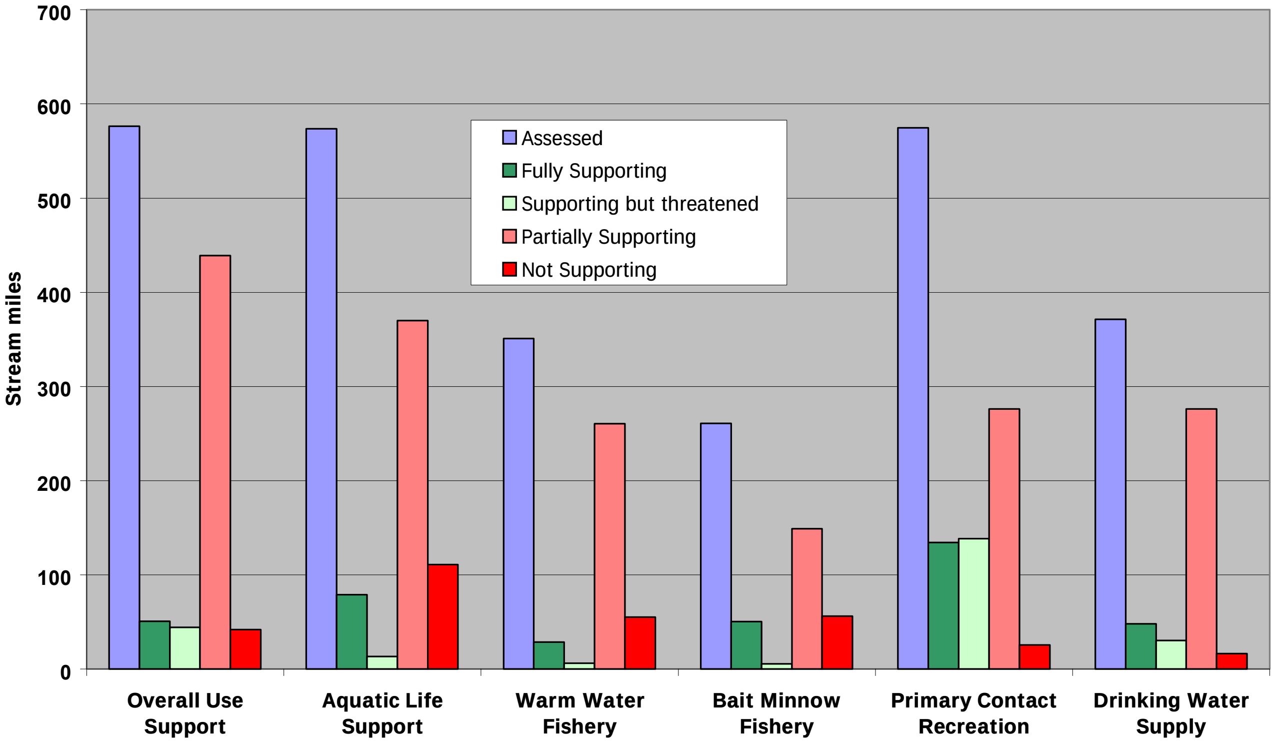


Figure 25b. Summary of Impairment Causes

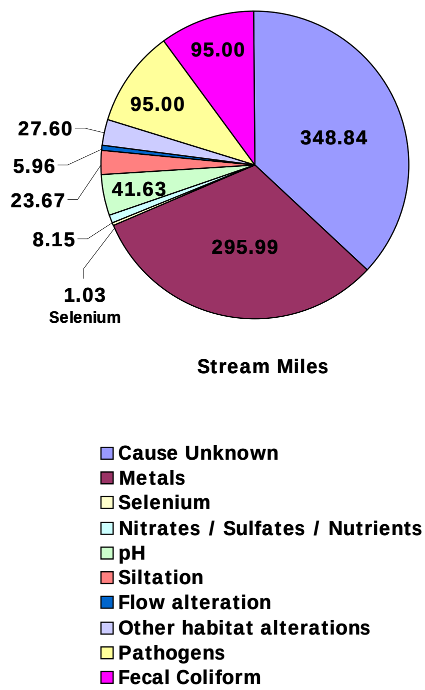


Figure 25c. Summary of Impairment Sources

Source Category	Stream Miles
Urban Runoff/Storm Sewers	97.84
Other Urban Runoff	2.84
Resource Extraction	199.29
Surface Mining	59.09
Subsurface Mining	26.48
Mine Tailings	12.32
Acid Mine Drainage	37.42
Abandoned mining	68.3
Active Mining	16.86
Inactive mining	16.84
Land Disposal	95
Raw sewage	95
Hydromodification	17.53
Channelization	3.79
Upstream Impoundment	2.24
Flow Regulation/Modification	8.4
Habitat Modification (other than Hydromodification)	5.08
Removal of Riparian Vegetation	2.84
Bank or Shoreline Modification/Destabilization	2.24
Source Unknown	395.32

Section 303(d) Waters

Appendix B includes streams from the Upper Guyandotte River Watershed that are on the current 303(d) list. Eighty-eight streams totaling 530 miles are on the list. Currently, no 303(d) listed streams in the Upper Guyandotte River watershed have had TMDLs completed.

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The Upper Ohio River South Watershed

Background

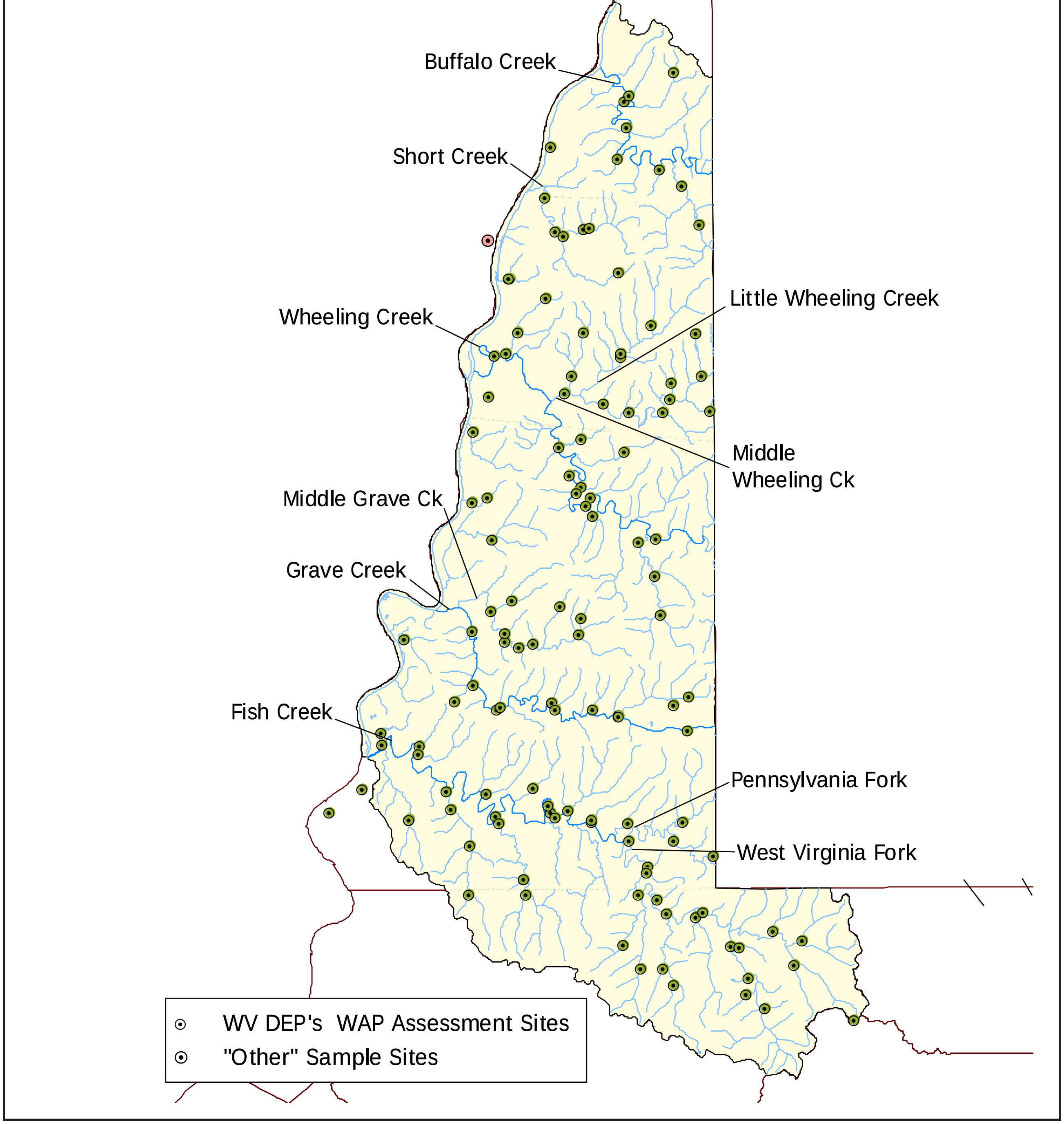
The Upper Ohio River South watershed (HUC # 05030106) is located in West Virginia's northern panhandle, and is so described due to the fact that its tributaries drain directly into the Ohio River. The watershed occupies a relatively narrow tract in the state and drains approximately 385 square miles of mostly forested land between the borders of Ohio and Pennsylvania. The rolling hills characteristic of the Western Allegheny Plateau serve as the watershed's hydrologic boundaries to the north and south; whereas, the political borders of Pennsylvania and Ohio are found to the east and west, respectively. The watershed is bordered by three other watersheds—the Upper Ohio River North watershed (north), the Middle Ohio River North watershed (south), and the Dunkard Creek watershed (west).

Three major tributaries to the Ohio River are located within the watershed, and have a drainage area of at least 50 square miles. The tributaries and their respective drainage areas are as follows: Buffalo Creek (49 mi^2), Wheeling Creek (135 mi^2), and Fish Creek (200 mi^2). Flowing primarily from east to west, these tributaries reach the mainstem Ohio River and are somewhat impounded as a result of the managed navigation system. The Ohio River, which originates at the confluence of the Monongahela and Allegheny Rivers at Pittsburgh, Pennsylvania, flows 981 miles in a southwesterly direction to its mouth at Cairo, Illinois. The creation of such slackwater stretches at the mouth of tributaries can greatly change the overall stream dynamics, which includes the diversity and abundance of the resident biota.

Land use within the Upper Ohio River South watershed is considered mostly forested; however, areas of urban expansion and industrial activities heavily impact the landscape. In reference to industrial land uses, coal mining, oil and gas production/extraction, and timbering are each found throughout the watershed, but are rather sporadic in occurrence. Agricultural development can also be viewed within the watershed because of the low-lying, rolling nature of the topography. Large, broad valleys bordered by shallow-sloped ridges provide adequate terrain for cultivation, pasture, and hay production. The dominant forest type or natural vegetation classification within the watershed is Appalachian oak.

Only one EPA (Level III & IV) designated ecoregion is found in the Upper Ohio River South watershed. Ecoregion 70a, the Permian Hills, is slightly more rugged, more forested, and cooler than the conditions typically prevailing throughout Ecoregion 70, the Western Allegheny Plateau. A component of ecoregional designation—along with many, many others—is the type of soil occurring in a given area or ecoregion. The soils in the Upper Ohio River South watershed are underlain by

Figure 26. Upper Ohio River South Watershed



Permian sandstone, shale, limestone, and coal of the flat-lying Green and Washington formations. The soils themselves are derived from residuum and are typically Alfisols.

Pollution in the form of acid mine drainage, sedimentation, agricultural runoff, and residential waste impacts the water quality in the watershed. Also, several coal-fired power stations and other large industries, including steel manufacturing and petroleum production, reside within the

Upper Ohio River South Watershed

Figure 27a. Summary of Individual Use Support

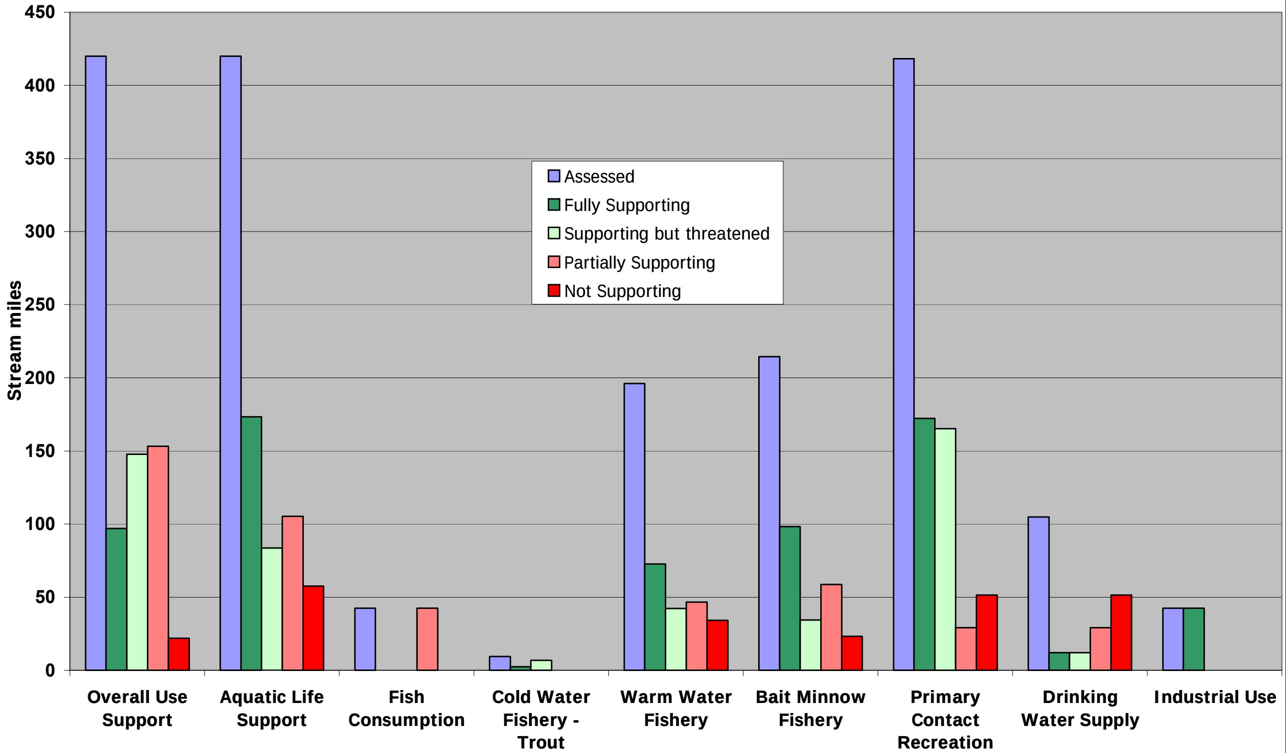


Figure 27b. Summary of Impairment Causes

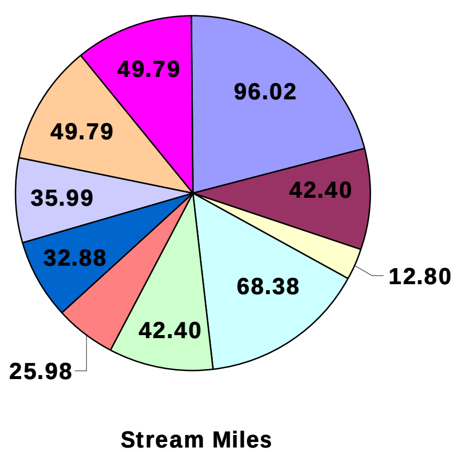


Figure 27c. Summary of Impairment Sources

Source Category	Stream Miles
Municipal Point Sources	19.5
Agriculture	4.96
Grazing related Sources	4.96
Resource Extraction	56.21
Petroleum Activities	1
Mine Tailings	3.16
Acid Mine Drainage	18.89
Abandoned mining	33.16
Land Disposal	3.86
Sludge	0.7
Landfills	3.16
Hydromodification	4.86
Channelization	1
Upstream Impoundment	3.16
Habitat Modification (other than Hydromodification)	7.42
Removal of Riparian Vegetation	5.49
Bank or Shoreline Modification/Destabilization	5.49
Source Unknown	143.83

watershed. Situated in regard to Ohio River docking access, these facilities employ thousands of watershed residents and produce electricity for many areas in the eastern United States.

Water Quality Summary

During this reporting period, 108 stream segments totaling 419.78 miles were assessed in the Upper Ohio River South watershed. Figure 26 is a map depicting sampling stations in the watershed, while Appendix A provides a list of these stations. An individual use support summary is given in Table 80.

Of the 419.78 stream miles assessed, 97.06 (23.1%) were fully supporting all assessed uses, 147.73 (35.2%) were fully supporting all uses but threatened for at least one, and 174.99 (41.7%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 419.78 miles assessed for the aquatic life support use, 173.4 (41.3%) were fully supporting, 83.59 (19.9%) were fully supporting but threatened, 105.34 (25.1%) were partially supporting, and 57.45 (13.7%) were not supporting. All 42.4 stream miles assessed for the fish consumption use during this reporting period were partially supporting.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 418.08 miles assessed for the primary contact recreation use, 172.24 (41.2%) were fully supporting, 165.26 (39.5%) were fully supporting but threatened, 29.16 (7%) were partially supporting, and 51.42 (12.3%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the Upper Ohio River South watershed is provided in figure 27b. The principal causes of impairment in the watershed are unknown cause (96.02 miles), metals (68.38 miles), fecal coliform (49.79 miles), and PCBs (42.4 miles).

Relative Assessment of Sources

A detailed summary of the major sources of pollution in the Upper Ohio River South watershed is provided in figure 27c. The principal sources of pollution in the watershed are unknown source (143.83 miles) and abandoned mining (33.16 miles).

Public Health / Aquatic life Impacts

The entire length (42.4 miles) of the Upper Ohio River South mainstem is currently under a fish consumption advisory. The pollutants of concern are mercury, PCBs, and dioxin. A current list of fish consumption advisories is provided in Table 95. No bathing beach or public water supply closures were documented in the watershed during this reporting period.

Section 303(d) Waters

Appendix B includes streams from the Upper Ohio River South watershed that are on the current 303(d) list. Thirty-one streams totaling 170 miles are on the list. Three waterbodies in the watershed have had TMDLs completed (Bear, Burches Run, and Castleman Run lakes).

Information sources

Ohio River Basin Plan. 1988. West Virginia Dept. of Natural Resources, Charleston, West Virginia.

Woods, A. J., J. M. Omernik, and D. D. Brown. 1999. Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. USEPA, Corvallis, Orego

The West Fork River Watershed

Background

From its headwaters in Upshur County, the West Fork River flows 103 miles northward through Lewis, Harrison, and Marion counties until it joins with the Tygart Valley River to form the Monongahela River. Through its journey, the West Fork drains 881 square miles and descends from an elevation of 1,600 feet at its source to 845 feet at its mouth in Fairmont, West Virginia.

Geologically, the West Fork basin (HUC # 05020002) is characterized by alternating layers of sandstone and shale bedrock with layers of limestone bedrock and intermittent coal beds. Bedrock in this region is fairly horizontal which attributes to gentler streambed gradients with slower flow and higher fine sediment deposition. It lies in the Western Allegheny ecoregion (70), which is not as rugged and hilly as the ecoregions to the east. The area was once covered by maple-beech-birch forest but it has been widely developed for use as farmland.

The first white settlers entered the West Fork region sometime between 1760 and 1770. Clarksburg, the largest city in the basin with a current population of 16,743, was first recognized in 1785. Iron manufacturing and timber were the first industries along the West Fork basin. Iron manufacturing ceased around 1870 but gas and oil exploration filled the void. The first railroads in the area were built around 1860 to transport timber and then later, coal, which is now the principal industry in the West Fork basin. In subsequent years, the glass manufacturing industry took hold in the basin as did brick and tile production and stone quarrying. Agriculture was and still is a major part of the economy in this area.

The EPA cites sedimentation as the biggest problem facing the Western Allegheny ecoregion; runoff from mining and agriculture coupled with the gentle stream slopes add up to ample opportunity for sediment deposition. According to the Watershed Characterization and Modeling System (WCMS)[1], the watershed has a significant number of landfills, is peppered by abandoned mine lands, bond forfeiture sites, and has several hazardous and solid waste sites. Acid mine drainage, habitat alteration, and phosphorus are also noted as potential or real threats in this watershed. The West Fork River TMDL for Metals and pH was completed in 2002.

Water Quality Summary

During this reporting period, 204 stream segments totaling 637.33 miles were assessed in the West Fork River watershed. Figure 28 is a map depicting sampling stations in the watershed, while

Appendix A provides a list of these stations. An individual use support summary is given in figure 29a.

Of the 637.33 stream miles assessed, 34.83 (5.5%) were fully supporting all assessed uses, 101.1 (15.9%) were fully supporting all uses but threatened for at least one, and 501.4 (78.7%) were impaired for one or more uses.

Attainability of the fishable goal of the Clean Water Act is determined by assessing the aquatic life support and fish consumption uses. Of the 637.33 miles assessed for the aquatic life support use, 92.23 (14.5%) were fully supporting, 60.5 (9.5%) were fully supporting but threatened, 339.49 (53.3%) were partially supporting, and 145.11 (22.7%) were not supporting. No streams in the watershed were assessed for the fish consumption use during this reporting period.

Attainability of the swimmable goal of the Clean Water Act is determined by assessing the primary contact recreation use. Of the 636.33 miles assessed for the primary contact recreation use, 60.14 (9.5%) were fully supporting, 224.32 (35.2%) were fully supporting but threatened, 339.67 (53.4%) were partially supporting, and 12.2 (1.9%) were not supporting.

Relative Assessment of Causes

A detailed summary of the major causes of pollution in the West Fork River watershed is provided in figure 29b. The principal causes of impairment in the watershed are unknown cause (424.12 miles), metals (380.53 miles), siltation (232.92 miles), and habitat alterations (131.92 miles).

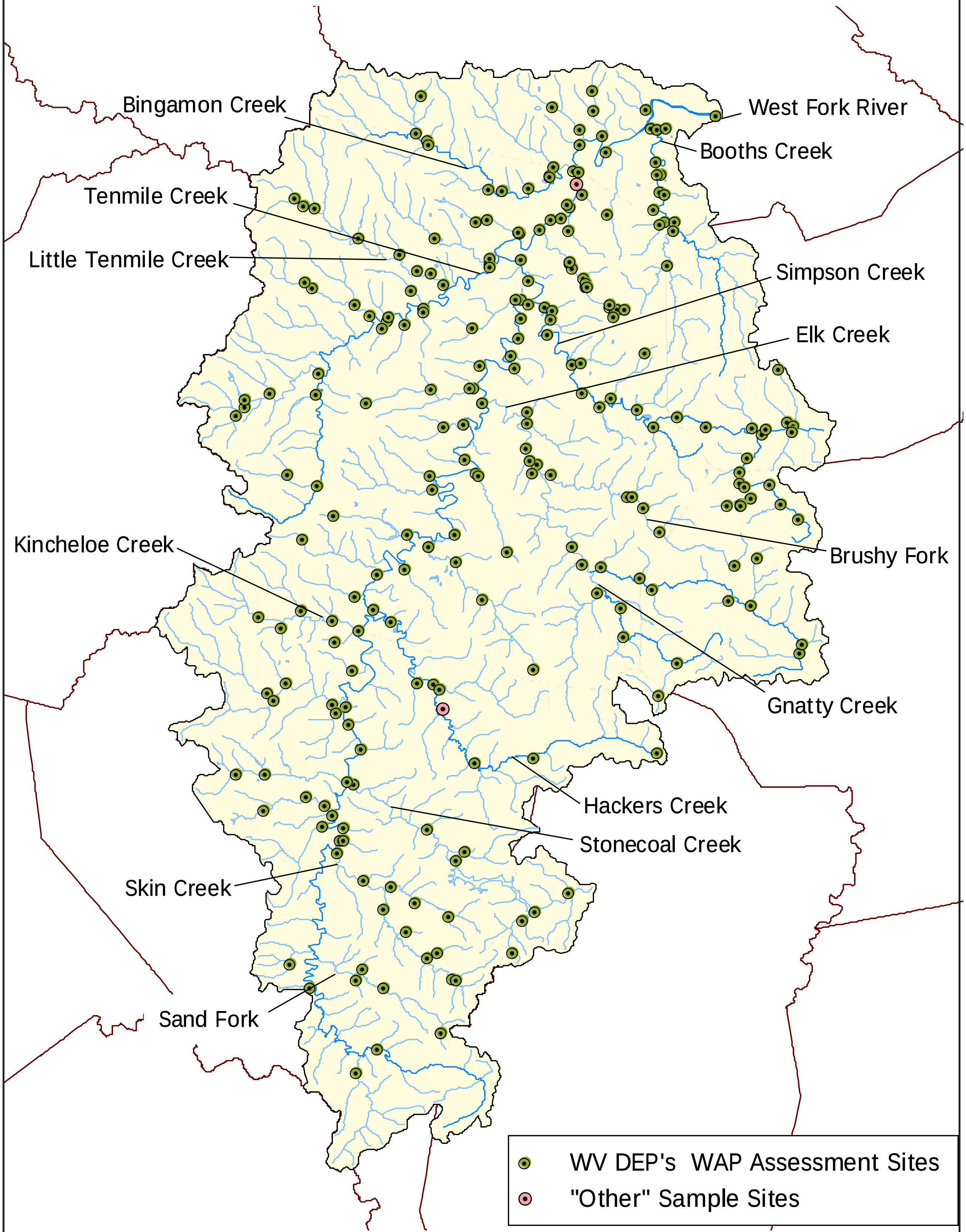
Relative Assessment of Sources

A detailed summary of the major sources of pollution in the West Fork River watershed is provided in figure 29c. The principal sources of pollution in the watershed are abandoned mining (260.05 miles) and unknown source (242.96 miles).

Public Health / Aquatic life Impacts

No streams in the West Fork River watershed are currently under a fish consumption advisory. In addition, no bathing beach or public water supply closures were documented during this reporting period.

Figure 28. West Fork River Watershed



West Fork River Watershed

Figure 29a. Summary of Individual Use Support

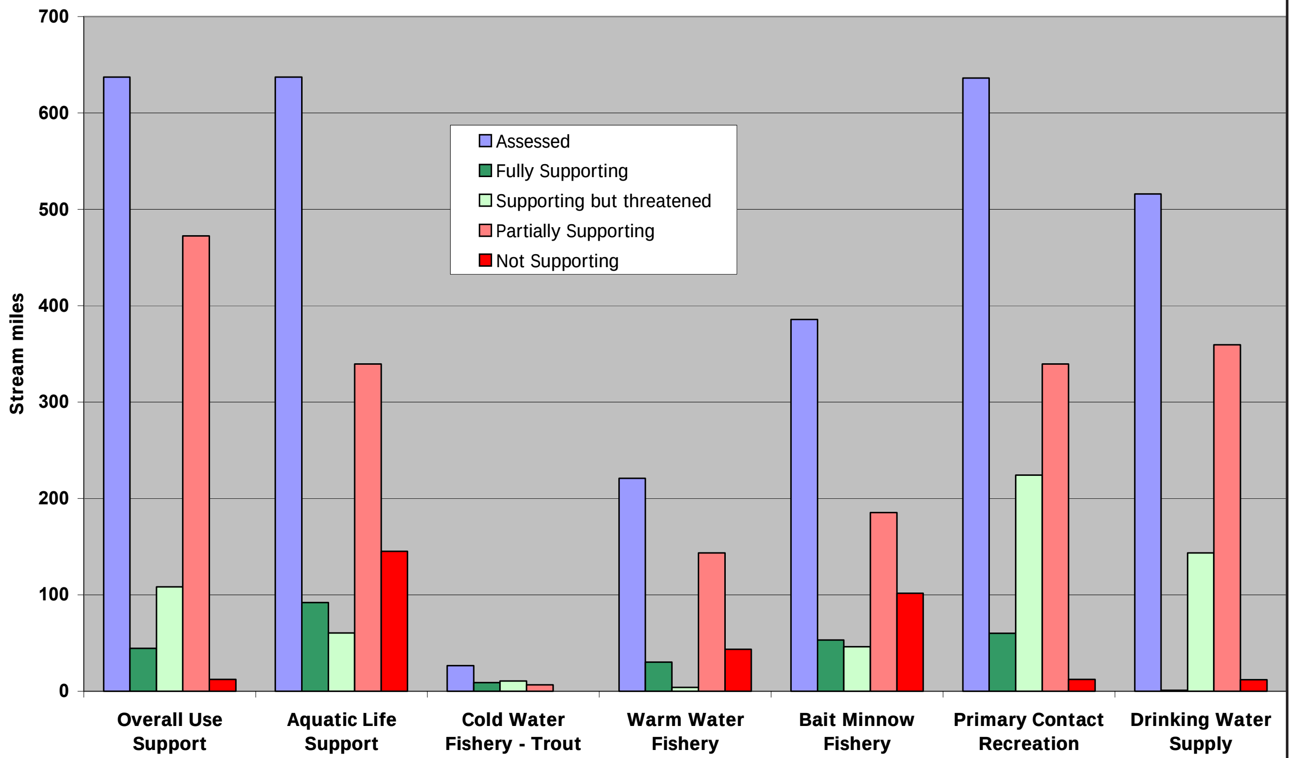


Figure 29b. Summary of Impairment Causes

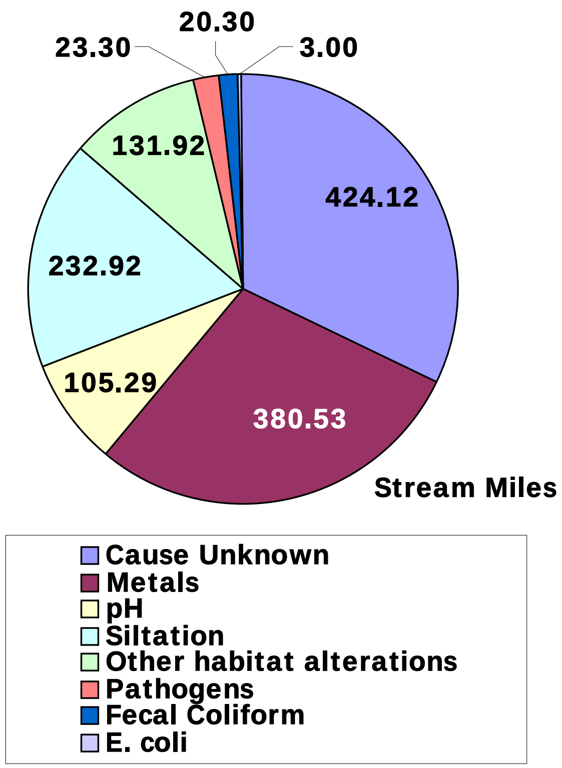


Figure 29c. Summary of Impairment Sources

Source Category	Stream Miles
Agriculture	10.9
Grazing related Sources	10.9
Pasture grazing - Riparian and/or Upland	10.9
Construction	14.6
Highway/Road/Bridge Construction	12.8
Land Development	1
Urban Runoff/Storm Sewers	3.96
Erosion and Sedimentation	3.96
Resource Extraction	353.05
Surface Mining	12.6
Subsurface Mining	1.9
Acid Mine Drainage	166.98
Abandoned mining	260.05
Active Mining	3.2
Land Disposal	7.6
Hydromodification	2.7
Channelization	2.7
Natural Sources	11.6
Source Unknown	242.96

Section 303(d) Waters

Appendix B includes streams from the West Fork River watershed that are on the current 303(d) list. One hundred thirty two streams totaling 597 miles are on the list. **Currently, no 303(d) listed streams in the watershed have had a TMDL completed. (???)**

Information sources

Strager, Michael P., Jacquelyn M. Strager, Jerald J. Fletcher, and Charles B. Yuill. 1999. "Watershed Characterization and Modeling System, Version 2.8" Division of Resource Management, West Virginia University, Morgantown, WV.

Woods, Alan J., James M. Omernik, and Douglas D. Brown. 1999. Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. Corvallis, OR. U.S. Environmental Protection Agency.

West Virginia Department of Natural Resources, Division of Water Resources. 1983. West Fork River Subbasin Abandoned Mine Drainage Assessment. Charleston, WV.

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 contained in this report was broken down by individual watersheds, lake data will be reported as an aggregate due to the fact that only 15 lakes were assessed during this reporting period.

Since the phase out of the federal Clean Lakes Program in 1995, DEP has performed limited monitoring of lakes. The 1996 lakes assessment represents the final assessment of its type under the old Clean Lakes Program. Without a federal funding source for lake monitoring, DEP will no longer be able to perform ambient water quality monitoring of the state's public lakes.   USEPA completed TMDL's on those water quality limited lakes that appeared on the 1996 303(d) list. 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 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 ten of the State's original 13 priority lakes along with five non-priority lakes with potential impairment.

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.

Trophic Status

Trophic State indices for public lakes assessed during this reporting period are given in Table 7. Of the 15 lakes assessed for trophic status, one was classified as oligotrophic (infertile), three

TABLE 7. TROPHIC STATE INDICES (TSI) OF PRIORITY LAKES - SUMMER 1996								
	SECCHI DISK		CHLOROPHYLL A		TOT PHOS			
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	48	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

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 were previously summarized in the 1996 305(b) report. That report may be referenced for details. No additional controls have been implemented since that time.

Restoration Methods

Lake restoration methods were previously summarized in the 1998 305(b) report, which may be referenced for details. During this reporting period, Tomlinson Run Lake and Kanawha State Forest Pond were both drained and dredged.

Impaired and Threatened Lakes

The overall designated use support status for public lakes assessed during this reporting period is presented in Table 8. 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.

A summary of specific designated uses is provided in Table 9. 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.

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

Table 8. Summary of Overall Use Support for Lakes			
Total Number of Lake/Reservoir Assessed:			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	144	144
SUPPORTING BUT THREATENED	0	1845	1845
PARTIALLY SUPPORTING	0	473	473
NOT SUPPORTING	0	0	0
NOT ATTAINABLE	0	0	0
TOTAL SIZE ASSESSED	0	2462	2462

Table 9. Individual Use Support Summary for Lakes (units = acres)

USE	Supporting	Supporting but Threatened	Partially Supporting	Not Supporting	Not Attainable
Overall Use	144	1845	473		
Aquatic Life	144	1845	473		
Cold Water Fishery - Trout		68			
Warm Water Fishery	144	1777	473		
Primary Contact Recreation	732	1730			
Drinking Water Supply		1730			
Industrial		1730			

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 10. Considering both major and moderate/minor impacts, siltation was found to have the greatest impact on lakes, followed by metals, turbidity, and nutrients.

Pollution source categories for lakes classified as less than fully supporting are provided in Table 11. Overall, petroleum activities, agriculture, silviculture, and construction affected the most lake acreage.

Water quality standards promulgated by the State Environmental Quality Board for streams also are applicable to lakes (WV EQB, 1999). 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 dissolved oxygen 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.

Section 303(d) Waters

A list of public lakes that were previously listed on the 1998 303(d) list can be found at the end of Appendix B. These lakes are currently listed in Supplemental Table B (Previously Listed Waters) of the 2002 303(d) list. Nine lakes totaling 193 acres appear on the list. Pollutants common to these lakes are nutrients, siltation, metals, and low dissolved oxygen. Common sources of pollution include domestic sewage, construction, urban runoff, agriculture, and petroleum activities.

TMDL Status

To date, eight TMDL's have been completed on lakes in West Virginia. Four were completed in 1998 (Hurricane, Mountwood Park, Burches Run, and Tomlinson Run). An additional four were finalized in 1999 (Turkey Run, Ridenhour, Castleman Run, and Bear). A TMDL on Saltlick Pond #9 was completed in 2000.
Copies of the completed lake TMDL's are available from DEP's Division of Water Resources, 1201 Greenbrier Street, Charleston, WV 25311, telephone (304) 558-2108.

Table 10. Summary of Causes for Lakes not Fully Supporting Uses

Code	Cause Category	Major impact in Acres	Moderate/Minor impact in Acres
500	METALS	27	232
900	NUTRIENTS	8	80
1100	SILTATION	256	217
1200	ORGANIC ENRICHMENT/LOW DO	8	0
2200	NOXIOUS AQUATIC PLANTS (Native)	8	0
2500	TURBIDITY	0	217

Table 11. Summary of Sources for Lakes not Fully Supporting Uses

Code	Source Category	Major impact in Acres	Moderate/Minor impact in Acres
230	Package Plants (Small Flows)	0	16
1000	AGRICULTURE	46	274
2000	SILVICULTURE	137	0
3000	CONSTRUCTION	65	0
4000	URBAN RUNOFF/STORM SEWERS	27	0
5000	RESOURCE EXTRACTION	153	217
5500	Petroleum Activities	153	217
6000	LAND DISPOSAL	0	16
6800	Raw Sewage	0	27

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

West Virginia State Environmental Quality Board. 1999. Title 46, Requirements Governing Water Quality Standards, Series 1. West Virginia State Environmental Quality Board, Charleston, WV.

PART IV: GROUNDWATER QUALITY

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 West Virginia Legislature on the status of the State's groundwater resources and groundwater management program, including detailed reports from each agency which holds groundwater regulatory responsibility. The fourth Biennial Report to the legislature covering the period from July 1, 1997 through June 30, 1999 was submitted in the fall of 1999.

The DEP's Division of Water Resources is responsible for compiling and editing information submitted for the biennial report. The DEP, the West Virginia Department of Agriculture (DOA), and the West Virginia Bureau for Public Health (BPH) all have groundwater regulatory responsibility and contributed to the 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 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's Division of Water Resources, Technical and Geographic Information System, and Information Technology Office 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. There also is 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 in this regard 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 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 nonpoint 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 BPH 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 2000 Legislature" may be obtained by contacting the Groundwater Program at the Division of Water Resources, 1201 Greenbrier Street, Charleston, WV 25311, telephone (304) 558-2108.

LITERATURE CITED

West Virginia Department of Environmental Protection. 1991. West Virginia Groundwater Protection Act, Chapter 22, Article 12, West Virginia Code.

PART V: WETLANDS

While West Virginia's wetlands (102,000 acres) comprise less than one 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. Permitting authority for activities impacting wetlands (Section 404) lies with the U.S. Army Corps of Engineers. West Virginia ensures protection through an active Section 401 certification program.

No significant changes have occurred in the status of West Virginia's wetlands since submission of the 305(b) report for 2000. This publication is available from the Division of Water Resources, 1201 Greenbrier Street, Charleston, WV 25311, or it may be accessed via the Internet at http://www.dep.state.wv.us.

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.

LITERATURE CITED

Tiner, R. W. 1996. West Virginia's Wetlands, Uncommon Valuable Wildlands. U. S. Fish and Wildlife Service, Ecological Services, Northeast Region, Hadley, MA. 20 pp.

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 Division of Water Resources' primary mechanism for carrying out this program is the WV/NPDES (West Virginia National Pollutant Discharge Elimination System) 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 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. Also, it 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 DWR to correct problems, state rules also provide a pretreatment program in conjunction with the NPDES program with procedures for regulating proposed industrial wastewater connections to publicly owned treatment works (POTWs). This allows DWR to evaluate proposals and require the installation of pretreatment facilities where necessary, or otherwise approve with required conditions.

Each permitted facility is required to monitor its discharges and submit regular reports. As a result of reviewing these reports, where noncompliance exists, administrative actions are generally initiated to obtain compliance. These may include warning letters, notices to comply, enforcement orders, or referrals for civil action.

DWR 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 ensure the analytical information submitted to DWR is accurate.

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 important mechanism to address toxic discharges is the toxicity testing program. This program, formerly run by DEP, was turned over to the EPA's Wheeling field office in 1998. 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 Virginia 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).

DWR 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. The inspector makes a quick assessment of downstream drinking water intakes 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, and 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 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 nonpoint source 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.

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

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

DWR's NPS program supports the overall administration and coordination of the nonpoint source activities through participating state agencies: DEP's Office of Oil and Gas, Environmental Enforcement, Save Our Streams, West Virginia Conservation Agency, and Division of Forestry. DWR also employs two NPS Specialists located in the northern and southern portions of the state to assist with nonpoint source assessment and project identification, implementation and tracking. Each year, there are specific activities funded under the nonpoint source program. Following is a description of the current program components.

Nonpoint Source Program for Agriculture and Construction

The NPS Program for Agriculture and Construction is managed by the West Virginia Conservation Agency (WVCA). This Program, through 12 staff and WV's 14 Conservation Districts located throughout the state, provides technical and educational assistance to the agriculture and construction industries to install and maintain Best Management Practices (BMPs). The Program implements incremental watershed projects to provide financial assistance for BMP installation. The Program also involves organizing training, implementing natural stream restoration projects to reduce sediment from eroding streambanks, developing relationships among cooperating agencies, and making public presentations.

Agriculture Water Quality Loan Program

Loan funds are made available at low interest to landowners for installation of best management practices on farms through DWR's state revolving loan fund (SRF). The Agriculture Water Loan Program coordinator is located at the West Virginia Conservation Agency headquarters. This individual has responsibility for development of the program, which includes implementing and evaluating the state revolving loan fund for the installation of agriculture best management practices. The SRF coordinator works with the local conservation districts, WVCA, DEP, Natural Resources Conservation Service, and the Farm Service Agency (FSA) to effectively manage the use of the SRF.

State Nonpoint Source 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 public toward preventing and correcting water quality problems associated with the harvesting and processing of forest products. In addition, the program deals with problems created by forest fires and repeat fires and enforces the use of management practices under the West Virginia Logging Sediment Control Act.

Nonpoint Source Watershed Resource Center (WRC) at Cedar Lakes

The Nonpoint Source Watershed Resource Center is a cooperative partnership project conducted by the West Virginia Conservation Agency, WV Department of Education, DEP, and the EPA. The main objective of this partnership is to combat NPS pollution in West Virginia and reduce NPS impacts through public education. The NPS WRC provides watershed information as well as information and training on the control of NPS impacts to all individuals and groups that disturb soil. Land users utilizing this facility include urban developers, loggers, farmers, watershed associations, homeowners, earth moving contractors, consulting engineers, people in the resource extraction industry, students, and teachers.

Nonpoint Source Program for Oil and Gas

Recent developments in DWR's Total Maximum Daily Load (TMDL) program indicate that sedimentation from a variety of land uses is a major source of impact to many watersheds in the state. In some areas of high oil and gas exploration, road and site maintenance have been targeted as contributors to the sediment load. The program assesses road and site maintenance in targeted watersheds, identifies responsible parties, encourages compliance with proper practices, and provides training in proper road building and maintenance techniques.

Following are the specific watershed projects currently being funded by the Nonpoint Source Program and the Nonpoint Sources they address:

Cheat River AMD Initiative – acid mine drainage from abandoned mine lands.

Dunloup Creek Watershed Project – domestic sewage, stormwater run-off from construction and development.

North Fork of the South Branch Potomac Incremental Water Quality Project – agriculture, streambank erosion, forestry.

Paint Creek Watershed AMD Initiative – acid mine drainage from abandoned mine lands.

Robinson Run of Old Town Creek Incremental Watershed Project - agriculture.

Sourcing Fecal Bacteria in Ground Water and Surface Water of Berkeley County, WV.

Spring Creek of the Little Kanawha Incremental Watershed Project – agriculture, forestry, domestic sewage, streambank erosion, and oil and gas.

Upper Buckhannon River, Finks Run and Pecks Run Watershed Project – agriculture, acid mine drainage, domestic sewage, oil and gas, and general sedimentation from a variety of land uses.

Chapter Three: Cost / Benefit Assessment

The improvement in water quality due to the installation of new and upgraded municipal wastewater systems has been significant since 1972 when the Water Pollution Control Act Amendment was passed by Congress. Between 1972 and 2001, 341 wastewater systems received funding provided by the DEP's Construction Assistance Program. From 1972 to 1990 the major funding provided was from the EPA Construction Grants Program totaling $668 million in grant funds to 200 projects. From 1990 to 2001, the major funding provided was from the Clean Water State Revolving Fund (SRF) low interest loan program and this totaled $281 million in loan funds to 138 projects. During the specific reporting period of July 1999 to July 2001, 37 wastewater projects were funded by the SRF program totaling $116 million in closed loan agreements.

In addition to the traditional municipal wastewater projects that have always been funded by the DEP, in FY98 a new nonpoint source pollution control program was created under the SRF program called the West Virginia Agriculture Water Quality Loan Program. This program has provided over $3 million for the installation of agriculture best management practices (BMPs) across the state, with most of the funding going to Grant, Hampshire, Hardy, Pendleton and Mineral Counties. These counties were the original five that participated in the 1998 pilot program before the program was implemented statewide. During the specific reporting period of July 1999 to July 2001, over $1.2 million was provided for agriculture BMPs statewide.

The above funding provided for municipal systems has resulted in a number of them coming into compliance with administrative orders and consent decrees. Some of the utilities have extended sewer service to areas where customers used malfunctioning septic tank systems or had direct discharges to streams. All of these projects have environmental benefits affecting the quality of surface and groundwater. These projects have also corrected a number of health hazards in localized areas. These environmental benefits or results are obvious in some project areas while other projects were completed to prevent a pollution problem from occurring in the future.

In West Virginia, the majority of water pollution control activities (permitting) are administered through various state agencies. DEP's Division 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 certifications, with comments provided by DNR's Wildlife Resources Section. The Division of Mining and Reclamation handles coal related NPDES permits. The Division of Waste Management issues NPDES permits associated with solid waste facilities. The state Bureau for Public Health has input on municipal facilities and oversees all activities associated with home septic systems in cooperation with county sanitarians. The Environmental Quality Board (EQB) establishes water quality standards and acts as an appellate board on some water pollution control activities. The Division 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 2001:

Department of Environmental Protection	
Office of Administration	$4,032,545
Information Technology Office	$2,385,966
Division of Water Resources (includes Revolving Loan Fund)	$130,021,277
Division of Waste Management	$13,263,617
Division of Mining and Reclamation	$13,460,326
Division of Abandoned Mine Lands & Reclamation	$32,859,622
Office of Oil & Gas	$2,360,388
Office of Environmental Enforcement	$2,947,879
Office of Environmental Remediation	$2,679,575
Division of Natural Resources	
Fish Kill Reimbursement	$24,727
Acid Impacted Streams	$75,959
Stream Restoration	$13,050
Bureau for 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, particularly 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, 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: 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 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, TMDL, 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 Division of Water Resources. DEP's Environmental Enforcement (EE) unit oversees 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 Division of Water Resources:

Watershed Assessment Program

Located within the DWR, 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 that participate 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.

WAS uses the U. S. Geological Survey's (USGS) scheme of hydrologic units to divide the State into 32 watersheds (see map, Figure 1). WAS assesses the health of a watershed by evaluating as many of its streams as possible, as close to their mouths as possible. In addition WAS began evaluating random sites in each watershed beginning with group B watersheds in 1997. WAS'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 Assessment Database (ADB).

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,
5. Streams of particular concern to citizens, public officials, and permit writers
6. Potential reference sites, and
7. Natural-reproducing trout streams and other high quality streams on public lands.

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 DWR's ability to plan and e) buffering the assessment process against domination by special interests.

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 WAS developed a special sampling strategy for comparing watersheds. It can be highlighted in a few steps:

C 30-45 stream locations within each watershed are selected randomly from an EPA database.

C Sampling teams visit the sites one time and sample utilizing pre-designed protocols.

C Special statistical analyses allow comparisons among watersheds. (This special watershed assessment strategy was applied to the Group A watersheds when they were revisited in 2001, since the random program had not been established when these watersheds were initially sampled in 1996).

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 experienced a significant change with the creation of the WV Interagency Fish Consumption Advisory Technical Committee in September 2000. The committee, which is chaired by the WV Bureau for Public Health and includes representatives from WVDEP and the WV Division of Natural Resources, is responsible for the development and dissemination of fish consumption advisories. The committee will work with the representative agencies to achieve the following objectives:

- Selection of fish tissue monitoring sites,
- Collection and evaluation of fish tissue contaminants and other data relevant to fish consumption,
- Maintenance of a database of fish species, waterway locations, primary contaminants and contaminant concentrations,
- Implementation of risk-based (public health) fish consumption protocols for use by the general public, and
- Development and implementation of a policy for the effective communication of fish consumption advisory information.

The committee has adopted risk-based advisory protocols and will apply these protocols to future fish contaminant data. The committee also has secured a federal grant for a statewide fish tissue collection project, which will provide an assessment of PCB and mercury contamination. The results of this study should be available by December 2003.

A list of current fish consumption advisories can be found in Table 12.

Table 12. Current Fish Consumption Advisories in West Virginia

Stream/ Advisory Area	Contaminant	One meal/ week	One meal/ month	Six meals / year	DO NOT EAT!
	Species Affected under Current Advisories and Assigned Consumption Categories				
Ohio River, entire length in WV	PCBs Dioxin Mercury	largemouth bass, smallmouth bass, sauger	white bass, hybrid striped bass, freshwater drum,	flathead catfish, channel catfish <17 in. in length	carp channel catfish >17 in. in length
Kanawha River and backwaters, from I-64 bridge in Dunbar to the Ohio River AND Pocatalico River, lower two miles, AND Armour, Manila, and Heizer Creeks	Dioxin		all other fish species		carp, catfish, suckers, hybrid striped bass
Shenandoah River, entire length in WV					carp, suckers, channel catfish,
Potomac River, entire length in WV AND North Branch of Potomac River, from Luke MD to mouth	Dioxin				non-sport fish species (suckers, etc.)
Flat Fork Creek (KP-33), Roane Co. entire length	PCBs				carp, suckers, channel catfish suckers,

Note: One meal = 1/2 pound of fish

Ambient Water Quality Monitoring

Ambient water quality monitoring is conducted quarterly by the Division of Water Resources at 26 selected stations around the state. Most of these stations are located at the downstream terminus of each of the State's major hydrologic regions. The information gathered is useful in assessing long-term trends and measuring differences between upstream and downstream stations on major Rivers. The data also are of major importance in determining 303(d) listings for these rivers. Chemical constituents that indicate problems associated with sewage, mining, oil and gas extraction, agriculture, and several classes of industries are evaluated at each site.

A list of current sites monitored by representatives of DWR and the Ohio River Valley Water Sanitation Commission (ORSANCO) can be found in Table 13. Eight Ohio River stations are contracted to ORSANCO. These 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 Monongahela River at Pittsburgh.

Total Maximum Daily Load (TMDL) Program

The 303(d) list is used to determine which waters within the State will enter the Total Maximum Daily Load program. Federal law requires the State to develop (TMDL's) for waterbodies that meet the definition of "water quality limited." A TMDL can be defined as a plan of action that is used to clean up polluted waters. The current definition requires the TMDL process to accomplish certain minimum requirements. The TMDL development process, as recommended by EPA, involves the following 5 steps:

1. Selecting a pollutant
2. Estimating the assimilative capacity of the waterbody
3. Estimating pollutant loadings from all sources
4. Using predictive analyses to determine total allowable pollution load (computer modeling)
5. Allocating allowable pollution so that water quality standards are achieved.

Since 1997, EPA Region III has developed West Virginia TMDLs under the settlement of a 1995 lawsuit, *Ohio Valley Environmental Coalition , Inc., West Virginia Highlands Conservancy, et. al. v. Browner, et. al*. While EPA was working to fulfill the requirements of the consent decree, the West Virginia Department of Environmental Protection (DEP) has concentrated on building its own

TABLE 13. Ambient Water Quality Stations			
Watershed Assessment Ambient Water Quality Stations (2000-2001)			
STORET Station	**State Code #**	**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, WV	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	James River at Coonskin Park, above Charleston, WV	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-98-K10	KNG-002	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 at Star City, WV	Monongalia, WV
WA-96-M02	M-01-20	Dunkard Creek below Dolls Run, WV	Monongalia, WV
WA-96-M03	MT-006	Tygart Valley River at Colfax, WV	Marion, WV
WA-96-M05	MC-01	Cheat River below Lake Lynn Dam, PA	Fayette, PA
WA-96-O01	OMI-010	Middle Island Creek at Arvilla, WV	Pleasants, WV
WA-96-M04	MW-012	West Fork River at Enterprise, WV	Harrison, WV
WA-96-M06	MC-32	Cheat River at Albright, WV	Preston, 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, WV	Hampshire, WV
WA-96-S01	S-001	Shenandoah River at Harpers Ferry, WV	Jefferson, WV
Ohio River Sanitation Commission Water Quality Sampling Stations			
(All mile points on the Ohio River are measured from the confluence of the Allegheny River and the Monongahela River at Pittsburgh, PA)			
OR-1	OR9408M	Ohio River at East Liverpool, OH, MP 40.2	Columbiana, OH
OR-2	OR8968M	Ohio River at Pike Island Lock, WV, MP 84.2	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	Pleasants, WV
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, WV, MP 279.2	Mason, WV
OR-8	OR6741M	Ohio River near Huntington, WV, MP 306.9	Cabell, WV

TMDL program. A TMDL stakeholder group was created and with its help funding was secured from the legislature for creation of a TMDL program within the Division of Water Resources. The TMDL section is committed to implementing a TMDL process that reflects the requirements of TMDL regulations, provides for achievement of water quality standards, and ensures ample stakeholder participation is achieved in the development and implementation of TMDLs.

The Division of Water resources has initiated a new approach that will take 48 months to develop a TMDL from start to finish. This approach will enable the agency to undertake extensive data collection, compilation and generation efforts to produce scientifically sound TMDLs. Additionally, ample time will be provided for modeling, report writing and numerous opportunities for public participation in the TMDL process. This process has already begun for TMDLs scheduled for development in 2004 and 2005. An up to date list of waters with completed TMDLs can be found in West Virginia's 2002 303d listing document. In addition, the 2002 303d list contains projected years for TMDL development for each stream currently listed as impaired by West Virginia.

Citizens Stream Monitoring Program

During the year 2000, long-time program coordinator Alvan Gale accepted the position of Nonpoint Coordinator with WVDEP's Nonpoint Source Pollution Program. Alvan, with the help of many dedicated volunteers built a successful citizen's volunteer stream monitoring program, each year adding new protocols and increasing outreach throughout the state. The number of surveys submitted by volunteer stream monitors has steadily increased since 1995 from just less than 100 to nearly 250 in the year 2000. There are now long-term volunteer monitoring efforts in 53% of West Virginia's 32 hydrologic regions. West Virginia Save Our Streams (WVSOS) continues to grow, with this past year and a half resulting in many program firsts. These firsts include the following:

1) WVSOS now provides various levels of training depending upon the experience, interest and skill level of the volunteer groups.

2) WVSOS incorporated rapid bioassessment style protocols into the habitat assessment surveys.

3) WVSOS information is now available on the Internet, linked both to the Division of Water Resources web page and to the American Rivers web page. American Rivers provides WVSOS survey forms (all levels), the WVSOS stream assessment protocols, and WVSOS techniques for conducting a watershed survey, all in Adobe Acrobat format. The information can be downloaded at http://www.amrivers.org/streamrestorationtoolkit/sampledoc.htm.

4) WVSOS has formed new partnerships with organizations such as Trout Unlimited and several

West Virginia Isaac Walton League Chapters.

5) WVSOS introduced wetland monitoring procedures for volunteers and is working towards publishing a wetland manual specifically designed for West Virginia's wetlands. WVSOS held the inaugural Volunteer Monitoring Roundtable. The event included several quality presenters, provided hands-on advanced training tips in habitat survey techniques and gave a forum for volunteer suggestions and questions regarding future program directions. The result was a new advanced WVSOS Streamside Bioassessment Manual.

6) WVSOS recently introduced advanced streamside survey techniques, which include a variety of stream biotic indexes. These indexes are integrated into a single bioassessment score. This method provides a better overall assessment of stream conditions. The bioassessment scores are calculated by WVSOS based upon the total numbers of macroinvertebrates and the number of types (family estimates) reported by the volunteer monitors.

7) WVSOS participated in and presented at several regional workshops and roundtables, which brought together state representatives from all across the mid-Atlantic region. WVSOS was an active participant in several training sessions held by the West Virginia Watershed Network. Table 14 provides a summary of stream workshop statistics over the past two years.

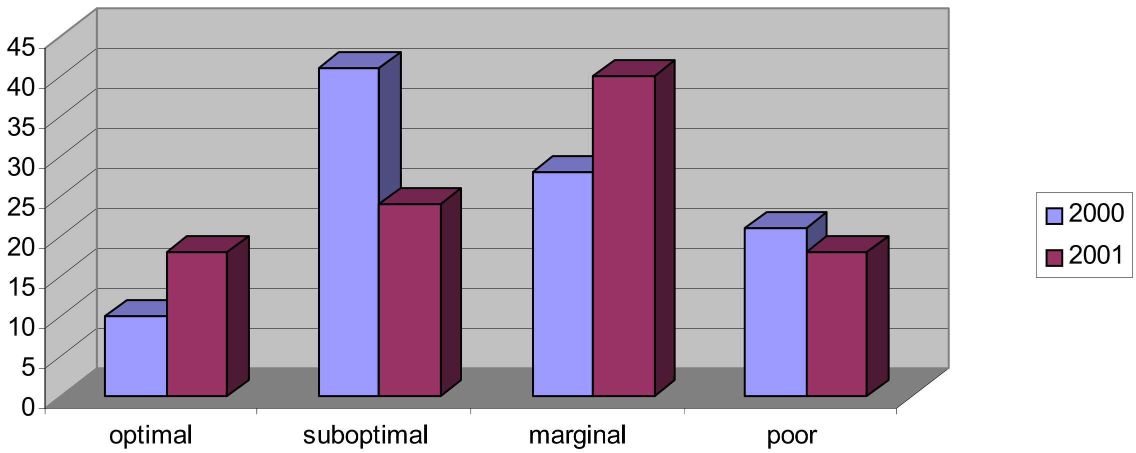
Table 14 – SOS Stream Workshops

2000 Stream Monitoring Workshops			2001 Stream Monitoring Workshops		
Basic	Advanced	Total	Basic	Advanced	Total
16	1	17	30	10	40
Number of Participants - 847			Number of Participants - 1354		

WVSOS trains volunteer monitors to evaluate a variety of parameters when completing a streamside survey. This type of survey represents a summary of the physical and biological features of a visual-based habitat assessment and their relationship to, and influence on, the stream's conditions. The quality of the physical habitat of the stream's channel and the surrounding riparian zone as it relates to unimpaired streams of similar site-specific and regional characteristics, provides an estimate of the stream's general conditions.

Two important parameters to consider when evaluating the stream's channel habitat are sediment deposition and embeddededness. Embeddedness refers to the extent which rocks (gravel, cobble, and boulders) are covered by or sunken into silt, sand or mud. Embeddedness is the result of large-scale sediment movement and deposition. Sediment deposition, a similar parameter to embeddedness, refers to the amount of sediment that has accumulated and the changes that have occurred in the stream channel as a result. The bar graphs below shows optimal through poor conditions of sediment deposition and embeddedness from volunteer surveys in 2000 and 2001.

Figure 30.   Stream Sediment Deposition

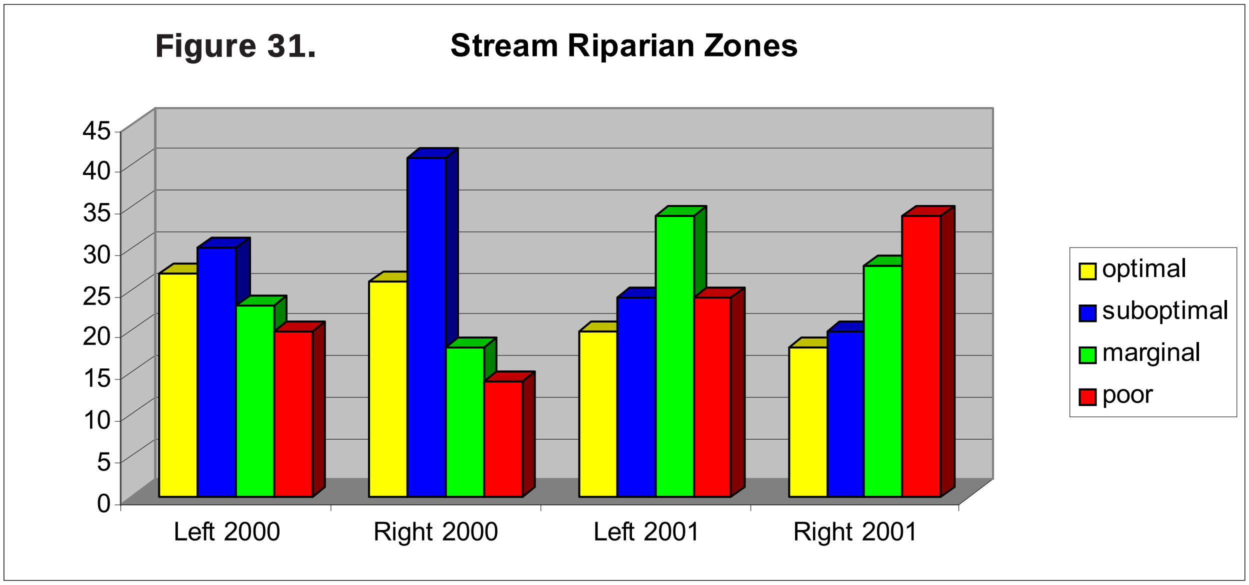


60% of the stream's surveyed in 2000 were affected by embeddedness (marginal and poor categories), while 44% were affected in 2001. 49% of the stream's surveyed in 2000 were affected by sediment deposition (marginal and poor categories), while 58% were affected in 2001.

Several factors contributed to the differences in embeddedness and sedimentation from 2000 to 2001. The floods of 2001 were probably the greatest single contributor in streams throughout much of West Virginia (particularly southern sections). The flooding resulted in an increase in sediment deposition (more sediment from surrounding land brought by overland flow) and a decrease in embeddedness due to the scoring action of increased flows. Another important factor is increased development in the floodplains surrounding our rivers and streams resulting in a greater overall sediment load to the streams.

The evaluation of riparian zone characteristics is another important factor in determining the health of a stream. Volunteer monitors reported relatively good riparian conditions in 2000, while 2001 showed an overall deterioration of riparian conditions. The bar graph below shows comparisons between right and left buffer zones for 2000 and 2001. Nearly 62% of the stream's surveyed by volunteer monitors in 2000 fell into the optimal or sub-optimal categories for adequate riparian protection, while 2001 showed an overall decrease in riparian protection and 60% of the stream's surveyed fell into the marginal or poor categories.

The results from the habitat assessments help to understand and interpret benthic macroinvertebrate data. When compared to various parameters clear trends begin to emerge.



Overall, based upon the above information, there was slight deterioration in stream conditions from 2000 to 2001. Therefore, it follows that the stream scores, which are based upon the macroinvertebrate counts, show a similar trend. Table 15 shows the stream scores from volunteer surveys reported in 2000 and 2001.

Table 15 – SOS Stream Scores

Stream Index Scores 2000				Stream Index Scores 2001			
Optimal	Suboptimal	Marginal	Poor	Optimal	Suboptimal	Marginal	Poor
30.9	34	20	15.1	8.4	38.3	35	18.3
Overall average score = 21.8				Overall average score = 18.2			

Stream Bioassessment Rating Scale			
Optimal	Suboptimal	Marginal	Poor
30 or more	29 - 20	19 - 11	10 or less

In 2000 65% of the stream's surveyed fell into the optimal or sub-optimal categories and the average stream score was suboptimal. In 2001 only 46.7% of the stream's surveyed fell into the optimal and suboptimal categories and the average stream score was only marginal.

Volunteer monitors also evaluate land uses when completing streamside surveys. Varying degrees of investigation from windshield surveys, to stream walks, to background knowledge to various combinations of information accompany every streamside survey submitted to the coordinator. WVSOS encourages all volunteer monitors to incorporate a comprehensive watershed survey into their monitoring program. Table 16 shows the top ten percentages of land uses in 2000 and 2001.

Table 16 – SOS Land Uses			
Top Ten Land Uses Reported by Volunteer Stream Monitors for 2000		**Top Ten Land Uses Reported by Volunteer Stream Monitors for 2001**	
Pasturelands	41%	Pasturelands	33%
Residential development	35%	Recreational activities	27%
Mining	33%	Residential development	26%
Active construction	29%	Mining	20%
Logging	26%	Logging	16%
Recreational activities	26%	Active construction	15%
Urban stormwater	20%	Oil and gas wells	13%
Croplands	13%	Pipes and drainage ditches	12%
Oil and gas wells	5%	Croplands	12%
Trash	2%	Urban stormwater	6%
Totals reported are based upon 200-surveys.			

The citizens monitoring program continues to grow, providing quality hands-on educational opportunity for elementary and high schools, several schools are integrating WVSOS program protocols into their science curriculums, and provide training opportunities and equipment for accurate high-quality volunteer assessment of West Virginia's wadeable streams and rivers. WVSOS will continuously strive for program improvements and offer volunteers the opportunity to affect program development and help create a better citizens volunteer stream monitoring program.

Chapter Five: Special State Concerns and Recommendations

SPECIAL STATE CONCERNS

Following is a list and description of the state's major concerns regarding water quality and pollution control.

Abandoned Mine Drainage

This is the most serious water quality problem facing the State affecting at least 488 streams totaling over 2,800 miles. Mine drainage streams are impaired by low pH and/or elevated concentrations of metals, including iron, aluminum, and manganese. Many of these streams also exhibit biological impairment. TMDLs have been developed for mine drainage-impaired streams in the Cheat River, Tygart River, Paint Creek, Elk River, Buckhannon River, and Stony River watersheds. In these watersheds, restoration through TMDL implementation is now the focus.

TMDL development for numerous impaired waterbodies in the Monongahela River, Tug Fork River, and West Fork River watersheds are scheduled to be completed by the end of September 2002. Remaining watersheds with mine drainage impairment will be addressed by TMDLs prior to the end of March 2008.

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. The State Revolving Fund Program tried to partner with the Raleigh County Health Department to use the low interest loan funds for repair and replacement of failing septic tanks to low-income homes. Although three loans were made, the program could not find a willing, stable financial partner in the county and currently the program is under review for changes.

Combined Sewer Overflows

There are currently 56 permitted CSO communities in West Virginia that have 719 outfalls. These communities are located throughout the State and discharge to the major rivers including the Ohio, Kanawha, Monongahela, and Guyandotte as well as their tributaries. The DEP is currently reviewing Long-Term Control Plans and Water Quality Studies submitted by these communities. Long-Term Control Plans have been approved thus far for the towns of Beckley, Morgantown, and Dunbar. CSO systems are inspected by DEP independently and also joint inspections with EPA Region III and/or ORSANCO are conducted.

Concerns include CSOs located along rivers used for recreational purposes. Many of West Virginia's larger rivers are used for water contact recreation. It is important to educate the public about CSOs when using these recreational areas. The major concern is the effect of CSOs on water quality. Preliminary results have indicated smaller streams are affected more than the larger rivers. Long term planning for many cities has tried to reduce the number of CSOs or discharges on these smaller streams. West Virginia so far has identified funding needs of over $900 million to minimize CSO impacts statewide.

Fecal Coliform Impairment

Traditionally West Virginia has been reluctant to list waters impaired by fecal coliform from human sources on its 303(d) list, rationalizing that this is primarily an enforcement issue and that the TMDL program was not the proper mechanism to address domestic sewage issues. However, the TMDL stakeholder committee recommended that the DEP list streams impaired by fecal coliform when it possesses data showing impairment. The DEP has honored the committee recommendation and, as such, the draft 2002 Section 303(d) list contains a number of streams with fecal coliform impairment. The DEP will continue to list streams for fecal coliform impairment in the future should the data warrant.

Nutrient Criteria Development

As a result of the 1994 and 1996 National Water Quality Inventory Reports to Congress citing nutrients as one of the leading causes of water quality impairment, a major clean water initiative (Clean Water Action Plan) mandated that states reduce nutrient over-enrichment. To address this mandate, each state is required to develop appropriate nutrient criteria as part of their individual state water quality standards by 2004. To initiate this effort, EPA recently developed waterbody type guidance documents and recommended criteria that each state might use in their individual criteria development processes.

In June 2002, the State Environmental Quality Board created a Nutrient Criteria Development Workgroup to prepare a State plan for criteria development as well as ultimately recommend appropriate criteria to protect West Virginia's waters from impairment. Additionally, the workgroup must address West Virginia's contributions to impairment of downstream waters (e.g., the Chesapeake Bay and the Gulf of Mexico).

Water Quality Impacts from Nonpoint Sources

In West Virginia, nonpoint source water quality impacts continue to be a source of impairment. Runoff from a variety of land disturbing activities, such as agriculture, timbering, and construction projects carries pollutants, such as excess nitrogen and phosphorus from fertilizers, animal wastes, pesticides, and petroleum products from heavy machinery into adjacent waterways. Siltation associated with the runoff also adversely impacts beneficial uses of the State's streams. Many of the streams being listed on the State's list of impaired waters are affected by nonpoint sources. In fact, the majority of the TMDLs being developed involve nonpoint source water quality impacts.

To more effectively respond to TMDL implementation needs, the Nonpoint Source Management Plan was updated in 2000 to incorporate watershed management principles, including integration of TMDL and Watershed Management Framework scheduling. That integration has already proven beneficial in the State's eastern panhandle where TMDLs were completed in the mid-1990's for bacteria associated with agricultural animal wastes. Through the Nonpoint Source Program, partnerships with state and federal agriculture agencies, and the DEP's State Revolving Fund (SRF), over $18 million has been spent implementing best management practices to address agricultural water quality impacts in the Potomac and its tributaries. Concurrently, the State has decided to participate with partner states draining into the Chesapeake Bay to address water quality impacts from nitrogen, phosphorus and sediment.

These examples emphasize the need for the existing nonpoint source programs promoting voluntary installation of best management practices to be more focused on identified priority watersheds. Also, enforcement of water quality violations from nonpoint source activities should be used as necessary to encourage compliance. Continuation and expansion of the agency's use of SRF loans for additional nonpoint source problems, such as failing septic system rehabilitation, also would be beneficial. An issue that remains is the ability to characterize when a stream is impaired by sediment, as there are no specific sediment criteria written in the State's water quality standards. In absence of sediment criteria, assessment personnel have used surrogate indicators (e.g. total iron, total aluminum, and biological impairment) as a means to relate water quality impairments to the excessive sediment loads a stream may be carrying. The DEP believes enhanced criteria would make sediment control more understandable, enforceable and effective.

Total Maximum Daily Loads (TMDLs)

Since 1997, EPA Region III has developed West Virginia TMDLs under the settlement of a 1995 lawsuit, *Ohio Valley Environmental Coalition , Inc., West Virginia Highlands Conservancy, et. al. v. Browner, et. al*. While EPA has worked to fulfill the requirements of the consent decree, the DEP has concentrated on building its own TMDL program. A TMDL stakeholder group was created in 1999 and with its help funding was secured from the legislature for creation of a TMDL program within the Division of Water Resources. The TMDL section is committed to implementing a TMDL process that reflects the requirements of TMDL regulations, provides for achievement of water quality standards, and ensures ample stakeholder participation in the development and implementation of TMDLs.

The Division of Water resources has initiated a new approach to TMDL development that will take 48 months from start to finish. This approach will enable the agency to undertake extensive data collection, compilation and generation efforts to produce scientifically sound TMDLs. Additionally, ample time will be provided for modeling, report writing and numerous opportunities for public participation in the TMDL process. This process has already begun for TMDLs scheduled for development in 2004 and 2005.

Concentrated Animal Feeding Operations

Since discussions ensued on the merits of permitting Concentrated Animal Feeding Operations (CAFOs) under the NPDES program (47 CSR 10-13), no facility, to date, has been determined to meet the requirements for permitting under these rules. The State's two major horse racing operations have been evaluated to determine if they are CAFOs. Both operations are sending their sewage to POTWs, while the manure is being stored where runoff will not result. The manure is subsequently being transported for disposal. Thus, as only routine storm water runoff is left to be addressed under their permits, they are not classified as CAFOs.

CAFOs are a unique type of industry in that they may or may not be considered point sources subject to NPDES requirements depending on a number of factors (e.g., whether the operation has continuous overflow watering or has a liquid manure handling system, how storm water can be defined, as well as numbers and types of animals confined). The agency has discretion to designate any animal feeding operation as a CAFO if it is determined to be a significant contributor of pollution.

Agency-conducted surveys recently resulted in a document entitled "Greenbrier Watershed AFO/CAFO Initiatives" put together by DEP-Environmental Enforcement, a major goal of which was to insure that all animal feeding operations develop and implement Comprehensive Nutrient Management Plans (CMNPs). Targeted sampling and site reviews resulted in the forwarding of nineteen follow-up letters, over half of which included Notices of Violation stating deficiencies observed at the survey sites and requesting correction and documentation. Inspections and enforcement efforts in the Potomac region have also resulted in several cattle feedlot improvements in Hardy County and an enforcement action initiated in Hampshire County in 2002.

In January of 2001, EPA proposed to revise the federal rules by redefining which operations are subject to CAFO requirements. The definition of CAFO also was revised to include both the production areas as well as the land application areas under control of the CAFO owner or operator.

Many CAFO categories have proposed changes, including all types of poultry operations regardless of the type of manure handling system or watering system used. One new provision requires application of manure only at a rate calculated to meet nitrogen and phosphorus requirements. CAFOs that are under Best Available Technology (BAT) are proposed to achieve zero discharge to groundwater in a production area that has a hydrologic connection to surface water, and operators must develop nutrient management plans for both the production and land application areas. Furthermore, EPA has clarified its interpretation of the agricultural storm water exemption as well as the implications for land application of manure both on or off site.

Notices of data availability on the proposed rule have subsequently been published in the Federal Register in November of 2001 and July 2002 for public comment. Final action on the proposed rule is scheduled for December 15, 2002.

Biological Monitoring and Associated 303(d) Listings

Since inception of the Watershed Assessment Program (renamed as Watershed Assessment Section in 2001) in 1995, much emphasis has been placed on measuring stream health using Rapid Bioassessment Protocols. Refinement of reference conditions, index periods and sampling precision allowed the development of the West Virginia Stream Condition Index (WVSCI). The primary mechanism employed in West Virginia today for assessing aquatic life use support is the rating of benthic macroinvertebrate communities using the WVSCI.

Biological monitoring has resulted in over 600 listings of biologically impaired waters on West Virginia's draft 2002 Section 303(d) list. Those listings represent an enormous TMDL development workload, and TMDL development for biological impairment is complicated by the need to identify causative sources and link those sources and other watershed stressors to a biological endpoint. West Virginia urges EPA and Congress to apply financial resources to the development of technical tools needed by West Virginia and other states to meet biological impairment TMDL development challenges.

It is likely that biological impairment TMDLs will identify precipitation-induced sedimentation and instream and riparian habitat destruction as significant stressors. Restoration may depend upon the application of nontraditional remedies (e.g., riparian buffer zone establishment) by entities not subject to regulatory programs (e.g., homeowners). West Virginia urges EPA and Congress to create/expand financial assistance programs for environmental restoration to assist in the implementation of these TMDLs.

Data Management

For many years EPA's STORET mainframe data system was used by numerous agencies, both state and federal, as an outstanding repository for stream related information. Beginning in 1998 (timing coinciding with the discontinuation of the legacy STORET System, and initiation of the STORET X system) many agencies began to abandon their faithfulness to this system. This abandonment has taken a very effective tool away from state assessment personnel. No longer can information from ORSANCO, USGS, U.S. Army Corps of Engineers, etc. be found on the STORET system. It is believed that many agencies have elected to build their own data systems as EPA budget cuts caused delay after delay in implementing the new STORET system. The new system is still far from being fully implemented, meanwhile state personnel search out information that was once centralized, piecemeal from the individual agencies and programs.

West Virginia strongly urges EPA to make the STORET system as credible and effective as it once was. The State urges EPA to seek commitments from all former STORET participants to again contribute information to the STORET system.

RECOMMENDED IMPROVEMENTS FOR WATER RESOURCE MANAGEMENT

In 1997, the DEP along with nine 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 intended to provide a watershed focus for all participating agencies and to establish mutual priorities for remediation and protection projects. Recognizing that the resolution of water quality and other environmental issues often requires the application of multi agency authorities and resources, the WMF partners committed to identifying watershed projects in which 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 WAS 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 WAS provide a logical vehicle for multi agency involvement in water resources management. Identification of water quality problems, and development of management strategies to address water quality issues, mesh well with the issues confronting the State in the next several years. TMDLs, anti-degradation, nutrient criteria development, endangered species and implementation of nonpoint strategies must be cooperatively addressed at the state level by these agencies with the authority and responsibility to achieve positive results.

The State has recognized that effective water resources (environmental) management cannot be achieved by a single entity. It requires the participation and cooperation of multiple interests, including local input. The WMF provides the mechanism to address these challenges.

Appendix A. Sample Sites

Table A1. Sampling Locations for Greenbrier River Watershed 1995-2000

Station ID*	Location	AN CODE
KNG-000-001.4	Greenbrier River at Hinton	WVKN-46-{1.4}
KNG-000-001.8	Greenbrier River in Hinton	WVKN-46-{1.8}
KNG-000-002.0	Greenbrier River above Hinton	WVKN-46-{2.0}
KNG-000-002.8	Greenbrier River east of Hinton	WVKN-46-{2.8}
KNG-000-005.5	Greenbrier River west of Hilldale	WVKN-046-{005.5}
KNG-000-015.5	Greenbrier River below Talcott	WVKN-46-{15.5}
KNG-000-018.7	Greenbrier River above Lowell	WVKN-46-{8.7}
KNG-000-028.9	Greenbrier River in Alderson	WVKN-46-{28.9}
KNG-000-033.0	Greenbrier River southwest of Fort Spring	WVKN-46-{33.0}
KNG-000-039.0	Greenbrier River at Fort Spring	WVKN-46-{39}
KNG-000-044.4	Greenbrier River at Ronceverte	WVKN-46-{44.4}
KNG-000-052.4	Greenbrier River above Caldwell	WVKN-46-{52.4}
KNG-000-062.5	Greenbrier River above Keister	WVKN-46-{62.5}
KNG-000-073.0	Greenbrier River at Spring Creek	WVKN-46-{73.0}
KNG-000-081.3	Greenbrier River Falling Spring	WVKN-46-{120.8}
KNG-000-093.2	Greenbrier River at Denmar	WVKN-46-{132.1}
KNG-000-119.2	Greenbrier River above Clawson	WVKN-46-{166.6}
KNG-000-121.2	Greenbrier River northeast of Clawson	WVKN-46-{169.9}
KNG-000-126.0	Greenbrier River below Clover Lick	WVKN-46-{174.4}
KNG-000-130.0	Greenbrier River below Stony Bottom	WVK-46—{178.6}
KNG-000-153.9	Greenbrier River below Hosterman	WVKN-46-{194.3}
KNG-007-0001	Wolf Creek east of Buck	WVKNG-7
KNG-011-0001	Stony Creek at Bargers Springs	WVKNG-11-{0.0}
KNG-011-0002	Un. Trib. Stony Creek north of Wayside	WVKNG-11-G
KNG-013-0001	Hungard Creek at Talcott	WVKNG-11-{0.0}
KNG-013-0002	Hungard Creek north of Pence Springs	WVKNG-13-{5.2}
KNG-013-0003	Boone Creek north of Talcott	WVKNG-13-A
KNG-015-0001	Kelly Creek northeast of Lowell	WVKNG-15-{1.8}
KNG-018-0001	Wolf Creek south of Alderson	WVKNG-18-{0.0}
KNG-018-0002	Wolf Creek north of Elmhurst	WVKNG-18-{7.6}
KNG-019-0001	Griffith Creek west Glenray	WVKNG-19
KNG-020-0001	Eagle Branch north of Glenray	WVKNG-20-{1.0}
KNG-022-0001	Muddy Creek at Alderson	WVKNG-22-{0.0}
KNG-022-0002	Muddy Creek west of Ausbury	WVKNG-22-{17.6}
KNG-022-0003	Kitchen Creek west of Ausbury	WVKNG-22-C
KNG-022-0004	Snake Run at Blue Sulphur Springs	WVKNG-22-C-2
KNG-022-0005	Kitchen Creek ne of Blue Sulphur Springs	WVKNG-22-C-{10.0}
KNG-022.7-0001	Davis Spring Run north of Snowflake	WVKNG-22.7
KNG-023-0001	Second Creek north of Hokes Mill	WVKNG-23-{0.0}
KNG-023-0002	Second Creek east of Patton	WVKNG-23-{6.4}
KNG-023-0003	Second Creek at Second Creek	WVKNG-23-{10.4}
KNG-023-0004	Second Creek south of Hollywood	WVKNG-23-{17.4}
KNG-023-0005	Rayburn Draft at Second Creek	WVKNG-23-A
KNG-023-0006	Carpenter Creek east of Second Creek	WVKNG-23-B
KNG-023-0007	Laurel Creek southeast of Second Creek	WVKNG-23-C-{0.0}
KNG-023-0008	Laurel Creek west of Glace	WVKNG-23-C-{5.0}
KNG-023-0009	Archer Fork west of Glace	WVKNG-23-C-1-{1.7}
KNG-023-0010	Kitchen Creek at Gap Mills	WVKNG-23-H
KNG-023-0011	Kitchen Creek east of Gap Mills	WVKNG-23-H-{2.0}
KNG-025-0001	Howard Creek below Caldwell	WVKNG-25-{0.1}
KNG-025-0002	Howard Creek at Caldwell	WVKNG-25

*** Station ID is the identifier from the STORET database, available online, which will allow one to obtain**

Table A1. Sampling Locations for Greenbrier River Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
KNG-025-0003	Howard Creek below White Sulphur Springs	WVKNG-25-{6.2}
KNG-025-0004	Howard Creek southeast of Mapledale	WVKNG-25-{11.2}
KNG-025-0005	Harts Run east of Caldwell	WVKNG-25-B
KNG-025-0006	Dry Run in White Sulphur Springs	WVKNG-25-C
KNG-025-0007	Tuckahoe Run at Greenbrier State Forest	WVKNG-25-C-3
KNG-025-0008	Fletcher Hollow at Greenbrier State Forest	WVKNG-25-C-3-B
KNG-025-0009	Sulphur Lick Run at Mapledale	WVKNG-25-F
KNG-025-0010	Pond Lick Run east of Mapledale	WVKNG-25-F-1
KNG-027-0001	Dodson Branch at Anthony	WVKNG-27
KNG-028-0001	Anthony Creek northeast of Anthony	WVKNG-28-{2.2}
KNG-028-0002	Anthony Creek northeast of Alvon	WVKNG-28-{8.0}
KNG-028-0003	Anthony Creek southwest of Neola	WVKNG-28-{14.5}
KNG-028-0004	Anthony Creek northeast of Neola	WVKNG-28-{17.8}
KNG-028-0005	Laurel Creek northeast of Anthony	WVKNG-28-A
KNG-028-0006	Little Creek north of Alvon	WVKNG-28-D-{1.0}
KNG-028-0007	Fleming Run north of Alvon	WVKNG-28-E
KNG-028-0008	Whitman Draft at Alvon	WVKNG-28-E-1
KNG-028-0009	Whites Draft north of Alvon	WVKNG-28-F
KNG-028-0010	North Fork at Neola	WVKNG-28-P
KNG-028-0011	Onemile Run north of Neola	WVKNG-028-P-1
KNG-028-0012	Meadow Creek at Neola	WVKNG-28-Q-{0.0}
KNG-028-0013	Meadow Creek below Lake Sherwood Area	WVKNG-28-Q-{6.0}
KNG-028-0014	Laurel Run east of Neola	WVKNG-28-Q-1-{0.2}
KNG-028-0015	Laurel Run east of Neola	WVKNG-28-Q-1-{0.3}
KNG-028-0016	Sugar Run northeast of Neola	WVKNG-28-U
KNG-028-0017	Big Run northeast of Neola	WVKNG-28-V
KNG-028-0018	Un. Trib. Anthony Creek north of Lake Sherwood	WVKNG-28-X.2-{0.1}
KNG-029-0001	Laurel Run north of Anthony	WVKNG-29-{0.3}
KNG-030-0001	Spring Creek at Spring Creek	WVKNG-30
KNG-030-0002	Spring Creek north of Renick	WVKNG-30-{12.8}
KNG-030-0003	Spring Creek southeast of Oscar	WVKNG-03-{14.0}
KNG-030-0004	Robbins Run south of Oscar	WVKNG-30-C
KNG-030-0005	Robbins Run south of Greenbrier-Pocahontas Co line	WVKNG-30-C-{4.4}
KNG-030-0006	Rockcamp Branch east of Leonard	WVKNG-30-D
KNG-030-0007	Panther Camp Creek at Leonard	WVKNG-30-E
KNG-030-0008	UNT / Robbins Run at Greenbrier-Pocahontas Co line	WVKNG-30-C-3-{0.8}
KNG-030-0009	Fitzwater Branch at Pocahontas-Greenbrier Co line	WVKNG-30-C-2
KNG-034-0001	Slabcamp Run northeast of Renick	WVKNG-34
KNG-036-0001	Davy Run northeast of Renick	WVKNG-36
KNG-037-0001	Spice Run at Greenbrier-Pocahontas County line	WVKNG-37
KNG-038-0001	Locust Creek south of Denmar	WVKNG-38
KNG-038-0002	Trump Run southwest of Denmar	WVKNG-38-A
KNG-039-0001	Oldham Run south of Beard	WVKNG-39
KNG-040-0001	Laurel Run at Denmar	WVKNG-40
KNG-044-0001	Stamping Creek north of Seebert	WVKNG-44-{0.3]
KNG-044-0002	Bluelick Run northeast of Mill Point	WVKNG-44-B
KNG-046-0001	Chicken House Run south of Watoga	WVKNG-46
KNG-047-0001	Beaver Creek north of Watoga	WVKNG-47
KNG-048-0001	Improvement Lick Run northeast of Watoga	WVKNG-48-{1.6}
KNG-049-0001	Swago Creek at Buckeye	WVKNG-49
KNG-053-0001	Knapp Creek at Marlinton	WVKNG-53-{0.0}
KNG-053-0002	Knapp Creek northeast of Minnehaha Springs	WVKNG-53-{12.4}
KNG-053-0003	Cummins Creek at Huntersville	WVKNG-53-C
KNG-053-0004	Browns Creek at Huntersville	WVKNG-53-D

Table A1. Sampling Locations for Greenbrier River Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
KNG-053-0005	Possum Hollow northwest of Minnehaha Springs	WVKNG-53-E
KNG-053-0006	Douthat Creek at Minnehaha Springs	WVKNG-53-H-{0.5}
KNG-053-0007	Laurel Creek south of Minnehaha Springs	WVKNG-53-H-2
KNG-053-0008	Cochran Creek south of Rimel	WVKNG-53-H-2-A
KNG-053-0009	Widemouth Run south of Rimel	WVKNG-53-H-2-A-6
KNG-053-0010	Mill Run south of Frost	WVKNG-53-V
KNG-053-0011	Moore Run south of Frost	WVKNG-53-X
KNG-053-0012	Moore Run southeast of Frost	WVKNG-53-X-{3.0}
KNG-053-0013	Sugar Camp Run north of Frost	WVKNG-53-Y
KNG-053-0014	Bird Run east of Frost	WVKNG-53-Z
KNG-055-0001	Stoney Creek at Campbelltown	WVKNG-55
KNG-058-0001	Lewis Lick Run west of Thorney Creek	WVKNG-58-{0.8}
KNG-059-0001	Thorney Creek south of Thorney Creek	WVKNG-59-{0.0}
KNG-059-0002	Thorney Creek at Dilley's Mill	WVKNG-59—{6.8}
KNG-059-0003	Thorney Creek northeast of Dilley's Mill	WVKNG-59-{8.8}
KNG-059-0004	Thorney Creek north of Dilley's Mill	WVKNG-59-{9.0}
KNG-059-0005	Little Thorney Creek north of Dilley's Mill	WVKNG-59-D
KNG-059-0006	Un. Trib. Thorney Creek north of Dilley's Mill	WVKNG-59-E
KNG-063-0001	Big Run northeast of Clover Lick	WVKNG-63
KNG-066-0001	Sitlington Creek at Sitlington	WVKNG-66
KNG-066-0002	Sitlington Creek east of Dunmore	WVKNG-66-{5.2}
KNG-066-0003	Thomas Creek west of Dunmore	WVKNG-66-A-{0.9}
KNG-066-0004	Shock Run southeast of Dunmore	WVKNG-66-D
KNG-066-0005	Left Prong east Dunmore	WVKNG-66-E-4
KNG-066-0006	Thorny Branch east of Dunmore	WVKNG-66-F
KNG-068-0001	Deer Creek at Cass	WVKNG-68-{0.0}
KNG-068-0002	Deer Creek at Greenbank Nat. Radio Astronomy Obs.	WVKNG-68-{10.6}
KNG-068-0003	North Fork Deer Creek at Greenbank	WVKNG-68-A
KNG-068-0004	Buffalo Run at Greenbank Nat. Radio Astro. Observ.	WVKNG-68-F
KNG-068-0005	Saulsbury Run at Greenbank Nat. Radio Astro. Obs.	WVKNG-68-G-{3.0}
KNG-070-0001	Leatherbark Run at Cass	WVKNG-790
KNG-070-0002	Leatherbark Run above Cass	WVKNG-70
KNG-075-0001	Allegheny Run at Hosterman	WVKNG-75
KNG-077-0001	Elk Creek south of Durbin	WVKNG-77
KNG-078-0001	East Fork Greenbrier River at Durbin	WVKNG-78-{0.0}
KNG-078-0002	East Fork Greenbrier River above Thornwood	WVKNG-78-{8.2}
KNG-078-0003	East Fork Greenbrier River northeast of Thornwood	WVKNG-78-{9.4}
KNG-078-0004	East Fork Greenbrier River northeast of Thornwood	WVKNG-78-{14.7}
KNG-078-0005	John Run at Frank	WVKNG-78-A
KNG-078-0006	Hawchen Hollow north of Bartow	WVKNG-78-B-{1.6}
KNG-078-0007	Little River south of Thornwood	WVKNG-78-C-{0.1}
KNG-078-0008	Long Run northeast of Thornwood	WVKNG-78-H-1
KNG-078-0009	Grassy Run northeast of Thornwood	WVKNG-78-H-2
KNG-078-0010	Mullenax Run northeast of Thornwood	WVKNG-78-K
KNG-079-0001	West Fork Greenbrier River in Durbin	WVKNG-79-{0.0}
KNG-079-0002	West Fork Greenbrier River north of Braucher	WVKNG-79-{8.4}
KNG-079-0003	Mountain Lick Creek north of Olive	WVKNG-79-A-{1.4}
KNG-079-0004	Braucher Run west of Braucher	WVKNG-79-B.5
KNG-079-0005	Little River northeast of Braucher	WVKNG-79-C-{3.3}
KNG-079-0006	Clubhouse Run northeast of Braucher	WVKNG-79-C-2
KNG-079-0007	Hinkle Run northeast of Braucher	WVKNG-79-C-3
KNG-079-0008	Old Road Run north of Braucher	WVKNG-79-C.5

Table A2. Sampling Locations for James River Watershed 1995-2000

Station ID	Location	AN CODE
J-001-0002	Ewin Run east of Laurel Branch	WVJ-1-A
J-001-0003	Trout Branch at Laurel Branch	WVJ-1-B
J-001-0004	Wilson Branch northeast of Waiteville	WVJ-1-C
J-001-0005	North Fork of Potts Creek north of Waiteville	WVJ-1-D-{0.8}
J-001-0006	North Fork of Potts Creek northwest of Waiteville	WVJ-1-D-{2.7}
J-001-0007	South Fork of Potts Creek northeast of Waiteville	WVJ-1-E-{0.5}
J-001-0009	Crosier Branch southwest of Waiteville	WVJ-1-E-2-{1.7}
J-002-0001	Sweet Springs Creek northeast of Sweet Springs	WVJ-2-{0.0}
J-003-0001	Cove Creek north of Sweet Springs	WVJ-3-{1.2}
J-003-0002	Back Creek north of Sweet Springs	WVJ-3-A-{0.0}

Table A3. Sampling Locations for Little Kanawha River Watershed 1995-2000

Station ID	Location	AN CODE
LK-002-0001	Worthington Creek at Parkersburg	WVLK-2-{0.0}
LK-002-0002	Worthington Creek east of Parkersburg	WVLK-2-{9.2}
LK-002-0003	Holmes Run at Parkersburg	WVLK-2-B
LK-002-0004	Johnson Run east of Parkersburg	WVLK-2-B.5
LK-002-0005	Laurel Fork east of Parkersburg	WVLK-2-F
LK-006-0001	Tygart Creek at Mineral Wells	WVLK-6
LK-006-0002	Green Valley Run southwest of Mineral Wells	WVLK-6-B-2
LK-006-0003	Egypt Run southwest of Mineral Wells	WVLK-6-B-3
LK-006-0004	Holmes Run south of Mineral Wells	WVLK-6-D.3
LK-006-0005	Un. Trib. Tygart Creek north of Rockport	WVLK-6-I.2
LK-006-0006	Rockcamp Run north of Rockport	WVLK-6-J
LK-006-0007	Burns Run west of Rockport	WVLK-6-K
LK-007-0001	Stillwell Creek at Kanawha	WVLK-7
LK-007-0002	Left Fork Stillwell Creek north of Kanawha	WVLK-7-A
LK-007-0003	North Fork Stillwell Creek at Dallison	WVLK-7-F
LK-010-0001	Kites Run southeast of Kanawha	WVLK-10-A-{0.4}
LK-010-0003	Right Fork Kites Run southeast of Kanawha	WVLK-10-A-2
LK-010-0004	Tug Fork at Walker	WVLK-10-B
LK-010-0005	Camp Run north of Walker	WVLK-10-B-1
LK-010-0006	Addis Run east of Deerwalk	WVLK-10-J
LK-011-0001	Cow Run at Slate	WVLK-11-A
LK-011-0002	Snyder Run northwest of Elizabeth	WVLK-11-B-1
LK-020-0001	Cave Run north of Elizabeth	WVLK-20
LK-021-0001	Standingstone Creek southeast of Elizabeth	WVLK-21-{4.4}
LK-023-0001	Horse Run west of Elizabeth	WVLK-23-A
LK-023-0002	Mason Run west of Elizabeth	WVLK-23-B.8
LK-023-0003	Bennett Run southwest of Elizabeth	WVLK-23-D-1
LK-025-0001	Reedy Creek at Palestine	WVLK-25-{0.0]
LK-025-0002	Reedy Creek at Two Run	WVLK-25-{9.2}
LK-025-0003	Rush Run south of Palestine	WVLK-25-A
LK-025-0004	Right Fork Reedy Creek at Zackville	WVLK-25-B-{7.6}
LK-025-0005	Tan Trough southwest of Palestine	WVLK-25-B-1-D
LK-025-0006	Morris Hollow east of Zackville	WVLK-25-B-4-A
LK-025-0007	Cranesnest Run south of Zackville	WVLK-25-B-8
LK-025-0008	Fulls Run at Peewee	WVLK-25-B-9
LK-025-0009	Enoch Fork at Peewee	WVLK-25-B-10
LK-025-0010	Smith Run west of Peewee	WVLK-25B-10-C
LK-025-0011	Big Laurel Run northwest of Two Run	WVLK-25-E
LK-025-0012	Little Laurel Run northwest of Two Run	WVLK-25-E.5

Table A3. Sampling Locations for Lit. Kanawha R Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
LK-025-0013	Roundbottom Run south of Two Run	WVLK-25-H
LK-025-0014	Lee Run at Lucille	WVLK-25-K
LK-025-0015	Stutler Creek south of Lucille	WVLK-25-N
LK-025-0016	Right Fork Reedy Creek in Reedy	WVLK-25-Q
LK-025-0017	Seamans Fork at Dukes	WVLK-25-Q-1
LK-025-0018	Middle Fork Reedy Creek at Reedy	WVLK-25-R-{0.0}
LK-025-0019	Middle Fork Reedy Creek at Peniel	WVLK-25-R-{6.4}
LK-025-0021	Left Fork Reedy Creek at Reedy	WVLK-25-S-{0.0}
LK-025-0022	Left Fork Reedy Creek at Billings	WVLK-25-S-{5.2}
LK-025-0023	Bear Run at Billings	WVLK-25-S-6
LK-025-0024	Tucker Run at Mount Olive	WVLK-25-S-11
LK-031-0001	Spring Creek at Sanoma	WVLK-31-{00.0}
LK-031-0002	Spring Creek south of Sanoma	WVLK-31-{07.0}
LK-031-0003	Spring Creek north of Spencer	WVLK-31-{20.0}
LK-031-0004	Bear Run southwest of Sanoma	WVLK-31-A
LK-031-0005	Horse Run south of Sanoma	WVLK-31-F
LK-031-0006	Beaverdam Run south of Sanoma	WVLK-31-H
LK-031-0007	Wagon Run north of Grace	WVLK-31-L
LK-031-0008	Toms Run at Millard	WVLK-31-N
LK-031-0009	Little Spring Creek at Millard	WVLK-31-O-{0.0}
LK-031-0010	Little Spring Creek southeast of Millard	WVLK-31-O-{0.4}
LK-031-0011	Little Spring Creek south of Triplett	WVLK-31-O-{4.8}
LK-031-0012	Left Fork Little Spring Creek southeast of Millard	WVLK-31-O-2
LK-031-0013	Right Fork Little Spring Creek south of Triplett	WVLK-31-O-6
LK-031-0014	Island Run north of Wellington	WVLK-31-R
LK-031-0015	Nancy Run at Nancy Run	WVLK-31-W
LK-031-0016	Tanner Run in Spencer	WVLK-31-X
LK-031-0017	Miletree Run at Spencer	WVLK-31-X-1
LK-031-0018	Scaffold Run west of Spencer	WVLK-31-X-2
LK-031-0019	Goff Run in Spencer	WVLK-31-Y
LK-031-0020	Laurel Run in Spencer	WVLK-31-Y-1
LK-031-0021	Left Fork Spring Creek at Spencer	WVLK-31-Z-{0.0}
LK-031-0022	Left Fork Spring Creek at Schilling	WVLK-31-Z-{2.8}
LK-031-0023	Charles Fork below Charles Fork Lake Impoundment WV	WVLK-31-Z-1-{0.0}
LK-031-0024	Charles Fork above Charles Fork Lake	WVLK-31-Z-1-{2.9}
LK-031-0025	Daniels Run southeast of Spencer	WVLK-31-Z-2
LK-031-0026	Vandale Fork at Schilling	WVLK-31-Z-3
LK-031-0027	Right Fork Spring Creek at Spencer	WVLK-31-AA-{0.0}
LK-031-0028	Right Fork Spring Creek north of Speed	WVLK-31-AA-{4.0}
LK-031-0029	Lick Fork south of Spencer	WVLK-31-AA-1
LK-031-0030	Lick Run southwest of Spencer	WVLK-31-AA-1-{2.6}
LK-031-0031	Missouri Fork north of Speed	WVLK-31-AA-3
LK-039-0001	Straight Creek north of Creston	WVLK-39-{0.2}
LK-040-0001	Leading Creek at Industry	WVLK-40
LK-040-0002	Straight Creek at Freed	WVLK-40-{5.6}
LK-040-0003	Bell Run northeast of Industry	WVLK-40-B
LK-040-0004	Fivemile Run west of Freed	WVLK-40-D
LK-040-0005	Threemile Run northeast of Industry	WVLK-40-E
LK-051-0001	Bee Creek south of Bells Ford	WVLK-51-{1.4}
LK-053-0001	Pine Creek west of Grantsville	WVLK-53
LK-056-0001	Philip Run at Grantsville	WVLK-56
LK-061-0001	Laurel Run north of Henrietta	WVLK-61
LK-061-0002	Laurel Creek south of White Pine	WVLK-61-{3.4}

Table A3. Sampling Locations for Lit. Kanawha R Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
LK-066-0001	Tanner Creek at Latonia	WVLK-66-{0.0}
LK-066-0002	Tanner Creek north of Tanner	WVLK-66-{7.0}
LK-066-0003	Jones Cabin Run north of Tanner	WVLK-66-E-4
LK-069-0001	Hardman Fork at Hardman	WVLK-69-A
LK-070-0001	Millseat Run west of Dekalb	WVLK-70
LK-070-0002	Un. Trib. Millseat Run west of Dekalb	WVLK-70-A
LK-072-0001	Cedar Creek east of Dekalb	WVLK-72-{0.0}
LK-072-0002	Cedar Creek at Cedar Creek State Park	WVLK-72-{10.8}
LK-072-0003	Cedar Creek southwest of Flower	WVLK-72-{19.8}
LK-072-0004	Kelley Run east of Cedar Creek State Park	WVLK-72-D-2
LK-072-0005	Lower Level Run at Cedarville	WVLK-72-I
LK-072-0006	Slabcamp Run northwest of Exchange	WVLK-72-R
LK-072-0007	Westfall Fork east of Exchange	WVLK-72-V
LK-074-0001	Sinking Creek at Kanawha Drive	WVLK-74
LK-074-0002	Upper Big Run north of Kanawha Drive	WVLK-74-B
LK-074-0003	Panther Run at Lucerne	WVLK-74-C
LK-075-0001	Leading Creek northeast of Revel	WVLK-75-{1.8}
LK-075-0002	Leading Creek at Alice	WVLK-75-{8.8}
LK-075-0003	Richbottom Run north of Revel	WVLK-75-C
LK-075-0004	Horn Creek north of Alice	WVLK-75-F-{2.4}
LK-075-0005	Crane Run north of Troy	WVLK-75-K-4-{0.8}
LK-075-0006	Rush Run north of Conings	WVLK-75-K-7
LK-075-0007	Fink Creek northwest of Linn	WVLK-75-N-{1.0]
LK-075-0008	Fink Creek north of Hurst	WVLK-75-N-{9.4}
LK-075-0009	Issacs Fork west of Churchville	WVLK-75-N-7
LK-075-0010	Crooked Run southwest of Alum Bridge	WVLK-75-P
LK-075-0011	Alum Fork at Alum Bridge	WVLK-75-Q
LK-075-0012	Sleeths Run southwest of Pickle Street	WVLK-75-O.5
LK-075-0013	Leading Creek north of Revel	WVLK-75-{0.9}
LK-078-0001	Nutter Run at Glenville	WVLK-78
LK-079-0001	Stewart Creek at Glenville	WVLK-79
LK-082-0001	Duck Creek southeast of Glenville	WVLK-82
LK-083-0001	Bear Run southeast of Glenville	WVLK-83
LK-085-0001	Lynch Run east of Truebada	WVLK-85
LK-086-0001	Sand Fork at Sand Fork	WVLK-86-{0.0}
LK-086-0002	Sand Fork east of Donlan	WVLK-86—{9.6}
LK-086-0003	Jakes Run northwest of Ellis	WVLK-86-C-3
LK-086-0004	Indian Fork southeast of Ellis	WVLK-86-E-{0.0}
LK-086-0005	Pine Run northwest of Aspinall	WVLK-86-E-2-{0.5}
LK-086-0006	Bens Run at Aspinall	WVLK-86-E-5
LK-086-0007	Sleepcamp Run northeast of Aspinall	WVLK-86-E-7
LK-086-0008	Goosepen Run east of Aspinall	WVLK-86-E-8
LK-086-0009	Cove Lick at Copley	WVLK-86-J-{0.0}
LK-086-0010	Laurel Run northeast of Copley	WVLK-86-J-3
LK-088-0001	Duskcamp Run west of Stouts Mills	WVLK-88
LK-094-0001	Oil Creek at Burnsville	WVLK-94
LK-094-0002	Oil Creek northeast of Burnsville	WVLK-94-{0.5}
LK-094-0003	Clover Fork at Orlando	WVLK-94-E
LK-094-0004	Three Lick Run north of Orlando	WVLK-94-F
LK-095-0001	Saltlick Creek at Burnsville	WVLK-95-{0.0}
LK-095-0002	Saltlick Creek in Burnsville	WVLK-95-{0.3}
LK-095-0003	Saltlick Creek at Rollyson	WVLK-95-{8.4}
LK-095-0004	Bragg Run southwest of Gem	WVLK-95-B-1

Table A3. Sampling Locations for Lit. Kanawha R Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
LK-095-0005	O'Brien Fork south of Rollyson	WVLK-95-G
LK-095-0006	Carpenter Fork east of Flatwoods	WVLK-95-L
LK-109-0001	Coplin Run north of Milroy	WVLK-109
LK-110-0001	Short Run north of Milroy	WVLK-110
LK-111-0001	Laurel Run east of Milroy	WVLK-111-{1.0}
LK-112-0001	Little Laurel Run northeast of Milroy	WVLK-112
LK-113-0001	Papaw Run southeast of Hettie	WVLK-113
LK-114-0001	Pretty Run southeast of Hettie	WVLK-114
LK-115-0001	Right Fork Little Kanawha River above Bois	WVLK-115
LK-115-0002	Right Fork Little Kanawha River southwest of Eden	WVLK-115-{9.2}
LK-115-0003	Jerry Run west of Cleveland	WVLK-115-D
LK-115-0004	Left Fork north of Eden	WVLK-115-H
LK-121-0001	Cherry Fork at Ingo	WVLK-121
LK-130.5-0001	Ellis Run at Holly Grove	WVLK-130.5
LK-131-0001	Getout Run east of Gaines	WVLK-121
LKH-000-003.4	Hughes River west of Freeport	WVLK-16-{0.0}
LKH-009-0021	Poverty Hollow northwest of Holbrook	WVLK-9-CC
LKS-000-003.0	Steer Creek east of Dodrill	WVLK-59-{3.0}
LKS-004-0001	Rush Run at Dodrill	WVLK-4
LKS-008-0001	Bear Fork south of Stumptown	WVLK-8
LKS-009-0002	Right Fork Steer Creek at Rosedale	WVLK-9-{13.4}
LKW-000-000.0	West Fork Little Kanawha at Creston	WVLK-33-{0.0}
LKW-000-022.0	West Fork northwest of Arnoldsburg	WVLK-33-{22.0}
LKW-000-025.6	West Fork Little Kanawha River at Arnoldsburg	WVLK-33-{25.6}
LKW-000-042.0	West Fork Little Kanawha River north of Stinson	WVLK-33-{42.0}
LKW-010-0001	Board Fork southwest of Cremo	WVLK-10-A
LKW-015-0001	Henry Fork at Rocksdale	WVLK-15-{0.0}
LKW-015-0002	Henry Fork north of Linden	WVLK-15-{14.4}
LKW-015-0003	Pup Run north of Tristan	WVLK-15-E
LKW-015-0004	Beech Fork northwest of Beech	WVLK-15-I
LKW-015-0005	Beech Fork southwest of Milo	WVLK-15-I-{8.0}
LKW-015-0008	Duck Run southeast of Linden	WVLK-15-N
LKW-015-0009	Wolf Run north of Tariff	WVLK-15-Q
LKW-017-0001	Jesse Run at Adam	WVLK-17
LKW-035-0001	Meadow Run west of Minnora	WVLK-35

Table A4. Sampling Locations for Lower New River Watershed 1995-2000

Station ID	Location	AN CODE
KN-000-001.1	New River east of Gauley Bridge	WVK-81-{1.1}
KN-000-004.6	New River north of Cotton Hill	WVK-81-{4.6}
KN-000-014.1	New River southeast of Fayette Station	WVK-81-{14.1}
KN-000-017.1	New River above Keeneys Creek	WVK-81-{17.1}
KN-000-021.5	New River south of Babcock State Park	WVK-81-{21.5}
KN-000-030.0	New River southeast of Claremont	WVK-814-{30.0}
KN-000-036.1	New River south of McKendree	WVK-81-{36.1}
KN-000-040.3	New River west of Prince	WVK-81-{40.3}
KN-000-057.3	New River at Sandstone Falls	WVK-81-57.3
KN-000-065.7	New River north of Brooklin	WVK-81-{65.7}
KN-005-0001	Laurel Creek north of Beckwith	WVKN-5
KN-005-0002	Laurel Creek north of Dempsey	WVKN-5-{4.8}
KN-005-0003	Coalmans Branch north of Dempsey	WVKN-5-C.5
KN-007-0001	Mill Creek at Hawk's Nest State Park	WVKN-7-{0.4}
KN-007-0002	Mill Creek at Ansted	WVKN-7-{1.0}
KN-007-0003	Mill Creek in Ansted	WVKN-7-{2.2}
KN-007-0004	Mill Creek northwest of Ames Heights	WVKN-7-{6.8}
KN-007-0005	Mill Creek southwest of Hico	WVKN-7-{13.0}
KN-007-0006	Un. Trib. Mill Creek in Ansted	WVKN-7-0.5A-{1.4}
KN-007-0007	Osborne Creek southwest of Hopewell	WVKN-7-B
KN-009-0001	Marr Branch north of Fayetteville	WVKN-9
KN-010-0001	Wolf Creek at South Fayette	WVKN-10-{0.0}
KN-010-0002	Wolf Creek north of Oak Hill	WVKN-10-{6.7}
KN-011-0001	Fern Creek at Canyon Rim Visitor Center	WVKN-11-{1.0}
KN-013-0001	Craig Branch northeast of Kaymoor No. 1	WVKN-13
KN-015-0001	Keeney Creek at Boone	WVKN-15-{1.4}
KN-017-0001	Mann's Creek in Babcock State Park	WVKN-17-{2.6}
KN-017-0002	Mann's Creek east of Ravenseye	WVKN-17-{7.8}
KN-017-0003	Glade Creek at Babcock State Park	WVKN-17-A-{1.5}
KN-017-0004	Glade Creek west of Pittman	WVKN-17-A-{4.4}
KN-017-0005	Glade Creek southeast of Pittman	WVKN-17-A-{8.0}
KN-017-0006	Un. Trib. Glade Creek at Babcock State Park	WVKN-17-A-0.5
KN-017-0007	Laurel Creek north of Pittman	WVKN-17-A-2
KN-017-0008	Floyd Creek south of Clifftop	WVKN-17-B
KN-018-0001	Ephraim Creek south of Babcock State Park	WVKN-18
KN-021-0001	Arbuckle Creek at Minden	WVKN-21
KN-022-0001	Dunloup Creek south of Thurmond	WVKN-22-{0.2}
KN-022-0002	Dunloup Creek at Harvey	WVKN-22-{4.9}
KN-022-0003	Dunloup Creek below Mount Hope	WVKN-22-{10.1}
KN-022-0004	Dunloup Creek above Mount Hope	WVKN-22-{12.5}
KN-022-0005	Dunloup Creek northeast of Bradley	WVKN-22-{13.6}
KN-022-0006	Meadow Fork southwest of Thurmond	WVKN-22-B
KN-022-0007	Hamilton Branch southeast of Harvey	WVKN-22-D-1-{0.8}
KN-022-0008	White Oak Branch at Glen Jean	WVKN-22-G-{0.2}
KN-022-0009	Sugar Creek at Mount Hope	WVKN-22-J
KN-022-0010	Mill Creek at Mount Hope	WVKN-22-K
KN-023-0001	Buffalo Creek north of Thayer	WVKN-23-{0.4}
KN-023-0002	Buffalo Creek northeast of Thayer	WVKN-23-{1.6}
KN-024-0001	Slater Creek at Thayer	WVKN-24
KN-025-0001	Dowdy Creek south of McKendree	WVKN-25
KN-026-0001	Piney Creek at McCreery	WVKN-26-{0.0}
KN-026-0002	Piney Creek east of Beckley	WVKN-26-{7.8}
KN-026-0003	Piney Creek north of Glen Morgan	WVKN-26-{11.6}

Table A4. Sampling Locations for Lower New R. Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
KN-026-0004	Piney Creek north of Cedar	WVKN-26-{18.6}
KN-026-0005	Piney Creek south of Fireco	WVKN26-{31.4}
KN-026-0006	Batoff Creek southwest of McCreery	WVKN-26-A
KN-026-0007	Fat Creek southwest of Wright	WVKN-26-B-{0.0}
KN-026-0008	Fat Creek south of Wright	WVKN-26-B-{0.8}
KN-026-0009	Stanaford Branch north of Stanaford	WVKN-26-C
KN-026-0010	Cranberry Creek at Beckley	WVKN-26-E
KN-026-0011	Little Whitestick Creek at Beckley	WVKN-26-E-1
KN-026-0012	Beaver Creek northwest of Beaver	WVKN-26-F
KN-026-0013	Little Beaver Creek at Beaver	WVKN-26-F-2-{0.0}
KN-026-0014	Little Beaver Creek at Little Beaver State Park	WVKN-26-F-2-{5.6}
KN-026-0015	Left Fork Beaver Creek west of Shady Springs	WVKN-26-F-6-{1.5}
KN-026-0016	Whitestick Creek at Raleigh	WVKN-26-G
KN-026-0017	Soak Creek east of Sophia	WVKN-26-K-{1.6}
KN-026-0018	Bowyer Creek at Whitby	WVKN-26-M
KN-026-0019	Laurel Creek at Jonben	WVKN-26-N
KN-027-0001	Laurel Creek at Quinnmont	WVKN-27-{0.0}
KN-027-0002	Laurel Creek at Laurel Creek	WVKN-27-{3.8}
KN-027-0003	Laurel Creek east of Kathryn	WVKN-27-{7.8}
KN-029-0001	Glade Creek east of Grandview	WVKN-29-{0.2}
KN-029-0002	Glade Creek northeast of Table Rock	WVKN-29-{3.4}
KN-029-0003	Glade Creek northeast of Glade Springs	WVKN-29-{8.4}
KN-029-0004	Glade Creek southeast of Whiteoak	WVKN-29-{14.6}
KN-029-0005	Glade Creek east of Cool Ridge	WVKN-29-{17.4}
KN-029-0006	Polls Branch east of Table Rock	WVKN-29-C-{0.1}
KN-029-0007	Kates Branch southeast of Table Rock	WVKN-29-D
KN-029-0008	Pinch Creek east of Crow	WVKN-29-E
KN-029-0009	Pinch Creek east of Little Beaver State Park	WVKN-29-E-{2.8}
KN-029-0010	Un. Trib. Glade Creek southeast of Ghent	WVKN-29-I.5-{2.2}
KN-032-0001	Meadow Creek at Meadow Creek	WVKN-32-{0.0}
KN-032-0002	Meadow Creek west of Claypool	WVKN-32-{3.6}
KN-032-0003	Lefthand Fork above Fayette-Summers Countyline	WVKN-32-A-{0.4}
KN-032-0004	Laurel Branch in Meadow Bridge	WVKN-32-D-{0.0}
KN-032-0005	Laurel Branch northeast of Meadow Bridge	WVKN-32-D-{1.4}
KN-032-0006	Claypool Branch at Claypool	WVKN-32-B-{0.8}
KN-034-0001	Farelys Creek north of Sandstone Falls State Park	WVKN-34-{0.1}
KN-035-0001	Lick Creek at Sandstone	WVKN-35-{0.3}
KN-035-0002	Lick Creek at Green Sulphur Springs	WVKN-35-{5.8}
KN-035-0003	Red Spring Branch southeast of Green Sulphur Springs	WVKN-35-D
KN-036-0001	Laurel Creek at Sandstone	WVKN-36
KN-037-0001	Fall Branch south of Sandstone Falls State Park	WVKN-37-{0.3}
KN-042-0001	Brooks Branch at Barksdale	WVKN-42
KN-044-0001	Madam Creek at Brooklin	WVKN-44-{0.0}
KN-044-0002	Madam Creek west of Brooklin	WVKN-44-{2.8}

Table A5. Sampling Locations for Monongahela River Watershed 1995-2000

Station ID	Location	AN CODE
M-000-095.4	Monongahela River above West Van Voorhis	WVM-000-{095.4}
M-000-097.9	Monongahela River north of Morgantown	WVM-000-{097.9}
M-000-102.1	Monongahela River above Morgantown Locks & Dam	WVM-000-10.2.1
M-000-104.0	Monongahela River below Uffington	WVM-000-104
M-000-107.2	Monongahela River below Hilderbrand Locks & Dam	WVM-000-107.2
M-000-108.1	Monongahela River at Hilderbrand Locks & Dam	WVM-000-108.1
M-000-109.9	Monongahela River below Little Falls	WVM-000-109.9
M-000-110.0	Monongahela River at Little Falls	WVM-000-110.0
M-000-113.5	Monongahela River above Flaggy Meadow	WVM-000-110.0
M-000-115.5	Monongahela River at Opekiska Locks & Dam	WVM-000-115.5
M-000-117.4	Monongahela River above Opekiska	WVM-000117.4
M-000-120.8	Monongahela River at Pricketts Fort State Park	WVM-000-120.8
M-000-123.7	Monongahela River above Rivesville	WVM-000-123.7
M-000-127.2	Monongahela River at Fairmont	WVM-000-127.2
M-002-0001	Camp Run at West Virginia-Pennsylvania Stateline.	WVM-2
M-019-0017	Prickett Creek near Winfield	WVM-19-{7.2}
M-020-0001	Parker Run east of Rivesville	WVM-20
M-021-0001	Pharaoh Run at Rivesville	WVM-20-{0.0}
M-021-0002	Pharaoh Run in Rivesville	WVM-21-{0.2}
M-022-0001	Paw Paw Creek at Rivesville	WVM-022-{0.1}
M-022-0002	Paw Paw Creek in Rivesville	WVM-22-{0.3}
M-022-0003	Paw Paw Creek south of Baxter	WVM-22-{1.7}
M-022-0004	Paw Paw Creek in Grant Town	WVM-22-{6.1}
M-022-0005	Little Paw Paw Creek at Baxter	WVM-22-A-{0.0}
M-022-0006	Little Paw Paw Creek at McCurdyville	WVM-22-A-{5.8}
M-022-0007	Arnett Run at Grant Town	WVM-22-A.5
M-022-0008	Tarney Run in Grant Town	WVM-22-A.7
M-022-0009	Robinson Run west of Grant Town	WVM-22-C
M-022-0010	Bennefield Prong in Fairview	WVM-22-H-{0.2}
M-022-0011	Sugar Run northwest of Fairview	WVM-22-K
M-023-0001	Buffalo Creek at Fairmont	WVM-023-{0.5}
M-023-0002	Buffalo Creek in Fairmont	WVM-23-{1.0}
M-023-0003	Buffalo Creek at Fairmont	WVM-23-{2.0}
M-023-0004	Buffalo Creek east of Rachel	WVM-23-{13.4}
M-023-0005	Buffalo Creek below Mannington	WVM-23-{16.4}
M-023-0006	Buffalo Creek in Mannington	WVM-23-{18.4}
M-002-0002	Un. Named Trib of Camp Run north Stewartstown	WVM-2-A
M-002.5-0001	Crooked Run northeast of Fort Martin	WVM-2.5
M-002.6-0001	Unnamed Tributary Monongahela River northeast of Hoard	WVM-2.6
M-002.7-0001	Laurel Run north of Baker Ridge	WVM-2.7
M-003-0001	West Run north of Star City	WVM-3-{1.2}
M-003-0002	West Run at Fieldcrest	WVM-2-{3.6}
M-004-0001	Robinson Run at Maidsville	WVM-3-{0.2}
M-004-0002	Crafts Run in Maidsville	WVM-4-A
M-004-0003	Un. Trib. Robinson Run northwest of Maidsville	WVM-4-B
M-005-0001	Courtney Run at Bertha Hill	WVM-5
M-006-0001	Scott Run below Osage	WVM-6
M-006-0002	Wades Run north of Pursglove	M-6-A-{0.2}
M-006-0003	Guston Run northwest of Pursglove	WVM-6-B-{0.8}
M-006.2-0001	Un. Trib. Monongahela River at Star City	M-6.2
M-007-0001	Dents Run at Granville	WVM-7
M-007-0002	Flaggy Meadow Run at Westover	WVM-7-A
M-007-0003	Un. Named Trib. Dents Run at Laurel Point	WVM-7-C

Table A5. Sampling Locations for Monongahela R. Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
M-007-0004	Un. Named Trib. Dents Run west of Laurel Point	WVM-7-G-{0.8}
M-008-0001	Deckers Creek in Morgantown	WVM-8-{0.2}
M-008-0002	Deckers Creek in Morgantown	WVM-8-{3.2}
M-008-0003	Deckers Creek below Richard	WVM-8-{4.7}
M-008-0004	Deckers Creek at Brookhaven	WVM-8-{5.2}
M-008-0005	Deckers Creek below Greer	WVM-8-{9.0}
M-008-0006	Deckers Creek above Greer	WVM-8-{10.6}
M-008-0007	Deckers Creek at Masontown	WVM-8-{13.4}
M-008-0008	Deckers Creek at Bretz	WVM-8-{16.4}
M-008-0009	Deckers Creek west of Monongalia-Preston County Line	WVM-8-{24.0}
M-008-0010	Hartman Run in Morgantown	WVM-8-0.5A
M-008-0011	Aaron Creek at Morgantown	WVM-8-A-{0.0}
M-008-0012	Aaron Creek south of Morgantown	WVM-8-A-{1.4}
M-008-0013	Deep Hollow west of Dellslow	WVM-8-A.7
M-008-0014	Tibbs Run east of Dellslow	WVM-8-B
M-008-0015	Tibbs Run below Tibbs Run Reservoir	WVM-8-B
M-008-0016	Glady Run at Masontown	WVM-8-D
M-008-0017	Slabcamp Run at Bretz	WVM-8-F
M-008-0018	Dillan Creek south of Bretz	WVM-8-G-{1.4}
M-008-0020	Dillan Creek south of Bretz	WVM-8-G
M-008-0021	Laurel Run east of Mount Vernon	WVM-8-H
M-008-0022	Kanes Creek at Reedsville	WVM-8-I
M-009-0001	Cobun Creek at Morgantown	WVM-9-{0.2}
M-009-0002	Cobun Creek south of Morgantown	WVM-9-{1.4}
M-009-0003	Cobun Creek north of Ringgold W.Va	WVM-9-{4.2}
M-009-0004	Cobun Creek north of Ridgedale	WVM-9-{6.4}
M-009-0005	Mountain Run northeast of Ringgold	WVM-9-A-{1.0}
M-009-0006	Mountain Run northeast of Ridgedale	WVM-9-{2.6}
M-010-0001	Booths Creek at Uffington	WVM-010-{0.1}
M-010-0002	Booths Creek north of Clinton Furnace	WVM-10-{5.6}
M-010-0003	Joliet Run south of Uffington	WVM-10-B-1
M-010-0004	Bloody Run south of Uffington	WVM-10-C
M-010-0005	Owl Creek north of Clinton Furnace	WVM-10-D-{0.0}
M-010-0006	Owl Creek northeast of Clinton Furnace	WVM-10-D-{0.6}
M-010-0007	Un. Named Trib. Owl Creek north of Clinton Furnace	WVM-10-D-1
M-010-0008	Mays Run north of Clinton Furnace	WVM-10-E
M-010-0009	Sec. Un. Named Trib. Booths Creek at Clinton Furnace	WVM-10-F
M-010-0010	3rd. Un. Trib. Booths Creek south of Clinton Furnace	WVM-10-I-{0.4}
M-011-0001	Brand Run south of Hilderbrand	WVM-11
M-012-0001	Toms Run at Little Falls	WVM-12
M-013-0001	Joes Run southwest of Little Falls	WVM-13
M-014-0001	Flaggy Meadow Run at Flaggy Meadow	WVM-14
M-015-0001	Birchfield Run at Lowsville	WVM-15
M-016-0001	Whiteday Creek south of Opekiska	WVM-16-{0.7}
M-016-0002	Whiteday Creek north of Smithtown	WVM-016-{2.6}
M-016-0003	Whiteday Creek southeast of Smithtown	WVM-16-{7.7}
M-016-0004	Unnamed Trib. Whiteday Creek south of Triune	WVM-16-C.5-{0.8}
M-016-0005	Laurel Run below Laurel Run Impoundment.	WVM-16-D-{0.9}
M-016-0006	2nd Unnamed Trib. Whiteday Creek southwest of Halleck	WVM-16-D.7-{0.0}
M-016-0007	Maple Run southwest of Halleck	WVM-16-E
M-016-0008	Maple Run south of Halleck	WVM-16-E-{1.6}
M-016-0009	Cherry Run at Taylor-Marion County Line.	M-16-F-{0.0}
M-017-0001	Indian Creek below Everettville	WVM-017-{0.1}

Table A5. Sampling Locations for Monongahela R. Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
M-017-0002	Indian Creek below Crown	WVM-17-{3.3}
M-017-0003	Indian Creek southeast of Hagans	WVM-17-{6.5}
M-017-0004	Indian Creek below Hagans	WVM-17-{6.9}
M-017-0005	Little Indian Creek north of Osgood	WVM-17-A
M-017-0006	Snider Run north of Osgood	WVM-17-A-1
M-017-0007	Un. Trib. Indian Creek north of Hagans	WVM-17-H-{0.1}
M-019-0001	Pricketts Creek above Pricketts Fort State Park	WVM-019-{001.0}
M-019-0002	Pricketts Creek above Meadowdale	WVM-019
M-019-0003	Pricketts Creek south of Winfield	WVM-019
M-019-0004	Pricketts Creek southeast of Winfield	WVM-019
M-019-0005	Pricketts Creek north of Valleys Fall State Park	WVM-019
M-019-0006	Unnamed Trib. Pricketts Creek at Meadowdale	WVM-019-AA
M-019-0007	Scratches Run at Meadowdale	WVM-019-A
M-019-0008	Reuben Run at Winfield	WVM-019-B
M-019-0009	Piney Run southeast of Winfield	WVM-019-C
M-019-0010	Otter Run southeast of Winfield	WVM-019-D
M-019-0011	Grassy Run southeast of Winfield	WVM-019-E
M-019-0012	Long Run southeast of Winfield	WVM-019-F
M-019-0013	Peter Johnson Run southeast of Winfield	WVM-019-G
M-019-0014	Mud Lick Run southeast of Winfield	WVM-09-H
M-019-0015	Dunham Run southeast of Winfield	WVM-019-I
M-019-0016	Prickett Creek southeast of Winfield	WVM-19-{6.2}
M-023-0007	Buffalo Creek west of Mannington	WVM-23-{20.6}
M-023-0008	Buffalo Creek southeast of Rymer	WVM-23-{27.0}
M-023-0009	Finchs Run north of Barrackville	WVM-23-B-{0.4}
M-023-0010	Dunkard Mill Run north of Katy	WVM-23-E-{0.8}
M-023-0011	Dunkard Mill Run southeast of Consol No. 9 Mine	WVM-23-E-{2.8}
M-023-0012	Un. Trib Buffalo Creek east of Farmington	WVM-23-E.5
M-023-0013	Little Laurel Run at Farmington	WVM-23-F
M-023-0014	Plum Run east of Rachel	WVM-23-I
M-023-0015	Un. Trib. Plum Run north of McCellan	WVM-23-I-3-{1.5}
M-023-0016	Mod Run at Rachel	WVM-23-K
M-023-0017	Flaggy Meadow Run in Mannington	WVM-23-N
M-023-0018	Fleming Run south of Mannington	WVM-23-N-1
M-023-0019	Pyles Fork in Mannington	WVM-23-O-{0.2}
M-023-0020	Pyles Fork north of Mannington	WVM-23-O-{2.6}
M-023-0021	Pyles Fork north of Glover Gap	WVM-23-O-{10.8}
M-023-0022	Dudley Fork northeast of Condit	WVM-23-O-3-B-{2.0}
M-023-0023	Dents Run at Mannington	WVM-23-P
M-023-0024	Whetstone Run west of Mannington	WVM-23-Q
M-023-0025	Joe’s Run at Deep Valley	WVM-23-R
M-023-0026	Owen Davy Fork west of Curtisville	WVM-23-W-{4.2}
M-023-0027	Barthlolmew Fork north of Logansport	WVM-23-X-{0.0}
M-023-0028	Barthlolomew Fork at Seven Pines	WVM-23-X-{3.2}
M-023.5-0001	Un. Trib. Monongahela River in Fairmont	WVM-23.5

Table A6. Sampling Locations for Big Sandy River Watershed 1995-2000

Station ID	Location	AN CODE
BS-000-002.6	Big Sandy River south of Kenova	WVBS-{2.6}
BS-000-026.6	Big Sandy River west of Fort Gay	WVBS-{26.6}
BS-001-0001	Miller Creek south of Kenova	WVBS-1
BS-002-0001	Dock Creek south of Neal	WVBS-2
BS-004-0001	Cedar Run north of Cryus	WVBS-4
BS-005-0001	Whites Creek at Cyrus	WVBS-5
BS-005-0002	Sours Run north of Centerville	WVBS-5-A
BS-005-0003	Hensley Branch north of Centerville	WVBS-5-A.3
BS-005-0004	Merrick Branch north of Centerville	WVBS-5-A.5
BS-005-0005	Rocklick Branch north of Centerville	WVBS-5-A.7
BS-005-0006	Balangee Branch north of Centerville	WVBS-5-A.9
BS-005-0007	Smith Branch southeast of Centerville	WVBS-5-B
BS-006-0001	Gragston Creek south of Cyrus	WVBS-6
BS-006-0002	Odell Fork east of Prichard	WVBS-6-A
BS-006-0003	Brush Fork east of Prichard	WVBS-6-B
BS-006-0004	Sulfur Fork east of Prichard	WVBS-6-C
BS-006-0005	Black Fork east of Prichard	WVBS-6-D
BS-006-0006	Birch Branch southeast of Prichard	WVBS-6-E
BS-007-0001	Elijah Creek at Prichard	WVBS-7
BS-007-0002	Davis Branch east of Prichard	WVBS-7-A
BS-007-0003	Gilkerson Branch east of Prichard	WVBS-7-B
BS-008-0001	Hurricane Creek east of Hubbardstown	WVBS-8
BS-008-0002	Hattons Branch east of Hubbardstown	WVBS-8-0.5A
BS-008-0003	Sugar Branch east of Hubbardstown	WVBS-8-0.7A
BS-008-0004	Queens Creek east of Hubbardstown	WVBS-8-A
BS-008-0005	Left Fork Hurricane Creek at Forks of Hurricane	WVBS-8-B
BS-008-0006	Long Branch south of Forks of Hurricane	WVBS-8-C
BS-008-0007	Wolfpen Branch south of Forks of Hurricane	WVBS-8-D
BS-008-0008	Dawson Branch west of Carrel	
BS-008-0009	Spruce Lick west of Carrel	WVBS-8-F
BS-008-0010	Artip Branch west of Carrel	WVBS-8-G
BS-009-0001	Little Hurricane Creek south of Hubbardstown	WVBS-9
BS-010-0001	Tabor Creek north of Brick Church	WVBS-10
BS-010-0002	Powder Mill Branch north of Brick Church	WVBS-10-0.5A
BS-010-0003	Wildcat Branch at Brick Church	WVBS-10-0.7A
BS-010-0004	Long Branch southeast of Brick Church	WVBS-10-A
BS-011-0001	Big Branch west of Brick Church	WVBS-11
BS-012-0001	Lycans Branch west of Brick Church	WVBS-12
BS-013-0001	Redhead Branch west of Brick Church	WVBS-13

Table A7. Sampling Locations for Upper New River Watershed 1995-2000

Station ID	Location	AN CODE
KN-000-001.1	New River east of Gauley Bridge, W.Va.	
KN-000-004.6	New River north of Cotton Hill, W.Va.	WVK-81-{4.6}
KN-000-014.1	New River southeast of Fayette Station, W.Va.	WVK-81-{14.1}
KN-000-017.1	New River above Keeneys Creek, W.Va.	WVK-81-{17.1}
KN-000-021.5	New River south of Babcock State Park, W.Va.	WVK-81-{21.5}
KN-000-030.0	New River southeast of Claremont, W.Va.	WVK-81-{30.0}
KN-000-036.1	New River south of McKendree, W.Va.	WVK-81-{36.1}
KN-000-040.3	New River west of Prince, W.Va.	WVK-81-{40.3}
KN-000-057.3	New River at Sandstone Falls, W.Va.	WVK-81-57.3
KN-000-065.7	New River north of Brooklin, W.Va.	WVK-81-{65.7}
KN-005-0001	Laurel Creek north of Beckwith, W.Va.	WVKN-5
KN-005-0002	Laurel Creek north of Dempsey, W.Va.	WVKN-5-{4.8}
KN-005-0003	Coalmans Branch north of Dempsey, W.Va.	WVKN-5-C.5
KN-007-0001	Mill Creek at Hawk's Nest State Park, W.Va.	WVKN-7-{0.4}
KN-007-0002	Mill Creek at Ansted, W.Va.	WVKN-7-{1.0}
KN-007-0003	Mill Creek in Ansted, W.Va.	WVKN-7-{2.2}
KN-007-0004	Mill Creek northwest of Ames Heights, W.Va.	WVKN-7-{6.8}
KN-007-0005	Mill Creek southwest of Hico, W.Va.	WVKN-7-{13.0}
KN-007-0006	Un. Trib. Mill Creek in Ansted, W.Va.	WVKN-7-0.5A-{1.4}
KN-007-0007	Osborne Creek southwest of Hopewell, W.Va.	WVKN-7-B
KN-009-0001	Marr Branch north of Fayetteville, W.Va.	WVKN-9
KN-010-0001	Wolf Creek at South Fayette, W.Va.	WVKN-10-{0.0}
KN-011-0001	Fern Creek at Canyon Rim Visitor Center, W.Va.	WVKN-11-{1.0}
KN-013-0001	Craig Branch northeast of Kaymoor No. 1, W.Va.	WVKN-13
KN-015-0001	Keeney Creek at Boone, W.Va.	WVKN-15-{1.4}
KN-017-0001	Mann's Creek in Babock State Park, W.Va.	WVKN-17-{2.6}
KN-010-0002	Wolf Creek north of Oak Hill, W.Va.	WVKN-10-{6.7}
KN-017-0002	Mann's Creek east of Ravenseye, W.Va.	WVKN-17-{7.8}
KN-017-0003	Glade Creek at Babcock State Park, W.Va.	WVKN-17-A-{1.5}
KN-017-0004	Glade Creek west of Pittman, W.Va.	WVKN-17-A-{4.4}
KN-017-0005	Glade Creek southeast of Pittman, W.Va.	WVKN-17-A-{8.0}
KN-017-0006	Un. Trib. Glade Creek at Babcock State Park, W.Va.	WVKN-17-A-0.5
KN-017-0007	Laurel Creek north of Pittman, W.Va.	WVKN-17-A-2
KN-017-0008	Floyd Creek south of Clifftop, W.Va.	WVKN-17-B
KN-018-0001	Ephraim Creek south of Babcock State Park, W.Va.	WVKN-18
KN-021-0001	Arbuckle Creek at Minden, W.Va.	WVKN-21
KN-022-0001	Dunloup Creek south of Thurmond, W.Va.	WVKN-22-{0.2}
KN-022-0002	Dunloup Creek at Harvey, W.Va.	WVKN-22-{4.9}
KN-022-0003	Dunloup Creek below Mount Hope, W.Va.	WVKN-22-{10.1}
KN-022-0004	Dunloup Creek above Mount Hope, W.Va.	WVKN-22-{12.5}
KN-022-0005	Dunloup Creek northeast of Bradley, W.Va.	WVKN-22-{13.6}
KN-022-0006	Meadow Fork southwest of Thurmond, W.Va.	WVKN-22-B
KN-022-0007	Hamilton Branch southeast of Harvey, W.Va.	WVKN-22-D-1-{0.8}
KN-022-0008	White Oak Branch at Glen Jean, W.Va.	WVKN-22-G-{0.2}
KN-022-0009	Sugar Creek at Mount Hope, W.Va.	WVKN-22-J
KN-022-0010	Mill Creek at Mount Hope, W.Va.	WVKN-22-K
KN-023-0001	Buffalo Creek north of Thayer, W.Va.	WVKN-23-{0.4}
KN-023-0002	Buffalo Creek northeast of Thayer, W.Va.	WVKN-23-{1.6}
KN-024-0001	Slater Creek at Thayer, W.Va.	WVKN-24
KN-025-0001	Dowdy Creek south of McKendree, W.Va.	WVKN-25
KN-026-0001	Piney Creek at McCreery, W.Va.	WVKN-26-{0.0}
KN-026-0002	Piney Creek east of Beckley, W.Va.	WVKN-26-{7.8}
KN-026-0003	Piney Creek north of Glen Morgan, W.Va.	WVKN-26-{11.6}

Table A7. Sampling Locations for Upper New River Watershed 1995-2000

Station ID	Location	AN CODE
KN-026-0004	Piney Creek north of Cedar, W.Va.	WVKN-26-{18.6}
KN-026-0005	Piney Creek south of Fireco, W.Va.	WVKN26-{31.4}
KN-026-0006	Batoff Creek southwest of McCreery, W.Va.	WVKN-26-A
KN-026-0007	Fat Creek southwest of Wright, W.Va.	WVKN-26-B-{0.0}
KN-026-0008	Fat Creek south of Wright, W.Va.	WVKN-26-B-{0.8}
KN-026-0009	Stanaford Branch north of Stanaford, W.Va.	WVKN-26-C
KN-026-0010	Cranberry Creek at Beckley, W.Va.	WVKN-26-E
KN-026-0011	Little Whitestick Creek at Beckley, W.Va.	WVKN-26-E-1
KN-026-0012	Beaver Creek northwest of Beaver, W.Va.	WVKN-26-F
KN-026-0013	Little Beaver Creek at Beaver, W.Va.	WVKN-26-F-2-{0.0}
KN-026-0014	Little Beaver Creek at Little Beaver State Park, W.Va.	WVKN-26-F-2-{5.6}
KN-026-0015	Left Fork Beaver Creek west of Shady Springs, W.Va.	KN-26-F-6-{1.5}
KN-026-0016	Whitestick Creek at Raleigh, W.Va.	WVKN-26-G
KN-026-0017	Soak Creek east of Sophia, W.Va.	WVKN-26-K-{1.6}
KN-026-0018	Bowyer Creek at Whitby, W.Va.	WVKN-26-M
KN-026-0019	Laurel Creek at Jonben, W.Va.	WVKN-26-N
KN-027-0001	Laurel Creek at Quinnmont, W.Va.	WVKN-27-{0.0}
KN-027-0002	Laurel Creek at Laurel Creek, W.Va.	WVKN-27-{3.8}
KN-027-0003	Laurel Creek east of Kathryn, W.Va.	WVKN-27-{7.8}
KN-029-0001	Glade Creek east of Grandview, W.Va.	WVKN-29-{0.2}
KN-029-0002	Glade Creek northeast of Table Rock, W.Va.	WVKN-29-{3.4}
KN-029-0003	Glade Creek northeast of Glade Springs, W.Va.	WVKN-29-{8.4}
KN-029-0004	Glade Creek southeast of Whiteoak, W.Va.	WVKN-29-{14.6}
KN-029-0005	Glade Creek east of Cool Ridge, W.Va.	WVKN-29-{17.4}
KN-029-0006	Polls Branch east of Table Rock, W.Va.	WVKN-29-C-{0.1}
KN-029-0007	Kates Branch southeast of Table Rock, W.Va.	WVKN-29-D
KN-029-0008	Pinch Creek east of Crow, W.Va.	WVKN-29-E
KN-029-0009	Pinch Creek east of Little Beaver State Park, W.Va.	WVKN-29-E-{2.8}
KN-029-0010	Un. Trib. Glade Creek southeast of Ghent, W.Va.	WVKN-29-I.5-{2.2}
KN-032-0001	Meadow Creek at Meadow Creek, W.Va.	WVKN-32-{0.0}
KN-032-0002	Meadow Creek west of Claypool, W.Va.	WVKN-32-{3.6}
KN-032-0003	Lefthand Fork above Fayette-Summers Countyline, W.Va.	WVKN-32-A-{0.4}
KN-032-0004	Laurel Branch in Meadow Bridge, W.Va.	WVKN-32-D-{0.0}
KN-032-0005	Laurel Branch northeast of Meadow Bridge, W.Va.	WVKN-32-D-{1.4}
KN-032-0006	Claypool Branch at Claypool, W.Va.	WVKN-32-B-{0.8}
KN-034-0001	Farelys Creek north of Sandstone Falls State Park, W.Va.	WVKN-34-{0.1}
KN-035-0001	Lick Creek at Sandstone, W.Va.	WVKN-35-{0.3}
KN-035-0002	Lick Creek at Green Sulphur Springs, W.Va.	WVKN-35-{5.8}
KN-035-0003	Red Spring Branch southeast of Green Sulphur Springs, WV	WVKN-35-D
KN-036-0001	Laurel Creek at Sandstone, W.Va.	WVKN-36
KN-037-0001	Fall Branch south of Sandstone Falls State Park, W.Va.	WVKN-37-{0.3}
KN-042-0001	Brooks Branch at Barksdale, W.Va.	WVKN-42
KN-044-0001	Madam Creek at Brooklin, W.Va.	WVKN-44-{0.0}
KN-044-0002	Madam Creek west of Brooklin, W.Va.	WVKN-44-{2.8}

Table A8. Sampling Locations for Cacapon River Watershed 1995-2000

Station ID	Location	AN CODE
P-019-0001	Little Cacapon River southwest of Cacapon	WVP-19-{5.7}
P-019-0002	Little Cacapon River southwest of Cacapon	WVP-19-{7.8}
P-019-0003	Little Cacapon River northeast of Higginsville	WVP-19-{13.0}
P-019-0004	Little Cacapon River southwest of Barnes Mills	WVP-19-{22.6}
PC-000-005.2	Cacapon River 3 mi. south of Great Cacapon	WVP-13-{5.2}
PC-000-005.5	Cacapon River 3.1 mi. south of Great Cacapon	WVP-13-{5.5}
PC-000-006.0	Cacapon River south of Great Cacapon	WVP-013
PC-000-009.3	Cacapon River 7 mi. south of Great Cacapon	WVP-13-{9.3}
PC-000-012.4	Cacapon River 8 mi. southwest of Great Cacapon	WVP-13-{12.4}
PC-000-024.1	Cacapon River south of Largent	WVP-13-{24.1}
PC-000-031.1	Cacapon River southwest of Largent	WVP-13-{31.1}
PC-000-037.0	Cacapon River northeast of Forks of Cacapon	WVP-13-{37.0}
PC-000-050.6	Cacapon River at Capon Bridge	WVP-13-{50.6}
PC-000-051.0	Cacapon River south of Capon Bridge	WVP-13-{51.0}
PC-000-077.0	Cacapon River west of Wardensville	WVP-13-{77.0}
PC-000-077.2	Cacapon River west of Wardensville	WVP-13-{77.2}
PC-000.9-0001	Connor Hollow north of Largent	WVPC-0.9A-{0.2}
PC-001-0001	Constant Run north of Largent	WVPC-1-{0.2}
PC-002-0001	Stony Creek at Largent	WVPC-2
PC-007-0001	North River at Forks of Cacapon	WVPC-7-{0.6}
PC-007-0002	North River northeast of North River Mills	WVPC-7-{8.6}
PC-007-0003	North River north of Northriver Mills	WVPC-7-{10.4}
PC-007-0004	North River southeast of Hoy	WVPC-7-{19.3}
PC-007-0005	North River at Hanging Rock	WVPC-7-{24.8}
PC-007-0006	North River southwest of Hanging Rock	WVPC-7-{28.2}
PC-007-0007	North River at Rio	WVPC-7-{39.8}
PC-007-0008	North River east of Rock Oak	WVPC-7-{43.4}
PC-007-0009	North River at Inkerman	WVPC-7-{46.6}
PC-007-0010	North River west of Inkerman	WVPC-7-{48.2}
PC-007-0011	Crooked Run west of Forks of Cacapon	WVPC-7-B
PC-007-0012	Hiett Run west of Cold Stream	WVPC-7-C-{4.0}
PC-007-0013	Un.Trib. Maple Run north of Slanesville	WVPC-7-D-5-{5.3}
PC-007-0014	Tear Coat Creek east of Pleasant Dale	WVPC-7-F-{0.2}
PC-007-0015	Tear Coat Creek southwest of Pleasant Dale	WVPC-7-F-{8.8}
PC-007-0016	Tear Coat Creek south of Augusta	WVPC-7-F-{11.0}
PC-007-0017	Tear Coat Creek south of Augusta	WVPC-7-F-{11.5}
PC-007-0018	Tear Coat Creek west of Short Mountain WMA	WVPC-7-F-{15.9}
PC-007-0019	Un.Trib. Bear Wallow Creek northwest of Pleasant Dale	WVPC-7-F-1-B-{1.6}
PC-007-0020	Sperry Run northeast of Arkansas	WVPC-7-K-{2.4}
PC-007-0021	Meadow Run west of Rio	WVPC-7-L-{0.1}
PC-007-0022	Skaggs Run at Inkerman	WVPC-7-P-{0.0]
PC-008-0001	Ivy Run east of Forks of Cacapon	WVPC-8-A-{0.6}
PC-010-0001	Edwards Run at Edwards Run WMA	WVPC-10-{1.4}
PC-011-0001	Dillons Run at Capon Bridge	WVPC-11
PC-015-0001	Loman Branch north of Yellow Spring	WVPC-15-{0.6}
PC-015-0002	Loman Branch south of Lehew	WVPC-15-{4.2}
PC-015-0003	Un.Trib. Loman Branch south of Lehew	WVPC-15-H-{0.1}
PC-016-0001	Capon Springs Run at Capon Lake	WVPC-16
PC-016-0002	Himmelwright Run east of Capon Springs	WVPC-16-B-{2.2}
PC-018-0001	Harness Run southeast of Intermont	WVPC-18-{0.9}
PC-020-0001	Moores Run north of Wardensville	WVPC-20-{4.2}
PC-021-0001	Slate Rock Run northeast of Wardensville	WVPC-21-{0.8}
PC-022-0001	Waites Run at Wardensville	WVPC-22-{1.0}
PC-023-0001	Trout Run at Wardensville	WVPC-23-{0.5}

Table A8. Sampling Locations for the Cacapon R. Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
PC-023-0002	Trout Run southwest of Wardensville	WVPC-23-{9.2}
PC-023-0003	Thorny Bottom Run southwest of Wardensville	WVPC-23-A
PC-024-0001	Lost River southwest of Wardensville	WVPC-23-{0.8}
PC-024-0002	Lost River northeast of McCauley	WVPC-23-{2.6}
PC-024-0003	Lost River northwest of McCauley	WVPC-24-{6.1}
PC-024-0004	Lost River southeast of Baker	WVPC-24-{9.2}
PC-024-0005	Lost River 0.8 mile north of Lost River	PC-24-{15.0}
PC-024-0006	Lost River north of Lost River	WVPC-24-{15.3}
PC-024-0007	Lost River north of Lost City	WVPC-24-{17.7}
PC-024-0008	Lost River at Lost City	WVPC-24-{18.4}
PC-024-0010	Brushy Hollow southeast of McCauley	WVPC-24-A
PC-024-0011	Longlick Run north of Needmore	WVPC-24-C.7-{0.8}
PC-024-0012	Kimsey Run northwest of Lost River	WVPC-24-E-{2.7}
PC-024-0013	Un.Trib. Kimsey Run northwest of Lost River	WVPC-24-E-0.2-{1.0}
PC-024-0014	Camp Branch northwest of Lost River	WVPC-24-E-1-{0.8}
PC-024-0015	Mill Gap Run east of Lost River	WVPC-24F-{0.8}
PC-024-0016	Lower Cove Run east of Lost City	WVPC-24-H-{3.9}
PC-024-0017	Howards Lick Run east of Lost River State Park	WVPC-24-J.8-{2.4}
PC-024-0018	Upper Cove Run at Mathias	WVPC-24-K-{0.0}
PC-024-0019	Upper Cove Run northwest of Basore	WVPC-24-K-{1.9}
PC-024-0020	Upper Cove Run south of Basore	WVPC-24-K-{3.8}
PC-024-0021	Upper Cove Run 3 miles south of Basore	WVPC-24-K-{5.2}
PC-024-0022	Cullers Run south of Mathias	WVPC-24-M-{0.2}
PC-024-0023	Wetzel Hollow southwest of Mathia	WVPC-24-M-1
PC-024-0024	Shipe Hollow southwest of Mathias	WVPC-24-M-2-{0.5}

Table A9. Sampling Locations for the Dunkard Creek Watershed 1995-2000

Station ID	Location	AN CODE
M-001-0001	Dunkard Creek east of Pentress	WVM-001
M-001-0002	Dunkard Creek south of W.Va.-Pa. Stateline	WVM-1-{0.2}
M-001-0003	Dunkard Creek above W.Va.-Pa. Stateline	WVM-1-{1.1}
M-001-0004	Dunkard Creek below Doll Run	WVM-1-{2.9}
M-001-0005	Dunkard Creek northeast of Worley	WVM-1-{4.1}
M-001-0006	Dunkard Creek at Worley	WVM-1-{6.7}
M-001-0007	Dunkard Creek at Prentress	WVM-1-{9.2}
M-001-0008	Dunkard Creek northwest of Pentress	WVM-1-{11.1}
M-001-0009	Dunkard Creek in Blacksville	WVM-1-{13.9}
M-001-0010	Dunkard Creek at Blacksville	WVM-01-{14.5}
M-001-0011	Dunkard Creek west of Macdale	WVM-1-{16.0}
M-001-0012	Dunkard Creek northeast of Wana	WVM-1-{18.1}
M-001-0013	Dolls Run north of Core	WVM-1-A-{1.2}
M-001-0014	Dolls Run south of Core	WVM-1-A-{3.5}
M-001-0015	Un.Trib. Pedlar Run southwest of Core	WVM-1-A-1-B-{0.6}
M-001-0016	Smoky Drain at Core	WVM-1-A-2
M-001-0017	Berry Hollow south of Core	WVM-1-A-3
M-001-0018	Ripleys Run south of W.Va.-Pa. Stateline	WVM-1-B
M-001-0019	Jakes Run northeast of Mooresville	WVM-1-B.1-{1.8}
M-001-0020	Jakes Run north of Jakes Run	WVM-1-B.1-{5.2}
M-001-0021	Jakes Run southwest of Jakes Run	WVM-1-B.1-{6.1}
M-001-0022	Un.Trib. Jakes Run southeast of Jakes Run	WVM-1-B.1-12-{1.2}
M-001-0023	Blacks Run northwest of Worley	WVM-1-B.3

Table A9. Sampling Locations for the Dunkard Ck Watershed 1995-2000 (cont.)

Station ID	Location	AN CODE
M-001-0024	Days Run southwest of Pentress	WVM-1-C-{0.6}
M-001-0025	Days Run northeast of Daybrook	WVM-1-C-{2.5}
M-001-0026	Days Run north of Daybrook	WVM-1-C-{2.8}
M-001-0027	Days Run below Daybrook	WVM-1-C-{4.0}
M-001-0028	Days Run at Daybrook	WVM-1-C-{5.3}
M-001-0029	Shriver Run northwest of Daybrook	WVM-1-C-3-{1.4}
M-001-0030	Building Run west of Daybrook	WVM-1-C-3-A
M-001-0031	Un. Trib. Days Run south of Daybrook	WVM-1-C-4-{0.6}
M-001-0032	Un.Trib. Days Run south of Daybrook	WVM-1-C-5-{0.7}
M-001-0033	Un.Trib. Days Run southwest of Daybrook	WVM-1-C-7-{0.9}
M-001-0034	Kings Run east of Blacksville	WVM-1-D
M-001-0035	Miracle Run at Macdale	WVM-1-E-{0.1}
M-001-0036	Miracle Run south of Bula	WVM-1-E-{2.4}
M-001-0037	Miracle Run north of Miracle Run	WVM-1-E-{3.4}
M-001-0038	Right Branch Miracle Run west of Bula	WVM-1-E-2-{1.2}
M-001-0039	Right Branch Miracle Run south of Kimberl	yWVM-1-E-2-{3.3}
M-001-0040	Right Branch Miracle Run south of Crossroads	WVM-1-E-2-{8.6}
M-001-0041	Honey Run southwest of Kimberly	WVM-1-E-2-A
M-001-0042	Building Run south of Miracle Run	WVM-1-E-5
M-001-0043	W.Va. Fk. Dunkard Creek northeast of Wana	WVM-1-F-{1.0}
M-001-0044	W.Va. Fk. Dunkard Creek at Wana	WVM-1-F-{3.0}
M-001-0045	W.Va. Fk. Dunkard Creek above Wana	WVM-1-F-{3.6}
M-001-0046	W.Va. Fk. Dunkard Creek southwest of Wana	WVM-1-F-{4.8}
M-001-0047	W.Va. Fk. Dunkard Creek at Wadestown	WVM-1-F-{6.9}
M-001-0048	South Fk. W.Va. Fk. Dunkard Ck south of Wadestown	WVM-1-F-7
M-001-0049	Wise Run north of Hunting Hills	WVM-1-F-3
M-001-0050	Range Run south of Wadestown	WVM-1-F-5
M-001-0051	Un.Trib. Range Run south of Wadestown	WVM-1-F-5-D-{0.7}
M-001-0052	Browns Run northwest of Wadestown	WVM-1-F-6-A-1-{0.5}
M-001-0053	Briar Run northwest of Wadestown	WVM-1-F-6-A-3
M-001-0054	Miller Run west of Wadestown	WVM-1-F-6-B
M-001-0055	Whisler Run west of Wadestown	WVM-1-F-6-D-{0.8}
M-001-0056	Middle Fk. Dunkard Creek southwest of Wadestown	WVM-1-F-7-A-{1.1}
M-001-0057	Brushy Fork west of Maple	M-1-H
M-001-0058	UNT Pa. Fork Dunkard Creek south of WV-PA Stateline	WVM-1-I-{0.5}
M-001-0059	Un. Trib. Pa. Fk. Dunkard Creek northeast of Saint Cloud	WVM-1-I-{0.7}

Table A10. Sampling Locations for the Lower Ohio River Watershed 1995-2000

Station ID	Location	AN CODE
O-003-0001	Fourpole Creek in Huntington	WVO-3
O-003-0002	Fourpole Creek in Huntington	WVO-3-{1.0}
O-003-0003	Fourpole Creek at Hal Greer Blvd, Huntington	WVO-3-{6.0}
O-005-0001	Threemile Creek east of Huntington	WVO-5
O-006-0001	Sevenmile Creek south of Cox Landing	WVO-6-{0.3
O-007-0001	Ninemile Creek north of Cox Landing	WVO-7-{1.6}
O-007-0002	Ninemile Creek southeast of Lesage	WVO-7-{3.2}
O-007-0003	Un.Trib. Ninemile Creek southeast of Lesage	WVO-7-A-{1.1}
O-009-0001	Guyan Creek east of Gwinn	WVO-9-{3.9}
O-009-0002	Guyan Creek southeast of Gwinn	WVO-9-{5.3}
O-009-0003	Guyan Creek south of Cabell-Mason Countyline	WVO-9-{6.7}
O-009-0004	Guyan Creek west of Upland	WVO-9-{12.5}
O-009-0005	Spurlock Creek at Gwinn	WVO-9-A-{1.5}

Table A10. Sampling Locations for the Lower Ohio R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
O-009-0006	Left Fork Spurlock Creek at Gwinn	WVO-9-A-2
O-009-0007	McCowan Branch at Mason-Cabell Countyline, W. Va.	WVO-9-B
O-009-0008	Byran Creek north of Swann	WVO-9-C-{1.6}
O-009-0009	Bryan Creek west of Dudley Gap	WVO-9-C-{4.5}
O-009-0010	Jenkins Branch north of Dudley Gap	WVO-9-D-1-{0.0}
O-009-0012	Bear Hollow Creek southwest of Mount Olive	WVO-9-F-{4.7}
O-010-0001	Eighteenmile Creek east of Ashton	WVO-10-{5.8}
O-010-0002	Eighteenmile Creek east of Ashton	WVO-10-{6.3}
O-010-0003	Eighteenmile Creek east of Putnam-Mason Countyline	WVO-10-{11.1}
O-010-0004	Eighteenmile Creek east of Putnam-Mason Countyline	WVO-10-{11.7}
O-010-0005	Mud Run east of Ashton	WVO-10-D-{0.0}
O-010-0006	Mud Run east of Ashton	WVO-10-D-{1.5}
O-010-0007	Road Fork west of Mason-Putnam Countyline	WVO-10-E-{0.3}
O-010-0008	White Pine Creek at Putnam-Mason Countyline	WVO-10-F
O-010-0009	Spring Branch at Putnam-Mason Countyline	WVO-F-1
O-011-0001	Sixteenmile Creek north of Ashton	WVO-11-{1.3}
O-011-0002	Sixteenmile Creek east of Mercer Bottom	WVO-11-{2.3}
O-011-0003	Sixteenmile Creek east of Apple Grove	WVO-11-{5.9}
O-011-0004	Sixteenmile Creek southwest of Cornstalk WMA	WVO-11-{7.7}
O-011-0005	Sixteenmile Creek west of Cornstalk WMA	WVO-11-{10.4}
O-011-0006	Sixteenmile Creek north of Cornstalk WMA	WVO-11-{13.2}
O-011-0007	Un.Trib. Sixteenmile Creek north of Mercers Bottom	WVO-11-.8A-{0.9}
O-011-0008	Stonecoal Run east of Mercers Bottom	WVO-11-A
O-011-0009	Millstone Branch east of Apple Grove	WVO-11-D
O-011-0010	Righthand Fork Sixteenmile Creek S of Cornstalk WMA	WVO-11-E-{1.2}
O-011-0011	Un.Trib. Righthand Fork at Cornstalk WMA	WVO-11-E-3-{0.6}
O-011-0012	Un.Trib. Righthand Fork south of Cornstalk WMA	WVO-11-E-4-{0.3}
O-011-0013	Potts Hollow at Cornstalk WMA	WVO-11-F-{1.8}
O-011-0014	Willow Branch near Cornstalk WMA	WVO-11-H
O-011-0015	Wolfpen Run at Cornstalk WMA	WVO-11-I
O-012-0001	Flatfoot Creek at Byrd Locks and Dam	WVO-12-{1.5}
O-012-0002	Flatfoot Creek east of Hogsett	WVO-12-{5.5}
O-012-0003	Un.Trib. Flatfoot Creek north of Apple Grove	WVO-12-B
O-013-0001	Crab Creek south of Gallipolis Ferry	WVO-13-{3.0}
O-013-0002	Crab Creek southeast of Gallipolis Ferry	WVO-13-{6.2}
O-013-0003	Mud Run at Ben Lomond	WVO-13-A
O-013-0004	Middle Fork southeast of Gallipolis Ferry	WVO-13-D
O-013-0005	Middle Fork of Crab Creek east of Gallipolis Ferry	WVO-13-D-{2.3}
O-013-0006	Un.Trib. Crab Creek northeast of Ben Lomond	WVO-13-E-{1.4}
O-015-0001	Threemile Creek southwest of Henderson	WVO-15
O-016-0001	Twomile Creek southwest of Henderson	WVO-16-{0.2}
O-019-0001	Willow Branch south of Henderson	WVO-19

Table A11. Sampling Locations for the Twelvepole Creek Watershed 1995-2000

Station ID	Location	AN CODE
O-002-0001	Twelvepole Creek south of Ceredo	WVO-002
O-002-0002	Twelvepole Creek southeast of Ceredo	WVO-2-{6.2}
O-002-0003	Twelvepole Creek northwest of Shoals	WVO-2-{9.6}
O-002-0004	Twelvepole Creek at Shoals	WVO-2-{13.9}
O-002-0005	Twelvepole Creek south of Dickson	WVO-2-{21.7}
O-002-0006	Twelvepole Creek north of Herbert	WVO-2-{23.3}
O-002-0007	Twelvepole Creek north of Wayne	WVO-2-{28.8}
O-002-0008	Twelvepole Creek in Wayne	WVO-2-{30.8}
O-002-0009	Twelvepole Creek in Wayne	WVO-2-{31.2}
O-002-0010	Twelvepole Creek south of Wayne	WVO-2-{32.0}
O-002-0011	Krout Creek in Huntington	WVO-2-.1A
O-002-0012	Un. Trib. Twelvepole Creek southeast of Ceredo	WVO-2-.8A
O-002-0013	Bobs Branch south of Huntington, W.Va	WVO-2-B-{1.0}
O-002-0014	Buffalo Creek west of Buffalo Creek	WVO-2-C
O-002-0015	Buffalo Creek south of Buffalo Creek	WVO-2-C-{4.5}
O-002-0016	Plymate Branch northwest of Shoals	WVO-2-E
O-002-0017	Newcomb Creek southwest of Shoals	WVO-2-F-{1.6}
O-002-0018	Camp Creek north of Lavalette	WVO-2-G
O-002-0019	Right Fork Camp Creek north of Lavalette	WVO-2-G-1
O-002-0020	Beech Fork east of Lavalette	WVO-2-H-{1.2}
O-002-0021	Beech Fork east of Lavalette	WVO-02-H-{1.6}
O-002-0022	Beech Fork southwest of Winslow	WVO-2-H-{13.0}
O-002-0023	Millers Fork at Crockett	WVO-2-H-2-{7.2}
O-002-0024	Stowers Branch at Beech Fork Lake WMA	WVO-2-H-2-A
O-002-0025	Rubens Branch in Beech Fork Lake WMA	WVO-2-H-3
O-002-0026	Price Creek in Beech Fork Lake WMA	WVO-2-H-4
O-002-0027	Long Branch in Beech Fork Lake State Park	WVO-2-H-7-{1.1}
O-002-0028	Camp Branch at Beech Fork Lake State Park	WVO-2-H-7-A
O-002-0029	Jim Branch in Beech Fork Lake State Park	WVO-2-H-9
O-002-0030	Grassy Lick at Winslow	WVO-2-H-10
O-002-0031	Bowen Creek southeast of Beech Fork Lake WMA	WVO-2-H-11-{1.5}
O-002-0032	Raccoon Creek at Cabell-Wayne Countyline	WVO-2-H-12
O-002-0033	Parker Branch south of Winslow	WVO-2-H-13
O-002-0034	Right Fork Beech Fork north of Gilkerson	WVO-2-H-19-{0.5}
O-002-0035	Wolfpen Branch north of Nestlow	WVO-2-H-19
O-002-0036	Lynn Creek southwest of Lavalette	WVO-2-I
O-002-0037	Lynn Creek southwest of Lavalette	WVO-2-I-{0.3}
O-002-0038	Shoal Branch north of Wayne	WVO-2-M
O-002-0039	Left Fork Wilson Creek northeast of Wayne	WVO-2-N-1
O-002-0040	Toms Creek at Wayne	WVO-2-O
O-002-0041	West Fork Twelvepole Creek south of Wayne	WVO-2-P-{0.7}
O-002-0042	West Fork Twelvepole Creek northwest of Genoa	WVO-2-9-{10.3}
O-002-0043	West Fork Twelvepole Creek north of Fleming	WVO-2-P-{14.0}
O-002-0044	West Fork Twelvepole Creek at Radnor	WVO-2-P-{16.1}
O-002-0045	West Fork Twelvepole Creek at Quaker	WVO-2-P-{19.7}
O-002-0046	West Fork Twelvepole Creek northeast of Cabwaylingo SP	WVO-2-P-{27.4}
O-002-0047	West Fork Twelvepole Creek in Cabwaylingo SP	WVO-2-P-{30.2}
O-002-0048	West Fork Twelvepole Creek northwest of Wilsondale	WVO-2-P-{33.1}
O-002-0049	West Fork Twelvepole Creek northwest of Lowney	WVO-2-P-{37.3}
O-002-0050	West Fork Twelvepole Creek southeast of Breeden	WVO-2-P-{40.9}
O-002-0051	Big Branch south of Wayne	WVO-2-P-1
O-002-0052	Patrick Creek southwest of Wayne	WVO-2-P-2-{0.3}
O-002-0053	Trace Fork at Echo	WVO-2-P-4
O-002-0054	Trace Fork west of Echo	

Table A11. Sampling Locations for the Twelvepole Ck W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
O-002-0055	Greenbrier Creek southwest of Echo	WVO-2-P-4-B
O-002-0056	Drift Branch east of Genoa	WVO-2-P-10-{1.2}
O-002-0057	Billy Branch northeast of Radnor	WVO-2-P-12-{1.5}
O-002-0058	Wells Branch at Missouri Branch	WVO-2-P-19
O-002-0059	Moses Fork west of Cabwaylingo State Park	WVO-2-P-21
O-002-0060	Right Fork Moses Fork west of Cabwaylingo State Park	WVO-2-P-21-C
O-002-0061	Arkansas Branch in Cabwaylingo State Park	WVO-2-P-23
O-002-0062	Wiley Branch in Cabwaylingo State Park	WVO-2-P-24
O-002-0063	Un.Trib. Millers Fork in Beech Fork Lake WMA	WVO-2-H-B.5
O-002-0064	Rubens Branch in Beech Fork Lake WMA	WVO-2-H-3
O-002-0065	Butler Branch in Beech Fork Lake State Park	WVO-2-H-8
O-002-0066	Sweetwater Branch in Cabwaylingo State Park	WVO-2-P-25
O-002-0067	Long Branch in Cabwaylingo State Park	WVO-2-P-26
O-002-0068	Spruce Fork in Cabwaylingo State Park	WVO-2-P-27
O-002-0069	Moses Fork east of Dingess	WVO-2-P-43-{1.3}
O-002-0070	East Fork Twelvepole Creek south of Elmwood	WVO-2-Q-{0.7}
O-002-0071	East Fork Twelvepole Creek east of Bethesda	WVO-2-Q-{4.4}
O-002-0072	East Fork Twelvepole Creek northwest of East Lynn	WVO-2-Q-{6.6}
O-002-0073	East Fk Twelvepole Ck east of Cabwaylingo State Forest	WVO-2-Q-{33.3}
O-002-0074	East Fk Twelvepole Ck east of Lincoln-Wayne Co line	WVO-2-Q-{37.7}
O-002-0075	East Fork Twelvepole Creek northwest of McCloud	WVO-2-Q-{42.0}
O-002-0076	East Fork Twelvepole Creek at McCloud	WVO-2-Q-{45.1}
O-002-0077	Twomile Creek southwest of Bethesda	WVO-2-Q-3
O-002-0078	Petercave Branch south of Armilda	WVO-2-Q-6
O-002-0079	Camp Creek at East Lynn	WVO-2-Q-8
O-002-0080	Left Fork Camp Creek east of East Lynn	WVO-2-Q-8-A
O-002-0081	Tiger Fork west of Girard	WVO-2-Q-8-A-1
O-002-0082	Right Fork Camp Creek east of East Lynn	WVO-2-Q-8-B
O-002-0083	Lynn Creek southwest of East Lynn	WVO-2-Q-9-{0.1}
O-002-0084	Laurel Creek south of East Lynn	WVO-2-Q-10
O-002-0085	Brush Creek in East Lynn Lake WMA	WVO-2-Q-11
O-002-0086	Lick Creek east of East Lynn Lake WMA	WVO-2-Q-12-{3.5}
O-002-0087	Rich Creek in East Lynn Lake WMA	WVO-2-Q-14-{2.6}
O-002-0088	Bluelick Branch in East Lynn Lake WMA	WVO-2-Q-16
O-002-0089	Cove Creek at East Lynn Lake WMA	WVO-2-Q-17-{1.9}
O-002-0090	Alum Fork in East Lynn Lake WMA	WVO-2-Q-17.8
O-002-0091	Kiah Creek in East Lynn Lake WMA	WVO-2-Q-18-{1.9}
O-002-0092	Little Laurel Creek in East Lynn Lake WMA	WVO-2-Q-18-A
O-002-0093	Parker Branch southeast of East Lynn Lake WMA	WVO-2-Q-18-D
O-002-0094	Rollem Fork northwest of Wayne-Lincoln Countyline	WVO-2-Q-18-E
O-002-0095	Copley Trace Branch southeast of Lincoln-Wayne Co line	WVO-2-Q-18-G
O-002-0096	Milam Creek west of East Lynn Lake WMA	WVO-2-Q-20-{0.1}
O-002-0097	Little Milam Creek southwest of East Lynn Lake WMA	WVO-2-Q-20-B
O-002-0098	Honeytrace Fork south of East Lynn Lake WMA	WVO-2-Q-20-C-{0.6}
O-002-0099	Maynard Branch south of East Lynn Lake WMA	WVO-2-Q-23
O-002-0100	Open Fork northwest of Wayne-Lincoln Countyline	WVO-2-Q-27
O-002-0101	Wiley Branch northwest of Wayne-Lincoln Countyline	WVO-2-Q-28
O-002-0102	Honey Branch southeast of Lincoln-Wayne Countyline	WVO-2-Q-29
O-002-0103	Right Fork Cub Branch at Mingo-Lincoln Countyline	WVO-2-Q-31-A

Table A12. Sampling Locations for the Upper Guyandotte W'shed 1995-2000

Station ID	Location	AN CODE
OG-135-0001	Allen Creek north of Wyco	WVOG-135
OG-131-0001	Barkers Creek at Tralee	WVOG-131
OG-131-0002	Barkers Creek northwest of Montecarlo	WVOG-131
OG-123-0004	Bearhole Fork at Pineville	WVOG-123-A
OG-124-0011	Beartown Fork southeast of Pineville	WVOG-124-N
OG-136-0001	Big Branch east of Iroquois	WVOG-136
OG-096-0001	Big Cub Creek in R.D. Bailey Lake WMA	WVOG-96
OG-123-0005	Bird Branch northeast of Pineville	WVOG-123-A-1
OG-127-0005	Black Fork in Twin Falls State Park	WVOG-127-E
OG-137-0002	Bluff Fork south of Madeline	WVOG-137-B
OG-102-0001	Brickle Branch in R.D. Bailey Lake WMA	WVOG-102
OG-110-0003	Brier Creek in Fanrock	WVOG-110-A
OG-089-0001	Browning Creek northwest of Gilbert	WVOG-89-B-1
OG-075-0002	Buffalo Creek at Lundale	WVOG-75-009.9
OG-075-0003	Buffalo Creek east of Saunders	WVOG-75-018.0
OG-075-0001	Buffalo Creek in Man	WVOG-75-002.0
OG-092-0005	Buffalo Creek south of Hanover	WVOG-92-000.0
OG-092-0006	Buffalo Creek south of Hanover	WVOG-92-001.8
OGC-016-0004	Cabin Branch in Jesse	WVOG-16-C
OG-127-0001	Cabin Creek east of New Richmond	WVOG-127
OG-071.5-0001	Camp Branch at Neibert	WVOG-71.5
OGC-016-0003	Chestnut Flats Branch southeast of Matheny	WVOG-16-B-1
OGC-000-013.9	Clear Fork in Oceana	WVOG-100-013.9
OGC-000-004.6	Clear Fork north of Clear Fork	WVOG-100-004.6
OGC-000-025.0	Clear Fork northeast of Crany	WVOG-100.025
OG-065-0004	Coal Branch west of Logan	WV0G-65-A
OG-065-0005	Copperas Mine Fork at Mt. Gay	WVOG-65-B
OG-065-0019	Cow Creek in Barnabus	WVOG-65-J
OGC-026-0001	Crane Fork in Crany	WVOGC-26
OG-065-0014	Curry Branch west of Holden	WVOG-65-B-5
OG-137-0001	Devils Fork at Amigo	WVOG-137
OG-065-0015	Dingess Fork west of Sulphur Springs	WVOG-65-B-8
OG-080-0001	Elk Creek at Wylo	WVOG-80
OG-096-0004	Elk Trace Branch in R.D. Bailey Lake WMA	WVOG-96-C
OG-065-0009	Ellis Branch at Hedgeview	WVOG-65-B-1-B
OG-139-0004	Farley Branch at Killarney	WVOG-139-C
OG-068-0001	Fort Branch at Fort Branch	WVOG-68-B
OGC-016-0009	Franks Fork in Glen Rogers	WVOGC-16-U
OG-068-0002	Georges Creek southeast of Hetzel	WVOG-68-H
OG-131-0005	Gooney Otter Fork northwest of Montecarlo	WVOG-131-F
OG-134-0007	Grave Fork at Hotchkiss	WVOG-134-G
OG-131-0003	Hickory Branch north of Alpoca	WVOG-131-B
OG-076-0003	Huff Creek at Combs Addition	WVOG-76-004.0
OG-076-0002	Huff Creek at Davin	WVOG-76-003.0
OG-076-0001	Huff Creek at Huff Junction	WVOG-76-000.0
OG-076-0006	Huff Creek east of Lacoma	WVOG-76-013.9
OG-076-0004	Huff Creek east of Wyoming-Logan Countyline	WVOG-76-009.0
OG-076-0007	Huff Creek northeast of Lacoma	WVOG-76-015.3
OG-076-0005	Huff Creek west of Cyclone	WVOG-76-012.1
OG-110-0001	Indian Creek east of Baileysville	WVOG-110-000.2
OG-110-0002	Indian Creek south of Wolf Pen	WVOG-110-009.6
OG-065-0001	Island Creek at Logan	WVOG-65-000.0
OG-065-0003	Island Creek in Omar	WVOG-65-009.6

Table A12. Sampling Locations for the U. Guyandotte Wshed 1995-2000 (cont.)		
Station ID	Location	AN CODE
OG-065-0002	Island Creek north of Monaville	WVOG-65-003.5
OG-131-0006	Jim's Branch at Herdon	WVOG-131-F-1
OG-128-0001	Joe Branch southwest of Joe Branch	WVOG-128
OG-092-0007	Kezee Fork south of Hanover	WVOG-92-K-1
OG-124-0009	Laurel Branch southeast of Pineville	WVOG-124-H
OGC-016-0002	Laurel Fork at Glen Fork	WVOGC-16
OGC-016-0001	Laurel Fork in Oceana	WVOGC-16
OG-135-0002	Left Fork Allen Creek north of Wyco	WVOG-135-A
OG-077-0004	Lefthand Fork Rockhouse Creek SW of Hensley Heights	WVOG-77-D
OG-108-0001	Little Cub Creek at Baileysville	WVOG-108
OG-092-0003	Little Cub Creek south of Justice	WVOG-92-B
OG-092-0001	Little Huff Creek east of Justice	WVOG-92
OG-092-0002	Little Huff Creek south of Hanover	WVOG-92
OG-124-0008	Little White Oak Creek southeast of Pineville	WVOG-124-E
OG-129-0001	Long Branch south of Joe Branch	WVOG-129
OG-097-0001	Long Branch in R.D. Bailey Lake WMA	WVOG-97
OG-065-0008	Lower Dempsey Branch at Lintz Addition	WVOG-65-B-1-A
OG-065-0020	Lower Dempsey Branch at Crystal Block	WVOG-65-L.5
OGC-012-0001	Lower Road Branch in Lilyhaven	WVOGC-12
OG-110-0005	Marsh Fork south of Fanrock	WVOG-110-A-2
OG-127-0004	Marsh Fork south of Saulsville	WVOG-127-D
OG-127-0003	Marsh Fork in Twin Falls State Park	WVOG-127-D
OG-134-0003	Marsh Fork at Maben	WVOG-134-C
OG-134-0004	Marsh Fork northwest of Maben	WVOG-134-C
OG-096-0006	McDonald Fork north of Coal Mountain	WVOG-96-H
OG-127-0002	Meadow Fork south of Twin Falls State Park	WVOG-127-B
OG-134-0005	Measle Fork north of Maben	WVOG-134-D
OG-131-0008	Middle Fork Barkers Creek north of Montecarlo	WVOG-131-G
OG-075-0007	Middle Fork Buffalo Creek at Saunders	WVOG-75-L
OGC-016-0006	Milam Branch at Milam	WVOGC-16-M
OG-131-0004	Mill Branch at Bud	WVOG-131-C
OG-065-0016	Mill Creek in Monaville	WVOG-65-C
OG-065-0006	Mud Fork west of Mt. Gay	WVOG-65-B-1
OG-092-0008	Mudlick Fork south of Hanover	WVOG-92-K-2
OG-138-0004	Mullens Branch at Stotesbury	WVOG-138-E
OG-092-0004	Muzzle Creek south of Hanover	WVOG-92-I
OG-131-0007	Noseman Branch at Herdon	WVOG-131-F-2
OG-134-0006	Old Slab Fork north of Maben	WVOG-134-E
OG-077-0002	Oldhouse Branch southwest of Hensley Heights	WVOG-77-A.5
OGC-016-0008	Otter Fork west of Glen Rogers	WVOGC-16-Q
OG-092-0010	Pad Fork east of Steeles	WVOG-92-Q
OG-076-0009	Paynter Branch at Campus	WVOG-76-M
OG-107-0001	Pigeon Creek in R.D. Bailey Lake WMA	WVOG-107
OG-073.5-0001	Pine Branch at Earling	WVOG-73.5
OG-124-0002	Pinnacle Creek southeast of Pineville	WVOG-124-003.7
OG-124-0003	Pinnacle Creek southeast of Pineville	WVOG-124-006.7
OG-124-0004	Pinnacle Creek	WVOG-124-008.3
OG-124-0005	Pinnacle Creek north of Wyoming-McDowell Co line	WVOG-124-020.6
OG-124-0001	Pinnacle Creek at Pineville	WVOG-124-000.7
OG-075-0005	Proctor Hollow in Amherstdale	WVOG-75-C.5
OG-099-0001	Reedy Branch in R.D. Bailey Lake WMA	WVOG-99
OG-075-0004	Right Fork Buffalo Creek east of Accoville	WVOG-75-A
OG-065-0017	Right Fork Pine Creek west of Omar	WVOG-65-H-1

Table A12. Sampling Locations for the U. Guyandotte Wshed 1995-2000 (cont.)

Station ID	Location	AN CODE
OG-078-0001	Right Fork Sandlick Creek southwest of Bruno	WVOG-78-A
OG-070-0001	Righthand Fork Rum Creek southeast of Hutchinson	WVOG-70-A
OG-092-0011	Righthand Fork of Pad Fork east of Steeles	WVOG-92-Q-1
OG-096-0003	Road Branch in R.D. Bailey Lake WMA	WVOG-96-B
OG-075-0006	Robinette Branch at Robinette	WVOG-75-D
OG-123-0002	Rockcastle Creek in Pineville	WVOG-123-002.6
OG-123-0003	Rockcastle Creek at Rock View	WVOG-123-004.0
OG-123-0001	Rockcastle Creek in Pineville	WVOG-123-000.5
OG-065-0011	Rockhouse Branch northwest of Shegon	WVOG-65-B-1-F
OG-077-0001	Rockhouse Creek at Hensley Heights	WVOG-77
OG-119-0001	Skin Fork north of Wyoming	WVOG-119
OG-134-0001	Slab Fork in Mullens	WVOG-134
OG-134-0002	Slab Fork west of Wyoming-Raleigh Countyline	WVOG-134
OG-124-0007	Smith Branch southeast of Pineville	WVOG-124-D
OG-082-0001	Spice Creek at Verner	WVOG-82
OG-124-0010	Spider Creek southeast of Pineville	WVOG-124-I
OG-088-0001	Stafford Branch at Gilbert	WVOG-88
OG-130-0001	Still Run east of Itmann	WVOG-130
OG-139-0001	Stonecoal Creek north of Amigo	WVOG-139-000.0
OG-139-0002	Stonecoal Creek west of Eastgulf	WVOG-139-003.1
OG-076-0010	Straight Fork northeast of Lacoma	WVOG-76-U
OG-096-0002	Sturgeon Branch in R.D. Bailey Lake WMA	WVOG-96-A
OG-125-0001	Sugar Run west of New Richmond	WVOG-125
OG-092-0009	Suke Creek south of Hanover	WVOG-92-M
OG-084-0001	Sylvia Branch west of Verner	WVOG-84
OG-096-0005	Toler Hollow in Coal Mountain	WVOG-96-F
OGC-016-0005	Tom Bailey Branch northeast of Glen Fork	WVOGC-16-J-1
OG-139-0003	Tommy Creek at Rhodell	WVOG-139-A
OGC-019-0001	Toney Fork at Toney Fork	WVOGC-19
OG-076-0008	Toney Fork northwest of Campus	WVOG-76-L
OG-105-0001	Trace Fork in R.D. Bailey Lake WMA	WVOG-105-A
OG-110-0004	Trace Fork south of Fanrock	WVOG-110-A-1
OG-065-0013	Trace Fork in Holden	WVOG-65-B-4
OGC-016-0007	Trough Fork southwest of Glen Rogers	WVOGC-16-P
OG-118-0001	Turkey Creek west of Pineville	WVOG-118
OG-065-0018	Twin Branch southwest of Omar	WVOG-65-H-2
OG-110-0007	Un.Trib. Indian Creek south of Woosley	WVOG-110-K.3
OG-065-0007	Un.Trib. Mud Fork west of Mt. Gay	WVOG-65-B-1-0.2A
OG-065-0010	Upper Dempsey Hollow at Shegon	WVOG-65-B-1-E
OG-065-0012	Whitman Creek at Walnut Hill	WVOG-65-B-2
OG-137-0003	Wiley Spring Branch south of Madeline	WVOG-137-C
OG-138-0003	Winding Gulf at Hotcoal	WVOG-138-009.8
OG-138-0001	Winding Gulf north of Amigo	WVOG-138-000.7
OG-138-0002	Winding Gulf north of Helen	WVOG-138-003.4
OG-110-0006	Wolfpen Branch at Wolf Pen	WVOG-110-G

Table A13. Sampling Locations for the Upper Ohio South Watershed 1995-2000

Station ID	Location	AN CODE
O-075-0001	Sims Run northeast of Kent	WVO-75-{0.4}
O-076-0001	Coon Run southeast of Franklin	WVO-76-{0.6}
O-077-0001	Fish Creek east of Graysville	WVO-77-{4.1}
O-077-0002	Fish Creek at Lynn Camp	WVO-77-{14.9}
O-077-0003	Fish Creek 1.2 miles northwest of Adaline	WVO-77-{21.3}
O-077-0004	Fish Creek 1 mile northwest of Adaline	WVO-77-{21.7}
O-077-0005	Fish Creek east of Adaline	WVO-77-{24.1}
O-077-0006	Conner Run east of Captina	WVO-77-A-{0.2}
O-077-0007	Conner Run northeast of Captina	WVO-77-A-{0.9}
O-077-0008	Long Run southeast of Woodlands	WVO-77-B-{4.3}
O-077-0009	Big Tribble Creek east of Graysville	WVO-77-D-{0.2}
O-077-0010	Whetstone Creek west of Meighen	WVO-77-E
O-077-0011	Sugar Run southwest of Meighen	WVO-77-E-0.5
O-077-0012	Rocky Fork south of Meighen	WVO-77-E-1
O-077-0013	Brushy Fork northeast of Peabody	WVO-77-E-2
O-077-0014	Middle Bowan Run east of Meighen	WVO-77-G
O-077-0015	Lynn Camp Run south of Lynn Camp	WVO-77-H-{0.2}
O-077-0016	Lynn Camp Run east of Saint Joseph	WVO-77-H-{4.0}
O-077-0017	Bark Camp Run east of Saint Joseph	WVO-77-H-0.8
O-077-0018	Blake Fork northeast of Newdale	WVO-77-H-1-{0.1}
O-077-0019	Upper Bowan Run northeast of Lynn Camp	WVO-77-I-{1.2}
O-077-0020	Valley Run west of Adaline	WVO-77-J
O-077-0021	Maggoty Run north of Adaline	WVO-77-K
O-077-0022	Big Run northwest of Kausooth	WVO-77-M
O-077-0023	Cedar Run north of Kausooth	WVO-77-N-{1.2}
O-077-0024	West Virginia Fork Fish Creek south of Kausooth	WVO-77-O-{0.1}
O-077-0025	West Virginia Fork Fish Creek northwest of Wade	WVO-77-O-{7.1}
O-077-0026	Amos Hollow northeast of Bannen	WVO-77-O-0.5
O-077-0027	Hickman Run northeast of Bannen	WVO-77-O-1
O-077-0028	Rocky Run northwest of Wade	WVO-77-O-2
O-077-0029	Carney Fork northwest of Endicott	WVO-77-O-2-A-{2.1}
O-077-0030	Miller Fork south of Endicott	WVO-77-2-C-{0.7}
O-077-0031	Knob Fork at Wade	WVO-77-O-3
O-077-0032	Bear Run northwest of Knob Fork	WVO-77-0-3-A
O-077-0033	Camp Run northwest of Knob Fork	WVO-77-O-3-B
O-077-0034	Sugar Run west of Littleton	WVO-77-O-5
O-077-0035	Cliff Run northwest of Littleton	WVO-77-O-6
O-077-0036	Long Drain south of Littleton	WVO-77-O-8-{0.9}
O-077-0037	Stottlemire Run southeast of Littleton ,W.Va.	WVO-77-O-8-A
O-077-0038	Shriver Run southwest of Hundred	WVO-77-O-8-A.8
O-077-0039	Roberts Run southwest of Hundred	WVO-77-O-8-C
O-077-0040	Moses Run north of Earnshaw	WVO-77-O-8-E
O-077-0041	Rockcamp Run at Hundred	WVO-77-O-10
O-077-0042	Cappo Run east of Hundred	WVO-77-O-11-A
O-077-0043	Rush Run south of Hundred	WVO-77-O-13
O-077-0044	Pennsylvania Fork Fish Creek south of Bellton	WVO-77-P-{5.4}
O-077-0045	Pennsylvania Fork Fish Creek northeast of Georgetown, WV	WVO-77-P-{9.1}
O-077-0046	Harts Run southwest of Woodruff	WVO-77-P-2-{0.6}
O-081-0001	Fish Run south of McKeefrey	WVO-81
O-083-0001	Grave Creek south of Moundsville	WVO-83-{2.5}
O-083-0002	Grave Creek northwest of Rosbys Rock	WVO-83-{5.3}
O-083-0003	Grave Creek at Rosbys Rock	WVO-83-{7.7}
O-083-0004	Grave Creek at Loudenville	WVO-83-{17.6}

Table A13. Sampling Locations for the U. Ohio South W"shed 1995-2000 (cont.)

Station ID	Location	AN CODE
O-083-0005	Grave Creek just above Loundeville	WVO-83-{17.7}
O-083-0006	Grave Creek east of Cameron	WVO-83-{21.1}
O-083-0007	Toms Run southeast of Moundsville	WVO-83-A-1
O-083-0008	Leach Run southeast of Moundsville	WVO-83-A-1-A
O-083-0009	Little Toms Run southeast of Moundsville	WVO-83-A-1.1
O-083-0010	Barletts Run southeast of Moundsville	WVO-83-A-1.3
O-083-0011	Wells Run southeast of Moundsville	WVO-83-A-1.5
O-083-0012	North Fk Middle Grave Ck southwest of Pleasant Valley	WVO-83-A-1.6-{2.2}
O-083-0013	Whitney Run at Knoxville	WVO-83-A-2
O-083-0014	Un.Trib Whitney Run north of Knoxville	WVO-83-A-2-{0.7}
O-083-0015	Lick Run northwest of Glen Easton	WVP-83-B.7
O-083-0016	French Run northwest of Glen Easton	WVO-83-B.8
O-083-0017	North Fork Grave Creek east of Clouston	WVO-83-E-{2.7}
O-083-0018	Burch Run west of Loudenville	WVO-83-C
O-084-0001	Molleys Hollow east of Glendale	WVO-84-A.8
O-085-0001	Jim Run south of McMechen	WVO-85-{0.5}
O-085-0002	Jim Run east of McMechen	WVO-82-{1.6}
O-086-0001	Boggs Run in Benwood	WVO-86
O-087-0001	Caldwell Run in Wheeling	WVO-87
O-088-0001	Wheeling Creek in Wheeling	WVO-88-{3.3}
O-088-0002	Wheeling Creek northwest of Burches WMA	WVO-8-{15.3}
O-088-0003	Wheeling Creek northeast of Burches WMA	WVO-88-{18.7}
O-088-0004	Wheeling Creek east of Viola	WVO-88-{24.7}
O-088-0005	Long Run in Wheeling	WVO-88-B
O-088-0006	Waddles Run in Wheeling	WVO-88-B-1
O-088-0007	Pogue Run in Wheeling	WVO-88-B-2
O-088-0008	Little Wheeling Creek in Wheeling	WVO-88-D-{0.8}
O-088-0009	Peters Run south of Eden	WVO-88-D-1-{0.9}
O-088-0010	Peters Run northeast of Eden	WVO-88-D-1-{3.2}
O-088-0011	Middle Wheeling Creek in Triadelphia	WVO-88-D-2-{1.4}
O-088-0012	Middle Wheeling Creek east of Triadelphia	WVO-88-D-2-{8.3}
O-088-0013	Tanyard Run at Twilight	WVO-88-D-2-0.5A
O-088-0014	Gillespie Run east of Twilight	WVO-88-D-2-A
O-088-0015	Laidley Run west of W.Va.-Pa. Stateline.	WVO-88-D-2-D-{1.5}
O-088-0016	Todd Run south of Bears Rock WMA	WVO-88-D-2-F-{0.0}
O-088-0017	Todd Run north of Bear Rocks WMA	WVO-88-D-2-F-{2.1}
O-088-0018	Point Run east of Roneys Point	WVO-88-D-5
O-088-0019	Roneys Point Run north of Roneys Point	WVO-88-D-6
O-088-0020	McGraw Run in Valley Grove	WVO-88-D-9-{0.5}
O-088-0021	Britt Run south of Wheeling	WVO-88-E.9-{0.0}
O-088-0022	Britt Run southeast of Wheeling	WVO-88-E.9-{1.4}
O-088-0023	Wherry Run west of Dallas	WVO-88-H-2
O-088-0024	Cricket Hollow north of Burches Run WMA	WVO-88-H.3
O-088-0025	Hollidays Hollow north of Burches Run WMA	WVO-88-H.5
O-088-0026	Burch Run at Burches Run WMA	WVO-88-I-{0.0}
O-088-0027	Burch Run south of Burches Run WMA	WVO-88-I-{0.7}
O-088-0028	Wolf Run in Wolf Run Lake southeast of Viola	WVO-88-M-{0.8}
O-088-0029	Wolf Run north of Wolf Run	WVO-88-M-{3.0}
O-088-0030	Williams Run south of Wolf Run	WVO-88-M-3
O-089-0001	Glenns Run in Wheeling	WVO-89
O-089-0002	Coreab Hollow in Wheeling	WVO-89-A
O-090-0001	Short Creek west of Wheeling-Ohio County Airport	WVO-89-{1.4}
O-090-0002	Short Creek south of Wheeling-Ohio County Airport	WVO-90-{4.1}
O-090-0003	Short Creek northeast of Clinton	WVO-90-{9.4}

Table A13. Sampling Locations for the U. Ohio South W"shed 1995-2000 (cont.)

Station ID	Location	AN CODE
O-090-0004	North Fork Short Creek south of Wheeling-Ohio County Airport	WVO-90-D
O-090-0005	Un.Trib. N Fk Short Ck south Wheeling-Ohio Airport	WVO-90-D-0.8
O-090-0006	Huff Run south of Wheeling-Ohio County Airport	WVO-90-D-1
O-091-0001	Harrison Run at Power	WVO-91
O-092-0001	Buffalo Creek at McKinleyville	WVO-92-{3.5}
O-092-0002	Buffalo Creek at Bethany	WVO-92-{13.4}
O-092-0003	Titt Run at McKinleyville	WVO-92-C
O-092-0004	Pierce Run southwest of Franklin	WVO-92-D-{3.1}
O-092-0005	Grogg Run northwest of Bethany	WVO-92-F
O-092-0006	Lazaer Run west of Bethany	WVO-92-I
O-092-0007	Castleman Run south of Bethany	WVO-92-L-{1.7}
O-092-0008	Castleman Run at Castleman Run WMA	WVO-92-L-{4.0}

Table A14. Sampling Locations for the West Fork River Watershed 1995-2000

Station ID	Location	AN CODE
MW-000-000.2	West Fork River at Fairmont	WVMW-000-000.2
MW-000-000.4	West Fork River at Fairmont	WVM-26-{0.4}
MW-000-012.1	West Fork River at Enterprise	WVM-026
MW-000-013.0	West Fork River south of Enterprise	WVM-26-{13.0}
MW-000-019.5	West Fork River at Gypsy	WVM-26-{19.5}
MW-000-022.6	West Fork River at Erie	WVM-26-{22.6}
MW-000-024.0	West Fork River south of Erie	WVM-26-{24.0}
MW-000-025.0	West Fork River at Hepzibah	WVM-26-{25.0}
MW-000-038.6	West Fork River south of Clarksburg	WVM-26-{38.6}
MW-000-046.5	West Fork River northeast of West Milford	WVM-26-{46.5}
MW-000-056.2	West Fork River south of Goodhope	WVM-26-{56.2}
MW-000-065.1	West Fork River at Jackson Mill Camp	WVM-26-{65.1}
MW-000-066.0	West Fork River south of Jackson Mill	WVM-26-{66.0}
MW-000-074.2	West Fork River below Stonewall Jackson Dam	WVM-26-{74.2}
MW-000-074.8	West Fork River in Stonewall Jackson Lake	WVM-26-{74.8}
MW-000-087.9	West Fork River in Stonewall Jackson Lake	WVM-26-{87.9
MW-000-097.3	West Fork River in Stonewall Jackson Lake	WVM-26-{97.3}
MW-001-0001	Mill Fall Run at Monongah	WVM-1-{0.4}
MW-002-0001	Booths Creek in Monongah	WVM-2-{0.2}
MW-002-0002	Booths Creek in Monongah	WVM-2-{0.8}
MW-002-0003	Un.Trib. Booths Creek in Monongah	WVM-2-.1A
MW-002-0004	Un.Trib. Booths Creek in Monongah	WVM-2-.5A
MW-002-0005	Un.Trib. Booths Creek at Eldora	WVMW-2-.6A
MW-002-0006	Un.Trib. Booths Creek north of Eldora	WVMW-2-.8A
MW-002-0007	Hog Lick Run at Eldora	WVM-2-A
MW-002-0008	Sopp Run in Eldora	WVMW-2-B
MW-002-0009	Sweep Run south of Eldora	WVM-2-C
MW-002-0010	Horners Run northwest of Boothsville	
MW-002-0011	Purdys Run northwest of Boothsville	WVMW-2-D-1
MW-002-0012	Un.Trib. Booths Creek north of Boothsville	WVMW-2-D.5
MW-002-0013	Corbin Branch at Santiago	
MW-002-0014	Hustead Run in Boothsville	WVMW-2-E.5
MW-003-0001	Coons Run at Highland	WVM-3
MW-003-0002	Un.Trib. Coons Run at Adamsville	
MW-004-0001	Helens Run at Worthington	WVMW-4-{0.2}
MW-004-0002	Helens Run north of Worthington	WVMW-4-{1.7}

Table A14. Sampling Locations for the West Fork R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
MW-004-0003	Helens Run south of Idamay	WVMW-4-{2.8}
MW-005-0001	Tevebaugh Creek west of Worthington	WVMW-5-{0.5}
MW-005-0002	Tevebaugh Creek southeast of Four States	WVMW-5-{2.1}
MW-006-0001	Camp Run southwest of Worthington	WVMW-6
MW-007-0001	Bingamon Creek north of Enterprise	WVMW-7-{0.0}
MW-007-0002	Bingamon Creek northwest of Enterprise	WVMW-7-{2.7}
MW-007-0003	Bingamon Creek east of Peora	WVMW-7-{6.2}
MW-007-0004	Bingamon Creek at Oakdale	WVMW-7-{11.6}
MW-007-0005	Bingamon Creek north of Oakdale	WVMW-7-{11.7}
MW-007-0006	Little Bingamon Creek southwest of Worthington	WVMW-7-A-{0.0}
MW-007-0007	Long Run northwest of Enterprise	WVMW-7-B
MW-007-0008	Elklick Run east of Pine Bluff	WVMW-7-C
MW-007-0009	Cunningham Run at Peora	WVMW-7-D
MW-007-0010	Coal Lick Run at Grangeville	WVMW-7-F-{0.0}
MW-007-0011	Coal Lick Run north of Joetown	WVMW-7-F-{2.0}
MW-007.1-0001	Un.Trib. West Fork River south of Hutchinson	WVMW-7.1
MW-008-0001	Laurel Run at Enterprise	WVMW-8
MW-008.5-0001	Un.Trib. West Fork River south of Enterprise	WVMW-8.5
MW-008.7-0001	Un.Trib. West Fork River north of Shinnston	WVMW-8.7
MW-009-0001	Mudlick Run at Shinnston	WVMW-9
MW-010-0001	Browns Run in Shinnston	WVMW-10
MW-011-0001	Shinns Run at Shinnston	WVMW-11-{0.2}
MW-011-0002	Shinns Run northwest of Saltwell	WVMW-11-{2.6}
MW-011-0003	Shinns Run northwest of Saltwell	WVMW-11-{3.0}
MW-011-0004	Shinns Run southeast of Saltwell	WVMW-11-{3.8}
MW-011-0005	Shinns Run west of McAlpin	WVMW-11-{5.5}
MW-011-0006	Shinns Run west of McAlpin, W.Va,	WVMW-11-{5.9}
MW-011-0007	Shinns Run west of McAlpin	WVMW-11-{6.07}
MW-011-0008	Shinns Run west of McAlpin	WVMW-11-{6.43}
MW-011-0009	Shinns Run west of McAlpin	WVMW-11-{6.3}
MW-011-0010	Shinns Run south of McAlpin	WVMW-11-{6.5}
MW-011-0012	4th Un.Trib. Shinns Run at Saltwell	WVMW-11-D
MW-011-0013	Un.Trib. Shinns Run southwest of Saltwell	WVMW-11-D.5
MW-011-0014	Nixon Run southwest of Saltwell	WVMW-11-E-{0.1}
MW-011-0003	Shinns Run northwest of Saltwell	WVMW-11-{3.0}
MW-011-0016	6th Un.Trib. Shinns Run west of McAlpin	WVMW-11-F
MW-011-0017	7th Un.Trib. Shinns Run southwest of McAlpin	WVMW-11-G-{0.3}
MW-012-0001	Robinson Run southwest of Shinnston	WVMW-12-{0.3}
MW-012-0002	Robinson Run west of Prospect Valley	WVMW-12-{2.6}
MW-012-0003	Piggots Run west of Shinnston	WVMW-12-A
MW-012-0004	Un.Trib. Robinson Run west of Prospect Valley	WVMW-12-B
MW-013-0001	Tenmile Creek at Lumberport	WVMW-13-{1.1}
MW-013-0002	Tenmile Creek northeast of Sardis	WVMW-13-{7.3}
MW-013-0003	Tenmile Creek west of Sardis	WVMW-13-{10.3}
MW-013-0004	Jack Run in Lumberport	WVMW-13-.5A
MW-013-0005	Jones Creek in Lumberport	WVMW-13-A-{0.1}
MW-013-0006	Jones Creek southeast of Jimtown	WVMW-13-A-{3.6}
MW-013-0007	Little Tenmile Creek west of Robey, W.va.	WVMW-13-B-{0.4}
MW-013-0008	Little Tenmile Creek at Wallace	WVMW-13-B-{9.6}
MW-013-0009	Peters Run east of Rosebud	WVMW-13-B-1
MW-013-0010	1st. Un.Trib. Little Tenmile Creek at Rosebud	WVMW-13-B-1.5
MW-013-0011	Bennett Run north of Dola	WVMW-13-B-2-{0.2}
MW-013-0012	Laurel Run northeast of Brown	WVMW-13-B-4

Table A14. Sampling Locations for the West Fork R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
MW-013-0013	Middle Run at Wallace	WVMW-13-B-7
MW-013-0014	Mudlick Run northwest of Wallace	WVMW-13-B-9
MW-013-0015	Isaacs Creek southwest of Robey	WVMW-13-C
MW-013-0016	Little Isaacs Creek west of Robey	WVMW-13-C-1
MW-013-0017	Gregory Run northeast of Sardis	WVMW-13-D
MW-013-0002	Tenmile Creek northeast of Sardis	WVMW-13-{7.3}
MW-013-0003	Tenmile Creek west of Sardis	WVMW-13-{10.3}
MW-013-0018	Katys Lick Run at Sardis	WVMW-13-E
MW-013-0019	Flag Run west of Sardis	WVMW-13-E.5
MW-013-0020	Un.Trib. Tenmile Creek west of Sardis	WVMW-13-E.7
MW-013-0021	Rockcamp Run southeast of Olive	WVMW-13-F-{0.1}
MW-013-0022	Rockcamp Run northwest of Olive	WVMW-13-F-{3.4}
MW-013-0023	Rockcamp Creek northwest of Olive	WVMW-13-F-{3.9}
MW-013-0024	Little Rockcamp Run at Olive	WVMW-13-F-1
MW-013-0025	Salem Fork north of Maken	WVMW-13-I-{0.0}
MW-013-0026	Salem Fork at Salem	WVMW-13-I-{5.9}
MW-013-0027	Cherry Camp Run east of Salem	WVMW-13-I-2
MW-013-0028	Dog Run at Salem	WVMW-13-I-2.5
MW-013-0029	Patterson Run at Salem	WVMW-13-I-3
MW-013-0030	Halls Run west of Wolf Summit	WVMW-13-J
MW-013-0031	Coburn Fork at Jarvisville	WVMW-13-N
MW-013-0032	Shaw Run west of Jarvisville	WVMW-13-N-1
MW-014.2-0001	Un.Trib. West Fork River south of Gypsy	WVMW-14.2
MW-015-0001	Simpson Creek at Spelter	WVMW-15-{0.4}
MW-015-0002	Simpson Creek at Clarksburg	WVMW-15-{6.6}
MW-015-0003	Simpson Creek in Bridgeport	WVMW-15-{8.7}
MW-015-0004	Simpson Creek at Rosemont	WVMW-15-{17.2}
MW-015-0005	Simpson Creek at Galloway	WVMW-15-{25.4}
MW-015-0006	1st. Un.Trib. Simpson Creek east of Meadowbrook	WVMW-15-.5A
MW-015-0007	Jack Run east of Meadowbrook	WVMW-15-A
MW-015-0008	Smith Run southeast of Meadowbrook	WVMW-15-B
MW-015-0009	2nd Un.Trib. Simpson Creek at Bridgeport	WVMW-15-B.5
MW-015-0010	Barnette Run at Bridgeport	WVMW-15-C
MW-015-0011	Davisson Run at Bridgeport	WVMW-15-D
MW-015-0012	Ann Run in Bridgeport	WVMW-15-E-{0.4}
MW-015-0013	Ann Run north of Bridgeport	WVMW-15-E-{3.2}
MW-015-0014	Peddler Run east of Bridgeport	WVMW-15-F
MW-015-0015	Beards Run east of Bridgeport	WVMW-15-G
MW-015-0016	Jerry Run west of Rosemont	WVMW-15-H
MW-015-0017	Berry Run in Flemington	WVMW-15-I
MW-015-0018	Right Fork Simpson Creek in Flemington	WVMW-15-J
MW-015-0019	3rd Un.Trib. Right Fk Simpson Ck at Flemington	WVMW-15-J-0.3
MW-015-0020	Buck Run east of Flemington	WVMW-15-J-1
MW-015-0021	Sand Lick Run at Simpson	WVMW-15-J-2-{0.1}
MW-015-0022	Sand Lick Run north of Wendel	WVMW-15-J-2-{2.8}
MW-015-0023	Gabe Run south of Simpson	WVMW-15-J-3
MW-015-0024	4th Un.Trib. Right Fk. Simpson Ck. S of Flemington	WVMW-15-J.5
MW-015-0025	Bartlett Run north of Galloway	WVMW-15-K
MW-015-0026	5th Un.Trib. Right Fk Simpson Ck at Galloway	WVMW-15-K.7
MW-015-0027	West Branch south of Galloway	WVMW-15-L
MW-015-0028	Un.Trib. West Br. below mine discharge south of Galloway	WVMW-15-L-0.5-{0.17}
MW-015-0030	Un.Trib. West Br. above mine discharge south of Galloway	WVMW-15-L-0.5-{0.18}
MW-015-0031	Stillhouse Run below mine discharge east of Brownton	WVMW-15-L-1-{0.19}
MW-015-0033	Stillhouse Run above mine discharge east of Brownton	WVMW-15-L-1-{0.20}

Table A14. Sampling Locations for the West Fork R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
MW-015-0034	Right Br. West Branch southwest of Brownton	WVMW-15-L-2
MW-015-0035	Camp Run southeast of Galloway	WVNW-15-M
MW-015-0036	6th Un.Trib. Simpson Ck southeast of Galloway	WVMW-15-N
MW-016-0001	Lambert Run west of Meadowbrook	WVMW-16-{0.0}
MW-016-0002	Lambert Run west of Hepzibah	WVMW-16-{2.9}
MW-017-0001	Jack Run north of Glen Falls	WVMW-17
MW-018-0001	Fall Run south of Glen Fall	WVMW-18
MW-019-0001	Crooked Run at Clarksburg	WVMW-19
MW-020-0001	Limestone Run in Clarksburg	WVMW-20
MW-020-0002	Stonecoal Run in Clarksburg	WVMW-20-A
MW-020-0003	Johnson Fork in Wilsonburg	WVMW-20-C
MW-020-0004	Phoenix Hollow west of Reynoldsville	
MW-021-0001	Elk Creek in Clarksburg	WVMW-21-{0.0}
MW-021-0002	Elk Creek at Stonewood	WVMW-21-{6.8}
MW-021-0003	Elk Creek at Craigmoor	WVMW-21-{12.8}
MW-021-0004	Elk Creek northwest of Romines Mill	WVMW-21-{14.0}
MW-021-0006	Murphy Run in Clarksburg	WVMW-21-A
MW-021-0007	Anmoore Run in Clarksburg	WVMW-21-B
MW-021-0008	Nutter Run south of Nutter Fort	WVMW-21-D
MW-021-0009	Turkey Run at Stonewood	WVMW-21-E
MW-021-0010	Hooppole Run southwest of Stonewood	WVMW-21-F
MW-021-0011	Brushy Fork southeast of Stonewood	WVMW-21-G-{0.6}
MW-021-0012	Brushy Fork west of Harrison-Barbour Countyline	WVMW-21-G-{5.9}
MW-021-0013	Brushy Fork southeast of Pepper	WVMW-21-G-{13.7}
MW-021-0014	Coplin Run west of Harrison-Barbour Countyline	WVMW-21-G-1
MW-021-0015	Glade Run west of Harrison-Barbour Countyline	WVMW-21-G-2
MW-021-0016	Stonecoal Run west of Harrison-Barbour Countyline	WVMW-21-G-3
MW-021-0017	Gnatty Creek southeast of Romines Mill	WVMW-21-M-{3.9}
MW-021-0018	Gnatty Creek west of Harrison-Barbour Countyline.	WVMW-21-M-{5.8}
MW-021-0019	Rooting Creek south of Romines Mill	WVMW-21-M-1-{0.1}
MW-021-0020	Right Branch Gnatty Creek southeast of Peeltree	WVMW-21-M-5
MW-021-0021	Charity Fork south of Upshur-Barbour Countyline	WVMW-21-M-5-A
MW-021-0022	Stouts Run southeast of Craigmoor	WVMW-21-N
MW-021-0023	Birds Run west of Harrison-Barbour Countyline	WVMW-21-O
MW-021-0024	Arnold Run west of Overfield	WVMW-21-P
MW-021-0025	Isaacs Run east of Overfield	WVMW-21-Q
MW-021-0026	Stewart Run east of Overfield	WVMW-21-S-{0.2}
MW-021-0027	Stewart Run southwest of Nero	
MW-021-0028	Un.Trib. Elk Creek southeast of Elk City	WVMW-21-T.7
MW-022-0001	Davisson Run in Clarksburg	
MW-022-0002	Washburn Camp Run west of Clarksburg	
MW-022.8-0001	Un.Trib. West Fork River south of Clarksburg	
MW-023-0001	Browns Creek south of Clarksburg	
MW-023-0002	Browns Creek south of Mount Clare	
MW-024-0001	Coburns Creek north of West Milford	
MW-025-0001	Sycamore Creek north of West Milford	
MW-026-0001	Lost Creek south of West Milford	
MW-026-0002	Lost Creek southeast of Lost Creek	
MW-026-0003	Second Un.Trib. Lost Creek southeast of West Milford	
MW-026-0004	Bonds Run at Lost Creek	
MW-027-0001	Buffalo Creek at West Milford	
MW-027-0002	Buffalo Creek west of West Milford	
MW-028-0001	Duck Creek at Watters Smith Memorial State Park	

Table A13. Sampling Locations for the West Fork R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
MW-029-0001	Isaacs Creek south of Goodhope	
MW-029-0002	Isaacs Creek west of Tichenal	
MW-030-0001	Two Lick Creek southwest of Goodhope	
MW-031-0001	Hackers Creek south of Goodhope	
MW-031-0002	Hackers Creek at Jane Lew	
MW-031-0003	Hackers Creek at Berlin	
MW-031-0004	Hackers Creek east of Aberdeen	
MW-031-0005	Hackers Creek east of Ruraldale	
MW-031-0006	West Run at Jane Lew	
MW-031-0007	Jesse Run east of Jane Lew	
MW-032-0001	Kincheloe Creek at Harrison-Lewis Countyline	
MW-032-0002	Kincheloe Creek west of Kincheloe	
MW-032-0003	Hollick Run northwest of Lightburn, W.Va	
MW-032-0004	Browns Run at Harrison-Lewis Countyline	
MW-032-0005	Right Fork Kincheloe Creek in Kincheloe	
MW-032-0006	Hog Camp Run south of Lewis-Harrison Countyline	
MW-034-0001	McCann Run north of Jackson Mill	
MW-036-0001	Freemans Creek south of Jackson Mill	
MW-036-0002	Geelick Run at Butchersville	
MW-036-0003	Mare Run west of Jackson Mill	
MW-036-0004	Right Fork Freeman Creek north of Freemansburg	
MW-036-0005	Left Fork Freeman Creek north of Freemansburg	
MW-037-0001	Maxwell Run north of Weston	
MW-038-0001	Stonecoal Creek at Weston	
MW-038-0002	Stonecoal Creek east of Horner	
MW-038-0003	Grass Run northwest of Gaston	
MW-038-0004	Right Fork Stonecoal Creek below Stonecoal Lake Dam	
MW-038-0005	Right Fork Stonecoal Creek southwest of Atlas	
MW-038-0006	Pringle Fork at Stonecoal Lake WMA	
MW-038-0007	Pringle Run south of Stonecoal Lake WMA	
MW-038-0008	Brushlick Run at Stonecoal Lake WMA	
MW-039-0001	Polk Creek in Weston	
MW-039-0002	Polk Creek east of Camden	
MW-039-0003	Dry Fork west of Pricetown	
MW-041-0001	Murphy Creek at Homewood	
MW-041-0002	Murphy Creek west of Weston	
MW-041-0003	Murphy Creek east of Lake Riley	
MW-042-0001	Middle Run at Homewood	
MW-043-0001	Rush Run at Ben Dale	
MW-031-0006	West Run at Jane Lew	
MW-031-0007	Jesse Run east of Jane Lew	
MW-044-0001	Stone Lick east of Ben Dale	
MW-045-0001	Washburn Run in Stonewall Jackson Lake State Park	
MW-046-0001	Skin Creek in Stonewall Jackson Lake State Park	
MW-046-0002	Skin Creek in Stonewall Jackson Lake State Park	
MW-046-0003	Skin Creek southeast of Vandalia	
MW-046-0004	Skin Creek southeast of Vandalia	
MW-046-0005	Little Skin Creek in Stonewall Jackson Lake State Park	
MW-046-0006	Little Skin Creek in Stonewall Jackson Lake State Park	
MW-046-0007	Straight Fork in Stonewall Jackson Lake State Park	
MW-046-0008	Ranges Run in Stonewall Jackson Lake State Park	
MW-046-0009	Hughes Fork at Vandalia	
MW-046-0010	Hughes Fork northeast of Vandalia	

Table A13. Sampling Locations for the West Fork R. W'shed 1995-2000 (cont.)

Station ID	Location	AN CODE
MW-049-0001	Canoe Run in Stonewall Jackson Lake State Park	
MW-050-0001	Sand Fork in Stonewall Jackson Lake State Park	
MW-050-0002	Sand Fork east of Stonewall Jackson Lake State Park	
MW-050-0003	Fitz Run at Stonewall Jackson Lake State Park	
MW-050-0004	Ward Run in Stonewall Jackson Lake State Park	
MW-055-0001	Right Fork West Fork River south of Walkersville	

Appendix B. 2002 303(d) list of impaired streams from watersheds assessed in this report

For Internet users:
Appendix B can be found on the Watershed Branch's web page.